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INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

FISCAL YEAR 1998 ANNUAL PERFORMANCE REPORT

Distribution is limited to U.S. Government Agencies only for protection of privileged information. Other requests for the documents must be referred to:

Commander
Twin Cities Army Ammunition Plant
4700 Highway 10, Suite A
Arden Hills, Minnesota
55112-3928

Prepared for:

Commander
Twin Cities Army Ammunition Plant
4700 Highway 10, Suite A
ATTN: SIOTC-EV
Arden Hills, Minnesota 55112-3928

JULY 1999
FINAL REPORT

Minnesota Pollution Control Agency

July 6, 1999

Mr. Martin McCleery
Remedial Project Manager
Twin Cities Army Ammunition Plant
4700 Highway 10, Suite A
Arden Hills, Minnesota 55112-3928

Mr. Dave Gosen
Alliant Techsystems
600 2nd Street Northeast
Hopkins, Minnesota 55343

RE: Consistency Test for the Fiscal Year 1998 Annual Performance Report for the Twin Cities Army Ammunition Plant - Prepared by Wenck Associates, Inc., February 1999

Dear Mr. McCleery and Mr. Gosen:

The staff at the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (U.S. EPA) have reviewed the above-referenced document (report). MPCA staff provided comments to the report on March 31, 1999, and U.S. EPA provided comments to the report on April 7, 1999. Army's responses to comments were dated April 13, 1999 and were discussed in a comment resolution meeting on May 4, 1999. Red-Lined revisions to the report dated June 1, 1999, and was submitted by Wenck Associates, Inc., accurately reflect the discussion among MPCA, U.S. EPA, Army and Alliant Techsystems, which took place at the comment resolution meeting.

You are hereby advised that, with the incorporation of the red-lined pages into the final report, in accordance with Chapter XIV of the Federal Facility Agreement, the Fiscal Year 1998 Annual Performance Report for the Twin Cities Army Ammunition Plant passes the Consistency Test.

If there are questions or you require additional information, please contact Dagmar Romano at (651) 296-7776, or Tom Barounis at (312) 353-5577.

Sincerely,

Dagmar Romano
Project Manager
Site Remediation Section
Metro District

for Tom Barounis
Project Manager
U.S. Environmental Protection Agency

DR/TB:csa

INSTALLATION RESTORATION PROGRAM
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JULY 1999
FINAL REPORT

U.S. ARMY CORPS OF ENGINEERS
WENCK ASSOCIATES, INC.

ALLIANT TECHSYSTEMS, INC.
CONESTOGA-ROVERS & ASSOCIATES, LTD.

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APPENDICES

List of Acronyms

Alliant	-	Alliant Techsystems, Inc.
Army	-	U.S. Army
CRA	-	Conestoga-Rovers and Associates, Inc.
EE/CA	-	Engineering Evaluation/Cost Analysis
FFA	-	Federal Facilities Agreement
FY	-	Fiscal Year
GAC	-	Granular Activated Carbon
gpm	-	Gallons per Minute
IRA	-	Interim Remedial Action
MCES	-	Metropolitan Council Environmental Services
MCLs	-	Maximum Contaminant Levels
MCLGs	-	Maximum Contaminant Level Goals
MDH	-	Minnesota Department of Health
MPCA	-	Minnesota Pollution Control Agency
NBM	-	New Brighton Municipal
NPL	-	National Priorities List
O&M	-	Operation and Maintenance
OU	-	Operable Unit
PCBs	-	Polychlorinated Biphenyls
PGAC	-	Permanent Granular Activated Carbon
PGRS	-	Plume Groundwater Recovery System
PLC	-	Programmable Logic Controller
PM	-	Preventative Maintenance
POTW	-	Publicly-Owned Treatment Works
ROD	-	Record of Decision
SDWA	-	Safe Drinking Water Act

List of Acronyms (Cont.)

SVE	-	Soil Vapor Extraction
TCAAP	-	Twin Cities Army Ammunition Plant
TGRS	-	TCAAP Groundwater Recovery System
TSCA	-	Toxic Substances Control Act
µg/l	-	Micrograms per liter
USAEC	-	U.S. Army Environmental Center
USEPA	-	U.S. Environmental Protection Agency
VOCs	-	Volatile Organic Compounds
Wenck	-	Wenck Associates, Inc.

SECTION 1

1.0 Executive Summary

This Fiscal Year 1998 (FY 1998) Annual Performance Report:

- Summarizes the status of remedy implementation; and
- Addresses how the remedies are performing,

for each of the three operable units related to the Twin Cities Army Ammunition Plant (TCAAP). Fiscal Year 1998 is defined as the period from October 1, 1997, through September 30, 1998.

Records of Decision (RODs) have been signed for each of the three operable units (OUs):

- OU1 ROD signed September 1993
- OU2 ROD signed December 1997
- OU3 ROD signed September 1992

The RODs present the major components of the final remedies for the media of concern. This report looks at each of the major components and addresses:

1. *Are the remedies being implemented? (Compliance check with the RODs)*
2. *Are the remedies doing what they are suppose to?*

Table 1-1, at the end of this section, summarizes the status of remedial actions at the end of FY 1998. Following are highlights of the accomplishments for each operable unit.

Operable Unit 1 (OU1): Deep Groundwater

OU1 consists of the "north" plume of VOC groundwater contamination off the TCAAP installation. The final remedy for OU1 consists of pumping three municipal wells (New Brighton municipal wells NBM #4, #14, and #15) and treating the extracted groundwater through the Permanent Granular Activated Carbon (PGAC) system. Treated water is piped to the New Brighton water supply system for distribution as potable water. Other remedy components include providing alternate water supply and/or well abandonment to affected private wells, and drilling advisories for new well construction. Highlights for FY 1998:

- Three private water supply wells were abandoned and one well owner was provided a hookup to municipal water supply,
- NBM #15 was put into service in March 1998,
- The wells that were pumped and the pumping rates were highly variable and not in strict accordance with the designed program,
- Contouring of measured water levels indicates the system provided containment of the North Plume,
- The PGAC treated 1,018,730,000 gallons of water and removed 1,407 pounds of VOCs during FY 1998,
- The effluent of the PGAC was in compliance with the applicable Safe Drinking Water Act criteria,
- The treated groundwater was beneficially used in the New Brighton municipal water supply system,
- Eight new monitoring wells were installed in the vicinity of the extraction system,
- The extent and magnitude of contamination in the North Plume did not change significantly; however, at most wells, the concentrations decreased.

Operable Unit 2 (OU2)

OU2 is defined as the TCAAP property, including the groundwater beneath it. The OU2 ROD, which was signed in December 1997, documents the final remedies.

Highlights for activities within OU2 during FY 1998 are:

- Shallow Soil Sites
  - Soil remediation commenced at Site A, with 10,760 tons of soil excavated, treated, and transported off-site for disposal. Completion is expected in 1999.
  - Approval was received for the installation of an SVE system to remediate VOC-contaminated soils at Site A. Implementation is scheduled for 1999.
  - A phytoremediation demonstration project was implemented at Sites C and 129-3.
  - Work plans to address all of the shallow soil sites identified in the OU2 ROD were approved.
- Deep Soil Sites
  - The shallow SVE systems continued to operate at both Sites D and G. During FY 1998, the systems removed 570 pounds and 62 pounds of VOCs, respectively. From start of operation in 1986 through September 1998, the systems have removed totals of 116,199 pounds and 104,418 pounds, respectively.
  - The systems were shut off in late FY 1998 to allow testing at individual vents to determine if optimization of system operation was feasible. Testing was performed in early FY 1999.
  - A pilot study was performed at Site D to evaluate the effectiveness of deeper SVE vents. A report is in progress.

- Site A Shallow Groundwater
  - The eight-well extraction system, which has been operating since May 1994, continued to provide containment and mass removal.
  - The system pumped at an average rate of 29.5 gallons per minute during FY 1998 versus the design rate to achieve containment of 25 gallons per minute.
  - During FY 1998, the system removed nearly 6 pounds of VOCs, with a cumulative mass removal of 26 pounds since May 1994.
  - The extracted water was discharged to the sanitary sewer system in compliance with all discharge criteria.
  - Remediation of source area soils commenced in FY 1998 and will resume in 1999 as stated under the "Shallow Soil Sites."
  - Overall, the extraction system has reduced contaminant concentrations in groundwater. Two primary areas remaining to be remediated are: in the vicinity of extraction well 01U353 for cis-1,2-dichloroethene, and in the vicinity of monitoring well 01U108 for tetrachloroethene and trichloroethene.
- Site I Shallow Groundwater
  - Sampling at Site I indicated no significant changes in VOC concentrations in Unit 1 monitoring wells in FY 1998. Three of the seven wells scheduled for sampling were dry.
- Site K Shallow Groundwater
  - At Site K, the groundwater extraction trench and treatment system continued to operate as designed. The system captured and treated 3,942,920 gallons of water and maintained a continuous zone of capture downgradient of Building 103. A total of 10.2 pounds of VOCs were removed in FY 1998.
  - The extracted water was discharged to Rice Creek in compliance with all discharge criteria.

- Deep Groundwater
  - The TGRS operated in accordance with the 1998 ROD.
  - The TGRS continued to create a continuous zone of capture along the southwest TCAAP boundary that extends beyond the 5 μg/l trichloroethene contour.
  - In FY 1998, the TGRS extracted and treated 1,220,604,000 gallons of water. The mass of VOCs removed was 6,132 pounds. The total VOC mass removed by the TGRS through FY 1998 is 167,289 pounds.
  - Beginning in November 1997, wells B12 and SC4 were shut down due to reductions in the plume size, as per agreements with the MPCA and USEPA.

Operable Unit 3 (OU3): Deep Groundwater

- The PGRS continued to operate as designed.
- The PGRS is containing the leading edge of the South Plume.
- In FY 1998, a total of 477,768,000 gallons of water were treated by the PGRS, removing 5.1 pounds of VOCs.
- PGRS effluent VOC concentrations met or were below all applicable drinking water criteria in FY 1998.
- The treated groundwater was beneficially used in the New Brighton municipal water supply system.

Tables

Table 1-1

Status of Remedial Actions: FY 1998
Twin Cities Army Ammunition Plant

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose to?	Comments
Operable Unit 1: Deep Groundwater			
#1: Alternate Water Supply/Well Abandonment	Yes	Yes	--
#2: Drilling Advisories	Yes	Yes	Component completed
#3: Groundwater Containment	Yes	Yes	--
#4: Removal of VOCs by GAC (Discharge Quality)	Yes	Yes	--
#5: Discharge of Treated Water	Yes	Yes	--
#6: Groundwater Monitoring	Yes	Yes	--
Overall Remedy	Yes	Yes	--
Operable Unit 2: Shallow Soil Sites			
#1-7: Soil Remediation	Yes	Partially	Site A and Site C
#8: Groundwater Monitoring	No	No	Starts after #1-7 are completed
#9: Characterization of Dumps	Yes	Partially	Work Plans were approved

Table 1-1 (continued)

Status of Remedial Actions: FY 1998
Twin Cities Army Ammunition Plant

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose to?	Comments
Operable Unit 2: Deep Soil Sites			
#1: Groundwater Monitoring	Yes	Yes	--
#2: Restrict Site Access	Yes	Yes	--
#3: SVE Systems	Yes	Partially	Deep SVE pilot study completed
#4: Enhancements to SVE Systems	Yes	No	Optimization testing completed, no changes yet
#5: Maintain Existing Site Caps	Yes	Yes	--
#6: Maintain Surface Drainage Controls	Yes	Yes	--
#7: Characterize Shallow Soils and Dump	Yes	Partially	Work Plan approved to characterize "tar-like" substances at Site G
Overall Remedy	Yes	Yes	

Table 1-1 (continued)

Status of Remedial Actions: FY 1998
Twin Cities Army Ammunition Plant

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose to?	Comments
Operable Unit 2: Site A Shallow Groundwater			
#1: Groundwater Monitoring	Yes	Yes	
#2: Groundwater Containment/Mass Removal	Yes	Yes	
#3: Drilling Advisory/Alternate Water Supply/Well Abandonment	Yes	Yes	
#4: Discharge of Extracted Water	Yes	Yes	
#5: Source Characterization/Remediation	Yes	Yes	
Overall Remedy	Yes	Yes	
Operable Unit 2: Site I Shallow Groundwater			
#1: Groundwater Monitoring	Partially	Partially	OU2 ROD predesign work is in progress
#2: Groundwater Extraction	No	No	See above
#3: POTW Discharge	No	No	See above
#4: Additional Investigation	No	No	See above
Overall Remedy	No	No	See above

Table 1-1 (continued)

Status of Remedial Actions: FY 1998
Twin Cities Army Ammunition Plant

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose to?	Comments
Operable Unit 2: Site K Shallow Groundwater			
#1: Groundwater Monitoring	Yes	Yes	
#2: Sentinel Wells	No	No	OU2 ROD predesign work plan in progress
#3: Hydraulic Containment	Yes	Yes	
#4: Groundwater Treatment	Yes	Yes	
#5: Treated Water Discharge	Yes	Yes	
#6: Discharge Monitoring	Yes	Yes	
#7: Additional Investigation	No	No	OU2 ROD predesign work plan in progress
Overall Remedy	Yes	Yes	

Table 1-1 (continued)

Status of Remedial Actions: FY 1998
Twin Cities Army Ammunition Plant

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose to?	Comments
Operable Unit 2: Deep Groundwater			
#1: Hydraulic Containment and Contaminant Mass Removal	Yes	Yes	The work plan for optimizing the TGRS was approved in FY 1998
#2: Groundwater Treatment	Yes	Yes	
#3: Treated Water Discharge	Yes	Yes	
#4: Institutional Controls	Yes	Yes	
#5: Review of New Technologies	Yes	Yes	USEPA/MPCA Natural Attenuation Study
#6: Groundwater Monitoring	Yes	Yes	
Overall Remedy	Yes	Yes	
Operable Unit 3: Deep Groundwater			
#1: Groundwater Extraction	Yes	Yes	
#2: Groundwater Treatment	Yes	Yes	
#3: Use of Water for Municipal Supply	Yes	Yes	
#4: Groundwater Monitoring	Yes	Yes	
Overall Remedy	Yes	Yes	

SECTION 2

2.0 Introduction

2.1 PURPOSE

This Fiscal Year 1998 Annual Performance Report is intended to:

- Summarize the status of remedy implementation; and
- Address how the remedies are doing,

for remedial actions in conjunction with the Twin Cities Army Ammunition Plant (TCAAP), and its role in the New Brighton/ Arden Hills Superfund site. Fiscal Year 1998 (FY 1998) extended from October 1, 1997, through September 30, 1998.

For purposes of remediation, the areas contaminated by activities at TCAAP have been divided into three areas designated "Operable Units." Operable Unit 1 (OU1) encompasses the deep groundwater "North Plume" of off-TCAAP contaminated groundwater. Operable Unit 2 (OU2) includes all soil and groundwater contamination on TCAAP. OU2 also includes the shallow Site A plume which extends off the north end of TCAAP in the Unit 1 aquifer. Operable Unit 3 (OU3) consists of the deep groundwater "South Plume" of off-TCAAP contaminated groundwater.

The report addresses remedial actions for the following media as prescribed in the Record of Decision (ROD) for each Operable Unit:

- Operable Unit 1
  - Deep Groundwater

- Operable Unit 2
  - Shallow Soil Sites
  - Deep Soil Sites
  - Site A Shallow Groundwater
  - Site I Shallow Groundwater
  - Site K Shallow Groundwater
  - Deep Groundwater

- Operable Unit 3
  - Deep Groundwater

Monitoring activities and submittal of this report are in fulfillment of the Federal Facilities Agreement (FFA) signed August 12, 1987, between the United States Army (Army), United States Environmental Protection Agency (USEPA), and Minnesota Pollution Control Agency (MPCA). Minor modifications to the FFA were agreed to by these parties on:

- October 12, 1990
- February 12, 1992
- March 3, 1992
- November 23, 1993
- January 5, 1998

The requirements have been fulfilled for FFA Attachment 2 (Interim Remedial Actions), Attachment 3 (Remedial Investigation), and Attachment 4 (Feasibility Study). Activities are now geared towards fulfilling the requirements of FFA Attachment 5 (Remedial Design and Remedial Action).

Assessment of performance is really answering two questions:

1. *Are all of the remedies being implemented? (Compliance check with the RODs)*
2. *Are the remedies doing what they are supposed to?*

To address these two questions, this report is broken into the three Operable Units. Using each ROD, the report is broken down one more level to the major components of the selected remedy for each of the media described previously.

A key aspect of this report was the development of performance standards for each of the major remedy components. The performance standards are the "what they are supposed to" part of the question, "Are the remedies doing what they are supposed to?" The performance standards are the yardstick against which performance is measured, and are used to determine when a remedy component has been successfully implemented and/or completed.

For some of the remedy components, the performance standards are clearly defined in the RODs (e.g., soil or groundwater cleanup levels). For other remedy components (e.g., alternate water supply) the performance standards are less clear in the RODs, but may have been agreed to through Work Plans or design documents.

With the performance standards identified, this report then addresses the two questions described above, often through a series of sub-questions. The questions are written in the text in an attempt to make the report focused, streamlined, and user friendly. To the extent possible, answers are in the form of pictures (figures, graphs, etc.) versus words.

In addition to the performance evaluation, another objective of making the report focused is to make the monitoring program focused and efficient. With specific questions identified, it is easier to develop the monitoring needs. In addition to reporting on FY 1998, this document presents proposed monitoring for future years.

The monitoring plan shows FY 1998 through FY 2002. The FY 1998 monitoring plan indicates the work for which results are included in this report. The FY 1999 monitoring plan is in progress. The intent is that the monitoring plan will always be a revolving 5-year timespan--in other words, next year FY 1998 will drop off and FY 2003 will be added.

This report represents the collaboration of work performed by the U.S. Army (Army) and Alliant Techsystems Inc. (Alliant). On behalf of the Army, the Corps of Engineers contracted Wenck Associates, Inc. (Wenck) to prepare Sections 2.0 through 6.0, and 11.0 of this report. On behalf of Alliant Techsystems Inc., Conestoga-Rovers & Associates (CRA) prepared Sections 7.0 through 10.0. Wenck and CRA both contributed to Section 1.0.

2.2 SITE DESCRIPTION

The Twin Cities Army Ammunition Plant is a government-owned facility located in Arden Hills, Minnesota, in the northern portion of the Minneapolis-St. Paul metropolitan area (Figure 2-1). The facility occupies approximately a four-square mile area immediately east of U.S. Interstate Highway 35W and north of Ramsey County Highway 96. Alliant Techsystems Inc. is the contracted operator and the prime tenant on the installation.

TCAAP was constructed in 1941 to provide small-caliber ammunition for the military needs of the United States. Production began in 1941 and then alternated between periods of activity and shutdown. TCAAP was placed in "standby" status in 1976; and then in 1992, its status was changed to "modified caretaker" which indicates that it will no longer be maintained for the production of ammunition.

During periods of activity, solvents were utilized as part of the manufacturing process. Disposal of solvents and other wastes at the TCAAP site resulted in soil contamination and also groundwater contamination, which has migrated beyond the site boundary. Groundwater

contamination was first discovered in July 1981, and the site was placed on the National Priorities List (NPL) in 1983.

A number of known and potential contaminant source areas have been identified on the TCAAP property: Sites A, B, C, D, E, F, G, H, I, J, K, 129-3, 129-5, and 129-15. Sites F and J have previously been remediated. The remaining sites are addressed in the OU2 ROD.

Two other sites, the Grenade Range and the Outdoor Firing Range, are being addressed as Removal Actions separate from the OU2 ROD; therefore, they are not specifically addressed in this report.

2.3 HYDROGEOLOGIC UNITS AND WELL NOMENCLATURE

On- and off-post wells have been installed in four hydrogeologic units beneath the site: Unit 1 through Unit 4. Descriptions of these four units are presented in Appendix A.1, along with a description of the nomenclature system used for well designations (e.g., 03U704). A well-designation cross-reference guide (sorted two different ways) is included as Appendices A.2 and A.3. The well index lists all wells of concern, the TCAAP designation, Minnesota unique number, and any other name(s) the wells may have.

2.4 DATA COLLECTION, MANAGEMENT, AND PRESENTATION

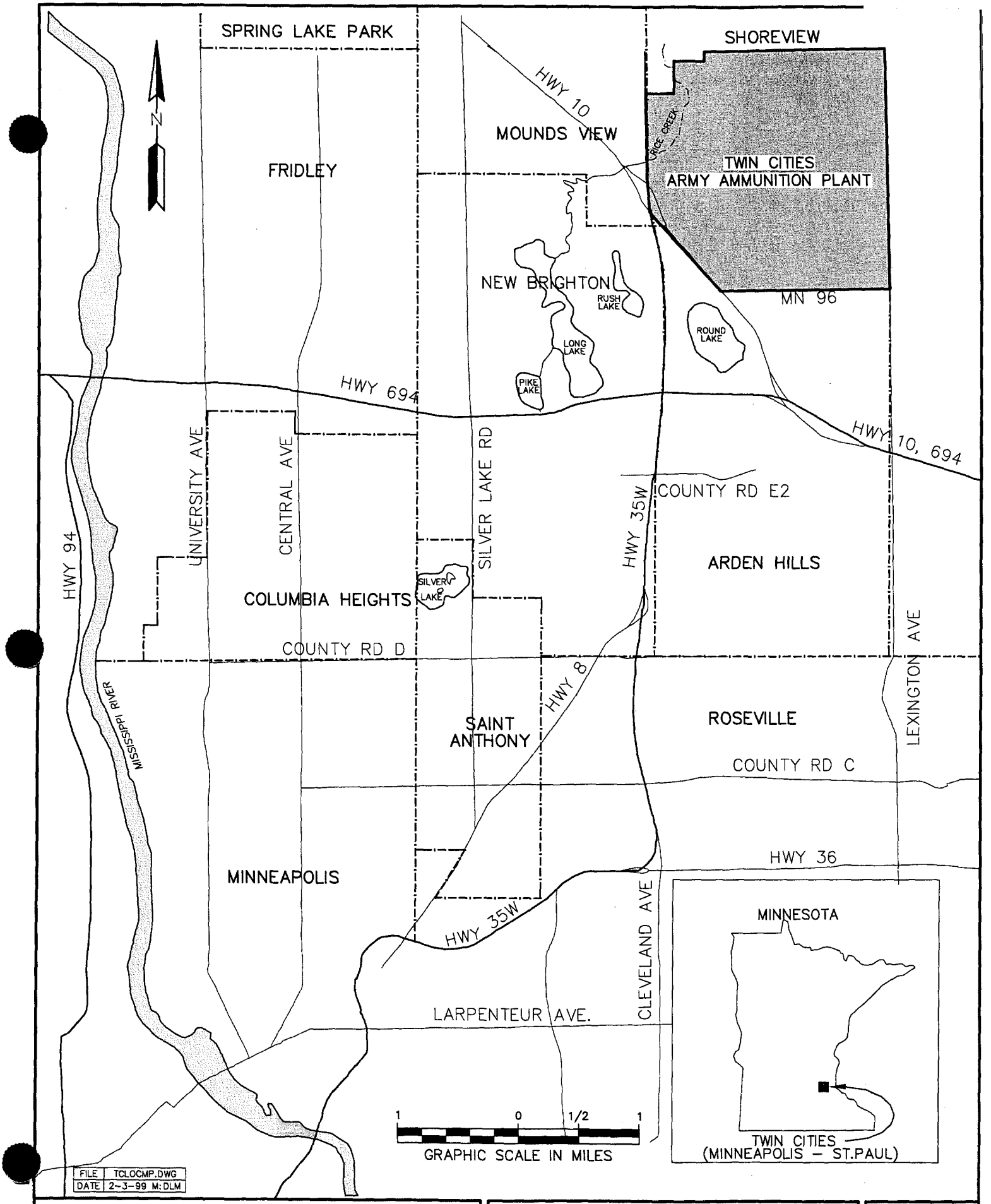
Performance monitoring data was collected in accordance with the:

- FY 1998 Monitoring Plan for Groundwater Monitoring Wells
- FY 1998 Monitoring Plan for Remedial Treatment Systems
- FY 1998 Monitoring Plan for Surface Water
- New Brighton Water System Sampling and Analysis Plan

Data was collected principally by two parties: CRA on behalf of Alliant Techsystems, and Barr Engineering on behalf of the City of New Brighton.

With the exception of a few minor deviations, the data set for FY 1998 is complete. Appendix B.1 presents a discussion of data collection, management, and presentation. Appendix B.2 provides explanations for the deviations. The comprehensive groundwater level and groundwater quality databases from 1987 to present are contained on a CD-ROM in Appendix C. Tables showing FY 1998 data are presented following the text at the end of the section in which they are referenced.

Figures



TWIN CITIES ARMY AMMUNITION PLANT

Site Location Map

Wenck

Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center P.O. BOX 428
Maple Plain, MN 55359-0428

JULY 1999

Fig. 2-1

SECTION 3

3.0 Operable Unit 1: Deep Groundwater

The reference for the OU1 ROD is:

RECORD OF DECISION
Groundwater Remediation
Operable Unit 1
At New Brighton/Arden Hills Superfund Site
September 1993

There have been no subsequent ROD Amendments or Explanations of Significant Differences.

Groundwater containment is provided by three municipal wells: New Brighton Municipal (NBM) #4, #14, and #15. The extracted water is treated in the Permanent Granular Activated Carbon (PGAC) treatment facility for removal of VOCs, and is then used as part of the municipal water supply. NBM #4 was a pre-existing well. NBM #14 began pumping on December 30, 1996, and NBM #15 came on-line in March 1998.

The remedy also relies on institutional controls (drilling advisory, alternate water supply, and well abandonment) to manage risks, including downgradient of the containment system.

Section 1.4 of the ROD prescribes six major components of the remedy which are described and evaluated in the following sections.

3.1 REMEDY COMPONENT #1: ALTERNATE WATER SUPPLY/WELL ABANDONMENT

Description: "Providing an alternative water supply to residents with private wells within the North Plume." (OU1 ROD, page 2)

- Clarified by the OU1 Alternate Water Supply Plan (Montgomery Watson, October 1995) to delete "residents with" since the remedy applies to other wells in addition to residential wells. This plan also identifies the criteria for determining what wells are eligible for an alternate water supply.
- Clarified by the OU1 Alternate Water Supply Plan to also include well abandonment.
- Clarified by the OU1 Alternate Water Supply Plan (page i-2) to also encompass OU3 and the OU2 Site A shallow groundwater plume.

Performance Standard (how do you know when you're done):

- For alternate water supply, when <u>all</u> well owners that meet all of the following criteria have been offered and provided with an alternate water supply (or offered and rejected):
    i. The well is located within the area affected by groundwater plumes that originate at TCAAP; and
    ii. The well is completed in an affected aquifer; and
    iii. The well contains detectable concentrations of the TCAAP-related chemicals of concern identified on page 18 of the OU1 ROD (or page 26 of the OU3 ROD, or Table 1 of the OU2 ROD, as appropriate for the well location); and
    iv. The well is used in a manner to cause exposure (uses are defined in the Alternate Water Supply Plan); and
    v. The well owner does not already have an alternate water supply.

If eligible well owners refuse the offer to have an alternate water supply provided, this also satisfies the performance standard.

- For well abandonment, when all wells that meet all of the following criteria have been offered and provided abandonment (or offered and rejected):
    i. The well is located within the area affected by groundwater plumes that originate at TCAAP; and
    ii. The well is completed in an affected aquifer; and
    iii. The well contains detectable concentrations of the TCAAP-related chemicals of concern identified on page 18 of the OU1 ROD (or page 26 of the OU3 ROD, or Table 1 of the OU2 ROD, as appropriate for the well location); and
    iv. The well was constructed prior to the Minnesota Department of Health (MDH) Special Well Construction Area advisory; and
    v. The well is being used by the well owner or use was discontinued due to contamination; and
    vi. The well is used in a manner to cause exposure (uses are defined in the Alternate Water Supply Plan).

    If eligible well owners refuse the offer for abandonment, this also satisfies the performance standard. An exception to abandonment would be if the well is needed for groundwater monitoring.

Is this remedy component being implemented?

Yes. The Alternate Water Supply and Well Abandonment Program is underway, but is not yet completed.

Within the North Plume, are there any well owners which meet the criteria, but have not yet been provided an alternate water supply?

Yes. The Bochnak residence (234369) at 2600 St. Anthony Boulevard is scheduled for hookup in Spring 1999.

Within the North Plume, are there any wells which meet the criteria, but have not yet been abandoned?

Yes. Same response as for the previous question.

Did the boundary of the North Plume get any bigger during FY 1998, as defined by the 1 μg/l contour line?

No. Table 3-1 presents water quality data for FY 1998. Figures 3-2 through 3-4 illustrate the 1 μg/l contour line for trichloroethene at three depths: Upper Unit 3, Lower Unit 3, and Upper Unit 4. Trichloroethene is in general the most widespread of the chemicals of concern for OU1. These figures indicate there was no appreciable change in the 1 μg/l contour for the North Plume (or the South Plume for OU3).

Were any new wells discovered within the North Plume during FY 1998?

No. The last report on new wells is the 1996/1997 Well Inventory Update, prepared by CRA.

Were any water supply wells within the North Plume sampled during FY 1998 (outside of those included in the OU1 performance monitoring plan)?

No. The most recent results were presented in the 1996/1997 Well Inventory Update, prepared by CRA.

Were any well owners offered an alternate water supply and/or well abandonment?

Yes. Montgomery Watson, who has been under contract with the Army to perform this work, reports that for calendar years 1997 - 1998:

- Eight private wells (Pletscher (2), Indykiewicz, Martin, Yepma, Olson, Shanzer, and Lindahl) were abandoned; no further Army action.
- Three well owners (Johnson Filtration, Big 10 Supper Club, and Gamradt) have refused participation in the program; no further Army action.
- Three well owners (DeWitt/Bergeron, Clover Pond and Sunset Memorial) unresponsive to program offers; no further Army action. Note: the Clover Pond well is being used in the TCAAP performance monitoring program.
- One well owner (Menglekoch) has an appropriate industrial use; no further Army action.
- One well owner (Darling International) has been supplied a municipal hookup (final Army action).
- One well owner (Gross Golf Course) refused well abandonment; water use information to be collected by Army and forwarded to regulatory agencies.
- One well owner (Bochnak) has requested abandonment of a well in addition to a municipal hookup to take place in the spring of 1999.

Montgomery Watson is currently preparing a report summarizing these activities in greater detail.

Are there any alternate water supply hookups or well abandonments proposed prior to the next report?

Yes. The Bochnak residence (234369) at 2600 St. Anthony Boulevard is scheduled for Spring 1999.

Is any sampling of water supply wells (excluding those included in the OU1 performance monitoring plan) proposed prior to the next report?

Yes. The proposed monitoring is presented in the 1996/1997 Well Inventory Update, prepared by CRA.

Are there any changes or additional actions required for this remedy component? No.

3.2 REMEDY COMPONENT #2: DRILLING ADVISORIES

Description: "Implementing drilling advisories that would regulate the installation of new private wells within the North Plume as a Special Well Construction Area." (OU1 ROD, page 2)

Performance Standard (how do you know when you're done):
When the Minnesota Department of Health (MDH) has issued a Special Well Construction Area Advisory.

Has the MDH issued a Special Well Construction Area Advisory?
Yes. It was issued in June 1996. In addition to covering OU1, the Special Well Construction Area also encompasses OU3 and the OU2 Site A shallow groundwater plume.

Are any changes or additional actions required for this remedy component? No.

3.3 REMEDY COMPONENT #3: GROUNDWATER CONTAINMENT

Description: "Extracting groundwater at the containment boundary in the North Plume near County Road E." (ROD, page 2)

- This remedy component consists of recovering deep (Unit 4) groundwater using three City of New Brighton municipal wells: NBM #4, #14, and #15. New Brighton municipal well #4 (NBM #4) was an existing well completed in both the Prairie du Chien and Jordan. NBM #14 and NBM #15 were

constructed in the Prairie du Chien as part of the remedy. The location of the three recovery wells are approximately ⅓ mile south of Interstate 694, east of Silver Lake Road, as shown on Figure 3-1.

- NBM #3 has been designated as an alternate containment/production well for times when one of the three primary wells are not in operation. NBM #5 and NBM #6 are considered secondary alternates.

The OU1 remedy is part of the New Brighton water supply system, and as such, New Brighton took the lead on design and construction of the system, and will be responsible for operation of the system. New Brighton contracted Barr Engineering to provide design and construction oversite services. The OU1 remedy is being paid for by the Army.

Performance Standard (how do you know when you're done):

When the containment boundary created by the extraction system is providing complete capture of all groundwater with contaminant concentrations exceeding the cleanup standards specified on page 18 of the OU1 ROD. The cleanup standards are shown in Table 3-1.

Is this remedy component being implemented?

Yes. Recent highlights include:

- NBM #14 was installed and started pumping December 30, 1996.
- NBM #15 started pumping in March 1998.

During FY 1998, did the OU1 extraction system provide complete capture (at the containment boundary) of all groundwater exceeding the cleanup standards specified on page 18 of the OU1 ROD?

Based on contouring of measured water levels, the OU1 extraction system appears to be providing complete capture. Table 3-2 presents water level data for FY 1998. Figure 3-1 shows

water level data, water level contours, and the approximate capture limit. The contours clearly show the influence of pumping. Figure 3-4 shows the capture limit overlain on the trichloroethene plume map. This figure indicates that groundwater exceeding the cleanup standard for trichloroethene of 5 µg/l is being captured.

This interpretation should be considered preliminary for the following reasons:

1. Figure 3-1 shows data from different dates, 3 months apart. September 1998 data from the eight new monitoring wells in the vicinity of the extraction system is shown on the map along with the comprehensive data collected in early June. A few wells were in common to both dates and the differences were generally less than one-foot; hence, the mixing of data is reasonably valid for a preliminary interpretation. Future monitoring, all at the same time, will help refine the interpretation.

2. For normal operations, the design flow rates derived from modeling are:

		Total Flow (thousands of gallons)	
Well	Flow Rate (MGD)	30 day Month	31 day Month
NBM #4	1.19	35,700	36,890
NBM #14	0.99	29,700	30,690
NBM #15	0.99	29,700	30,690
Total	3.17	95,100	98,270

Pumping volumes in Table 3-3 show that the distribution of pumping among the extraction wells was highly variable during FY 1998. Given that NBM #15 was just coming on-line, it is reasonable to expect variable conditions, including during the pumping test described in the next point. There will be greater confidence in the capture interpretation once the City of New Brighton begins operating the wells in a more uniform fashion.

3. Pumping tests were conducted at NBM #14 and #15 in July 1998 by Montgomery Watson. The report of their findings is currently under regulatory review. The report suggests differences in aquifer characteristics versus those used in the model to generate the design flow rates. The report is somewhat inconclusive in regard to complete capture, and recommends future monitoring to evaluate the situation.

Over the long-term, water quality data will be useful in evaluating containment. If containment is being achieved, we should see decreases in concentrations downgradient of the extraction system. It is expected that it will take several years to see these trends develop. Trichloroethene concentration versus time graphs are presented in Appendix F. For well 04U871, the concentration has generally been decreasing since late 1996. This coincides with when NBM #14 came on-line, and along with NBM #3 and NBM #4, was providing interim containment. A similar, but less clear trend is depicted for 04U872.

Vertical gradients can be useful in evaluating the vertical extent of capture. Vertical gradients for well nests throughout OU1 are presented in Table 3-4. In general for OU1, the gradients indicate that groundwater moves downward from the Prairie du Chien into the Jordan. At the 836 nest near NBM #4, the flow is upward from the Jordan into the Prairie du Chien. NBM #4 is completed through both formations. The fact that the gradient is upward suggests that water is removed faster from the Prairie du Chien than the Jordan, which is inducing water to move upward. At well nest 836, most of the trichloroethene is in the Prairie du Chien (35.6 µg/l) versus the Jordan (3.56 µg/l). Thus, while NBM #4 captures water from both the Prairie du Chien and the Jordan, most of the water is from the more contaminated portion of the aquifer. At the 837 nest near NBM #15 and the 838 nest near NBM #14, the gradients are downward; however, pumping has reduced the magnitude. The gradients are approximately three times less than at the 839 well nest located further west, outside the capture limits of the wells.

Are any changes or additional actions required for this remedy component?

The limit of capture shown on Figure 3-1 indicates that the extraction system is pumping enough water collectively to achieve containment. When overlain on the plume map (Figure 3-4), there is no doubt there is adequate capture on the east side near NBM #14. Figure 3-4 shows that NBM #14 is near the east edge of the plume and drawing some clean water. If there are any doubts, it would be on the west edge (NBM #4) or in the middle of the plume between NBM #4 and NBM #15.

To better balance the capture and alleviate possible doubts, it is recommended that the Army explore, with the City of New Brighton, the possibility of pumping more water from NBM #4 (and/or NBM #3) and NBM #15, and less water from NBM #14. This would shift the capture limits more to the center and west side of the plume. NBM #13, the OU3 extraction well, should also be factored into the optimization strategy.

3.4 REMEDY COMPONENT #4: REMOVAL OF VOCs BY GAC

Description: "Pumping the extracted groundwater to the Permanent Granular Activated Carbon (PGAC) Water Treatment Facility in New Brighton for removal of VOCs by a pressurized GAC system." (OU1 ROD, page 2)

- The PGAC, along with iron and manganese removal, make the recovered groundwater suitable for municipal drinking water purposes. The PGAC is located approximately ⅓ mile south of Interstate 694 near Silver Lake Road as shown on Figure 3-1. The City of New Brighton is responsible for operation and maintenance of the PGAC, with cost reimbursement from the Army for the operations related to the remedy.

Performance Standard (how do you know when you're done):

When the treated water meets the MCLs and non-zero MCLGs established by the Safe Drinking Water Act (SDWA). (OU1 ROD, page 18)

- Specifically for the chemicals of concern identified on page 18 of the OU1 ROD.

During FY 1998, did the treated water meet the MCLs and non-zero MCLGs established by the SDWA for the OU1 chemicals of concern?

Yes. Table 3-5 shows the effluent results from the PGAC for FY 1998. The data is not from a combined effluent after the GAC vessels; instead, it is from sampling ports between the lead and lag GAC vessel for each of the 8 GAC vessel pairs in the PGAC. The sampling is primarily intended to determine when breakthrough of each lead GAC vessel has occurred. When breakthrough of a lead vessel has occurred, the sampling location is switched to after the lag vessel, which then becomes the lead vessel. The vessel with breakthrough has its carbon changed-out, and then it becomes the lag vessel, which puts the sampling location back between two vessels.

Table 3-5 shows the periodic breakthrough of VOCs between the two vessels. Although the table reports the concentrations as total VOCs, inspection of the laboratory data shows that all of the values consist of one compound (1,1-dichloroethane) except for one sample. The sample from vessel 7B on October 31, 1997, had 10 µg/l 1,1-dichloroethane and 1 µg/l 1,1,1-trichloroethane, which combine for the 11 µg/l total VOCs. The MCL for 1,1,1-trichlorethane is 200 µg/l and there is no MCL for 1,1-dichloroethane. Therefore, the effluent meets the performance standard, even before polishing in the second GAC vessel.

Is any sampling of the treated water proposed prior to the next report?

Yes. Sampling will be performed by the City of New Brighton or their contractor.

Are any changes or additional actions required for this remedy component? No.

3.5 REMEDY COMPONENT #5: DISCHARGE OF TREATED WATER

Description: "Discharging all of the treated water to the New Brighton municipal distribution system." (OU1 ROD, page 2)

Performance Standard (how do you know when you're done):
When the connection to the New Brighton municipal supply system has been completed and water is being discharged.

Is the treated water being discharged to the New Brighton municipal distribution system?
Yes.

Are any changes or additional actions required for this remedy component? No.

3.6 REMEDY COMPONENT #6: GROUNDWATER MONITORING

Description: "Monitoring the groundwater to verify the effectiveness of the remedy." (OU1 ROD, page 2)

Performance Standard (how do you know when you're done):
When a performance groundwater monitoring program has been established and on-going monitoring is in compliance with the program.

Is this remedy component being implemented?
Yes. Performance monitoring programs have been established to collect the data required to verify the effectiveness of remedy components #1-#5. Table 3-6 summarizes the performance monitoring requirements, responsible parties, and the documents which contain the monitoring plans.

Were the groundwater monitoring requirements for this remedy met?

In general, yes. The FY 1998 monitoring plan is shown in Appendix H.1 and explanations for missed monitoring data are provided in Appendix B.2.

Is any groundwater sampling proposed prior to the next report? Yes.

- Groundwater sampling of water supply wells related to alternate supply and abandonment will be in accordance with recommendations in the 1996/1997 Well Inventory Update (CRA).
- Monitoring of the extraction wells and treatment system effluent will be performed by the City of New Brighton in accordance with the "New Brighton Water System Sampling and Analysis Plan," June 1997.
- Other groundwater monitoring will be in accordance with the Groundwater Monitoring Plan included as Appendix H.1.

Are any changes or additional actions required for this remedy component?

Yes. It is recommended to add monitoring at well 04U847. This well will help to define conditions in the northern part of OU1, downgradient of the TCAAP boundary (see Figure 3-4 for location). The trichloroethene concentration at this well was typically greater than 1,000 µg/l in the early 1990's, then decreased in 1994, and was 68 µg/l in September 1995, the last time sampled. It is recommended to measure water levels and perform VOC analysis on a biennial basis, similar to other monitoring in OU1. This change is shown in Appendix H.1.

3.7 OVERALL REMEDY FOR OU1 DEEP GROUNDWATER

Has the OU1 remedy been completed (i.e., have the cleanup levels on page 18 of the OU1 ROD been attained throughout the areal and vertical extent of the North Plume)? No.

What impact is the groundwater extraction system having on contaminant concentrations? Trichloroethene trend graphs for Deep Groundwater monitoring wells are presented in Appendix F. The graphs are grouped by Operable Unit, and then hydrogeologic unit. The graphs best illustrate the long-term changes that have occurred throughout OU1. The FY 1998 trichloroethene concentrations are shown in plan view on Figures 3-2 through 3-4, and in cross-section view on Figure 3-5.

In general, the FY 1998 concentrations are very similar to last year's data. A few comments:

1. Eight new monitoring wells (four well nests) were installed roughly along an east-west line through the extraction system. The first data from these wells was in September 1998, and results have not been confirmed.
2. At well nest 839 (located west, outside the capture limit), the concentrations matched well with previous interpretations for this area (2.78 µg/l in the Prairie du Chien and 1.58 µg/l in the Jordan).
3. At well nest 836 (located adjacent to NBM #4), the concentrations in the Prairie du Chien (35.6 µg/l) and Jordan (3.56 µg/l) were lower than expected since this area was previously interpreted to be greater than 100 µg/l. The data at these wells was not used for contouring, since it has not been confirmed.
4. At well nest 837 (located near NBM #15), the concentration in the Prairie du Chien (26.1 µg/l) was similarly lower than expected, while the concentration in the Jordan (134 µg/l) matched expectations.

5. At well nest 838 (located near NBM #14), the concentrations in the Prairie du Chien (71.3 µg/l) and Jordan (36.2 µg/l) matched well with previous interpretations since this is getting closer to the east edge of the plume.
6. Additional monitoring of these eight wells is warranted before any decisions are made based upon the data.
7. Further downgradient of NBM #14, the concentration at 04U877 was 15.10 µg/l compared to 30.8 µg/l last year and 171 µg/l in June 1996. NBM #14 began pumping in December 1996, so the decrease may be attributable to capture.
8. Further downgradient at 04U871, the concentration was 113 µg/l compared to 150 µg/l last year and 175 µg/l in June 1996.
9. Further downgradient at 04U872, the concentration was 30 µg/l compared to 120 µg/l last year and 116 µg/l in June 1996.

How much VOC mass has been removed (at each well and total)?

The PGAC removed 1,407 pounds of VOCs during FY 1998. Table 3-3 shows the breakdown for each extraction well.

Are any changes or additional actions required for OU1?

Yes. As discussed previously:

1. Consider increasing pumping in NBM #4 (and/or NBM #3) and NBM #15, while decreasing pumping at NBM #14 in order to shift the capture limits further west. NBM #13, the OU3 extraction well, should also be factored into the optimization strategy.
2. Add 04U847 to the monitoring plan.

Tables

TABLE 3-1
OU1 Groundwater Quality Data: FY 1998

Site ID		Sample Date	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	1,1-Dichloroethane (ug/l)
OU1 Cleanup Level (1)			5	6	70 (2)	200	3	70
03L822		22-Jun-98	219.00	40.60	8.56	29.90	<0.78	39.30
03L841		19-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
03L846		18-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
03L853		23-Jun-98	90.10	2.71	<0.76	9.33	<0.78	1.88
03M843		18-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
03M843	D	18-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
03U822		22-Jun-98	16.90	3.84	1.42	<0.76	<0.78	8.70
03U831		23-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J834		11-Dec-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J834		18-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J836		04-Sep-98	3.91	<1.70	<0.76	<0.76	<0.78	<0.73
04J837		08-Sep-98	147.00	9.70	1.24	21.50	<0.78	8.91
04J838		03-Sep-98	39.80	<1.70	<0.76	2.35	<0.78	1.60
04J839		04-Sep-98	1.74	<1.70	<0.76	<0.76	<0.78	<0.73
04J839	D	04-Sep-98	1.94	<1.70	<0.76	<0.76	<0.78	<0.73
04J882		10-Dec-97	1.88	<1.70	<0.76	<0.76	<0.78	<0.73
04J882		19-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U834		10-Dec-97	111.00	6.97	<0.76	10.30	<0.78	4.71
04U834		18-Jun-98	69.50	3.09	<0.76	4.17	<0.78	2.71
04U836		08-Sep-98	39.10	1.91	<0.76	4.74	<0.78	1.48
04U837		08-Sep-98	28.70	<1.70	<0.76	2.35	<0.78	2.08
04U838		03-Sep-98	78.40	4.55	<0.76	9.59	<0.78	3.52
04U839		04-Sep-98	3.05	<1.70	<0.76	<0.76	<0.78	<0.73
04U841		19-Jun-98	18.80	3.70	<0.76	11.00	<0.78	1.74
04U843		18-Jun-98	32.50	9.92	<0.76	11.00	<0.78	6.94
04U844		23-Jun-98	470.00	35.60	4.48	94.10	<0.78	20.40

TABLE 3-1
OU1 Groundwater Quality Data: FY 1998

Site ID		Sample Date	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	1,1-Dichloroethane (ug/l)
OU1 Cleanup Level (1)			5	6	70 (2)	200	3	70
04U846		17-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	0.85
04U855		18-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U871		12-Dec-97	141.00	9.28	1.16	14.40	<0.78	6.30
04U871	D	12-Dec-97	123.00	8.24	0.97	13.00	<0.78	5.73
04U871		23-Jun-98	113.00	7.89	<0.76	12.40	<0.78	4.87
04U872		04-Dec-97	42.90	2.62	<0.76	3.75	<0.78	2.29
04U872		09-Jun-98	30.00	<1.70	<0.76	2.23	<0.78	1.24
04U875		11-Dec-97	13.50	<1.70	<0.76	2.48	<0.78	<0.73
04U875		29-Jun-98	12.60	<1.70	<0.76	1.87	<0.78	<0.73
04U877		19-Jun-98	15.10	<1.70	<0.76	<0.76	<0.78	0.85
04U879		24-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U880		12-Dec-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U880		24-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U881		11-Dec-97	0.74	<1.70	<0.76	<0.76	<0.78	<0.73
04U881		23-Jun-98	0.66	<1.70	<0.76	<0.76	<0.78	<0.73
04U881	D	23-Jun-98	0.64	<1.70	<0.76	<0.76	<0.78	<0.73
04U882		10-Dec-97	18.60	<1.70	<0.76	2.88	<0.78	<0.73
04U882		19-Jun-98	16.90	<1.70	<0.76	1.27	<0.78	<0.73
04U883		24-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
200154		26-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
200524		25-Jun-98	26.00	<1.70	<0.76	1.43	<0.78	<0.73
200524	D	25-Jun-98	25.80	<1.70	<0.76	1.34	<0.78	<0.73
200803		25-Jun-98	27.60	<1.70	<0.76	0.85	<0.78	<0.73
206688		26-Jun-98	11.10	<1.70	<0.76	1.63	<0.78	<0.73
206792		03-Mar-98	49.00	3.99	<0.76	5.74	<0.78	1.91
206792		25-Jun-98	59.20	3.06	<0.76	5.88	<0.78	1.65
206792		01-Sep-98	52.70	2.75	<0.76	6.23	<0.78	1.81
206793		25-Jun-98	23.50	<1.70	<0.76	2.69	<0.78	<0.73
206793		01-Sep-98	23.00	<1.70	<0.76	3.26	<0.78	<0.73

TABLE 3-1
OU1 Groundwater Quality Data: FY 1998

Site ID	Sample Date	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethene (ug/l)	1,1,1-Trichloroethane (ug/l)	1,1,2-Trichloroethane (ug/l)	1,1-Dichloroethane (ug/l)
OU1 Cleanup Level (1)		5	6	70 (2)	200	3	70
206796	25-Jun-98	140.00	9.17	<0.76	16.90	<0.78	4.91
206797	25-Jun-98	98.90	6.11	<0.76	13.70	<0.78	2.79
234546	25-Jun-98	44.10	2.00	<0.76	3.37	<0.78	1.42
409547	22-Jun-98	<0.56	<1.70	0.90	0.87	<0.78	<0.73
409548	22-Jun-98	2.91	<1.70	<0.76	<0.76	<0.78	1.19
409549	19-Jun-98	8.18	<1.70	<0.76	<0.76	<0.78	0.97
409550	23-Jun-98	530.00	32.00	4.78	123.00	<0.78	17.50
409555	19-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
409556	23-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
409557	22-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
409557 D	22-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
409597	23-Jun-98	147.00	13.80	3.15	10.60	<0.78	21.90
512761	25-Jun-98	78.90	4.19	<0.76	7.53	<0.78	2.29
554216	23-Dec-97	V 180.00	V 11.00	V 1.27	V 26.90	V <0.78	V 8.16
554216	03-Mar-98	140.00	10.90	1.27	18.50	<0.78	8.37
554216	25-Jun-98	218.00	17.50	2.18	28.50	<0.78	12.40
554216	01-Sep-98	260.00	15.70	2.01	25.30	<0.78	12.40
582628	25-Jun-98	66.60	4.58	0.94	8.95	<0.78	4.09
582628	01-Sep-98	112.00	8.60	1.30	14.90	<0.78	6.75
PJ#318	12-Dec-97	8.56	<1.70	<0.76	<0.76	<0.78	<0.73
PJ#318	02-Jul-98	10.00	<1.70	<0.76	<0.76	<0.78	<0.73

Notes:
(1) Cleanup levels for OU1 Deep Groundwater are from Page 18 of the OU1 ROD. Shading indicates exceedance of the cleanup level.
(2) The cleanup standard is specifically for cis-1,2-dichloroethene, not total.
D= Duplicate
V= Sample was subjected to unusual storage/preservation condition.

TABLE 3-2
OU1 Groundwater Level Data: FY 1998

Well	TOS (1) (ft)	Date	Qtr (2)		Groundwater Elev.(ft)
03L822	876.6	01-Dec-97	57	A	833.0
03L822	876.6	01-Jun-98	59	A	833.7
03L841	911.3	01-Dec-97	57	A	840.3
03L841	911.3	01-Jun-98	59	A	841.2
03L846	887.6	01-Dec-97	57	A	828.5
03L846	887.6	01-Jun-98	59	A	829.3
03L853	888.8	01-Dec-97	57	A	833.7
03L853	888.8	01-Jun-98	59	A	834.4
03M843	885.7	01-Dec-97	57	A	834.0
03M843	885.7	01-Jun-98	59	A	834.6
03U815	872.6	01-Dec-97	57	A	835.5
03U815	872.6	01-Jun-98	59	A	835.8
03U821	878.0	01-Dec-97	57	A	833.4
03U821	878.0	01-Jun-98	59	A	834.0
03U822	876.7	01-Dec-97	57	A	833.0
03U822	876.7	01-Jun-98	59	A	833.7
03U831	888.6	01-Dec-97	57	A	832.9
03U831	888.6	01-Jun-98	59	A	833.7
03U832	884.8	01-Dec-97	57	A	831.9
03U832	884.8	01-Jun-98	59	A	832.6
04J834	946.1	01-Dec-97	57	A	808.1
04J834	946.1	01-Jun-98	59	A	804.9
04J882	884.8	01-Dec-97	57	A	806.9
04J882	884.8	01-Jun-98	59	A	803.2
04U834	945.7	01-Dec-97	57	A	811.4
04U834	945.7	01-Jun-98	59	A	808.8
04U841	911.5	01-Dec-97	57	A	841.9
04U841	911.5	01-Jun-98	59	A	842.7
04U843	886.1	01-Dec-97	57	A	833.3
04U843	886.1	01-Jun-98	59	A	833.9
04U844	884.5	01-Dec-97	57	A	831.6
04U844	884.5	01-Jun-98	59	A	832.3
04U846	888.4	01-Dec-97	57	A	827.3
04U846	888.4	01-Jun-98	59	A	828.1
04U850	916.8	01-Dec-97	57	A	827.1
04U850	916.8	03-Mar-98	58	A	827.8
04U850	916.8	01-Jun-98	59	A	828.2
04U850	916.8	01-Sep-98	60	A	827.5
04U855	896.1	01-Dec-97	57	A	831.4
04U855	896.1	01-Jun-98	59	A	832.0
04U871	957.1	01-Dec-97	57	A	819.0
04U871	957.1	03-Mar-98	58	A	819.3
04U871	957.1	01-Jun-98	59	A	818.7
04U871	957.1	01-Sep-98	60	A	817.6
04U872	952.2	01-Dec-97	57	A	817.8
04U872	952.2	01-Jun-98	59	A	816.5
04U875	1013.6	01-Dec-97	57	A	818.6
04U875	1013.6	03-Mar-98	58	A	819.1
04U875	1013.6	01-Jun-98	59	A	818.8
04U875	1013.6	01-Sep-98	60	A	817.7
04U877	920.9	01-Dec-97	57	A	826.6
04U877	920.9	01-Jun-98	59	A	827.8
04U879	945.6	01-Dec-97	57	A	827.3
04U879	945.6	03-Mar-98	58	A	828.0
04U879	945.6	01-Jun-98	59	A	828.2
04U879	945.6	01-Sep-98	60	A	827.4
04U880	972.0	01-Dec-97	57	A	815.2
04U880	972.0	01-Jun-98	59	A	814.7
04U881	976.5	01-Dec-97	57	A	814.0
04U881	976.5	01-Jun-98	59	A	812.7
04U882	917.7	01-Dec-97	57	A	810.4
04U882	917.7	01-Jun-98	59	A	807.4
04U883	948.6	01-Dec-97	57	A	808.7
04U883	948.6	01-Jun-98	59	A	804.9
200524	946.5	01-Dec-97	57	A	776.30 P
200524	946.5	01-Jun-98	59	A	773.50 P
200803	1012.7	01-Dec-97	57	A	780.60 P
200803	1012.7	01-Jun-98	59	A	777.50 P
200804	1015.0	01-Dec-97	57	A	815.0
200804	1015.0	01-Jun-98	59	A	811.7
206792	1000.8	01-Dec-97	57	A	820.7
206792	1000.8	03-Mar-98	58	A	813.66 P
206792	1000.8	01-Jun-98	59	A	814.66 P
206792	1000.8	01-Sep-98	60	A	813.66 P
206793	999.0	01-Dec-97	57	A	829.0
206793	999.0	03-Mar-98	58	A	NA(3)
206793	999.0	01-Jun-98	59	A	827.0
206793	999.0	01-Sep-98	60	A	824.96 P
206796	965.0	01-Dec-97	57	A	814.5
206796	965.0	01-Jun-98	59	A	782.51 P
206797	1025.8	01-Dec-97	57	A	809.7
206797	1025.8	01-Jun-98	59	A	788.73 P
409546	867.0	01-Dec-97	57	A	829.9
409546	867.0	01-Jun-98	59	A	830.7
409547	896.0	01-Dec-97	57	A	833.4
409547	896.0	01-Jun-98	59	A	836.4
409548	867.0	01-Dec-97	57	A	828.7
409548	867.0	01-Jun-98	59	A	829.4
409549	921.3	01-Dec-97	57	A	827.5
409549	921.3	03-Mar-98	58	A	828.1
409549	921.3	01-Jun-98	59	A	828.4
409549	921.3	01-Sep-98	60	A	827.6
409550	912.0	01-Dec-97	57	A	842.6
409550	912.0	01-Jun-98	59	A	843.4
409555	923.0	01-Dec-97	57	A	820.8
409555	923.0	03-Mar-98	58	A	821.0
409555	923.0	01-Jun-98	59	A	820.2
409555	923.0	01-Sep-98	60	A	819.1
409556	960.0	01-Dec-97	57	A	827.0
409556	960.0	01-Jun-98	59	A	828.6
409557	896.0	01-Dec-97	57	A	835.1
409557	896.0	01-Jun-98	59	A	833.6

TABLE 3-2
OU1 Groundwater Level Data: FY 1998

Well	TOS (1) (ft)	Date	Qtr (2)		Groundwater Elev.(ft)
409597	880.3	01-Dec-97	57	A	NA(4)
409597	880.3	01-Jun-98	59	A	833.8
554216	890.8	01-Dec-97	57	A	827.78 P
554216	890.8	03-Mar-98	58	A	827.78 P
554216	890.8	01-Jun-98	59	A	828.78 P
554216	890.8	01-Sep-98	60	A	813.78 P
04U836	1000.6	01-Sep-98	60	A	824.0
04J836	1001.5	01-Sep-98	60	A	824.2
04U837	929.2	01-Sep-98	60	A	826.5
04J837	929.4	01-Sep-98	60	A	824.6
04U838	880.5	01-Sep-98	60	A	827.5
04J838	880.2	01-Sep-98	60	A	826.1
04U839	987.7	01-Sep-98	60	A	827.3
04J839	987.9	01-Sep-98	60	A	824.1
582628		01-Dec-97	57	A	NA(5)
582628		03-Mar-98	58	A	NA(5)
582628		01-Jun-98	59	A	827.74 P
582628		01-Sep-98	60	A	826.24 P
PJ#318	983.0	01-Dec-97	57	A	814.1
PJ#318	983.0	01-Jun-98	59	A	810.7

Well	TOS (1) (ft)	Date	Qtr (2)	Groundwater Elev.(ft)

Notes:

1) TOS = Top of Surface which represents the ground surface elevation in feet above mean sea level (MSL). The TOS elevations were retrieved from the USAEC IRDMIS. All data are referenced to TOS elevations surveyed by Kemper and Associates, Inc. during July through September 1992.

2) Qtr = Quarter. Under this heading, A = Alliant Techsystems, Inc., the party responsible for data collection.

3) = NBM#3 was being redeveloped.

4) = Human error. Measured at wrong well.

5) = NBM#15 was not accessible at this time due to construction.

NA = Not available.

P = Pumping

Table 3-3

OU1 PUMPING/VOC MASS REMOVAL DATA

		PGAC Wells							PGRS Well	
MTH/YR	ITEMS	WELL # 3	WELL # 4	WELL # 5	WELL # 6	WELL # 14	WELL # 15	Total PGAC WELLS	WELL # 13	TOTAL ALL GAC WELLS
Oct-97	Pumpage (Thousands of gals.)	20,859	28,986	893	316	51,216		102,270	44,166	146,436
	VOC Level (ppb)	75	82	262	171	298			3	
	Total VOCs (lbs)	13	20	2	0	127		163	1	164
Nov-97	Pumpage (Thousands of gals.)	20,012	6,857	2,906	8	44,709		74,492	47,718	122,210
	VOC Level (ppb)	34	101	197	102	216			2	
	Total VOCs (lbs)	6	6	5	0	81		97	1	98
Dec-97	Pumpage (Thousands of gals.)	2,295	2,692	27,675	2,631	50,886		86,179	44,011	130,190
	VOC Level (ppb)	55 *	92 *	136	100	193			2	
	Total VOCs (lbs)	1	2	31	2	82		119	1	119
Jan-98	Pumpage (Thousands of gals.)	243	21,708	9,651	1,749	50,727		84,078	44,277	128,355
	VOC Level (ppb)	45 **	97	220	137	245			2	
	Total VOCs (lbs)	0	18	18	2	104		141	1	142
Feb-98	Pumpage (Thousands of gals.)	0	29,264	1,885	71	46,503		77,723	39,894	117,617
	VOC Level (ppb)	45 **	90	200	125	252			2	
	Total VOCs (lbs)	0	22	3	0	98		123	0	123
Mar-98	Pumpage (Thousands of gals.)	3,831	22,206	4,467	942	41,695	10,802	83,943	42,889	126,832
	VOC Level (ppb)	45 **	77	160	131 ***	210	110		1	
	Total VOCs (lbs)	1	14	6	1	73	10	106	0	106
Apr-98	Pumpage (Thousands of gals.)	19,940	1,541	5,645	0	33,469	34,491	95,086	37,172	132,258
	VOC Level (ppb)	56	78	180	131 ***	310	140		2	
	Total VOCs (lbs)	9	1	8	0	87	40	146	1	146
May-98	Pumpage (Thousands of gals.)	8,036	20,913	2,275	0	34,124	39,116	104,464	18,045	122,509
	VOC Level (ppb)	38	87	144	131 ***	173	146		0	
	Total VOCs (lbs)	3	15	3	0	49	48	117	0	117
Jun-98	Pumpage (Thousands of gals.)	992	10,378	155	97	30,296	27,520	69,438	41,482	110,920
	VOC Level (ppb)	23	30	150	95	230	110		2	
	Total VOCs (lbs)	0	3	0	0	58	25	86	1	87
Jul-98	Pumpage (Thousands of gals.)	5,963	22,507	18,872	12,299	24,307	19,240	103,188	28,861	132,049
	VOC Level (ppb)	27	67	135	104	252	153		1	
	Total VOCs (lbs)	1	13	21	11	51	25	122	0	122
Aug-98	Pumpage (Thousands of gals.)	2,054	33,340	1,407	113	23,390	9,892	70,196	42,302	112,498
	VOC Level (ppb)	41	48	172	108	257	166		2	
	Total VOCs (lbs)	1	13	2	0	50	14	80	1	81
Sep-98	Pumpage (Thousands of gals.)	16,282	12,222	1,185	156	18,520	19,308	67,673	46,951	114,624
	VOC Level (ppb)	43	63	220	130	370	220		2	
	Total VOCs (lbs)	6	6	2	0	57	35	107	1	108

* VOC Levels were not sampled due to servicing of Well #3 during December. The levels for December are an average of the October-November levels.

** VOC Levels were not sampled due to maintenance of Well # 3 for months of January through March. These levels are an average of the Nov-97 and Apr-98 levels.

*** VOC Levels were not sampled due to servicing of Well #6 for the months of March through May. These levels are an average of January and February levels.

Table 3-4

OU1 Vertical Hydraulic Gradients

	Mid-Screen (or hole) Elevation (ft)	Groundwater Elevation (ft) 12/3/96	5/29/97	12/2/97	6/1/98	9/1/98
03U811	803	842.5	842.1	842.3	843.0	No Data
03L811	689	841.8	841.2	841.5	842.1	
Difference	114	0.7	0.9	0.8	0.9	
Vertical Gradient		.006	.008	.007	.008	
03U822	786	No Data	No Data	833.0	833.7	No Data
03L822	761	833.9	830.6	833.0	833.7	
Difference	25	-	-	-	-	
Vertical Gradient		-	-	-	-	
04U834	570	811.0	809.0	811.4	808.8	No Data
04J834	496	807.8	804.7	808.1	804.9	
Difference	74	3.2	4.3	3.3	3.9	
Vertical Gradient		.043	.058	.045	.053	
03L841	760	840.3	840.4	840.3	841.2	No Data
04U841	682	841.2	841.1	841.9	842.7	
Difference	78	-0.9	-0.7	-1.60	-1.5	
Vertical Gradient		-.012	-.009	-.021	-.019	
03L846	760	829.5	828.4	828.5	829.3	No Data
04U846	674	828.5	827.6	827.3	828.1	
Difference	86	1.0	0.8	1.200	1.2	
Vertical Gradient		.012	.009	.014	.014	
04U882	600	810.2	808.0	810.4	807.4	No Data
04J882	455	772.8	769.3	806.9	803.2	
Difference	145	37.4	38.7	3.5	4.2	
Vertical Gradient		.258	.267	.024	.029	
409546 (PCA2L3)	737	830.6	829.7	829.9	830.7	No Data
409548 (PCA2U4)	660	829.5	828.6	828.7	829.4	
Difference	77	1.1	1.1	1.2	1.3	
Vertical Gradient		.014	.014	.016	.017	
04U836(MW1)	663					824.0
04J836(MW2)	554					824.2
Difference	109					-0.2
Vertical Gradient						-.002
04U837(MW3)	653					826.5
04J837(MW4)	555					824.6
Difference	98					1.9
Vertical Gradient						.019
04U838(MW5)	659					827.5
04J838(MW6)	556					826.1
Difference	103					1.4
Vertical Gradient						.014
04U839(MW7)	626					827.3
04J839(MW8)	556					824.1
Difference	70					3.2
Vertical Gradient						.046

Note: Negative sign denotes upward vertical gradient.

Table 3-5

PGAC Effluent Water Quality

Note: **These results are from sampling ports after the lead GAC vessel and before the lag vessel. Notes below indicated GAC replacement.**

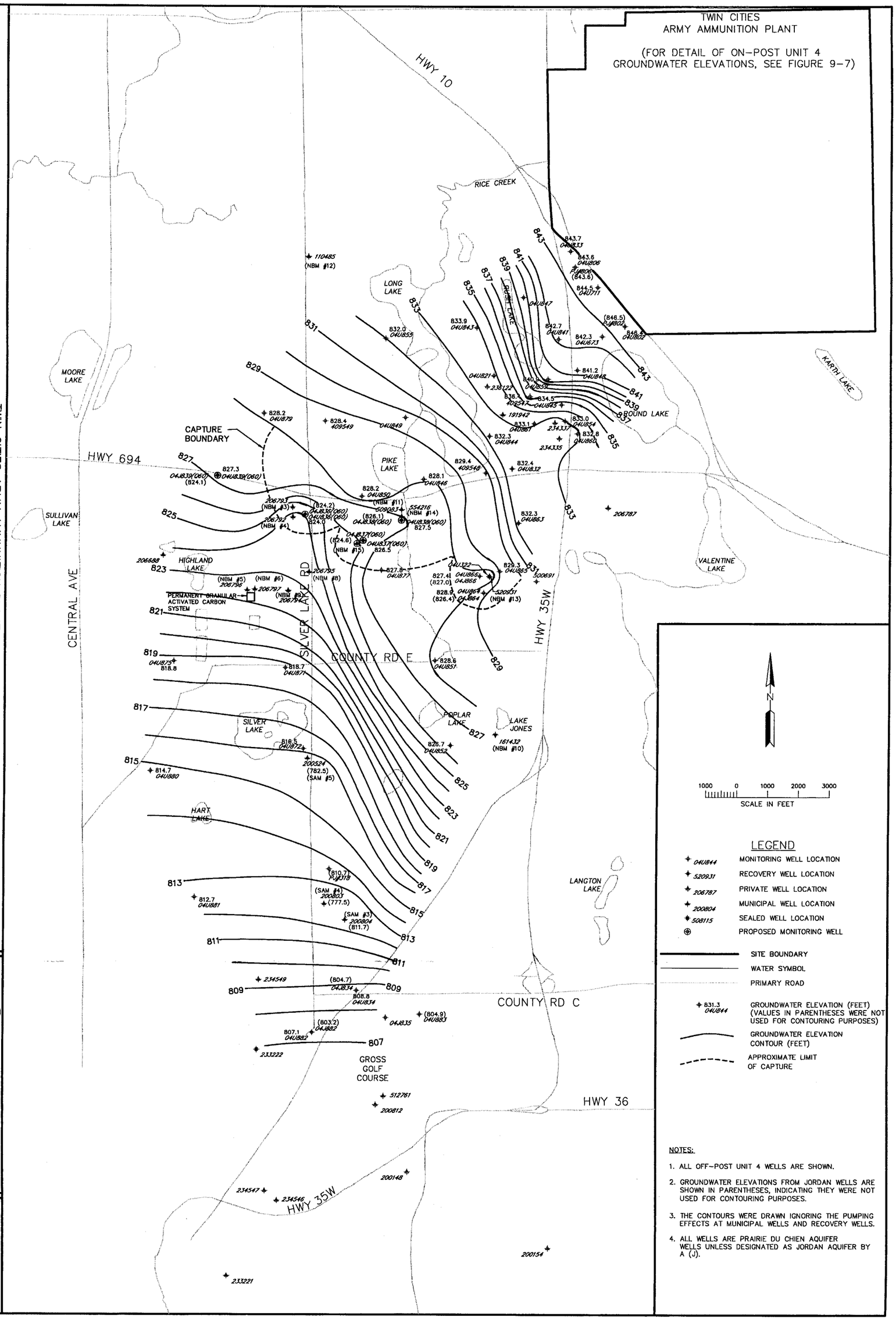
		QUARTERLY INFLUENT WELL MONITORING						MONTHLY OPERATIONAL PERFORMANCE MONITORING													
SAMPLE DATE	COMPOUND (PPB)	Well #3	Well #4	Well #5	Well #6	Well #14	Well #15	Contactor #1 A	Contactor #1 B	Contactor #2 A	Contactor #2 B	Contactor #3 A	Contactor #3 B	Contactor #4 A	Contactor #4 B	Contactor #5 A	Contactor #5 B	Contactor #6 A	Contactor #6 B	Contactor #7 A	Contactor #7 B	Contactor #8 A	Contactor #8 B
		GAC Replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between March 22 - March 31, 1993. "B" Vessels become the Lead Vessels.																			
04/19/93	Total VOCs	424	277	156	0			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
05/19/93	Total VOCs	432	265	237	159			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
06/08/93	Total VOCs	301	340	191	159			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
07/28/93	Total VOCs	248	270	206	147			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
08/26/93	Total VOCs	377	328	215	158			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
09/23/93	Total VOCs	323	234	140	155			NS	0	NS	0	NS	0	NS	0	NS	1	NS	3	NS	0	NS	0
10/12/93	Total VOCs	297	290	181	139			0	0	0	0	0	1	0	1	0	3	0	5	0	1	0	1
11/22/93	Total VOCs	410	313	215	169			0	3	0	3	0	4	0	4	0	5	0	6	0	3	0	3
		GAC Replaced in contactors 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B between December 1, 1993 - January 10, 1994. "A" Vessels become the Lead Vessels.																			
12/28/93	Total VOCs	414	293	389	0			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
01/13/94								0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
01/24/94	Total VOCs	459	292	269	182			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
02/23/94	Total VOCs	383	322	204	213			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
03/28/94	Total VOCs	478	382	168	150			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
04/30/94	Total VOCs	397	336	135	166			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
05/31/94	Total VOCs	404	386	168	135			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
06/30/94	Total VOCs	412	312	169	149			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
07/28/94	Total VOCs	270	269	156	134			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
08/29/94	Total VOCs	385	288	177	132			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
09/30/94	Total VOCs	209	214	158	121			0	NS	0	NS	0	NS	0	NS	0	NS	1	NS	0	NS	0	NS
10/31/94	Total VOCs	203	226	156	126			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GAC Replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between October 26 - December 6, 1994. "B" Vessels become the Lead Vessels.																			
11/29/94	Total VOCs	203	226	156	126			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
12/07/94	Total VOCs	197	239	154	132			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
01/31/95	Total VOCs	212	240	135	113			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
02/28/95	Total VOCs	209	240	132	109			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
03/31/95	Total VOCs	241	240	170	123			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
04/30/95	Total VOCs	258	280	145	108			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
05/31/95	Total VOCs	230	232	133	107			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
06/30/95	Total VOCs	216	237	136	127			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
07/31/95	Total VOCs	225	188	135	105			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
08/31/95	Total VOCs	215	159	148	110			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
09/30/95	Total VOCs	225	188	135	105			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
10/31/95	Total VOCs	174	184	182	181			NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
11/30/95	Total VOCs	154	177	176	106			NS	2.5	NS	3.7	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
		GAC Replaced in contactors 1B, 2B, 3B, 4B, 5A, 5B, 6B, 7B, 8B between December 5 - December 20, 1995. "A" Vessels become the Lead Vessels.																			
12/31/95	Total VOCs	206	212	158	126			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
01/31/96	Total VOCs	201	200	173	135			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
02/28/96	Total VOCs	189	203	191	177			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
03/31/96	Total VOCs	177	179	198	177			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
04/30/96	Total VOCs	174	173	159	125			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
05/31/96	Total VOCs	162	218	144	134			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
06/30/96	Total VOCs	135	254	147	133			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
07/31/96	Total VOCs	125	205	143	121			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
08/31/96	Total VOCs	117	234	181	125			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
09/30/96	Total VOCs	104	221	173	123			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
10/31/96	Total VOCs	113	158	153	108			0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
11/30/96	Total VOCs	95	200	130	109			0	NS	1.4	NS	1.1	NS	3	NS	2.3	NS	1.1	NS	0	NS	0	NS
12/31/96	Total VOCs	103	193	155	100	279		1.3	0	3	0	1.8	0	4.2	0	4.8	0	1.9	0	1.6	0	1.2	0
		GAC Replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between January 7, 1997 - January 21, 1997. "B" Vessels become the Lead Vessels.																			
01/31/97	Total VOCs	105	135	218	132	306		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
02/28/97	Total VOCs	112	110	192	107	279		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
03/31/97	Total VOCs	97	98	182	104	252		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
04/30/97	Total VOCs	51	151	197	110	284		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
05/31/97	Total VOCs	52	150	197	115	285		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
06/30/97	Total VOCs	98	120	250	150	300		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
07/31/97	Total VOCs	62	95	222	132	268		NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
08/31/97	Total VOCs	44	122	247	197	240		NS	0	NS	0	NS	0	NS	3.1	NS	0	NS	1.1	NS	2.9	NS	0
09/30/97	Total VOCs	47	146	202	137	214		0	1.8	0	1.9	0	2.6	0	6.2	0	0	0	3	0	4.9	0	1.7
10/31/97	Total VOCs	75	82	262	171	298		0	4.9	0	6	0	7.7	0	9.8	0	3.3	0	7.8	0	11	0	5.1
		GAC Replaced in contactors 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B between November 5, 1997 - November 21, 1997. "A" Vessels become the Lead Vessels.																			
11/30/97	Total VOCs	34	101	197	102	216		0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
12/31/97	Total VOCs	54.5	91.5	136	100	193		0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
01/31/98	Total VOCs	45	97	220	137	245		0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
02/28/98	Total VOCs	45	90	200	125	252		0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
03/31/98	Total VOCs	45	77	160	131	210	110	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
04/30/98	Total VOCs	56	78	180	131	310	140	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
05/31/98	Total VOCs	38	87	144	131	173	146	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
06/30/98	Total VOCs	23	30	150	95	230	110	0	NS	0	NS	2.3	NS	2	NS	0	NS	0	NS	1	NS	0	NS
07/31/98	Total VOCs	27	67	135	104	252	153	3.5	0	3.5	0	3.7	0	6.5	0	2.5	0	2.7	0	0	0	2.7	0
08/31/98	Total VOCs	41	48	172	108	257	166	6.8	0	6	0	6	0	9.7	0	4.6	0	5.2	0	7.3	0	5.8	0
		GAC Replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between September 8, 1998 - September 21, 1998. "B" Vessels become the Lead Vessels.																			
09/30/98	Total VOCs	43	63	220	130	370	220	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
10/31/98	Total VOCs																						
11/30/98	Total VOCs																						
12/31/98	Total VOCs																						

Table 3-6

Summary of OU1 Monitoring Requirements

Remedy Component	Monitoring Requirements	Responsible Party	Documents Containing the Monitoring Plan
#1: Alternate Water Supply/Well Abandonment	a. Water quality data for the perimeter of the plume to define the area of concern	Army	OU1 Groundwater Monitoring Plan (in the Annual Report)
	b. Water quality data for water supply wells to determine eligibility for alternate supply/abandonment	Army	Well Inventory Report
#2: Drilling Advisories	• None		
#3: Groundwater Containment	a. Pumping volume and rates for each extraction well for comparison to design flowrates for containment	New Brighton	New Brighton Water System Sampling and Analysis Plan
	b. Water levels from monitoring wells to draw contour maps showing the influences of pumping	Army	OU1 Groundwater Monitoring Plan (in the Annual Report)
#4: Removal of VOCs	a. Effluent water quality to demonstrate compliance with the Safe Drinking Water Act	New Brighton	New Brighton Water System Sampling and Analysis Plan
#5: Discharge of Treated Water	• None		
#6: Groundwater Monitoring	• Outlined above and below		
OR Overall Remedy (Attainment of cleanup goals)	a. Water quality data throughout the North Plume to evaluate attainment	Army	OU1 Groundwater Monitoring Plan (in the Annual Report)

Figures



NOTES:

1. ALL OFF-POST UNIT 4 WELLS ARE SHOWN.
2. GROUNDWATER ELEVATIONS FROM JORDAN WELLS ARE SHOWN IN PARENTHESES, INDICATING THEY WERE NOT USED FOR CONTOURING PURPOSES.
3. THE CONTOURS WERE DRAWN IGNORING THE PUMPING EFFECTS AT MUNICIPAL WELLS AND RECOVERY WELLS.
4. ALL WELLS ARE PRAIRIE DU CHIEN AQUIFER WELLS UNLESS DESIGNATED AS JORDAN AQUIFER BY A (J).

TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 4 Potentiometric Map, Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359
Wenck

JULY 1999

Figure 3-1

TWIN CITIES ARMY AMMUNITION PLANT
(FOR DETAIL OF ON-POST UPPER UNIT 3 CONCENTRATIONS AND CONTOURS, SEE FIGURE NO. 9-8)

N

SCALE IN FEET
1000 0 1000 2000 3000

LEGEND

- MONITORING WELL LOCATION
- SITE BOUNDARY
- WATER SYMBOL
- PRIMARY ROAD
- TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- ISOCONCENTRATION CONTOUR (ug/l)
- ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- CROSS SECTION LINE

NOTES:

1. ALL OFF-POST UPPER UNIT 3 WELLS ARE SHOWN.
2. ALL DATA IS FROM QUARTER 59(Q59) UNLESS OTHERWISE INDICATED.

A'
A
B
B'
KARTH LAKE
VALENTINE LAKE
ROUND LAKE
RUSH LAKE
RICE CREEK
LANGTON LAKE
LAKE JONES
POPLAR LAKE
LONG LAKE
PIKE LAKE
SILVER LAKE
HART LAKE
HIGHLAND LAKE
MOORE LAKE
SULLIVAN LAKE
GROSS GOLF COURSE
HWY 10
HWY 35W
HWY 36
HWY 8
HWY 694
COUNTY RD C
SILVER LAKE RD
CENTRAL AVE

FILE F3UTRCLP.DWG
DATE 7-9-99 M:DLM

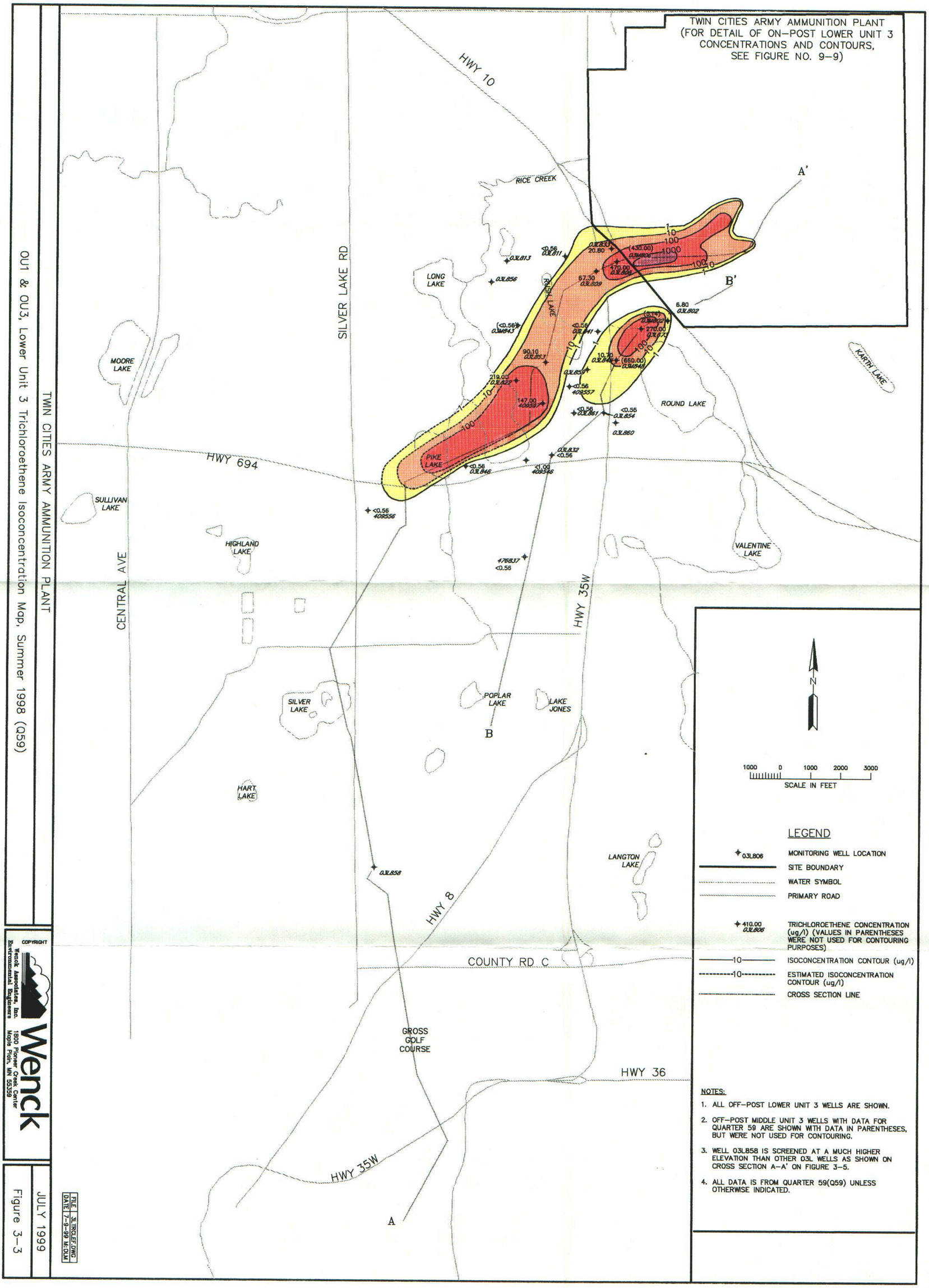
TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 3-2



TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Lower Unit 3 Trichloroethene Isoconcentration Map, Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 3-3

FILE 3LTRIOLEF.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT
(FOR DETAIL OF ON-POST UPPER UNIT 4
CONCENTRATIONS AND CONTOURS,
SEE FIGURE NO. 9-10)

SCALE IN FEET
1000 0 1000 2000 3000

LEGEND
- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- PRIVATE WELL LOCATION
- MUNICIPAL WELL LOCATION
- SITE BOUNDARY
- WATER SYMBOL
- PRIMARY ROAD
- TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES SHOWN IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- ISOCONCENTRATION CONTOUR (ug/l)
- ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- CROSS SECTION LINE
- APPROXIMATE LIMIT OF CAPTURE

NOTES:
1. ALL OFF-POST UPPER UNIT 4 WELLS ARE SHOWN.
2. ALL DATA IS FROM SUMMER 1998(Q59) UNLESS OTHERWISE NOTED.
3. OAJ AND PJ WELLS WITH DATA FOR QUARTER 59 ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
4. ALL PROPOSED WELLS ARE PRAIRIE DU CHIEN AQUIFER WELLS UNLESS DESIGNATED AS JORDAN AQUIFER BY A (J).
5. DATA SHOWN WITH A "J", THE VALUE IS ESTIMATED BECAUSE THE VALUE IS BELOW THE METHOD DETECTION LIMIT, BUT ABOVE THE INSTRUMENT DETECTION LEVEL.

FILE F4UTRCLE.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 4 Trichloroethene, Isoconcentration Map – Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 3-4

SECTION 4

4.0 Operable Unit 2: Shallow Soil Sites

The reference for the OU2 ROD is:

Twin Cities Army Ammunition Plant
New Brighton/Arden Hills Superfund Site
Operable Unit 2
RECORD OF DECISION
October 1997

There have been no subsequent ROD Amendments or Explanations of Significant Differences.

Section 1.4 of the ROD prescribes major remedy components for each of four media as described in sections 4.0 through 9.0 of this report. Section 4.0 addresses the shallow soil sites.

Through the RI/FS process, Sites A, C, E, H, 129-3, and 129-5 were found to have inorganic and/or organic contaminants above the cleanup goals specified in Table 1 of the OU2 ROD. Unpermitted landfills, or dumps, exist within Sites A, B, E, H, and 129-15. The OU2 ROD (page 2) describes nine remedy components to address the shallow soil sites.

4.1 REMEDY COMPONENTS #1-7: SOIL REMEDIATION

Description: These seven components collectively address the characterization, excavation, sorting, treatment, disposal, site restoration, and site access restrictions for the shallow soils and dumps at Sites A, C, E, H, 129-3, and 129-5.

Performance Standard (how do you know when you're done):

When the soils at these sites have been remediated such that the contaminant concentrations are below the cleanup levels specified in Table 1 of the OU2 ROD.

Are these remedy components being implemented?

Yes. Activities during FY 1998 were:

- Approval of Work Plans for Sites A, C, E, H, 129-3, and 129-5.
- Implementation at Site A of soil excavation, treatment, and disposal.
  - In calendar year 1998, approximately 10,760 tons of soil were excavated, transported to the on-TCAAP Corrective Action Management Unit (CAMU), stabilized, and transported off-site as non-hazardous waste for disposal at a permitted facility.
  - Work was suspended for the winter and will resume in spring 1999.
- Approval of an Engineering Evaluation/Cost Analysis (EE/CA) for a soil vapor extraction (SVE) system to remediate VOC-contaminated soils at Site A.
  - Implementation is scheduled for late FY 1999.
- Implementation of a phytoremediation demonstration project at Sites C and 129-3.
  - A report of findings is being prepared.
  - The demonstration is scheduled to last through FY 1999.

For more information on the first three bullets, including figures showing areas that have been remediated, please see the "Shallow Soil Closeout Report" for 1998, prepared by Stone & Webster.

4.2 REMEDY COMPONENT #8: GROUNDWATER MONITORING

Description: "Five-year period of groundwater monitoring to verify no adverse remedy impacts at Sites A, C, E, H, 129-3, and 129-5." (OU2 ROD, page 2)

Performance Standard (how do you know when you're done):

When five years have elapsed with groundwater monitoring results below the groundwater cleanup levels.

Is this remedy component being implemented?

No. The intent of this remedy component is to verify that soil characterization and/or remediation activities do not somehow cause impacts to groundwater. As such, the five-year monitoring period is intended to start after completion of remedy components #1-7 above. Thus, specifically for this remedy component, there was no monitoring performed in FY 1998. Given the anticipated schedules of completing remedy components #1-7, it is estimated that the five-year verification monitoring will begin in the years 2000-2002 at the various shallow soil sites.

Through a future report, a monitoring plan will be developed for this remedy component. The plan will address the following items for each of the shallow soil sites:

- The well(s) to be sampled
- The frequency of sampling
- The analytical parameters
- The cleanup levels
- How the data will be compared to the cleanup levels (e.g., all data must be below the criteria, or mean values, etc.).

With respect to bullets 3 and 4, the OU2 ROD specifies shallow groundwater contaminant cleanup levels for Site A (Table 1), but not for the other shallow soil sites. Since there is no

shallow (Unit 1) groundwater beneath Sites E and 129-3, it is implied that the OU2 Deep Groundwater cleanup levels would apply to these two sites. It is unclear whether the Site A parameter list and cleanup levels apply to the other shallow soil sites. This is an issue to be resolved in the future.

4.3 REMEDY COMPONENT #9: CHARACTERIZATION OF DUMPS

Description: "Characterization of dumps at Sites B and 129-15 to determine their contents. If contents are found to be toxic, hazardous, or contaminated, then a remedy for the landfill will be utilized and documented through a post-ROD amendment. If the contents are not toxic, hazardous or contaminated, a no further action remedy would be employed." (OU2 Rod, page 2)

Performance Standard (how do you know when you're done):

When characterization has been sufficient to determine if the contents are toxic, hazardous, or contaminated.

Is this remedy component being implemented?

Yes. A Work Plan for characterization at these two sites was approved in late FY 1998. Field work was performed in early FY 1999 and a report is currently being prepared.

SECTION 5

5.0 Operable Unit 2: Deep Soil Sites

Sites D and G have been impacted primarily by VOC contaminants at depths extending to between 50 and 170 feet. Some additional shallow soil contaminants may exist at Site D, and Site G also contains a dump. The OU2 ROD (pages 2-3) describes seven remedy components for these two sites. The final remedy incorporates the use of existing SVE systems and site caps, which were installed in 1986.

5.1 REMEDY COMPONENT #1: GROUNDWATER MONITORING

Description: "Groundwater Monitoring." (OU2 ROD, page 2)

Performance Standard (how do you know when you're done):
When groundwater monitoring results from wells adjacent to each site are below the cleanup levels for deep groundwater specified in Table 1 of the OU2 ROD, and shown on Table 5-1 in this report.

Is this remedy component being implemented? Yes.

Were the groundwater monitoring requirements of this remedy met?
Yes. Samples were collected and analyzed from the wells nearest to Sites D and G in accordance with the FY 1998 Monitoring Plan.

What impact are the SVE systems having on contaminant concentrations in groundwater adjacent to Sites D and G?
Figure 5-1 shows the locations of the wells nearest to Site D (03U096, 03U093, and 03U018) and Site G (03U094 and 03U014). As shown on the trend graphs in Figures 5-2 through 5-4,

trichloroethene concentrations in these wells remained generally the same in FY 1998. All of the graphs show that the most dramatic decreases in concentrations occurred between 1987 and 1991-1993. Since then, the concentrations generally appear to be decreasing, but at a much slower rate (asymptotic behavior). The declining concentrations (asymptotic behavior) could also be described in terms of a first order decay process. A semilog regression of concentration versus time for wells 03U094 and 03U096 reveals a steady rate constant since 1987.

Table 5-1 presents the FY 1998 data from these five wells for the deep groundwater chemicals of concern. The table shows that four of the five wells still exceed the cleanup level for trichloroethene, and one well exceeds the cleanup level for 1,1-dichloroethene, and this same well exceeds the cleanup level for 1,1,1-trichloroethane.

Overall, these results indicate that the SVE systems at Sites D and G are effectively minimizing (or eliminating) further contamination of the deep groundwater beneath these sites; however, there appears to be diminishing returns.

Is any groundwater sampling proposed prior to the next report?

Yes. As shown in Appendix H.1, these same five wells will be sampled in June 1999 for VOC analysis.

Are any changes or additional actions required for this remedy component? No.

5.2 REMEDY COMPONENT #2: RESTRICT SITE ACCESS

Description: "Restrict site access and use during remedy implementation." (OU2 ROD, page 2)

Performance Standard (how do you know when you're done):
When site access is adequately restricted to protect human health.

Is this remedy component being implemented?
Yes. TCAAP is fenced with locking gates controlled by the operating contractor, Alliant Techsystems.

Are any changes or additional actions required for this remedy component? No.

5.3 REMEDY COMPONENT #3: SVE SYSTEMS

Description: "Install and operate deep soil vapor extraction (SVE) systems with modified shallow SVE." (OU2 ROD, page 2)

- SVE systems were installed at Sites D and G in 1986 as Interim Remedial Actions to address soil contamination. The existing system at Site D consists of 39 shallow vents (depths of 33-54 feet) and one deep vent (depth of 150 feet). At Site G there are 89 shallow vents (depths of 23-55 feet).
- The intent of this remedy component is to add additional deep vents, as needed, at both sites to address presumably contaminated soils below the existing SVE systems. The existing systems will be modified as needed, including possibly turning off vents which are removing little, if any, VOC mass.

Performance Standard (how do you know when you're done):

When the soil concentrations are below the cleanup levels specified in Table 8 of the OU2 ROD.

Is this remedy component being implemented?

Yes. Activities during FY 1998 included:

- Approval of the Site D and G Investigation Report
- Approval to perform an SVE pilot study at Site D first, then consider whether or not to perform a pilot study at Site G
- Approval of the Site D pilot study plan
- Implementation of the Site D pilot study
  - The report of findings is being prepared

Have the deep SVE systems been installed?

Partially. Additional deep vents were installed at Site D as part of the pilot study.

Have the shallow SVE systems been modified?

No. However, approval was received to shut down the SVE systems at Sites D and G in order to test individual vents. The testing was performed in early FY 1999, and a report is being prepared.

Were the monitoring requirements for this remedy component met?

Yes. The combined discharge at each system was monitored monthly for flowrate and air quality analyses as reported in Table 5-2. Samples from Site D were analyzed for 1,1,1-trichloroethane and trichloroethene, while samples from Site G were analyzed for these same two compounds, plus cis-1,2-dichloroethene. This monitoring was in accordance with past agreements between the Army, MPCA, and USEPA. For the tests described above, the Site G system was shut down in August, and both the Site D and G systems were shut down in September.

How much VOC mass has been removed (at each vent and total)?

Table 5-2 shows that during FY 1998, the existing SVE systems at Sites D and G removed 570 pounds and 62 pounds of VOCs, respectively. From startup in 1986, through September 1998, the systems have removed 116,199 pounds and 104,418 pounds, respectively. These calculations utilize measured air flowrate, laboratory VOC air monitoring results, and operating time to determine mass removal rates. Periods of downtime are accounted for in these calculations. The current monitoring program does not permit calculation of VOC mass removal at individual vents, only total system results.

Are the air emissions in exceedance of any discharge criteria?

No. The annual emissions are below the regulatory thresholds that would require an air emissions permit (10 tons per year for any individual hazardous air pollutant and 25 tons per year for total hazardous air pollutants).

Were there any significant operation and maintenance problems in FY 1998 (greater than 24 hour shutdown)?

Yes. Table 5-3 summarizes O&M notes for FY 1998.

Is any monitoring proposed prior to the next report?

Yes. There will be continuation of the monthly monitoring program currently in place, when and if the systems are restarted. Additional monitoring may be proposed at a later time as part of either the remedial design process, or other recommended operation actions.

Are any changes or additional actions required for this remedy component? No.

5.4 REMEDY COMPONENT #4: ENHANCEMENTS TO THE SVE SYSTEMS

Description: "Evaluate and potentially use enhancements to the SVE systems." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When an adequate evaluation has been completed.

Is this remedy component being implemented?

Yes. See discussion in Section 5.3.

Are any evaluations proposed prior to the next report?

Reports of findings are being prepared.

Are any changes or additional actions required for this remedy component? No.

5.5 REMEDY COMPONENT #5: MAINTAIN EXISTING SITE CAPS

Description: "Maintain existing site caps." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the caps are maintained in adequate condition.

Is this remedy component being implemented?

Yes. Alliant Techsystems inspects the caps during routine operation and maintenance inspections.

Are there any problems with the caps?

No problems were observed in FY 1998.

Were any maintenance activities performed for the caps in FY 1998? No.

Are any maintenance activities planned prior to the next report?

No, except for cutting of any trees or bushes, as necessary.

Are any changes or additional actions required for this remedy component? No.

5.6 REMEDY COMPONENT #6: MAINTAIN SURFACE DRAINAGE CONTROLS

Description: "Maintain surface [drainage] controls." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When surface water does not pond on the caps, and surface water flows off at a rate that does not cause erosion problems with the cap.

Is this remedy component being implemented?

Yes. Alliant Techsystems inspects the drainage conditions during routine operation and maintenance inspections.

Are there any problems with the surface drainage controls? No.

Were any maintenance activities performed for the surface drainage controls in FY 1998?

No.

Are any maintenance activities planned prior to the next report? No.

Are any changes or additional actions required for this remedy component? No.

5.7 REMEDY COMPONENT #7: CHARACTERIZE SHALLOW SOILS AND DUMP

Description: "Following completion of SVE remediation of deep soils, characterize Site D shallow soils and Site G dump to determine appropriate action." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the characterizations have provided answers necessary to determine if additional remediation is required, and if remediation is required, when it has been completed.

Is this remedy component being implemented?

Yes. The investigation work at Sites D and G in FY 1997 were primarily intended for deep soil conditions, but also addressed shallow soils to some extent. The investigation at Site G discovered "tar-like substances" in an area of the site. A work plan for further investigation was approved in FY 1998, and will be implemented in FY 1999. (See the "Final Addendum to the Work Plan, Sampling and Analysis Plan, Site Safety and Health Plan for Sites D and G Pilot Study, Site G Tar-Like Material Investigation, Revision 2," September 21, 1998, prepared by Stone & Webster.

Is any characterization work proposed prior to the next report?

Yes. See previous answer.

Are any changes or additional actions required for this remedy component? No.

5.8 OVERALL REMEDY FOR DEEP SOIL SITES

Has the SVE remediation been completed (i.e., have the soil cleanup levels in Table 8 of the OU2 ROD been attained throughout the areal and vertical extent of Sites D and G)? No.

Has it been determined that remediation of shallow soils at Site D and/or the dump at Site G is not required, or if required, has the remediation been completed?

No, the determination has not been made.

Tables

Table 5-1

Deep Groundwater Data Near Sites D and G: FY1998

			Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	Cis-1,2-Dichloroethene (ug/l)	1,1-Dichloroethane (ug/l)	1,1,1-Trichloroethane (ug/l)	1,2-Dichloroethane (ug/l)
OU2 Cleanup Level (1)			5	5	7	70	70	200	5
Site D	03U096	17-Jun-98	<0.75	49.10	2.12	<0.76*	3.11	14.50	<1.10
	03U093	16-Jun-98	<0.75	202.00	6.76	1.03*	4.76	39.20	<1.10
	03U018	12-Jun-98	<0.75	230.00	3.76	2.97*	2.93	25.40	<1.10
Site G	03U094	15-Jun-98	<0.75	500.00	30.10	2.20*	4.20	320.00	<1.10
	03U014	08-Jun-98	<0.75	<0.56	<1.70	<0.76*	<0.73	<0.76	<1.10

Notes:

(1) Cleanup levels for Deep Groundwater from Table 1 of the OU2 ROD. Shading indicates exceedance of the cleanup level.

* Data is total 1,2-Dichloroethene, not the cis- isomer.

Table 5-2

Sites D and G

SVE System Flow Rates and Mass Removal

FY 1998

Site D- Laboratory Analysis and Mass Removal Calculations

				1,1,1-Trichloroethane		1,1,2-Trichloroethlyene		Total VOCs	
Date	Days of Operation in Monitoring Period	Flow Rate (ft^3/min)	Liters of Air Sampled(L)	Mass in Sample (µg)	Weight Removed During Monitoring Period (lbs)	Mass in Sample (µg)	Weight Removed During Monitoring Period (lbs)	Weight Removed During Monitoring Period (lbs)	Cumulative VOCs Removed (lbs)
10/07/97	24	6570	10.04	7.4	6.75	48.0	43.78	50.53	115,679
11/04/97	20	6460	4.18	<4.4	0.00	22.0	39.49	39.49	115,719
12/05/97	23	6670	10.20	12.0	10.48	67.0	58.52	69.00	115,788
01/06/98	22	6610	11.52	14.0	10.26	78.0	57.18	67.44	115,855
02/04/98	21	6550	10.32	11.0	8.51	63.0	48.76	57.28	115,913
03/03/98	19	6130	11.52	12.0	7.05	61.0	35.82	42.86	115,955
04/07/98	25	6200	10.80	8.1	6.75	47.0	39.17	45.92	116,001
05/06/98	21	6440	11.52	11.0	7.50	61.0	41.59	49.09	116,050
06/02/98	19	6240	13.70	15.0	7.54	77.0	38.70	46.24	116,097
07/07/98	25	6230	10.86	12.0	9.99	64.0	53.30	63.30	116,160
08/04/98	20	6340	15.15	12.0	5.83	69.0	33.54	39.37	116,199
09/02/98	2	No Sample (2)	No Sample (2)	No Sample (2)	No Sample (2)	No Sample (2)	No Sample (2)	No Sample (2)	No Sample (2)

Site G- Laboratory Analysis and Mass Removal Calculations

				1,1,1-Trichloroethane		1,1,2-Trichloroethlyene		cis-1,2-Dichloroethylene		Total VOCs	
Date	Days of Operation in Monitoring Period	Flow Rate (ft^3/min)	Liters of Air Sampled (L)	Mass in Sample (µg)	Weight Removed During Monitoring Period (lbs)	Mass in Sample (µg)	Weight Removed During Monitoring Period (lbs)	Mass in Sample (µg)	Weight Removed During Monitoring Period (lbs)	Weight Removed During Monitoring Period (lbs)	Cumulative VOCs Removed (lbs)
10/07/97	24	7630	10.04	<4.4	0.00	7.7	8.16	<3.2	0.00	8.16	104,364
11/04/97	20	8360	4.18	<4.4	0.00	<4.2	0.00	<3.2	0.00	0.00	104,364
12/05/97	23	7530	10.20	<4.4	0.00	7.7	7.59	3.5	3.45	11.04	104,375
01/06/98	22	7340	11.52	<4.4	0.00	7.6	6.19	<3.2	0.00	6.19	104,382
02/04/98	21	7910	10.32	<4.4	0.00	6.8	6.36	<3.2	0.00	6.36	104,388
03/03/98	19	7240	11.52	<4.4	0.00	5.4	3.74	<3.2	0.00	3.74	104,392
04/07/98	25	5790	10.80	<4.4	0.00	5.6	4.36	<3.2	0.00	4.36	104,396
05/06/98	21	7240	11.52	<4.4	0.00	6.5	4.98	<3.2	0.00	4.98	104,401
06/02/98	19	6720	17.40	<4.4	0.00	9.4	4.01	3.5	1.49	5.50	104,407
07/07/98	25	7240	10.86	<4.4	0.00	8.3	8.03	3.4	3.29	11.32	104,418
08/04/98	13	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)	No Sample (1)

NOTES:

1 Site G was shut down for evaluation on 07/24/98; therefore, no sample was taken in August.

2 Site D was shut down for evaualtion on 08/06/98; therefore, no sample was taken in September

Source: Conestoga-Rovers and Associates

Table 5-3

TCAAP - SITES D&G
OPERATION AND MAINTENANCE NOTES
FISCAL YEAR 1998

04/01/98 - A power outage on TCAAP caused the Sites D&G systems to shut down for 7.5 hours.
04/02-09/98 - Motor control switch for Site G motor #4 malfunctioned and the motor was off .
04/16/98 - An electrical problem on the power feed caused the power to be off for 14.5 hours.

06/23/98 - A blown fuse on blower motor #4 at Site G caused Blower #4 to shut down for 169 hours.
06/25/98 - A power outage at TCAAP caused the Sites D&G systems to shut down for 19 hours.

07/07/98 - An interior filter on the SKC air check sampler became constricted during the July sampling event, resulting in a significantly lower sampler flow rate calibration after sampling than before sampling. Therefore, the presample average flow rate calibration of 181 cc/minute was used to calculate the liters of air sampled and subsequently the total weight of VOCs removed.
07/24/98 - Site G system was shut down for evaluation.

08/06/98 - Site D system was shut down for evaluation.

Source: Conestoga-Rovers and Associates

Figures

NOTE:
THIS FIGURE IS AN INSET(EXCERPT) FROM FIGURE NO. 9-8: UPPER UNIT 3 TRICHLORDETHENE ISOCONCENTRATION MAP, SUMMER 1998. SEE FIGURE NO. 9-8 FOR ADDITIONAL LEGEND NOTES.

SITE 129-15
03U124
1.14
03U032
49.10
03U096
SITE D
519291
03U113
202.00
03U093
03U090
1000
230.00
03U018
03U112
03U121
4.38
03U017
(4700.00)
03U317
SITE F
03U026
03U114
03U019
03U716
03U316
03U092
SITE J
10
100
1000
SITE G
(18.40)
03U315
500.00
03U094
03U715
<0.56
620.00
03U020
(240.00)
03U314
03U014
FEDERAL ROAD
630.00
03U021
03U002
80.00
03U709
(1700.00)
03U305
03U027
B'
N
400 0 200 400
GRAPHIC SCALE IN FEET

TWIN CITIES ARMY AMMUNITION PLANT

Location of Wells Nearest to Sites D and G

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center P.O. BOX 428
Maple Plain, MN 55359-0428

JULY 1999

Fig. 5-1

SITE D, WELLS 03U096 & 03U018, TRICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNITION PLANT

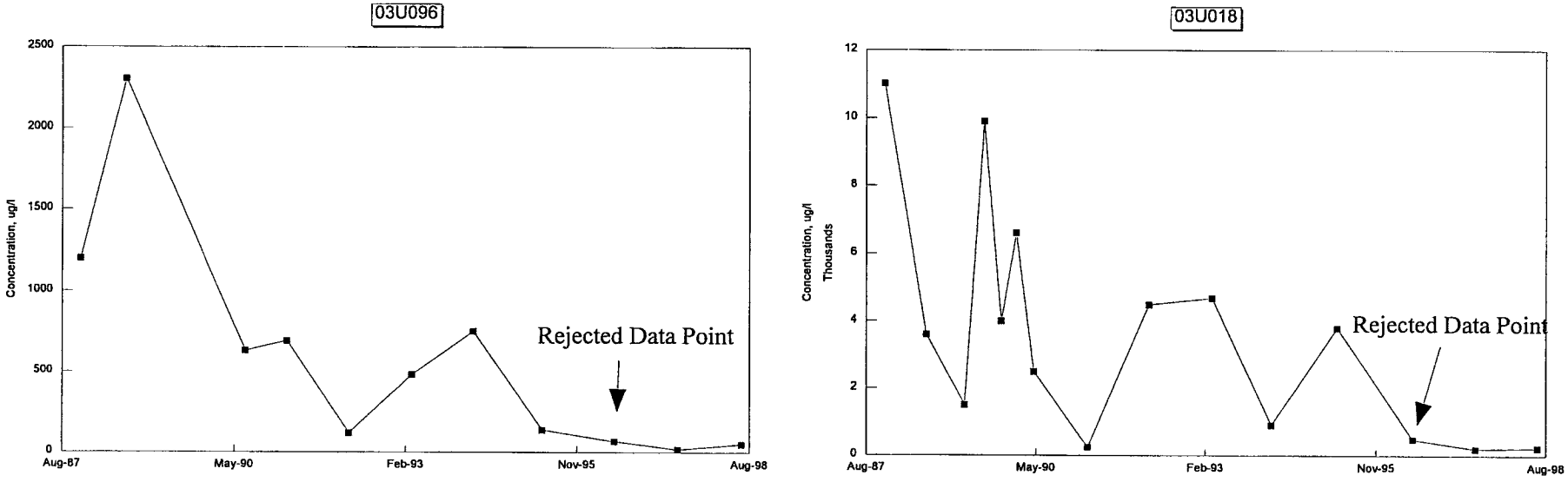


Figure 5-2
Wenck Associates, Inc.

SITE D, WELL 03U093, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

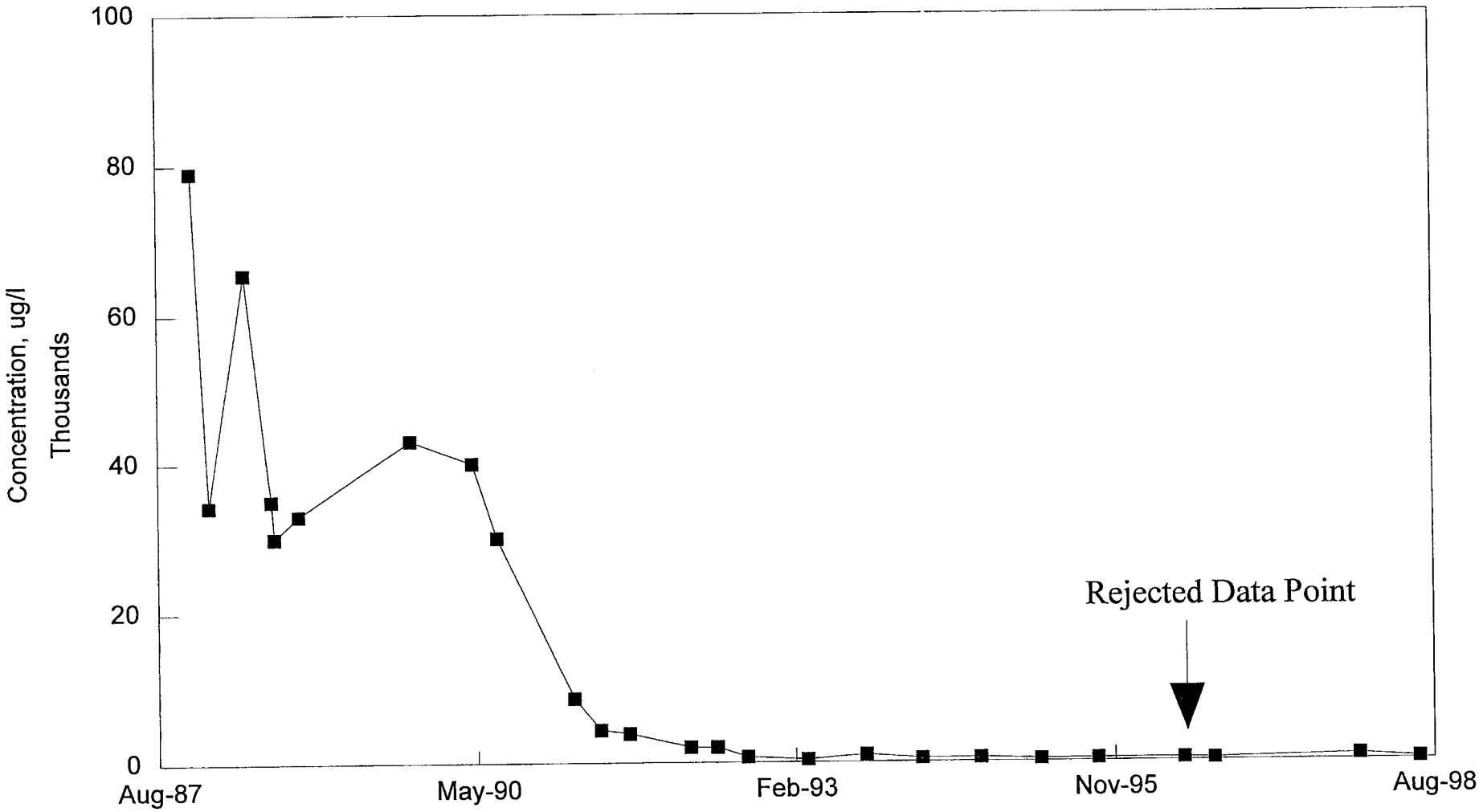


Figure 5-3
Wenck Associates, Inc.

SITE G, WELLS 03U014 & 03U094, TRICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNTION PLANT

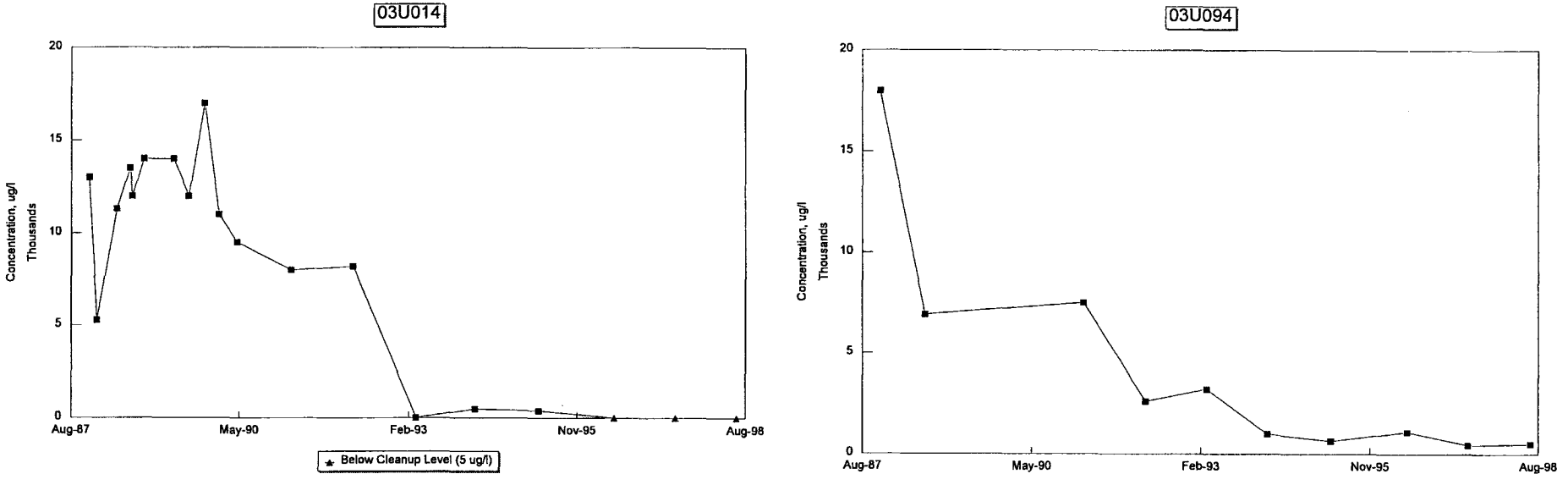


Figure 5-4
Wenck Associates, Inc.

SECTION 6

6.0 Operable Unit 2: Site A Shallow Groundwater

Shallow groundwater at Site A has been impacted by VOCs and antimony. The selected remedy in the OU2 ROD incorporates the use of a groundwater extraction system, which began operation May 31, 1994. The containment system consists of eight extraction wells installed along two lines downgradient of the source area. Extracted groundwater is discharged to the sanitary sewer for treatment at a Publicly-Owned Treatment Works (POTW). The ROD prescribes five major components of the remedy which are described and evaluated in the following sections.

6.1 REMEDY COMPONENT #1: GROUNDWATER MONITORING

Description: "Groundwater monitoring to track plume migration and remedy performance." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When a performance groundwater monitoring program has been established and on-going monitoring is in compliance with the program.

Is this remedy component being implemented?

Yes. Performance monitoring programs have been established to collect the data required for remedy components #2-#4 and evaluation of the overall remedy. Table 6-1 summarizes the performance monitoring requirements, responsible parties, and the documents which contain the monitoring plans.

Were the groundwater monitoring requirements for this remedy met?

Yes, with one note. The reporting limit, or Contract required detection limit (CRDL) for antimony (10 µg/l) is greater than the cleanup level of 6 µg/l. However, the method detection

limit (MDL) for antimony is 2.96 µg/l. The laboratory will report any values between the MDL and CRDL and flag them as estimated. No estimated values were reported for FY 1998. The FY 1998 Monitoring Plan is included as Appendix H.1 and explanations for missed monitoring are provided in Appendix B.2.

Is any groundwater sampling proposed prior to the next report? Yes.

- Groundwater sampling of water supply wells related to alternate water supply and well abandonment will be in accordance with recommendations in the 1996/1997 Well Inventory Update (CRA).
- Monitoring of the extraction wells (pumping volumes, water levels, and water quality) and treatment system effluent will be performed in accordance with Appendix H.2.
- Other groundwater monitoring will be in accordance with the Groundwater Monitoring Plan included as Appendix H.1.

Are any changes or additional actions required for this remedy component?
Yes. The method detection limit for antimony analysis needs to be less than 6 µg/l in order to compare the data to the cleanup level.

6.2 REMEDY COMPONENT #2: GROUNDWATER CONTAINMENT AND MASS REMOVAL

Description: "Use of existing gradient control wells to contain the contaminant plume and remove mass." (OU2 ROD, page 3)

- Eight recovery wells (01U351-01U358) were installed in two capture lines as shown on Figure 6-1. Seven of the eight recovery wells fully penetrate the

Unit 1 aquifer and range in depth from 31 to 48 feet, as shown in cross-section view on Figure 6-2. The one partially penetrating well, 01U353, was completed in silt to sandy clay units which were resistant to drilling and determined to be the top of Unit 2 by the field geologist. The well log does not note the presence of silt (Fuller, 1994). The partially penetrating well is illustrated on cross-section B-B' on Figure 6-2.

Performance Standard (how do you know when you're done):
When the extraction system is providing complete capture of all groundwater exceeding the cleanup levels specified in Table 1 of the OU2 ROD, and shown in Table 6-6 of this report.

Is the Site A groundwater extraction system providing complete capture of all groundwater exceeding the cleanup levels specified in Table 1 of the OU2 ROD?
Yes. Table 6-2 shows the monthly average pumping rate for each extraction well along with the target pumping rates for containment. The table shows that the average pumping rate for the entire system in FY 1998 was 29.5 gpm, which exceeds the flowrate of 25 gpm determined necessary to achieve containment.

Table 6-3 presents water level data collected during FY 1998 at Site A. Figure 6-3 presents a water level contour map using the data from late May 1998. Figure 6-3 shows the influence of pumping at the extraction wells during the summer of 1998, and supports the statement that the system is providing complete capture of all groundwater exceeding the Site A cleanup levels.

Were there any significant operation and maintenance problems in FY 1998 (greater than 24 hour shutdown)?
Yes. Table 6-4 summarizes O&M notes for FY 1998.

Are any changes or additional actions required for this remedy component? No.

6.3 REMEDY COMPONENT #3: DRILLING ADVISORY/ALTERNATE WATER SUPPLY/WELL ABANDONMENT

Description: "Institutional controls to restrict new well installations and provide alternate water supplies and well abandonment as necessary." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the MDH has issued a Special Well Construction Area Advisory and when well owners who qualify have been offered and provided with alternate water supply and/or have had their wells abandoned (or the offers have been rejected).

Is the remedy component being implemented?

Yes. The OU1 Alternate Water Supply and Well Abandonment Program is underway and was expanded to cover the area affected by the OU2 Site A Shallow Groundwater plume. See Section 3.1 of this report.

Has the MDH issued a Special Well Construction Area Advisory for the area impacted by Site A?

Yes, it was issued in June 1996.

Within the Site A plume, are there any well owners which meet the criteria but have not yet been provided an alternate water supply?

No.

Within the Site A plume, are there any wells which meet the criteria, but have not yet been abandoned?

No. The Gamradt residence (5567 Fairview Avenue) refused the Army's offer for abandonment so they will be excluded from future eligibility.

Did the boundary of the Site A plume get any bigger, as defined by the 1 µg/l contour?
No. Figure 6-4 shows the 1 µg/l contour line for 1,2-dichloroethene. There were no significant changes from last year.

Were any new water supply wells discovered within the Site A plume? No.

Were any water supply wells within the Site A plume sampled during FY 1998? No.

Were any well owners offered an alternate supply? No.

Were any wells offered abandonment?
Yes. The Gamradt residence (5567 Fairview Avenue) refused the Army's offer for abandonment and will be excluded from future eligibility.

Are there any alternate water supply hookups or well abandonments proposed prior to the next report? No.

Is any sampling of water supply wells proposed prior to the next report?
Yes. The proposed monitoring is presented in the 1996/1997 Well Inventory Update, prepared by CRA.

Are any changes or additional actions required for this remedy component? No.

6.4 REMEDY COMPONENT #4: DISCHARGE OF EXTRACTED WATER

Description: "Discharge of extracted groundwater to a publicly-owned treatment works (POTW)." (OU2 ROD, page 3)

- The recovered groundwater is piped to a sewer discharge manhole (Shoreview sanitary sewer discharge manhole #229) located approximately 150 feet north of the TCAAP boundary as shown on Figure 6-1. The recovered groundwater is conveyed via a City of Shoreview sanitary sewer to the Metropolitan Council Environmental Services (MCES) Treatment Plant located at 2400 Childs Road in St. Paul, Minnesota. Discharge is in accordance with Industrial Discharge Permit Number 2194 from the MCES.

Performance Standard (how do you know when you're done):
When the concentrations of contaminants in the extracted groundwater and the flow rate are below the criteria in the Special Discharge Permit as shown in Table 6-5.

During FY 1998, was the discharge water in compliance with the Industrial Discharge Permit requirements?
Yes. Table 6-5 shows that the effluent water quality was below the discharge criteria every month in FY 1998.

Is any sampling of the discharge water proposed prior to the next report?
Yes. In accordance with the permit requirements, the discharge will be sampled monthly for 1,2-dichloroethene; trichloroethene; tetrachloroethene; and total mercury, and annually for pH; Total Suspended Solids; and Chemical Oxygen Demand (see Appendix H.2).

Are any changes or additional actions required for this remedy component? No.

6.5 REMEDY COMPONENT #5: SOURCE CHARACTERIZATION/ REMEDIATION

Description: "Source characterization/remediation." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
For characterization, when the investigation has answered the questions needed to prepare remedial design documents. For remediation, when the contaminant concentrations in soil are below the cleanup levels specified in Table 1 of the OU2 ROD.

Is this remedy component being implemented?
Yes. Characterization work has been completed. Stone and Webster performed investigation work in 1997 and the final "Site A Investigation Report" was issued December 12, 1997. That report delineated the extent of both VOC-contaminated and metal-contaminated soils requiring remediation.

Remediation work has been implemented. Stone and Webster initiated removal of metal-contaminated soils in FY 1998 (see Section 4.1 of this report).

Is any characterization work or remediation work proposed prior to the next report?
Yes. Remediation of metals-contaminated soils will resume in Spring 1999 and an SVE system will be installed to address VOC-contaminated soil later in 1999.

Are any changes or additional actions required for this remedy component? No.

6.6 OVERALL REMEDY FOR SITE A SHALLOW GROUNDWATER

Performance Standard (how do you know when you're done):

When the cleanup levels in Table 1 of the OU2 ROD have been attained throughout the areal and vertical extent of the Site A plume within the anticipated ten-year lifespan of the remedy. If the remedy has not been completed within ten years, additional remedial measures will be addressed. (OU2 ROD, p. 54)

Has the Site A shallow groundwater remedy been completed (i.e., have the cleanup levels in Table 1 of the OU2 ROD been attained throughout the areal and vertical extent of the Site A plume)?

No. Table 6-6 shows the exceedances in wells at Site A during FY 1998. Table 6-6 indicates that the two primary areas remaining to be remediated are: in the vicinity of extraction well 01U353 for cis-1,2-dichloroethene, and in the vicinity of monitoring well 01U108 for tetrachloroethene and trichloroethene.

What impact is the groundwater extraction system having on contaminant concentrations?

Groundwater contaminant concentrations at Site A remained generally stable compared to last year's data. Some wells exhibited relatively small increases while others had decreases. All wells downgradient of the first line of extraction wells (01U351-354), including extraction wells (01U355-358), had water quality results remaining below the cleanup levels.

Figure 6-4 presents the FY 1998 contour map for 1,2-dichloroethene. Changes from FY 1997 are:

1. The concentration at 01U108 dropped below 10 µg/l, resulting in a shift of the 10 µg/l contour line.
2. The concentrations at 01U117 and 01U139 increased above 10 µg/l, resulting in a shift of the contour lines.

3. The concentration at extraction well 01U353 increased to 250 µg/l, resulting in the addition of a 100 µg/l contour line. The 100 µg/l contours had disappeared last year, but been present in years before that.

As a different perspective on the contaminant conditions, Figure 6-2 presents several cross-sections with 1,2-dichloroethene concentrations and contours showing the same changes described above.

Figures 6-5 through 6-10 present trend graphs of 1,2-dichloroethene; trichloroethene; and tetrachloroethene for representative wells:

- 01U102 - Near the suspected source area for the "South" plume
- 01U108 - Near the suspected source area for the "North" plume
- 01U902 - Downgradient of the recovery system for the "South" plume
- 01U115 - Downgradient of the recovery system for the "North" plume
- Extraction Wells 01U351 - 01U358 (1,2-dichloroethene only)

Most of the graphs exhibit stable or decreasing concentrations. However, at Extraction Well 01U353, the concentrations of 1,2-dichloroethene are increasing suggesting the arrival of a "slug" of contamination (Figure 6-9). It is interesting to note that upgradient of this well at 01U102, there appeared to be a "slug" of contamination passing through between 1990 and 1994 (Figure 6-5). Given the distance and velocities published in earlier reports, the travel time fits reasonably well with the arrival of higher contamination at 01U353.

How much VOC mass has been removed?

Table 6-7 shows the calculated VOC mass removal rates for the total effluent during FY 1998. The system removed nearly 6 pounds of VOCs in FY 1998, with a cumulative VOC mass removal of 26 pounds since system startup on May 31, 1994.

Has 10 years elapsed since signing of the OU2 ROD? No.

Do additional remedial measures need to be addressed?

No. In fact consideration should be given to shutting off some or all of the downgradient extraction wells (01U355-358). It is likely that the Army will make this proposal in a separate letter sometime in 1999.

Tables

Table 6-1

Summary of Site A Shallow Groundwater Monitoring Requirements

Remedy Component	Monitoring Requirements	Responsible Party	Documents Containing the Monitoring Plan
#1: Groundwater Monitoring	• Outlined below		
#2: Containment and Mass Removal	a. Pumping volumes and rates for each extraction well for comparison to design flowrates for containment	Army	Site A Monitoring Plan in the Annual Report
	b. Water levels from monitoring wells to draw contour maps showing the influences of pumping	Army	Site A Monitoring Plan in the Annual Report
	c. Water quality data for each extraction well to determine VOC mass removal	Army	Site A Monitoring Plan in the Annual Report
#3: Drilling Advisory/Alternate Water Supply/Well Abandonment	• See OU1, Remedy Component #1 which also includes the area north of Site A		
#4: Discharge of Extracted Water	a. Water quality data for total system effluent to demonstrate compliance with the Industrial Discharge Permit	Army	Site A Monitoring Plan in the Annual Report
#5: Source Characterization/ Remediation	• None		
OR Overall Remedy (Attainment of cleanup goals)	a. Water quality data throughout the Site A plume to evaluate attainment	Army	Site A Monitoring Plan in the Annual Report

Table 6-2

Site A Removal Action Pumping Data

Average Flow Rate (GPM)

Month	01U351	01U352	01U353	01U354	01U355	1-5 Subtotal	01U356	01U357	01U358	6-8 Subtotal	Total
Target GPM						**15.0**				**10.0**	**25.0**
Oct-97	4.7	4.0	4.3	4.1	4.6	21.7	4.8	1.6	4.6	11.0	32.7
Nov-97	4.4	3.7	4.1	3.4	4.2	19.8	3.4	1.5	4.5	9.4	29.2
Dec-97	3.3	2.8	4.1	3.5	4.1	17.8	4.2	1.3	4.2	9.7	27.5
Jan-98	1.4	3.6	4.5	4.2	4.6	18.3	3.8	1.5	4.5	9.8	28.1
Feb-98	3.1	3.7	4.3	3.8	4.3	19.2	4.5	1.6	4.3	10.4	29.6
Mar-98	4.4	3.0	4.0	3.6	4.4	19.4	4.3	1.8	5.2	11.3	30.7
Apr-98	4.1	3.4	3.6	4.2	4.3	19.6	4.0	1.2	4.2	9.4	29.0
May-98	5.0	3.7	3.9	4.8	3.6	21.0	4.5	1.5	5.1	11.1	32.1
Jun-98	4.4	3.6	3.2	4.2	3.4	18.8	4.2	1.3	4.6	10.1	28.9
Jul-98	2.7	3.7	3.6	4.5	3.4	17.9	4.3	1.5	4.5	10.3	28.2
Aug-98	3.5	3.3	3.6	3.8	3.6	17.8	4.8	1.6	5.5	11.9	29.7
Sep-98	2.8	3.7	4.3	3.9	3.2	17.9	4.2	1.6	4.1	9.9	27.8
FY98 Average	**3.7**	**3.5**	**4.0**	**4.0**	**4.0**	**19.1**	**4.3**	**1.5**	**4.6**	**10.4**	**29.5**

TABLE 6-3
Site A Groundwater Level Data: FY1998

Well	TOS (1) (ft)	Date	Qtr (2)	Groundwater Elev.(ft)
01U038	900.3	03-Dec-97	57 A	892.8
01U038	900.3	27-May-98	59 A	892.6
01U039	897.5	03-Dec-97	57 A	884.5
01U039	897.5	27-May-98	59 A	884.0
01U040	892.5	03-Dec-97	57 A	884.6
01U040	892.5	27-May-98	59 A	884.5
01U041	898.3	03-Dec-97	57 A	891.9
01U041	898.3	27-May-98	59 A	892.2
01U063	892.6	03-Dec-97	57 A	884.2
01U063	892.6	27-May-98	59 A	884.7
01U067	897.4	03-Dec-97	57 A	893.3
01U067	897.4	27-May-98	59 A	893.4
01U102	905.2	03-Dec-97	57 A	890.0
01U102	905.2	27-May-98	59 A	889.8
01U103	904.1	03-Dec-97	57 A	891.0
01U103	904.1	27-May-98	59 A	891.0
01U104	899.1	03-Dec-97	57 A	893.3
01U104	899.1	27-May-98	59 A	893.0
01U105	901.4	03-Dec-97	57 A	894.6
01U105	901.4	27-May-98	59 A	894.4
01U106	896.8	03-Dec-97	57 A	890.9
01U106	896.8	27-May-98	59 A	890.8
01U107	899.2	03-Dec-97	57 A	891.9
01U107	899.2	27-May-98	59 A	892.1
01U108	904.3	03-Dec-97	57 A	890.7
01U108	904.3	27-May-98	59 A	890.6
01U109	903.0	03-Dec-97	57 A	894.6
01U109	903.0	27-May-98	59 A	894.5
01U110	897.2	03-Dec-97	57 A	895.1
01U110	897.2	27-May-98	59 A	895.2
01U115	900.3	03-Dec-97	57 A	886.7
01U115	900.3	27-May-98	59 A	886.0
01U116	902.7	03-Dec-97	57 A	886.9
01U116	902.7	27-May-98	59 A	886.3
01U117	902.7	03-Dec-97	57 A	887.8
01U117	902.7	27-May-98	59 A	887.4
01U118	901.8	03-Dec-97	57 A	889.9
01U118	901.8	27-May-98	59 A	889.8
01U119	898.1	03-Dec-97	57 A	892.8
01U119	898.1	27-May-98	59 A	892.7
01U120	902.2	03-Dec-97	57 A	890.3
01U120	902.2	27-May-98	59 A	890.2
01U125	901.1	03-Dec-97	57 A	887.6
01U125	901.1	27-May-98	59 A	887.0
01U126	903.3	03-Dec-97	57 A	889.4
01U126	903.3	27-May-98	59 A	889.1
01U127	902.9	03-Dec-97	57 A	890.7
01U127	902.9	27-May-98	59 A	890.7
01U133	900.7	03-Dec-97	57 A	892.2
01U133	900.7	27-May-98	59 A	892.2
01U135	900.0	03-Dec-97	57 A	884.1
01U135	900.0	27-May-98	59 A	883.7
01U136	898.8	03-Dec-97	57 A	880.3
01U136	898.8	27-May-98	59 A	880.4
01U137	900.9	03-Dec-97	57 A	889.0
01U137	900.9	27-May-98	59 A	888.6
01U138	904.6	03-Dec-97	57 A	886.4
01U138	904.6	27-May-98	59 A	885.6
01U139	901.5	03-Dec-97	57 A	885.5
01U139	901.5	27-May-98	59 A	885.0
01U140	899.0	03-Dec-97	57 A	884.9
01U140	899.0	27-May-98	59 A	884.4
01U141	898.0	03-Dec-97	57 A	886.8
01U141	898.0	27-May-98	59 A	886.2
01U145	901.4	03-Dec-97	57 A	887.6
01U145	901.4	27-May-98	59 A	887.0
01U146	903.5	03-Dec-97	57 A	887.3
01U146	903.5	27-May-98	59 A	888.7
01U147	902.8	03-Dec-97	57 A	887.5
01U147	902.8	27-May-98	59 A	887.1
01U148	902.6	03-Dec-97	57 A	886.9
01U148	902.6	27-May-98	59 A	886.4
01U149	901.3	03-Dec-97	57 A	887.1
01U149	901.3	27-May-98	59 A	886.5
01U150	901.3	03-Dec-97	57 A	886.4
01U150	901.3	27-May-98	59 A	885.7
01U151	904.7	03-Dec-97	57 A	886.5
01U151	904.7	27-May-98	59 A	885.8
01U152	901.0	03-Dec-97	57 A	886.1
01U152	901.0	27-May-98	59 A	885.6
01U153	899.9	03-Dec-97	57 A	885.2
01U153	899.9	27-May-98	59 A	884.6
01U154	898.9	03-Dec-97	57 A	884.9
01U154	898.9	27-May-98	59 A	884.3
01U155	897.9	03-Dec-97	57 A	884.5
01U155	897.9	27-May-98	59 A	884.0
01U156	897.8	03-Dec-97	57 A	884.3
01U156	897.8	27-May-98	59 A	883.8
01U157	901.9	03-Dec-97	57 A	886.4
01U157	901.9	27-May-98	59 A	886.0
01U158	901.1	03-Dec-97	57 A	885.8
01U158	901.1	27-May-98	59 A	885.2
01U351	904.0	10-Oct-97	57 A	886.04 P
01U351	904.0	04-Nov-97	57 A	888.7
01U351	904.0	03-Dec-97	57 A	885.28 P
01U351	904.0	06-Jan-98	58 A	886.82 P
01U351	904.0	03-Feb-98	58 A	885.00 P
01U351	904.0	03-Mar-98	58 A	883.85 P
01U351	904.0	07-Apr-98	59 A	883.90 P
01U351	904.0	05-May-98	59 A	884.45 P
01U351	904.0	27-May-98	59 A	884.58 P
01U351	904.0	07-Jul-98	60 A	887.1

TABLE 6-3
Site A Groundwater Level Data: FY1998

Well	TOS (1) (ft)	Date	Qtr (2)	Groundwater Elev.(ft)
01U351	904.0	04-Aug-98	60 A	885.30 P
01U351	904.0	09-Sep-98	60 A	885.37 P
01U352	901.0	10-Oct-97	57 A	885.13 P
01U352	901.0	04-Nov-97	57 A	888.4
01U352	901.0	03-Dec-97	57 A	885.43 P
01U352	901.0	06-Jan-98	58 A	884.93 P
01U352	901.0	03-Feb-98	58 A	884.18 P
01U352	901.0	03-Mar-98	58 A	883.43 P
01U352	901.0	07-Apr-98	59 A	882.98 P
01U352	901.0	05-May-98	59 A	883.78 P
01U352	901.0	27-May-98	59 A	884.20 P
01U352	901.0	07-Jul-98	60 A	884.33 P
01U352	901.0	04-Aug-98	60 A	884.88 P
01U352	901.0	09-Sep-98	60 A	882.95 P
01U353	902.0	10-Oct-97	57 A	884.72 P
01U353	902.0	04-Nov-97	57 A	888.1
01U353	902.0	03-Dec-97	57 A	884.38 P
01U353	902.0	06-Jan-98	58 A	883.80 P
01U353	902.0	03-Feb-98	58 A	883.47 P
01U353	902.0	03-Mar-98	58 A	882.07 P
01U353	902.0	07-Apr-98	59 A	882.12 P
01U353	902.0	05-May-98	59 A	882.52 P
01U353	902.0	27-May-98	59 A	883.57 P
01U353	902.0	07-Jul-98	60 A	883.27 P
01U353	902.0	04-Aug-98	60 A	883.32 P
01U353	902.0	09-Sep-98	60 A	880.76 P
01U354	903.8	10-Oct-97	57 A	886.25 P
01U354	903.8	04-Nov-97	57 A	887.9
01U354	903.8	03-Dec-97	57 A	885.86 P
01U354	903.8	06-Jan-98	58 A	884.93 P
01U354	903.8	03-Feb-98	58 A	884.77 P
01U354	903.8	03-Mar-98	58 A	883.72 P
01U354	903.8	07-Apr-98	59 A	883.87 P
01U354	903.8	05-May-98	59 A	884.42 P
01U354	903.8	27-May-98	59 A	884.46 P
01U354	903.8	07-Jul-98	60 A	884.42 P
01U354	903.8	04-Aug-98	60 A	884.97 P
01U354	903.8	09-Sep-98	60 A	884.75 P
01U355	899.9	10-Oct-97	57 A	881.76 P
01U355	899.9	04-Nov-97	57 A	887.1
01U355	899.9	03-Dec-97	57 A	880.76 P
01U355	899.9	06-Jan-98	58 A	880.30 P
01U355	899.9	03-Feb-98	58 A	880.63 P
01U355	899.9	03-Mar-98	58 A	878.98 P
01U355	899.9	07-Apr-98	59 A	878.33 P
01U355	899.9	05-May-98	59 A	880.78 P
01U355	899.9	27-May-98	59 A	880.88 P
01U355	899.9	07-Jul-98	60 A	881.23 P
01U355	899.9	04-Aug-98	60 A	881.03 P
01U355	899.9	09-Sep-98	60 A	880.98 P
01U356	899.5	10-Oct-97	57 A	879.65 P
01U356	899.5	04-Nov-97	57 A	886.3
01U356	899.5	03-Dec-97	57 A	878.74 P
01U356	899.5	06-Jan-98	58 A	878.77 P
01U356	899.5	03-Feb-98	58 A	878.00 P
01U356	899.5	03-Mar-98	58 A	877.10 P
01U356	899.5	07-Apr-98	59 A	876.40 P
01U356	899.5	05-May-98	59 A	877.15 P
01U356	899.5	27-May-98	59 A	877.35 P
01U356	899.5	07-Jul-98	60 A	877.75 P
01U356	899.5	04-Aug-98	60 A	877.05 P
01U356	899.5	09-Sep-98	60 A	877.30 P
01U357	899.1	10-Oct-97	57 A	884.11 P
01U357	899.1	04-Nov-97	57 A	885.6
01U357	899.1	03-Dec-97	57 A	880.69 P
01U357	899.1	06-Jan-98	58 A	880.81 P
01U357	899.1	03-Feb-98	58 A	879.48 P
01U357	899.1	03-Mar-98	58 A	883.3
01U357	899.1	07-Apr-98	59 A	877.48 P
01U357	899.1	05-May-98	59 A	878.53 P
01U357	899.1	27-May-98	59 A	880.53 P
01U357	899.1	07-Jul-98	60 A	878.33 P
01U357	899.1	04-Aug-98	60 A	878.53 P
01U357	899.1	09-Sep-98	60 A	877.57 P
01U358	898.3	10-Oct-97	57 A	880.78 P
01U358	898.3	04-Nov-97	57 A	885.1
01U358	898.3	03-Dec-97	57 A	880.36 P
01U358	898.3	06-Jan-98	58 A	879.45 P
01U358	898.3	03-Feb-98	58 A	879.55 P
01U358	898.3	03-Mar-98	58 A	878.60 P
01U358	898.3	07-Apr-98	59 A	877.65 P
01U358	898.3	05-May-98	59 A	872.22 P
01U358	898.3	27-May-98	59 A	875.25 P
01U358	898.3	07-Jul-98	60 A	875.45 P
01U358	898.3	04-Aug-98	60 A	875.45 P
01U358	898.3	09-Sep-98	60 A	875.56 P
01U901	901.5	03-Dec-97	57 A	883.7
01U901	901.5	27-May-98	59 A	883.4
01U902	901.3	03-Dec-97	57 A	885.7
01U902	901.3	27-May-98	59 A	885.2
01U903	903.7	03-Dec-97	57 A	887.5
01U903	903.7	27-May-98	59 A	887.0
01U904	899.4	03-Dec-97	57 A	884.4
01U904	899.4	27-May-98	59 A	884.0

Notes: (1) TOS= Top of Surface which represents the ground surface elevation in feet above mean sea level (MSL). The TOS elevations were retrieved from USAEC IRDMIS. All data are referenced to TOS elevations surveyed by Kemper and Associates, Inc. during July through September 1992.

(2) Qtr= Quarter. Under this heading, A=Alliant Technsystems, Inc., the party responsible for data collection.

P= Pumping

Table 6-4

TCAAP - SITE A
OPERATION AND MAINTENANCE NOTES
FISCAL YEAR 1998

October

10/6/97 - EW2 and EW3 pumps and motors were replaced, having failed at the end of September. Down Time: 168.0 hours
10/17/97 - EW2 and EW7 control valves had failed and were replaced with globe valves. Down Time: 2.1 hours

November

11/01-04/97 - Extraction system shut down for scheduled acidification and cleaning. Down Time: 96.0 hours
11/15-21/97 - EW6 pump and motor had failed and were replaced. Down Time: 95.5 hours
11/18-19/97 - EW4 was shut down to repair leaking at the pressure gauge. Down Time: 21.0 hours

December

12/08-12/97 - EW7 pump and motor had failed and were replaced just before the scheduled cleaning. Down Time: 132.0 hours
12/12/97 - The system was shut down for scheduled acidification and cleaning. Down Time: 101.0 hours
12/18/97 - The flowmeter on EW4 had failed on 12/17/98 and was replaced. Down Time: 1.0 hour

January

01/09/98 - EW4 control valve was replaced with a globe valve. Down Time: 0.5 hour
01/19-21/98 - EW6 pump and motor had failed and were replaced. Down Time: 66.0 hours
01/23/98 - EW1 control valve was replaced with a globe valve. Down Time: 0.5 hour
01/27/98 - EW2 and EW6 had tripped the circuit breakers, which were reset. Down Time: 10.0 hours
01/29/98 - EW6 had tripped the circuit breaker, which was reset. Down Time: 18.0 hours
01/30/98 - 2/03/98 - The system was shut down for scheduled acidification and cleaning. January Down Time: 37.0 hours

February

01/30/98 - 02/03/98 - The system was shut down for scheduled acidification and cleaning. February Down Time: 64 hours
02/14-20/98 - EW1 pump and motor had failed and were replaced. Down Time: 168 hours

March

03/04-06/98 - EW7 pump and motor had failed and were replaced. Down Time: 68.0 hours
03/12-13/98 - EW4 pump and motor had failed and were replaced. Down Time: 30.0 hours
03/13-17/98 - The system was shut down for scheduled acidification and cleaning. Down Time: 98.0 hours
03/27-4/2/98 - EW2 pump and motor failed, and were replaced. March Down Time: 142 hours

Source: Conestoga-Rovers and Associates

Table 6-4

TCAAP - SITE A
OPERATION AND MAINTENANCE NOTES
FISCAL YEAR 1998

April
04/21/98 - EW1-4, and EW8 pressure gauges were broken and were replaced. Down Time: None
04/24-28/98 - The system was shut down for scheduled acidification and cleaning. Down Time: 96.5 hours
04/29-30/98 - The system was shut down for additional base treatment of the wells. Down Time: 28.0 hours

May
05/13/98 - Extraction wells EW2, EW4, EW6, and EW7 had tripped their overload circuits and were reset. Down Time: 76 hours
05/18-19/98 - Pumps and motors at extraction wells EW3 and EW5 had failed and were replaced. Down Time: EW3 - 50 hours, EW5 - 96 hours

June
06/05-09/98 - The system was shut down for scheduled acidification and cleaning. Down Time: 101.5 hours
06/25/98 - EW5 and EW6 were off and the overload circuit breakers were reset. Down Time: 6.0 hours
06/26-07/01/98 - EW7 pump and motor had failed and were replaced. Down Time: 102.0 hours

July
07/01-08/98 - EW1 pump and motor had failed and were replaced. Down Time: 158.0 hours
07/17-21/98 - The system was shut down for scheduled acidification and cleaning, and repairs to EW7. Down Time: 104.5 hours, EW7 152.0 hour
07/29/98 - Pressure gauge at EW7 had failed and was replaced. Down Time: 0.0 Hours

August
08/28-31/98 - The system was shut down for scheduled acidification and cleaning. Down Time: 91.5 hours
08/31-09/03/98 - EW6 and EW7 pumps and motors had failed and were replaced. EW1 was reset without repair. Down Time: 70.5 hours

September
09/03-04/98 - The system was treated with a base solution to further clean the wells after the acid treatment. Down Time: 16.5 hours
09/04/98 - EW7 pump and motor had failed during the base cleaning and were replaced. Down Time: 0.0 additional hours

TABLE 6-5

Site A Revoval Action Effluent Water Quality

Site ID	Sample Date	1,2-Dichloroethene (ug/l)	Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	Mercury (ug/l)	Total Suspended Solids (ug/l)	Chemical Oxygen Demand (ug/l)
DISCHARGE CRITERIA		3,000	3,000	3,000	100	None	None
EFFLUENT-A	07-Oct-97	35.10	<0.75	1.82	<0.10		
EFFLUENT-A	04-Nov-97	50.80	<0.75	1.54	<0.10		
EFFLUENT-A	02-Dec-97	27.70	<0.75	1.18	<0.10		
EFFLUENT-A	06-Jan-98	47.10	<0.75	2.73	0.10		
EFFLUENT-A	03-Feb-98	129.00	<0.75	3.71	<0.10		
EFFLUENT-A	03-Mar-98	29.00	<0.75	1.14	<0.10		
EFFLUENT-A	07-Apr-98	34.40	<0.75	2.43	<0.10		
EFFLUENT-A	05-May-98	34.80	<0.75	1.89	<0.10		
EFFLUENT-A	02-Jun-98	36.10	<0.75	1.42	<0.10	<4000.00 JP	93100.00
EFFLUENT-A	07-Jul-98				<0.10		
EFFLUENT-A	28-Jul-98	34.10	<0.75	1.19			
EFFLUENT-A	04-Aug-98	37.40	<0.75	0.91	<0.10		
EFFLUENT-A	08-Sep-98	41.70	<0.75	1.84	0.2		

Notes: JP = The value is below the method detection level, but above the instrument detection level.

TABLE 6-6
Site A Groundwater Quality Data: FY 1998

Site ID	Sample Date	Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethene (ug/l)	1,2-Dichloroethane (ug/l)	Chloroform (ug/l)	Benzene (ug/l)	Antimony (ug/l)
Site A Cleanup Level(1)		7.0	30.0	6.0	70 (2)	4.0	60.0	10.0	6.0
01U039	04-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U102	08-Dec-97	2.82	<0.56	<1.70	<0.76	<1.10	<0.50		
01U102	05-Jun-98	2.22	<0.56	<1.70	1.40	<1.10	<0.50		
01U103	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U108	03-Dec-97	170.00	106.00	<1.70	22.20	<1.10	<0.50		
01U108	05-Jun-98	127.00	33.50	<1.70	6.63	<1.10	<0.50		
01U115	03-Dec-97	1.74	0.66	<1.70	<0.76	<1.10	<0.50		
01U115	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U116	03-Dec-97	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U116	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U116 D	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U117	03-Dec-97	4.02	3.22	<1.70	14.80	<1.10	<0.50		
01U117	05-Jun-98	4.76	1.93	<1.70	16.20	<1.10	<0.50		
01U125	08-Dec-97	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U125	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U126	05-Jun-98	22.00	<0.56	<1.70	<0.76	<1.10	<0.50		
01U135	04-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U138	08-Dec-97	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U138	05-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U139	03-Dec-97	<0.75	0.64	<1.70	8.23	<1.10	<0.50		
01U139 D	03-Dec-97	<0.75	0.85	<1.70	8.82	<1.10	<0.50		
01U139	08-Jun-98	<0.75	0.65	<1.70	10.30	<1.10	<0.50		
01U139 D	08-Jun-98	<0.75	<0.56	<1.70	10.30	<1.10	<0.50		
01U140	03-Dec-97	<0.75	<0.56	<1.70	4.88	<1.10	<0.50		
01U140	08-Jun-98	<0.75	<0.56	<1.70	5.48	<1.10	<0.50		
01U157	05-Dec-97	<0.75	<0.56	<1.70	3.00	<1.10	<0.50		
01U157	05-Jun-98	<0.75	0.87	<1.70	5.28	<1.10	<0.50		
01U158	05-Dec-97	<0.75	<0.56	<1.70	1.52	<1.10	<0.50		
01U158	05-Jun-98	<0.75	<0.56	<1.70	0.95	<1.10	<0.50		
01U351	05-Dec-97	<0.75	1.26	<1.70	1.22	<1.10	<0.50		
01U351	12-Jun-98	<0.75	1.38	<1.70	0.88	<1.10	<0.50		
01U351	12-Jun-98								<10.00
01U352	05-Dec-97	3.35	6.70	<1.70	76.50	<1.10	<0.50		
01U352	12-Jun-98	2.70	6.00	<1.70	62.60	<1.10	<0.50		
01U352	12-Jun-98								<10.00

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TABLE 6-6
Site A Groundwater Quality Data: FY 1998

Site ID	Sample Date	Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethene (ug/l)	1,2-Dichloroethane (ug/l)	Chloroform (ug/l)	Benzene (ug/l)	Antimony (ug/l)
Site A Cleanup Level(1)		7.0	30.0	6.0	70 (2)	4.0	60.0	10.0	6.0
01U353	05-Dec-97	<0.75	2.32	<1.70	114.00	<1.10	<0.50		
01U353	12-Jun-98	<0.75	2.08	<1.70	250.00	<1.10	<0.50		
01U353	12-Jun-98								<10.00
01U354	05-Dec-97	<0.75	<0.56	<1.70	1.33	<1.10	<0.50		
01U354	12-Jun-98	<0.75	<0.56	<1.70	1.48	<1.10	<0.50		
01U354	12-Jun-98								<10.00
01U355	05-Dec-97	<0.75	<0.56	<1.70	9.72	<1.10	<0.50		
01U355	12-Jun-98	<0.75	<0.56	<1.70	9.65	<1.10	<0.50		
01U355	12-Jun-98								<10.00
01U356	05-Dec-97	<0.75	<0.56	<1.70	8.99	<1.10	<0.50		
01U356	12-Jun-98	<0.75	<0.56	<1.70	8.76	<1.10	<0.50		
01U356	12-Jun-98								<10.00
01U357	05-Dec-97	<0.75	<0.56	<1.70	8.10	<1.10	<0.50		
01U357	12-Jun-98	<0.75	<0.56	<1.70	10.60	<1.10	<0.50		
01U357	12-Jun-98								<10.00
01U358	05-Dec-97	<0.75	<0.56	<1.70	5.40	<1.10	<0.50		
01U358 D	05-Dec-97	<0.75	<0.56	<1.70	5.78	<1.10	<0.50		
01U358	12-Jun-98	<0.75	<0.56	<1.70	5.94	<1.10	<0.50		
01U358	12-Jun-98								<10.00
01U901	09-Dec-97	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U901	08-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U902	04-Dec-97	<0.75	<0.56	<1.70	27.00	<1.10	<0.50		
01U902	08-Jun-98	<0.75	<0.56	<1.70	19.80	<1.10	<0.50		
01U902	08-Jun-98							JP 0.24	
01U902	08-Jun-98								<10.00
01U903	09-Dec-97	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U903	08-Jun-98	<0.75	<0.56	<1.70	<0.76	<1.10	<0.50		
01U904	04-Dec-97	<0.75	<0.56	<1.70	2.70	<1.10	<0.50		
01U904	08-Jun-98	<0.75	<0.56	<1.70	3.71	<1.10	<0.50		
01U904	08-Jun-98							<1.00	
01U904	08-Jun-98								<10.00

Notes: (1) Cleanup levels for Site A Shallow Groundwater are from Table 1 of the OU2 ROD. Shading indicates exceedance of the cleanup level or detection limits higher than the cleanup level.

(2) Cleanup level is for the cis-isomer, while the data is total.

JP The value is below the method detection level, but above the instrument detection level.

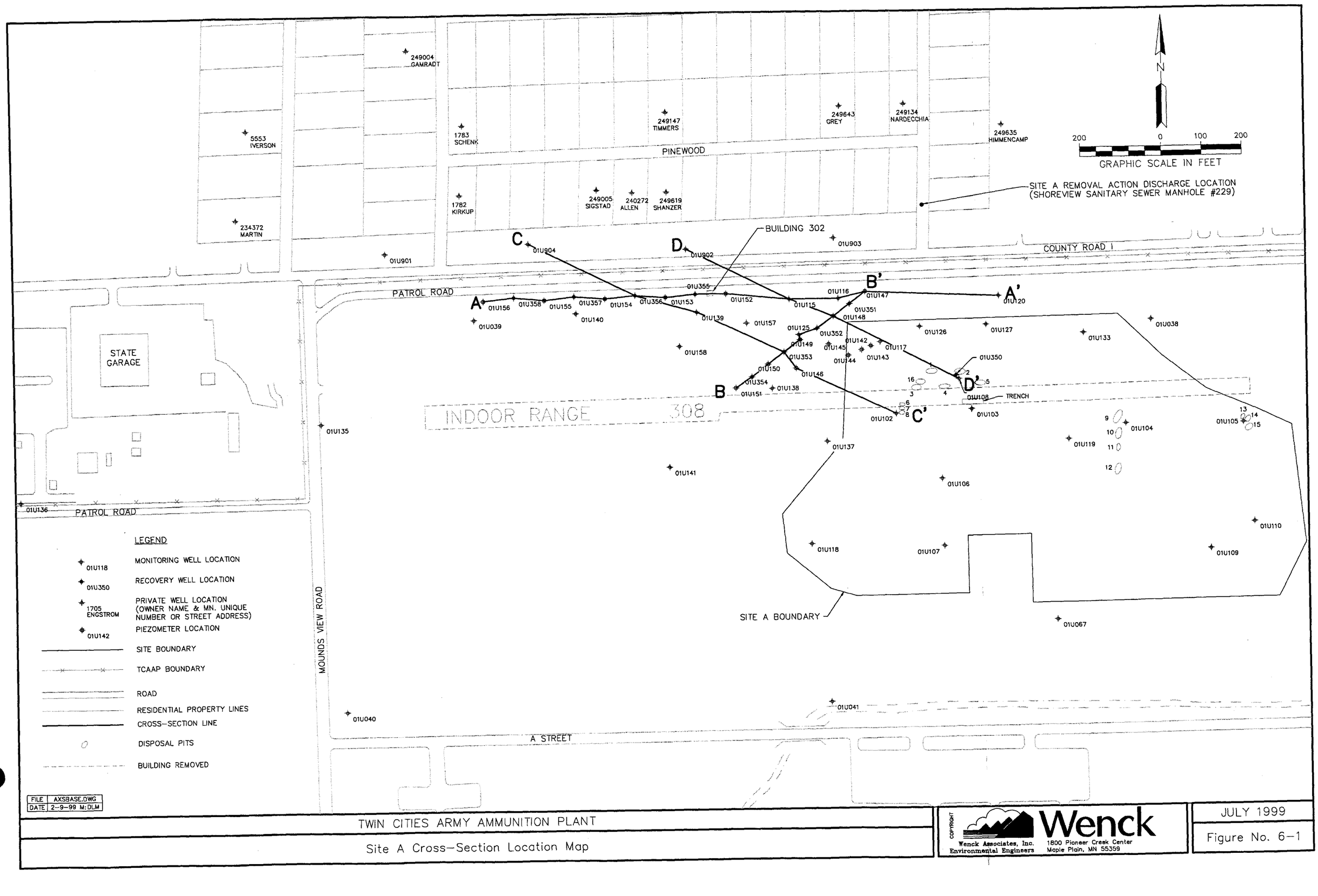
Table 6-7

Site A Removal Action
Summary of VOC Removal
FY 1998

Date	*Water Pumped (gal)*	*Conversion Factor*	*1,2-DCE Effluent (µg/L)*	*1,2-DCE Removed (lbs)*	*TRCLE Effluent (µg/L)*	*TRCLE Removed (lbs)*	*Total VOCs Removed (lbs)*
cumulative totals up to 09/02/97	58,513,015			19.93		0.64	20.57
10/07/97	1,345,740	8.35E-09	32.6	0.37	1.66	0.02	0.38
11/04/97	1,178,780	8.35E-09	47.2	0.46	1.40	0.01	0.48
12/02/97	1,355,040	8.35E-09	25.8	0.29	1.07	0.01	0.30
01/06/98	1,394,640	8.35E-09	43.8	0.51	2.48	0.03	0.54
02/03/98	993,110	8.35E-09	120.0	1.00	3.38	0.03	1.02
03/03/98	1,350,330	8.35E-09	27.0	0.30	1.04	0.01	0.32
04/07/98	1,572,520	8.35E-09	32.0	0.42	2.21	0.03	0.45
05/05/98	1,118,250	8.35E-09	32.4	0.30	1.72	0.02	0.32
06/02/98	1,295,250	8.35E-09	33.6	0.36	1.29	0.01	0.38
07/28/98	2,286,000	8.35E-09	31.7	0.61	1.08	0.02	0.63
08/04/98	315,900	8.35E-09	34.8	0.09	0.82	0.00	0.09
09/09/98	1,430,480	8.35E-09	38.8	0.46	1.67	0.02	0.48
09/30/98	917,830	8.35E-09	38.8	0.30	1.67	0.01	0.31
CUMULATIVE TOTALS:	75,066,885			25.41		0.87	26.28

Source: Conestoga-Rovers and Associates

Figures



TWIN CITIES ARMY AMMUNITION PLANT

Site A Cross-Section Location Map

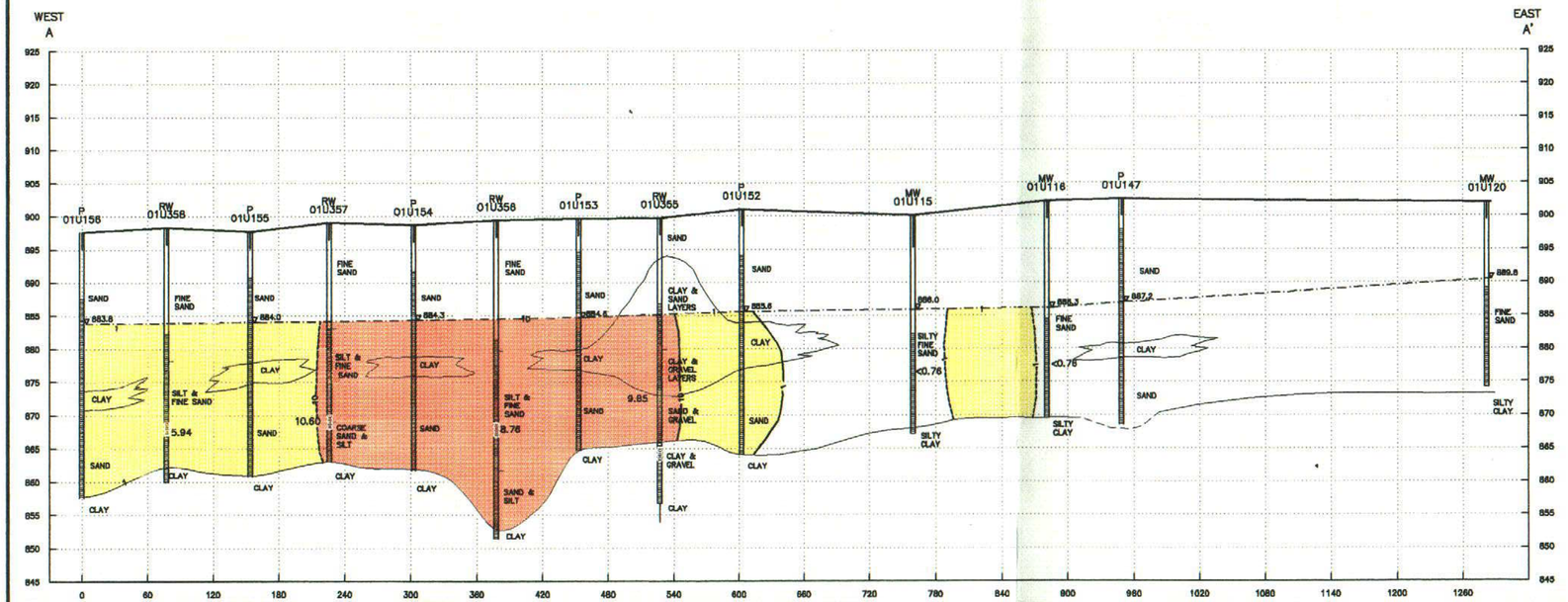
Wenck

Wenck Associates, Inc. Environmental Engineers

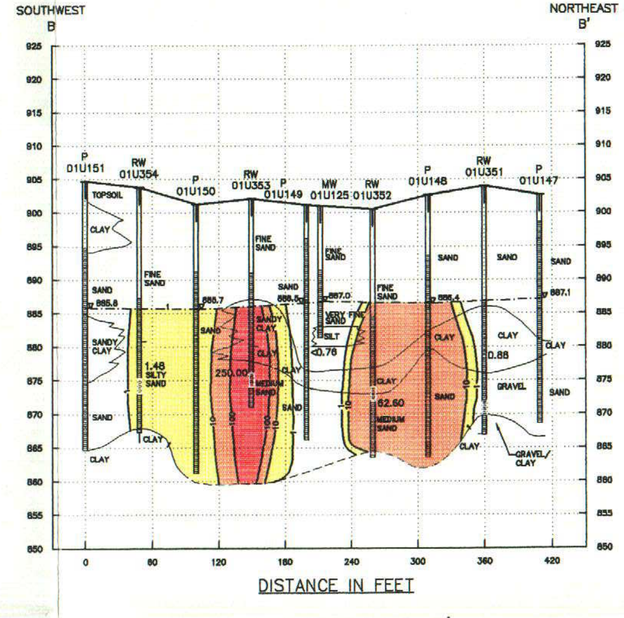
1800 Pioneer Creek Center Maple Plain, MN 55359

JULY 1999

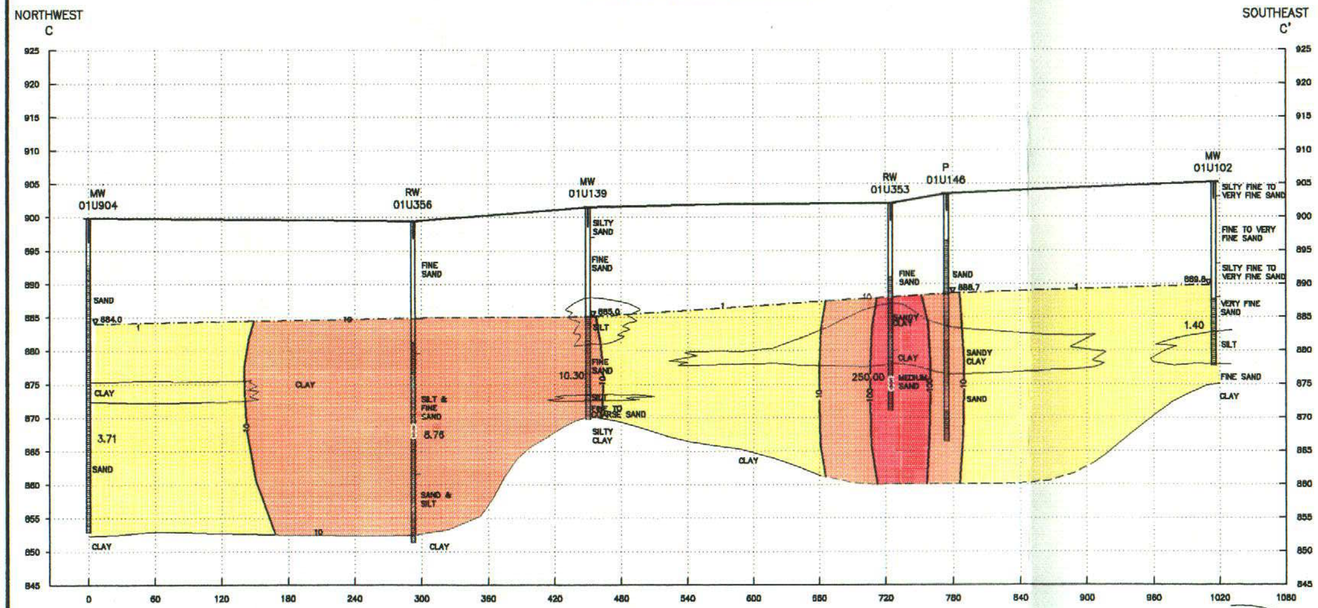
Figure No. 6-1



CROSS SECTION A–A'



CROSS SECTION B–B'



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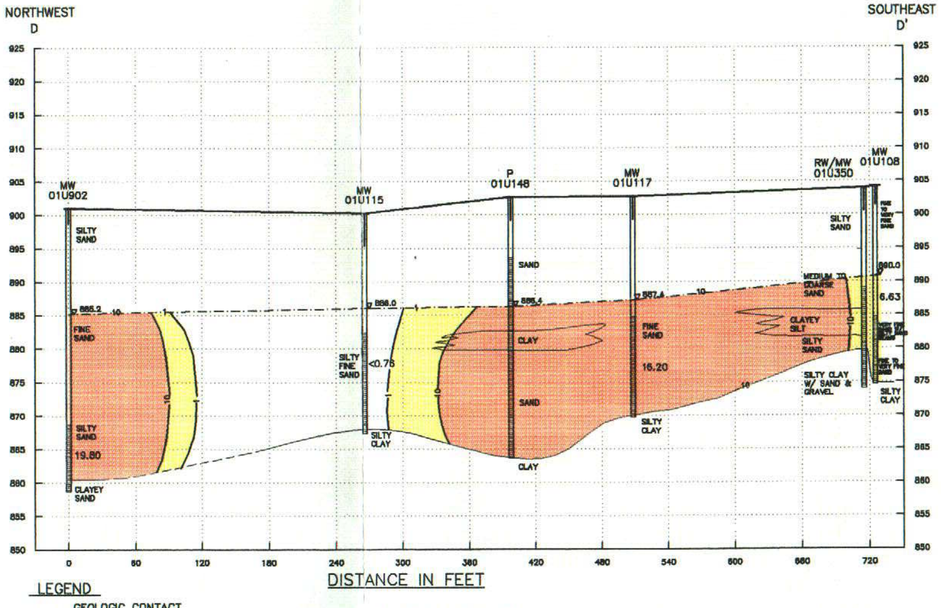


CROSS SECTION D–D'

NOTE:

1. ALL WATER LEVEL AND QUALITY DATA IS FROM QTR. 59
2. WELL 01U350 WAS USED AS A RECOVERY WELL UNTIL JUNE 1994 WHEN THE PUMP WAS REMOVED AND THE WELL BEGAN BEING USED AS A MONITORING WELL.
3. DATA ON RECOVERY WELLS AND PIEZOMETERS WAS GENERATED BY DAHL AND ASSOCIATES, INC. AS PART OF THE SITE A REMOVAL ACTION SYSTEM CONSTRUCTION. DATA ON MONITORING WELLS PROVIDED BY FEDERAL CARTRIDGE COMPANY.
4. WATER QUALITY SAMPLES COLLECTED FROM RECOVERY WELLS ARE RECOGNIZED TO BE DILUTED AND ARE NOT MEANT TO REPRESENT ABSOLUTE CONCENTRATIONS.

LEGEND

- GEOLOGIC CONTACT
- INFERRED GEOLOGIC CONTACT
- SCREENED INTERVAL OF WELL
- PUMP LOCATION
- 1,2–DICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- ISOCONCENTRATION CONTOUR (ug/l)
- WATER LEVEL SURFACE
- SLIGHT CHANGE IN GEOLOGIC UNIT (MARK LOCATED ALONG WELL STAFF)
- MW — MONITORING WELL
- RW — RECOVERY WELL
- P — PIEZOMETER

FILE TCAX0184.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

Site A, 1,2–Dichloroethene Cross Sections A–A', B–B', C–C', D–D', Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 6–2

NOTES:

1. THE LOCATION AND EXTENT OF DISPOSAL PITS, TRENCH, AND BURIAL AREA WERE OBTAINED FROM INSTALLATION RESTORATION PROGRAM REMEDIAL INVESTIGATION REPORT FOR THE TWIN CITIES ARMY AMMUNITION PLANT DATED APRIL 1991.
2. THE WATER LEVEL DATA FOR RECOVERY WELLS IS SHOWN IN PARENTHESES, BUT WAS NOT USED FOR CONTOURING PURPOSES.

SCHUTTA
FAIRVIEW
ALDINE
TERRACE
PINEWOOD
PATROL ROAD
COUNTY ROAD I
A STREET
MOUNDS VIEW ROAD
INDOOR RANGE 308
STATE GARAGE
SITE A REMOVAL ACTION BUILDING 302
SITE A REMOVAL ACTION DISCHARGE LOCATION (SHOREVIEW SANITARY SEWER MANHOLE #229)
CAPTURE BOUNDARY
SITE A BOUNDARY
249152 BOYLE
249145 AULICH
249149 BONA
249621 STENGER
1705 ENGSTROM
249004 GAMRADT
5553 IVERSON
1783 SCHENK
249147 TIMMERS
249643 GREY
249134 NARDECCHIA
249635 HIMMENCAMP
1782 KIRKUP
249005 SIGSTAD
240272 ALLEN
249619 SHANZER
234372 MARTIN
883.36 01U901
883.99 01U904
885.22 01U902
887.04 01U903
890.21 01U120
890.68 01U121
892.62 01U038
892.16 01U133
889.09 01U126
890.63 01U108
890.98 01U103
893.04 01U104
894.37 01U105
892.72 01U119
890.82 01U106
895.16 01U110
894.46 01U109
889.80 01U118
892.09 01U107
893.36 01U067
892.15 01U041
884.52 01U040
884.65 01U063
880.37 01U136
883.88 01U135
883.98 01U039
883.80 01U156
(875.25) 01U358
(880.53) 01U352
(877.35) 01U356
(880.88) 01U355
884.36 01U140
884.30
885.15 01U158
885.95 01U067
885.97 01U125
886.04 01U115
886.30 01U116
887.08 01U147
(884.58) 01U354
(884.20) 01U352
887.35 01U117
885.67 01U138
(883.57) 01U357
886.98 01U144
888.65 01U146
885.64 01U134
(884.46) 01U353
885.75
889.70 01U102
888.58 01U137
886.20 01U141
01U350
01U351
01U352
01U353
01U354
01U355
01U356
01U357
01U358

LEGEND

- 01U118 — MONITORING WELL LOCATION
- 01U351 — RECOVERY WELL LOCATION
- 1705 ENGSTROM — PRIVATE WELL LOCATION (OWNER NAME & MN UNIQUE NUMBER OR STREET ADDRESS)
- 01U142 — PIEZOMETER LOCATION
- SITE BOUNDARY
- TCAAP BOUNDARY
- EPHEMERAL DRAINAGE
- ROAD
- RESIDENTIAL PROPERTY LINES
- CROSS-SECTION LINE
- 892.2 01U118 — GROUNDWATER ELEVATION (FEET)
- GROUNDWATER ELEVATION CONTOUR (FEET)
- DISPOSAL PITS
- APPROXIMATE LIMIT OF CAPTURE
- BUILDING REMOVED

FILE AH2OP.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

Site A, Unit 1, Potentiometric Map – Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 6-3

NOTES:

1. THE LOCATION AND EXTENT OF DISPOSAL PITS, TRENCH, AND BURIAL AREA WERE OBTAINED FROM INSTALLATION RESTORATION PROGRAM REMEDIAL INVESTIGATION REPORT FOR THE TWIN CITIES ARMY AMMUNITION PLANT DATED APRIL 1991.
2. WATER SAMPLES COLLECTED FROM RECOVERY WELLS 01U351 – 01U358 CAN BE DILUTED AND ARE NOT MEANT TO REPRESENT ABSOLUTE CONCENTRATIONS.

SCHUTTA

FAIRVIEW

ALDINE

TERRACE

PINEWOOD

PATROL ROAD

COUNTY ROAD I

MOUNDS VIEW ROAD

A STREET

STATE GARAGE

INDOOR RANGE 308

SITE A REMOVAL ACTION BUILDING 302

SITE A REMOVAL ACTION DISCHARGE LOCATION (SHOREVIEW SANITARY SEWER MANHOLE #229)

SOUTH PLUME

NORTH PLUME

SITE A

SITE A BOUNDARY

LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- PRIVATE WELL LOCATION (OWNER NAME & MN. UNIQUE NUMBER OR STREET ADDRESS)
- PIEZOMETER LOCATION
- SITE BOUNDARY
- TCAAP BOUNDARY
- EPHEMERAL DRAINAGE
- ROAD
- RESIDENTIAL PROPERTY LINES
- CROSS–SECTION LINE
- 1,2–DICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- ISOCONCENTRATION CONTOUR (ug/l)
- ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- DISPOSAL PITS
- BUILDING REMOVED

FILE A12DCEP.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

Site A, Unit 1 1,2–Dichloroethene Isoconcentration Map, Summer 1998 (Q59)

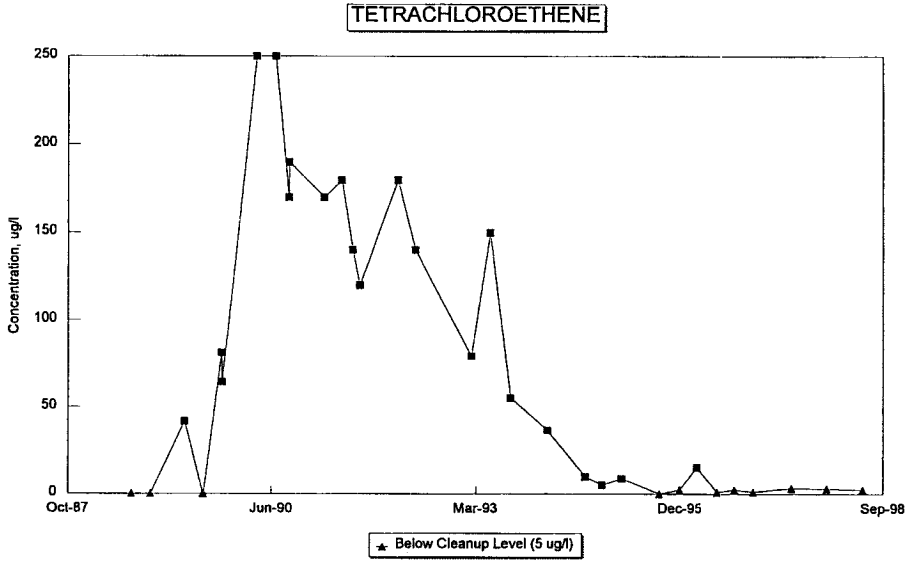
Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

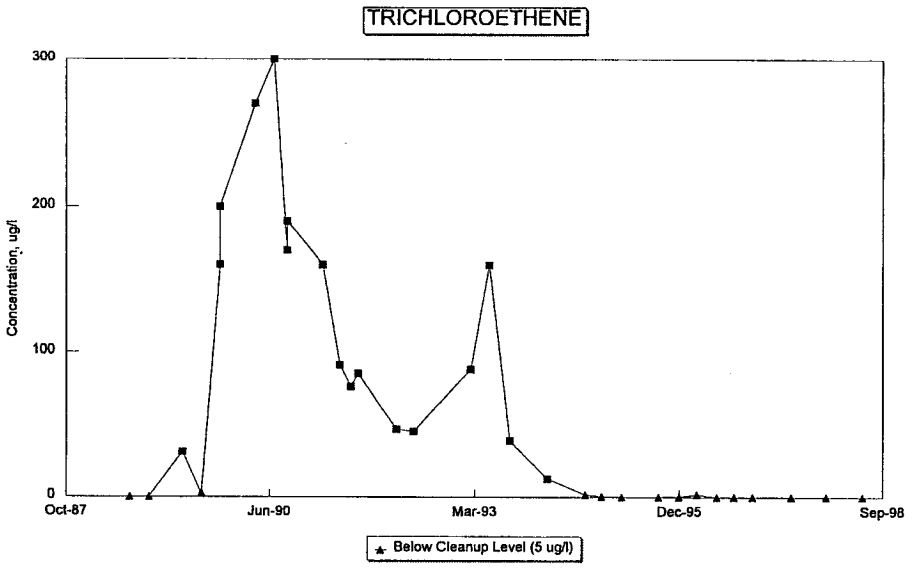
JULY 1999

Figure 6–4

SITE A, WELL 01U102, TETRACHLOROETHENE, TRICHLOROETHENE, 1,2-DICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNITION PLANT





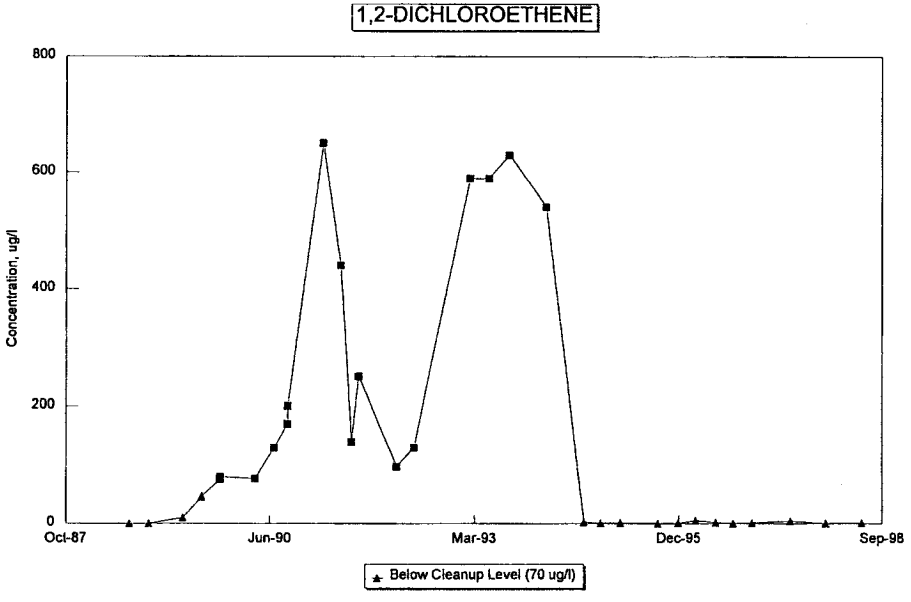
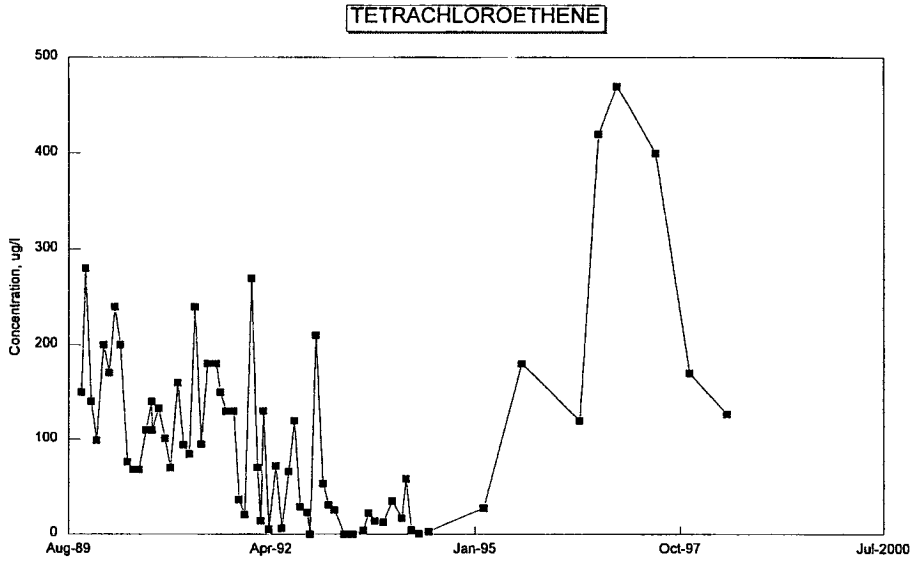
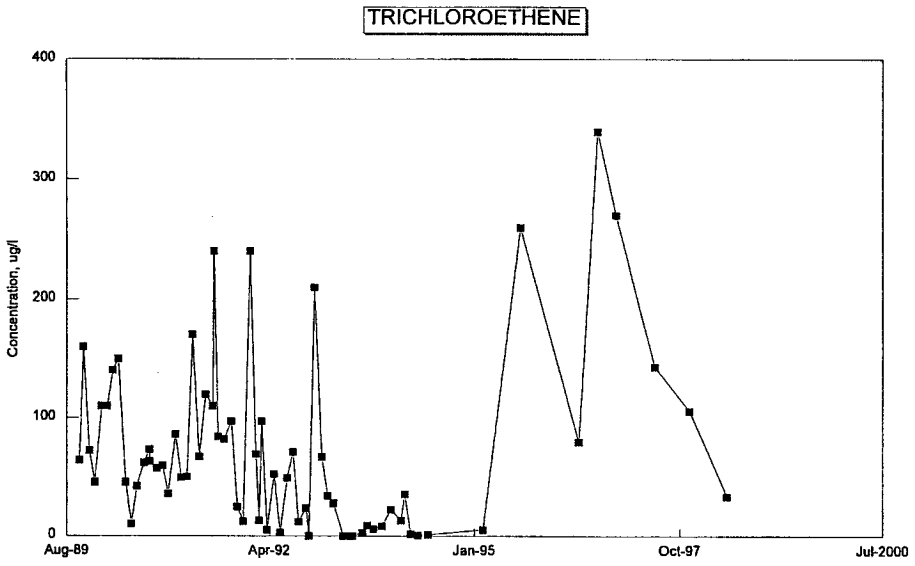


Figure 6-5
Wenck Associates, Inc.

SITE A, WELL 01U108, TETRACHLOROETHENE, TRICHLOROETHENE, 1,2-DICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNITION PLANT





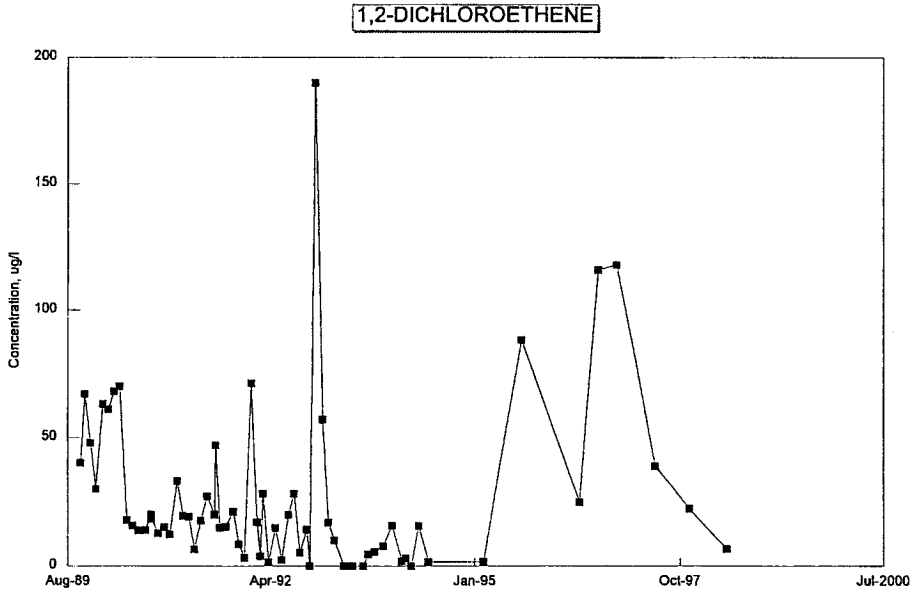
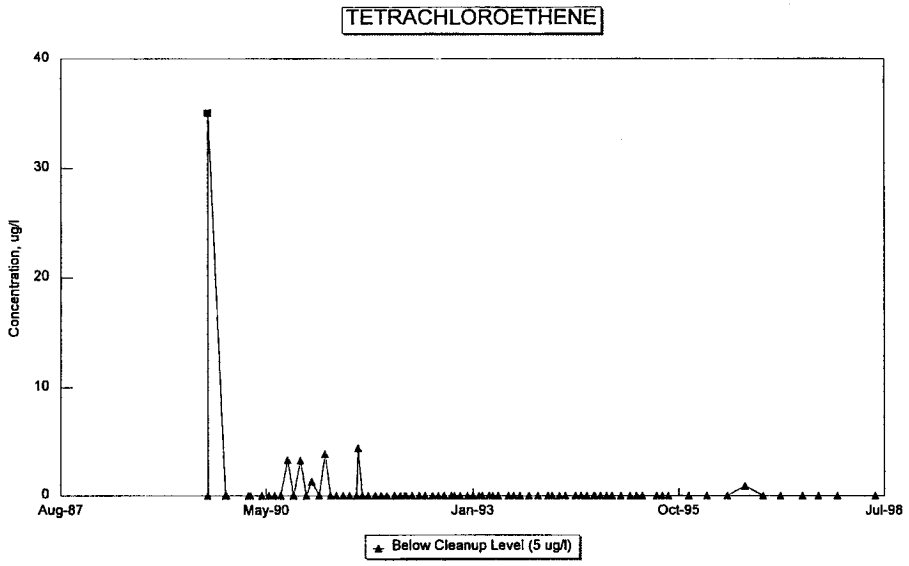
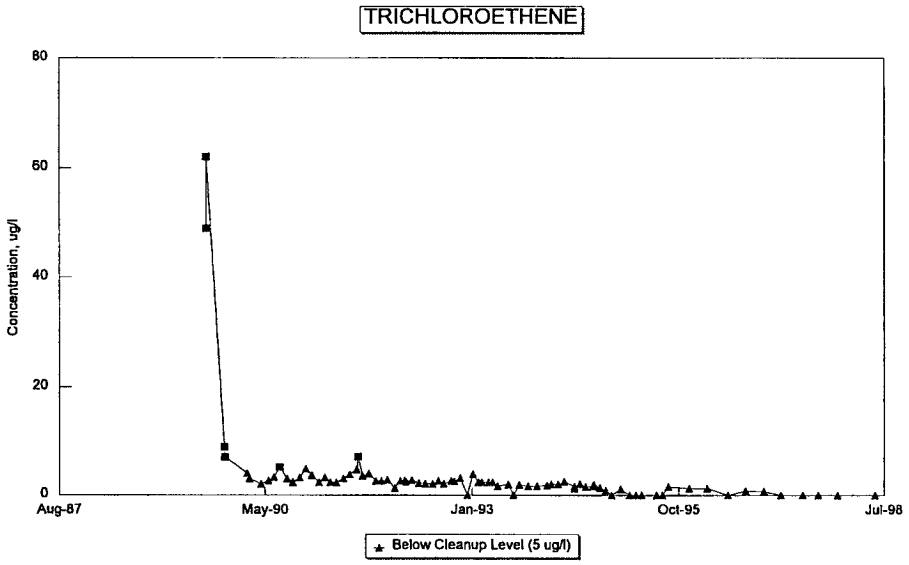


Figure 6-6
Wenck Associates, Inc.

SITE A, WELL 01U902, TETRACHLOROETHENE, TRICHLOROETHENE, 1,2-DICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNITION PLANT





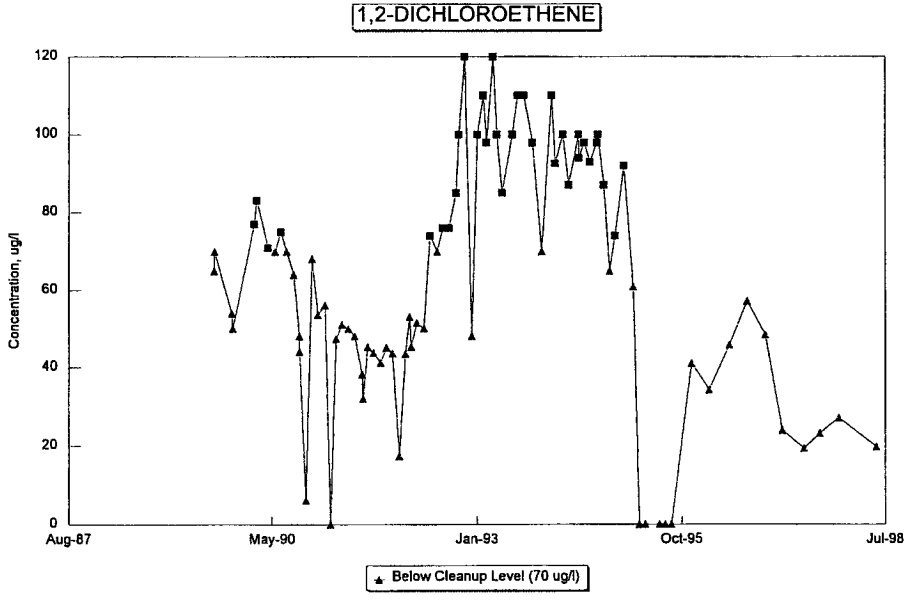
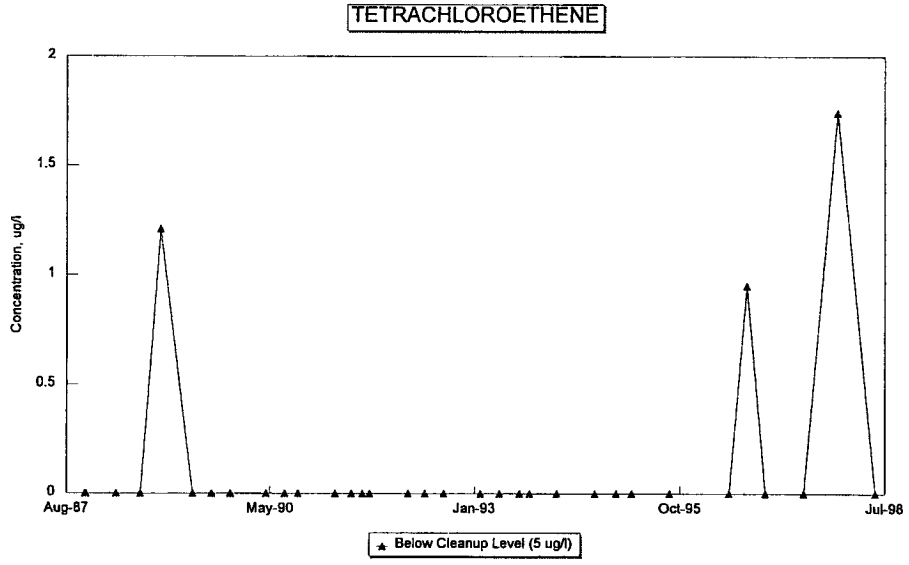
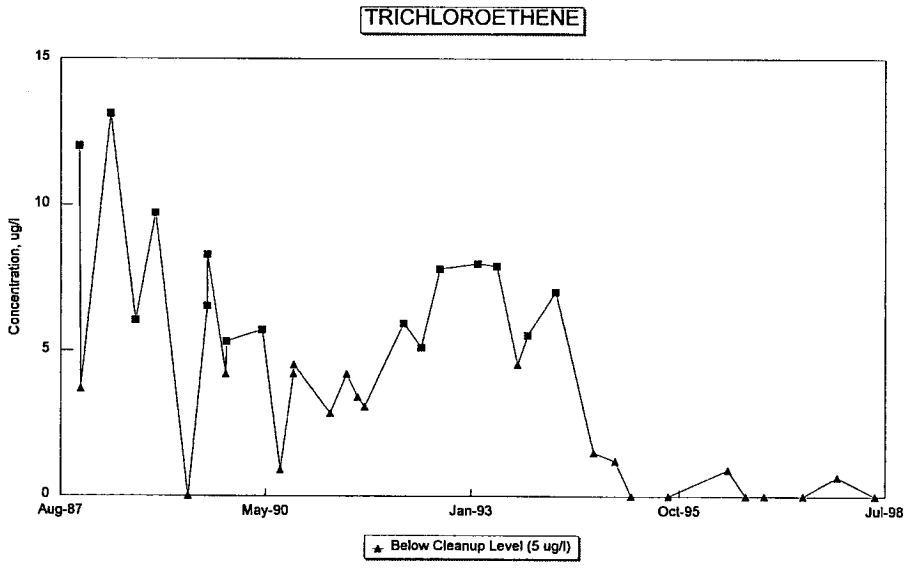


Figure 6-7
Wenck Associates, Inc.

SITE A, WELL 01U115, TETRACHLOROETHENE, TRICHLOROETHENE, 1,2-DICHLOROETHENE WATER QUALITY TRENDS

TWIN CITIES ARMY AMMUNITION PLANT





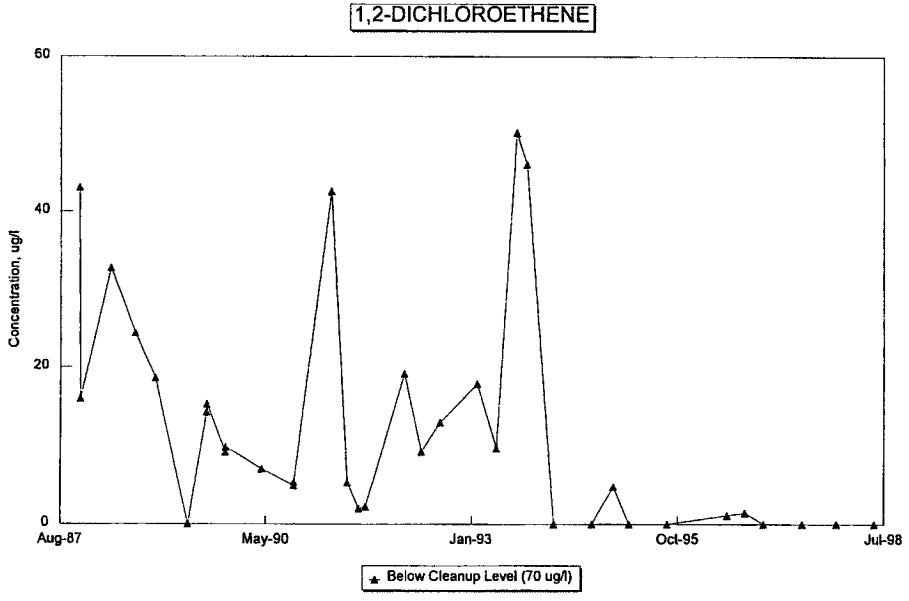


Figure 6-8
Wenck Associates, Inc.

SITE A, 1,2-DICHLOROETHENE WATER QUALITY TRENDS: RECOVERY WELLS

TWIN CITIES ARMY AMMUNITION PLANT

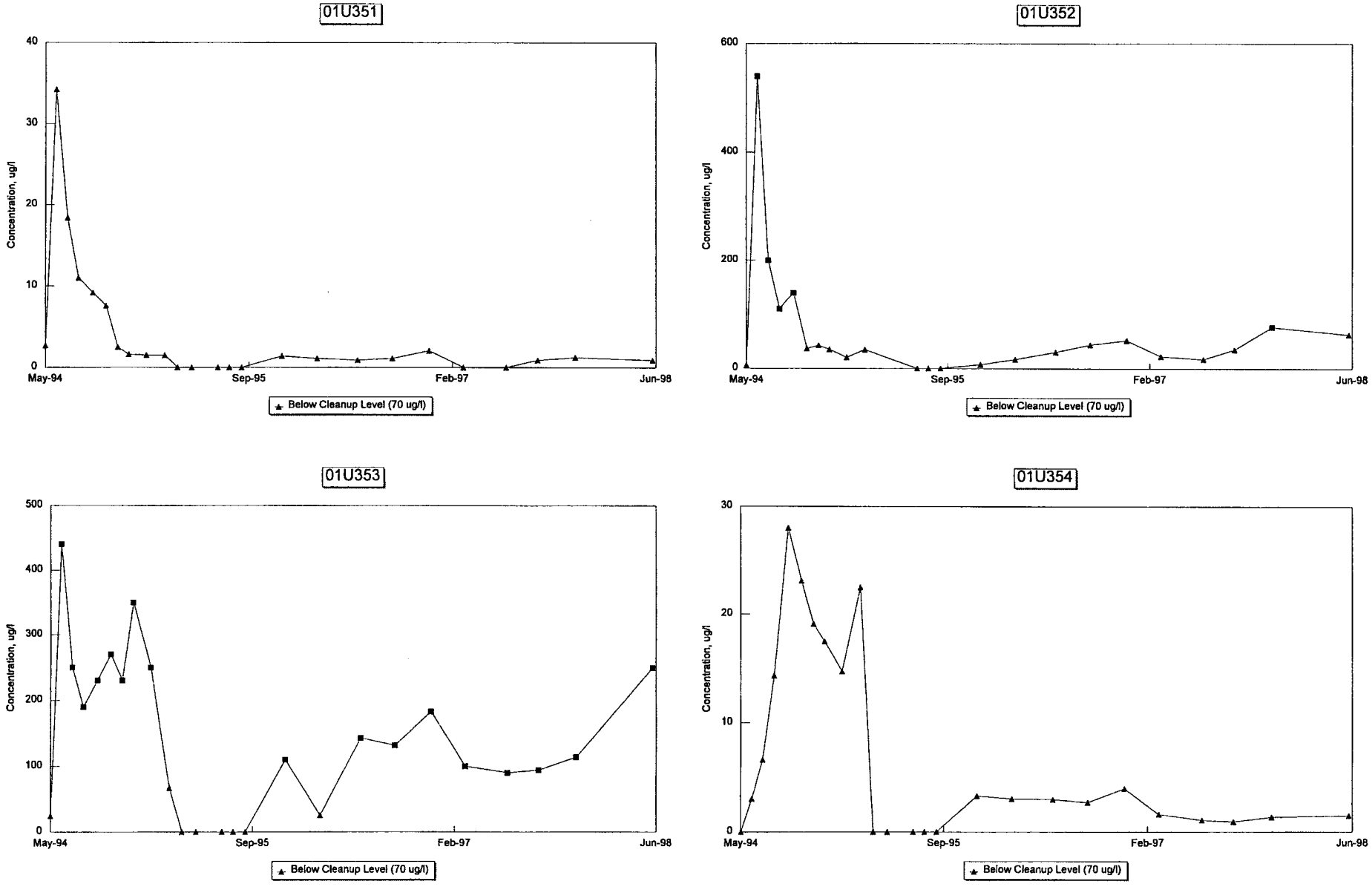


Figure 6-9
Wenck Associates, Inc.

SITE A, 1,2-DICHLOROETHENE WATER QUALITY TRENDS: RECOVERY WELLS

TWIN CITIES ARMY AMMUNITION PLANT

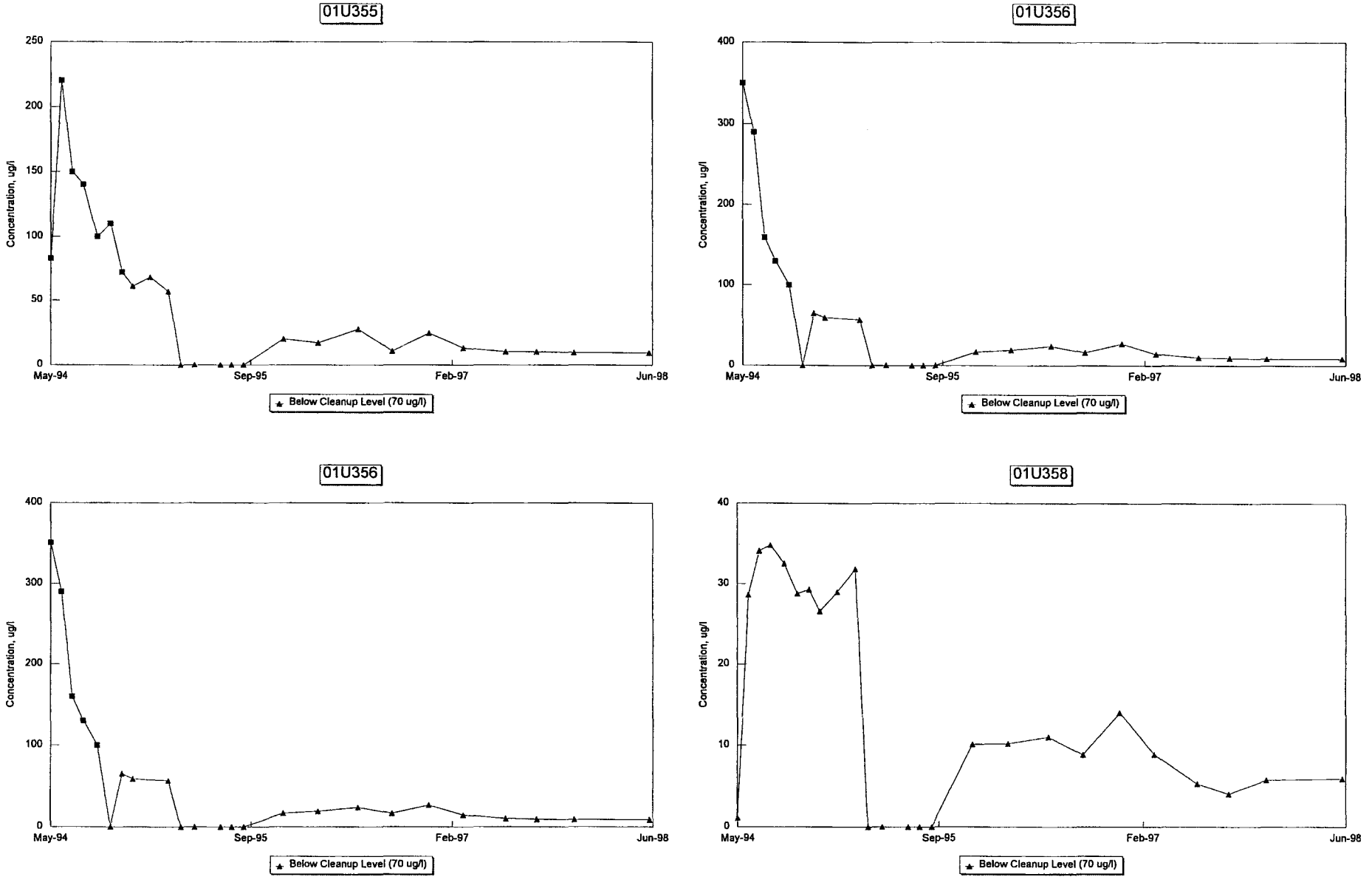


Figure 6-10
Wenck Associates, Inc.

SECTION 7

7.0 Operable Unit 2: Site I Shallow Groundwater

VOCs were identified in the Unit 1 groundwater at Site I. PCBs were identified in soils east of Building 502.

PCB contaminated soils east of Building 502 were excavated in 1986. These soils were stored in a storage building built as part of the PCB Interim Remedial Action (IRA) at Site I. During August and September 1996, these soils were removed and disposed of at a Toxic Substances Control Act (TSCA) landfill with approval of the MPCA and USEPA.

Monitoring in FY 1998 addressed the VOCs identified in the groundwater beneath the western portion of Building 502. The selected remedy in the OU2 ROD consists of four components, which incorporate the use of an existing well for groundwater extraction and additional investigation beneath the building slab. The additional investigation and Predesign Investigation Work Plan (Work Plan) are complete. The selected remedy has been modified and now consists of a dual-phase extraction system, which combines groundwater extraction with soil vapor extraction, to be installed beneath Building 502.

7.1 REMEDY COMPONENT #1: GROUNDWATER MONITORING

Description: "Groundwater monitoring to track remedy performance." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
When a monitoring plan has been established and on-going monitoring is in compliance with the plan.

Is the remedy component being implemented?

Partially. Monitoring at Site I in FY 1998 was conducted according to the monitoring plan for FY 1998, which did not address the final remedy in the OU2 ROD. Appendix H summarizes the FY 1998 monitoring plan and any deviations are explained in Appendix B.2.

Seven Unit 1 monitoring wells were planned for sampling at Site I (Building 502) during 1998. These wells are 01U064, 01U636, 01U639, 01U640, I01-MW, I02-MW, and I05-MW. Figure 7-1 shows these well locations. Wells I01-MW, I02-MW, and I05-MW, were dry at the time of sampling (June 30, 1998). The dry wells yielded water when originally installed. Samples from the wells were analyzed using EPA Method 601 for VOCs.

What were the monitoring results for FY 1998?

Table 7-1 presents the results of the FY 1998 analyses. The VOCs present in the wells are consistent with past data which identified VOCs in Unit 1 at Site I.

PCBs were no longer monitored at Site I during FY 1998. PCBs were removed from the monitoring plan based on consistent non-detectable results in the Unit 1 groundwater.

7.2 REMEDY COMPONENT #2: GROUNDWATER EXTRACTION

Description: "Use of an existing well to remove impacted groundwater." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the equipment has been installed and is operating according to the Remedial Design approved by the regulators.

Has the remedy component been implemented?

No. The Work Plan for implementing the remedy has been submitted to the Agencies and has received approval.

The remedy has been modified and now consists of a dual-phase extraction system to be located inside of Building 502. Work is scheduled to begin later in FY 1999.

7.3 REMEDY COMPONENT #3: POTW DISCHARGE

Description: "POTW discharge of extracted groundwater." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the discharge component has been implemented.

Has the remedy component been implemented?

No. As discussed above, the Work Plan is complete. Work is scheduled to begin later in FY 1999.

7.4 REMEDY COMPONENT #4: ADDITIONAL INVESTIGATION

Description: "Additional characterization of the Unit 1 and Unit 2 soil and groundwater." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the work has been completed according to a regulator approved work plan.

Has the remedy component been implemented?

Yes. The results of the additional investigation were included in the Work Plan. The additional investigation resulted in modifying the proposed remedy to a dual-phase extraction system.

Overall Remedy for Site I Shallow Groundwater

The remedy specified in the OU2 ROD (as modified in the RD work plan) will be implemented in FY 1999. Monitoring in FY 1998 was consistent with the FY 1998 monitoring plan. The following conclusions are made for FY 1998:

- VOCs continue to be present in the Unit 1 aquifer beneath the western portion of Building 502.

- The additional investigation work identified the sources of VOCs in the Unit 1 aquifer beneath Building 502 and allowed for the selection of a dual-phase extraction remedy to address the source area.

Is additional monitoring proposed prior to the next report?

Yes. Appendix H presents the FY 1999 - FY 2002 Monitoring Plan. Table 7-2 presents the monitoring requirements for Site I. Unit 3 and Unit 4 groundwater monitoring at Site I is addressed as part of the deep groundwater portion of the monitoring plan. The monitoring plan for Site I will be subject to review based on the final design of the remedial action.

Tables

TABLE 7.1

FISCAL YEAR 1998 MONITORING DATA
SITE I, TCAAP
NEW BRIGHTON, MINNESOTA

Well Location	*Sample Date*	*111TCE*	*112TCE*	*11DCE*	*11DCLE*	*C12DCE*	*T12DCE*	*12DCLE*	*12DCLP*	*C2H3CL*	*CCL4*	*CH2CL2*	*CHCL3*	*TCLEE*	*TCLTFE*	*TRCLE*
01U064	6/30/98	< 1	< 1	0.63 JP	1.6	1200	8.7	< 1	< 1	8.3	< 1	< 1	< 1	< 1	< 1	1 JP
01U636	6/30/98	0.19 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
01U639	6/30/98	0.22 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	8.8
01U639	6/30/98	0.25 DEP	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	8.9 D
01U640	6/30/98	0.27 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.43 JP
I01MW	6/30/98	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
I02MW	6/30/98	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
I05MW	6/30/98	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Notes:
Concentrations in µg/L.
D - Duplicate analysis.
J - Value is estimted.
P - High spike recoveries excessively different.
E - Low spike recovery is low.

TABLE 7.2

SUMMARY OF GROUNDWATER MONITORING REQUIREMENTS
SITE I, TCAAP
NEW BRIGHTON, MINNESOTA

Remedy Component	*Monitoring Requirements*	*Responsible Party*	*Documents Containing the Monitoring Plan*
#1 Groundwater Monitoring	a. Groundwater quality and water levels to track remedy progress	Alliant	Future monitoring plans in Annual Performance Report
#2 Groundwater Extraction	a. Extracted water volumes and rates	Alliant	Future monitoring plans in Annual Performance Report
#3 POTW Discharge	a. Water quality data for system effluent to demonstrate compliance with discharge requirements	Alliant	Future monitoring plans in Annual Performance Report
#4 Additional Investigation	a. As per work plan	Alliant	Future monitoring plans in Annual Performance Report
Overall Remedy	a. Water quality data to evaluate attainment	Alliant	Future monitoring plans in Annual Performance Report

Figures

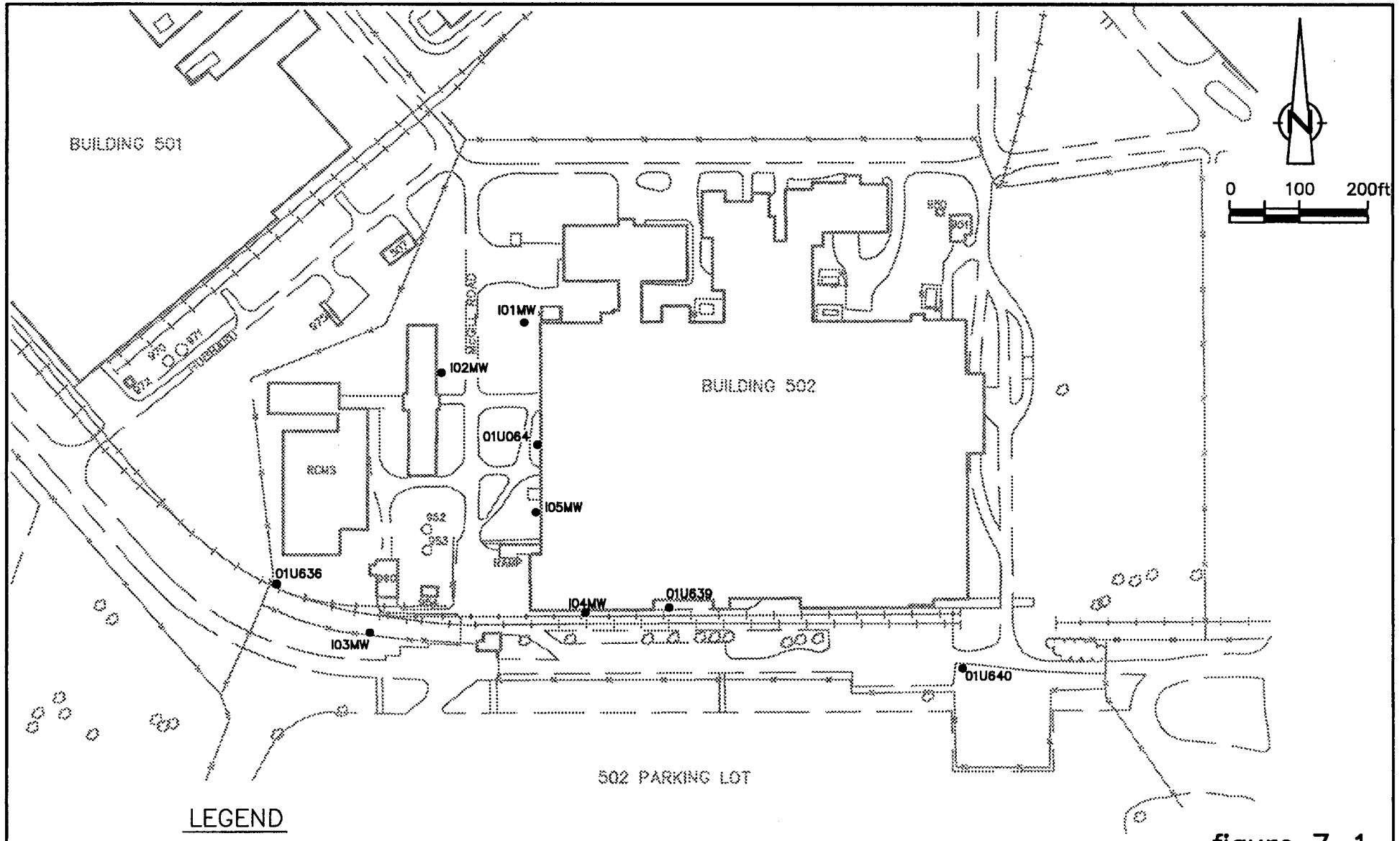


figure 7–1

SITE I, UNIT 1 GROUNDWATER QUALITY MONITORING LOCATIONS

Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP008 JAN 06/99

8.0 Operable Unit 2: Site K Shallow Groundwater

Volatile organic compound (VOC) contamination was identified in the Unit 1 (perched aquifer) at Building 103. The limits of the VOC plume in the perched groundwater have been defined to be beneath and immediately northwest of Building 103.

The remedy selected in the OU2 ROD consists of seven components that incorporate the existing groundwater extraction trench and air stripper, which began operation in August 1986. The remedy also includes additional investigation of the unsaturated soils beneath the building slab.

8.1 REMEDY COMPONENT #1: GROUNDWATER MONITORING

Description: "Groundwater monitoring to track remedy performance." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
When a monitoring plan is established and monitoring is in compliance with the plan.

Is the remedy component being implemented?
Yes. Appendix H summarizes the FY 1998 monitoring plan and any deviations are explained in Appendix B.2. Monitoring was as follows:

Treatment System

On a monthly basis, the treatment system effluent flow rate was measured by using a bucket and stopwatch and by flow meter. Additional monitoring was also performed which consisted of sampling the treatment system effluent monthly and influent quarterly.

During FY 1998, the treatment system functioned properly. The flowmeter that measures the discharge from the trench had frequently malfunctioned due to fouling. During FY 1998 a regular cleaning schedule was implemented and the meter was periodically checked for accuracy and corrected using coincidental bucket test data. Appendix J.3 summarizes operational data and events at the groundwater extraction and treatment system.

Groundwater Monitoring

Water levels are collected semi-annually from the monitoring wells and bundle piezometers in the vicinity of the groundwater collection and treatment system. FY 1998 monitoring was performed in accordance with the Monitoring Plan included as Appendix H.1. The comprehensive monitoring well sampling was conducted in June 1998. Figures 8-1 and 8-2 present the sampling and water level monitoring locations. Figure 8-1 also shows the cross-section alignment.

8.2 REMEDY COMPONENT #2: SENTINEL WELLS

Description: "Installation of sentinel wells at the bottom of Unit 1 and top of Unit 3." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the wells have been installed according to a regulator approved work plan.

Is the remedy component being implemented?

No. The OU2 ROD was signed in December 1997 (FY 1998). The Predesign Investigation Work Plan for Site K is currently in draft form and Agency comments are being resolved.

8.3 REMEDY COMPONENT #3: HYDRAULIC CONTAINMENT

Description: "Use of existing interceptor/recovery trench to contain plume and remove impacted groundwater." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the trench is operating as designed and capturing all groundwater exceeding the clean up levels presented in Table 1 of the OU2 ROD, as described below.

Is the remedy component being implemented?

Yes. The groundwater collection system continues to provide capture (as described later) of the Unit 1 groundwater, upgradient of the trench and beneath Building 103, as designed.

Is the system providing hydraulic capture of the plume?

Yes. Water level data are presented in Table 8-1. Figure 8-3 presents a plan view of the groundwater contours from the May round of groundwater level measurement. At nested wells, the lowest water elevation was used to create the plan view contours. Monitoring wells downgradient of the extraction trench show consistently higher water levels than those near and upgradient of the trench. This demonstrates that the horizontal hydraulic gradient has been reversed toward the extraction trench due to system operation.

Vertical capture was also effective as illustrated on Figure 8-4. As seen in the figure, groundwater both upgradient and downgradient of the trench is captured and collected. The upward gradient beneath the trench indicates that groundwater does not migrate below the trench. The monitoring coverage provided by the bundle piezometers demonstrates complete vertical and horizontal hydraulic capture.

Figure 8-5 presents the trichloroethene concentrations from the June 1998 annual sampling event. Trichloroethene concentrations range from non-detect to 44,000 μg/l. Comparison of

Figure 8-5 to the groundwater contour maps indicates that the VOC plume is hydraulically contained by the treatment system. Table 8-2 presents the monitoring well sampling data. The plume was originally defined based on data from all of the monitoring wells. The current monitoring well network is used to confirm the plume contours and measure the progress of remediation. Thus, Figure 8-5 was drawn with consideration of the extensive historical data.

Three wells (01U128, 01U617, and 01U621) exhibit low concentrations of 1,2-dichloroethene downgradient of the groundwater collection system's capture zone. Two of these wells (01U128 and 01U617) have exhibited reasonably consistent concentrations of 1,2-dichloroethene since 1987, indicating that it migrated prior to the establishment of the capture zone. The third well, 01U621, has only exhibited 1,2-dichloroethene since September 1993. The concentrations at these wells decreased in FY 1998.

Trichloroethene was detected downgradient of the trench, at well 01U617, with a concentration of 0.58 μg/l and at 01U604 at 0.23 μg/l. These wells are within the hydraulic capture zone of the trench.

Were there any major operational changes during the year? No.

8.4 REMEDY COMPONENT #4: GROUNDWATER TREATMENT

Description: "Treatment of contaminated groundwater using air stripping." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
When the air stripping facility is treating water to the clean up standards.

Is the remedy component being implemented?

Yes. See discussion below.

8.5 REMEDY COMPONENT #5: TREATED WATER DISCHARGE

Description: "Discharge of treated groundwater to Rice Creek." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the system is operating as designed with treated water discharge to the storm sewer that, in turn, discharges to Rice Creek. The water is required to meet the substantive requirements of Document No. MNU000579 (MPCA). Sampling and analysis are performed to monitor performance (see below).

Is the remedy component being implemented?

Yes. See discussion below.

8.6 REMEDY COMPONENT #6: DISCHARGE MONITORING

Description: "Monitoring to track compliance with discharge requirements." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When a monitoring plan is established and is being implemented in accordance with the plan.

Is the remedy component being implemented?

Yes. Influent and effluent analytical results are presented in Table 8-3 and Table 8-4. The discharge met all the treatment requirements. Table 8-5 presents the VOC mass removal and

monthly flow rates. A total of 3,942,920 gallons of water and 10.2 pounds of VOCs were removed from the aquifer in FY 1998.

8.7 REMEDY COMPONENT #7: ADDITIONAL INVESTIGATION

Description: "Additional characterization of the unsaturated Unit 1 soil." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
When the additional investigation has been completed according to a regulator approved work plan.

Is the remedy component being implemented?
Yes. As discussed above, the Work Plan is currently in draft form and the final comments are being resolved.

8.8 OVERALL REMEDY FOR SITE K

Overall, the remedy for Site K continued to operate consistent with past years and in compliance with the required performance criteria.

Is additional monitoring proposed prior to the next report?
Yes. Appendix H presents the FY 1999 - 2002 Monitoring Plan. Table 8-6 presents the Site K monitoring requirements. The monitoring plan is subject to review based on the results of the additional investigation and final design of the remedial action.

Tables

TABLE 8.1

FISCAL YEAR 1998 GROUNDWATER ELEVATION (FT. AMSL)
SITE K, TCAAP
NEW BRIGHTON, MINNESOTA

Well Location	*TOC Elevation*	*12/2/97*	*5/28/98*
01U047	880.31	--	874.53
01U048	885.32	873.54	874.67
01U052	886.51	873.78	875.31
01U065	883.90	873.51	874.13
01U128	883.69	873.27	874.92
01U601	892.68	883.47	884.54
01U602	889.35	882.87	883.10
01U603	887.31	876.73	878.38
01U604	888.98	876.21	877.37
01U605	887.76	876.39	878.01
01U607	891.01	883.46	884.48
01U608	889.30	883.00	883.32
01U609	889.33	882.94	883.05
01U611	889.29	883.28	883.70
01U612	886.91	876.70	877.98
01U613	892.07	882.97	884.47
01U615	888.66	876.21	876.97
01U616	890.37	878.66	879.42
01U617	887.72	876.56	877.51
01U618	891.52	878.81	879.58
01U619	891.75	882.45	883.22
01U620	888.65	877.87	878.67
01U621	886.57	878.47	878.41
01U622	889.43	Obstructed	Obstructed
01U623	889.44	Obstructed	Obstructed
01U624A	889.88	877.54	878.34
01U624B	889.88	877.54	878.34
01U624C	889.91	877.57	878.34
01U624D	889.89	877.55	878.32
01U625A	886.92	876.78	877.60
01U625B	886.91	876.77	877.58
01U625C	886.91	876.77	877.58
01U625D	886.92	876.78	877.56
01U626A	886.87	876.50	877.34
01U626B	886.88	876.43	877.24
01U626C	886.88	876.45	877.29
01U626D	886.88	876.51	877.33
01U627A	886.46	877.18	878.13
01U627B	886.47	876.64	877.51
01U627C	886.47	876.58	877.45
01U627D	886.48	876.59	877.46
01U628A	887.82	877.01	878.16
01U628B	887.83	876.88	877.95
01U628C	887.82	876.69	877.67
01U628D	887.84	876.69	877.67
K01MW	891.24	885.21	886.58
K02MW	891.35	884.09	886.64
K04MW	887.66	878.97	880.53

TABLE 8.2

FISCAL YEAR 1998 GROUNDWATER QUALITY DATA
SITE K, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*Date*	*111TCE*	*112TCE*	*11DCE*	*11DCLE*	*12DCLE*	*12DCLP*	*C12DCE*	*C2H3CL*	*CCL4*	*CH2CL2*	*CHCL3*	*T12DCE*	*TCLEE*	*TCLTFE*	*TRCLE*
OW104	12/8/97	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
(01U604)	6/3/98	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.23 JP
OW111 (01U611)	6/3/98	< 200	< 200	40 JP	< 200	< 200	< 200	15000	76 JP	< 200	< 200	< 200	580	< 200	< 200	44000
OW115 (01U615)	6/3/98	< 20	< 20	< 20	< 20	< 20	< 20	760	6.8 JP	< 20	< 20	< 20	240	< 20	< 20	4000
OW117	12/8/97	< 1	< 1	< 1	< 1	< 1	< 1	1.8	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.5 JP
(01U617)	6/3/98	< 1	< 1	< 1	< 1	< 1	< 1	1.8	< 1	< 1	< 1	< 1	0.34 JP	< 1	< 1	0.58 JP
OW118 (01U618)	6/3/98	< 1	< 1	< 1	< 1	< 1	< 1	0.63 JP	< 1	< 1	< 1	< 1	< 1	< 1	10	2
OW119 (01U619)	6/3/98	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	130 XJ	0.66 JP
OW121	12/8/97	< 1	< 1	< 1	< 1	< 1	< 1	4.7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
(01U621)	6/3/98	< 1	< 1	< 1	< 1	< 1	< 1	3.7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	6/3/98	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	3.5 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
01U128	6/3/98	< 1	< 1	< 1	0.21 JP	< 1	< 1	8.8	< 1	< 1	< 1	< 1	0.99 JP	< 1	< 1	< 1
K04MW	6/3/98	< 1	< 1	< 1	0.43 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.2	3.1

Notes:
Concentration in µg/L.
D - Duplicate analysis.
J - Value is estimated.
P - Results less than reporting level but greater than instrumental detection limit.
X - Analyte concentration is above the upper reporting level.

TABLE 8.3

FISCAL YEAR 1998
SITE K TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)
BUILDING 103 TCAAP
NEW BRIGHTON, MINNESOTA

Sample Location	*Date*	*CCL4*	*CHCL3*	*CH2CL2*	*C2H3CL*	*TCLEE*	*TRCLE*	*11DCE*	*11DCLE*	*111TCE*	*C12DCE*	*T12DCE*	*12DCLE*	*112TCE*	*12DCLP*	*TCLTFE*
Effluent	10/7/97	--	--	--	<0.33	--	<0.32	<0.36	<0.30	--	<0.29	<0.34	<0.32	--	--	--
Effluent	11/4/97	--	--	--	<0.33	--	0.68 J	<0.36	<0.30	--	<0.29	<0.34	<0.32	--	--	--
Effluent	11/4/97	--	--	--	<0.33 D	--	0.66 JD	<0.36 D	<0.30 D	--	<0.29 D	<0.34 D	<0.32 D	--	--	--
Effluent	12/2/97	--	--	--	<0.33	--	<0.32	<0.36	<0.30	--	0.40 J	<0.34	<0.32	--	--	--
Effluent	12/2/97	--	--	--	<0.33 D	--	0.32 JD	<0.36 D	<0.30 D	--	0.42 JD	<0.34 D	<0.32 D	--	--	--
Effluent	1/6/98	--	--	--	<0.15	--	<0.14	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	1/6/98	--	--	--	<0.15 D	--	<0.14 D	<0.16 D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	2/3/98	--	--	--	<0.15	--	<0.14	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	2/3/98	--	--	--	<0.15 D	--	<0.14 D	<0.16 D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	3/3/98	--	--	--	<0.15	--	0.64 J	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	3/3/98	--	--	--	<0.15 D	--	<0.14 D	<0.16 D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	4/7/98	--	--	--	<0.15	--	<0.14	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	4/7/98	--	--	--	<0.15 D	--	<0.14 D	<0.16 D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	5/5/98	--	--	--	<0.15	--	<0.14	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	5/5/98	--	--	--	<0.15 D	--	<0.14D	<0.16D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	6/2/98	--	--	--	<0.16	--	0.33 J	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	6/2/98	--	--	--	<0.17 D	--	0.29 JD	<0.16D	<0.08 D	--	<0.23 D	<0.09 D	<0.04 D	--	--	--
Effluent	7/9/98	<0.1	<0.07	<0.1	<0.18	<0.1	0.23 JP	<0.16	<0.08	<0.14	<0.23	<0.09	<0.04	<0.09	<0.04	<0.1
Effluent	7/9/98	<0.1D	<0.07 D	<0.1D	<0.19 D	<0.1D	0.24 JPD	<0.16D	<0.08 D	<0.14 D	<0.23 D	<0.09 D	<0.04 D	<0.09 D	<0.04 D	<0.1 D
Effluent	8/4/98	--	--	--	<0.20	--	0.61 J	<0.16	<0.08	--	0.44 J	<0.09	<0.04	--	--	--
Effluent	8/4/98	--	--	--	<0.21	--	0.60 JD	<0.16	<0.08	--	0.45 JD	<0.09	<0.04	--	--	--
Effluent	9/8/98	--	--	--	<0.22	--	<0.14	<0.16	<0.08	--	<0.23	<0.09	<0.04	--	--	--
Effluent	9/8/98	--	--	--	<0.23 D	--	<0.14D	<0.16D	<0.08D	--	<0.23D	<0.09 D	<0.04 D	--	--	--
Influent	12/2/97	--	--	--	1.2	--	260	0.77 J	<0.30	--	71	12	<0.32	--	--	--
Influent	3/3/98	--	--	--	0.89 J	--	200	<0.156	<0.08	--	49	8.4	<0.04	--	--	--
Influent	6/2/98	--	--	--	0.41	--	260	0.36 J	0.25 J	--	47	5.6	<0.04	--	--	--
Influent	9/11/98	--	--	--	1.1	--	280	0.67 J	0.32 J	--	56	9.4	<0.04	--	--	--

Notes:
Concentrations in µg/L.
D - Duplicate analysis.
J - Value is estimated.
P - Result is less than reporting level, but greater than instrument detection limit.

TABLE 8.4

FISCAL YEAR 1998
SITE K TREATMENT SYSTEM CONCENTRATIONS (INORGANICS)
BUILDING 103 TCAAP
NEW BRIGHTON, MINNESOTA

Sample Location	*Date*	*Lead*	*Mercury*	*Cyanide*	*Total Phosphorus*	*Copper*	*Zinc*	*Silver*
Effluent	12/2/97	<4.47	<0.1	<5.0	70.4	<18.8	<18.0	<0.33
Effluent	3/3/98	<4.47	<0.1	<5.0	<6.45	<18.8	<18.0	<0.33
Effluent	6/2/98	<4.47	<0.1	<1.47	53.2	<18.8	<18.0	<0.33
Effluent	9/1/98	<4.47	<0.1	3.37 J	57.3	<60.0	<117	<0.33

Notes:
Concentration in µg/L.
J - Value is estimated.

TABLE 8.5

SUMMARY OF MONTHLY VOC REMOVAL FOR FISCAL YEAR 1998
SITE K, TCAAP
NEW BRIGHTON, MINNESOTA

Month	*VOC Influent* [1,2] *(µg/L)*	*Water Treated* [3] *(million gallon)*	*Total VOCs Into Treatment Center (lbs/quarter)*	*VOC Effluent* [1] *(µg/L)*	*Total VOCs Out Of Treatment Center* [2] *(lbs/quarter)*	*Total VOCs Removed By Stripping Towers (lbs/quarter)*
December	344.20	0.91662	2.63	0.0	0.000	2.63
March	257.40	1.17827	2.53	0.0	0.000	2.53
June	313.01	0.94963	2.48	0.0	0.000	2.48
September	346.50	0.89840	2.60	0.0	0.000	2.60

Notes:

[1] VOC concentrations do not include estimated concentrations for compounds detected below the reporting limit

[2] VOC influent and effluent data is collected in the third month of every quarter. Data is used to calculate VOC's removed for the quarter.

[3] Number reflects quarterly volume.

TABLE 8.6

SUMMARY OF MONITORING REQUIREMENTS
SITE K, TCAAP
NEW BRIGHTON, MINNESOTA

Remedy Component	*Monitoring Requirements*	*Responsible Party*	*Documents Containing the Monitoring Plan*
#1 Groundwater Monitoring	• Outlined below	Alliant	Site K Monitoring Plan in Annual Report
#2 Sentinel Wells	a. Water quality to monitor potential migration	Alliant	Site K Monitoring Plan in Annual Report
#3 Hydraulic Containment	a. Water levels to draw contour maps showing capture	Alliant	Site K Monitoring Plan in Annual Report
	b. Pumping volumes and rates for comparison to design needs and mass removal calculation	Alliant	Site K Monitoring Plan in Annual Report
#4 Groundwater Treatment	• None	Alliant	Site K Monitoring Plan in Annual Report
#5 Treated Water Discharge	• None	Alliant	Site K Monitoring Plan in Annual Report
#6 Discharge Monitoring	a. Treated effluent water quality for comparison to substantive requirements for discharge	Alliant	Site K Monitoring Plan in Annual Report
#7 Additional Investigation	a. As per work plan	Alliant	Site K Monitoring Plan in Annual Report

Figures

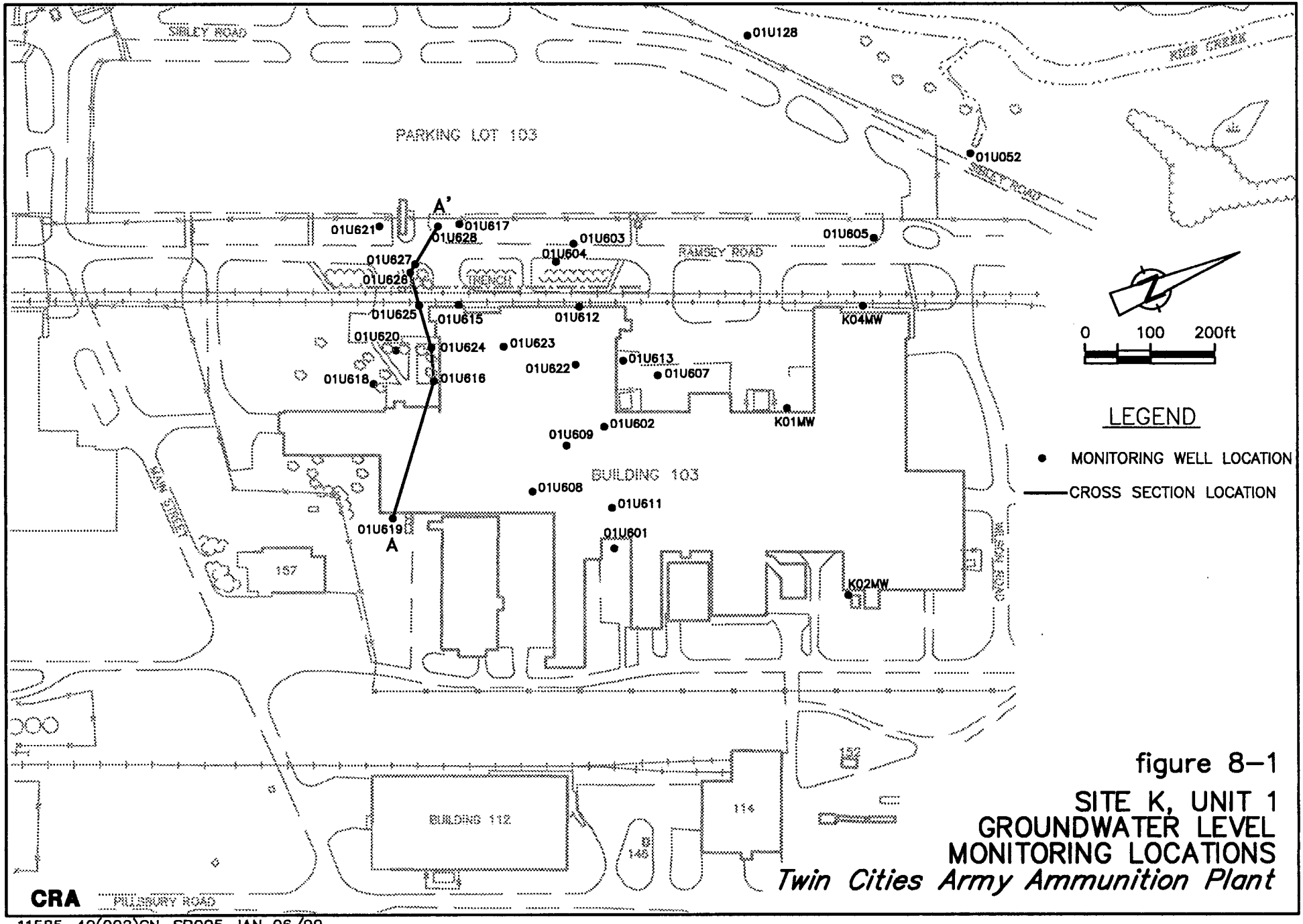


figure 8–1

SITE K, UNIT 1
GROUNDWATER LEVEL
MONITORING LOCATIONS

Twin Cities Army Ammunition Plant

11585–40(002)GN–SP005 JAN 06/99

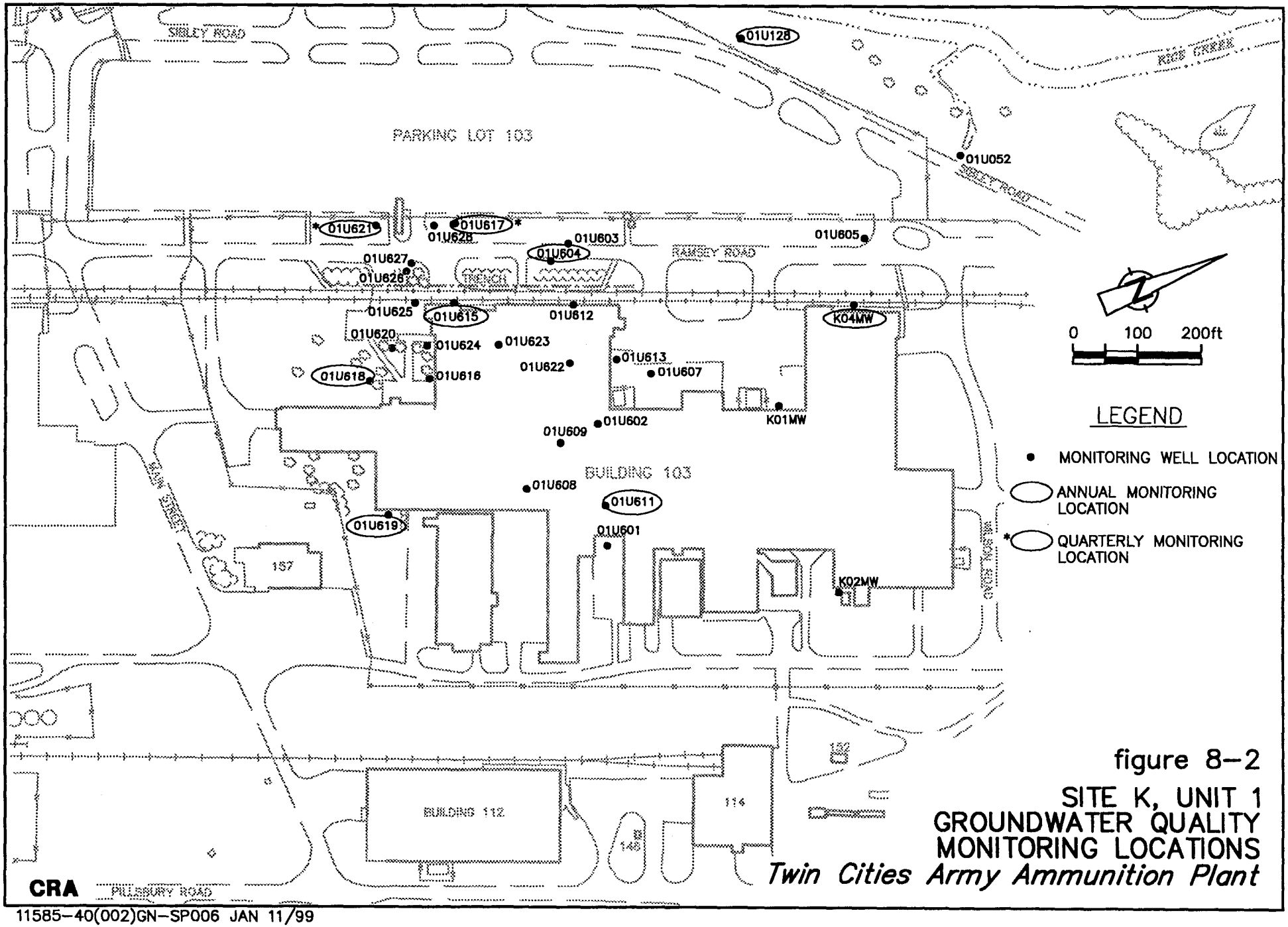


figure 8–2

SITE K, UNIT 1
GROUNDWATER QUALITY
MONITORING LOCATIONS

Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP006 JAN 11/99

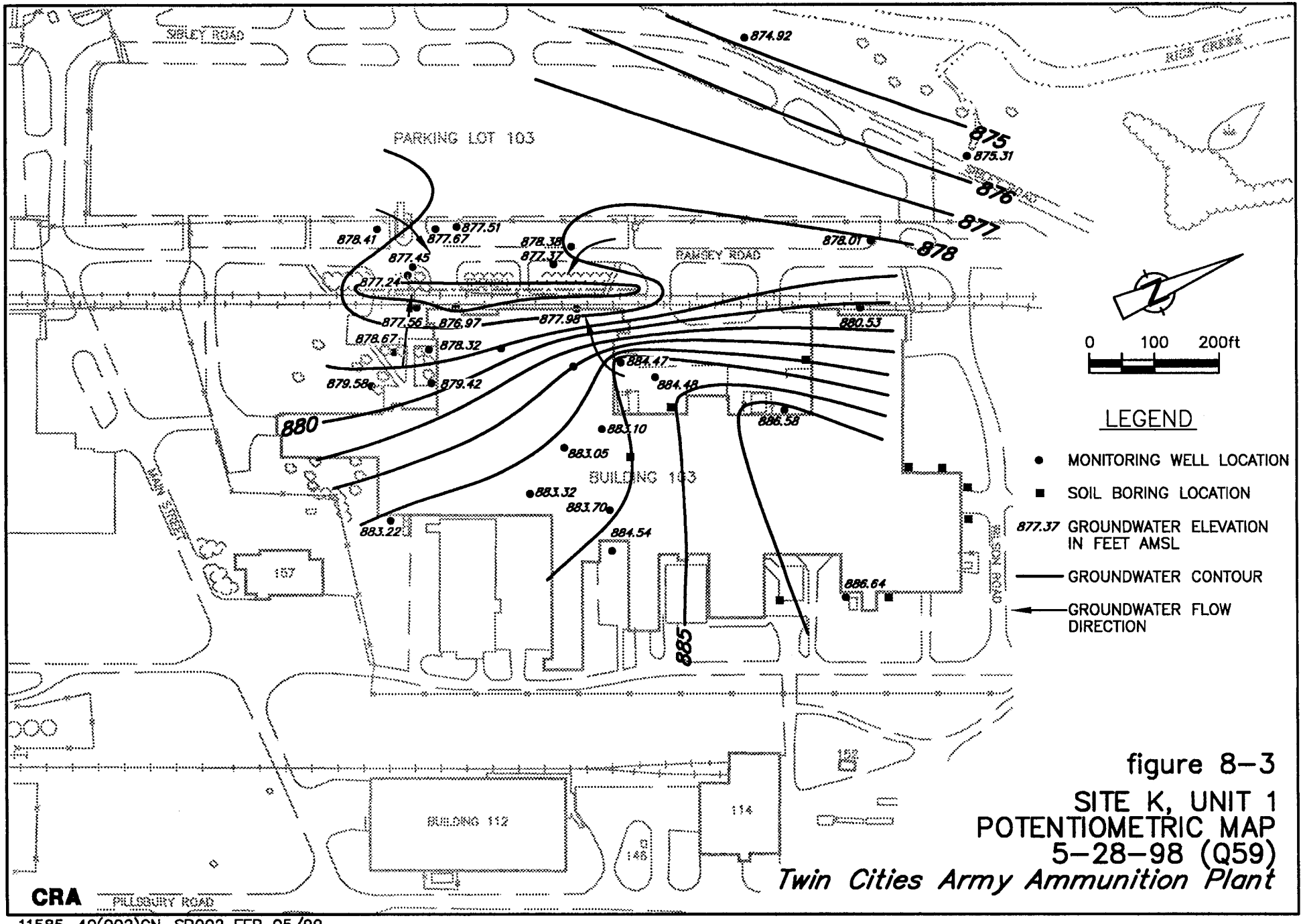
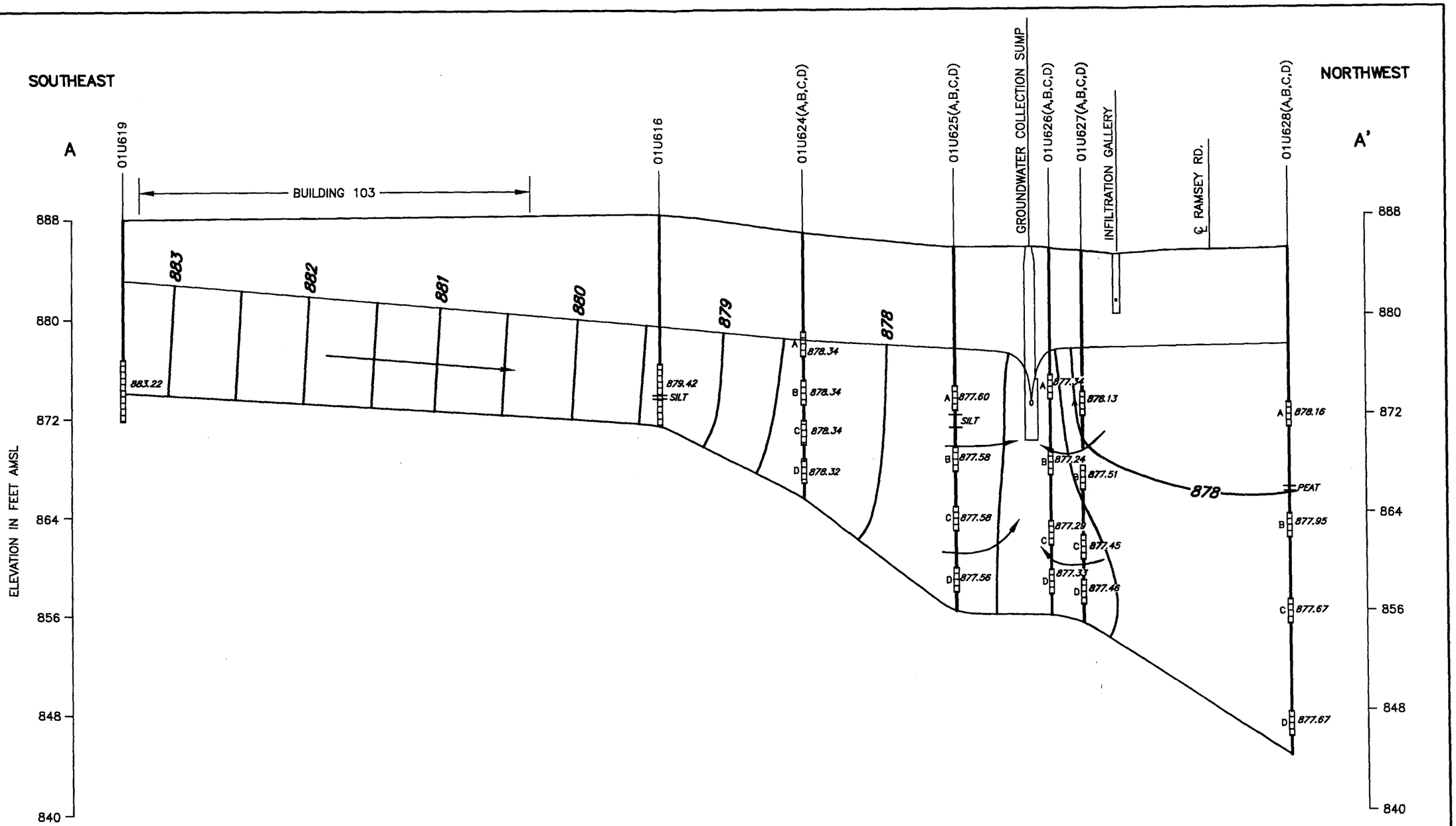


figure 8–3

SITE K, UNIT 1
POTENTIOMETRIC MAP
5–28–98 (Q59)

Twin Cities Army Ammunition Plant

11585–40(002)GN–SP002 FEB 05/99



SCALE: 1"=8' VER., 1"=40' HOR.

figure 8–4

SITE K, HYDROGEOLOGIC CROSS SECTION A–A'
5–28–98 (Q59)
Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP004 FEB 05/99

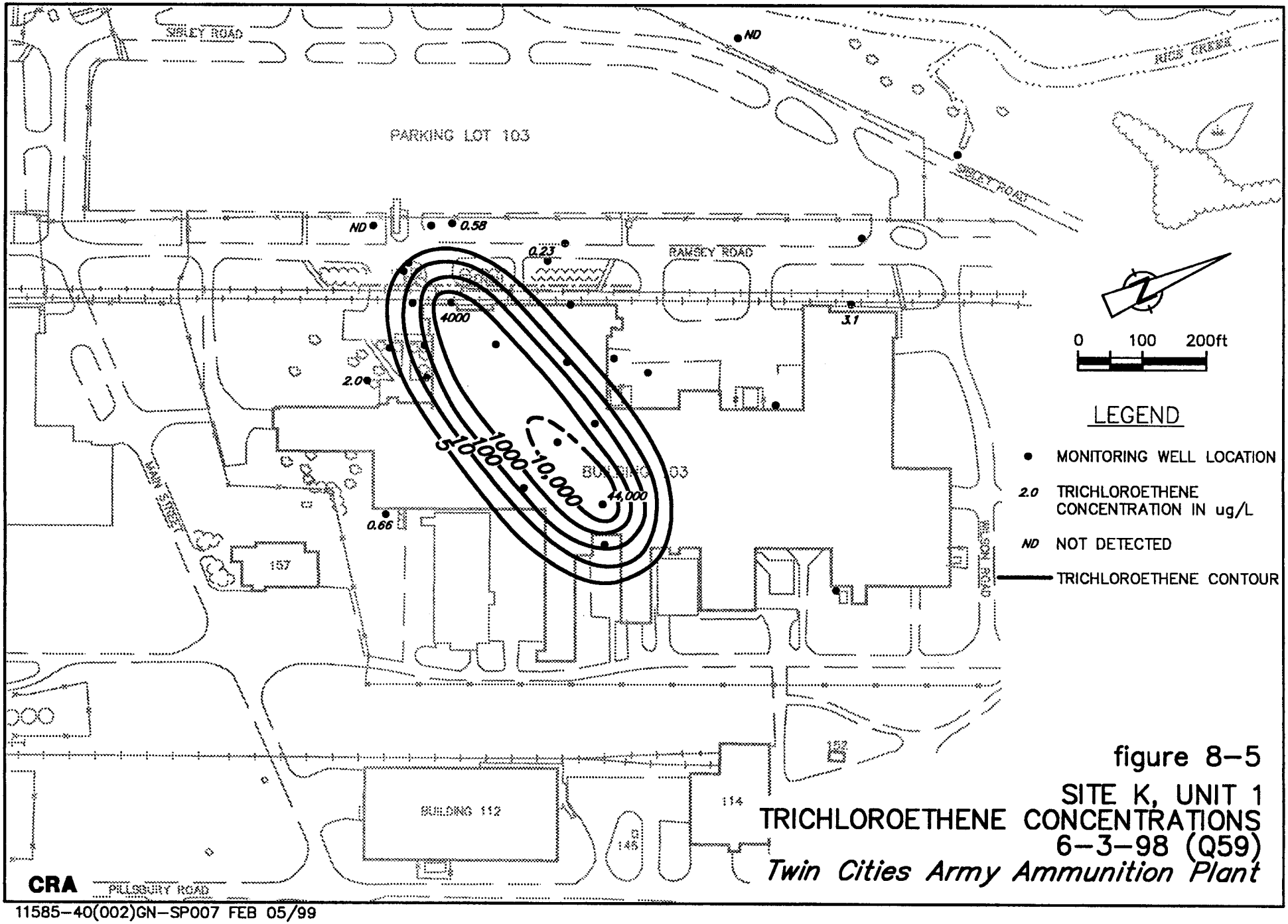


figure 8–5

SITE K, UNIT 1
TRICHLOROETHENE CONCENTRATIONS
6–3–98 (Q59)
Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP007 FEB 05/99

SECTION 9

9.0 Operable Unit 2: Deep Groundwater

The selected remedy for the Deep Groundwater in the OU2 ROD consists of five remedial components that include continued use of the TGRS, with modifications to improve VOC contaminant removal from the source area. It also includes an annual review of new and emerging technologies potentially applicable to the Deep Groundwater. This report documents all performance and monitoring data collected from October 1997 through September 1998.

Historical Design and Evaluation of TGRS Remedial Action

In September 1987 a Record of Decision (1987 ROD) was prepared by the USEPA in order to implement the Interim Response Action Plan (IRAP) for TCAAP. The 1987 ROD provided specific criteria for the BGRS and TGRS. Following extensive interagency negotiations on the FFA and the ROD, the BGRS was started on October 19, 1987.

The BGRS consisted of six Unit 3 extraction wells (B1 through B6) which were connected by forcemain to an air stripping treatment facility. The initial six BGRS extraction wells (B1 through B6) were installed and pumping tests were conducted prior to start up of the BGRS. These pumping tests were documented in the BGRS Extraction Well Pumping Test Report.

Following the initial 90-day operation of the BGRS, the IRA-BGRS Performance Assessment Report (PAR) was prepared. The PAR assessed the hydraulic and treatment performance of the BGRS. The PAR presented an extensive database collected during the initial 90 day period of BGRS operation and prior pertinent data. The PAR also included a summary of the geology, hydrogeology and remediation history for TCAAP. The PAR was subsequently approved by the MPCA and EPA.

A pumping test on well B9 was conducted in August 1988 and formed the basis of the final design of the TGRS. This and the previous pumping tests were utilized to determine the pumping rate required to achieve the necessary zone of capture for the TGRS. The overall rate needed for the 17 extraction wells was determined to be 2,450 gpm. During the detailed design of the TGRS, the system was designed with the capacity to operate at a maximum theoretical rate of 2,900 gpm. The additional pumpage was included to provide a safety margin for the calculations and to allow for fluctuations in system operation.

The PAR made recommendations for expansion of the BGRS into the TGRS in order to meet the Phase II remediation criteria established in the 1987 ROD. These modifications were completed and the expanded system began operation on January 31, 1989.

The 1989 Annual Monitoring Report was the first report covering the fully configured TGRS. It concluded that the TGRS develops a continuous zone of capture that is approximately 4,500 feet wide at the TCAAP boundary. The zone of capture widens to approximately 8,300 feet upgradient of the boundary. This zone of capture was demonstrated at average system pumping rates of 2,400 to 2,700 gpm.

The 1989 Annual Monitoring Report was wider in scope than this or future annual monitoring reports for the TGRS. The 1989 report was both a performance assessment report and a monitoring report. The 1989 report represented the first year of operation of the expanded TGRS. Thus, a more detailed and exhaustive performance assessment was appropriate and possible, as there were data available from non-pumping conditions for detailed comparison with pumping conditions. Since 1990 the system has continued to operate at an essentially steady state condition, so, no new comparisons to ambient conditions are necessary or possible.

TGRS Modifications

Since 1990 a number of modifications have been made to the TGRS operation in response to changes in plume configuration or operational issues. A brief summary of changes is presented below:

1. Source control well SC4 was shut down in 1996 in response to insignificant VOC mass removal by this well. SC4 operated at a nominal rate of 45 gpm.

2. Boundary extraction well B12 was shut down in 1996. Well B12 is the northern most extraction well and is screened across the Unit 4. The plume in the B12 area had dropped below cleanup standards for several years. Well B12 operated at a nominal rate of 190 gpm.

3. Flowrates at individual wells have been modified from time to time due to plume configuration changes and operational issues.

The original average pumping rate needed to maintain capture, as determined in the 1989 Annual Monitoring Report, was 2,450 gpm. With the reduction in plume width and shutdown of B12 in 1996, the minimum rate was revised to 2,260 gpm. The operation and maintenance program for the TGRS is designed to maintain this minimum average operating rate, and the individual well flow rates determined in 1989, with subsequent modifications.

9.1 REMEDY COMPONENT #1: HYDRAULIC CONTAINMENT AND CONTAMINANT REMOVAL FROM THE SOURCE AREA

Description: "Groundwater extraction to hydraulically contain the contaminated source area to the 5 µg/L trichloroethene (TCE) concentration contour and optimize the removal of contaminants from the source area through pumping of select wells." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the TGRS is containing the contaminated source area to the 5 µg/l trichloroethene contour and the system is operated to maximize the contaminant removal from the source area.

Is the remedy component being implemented?

Yes. The TGRS was operated in FY 1998 consistent with the requirements of the OU2 ROD. Table 9-1 presents the groundwater capture and treatment requirements for the TGRS from the OU2 ROD. As such, it met the requirement for capture at the TCAAP boundary. The TGRS was not, however, optimized with respect to contaminant removal from the source area. A work plan addressing this requirement has been prepared and has received Agency approval.

How is the system operated and what preventative maintenance measures were conducted during the year?

Summary of Operations

Through FY 1998, groundwater was extracted from 11 wells along the southwest boundary of TCAAP (B1 through B11) and four wells downgradient of interior source areas on TCAAP (SC1 through SC3 and SC5). Submersible pumps in the extraction wells discharge into a common pressurized forcemain which carries the water to the treatment system. The treatment system is located adjacent to Building 116. The TGRS layout is presented on Figure 9-1.

The TGRS is designed and constructed with three options for treated water discharge: recharge at the Arsenal Sand and Gravel Pit, discharge to Rice Creek and discharge to the TCAAP elevated water tank. Water stored in the elevated tank is "polished" with granular activated carbon (GAC) prior to distribution at TCAAP. Currently, the Arsenal Sand and Gravel Pit option is utilized for the majority of treated water. The TCAAP, through its distribution system, uses approximately 50,000 to 100,000 gallons per workday, depending on the time of year.

System Operation Specifications

In general, the influent and effluent water flow rates at the treatment plant are designed to be equal, thereby providing continuous operation of all processes and equipment. The following is a summary of the system design parameters:

- The groundwater extraction system, including the treatment center and 17 TGRS extraction wells, was designed to provide a theoretical hydraulic capacity of 2,900 gpm and a sustained daily average capacity of 2,730 gpm (by agreement with the regulators, B12 and SC4 were shut down in November 1996).

- The influent to the treatment plant is divided between Towers 1 and 2, each receiving up to a maximum of 1,450 gpm.

- Wet Well Pumps 1 and 2 (WWP#1 and WWP#2 located in Wet Wells 1 and 2) transfer water to Towers 4 and 3, respectively. Each pump and tower handles up to a maximum of 1,450 gpm.

- Wet Well Pumps 3 and 4 (WWP#3 and WWP#4 located in Wet Well 3) discharge treated water to an end use at a combined rate of up to a maximum of 2,900 gpm.

- Air blowers provide air to the towers. The blowers for Towers 1 and 2 provide 6,000 - 7,000 standard cubic feet per minute (scfm) each. The blowers for Towers 3 and 4 provide 9,000 - 14,000 scfm each.

Water level sensors within the wet wells communicate with the programmed logic controller (PLC) according to changing water levels. A complete and balanced operation should provide continuing water levels above the low level sensors and below the high-level sensors. However, given the probability of unbalanced flows for any number of reasons (i.e., changing hydraulic heads, maintenance, repairs, temporary malfunctions), the PLC has provisions within its program to cycle-off the extraction well(s) or wet well pumps according to high water levels occurring in the wet wells; and in turn, cycle-off the wet well pumps according to low levels occurring within these wet wells.

The system operates such that the wet well pumps cycle rather than the extraction well pumps. The rationale behind this is that there are a relatively small number of motors, starters and electrically controlled valves associated with the wet wells when compared with the extraction well field. This also provides for more continuous and complete hydraulic capture within the aquifer units. The extraction well field will cycle if necessary, however, starting with the least contaminated extraction well, B7, and followed by the other extraction wells in a predetermined sequence.

In summary, the priority of operation is as follows:

- Maintain constant operation of all extraction wells and air stripping towers;
- Maintain the desired flow rates at individual wells;
- Maintain treatment center WWP#1 and WWP#2 pumping rate equal to or slightly above the combined pumping rate of the extraction well field;
- Maintain treatment center WWP#3 and WWP#4 pumping rate equal to or slightly above WWP#1 and #2; and
- Provide water to the TCAAP water supply system.

FY 1998 Maintenance and Inspection Activity

Preventive Maintenance (PM): The extensive PM program allowed the operations staff to identify and repair or replace equipment to avoid a downtime failure. When required, further repair work was scheduled rather than waiting for the failure to occur. A broad range of system-specific information was collected during this year's PM. This information was used to refine the content and frequency of PM procedures. The PM procedures were revised in FY 1998 and also for FY 1999.

Electrical Inspection and Temperature Survey: A system-wide electrical inspection and infrared temperature survey was performed to identify loose connections and overheating components. Component overheating often precedes equipment failure.

Verification of Flow Meters: As part of the annual PM, flow meters in the pumphouses were interchanged. Flow volume measurements before and after conducting maintenance on the meters were compared to verify the consistency of measurements.

Daily Tracking of Flow Rates: Pumphouse and treatment center meter readings were recorded in the course of the daily inspections. Daily meter readings were entered into the computer and the flow rates were calculated and reviewed by the operations staff. Early detection of changes in flow rate were critical in early identification of failing equipment. By early detection of flow rate changes, equipment repair was typically scheduled before a failure occurred.

Pumphouse Flow Tests and Motor Amperage Readings: Pumphouse lift systems were tested to determine the flow capacity and motor amperage draw. The test data were compared to the original flow capacity and amperage draw. Decreases in flow capacity or changes in current draw alerted the system operations staff to inspect suspect equipment and schedule repairs before a down time failure occurred.

Did the system operate at a rate sufficient for complete capture?

Yes. The TGRS successfully captured and treated 1,220,604,000 gallons of contaminated water from October 1997 through September 1998. The system pumped at an average of 2,322 gpm, of which the boundary wells contributed 2,054 gpm and the source control wells contributed 268 gpm. This represents 103 percent of the rate needed to achieve capture. The above pumphouse volumes are corrected to reflect the total from treatment center meters #1 and #2, which are the most accurate for overall flow measurement. The TGRS as a whole was operational over 95.6 percent of the time.

The monthly and annual volume of water pumped is presented in Tables 9-2 and 9-3. Table 9-2 presents the pumphouse metered monthly flow volumes of each extraction well and historical flow data. Table 9-3 presents the combined pumphouse-metered flow volume (extraction wells) and the flow volumes metered at various stages in the treatment center along with historical data.

Monthly Flow Reports

Each month a Monthly Flow Report is prepared. The report includes the month's meter totalizer readings, calculated flow volumes and operational notes. Flow volumes are presented on a daily basis and are totaled to provide a monthly flow volume. A compilation of FY 1998 operational notes is presented in Appendix J.1. During FY 1998, treatment center flow meters #1 and #2 were used to measure total flow volumes used in monthly reports because they are the most accurate and representative of actual flow. Daily variation in readings at individual wells is primarily due to differences in the time of day when meter readings were taken.

How much down time occurred during the year?

The down time for each extraction well, over the last three years, is presented in Table 9-4. A summary of average down time for the pumphouses and the treatment center by the category of failure is presented in Table 9-5. A description of each down time event, organized chronologically, is presented in Appendix J.1. The same descriptions organized by affected pumphouse and treatment center is presented in Appendix J.2.

Treatment center and extraction well down times resulted primarily from failure and subsequent repair of components in the pumphouses, treatment center and TCAAP electrical system.

Description of Down Time Categories

Pumphouse component failures accounted for an average of 3.5 days down time per pumphouse. These failures and repairs typically involved replacement of failed electrical components, repair of an electric check valve, flow meter, well check valve, submersible pumps and motors and/or cleaning iron or manganese sludge from the well and piping.

Treatment center component failures and repairs that caused pumphouse down time consisted of electric check valve malfunctions and repairs, wet well pump motor replacement, and float switch adjustment. Treatment center component failures, repairs, and adjustments accounted for an average of 5.5 days of down time per pumphouse.

TCAAP electrical system failures accounted for an average of 4.5 days down time per pumphouse. Electrical storm damage was the primary cause of down time.

Miscellaneous events that caused pumphouse down time included modification of TCAAP potable water plant piping. Miscellaneous events accounted for an average of 0.7 days of down time per pumphouse.

Preventative maintenance procedures accounted for an average of 1.2 days of down time per pumphouse. Preventative maintenance procedures are described in the project Operation and Maintenance Manual.

The category System Modification caused 1.0 day of down time per pumphouse. In FY 1998 the altitude valve controls were reconfigured and integrated into a new potable water control system for TCAAP. Additional piping was also installed in Building 116 and the treatment center which

allows the TCAAP elevated tank to discharge directly into Wet Well #3. This addition allows for more efficient cycling of the elevated tank during winter months.

A forcemain failure caused 1.6 days of down time per pumphouse. A minor leak was identified in the influent forcemain south of Building 116 and the leak was repaired.

Were there any major operational changes during the year? No.

Did the system achieve hydraulic capture?

Yes. The zone of hydraulic capture for the TGRS in FY 1998 was determined by contouring the December 1997 and May 1998 water level data. Contours were constructed manually. Past site experience and discussions with the MPCA and EPA determined that manually constructed contours are appropriate at TCAAP due to the complexities of the flow field and the resulting need for hydrogeological expertise in interpreting the flow field. Confidence in the groundwater contours was gained during the detailed analysis presented in the 1989 Annual Monitoring Report. The 1989 report included pumping test analysis, drawdown analysis and vertical gradient analysis. The reader should consult the 1989 report for a complete analysis of hydraulic capture.

Appendix C contains the water level database for the monitoring wells. Figures 9-2, 9-4, and 9-6 present the groundwater contours for Upper Unit 3, Lower Unit 3 and Unit 4, respectively for December 1997. Figures 9-3, 9-5, and 9-7 present the groundwater contours for May 1998. These figures present the potentiometric contours from three vertical portions of the aquifer.

Inspection of these figures indicates a broad area of very low horizontal gradients immediately southwest of the TGRS, which is indicative of a stagnation zone downgradient of the TGRS. In the southern portion of the TGRS there are insufficient wells to accurately contour Unit 4 capture in this part of the Site. The flat gradients do indicate there is capture of bedrock groundwater by Unit 3 extraction wells. Contaminants are not currently in Unit 4 in this area; therefore, Unit 4 is

not of concern for remediation in this area of the Site and further definition of Unit 4 capture is not needed.

Table 9-6 presents the groundwater quality data for FY 1998. Figure 9-8, Figure 9-9 and Figure 9-10 present the trichloroethene contours for the Upper Unit 3, Lower Unit 3, and Upper Unit 4 Aquifers, respectively. Along the TCAAP boundary, the width of the source area above 5 µg/l trichloroethene has been shrinking since approximately 1993. Currently, there are no Unit 3 wells north of B7 above 5 µg/l trichloroethene. In Unit 4, there were no monitoring wells north of B10 above 5 µg/l. Extraction well B12 was shut down in November 1996 in response to the observed reduction in the extent of source area contamination. These declining VOC concentrations show that the TGRS has successfully reduced the source area contaminant concentration in this portion of the site.

As shown above, the zone of capture created by the TGRS extends beyond the 5 µg/l trichloroethene contour along the entire southwest TCAAP boundary, in both the Unit 3 and the Unit 4 Aquifers.

How much VOC mass was removed by the system and how is it changing with time?

As discussed above, the TGRS extracted and treated 1,220,604,000 gallons of water from October 1997 through September 1998. Based on the monthly influent and effluent VOC concentrations and the monthly flow totals measured with meters #1 and #2, the TGRS removed a total of 6,132 pounds of VOCs from October 1997 through September 1998. The VOC mass is similar to the FY 1997 VOC mass removal of 6,210 pounds. The VOC mass removal rate for the TGRS has been declining since FY 1992. This reflects the overall decrease in plume concentration. Table 9-7 summarizes the individual VOC mass contribution of each extraction well and the entire system. Overall, the TGRS has removed 167,289 pounds of VOCs from the aquifers since 1987.

The total mass removed is based on the monthly TGRS influent and effluent sampling and flow through the treatment system. The monthly sampling of the treatment system provides the best estimate of overall mass removal, compared to the individual extraction well sampling, due to the larger number of samples and consistency in the month-to-month analytical results. The percent contributions for each well are based on the average flows from each well and the semi-annual VOC results from each well.

To calculate the number of pounds of VOCs for each well, the flows and concentrations were normalized to the treatment center flows and concentrations to correct for variance between flow meters in the well houses and for consistency between VOC concentrations at the wells and monthly VOC concentrations in the influent and effluent.

VOC samples were collected semi-annually from the 17 extraction wells that comprise the TGRS. Wells B12 and SC4 are shut down, but were temporarily operated for sampling. Table 9-8 presents a summary of these sampling results. Variations in detection limits from round to round are the result of varying sample dilution's performed by the laboratory. Dilutions are required due to the high concentrations of some analytes. The location of the extraction wells is presented on Figure 9-1.

Appendix I.1 presents trichloroethene versus time graphs for each extraction well. Wells B1, B2, B6, B7, B8, B9, B10, B11, B12, SC2, SC3 and SC5 exhibit declining trichloroethene concentrations over time. As is typical, these wells exhibit asymptotic decreases over time. In the past, wells B3 and B4 exhibited rising trichloroethene concentrations with time, but now appear to be leveling off or declining. Well B5 was increasing through 1992 and has been decreasing since then. Overall, the graphs indicate a long-term decrease in VOC concentrations.

Extraction well B6 exhibited a slight concentration increase in FY 1998. This is probably due to plume redistribution following the shutdown of B12 in FY 1996. Extraction well B7 was below

the contaminant-specific requirement for trichloroethene (5 µg/l), and all other VOCs, throughout FY 1998.

These trends reflect the overall decline in source area contaminant concentrations. In addition, as discussed below, there has been a reduction in overall TGRS influent concentrations over the previous several years.

As Table 9-7 illustrates, wells B1, B4, B5, B6, B9, SC1 and SC5, which are located in the centers of the plume, achieve the largest rates of VOC removal. These six wells together accounted for 98 percent of the VOC mass removed. Wells B7, B10 and B11, which pump on the south and north edges of the plume, removed only about 11 pounds (0.18 percent) of the total VOC mass.

The source control wells, SC1 through SC3 and SC5, together accounted for 45 percent of the VOC mass removed while accounting for only 12 percent of the water pumped by the system. SC5, in particular, removed 42 percent of the total VOC mass at a rate of only approximately 100 gpm. This illustrates the efficiency of extracting groundwater from near the source areas.

9.2 REMEDY COMPONENT # 2: GROUNDWATER TREATMENT

Description: "Groundwater treatment using air stripping." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):
When the air stripping treatment facility is treating water and meeting the clean up requirements in Table 1 of the OU2 ROD.

Is the remedy component being implemented?
Yes. The air stripping treatment facility has been operating since 1986.

Did the treatment system meet the treatment requirements in the OU2 ROD?

Yes. Influent and effluent water were sampled on a monthly basis during FY 1998. The influent/effluent database for FY 1998 is contained in Appendix I.2. TGRS influent is labeled TGRSI and effluent is labeled TGRSE. Figure 9-11 presents a graph of influent trichloroethene versus time. This graph is cumulative and includes data from before 1989, when the system consisted of only six extraction wells. Influent concentrations continued to decline in FY 1998.

The average FY 1998 influent trichloroethene concentration was 461 µg/l, down from 570 µg/l in FY 1997. Since the full-scale start-up of the TGRS, influent concentrations had not exhibited a clear trend until approximately 1993, when a decrease appeared to be occurring. The decline corresponds with the decrease in VOC mass removal and shrinkage of the plume discussed earlier.

Figure 9-11 also includes a summary of the effluent trichloroethene concentration versus time. As indicated, the effluent was below 5 µg/l trichloroethene for all sampling events in FY 1998. A review of the FY 1998 database indicates that the effluent has also remained below the treatment requirements for all other VOC compounds specified in the OU2 ROD. Comparison of influent and effluent trichloroethene concentrations indicates an average removal efficiency over 99.9 percent.

What was the mass of VOCs emitted into the air?

The air stripping towers remove VOCs with an efficiency of over 99.9 percent. Thus, the air emissions are essentially equal to the VOC mass removal rates presented in Table 9-6. Air emissions therefore averaged 17 pounds/day based on the VOC mass removal rates. The total VOC emissions from October 1997 through September 1998 were 6,132 pounds.

9.3 REMEDY COMPONENT #3: TREATED WATER DISCHARGE

Description: "Discharge of treated water to the on-site gravel pit." (OU2 ROD, page 3)

Performance Standard (how do you know when you're done):

When the gravel pit is accommodating the discharge from the treatment system and allowing it to recharge to the aquifer.

Is the remedy component being implemented?

Yes. The water elevation in the Arsenal Sand and Gravel Pit was relatively unchanged in FY 1998. Based on visual observation during FY 1998, there were no noticeable changes in Gravel Pit performance. The Gravel Pit is accommodating the TGRS discharge as designed.

9.4 REMEDY COMPONENT #4: INSTITUTIONAL CONTROLS

Description: "Institutional controls to restrict access to contaminated aquifers and prevent exposure to contaminated groundwater." (OU2 ROD, page 4)

Performance Standard (how do you know when you're done):

When a special well construction area and alternate water supplies have been established and private wells in impacted areas have been sealed.

Is the remedy component being implemented?

Yes, although, the institutional controls have not been formally adopted for OU2. There are no private users of groundwater on TCAAP and the TCAAP potable water supply is treated by the TGRS prior to distribution. TCAAP is a government reservation, is fenced, and access is restricted to authorized personnel. TCAAP will remain under Army control into the foreseeable future.

9.5 REMEDY COMPONENT #5: REVIEW OF NEW TECHNOLOGIES

Description: "Reviews of new and emerging technologies that have the potential to cost-effectively accelerate the timeframe for aquifer restoration. Reviews shall be performed by the Army and reported annually in accordance with the consistency provisions of the TCAAP FFA." (OU2 ROD, page 4)

- The intent is to consider new technologies of merit, which is not on any set schedule. To have merit, a new technology must have promise in reducing cost and the time for cleanup. There may be years where no technologies are considered. It is envisioned that at any time, any interested party (Army, USEPA, MPCA) can suggest new technologies for consideration. At a minimum, the Technical Review Committee meetings can serve as a forum for discussion of possible technologies. If a technology is agreed to have merit by the Army, USEPA, and MPCA, then the technology will be evaluated by the Army. The level of effort for evaluations can range from simple literature searches to extensive treatability studies. On an annual basis, the Army will report on:

  - Whether or not any new technologies were identified and considered to have merit that year
  - The progress or results of any evaluations during that year
  - Any planned evaluations for the following year.

Performance Standard (how do you know when you're done):

When the Army reports on the status of any reviews of emerging technologies in the annual monitoring report.

Is the remedy component being implemented?

Yes. Beginning with the FY 1997 Annual Performance Report, the Army is reporting annually on the status of any reviews of emerging technologies.

Were any new technologies identified and considered to have merit during the past year?

No.

What is the status and/or findings of any previously initiated reviews of emerging technologies?

The MPCA and USEPA completed their field investigation work for their Natural Attenuation Study of the Deep Groundwater in OU1 and OU2. Their report will be finalized in FY 1999.

Are any new reviews planned at this time for the coming year? No.

9.6 REMEDY COMPONENT #6: GROUNDWATER MONITORING

Description: "Groundwater monitoring to track remedy performance." (OU2 ROD, page 4)

Performance Standard (how do you know when you're done):

When a regulator approved monitoring plan is in place and monitoring is conducted according to the plan.

Is the remedy component being implemented?

Yes. Monitoring in FY 1998 was consistent with the 1986 ROD and the FFA. Appendix H summarizes the FY 1998 monitoring plan and any deviations are explained in Appendix B.2. Future monitoring will be consistent with the OU2 ROD. Monitoring was as follows:

Groundwater

Groundwater samples and groundwater levels were collected in December 1997 and June 1998 in accordance with the FY 1998 monitoring plan. Samples were analyzed for VOCs.

Treatment System

The TGRS treatment system influent and effluent was sampled monthly during FY 1998 in accordance with the FY 1998 monitoring plan. The samples were analyzed for VOCs listed in Appendix D.1, Category 1.

Is additional monitoring proposed prior to the next report?

Yes. Table 9-9 presents the monitoring requirements for Deep Groundwater. For FY 1999 through FY 2002, biennial monitoring well sampling and water level measurements will be conducted. The reduction in groundwater monitoring frequency is based on the stability observed over the last nine years. The TGRS extraction wells will be monitored biennially and the TGRS treatment system influent and effluent will continue to be monitored monthly to permit detailed system tracking. Appendix H presents the proposed FY 1999 to FY 2002 monitoring plan. Appendix H includes the following proposed changes:

- Delete 03U084--Redundant to 03U702 in defining the north edge of the plume.
- Delete 03U015--Not needed to draw the north edge of the plume. Has been non-detect every year except 1988.
- Delete 03U705 and 03U706--There no longer appears to be any concern regarding reinfiltration in the gravel pit.
- Delete 03L021--03L021 is redundant to 03L002 in defining the south edge of the 100 contour.
- Delete 03L001 and 03M713--Redundant to 03L084 in defining the north edge of the plume.
- Add 03M020--Historically, this well had the highest concentrations at this nest. The Army has not sampled this well since March 1994. It would help to confirm the

"break" downgradient of the source control wells. Note: this well was sampled four times as part of the USEPA/MPCA natural attenuation study; however, the data has not been entered into IRDMIS.

- Delete 04U001, 04U714, and 04J714--Redundant to 04U713/04J713 in defining the north edge of the plume since B-12 was shut off.
- Delete 04U003 and PJ#003--Redundant to 04U027 and 04U802 in defining the 1 contour.

9.7 OVERALL REMEDY FOR DEEP GROUNDWATER

Did the TGRS meet the requirements of the OU2 ROD? Yes.

- Hydraulic capture in Unit 3 extends beyond the 5µg/l trichloroethene contour at the TCAAP boundary. This meets the VOC capture criterion in the OU2 ROD.

- Hydraulic capture in Unit 4 extends beyond the 5 µg/l trichloroethene contour at the TCAAP boundary. This meets the VOC capture criterion in the OU2 ROD.

- The TGRS extracted and treated 1,220,604,000 gallons of water and removed 6,132 pounds of VOCs from October 1997 to September 1998.

- Based on the extracted water quality, the source area contamination continued to decrease in concentration. Monitoring wells in the source areas were relatively stable in FY 1998. This demonstrates that the TGRS is effectively removing VOC mass from the aquifer as it also effectively contains the contamination.

- Effluent VOC concentrations were below contaminant-specific requirements for all sampling events.

Do any additional measures need to be addressed?

No. However, consideration should be given to shutting down extraction well B7 based on the observed reduction in plume width at the TCAAP boundary. It is likely that the Army will make this proposal in a separate letter sometime in the near future.

Tables

TABLE 9.1

GROUNDWATER CAPTURE AND TREATMENT REQUIREMENTS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Substance	*Expected Level in Discharge (ppb)*	*Operable Unit 2 Rod Requirements (ppb)*
Volatile Organic Compounds (VOCs)		
Benzene	ND	
Toluene	ND	
cis-1,2-Dichloroethene plus trans-1,2-Dichloroethene	<1	70
1,1-Dichloroethene	<1	6
1,1,1-Trichloroethane	<1	200
1,1,2-Trichloroethane	<1	
1,2-Dichloroethane	--	4
1,1,2-Trichloroethene	<5	5
1,2-Dichloropropane	--	
1,1,2,2-Tetrachloroethane	--	
Carbon Tetrachloride	--	
1,1,2-Trichlorotrifluoroethane	--	
Chloroform	<1	
Vinyl Chloride	<2	
Xylene	ND	
1,1-Dichloroethane	--	70
Tetrachloroethene	--	5
Metals		
Arsenic	NA	
Barium	NA	
Cyanide	NA	
Cadmium	NA	
Lead	NA	
Nickel	NA	
Mercury	NA	

Notes:
ND - Non-detectable
NA - Not significantly affected by remedy and expected to remain at background levels

TABLE 9.2

FISCAL YEAR 1998 EXTRACTION WELL WATER PUMPED
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

	Volume of Water Pumped (gallons)																	
	B1	*B2*	*B3*	*B4*	*B5*	*B6*	*B7*	*B8*	*B9*	*B10*	*B11*	*B12*	*SC1*	*SC2*	*SC3*	*SC4*	*SC5*	*TOTAL*
October 1997	9,642,100	5,600,600	10,753,100	8,651,900	8,896,300	11,546,000	12,002,600	5,067,100	6,888,600	10,983,800	3,784,500	2,800	1,449,100	2,159,400	3,531,100	0	4,495,900	105,454,900
November 1997	9,292,200	5,468,000	10,479,400	8,410,800	8,706,500	11,224,400	11,721,000	5,359,800	6,736,700	11,032,400	2,828,200	0	1,398,700	1,777,900	3,670,200	0	4,351,400	102,457,600
December 1997	8,534,200	5,583,000	9,868,600	7,986,400	8,445,200	10,867,300	11,338,400	5,536,200	5,318,000	10,584,600	4,978,300	0	1,346,800	1,586,300	4,620,400	0	4,295,400	100,889,100
January 1998	8,418,700	5,923,800	10,500,500	7,711,800	9,053,500	11,293,100	11,717,700	5,677,700	5,702,500	10,906,000	4,707,100	0	1,400,700	1,205,000	4780000	0	4,573,100	103,571,200
February 1998	9,490,100	4,657,800	8,745,900	7,320,100	8,025,100	10,176,500	9,767,800	4,979,100	5,665,400	8,873,600	4,009,700	0	1,162,700	1,274,900	4,194,700	100	4,434,100	92,777,600
March 1998	10,660,600	5,251,200	10,619,600	8,260,800	9,015,800	11,389,900	11,836,100	5,662,800	6,492,400	10,621,200	4,853,300	0	1,370,600	2,132,000	4,692,100	0	5,003,800	107,862,200
April 1998	10,161,900	4,938,700	10,212,100	6,624,100	8,646,800	10,842,600	11,320,800	5,381,800	6,178,700	10,305,000	4,606,500	0	1,296,800	2,118,400	4,490,000	0	4,690,200	101,814,400
May 1998	9,420,200	4,549,700	9,377,600	6,262,600	4,927,500	9,934,100	12,070,700	4,877,000	5,575,100	9,447,400	4,160,400	0	1,184,900	2,565,800	4,873,900	0	4,887,300	94,114,200
June 1998	10,620,600	4,906,000	10,291,400	4,632,200	8,781,600	10,925,500	11,367,600	5,351,800	6,087,300	9,744,500	4,633,200	9,300	1,253,900	2,024,200	4,047,300	0	3,769,800	98,446,200
July 1998	10,354,800	4,328,800	9,601,900	7,684,500	9,903,000	10,403,200	10,803,300	5,090,500	5,392,500	9,855,800	4,449,100	0	1,200,900	1,250,600	4,304,400	100	3,396,000	98,019,400
August 1998	10,316,700	2,886,900	9,793,800	8,265,700	9,964,500	10,562,500	11,710,000	5,123,700	2,842,700	9,449,000	4,372,500	0	1,190,800	1,023,800	4,354,600	0	3,382,800	95,240,000
September 1998	8,771,900	4,377,000	8,967,800	6,577,100	10,068,900	10,544,400	11,685,100	5,024,600	6,570,600	8,569,200	4,010,800	0	1,123,900	2,296,700	4,088,400	0	2,684,700	95,361,100
TOTAL FY98	115,684,000	58,471,500	119,211,700	88,388,000	104,434,700	129,709,500	137,341,100	63,132,100	69,450,500	120,372,500	51,393,600	12,100	15,379,800	21,415,000	51,647,100	200	49,964,500	1,196,007,900

FY89	67,563,900	69,364,850	72,257,490	75,237,700	76,328,500	100,611,510	138,278,100	42,329,200	60,613,300	54,516,600	93,534,437	60,210,340	13,867,660	20,078,880	36,660,309	12,593,300	39,307,600	1,033,353,676
FY90	70,722,300	69,450,060	73,633,450	80,511,000	71,897,000	105,220,300	117,609,400	40,747,900	59,883,400	95,227,900	40,939,800	63,867,460	11,281,750	19,278,830	35,609,300	15,260,500	37,275,400	1,008,415,750
FY91	99,482,900	102,399,960	98,521,050	104,674,800	105,191,900	137,181,500	153,080,700	63,386,100	77,083,200	130,044,100	54,094,000	95,329,240	17,111,600	23,724,440	46,611,600	20,228,000	54,182,500	1,382,327,590
FY92	103,612,700	105,175,800	104,103,100	105,741,800	106,869,400	140,681,700	155,934,000	61,053,000	78,498,200	129,041,800	52,635,900	93,170,000	17,472,600	21,165,900	50,254,500	22,045,100	53,891,100	1,401,346,600
FY93	104,610,228	97,362,300	102,039,200	102,785,395	105,885,800	140,275,000	153,555,300	60,334,400	78,395,400	129,093,800	49,765,700	90,094,600	16,887,368	24,623,700	51,413,200	25,104,180	55,980,600	1,388,206,172
FY94	99,994,100	75,083,100	98,156,900	91,607,800	93,671,400	126,439,100	140,213,900	63,403,400	71,130,200	115,719,700	48,857,400	87,868,300	17,351,750	19,244,100	45,125,400	20,715,000	46,698,300	1,261,279,850
FY95	117,949,700	68,908,100	115,358,700	104,187,500	102,308,300	141,348,900	147,788,900	68,183,400	75,017,600	128,802,200	53,372,700	100,424,400	16,572,496	23,173,800	47,176,100	24,037,800	51,323,400	1,385,933,996
FY96	125,047,900	55,550,500	129,118,200	103,113,100	106,158,000	142,485,500	100,031,500	68,182,700	80,266,000	130,823,300	50,345,100	95,047,900	7,152,620	22,803,400	50,843,300	23,411,400	51,382,800	1,341,763,220
FY97	103,065,700	63,195,800	116,976,600	91,590,200	103,636,700	141,103,600	133,956,600	60,633,500	77,677,200	129,353,600	47,439,800	10,526,600	15,381,400	24,099,800	48,925,600	3,166,500	51,146,000	1,213,035,110
FY98	115,684,000	58,471,500	119,211,700	88,388,000	104,434,700	129,709,500	137,341,100	63,132,100	69,450,500	120,372,500	51,393,600	12,100	15,379,800	21,415,000	51,647,100	200	49,964,500	1,196,007,900

TABLE 9.3

FISCAL YEAR 1998 TREATMENT CENTER WATER METER TOTALS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

	Volume of Water Pumped (gallons)									
	Extraction Wells	*Meter 1*	*Meter 2*	*Total Meters 1 & 2*	*Meter 3*	*Meter 4*	*Total Meters 3 & 4*	*Meter 5*	*Meter 6*	*Total Meters 5 & 6*
October 1997	105,454,900	59,478,000	47,221,000	106,699,000	43,334,000	54,305,000	97,639,000	3,000	51,880,000	51,883,000
November 1997	102,457,600	58,407,000	45,997,000	104,404,000	34,842,000	59,281,000	94,123,000	1,000	51,002,000	51,003,000
December 1997	100,889,100	56,647,000	45,878,000	102,525,000	41,651,000	53,261,000	94,912,000	2,000	50,703,000	50,705,000
January 1998	103,571,200	59,222,000	46,232,000	105,454,000	38,252,000	58,122,000	96,374,000	6,000	24,470,000	24,476,000
February 1998	92,777,600	51,743,000	42,168,000	93,911,000	42,046,000	44,690,000	86,736,000	9,000	4,000	13,000
March 1998	107,862,200	59,569,000	48,730,000	108,299,000	54,070,000	48,558,000	102,628,000	18,000	5,000	23,000
April 1998	101,814,400	59,967,000	44,531,000	104,498,000	50,277,000	44,591,000	94,868,000	7,000	3,000	10,000
May 1998	94,114,200	53,548,000	42,401,000	95,949,000	48,224,000	39,026,000	87,250,000	4,000	2,000	6,000
June 1998	98,446,200	60,998,000	40,469,000	101,467,000	48,278,000	43,233,000	91,511,000	2,000	3,000	5,000
July 1998	98,019,400	51,589,000	49,829,000	101,418,000	37,951,000	52,728,000	90,679,000	1,000	1,000	2,000
August 1998	95,240,000	53,616,000	43,284,000	96,900,000	34,189,000	53,601,000	87,790,000	2,000	1,000	3,000
September 1998	95,361,100	55,467,000	43,613,000	99,080,000	37,951,000	52,475,000	90,426,000	3,000	2,000	5,000
TOTAL FY98	1,196,007,900	624,784,000	540,353,000	1,220,604,000	511,065,000	603,871,000	1,114,936,000	58,000	178,076,000	178,134,000

FY89	1,033,353,676	501,826,000	560,836,000	1,062,662,000	383,736,000	587,596,000	971,332,000	493,681,000	582,955,000	1,076,636,000
FY90	1,008,415,750	493,915,000	526,417,000	1,020,332,000	371,391,000	588,642,000	960,033,000	487,946,000	543,726,000	1,031,672,000
FY91	1,382,327,590	666,166,000	708,313,000	1,374,479,000	523,702,000	789,947,000	1,313,649,000	601,307,000	649,621,000	1,250,928,000
FY92	1,401,346,600	68,289,000	724,328,000	1,407,227,000	557,169,000	772,509,000	1,329,678,000	767,707,000	677,735,000	1,445,442,000
FY93	1,388,206,172	666,814,000	725,341,000	1,392,155,000	504,027,000	651,149,000	1,155,176,000	729,078,000	762,791,000	1,491,869,000
FY94	1,245,663,275	660,700,000	659,953,000	1,320,653,000	457,210,000	715,668,000	1,172,878,000	653,913,000	550,131,000	1,204,044,000
FY95	1,369,361,500	706,114,000	683,982,000	1,390,096,000	500,275,000	739,744,000	1,240,019,000	495,616,000	274,507,000	770,123,000
FY96	1,341,763,220	734,443,000	629,327,000	1,363,770,000	503,518,000	754,399,000	1,257,917,000	4,000	600,035,000	600,039,000
FY97	1,213,035,110	688,312,000	568,804,600	1,257,116,600	538,625,000	586,515,000	1,125,140,000	13,000	578,900,000	578,913,000
FY98	1,196,007,900	624,784,000	540,353,000	1,220,604,000	511,065,000	603,871,000	1,114,936,000	58,000	178,076,000	178,134,000

TABLE 9.4

PUMPHOUSE DOWN TIME (DAYS)
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Well Name	*FY98 Days Down*	*FY97 Days Down* [1]	*FY96 Days Down* [1]
B1	19.9	34.2	0.0
B2	18.4	29.9	13.2
B3	16.1	14.9	0.0
B4	16.9	4.1	0.0
B5	29.1	4.0	0.0
B6	12.6	4.0	0.0
B7	12.3	11.1	13.8
B8	14.9	9.3	0.0
B9	27.3	4.0	0.0
B10	15.8	11.6	0.0
B11	20.6	8.5	6.1
B12	--	5.0	0.0
SC1	16.1	11.5	102.5
SC2	23.9	5.0	4.0
SC3	12.3	7.7	0.4
SC4	--	5.2	0.4
SC5	13.9	5.0	0.4

Note:
[1] - Days down do not include down time resulting from automatic cycling off of well field.

TABLE 9.5

FISCAL YEAR 1998 DOWN TIME (DAYS)
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Category	*Down Time (Days)*	*Affected Wells/System*
Pumphouse Component	3.5	Pumphouses
Treatment Center Component	5.5	Pumphouses
TCAAP Electrical System	4.5	Pumphouses
Miscellaneous	0.7	Pumphouses
Preventive Maintenance	1.2	Pumphouses
System Modification	1.0	Pumphouses
Forcemain	1.6	Pumphouses
TGRS [1]	15.9	Treatment System
Anticipated Down Time for Fiscal Year 1999		
Pumphouse Component	3.0	Pumphouses
Treatment Center Component	3.0	Pumphouses
TCAAP Electrical System	4.5	Pumphouses
Miscellaneous	0.5	Pumphouses
Preventative Maintenance	2.0	Pumphouses
System Modification/Improvement	2.0	Pumphouses
Forcemain	2.0	Pumphouses

Note:

(1) The down time refers to the TGRS as a whole. It is the weighted sum of pumphouse down times. Weighting is based on the target flow rate for each pumphouse.

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03F302		08-Jun-98	1.6	250.00	3.11	13.20
03F302		08-Dec-97	1.49	240.00	3.06	13.50
03F302	D	08-Dec-97	1.45	250.00	2.98	11.50
03F303		08-Jun-98	2.9	57.00	4.38	1.41
03F303		08-Dec-97	2.74	<0.56	<1.70	<0.76
03F303	D	08-Dec-97	<0.75	61.60	5.20	2.12
03F304		08-Jun-98	<0.75	22.50	5.40	<0.76
03F304		08-Dec-97	<0.75	18.60	4.45	<0.76
03F305		08-Jun-98	<0.75	1700.00	86.00	56.00
03F305		08-Dec-97	<0.75	1400.00	90.10	69.10
03F306		08-Jun-98	1.25	1600.00	52.10	9.39
03F306		08-Dec-97	2.03	1700.00	61.00	9.42
03F307		08-Jun-98	<0.75	450.00	17.30	4.08
03F307		08-Dec-97	<0.75	380.00	14.40	4.04
03F308		08-Jun-98	<0.75	2.00	<1.70	<0.76
03F308		08-Dec-97	<0.75	1.90	<1.70	<0.76
03F312		08-Jun-98	<0.75	5.55	<1.70	<0.76
03F312		08-Dec-97	<0.75	4.89	<1.70	<0.76
03L001		08-Jun-98	<0.75	<0.56	<1.70	<0.76

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]		5	5	6	70 [2]
03L002	05-Jun-98	<0.75	57.30	<1.70	<0.76
03L017	11-Jun-98	<0.75	<0.56	<1.70	<0.76
03L018	11-Jun-98	<0.75	103.00	2.17	0.84
03L020	04-Jun-98	<0.75	73.30	<1.70	1.74
03L021	12-Jun-98	<0.75	13.30	<1.70	<0.76
03L077	15-Jun-98	<0.75	108.00	<1.70	<0.76
03L078	09-Jun-98	<0.75	<0.56	<1.70	<0.76
03L079	15-Jun-98	<0.75	<0.56	<1.70	<0.76
03L084	10-Jun-98	<0.75	<0.56	<1.70	<0.76
03L802	11-Jun-98	<0.75	6.80	<1.70	<0.76
03L806	12-Jun-98	<0.75	470.00	78.90	14.00
03L809	17-Jun-98	<0.75	67.30	26.90	3.82
03L811	11-Jun-98	<0.75	<0.56	<1.70	<0.76
03L822	22-Jun-98	<0.75	219.00	40.60	8.56

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03L832		22-Jun-98	<0.75	<0.56	<1.70	<0.76
03L833		11-Jun-98	<0.75	20.80	<1.70	<0.76
03L841		19-Jun-98	<0.75	<0.56	<1.70	<0.76
03L846		18-Jun-98	<0.75	<0.56	<1.70	<0.76
03L848		29-Jun-98	<0.75	10.70	<1.70	<0.76
03L853		23-Jun-98	<0.75	90.10	2.71	<0.76
03L854		26-Jun-98	<0.75	<0.56	<1.70	<0.76
03L854	D	26-Jun-98	<0.75	<0.56	<1.70	<0.76
03L861		29-Jun-98	<0.75	<0.56	<1.70	<0.76
03M713		10-Jun-98	<0.75	<0.56	<1.70	<0.76
03M802		17-Jun-98	<0.75	4.68	<1.70	<0.76
03M802	D	17-Jun-98	<0.75	5.14	<1.70	<0.76
03M806		12-Jun-98	<0.75	430.00	95.40	15.60
03M843		18-Jun-98	<0.75	<0.56	<1.70	<0.76
03M843	D	18-Jun-98	<0.75	<0.56	<1.70	<0.76
03M848		29-Jun-98	<0.75	660.00	6.13	58.70

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03U003		12-Jun-98	<0.75	107.00	4.08	5.90
03U014		08-Jun-98	<0.75	<0.56	<1.70	<0.76
03U015		10-Jun-98	<0.75	<0.56	<1.70	<0.76
03U017		11-Jun-98	<0.75	4.38	<1.70	<0.76
03U018		12-Jun-98	<0.75	230.00	3.76	2.97
03U020		04-Jun-98	<0.75	620.00	112.00	9.90
03U021		12-Jun-98	<0.75	630.00	28.90	57.00
03U028		15-Jun-98	<0.75	155.00	3.33	18.80
03U030		15-Jun-98	<0.75	6.66	<1.70	<0.76
03U032		17-Jun-98	<0.75	1.14	<1.70	<0.76
03U075		15-Jun-98	<0.75	<0.56	<1.70	<0.76
03U075	D	15-Jun-98	<0.75	<0.56	<1.70	<0.76
03U077		12-Jun-98	2.27	142.00	7.12	<0.76
03U077	D	12-Jun-98	2.25	145.00	6.94	<0.76
03U078		15-Jun-98	5.35	40.80	<1.70	<0.76

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03U079		15-Jun-98	<0.75	410.00	10.30	29.50
03U084		10-Jun-98	<0.75	<0.56	<1.70	<0.76
03U093		16-Jun-98	<0.75	197.00	5.91	0.89
03U093	D	16-Jun-98	<0.75	202.00	6.76	1.03
03U094		15-Jun-98	<0.75	500.00	30.10	2.20
03U096		17-Jun-98	<0.75	49.10	2.12	<0.76
03U099		15-Jun-98	<0.75	6.19	<1.70	<0.76
03U301		08-Jun-98	<0.75	1200.00	<1.70	81.40
03U301		08-Dec-97	<0.75	1000.00	4.11	84.40
03U314		08-Jun-98	<0.75	191.00	10.80	1.75
03U314		08-Dec-97	<0.75	218.00	11.60	2.69
03U315		08-Jun-98	<0.75	18.00	<1.70	<0.76
03U315	D	08-Jun-98	<0.75	18.40	<1.70	<0.76
03U315		08-Dec-97	<0.75	15.90	<1.70	<0.76
03U317		08-Jun-98	14.20	4700.00	98.80	5.44
03U317		08-Dec-97	15.90	7100.00	97.50	6.05
03U317	D	08-Dec-97	14.40	6700.00	99.20	5.80
03U658		16-Jun-98	<0.75	<0.56	<1.70	<0.76

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03U659		16-Jun-98	<0.75	196.00	2.82	31.10
03U671		15-Jun-98	2.1	72.30	6.51	1.03
03U672		17-Jun-98	<0.75	<0.56	<1.70	<0.76
03U701		10-Jun-98	<0.75	17.30	<1.70	<0.76
03U702		11-Jun-98	<0.75	<0.56	<1.70	<0.76
03U703		16-Jun-98	13.10	30.90	<1.70	<0.76
03U705		17-Jun-98	<0.75	<0.56	<1.70	<0.76
03U706		16-Jun-98	<0.75	<0.56	<1.70	<0.76
03U708		16-Jun-98	2.42	153.00	11.20	7.66
03U709		16-Jun-98	<0.75	80.00	17.80	<0.76
03U710		25-Jun-98	<0.75	320.00	10.00	15.40
03U711		16-Jun-98	3	115.00	13.40	1.85
03U711	D	16-Jun-98	2.96	121.00	14.50	1.94
03U801		17-Jun-98	<0.75	330.00	<1.70	4.26
03U803		16-Jun-98	<0.75	<0.56	<1.70	<0.76

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
03U804		16-Jun-98	<0.75	<0.56	<1.70	<0.76
03U805		16-Jun-98	<0.75	<0.56	<1.70	<0.76
03U811		11-Jun-98	<0.75	<0.56	<1.70	<0.76
04J077		15-Jun-98	<0.75	250.00	15.70	4.01
04J702		11-Jun-98	<0.75	14.10	<1.70	<0.76
04J708		09-Jun-98	<0.75	1.70	<1.70	<0.76
04J713		10-Jun-98	<0.75	<0.56	<1.70	<0.76
04J714		10-Jun-98	<0.75	<0.56	<1.70	<0.76
04U001		08-Jun-98	<0.75	<0.56	<1.70	<0.76
04U002		05-Jun-98	8.69	<0.56	<1.70	<0.76
04U002	D	05-Jun-98	<0.75	9.36	<1.70	<0.76
04U003		09-Jun-98	<0.75	<0.56	<1.70	<0.76
04U020		04-Jun-98	<0.75	16.50	<1.70	<0.76
04U027		16-Jun-98	<0.75	<0.56	<1.70	<0.76
04U077		12-Jun-98	<0.75	260.00	8.94	1.48

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
04U701		10-Jun-98	<0.75	7.56	<1.70	<0.76
04U702		11-Jun-98	<0.75	10.10	<1.70	<0.76
04U702	D	11-Jun-98	<0.75	10.80	<1.70	<0.76
04U708		09-Jun-98	<0.75	1.63	<1.70	<0.76
04U709		16-Jun-98	<0.75	26.30	<1.70	<0.76
04U711		09-Jun-98	<0.75	1.99	<1.70	<0.76
04U711	D	09-Jun-98	<0.75	1.82	<1.70	<0.76
04U713		10-Jun-98	<0.75	<0.56	<1.70	<0.76
04U714		10-Jun-98	<0.75	0.82	<1.70	<0.76
04U802		11-Jun-98	<0.75	<0.56	<1.70	<0.76
04U806		12-Jun-98	<0.75	340.00	85.80	16.80
04U833		11-Jun-98	<0.75	42.90	<1.70	<0.76
PJ#003		09-Jun-98	<0.75	<0.56	<1.70	<0.76
PJ#309		08-Jun-98	<0.75	36.40	2.27	0.86
PJ#309		08-Dec-97	<0.75	28.60	<1.70	<0.76

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*Tetrachloroethene (µg/L)*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*
TGRS Cleanup Level [1]			5	5	6	70 [2]
PJ#310		08-Jun-98	<0.75	210.00	12.40	4.06
PJ#310		08-Dec-97	<0.75	152.00	11.10	2.97
PJ#311		08-Jun-98	<0.75	8.53	<1.70	<0.76
PJ#311	D	08-Jun-98	<0.75	8.71	<1.70	<0.76
PJ#311		08-Dec-97	<0.75	8.36	<1.70	<0.76
PJ#806		12-Jun-98	<0.75	420.00	41.00	11.60

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03F302		08-Jun-98	13.10	<0.78	3.06	<1.10
03F302		08-Dec-97	13.40	<0.78	3.12	<1.10
03F302	D	08-Dec-97	12.90	<0.78	3.07	<1.10
03F303		08-Jun-98	5.15	3.71	2.71	<1.10
03F303		08-Dec-97	<0.76	<0.78	<0.73	<1.10
03F303	D	08-Dec-97	7.60	3.99	3.34	<1.10
03F304		08-Jun-98	10.40	1.15	3.16	<1.10
03F304		08-Dec-97	9.90	1.51	2.87	<1.10
03F305		08-Jun-98	390.00	<0.78	84.60	2.27
03F305		08-Dec-97	330.00	<0.78	95.40	3.11
03F306		08-Jun-98	135.00	<0.78	53.80	1.5
03F306		08-Dec-97	172.00	<0.78	60.40	1.6
03F307		08-Jun-98	21.30	<0.78	22.10	<1.10
03F307		08-Dec-97	20.50	<0.78	19.40	<1.10
03F308		08-Jun-98	<0.76	<0.78	<0.73	<1.10
03F308		08-Dec-97	<0.76	<0.78	<0.73	<1.10
03F312		08-Jun-98	<0.76	<0.78	<0.73	<1.10
03F312		08-Dec-97	<0.76	<0.78	<0.73	<1.10
03L001		08-Jun-98	<0.76	<0.78	<0.73	<1.10

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]		200	5	70	4
03L002	05-Jun-98	4.17	<0.78	1.19	<1.10
03L017	11-Jun-98	<0.76	<0.78	<0.73	<1.10
03L018	11-Jun-98	20.90	<0.78	3.64	<1.10
03L020	04-Jun-98	1.98	<0.78	4.88	<1.10
03L021	12-Jun-98	<0.76	<0.78	0.94	<1.10
03L077	15-Jun-98	9.22	<0.78	0.90	<1.10
03L078	09-Jun-98	<0.76	<0.78	<0.73	<1.10
03L079	15-Jun-98	<0.76	<0.78	<0.73	<1.10
03L084	10-Jun-98	<0.76	<0.78	<0.73	<1.10
03L802	11-Jun-98	<0.76	<0.78	<0.73	<1.10
03L806	12-Jun-98	177.00	11.20	62.40	<1.10
03L809	17-Jun-98	116.00	4.36	14.70	<1.10
03L811	11-Jun-98	<0.76	<0.78	5.39	<1.10
03L822	22-Jun-98	29.90	<0.78	39.30	1.56

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03L832		22-Jun-98	<0.76	<0.78	<0.73	<1.10
03L833		11-Jun-98	<0.76	<0.78	<0.73	<1.10
03L841		19-Jun-98	<0.76	<0.78	<0.73	<1.10
03L846		18-Jun-98	<0.76	<0.78	<0.73	<1.10
03L848		29-Jun-98	<0.76	<0.78	<0.73	<1.10
03L853		23-Jun-98	9.33	<0.78	1.88	<1.10
03L854		26-Jun-98	<0.76	<0.78	<0.73	<1.10
03L854	D	26-Jun-98	<0.76	<0.78	<0.73	<1.10
03L861		29-Jun-98	<0.76	<0.78	<0.73	<1.10
03M713		10-Jun-98	<0.76	<0.78	<0.73	<1.10
03M802		17-Jun-98	<0.76	<0.78	<0.73	<1.10
03M802	D	17-Jun-98	<0.76	<0.78	<0.73	<1.10
03M806		12-Jun-98	3.99	<0.78	148.00	1.45
03M843		18-Jun-98	<0.76	<0.78	<0.73	<1.10
03M843	D	18-Jun-98	<0.76	<0.78	<0.73	<1.10
03M848		29-Jun-98	1.18	<0.78	7.18	<1.10

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03U003		12-Jun-98	8.98	<0.78	3.03	<1.10
03U014		08-Jun-98	<0.76	<0.78	<0.73	<1.10
03U015		10-Jun-98	<0.76	<0.78	<0.73	<1.10
03U017		11-Jun-98	<0.76	<0.78	<0.73	<1.10
03U018		12-Jun-98	25.40	<0.78	2.93	<1.10
03U020		04-Jun-98	500.00	<0.78	21.70	<1.10
03U021		12-Jun-98	184.00	<0.78	44.20	2.12
03U028		15-Jun-98	14.50	<0.78	<0.73	<1.10
03U030		15-Jun-98	<0.76	<0.78	<0.73	<1.10
03U032		17-Jun-98	<0.76	<0.78	<0.73	<1.10
03U075		15-Jun-98	<0.76	<0.78	<0.73	<1.10
03U075	D	15-Jun-98	<0.76	<0.78	<0.73	<1.10
03U077		12-Jun-98	36.80	<0.78	0.89	<1.10
03U077	D	12-Jun-98	34.80	<0.78	0.87	<1.10
03U078		15-Jun-98	6.26	<0.78	<0.73	<1.10

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03U079		15-Jun-98	58.30	<0.78	6.94	<1.10
03U084		10-Jun-98	<0.76	<0.78	<0.73	<1.10
03U093		16-Jun-98	41.20	<0.78	3.98	<1.10
03U093	D	16-Jun-98	39.20	<0.78	4.76	<1.10
03U094		15-Jun-98	320.00	<0.78	4.20	<1.10
03U096		17-Jun-98	14.50	<0.78	3.11	<1.10
03U099		15-Jun-98	4.56	<0.78	<0.73	<1.10
03U301		08-Jun-98	37.30	<0.78	1.62	<1.10
03U301		08-Dec-97	31.70	<0.78	1.78	<1.10
03U314		08-Jun-98	89.90	<0.78	5.06	<1.10
03U314		08-Dec-97	99.20	<0.78	6.30	<1.10
03U315		08-Jun-98	6.32	<0.78	<0.73	<1.10
03U315	D	08-Jun-98	6.77	<0.78	<0.73	<1.10
03U315		08-Dec-97	6.95	<0.78	<0.73	<1.10
03U317		08-Jun-98	1300.00	<0.78	34.00	1.9
03U317		08-Dec-97	2100.00	<0.78	36.30	5.17
03U317	D	08-Dec-97	2100.00	<0.78	37.80	4.30
03U658		16-Jun-98	<0.76	<0.78	<0.73	<1.10

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03U659		16-Jun-98	22.80	<0.78	1.24	<1.10
03U671		15-Jun-98	20.80	<0.78	4.07	<1.10
03U672		17-Jun-98	<0.76	<0.78	<0.73	<1.10
03U701		10-Jun-98	1.80	<0.78	<0.73	<1.10
03U702		11-Jun-98	<0.76	<0.78	<0.73	<1.10
03U703		16-Jun-98	4.41	2.12	<0.73	<1.10
03U705		17-Jun-98	<0.76	<0.78	<0.73	<1.10
03U706		16-Jun-98	<0.76	<0.78	<0.73	<1.10
03U708		16-Jun-98	43.00	<0.78	7.71	<1.10
03U709		16-Jun-98	29.00	<0.78	24.80	<1.10
03U710		25-Jun-98	50.10	<0.78	8.79	<1.10
03U711		16-Jun-98	28.70	<0.78	14.90	<1.10
03U711	D	16-Jun-98	27.40	<0.78	14.90	<1.10
03U801		17-Jun-98	<0.76	<0.78	<0.73	<1.10
03U803		16-Jun-98	<0.76	<0.78	<0.73	<1.10

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
03U804		16-Jun-98	<0.76	<0.78	<0.73	<1.10
03U805		16-Jun-98	<0.76	<0.78	<0.73	<1.10
03U811		11-Jun-98	<0.76	<0.78	<0.73	<1.10
04J077		15-Jun-98	37.60	<0.78	10.80	<1.10
04J702		11-Jun-98	1.16	<0.78	<0.73	<1.10
04J708		09-Jun-98	<0.76	<0.78	<0.73	<1.10
04J713		10-Jun-98	<0.76	<0.78	<0.73	<1.10
04J714		10-Jun-98	<0.76	<0.78	<0.73	<1.10
04U001		08-Jun-98	<0.76	<0.78	<0.73	<1.10
04U002		05-Jun-98	<0.76	<0.78	1.83	<1.10
04U002	D	05-Jun-98	0.92	<0.78	1.80	<1.10
04U003		09-Jun-98	<0.76	<0.78	<0.73	<1.10
04U020		04-Jun-98	<0.76	<0.78	3.20	<1.10
04U027		16-Jun-98	<0.76	<0.78	<0.73	<1.10
04U077		12-Jun-98	34.30	<0.78	3.02	<1.10

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
04U701		10-Jun-98	<0.76	<0.78	<0.73	<1.10
04U702		11-Jun-98	1.11	<0.78	<0.73	<1.10
04U702	D	11-Jun-98	1.05	<0.78	<0.73	<1.10
04U708		09-Jun-98	<0.76	<0.78	<0.73	<1.10
04U709		16-Jun-98	1.32	<0.78	0.99	<1.10
04U711		09-Jun-98	<0.76	<0.78	<0.73	<1.10
04U711	D	09-Jun-98	<0.76	<0.78	<0.73	<1.10
04U713		10-Jun-98	<0.76	<0.78	<0.73	<1.10
04U714		10-Jun-98	<0.76	<0.78	<0.73	<1.10
04U802		11-Jun-98	<0.76	<0.78	<0.73	<1.10
04U806		12-Jun-98	145.00	13.10	74.20	<1.10
04U833		11-Jun-98	<0.76	<0.78	<0.73	<1.10
PJ#003		09-Jun-98	<0.76	<0.78	<0.73	<1.10
PJ#309		08-Jun-98	6.55	<0.78	2.46	<1.10
PJ#309		08-Dec-97	4.88	<0.78	1.69	<1.10

TABLE 9.6

TGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID		*Sample Date*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*	*1,2-Dichloroethane (µg/L)*
TGRS Cleanup Level [1]			200	5	70	4
PJ#310		08-Jun-98	34.20	<0.78	11.20	<1.10
PJ#310		08-Dec-97	26.90	<0.78	8.69	<1.10
PJ#311		08-Jun-98	0.83	<0.78	<0.73	<1.10
PJ#311	D	08-Jun-98	<0.76	<0.78	<0.73	<1.10
PJ#311		08-Dec-97	0.90	<0.78	<0.73	<1.10
PJ#806		12-Jun-98	79.10	<0.78	38.50	<1.10

Notes:

[1] Cleanup levels for TGRS are from the OU2 ROD. Shading indicates exceedance of the cleanup level.

[2] The cleanup standard is specifically for cis-1,2-Dichloroethene, not total.

D - Duplicate

TABLE 9.7

VOC MASS LOADING SUMMARY
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Well	*% Contribution to VOC Mass Removal*	*FY 1998 Total Pounds VOC Mass Removed*
B1	3.5	214
B2	0.4	22
B3	0.5	31
B4	20.3	1246
B5	21.7	1329
B6	6.6	406
B7	0.0	2
B8	0.3	17
B9	1.7	107
B10	0.1	7
B11	0.0	2
B12	(Shut down)	0
SC1	2.0	123
SC2	0.7	45
SC3	0.1	8
SC4	(Shut down)	0
SC5	41.9	2571
Fiscal Year 1998 Total (lbs)		*6132*
Daily Average (lbs/day)		*17*

HISTORICAL TOTAL

Fiscal Year		*Pounds VOC Mass Removed*
1998		6,132
1997		6,210
1996		10,655
1995		13,355
1994		15,070
1993		20,165
1992		24,527
1991		26,760
1990		18,005
1989	(First year of full scale system)	19,510
1988		4,800
1987		2,100
Total		*167,289*

TABLE 9.8

FISCAL YEAR 1998 VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE
03F302	12/8/97	12.9 ?	< 0.78 ?	2.98 ?	3.07 ?	11.5 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	0.64 ?	1.45 ?	< 1 T?	250 ?
(B-1)	12/8/97	13.4 D?	< 0.78 D?	3.06 D?	3.12 D?	13.5 D?	< 1.1 D?	< 1 DT?	< 1.01 D?	< 0.99 D?	< 7.4 D?	0 D?	1.49 D?	< 1 DT?	240 D?
	6/8/98	13.1 ?	< 0.78 ?	3.11 ?	3.06 ?	13.2 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	1.6 ?	< 1 T?	250 ?
03F303	12/8/97	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	< 0.56 ?
(B-2)	12/8/97	7.6 D?	3.99 D?	5.2 D?	3.34 D?	2.12 D?	< 1.1 D?	< 1 DT?	< 1.01 D?	< 0.99 D?	< 7.4 D?	< 0.5 D?	2.74 D?	< 1 DT?	61.6 D?
	6/8/98	5.15 ?	3.71 ?	4.38 ?	2.71 ?	1.41 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	2.9 ?	< 1 T?	57 ?
03F304	12/8/97	9.9 ?	1.51 ?	4.45 ?	2.87 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	18.6 ?
(B-3)	6/8/98	10.4 ?	1.15 ?	5.4 ?	3.16 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	22.5 ?
03F305	12/8/97	330 ?	< 0.78 ?	90.1 ?	95.4 ?	69.1 ?	3.11 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	3.59 ?	< 0.75 ?	< 1 T?	1400 ?
(B-4)	6/8/98	390 ?	< 0.78 ?	86 ?	84.6 ?	56 ?	2.27 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	2.91 ?	< 0.75 ?	< 1 T?	1700 ?
03F306	12/8/97	172 ?	< 0.78 ?	61 ?	60.4 ?	9.42 ?	1.6 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	1.07 ?	2.03 ?	3.42 ?	1700 ?
(B-5)	6/8/98	135 ?	< 0.78 ?	52.1 ?	53.8 ?	9.39 ?	1.5 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	0.945 ?	1.25 ?	3.35 Z	1600 ?
03F307	12/8/97	20.5 ?	< 0.78 ?	14.4 ?	19.4 ?	4.04 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	380 ?
(B-6)	6/8/98	21.3 ?	< 0.78 ?	17.3 ?	22.1 ?	4.08 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	450 ?
03F308	12/8/97	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	1.9 ?
(B-7)	6/8/98	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	2 ?
PJ#309	12/8/97	4.88 ?	< 0.78 ?	< 1.7 ?	1.69 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	28.6 ?
(B-8)	6/8/98	6.55 ?	< 0.78 ?	2.27 ?	2.46 ?	0.862 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	36.4 ?
PJ#310	12/8/97	26.9 ?	< 0.78 ?	11.1 ?	8.69 ?	2.97 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	152 ?
(B-9)	6/8/98	34.2 ?	< 0.78 ?	12.4 ?	11.2 ?	4.06 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	210 ?
PJ#311	12/8/97	0.904 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	8.36 ?
(B-10)	6/8/98	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	8.71 ?
	6/8/98	0.834 D?	< 0.78 D?	< 1.7 D?	< 0.73 D?	< 0.76 D?	< 1.1 D?	< 1 DT?	< 1.01 D?	< 0.99 D?	< 7.4 D?	< 0.5 D?	< 0.75 D?	< 1 DT?	8.53 D?
03F312	12/8/97	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	4.89 ?
(B-11)	6/8/98	< 0.76 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	5.55 ?
03U301	12/8/97	31.7 ?	< 0.78 ?	4.11 ?	1.78 ?	84.4 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	1000 ?
(SC-1)	6/8/98	37.3 ?	< 0.78 ?	< 1.7 ?	1.62 ?	81.4 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	3.8 ?	< 0.75 ?	< 1 T?	1200 ?
03U314	12/8/97	99.2 ?	< 0.78 ?	11.6 ?	6.3 ?	2.69 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	218 ?
(SC-2)	6/8/98	89.9 ?	< 0.78 ?	10.8 ?	5.06 ?	1.75 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	191 ?

TABLE 9.8

FISCAL YEAR 1998 VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE
03U315	12/8/97	6.95 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	15.9 ?
(SC-3)	6/8/98	6.77 ?	< 0.78 ?	< 1.7 ?	< 0.73 ?	< 0.76 ?	< 1.1 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	< 0.5 ?	< 0.75 ?	< 1 T?	18.4 ?
	6/8/98	6.32 D?	< 0.78 D?	< 1.7 D?	< 0.73 D?	< 0.76 D?	< 1.1 D?	< 1 DT?	< 1.01 D?	< 0.99 D?	< 7.4 D?	< 0.5 D?	< 0.75 D?	< 1 DT?	18 D?
03U317	12/8/97	2100 ?	< 0.78 ?	99.2 ?	37.8 ?	5.8 ?	4.3 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	1.42 ?	14.4 ?	31.2 Z?	6700 ?
(SC-5)	12/8/97	2100 D?	< 0.78 D?	97.5 D?	36.3 D?	6.05 D?	5.17 D?	< 1 DT?	< 1.01 D?	< 0.99 D?	< 7.4 D?	1.42 D?	15.9 D?	28.2 DZ?	7100 D?
	6/8/98	1300 ?	< 0.78 ?	98.8 ?	34 ?	5.44 ?	1.9 ?	< 1 T?	< 1.01 ?	< 0.99 ?	< 7.4 ?	1.32 ?	14.2 ?	28.2 Z?	4700 ?

Notes:
Units in µg/L
D - Duplicate analysis
T - Non-target compound analyzed for but not detected (non-GC/MS methods)
Z - Non-target compound analyzed for and detected (non-GC/MS methods)
? - Control chart not yet approved by USAEC

TABLE 9.9

SUMMARY OF OU2 DEEP GROUNDWATER MONITORING REQUIREMENTS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Remedy Component	*Monitoring Requirements*	*Responsible Party*	*Documents Containing the Monitoring Plan*
#1 Hydraulic Containment and Mass Removal	a. Water levels to draw contour maps showing hydraulic zone of capture	Alliant/Army	Deep groundwater monitoring plan in Annual Report
	b. Pumping volumes and rates for comparison to design rates	Alliant/Army	Deep groundwater monitoring plan in Annual Report
	c. Influent and extraction well water quality for overall mass removal calculations	Alliant/Army	Deep groundwater monitoring plan in Annual Report
#2 Groundwater Treatment	• Outlined below	Alliant/Army	Deep groundwater monitoring plan in Annual Report
#3 Treated Water Discharge	• Effluent monitoring to verify attainment of treatment requirements	Alliant/Army	Deep groundwater monitoring plan in Annual Report
#4 Institutional Controls	• None	Alliant/Army	Deep groundwater monitoring plan in Annual Report
#5 Review of New Technologies	• None	Alliant/Army	Deep groundwater monitoring plan in Annual Report
#6 Groundwater Monitoring	• As above	Alliant/Army	Deep groundwater monitoring plan in Annual Report
Overall Remedy	a. Groundwater quality to verify attainment of clean up goals	Alliant/Army	Deep groundwater monitoring plan in Annual Report

Figures

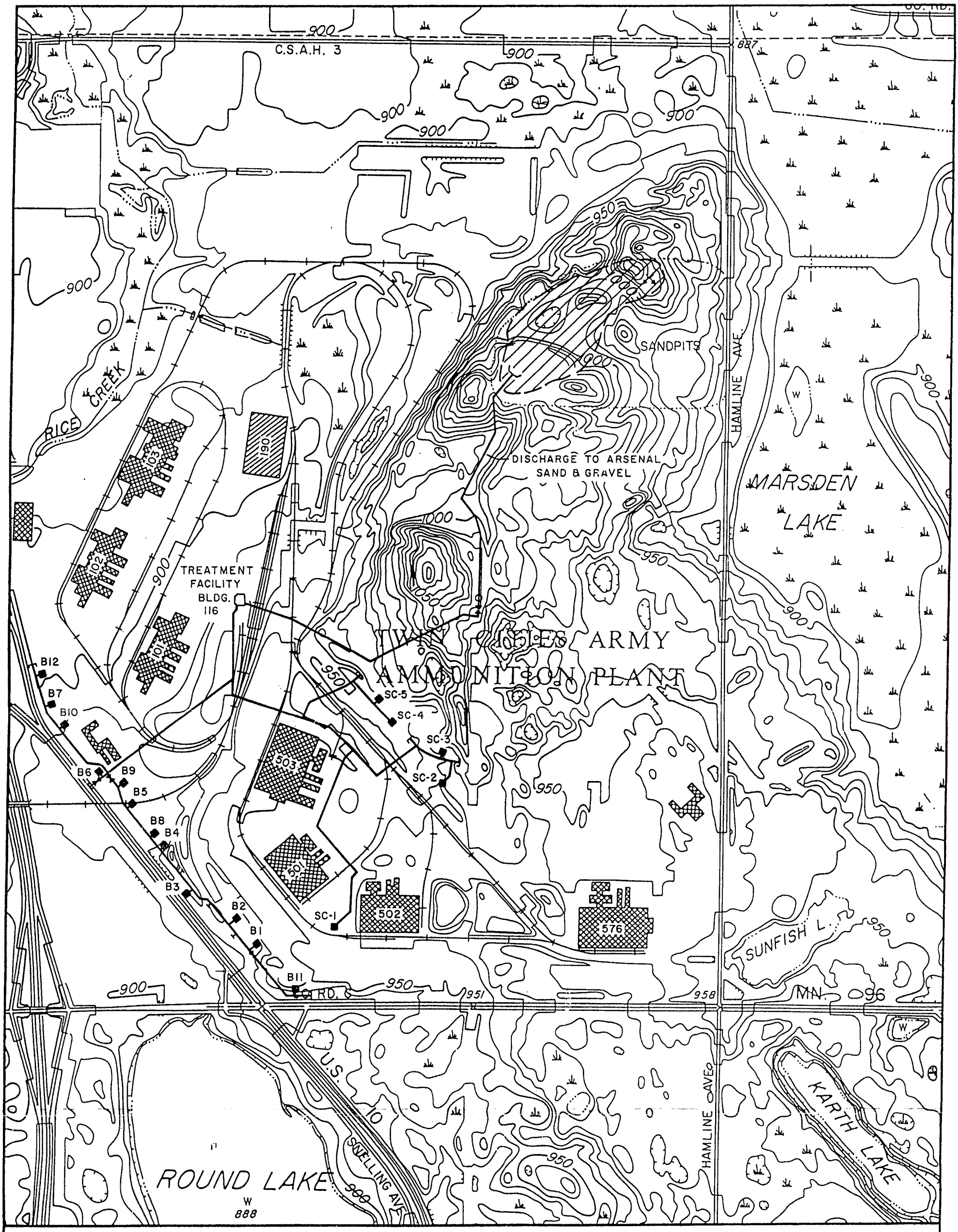


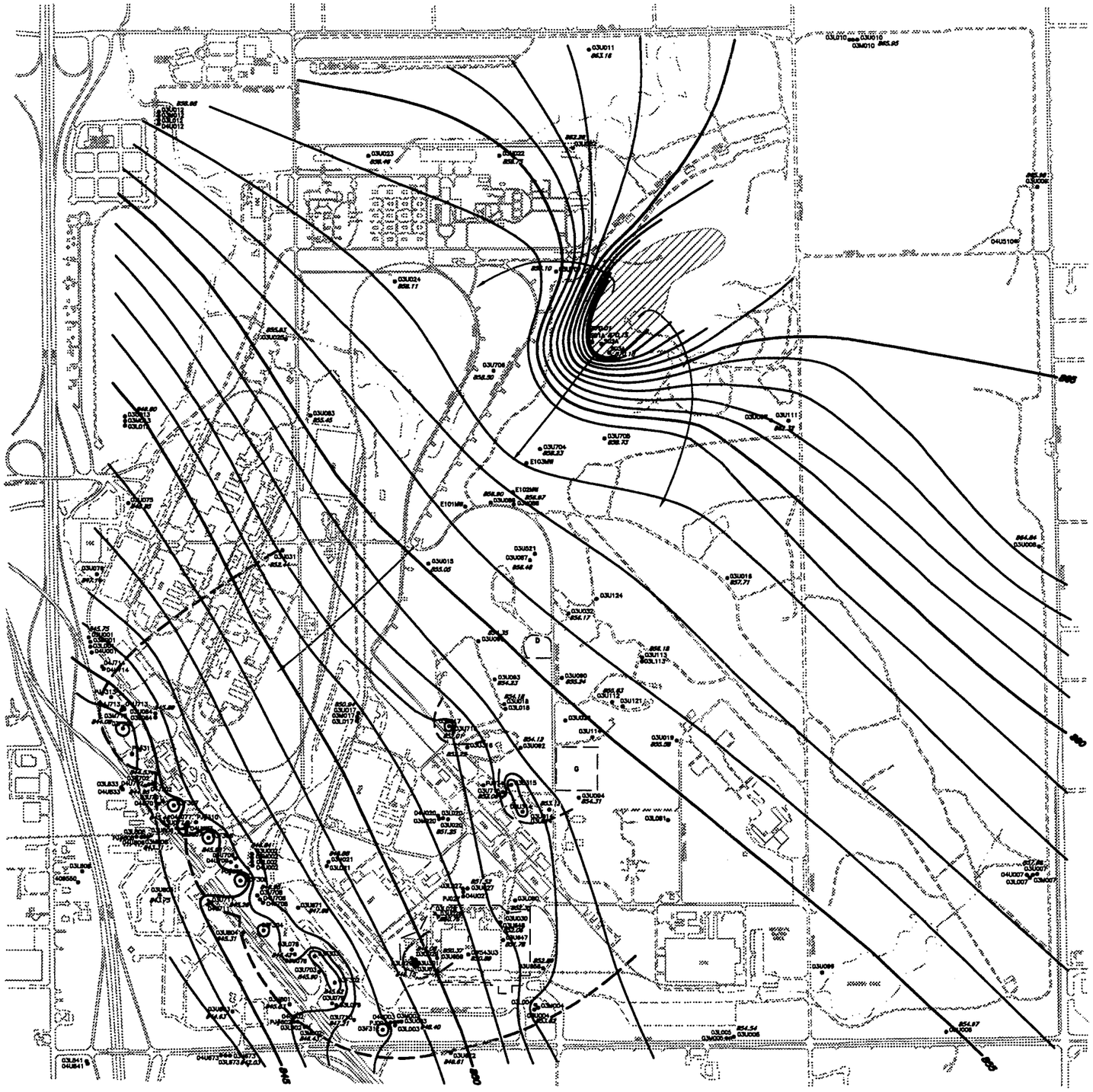
figure 9–1

OU2, TGRS LAYOUT

Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP JAN 11/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- *844.52* GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

ARSENAL SAND AND GRAVEL PIT TREATED WATER DISCHARGE AREA. (APPROXIMATE BOUNDARIES)

EXTRACTION WELL NAME CROSS REFERENCE

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

figure 9–2

OU2, UPPER UNIT 3, POTENTIOMETRIC MAP, 12–2–97 (Q57)

Twin Cities Army Ammunition Plant

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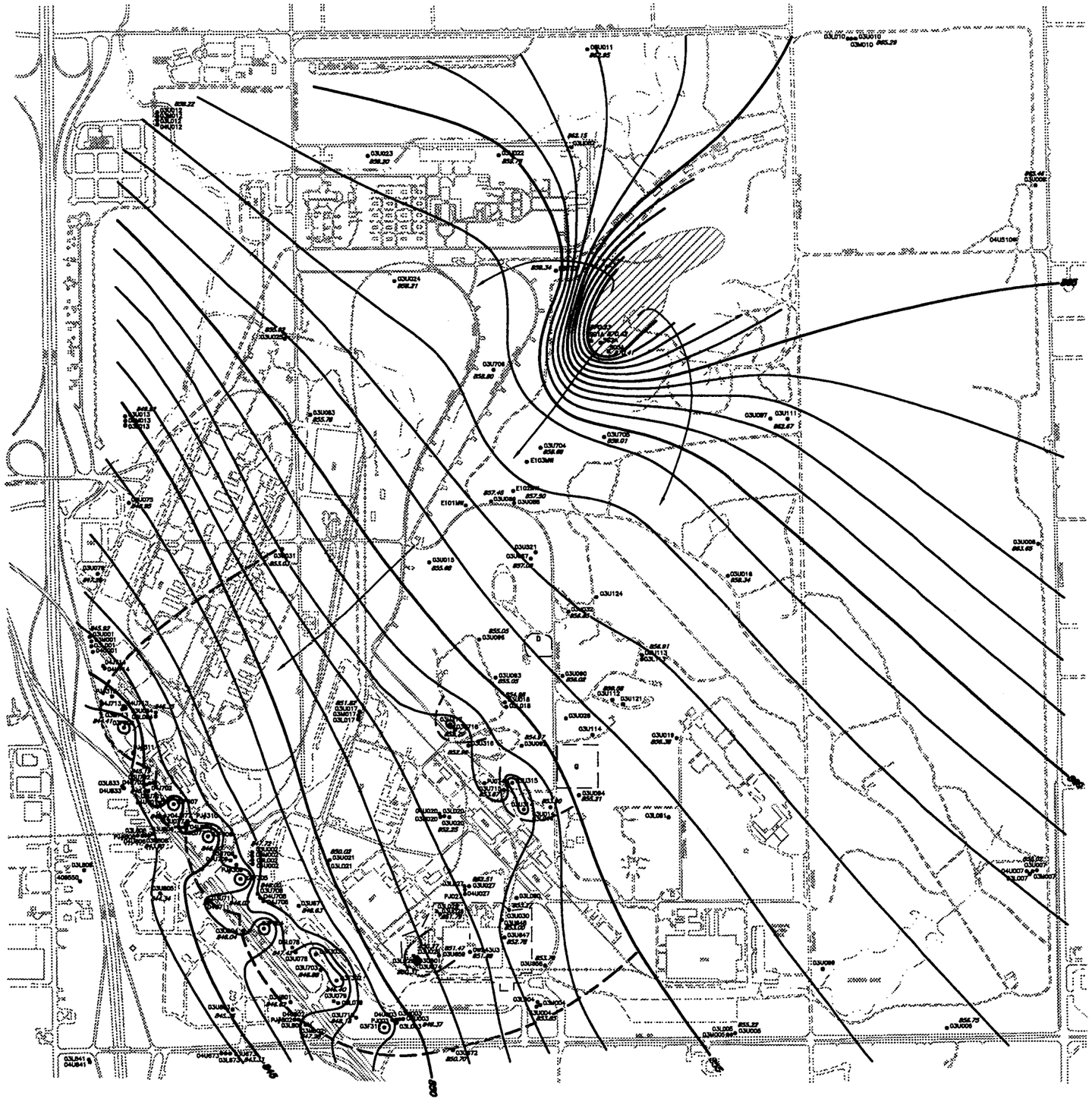
11585–40(002)GN–SP010 JAN 11/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- 844.52 GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

ARSENAL SAND AND GRAVEL PIT TREATED WATER DISCHARGE AREA. (APPROXIMATE BOUNDARIES)

EXTRACTION WELL NAME CROSS REFERENCE

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

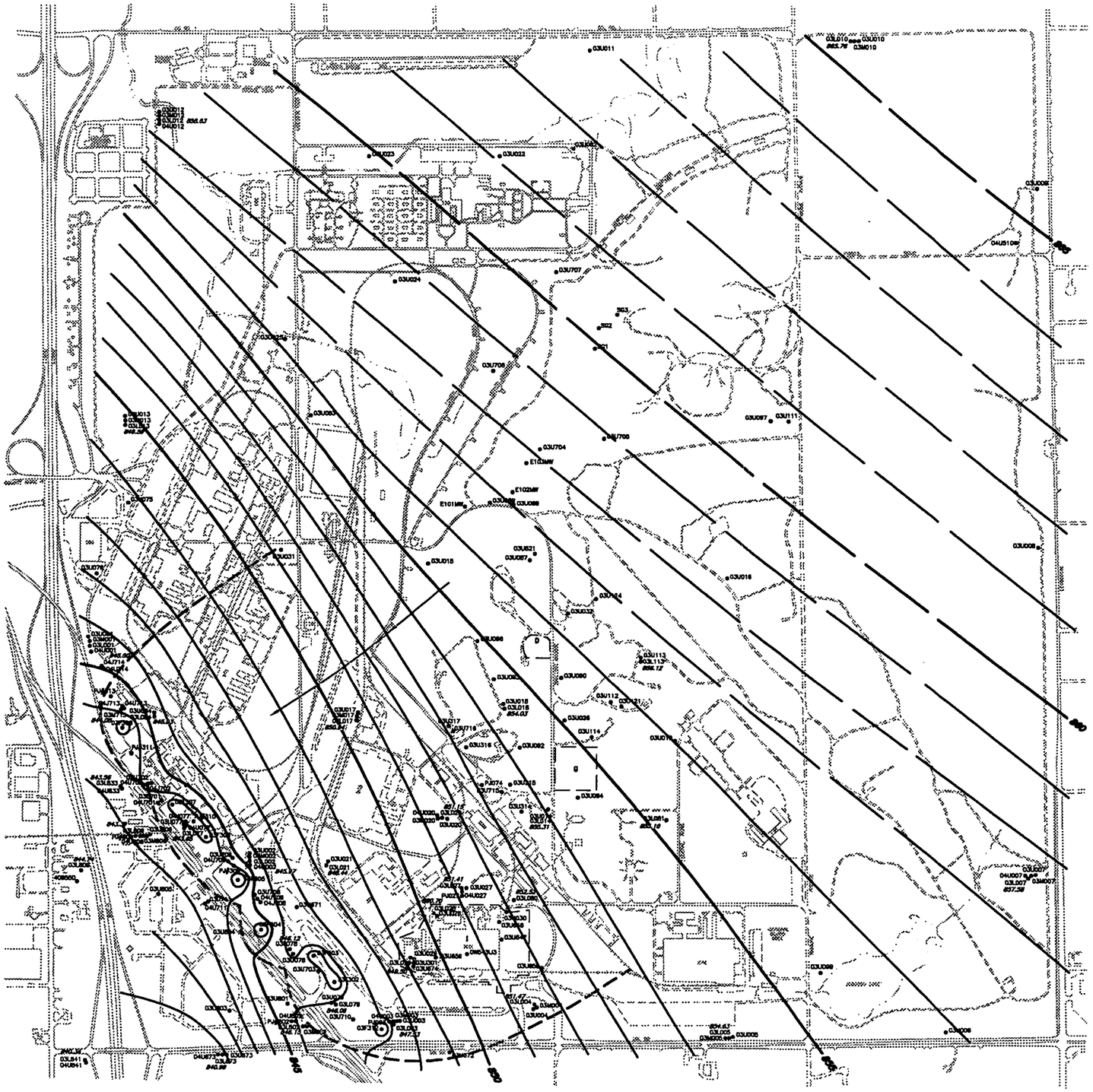
figure 9–3

OU2, UPPER UNIT 3, POTENTIOMETRIC MAP, 5–27–98 (Q59)

Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP011 JAN 11/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- *844.52* GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

EXTRACTION WELL NAME CROSS REFERENCE

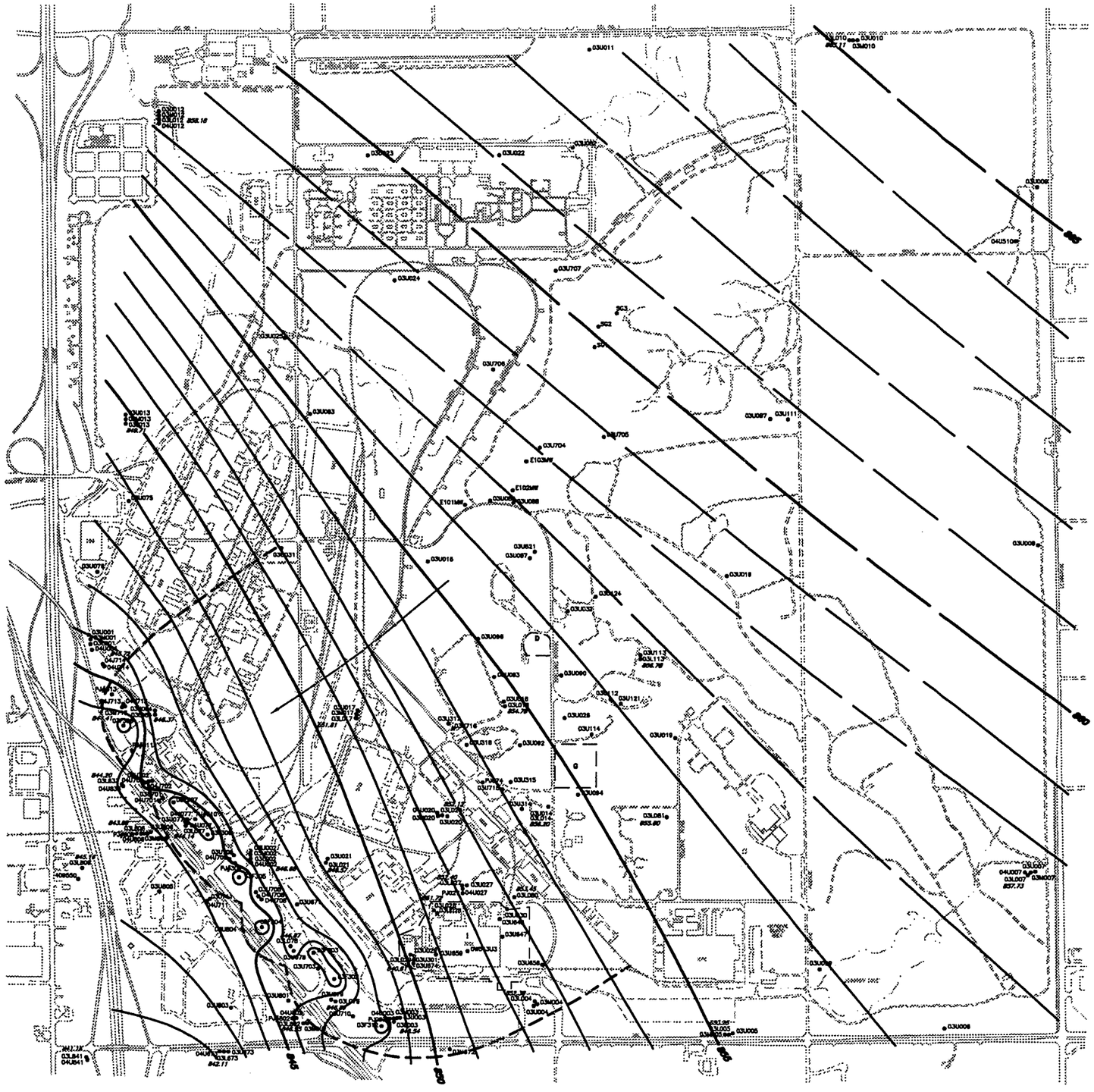
B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

CRA

figure 9–4

OU2, LOWER UNIT 3,
POTENTIOMETRIC MAP,
12–2–97 (Q57)
Twin Cities Army Ammunition Plant

11585–40(002)GN–SP012 JAN 12/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- *844.52* GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

EXTRACTION WELL NAME CROSS REFERENCE

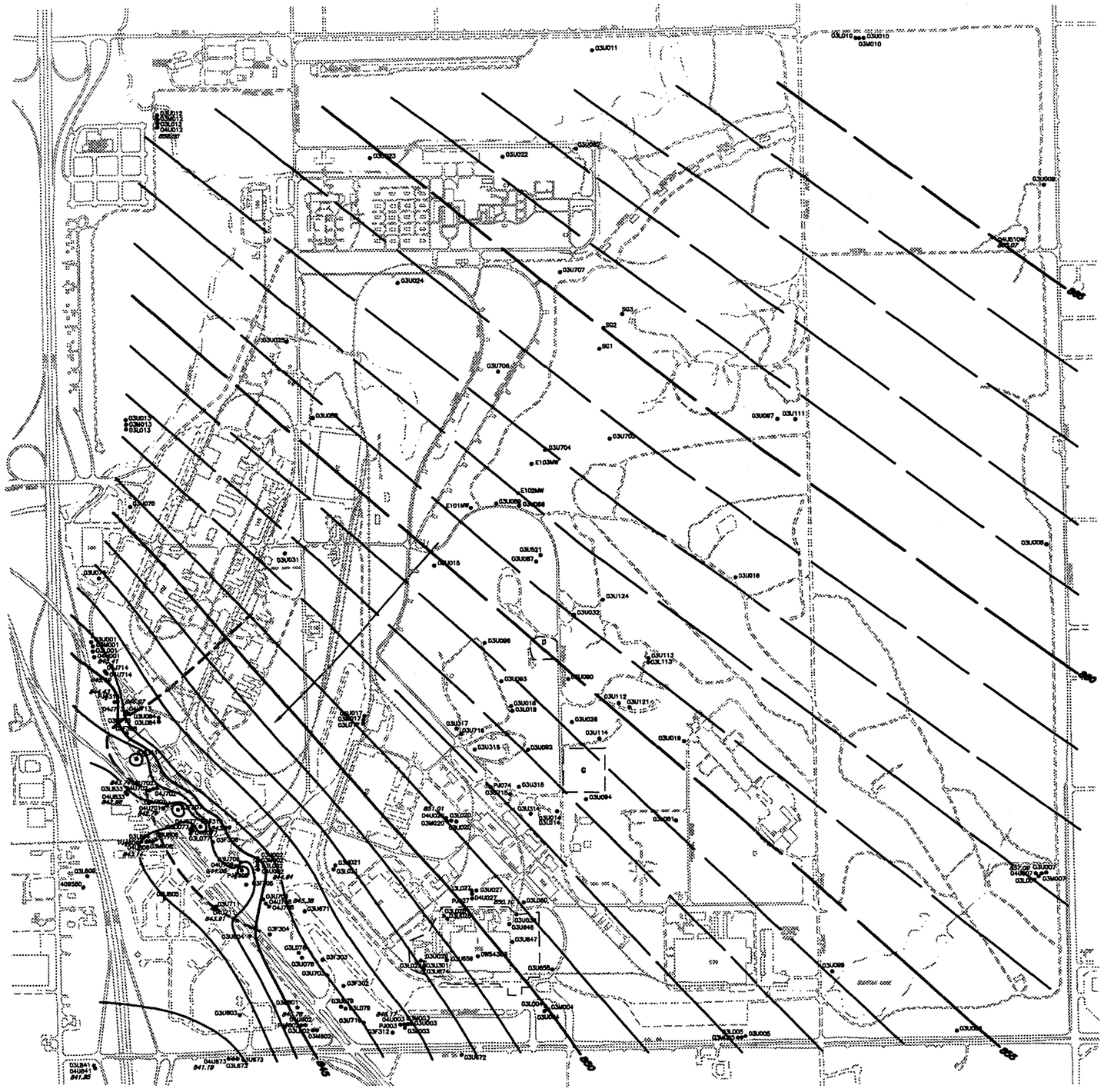
B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

figure 9–5

OU2, LOWER UNIT 3,
POTENTIOMETRIC MAP,
5–27–98 (Q59)
Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP013 JAN 12/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- 844.52 GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

EXTRACTION WELL NAME CROSS REFERENCE

B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

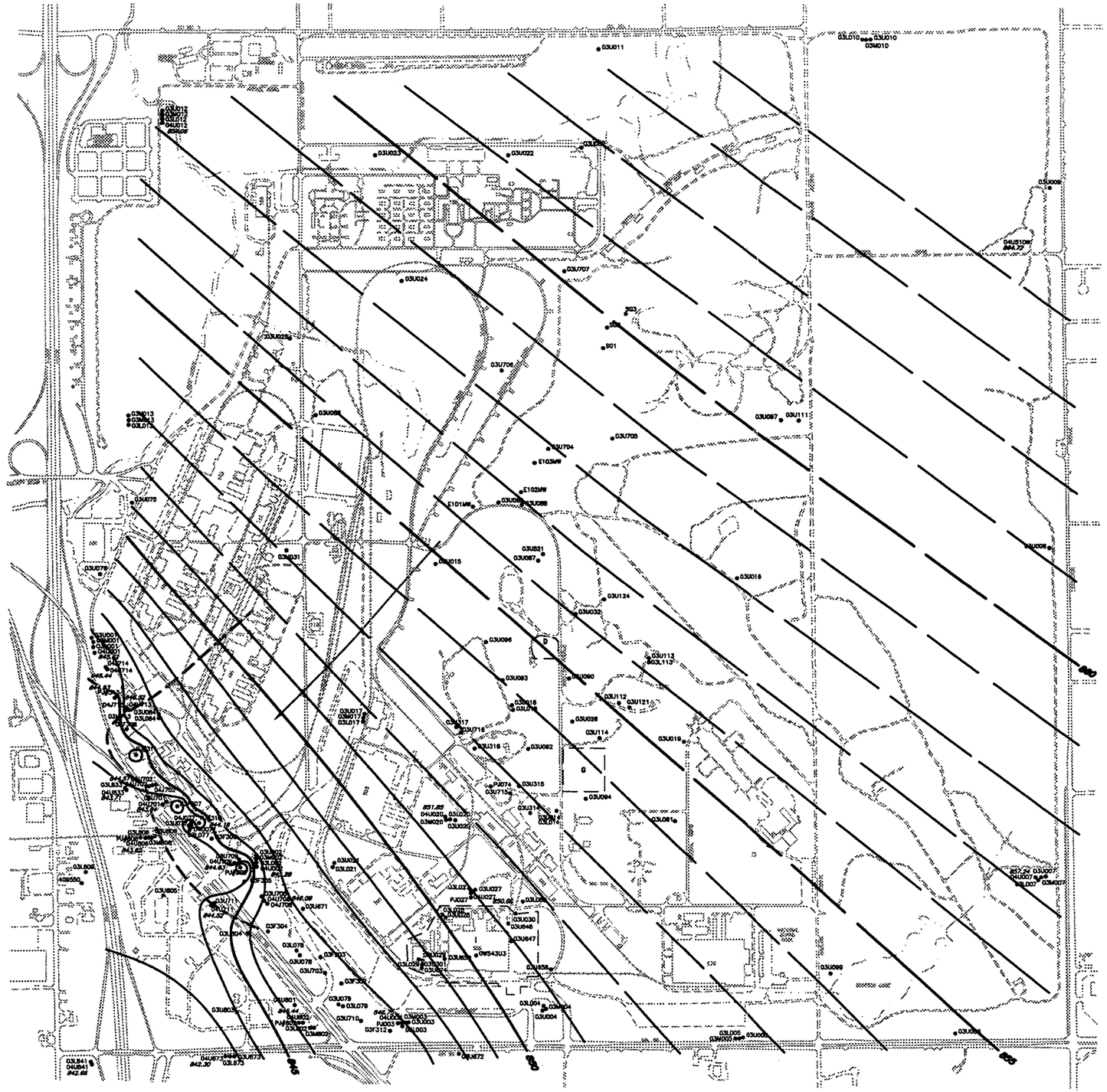
figure 9–6

OU2, UPPER UNIT 4, POTENTIOMETRIC MAP, 12–2–97 (Q57)

Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP014 MAY 18/99



0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION
- 844.52 GROUNDWATER ELEVATION IN FEET AMSL
- GROUNDWATER CONTOUR
- DIRECTION OF GROUNDWATER FLOW
- LIMIT OF CAPTURE

NOTE: GROUNDWATER CONTOURS ARE INTERPOLATED FROM THE DATA POINTS SHOWN.

NA NOT AVAILABLE

EXTRACTION WELL NAME CROSS REFERENCE

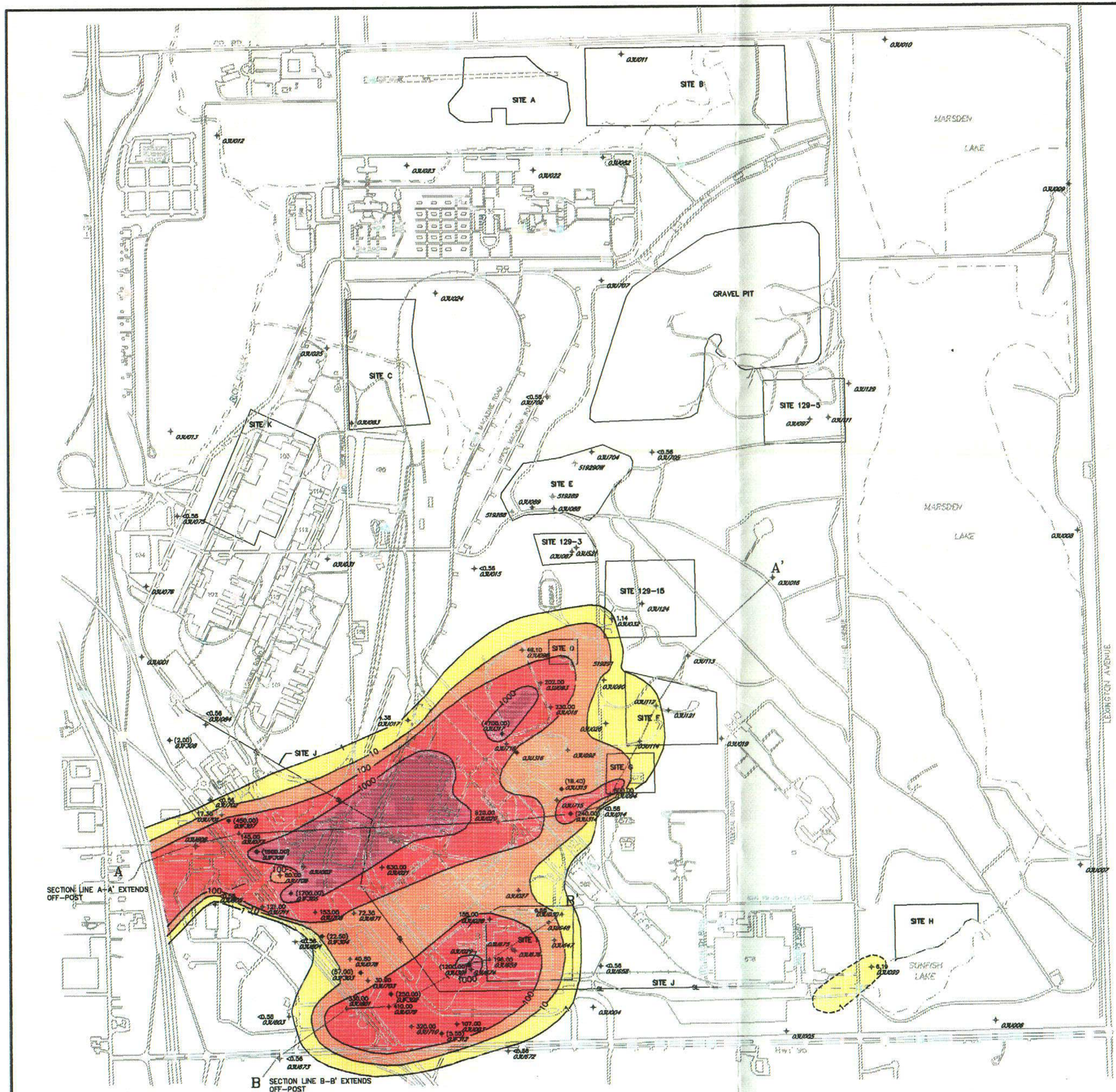
B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

figure 9–7

OU2, UPPER UNIT 4,
POTENTIOMETRIC MAP,
5–28–98 (Q59)
Twin Cities Army Ammunition Plant

CRA

11585–40(002)GN–SP015 MAY 18/99



N

400 0 400 800
SCALE IN FEET

LEGEND

- + 180.00 03U003 — MONITORING WELL LOCATION
- + 260.00 03F302 — RECOVERY WELL LOCATION
- SITE BOUNDARY
- WATER SYMBOL
- ROAD
- + 180.00 03U003 — TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- 10 — ISOCONCENTRATION CONTOUR (ug/l)
- 10 — ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- CROSS SECTION LINE
- BUILDING REMOVED

NOTES:

1. ALL UPPER UNIT 3 WELLS AT THE SITE ARE SHOWN.
2. 03F AND 03U RECOVERY WELLS ARE SHOWN WITH DATA IN PARENTHESES, BUT CONCENTRATIONS WERE NOT USED FOR CONTOURING.
3. RECOVERY WELL NAME CONVERSIONS:

03F302	B-1
03F303	B-2
03F304	B-3
03F305	B-4
03F306	B-5
03F307	B-6
03F308	B-7
03F312	B-11
03U301	SC-1
03U314	SC-2
03U315	SC-3
03U316	SC-4
03U317	SC-5

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DATE 7-9-99 M:DLM

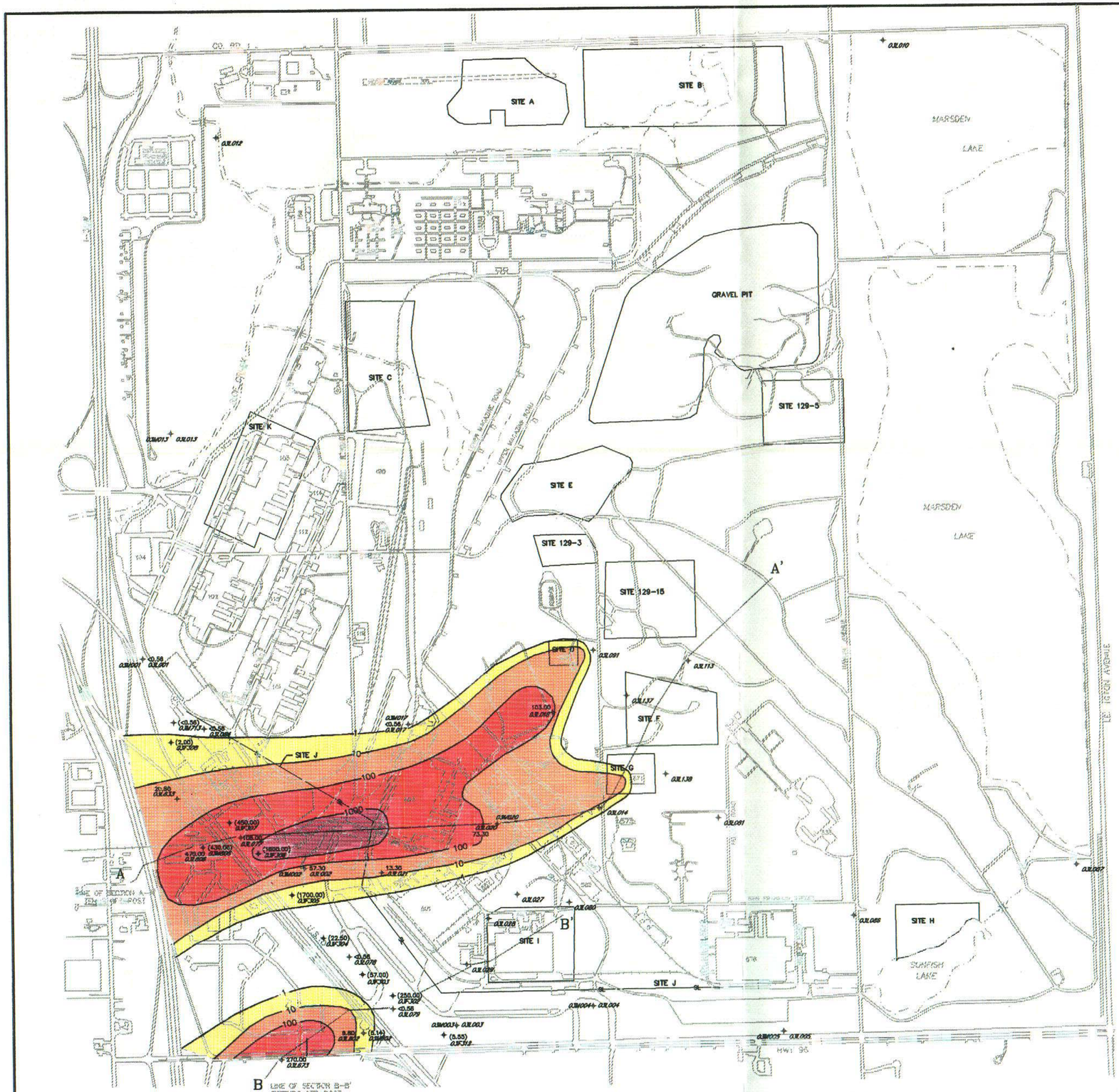
TWIN CITIES ARMY AMMUNITION PLANT

OU2, Upper Unit 3 Trichloroethene Isoconcentration Map, Summer 1998 (Q59)

Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 9-8



N

400 0 400 800

SCALE IN FEET

LEGEND

- 03L002 — MONITORING WELL LOCATION
- 03F302 — RECOVERY WELL LOCATION
- SITE BOUNDARY
- WATER SYMBOL
- ROAD
- 940.00 (03L002) — TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- 10 — ISOCONCENTRATION CONTOUR (ug/l)
- 10 — ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- CROSS SECTION LINE
- BUILDING REMOVED

NOTES:

1. ALL LOWER UNIT 3 WELLS AT THE SITE ARE SHOWN.
2. MIDDLE UNIT 3 WELLS WITH DATA FOR QUARTER 59 ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
3. 03F RECOVERY WELLS ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
4. RECOVERY WELL NAME CONVERSIONS:

03F302	B-1
03F303	B-2
03F304	B-3
03F305	B-4
03F306	B-5
03F307	B-6
03F308	B-7
03F312	B-11

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DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

OU2, Lower Unit 3 Trichloroethene Isoconcentration Map, Summer 1998 (Q59)

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359

JULY 1999

Figure 9-9

N

400 0 400 800
SCALE IN FEET

LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- SITE BOUNDARY
- WATER SYMBOL
- ROAD
- TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)
- ISOCONCENTRATION CONTOUR (ug/l)
- ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)
- CROSS SECTION LINE
- BUILDING REMOVED

NOTES:

1. ALL UNIT 4 WELLS AT THE SITE ARE SHOWN.
2. ALL 04J WELLS (JORDAN WELLS) WITH DATA FOR QUARTER 59 ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
3. ALL PJ# RECOVERY WELLS ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
4. PJ# MONITORING WELLS WITH DATA FOR QUARTER 59 ARE SHOWN WITH DATA IN PARENTHESES, BUT WERE NOT USED FOR CONTOURING.
5. RECOVERY WELL NAME CONVERSIONS:

PJ# 309	B-8
PJ# 310	B-9
PJ# 311	B-10
PJ# 313	B-12 (SHUT OFF)

FILE N4UTRCLP.DWG
DATE 7-9-99 M:DLM

TWIN CITIES ARMY AMMUNITION PLANT

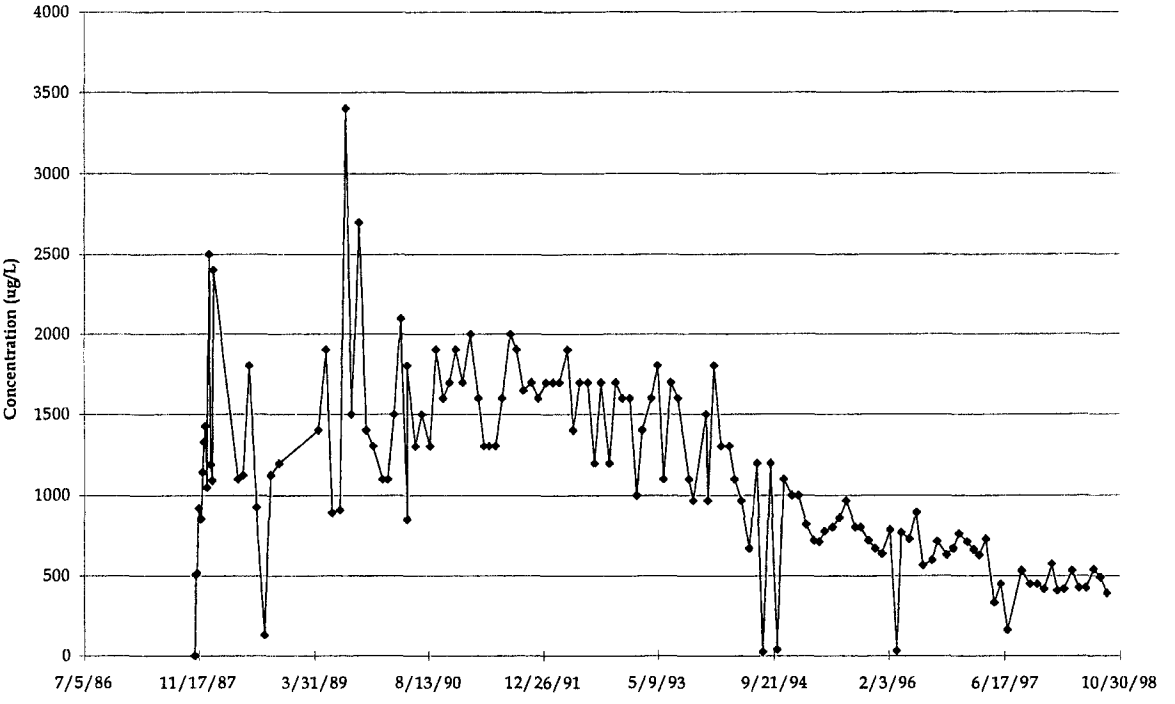
OU2, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 1998 (Q59)

Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359

JULY 1999

Figure 9-10

TRCLE vs. TIME - INFLUENT



TRCLE vs. TIME - EFFLUENT

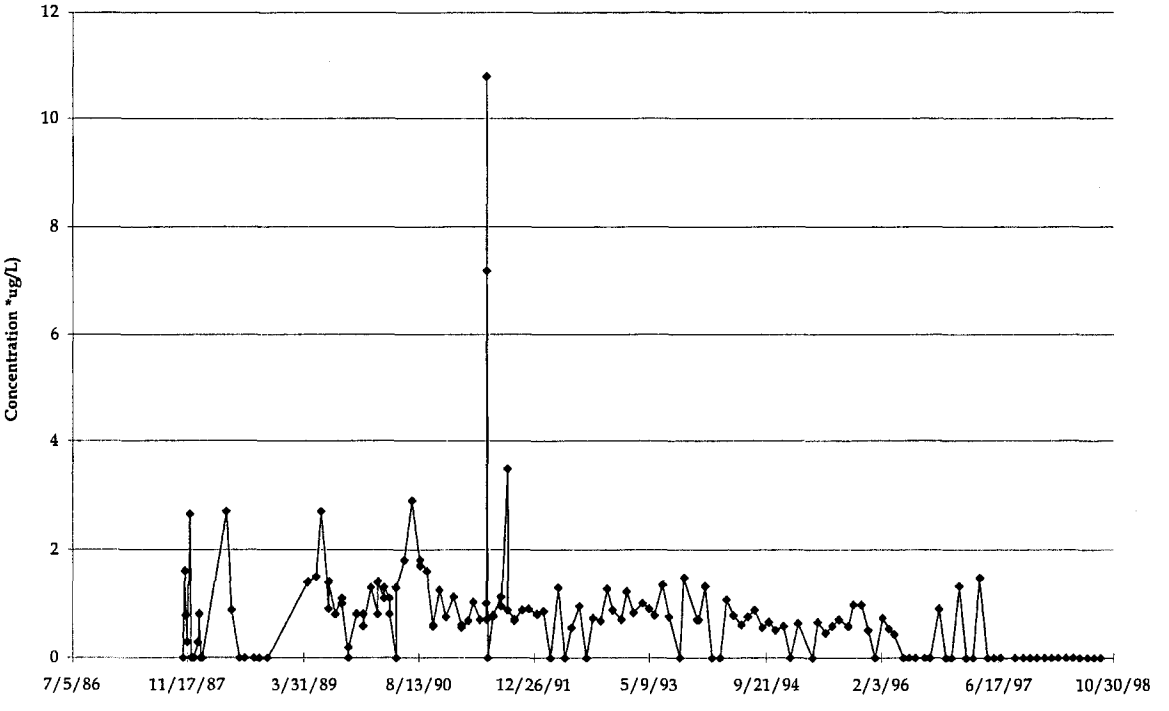


figure 9–11

OU2, TGRS TREATMENT SYSTEM PERFORMANCE

Twin Cities Army Ammunition Plant

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SECTION 10

10.0 Operable Unit 3: Deep Groundwater

The reference for the OU3 ROD is:

RECORD OF DECISION
Groundwater Remediation
Operable Unit 3
at New Brighton/Arden Hills Superfund Site
September 1992

There have been no subsequent ROD Amendments or Explanations of Significant Differences.

The PGRS (Plume Groundwater Recovery System) of Operable Unit 3 (OU3) is an off-post groundwater extraction and treatment system and municipal potable water supply. The PGRS consists of New Brighton Municipal Well #13 (NBM#13) and a GAC treatment plant. The water is used by New Brighton for Municipal supply. The PGRS is designed to contain the south plume of VOC contamination emanating from TCAAP and to prevent further downgradient migration. Recovered groundwater is treated and used by the City of New Brighton to fulfill its municipal water supply demand. Figure 10-1 presents a site plan for OU3.

The PGRS began operations on May 3, 1994. This section of the report presents the monitoring results from the FY 1998 operation of the PGRS and documents treatment and groundwater capture performance.

10.1 REMEDY COMPONENT #1: GROUNDWATER EXTRACTION

Description: "Extraction of groundwater at the leading edge of the South Plume." (OU3 ROD, page 2)

Performance Standard (how do you know when you're done):

When the PGRS is operating at the designed flow rates and the zone of capture is achieving containment of the leading edge of the south plume.

Is the remedy component being implemented?

Yes. The PGRS has been in full scale operation since May 1994.

Is the PGRS containing the south plume?

Yes. The zone of hydraulic capture for the PGRS in FY 1998 was determined by manually contouring the water level data. Appendix K.1 contains the water level database for the monitoring wells. Figure 3-1 presents the groundwater contours for the Prairie du Chien aquifer (the aquifer of concern) for May 1998. Inspection of this figure indicates a broad area of very low horizontal gradients immediately southwest of the PGRS. This area is indicative of a stagnation zone downgradient of the PGRS.

Based on monitoring well data, contaminants are not found in the Unit 3 or Jordan Sandstone aquifer in this area, which lie above and below the Prairie du Chien, respectively (see Appendix A for a description of the aquifer units). Therefore, the Unit 3 and Jordan Sandstone aquifer are not of concern for remediation in this area of the Site and further definition of Unit 3 and Jordan Sandstone capture is not needed.

Vertical Gradients

Table 10-1 presents a summary of the vertical gradients for nested wells shown on Figure 3-1.

FY 1998 data is comparable to the historic data which indicate an upward gradient between the Unit 3 and the Prairie du Chien immediately southwest of TCAAP. South of well nest 859, vertical gradients reverse to a downward trend. This downward gradient is also indicated in the Unit 3 VOC plume which extends to 03L859. The vertical gradient and analytical data suggests that the VOC plume is moving from the Unit 3 into the Prairie du Chien under this downward vertical gradient.

Table 10-1 shows that there is a downward vertical gradient between the Prairie du Chien and the Jordan Sandstone. However, this downward vertical gradient has been reduced since pumping began. Nearer to extraction well NBM #13 (completed in the Prairie du Chien) larger drawdowns within the Prairie du Chien are likely sufficient to create an upward vertical gradient between the Jordan and Prairie du Chien.

10.2 REMEDY COMPONENT #2: GROUNDWATER TREATMENT

Description: "Treatment of extracted groundwater for the removal of volatile organic compounds (VOCs) by a pressurized granular activated carbon (GAC) system." (OU3 ROD, page 2)

Performance Standard (how do you know when you're done):

When the effluent from the treatment system meets the standards in the OU3 ROD.

Is the remedy component being implemented?

Yes. The GAC treatment system has been in operation since 1994. The City of New Brighton operates the system as part of their municipal water system.

Is treatment meeting the requirements of the OU3 ROD?

Yes. Influent and effluent water was sampled on a monthly basis during FY 1998 and the results are provided in Table 10-2. PGRS influent is labeled NB13I and effluent is labeled NB13E. Table 10-3 presents a summary of monthly VOC removal for FY 1998 and Figure 10-2 shows the influent trichloroethene concentration versus time. The average FY 1998 influent trichloroethene concentration was 1.26 µg/l. Figure 10-2 indicates that influent concentrations continue to decrease. The influent to the treatment system ranged from 0.621 µg/l to 1.91 µg/l trichloroethene in FY 1998.

Figure 10-2 also presents a summary of the effluent trichloroethene concentration versus time. As indicated, effluent has remained below detection limits for all but one (0.899 in February 1998) sampling events in FY 1998. A review of the 1998 database indicates that the effluent has remained below the contaminant-specific requirements for all VOC compounds.

How much VOC mass did the system remove?

The PGRS extracted and treated 477,768,000 gallons of water from October 1997 through September 1998 (Appendix K.2) for an average of 908 gpm. A total of 25 days of down time occurred during FY 1998. The down time was the result of maintenance related to shock chlorination, some mechanical work and regeneration of the iron/manganese filter.

Based on the average monthly VOC concentrations from the NBM#13 influent for FY 1998, the PGRS removed approximately 5.1 pounds of VOCs from October 1997 through September 1998. A summary of the PGRS monthly pumping volumes and VOC mass removal is shown in Table 10-3. The total VOC mass removed from the PGRS from startup through FY 1998 is 129 pounds. The purpose of the PGRS is to contain the leading edge of the south plume, where VOC concentrations are low. Therefore, the VOC mass removal is generally low.

10.3 REMEDY COMPONENT #3: USE OF WATER FOR MUNICIPAL SUPPLY

Description: "Discharge of treated ground water to the potable supply of the City of New Brighton." (OU3 ROD, page 2)

Performance Standard (how do you know when you're done):

When the City of New Brighton is able to accept the entire discharge from the PGRS, and is doing so on a full time basis.

Is the remedy component being implemented?

Yes. The City of New Brighton established a municipal water supply interconnection with the City of Fridley in 1994. This has allowed them to accept the discharge from the PGRS on a full time basis since its start up in May 1994. The City of New Brighton operates the well and treatment system.

10.4 REMEDY COMPONENT #4: GROUNDWATER MONITORING

Description: "Monitoring of the ground water to verify the effectiveness of the remedy." (OU3 ROD, page 2)

Performance Standard (how do you know when you're done):

When a monitoring program is established and monitoring is in compliance with the regulator approved Annual Monitoring Plan.

Is the remedy component being implemented?

Yes. Appendix H summarizes the FY 1998 monitoring plan and any deviations are explained in Appendix B.2. Monitoring was as follows:

Groundwater

Groundwater samples and water level measurements for the annual event were collected in June 1998. Groundwater samples for the semiannual event were collected in December 1997. All samples were analyzed for VOCs using the Army Environmental Center (USAEC) Method N83. Monitoring wells used for water levels and sampling for the PGRS are shown on Figure 10-1. Appendix K.1 presents the water level database.

Treatment System

Samples were collected from the treatment facility effluent and influent on a monthly basis throughout FY 1998. All influent and effluent samples were analyzed for VOCs using USAEC Method N83. The extraction well flow measurements are provided in Appendix K.2.

Is additional monitoring proposed prior to the next report?

Yes. Table 10-4 presents the monitoring requirements for OU3. For FY 1999 through FY 2002, biennial monitoring well sampling and water level measurements will be conducted. This change is based on stability observed over the last several years. Treatment system influent and effluent will continue to be monitored monthly. Appendix H presents the FY 1999 - FY 2002 monitoring plan.

10.5 OVERALL REMEDY FOR OU3

Is the Remedy for OU3 Operating in Compliance with the OU3 ROD?

The PGRS continued to operate as designed during FY 1998. It is effectively containing the leading edge of the South Plume of contamination from TCAAP.

FY 1998 total VOC concentrations at NBM#13 exhibited stability throughout the year. The highest total VOC concentration was 1.91 µg/l in February 1998, and the lowest concentration was 0.65 µg/l in June 1998.

Chemical Performance

South VOC Plume

Table 10-5 presents the FY 1998 groundwater quality data. A total of 27 monitoring wells were sampled in June 1998 for the annual monitoring event. Sixteen of these wells are completed in the Prairie du Chien Formation. Nine wells are completed in the Unit 3, Hillside Sand Formation and two wells are in the Jordan Sandstone Formation. The treatment system was monitored monthly and the influent data represents groundwater from NBM#13, which was completed in the Prairie du Chien formation.

A total of eight monitoring wells were sampled in December 1996 for the semiannual monitoring event. These wells were also sampled during the annual event and include five Prairie du Chien, one Hillside Sand and two Jordan Sandstone wells.

Prairie du Chien

A distribution of the trichloroethene concentration above 1 µg/l is provided in Figure 3-4 and in cross-section in Figure 3-5. As shown, the trichloroethene plume extends approximately 1-1/2 miles southwest of TCAAP to extraction well NBM #13. Monitoring wells beyond NBM#13 to the south are non-detect for trichloroethene.

Unit 3

Three of the nine wells sampled exhibited concentrations above the MCLs. A distribution of the Unit 3 trichloroethene concentrations above 1 µg/l is provided in Figures 3-2 and 3-3 and in cross-section in Figure 3-5. As shown, the trichloroethene plume in the Unit 3 extends only approximately 1/2 mile from TCAAP, and does not extend into the area of NBM#13. The Unit 3 plume has remained stable for the last several years.

Jordan Sandstone

VOCs were not detected in the two Jordan Sandstone monitoring wells sampled (04J864 and 04J866).

Are any changes or additional actions required for OU3?

No, other than the monitoring plan changes previously discussed.

Tables

TABLE 10.1

PGRS VERTICAL HYDRAULIC GRADIENTS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

	Mid-Screen (or hole) Elevation (ft)	*Groundwater Elevation (ft)* 12/6/97	6/1/98
03U673	792.1	842.03	843.33
03L673	764.1	840.99	842.11
Difference	28	-1.04	-1.22
Vertical Gradient		-0.037	-0.044
03L673	764.1	840.99	842.11
04U673	691.1	841.19	842.3
Difference	73	0.2	0.19
Vertical Gradient		0.003	0.003
03U832	784.3	--	--
03L832	718.3	--	--
Difference	66	--	--
Vertical Gradient		--	--
03L832	718.3	--	--
04U832	652.2	831.76	832.38
Difference	66.1	--	--
Vertical Gradient		--	--
03L841	760	--	--
04U841	681	--	--
Difference	79	--	--
Vertical Gradient		--	--
03L846	761	--	--
04U846	669	--	--
Difference	92	--	--
Vertical Gradient		--	--
03M848	778.1	838.8	839.95
03L848	736.6	839.27	840.41
Difference	41.5	0.47	0.46
Vertical Gradient		0.011	0.011
03L848	736.6	839.27	840.41
04U848	666.6	840.17	841.2
Difference	70	0.9	0.79
Vertical Gradient		0.013	0.011
03L854	744.9	836.1	837.29
04U854	641.9	832.44	832.98
Difference	103	-3.66	-4.31
Vertical Gradient		-0.036	-0.042
03L859	763.8	836.62	837.81
04U859	673.8	839.83	840.97
Difference	90	3.21	3.16
Vertical Gradient		0.036	0.035

PGRS VERTICAL HYDRAULIC GRADIENTS
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

	Mid-Screen (or hole) Elevation (ft)	*Groundwater Elevation (ft)*	
		12/6/97	*6/1/98*
03L860	764.1	836.39	837.46
04U860	660.1	832.33	832.81
Difference	104	-4.06	-4.65
Vertical Gradient		-0.039	-0.045
03L861	760.6	834.47	835.53
04U861	658.6	832.43	833.09
Difference	102	-2.04	-2.44
Vertical Gradient		-0.020	-0.024
04U864	650.7	828.02	828.87
04J864	548.7	826.32	826.4
Difference	102	-1.7	-2.47
Vertical Gradient		-0.017	-0.024
04U866	650	826.3	827.42
04J866	553	826.8	827.02
Difference	97	0.5	-0.4
Vertical Gradient		0.005	-0.004

Note:
Negative sign denotes downward vertical gradient

TABLE 10.2

FISCAL YEAR 1998 TREATMENT SYSTEM ANALYTICAL SUMMARY
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

	Sample Date	111TCE		112TCE		11DCE		11DCLE		12DCE [1]		12DCLE		12DCLP		C2H3CL		CCL4		CH2CL2		CHCL3		TCLEE		TCLTFE		TRCLE	
ARAR		200.0		3.0		6.0		70.0		70.0																		5.0	
Site ID																													
NB13E	10/7/97	< 0.76		< 0.78		< 1.7		< 0.73		< 0.76		< 1.1		< 1	T	< 1.01		< 0.99		< 7.4		< 0.5		< 0.75		< 1	T	< 0.56	
NB13E	11/4/97	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	12/2/97	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	1/6/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	2/3/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	0.899	?
NB13E	3/3/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	4/7/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	5/28/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	6/2/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	7/7/98	< 0.76		< 0.78		< 1.7		< 0.73		< 0.76		< 1.1		< 1	T	< 1.01		< 0.99		< 7.4		< 0.5		< 0.75		< 1	T	< 0.56	
NB13E	8/4/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13E	9/1/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	< 0.56	?
NB13I	10/7/97	< 0.76		< 0.78		< 1.7		< 0.73		< 0.76		< 1.1		< 1	T	< 1.01		< 0.99		< 7.4		< 0.5		< 0.75		< 1	T	1.76	
NB13I	11/4/97	< 0.76	D?	< 0.78	?	< 1.7	D?	< 0.73	D?	< 0.76	?	< 1.1	D?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	?	< 0.5	D?	< 0.75	?	< 1	DT?	1.36	?
NB13I	11/4/97	< 0.76	?	< 0.78	D?	< 1.7	?	< 0.73	?	< 0.76	D?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	D?	< 0.5	?	< 0.75	D?	< 1	T?	1.54	D?
NB13I	12/2/97	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.54	?
NB13I	12/2/97	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.42	?
NB13I	1/6/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.84	?
NB13I	1/6/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	D?	< 0.76	D?	< 1.1	D?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	D?	< 0.75	D?	< 1	DT?	1.57	D?
NB13I	2/3/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.91	?
NB13I	3/3/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	?	< 0.76	D?	< 1.1	D?	< 1	DT?	< 1.01	?	< 0.99	D?	< 7.4	?	< 0.5	D?	< 0.75	D?	< 1	T?	1.23	D?
NB13I	3/3/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	D?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	D?	< 0.99	?	< 7.4	D?	< 0.5	?	< 0.75	?	< 1	DT?	1.34	?
NB13I	4/7/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.07	?
NB13I	4/7/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	D?	< 0.76	D?	< 1.1	D?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	D?	< 0.75	D?	< 1	DT?	1.11	D?
NB13I	5/28/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	?	< 0.76	D?	< 1.1	?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	?	< 0.75	D?	< 1	DT?	0.729	D?
NB13I	5/28/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	D?	< 0.76	?	< 1.1	D?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	D?	< 0.75	?	< 1	T?	0.741	?
NB13I	6/2/98	< 0.76	?	< 0.78	D?	< 1.7	D?	< 0.73	D?	< 0.76	D?	< 1.1	D?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	D?	< 0.75	D?	< 1	DT?	0.621	D?
NB13I	6/2/98	< 0.76	D?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	0.681	?
NB13I	7/7/98	< 0.76		< 0.78		< 1.7		< 0.73		< 0.76		< 1.1		< 1	T	< 1.01		< 0.99		< 7.4		< 0.5		< 0.75		< 1	T	1.01	
NB13I	7/7/98	< 0.76	D	< 0.78	D	< 1.7	D	< 0.73	D	< 0.76	D	< 1.1	D	< 1	TD	< 1.01	D	< 0.99	D	< 7.4	D	< 0.5	D	< 0.75	D	< 1	TD	0.953	D
NB13I	8/4/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	0.98	?
NB13I	8/4/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	D?	< 0.76	D?	< 1.1	D?	< 1	T?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	D?	< 0.75	D?	< 1	T?	1.14	D?
NB13I	9/1/98	< 0.76	?	< 0.78	?	< 1.7	?	< 0.73	?	< 0.76	?	< 1.1	?	< 1	T?	< 1.01	?	< 0.99	?	< 7.4	?	< 0.5	?	< 0.75	?	< 1	T?	1.47	?
NB13I	9/1/98	< 0.76	D?	< 0.78	D?	< 1.7	D?	< 0.73	D?	< 0.76	D?	< 1.1	D?	< 1	DT?	< 1.01	D?	< 0.99	D?	< 7.4	D?	< 0.5	D?	< 0.75	D?	< 1	DT?	1.68	D?

Notes:

Units in µg/L

ARARs (Applicable or Relevant and Appropriate Regulation) from Table 2.2, TCAAP OU-3 Feasibility Study, July 1992

[1] - ARAR of 70 is for cis- 1,2-dichloroethene

D - Duplicate analysis

T - Non-target compound analyzed for but not detected (non-GC/MS methods)

? - Control chart not yet approved by USAEC

TABLE 10.3

SUMMARY OF MONTHLY VOC REMOVAL FOR FISCAL YEAR 1998
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Month	*VOC Influent* [1, 2] *(µg/L)*	*Water Treated (million gallon)*	*Total VOCs Into Treatment Center (lbs)*	*VOC Effluent* [1] *(µg/L)*	*Total VOCs Out Of Treatment Center (lbs)*		*Total VOCs Removed By Carbon System (lbs)*
October	1.76	44.166	0.65	0.0	0.00		0.65
November	1.45	47.718	0.58	0.0	0.00		0.58
December	1.48	44.011	0.54	0.0	0.00		0.54
January	1.71	44.277	0.63	0.0	0.00		0.63
February	1.91	39.894	0.64	0.90	0.30		0.34
March	1.29	42.889	0.46	0.0	0.00		0.46
April	1.09	37.172	0.34	0.0	0.00		0.34
May	0.74	18.045	0.11	0.0	0.00		0.11
June	0.65	41.482	0.23	0.0	0.00		0.23
July	0.98	28.861	0.24	0.0	0.00		0.24
August	1.06	42.302	0.37	0.0	0.00		0.37
Setember	1.58	46.951	0.62	0.0	0.00		0.62
						Total	5.11

Notes:

[1] VOC concentrations do not include estimated concentrations for compounds detected below the reporting limit

[2] Concentration is an average, if more than one sample was collected during the month.

[2] Number reflects quarterly volume.

TABLE 10.4

SUMMARY OF OU3 MONITORING REQUIREMENTS
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Remedy Component	*Monitoring Requirements*	*Responsible Party*	*Documents Containing the Monitoring Plan*
#1 Groundwater Extraction	a. Water levels to draw contour maps demonstrating capture	Alliant	OU3 Monitoring Plan in Annual Report
	b. Pumping rates and volumes for comparison to design flow rates	Alliant	OU3 Monitoring Plan in Annual Report
#2 Groundwater Treatment	a. Influent/effluent monitoring to verify compliance and calculate mass removal	Alliant	OU3 Monitoring Plan in Annual Report
#3 Use of Water for Municipal Supply	a. Effluent monitoring for verifying compliance with public water supply requirements	New Brighton	New Brighton's Monitoring Plan
#4 Groundwater Monitoring	a. As above	Alliant	OU3 Monitoring Plan in Annual Report
Overall Remedy	a. Water quality monitoring to verify attainment of clean up goals	Alliant	OU3 Monitoring Plan in Annual Report

TABLE 10.5

PGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Well		*Date*	*Trichloroethene (µg/L)*	*1,1-Dichloroethene (µg/L)*	*1,2-Dichloroethene (µg/L)*	*1,1,1-Trichloroethane (µg/L)*	*1,1,2-Trichloroethane (µg/L)*	*1,1-Dichloroethane (µg/L)*
PGRS Cleanup Level [1]			5	6	70 [2]	200	3	70
03U673		25-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
03U832		22-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J864		09-Dec-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J864		25-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04J866		26-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U673		25-Jun-98	81.90	<1.70	2.95	<0.76	<0.78	<0.73
04U832		25-Jun-98	36.10	2.70	2.59	5.38	<0.78	2.13
04U845		25-Jun-98	32.90	<1.70	1.41	<0.76	<0.78	<0.73
04U848		29-Jun-98	4.19	<1.70	<0.76	<0.76	<0.78	<0.73
04U851		26-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U852		26-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U859		25-Jun-98	42.00	6.29	3.17	16.20	<0.78	3.96
04U859	D	25-Jun-98	46.80	7.55	3.17	19.00	<0.78	4.54
04U860		29-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U861		29-Jun-98	17.10	<1.70	12.40	2.35	<0.78	2.43
04U863		25-Jun-98	1.15	<1.70	<0.76	<0.76	<0.78	<0.73
04U864		09-Dec-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U864		25-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
04U865		25-Jun-98	0.82	<1.70	<0.76	<0.76	<0.78	<0.73
500691		25-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
MW15H		26-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		07-Oct-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73

TABLE 10.5

PGRS GROUNDWATER QUALITY DATA: FY 1998
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Well		Date	Trichloroethene (µg/L)	1,1-Dichloroethene (µg/L)	1,2-Dichloroethene (µg/L)	1,1,1-Trichloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,1-Dichloroethane (µg/L)
NB13E		04-Nov-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		02-Dec-97	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		06-Jan-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		03-Feb-98	0.90	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		03-Mar-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		07-Apr-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		28-May-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		02-Jun-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		07-Jul-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		04-Aug-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13E		01-Sep-98	<0.56	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		07-Oct-97	1.76	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		04-Nov-97	1.54	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	04-Nov-97	1.36	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		02-Dec-97	1.42	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	02-Dec-97	1.54	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		06-Jan-98	1.57	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	06-Jan-98	1.84	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		03-Feb-98	1.91	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		03-Mar-98	1.23	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	03-Mar-98	1.34	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		07-Apr-98	1.11	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	07-Apr-98	1.07	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		28-May-98	0.73	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	28-May-98	0.74	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		02-Jun-98	0.62	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	02-Jun-98	0.68	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		07-Jul-98	0.95	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	07-Jul-98	1.01	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		04-Aug-98	1.14	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	04-Aug-98	0.98	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I		01-Sep-98	1.68	<1.70	<0.76	<0.76	<0.78	<0.73
NB13I	D	01-Sep-98	1.47	<1.70	<0.76	<0.76	<0.78	<0.73

Notes:

(1) Cleanup levels for PGRS are from the OU3 ROD. Shading indicates exceedence of the cleanup level.

(2) The cleanup standard is specifically for cis-1,2-Dichloroethene, not total.

D - Duplicate

Figures

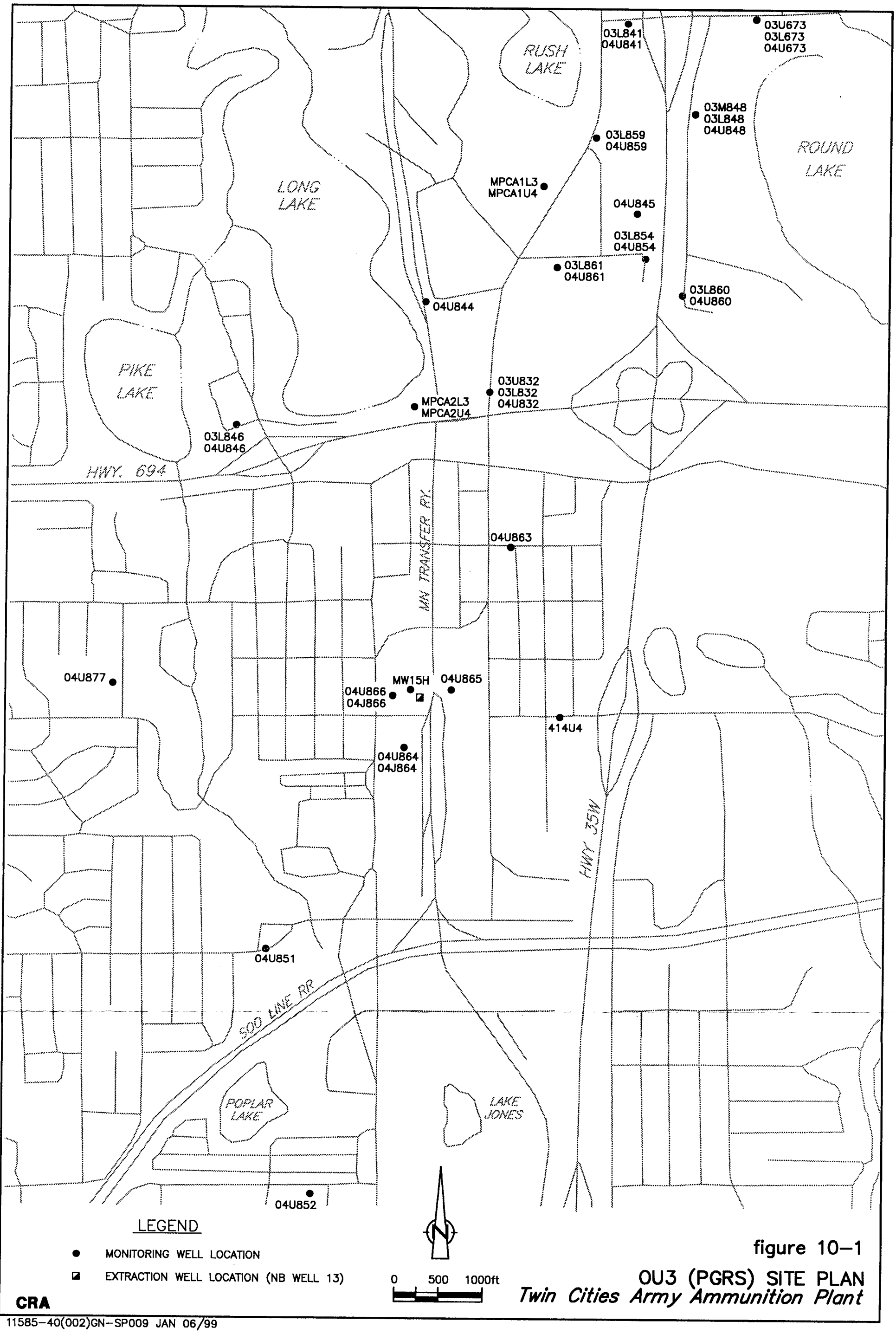
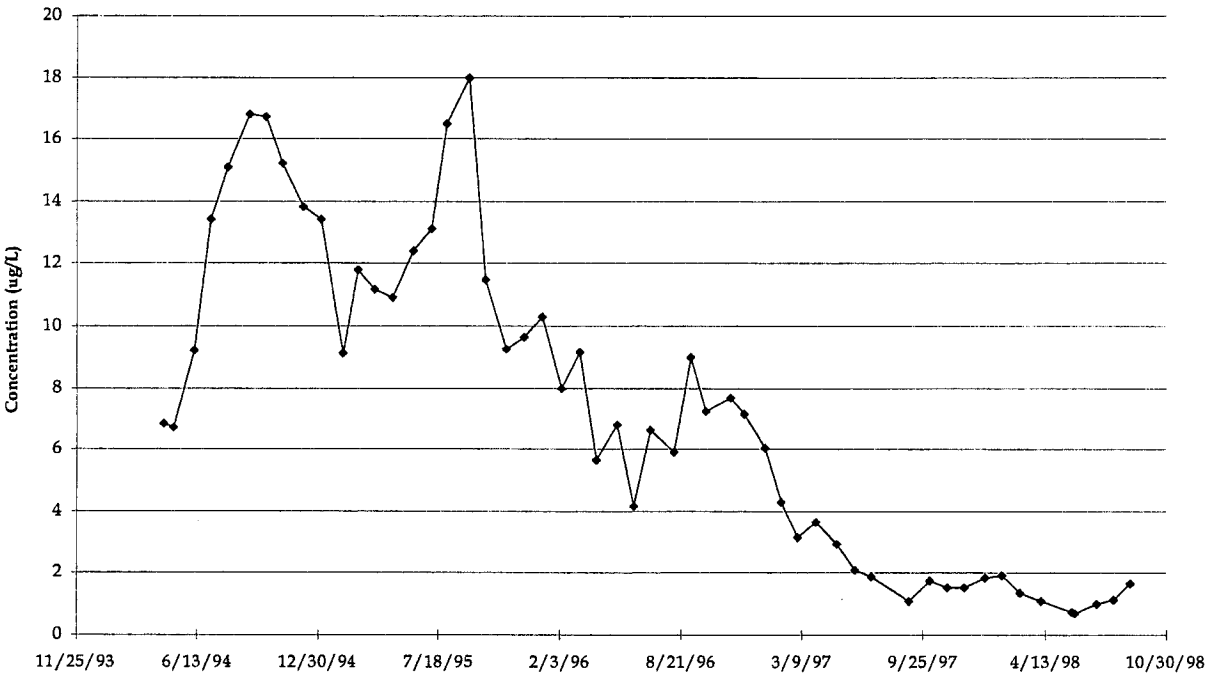


figure 10–1

OU3 (PGRS) SITE PLAN

Twin Cities Army Ammunition Plant

11585–40(002)GN–SP009 JAN 06/99



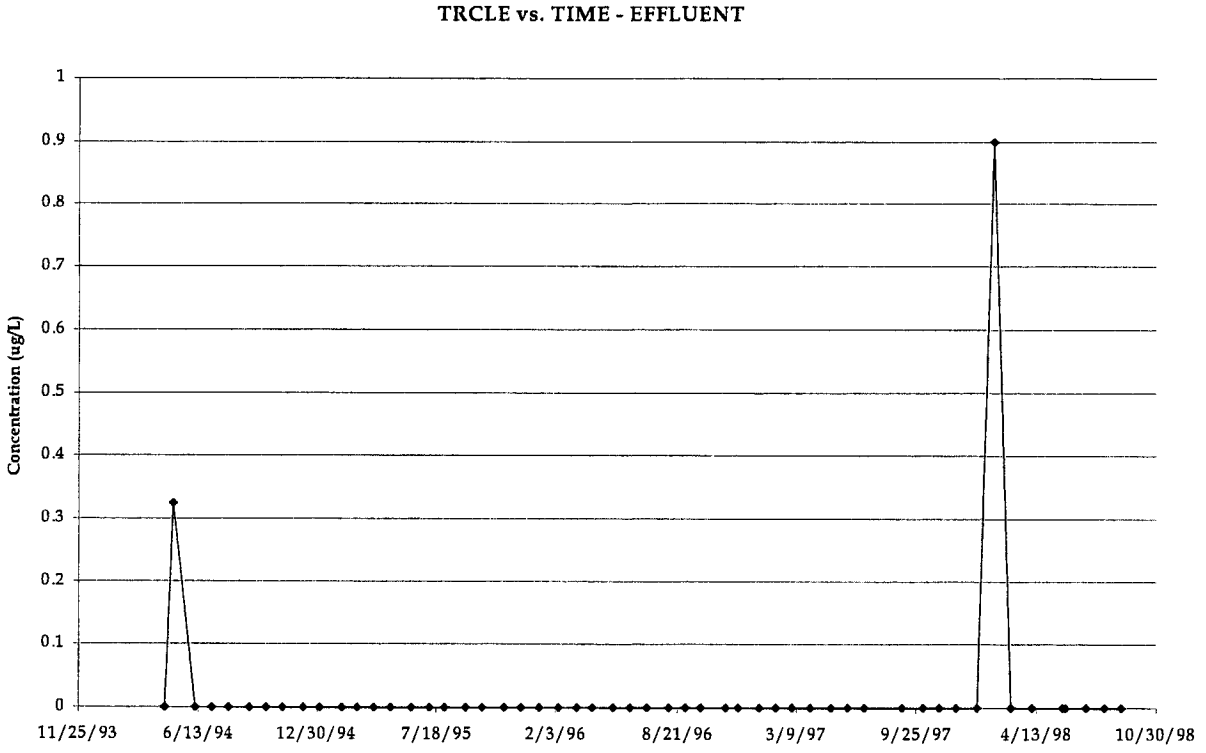


figure 10–2

OU3 (PGRS) TRCLE vs. TIME

Twin Cities Army Ammunition Plant

CRA

SECTION 11

11.0 Other Installation Restoration Activities During FY 1998

Appendix L briefly summarizes the status of other activities at TCAAP which are related to the Installation Restoration Program, but are not required in the RODs for OU1 through OU3. They are not part of the performance evaluation or the performance monitoring programs.

SECTION 12

12.0 References

"Federal Facility Agreement." August 12, 1997.

Fuller, D.B., 1994. Personal Communication from David Fuller, Federal Cartridge Company to William P. Johnsen, Wenck Associates, Inc., December 13, 1994.

Montgomery Watson, 1995. "Operable Unit 1 Alternate Water Supply Plan." Final Report, October 1995.

Montgomery Watson, 1997. "Operable Unit 2 Feasibility Study." Final Report, March 1997.

"Record of Decision, Groundwater Remediation Operable Unit 3 at New Brighton/Arden Hills Superfund Site." September 1992.

"Record of Decision, Groundwater Remediation Operable Unit 1 at New Brighton/Arden Hills Superfund Site." September 1993.

"Twin Cities Army Ammunition Plant, New Brighton/Arden Hills Superfund Site, Operable Unit 2, Record of Decision." October 1997.

Wenck Associates, Inc. and Conestoga-Rovers and Associates. "Fiscal Year 1997 Annual Monitoring Report." August 1998.

APPENDIX A

Appendix A

Hydrogeologic Units, Well Nomenclature, and Well Index

A.1 Description of Hydrogeologic Units and Well Nomenclature

Appendix A.1
Description of Hydrogeologic Units and Well Nomenclature

On- and off-post wells have been installed in four hydrogeologic units beneath the site. These hydrogeologic units, as referred to in this report, are described below:

Unit 1: This unit, referred to as the Fridley Formation, consists of alluvium and lacustrine deposits above the Twin Cities Formation (Unit 2). The formation is made up of fine- to medium-grained sand and clayey silt which acts as an unconfined aquifer with an estimated hydraulic conductivity of 8.3×10^{-3} cm/sec (International Technology Corp. 1992). The Unit 1 deposits are discontinuous at TCAAP and ranges in thickness from zero to 50 feet. They are predominantly limited to the north, east, and southwest portions of the site. Groundwater in Unit 1 is also discontinuous.

Unit 2: Known as the Twin Cities Formation, (Unit 2) consists of Quaternary aged glacial till and, similar to Unit 1, is discontinuous at TCAAP. Unit 2 is generally regarded as an aquitard to vertical migration of groundwater; however, sand and gravel lenses may contain water.

Unit 3: This unit consists primarily of the Quaternary aged Hillside Sand Formation which is continuous beneath TCAAP. Near the center of TCAAP, the Hillside Sand Formation is overlain by the Arsenal Sand, which forms a kame. There is no distinct lithologic contact between the Hillside Sand and the Arsenal Sand, and both are considered included in Unit 3. Unit 3 ranges in thickness from 25 to 450 feet. For monitoring purposes, the Unit 3 aquifer thickness has been arbitrarily subdivided into thirds designated as upper, middle, and lower.

Unit 4: This unit consists collectively of bedrock from the Prairie du Chien Group and Jordan Formation (Ordovician and Cambrian periods, respectively). For monitoring purposes, the Prairie du Chien Group is referred to as Upper Unit 4, while the Jordan Formation is Lower Unit 4. The Jordan Formation varies from fine- to coarse-grained quartz sandstone. The Prairie du Chien Group in the TCAAP area consists of a finely crystalline dolomite of the Oneota Formation, as well as quartz sandstone and dolomite members of the Shakopee Formation. A more detailed description of the bedrock geology can be found in the Remedial Investigation Report (Argonne National Laboratory, 1991).

In order to identify the hydrogeologic unit in which each well is completed, the United States Army Environmental Center (USAEC), formerly the United States Army Toxic and Hazardous Materials Agency (USATHAMA), developed a standardized identification system for wells at TCAAP. Well designations consist of six characters, such as 03U093. The first two characters represent the hydrogeologic unit in which the well is completed, as follows:

01	-	Unit 1
03	-	Unit 3
04	-	Unit 4: Prairie du Chien Group or Jordan Formation
PJ	-	Unit 4: Prairie du Chien Group and Jordan Formation

The third character represents the relative position of the well screen or open hole within the specified hydrogeologic unit, as follows:

U	-	upper portion
M	-	middle portion
L	-	lower portion
J	-	Jordan Sandstone
F	-	fully penetrating Unit 3
#	-	open hole (total or partial thickness)

The remaining three characters represent the well number, as follows:

001 thru 500	USAEC wells and additional wells installed by others adjacent to an existing well with the 001-500 designation.
501 thru 600	TCAAP wells.
601 thru 800	On-post Alliant Techsystems Inc. wells.
801 thru 999	Off-post Alliant Techsystems Inc. wells.

Off-post wells installed by parties other than USAEC, TCAAP, or Alliant Techsystems Inc. are designated by their Minnesota unique number. A well-designation cross-reference guide is included as Appendices A.2 and A.3, which lists all wells of concern, the USAEC designation or Minnesota unique number, and any other name(s) the wells may have.

A.2 TCAAP Well Index Sorted by Minnesota Unique Number

Note:

In the "Well Type" column of the following index, the different types are abbreviated as follows:

UN	=	Unknown
MUNI	=	Municipal
MON	=	Monitoring
DOM	=	Domestic
IND	=	Industrial
P.S.	=	Public Supply
COM	=	Commercial
IRR	=	Irrigation
ABAND	=	Abandoned
PIEZ.	=	Piezometer
REM	=	Remedial

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
107405		ROEBKE	OFF	UN				
110485		NEW BRIGHTON #12	OFF	MUNI				P-21
114410	03U521		OFF	MON			F-7	
122210		ST. PAUL PORT AUTH. #3	OFF	IND				
127537		MIDWEST ASPHALT	OFF	DOM				
134318		LORENZ W SEUTTER	OFF	DOM				
139035		WATERGATE MARINA	OFF	P.S.				
151568		ARDEN MANOR MOBILE HOME	OFF	P.S.				
161432		NEW BRIGHTON #10	OFF	MUN				V-24
191942		118PDC/MODEL STONE	OFF	MON				R-24
194701	01U620	OW120U1	ON	MON			F-3	
194702	01U621	PW121U1	ON	MON			F-3	
194703	01U622	OW122U1	ON	MON			F-3	
194704	01U623	OW123U1	ON	MON			F-3	
194716	01U634	OW504U1	ON	MON			J-5	
194717	01U638	OW508U1		MON				
194718	01U639	OW509U1	ON	MON			K-6	
194719	01U640	OW510U1	ON	MON			K-6	
194720	01U631	OW501U1	ON	MON				
194721	01U632	OW502U1		MON				
194722	01U635	OW505U1	ON	MON				
194723	01U636	OW506U1	ON	MON.			K-5	
194724	01U642	OW512U1	ON	MON			K-7	
194725	01U612	OW112U1	ON	MON		194758	E-3	
194726	01U613		ON	MON		194759	E-3	
194727	01U615	OW115U1	ON	MON		194760	F-3	
194728	01U616	OW116U1	ON	MON		194761	F-3	
194729	01U617	OW117U1	ON	MON		194770	F-3	
194730	01U618	OW118U1	ON	MON		194771	F-3	
194772	01U619	PW119U1	ON	MON			F-3	
200070		RUAN TRANSPORT	OFF	COM	✓			
200071		PRESTRESSED CONCRETE	OFF	IND	✓			
200072		WITTE TRANSPORTATION	OFF	IND	✓			
200073		WILSON TRANSFER & STORAGE	OFF	IND				
200074		ASBESTOS PROD	OFF	IND	✓			
200075		PHILLIPS PETROLEUM	OFF	IND	✓			
200076		OLD DUTCH FOODS INC	OFF	IND				Z-23
200077		JOHN CONLIN	OFF	DOM	✓			
200078		WILLIAM CLASS	OFF	DOM				
200079		LAWRENCE SCHOENING	OFF	DOM				
200080		CARL A OSTROM & SON	OFF	DOM				
200081		A. O. LIEBIG	OFF	DOM				
200082		2196 MARION ROAD	OFF	DOM				
200148		PAPER CALMERSON	OFF	IND	✓			BB-23
200154		U OF M GOLF COURSE	OFF	IRR				CC-25
200167		KOPPERS COKE #1	OFF	IND				
200171		PLATING INC	OFF	IND				
200197		SNOW FLAKE DAIRY	OFF	COM				
200264		1620 CENTRAL	OFF	IND				
200384		METALLURGICAL INC. WELL #1	OFF	IND				
200524		ST. ANTHONY #5	OFF	MUNI				V-21
200525		PLETSCHER	OFF	UN				
200531		NAZARETH	OFF	UN				

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
200599		CEDAR AVE. TRIANGLE	OFF	P.S.				
200602		ATKINSON MILL CO.	OFF	IND				
200629		GENERAL MILLS	OFF	IND				
200803		ST. ANTHONY #4	OFF	P.S.				X-22
200804		ST. ANTHONY #3	OFF	MUNI				X-22
200812		GROSS GOLF COURSE #1	OFF	COM				AA-22
200814		AMERICAN LINEN	OFF	IND				CC-22
201074		GLEASSON MORTUARY	OFF	COM				
201082		NORTHWESTERN HOSPITAL	OFF	P.S.				
206669		FRIDLEY #8	OFF	MUNI				
206672		FRIDLEY #9	OFF	MUNI				
206673		FRIDLEY #6	OFF	MUNI				
206688		CLOVERPOND WELL	OFF	DOM				T-20
206689		JAMES K. O'NEIL	OFF	UN				
206693		FERNELIUS	OFF	UN				
206702		MINN E.S.	OFF	UN				
206720		MOUNDSVIEW	OFF	MUNI				
206722		M0UNDSVIEW #5	OFF	MUNI				
206724	PJ#504	TWIN CITIES ARSENAL	OFF	ABAND	✓		E-2	
206725	03L523	ARSENAL GRAVEL PIT	ON	ABAND	✓		D-8	
206750		SHORE #4	OFF	MUNI				
206753	PJ#506	TWIN CITIES ARSENAL NO. 6	ON		✓		H-5	
206754	PJ#501	TWIN CITIES ARSENAL NO. 1	ON	P.S.			F-4	
206755	PJ#507	TWIN CITIES ARSENAL NO. 7	ON	ABAND	✓		H-5	
206756	PJ#502	TWIN CITIES ARSENAL NO. 2	ON	IND			G-4	
206758	PJ#503	TWIN CITIES ARSENAL NO. 3	ON	IND			H-4	
206759	PJ#508	TWIN CITIES ARSENAL NO. 8	ON	ABAND	✓		I-6	
206760	03M509		ON	MON			J-6	
206760	PJ#509	TWIN CITIES ARSENAL NO.9	ON	DOM			J-6	
206787		MOUNDSVIEW H.S.	OFF	P.S.				S-25
206789		NEW BRIGHTON #1	OFF	MUNI	✓			
206791		NEW BRIGHTON #7	OFF	MUNI				U-23
206792		NEW BRIGHTON #4						
206793		NEW BRIGHTON #3	OFF	MUNI				S-21
206794		NEW BRIGHTON #9	OFF	MUNI				T-21
206795		NEW BRIGHTON #8	OFF	MUNI				T-21
206796		NEW BRIGHTON #5	OFF	MUNI				
206797		NEW BRIGHTON #6	OFF	MUNI				T-21
206798		NEW BRIGHTON #2	OFF	MUNI	✓			
223844		KURTH MALTING CO EAST WL	OFF	IND				
223992		BOOM ISLAND	OFF	IND				
225886		FRANKLIN STEEL SQUARE	OFF	P.S.				
225905		ST PAUL TERM. WAREHOUSE	OFF	IND				
225906		ST PAUL TERM. WAREHOUSE	OFF	IND				
231741		LABELLE	OFF	UN				
231742	04U510	GRENADE PLANT PROOF RANGES	ON	IND			C-12	
231845		MNDOT CIVIL DEFENSE TRAIN.	ON/OFF	P.S.			A-4	
231854	03L522	ARSENAL GRAVEL PIT	ON	ABAND 8/	✓		D-8	
231857	03M505			ABAND	✓		K-12	
231878		MENGELKOCH #2	OFF	UN				R-25
232067		NBR 135	OFF	UN				
232069		UHIL	OFF	UN				
233221		REUBEN MEAT	OFF	DOM				CC-20

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
233222		LOWRY GROVE TRAILER	OFF	ABAND	✓			Z-21
233241		KOZAH'S MARKET	OFF	UN	✓			
233520		MCGILLIS	OFF	UN				
233533		ROSELAWN CEMETARY	OFF	IRR				
233763		P. L. MORGAN	OFF	DOM				
233806		2581 NORTH CLEVELAND	OFF	DOM				
234135	03U001	S1U3	ON	MON			G-2	0-25
234136	03M001	S1M3	ON	MON			G-2	0-25
234137	03L001	S1L3	ON	MON			G-2	0-25
234138	04U001	S1U4	ON	MON			G-2	0-25
234139	03U002	S2U3	ON	MON			I-4	P-25
234140	03M002	S2M3	ON	MON			I-4	P-25
234141	03L002	S2L3	ON	MON			I-4	P-25
234142	03U003	S3U3	ON	MON			K-5	Q-26
234143	03M003	S3M3	ON	MON			K-5	Q-26
234144	03L003	S3L3	ON	MON			K-5	Q-26
234145	03U004	S4U3	ON	MON			K-7	
234146	03M004	S4M3	ON	MON			K-7	
234147	03L004	S4L3	ON	MON			K-7	
234148	03U005	S5U3	ON	MON			K-9	
234149	03U006	S6U3	ON	MON			K-11	
234150	03U007	S7U3	ON	MON			J-12	
234151	03M007	S7M3	ON	MON			J-12	
234152	03L007	S7L3	ON	MON			J-12	
234153	03U008	S8U3	ON	MON			F-12	
234154	03U009	S9U3	ON	MON			B-12	
234155	03U010	S10U3	ON	MON			A-10	
234156	03M010	S10M3	ON	MON			A-10	
234157	03L010	S10L3	ON	MON			A-10	
234158	03U011	S11U3	ON	MON			A-7	
234159	03U012	S12U3	ON	MON			B-3	
234160	03M012	S12M3	ON	MON			B-3	
234161	03L012	S12L3	ON	MON			B-3	
234162	03U013	S13U3	ON	MON			E-2	
234163	03M013	S13M3	ON	MON			E-2	
234164	03L013	S13L3	ON	MON			E-2	
234165	03U014	S14U3	ON	MON			I-7	P-27
234166	03U015	S15U3	ON	MON			F-5	
234167	03U016	S16U3	ON	MON			F-9	0-27
234168	03U017	S17U3	ON	MON			H-5	
234169	03M017	S17M3	ON	MON			H-5	
234170	03L017	S17L3	ON	MON			H-5	
234171	03U018	S18U3	ON	MON			H-6	
234172	03U019	S19U3	ON	MON			H-8	
234173	03U020	S20U3	ON	MON			I-6	P-26
234174	03M020	S20M3	ON	MON			I-6	P-26
234175	03L020	S20L3	ON	MON			I-6	P-26
234176	03U021	S21U3	ON	MON			J-4	P-26
234193	04U003	S3U4	ON	MON			K-5	Q-26
234194	04U002	S2U4	ON	MON			I-4	P-25
234195	04U007	S7U4	ON	MON			J-12	
234196	04U012	S12U4	ON	MON			B-3	
234197	04U020	S20U4	ON	MON			I-6	P-26

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
234198	01U004	S4U1	ON	MON			K-7	
234199	01U011	S11U1	ON	MON			A-7	
234200	01U012	S12U1	ON	MON			B-3	
234201	01U022	S22U1	ON	MON			B-6	
234202	01U033	S33U1	ON	MON			A-10	
234204	01U034	S34U1	ON	MON			A-8	
234205	01U035	S35U1	ON	TEST			A-7	
234206	01U036	S36U1	ON	MON			A-7	
234207	01U037	S37U1		MON				
234208	01U038	S38U1		MON			A-6	
234209	01U039	S39U1	ON	MON			A-4	
234210	01U040	S40U1	ON	MON			B-4	
234211	01U041	S41U1	ON	MON			B-5	
234212	01U044	S44U1	ON	MON			C-4	
234215	01U045	S45U1	ON	MON			D-4	
234216	01U046	S46U1	ON	MON			D-4	
234217	01U047	S47U1	ON	MON			E-2	
234218	01U048	S48U1		MON			E-2	
234221	01U050	S50AU1		MON			H-2	
234222	01U051	S51U1	ON	MON			H-2	
234223	01U052	S52U1	ON	MON			E-3	
234225	01U053	S53AU1	ON	MON			K-4	
234227	01U054	S54AU1		MON			K-5	
234235	01U060	S60U1	ON	MON			J-10	
234237	01U062	S62U1	ON	MON			J-3	
234239	01U063	S63U1	ON	MON			B-4	
234240	01U064	S64U1	ON	MON			J-6	
234241	01U065	S65U1	ON	MON			F-2	
234243	01U067	S67U1	ON	MON			B-6	
234250	01U072	S72AU1	ON	MON			E-9	
234301		DEWITT	OFF	UN				
234305		GLENN BEGGIN	OFF	UN				
234319		HIDE & TALLOW #1	OFF	UN				P-25
234327		BRESKE	OFF	UN				
234335		MENGELKOCH #1	OFF	UN				R-25
234337		MENGELKOCH #3	OFF	UN	✓			R-25
234350		GORDON	OFF	UN				
234351		YEMPA	OFF	UN				
234352		1206 12TH AV NW	OFF	UN				R-23
234353		LENTSCH'S ICE WK.	OFF	UN				P-25
234355		KINGDOM HALL	OFF	UN				
234356		NORDQUIST P43	OFF	UN				Q-25
234357		PHILLIPS PET P46	OFF	UN				P-25
234386		ZELL OLS.	OFF	UN				
234391		SHERER L.	OFF	UN				
234396		DEWITT	OFF	UN	✓			
234406		KLAPP	OFF	UN	✓			
234409		HIDE & TALLOW	OFF	UN				
234425		KEN GEREBI	OFF	UN	✓			P-25
234430		CMIEL	OFF	UN	✓			Q-26
234431		HARSTAD	OFF	UN				
234463		KEN SOLIE	OFF	UN				V-21
234546		HONEYWELL RIDGEWAY	OFF	UN				BB-21

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
234547		HONEYWELL RIDGEWAY	OFF	UN				BB-21
234549		REINER	OFF	IRR				Y-21
235539		OLD HOTEL	OFF	UN				Q-24
235557		HIDDEN FALLS PARK W.WELL	OFF	P.S.				
235565	PJ#074	S74PJ		MON			I-6	
235619		SHRINERS HOSPITAL	OFF	P.S.				
235735		FLOUR CITY ARCHITECTURAL	OFF	COM				
235748	03L014	S14L3	ON	MON			I-7	P-27
235749	03L018	S18L3	ON	MON			H-6	
235750	03L021	S21L3	ON	MON			J-4	P-26
235751	03L027	S27L3	ON	MON			J-6	
235752	03L028	S28L3		MON			J-6	
235753	03L029	S29L3		MON		236066	K-5	P-26
236066	03U094	S94U3	ON	MON			I-7	P-27
236067	03L091	S91L3	ON	MON			G-7	
236068	03L086	S86L3	ON	MON			J-9	
236069	03U084	S84U3	ON	MON			H-3	0-25
236070	03L081	S81L3	ON	MON			I-8	
236071	03L080	S80L3	ON	MON			J-6	
236072	03U079	S79U3	ON	MON			K-5	Q-26
236073	03U078	S78U3	ON	MON			J-4	P-26
236074	03L078	S78L3	ON	MON			J-4	P-26
236075	03U077	S77U3	ON	MON			I-3	P-25
236076	03L077	S77L3	ON	MON			I-3	P-25
236077	03U076	S76U3	ON	MON			G-2	
236078	03U075	S75U3	ON	MON			F-2	
236079	03L005	S5L3	ON	MON			K-9	
236080	03L113	WF1L3	ON	MON			G-8	0-27
236122		NWR	OFF	ABAND				Q-24
236176	01U003	S3U1	ON	MON			K-5	Q-26
236177	01U043	S43AU1		MON			C-5	
236178	03U022	S22U3		MON			B-6	
236179	03U023	S23U3		MON			B-5	
236180	03U024	S24U3		MON			C-5	
236181	03U025	S25U3		MON			D-4	
236182	03U026	S26U3	ON	MON			H-7	
236183	03U027	S27U3		MON			J-6	
236184	03U028	S28U3		MON			J-6	
236185	03U029	S29U3		MON			K-5	P-26
236186	03U030	S30U3		MON			J-6	P-26
236187	03U031	S31U3		MON			F-4	
236188	03U032	S32U3		MON			G-7	
236189	01U601	OW101U1	ON	MON			F-3	
236190	01U602	OW102U1	ON	MON			F-3	
236191	01U603	OW103U1	ON	MON			E-3	
236192	01U604	OW104U1	ON	MON			E-3	
236193	01U605	OW10571	ON	MON			E-3	
236194	01U524	FA4U1	ON	PIEZ.			I-3	
236195	01U527	FV8U1	ON	PIEZ.			I-3	
236196	01U525	FW5U1	ON	PIEZ.			J-4	
236197	01U526	FV12U1	ON	PIEZ.			I-4	
236437	PJ#802	T2PJ	OFF	MON		421437	K-4	Q-26
236449	03U801	T1U3	OFF	MON			K-4	Q-26

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
236450	04U802	T2U4	OFF	MON			K-4	Q-26
236452	01U803	T3U1	OFF	TEST		424053	K-3	Q-25
236453	03U803	T3U3	OFF	MON		421434	K-3	Q-25
236455	03U804	T4U3	OFF	MON		421433	J-4	P-25
236457	01U805	T5U1	OFF	MON		424060	J-3	P-25
236458	03U805	T5U3	OFF	MON		421432	J-3	P-25
236460	01U806	T6U1	OFF	MON		424058	I-3	P-25
236461	03U806	T6U3	OFF	MON		421431	I-3	P-25
236462	03M806	T6M3	OFF	MON		421430	I-3	P-25
236463	03L806	T6L3	OFF	MON		421429	I-3	P-25
236464	04U806	T6U4	OFF	MON		421428	I-3	P-25
236465	PJ#806	T6PJ	OFF	MON		421427	I-3	P-25
236468	PJ#003	S3PJ	ON	MON			K-5	Q-26
236469	PJ#027	S27PJ	ON	MON			J-6	
236471	01U807	T7U1	OFF	TEST		424059		
236476	03U082	S82U3	ON	MON			B-7	
236478	03U083	S83U3	ON	MON			E-4	
236479	01U085	S85U1	ON	MON			D-4	
236480	03U087	S87U3	ON	MON			F-6	
236482	03U088	S88U3	ON	MON			F-6	
236483	03U089	S89U3	ON	MON			F-6	
236485	03U090	S90U3	ON	MON			H-7	
236487	03U092	S92U3	ON	MON			H-6	
236489	03U093	S93U3	ON	MON			H-6	
236491	03U096	S96U3	ON	MON			G-6	
236493	03U097	S97U3	ON	MON			E-9	
236494	01U098	S98U1	ON	MON			J-10	
236495	03U099	S99U3	ON	MON			K-10	
236497	01U100	S100U1	ON	MON			B-9	
236498	01U101	S101U1	ON	MON			B-8	
236499	01U102	S102U1	ON	MON			A-5	
236500	01U103	S103U1	ON	MON			A-6	
236501	01U104	S104U1	ON	MON			A-6	
236502	01U105	S105U1	ON	MON			A-6	
236503	01U106	S106U1	ON	MON			A-6	
236504	01U107	S170U1	ON	MON			B-6	
236505	01U108	S108U1	ON	MON			A-6	
236506	01U109	S109U1	ON	MON			B-6	
236507	01U110	S11OU1	ON	MON			B-6	
236508	03U111	S111U3	ON	MON			E-9	
236510	03U112	S112U3	ON	MON			H-7	0-27
242124	03U113	WF1U3	ON	MON			G-8	0-27
242125	03U114	WF2U3	ON	MON			H-7	0-27
242127	01U607	OW107U1	ON	MON			E-3	
242128	01U608	OW108U1	ON	MON			F-3	
242129	01U609	OW109U1	ON	MON			F-3	
242130	01U610	OW110U1	ON	MON				
242131	01U611	OW111U1	ON	MON			E-3	
242132	03U647		ON	MON			J-6	
242133	03U648		ON	MON			J-6	P-26
242134	01U652	OW522U1	ON	MON			J-6	
242135	01U666	OW536U1	ON	MON			K-5	
242136	01U667	OW537U1	ON	MON			J-6	

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
242137	01U668	OW538U1	ON	MON			J-6	
242138	04U027	S27U4		MON			J-6	
242153	01U813	H3U1	OFF	MON				P-23
242160	03L079	S79L3	ON	MON			K-5	Q-26
242162		301PB	OFF	UN				
242182	01U624A	BP185A	ON	PIEZ			F-3	
242183	01U624B	BP185B	ON	PIEZ			F-3	
242184	01U624C	BP185C	ON	PIEZ			F-3	
242185	01U624D	BP185D	ON	PIEZ			F-3	
242186	01U625A	BP285A	ON	PIEZ			F-3	
242187	01U625B	BP285B	ON	PIEZ			F-3	
242188	01U625C	BP285C	ON	PIEZ			F-3	
242189	01U625D	BP285D	ON	PIEZ			F-3	
242190	01U626A	BP385A	ON	PIEZ			F-3	
242191	01U626B	BP385B	ON	PIEZ			F-3	
242192	01U626C	BP385C	ON	PIEZ			F-3	
242193	01U626D	BP385D	ON	PIEZ			F-3	
242194	01U627A	BP485A	ON	PIEZ			F-3	
242195	01U627B	BP485B	ON	PIEZ			F-3	
242196	01U627C	BP485C	ON	PIEZ			F-3	
242197	01U627D	BP485D	ON	PIEZ			F-3	
242198	01U628A	BP585A	ON	PIEZ			F-3	
242199	01U628B	BP585B	ON	PIEZ			F-3	
242200	01U628C	BP585C	ON	PIEZ			F-3	
242201	01U628D	BP585D	ON	PIEZ			F-3	
242207		SUNSET MEMORIAL CEMETARY	OFF	UN				
249152		BOYLE	OFF	DOM				
265735		FLOUR CITY ARCH	OFF	UN				
322664		ABBOTT NW HOSP	OFF	UN				
405651		METAL-MATIC INC.	OFF	IND				
406198	04U851	311U4	OFF	MON				U-23
409546		PCA2L3	OFF	TEST				S-24
409547		PCA1U4	OFF	TEST				R-24
409548		PCA2U4	OFF	TEST				S-24
409549		PCA3U4	OFF	TEST				R-22
409550		PCA6U3	OFF	TEST				P-25
409555		PCA5U4	OFF	TEST				V-22
409556		PCA4L3	OFF	TEST				S-22
409557		PCA1L3	OFF	TEST				R-24
409595		B109U3	OFF	ABAND				R-24
409596		B118U3	OFF	MON				R-24
409597		B118L3	OFF	IND				R-24
409598		B117U3	OFF	ABAND				R-24
416051	03M848	308M3	OFF	MON				Q-25
416078	04U848	308U4	OFF	TEST				Q-25
416080	04U852	312U4	OFF	MON				V-23
416081	03L858	318L3	OFF	MON				X-22
416082	04U849	309U4	OFF	MON				R-23
416143			OFF	ABAND				
416198		311U4	OFF	MON				
416199	03L848	308L3	OFF	MON				Q-25
416200	04U850	310U4	OFF	MON				S-22
420713		HERBST LANDFILL	OFF	MON				

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
421425	03U659		ON	MON			J-6	P-26
421426	03U658		ON	MON			K-7	
421438	03U671	PO-1	ON	MON			J-4	P-26
421440	03U672	PD2U3	OFF	MON			K-6	Q-26
421441	03U673	PD3U3	OFF	MON			L-3	Q-25
424052	01L822	NW2L1	OFF	TEST				Q-24
424054	01L821	NW1L1	OFF	TEST				Q-24
424055	01L811	H1L1	OFF	TEST				P-24
424056	01L816	H6L1	OFF	ABAND	✓			P-24
424057	01U808	T8U1	ON	MON			J-2	
424061	01L823	NW3L1	OFF	TEST				S-24
424062	01L813	H3L1	OFF	TEST				P-23
426808	03U811	H1U3	OFF	TEST				P-24
426809	03L811	H1L3	OFF	TEST				P-24
426810	03U821	NW1U3	OFF	TEST				Q-24
426811	04U821	NW1U4	OFF	TEST				Q-24
426812	03U822	NW2U3	OFF	TEST				Q-24
426813	03L822	NW2L3	OFF	TEST				Q-24
426814	03U824	NW4U3	OFF	TEST				R-24
426815	03L673	PD3L3	OFF	TEST			L-3	Q-25
426816	03L813	H3L3	OFF	TEST				P-23
426817	03L802	T2L3	OFF	TEST			K-4	Q-26
426818	03M802	T2M3	OFF	TEST			K-4	Q-26
426842	03F302	B1	ON	REM			K-5	Q-26
426843	03F303	B2	ON	REM			K-4	P-26
426844	03F304	B3	ON	REM			J-4	P-25
426845	03F305	B4	ON	REM			J-3	P-25
426846	03F306	B5	ON	REM			I-3	P-25
426847	03F307	B6	ON	REM			I-3	P-25
426848	03U701	701U3	ON	MON			I-3	P-25
426849	04U701	701U4	ON	MON			I-3	P-25
426850	03U702	702U3	ON	MON			I-3	P-25
426851	04U841	301U4	OFF	TEST				Q-25
426852	03M843	303M3	OFF	TEST				Q-24
426853	04U843	303U4	OFF	TEST				Q-24
426854	04U844	304U4	OFF	TEST				R-24
426855	04U845	305U4	OFF	MON				R-25
426856	04U846	306U4	OFF	MON				S-22
426857	04U847	307U4	OFF	MON				P-24
426858	03L853	313L3	OFF	MON				Q-24
426859	03L854	314L3	OFF	MON				R-25
426860	04U855	315U4	OFF	MON				Q-22
426861	03L856	316L3	OFF	MON				P-23
426862	03U815	H5U3	OFF	TEST				P-23
426863	03U831	OM1U3	OFF	TEST				R-24
426864	03U832	OM2U3	OFF	TEST				R-24
426865	03L832	OM2L3	OFF	TEST				R-24
426866	04U832	OM2U4	OFF	TEST				R-24
426867	04U673	PD3U4	OFF	TEST			L-3	Q-25
426868	03L809	T9L3	OFF	MON				P-25
426876	04U702	702U4	ON	MON			I-3	P-25
426877	04U077	ST77U4	ON	MON			I-3	P-25
426878	03U703	703U3		MON			K-4	P-26

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
426879	03U708	708U3	ON	MON			J-4	P-25
426880	04U708	708U4	ON	MON			J-4	P-25
426881	03U709	709U3	ON	MON			J-3	P-25
426882	04U709	709U4	ON	MON			J-3	P-25
426883	03U704	704U3	ON	MON			E-7	
426884	03U705	705U3	ON	MON			E-7	
426885	03U706	706U3	ON	MON			E-6	
426886	03U707	707U3	ON	MON			C-7	
427410	01U120		ON	MON			A-6	
427411	01U115		ON	MON			A-5	
427412	01U116		ON	MON			A-5	
427413	01U117		ON	MON			A-5	
427414	01U118		ON	MON			B-5	
427415	01U119		ON	MON			A-6	
434031	04U711	711U4	OFF	MON			J-3	P-25
434032	03U710	71OU3	ON	MON			K-5	Q-26
434033	03U711	711U3	OFF	MON			J-3	P-25
434034	04U861	321U4	OFF	MON				R-24
434035	04U860	320U4	OFF	MON				R-25
434036	04U859	319U4	OFF	MON				Q-25
434037	03L841	301L3	OFF	MON				Q-25
434038	03L860	320L3	OFF	MON				R-25
434039	03L861	321L3	OFF	MON				R-24
434040	03L859	319L3	OFF	MON				Q-25
439701	04U854	314U4	OFF	MON				R-25
440884	03U121		ON	MON			H-7	
440885	03M005	ST-5-M3	ON	MON			K-9	
440886	03U129		ON	MON			D-9	
440887	03L084	ST84L3	ON	MON			H-3	0-25
440888	01U122		ON	MON			A-8	
440889	01U125		ON	MON			A-5	
440890	01U126		ON	MON			A-6	
440891	01U127		ON	MON			A-6	
440892	01U128		ON	MON			E-3	
440893	01U133		ON	MON			A-6	
440894	01U134		OFF	MON				
440895	01U130		ON	MON			G-2	
440896	03U124		ON	MON			G-7	
447889	04U871	401U4	OFF	MON				U-21
447890	04U882	412U4	OFF	MON				Z-22
447891	04U881	411U4	OFF	MON				X-20
447892	04U883	413U4	OFF	MON				Z-23
447893	01U350		ON	MON			A-6	
447894	PJ#318	318U4	OFF	MON				X-22
447895	04U880	410U4	OFF	MON				V-19
447896	04U877	407U4	OFF	MON				T-22
447898	04U875	405U4	OFF	MON				U-20
447899	03L846	306L3	OFF	MON				S-22
447900	04U879	409U4	OFF	MON				R-21
447988	04U872	402U4	OFF	MON				V-21
447998	01U135		ON	MON			A-4	
447999	01U136		ON	MON			A-3	
453821	03U317	SC-5	ON	REM			H-6	

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
453822	03U316	SC-4	ON	REM			H-6	
453823	03F308	B7	ON	REM			H-2	0-25
453824	03F312	B11	ON	REM			K-5	Q-26
453825	PJ#309	B8	ON	REM			J-3	P-25
453826	PJ#310	B9	ON	REM			I-3	P-25
453827	PJ#311	B10	ON	REM			H-2	P-25
453828	PJ#313	B12	ON	REM			H-2	0-25
453829	04J708		ON	MON			J-3	P-25
453830	04J713		ON	MON			H-2	0-25
453831	03M713		ON	MON			H-2	0-25
453832	04U714		ON	MON			G-2	0-25
453833	03U715	SM1	ON	MON			I-6	
453834	03U716	SM2	ON	MON			H-6	
471394	04U863	323U4	OFF	MON				
476387		MW15H	OFF	MON				
482083		K04-MW	ON	MON				
482084		K02-MW	ON	MON				
482085		K01-MW	ON	MON				
482086		I01-MW	ON	MON				
482087		I05-MW	ON	MON				
482088		I02-MW	ON	MON				
482089		I04-MW	ON	MON				
482090		I03-MW	ON	MON				
482707	04J882		OFF	MON				Z-21
482708	04J835		OFF	MON				Z-22
482709	04J834		OFF	MON				Y-22
500691	04U414	414U4/EZ SELF SERVICE	OFF	MON				T-24
500694	03L137		ON	MON				
505189	01U137		ON	MON			A-5	
505190	01U138		ON	MON			A-5	
505191	01U139		ON	MON			A-5	
505192	01U140		ON	MON			A-5	
505193	01U141		ON	MON			A-5	
505209	01U902		OFF	MON			A-5	
505210	01U901	H3U1	OFF	MON			A-4	
505618	03L138		ON	MON				
508115	04U322	322U4	OFF	MON				T-24
508117	04J702		ON	MON			I-3	P-25
508118	04J077		ON	MON				
508119	04U713		ON	MON			H-2	0-25
508120	04J714		ON	MON			G-2	0-25
508122	03U314	SC-2	ON	REM			I-6	P-27
509083		NEW BRIGHTON #11	OFF	MUNI				T-23
512761		GROSS GOLF #2	OFF	IRR				AA-22
519288		E101-MW	ON	MON				
519289		E102-MW	ON	MON				
519290		E103-MW	ON	MON				
519291		129-1501-MW	ON	MON				
519836	04U834		OFF	MON				Y-22
519956	03L833		OFF	MON			I-2	P-25
519957	04U833		OFF	MON			I-2	P-25
520931		NEW BRIGHTON #13	OFF	MUNI				T-24
524047	04U865	325U4	OFF	MON				T-24

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
524048	04J866	326J	OFF	MON				T-24
524049	04U866	326U4	OFF	MON				T-24
524050	04U864	324U4	OFF	MON				T-24
524051	04J864	324J	OFF	MON				T-24
538039	01U145		ON	PIEZ.				
538040	01U146		ON	PIEZ.				
538041	01U147		ON	PIEZ.				
538042	01U148		ON	PIEZ.				
538043	01U149		ON	PIEZ.				
538044	01U150		ON	PIEZ.				
538045	01U151		ON	PIEZ.				
538046	01U152		ON	PIEZ.				
538047	01U153		ON	PIEZ.				
538048	01U154		ON	PIEZ.				
538049	01U155		ON	PIEZ.				
538050	01U156		ON	PIEZ.				
538051	01U351		ON	REM				
538052	01U352		ON	REM				
538053	01U353		ON	REM				
538054	01U354		ON	REM				
538055	01U355		ON	REM				
538056	01U356		ON	REM				
538057	01U357		ON	REM				
538058	01U358		ON	REM				
538059	01U904		OFF	MON				
538060	01U903		OFF	MON				
538062	01U157		ON	MON				
538063	01U158		ON	MON				
	PJ#006		ON	MON				
	01U131							
	01U132							
	01U142							
	01U143							
	01U144							
	03U301	SC-1	ON	REM			K-5	P-26
	03L306		ON	MON				
	03U315	SC-3		REM			I-6	
	01U653			MON				
554216		NEW BRIGHTON #14	OFF	MUNI				T-23
	03U674	OW541U3	ON	MON			K-5	
	01U675							
	03U675							
	03U676		ON	MON			J-6	
	04U842			MON				
	03L843	303L3	OFF	MON				Q-24
		MW15D	OFF	MON				
		MW15S	OFF	MON				
		OW543U3						
		Staff Gauge 1						
		Staff Gauge 2						
		Staff Gauge 3						
582628		NEW BRIGHTON #15	OFF	MUNI				
596628	04U836	MW-1	OFF	MON				

TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
596629	04J836	MW-2	OFF	MON				
596630	04U837	MW-3	OFF	MON				
596631	04J837	MW-4	OFF	MON				
596632	04U838	MW-5	OFF	MON				
596633	04J838	MW-6	OFF	MON				
596634	04U839	MW-7	OFF	MON				
596635	04J839	MW-8	OFF	MON				

A.3 TCAAP Well Index Sorted by IRDMIS Number

Note:

In the "Well Type" column of the following index, the different types are abbreviated as follows:

UN	=	Unknown
MUNI	=	Municipal
MON	=	Monitoring
DOM	=	Domestic
IND	=	Industrial
P.S.	=	Public Supply
COM	=	Commercial
IRR	=	Irrigation
ABAND	=	Abandoned
PIEZ.	=	Piezometer
REM	=	Remedial

TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
424055	01L811	H1L1	OFF	TEST				P-24
424062	01L813	H3L1	OFF	TEST				P-23
424056	01L816	H6L1	OFF	ABAND	✓			P-24
424054	01L821	NW1L1	OFF	TEST				Q-24
424052	01L822	NW2L1	OFF	TEST				Q-24
424061	01L823	NW3L1	OFF	TEST				S-24
236176	01U003	S3U1	ON	MON			K-5	Q-26
234198	01U004	S4U1	ON	MON			K-7	
234199	01U011	S11U1	ON	MON			A-7	
234200	01U012	S12U1	ON	MON			B-3	
234201	01U022	S22U1	ON	MON			B-6	
234202	01U033	S33U1	ON	MON			A-10	
234204	01U034	S34U1	ON	MON			A-8	
234205	01U035	S35U1	ON	TEST			A-7	
234206	01U036	S36U1	ON	MON			A-7	
234207	01U037	S37U1		MON				
234208	01U038	S38U1		MON			A-6	
234209	01U039	S39U1	ON	MON			A-4	
234210	01U040	S40U1	ON	MON			B-4	
234211	01U041	S41U1	ON	MON			B-5	
236177	01U043	S43AU1		MON			C-5	
234212	01U044	S44U1	ON	MON			C-4	
234215	01U045	S45U1	ON	MON			D-4	
234216	01U046	S46U1	ON	MON			D-4	
234217	01U047	S47U1	ON	MON			E-2	
234218	01U048	S48U1		MON			E-2	
234221	01U050	S50AU1		MON			H-2	
234222	01U051	S51U1	ON	MON			H-2	
234223	01U052	S52U1	ON	MON			E-3	
234225	01U053	S53AU1	ON	MON			K-4	
234227	01U054	S54AU1		MON			K-5	
234235	01U060	S60U1	ON	MON			J-10	
234237	01U062	S62U1	ON	MON			J-3	
234239	01U063	S63U1	ON	MON			B-4	
234240	01U064	S64U1	ON	MON			J-6	
234241	01U065	S65U1	ON	MON			F-2	
234243	01U067	S67U1	ON	MON			B-6	
234250	01U072	S72AU1	ON	MON			E-9	
236479	01U085	S85U1	ON	MON			D-4	
236494	01U098	S98U1	ON	MON			J-10	
236497	01U100	S100U1	ON	MON			B-9	
236498	01U101	S101U1	ON	MON			B-8	
236499	01U102	S102U1	ON	MON			A-5	
236500	01U103	S103U1	ON	MON			A-6	
236501	01U104	S104U1	ON	MON			A-6	
236502	01U105	S105U1	ON	MON			A-6	
236503	01U106	S106U1	ON	MON			A-6	
236504	01U107	S170U1	ON	MON			B-6	
236505	01U108	S108U1	ON	MON			A-6	
236506	01U109	S109U1	ON	MON			B-6	
236507	01U110	S11OU1	ON	MON			B-6	
427411	01U115		ON	MON			A-5	
427412	01U116		ON	MON			A-5	

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
427413	01U117		ON	MON			A-5	
427414	01U118		ON	MON			B-5	
427415	01U119		ON	MON			A-6	
427410	01U120		ON	MON			A-6	
440888	01U122		ON	MON			A-8	
440889	01U125		ON	MON			A-5	
440890	01U126		ON	MON			A-6	
440891	01U127		ON	MON			A-6	
440892	01U128		ON	MON			E-3	
440895	01U130		ON	MON			G-2	
	01U131							
	01U132							
440893	01U133		ON	MON			A-6	
440894	01U134		OFF	MON				
447998	01U135		ON	MON			A-4	
447999	01U136		ON	MON			A-3	
505189	01U137		ON	MON			A-5	
505190	01U138		ON	MON			A-5	
505191	01U139		ON	MON			A-5	
505192	01U140		ON	MON			A-5	
505193	01U141		ON	MON			A-5	
	01U142							
	01U143							
	01U144							
538039	01U145		ON	PIEZ.				
538040	01U146		ON	PIEZ.				
538041	01U147		ON	PIEZ.				
538042	01U148		ON	PIEZ.				
538043	01U149		ON	PIEZ.				
538044	01U150		ON	PIEZ.				
538045	01U151		ON	PIEZ.				
538046	01U152		ON	PIEZ.				
538047	01U153		ON	PIEZ.				
538048	01U154		ON	PIEZ.				
538049	01U155		ON	PIEZ.				
538050	01U156		ON	PIEZ.				
538062	01U157		ON	MON				
538063	01U158		ON	MON				
447893	01U350		ON	MON			A-6	
538051	01U351		ON	REM				
538052	01U352		ON	REM				
538053	01U353		ON	REM				
538054	01U354		ON	REM				
538055	01U355		ON	REM				
538056	01U356		ON	REM				
538057	01U357		ON	REM				
538058	01U358		ON	REM				
236194	01U524	FA4U1	ON	PIEZ.			I-3	
236196	01U525	FW5U1	ON	PIEZ.			J-4	
236197	01U526	FV12U1	ON	PIEZ.			I-4	
236195	01U527	FV8U1	ON	PIEZ.			I-3	
236189	01U601	OW101U1	ON	MON			F-3	
236190	01U602	OW102U1	ON	MON			F-3	

TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
236191	01U603	OW103U1	ON	MON			E-3	
236192	01U604	OW104U1	ON	MON			E-3	
236193	01U605	OW10571	ON	MON			E-3	
242127	01U607	OW107U1	ON	MON			E-3	
242128	01U608	OW108U1	ON	MON			F-3	
242129	01U609	OW109U1	ON	MON			F-3	
242130	01U610	OW110U1	ON	MON				
242131	01U611	OW111U1	ON	MON			E-3	
194725	01U612	OW112U1	ON	MON		194758	E-3	
194726	01U613		ON	MON		194759	E-3	
194727	01U615	OW115U1	ON	MON		194760	F-3	
194728	01U616	OW116U1	ON	MON		194761	F-3	
194729	01U617	OW117U1	ON	MON		194770	F-3	
194730	01U618	OW118U1	ON	MON		194771	F-3	
194772	01U619	PW119U1	ON	MON			F-3	
194701	01U620	OW120U1	ON	MON			F-3	
194702	01U621	PW121U1	ON	MON			F-3	
194703	01U622	OW122U1	ON	MON			F-3	
194704	01U623	OW123U1	ON	MON			F-3	
242182	01U624A	BP185A	ON	PIEZ			F-3	
242183	01U624B	BP185B	ON	PIEZ			F-3	
242184	01U624C	BP185C	ON	PIEZ			F-3	
242185	01U624D	BP185D	ON	PIEZ			F-3	
242186	01U625A	BP285A	ON	PIEZ			F-3	
242187	01U625B	BP285B	ON	PIEZ			F-3	
242188	01U625C	BP285C	ON	PIEZ			F-3	
242189	01U625D	BP285D	ON	PIEZ			F-3	
242190	01U626A	BP385A	ON	PIEZ			F-3	
242191	01U626B	BP385B	ON	PIEZ			F-3	
242192	01U626C	BP385C	ON	PIEZ			F-3	
242193	01U626D	BP385D	ON	PIEZ			F-3	
242194	01U627A	BP485A	ON	PIEZ			F-3	
242195	01U627B	BP485B	ON	PIEZ			F-3	
242196	01U627C	BP485C	ON	PIEZ			F-3	
242197	01U627D	BP485D	ON	PIEZ			F-3	
242198	01U628A	BP585A	ON	PIEZ			F-3	
242199	01U628B	BP585B	ON	PIEZ			F-3	
242200	01U628C	BP585C	ON	PIEZ			F-3	
242201	01U628D	BP585D	ON	PIEZ			F-3	
194720	01U631	OW501U1	ON	MON				
194721	01U632	OW502U1		MON				
194716	01U634	OW504U1	ON	MON			J-5	
194722	01U635	OW505U1	ON	MON				
194723	01U636	OW506U1	ON	MON.			K-5	
194717	01U638	OW508U1		MON				
194718	01U639	OW509U1	ON	MON			K-6	
194719	01U640	OW510U1	ON	MON			K-6	
194724	01U642	OW512U1	ON	MON			K-7	
242134	01U652	OW522U1	ON	MON			J-6	
	01U653			MON				
242135	01U666	OW536U1	ON	MON			K-5	
242136	01U667	OW537U1	ON	MON			J-6	
242137	01U668	OW538U1	ON	MON			J-6	

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
	01U675							
236452	01U803	T3U1	OFF	TEST		424053	K-3	Q-25
236457	01U805	T5U1	OFF	MON		424060	J-3	P-25
236460	01U806	T6U1	OFF	MON		424058	I-3	P-25
236471	01U807	T7U1	OFF	TEST		424059		
424057	01U808	T8U1	ON	MON			J-2	
242153	01U813	H3U1	OFF	MON				P-23
505210	01U901	H3U1	OFF	MON			A-4	
505209	01U902		OFF	MON			A-5	
538060	01U903		OFF	MON				
538059	01U904		OFF	MON				
426842	03F302	B1	ON	REM			K-5	Q-26
426843	03F303	B2	ON	REM			K-4	P-26
426844	03F304	B3	ON	REM			J-4	P-25
426845	03F305	B4	ON	REM			J-3	P-25
426846	03F306	B5	ON	REM			I-3	P-25
426847	03F307	B6	ON	REM			I-3	P-25
453823	03F308	B7	ON	REM			H-2	0-25
453824	03F312	B11	ON	REM			K-5	Q-26
234137	03L001	S1L3	ON	MON			G-2	0-25
234141	03L002	S2L3	ON	MON			I-4	P-25
234144	03L003	S3L3	ON	MON			K-5	Q-26
234147	03L004	S4L3	ON	MON			K-7	
236079	03L005	S5L3	ON	MON			K-9	
234152	03L007	S7L3	ON	MON			J-12	
234157	03L010	S10L3	ON	MON			A-10	
234161	03L012	S12L3	ON	MON			B-3	
234164	03L013	S13L3	ON	MON			E-2	
235748	03L014	S14L3	ON	MON			I-7	P-27
234170	03L017	S17L3	ON	MON			H-5	
235749	03L018	S18L3	ON	MON			H-6	
234175	03L020	S20L3	ON	MON			I-6	P-26
235750	03L021	S21L3	ON	MON			J-4	P-26
235751	03L027	S27L3	ON	MON			J-6	
235752	03L028	S28L3		MON			J-6	
235753	03L029	S29L3		MON		236066	K-5	P-26
236076	03L077	S77L3	ON	MON			I-3	P-25
236074	03L078	S78L3	ON	MON			J-4	P-26
242160	03L079	S79L3	ON	MON			K-5	Q-26
236071	03L080	S80L3	ON	MON			J-6	
236070	03L081	S81L3	ON	MON			I-8	
440887	03L084	ST84L3	ON	MON			H-3	0-25
236068	03L086	S86L3	ON	MON			J-9	
236067	03L091	S91L3	ON	MON			G-7	
236080	03L113	WF1L3	ON	MON			G-8	0-27
500694	03L137		ON	MON				
505618	03L138		ON	MON				
	03L306		ON	MON				
231854	03L522	ARSENAL GRAVEL PIT	ON	ABAND	✓		D-8	
206725	03L523	ARSENAL GRAVEL PIT	ON	ABAND	✓		D-8	
426815	03L673	PD3L3	OFF	TEST			L-3	Q-25
426817	03L802	T2L3	OFF	TEST			K-4	Q-26
236463	03L806	T6L3	OFF	MON		421429	I-3	P-25

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
426868	03L809	T9L3	OFF	MON				P-25
426809	03L811	H1L3	OFF	TEST				P-24
426816	03L813	H3L3	OFF	TEST				P-23
426813	03L822	NW2L3	OFF	TEST				Q-24
426865	03L832	OM2L3	OFF	TEST				R-24
519956	03L833		OFF	MON			I-2	P-25
434037	03L841	301L3	OFF	MON				Q-25
	03L843	303L3	OFF	MON				Q-24
447899	03L846	306L3	OFF	MON				S-22
416199	03L848	308L3	OFF	MON				Q-25
426858	03L853	313L3	OFF	MON				Q-24
426859	03L854	314L3	OFF	MON				R-25
426861	03L856	316L3	OFF	MON				P-23
416081	03L858	318L3	OFF	MON				X-22
434040	03L859	319L3	OFF	MON				Q-25
434038	03L860	320L3	OFF	MON				R-25
434039	03L861	321L3	OFF	MON				R-24
234136	03M001	S1M3	ON	MON			G-2	0-25
234140	03M002	S2M3	ON	MON			I-4	P-25
234143	03M003	S3M3	ON	MON			K-5	Q-26
234146	03M004	S4M3	ON	MON			K-7	
440885	03M005	ST-5-M3	ON	MON			K-9	
234151	03M007	S7M3	ON	MON			J-12	
234156	03M010	S10M3	ON	MON			A-10	
234160	03M012	S12M3	ON	MON			B-3	
234163	03M013	S13M3	ON	MON			E-2	
234169	03M017	S17M3	ON	MON			H-5	
234174	03M020	S20M3	ON	MON			I-6	P-26
231857	03M505			ABAND	✓		K-12	
206760	03M509		ON	MON			J-6	
453831	03M713		ON	MON			H-2	0-25
426818	03M802	T2M3	OFF	TEST			K-4	Q-26
236462	03M806	T6M3	OFF	MON		421430	I-3	P-25
426852	03M843	303M3	OFF	TEST				Q-24
416051	03M848	308M3	OFF	MON				Q-25
234135	03U001	S1U3	ON	MON			G-2	0-25
234139	03U002	S2U3	ON	MON			I-4	P-25
234142	03U003	S3U3	ON	MON			K-5	Q-26
234145	03U004	S4U3	ON	MON			K-7	
234148	03U005	S5U3	ON	MON			K-9	
234149	03U006	S6U3	ON	MON			K-11	
234150	03U007	S7U3	ON	MON			J-12	
234153	03U008	S8U3	ON	MON			F-12	
234154	03U009	S9U3	ON	MON			B-12	
234155	03U010	S10U3	ON	MON			A-10	
234158	03U011	S11U3	ON	MON			A-7	
234159	03U012	S12U3	ON	MON			B-3	
234162	03U013	S13U3	ON	MON			E-2	
234165	03U014	S14U3	ON	MON			I-7	P-27
234166	03U015	S15U3	ON	MON			F-5	
234167	03U016	S16U3	ON	MON			F-9	0-27
234168	03U017	S17U3	ON	MON			H-5	
234171	03U018	S18U3	ON	MON			H-6	

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
234172	03U019	S19U3	ON	MON			H-8	
234173	03U020	S20U3	ON	MON			I-6	P-26
234176	03U021	S21U3	ON	MON			J-4	P-26
236178	03U022	S22U3		MON			B-6	
236179	03U023	S23U3		MON			B-5	
236180	03U024	S24U3		MON			C-5	
236181	03U025	S25U3		MON			D-4	
236182	03U026	S26U3	ON	MON			H-7	
236183	03U027	S27U3		MON			J-6	
236184	03U028	S28U3		MON			J-6	
236185	03U029	S29U3		MON			K-5	P-26
236186	03U030	S30U3		MON			J-6	P-26
236187	03U031	S31U3		MON			F-4	
236188	03U032	S32U3		MON			G-7	
236078	03U075	S75U3	ON	MON			F-2	
236077	03U076	S76U3	ON	MON			G-2	
236075	03U077	S77U3	ON	MON			I-3	P-25
236073	03U078	S78U3	ON	MON			J-4	P-26
236072	03U079	S79U3	ON	MON			K-5	Q-26
236476	03U082	S82U3	ON	MON			B-7	
236478	03U083	S83U3	ON	MON			E-4	
236069	03U084	S84U3	ON	MON			H-3	0-25
236480	03U087	S87U3	ON	MON			F-6	
236482	03U088	S88U3	ON	MON			F-6	
236483	03U089	S89U3	ON	MON			F-6	
236485	03U090	S90U3	ON	MON			H-7	
236487	03U092	S92U3	ON	MON			H-6	
236489	03U093	S93U3	ON	MON			H-6	
236066	03U094	S94U3	ON	MON			I-7	P-27
236491	03U096	S96U3	ON	MON			G-6	
236493	03U097	S97U3	ON	MON			E-9	
236495	03U099	S99U3	ON	MON			K-10	
236508	03U111	S111U3	ON	MON			E-9	
236510	03U112	S112U3	ON	MON			H-7	0-27
242124	03U113	WF1U3	ON	MON			G-8	0-27
242125	03U114	WF2U3	ON	MON			H-7	0-27
440884	03U121		ON	MON			H-7	
440896	03U124		ON	MON			G-7	
440886	03U129		ON	MON			D-9	
	03U301	SC-1	ON	REM			K-5	P-26
508122	03U314	SC-2	ON	REM			I-6	P-27
	03U315	SC-3		REM			I-6	
453822	03U316	SC-4	ON	REM			H-6	
453821	03U317	SC-5	ON	REM			H-6	
114410	03U521		OFF	MON			F-7	
242132	03U647		ON	MON			J-6	
242133	03U648		ON	MON			J-6	P-26
421426	03U658		ON	MON			K-7	
421425	03U659		ON	MON			J-6	P-26
421438	03U671	PO-1	ON	MON			J-4	P-26
421440	03U672	PD2U3	OFF	MON			K-6	Q-26
421441	03U673	PD3U3	OFF	MON			L-3	Q-25
	03U674	OW541U3	ON	MON			K-5	

TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
	03U675							
	03U676		ON	MON			J-6	
426848	03U701	701U3	ON	MON			I-3	P-25
426850	03U702	702U3	ON	MON			I-3	P-25
426878	03U703	703U3		MON			K-4	P-26
426883	03U704	704U3	ON	MON			E-7	
426884	03U705	705U3	ON	MON			E-7	
426885	03U706	706U3	ON	MON			E-6	
426886	03U707	707U3	ON	MON			C-7	
426879	03U708	708U3	ON	MON			J-4	P-25
426881	03U709	709U3	ON	MON			J-3	P-25
434032	03U710	71OU3	ON	MON			K-5	Q-26
434033	03U711	711U3	OFF	MON			J-3	P-25
453833	03U715	SM1	ON	MON			I-6	
453834	03U716	SM2	ON	MON			H-6	
236449	03U801	T1U3	OFF	MON			K-4	Q-26
236453	03U803	T3U3	OFF	MON		421434	K-3	Q-25
236455	03U804	T4U3	OFF	MON		421433	J-4	P-25
236458	03U805	T5U3	OFF	MON		421432	J-3	P-25
236461	03U806	T6U3	OFF	MON		421431	I-3	P-25
426808	03U811	H1U3	OFF	TEST				P-24
426862	03U815	H5U3	OFF	TEST				P-23
426810	03U821	NW1U3	OFF	TEST				Q-24
426812	03U822	NW2U3	OFF	TEST				Q-24
426814	03U824	NW4U3	OFF	TEST				R-24
426863	03U831	OM1U3	OFF	TEST				R-24
426864	03U832	OM2U3	OFF	TEST				R-24
508118	04J077		ON	MON				
508117	04J702		ON	MON			I-3	P-25
453829	04J708		ON	MON			J-3	P-25
453830	04J713		ON	MON			H-2	0-25
508120	04J714		ON	MON			G-2	0-25
482709	04J834		OFF	MON				Y-22
482708	04J835		OFF	MON				Z-22
596629	04J836	MW-2	OFF	MON				
596631	04J837	MW-4	OFF	MON				
596633	04J838	MW-6	OFF	MON				
596635	04J839	MW-8	OFF	MON				
524051	04J864	324J	OFF	MON				T-24
524048	04J866	326J	OFF	MON				T-24
482707	04J882		OFF	MON				Z-21
234138	04U001	S1U4	ON	MON			G-2	0-25
234194	04U002	S2U4	ON	MON			I-4	P-25
234193	04U003	S3U4	ON	MON			K-5	Q-26
234195	04U007	S7U4	ON	MON			J-12	
234196	04U012	S12U4	ON	MON			B-3	
234197	04U020	S20U4	ON	MON			I-6	P-26
242138	04U027	S27U4		MON			J-6	
426877	04U077	ST77U4	ON	MON			I-3	P-25
508115	04U322	322U4	OFF	MON				T-24
500691	04U414	414U4/EZ SELF SERVICE	OFF	MON				T-24
231742	04U510	GRENADE PLANT PROOF RANGES	ON	IND			C-12	
426867	04U673	PD3U4	OFF	TEST			L-3	Q-25

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
426849	04U701	701U4	ON	MON			I-3	P-25
426876	04U702	702U4	ON	MON			I-3	P-25
426880	04U708	708U4	ON	MON			J-4	P-25
426882	04U709	709U4	ON	MON			J-3	P-25
434031	04U711	711U4	OFF	MON			J-3	P-25
508119	04U713		ON	MON			H-2	0-25
453832	04U714		ON	MON			G-2	0-25
236450	04U802	T2U4	OFF	MON			K-4	Q-26
236464	04U806	T6U4	OFF	MON		421428	I-3	P-25
426811	04U821	NW1U4	OFF	TEST				Q-24
426866	04U832	OM2U4	OFF	TEST				R-24
519957	04U833		OFF	MON			I-2	P-25
519836	04U834		OFF	MON				Y-22
596628	04U836	MW-1	OFF	MON				
596630	04U837	MW-3	OFF	MON				
596632	04U838	MW-5	OFF	MON				
596634	04U839	MW-7	OFF	MON				
426851	04U841	301U4	OFF	TEST				Q-25
	04U842			MON				
426853	04U843	303U4	OFF	TEST				Q-24
426854	04U844	304U4	OFF	TEST				R-24
426855	04U845	305U4	OFF	MON				R-25
426856	04U846	306U4	OFF	MON				S-22
426857	04U847	307U4	OFF	MON				P-24
416078	04U848	308U4	OFF	TEST				Q-25
416082	04U849	309U4	OFF	MON				R-23
416200	04U850	310U4	OFF	MON				S-22
406198	04U851	311U4	OFF	MON				U-23
416080	04U852	312U4	OFF	MON				V-23
439701	04U854	314U4	OFF	MON				R-25
426860	04U855	315U4	OFF	MON				Q-22
434036	04U859	319U4	OFF	MON				Q-25
434035	04U860	320U4	OFF	MON				R-25
434034	04U861	321U4	OFF	MON				R-24
471394	04U863	323U4	OFF	MON				
524050	04U864	324U4	OFF	MON				T-24
524047	04U865	325U4	OFF	MON				T-24
524049	04U866	326U4	OFF	MON				T-24
447889	04U871	401U4	OFF	MON				U-21
447988	04U872	402U4	OFF	MON				V-21
447898	04U875	405U4	OFF	MON				U-20
447896	04U877	407U4	OFF	MON				T-22
447900	04U879	409U4	OFF	MON				R-21
447895	04U880	410U4	OFF	MON				V-19
447891	04U881	411U4	OFF	MON				X-20
447890	04U882	412U4	OFF	MON				Z-22
447892	04U883	413U4	OFF	MON				Z-23
236468	PJ#003	S3PJ	ON	MON			K-5	Q-26
	PJ#006		ON	MON				
236469	PJ#027	S27PJ	ON	MON			J-6	
235565	PJ#074	S74PJ		MON			I-6	
453825	PJ#309	B8	ON	REM			J-3	P-25
453826	PJ#310	B9	ON	REM			I-3	P-25

TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
453827	PJ#311	B10	ON	REM			H-2	P-25
453828	PJ#313	B12	ON	REM			H-2	0-25
447894	PJ#318	318U4	OFF	MON				X-22
206754	PJ#501	TWIN CITIES ARSENAL NO. 1	ON	P.S.			F-4	
206756	PJ#502	TWIN CITIES ARSENAL NO. 2	ON	IND			G-4	
206758	PJ#503	TWIN CITIES ARSENAL NO. 3	ON	IND			H-4	
206724	PJ#504	TWIN CITIES ARSENAL	OFF	ABAND	✓		E-2	
206753	PJ#506	TWIN CITIES ARSENAL NO. 6	ON		✓		H-5	
206755	PJ#507	TWIN CITIES ARSENAL NO. 7	ON	ABAND	✓		H-5	
206759	PJ#508	TWIN CITIES ARSENAL NO. 8	ON	ABAND	✓		I-6	
206760	PJ#509	TWIN CITIES ARSENAL NO.9	ON	DOM			J-6	
236437	PJ#802	T2PJ	OFF	MON		421437	K-4	Q-26
236465	PJ#806	T6PJ	OFF	MON		421427	I-3	P-25
107405		ROEBKE	OFF	UN				
110485		NEW BRIGHTON #12	OFF	MUNI				P-21
122210		ST. PAUL PORT AUTH. #3	OFF	IND				
127537		MIDWEST ASPHALT	OFF	DOM				
134318		LORENZ W SEUTTER	OFF	DOM				
139035		WATERGATE MARINA	OFF	P.S.				
151568		ARDEN MANOR MOBILE HOME	OFF	P.S.				
161432		NEW BRIGHTON #10	OFF	MUNI				V-24
191942		118PDC/MODEL STONE	OFF	MON				R-24
200070		RUAN TRANSPORT	OFF	COM	✓			
200071		PRESTRESSED CONCRETE	OFF	IND	✓			
200072		WITTE TRANSPORTATION	OFF	IND	✓			
200073		WILSON TRANSFER & STORAGE	OFF	IND				
200074		ASBESTOS PROD	OFF	IND	✓			
200075		PHILLIPS PETROLEUM	OFF	IND	✓			
200076		OLD DUTCH FOODS INC	OFF	IND				Z-23
200077		JOHN CONLIN	OFF	DOM	✓			
200078		WILLIAM CLASS	OFF	DOM				
200079		LAWRENCE SCHOENING	OFF	DOM				
200080		CARL A OSTROM & SON	OFF	DOM				
200081		A. O. LIEBIG	OFF	DOM				
200082		2196 MARION ROAD	OFF	DOM				
200148		PAPER CALMERSON	OFF	IND	✓			BB-23
200154		U OF M GOLF COURSE	OFF	IRR				CC-25
200167		KOPPERS COKE #1	OFF	IND				
200171		PLATING INC	OFF	IND				
200197		SNOW FLAKE DAIRY	OFF	COM				
200264		1620 CENTRAL	OFF	IND				
200384		METALLURGICAL INC. WELL #1	OFF	IND				
200524		ST. ANTHONY #5	OFF	MUNI				V-21
200525		PLETSCHER	OFF	UN				
200531		NAZARETH	OFF	UN				
200599		CEDAR AVE. TRIANGLE	OFF	P.S.				
200602		ATKINSON MILL CO.	OFF	IND				
200629		GENERAL MILLS	OFF	IND				
200803		ST. ANTHONY #4	OFF	P.S.				X-22
200804		ST. ANTHONY #3	OFF	MUNI				X-22
200812		GROSS GOLF COURSE #1	OFF	COM				AA-22
200814		AMERICAN LINEN	OFF	IND				CC-22
201074		GLEASSON MORTUARY	OFF	COM				

TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
201082		NORTHWESTERN HOSPITAL	OFF	P.S.				
206669		FRIDLEY #8	OFF	MUNI				
206672		FRIDLEY #9	OFF	MUNI				
206673		FRIDLEY #6	OFF	MUNI				
206688		CLOVERPOND WELL	OFF	DOM				T-20
206689		JAMES K. O'NEIL	OFF	UN				
206693		FERNELIUS	OFF	UN				
206702		MINN E.S.	OFF	UN				
206720		MOUNDSVIEW	OFF	MUNI				
206722		M0UNDSVIEW #5	OFF	MUNI				
206750		SHORE #4	OFF	MUNI				
206787		MOUNDSVIEW H.S.	OFF	P.S.				S-25
206789		NEW BRIGHTON #1	OFF	MUNI	✓			
206791		NEW BRIGHTON #7	OFF	MUNI				U-23
206792		NEW BRIGHTON #4						
206793		NEW BRIGHTON #3	OFF	MUNI				S-21
206794		NEW BRIGHTON #9	OFF	MUNI				T-21
206795		NEW BRIGHTON #8	OFF	MUNI				T-21
206796		NEW BRIGHTON #5	OFF	MUNI				
206797		NEW BRIGHTON #6	OFF	MUNI				T-21
206798		NEW BRIGHTON #2	OFF	MUNI	✓			
223844		KURTH MALTING CO EAST WL	OFF	IND				
223992		BOOM ISLAND	OFF	IND				
225886		FRANKLIN STEEL SQUARE	OFF	P.S.				
225905		ST PAUL TERM. WAREHOUSE	OFF	IND				
225906		ST PAUL TERM. WAREHOUSE	OFF	IND				
231741		LABELLE	OFF	UN				
231845		MNDOT CIVIL DEFENSE TRAIN.	ON/OFF	P.S.			A-4	
231878		MENGELKOCH #2	OFF	UN				R-25
232067		NBR 135	OFF	UN				
232069		UHIL	OFF	UN				
233221		REUBEN MEAT	OFF	DOM				CC-20
233222		LOWRY GROVE TRAILER	OFF	ABAND	✓			Z-21
233241		KOZAH'S MARKET	OFF	UN	✓			
233520		MCGILLIS	OFF	UN				
233533		ROSELAWN CEMETARY	OFF	IRR				
233763		P. L. MORGAN	OFF	DOM				
233806		2581 NORTH CLEVELAND	OFF	DOM				
234301		DEWITT	OFF	UN				
234305		GLENN BEGGIN	OFF	UN				
234319		HIDE & TALLOW #1	OFF	UN				P-25
234327		BRESKE	OFF	UN				
234335		MENGELKOCH #1	OFF	UN				R-25
234337		MENGELKOCH #3	OFF	UN	✓			R-25
234350		GORDON	OFF	UN				
234351		YEMPA	OFF	UN				
234352		1206 12TH AV NW	OFF	UN				R-23
234353		LENTSCH'S ICE WK.	OFF	UN				P-25
234355		KINGDOM HALL	OFF	UN				
234356		NORDQUIST P43	OFF	UN				Q-25
234357		PHILLIPS PET P46	OFF	UN				P-25
234386		ZELL OLS.	OFF	UN				
234391		SHERER L.	OFF	UN				

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
234396		DEWITT	OFF	UN	✓			
234406		KLAPP	OFF	UN	✓			
234409		HIDE & TALLOW	OFF	UN				
234425		KEN GEREBI	OFF	UN	✓			P-25
234430		CMIEL	OFF	UN	✓			Q-26
234431		HARSTAD	OFF	UN				
234463		KEN SOLIE	OFF	UN				V-21
234546		HONEYWELL RIDGEWAY	OFF	UN				BB-21
234547		HONEYWELL RIDGEWAY	OFF	UN				BB-21
234549		REINER	OFF	IRR				Y-21
235539		OLD HOTEL	OFF	UN				Q-24
235557		HIDDEN FALLS PARK W.WELL	OFF	P.S.				
235619		SHRINERS HOSPITAL	OFF	P.S.				
235735		FLOUR CITY ARCHITECTURAL	OFF	COM				
236122		NWR	OFF	ABAND				Q-24
242162		301PB	OFF	UN				
242207		SUNSET MEMORIAL CEMETARY	OFF	UN				
249152		BOYLE	OFF	DOM				
265735		FLOUR CITY ARCH	OFF	UN				
322664		ABBOTT NW HOSP	OFF	UN				
405651		METAL-MATIC INC.	OFF	IND				
409546		PCA2L3	OFF	TEST				S-24
409547		PCA1U4	OFF	TEST				R-24
409548		PCA2U4	OFF	TEST				S-24
409549		PCA3U4	OFF	TEST				R-22
409550		PCA6U3	OFF	TEST				P-25
409555		PCA5U4	OFF	TEST				V-22
409556		PCA4L3	OFF	TEST				S-22
409557		PCA1L3	OFF	TEST				R-24
409595		B109U3	OFF	ABAND				R-24
409596		B118U3	OFF	MON				R-24
409597		B118L3	OFF	IND				R-24
409598		B117U3	OFF	ABAND				R-24
416143			OFF	ABAND				
416198		311U4	OFF	MON				
420713		HERBST LANDFILL	OFF	MON				
476387		MW15H	OFF	MON				
482083		K04-MW	ON	MON				
482084		K02-MW	ON	MON				
482085		K01-MW	ON	MON				
482086		I01-MW	ON	MON				
482087		I05-MW	ON	MON				
482088		I02-MW	ON	MON				
482089		I04-MW	ON	MON				
482090		I03-MW	ON	MON				
509083		NEW BRIGHTON #11	OFF	MUNI				T-23
512761		GROSS GOLF #2	OFF	IRR				AA-22
519288		E101-MW	ON	MON				
519289		E102-MW	ON	MON				
519290		E103-MW	ON	MON				
519291		129-1501-MW	ON	MON				
520931		NEW BRIGHTON #13	OFF	MUNI				T-24
554216		NEW BRIGHTON #14	OFF	MUNI				T-23

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SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #	Well Location On-post	Well Location Off-post
582628		NEW BRIGHTON #15	OFF	MUNI				
		MW15D	OFF	MON				
		MW15S	OFF	MON				
		OW543U3						
		Staff Gauge 1						
		Staff Gauge 2						
		Staff Gauge 3						

Figures

APPENDIX B

Appendix B

FY 1998 Data Collection and Management

B.1 Data Collection, Management, and Presentation

APPENDIX B-1

DATA, COLLECTION, MANAGEMENT, AND PRESENTATION

1.0 INTRODUCTION

A groundwater monitoring program was initiated in January 1984 to obtain water level and water quality data at TCAAP. Each year has been divided into quarters with each quarter assigned a number. Accordingly, FY 1998 was comprised of Quarter 57 (October through December), Quarter 58 (January through March), Quarter 59 (April through June), and Quarter 60 (July through September). Water sampling and water level measurements were conducted in accordance with the TCAAP Quality Assurance Project.

Data collected at TCAAP is stored in the U.S. Army Environmental Center (USAEC) Installation Restoration Data Management Information System (IRDMIS). The IRDMIS is managed by Potomac Research, Inc. (PRI) on behalf of the USAEC.

2.0 GROUNDWATER LEVELS AND GROUNDWATER QUALITY

2.1 Data Collection and Management

Groundwater level and groundwater quality data were collected in accordance with the FY 1998 Annual Monitoring Plan which established the monitoring responsibilities for both:

- The Army (to be performed by Alliant the contracted operator)
- Alliant - the tenant and responsible party

Water level monitoring and groundwater sampling were conducted by CRA for both parties, and the laboratory analysis was performed by DataChem Laboratories.

For water level measurements, CRA measured the depth to water from the top of the well casing. Using the distance from the top of the casing to the ground surface, which is surveyed when each well is constructed, CRA determined the depth to water from the ground surface. This information was then submitted to PRI for entry into the IRDMIS. The IRDMIS contains ground-surface elevations measured to tenths of a foot.

Appendix D summarizes the individual parameters included within each analytical category (or family of related parameters) as indicated in the Groundwater Monitoring Plan. Halogenated volatile organic compounds (Category 1) were the parameters of primary interest, while select wells were sampled for aromatic volatile organic compounds (Category 7), antimony (Category 2), and mercury (Category 3).

All laboratory data was submitted to PRI for entry into the IRDMIS. Data validation was conducted through IRDMIS in accordance with procedures and requirements outlined in the TCAAP QAPP. The data validation process involved constructing control charts of tabulated data and analyzing the data to insure that it met certain Record Check Requirements and Group Check Requirements. For a more detailed description of the data validation process, the TCAAP QAPP and the IRDMIS User's Guide should be consulted.

Field blanks and other miscellaneous blanks data generated for quality assurance/quality control purposes for organics and inorganics are contained in Appendices E.1 and E.2, respectively. Some of the data in Appendices E.1 and E.2 were given a "V" flagging code. As shown in Appendix D.2, "V" indicates the sample was subjected to unusual storage and/or preservation conditions, such as if the samples were received at the laboratory at greater than 4°C, or were not correctly preserved in the field. The "V" flags are all on data either from trip blanks or background surface water samples. Not all samples were affected. The background surface water samples are collected at the Army's discretion, and are not a regulatory requirement. Therefore, the "V" flags do not affect the interpretations in the FY 1998 report.

As an additional quality assurance check, Wenck calculated the relative percent difference (RPD) for all duplicate groundwater samples collected in FY 1998, which are presented in

Appendix E.3. An RPD of 25 percent was used as a trigger for further review. All RPD values greater than 25 percent are highlighted in Appendix E.3. In the case of no detection, the detection limit for the particular analysis was used in the RPD calculation.

For preparation of this FY 1998 Annual Performance Report, Wenck received groundwater elevation and groundwater quality data electronically from CRA. CRA retrieved the data directly from the IRDMIS. Data was then converted into Microsoft Excel format to permit preparation of the groundwater elevation database (Appendix C.1) and groundwater quality databases (Appendices C.2 through C.4), all of which are contained on the CD-ROM in Appendix C.

Explanations for any missed data are provided in Appendix B.2.

2.2 Groundwater Elevation Contour Maps

Groundwater elevation contour maps were prepared using Quarter 59 data. Individual maps were developed for Upper Unit 3, Lower Unit 3, and Upper Unit 4. These maps are presented as figures which follow the text for the relevant sections. The on-post groundwater elevation contour maps were prepared by CRA while the off-post contour map was prepared by Wenck.

Groundwater elevation contour maps were not prepared for the Middle Unit 3 aquifer since there are not enough wells screened in this aquifer to justify contouring. However, the data from Middle Unit 3 wells are shown in parentheses on the Lower Unit 3 contour maps. The Middle Unit 3 elevations were not used to derive the contour lines, unless there were no nearby Lower Unit 3 wells to rely upon. In general, the difference in water levels between Middle Unit 3 and Lower Unit 3 is insignificant.

For the same reason, wells completed in the Jordan aquifer (04J), and wells completed as open holes intersecting both the Prairie du Chien and Jordan (PJ#), were not used for preparing the Upper Unit 4 groundwater elevation contours. These elevations are shown on the Upper Unit 4 contour maps with the data in parentheses.

2.3 Groundwater Quality Contour Maps and Cross-Sections

The most extensive sampling event performed during FY 1998 was in June (Quarter 59). This data was used to prepare contour maps and cross-sections to illustrate the spatial distribution of groundwater contamination.

Groundwater quality contour maps were generated by hand, based on the observed contaminant concentrations and the extent of past site contamination.

Contour maps are provided for trichloroethene, as this is the principal contaminant on a concentration basis. Contour maps were prepared by Wenck for OU2 (on-post) and OU1/OU3 combined (off-post), with individual maps for Upper Unit 3, Lower Unit 3, and Upper Unit 4. To complement the groundwater quality contour maps, cross-sections have been prepared to illustrate the vertical distribution of trichloroethene. One section line passes through the source area at Site G and follows the north plume (OU1) off-post, extending past Gross Golf Course (well 512761). A second section line passes through the source area at Site I and traces the south plume (OU3) off-post through the Plume Groundwater Recovery System (PGRS).

Contaminant concentrations for Middle Unit 3 wells are shown in parentheses on the Lower Unit 3 contour maps, but were not used for contouring purposes except when no Lower Unit 3 wells are in the vicinity. Similarly, wells completed in the Jordan aquifer (04J) and wells completed as open holes intersecting both the Prairie du Chien and Jordan aquifers (PJ#) are shown with the data in parentheses on the Upper Unit 4 maps, but were not used to develop contour lines.

Contaminant concentrations at recovery wells are also shown in parentheses on the maps. These values were considered, but were not used alone to prepare the isoconcentration contours. Concentrations of recovery wells generally represent an average contaminant value for all groundwater being drawn to the well; hence, the concentrations do not necessarily represent a discrete location or depth.

For Site A, an isoconcentration contour map was developed for 1,2-dichloroethene as this is the most widespread contaminant at Site A. Site A cross-sections were also prepared which illustrate 1,2-dichloroethene. Contour maps for Site A were prepared only for Unit 1 since this is the only contaminated aquifer.

3.0 GROUNDWATER PUMPING

Groundwater pumping data was collected to aid in evaluating the effect which the pumping has on the shape and migration of the contaminant plume. The data was compiled primarily from a database maintained by the Minnesota Department of Natural Resources (MDNR). The MDNR database includes all permitted wells in Minnesota. Permits are required for wells with pumping rates greater than 10,000 gallons per day or 1,000,000 gallons per year.

The MDNR anticipates having 1998 pumping data available in May 1999. This information will be added to the FY 1998 Annual Performance Report when it becomes available.

Groundwater pumping data for the Cities of New Brighton and St. Anthony was obtained directly from city personnel, and not from the MDNR database. As shown by the data in Appendix G, the pumping from these two municipalities historically includes the vast majority of the groundwater use in the vicinity of the TCAAP plume.

Appendix G includes all permitted wells in the vicinity of the plume and is divided into "High Capacity Wells" and "Other Wells." High capacity wells are defined as those wells with a permitted pumping rate of greater than or equal to 50 gallons per minute. On-TCAAP recovery wells are not included in Appendix G.

B.2 Explanations for Missed Monitoring

Con oga-Rovers & Associates
1801 Old Highway 8, Suite #114
St. Paul, Minnesota 55112
(651) 639-0913 Office (651) 639-0923 Fax

January 14, 1999

Reference No. 11062

James Persoon, Ph.D.
ALLIANT TECHSYSTEMS, INC.
4700 Highway 10, Suite F
Arden Hills, Minnesota 55112-3928

Dear Dr. Persoon:

Re: Clarifications and Deviations from Operable Unit One, Site A, Surface Water, Site D, and Site G Monitoring Programs - Fiscal Year 1998

Water quality sampling, water level measurement, air quality monitoring, and documentation for Site A, Operable Unit One Groundwater, Sites D and G SVE Systems, and Surface Water for Fiscal Year 1998 (FY98) were performed in accordance with the approved 1998 Annual Monitoring Plan and the "Installation Restoration Program" Quality Assurance Project Plan for the Remedial Investigation/Feasibility Study at the Twin Cities Army Ammunition Plant", USATHAMA, June 1988.

All required water quality samples were collected and water level measurements were recorded as listed in the FY 1998 Annual Monitoring Plan with the following comments and exceptions:

Operable Unit One

Deviations from the Monitoring Plan occurred in the following months:

December 1997

- MW1-MW8 were not monitored because they were not installed.
- NB#15 was not monitored because it was not in use.
- NB#3 and NB#4 were not sampled because they were not pumping due to nearby new well construction.

March 1998

- NB#3 was not monitored because it was in the process of being redeveloped.
- NB#15 was not monitored because installation was not complete, and it was not yet in production.
- MW1-MW8 were not monitored because they were not installed.

June 1998

- St. Anthony Well #3 was not sampled because it was not in operation.
- Residential Well 234549 (Reiner) was in need of repair, so it was not sampled.
- MW1-MW8 were not monitored because installation was not complete.

Site A Monitoring Wells

The only clarification is as follows:

November 1997

- During the November groundwater monitoring round the pumps in 01U351, 01U352, 01U353, 01U354, 01U355, 01U356, 01U357, and 01U358 were not running due to maintenance. Therefore, all recorded November groundwater levels were static.

Site A Treatment System

The only clarification is as follows:

July 1998

- Treatment system effluent sampling occurred on July 7, 1998; however, the laboratory broke the VOC sample bottles. The treatment system effluent was resampled for VOCs on July 28, 1998.

Surface Water

The only deviation from the Monitoring Plan occurred as follows:

March 1998

- The ortho-phosphorus samples from 20700 and 20800 were rendered invalid, and thus not analyzed, when Fed Ex delivered them to the laboratory past their holding time. These locations were not resampled for ortho-phosphorus.

Site D and Site G

August 1998

- Site G was not monitored because the system was shut down for evaluation.

September 1998

- Site D and Site G were not monitored because both systems were shut down for evaluation.

January 14, 1999 Reference No. 11062

Please call if you have any questions.

Sincerely,

CONESTOGA-ROVERS & ASSOCIATES

Jason Twaddle, P.E.

JT/bam/45
c.c.: Keith Benker; Wenck

Conestoga-Rovers & Associates
1801 Old Highway 8, Suite #114
St. Paul, Minnesota 55112
(651) 639-0913 Office (651) 639-0923 Fax

February 4, 1999

Reference No. 1496/3877/4304/
11585-30

Mr. Martin McCleery
TWIN CITIES ARMY AMMUNITION PLANT
SIOTC-EV
4700 Highway 10, Suite A
Arden Hills, Minnesota 55112-3928

Mr. David Gosen
ALLIANT TECHSYSTEMS, INC.
MN11-2115
600 Second Street Northeast
Hopkins, Minnesota 55343

Dear Mr. McCleery and Mr. Gosen:

Re: Deviations from TGRS, Site I, Site K, and PGRS Sampling Programs - 1998 Fiscal Year

Water quality sampling, water level measurement and documentation for the TGRS, Site I, Site K, and PGRS Fiscal Year 1998 (FY98) were performed in accordance with the approved 1998 Annual Monitoring Plan and the "Installation Restoration Program" Quality Assurance Project Plan for the Remedial Investigation/Feasibility Study at the Twin Cities Army Ammunition Plant", USATHAMA, June 1988.

All required water quality samples were collected and water level measurements were recorded as listed in the FY 1998 Annual Monitoring Plan with the following comments and exceptions:

TGRS (Operable Unit 2 Deep Groundwater)

October 1997 through May 1998 and July 1998 through September 1998

- No deviations from the Monitoring Plan occurred during FY98.

June 1998

- The boundary well water levels were collected 8 days following the collection of the other TGRS monitoring wells for the following reasons: Initially, boundary well water levels were postponed because extraction well B5 was down for repairs. Two days after B5 was restarted, extraction well B5 was shutdown again, due to an electrical storm.

Site I (Building 502)

October 1997 through November 1997

- No deviations from the Monitoring Plan occurred during this period.

December 1997

- CRA attempted to perform groundwater level measurements on monitoring wells I01MW and I02MW; however, groundwater elevations could not be calculated because the wells were dry.

January 1998 through May 1998

- No deviations from the Monitoring Plan occurred during this period.

June 1998

- CRA attempted to perform groundwater level measurements on monitoring wells I01MW, I02MW, I03MW, I04MW, and I05MW; however, groundwater elevations could not be calculated because these wells were dry.
- Groundwater samples were not collected from I01MW, I02MW, and I05MW during the June sampling round, as they were dry.

July 1998 through September 1998

- No deviations from the Monitoring Plan occurred during this period.

<u>Site K (Building 103)</u>

October 1997

- An effluent duplicate sample was not collected during the October sampling round, due to human error.

November 1997 through May 1998

- No deviations from the Monitoring Plan occurred during this period.

June 1998

- No field parameters were collected from 01U611 due to insufficient groundwater recharge.

July 1998 through September 1998

- No deviations from the Monitoring Plan occurred during this period.

<u>PGRS (Operable Unit 3 Deep Groundwater)</u>

October 1997

- An influent duplicate sample was not collected during the October sampling round, due to human error.

February 4, 1999

Reference No. 1496/3877/4304/
11585-30

November 1997 through January 1998 and March 1998 through September 1998

- No deviations from the Monitoring Plan occurred during this period.

February 1998

- An influent duplicate sample was not collected during the February sampling round, due to human error.

If you have any questions, please do not hesitate to contact us.

Sincerely,

CONESTOGA-ROVERS & ASSOCIATES

Charles F. Cooke

Charles F. Cooke, PE

RF/bam/20
c.c. Keith Benker; Wenck
Brian C. Boevers; CRA

APPENDIX C

Appendix C

Groundwater Database Disk

APPENDIX D

Appendix D

IRDMIS Information

D.1 Chemical Analysis Categories

Appendix D.1

USAEC CHEMICAL ANALYSIS CATEGORIES APPLICABLE TO TCAAP GROUNDWATER MONITORING

CATEGORY 1

Carbon Tetrachloride	CCL4
Chloroform	CHCL3
Methylene Chloride	CH2CL2
Vinyl Chloride	C2H3CL
Tetrachloroethylene	TCLEE
Trichloroethylene	TRCLE
1,1-Dichloroethylene	11DCE
1,1-Dichloroethane	11DCLE
1,1,1-Trichloroethane	111TCE
1,1,2-Trichlorethane	112TCE
1,1,2-Trichlorotrifluoroethane	TCLTFE
Cis-1,2-Dichloroethylene	C12DCE
Trans-1,2-Dichloroethylene	T12DCE

CATEGORY 2

Antimony	SB

*[**Note:** USAEC Category 2 includes other metals, but these are not applicable for current monitoring at TCAAP.]*

CATEGORY 7

Benzene	C6H6

*[**Note:** USAEC Category 7 includes other aromatic VOCs, but these are not applicable for current monitoring at TCAAP.]*

D.2 Flagging Codes

8.08 Flagging Code

ELEMENT IS USED IN THE FOLLOWING IR RECORDS AND DATA BASE TABLES:

IRDMIS Record		IRDMIS Data Base	
Record Type	Column(s)	DB Table(s)	DB Column
*	132	chem/cqc	flag_codes
	133		
	134		
	135		
	136		
	137		
	138		
	139		
		flag_quals_desc	f_q_code

* Any valid chemical or radiological record type

ELEMENT SIZE AND CHARACTERISTICS:

IRDMIS Record: 1 upper-case alphabetical character, full field (as many as 8 per record)
IRDMIS Data Base: chem/cqc: as many as 8 Flagging Codes per record
flag_quals_desc: 1 Flagging Code per record

ELEMENT DESCRIPTION:

Code assigned by the **Laboratory** to indicate other-than-usual analytical conditions or results.

ACCEPTABLE CRITERIA:

NOTE: **Flagging Codes marked with * were changed effective 1 February 1993! Flagging Codes marked with ** were changed effective with the introduction of Version 5.2 of the IRDMIS Data Entry and Validation Subsystem (PC IRDMIS) software!**

* A Analyte found in trip blank as well as in field samples . The analyte was detected in the field sample and the trip blank for the same cooler. To be used for volatiles only.

B Analyte found in the method blank or QC blank as well as the sample. This Code is to be used when an analyte was detected and quantitated at higher than normal background levels. For metals in soil, the following rules must be followed:

(1) If the analyte is detected in the method blank, both the field and QC samples are to be flagged.

(2) If the analyte is detected in the QC blank, only the QC samples are to be flagged.

C Analysis was confirmed. This Code is to be used when a confirmation analysis bears out the reported result (if it is above the CRL or MDL). The confirmation analysis must use a different column or analytical technique.

D Duplicate analysis. This Code is used to distinguish analytical results when duplicate analyses are required. Flag only the second (duplicate) sample.

ACCEPTABLE CRITERIA: (CONT.)

	E	**No longer in use.**
	F	Sample filtered prior to analysis. This Code is to be used when results of filtered samples are to be differentiated from non-filtered samples. This Code is also to be used when filtering of samples (as a first step in the sample preparation) is a deviation from the approved method SOP. This Code may be used to indicate both field and laboratory filtering. It is not to be used when filtering the extract is the normal procedure.
*	G	Analyte found in rinse blank as well as field sample. The analyte was detected in the field sample as well as that day's rinse blank for the same equipment type.
**	H	**No longer in use after introduction of Version 5.2 of PC IRDMIS.**
*	I	Interferences in sample cause the quantitation and/or identification to be suspect. This Code is to be used when matrix interferences may mask detection of the target analyte. Must always be used with Flagging Code J.
* **	J	Value is estimated because of one of the following conditions: Interferences in the sample (use Flagging Codes J and I) **or** The value is below the method detection level but above the instrumental detection level (use Flagging Codes J and P) **or** The value is above the upper reporting level of the method (use Flagging Codes J and X). This Code must always be used with Flagging Code I, P, or X. Both the J and I and the J and X combinations may be used both for methods demonstrated under the 1990 QA Program and for methods validated under the 1993 QA Guidelines. The J and P combination is only to be used for methods validated under the 1993 QA Guidelines.
*	K	Reported results affected by interferences or high background. This Code is to be used when analyte levels at or near the CRL or MDL cannot be accurately quantified down to the CRL/MDL due to interferences. This Code will allow a laboratory to input a higher CRL/MDL, rather than defaulting to the Methods data base. **(Formerly Flagging Code G)**
* **	L	**No longer in use after introduction of Version 5.2 of PC IRDMIS.**
**	M	**No longer in use after introduction of Version 5.2 of PC IRDMIS.**
*	N	Tentatively identified compound (result of a GC/MS library search) with a match greater than 70%. To be used when specified in the contract/task order.

ACCEPTABLE CRITERIA: (CONT.)

*	O	**No longer in use.**
*	P	Value is less than the method reporting level but greater than the instrumental detection limit. This Code must always be used with J. This Code is only to be used for methods validated under the 1993 QA Guidelines.
*	Q	Confirmatory analysis was performed; however, sample interference obscured the area where the peak of interest would have appeared. To be used when the peak of interest fell within the retention-time window on the primary column, but the retention-time window on the secondary column was masked by interferences.
	R	Non-target compound analyzed for but not detected (must be used with a Boolean of ND). This Code is used only for those analytes (in GC/MS methods) which were not performance demonstrated or validated. To be used when specified in the contract/task order.
	S	Non target compound analyzed for and detected. This Code is used only for those analytes (in GC/MS methods) which were not performance demonstrated or validated. Also used to report tentatively identified compounds which are quantitated against an internal standard. To be used when specified in the contract/task order.
	T	Non-target compound analyzed for but not detected (must be used with a Boolean of ND). This Code is used only for those analytes (in non-GC/MS methods) which were not performance demonstrated or validated.
	U	Analysis is unconfirmed. This Code is to be used when a confirmatory analysis was performed but does not verify the analytical results from the initial analysis.
	V	Sample was subjected to unusual storage/preservation condition. To be used when samples are received at the laboratory at greater than 4° C, or were not correctly preserved in the field.
	W	Single analyte required from a multi-analyte method. This Code is to be used when field samples are to be analyzed for a subset of the demonstrated/validated analytes.
**	X	Analyte concentration is above the upper reporting level. This Flagging Code is to be used when analyte concentrations exceed the upper reporting level and the laboratory feels that additional dilutions are not warranted. This Code is also to be used when no sample or extract remains to make additional dilutions. It must also be used whenever a Boolean of GT is used.
*	Y	Tentatively identified compound (result of a GC/MS library search) with a match of less than 70%, but peak area is greater than 35% of the internal standard. To be used when specified in the contract/task order.

ACCEPTABLE CRITERIA: (CONT.)

*	Z	Non-target compound analyzed for and detected. This Code is used only for those analytes (in non-GC/MS methods) which were not performance demonstrated or validated.
*	1	Result less than the CRL but greater than the Criteria of Detection (COD). Can only be used for methods which were performance demonstrated under the 1990 QA Program.
*	2	Ending calibration not within acceptable limits. This Code is to be used for an analyte for which the ending calibration is still unacceptable after multiple attempts.
*	3	Internal standard(s) nor within acceptable limits.
* **	4	Analyte quantitated on the secondary column, when this is not the normal practice.
* **	7	**No longer in use after introduction of Version 5.2 of PC IRDMIS.**
**	8	Analyte recovery outside of certified range but within acceptable limits. This Flagging Code is to be used when analyte recoveries exceed the upper limit of the certified range by less than 15% and the laboratory feels a dilution is not warranted. **No longer in use after introduction of Version 5.2 of PC IRDMIS (formerly Flagging Code X).**
**	9	Non-demonstrated/validated method performed for USAEC. This Code is to be used to identify Method 00 or NTAM data which was produced under contract to USAEC.

ACCEPTABLE ENTRIES:

A	Analyte found in trip blank as well as in field samples.
B	Analyte found in the method blank or QC blank as well as the sample.
C	Analysis was confirmed.
D	Duplicate analysis.
F	Sample filtered prior to analysis.
G	Analyte found in rinse blank as well as field sample.
I	Interferences in sample make quantitation and/or identification to be suspect.
J	Value is estimated.
K	Reported results are affected by interferences or high background.
N	Tentatively identified compound (match greater than 70%).
P	Results less than reporting level but greater than instrumental detection limit.
Q	Sample interference obscured peak of interest.
R	Non-target compound analyzed for but not detected (GC/MS methods).
S	Non-target compound analyzed for and detected (GC/MS methods).
T	Non-target compound analyzed for but not detected (non-GC/MS methods).
U	Analysis is unconfirmed.
V	Sample subjected to unusual storage/preservation conditions.

ACCEPTABLE ENTRIES: (CONT.)

W	Single analyte required from a multi-analyte method.
X	Analyte concentration is above the upper reporting level.
Y	Tentatively identified compound (match less than 70%).
Z	Non-target compound analyzed for and detected (non-GC/MS methods).
1	Result less than CRL but greater than COD.
2	Ending calibration not within acceptable limits.
3	Internal standard(s) not within acceptable limits.
4	Analyte quantitated on the secondary column.
9	Non-demonstrated/validated method performed for USAEC.

D.3 Data Qualifiers

8.30 Data Qualifier

ELEMENT IS USED IN THE FOLLOWING IR RECORDS AND DATA BASE TABLES:

IRDMIS Record		IRDMIS Data Base	
Record Type	Column(s)	DB Table(s)	DB Column
*	140	chem/cqc	data_quals
	141		
	142		
	143		
	144		
	145		
	146		
	147		
		flag_quals_desc	f_q_code

* Any valid chemical or radiological record type

ELEMENT SIZE AND CHARACTERISTICS:

IRDMIS Record: 1 upper-case alphabetical character, full field (as many as 8 per record)
IRDMIS Data Base: chem/cqc: as many as 8 Data Qualifiers per record
flag_quals_desc: 1 Data Qualifier per record

ELEMENT DESCRIPTION:

Code assigned only by the USAEC Chemist to indicate data acceptance or rejection based on other-than-usual analytical conditions or results.

ACCEPTABLE CRITERIA:

? Control chart either not received or not yet approved by USAEC. This Qualifier is automatically set when a lot file has been loaded but the corresponding control chart has not been approved.

I The low-spike recovery is high. To be used for the single low spike in Class 1 methods and the duplicate low spikes in Class 1P.

J The low-spike recovery is low. To be used for the single low spike in Class 1 methods and the duplicate low spikes in Class 1P.

K Missed holding times for extraction and preparation (Hold Time 1). This Qualifier is automatically set when the extraction/preparation holding time is exceeded. **(Formerly Flagging Code K)**

L Missed holding time for sample analysis (Hold Time or Hold Time 2). This Qualifier is automatically set when the analytical holding time is exceeded. **(Formerly Flagging Code L)**

M The high-spike recovery is high. To be used for the duplicate high spikes in Class 1 and 1P methods. Also to be used for the single spike in Class 1A and 1B methods and for the duplicate spikes in Class 1M methods.

ACCEPTABLE CRITERIA: (CONT.)

N The high-spike recovery is low. To be used for the duplicate high spikes in Class 1 and 1P methods. Also to be used for the single spike in Class 1A and 1B methods and for the duplicate spikes in Class 1M methods.

O Low spike recoveries excessively different. To be used only for the duplicate low spikes in Class 1P methods.

P High spike recoveries excessively different. To be used for the duplicate high spikes in Class 1 and 1P methods. Also to be used for the duplicate spikes in Class 1M methods.

Q Surrogate(s) in field sample outside of acceptable limits as specified by EPA CLP. To be followed by number of surrogates failing criteria (1 - 9). To be used only for field samples. **(Formerly Flagging Code Q)**

R Data is rejected and is not usable.

ACCEPTABLE ENTRIES:

?	Control chart not yet approved by USAEC.
1-9	Number of surrogates failing EPA CLP criteria (used with Data Qualifier Q)
I	The low-spike recovery is high.
J	The low-spike recovery is low.
K	Missed holding time for extraction and preparation.
L	Missed holding time for sample analysis.
M	The high-spike recovery is high.
N	The high-spike recovery is low.
O	Low spike recoveries excessively different.
P	High spike recoveries excessively different.
Q	Surrogate recovery outside of acceptable CLP limits (field samples only).
R	Data is rejected.

APPENDIX E

Appendix E

FY 1998 Groundwater and Surface Water QA/QC Data

E.1 Organics QA/QC Data

Notes:

(1) For complete spelling of chemical abbreviations, refer to Appendix D.1.

(2) Flagging codes (if necessary) are presented in parentheses next to the data value. See Appendix D.2 for explanations.
Data qualifier codes (if necessary) are presented next to the data value (not in parentheses). See Appendix D.3 for explanations.

(3) Under QC Type

F	=	Field Blank
N	=	Natural-Matrix Spike
R	=	Rinse Blank
T	=	Trip Blank
D	=	Duplicate

APPENDIX E.1
Organics QA/QC Data (ug/l)

Site ID	QC Type	Lab	IRDMIS Lot #	Sample Date		111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE	C12DCE	T12DCE	OILGR	TOC
20700	F	UB	BJWR 005	03-Jun-98	Data																		JPV 346.00
20700	F	UB	BJWR 005	03-Jun-98	Spike																		0
20700	F	UB	BJXV 006	03-Jun-98	Data	V <1.00		V <1.00	V <1.00		V <1.00		V <1.00		V <1.00				V <1.00	V <1.00	V <1.00		
20700	F	UB	BJXV 006	03-Jun-98	Spike	0		0	0		0		0		0				0	0	0		
03U301	F	UB	BJYC 006	08-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U301	F	UB	BJYC 006	08-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03F304	F	UB	BJYG 005	08-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03F304	F	UB	BJYG 005	08-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
01U357	F	UB	BJYQ 013	12-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
01U357	F	UB	BJYQ 013	12-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
20700	F	UB	BJYX 005	03-Jun-98	Data																	V <200.00	
20700	F	UB	BJYX 005	03-Jun-98	Spike																	0	
206792	F	UB	BJZM 023	25-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
206792	F	UB	BJZM 023	25-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
01U140	N	UB	BJBJ 017	03-Dec-97	Data	9.78	<0.78	9.37	<0.73	<0.76	<1.10	<1.00	8.08	<0.99	<7.40	9.80	9.08	<1.00	9.23				
01U140	N	UB	BJBJ 017	03-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
01U140	N	D UB	BJBJ 018	03-Dec-97	Data	9.73	<0.78	9.30	<0.73	<0.76	<1.10	<1.00	6.09	<0.99	<7.40	9.53	8.19	<1.00	8.74				
01U140	N	D UB	BJBJ 018	03-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03F312	N	UB	BJDW 006	08-Dec-97	Data	9.05	<0.78	9.40	<0.73	<0.76	<1.10	<1.00	7.51	<0.99	<7.40	7.81	6.85	<1.00	11.40				
03F312	N	UB	BJDW 006	08-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03F312	N	D UB	BJDW 007	08-Dec-97	Data	9.19	<0.78	9.56	<0.73	<0.76	<1.10	<1.00	7.29	<0.99	<7.40	8.35	7.72	<1.00	12.30				
03F312	N	D UB	BJDW 007	08-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U875	N	UB	BJDY 010	11-Dec-97	Data	10.40	<0.78	8.63	0.94	<0.76	<1.10	<1.00	6.75	<0.99	<7.40	8.58	7.39	<1.00	18.30				
04U875	N	UB	BJDY 010	11-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U875	N	D UB	BJDY 011	11-Dec-97	Data	10.00	<0.78	9.62	0.85	<0.76	<1.10	<1.00	6.44	<0.99	<7.40	8.00	7.56	<1.00	19.20				
04U875	N	D UB	BJDY 011	11-Dec-97	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
01U157	N	UB	BJXS 019	05-Jun-98	Data	7.91	<0.78	7.59	<0.73	4.46	<1.10	<1.00	6.36	<0.99	<7.40	8.67	6.97	<1.00	8.13				
01U157	N	UB	BJXS 019	05-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
01U157	N	D UB	BJXS 020	05-Jun-98	Data	7.88	<0.78	7.35	<0.73	4.62	<1.10	<1.00	6.79	<0.99	<7.40	8.65	7.01	<1.00	8.06				
01U157	N	D UB	BJXS 020	05-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03F305	N	UB	BJYF 012	08-Jun-98	Data	420.00	<7.80	140.00	88.00	64.00	<11.00	<10.00	76.00	<9.90	<74.00	89.00	67.00	<10.00	1500.00				
03F305	N	UB	BJYF 012	08-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03F305	N	D UB	BJYF 013	08-Jun-98	Data	370.00	<7.80	130.00	79.00	54.00	<11.00	<10.00	66.00	<9.90	<74.00	83.00	63.00	<10.00	1300.00				
03F305	N	D UB	BJYF 013	08-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				

APPENDIX E.1
Organics QA/QC Data (ug/l)

Site ID	QC Type		Lab	IRDMIS Lot #	Sample Date		111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE	C12DCE	T12DCE	OILGR	TOC
03U701	N		UB	BJYK 014	10-Jun-98	Data	9.60	<0.78	7.05	<0.73	<0.76	<1.10	<1.00	6.77	<0.99	<7.40	7.41	6.65	<1.00	24.90				
03U701	N		UB	BJYK 014	10-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03U701	N	D	UB	BJYK 015	10-Jun-98	Data	10.20	<0.78	7.24	<0.73	<0.76	<1.10	<1.00	7.26	<0.99	<7.40	7.77	6.98	<1.00	26.00				
03U701	N	D	UB	BJYK 015	10-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03L017	N		UB	BJYL 010	11-Jun-98	Data	8.48	<0.78	7.24	<0.73	<0.76	<1.10	<1.00	6.84	<0.99	<7.40	7.49	7.03	<1.00	7.33				
03L017	N		UB	BJYL 010	11-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03L017	N	D	UB	BJYL 011	11-Jun-98	Data	8.28	<0.78	7.42	<0.73	<0.76	<1.10	<1.00	7.30	<0.99	<7.40	7.42	6.91	<1.00	7.30				
03L017	N	D	UB	BJYL 011	11-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03U803	N		UB	BJYV 016	16-Jun-98	Data	7.52	<0.78	6.36	<0.73	<0.76	<1.10	<1.00	5.88	<0.99	<7.40	6.95	5.50	<1.00	5.63				
03U803	N		UB	BJYV 016	16-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03U803	N	D	UB	BJYV 017	16-Jun-98	Data	8.21	<0.78	6.40	<0.73	<0.76	<1.10	<1.00	5.55	<0.99	<7.40	7.01	5.76	<1.00	5.59				
03U803	N	D	UB	BJYV 017	16-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03U705	N		UB	BJZC 013	17-Jun-98	Data	7.41	<0.78	5.87	<0.73	<0.76	<1.10	<1.00	5.89	<0.99	<7.40	6.56	5.97	<1.00	6.02				
03U705	N		UB	BJZC 013	17-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
03U705	N	D	UB	BJZC 014	17-Jun-98	Data	6.98	<0.78	6.08	<0.73	<0.76	<1.10	<1.00	6.21	<0.99	<7.40	6.61	5.60	<1.00	6.00				
03U705	N	D	UB	BJZC 014	17-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04J882	N		UB	BJZK 007	19-Jun-98	Data	8.10	<0.78	6.80	<0.73	<0.76	<1.10	<1.00	6.72	<0.99	<7.40	8.00	6.77	<1.00	7.22				
04J882	N		UB	BJZK 007	19-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04J882	N	D	UB	BJZK 008	19-Jun-98	Data	7.86	<0.78	6.83	<0.73	<0.76	<1.10	<1.00	6.50	<0.99	<7.40	7.69	6.93	<1.00	7.29				
04J882	N	D	UB	BJZK 008	19-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U883	N		UB	BJZM 013	24-Jun-98	Data	7.47	<0.78	5.70	<0.73	<0.76	<1.10	<1.00	6.41	<0.99	<7.40	6.62	5.26	<1.00	5.71				
04U883	N		UB	BJZM 013	24-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U883	N	D	UB	BJZM 014	24-Jun-98	Data	7.13	<0.78	5.64	<0.73	<0.76	<1.10	<1.00	5.89	<0.99	<7.40	6.42	5.01	<1.00	5.49				
04U883	N	D	UB	BJZM 014	24-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U863	N		UB	BJZN 011	25-Jun-98	Data	6.61	<0.78	5.35	<0.73	<0.76	<1.10	<1.00	4.98	<0.99	<7.40	6.23	5.41	<1.00	6.84				
04U863	N		UB	BJZN 011	25-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
04U863	N	D	UB	BJZN 012	25-Jun-98	Data	6.42	<0.78	5.00	<0.73	<0.76	<1.10	<1.00	5.18	<0.99	<7.40	6.26	5.42	<1.00	6.97				
04U863	N	D	UB	BJZN 012	25-Jun-98	Spike	8	0	8	0	0	0	0	8	0	0	8	8	0	8				
01U116	R		UB	BJBJ 021	03-Dec-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
01U116	R		UB	BJBJ 021	03-Dec-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
01U102	R		UB	BJDN 017	08-Dec-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
01U102	R		UB	BJDN 017	08-Dec-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
04U881	R		UB	BJDY 013	11-Dec-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
04U881	R		UB	BJDY 013	11-Dec-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

APPENDIX E.1
Organics QA/QC Data (ug/l)

Site ID	QC Type	Lab	IRDMIS Lot #	Sample Date		111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE	C12DCE	T12DCE	OILGR	TOC
01U125	R	UB	BJXS 007	05-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
01U125	R	UB	BJXS 007	05-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
04U003	R	UB	BJYC 011	09-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
04U003	R	UB	BJYC 011	09-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03L084	R	UB	BJYK 006	10-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03L084	R	UB	BJYK 006	10-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03U702	R	UB	BJYK 018	11-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U702	R	UB	BJYK 018	11-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03L806	R	UB	BJYR 010	12-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03L806	R	UB	BJYR 010	12-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03U706	R	UB	BJYZ 007	16-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U706	R	UB	BJYZ 007	16-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03U709	R	UB	BJYZ 011	16-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U709	R	UB	BJYZ 011	16-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03U672	R	UB	BJZC 016	17-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U672	R	UB	BJZC 016	17-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03U801	R	UB	BJZC 021	17-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03U801	R	UB	BJZC 021	17-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
04U843	R	UB	BJZG 010	18-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
04U843	R	UB	BJZG 010	18-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
03L822	R	UB	BJZK 017	22-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
03L822	R	UB	BJZK 017	22-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
409556	R	UB	BJZM 011	23-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
409556	R	UB	BJZM 011	23-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
04J864	R	UB	BJZN 009	25-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
04J864	R	UB	BJZN 009	25-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
04U852	R	UB	BJZP 011	26-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
04U852	R	UB	BJZP 011	26-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BHDG 008	07-Oct-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BHDG 008	07-Oct-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BHSV 008	04-Nov-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BHSV 008	04-Nov-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJBJ 025	04-Dec-97	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJBJ 025	04-Dec-97	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

APPENDIX E.1
Organics QA/QC Data (ug/l)

Site ID	QC Type	Lab	IRDMIS Lot #	Sample Date	111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE	C12DCE	T12DCE	OILGR	TOC
	T	UB	BJDN 020	08-Dec-97 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJDN 020	08-Dec-97 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJDY 014	11-Dec-97 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJDY 014	11-Dec-97 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJDY 019	12-Dec-97 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJDY 019	12-Dec-97 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJFN 010	04-Dec-97 Data	<1.00		<1.00	<1.00		<1.00		<1.00		<1.00				<1.00	<1.00	<1.00		
	T	UB	BJFN 010	04-Dec-97 Spike	0		0	0		0		0		0				0	0	0		
	T	UB	BJHF 006	23-Dec-97 Data	V <0.82	V <0.91	V <1.91	V <0.82	V <0.82	V <1.34	V <1.00	V <0.86	V <1.09	V <8.31	V <0.57	V <0.82	V <1.00	V <0.62				
	T	UB	BJHF 006	23-Dec-97 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJJX 016	06-Jan-98 Data					<0.82							<0.82		<0.62				
	T	UB	BJJX 016	06-Jan-98 Spike					0							0		0				
	T	UB	BJNK 008	03-Feb-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJNK 008	03-Feb-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJQQ 008	03-Mar-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJQQ 008	03-Mar-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJRN 011	07-Apr-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJRN 011	07-Apr-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJVJ 008	06-May-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJVJ 008	06-May-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJWN 008	28-May-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJWN 008	28-May-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJWN 015	02-Jun-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJWN 015	02-Jun-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJXV 007	03-Jun-98 Data	V <1.00		V <1.00	V <1.00		V <1.00		V <1.00		JPV 0.28				JPV 0.96	V <1.00	V <1.00		
	T	UB	BJXV 007	03-Jun-98 Spike	0		0	0		0		0		0				0	0	0		
	T	UB	BJYB 011	05-Jun-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYB 011	05-Jun-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJYC 018	09-Jun-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYC 018	09-Jun-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJYL 013	11-Jun-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYL 013	11-Jun-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJYQ 014	15-Jun-98 Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYQ 014	15-Jun-98 Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

APPENDIX E.1
Organics QA/QC Data (ug/l)

Site ID	QC Type	Lab	IRDMIS Lot #	Sample Date		111TCE	112TCE	11DCE	11DCLE	12DCE	12DCLE	12DCLP	C2H3CL	CCL4	CH2CL2	CHCL3	TCLEE	TCLTFE	TRCLE	C12DCE	T12DCE	OILGR	TOC
	T	UB	BJYR 020	15-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYR 020	15-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJYZ 016	16-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJYZ 016	16-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZG 012	18-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZG 012	18-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZG 018	19-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZG 018	19-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZK 023	23-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZK 023	23-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZL 010	25-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZL 010	25-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZL 012	25-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZL 012	25-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZP 015	26-Jun-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZP 015	26-Jun-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BJZS 010	30-Jun-98	Data	<1.00	<1.00	<1.00	<1.00		<1.00	<1.00	<1.00	<1.00	JP 0.42	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00		
	T	UB	BJZS 010	30-Jun-98	Spike	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0		
	T	UB	BJZW 011	08-Jul-98	Data	<0.82	<0.91	<1.91	<0.82	<0.82	<1.34	<1.00	<0.86	<1.09	<8.31	<0.57	<0.82	<1.00	<0.62				
	T	UB	BJZW 011	08-Jul-98	Spike	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	T	UB	BKCJ 006	28-Jul-98	Data					<0.82							<0.82		<0.62				
	T	UB	BKCJ 006	28-Jul-98	Spike					0							0		0				

E.2 Inorganics QA/QC Data

Notes:

(1) Flagging codes (if necessary) are presented in parentheses next to the data value. See Appendix D.2 for explanations.
Data qualifier codes (if necessary) are presented next to the data value (not in parentheses). See Appendix D.3 for explanations.

(2) Under QC Type

F	=	Field Blank
N	=	Natural-Matrix Spike
S	=	Spike Blank
D	=	Duplicate

APPENDIX E.2
Inorganics QA/QC Data

Site ID	QC Type	Lab	IRDMIS Lot #	Sample Date		AG (ug/l)	CD (ug/l)	CR (ug/l)	CU (ug/l)	NI (ug/l)	SB (ug/l)	ZN (ug/l)	HG (ug/l)	CL (ug/l)	CYN (ug/l)	NH3N2 (ug/l)	COD (ug/l)	TSS (ug/l)	P4 PO4ORT (ug/l)
20700	F	UB	BJWB 005	03-Jun-98	Data								JPV	27.20					
20700	F	UB	BJWB 005	03-Jun-98	Spike									0					
20700	F	UB	BJWB 009	03-Jun-98	Data														V <200.00
20700	F	UB	BJWB 009	03-Jun-98	Spike														0
20700	F	UB	BJWH 013	03-Jun-98	Data						V	<0.10							
20700	F	UB	BJWH 013	03-Jun-98	Spike							0							
20700	F	UB	BJWS 006	03-Jun-98	Data											V <10000.00			
20700	F	UB	BJWS 006	03-Jun-98	Spike												0		
20700	F	UB	BJXY 005	03-Jun-98	Data													V <10.00	
20700	F	UB	BJXY 005	03-Jun-98	Spike													0	
01U357	F	UB	BJYT 015	12-Jun-98	Data							<0.10							
01U357	F	UB	BJYT 015	12-Jun-98	Spike							0							
20700	F	UB	BJYW 006	03-Jun-98	Data												V <4000.00		
20700	F	UB	BJYW 006	03-Jun-98	Spike												0		
20700	F	UB	BJYY 007	03-Jun-98	Data										JPV	43.80			
20700	F	UB	BJYY 007	03-Jun-98	Spike											0			
20700	F	UB	BJZD 005	03-Jun-98	Data									V	<10.00				
20700	F	UB	BJZD 005	03-Jun-98	Spike										0				
01U357	F	UB	BJZJ 015	12-Jun-98	Data						<10.00								
01U357	F	UB	BJZJ 015	12-Jun-98	Spike						0								
20800	N	UB	BJCD 004	04-Dec-97	Data								1.02						
20800	N	UB	BJCD 004	04-Dec-97	Spike								1						
20800	N	D UB	BJCD 005	04-Dec-97	Data								1.02						
20800	N	D UB	BJCD 005	04-Dec-97	Spike								1						
20800	N	UB	BJCK 005	04-Dec-97	Data	47.50	49.60	198.00	250.00	495.00		490.00							
20800	N	UB	BJCK 005	04-Dec-97	Spike	50	50	200	250	500		500							
20800	N	D UB	BJCK 006	04-Dec-97	Data	52.50	54.80	203.00	251.00	499.00		501.00							
20800	N	D UB	BJCK 006	04-Dec-97	Spike	50	50	200	250	500		500							

E.3 Relative Percent Difference (RPD) Data for Groundwater

Notes:

(1) Data and duplicate data [denoted by a (3)] are shown in pairs. Below each pair is the RPD. RPDs greater than 25 percent are shaded.

(2) Flagging codes (if necessary) are presented in parentheses next to the data value. See Appendix D.2 for explanations.
Data qualifier codes (if necessary) are presented next to the data value (not in parentheses). See Appendix D.3 for explanations.

APPENDIX E.3
Relative Percent Difference (RPD) Data

Site ID	Sample Date	Lot #	TCLEE	TRCLE	11DCE	12DCE	C12DCE	T12DCE	C2H3CL	111TCE	112TCE	11DCLE	12DCLE	CCL4	CHCL3	12DCLP	TCLTFE	CH2CL2
01U116	05-Jun-98	BJXS 009	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
01U116 D	05-Jun-98	BJXS 010	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01U139	08-Jun-98	BJYJ 010	<0.75	0.65	<1.70	10.30			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
01U139 D	08-Jun-98	BJYJ 011	<0.75	<0.56	<1.70	10.30			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-15.89	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01U358	05-Dec-97	BJDN 014	<0.75	<0.56	<1.70	5.40			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
01U358 D	05-Dec-97	BJDN 015	<0.75	<0.56	<1.70	5.78			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	0.00	0.00	6.57			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01U621	03-Jun-98	BJZH 003	<1.00	<1.00	<1.00		3.70	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
01U621 D	03-Jun-98	BJZH 004	<1.00	<1.00	<1.00		3.50	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
			0.00	0.00	0.00		-5.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01U639	30-Jun-98	BJZS 006	<1.00	8.80	<1.00		<1.00	<1.00	<1.00	JP 0.22	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
01U639 D	30-Jun-98	BJZS 007	<1.00	8.90	<1.00		<1.00	<1.00	<1.00	JP 0.25	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
			0.00	1.12	0.00		0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03F302	08-Dec-97	BJDW 008	1.45	250.00	2.98	11.50			<1.01	12.90	<0.78	3.07	<1.10	<0.99	0.64	<1.00	<1.00	<7.40
03F302 D	08-Dec-97	BJDW 009	1.49	240.00	3.06	13.50			<1.01	13.40	<0.78	3.12	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			2.68	-4.17	2.61	14.81			0.00	3.73	0.00	1.60	0.00	0.00	-28.00	0.00	0.00	0.00
03L854	26-Jun-98	BJZP 012	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03L854 D	26-Jun-98	BJZP 013	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03M802	17-Jun-98	BJZC 018	<0.75	5.14	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03M802 D	17-Jun-98	BJZC 019	<0.75	4.68	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-9.83	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03M843	18-Jun-98	BJZG 007	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03M843 D	18-Jun-98	BJZG 008	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03U075	15-Jun-98	BJYV 011	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03U075 D	15-Jun-98	BJYV 012	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03U077	12-Jun-98	BJYR 017	2.27	145.00	6.94	<0.76			<1.01	34.80	<0.78	0.87	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03U077 D	12-Jun-98	BJYR 018	2.25	142.00	7.12	<0.76			<1.01	36.80	<0.78	0.89	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			-0.89	-2.11	2.53	0.00			0.00	5.43	0.00	1.58	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E.3
Relative Percent Difference (RPD) Data

Site ID	Sample Date	Lot #	TCLEE	TRCLE	11DCE	12DCE	C12DCE	T12DCE	C2H3CL	111TCE	112TCE	11DCLE	12DCLE	CCL4	CHCL3	12DCLP	TCLTFE	CH2CL2
03U093	16-Jun-98	BJZC 010	<0.75	202.00	6.76	1.03			<1.01	39.20	<0.78	4.76	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03U093 D	16-Jun-98	BJZC 011	<0.75	197.00	5.91	0.89			<1.01	41.20	<0.78	3.98	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-2.54	-14.38	-16.38			0.00	4.85	0.00	-19.60	0.00	0.00	0.00	0.00	0.00	0.00
03U315	08-Jun-98	BJYG 010	<0.75	18.40	<1.70	<0.76			<1.01	6.77	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
03U315 D	08-Jun-98	BJYG 011	<0.75	18.00	<1.70	<0.76			<1.01	6.32	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-2.22	0.00	0.00			0.00	-7.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03U317	08-Dec-97	BJDW 020	14.40	6700.00	99.20	5.80			<1.01	2100.00	<0.78	37.80	4.30	<0.99	1.42	<1.00	Z 31.20	<7.40
03U317 D	08-Dec-97	BJDW 021	15.90	7100.00	97.50	6.05			<1.01	2100.00	<0.78	36.30	5.17	<0.99	1.42	<1.00	Z 28.20	<7.40
			9.43	5.63	-1.74	4.13			0.00	0.00	0.00	-4.13	16.83	0.00	0.00	0.00	-10.64	0.00
03U711	16-Jun-98	BJZC 008	2.96	121.00	14.50	1.94			<1.01	27.40	<0.78	14.90	<1.10	<0.99	0.95	<1.00	<1.00	<7.40
03U711 D	16-Jun-98	BJZC 009	3.00	118.00	13.40	1.85			<1.01	28.70	<0.78	14.90	<1.10	<0.99	0.72	<1.00	<1.00	<7.40
			1.33	-2.54	-8.21	-4.86			0.00	4.53	0.00	0.00	0.00	0.00	-31.94	0.00	0.00	0.00
04U002	05-Jun-98	BJYB 008	<0.75	9.36	<1.70	<0.76			<1.01	0.92	<0.78	1.80	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U002 D	05-Jun-98	BJYB 009	8.69	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	1.83	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			91.37	-1571.43	0.00	0.00			0.00	-20.79	0.00	1.64	0.00	0.00	0.00	0.00	0.00	0.00
04U702	11-Jun-98	BJYK 020	<0.75	10.80	<1.70	<0.76			<1.01	1.05	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U702 D	11-Jun-98	BJYK 021	<0.75	10.10	<1.70	<0.76			<1.01	1.11	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-6.93	0.00	0.00			0.00	5.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04U711	09-Jun-98	BJYC 016	<0.75	1.82	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U711 D	09-Jun-98	BJYC 017	<0.75	1.99	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	8.54	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04U859	25-Jun-98	BJZN 006	<0.75	46.80	7.55	3.17			<1.01	19.00	<0.78	4.54	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U859 D	25-Jun-98	BJZN 007	<0.75	42.00	6.29	3.17			<1.01	16.20	<0.78	3.96	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-11.43	-20.03	0.00			0.00	-17.28	0.00	-14.65	0.00	0.00	0.00	0.00	0.00	0.00
04U871	12-Dec-97	BJDY 015	<0.75	141.00	9.28	1.16			<1.01	14.40	<0.78	6.30	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U871 D	12-Dec-97	BJDY 016	<0.75	123.00	8.24	0.97			<1.01	13.00	<0.78	5.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-14.63	-12.62	-19.83			0.00	-10.77	0.00	-9.95	0.00	0.00	0.00	0.00	0.00	0.00
04U881	23-Jun-98	BJZK 020	<0.75	0.66	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
04U881 D	23-Jun-98	BJZK 021	<0.75	0.64	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-3.14	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200524	25-Jun-98	BJZM 018	<0.75	26.00	<1.70	<0.76			<1.01	1.43	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
200524 D	25-Jun-98	BJZM 019	<0.75	25.80	<1.70	<0.76			<1.01	1.34	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
			0.00	-0.78	0.00	0.00			0.00	-6.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E.3
Relative Percent Difference (RPD) Data

Site ID		Sample Date	Lot #	TCLEE	TRCLE	11DCE	12DCE	C12DCE	T12DCE	C2H3CL	111TCE	112TCE	11DCLE	12DCLE	CCL4	CHCL3	12DCLP	TCLTFE	CH2CL2
409557		22-Jun-98	BJZK 012	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
409557	D	22-Jun-98	BJZK 013	<0.75	<0.56	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		04-Nov-97	BHSV 010	<0.75	1.36	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	04-Nov-97	BHSV 011	<0.75	1.54	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	11.69	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		06-Jan-98	BJJX 010	<0.75	1.84	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	06-Jan-98	BJJX 011	<0.75	1.57	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-17.20	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		03-Mar-98	BJQQ 010	<0.75	1.34	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	03-Mar-98	BJQQ 011	<0.75	1.23	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-8.94	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		07-Apr-98	BJRN 005	<0.75	1.07	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	07-Apr-98	BJRN 006	<0.75	1.11	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	3.60	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		28-May-98	BJWN 005	<0.75	0.74	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	28-May-98	BJWN 006	<0.75	0.73	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-1.65	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		02-Jun-98	BJWN 010	<0.75	0.68	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	02-Jun-98	BJWN 011	<0.75	0.62	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-9.66	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		07-Jul-98	BJZW 005	<0.75	1.01	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	07-Jul-98	BJZW 006	<0.75	0.95	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-5.98	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		04-Aug-98	BKCX 009	<0.75	0.98	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	04-Aug-98	BKCX 010	<0.75	1.14	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	14.04	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NB13I		01-Sep-98	BKHW 006	<0.75	1.47	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
NB13I	D	01-Sep-98	BKHW 007	<0.75	1.68	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	12.50	0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PJ#311		08-Jun-98	BJYF 006	<0.75	8.71	<1.70	<0.76			<1.01	<0.76	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
PJ#311	D	08-Jun-98	BJYF 007	<0.75	8.53	<1.70	<0.76			<1.01	0.83	<0.78	<0.73	<1.10	<0.99	<0.50	<1.00	<1.00	<7.40
				0.00	-2.11	0.00	0.00			0.00	8.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX F

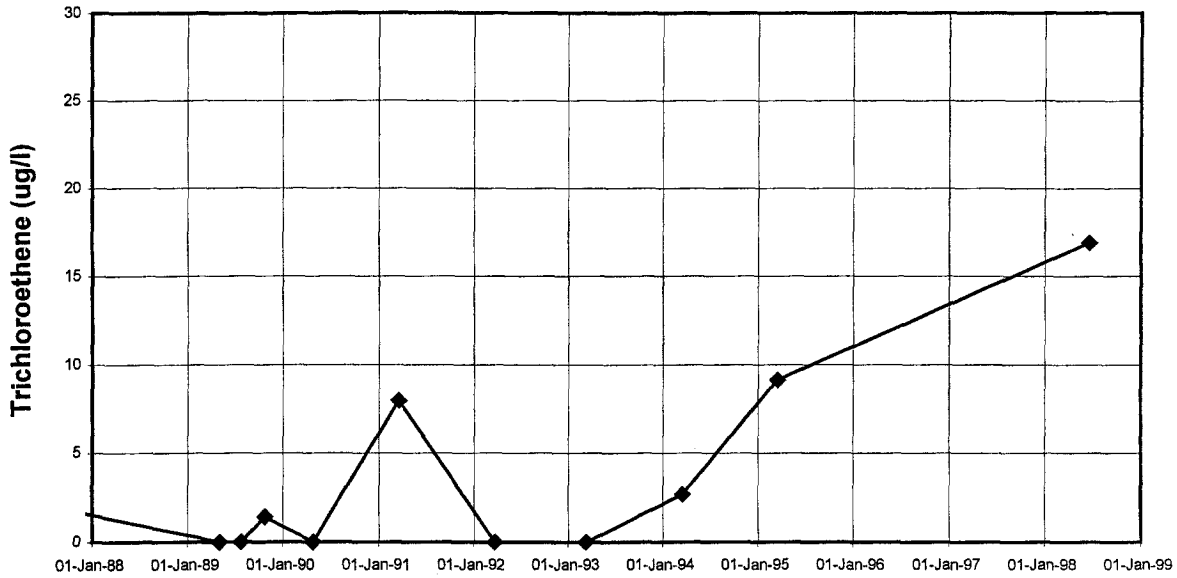
Appendix F

Trichloroethene Graphs for Deep Groundwater Monitoring Wells

OU1

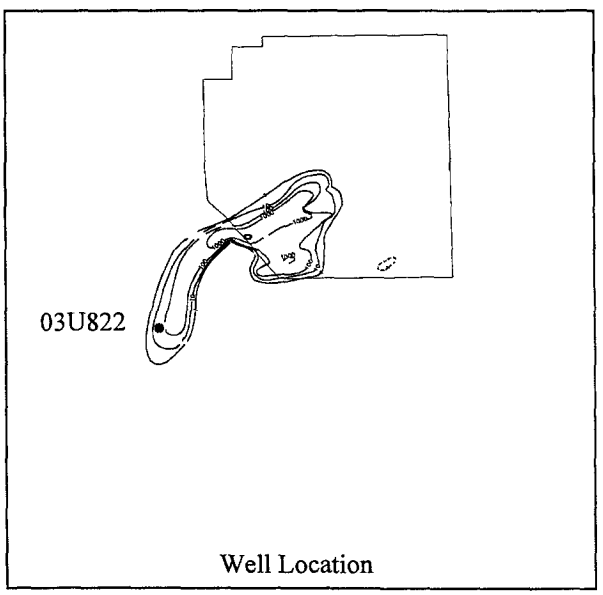
Upper Unit 3 Wells

03U822



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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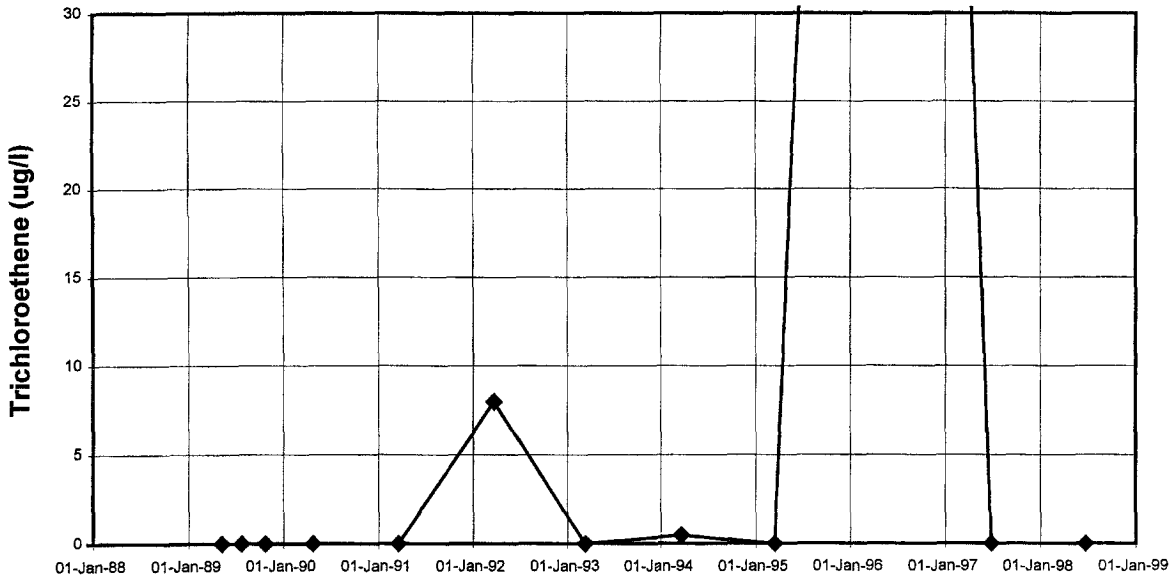
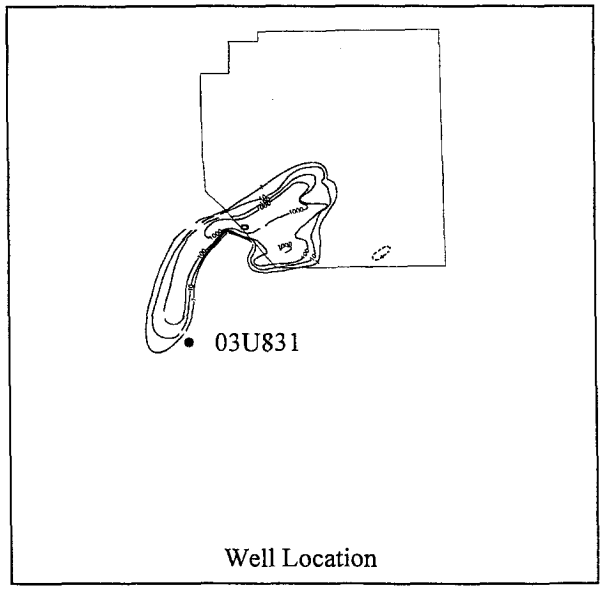
03U831

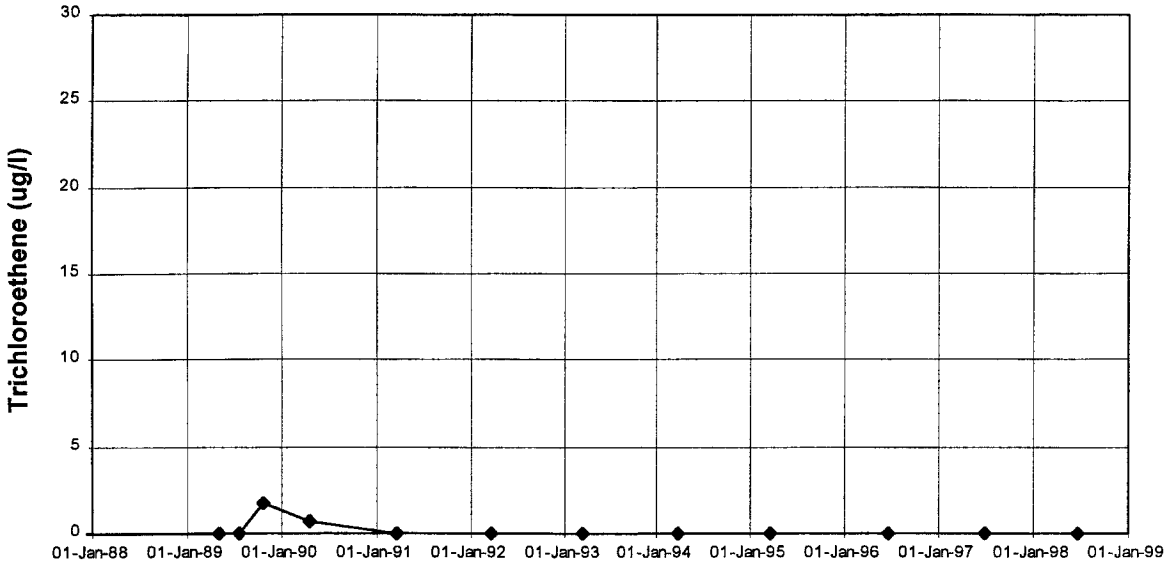


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

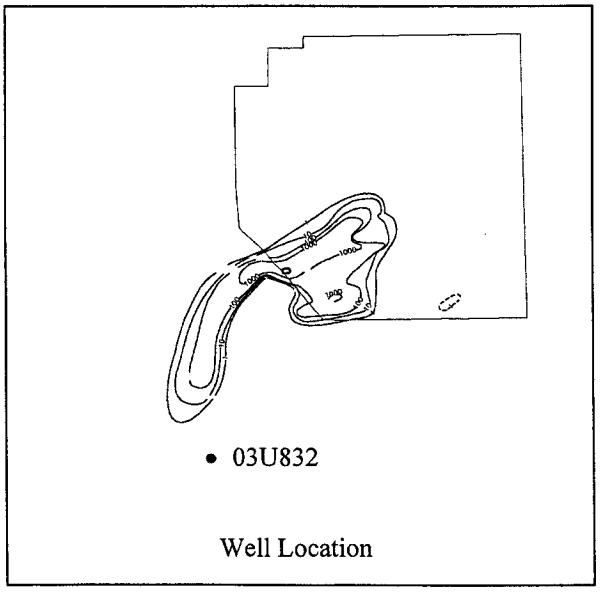


03U832



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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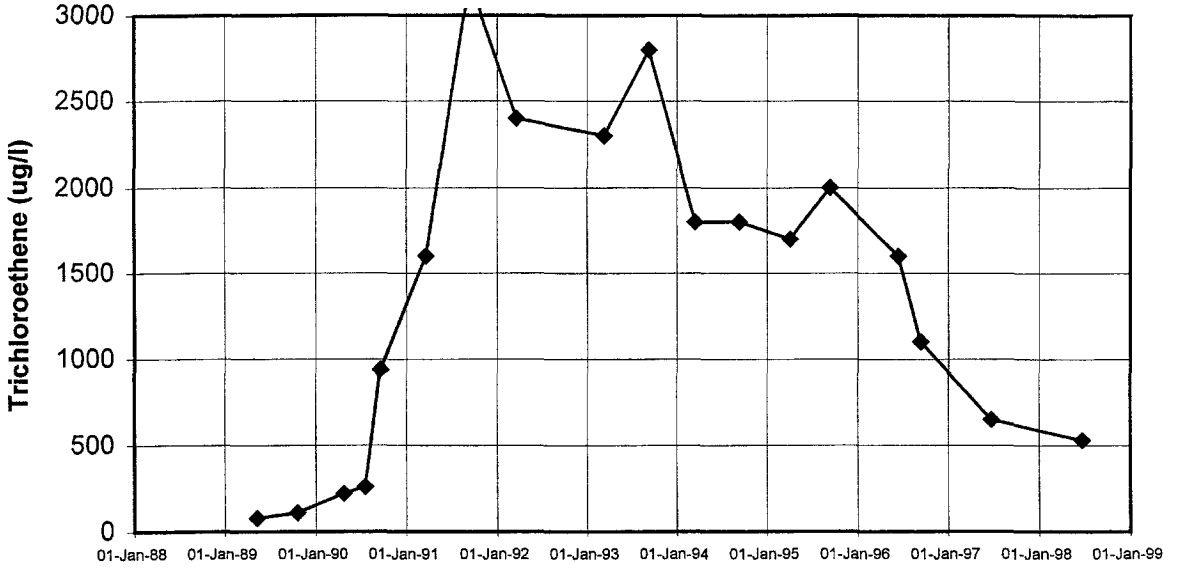
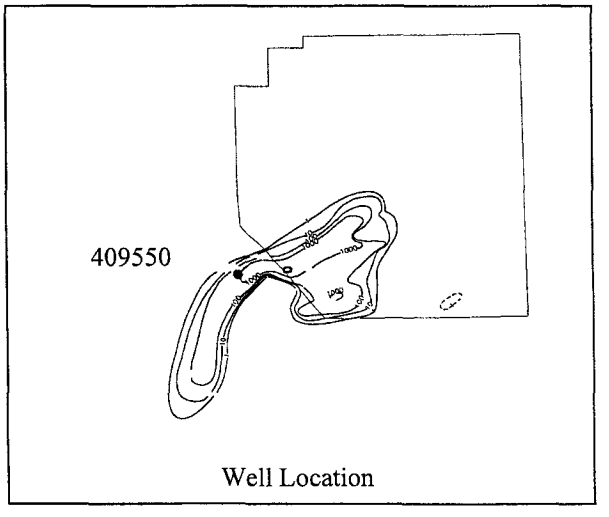
409550



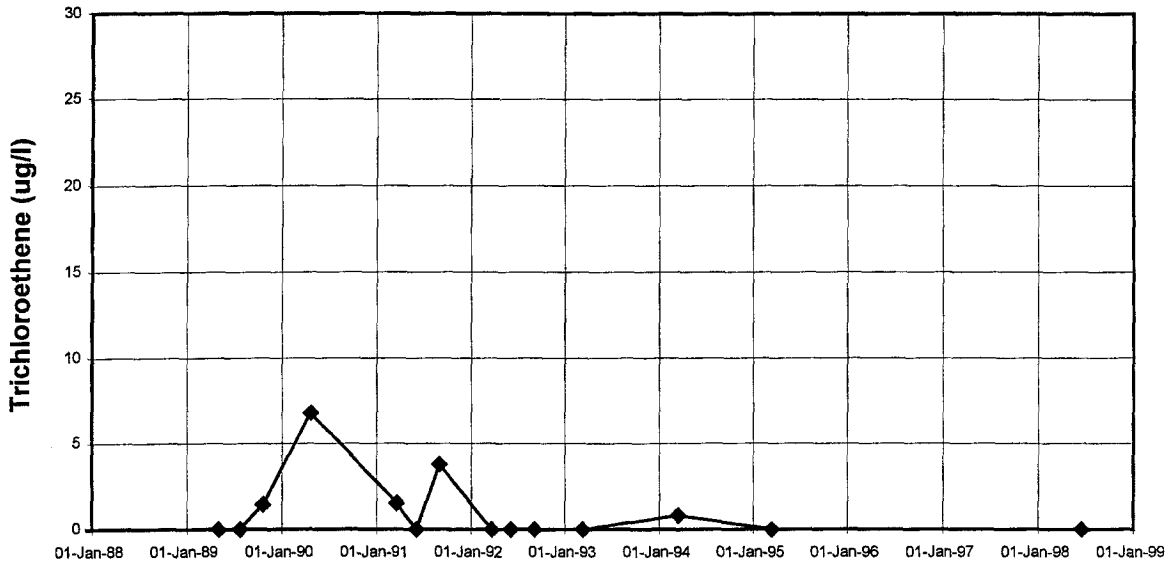
Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



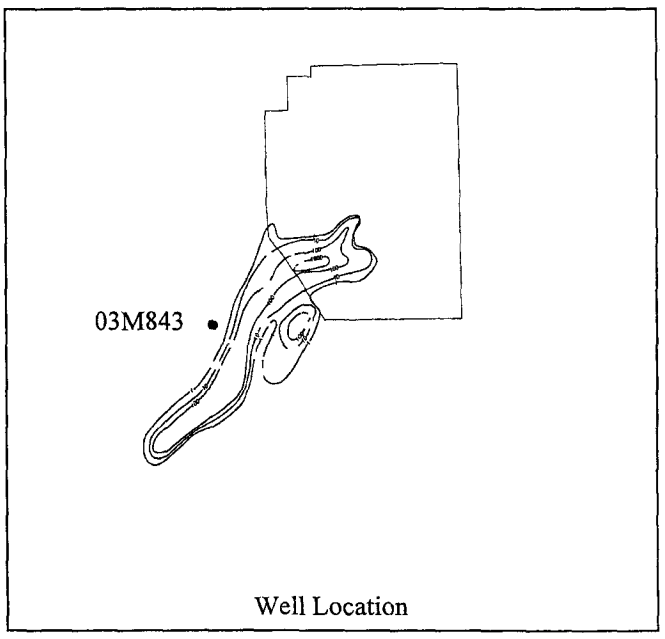
Middle and Lower Unit 3 Wells

03M843



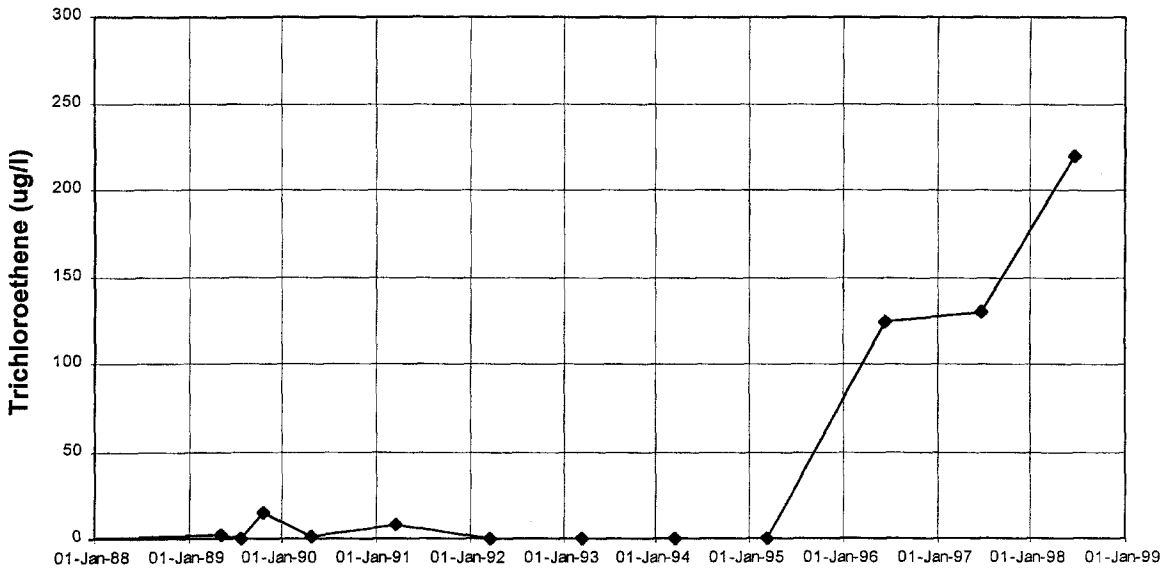
Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



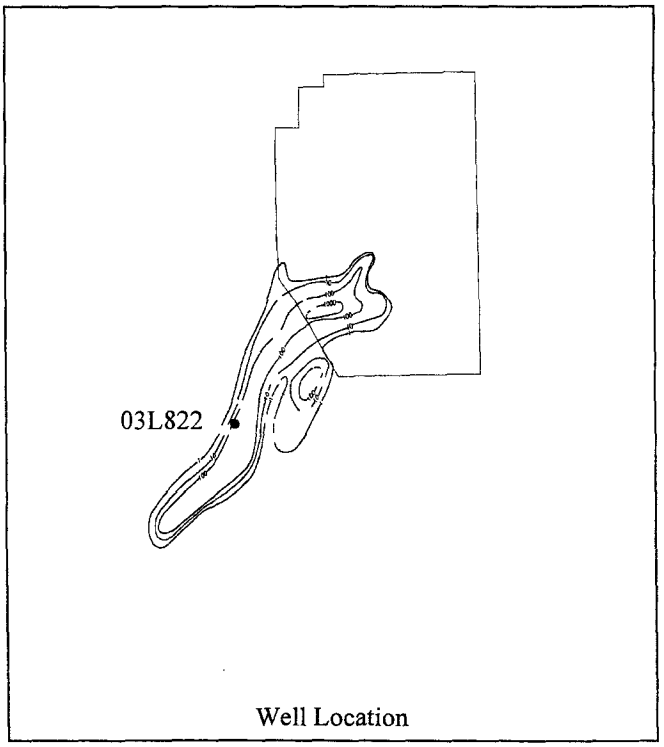
Well Location

03L822



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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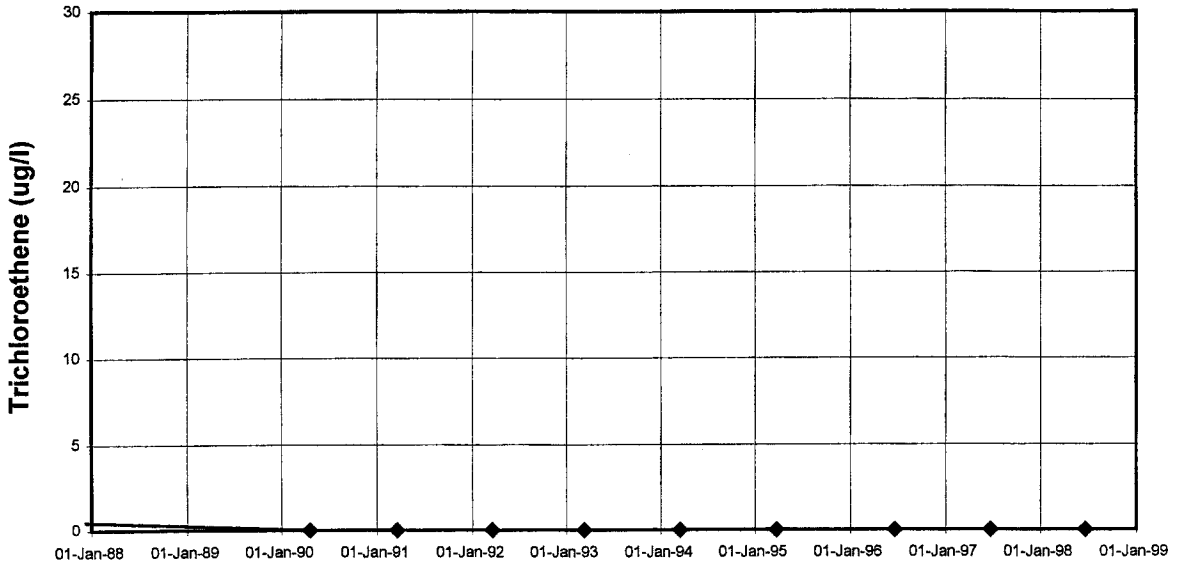
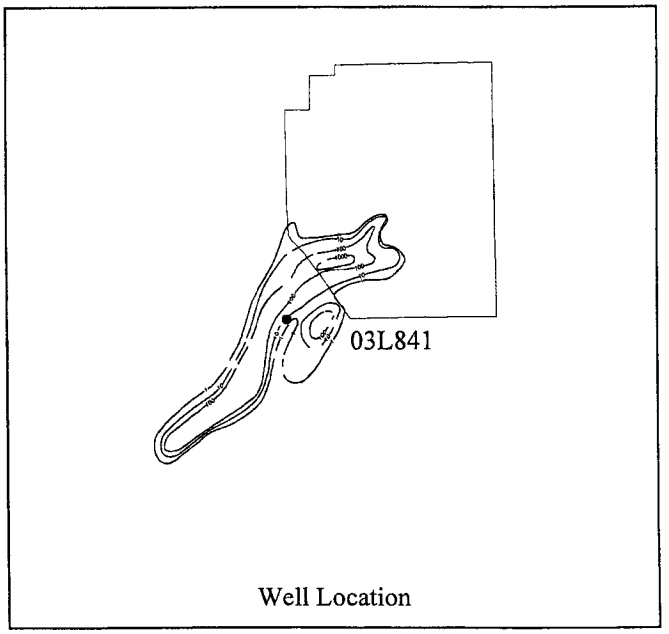
03L841

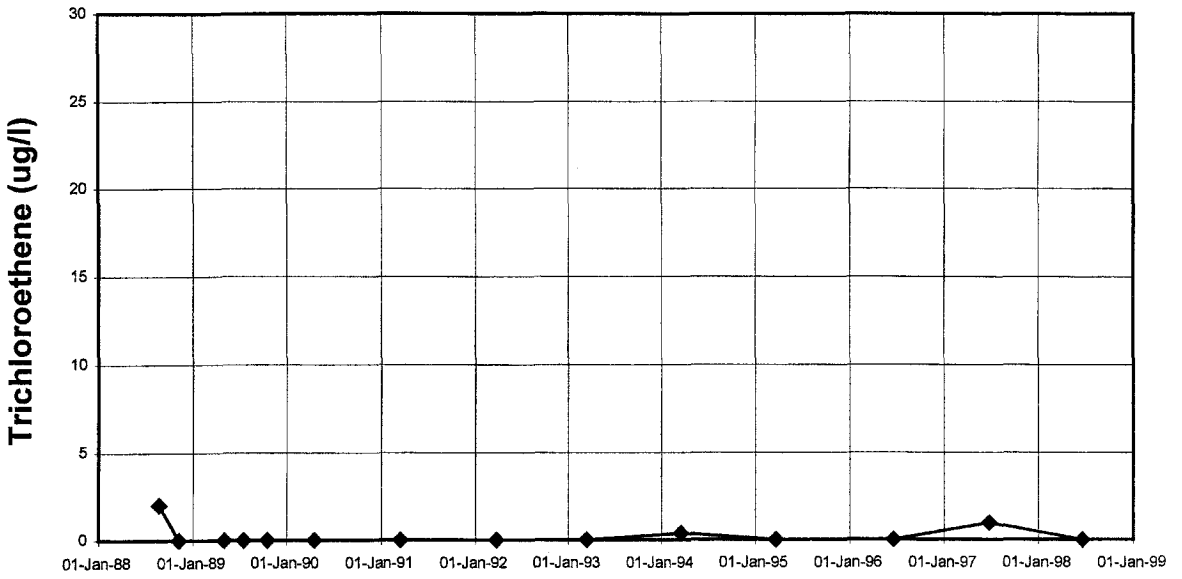


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

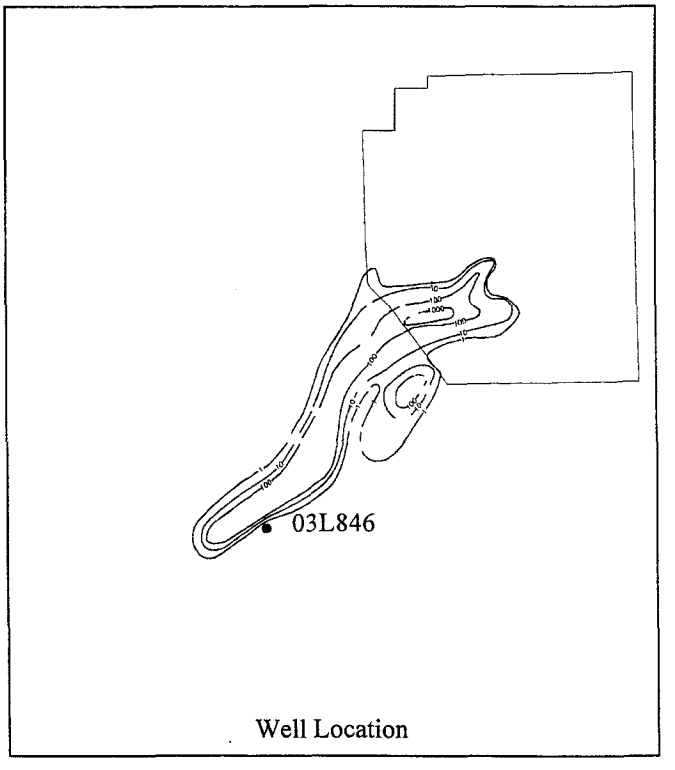


03L846

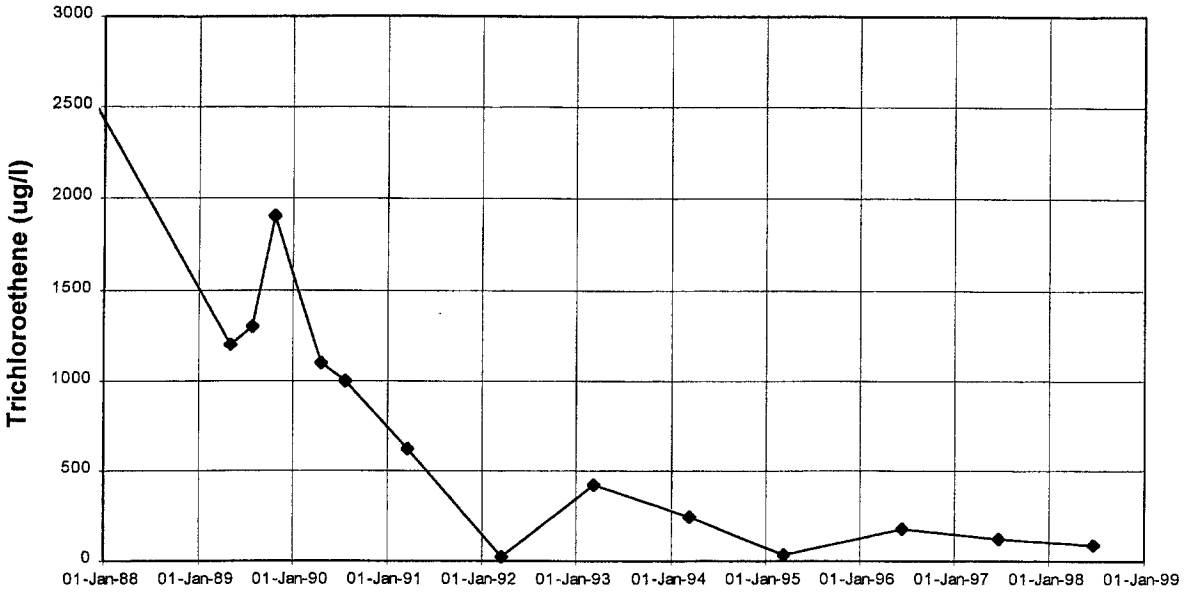


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

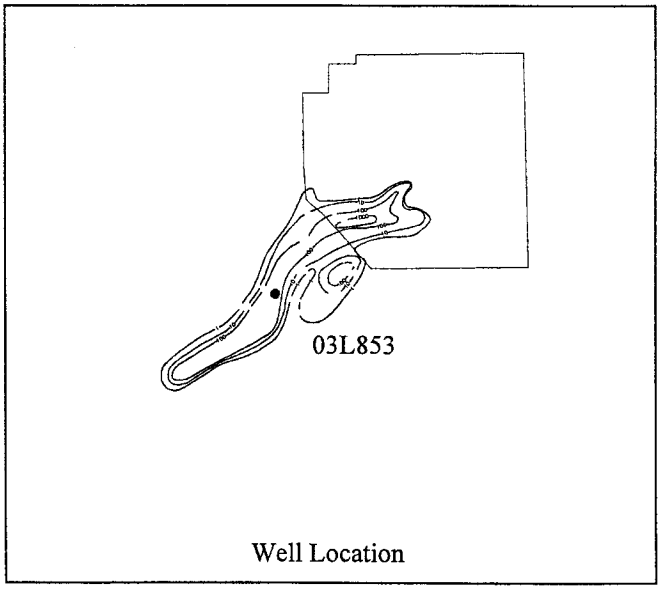


03L853



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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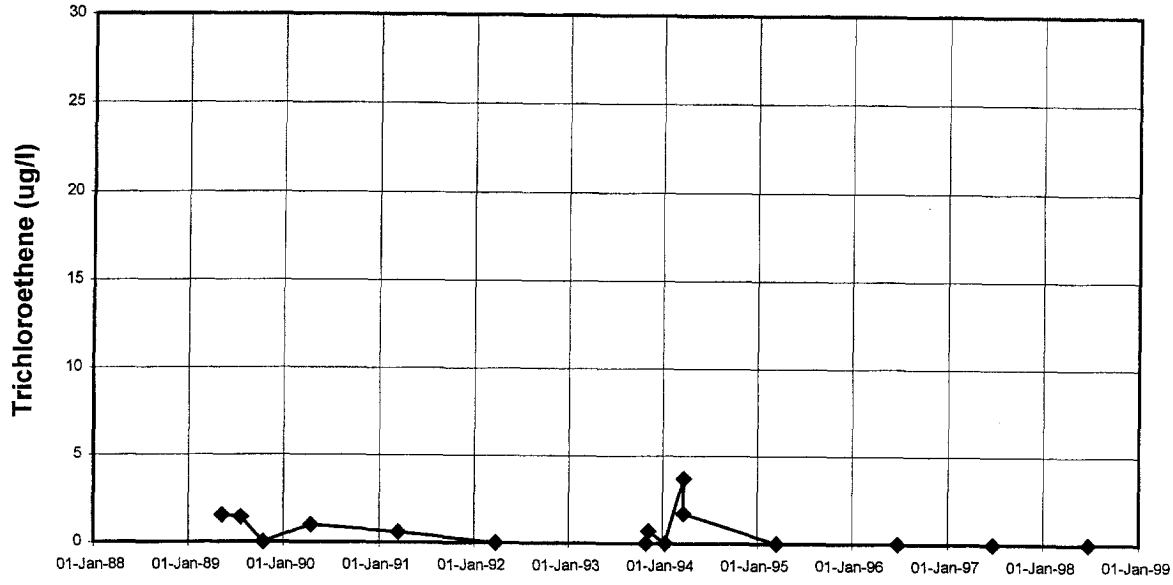
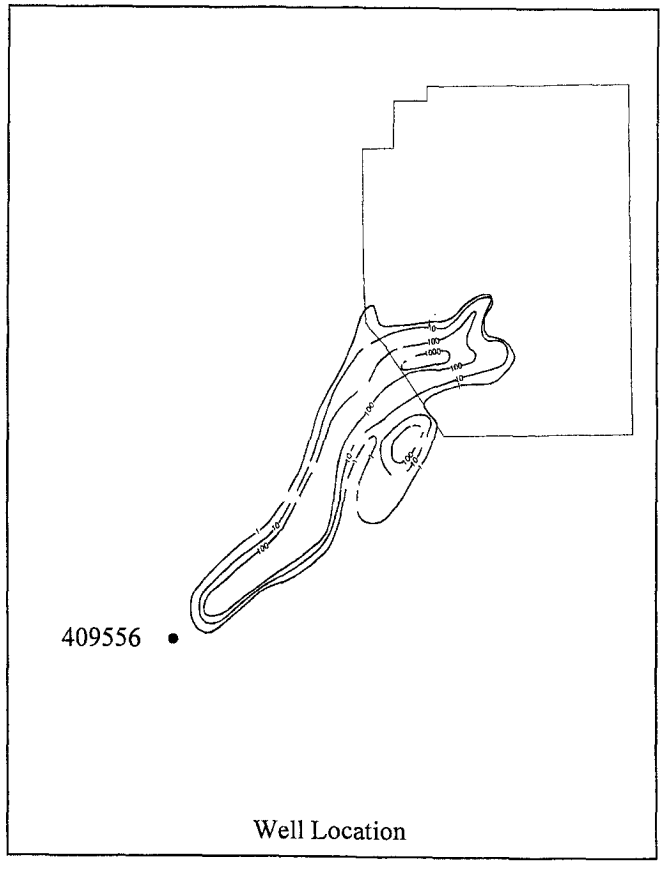
409556



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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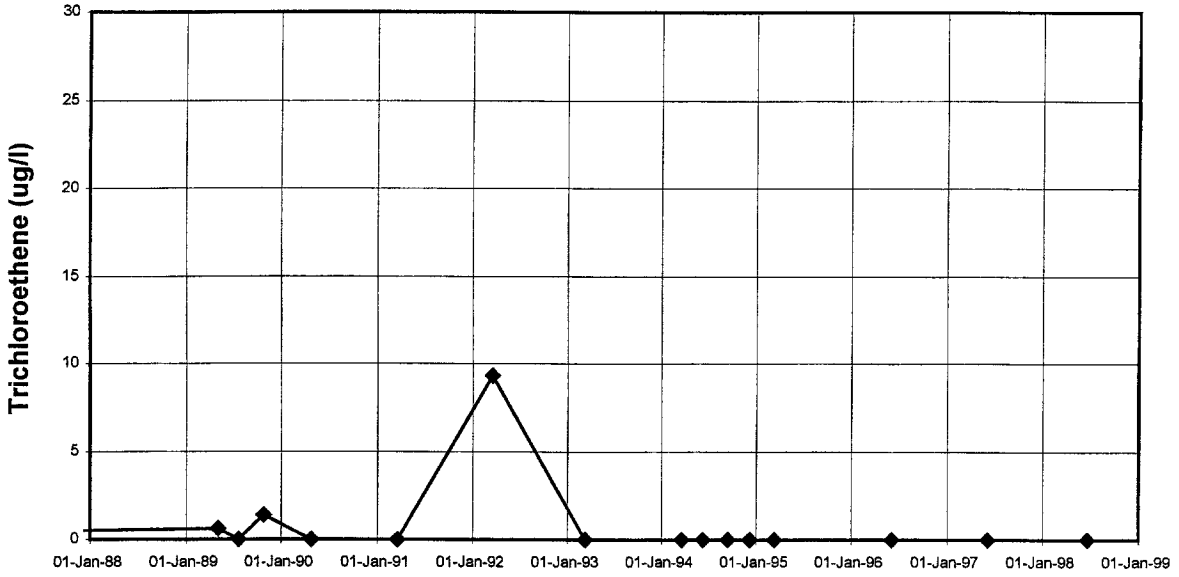
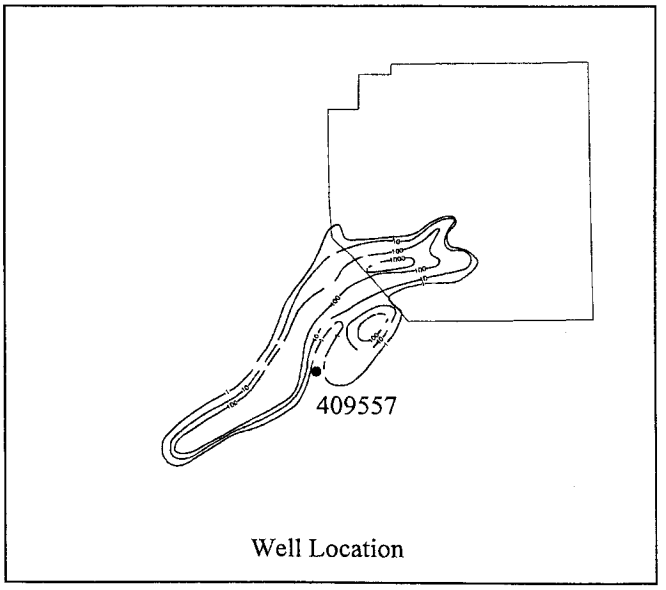
409557



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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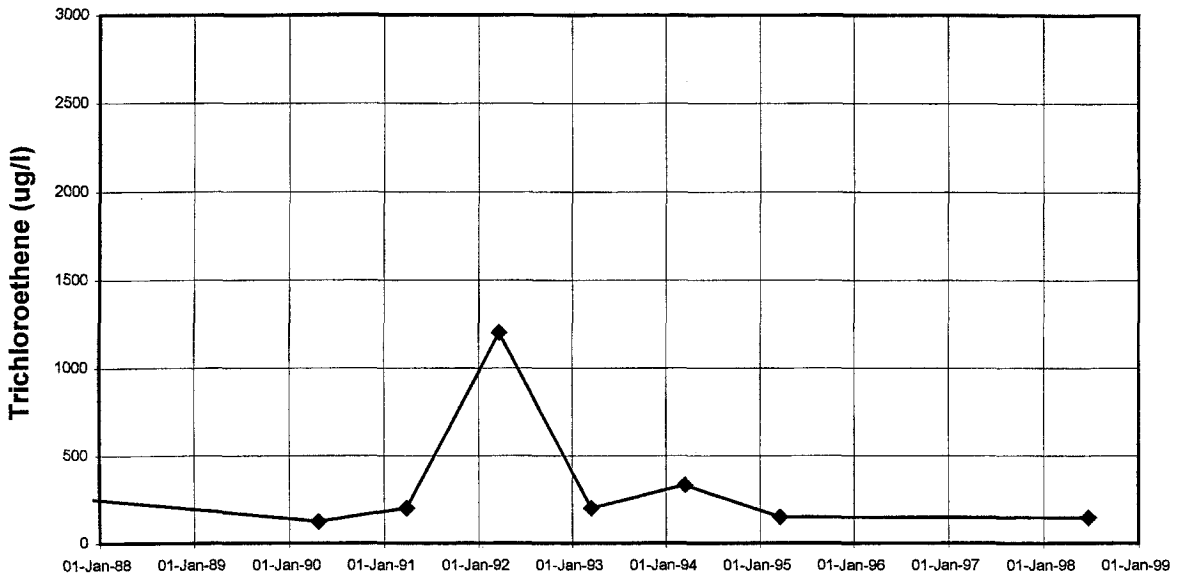
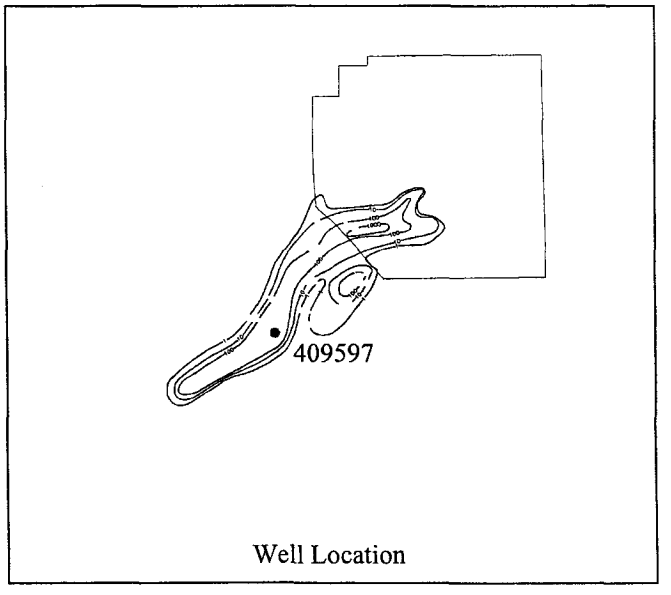
409597



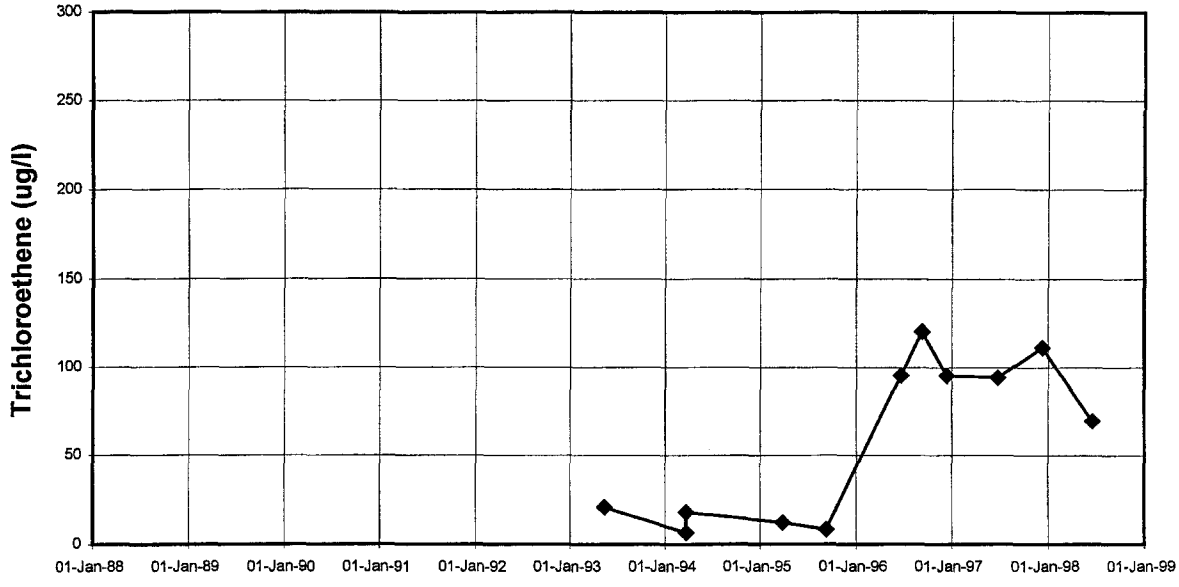
Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



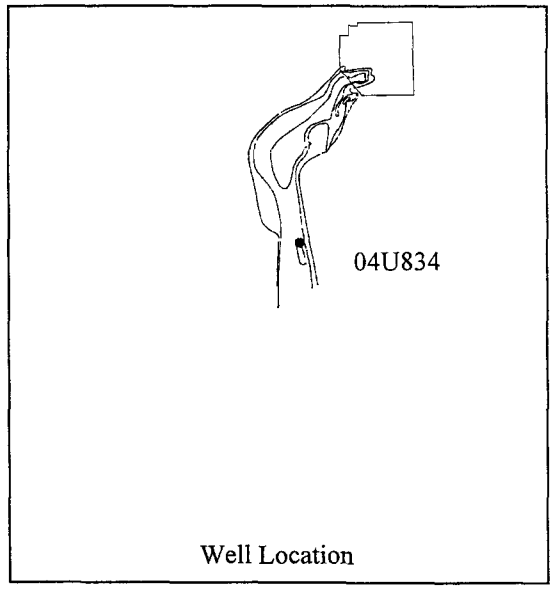
Unit 4 Wells

04U834



Well Purpose:
Monitor changes downgradient of the OU1 containment system.

Note:
Plume map is from FY 1998.



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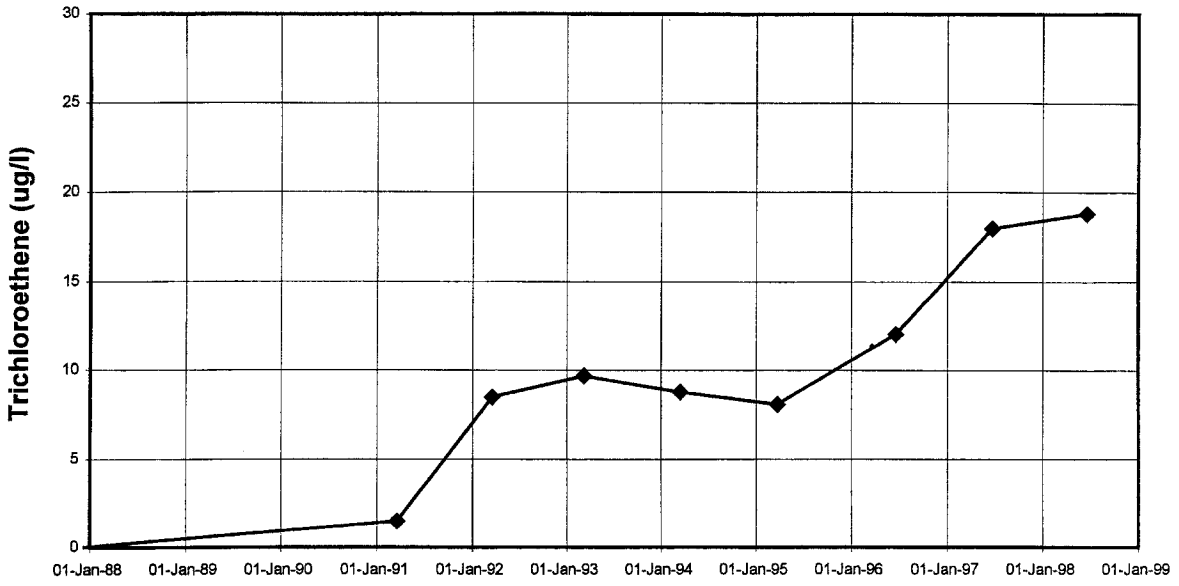
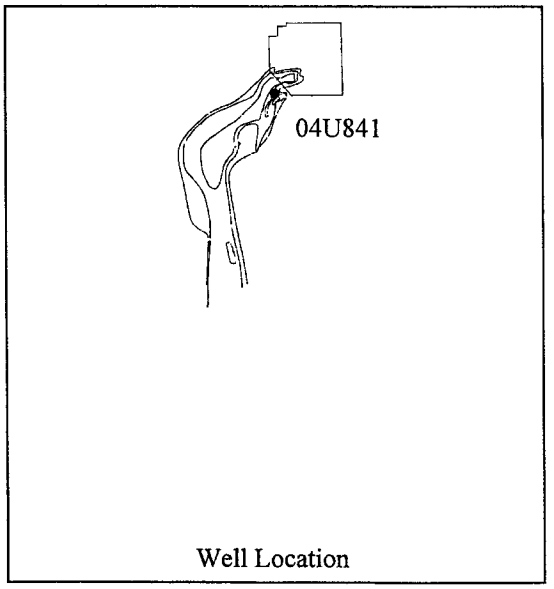
04U841

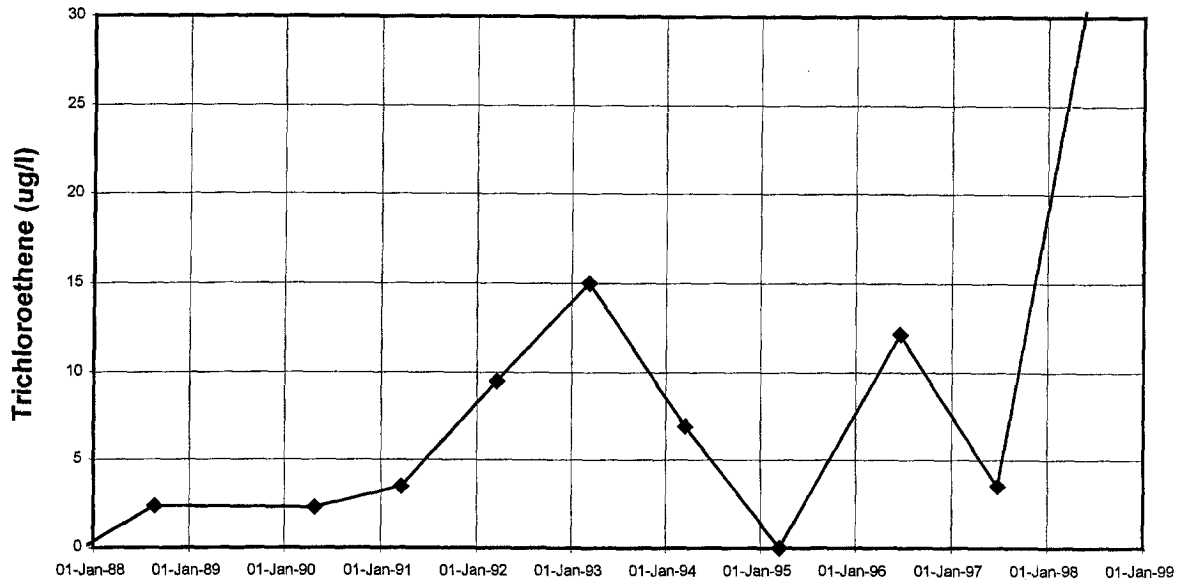


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

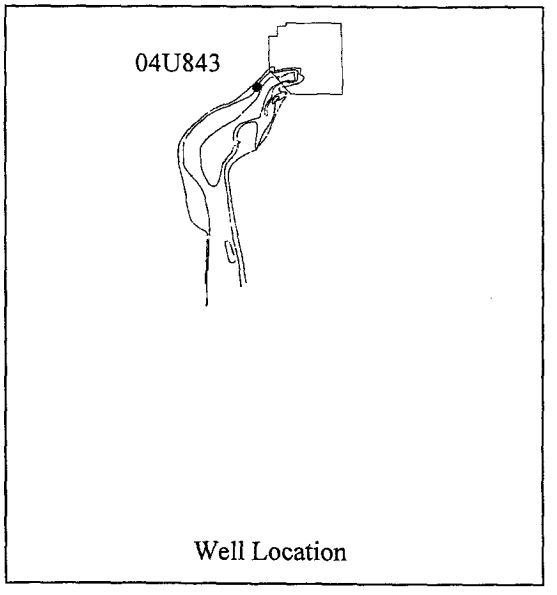


04U843



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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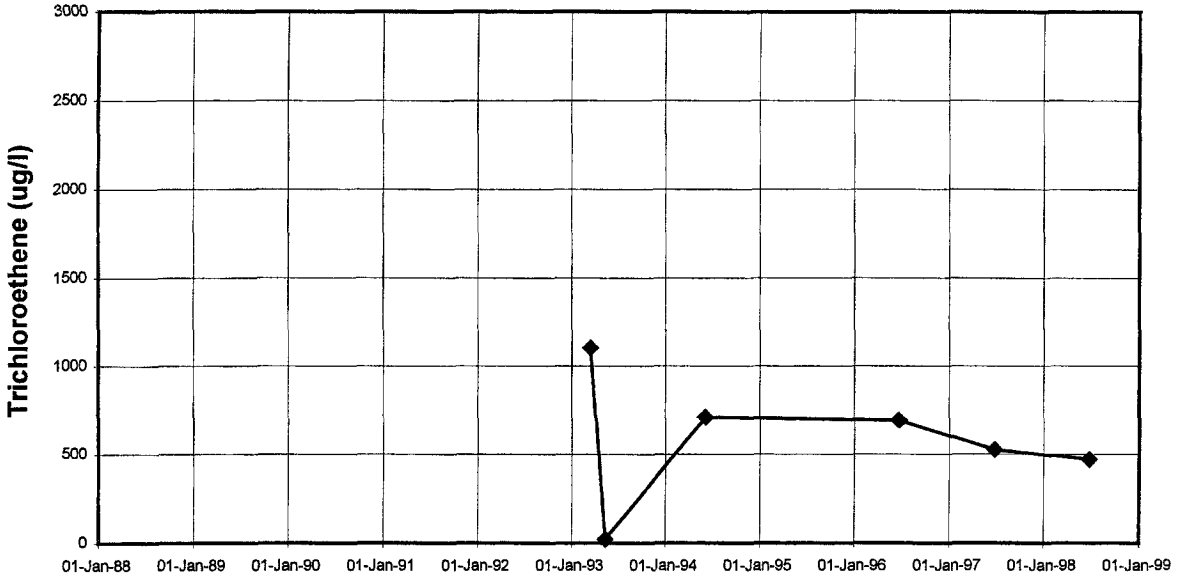
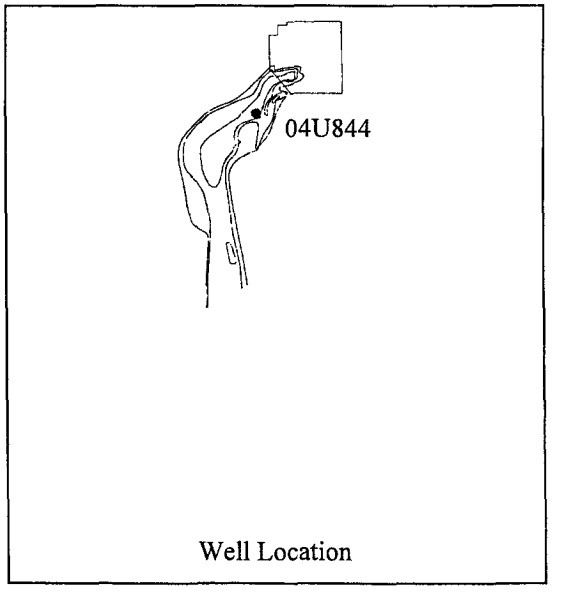
04U844

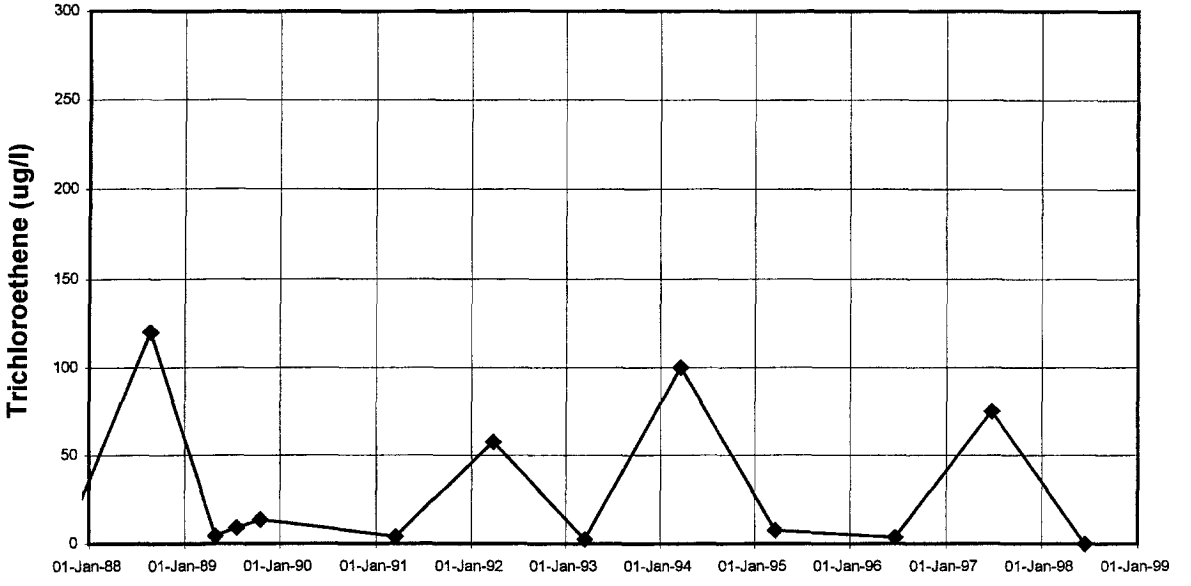


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

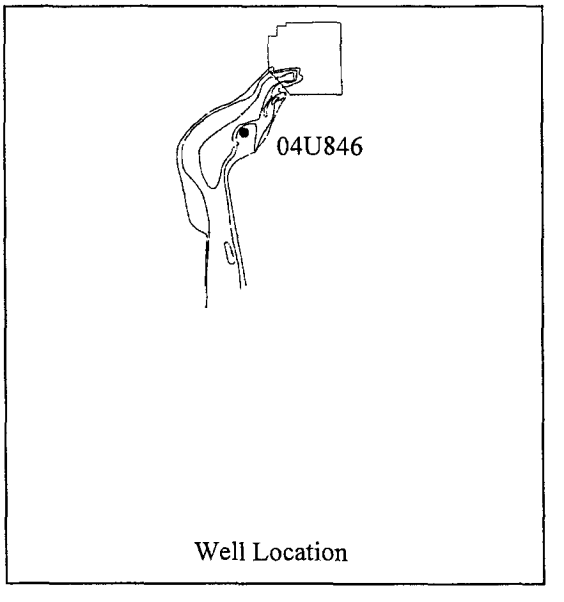


04U846



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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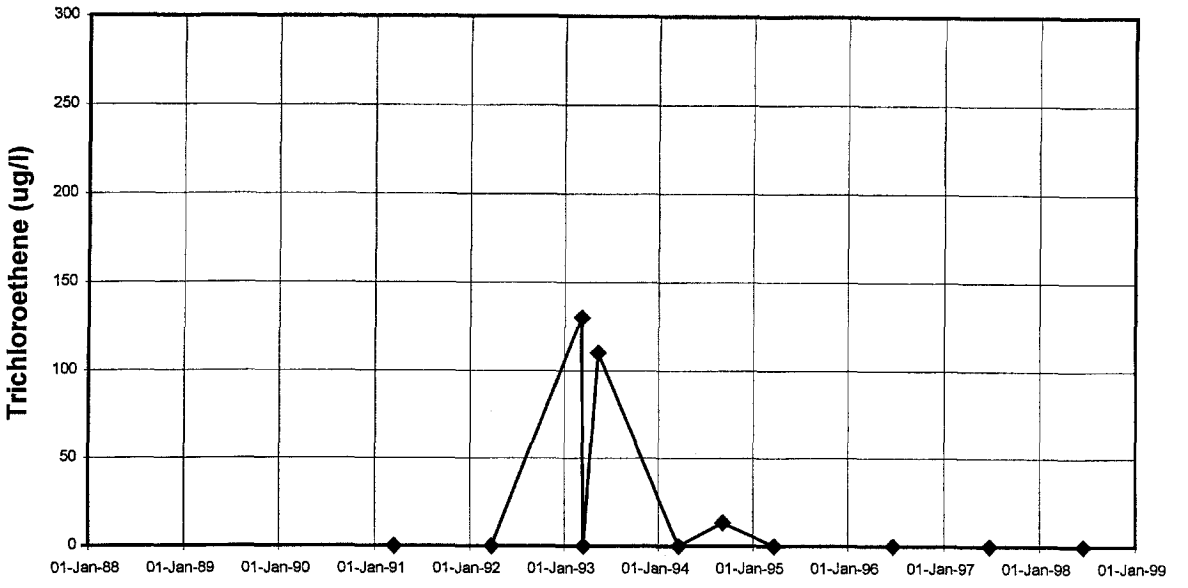
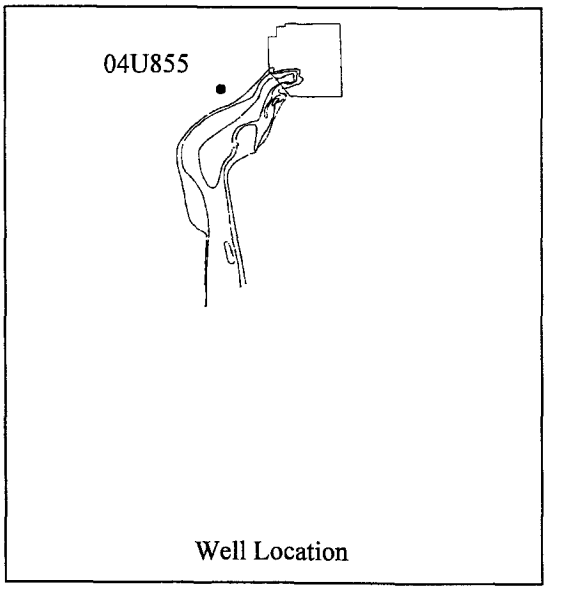
04U855

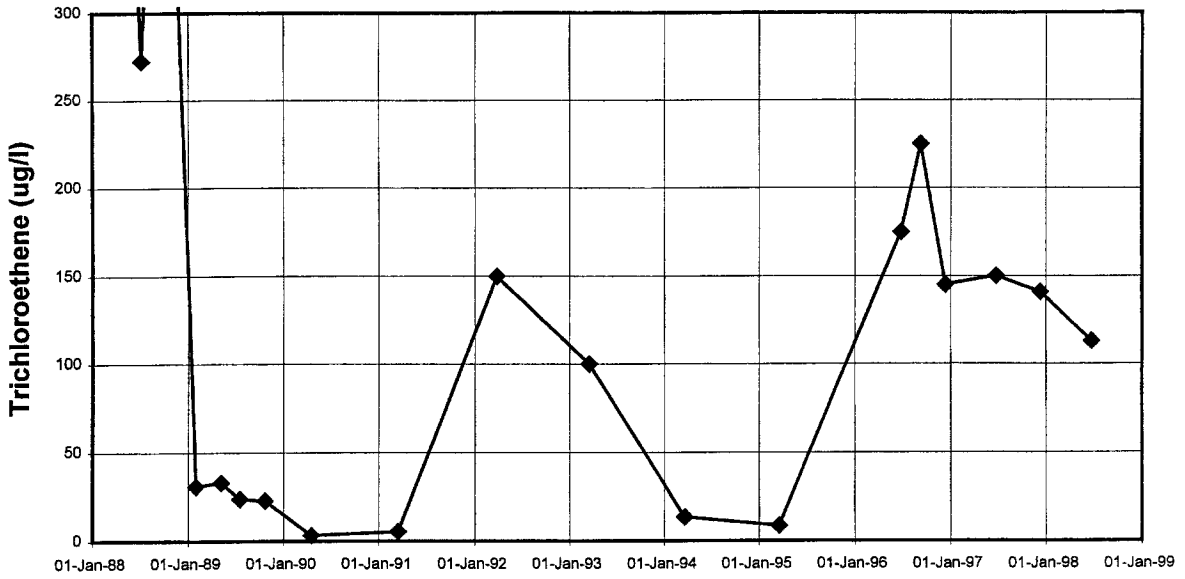


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map from FY 1998.

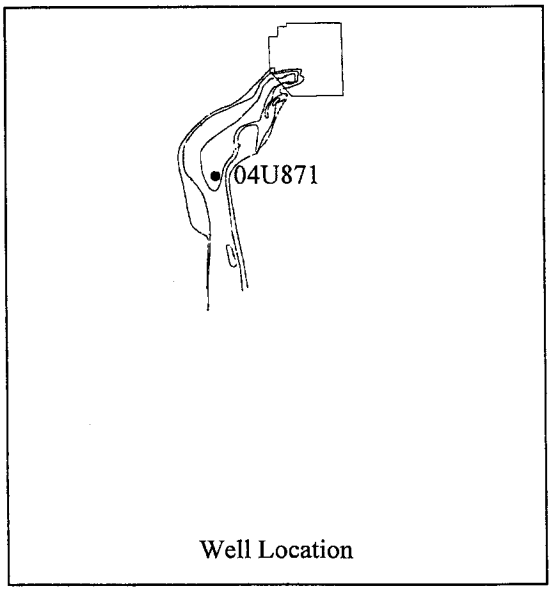


04U871



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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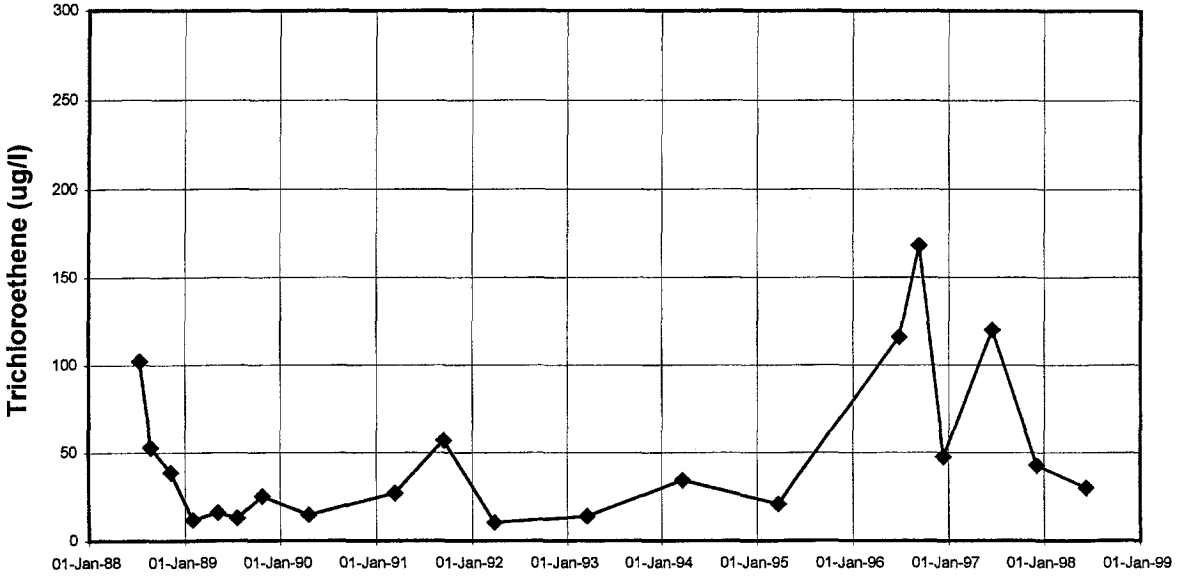
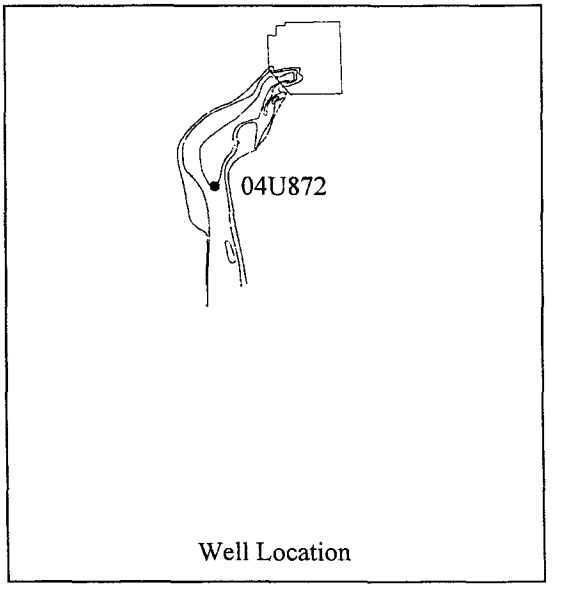
04U872



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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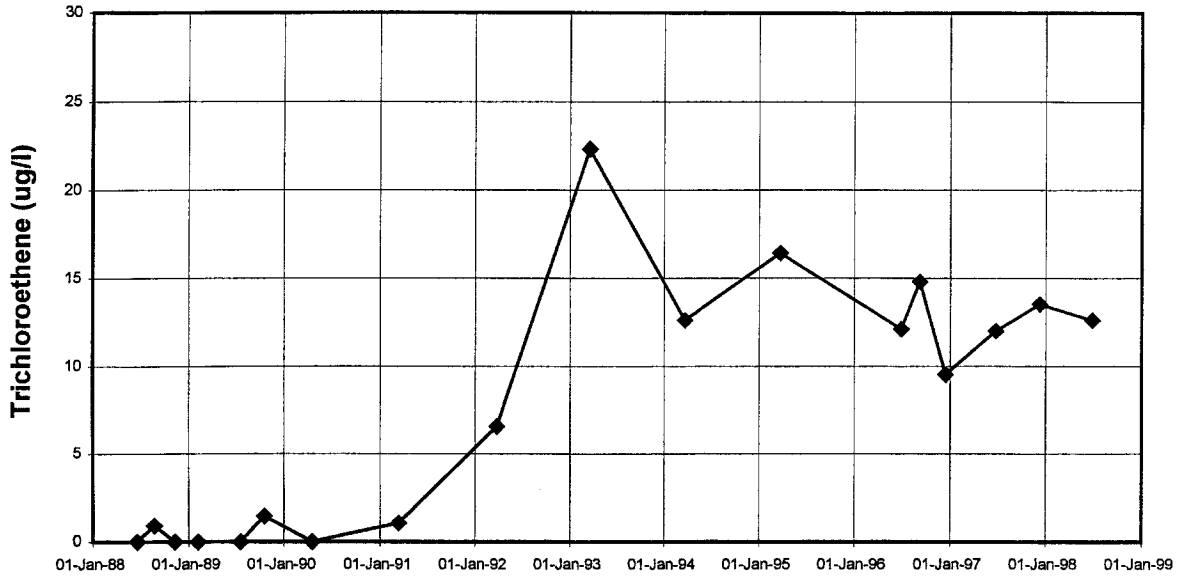
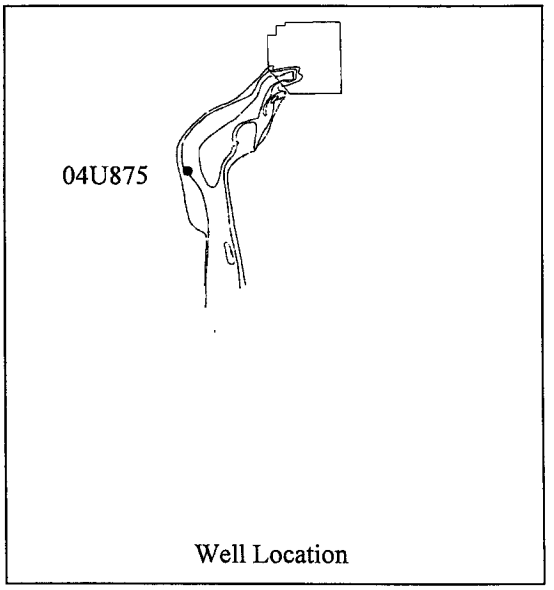
04U875



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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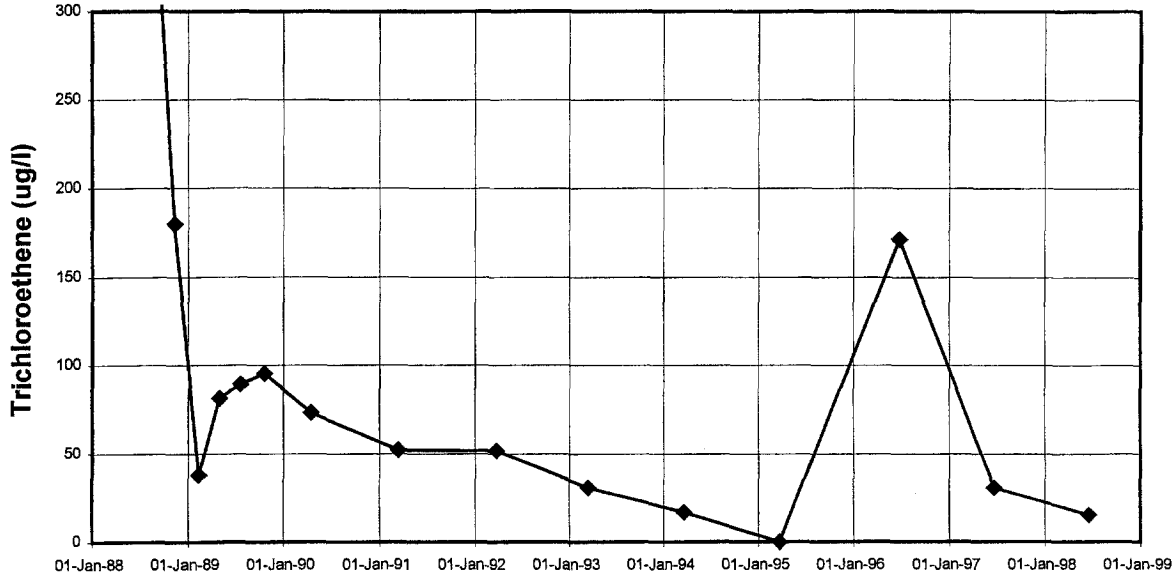
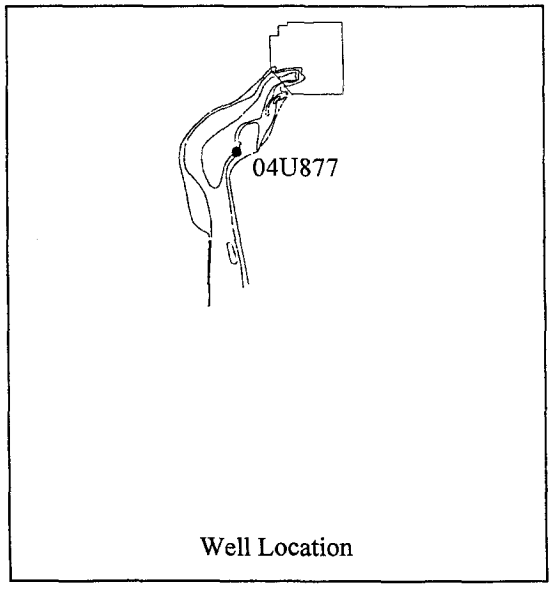
04U877



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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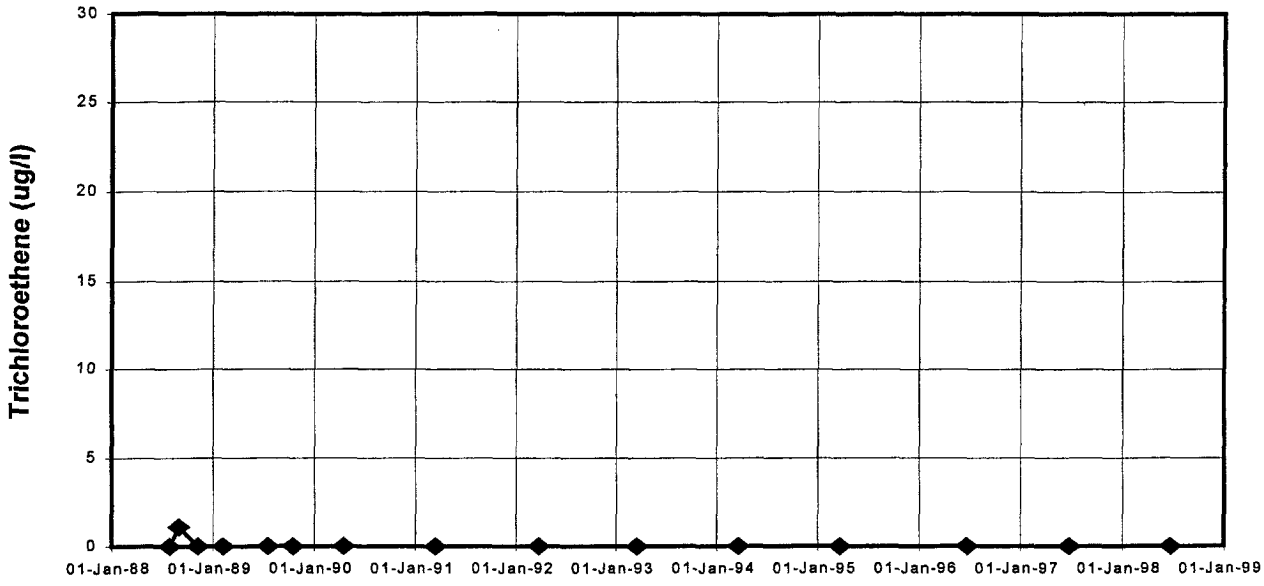
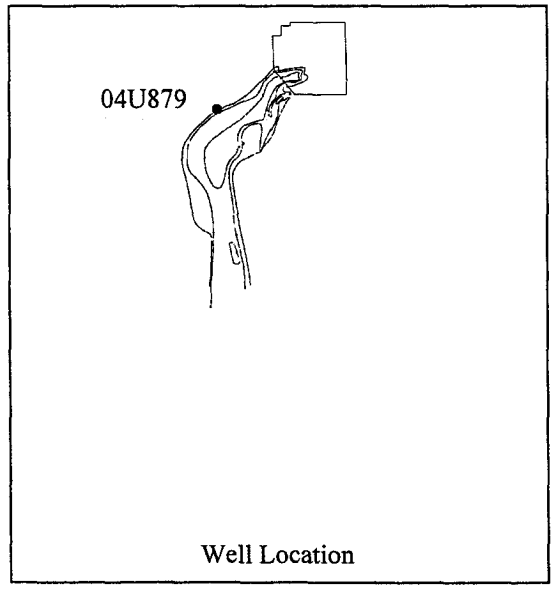
04U879



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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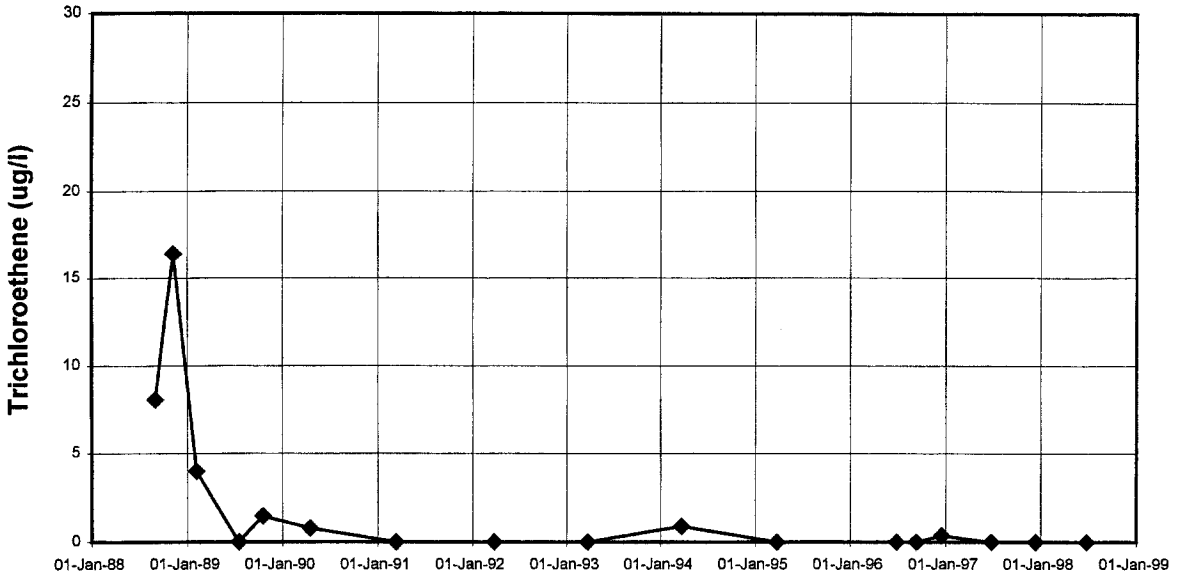
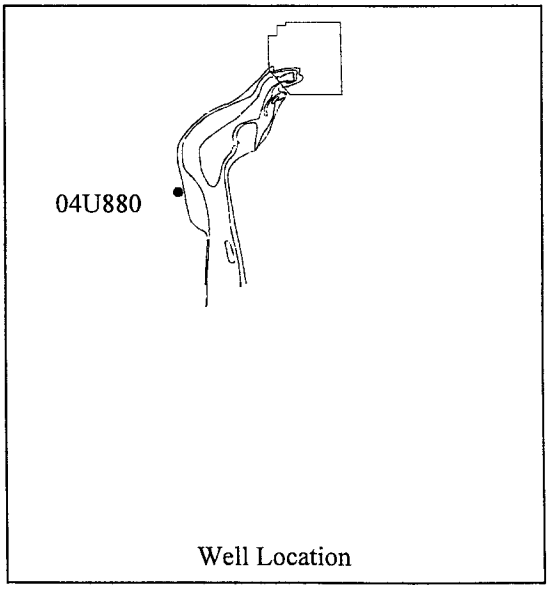
04U880



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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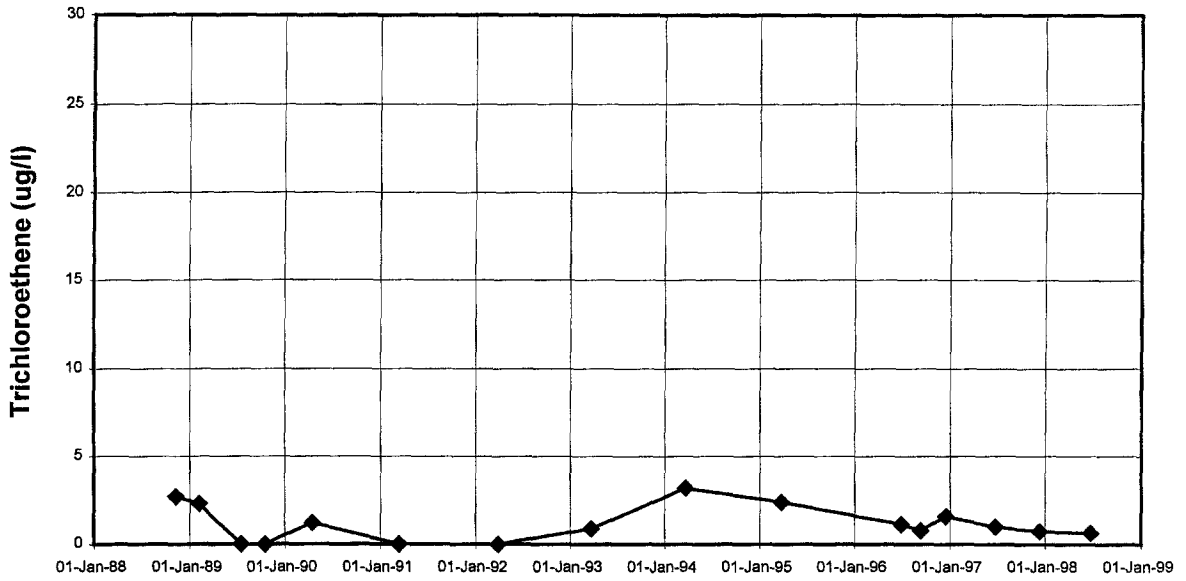
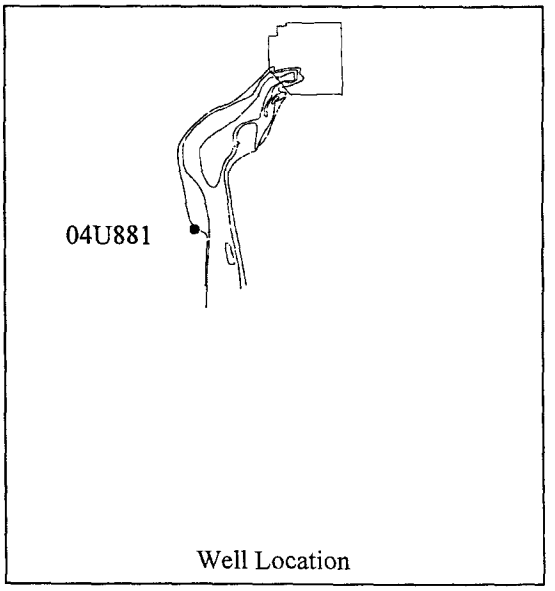
04U881



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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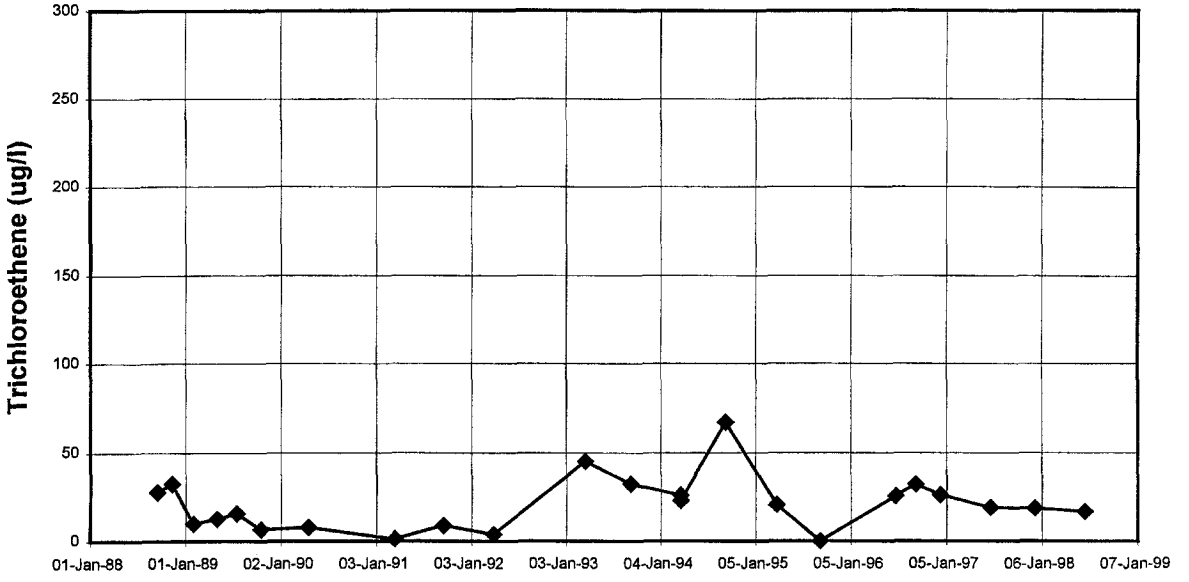
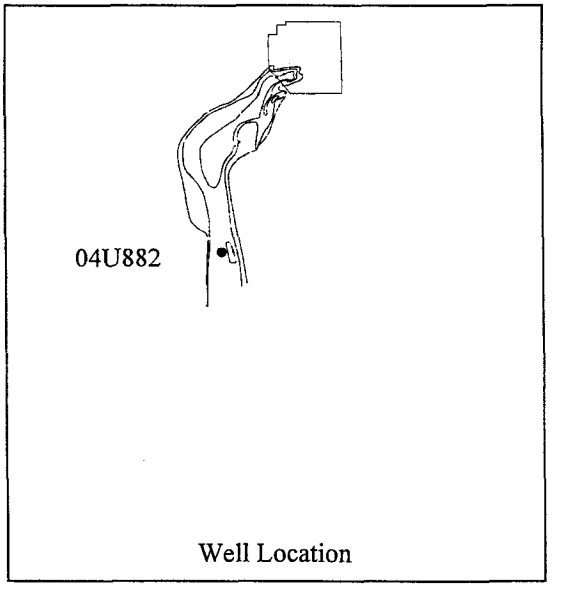
04U882



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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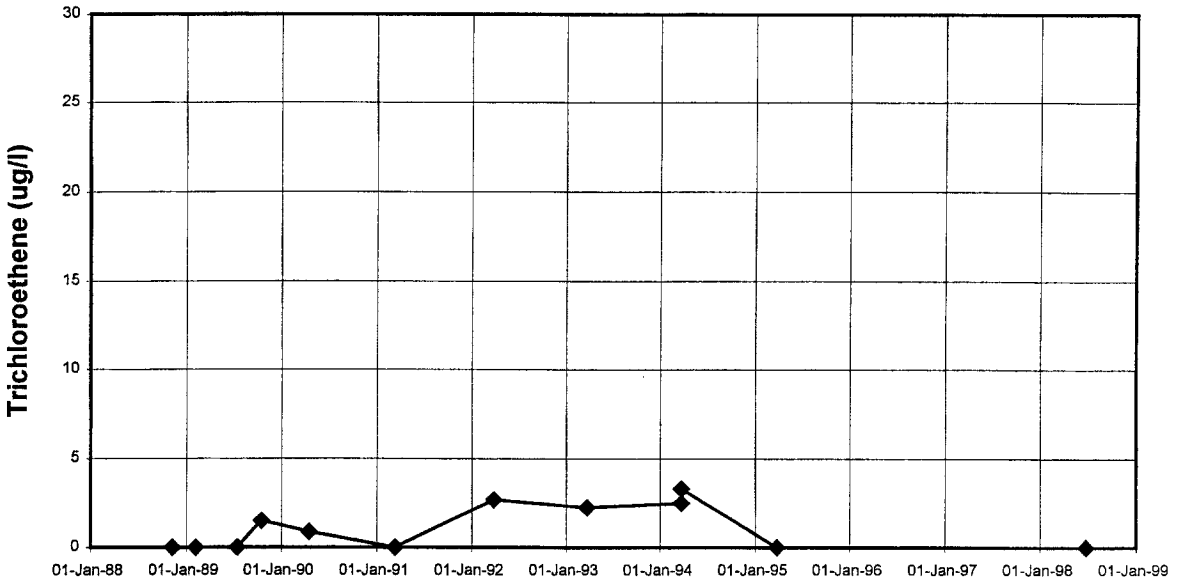
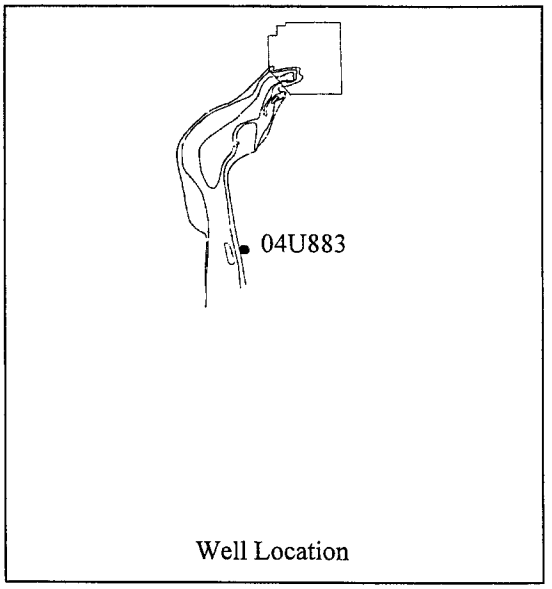
04U883



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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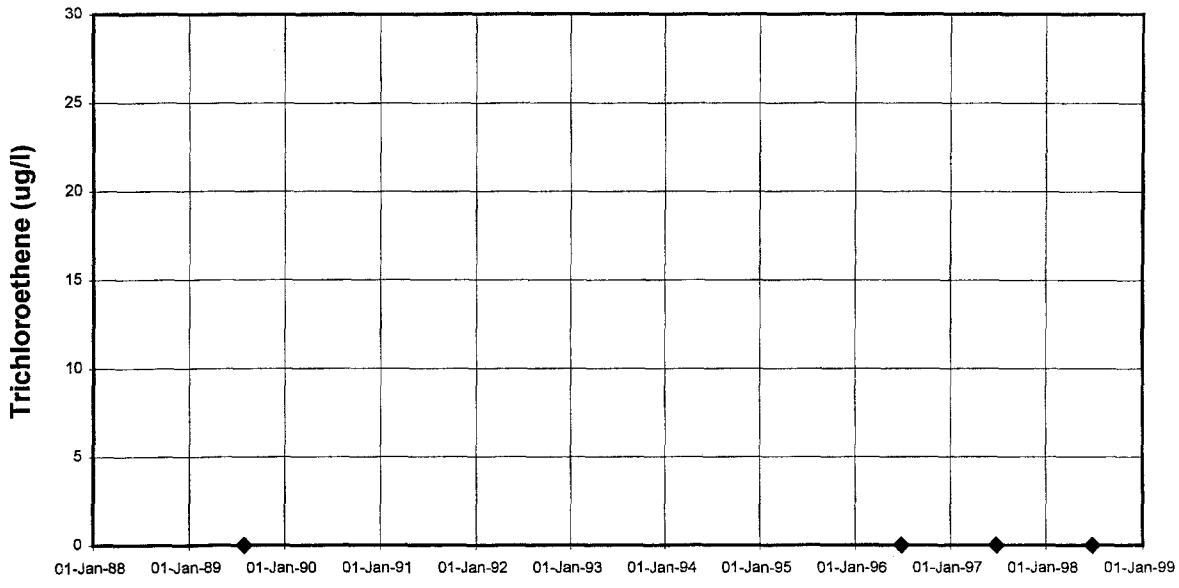
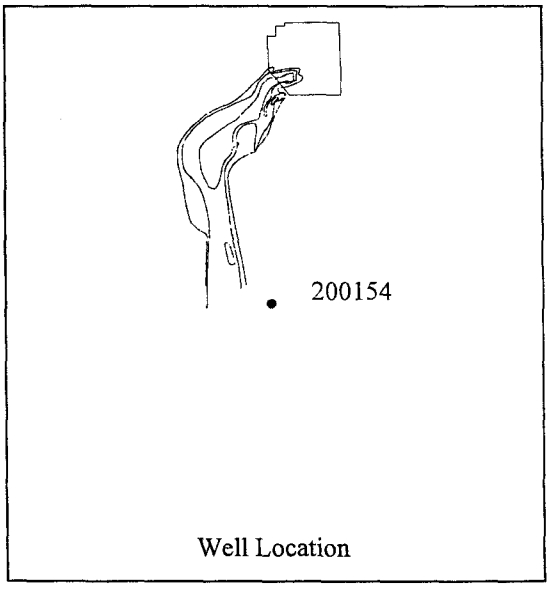
200154



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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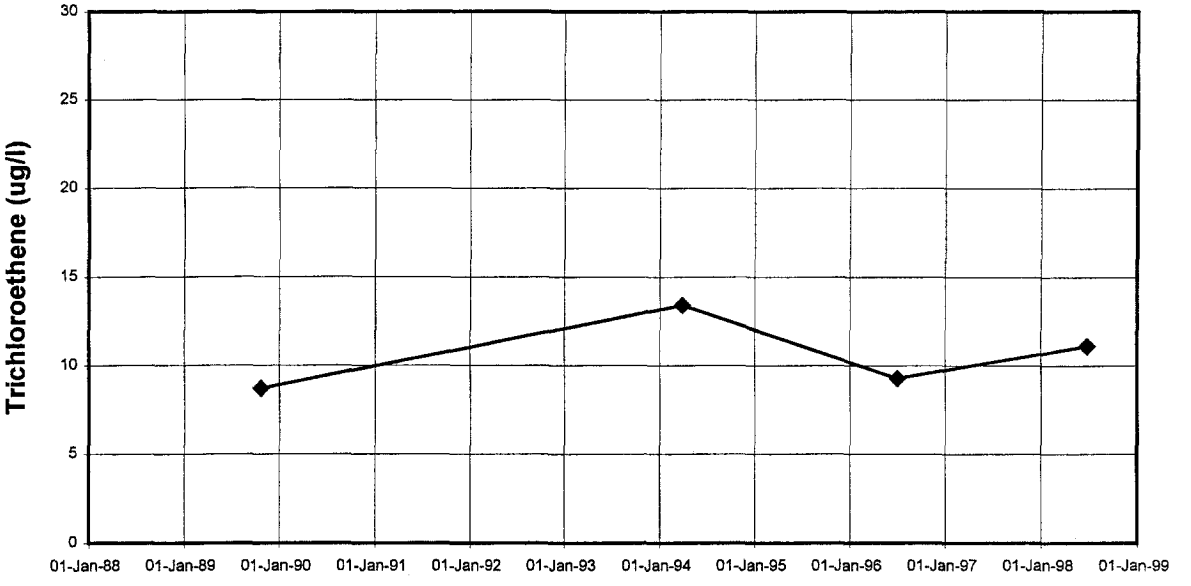
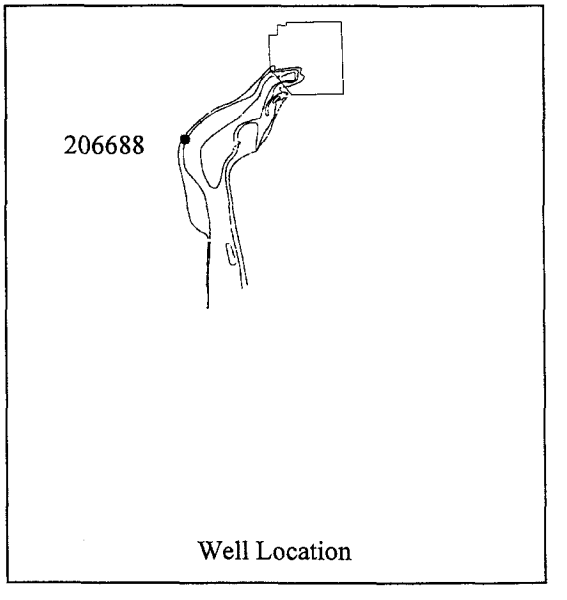
206688



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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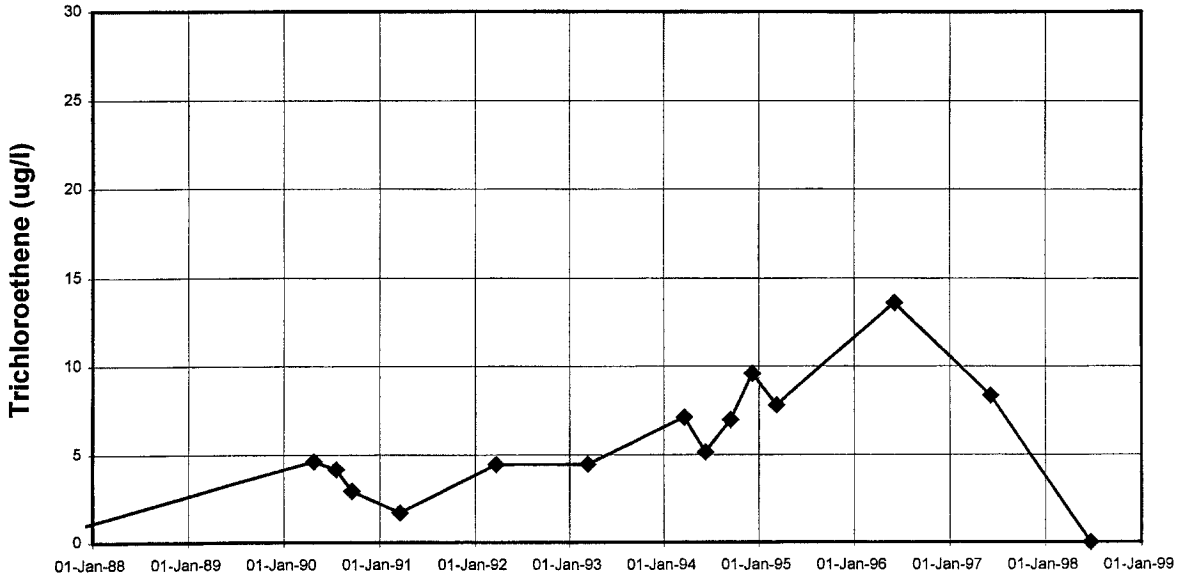
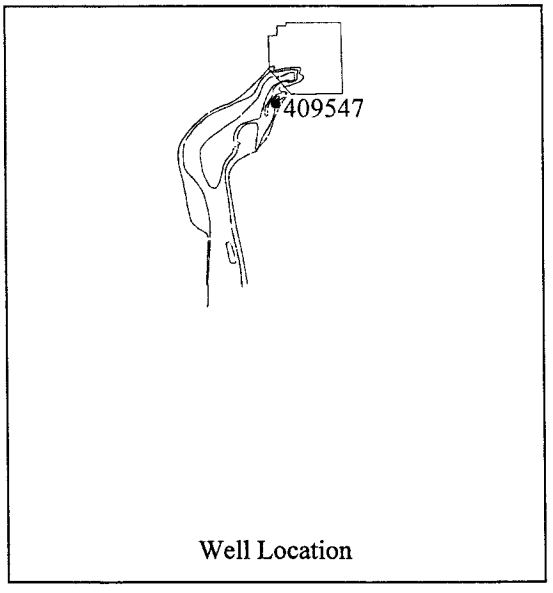
409547



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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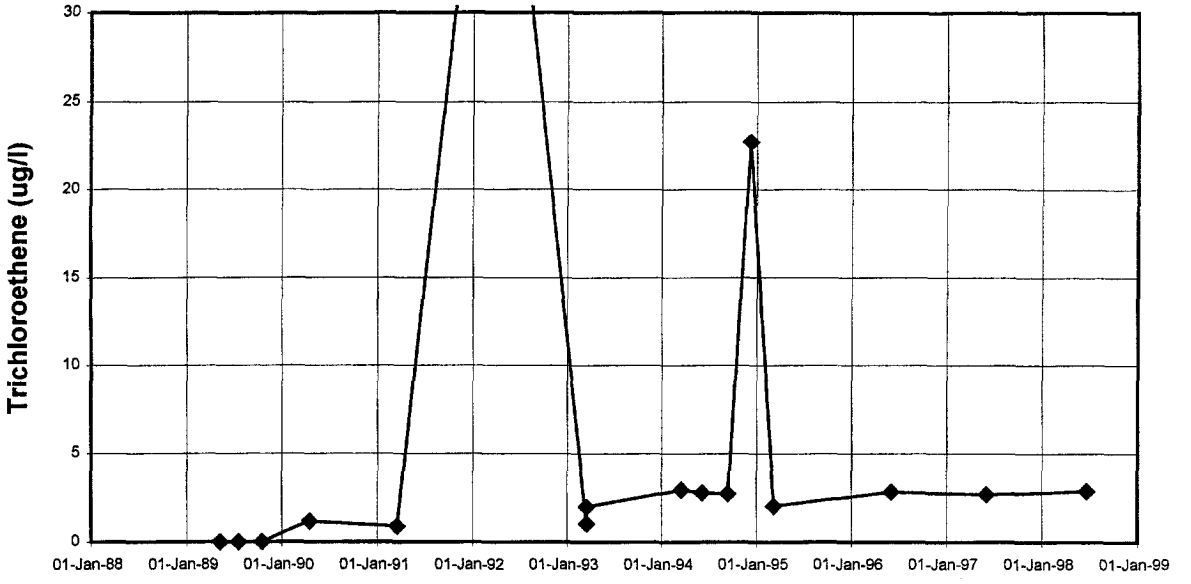
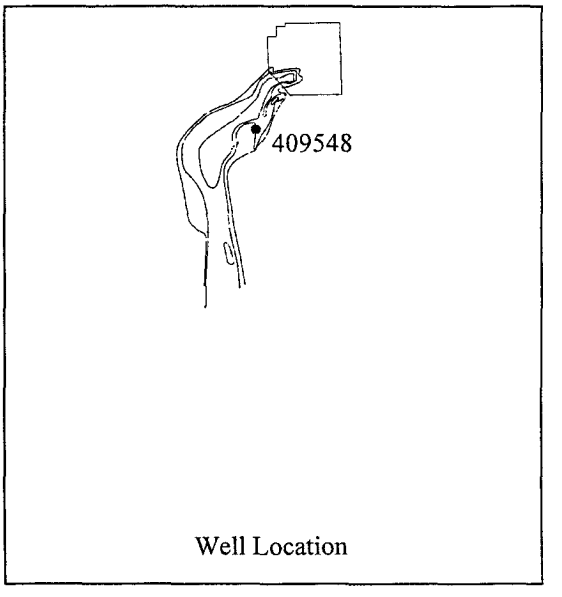
409548



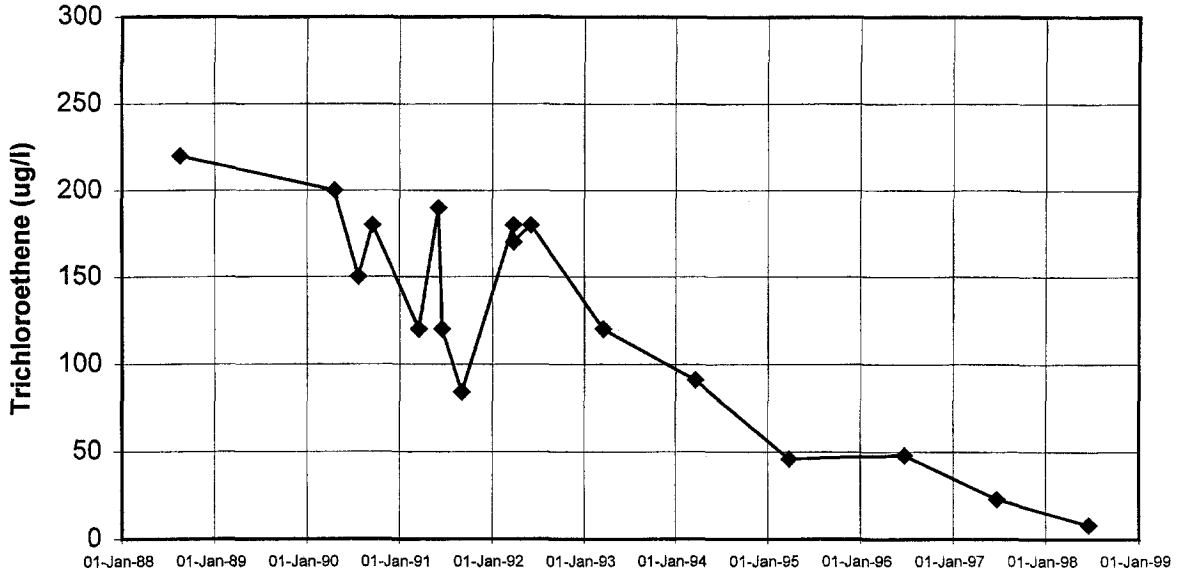
Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



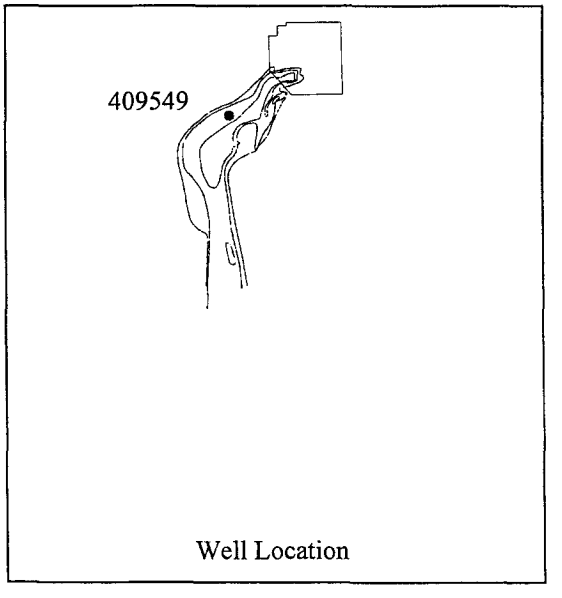
N:\0003\60\GRAPHS\OFF-U4\409548.DOC\TNW-lmh

409549



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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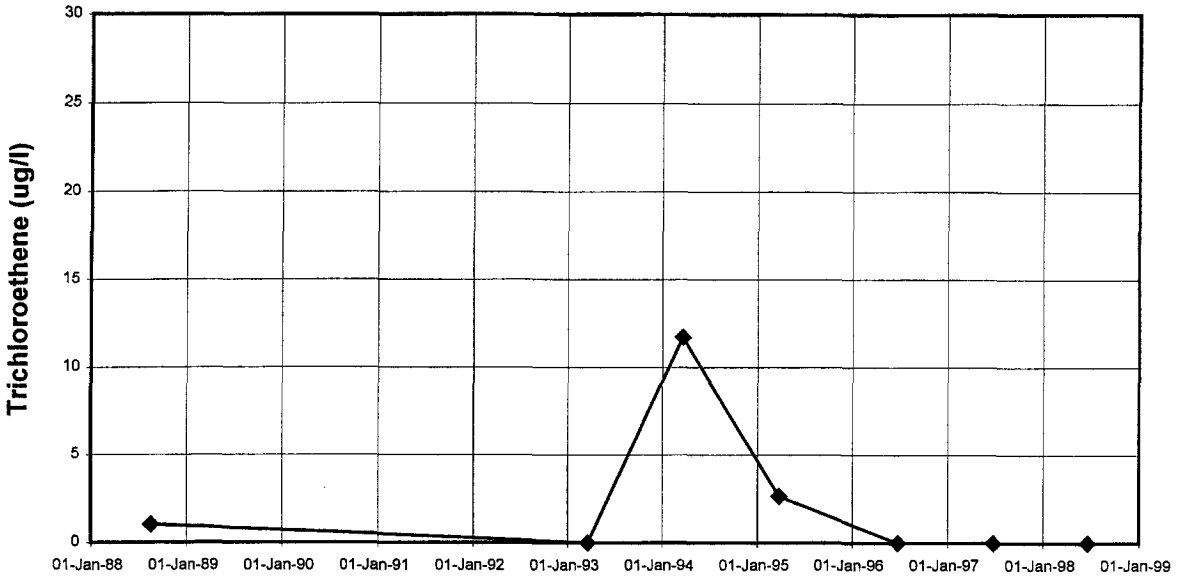
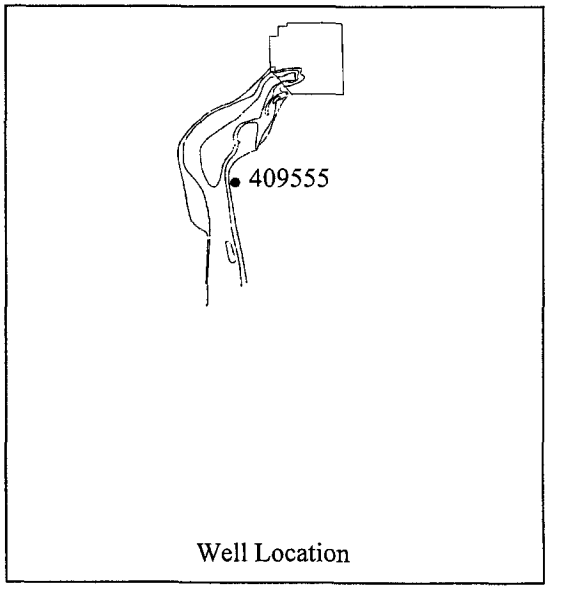
409555



Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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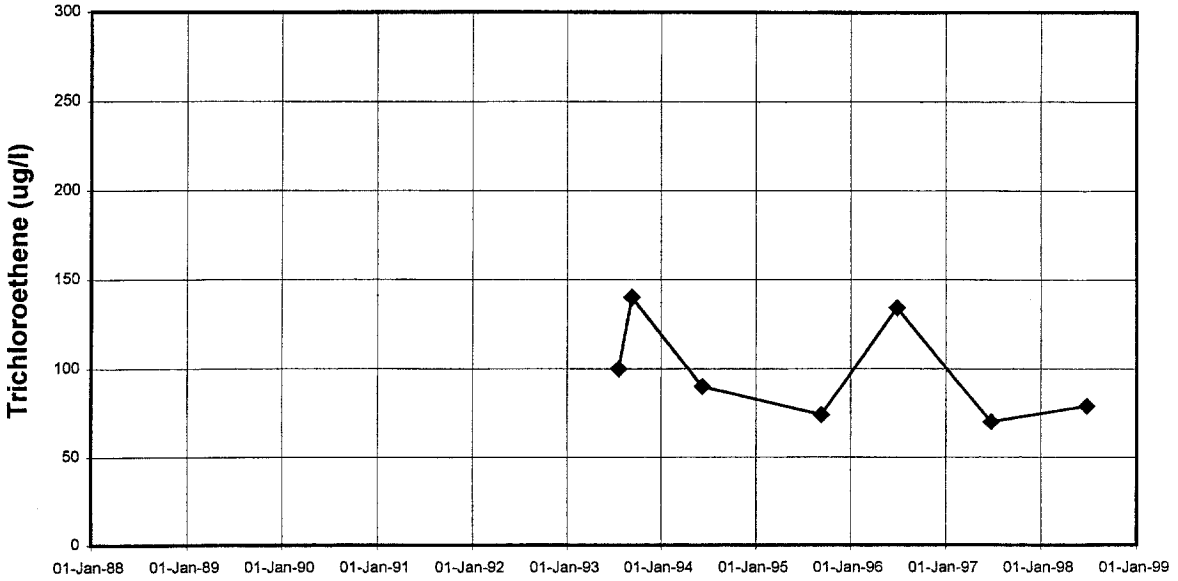
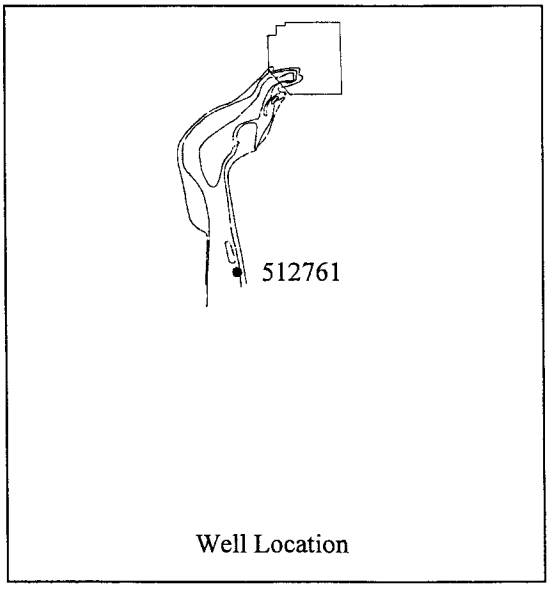
512761



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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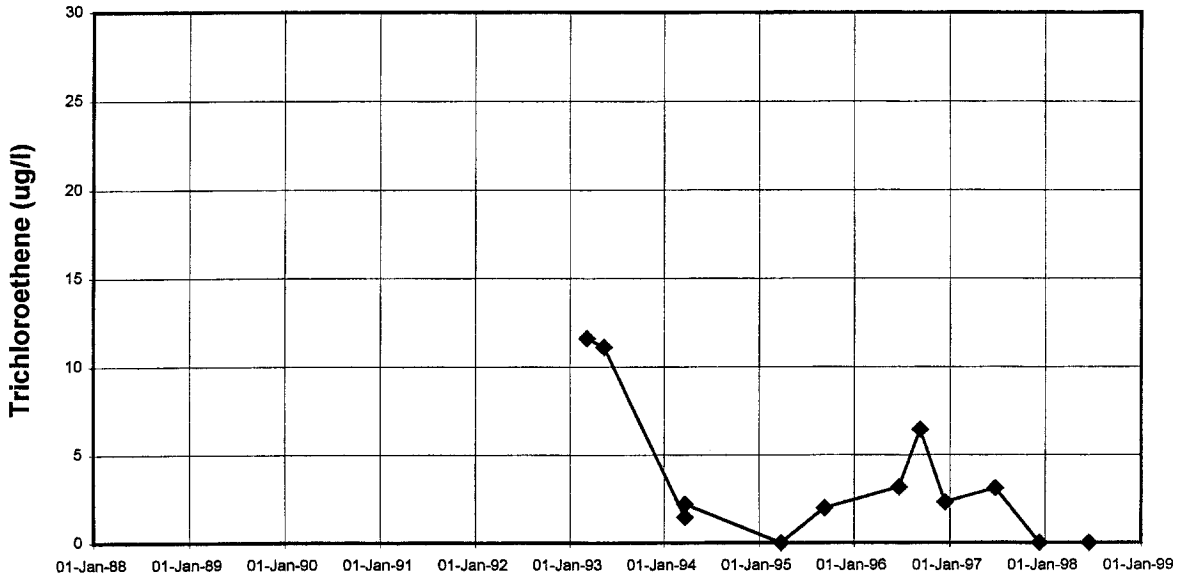
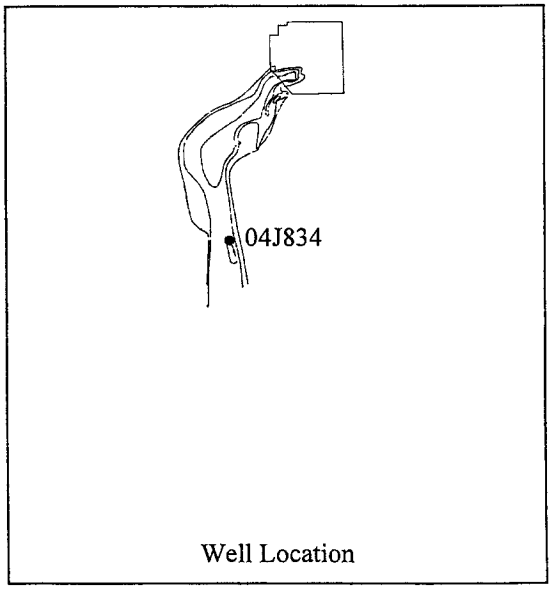
04J834



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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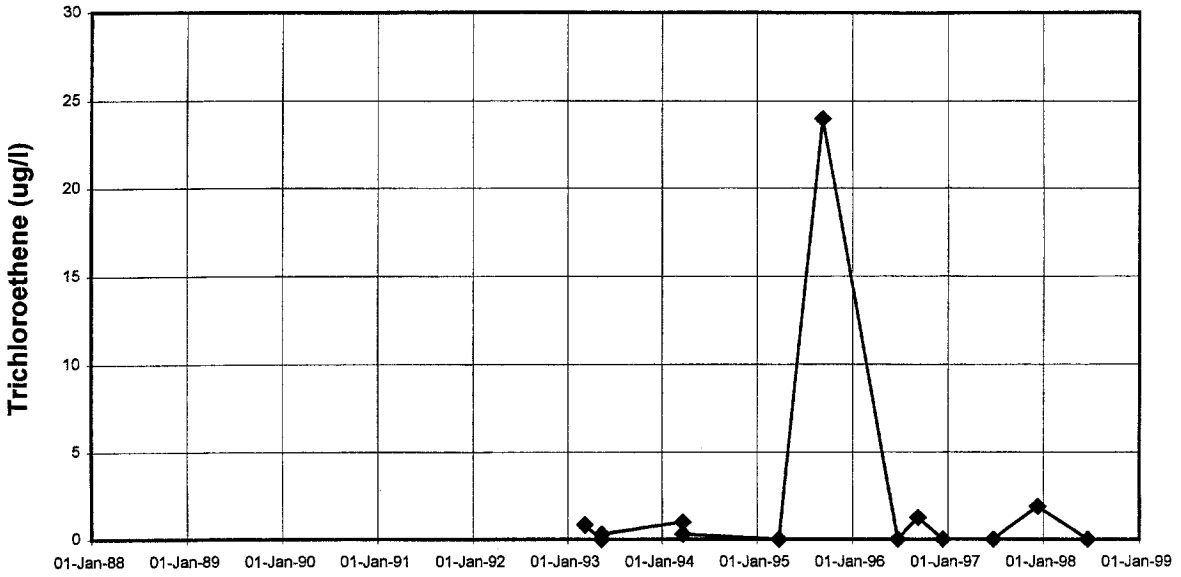
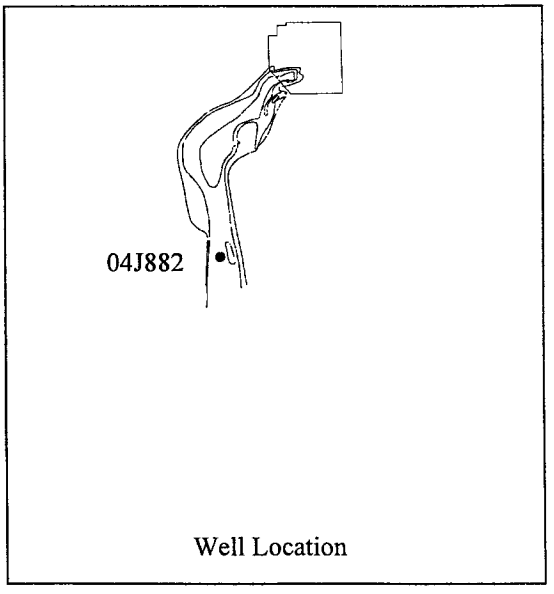
04J882



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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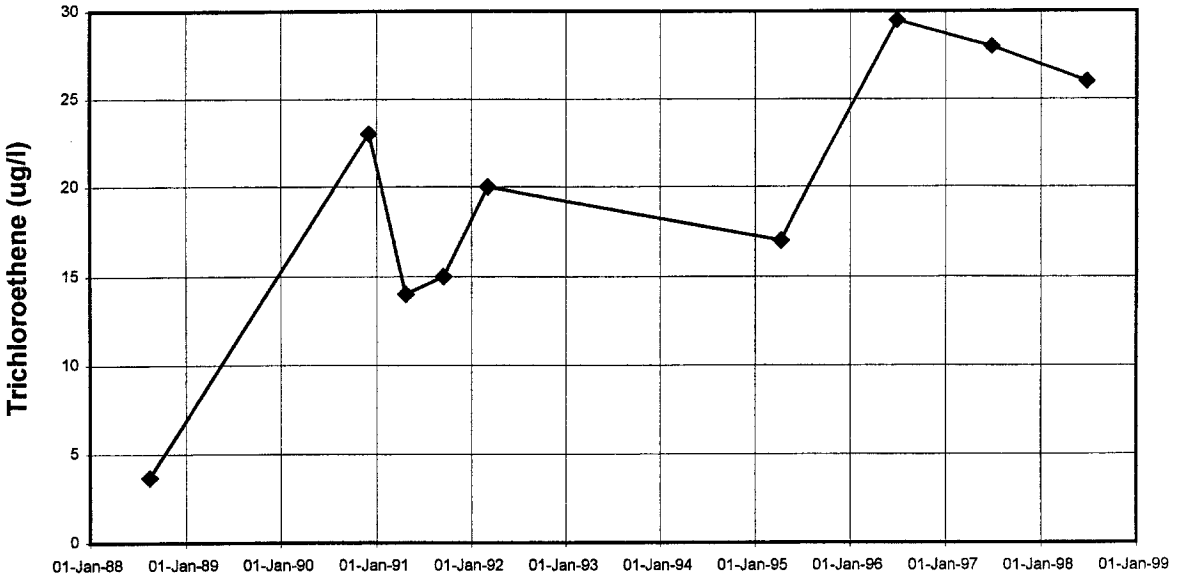
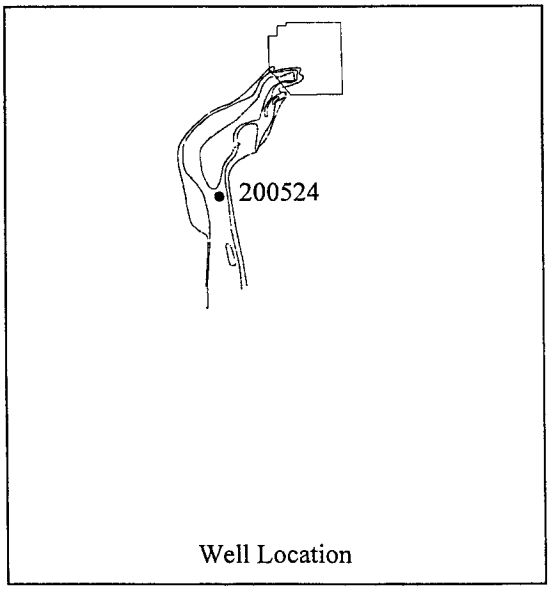
200524



Well Purpose:
Monitor the progress of groundwater cleanup.
This is St. Anthony Municipal Well #5.

Note:
Plume map is from FY 1998.



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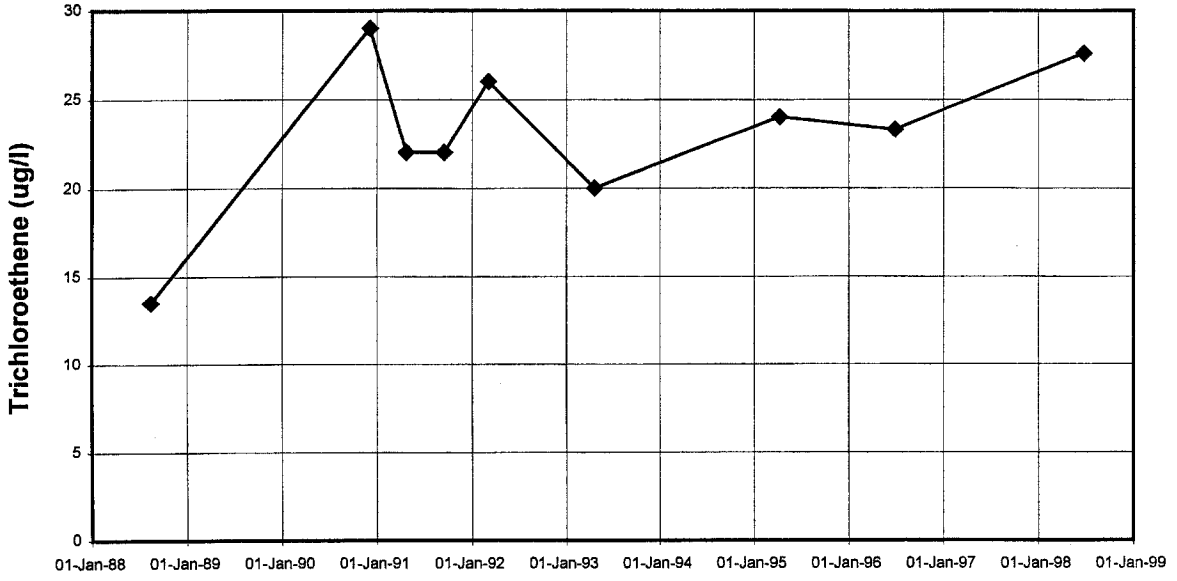
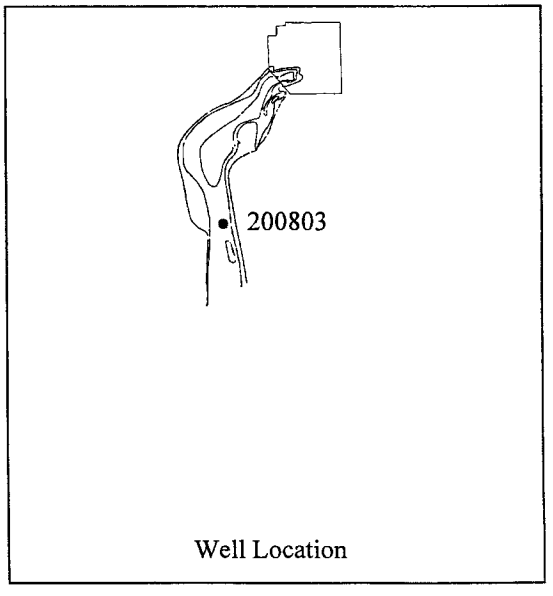
200803

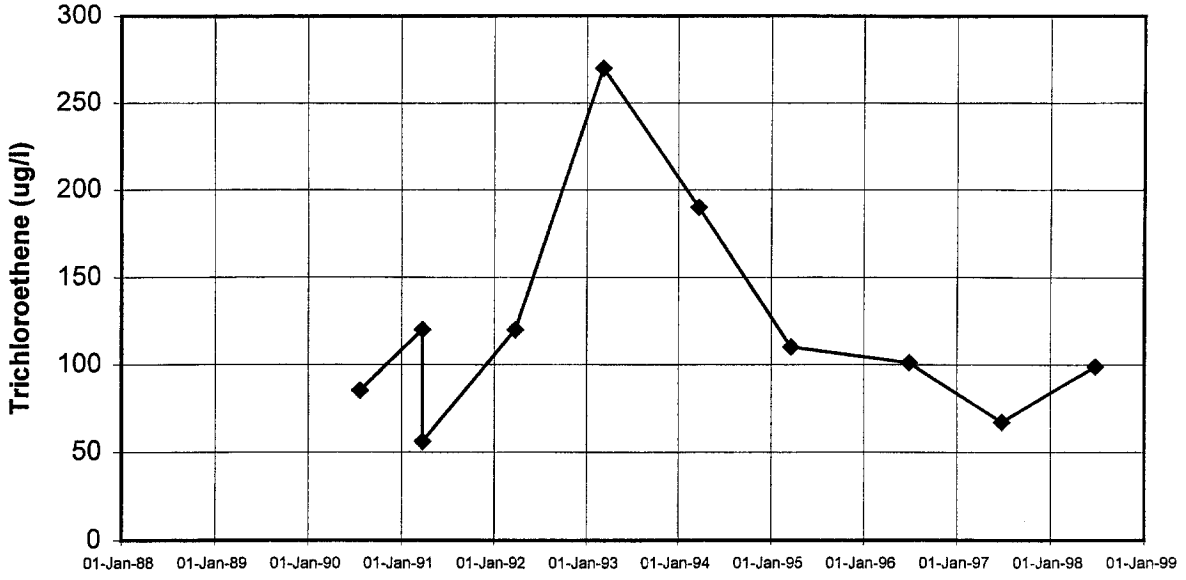


Well Purpose:
Monitor the progress of groundwater cleanup.
This is St. Anthony Municipal Well #4.

Note:
Plume map is from FY 1998.

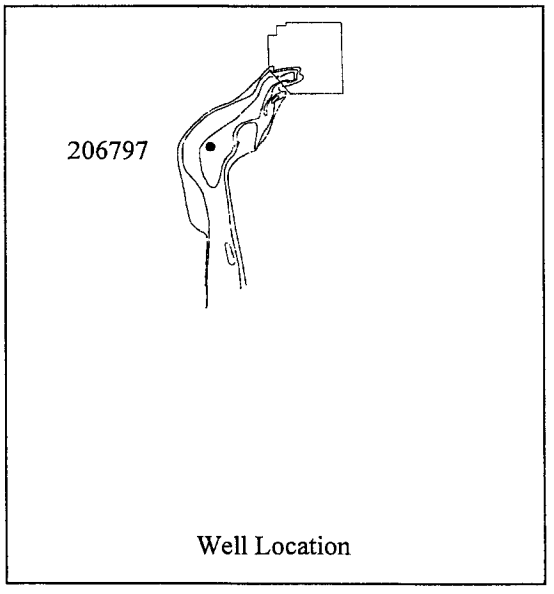


206797

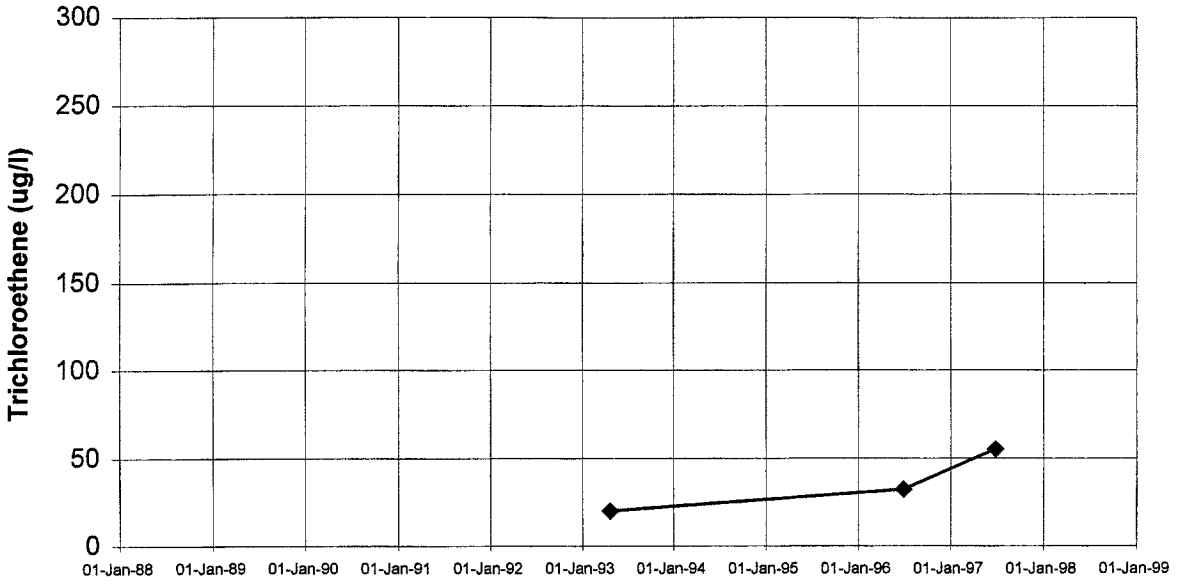


Well Purpose:
Monitor the progress of groundwater cleanup.
This is New Brighton Municipal Well #6.

Note:
Plume map is from FY 1998.

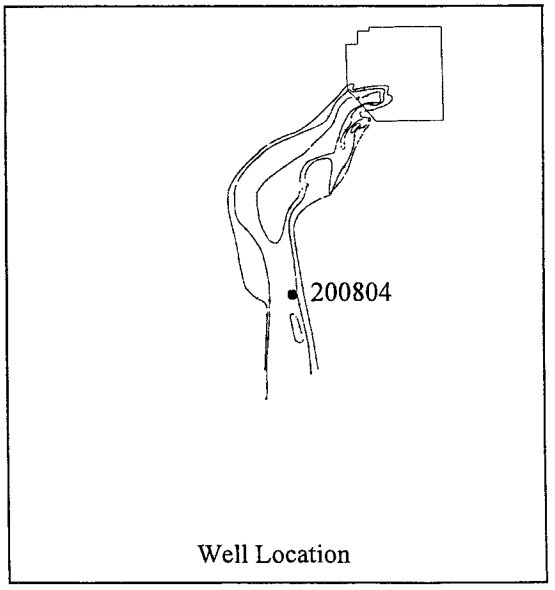


200804

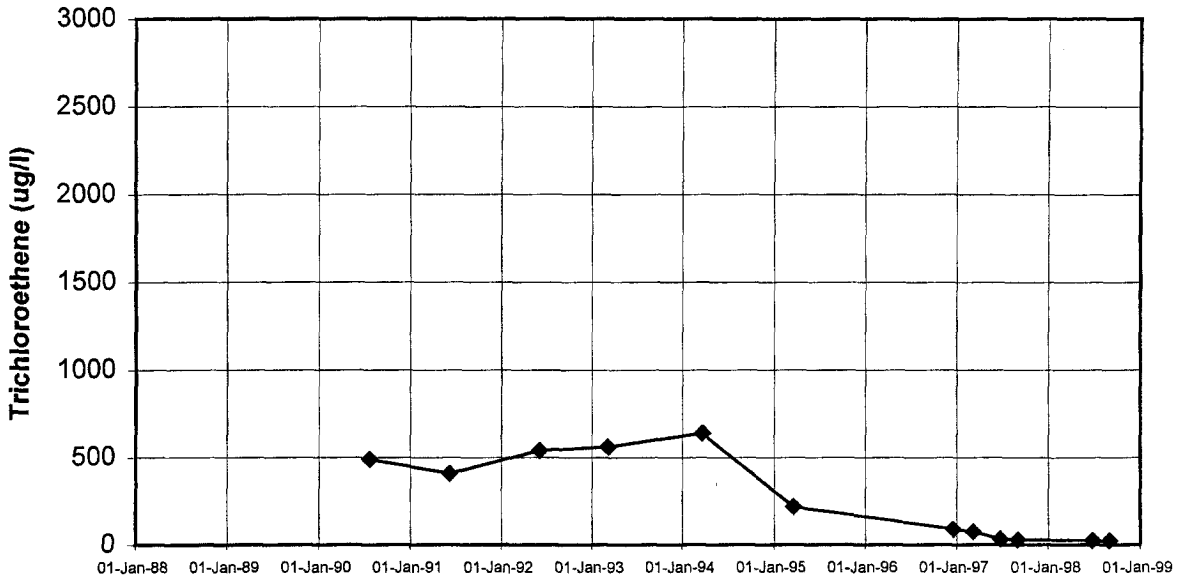


Well Purpose:
Monitor the progress of groundwater cleanup.
This is St. Anthony Municipal Well #3.

Note:
Plume map is from FY 1998.

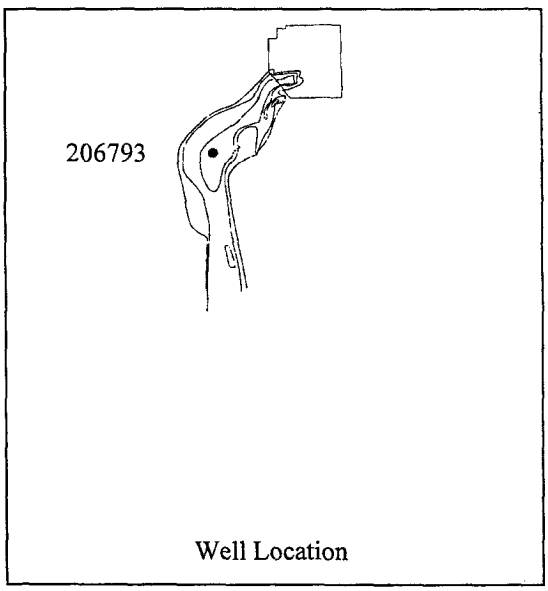


206793



Well Purpose:
Monitor the progress of groundwater cleanup.
This is New Brighton Municipal Well #3.

Note:
Plume map is from FY 1998.



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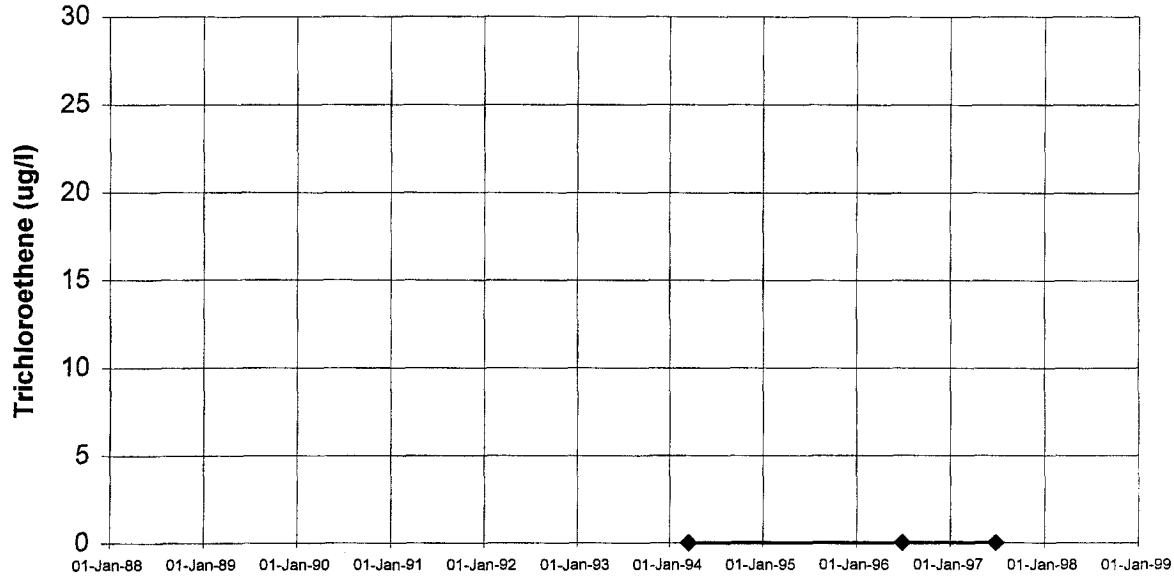
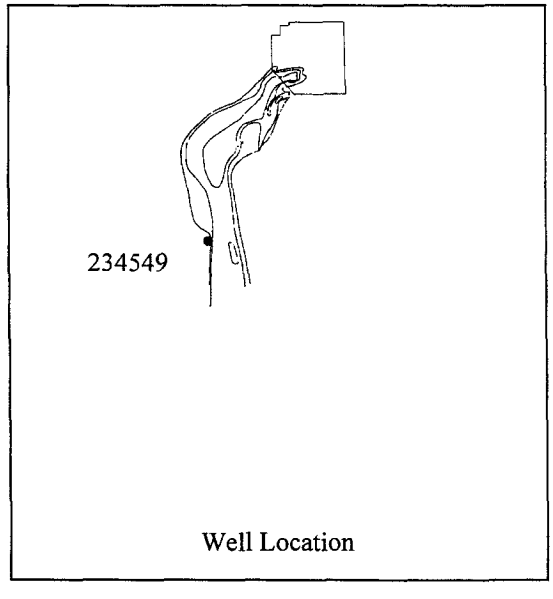
234549

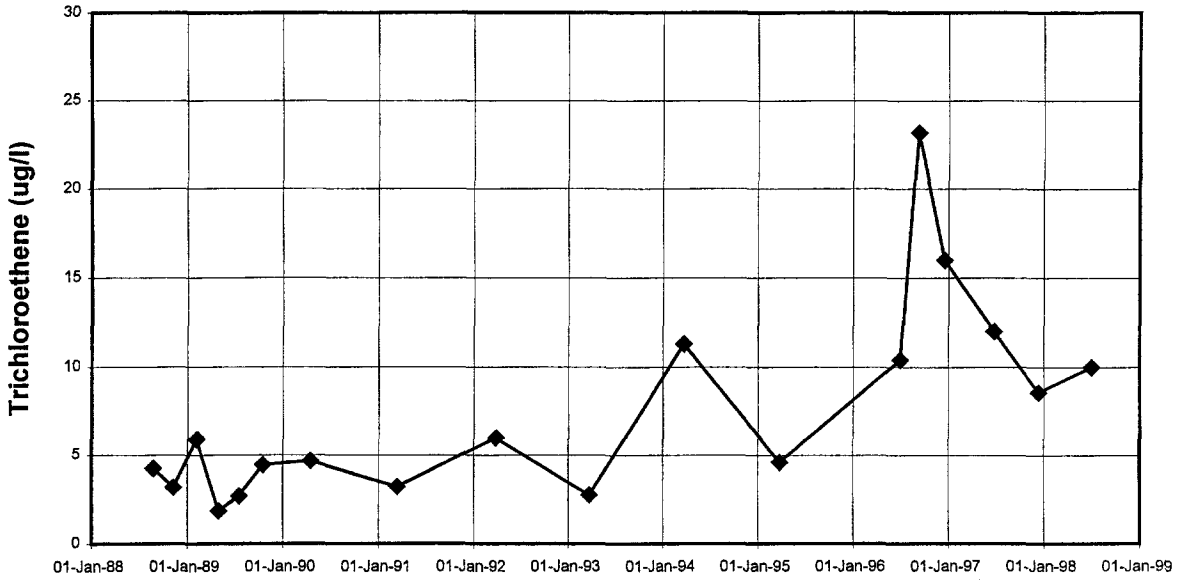


Well Purpose:
To check that the edge of the plume does not spread outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

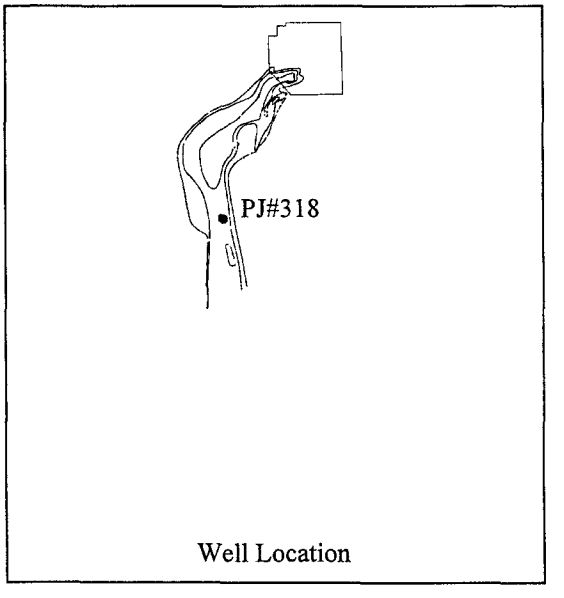


PJ#318



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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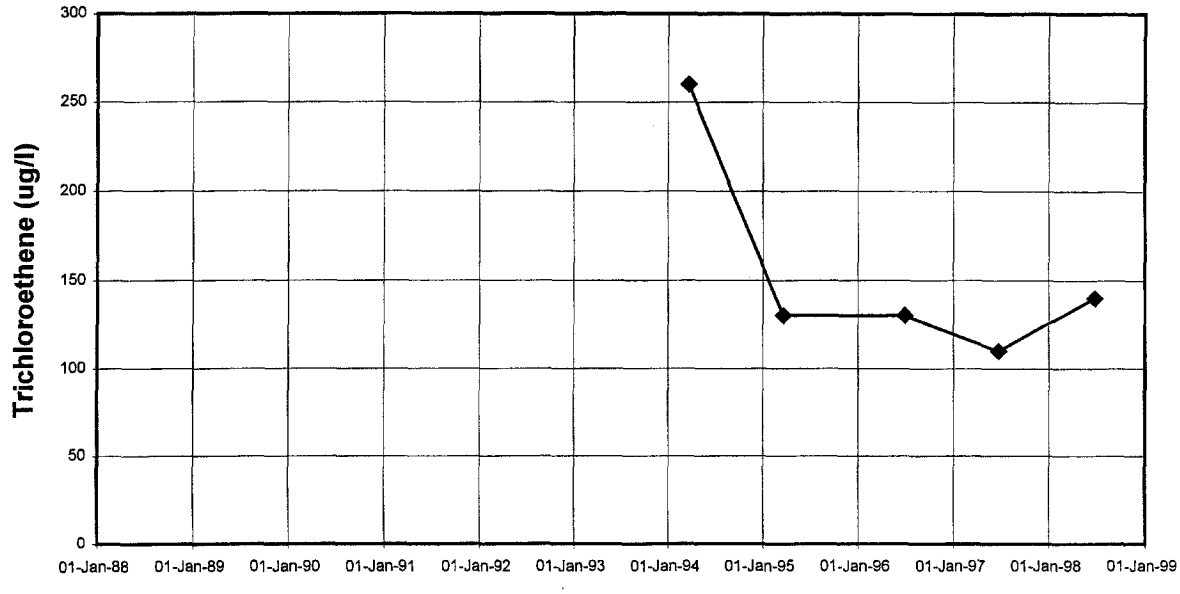
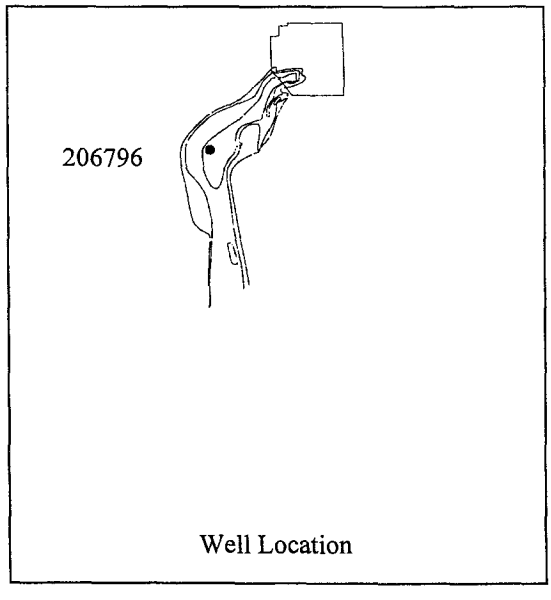
206796



Well Purpose:
Monitor the progress of groundwater cleanup.
This is New Brighton Municipal Well #5.

Note:
Plume map is from FY 1998.



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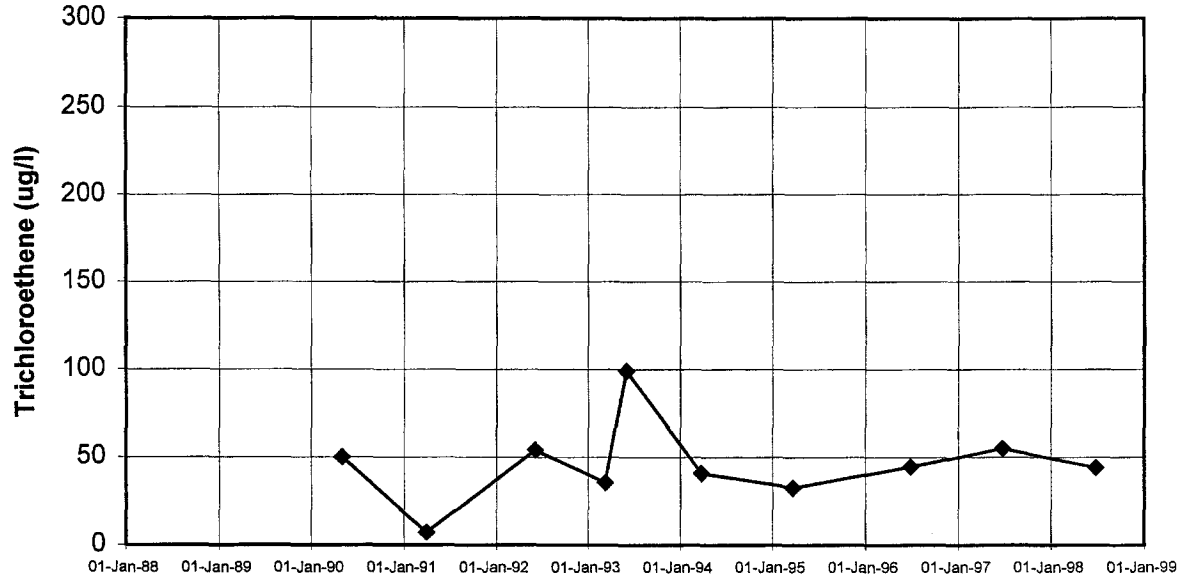
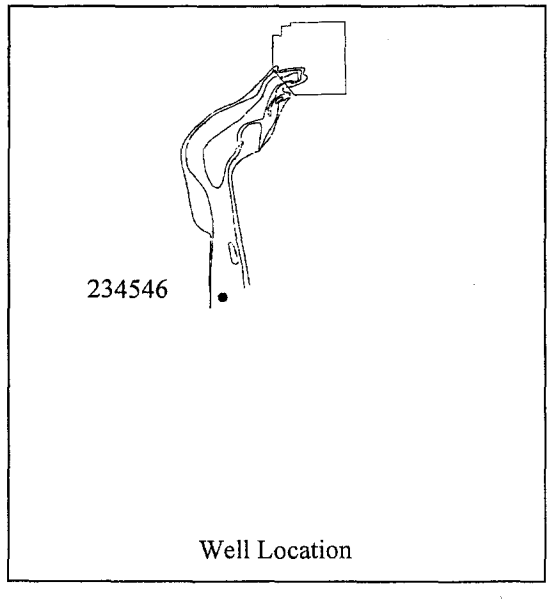
234546



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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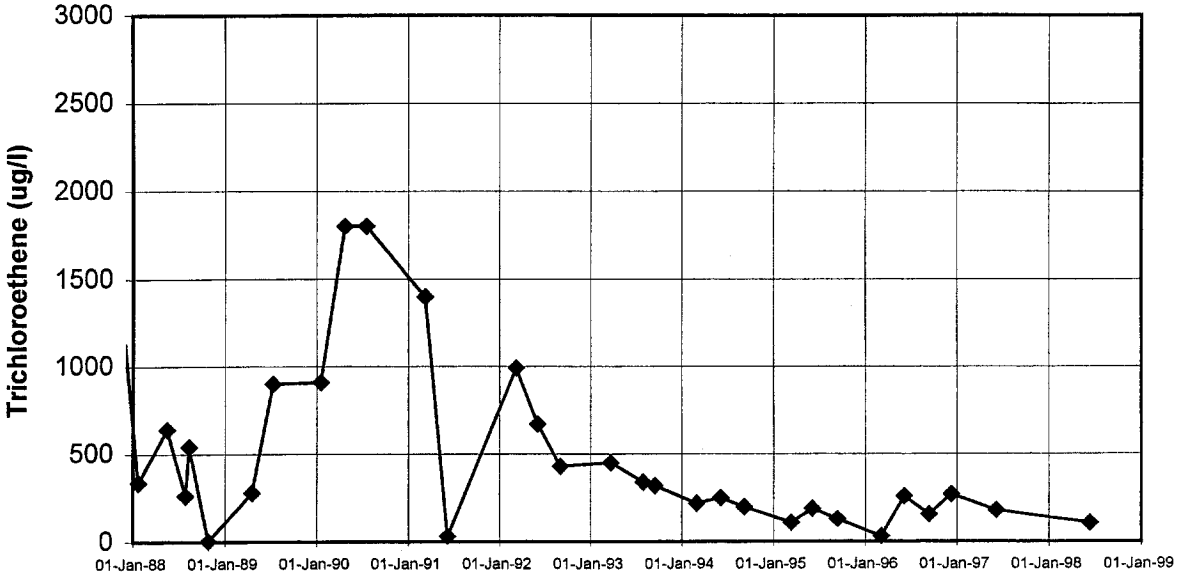
OU2

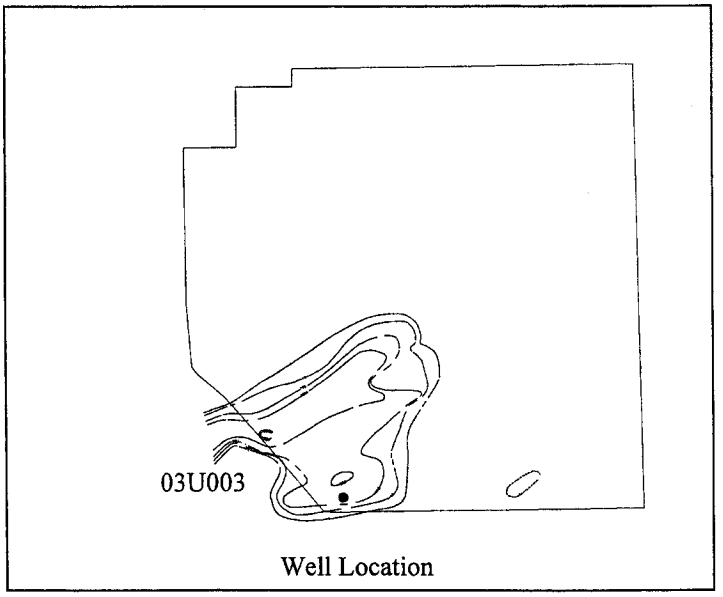
Upper Unit 3 Wells

03U003



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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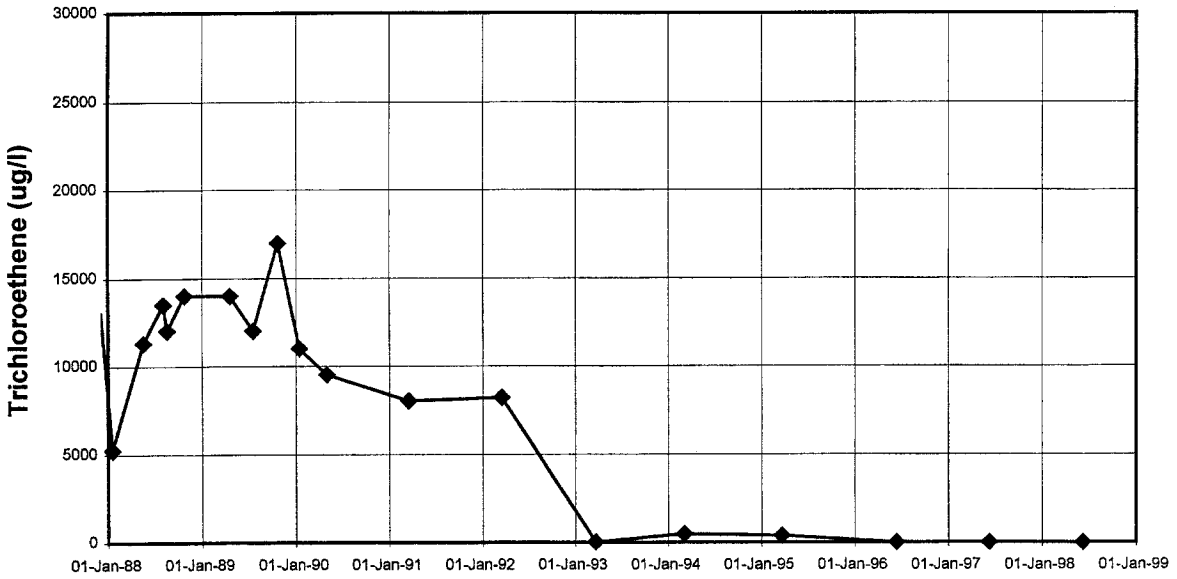
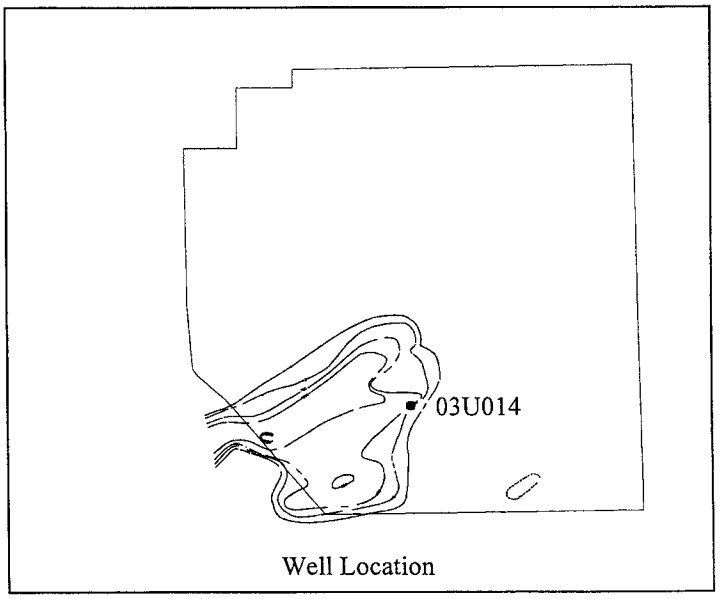
03U014



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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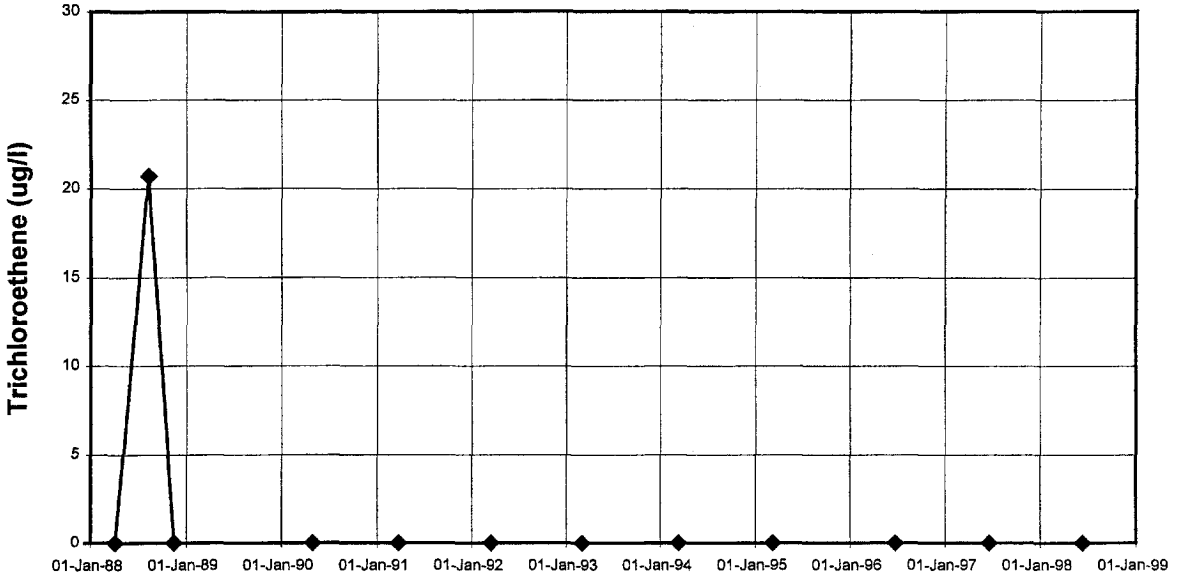
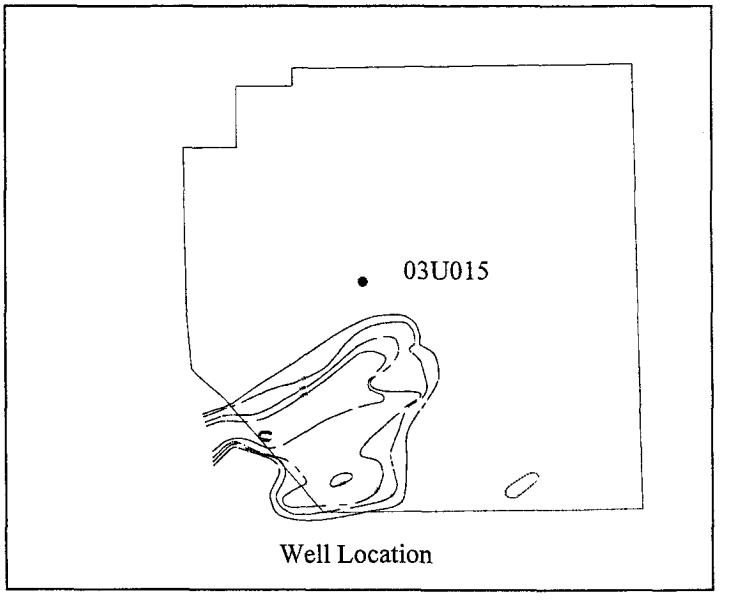
03U015

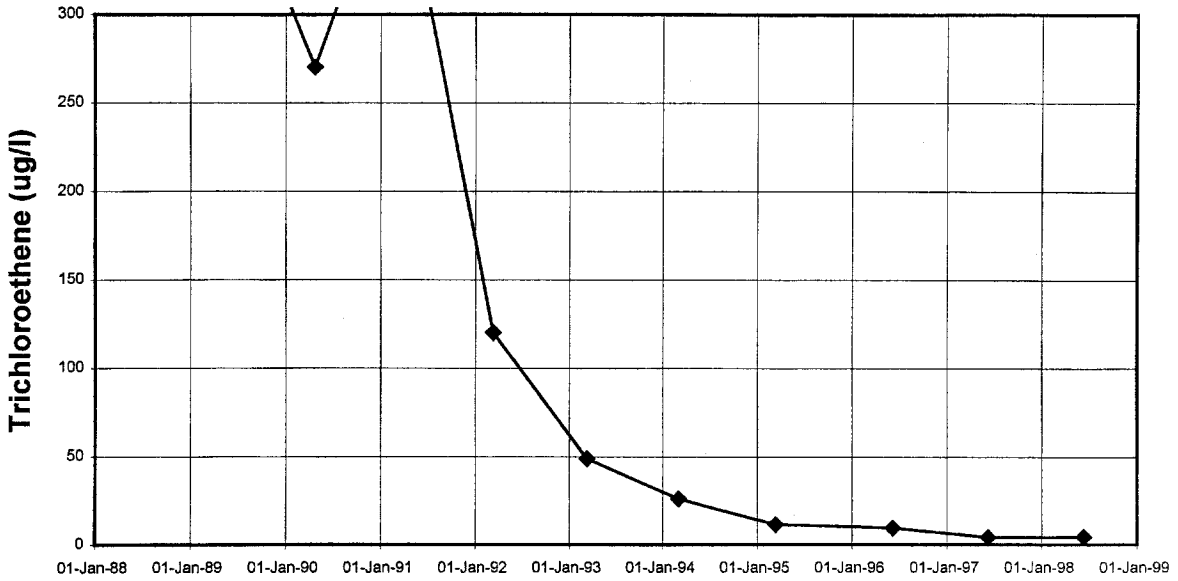


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

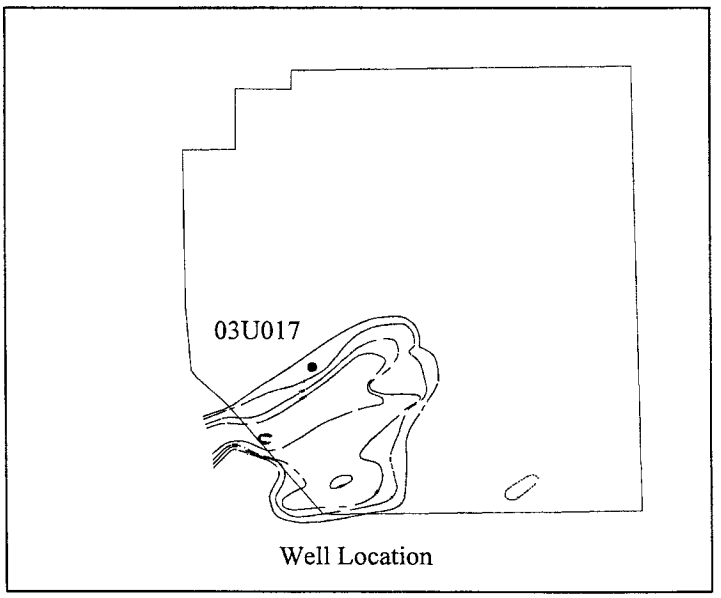


03U017

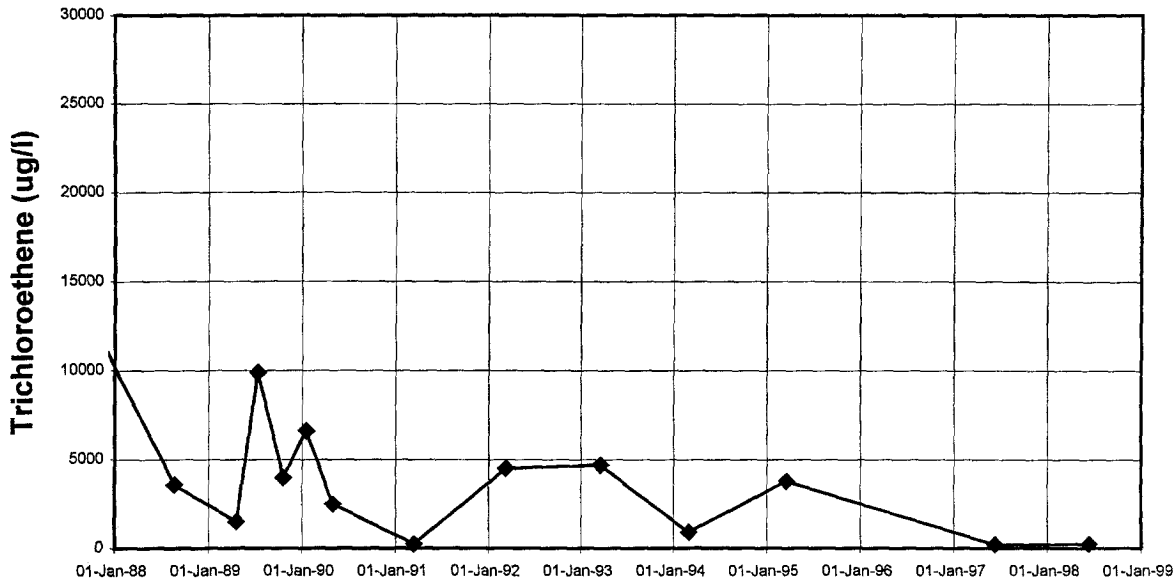


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

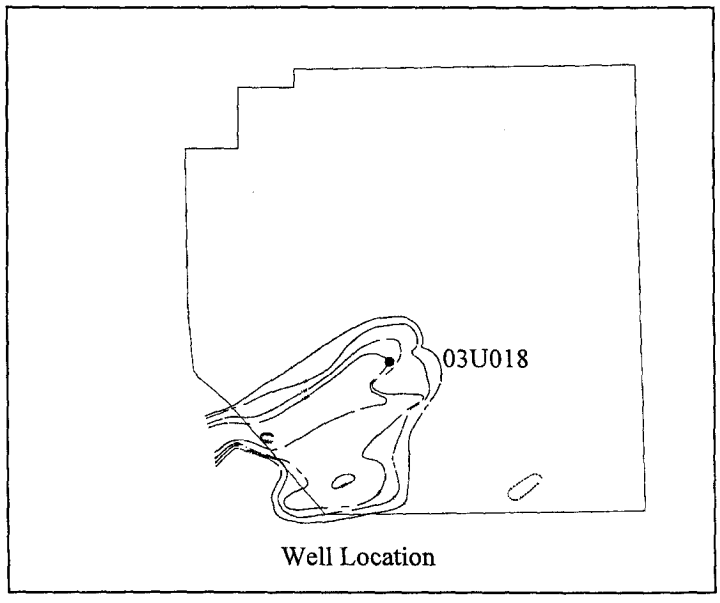


03U018

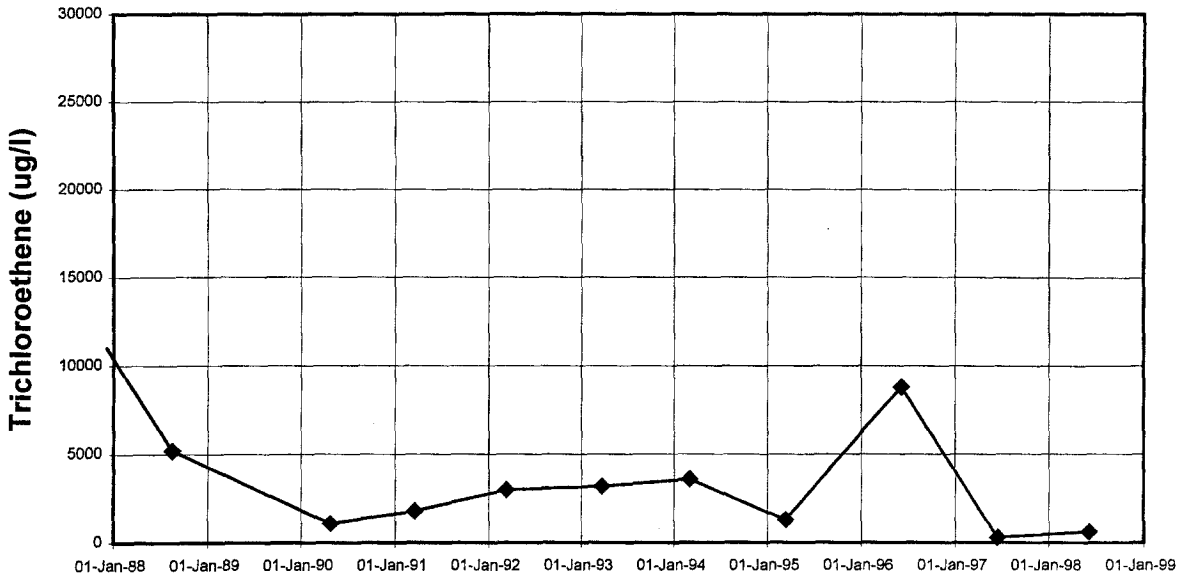


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

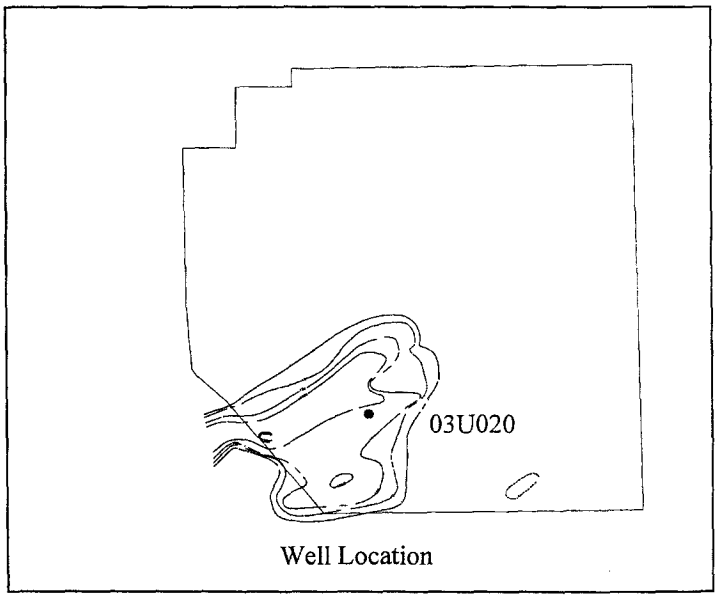


03U020



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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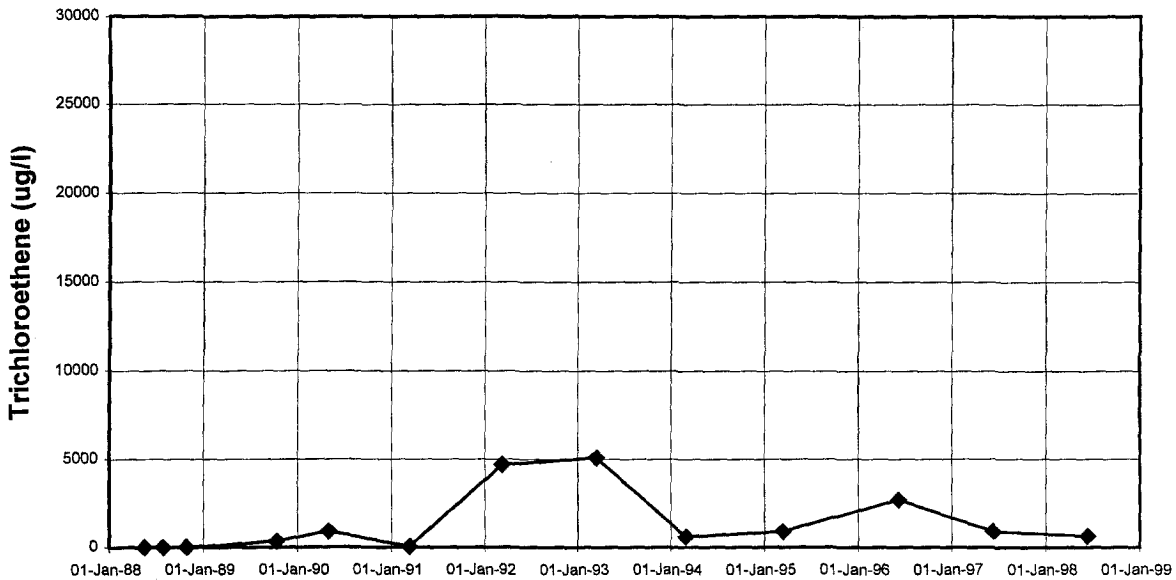
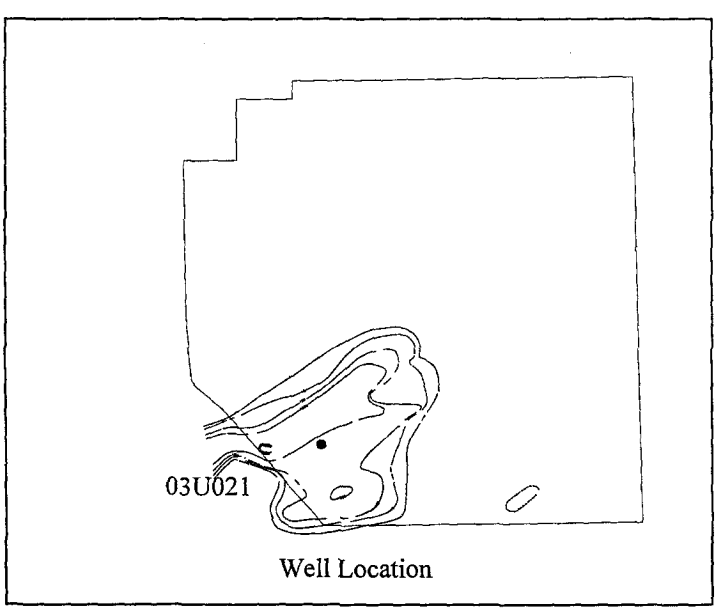
03U021



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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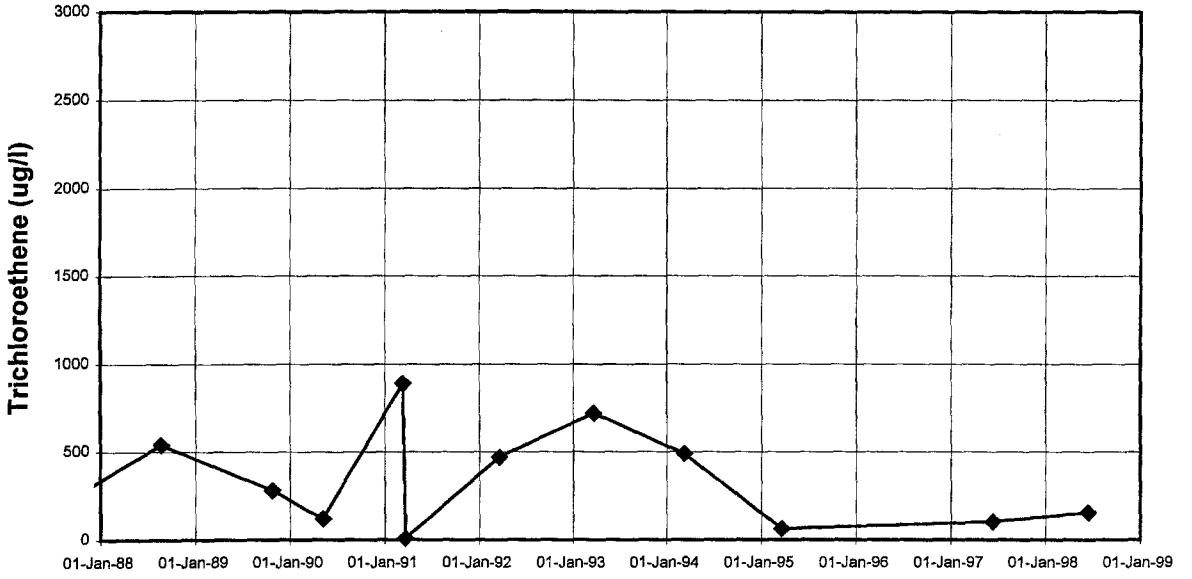
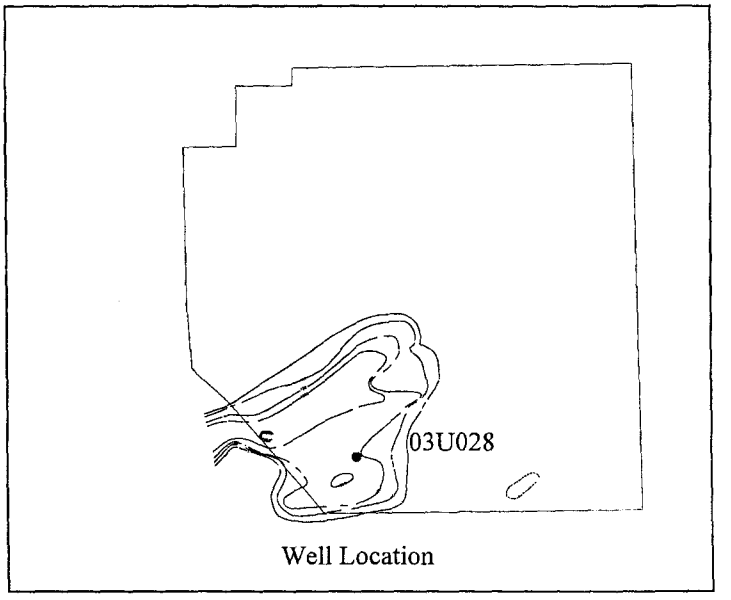
03U028

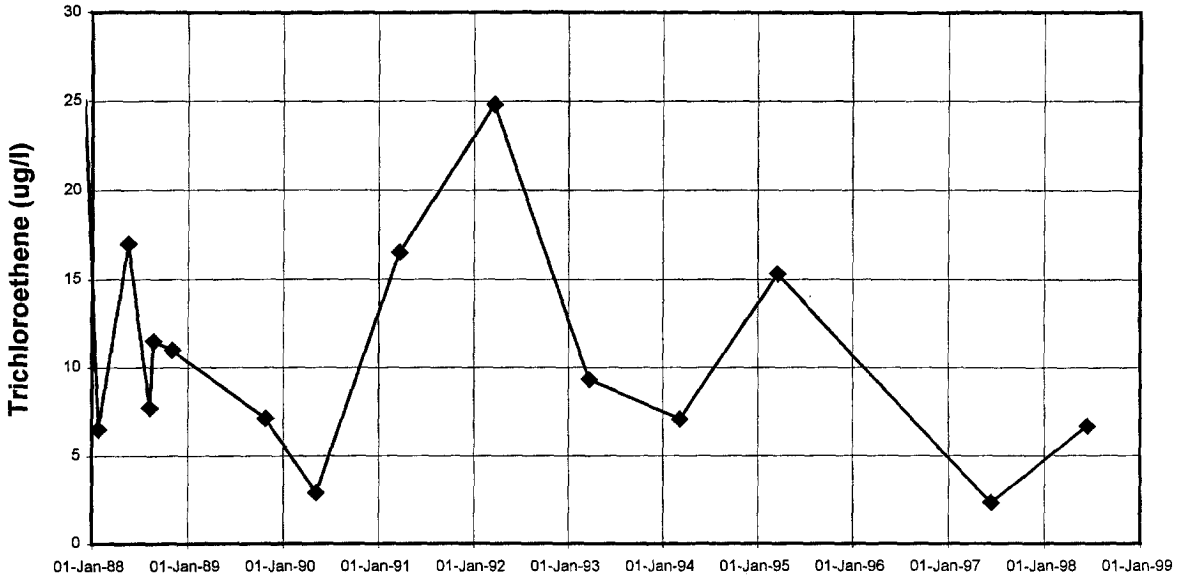


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

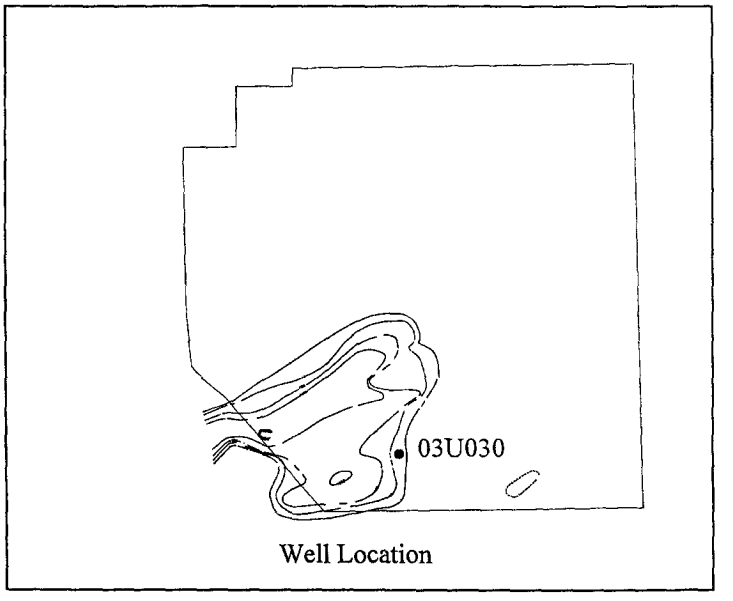


03U030



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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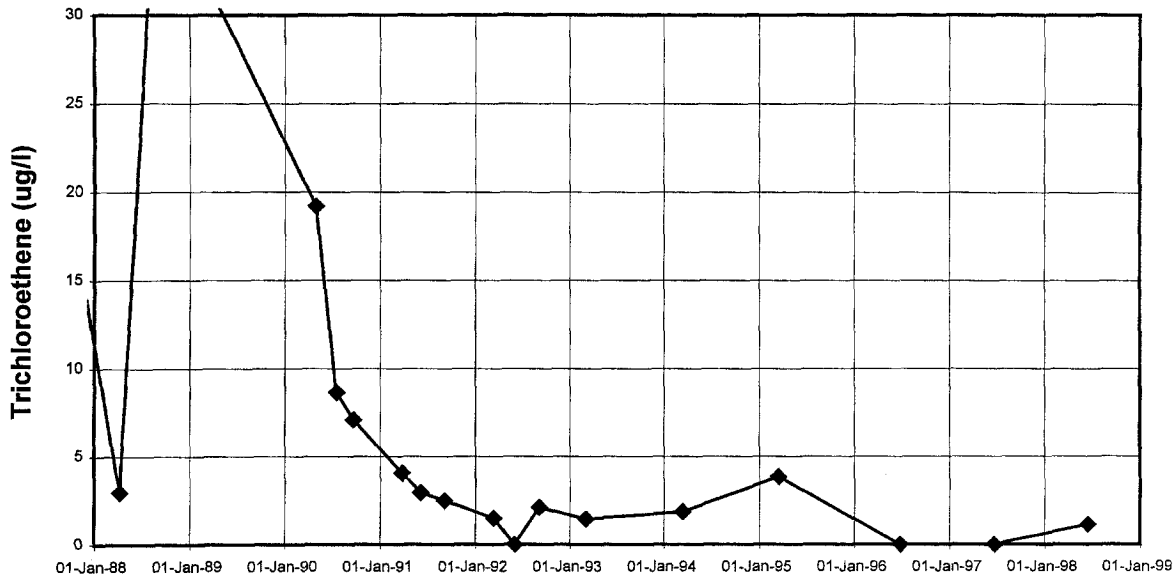
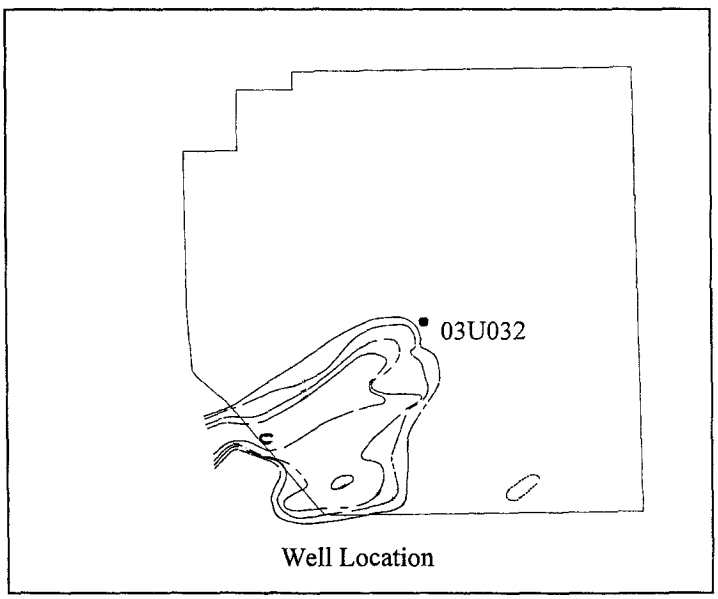
03U032



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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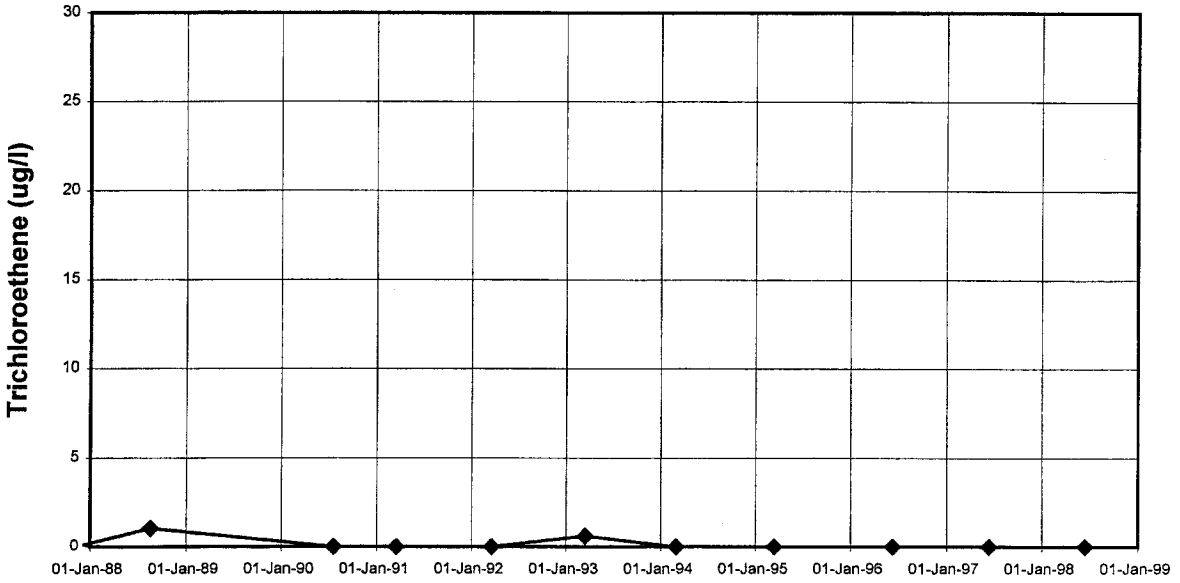
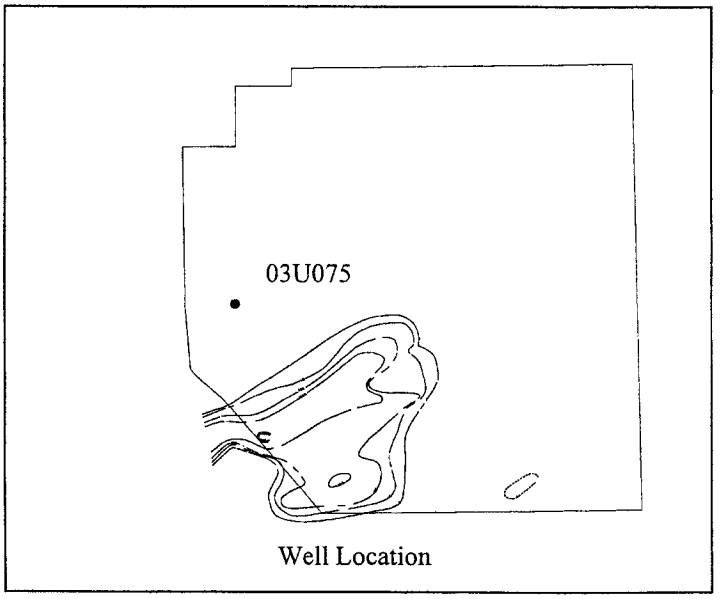
03U075



Well Purpose:
Monitor deep groundwater downgradient of Site K.

Note:
Plume map is from FY 1998.



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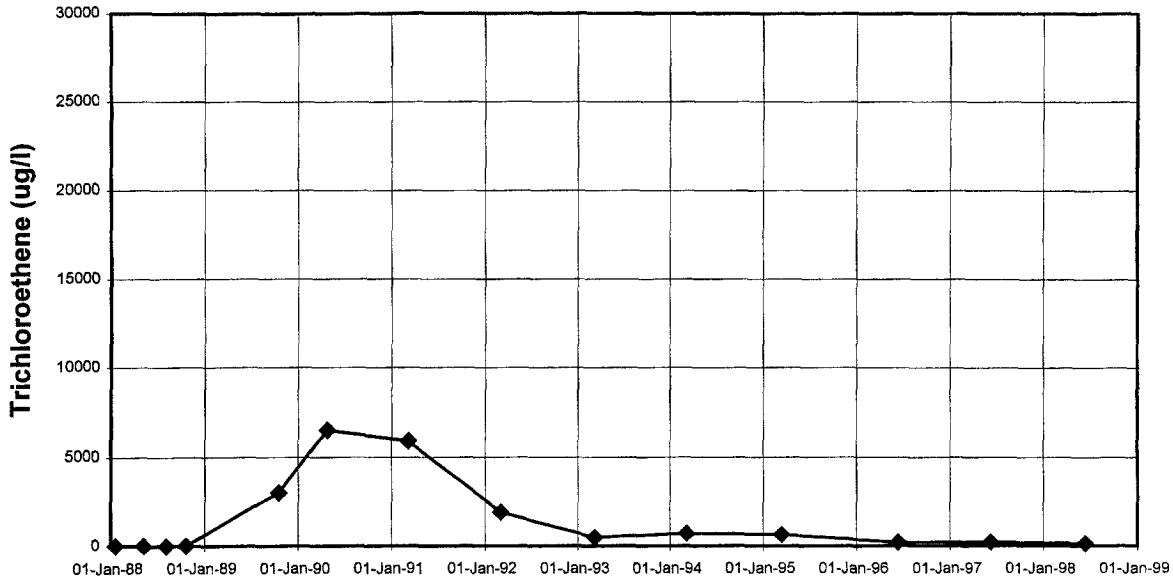
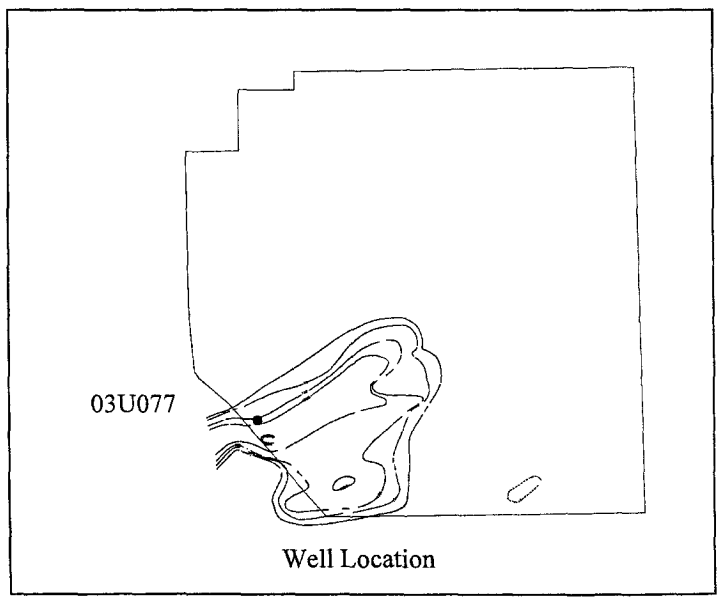
03U077

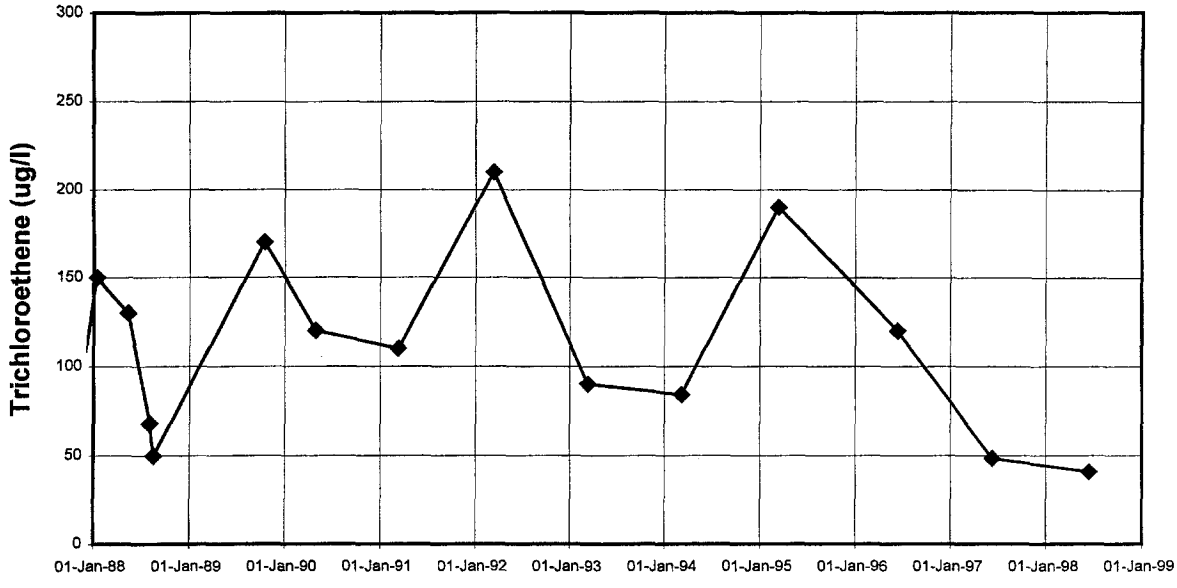


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

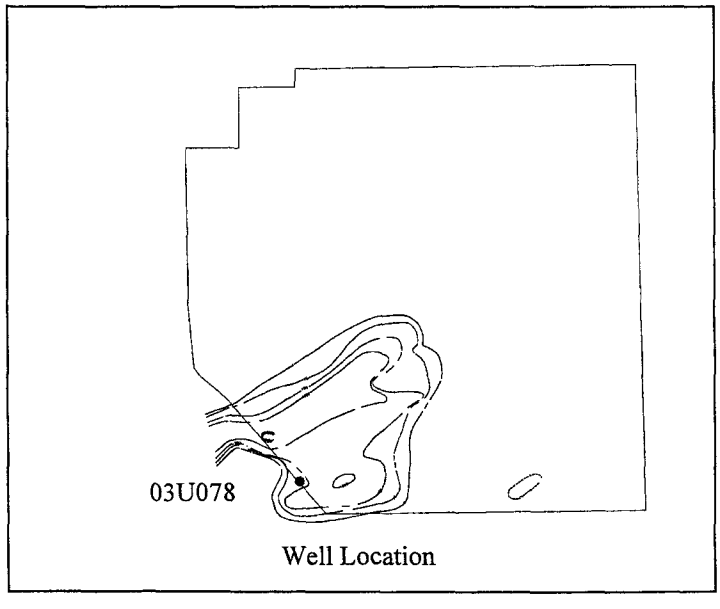


03U078

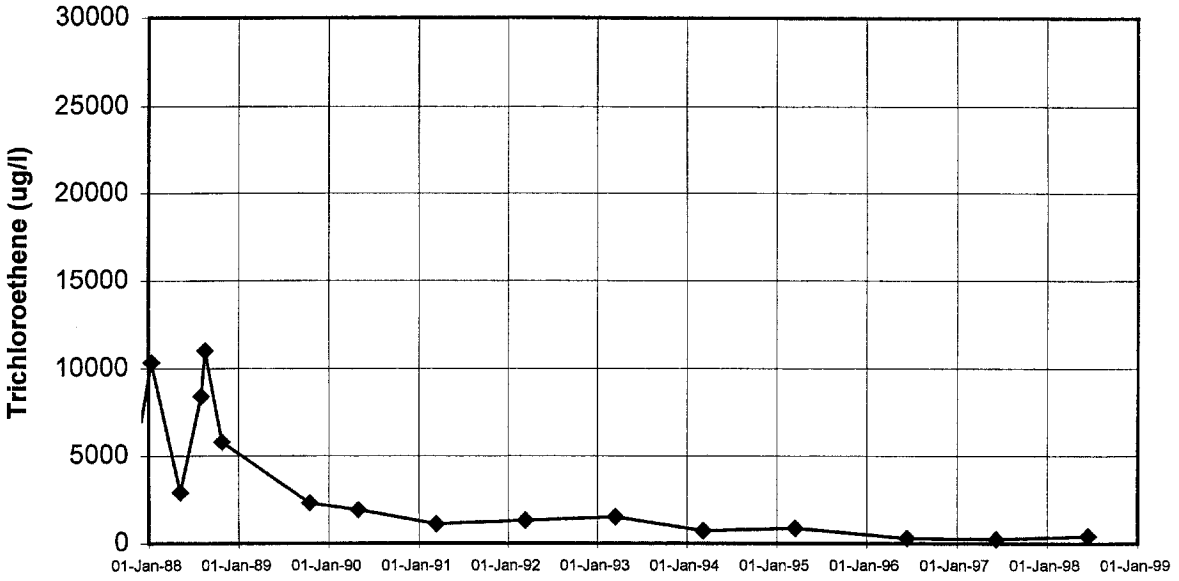


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

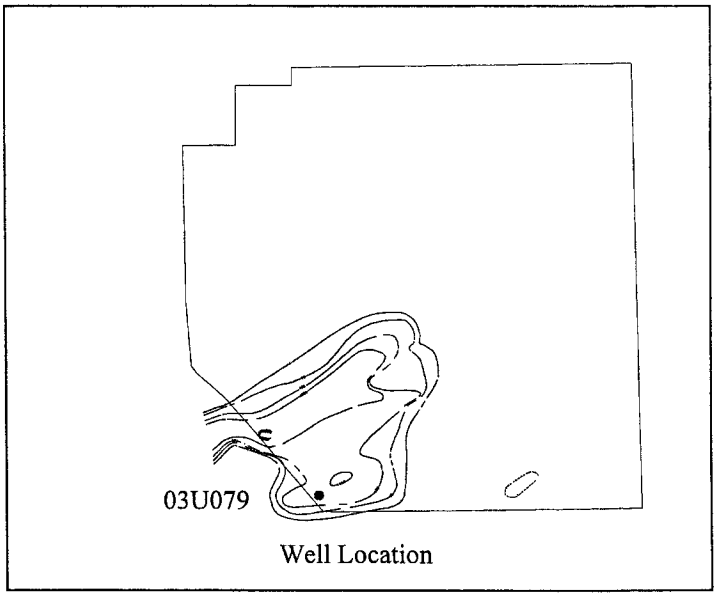


03U079

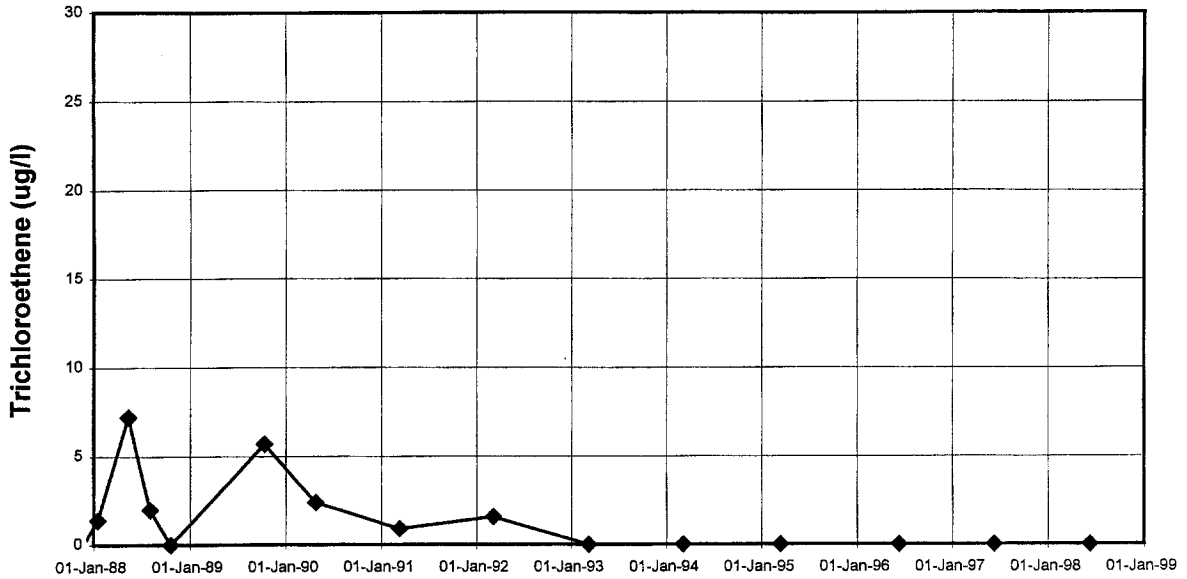


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

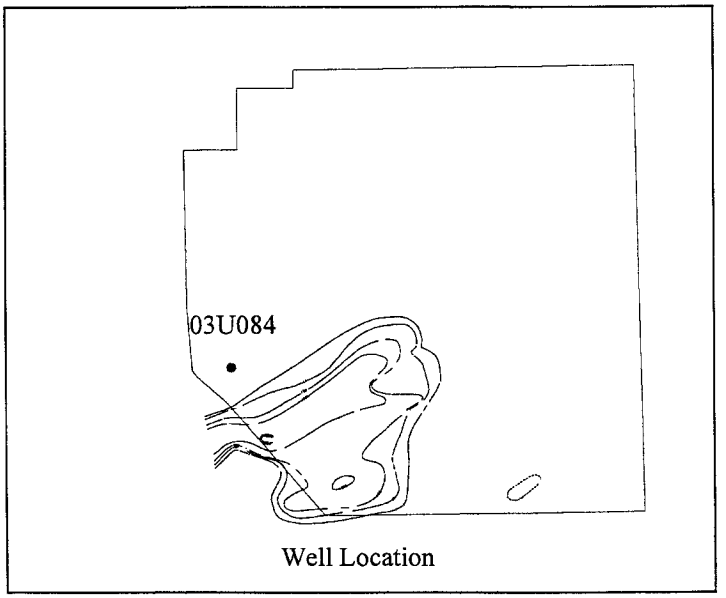


03U084

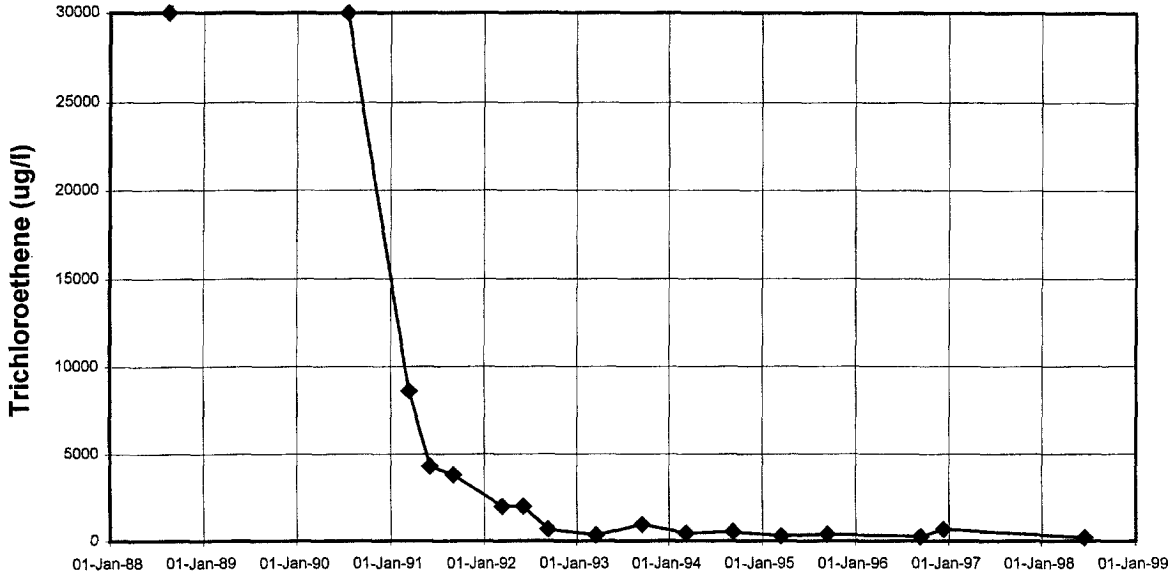


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

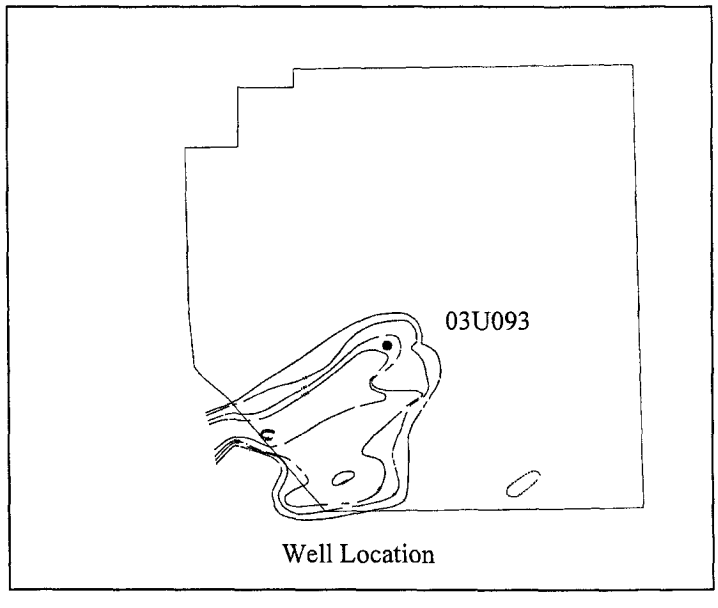


03U093

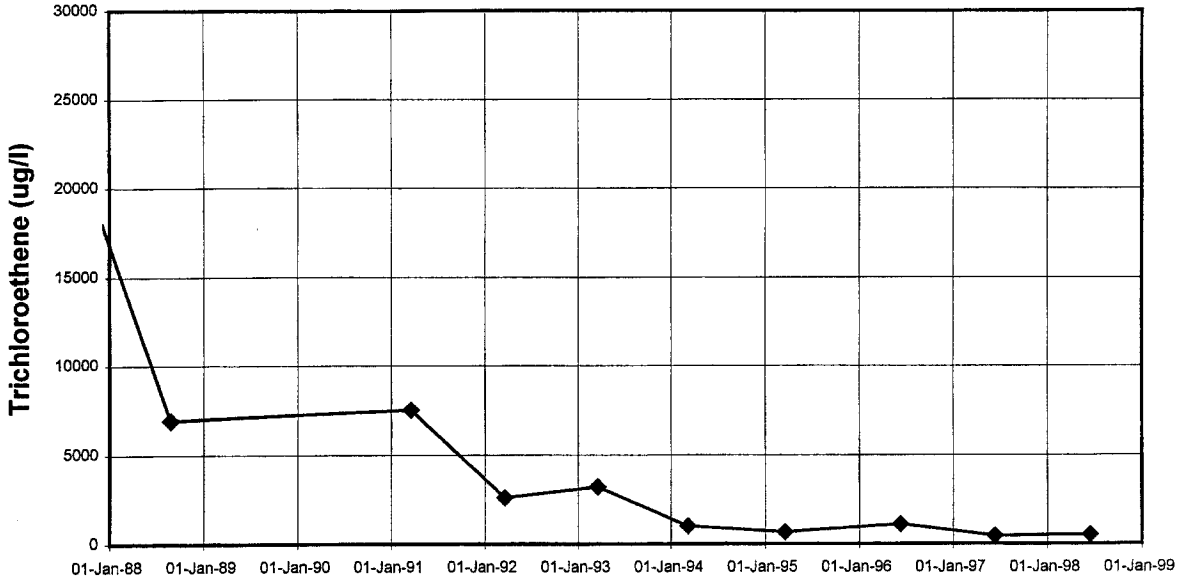


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

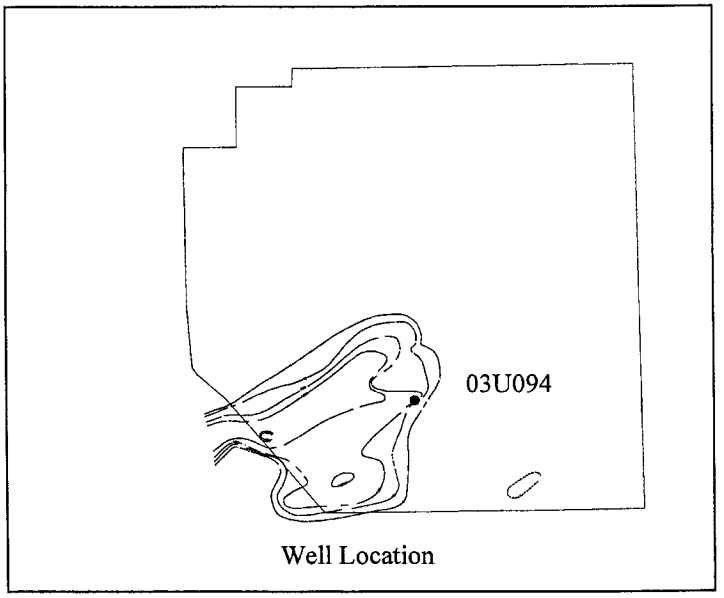


03U094



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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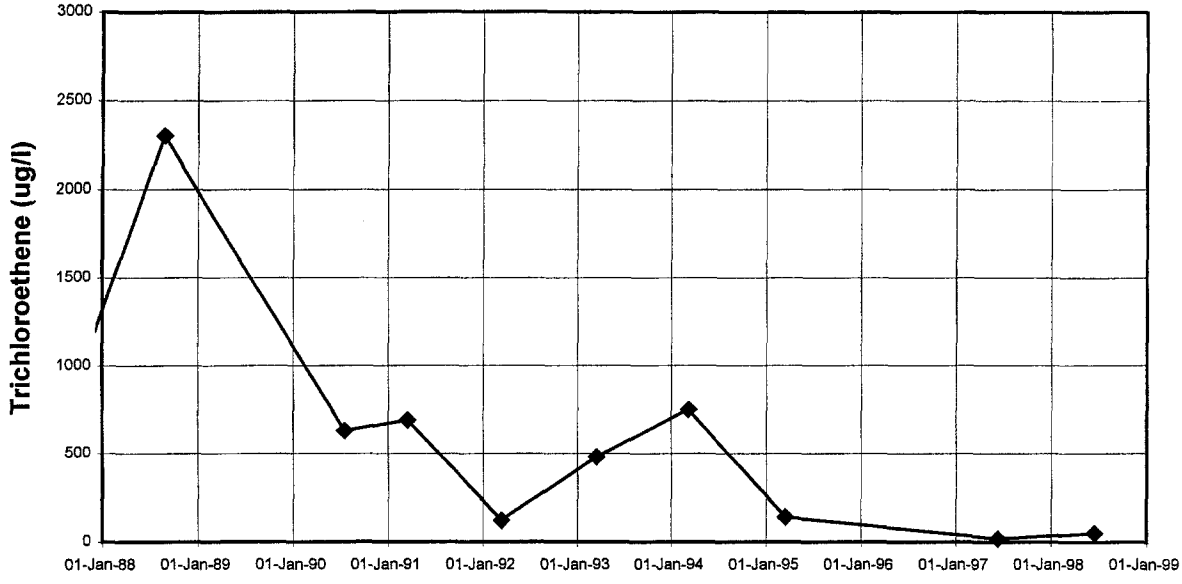
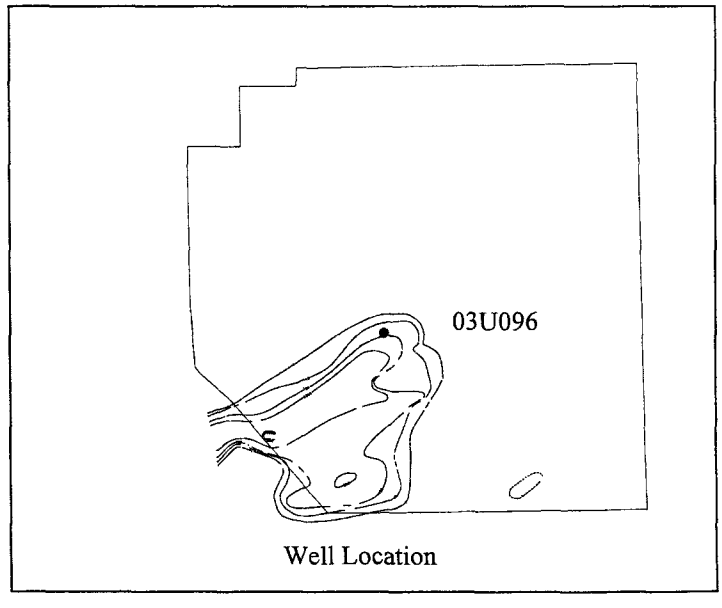
03U096

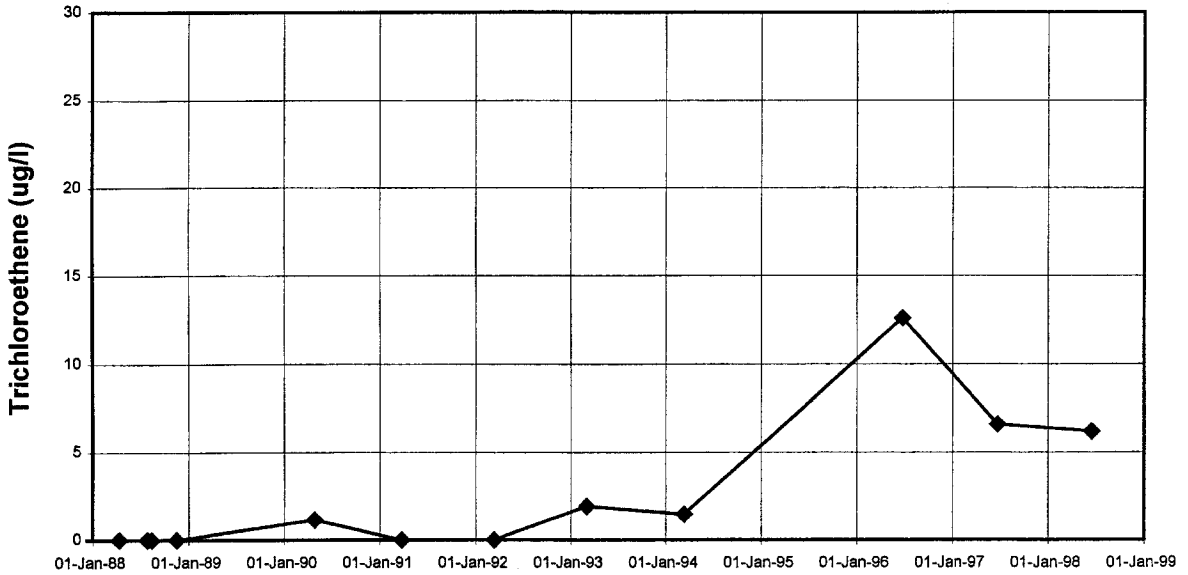


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

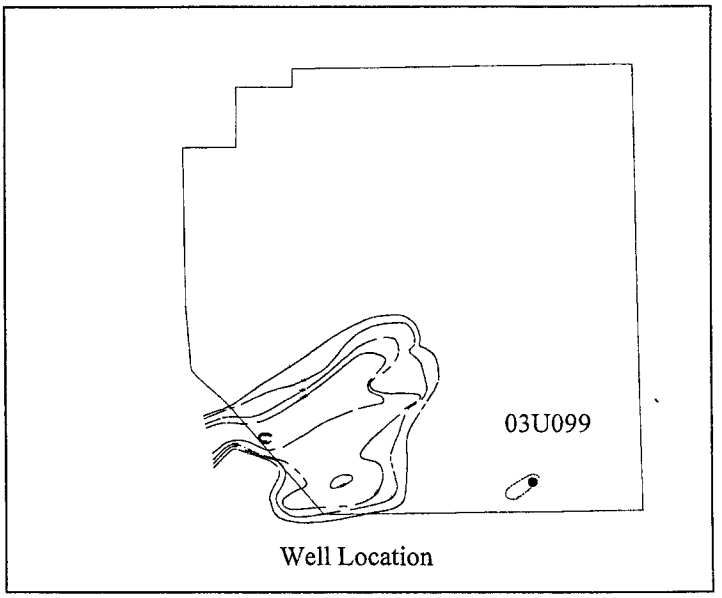


03U099

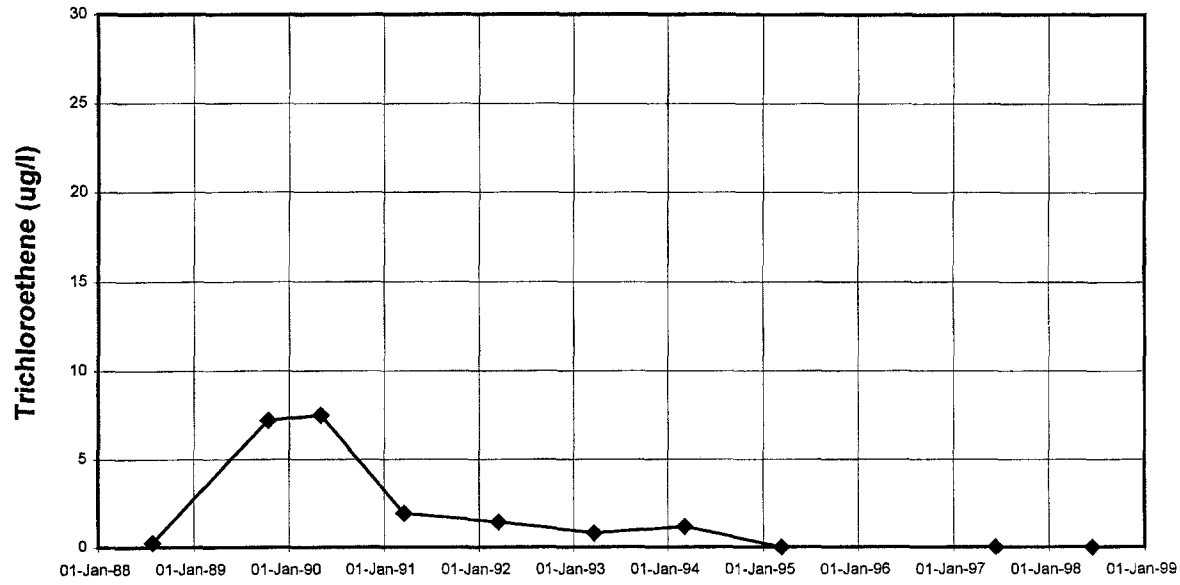


Well Purpose:
Monitor deep groundwater downgradient of Site H.

Note:
Plume map is from FY 1998.

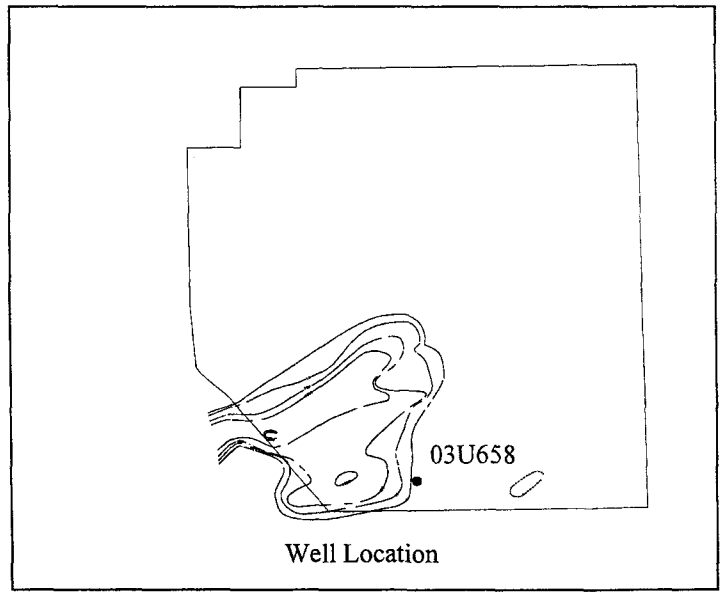


03U658

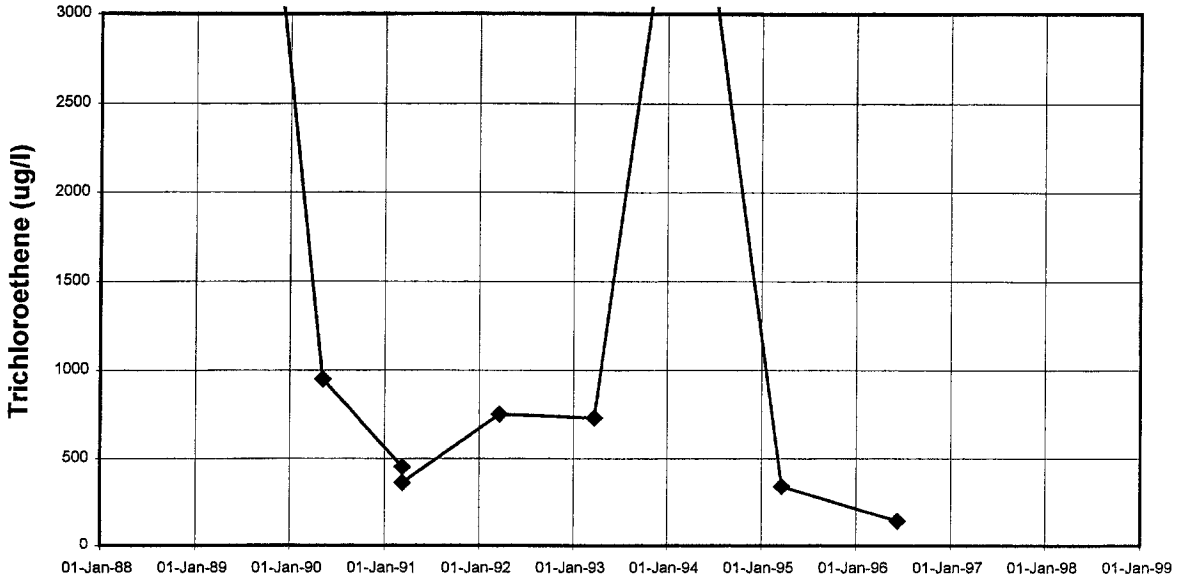


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

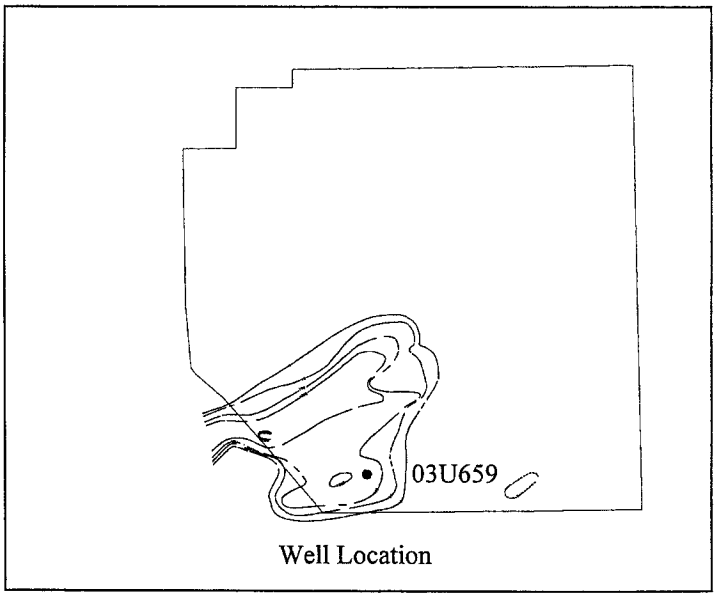


03U659

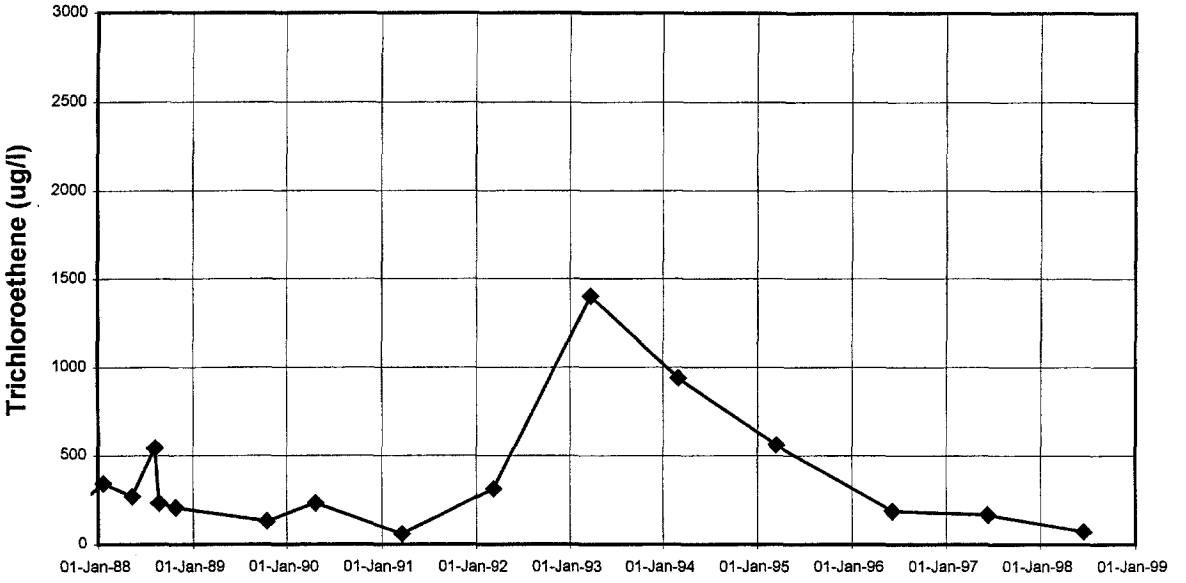


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

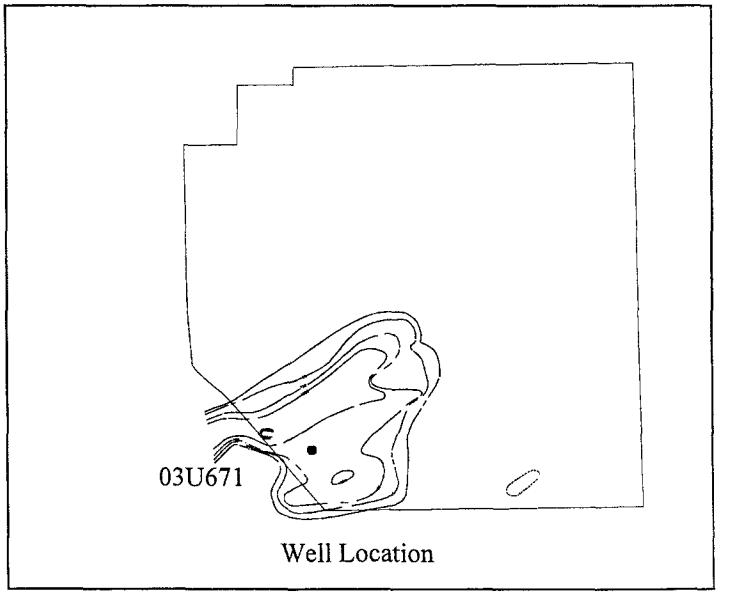


03U671



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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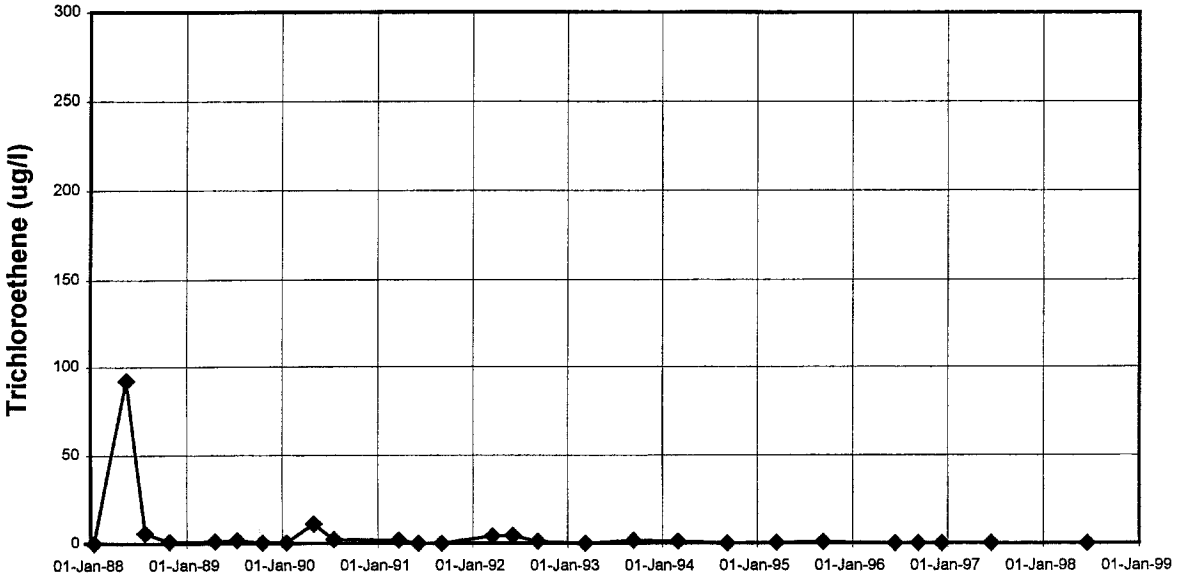
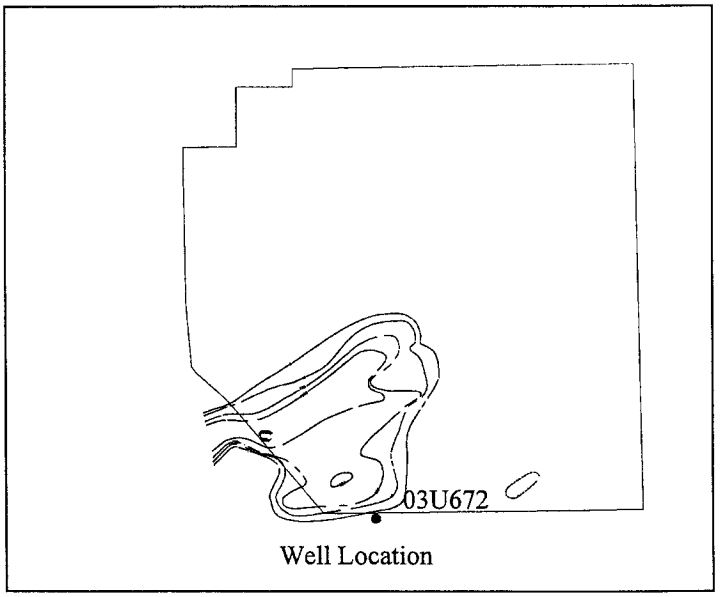
03U672

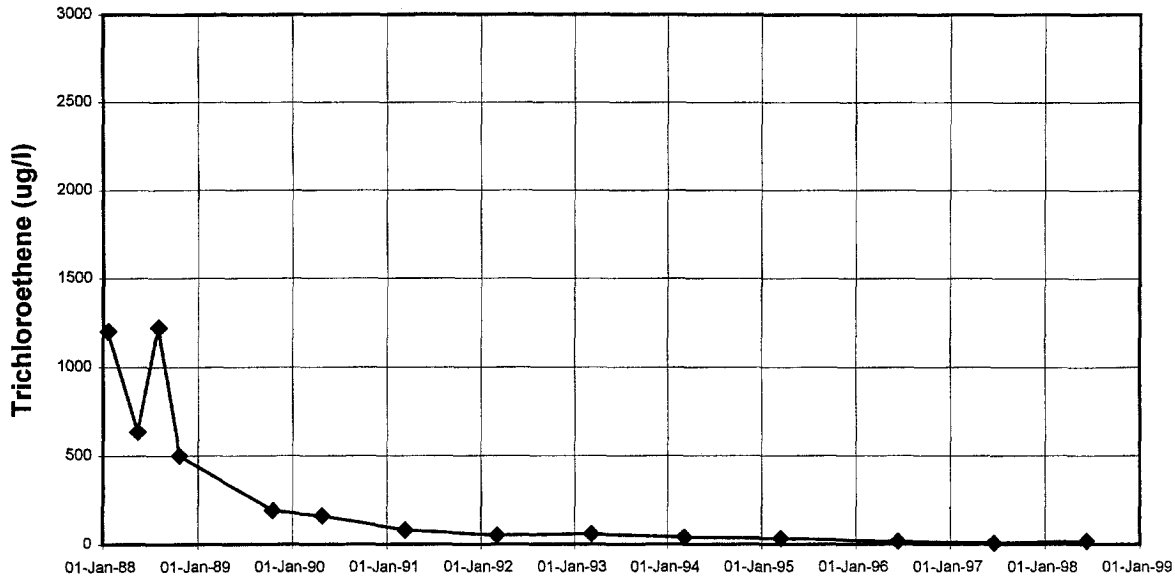


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

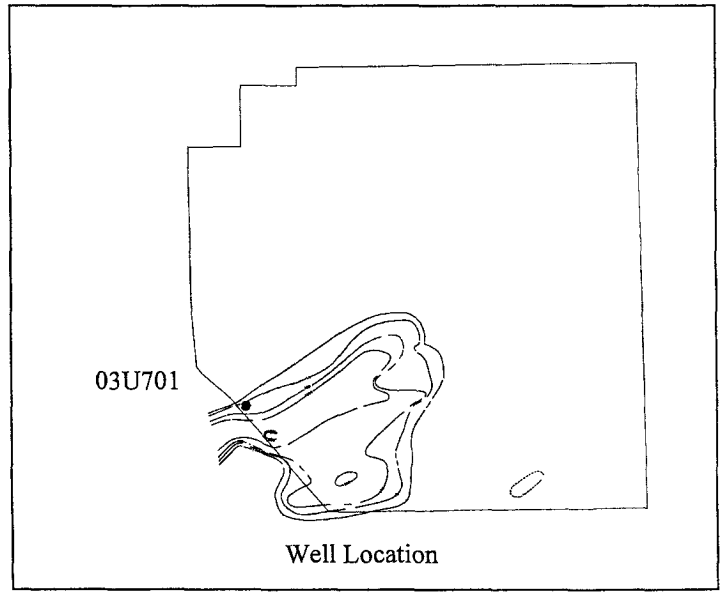


03U701

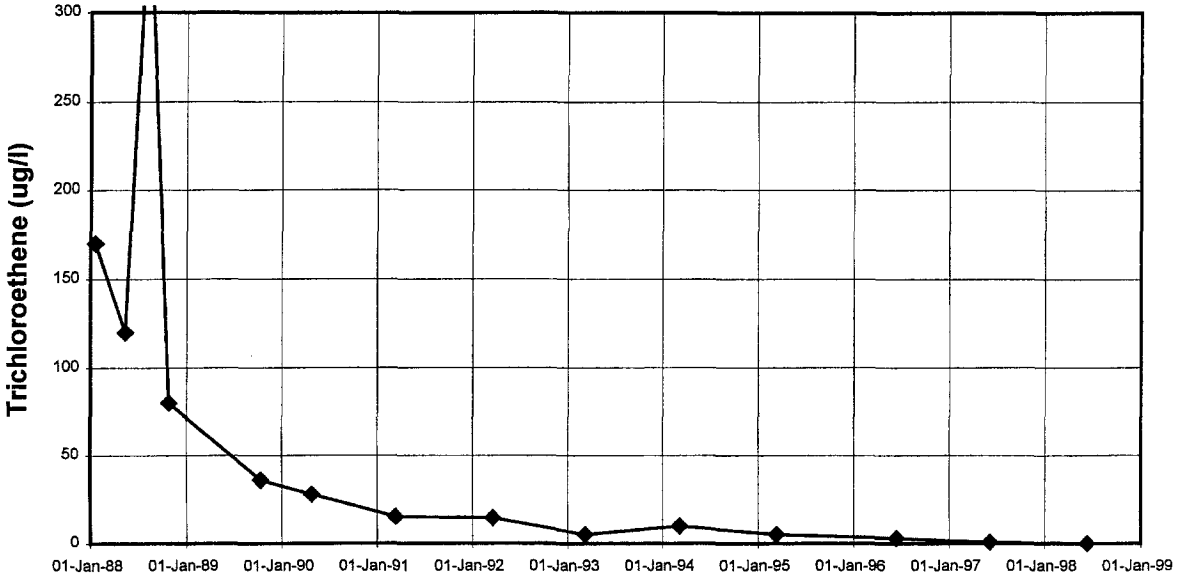


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

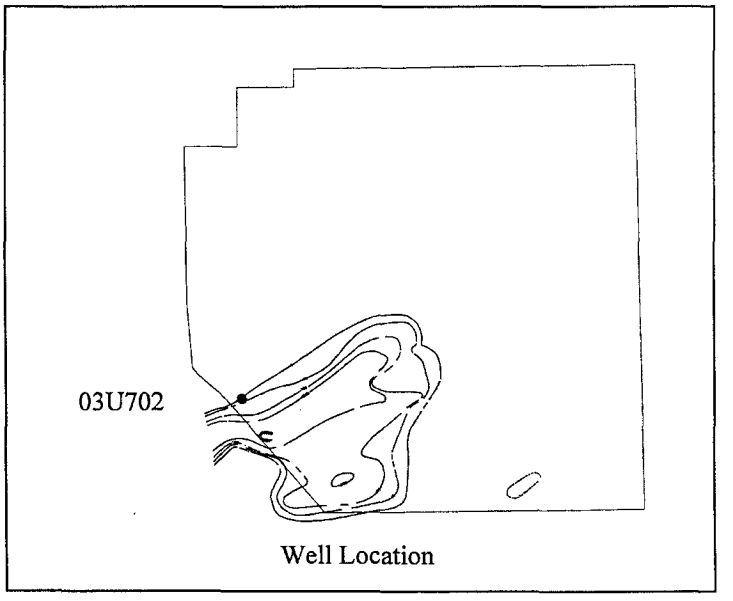


03U702



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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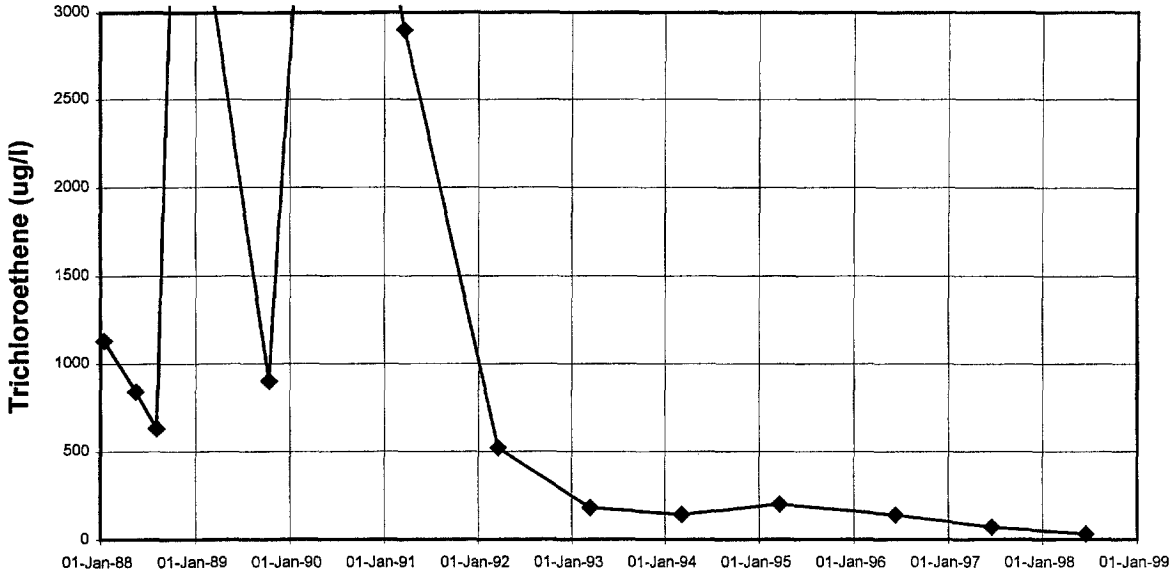
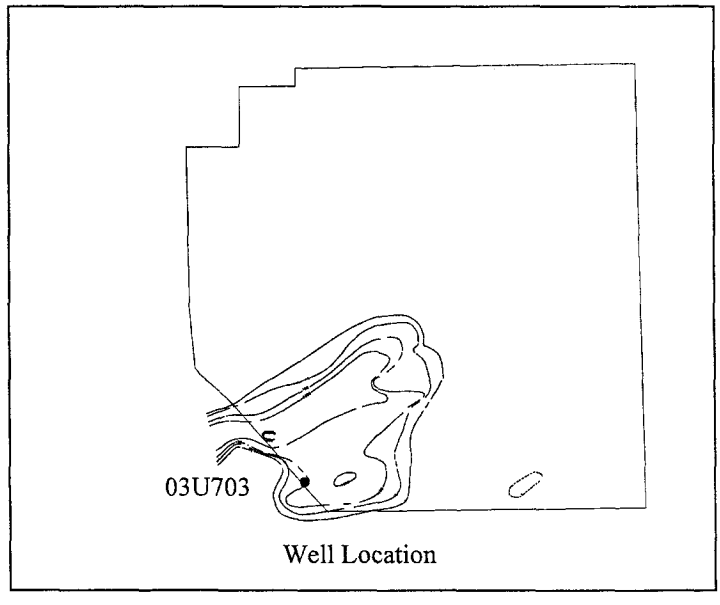
03U703

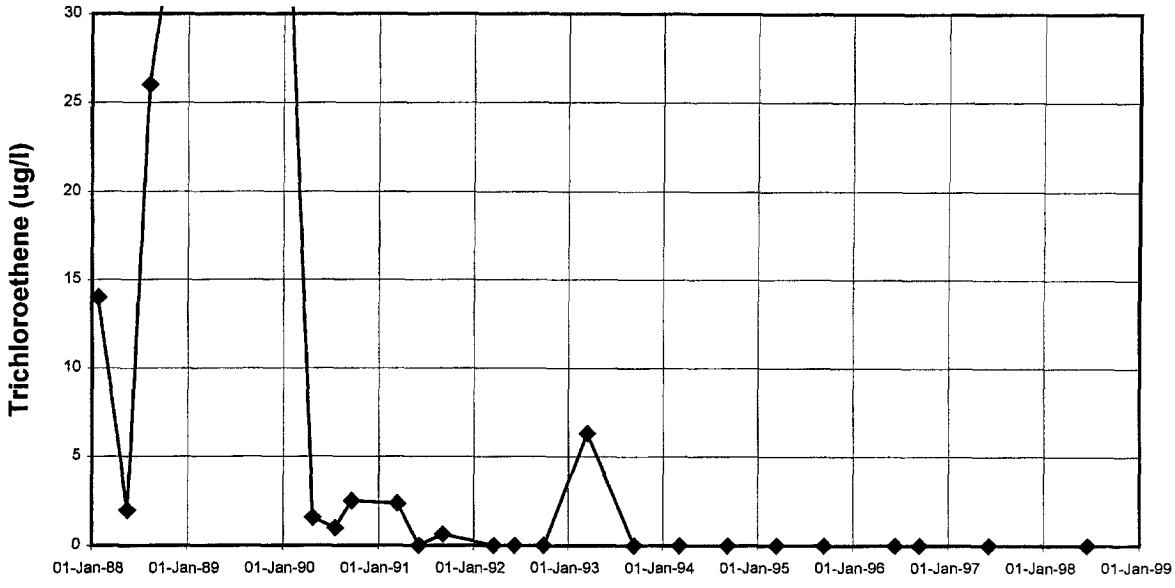


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

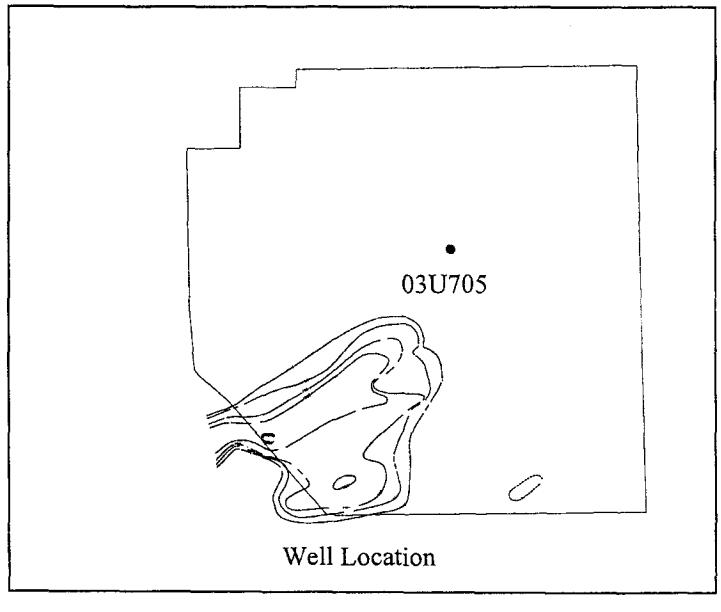


03U705



Well Purpose:
Monitor deep groundwater downgradient of the TGRS discharge in the gravel pit.

Note:
Plume map is from FY 1998.



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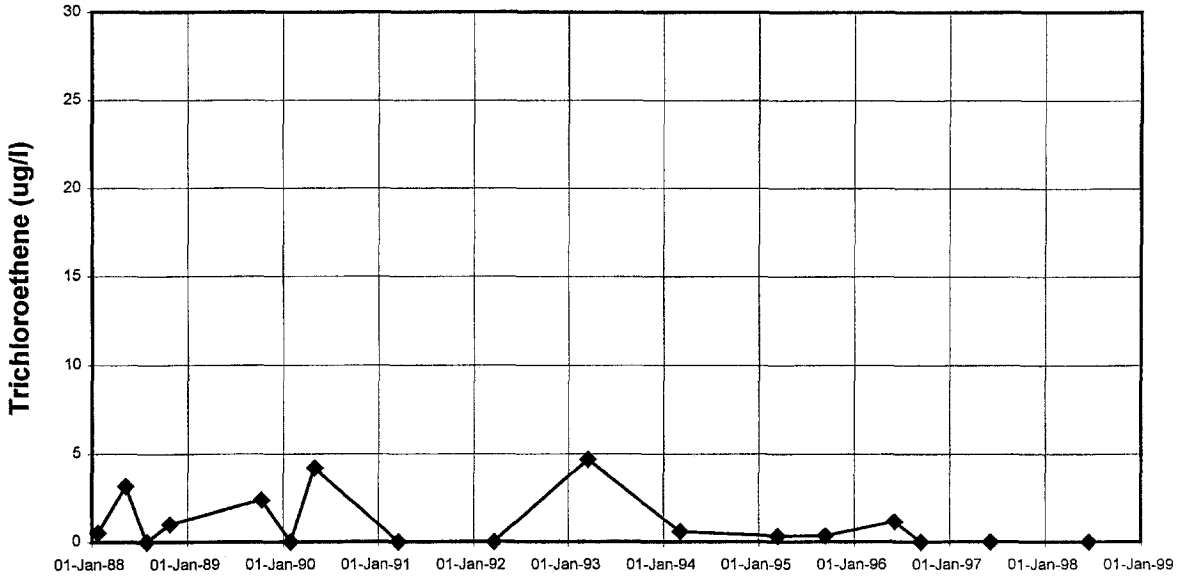
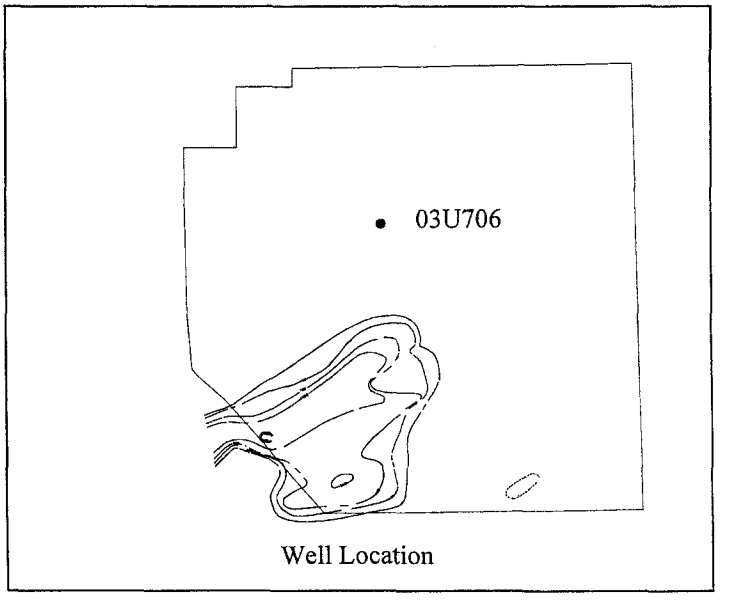
03U706

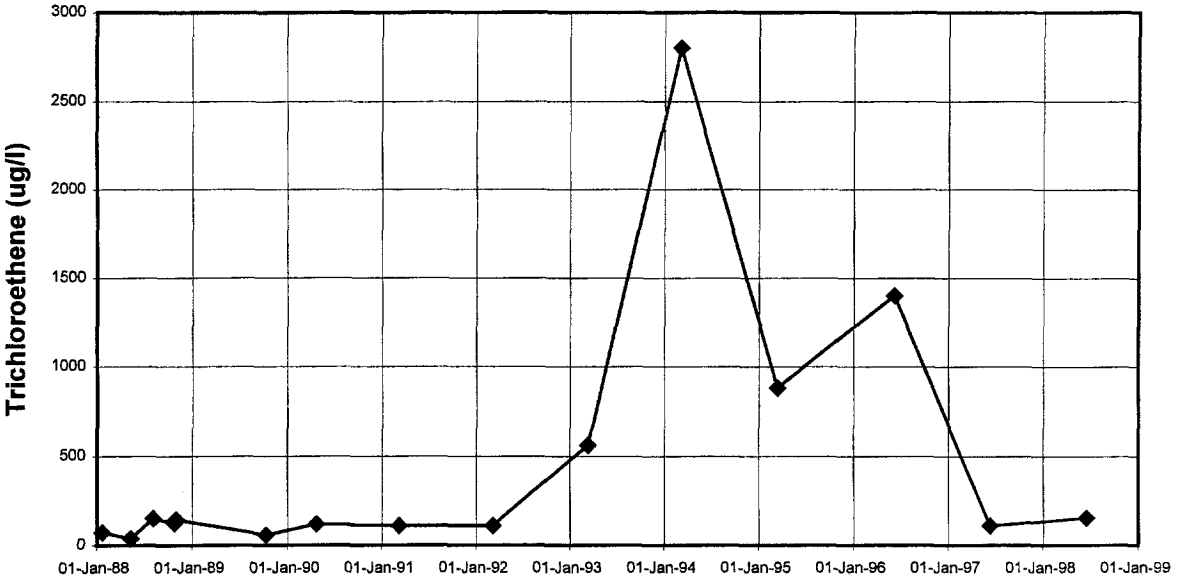


Well Purpose:
Monitor deep groundwater downgradient of the TGRS discharge in the gravel pit.

Note:
Plume map is from FY 1998.

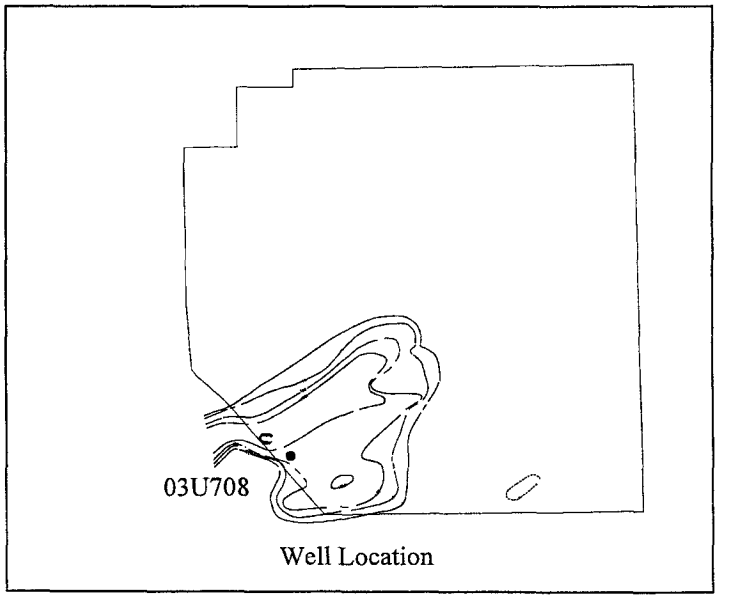


03U708

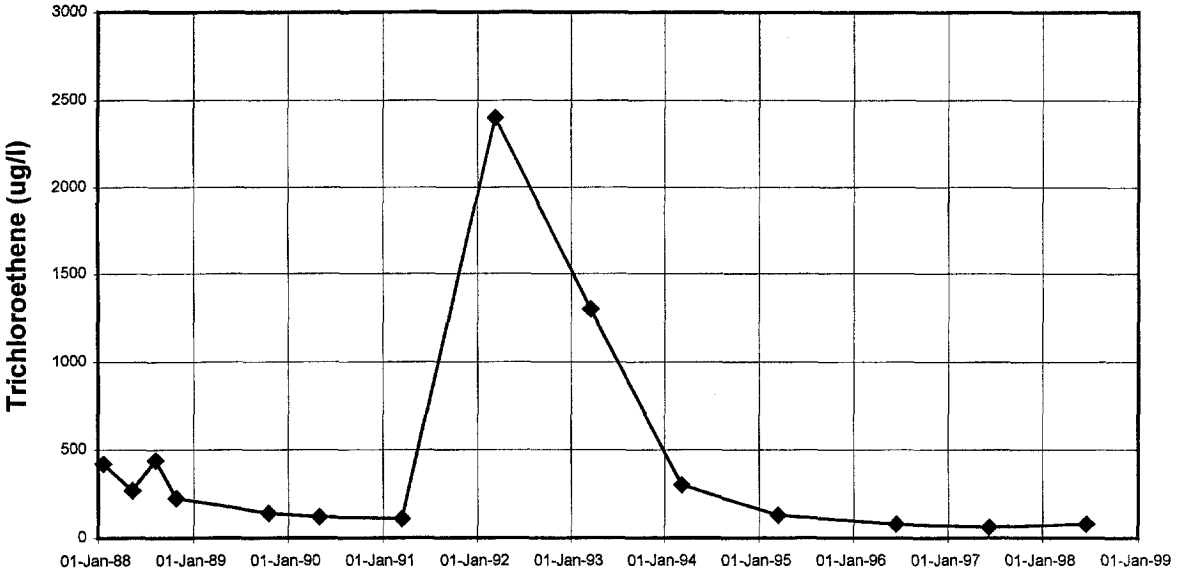


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

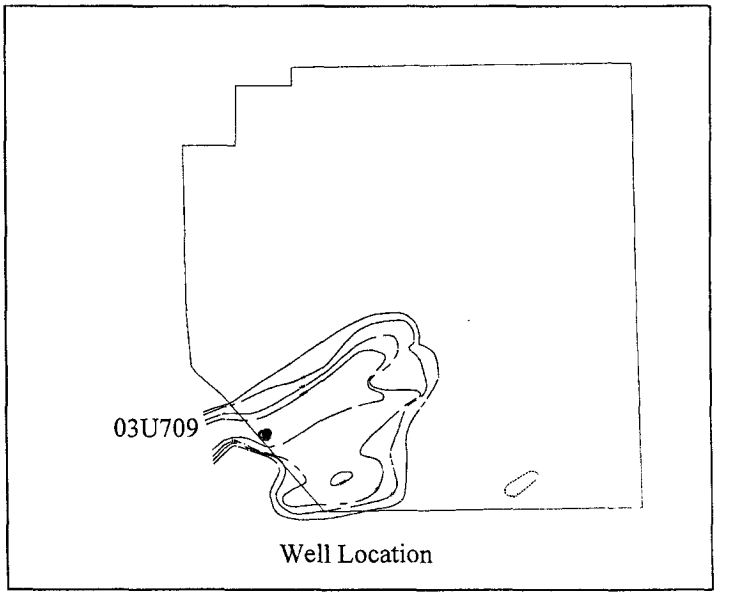


03U709

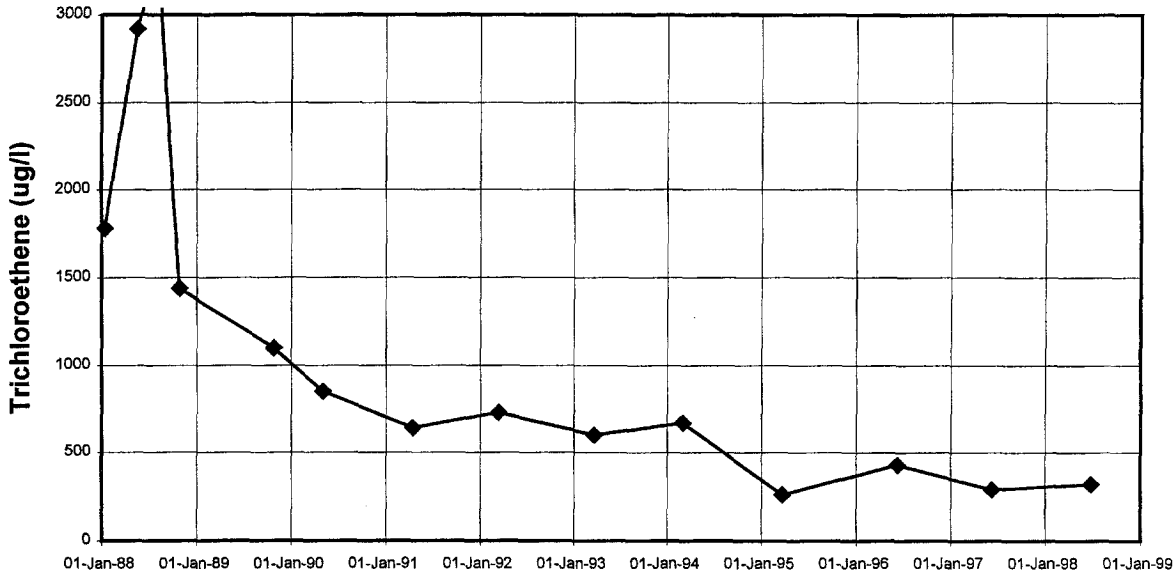


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

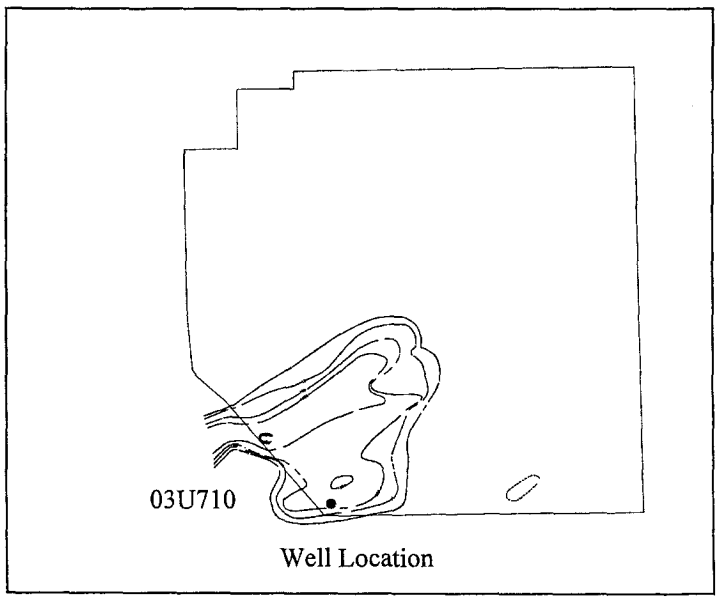


03U710



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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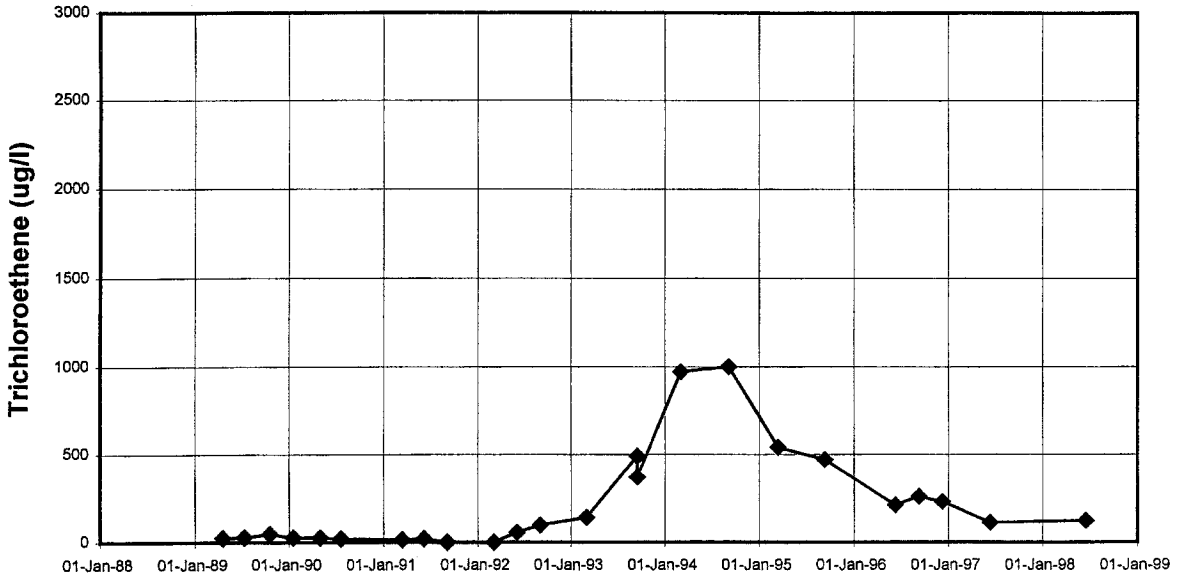
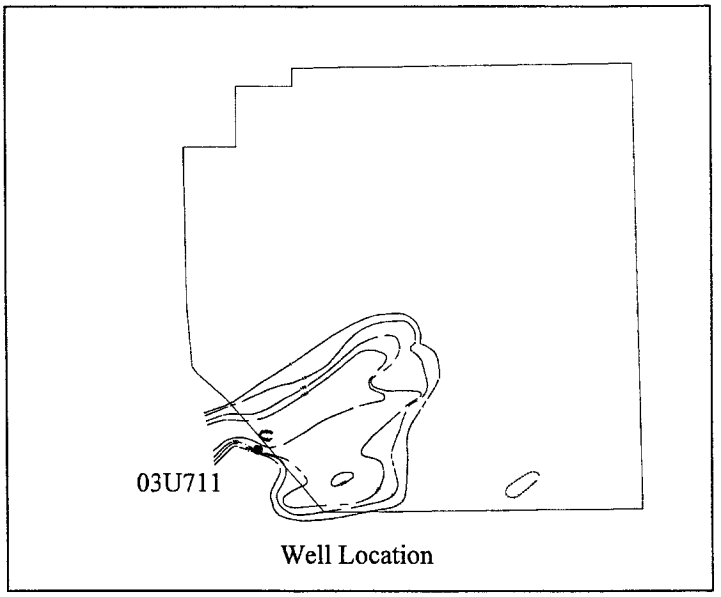
03U711

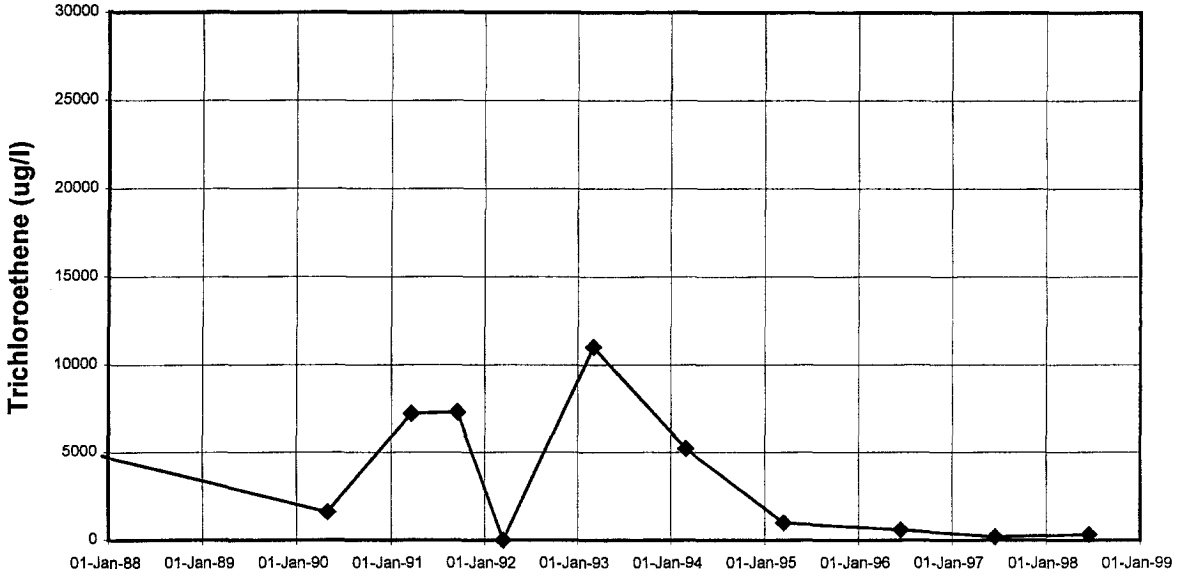


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

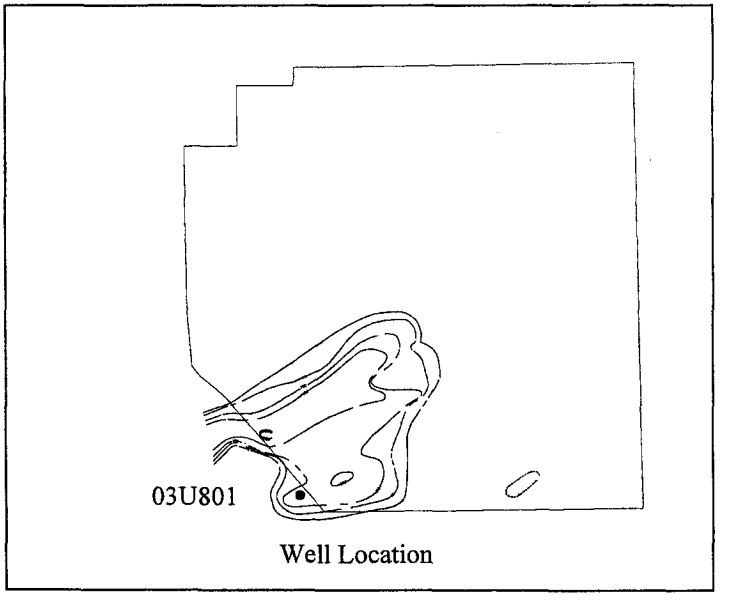


03U801

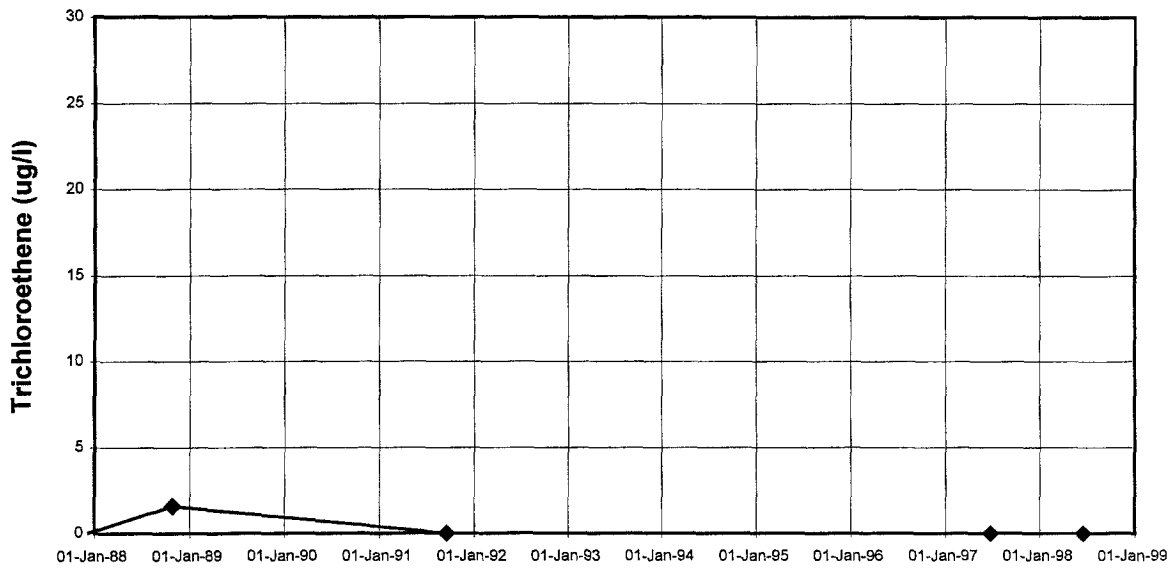


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

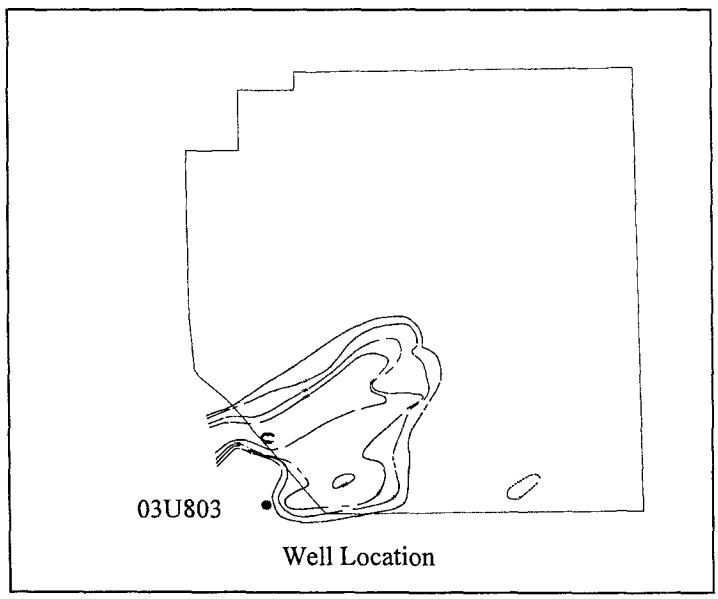


03U803



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



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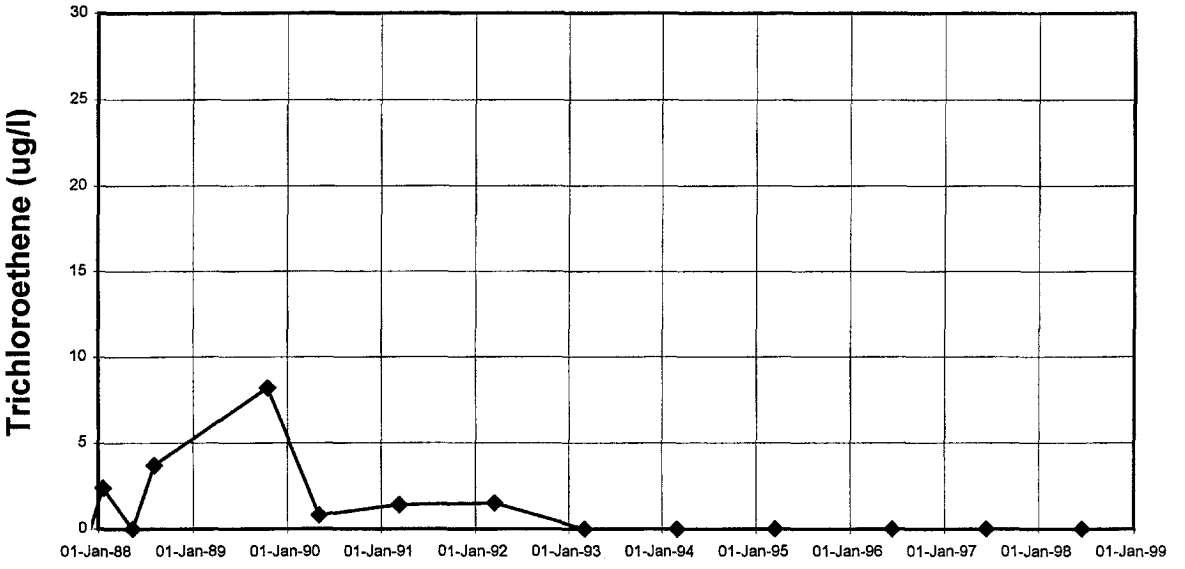
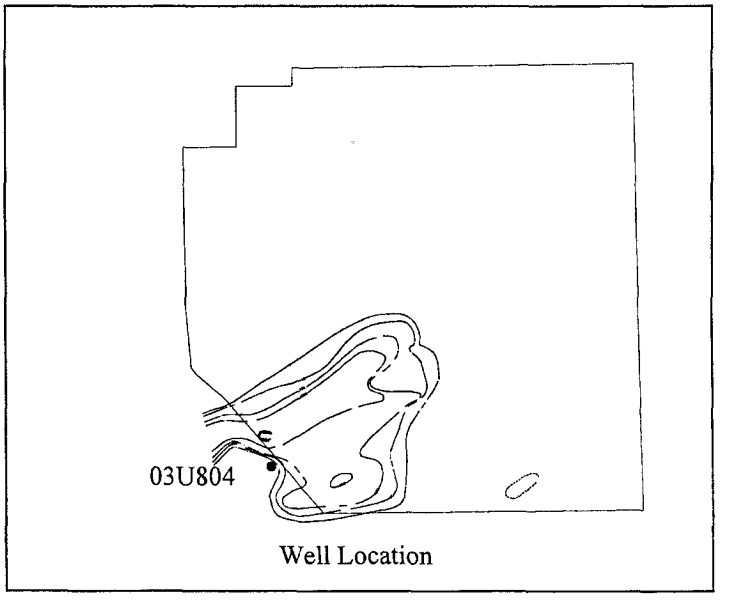
03U804



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



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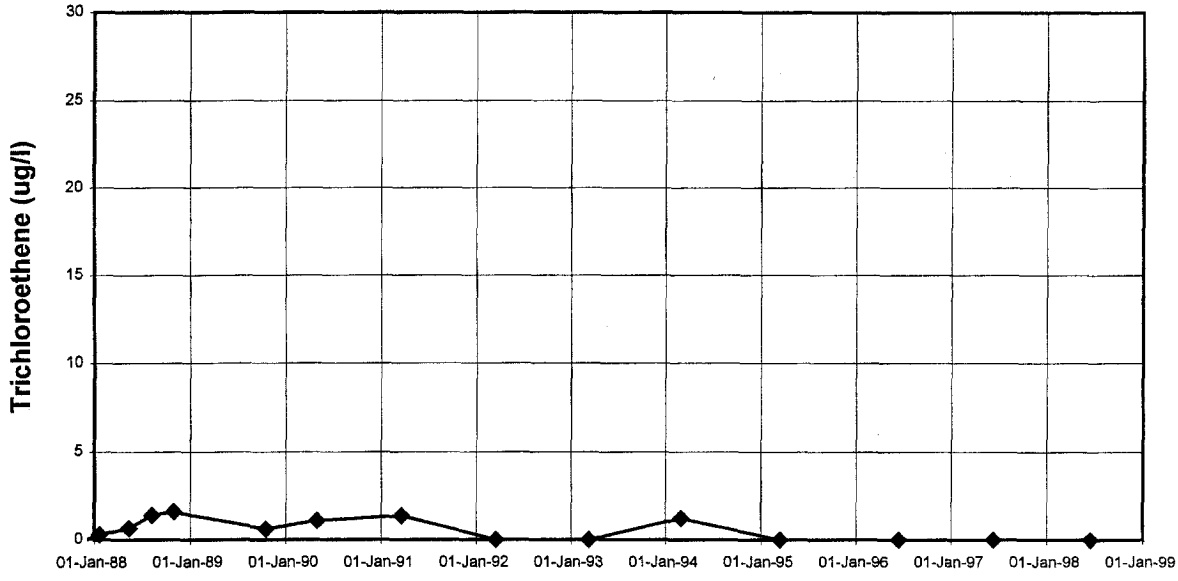
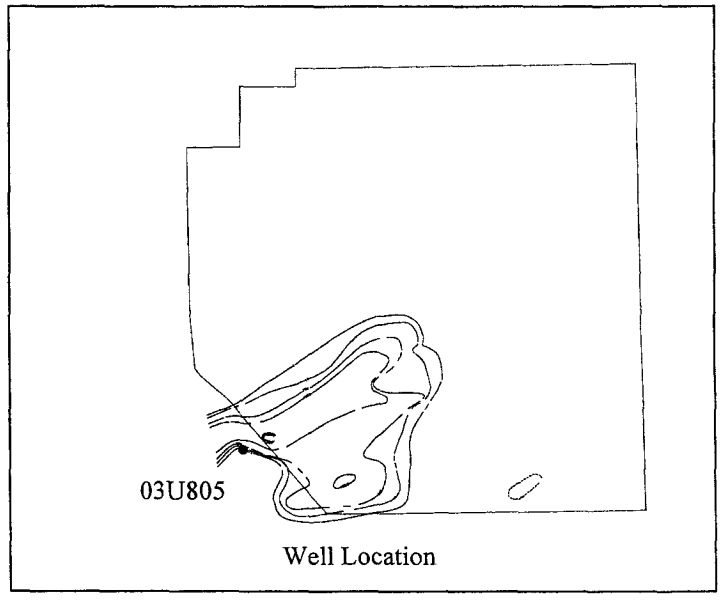
03U805

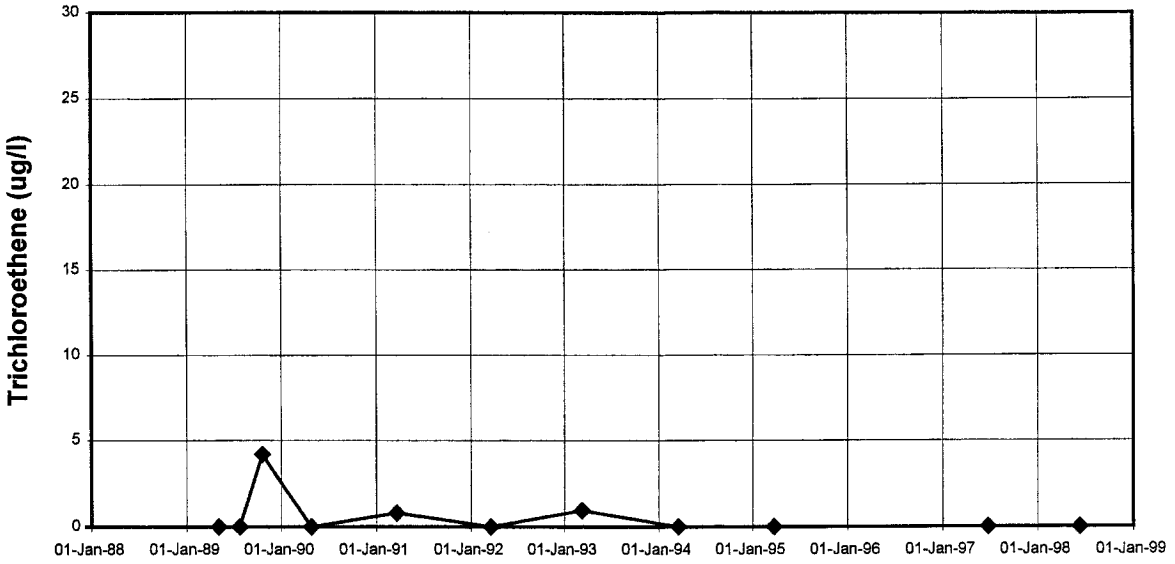


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

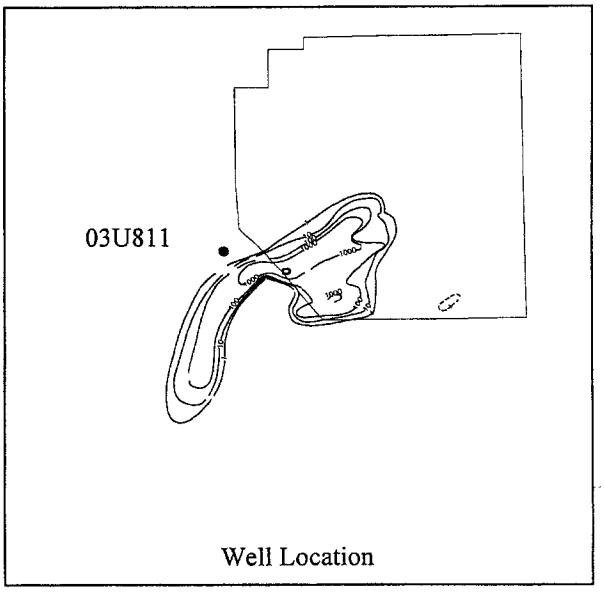


03U811



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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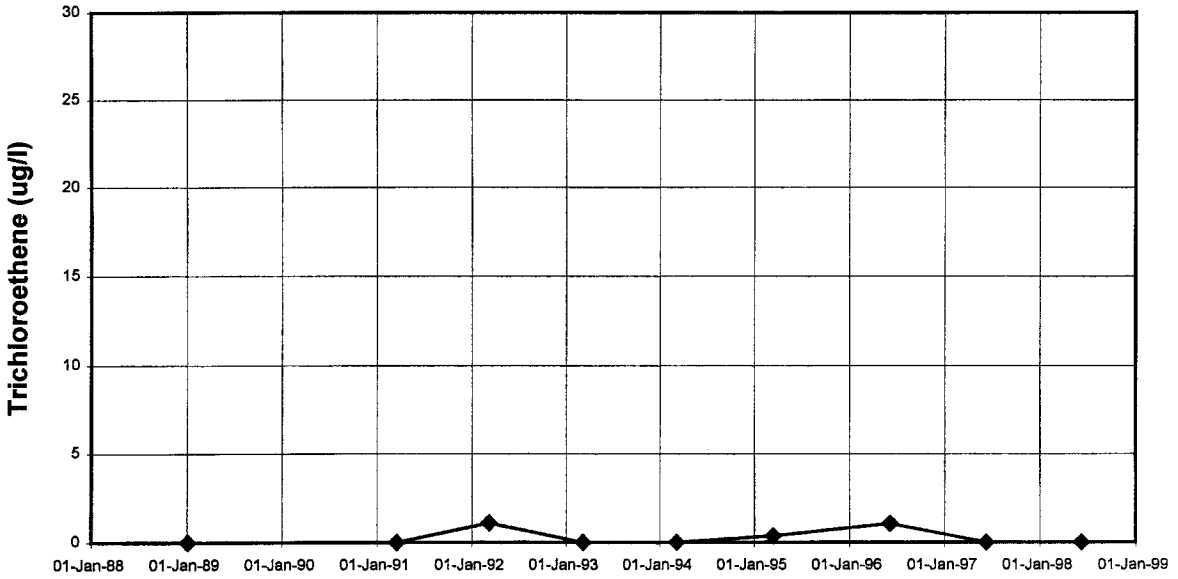
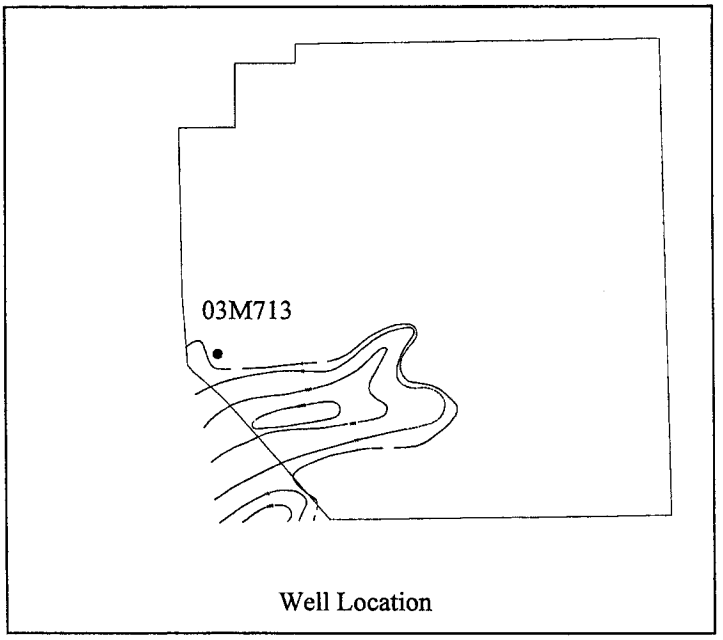
Middle and Lower Unit 3 Wells

03M713

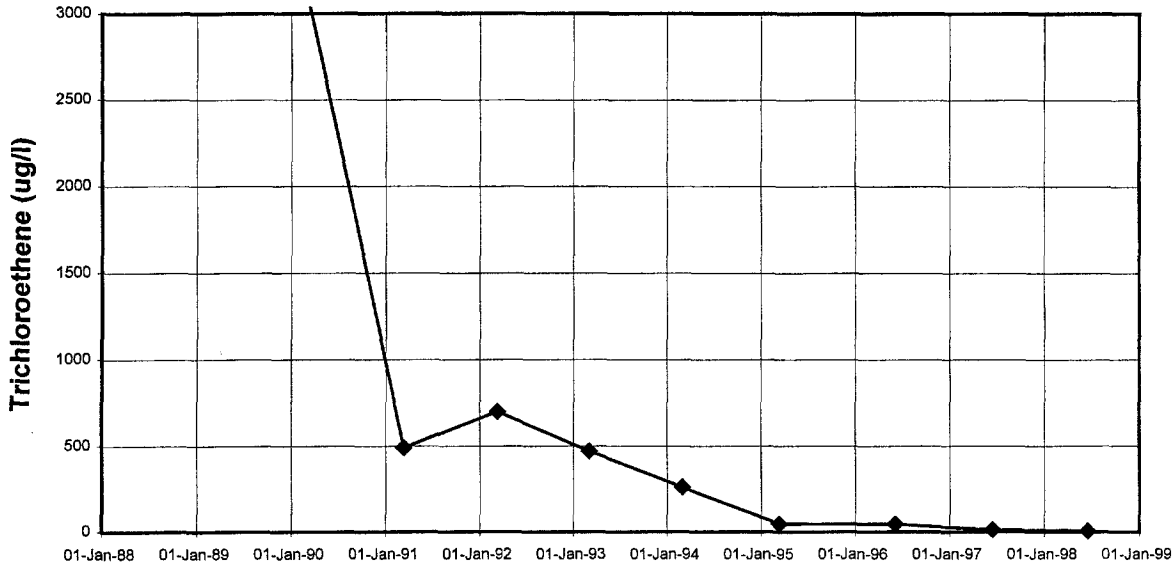


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

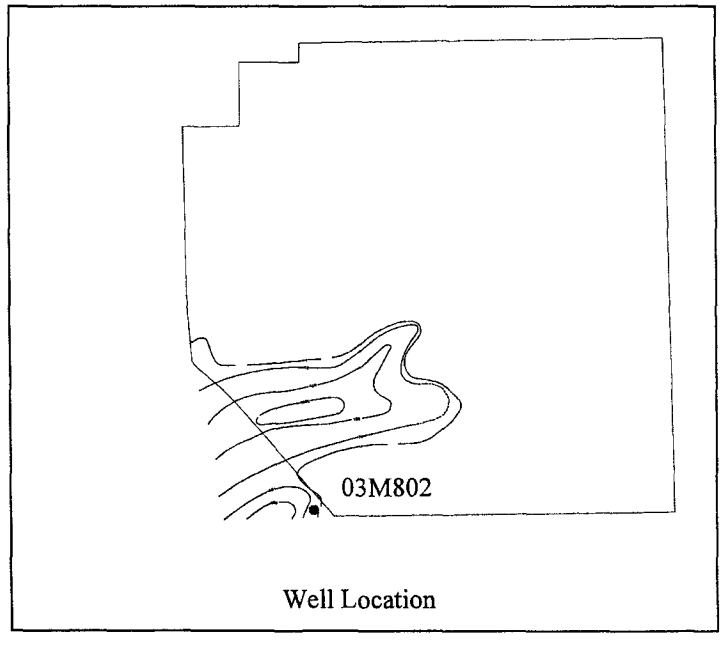


03M802

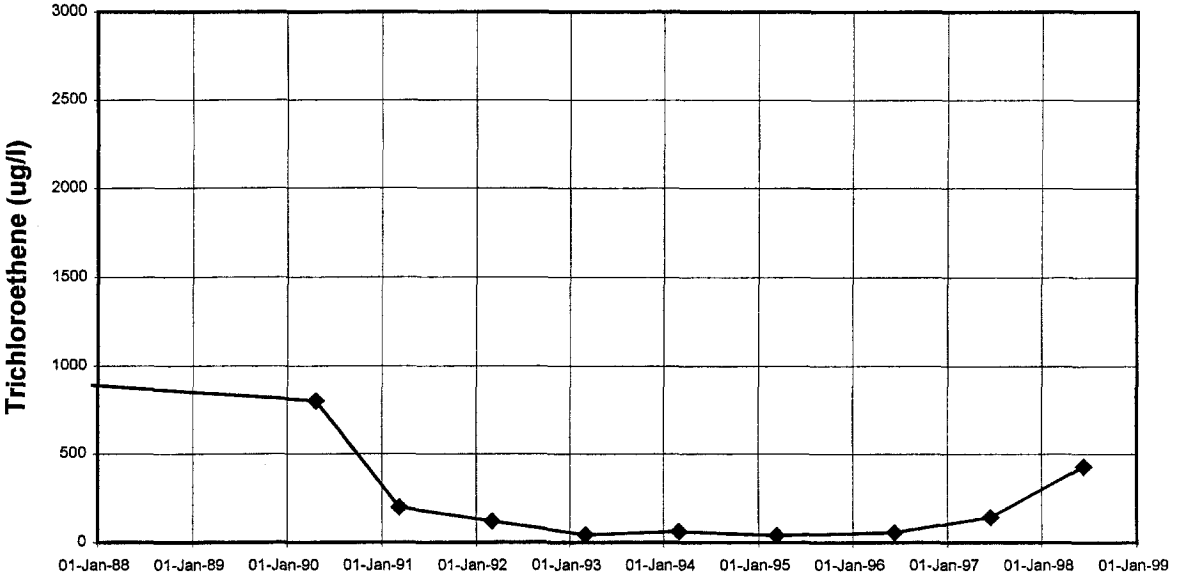


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

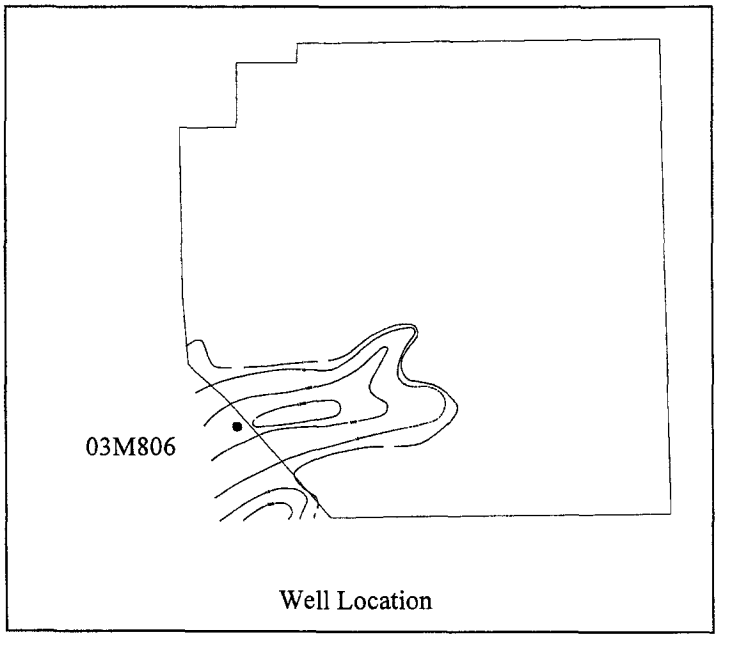


03M806



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



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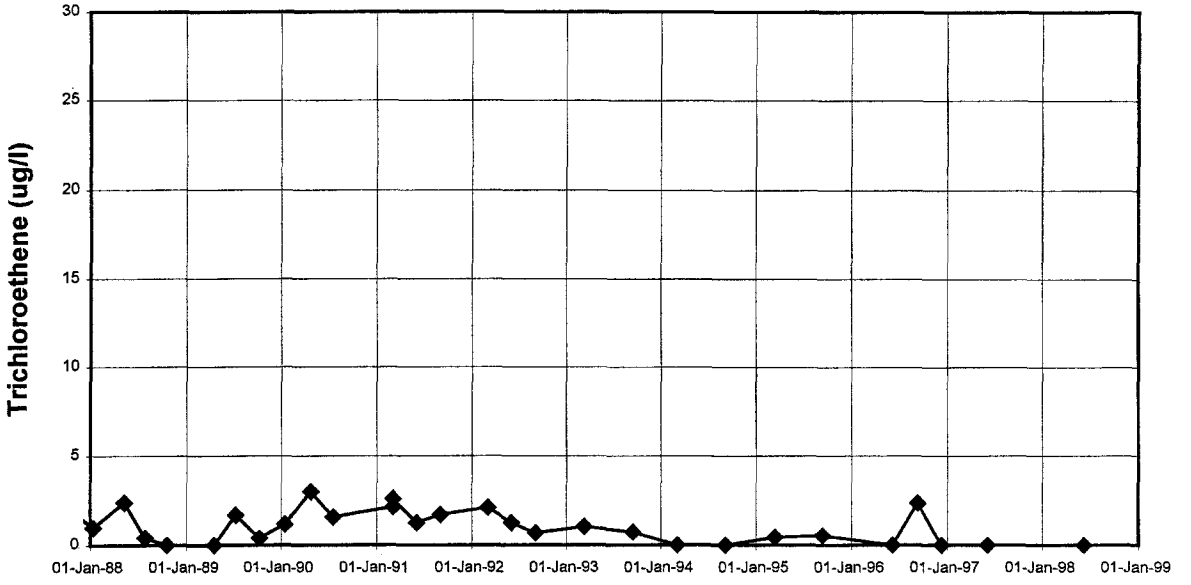
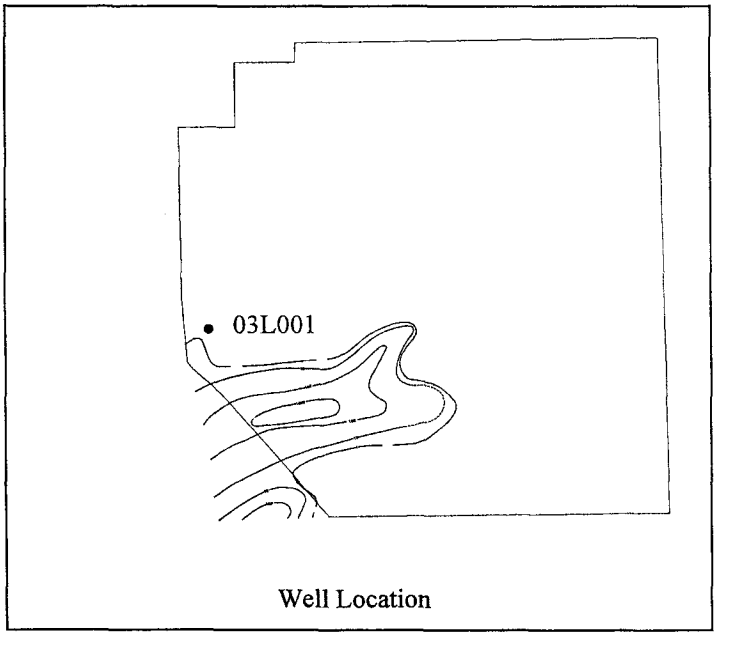
03L001

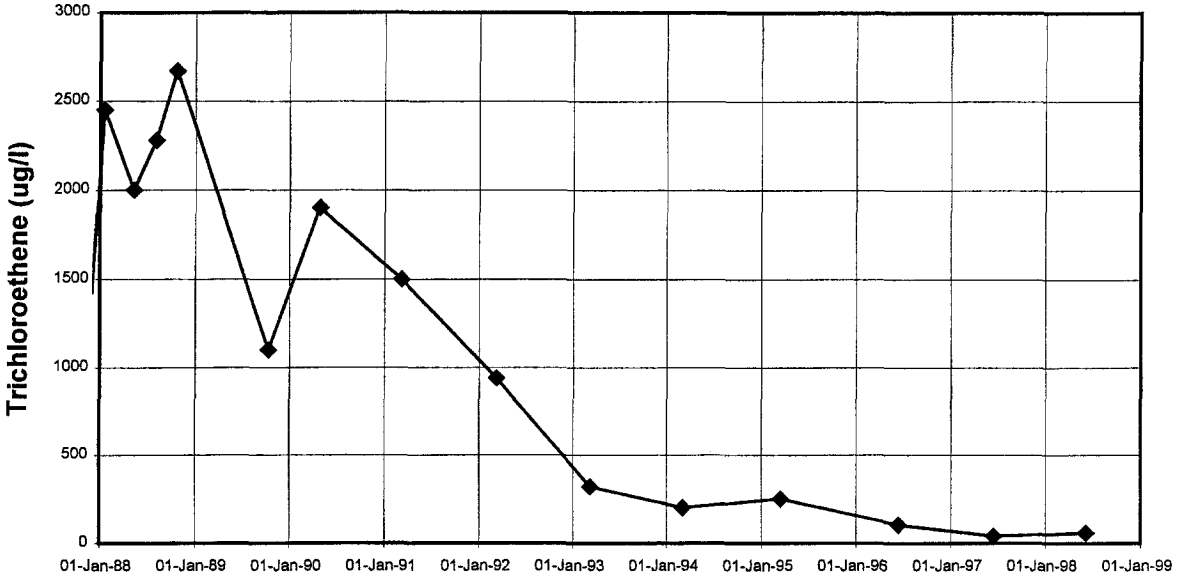


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

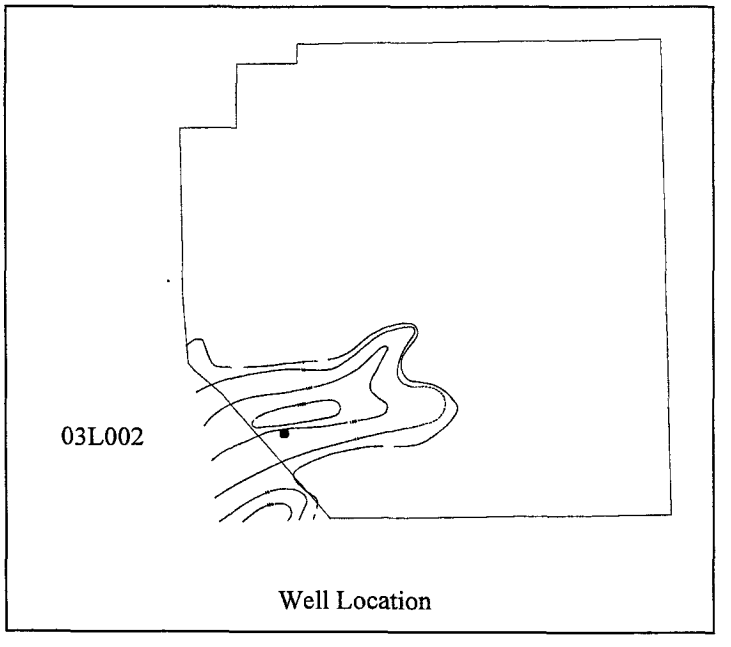


03L002



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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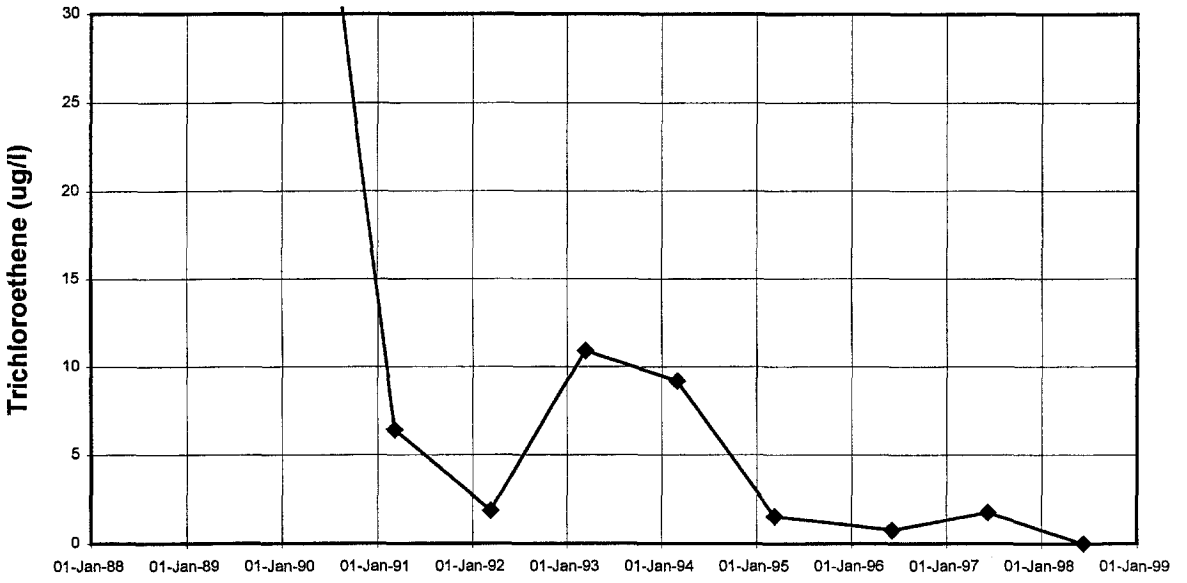
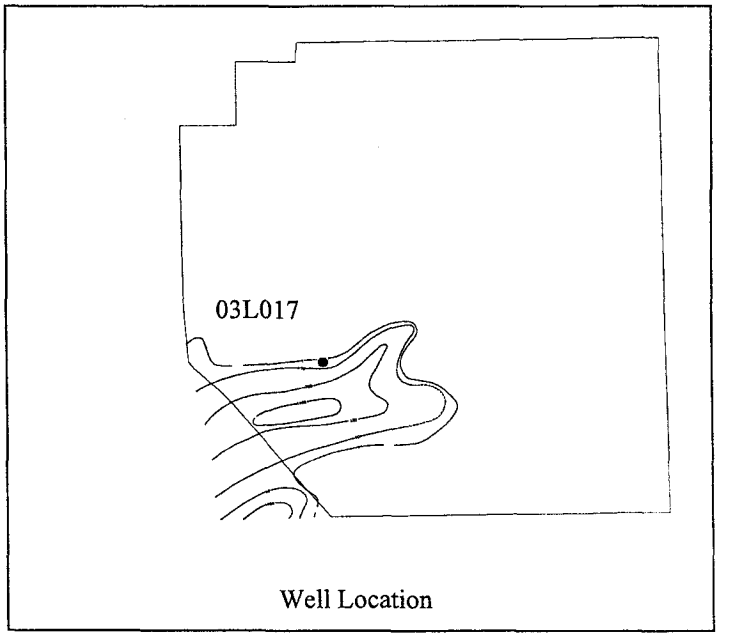
03L017



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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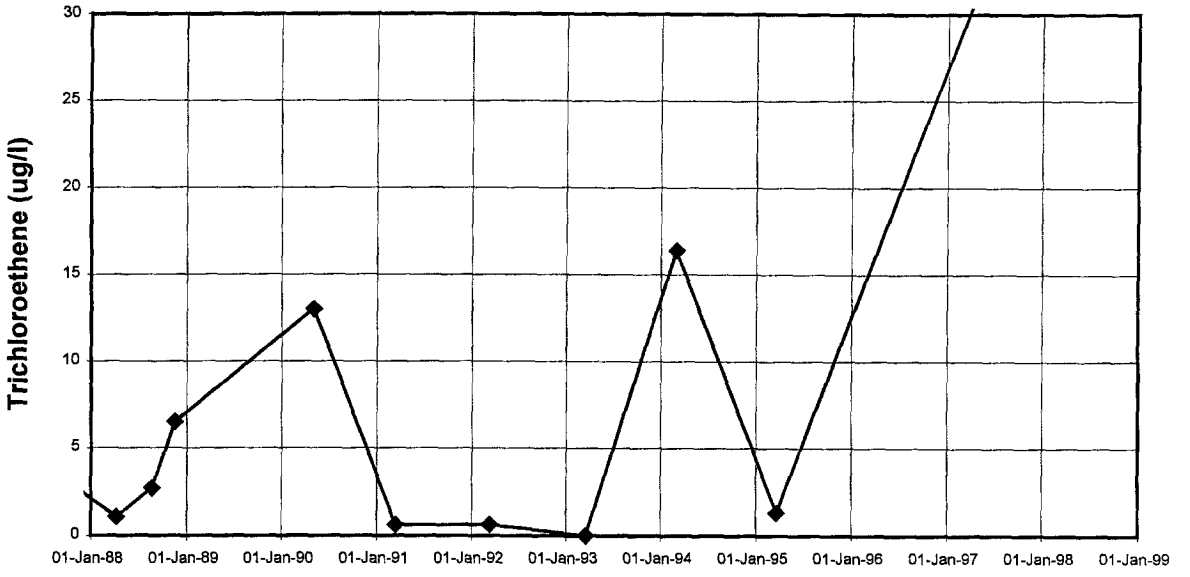
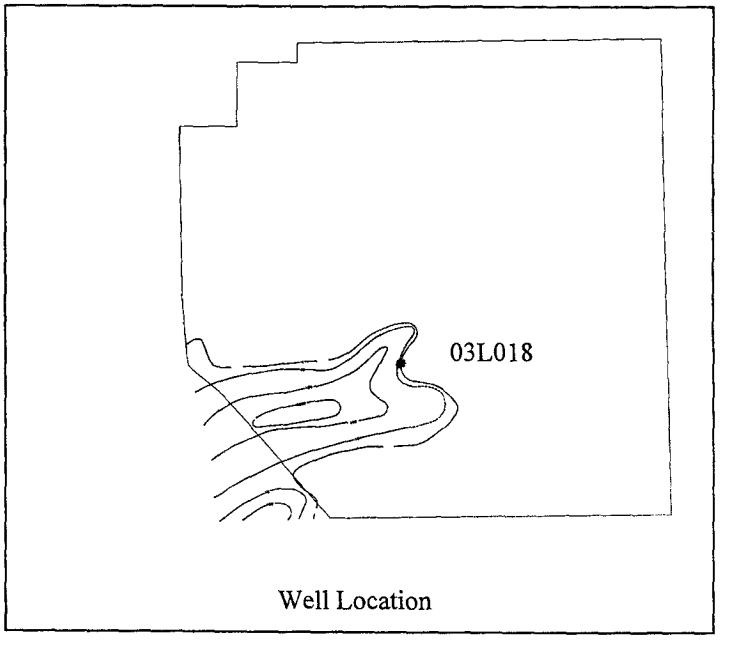
03L018



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



Well Location

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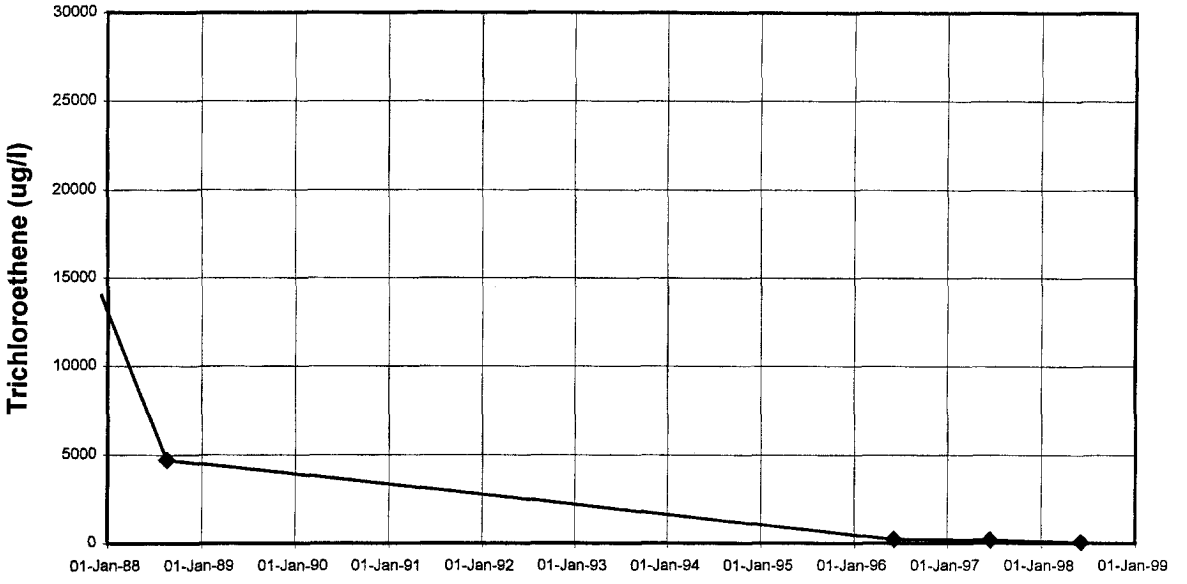
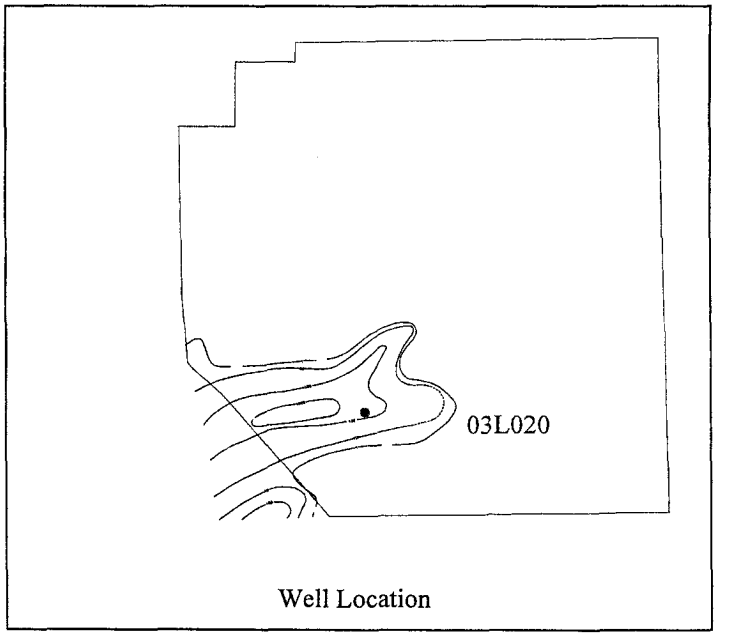
03L020

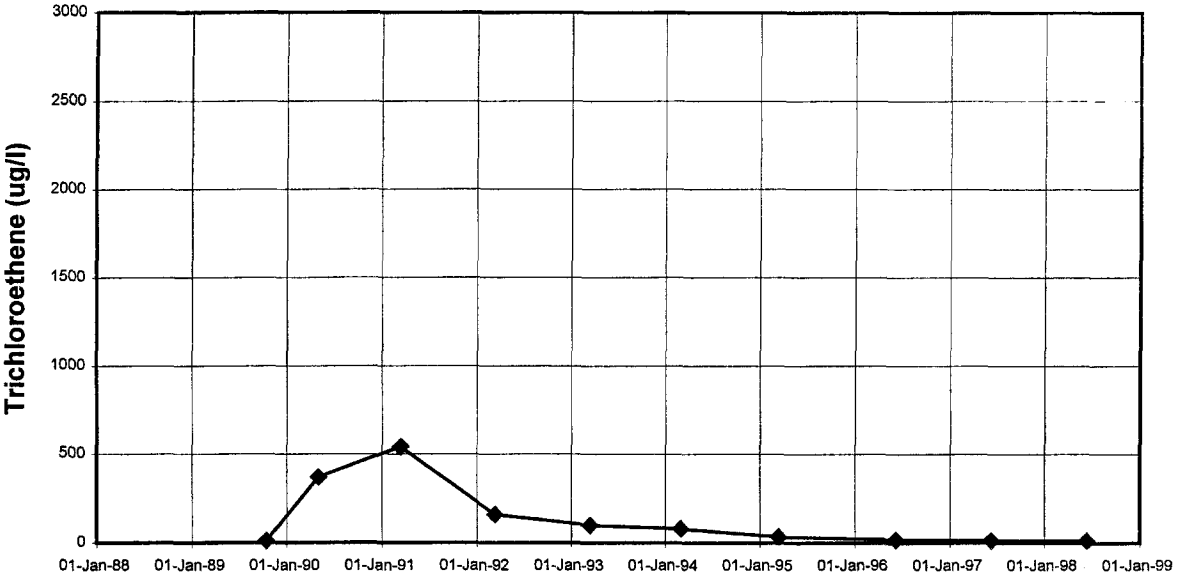


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

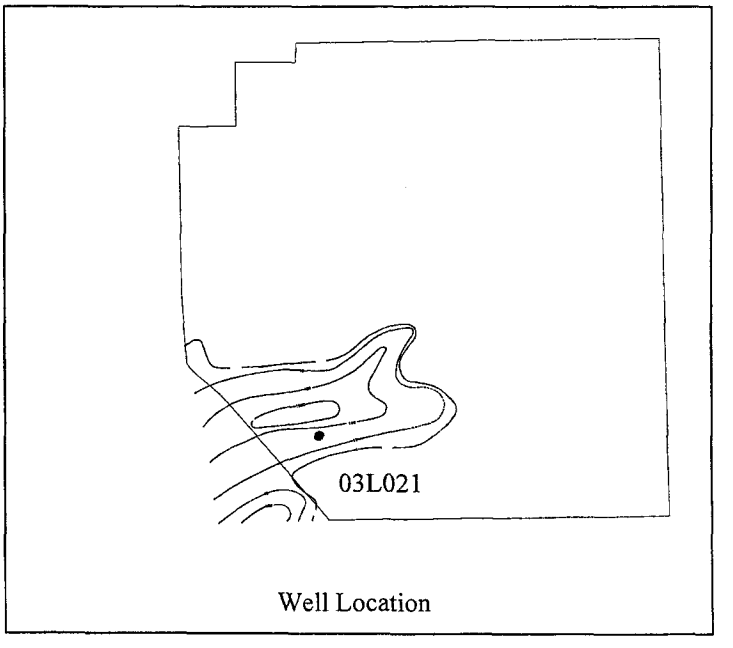


03L021



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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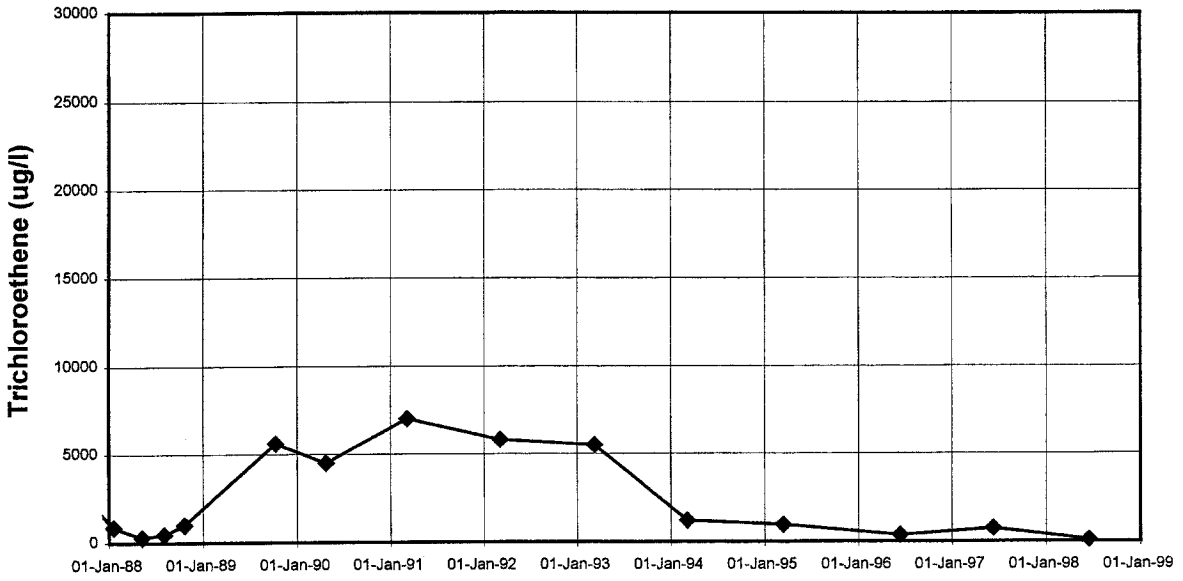
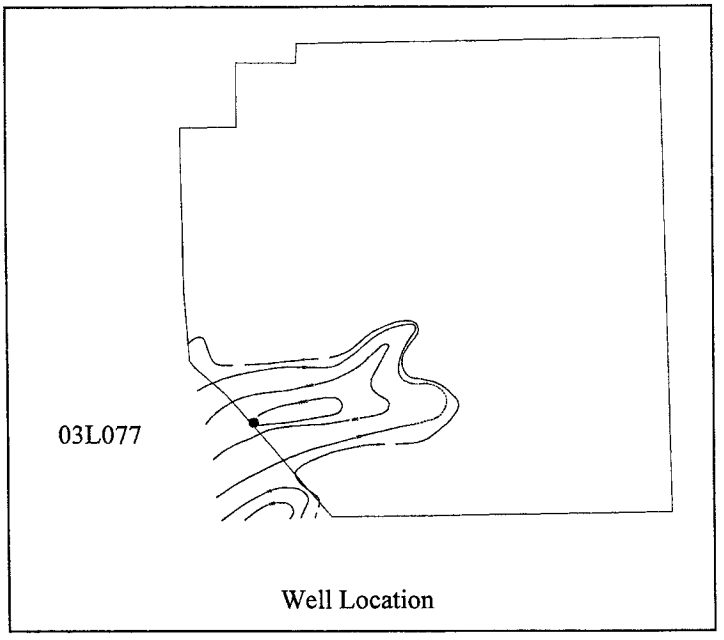
03L077



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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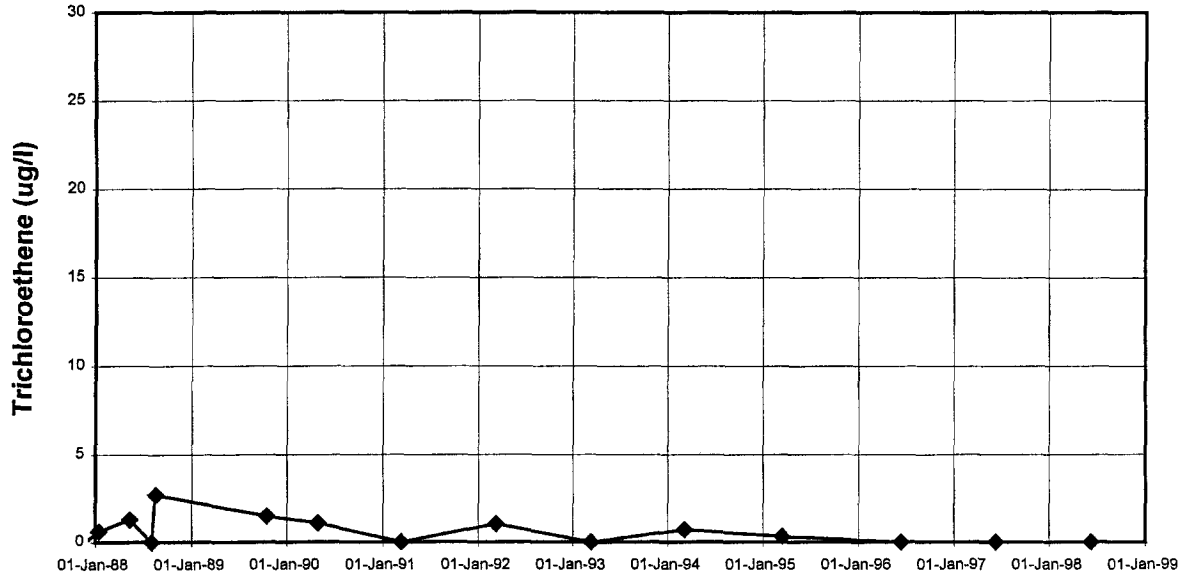
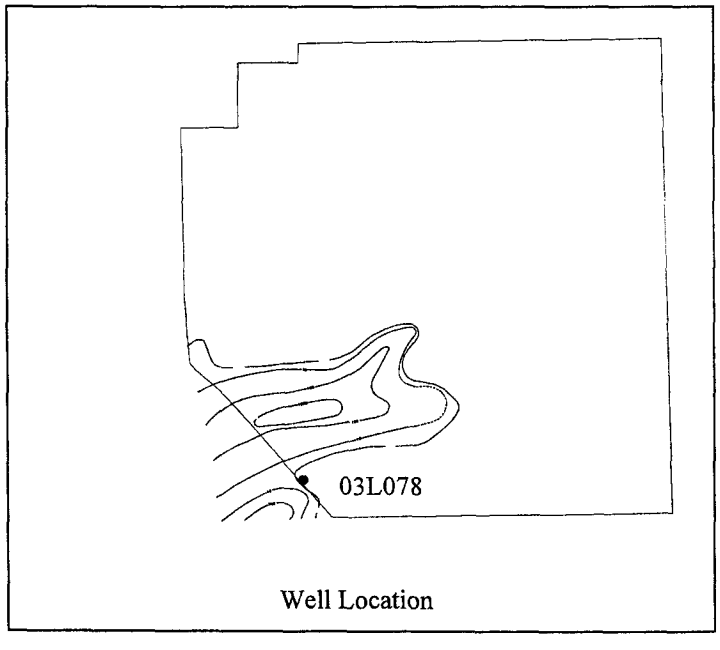
03L078

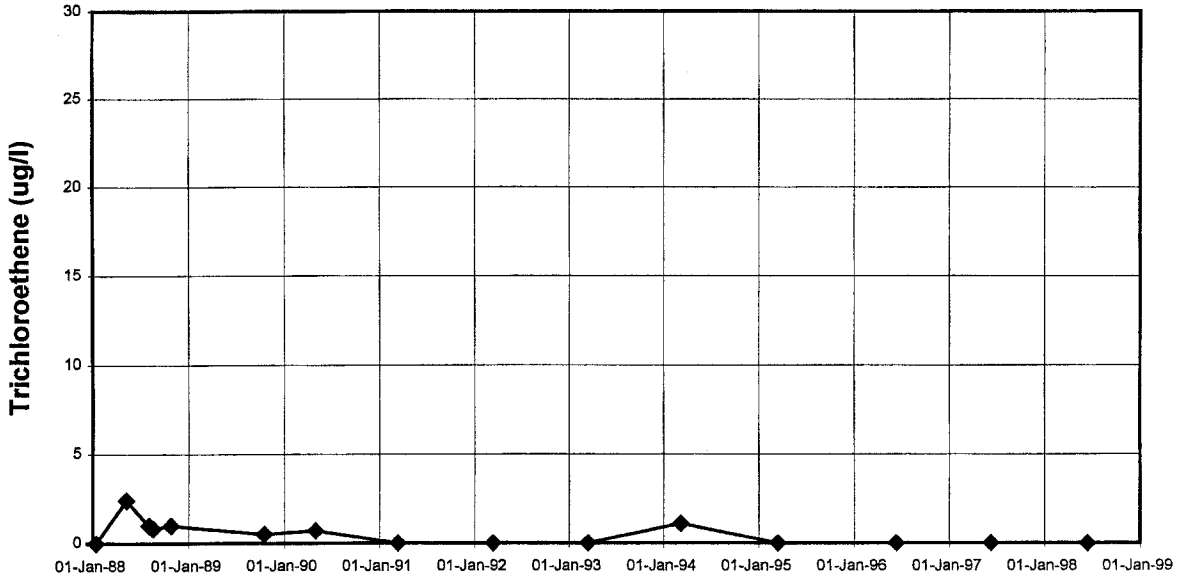


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

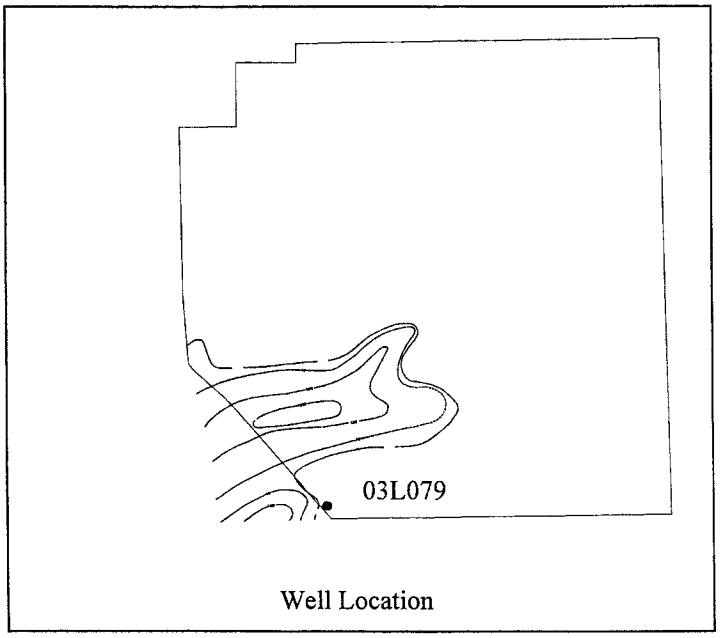


03L079



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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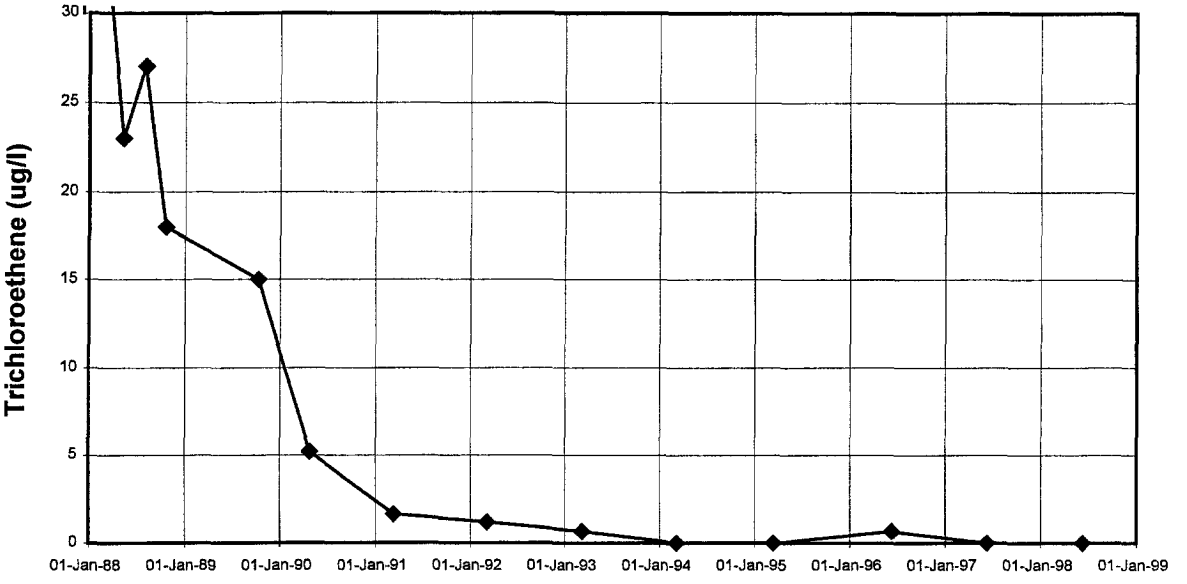
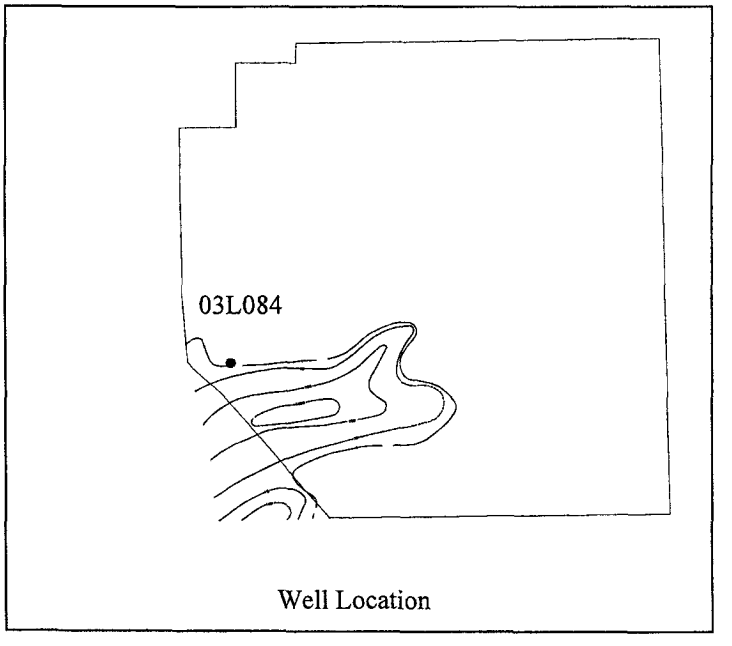
03L084



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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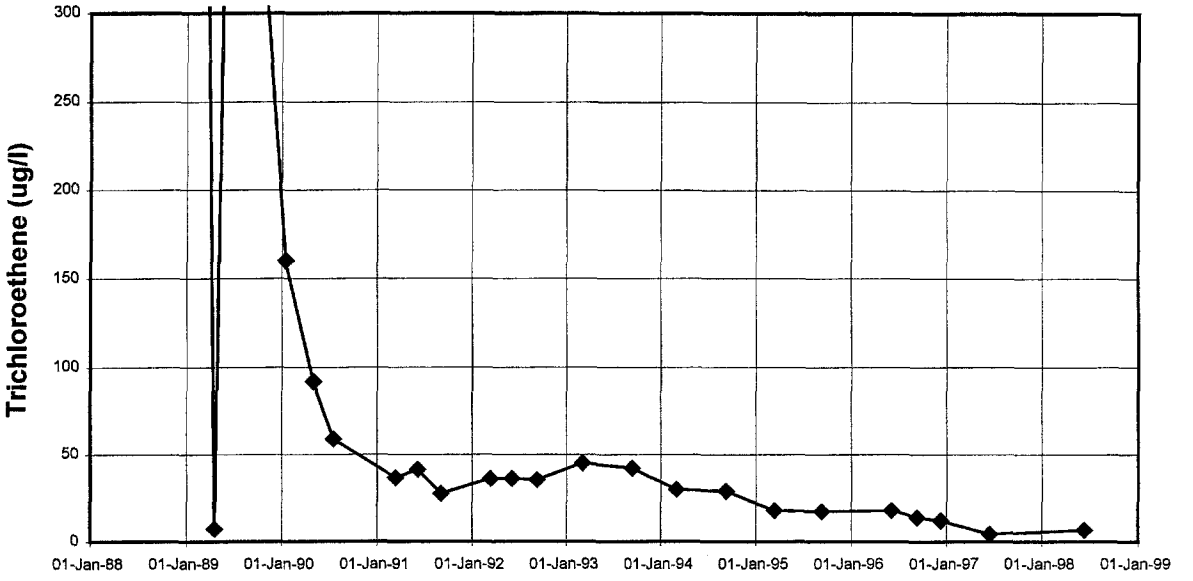
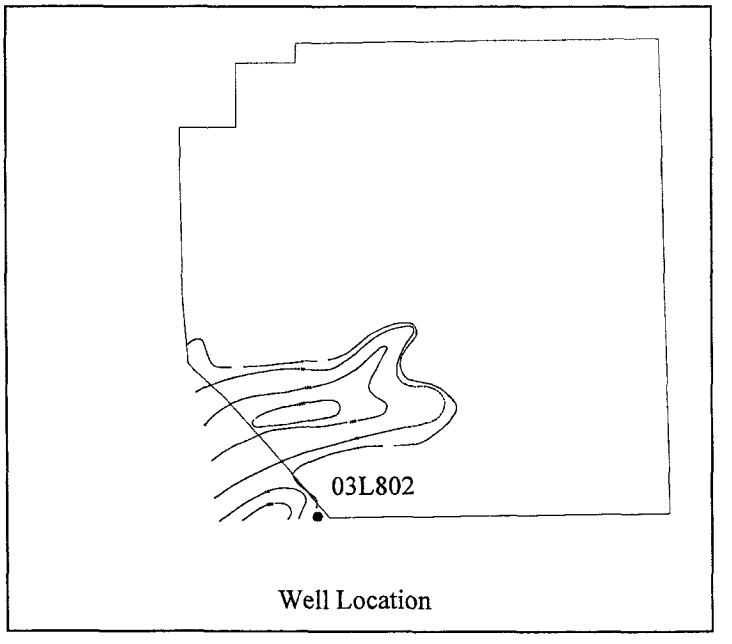
03L802



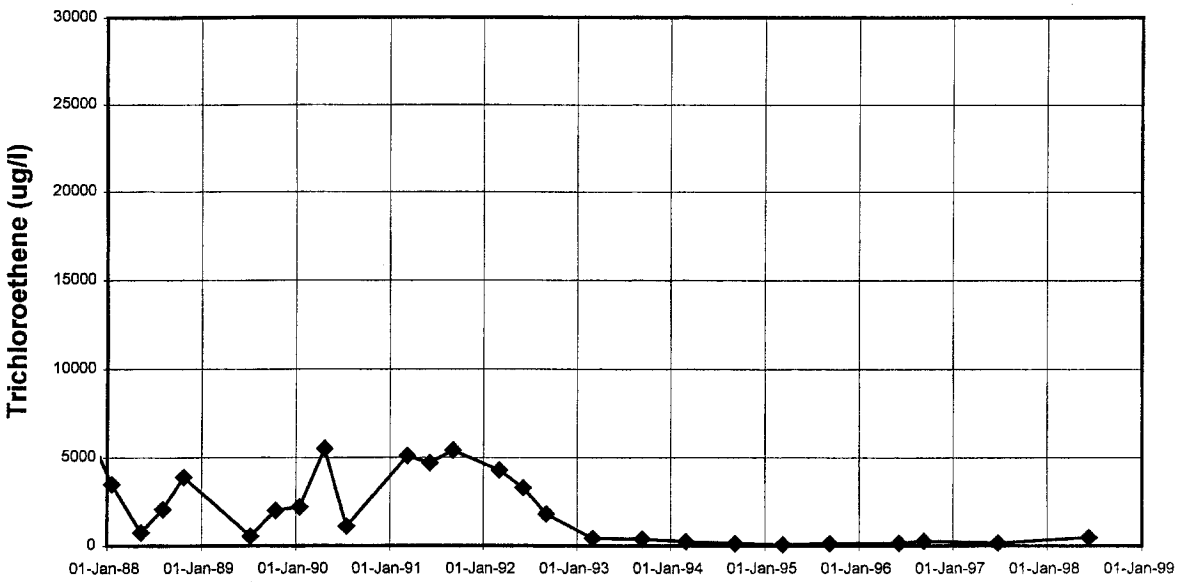
Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



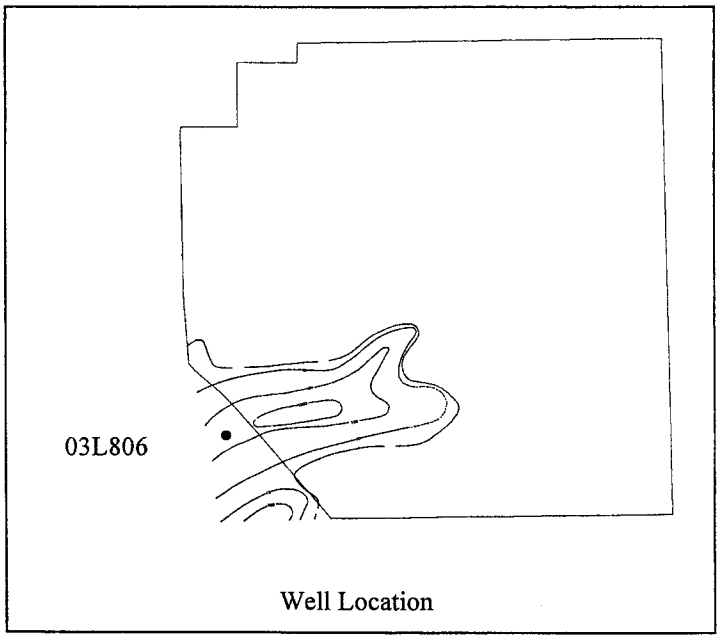
N:\0003\60\GRAPHS\ON-L3\03L802.DOC\TNW-lmh

03L806



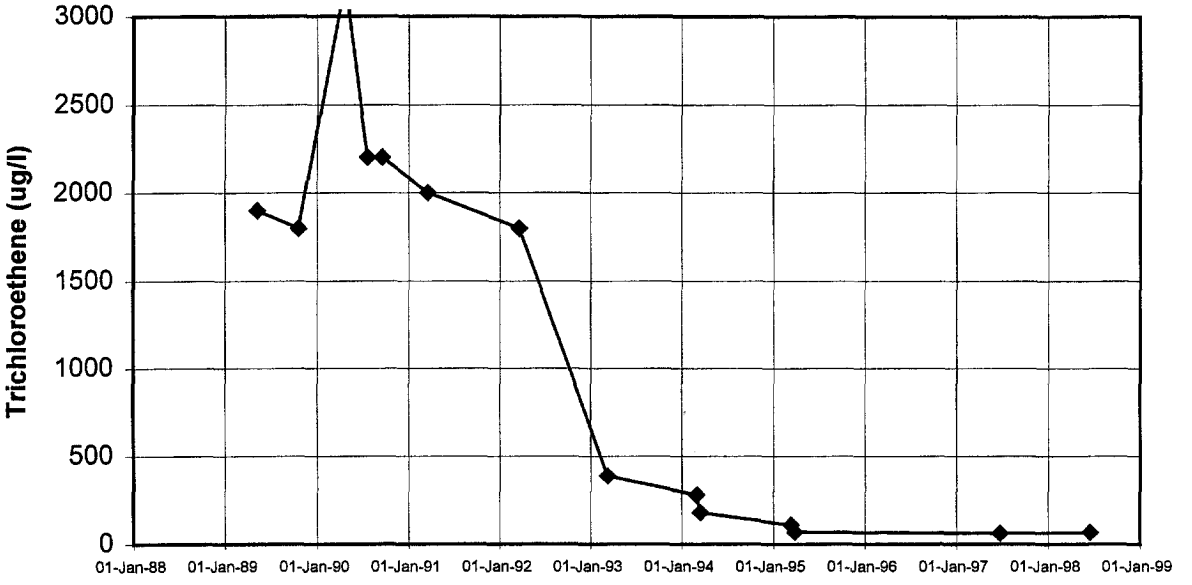
Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



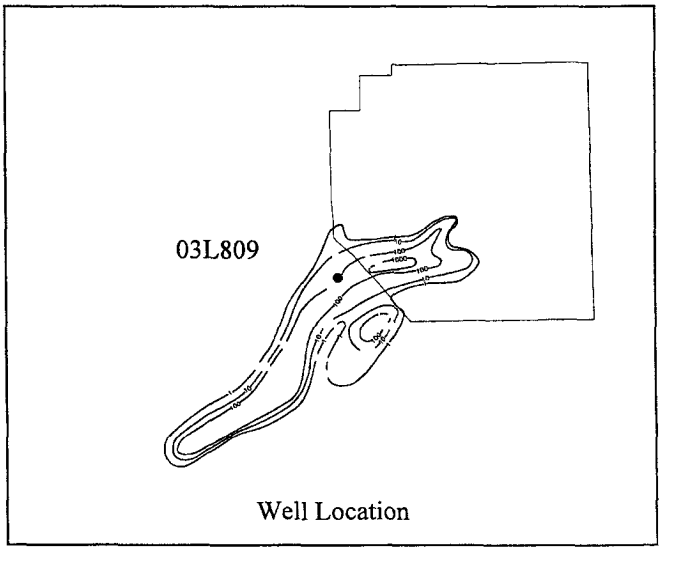
N:\0003\60\GRAPHS\ON-L3\03L806.DOC\TNW-lmh

03L809

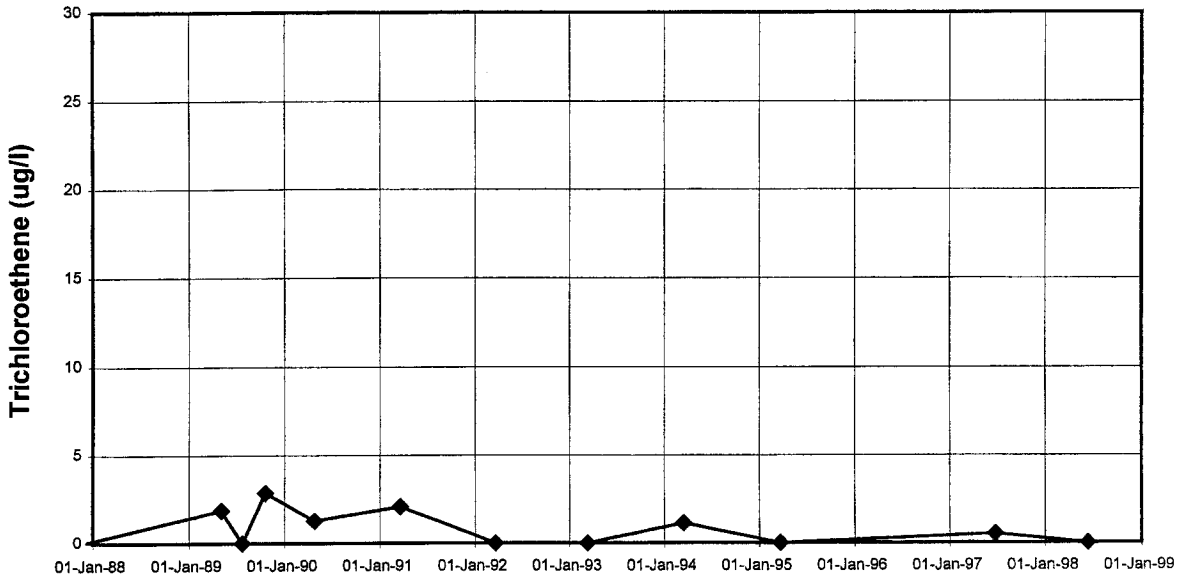


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

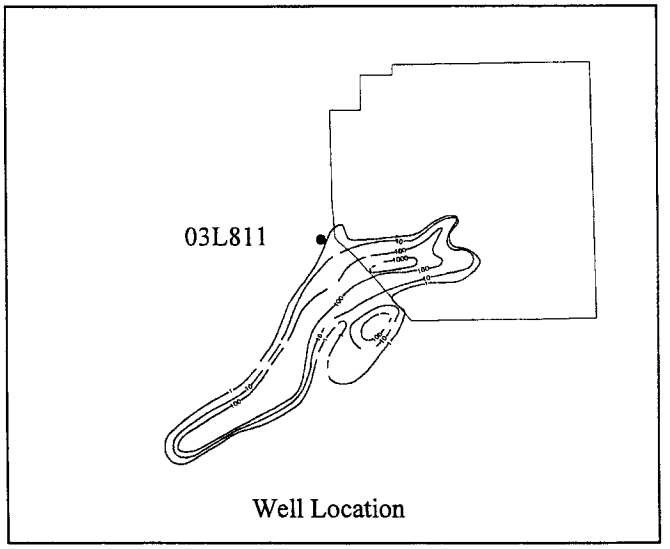


03L811

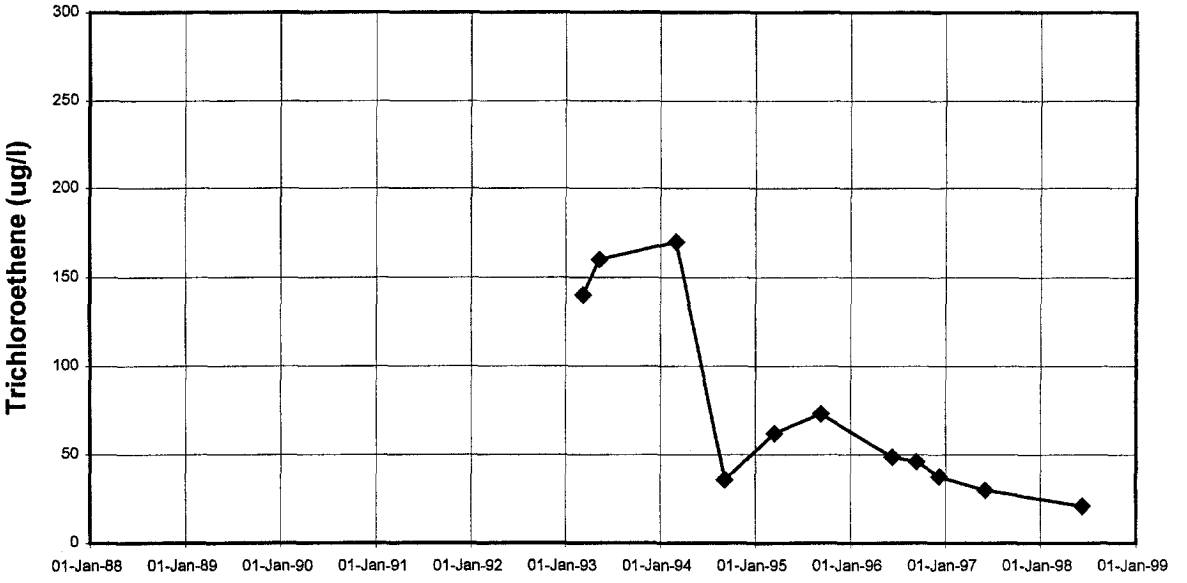


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

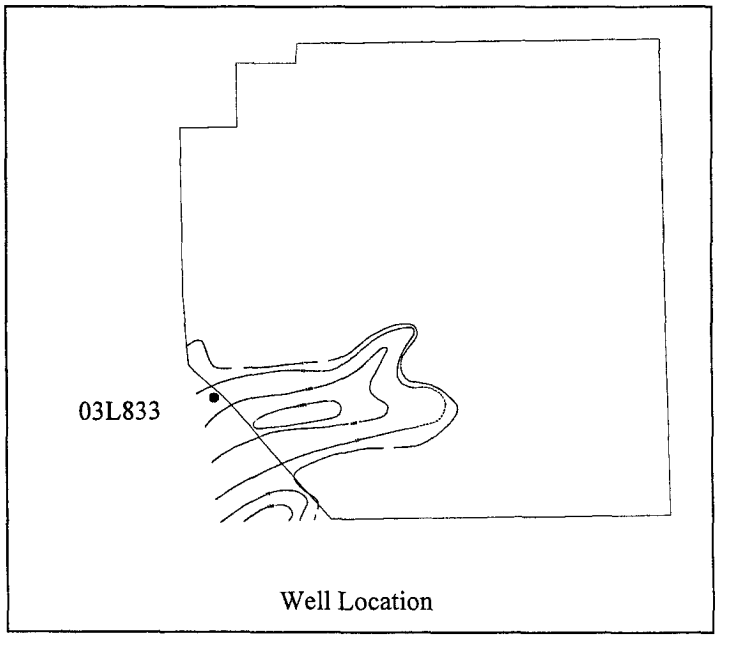


03L833



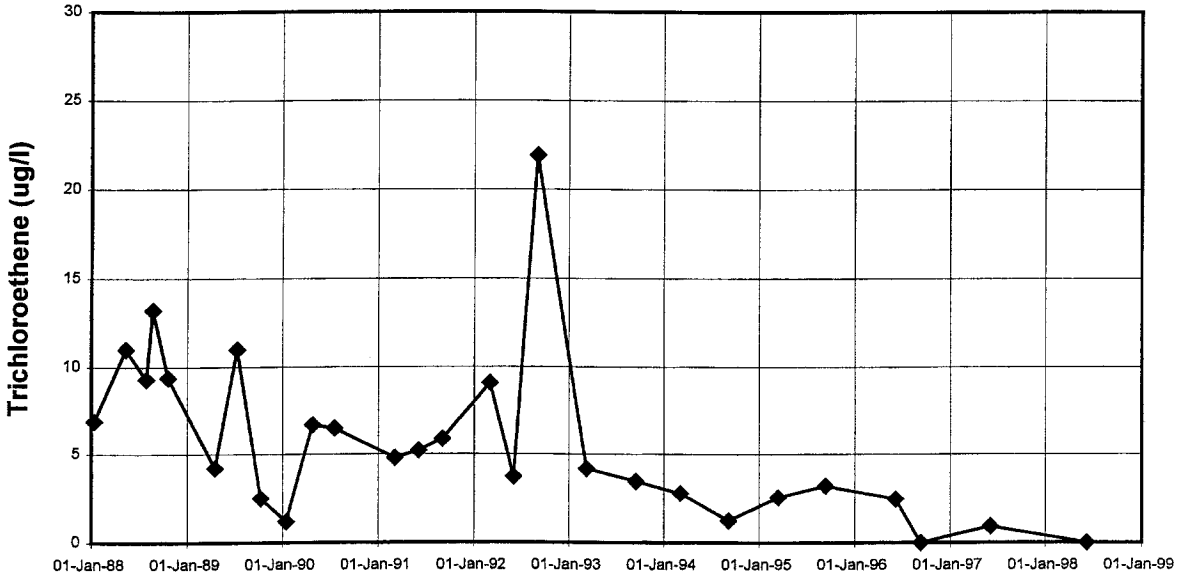
Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



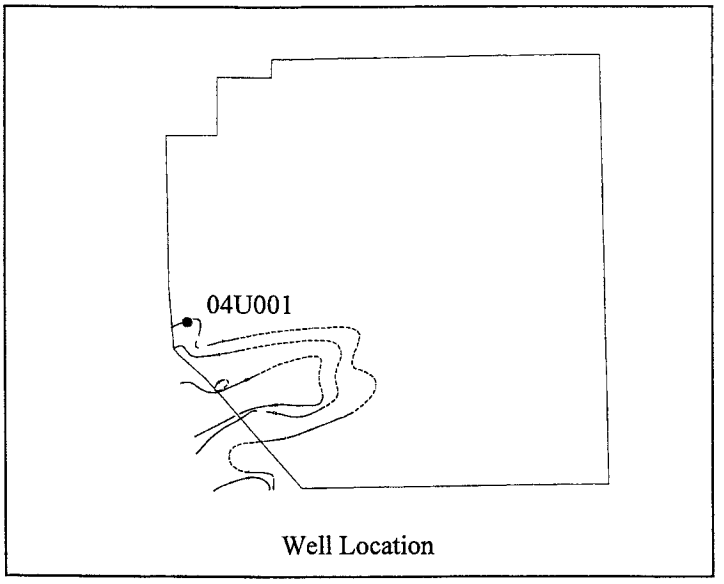
Unit 4 Wells

04U001



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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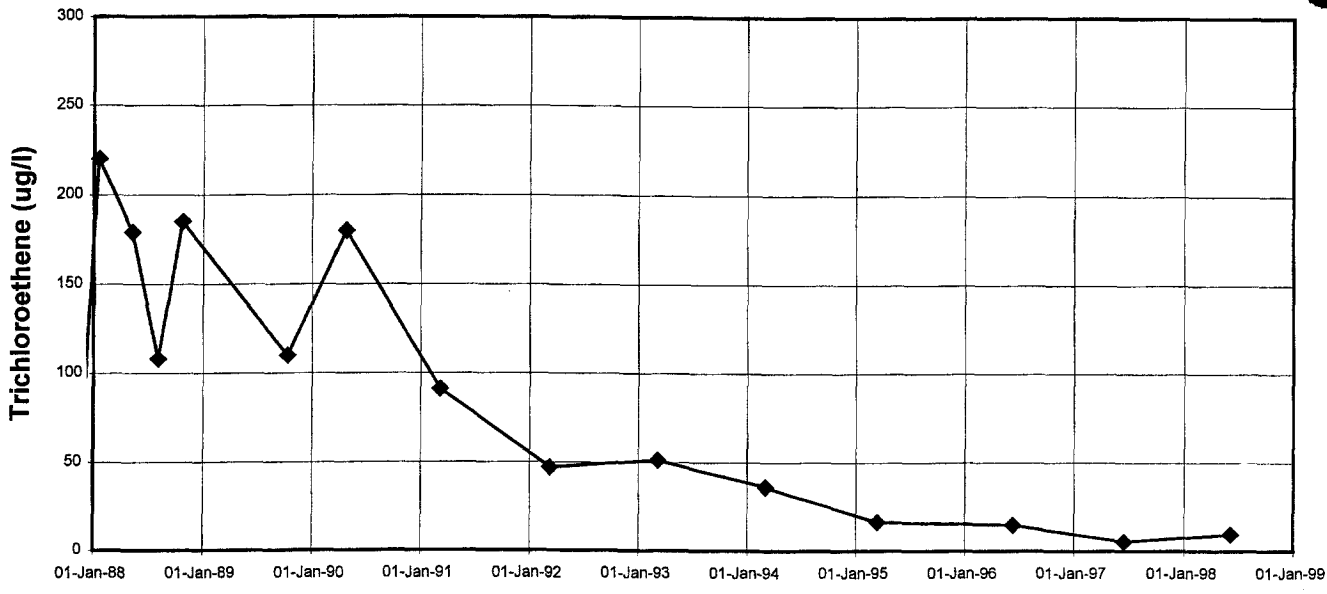
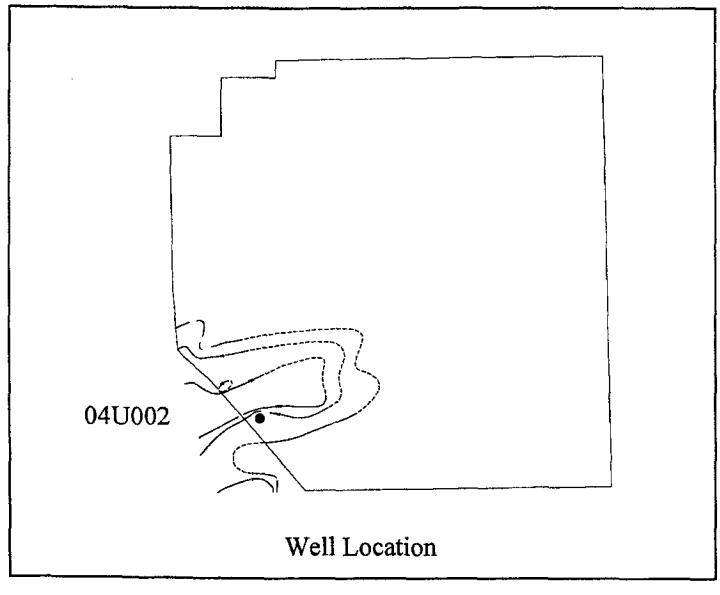
04U002

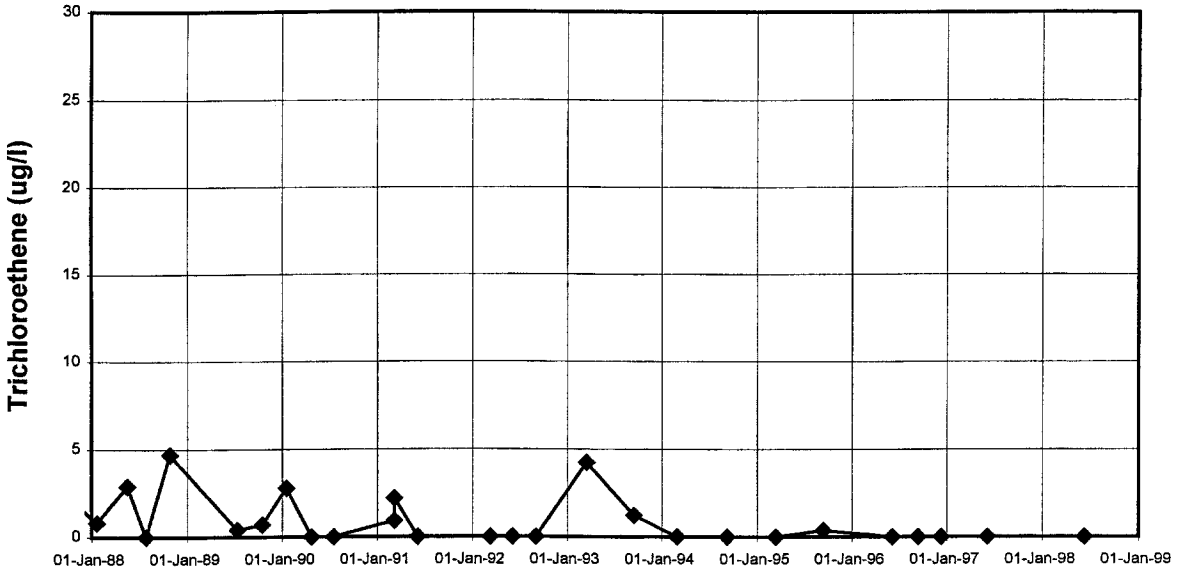


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

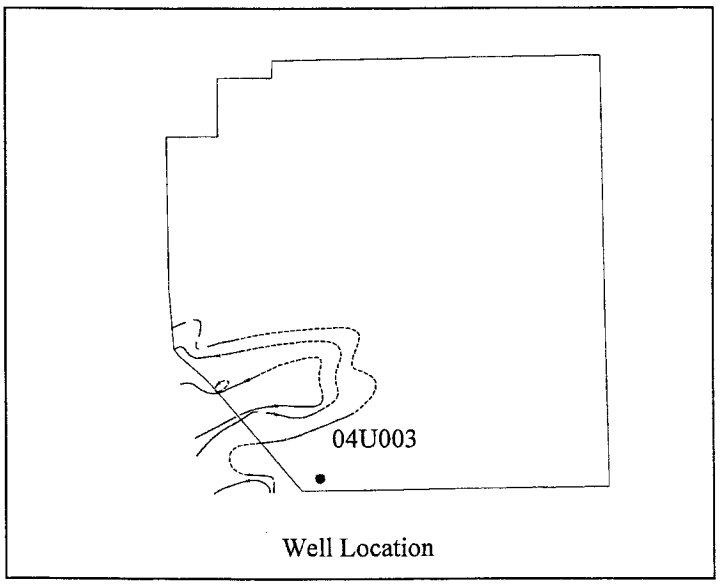


04U003

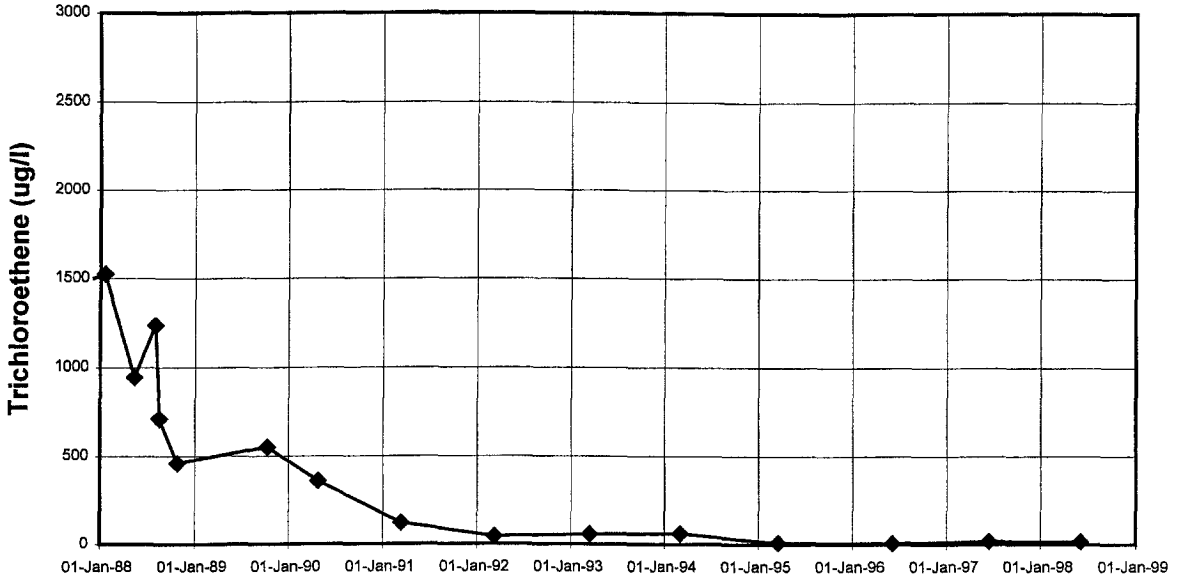


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

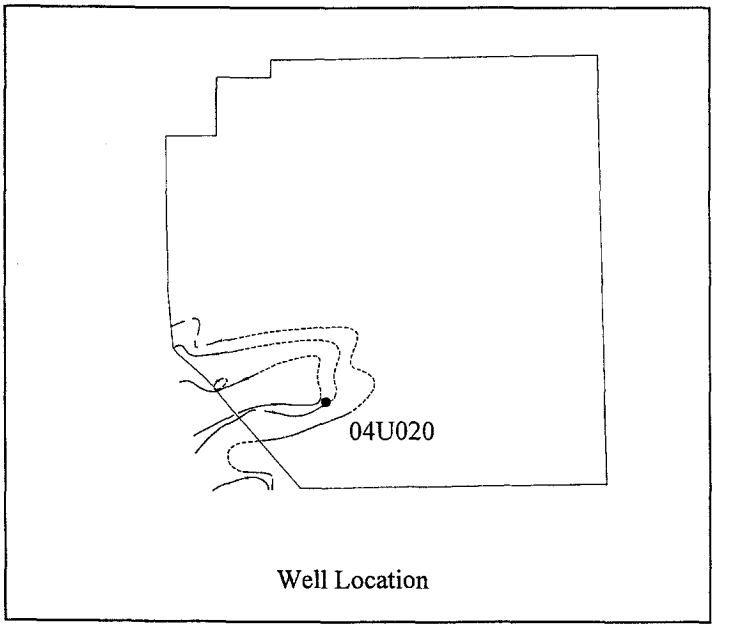


04U020

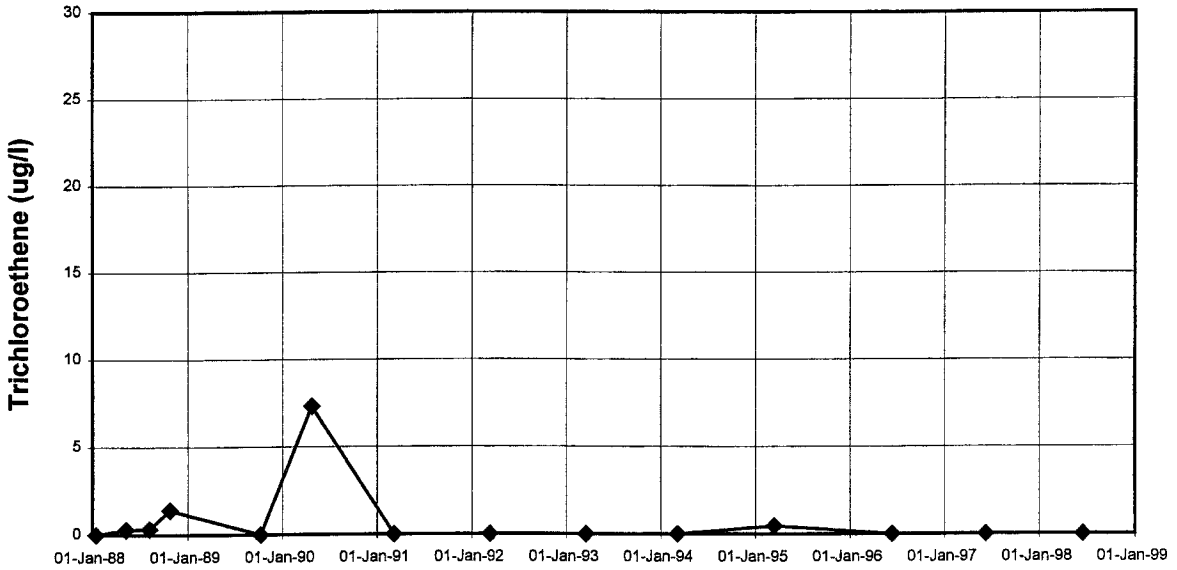


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

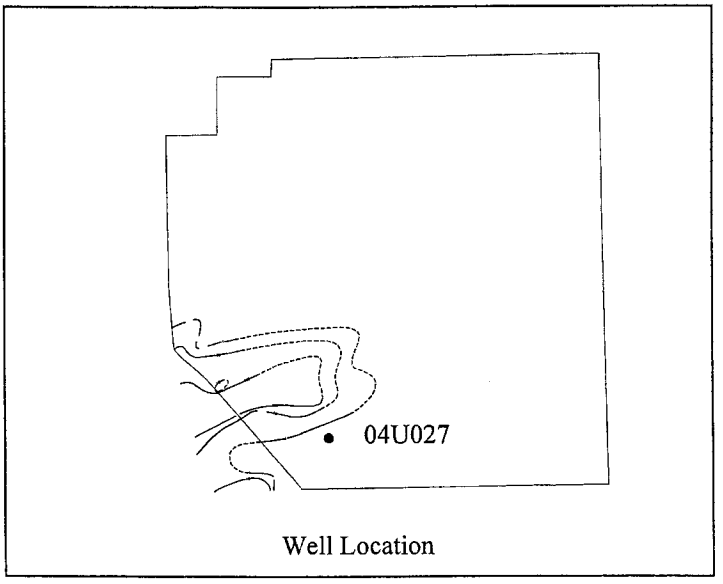


04U027



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.



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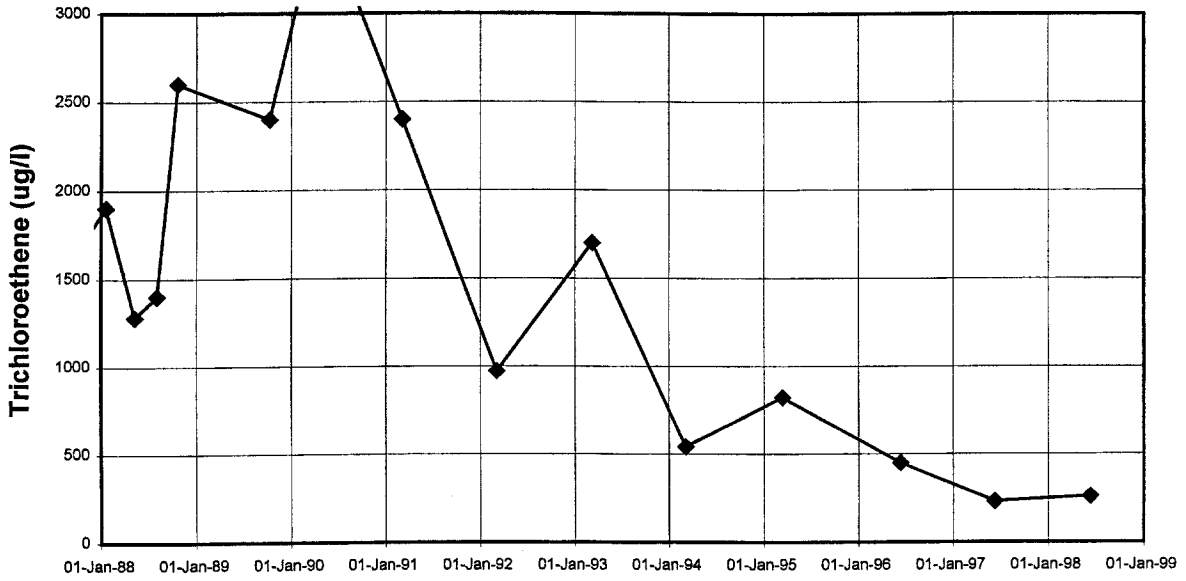
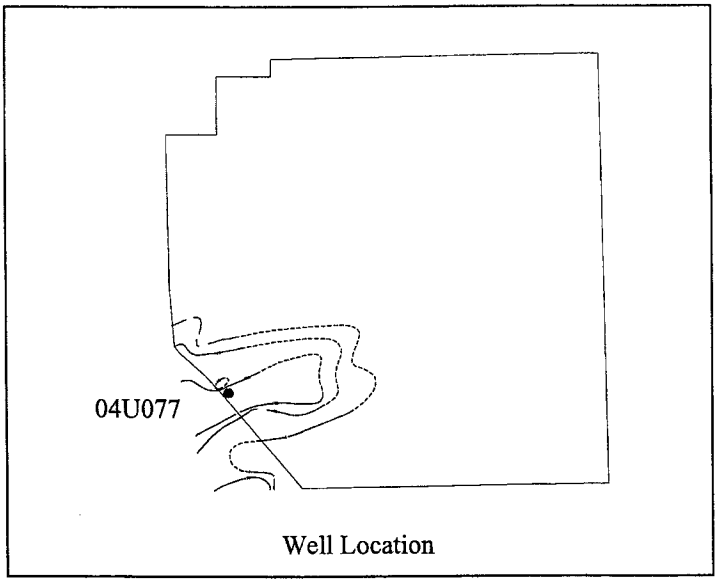
04U077

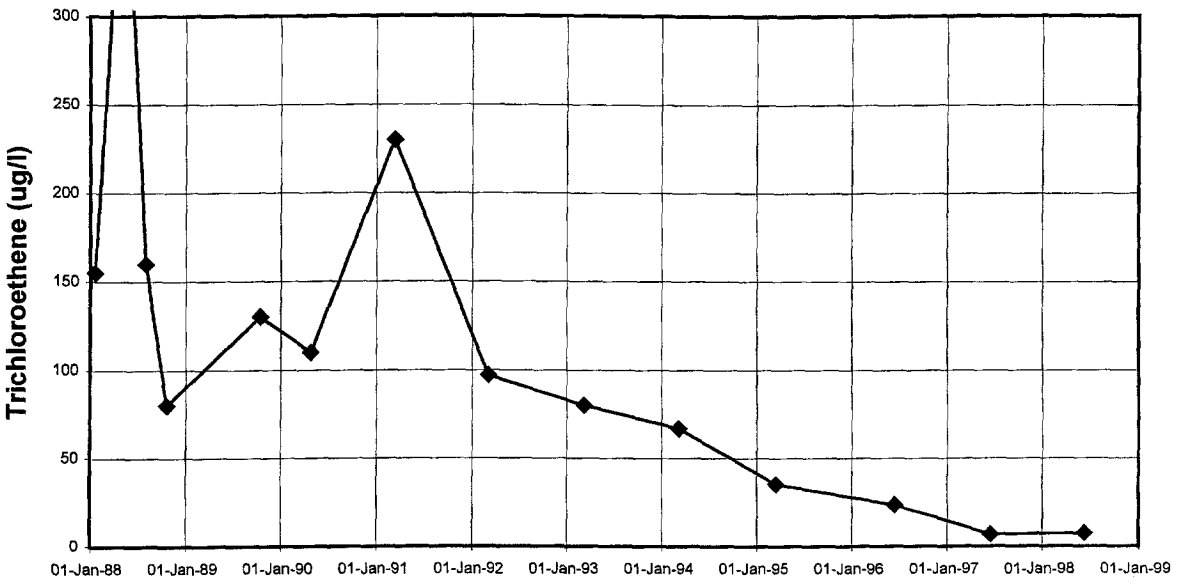


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

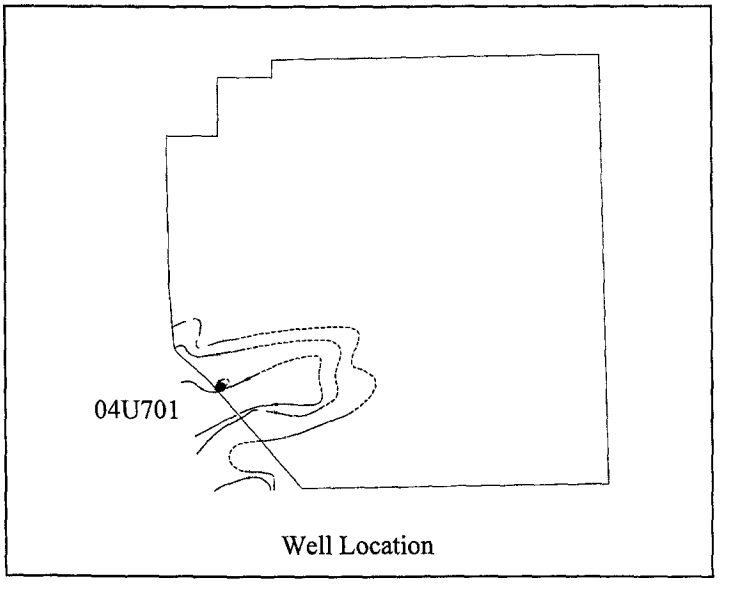


04U701



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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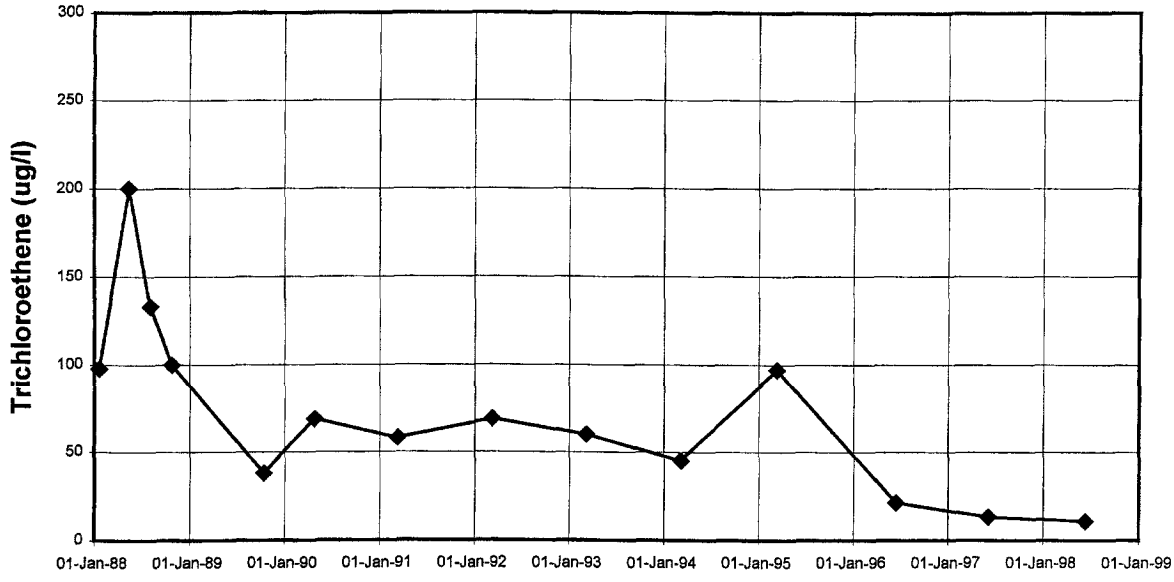
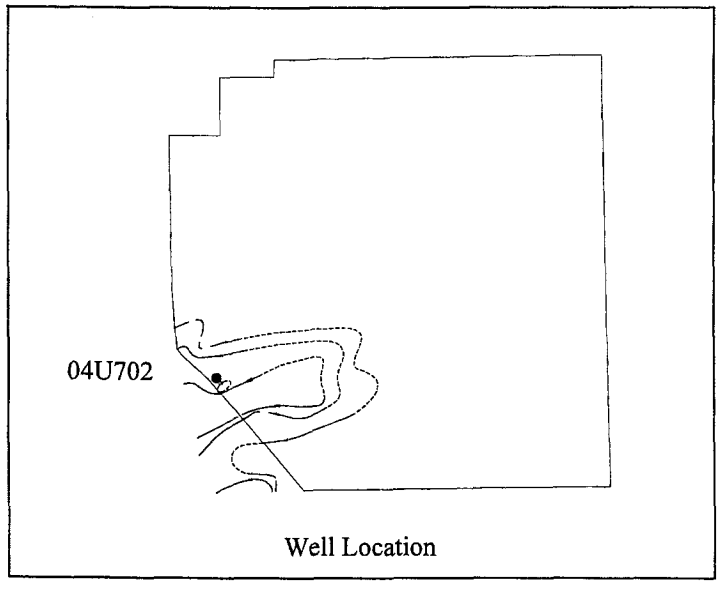
04U702

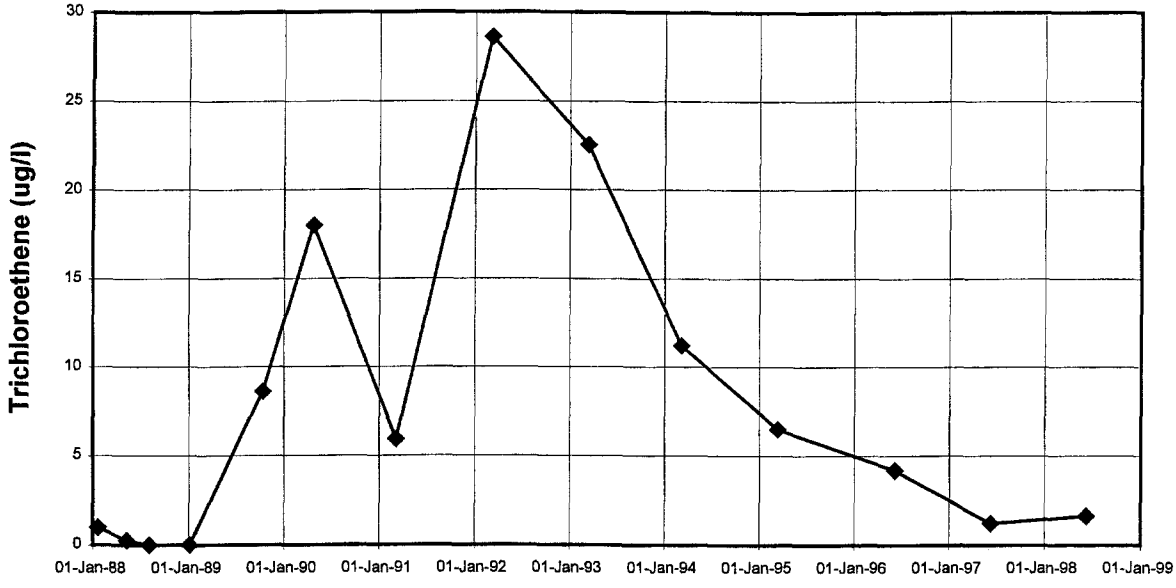


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

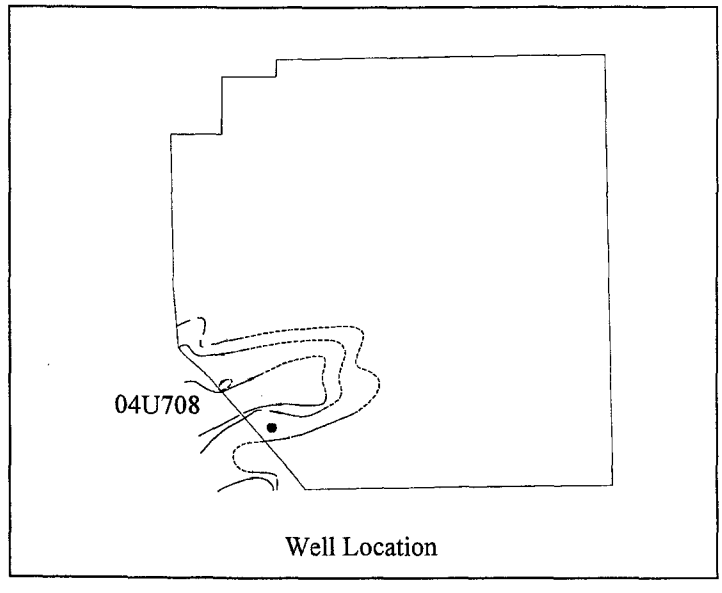


04U708

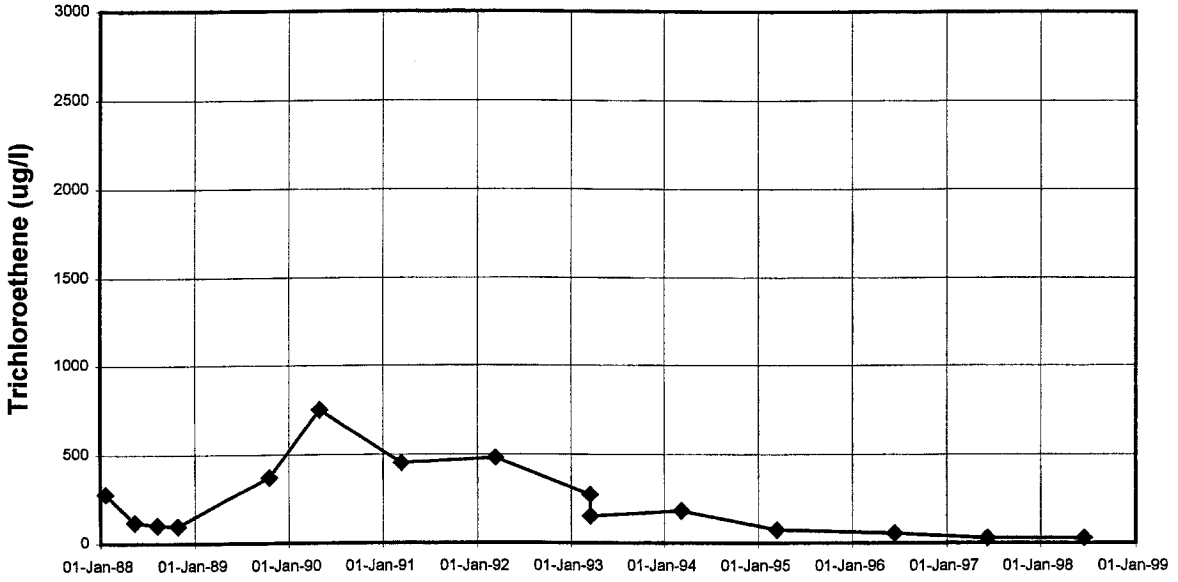


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

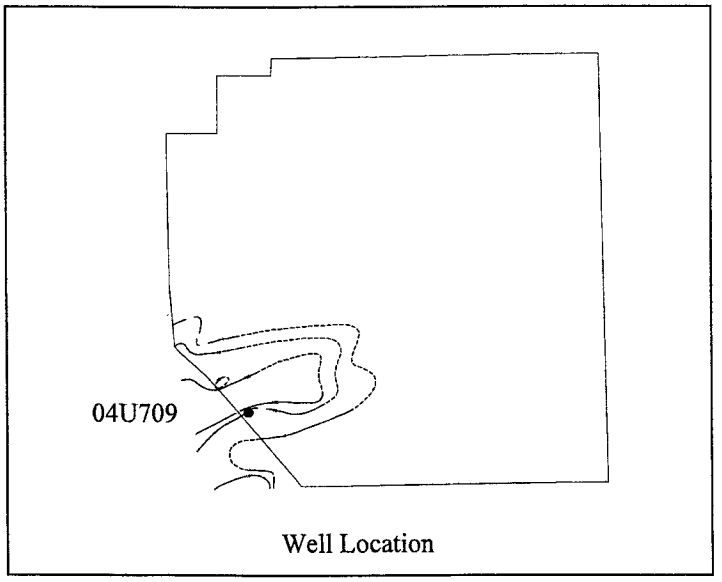


04U709

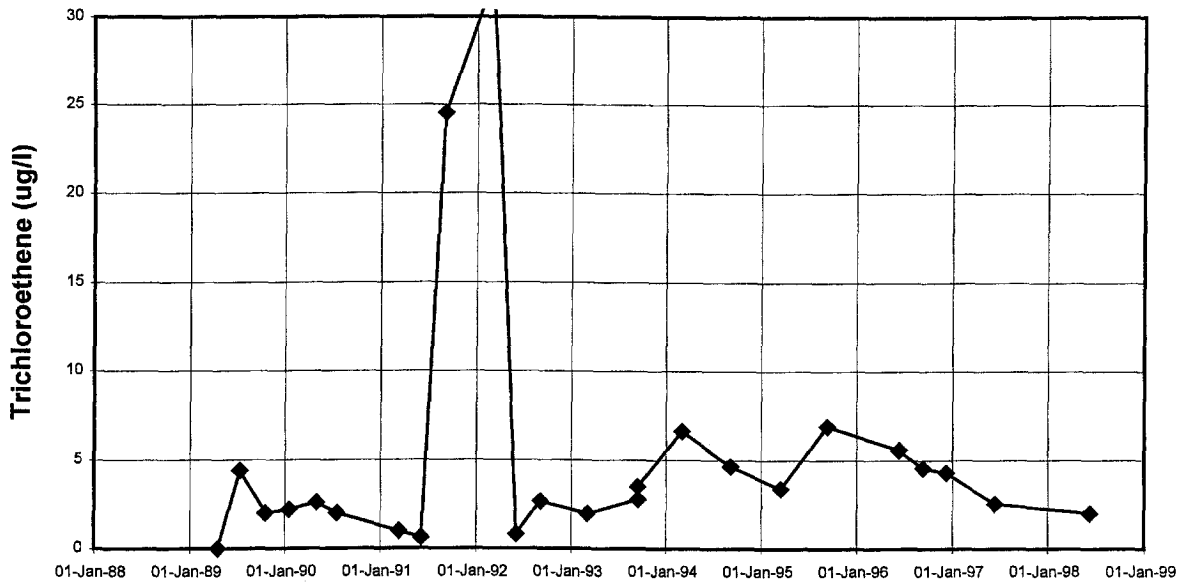


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

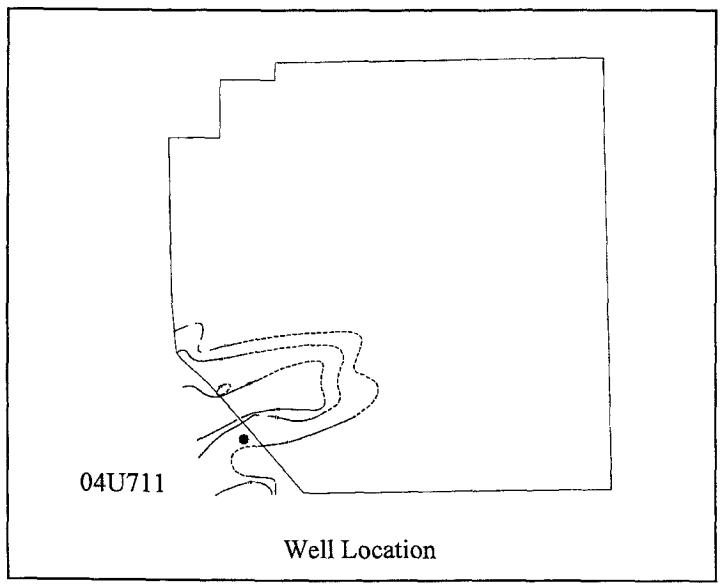


04U711



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.



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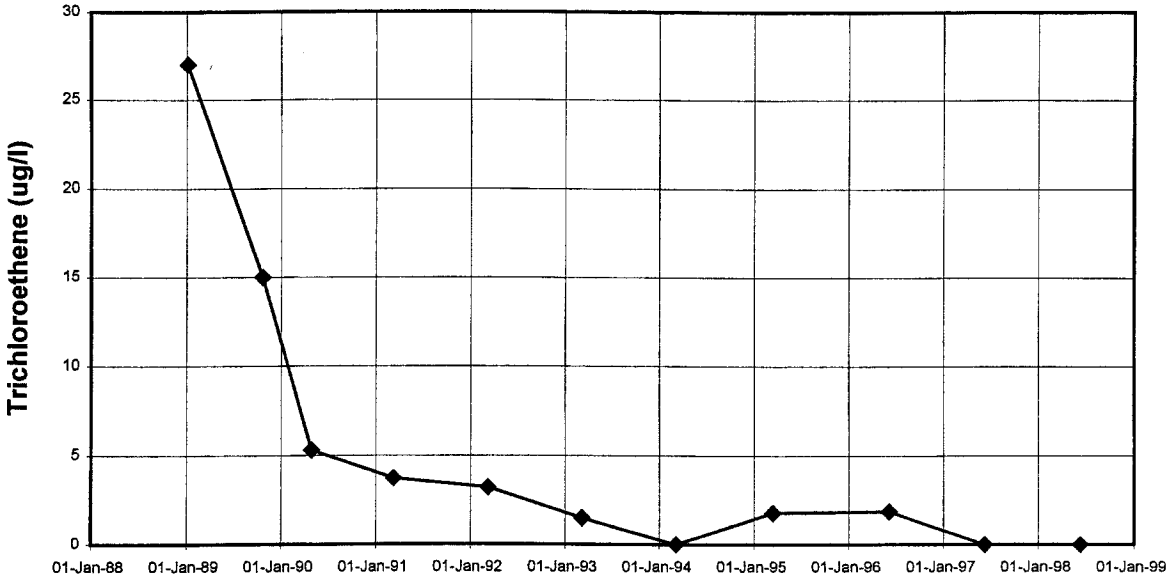
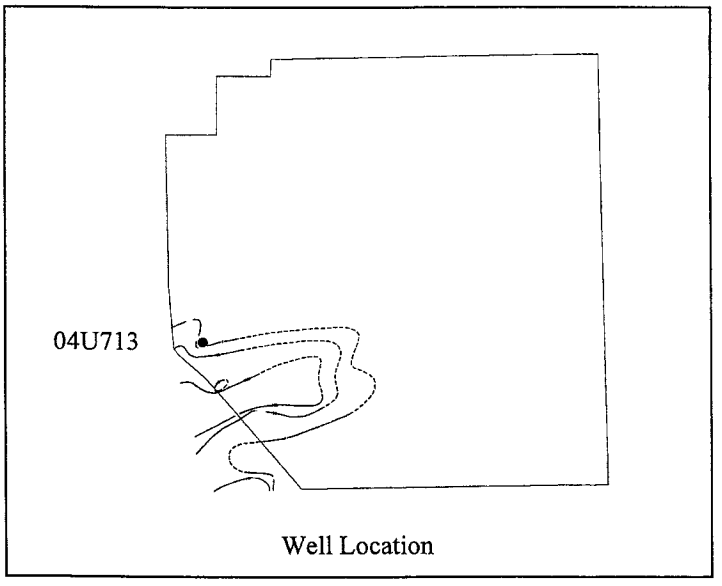
04U713

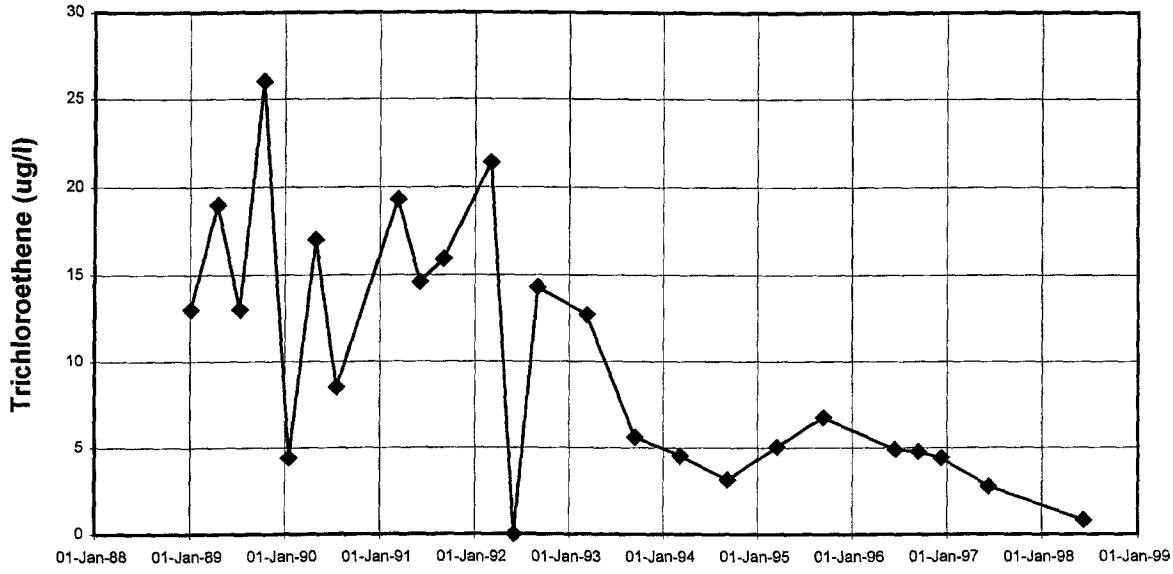


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

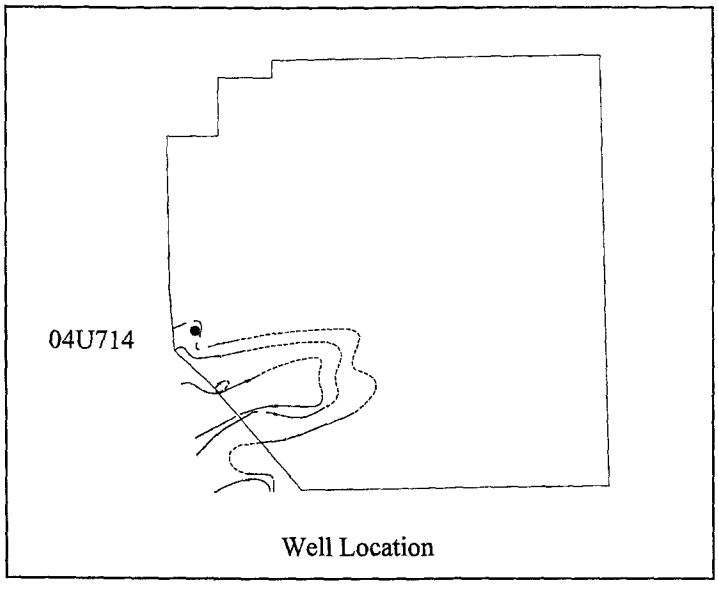


04U714

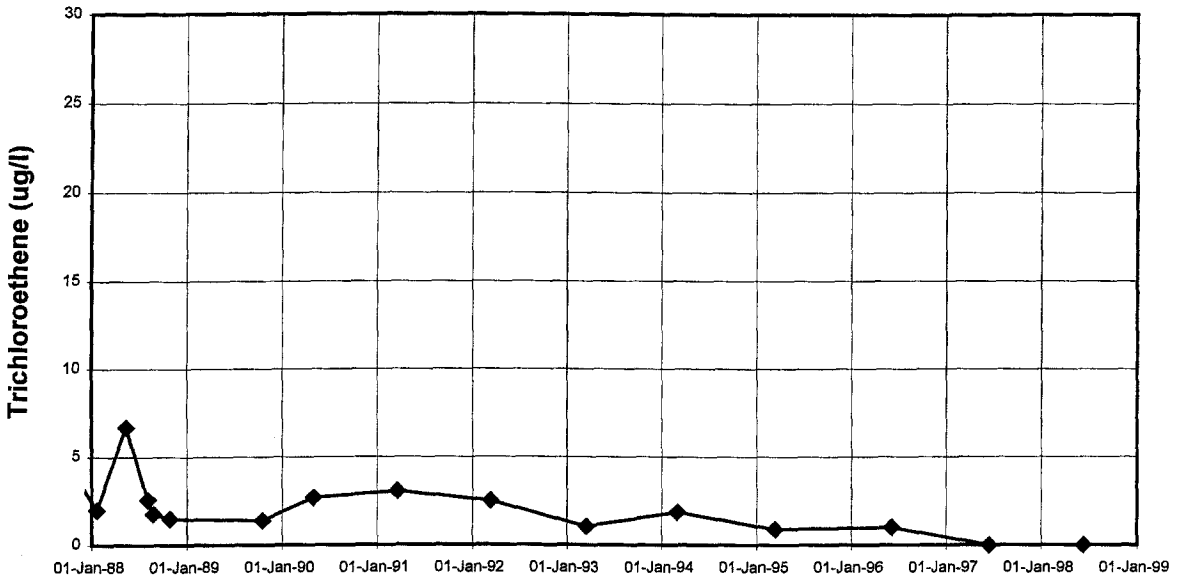


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

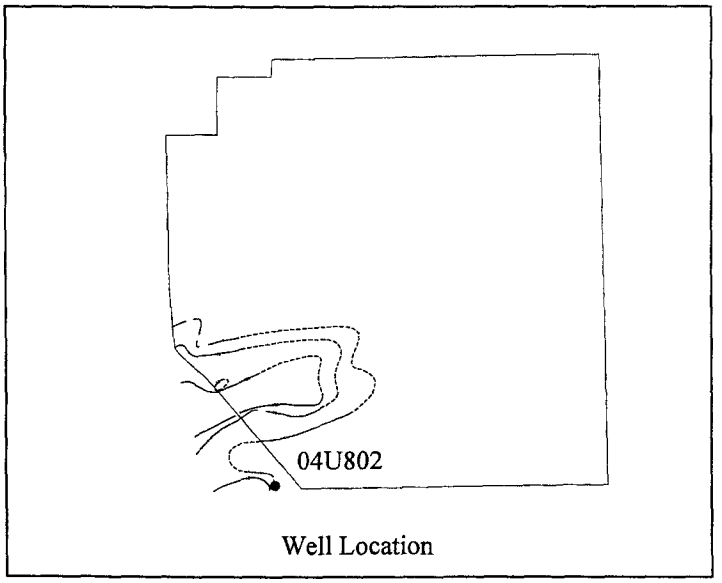


04U802

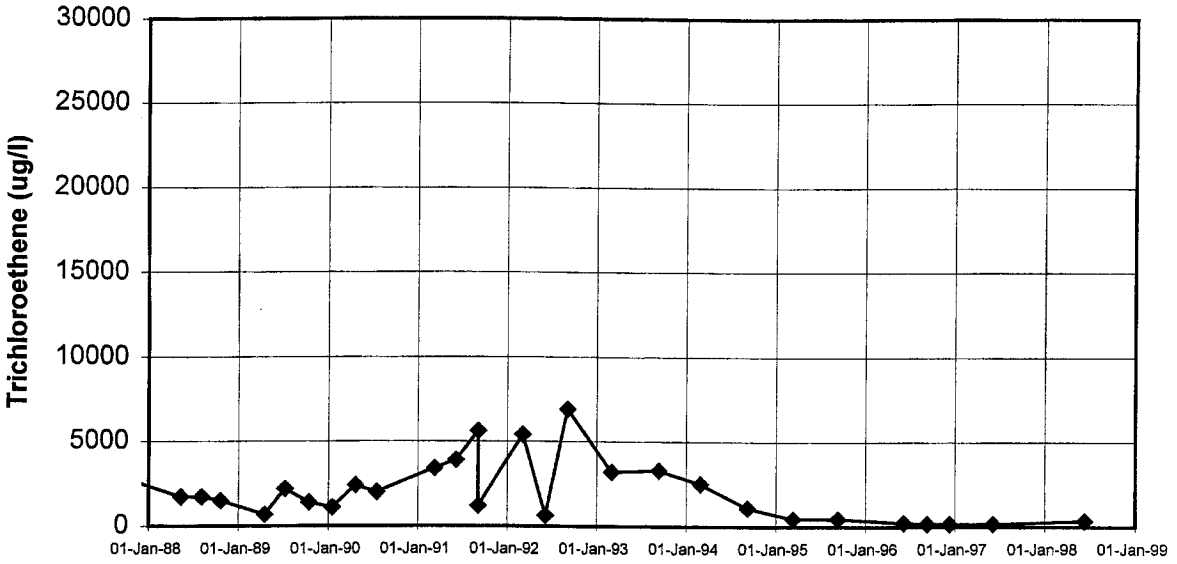


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

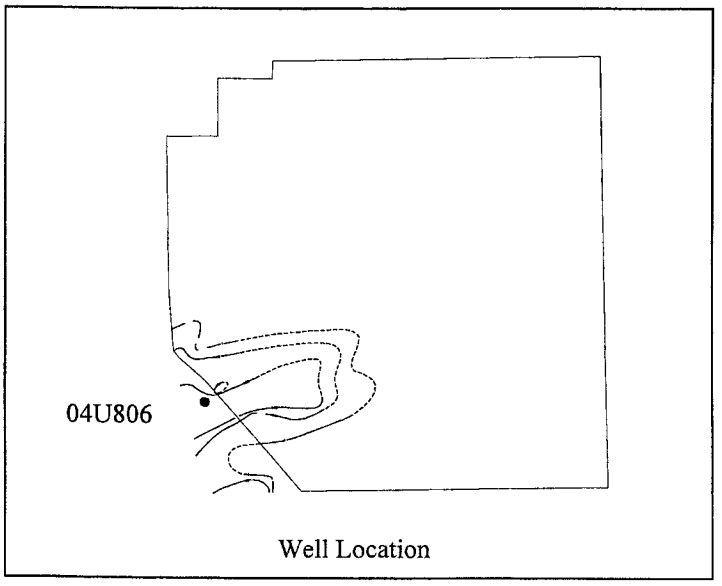


04U806

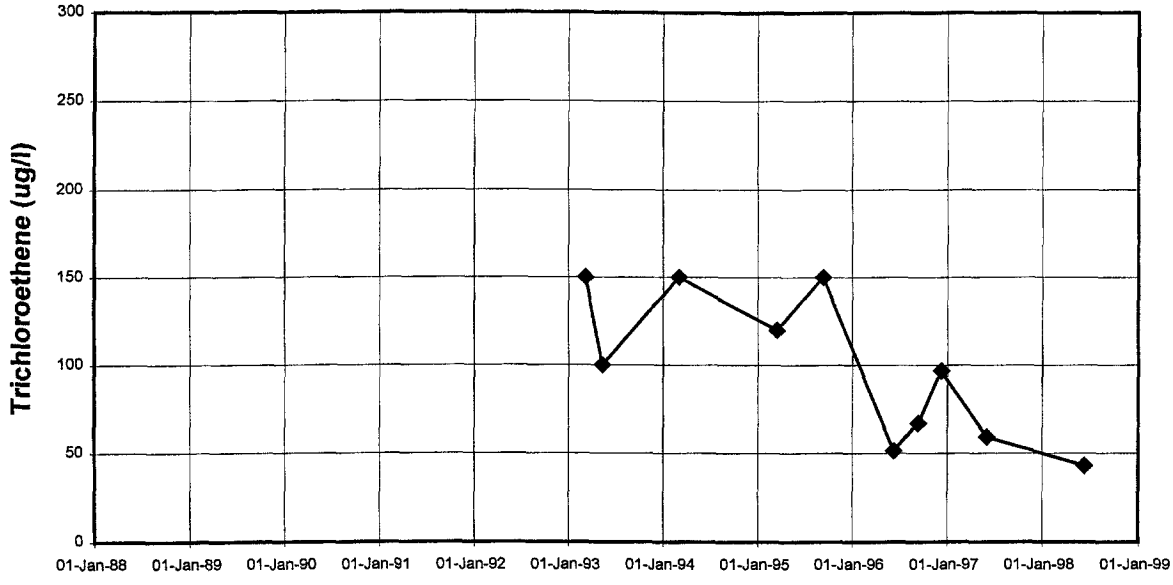


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

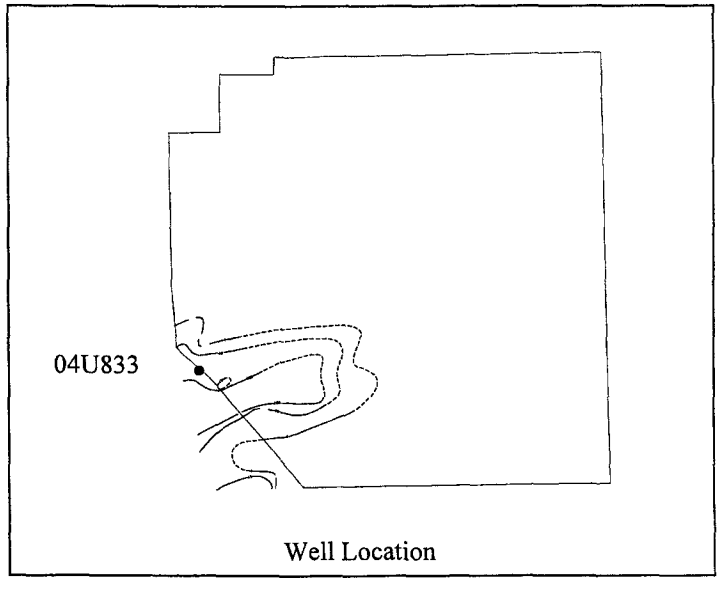


04U833

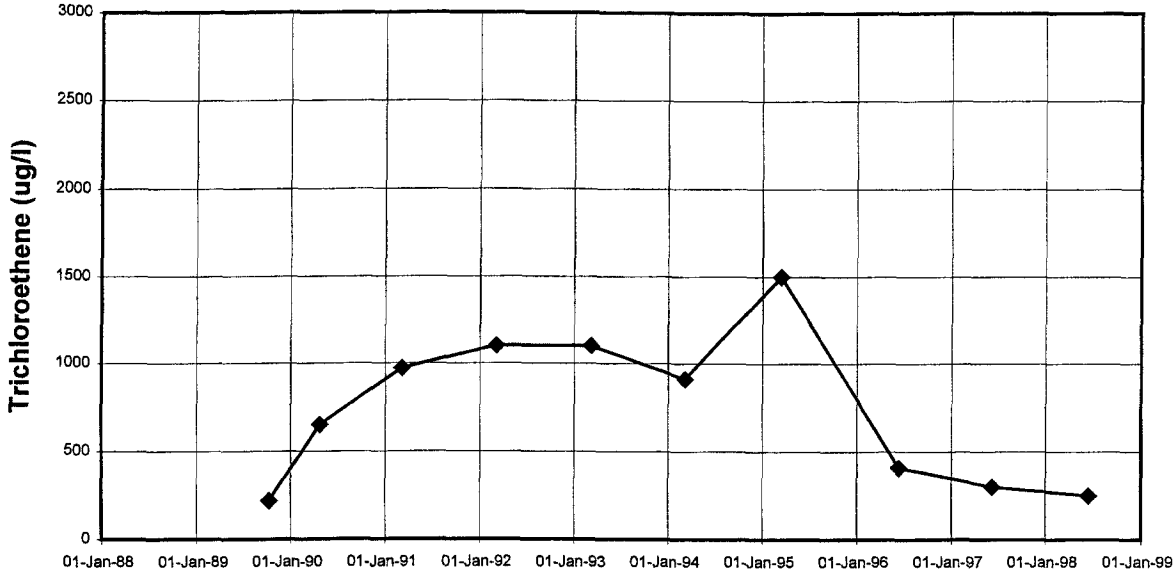


Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

Note:
Plume map is from FY 1998.

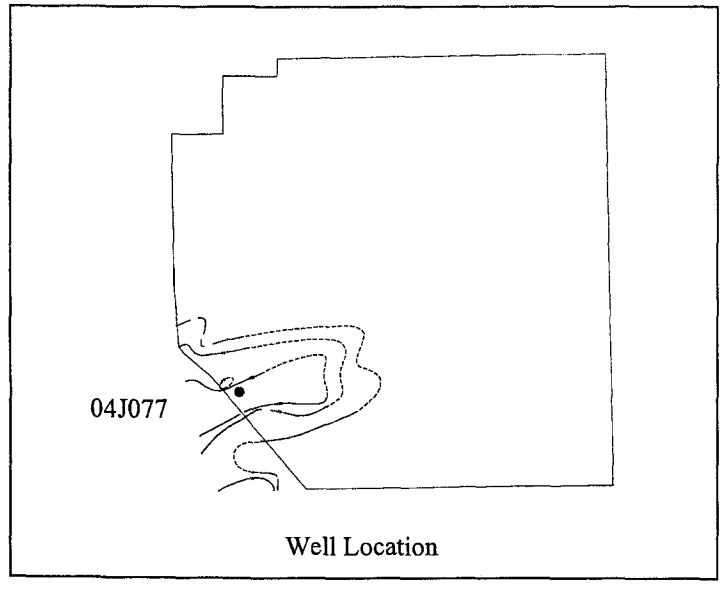


04J077

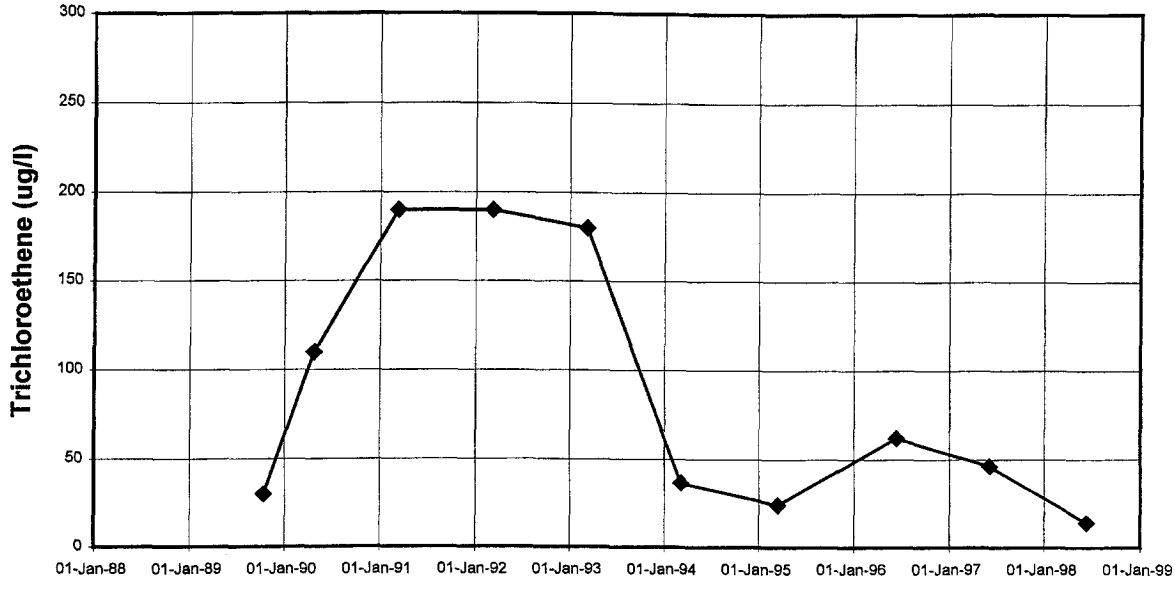


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

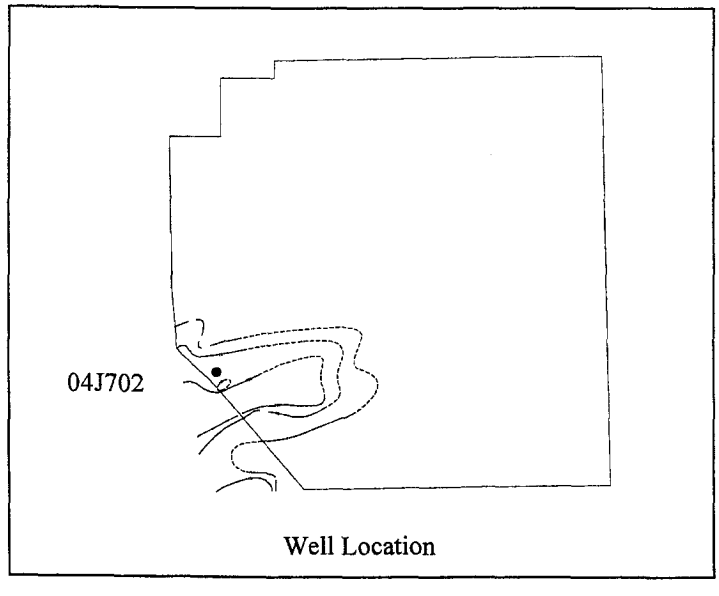


04J702

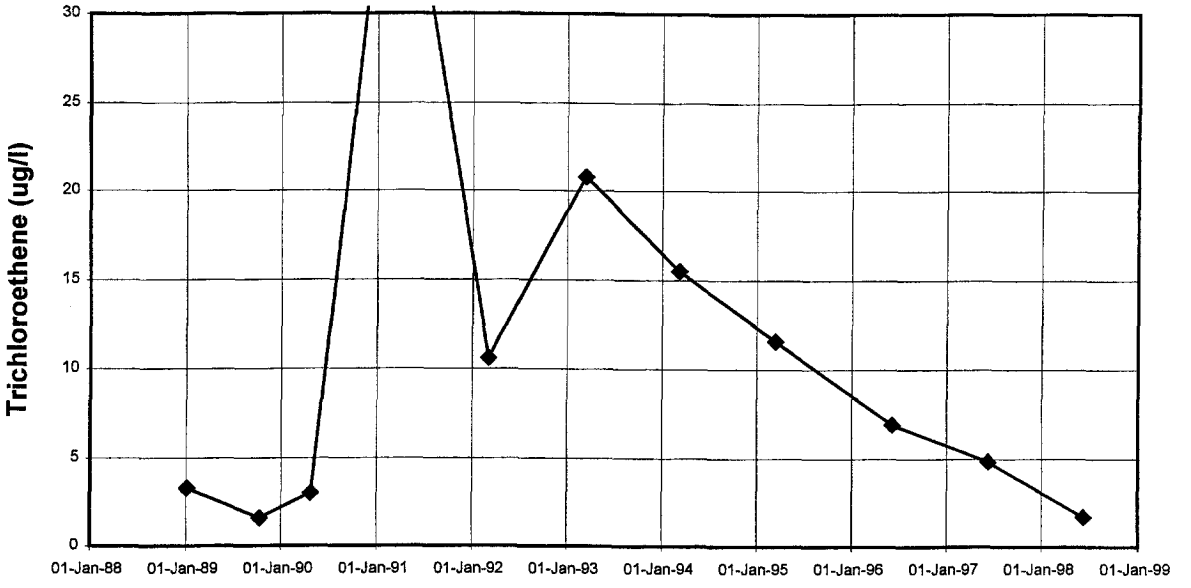


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

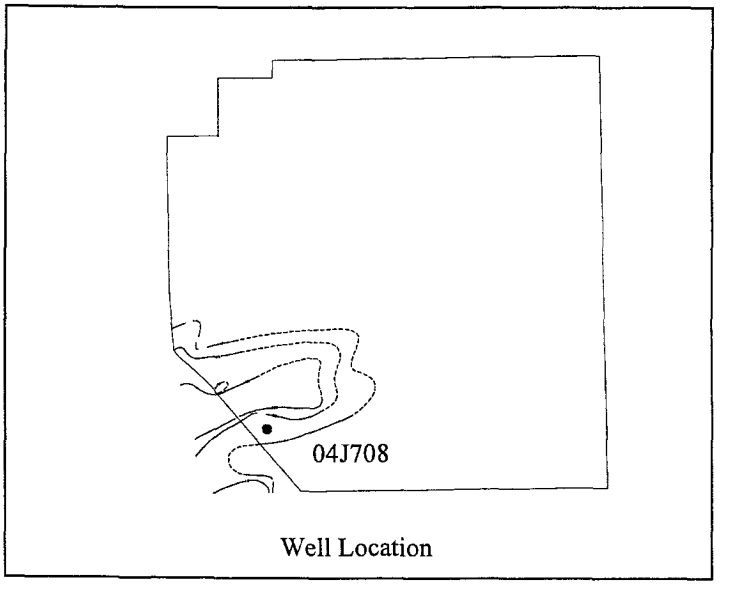


04J708



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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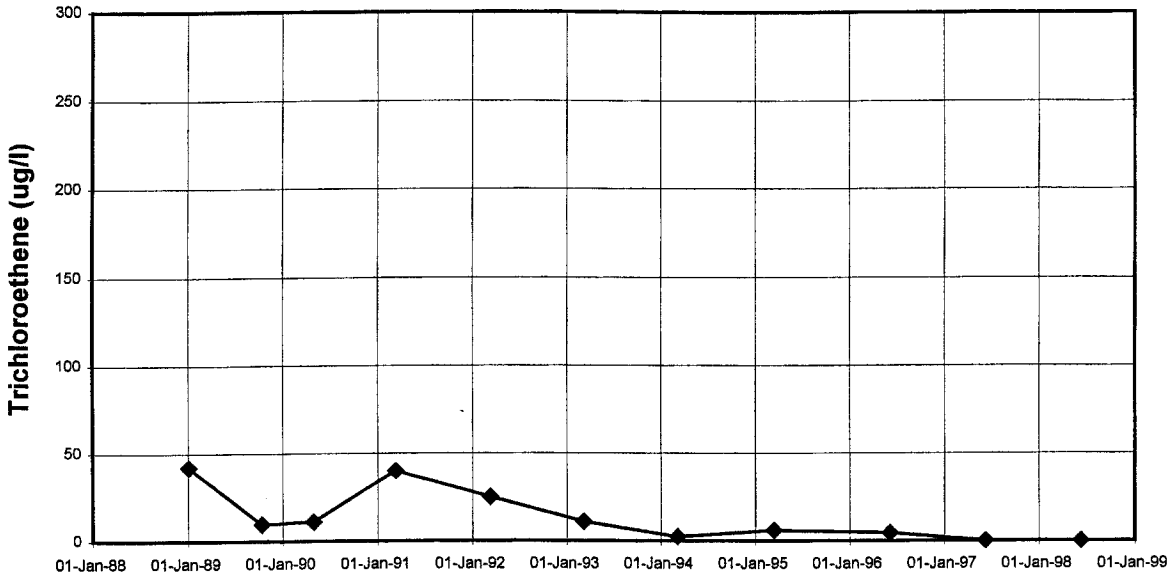
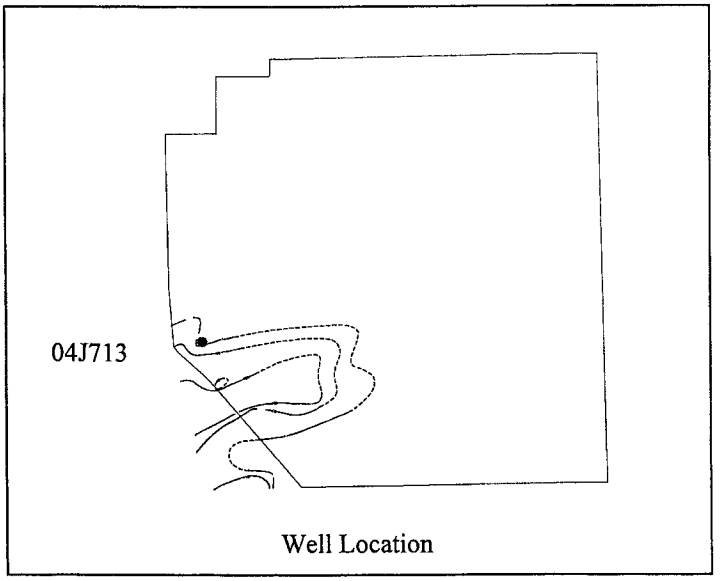
04J713

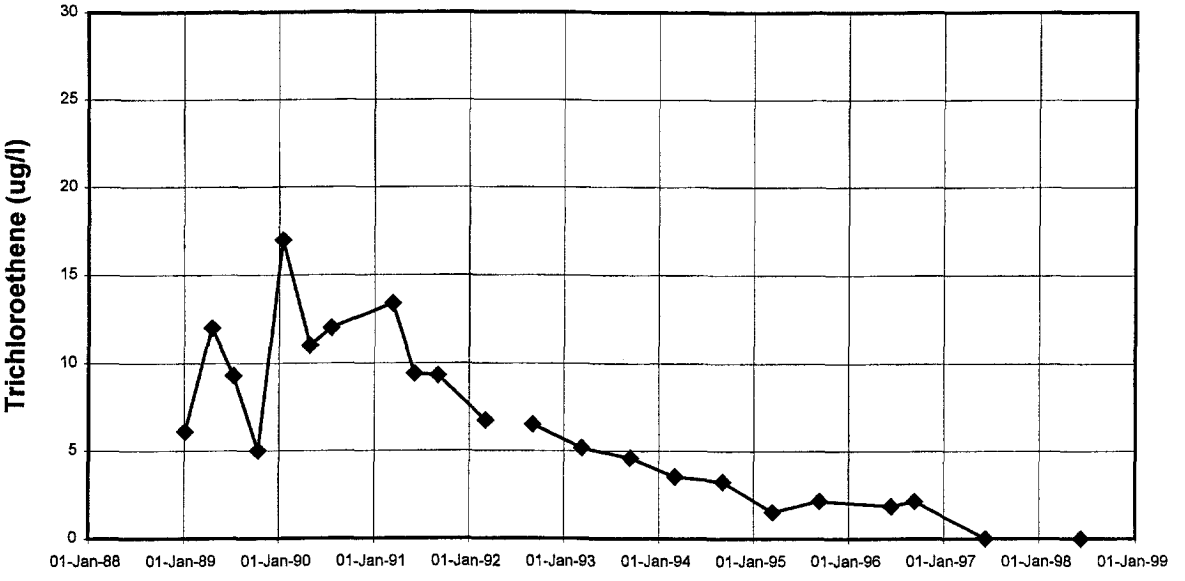


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

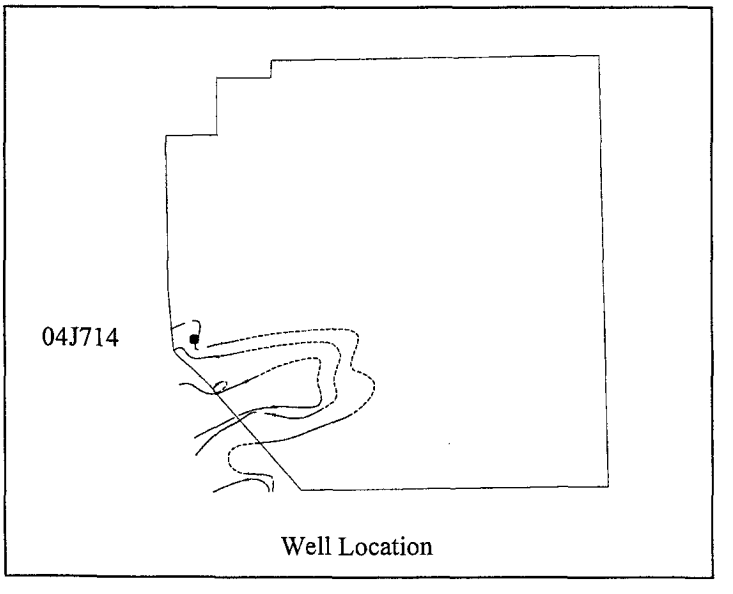


04J714

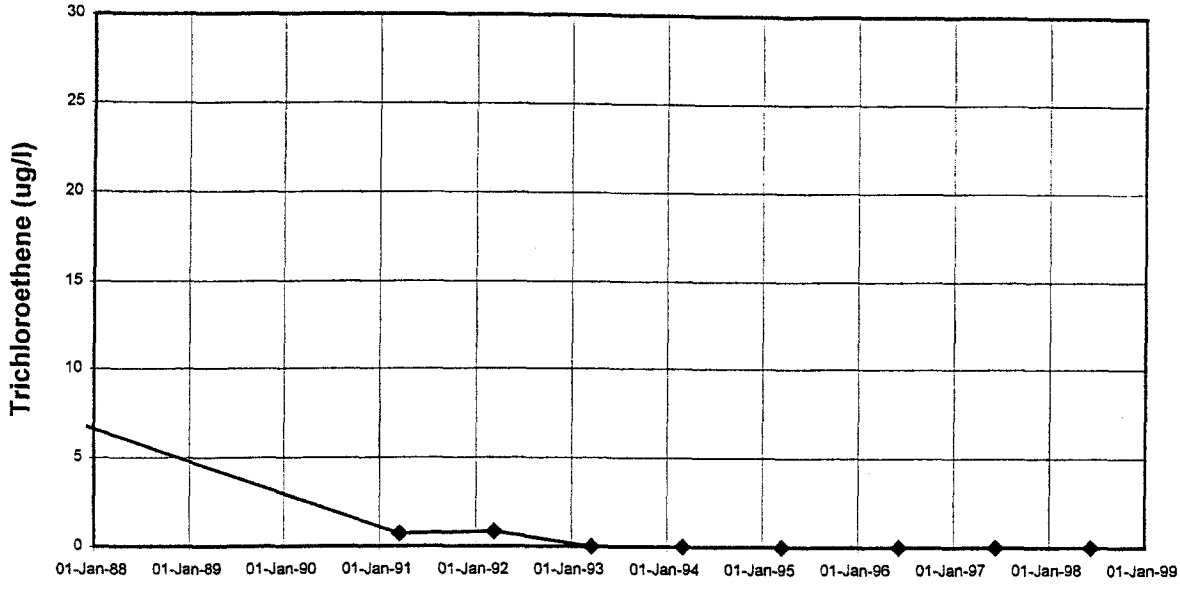


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

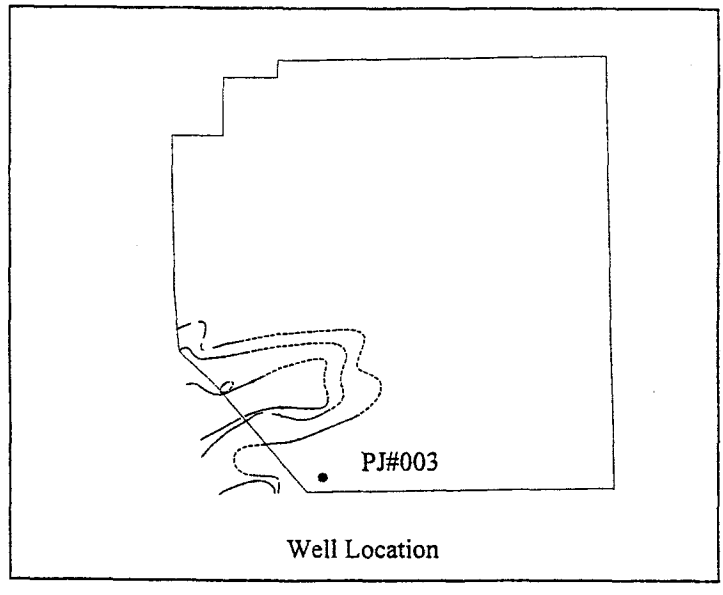


PJ#003

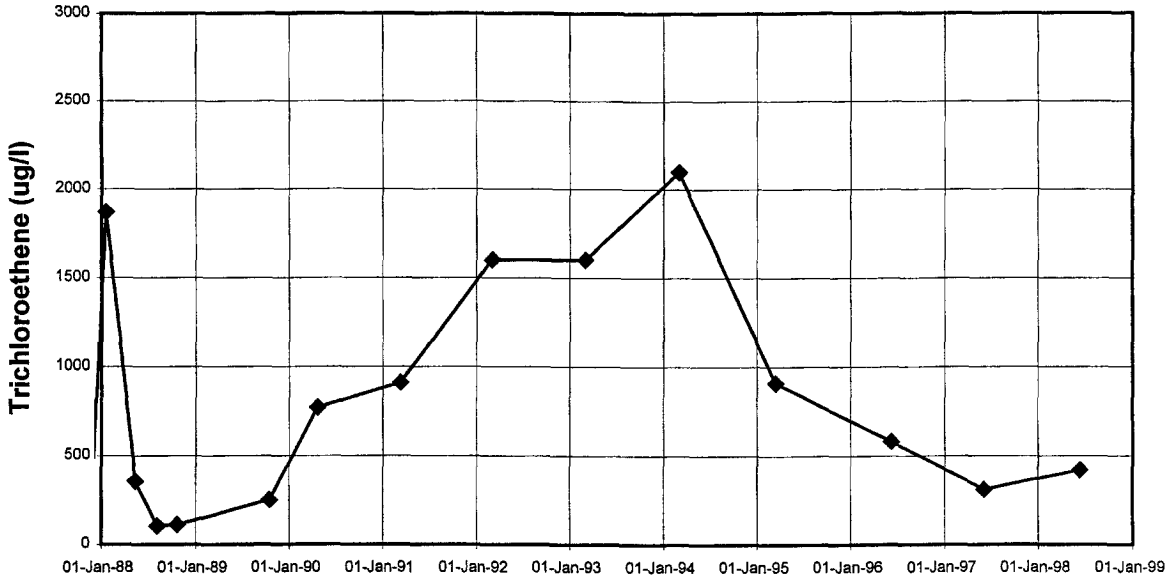


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the TGRS.

Note:
Plume map is from FY 1998.

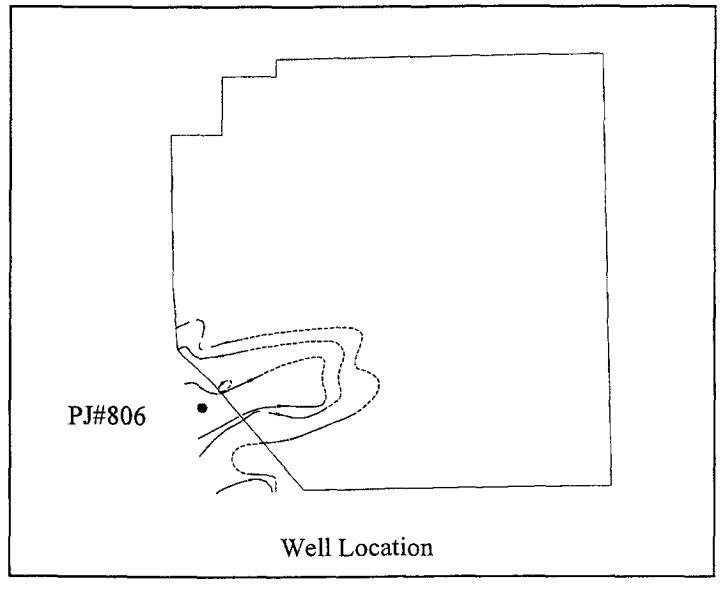


PJ#806



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the TGRS.

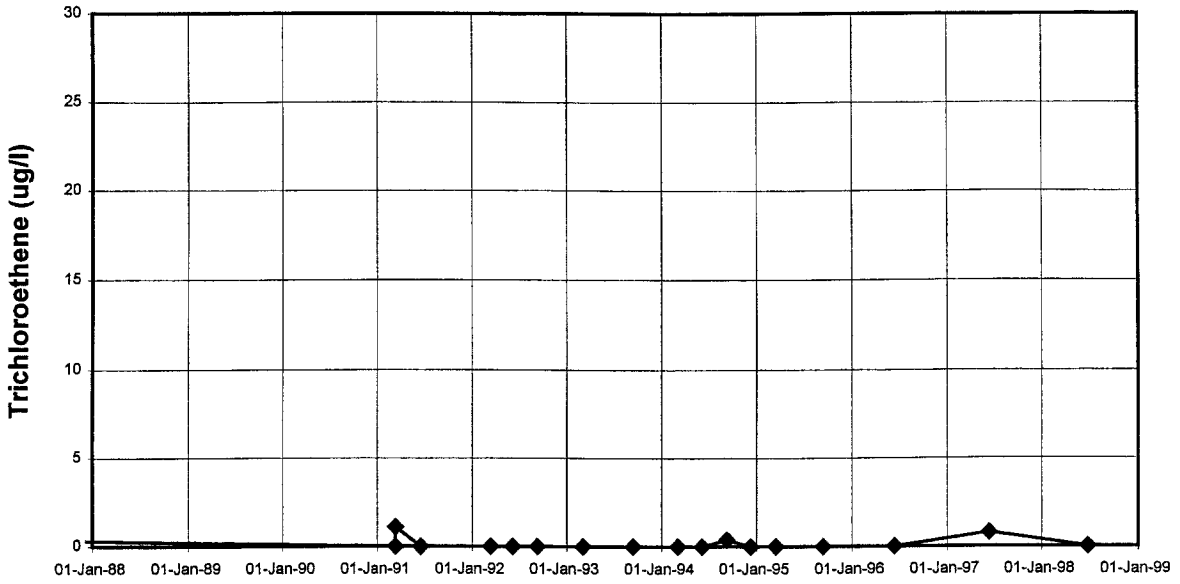
Note:
Plume map is from FY 1998.



OU3

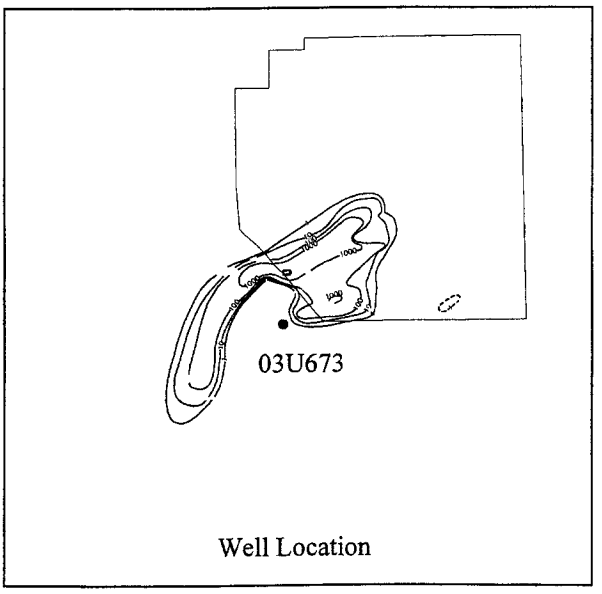
Upper Unit 3 Wells

03U673



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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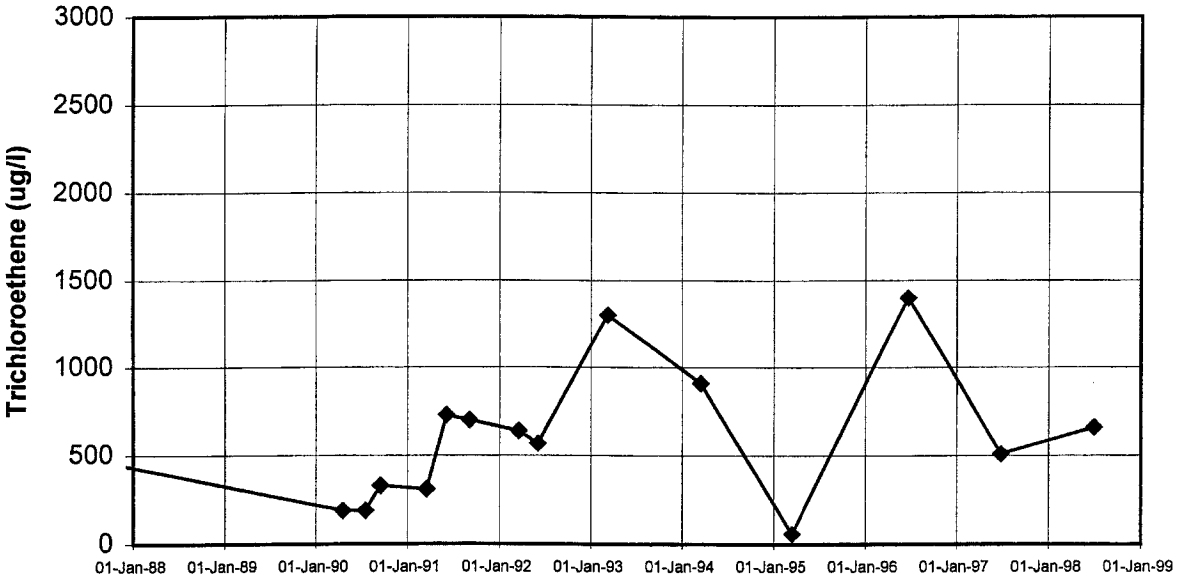
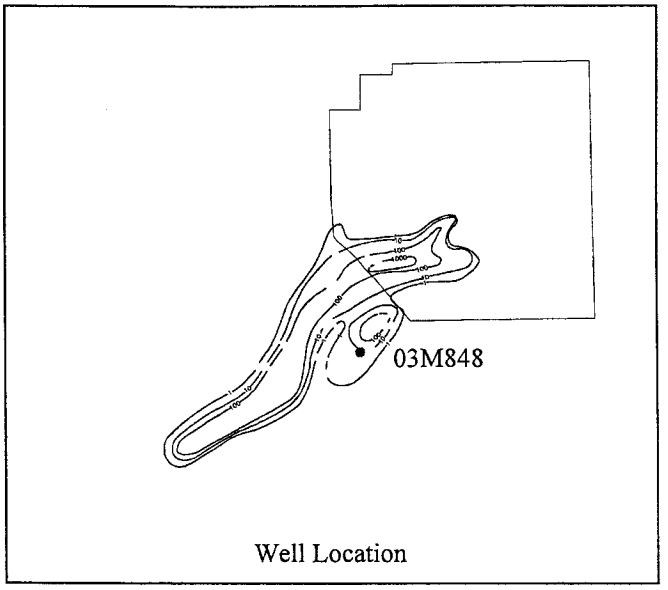
Middle and Lower Unit 3 Wells

03M848

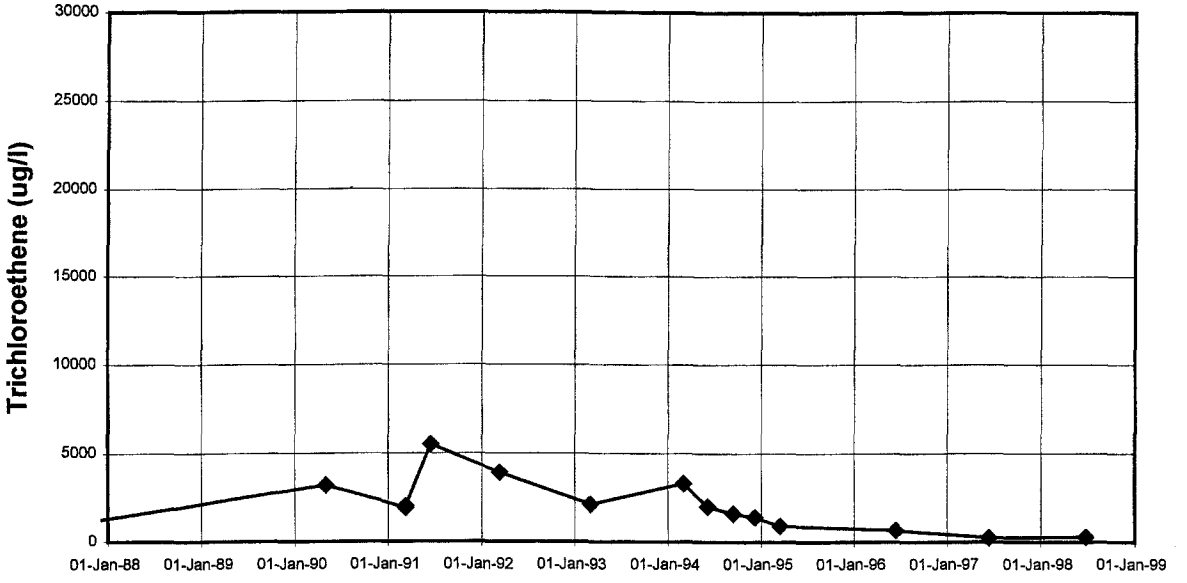


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

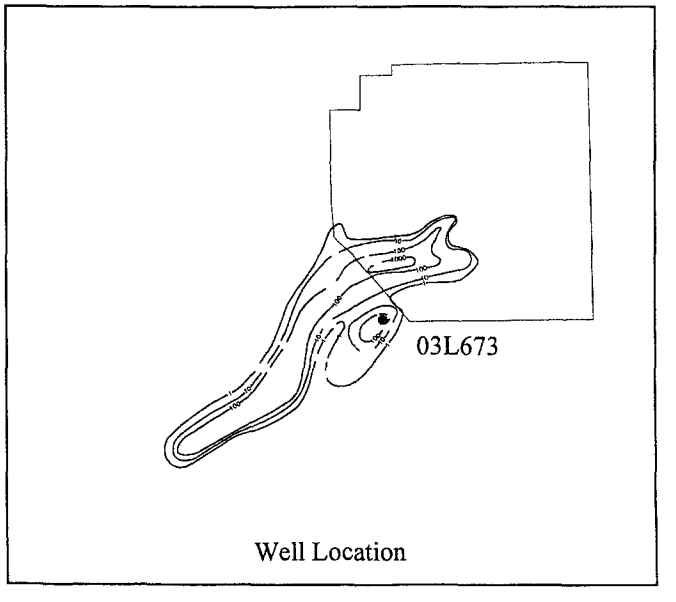


03L673

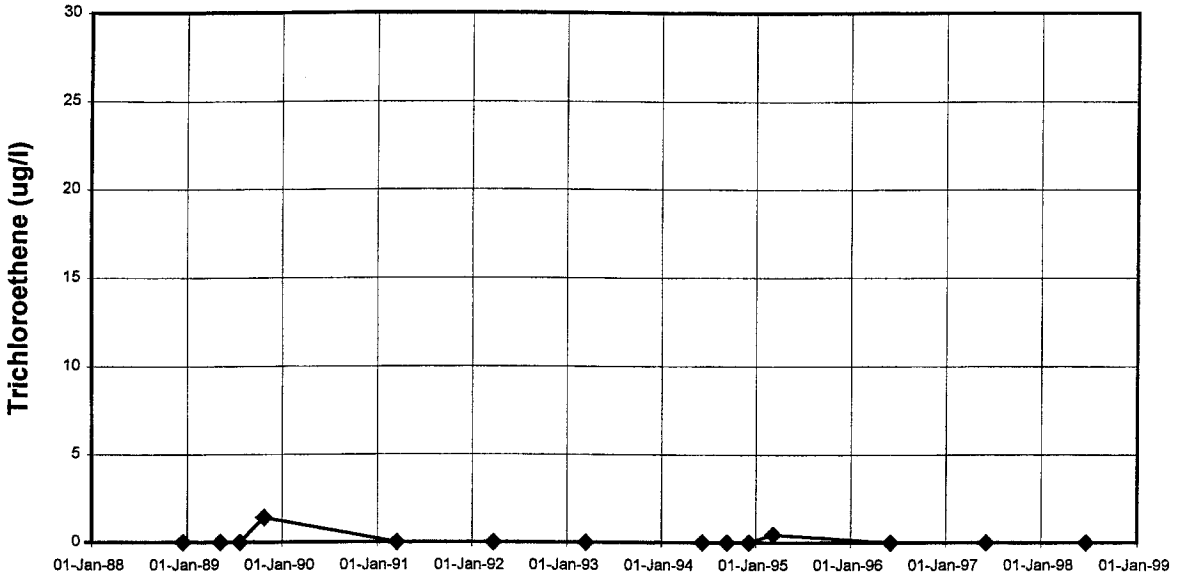


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

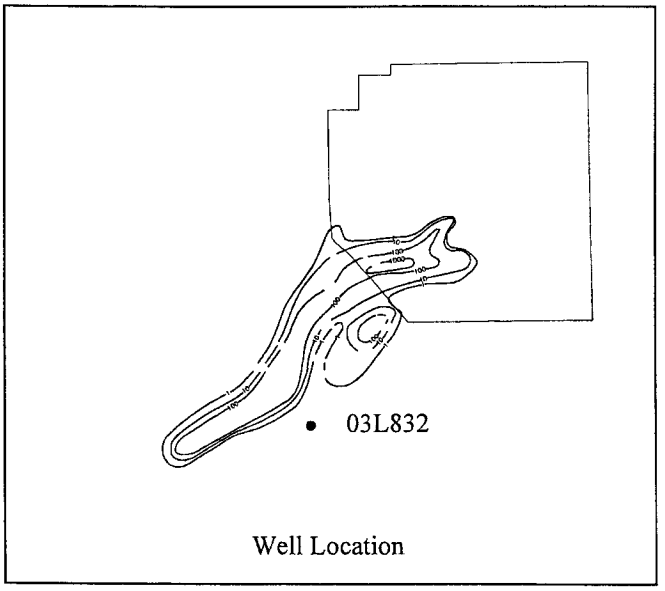


03L832



Well Purpose:
To verify the downgradient extent of contamination in Unit 3.

Note:
Plume map is from FY 1998.



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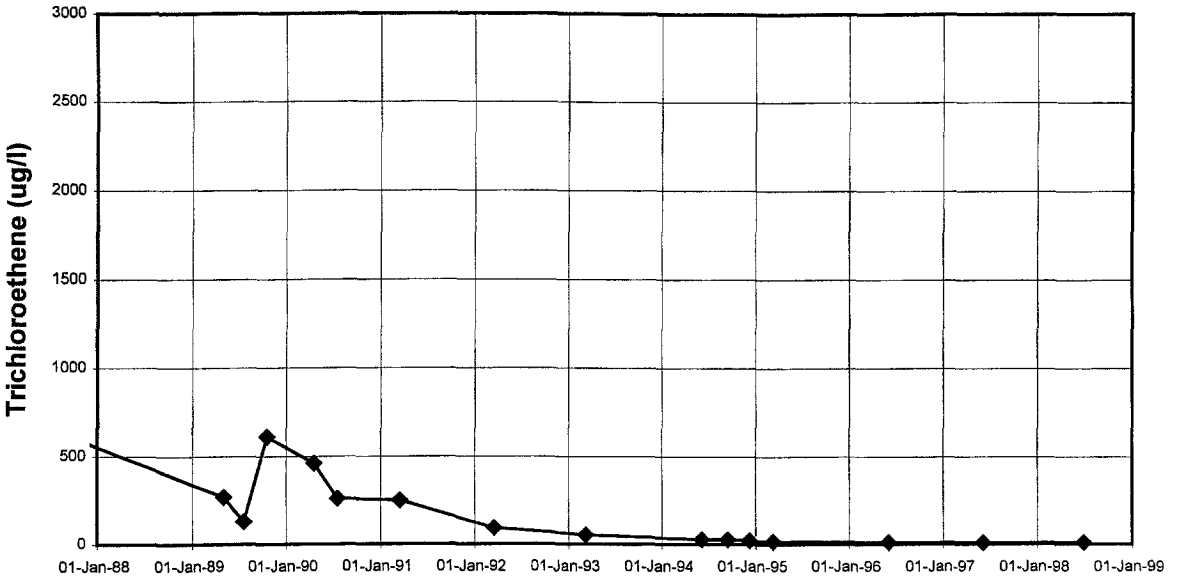
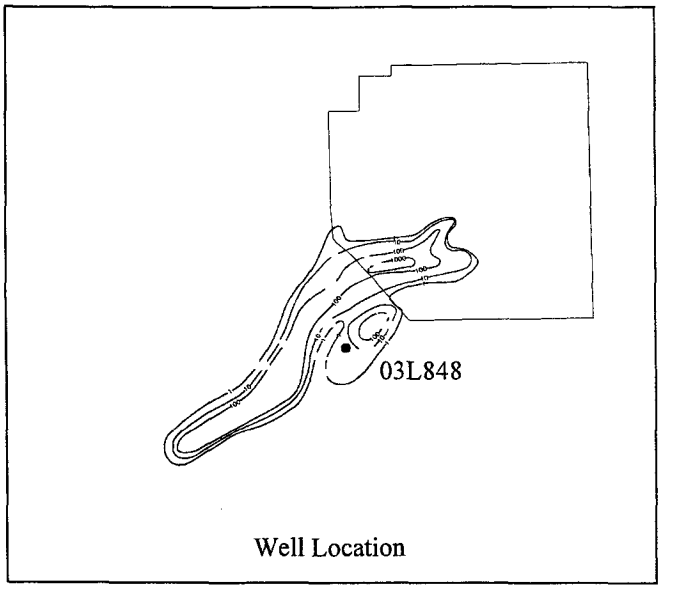
03L848

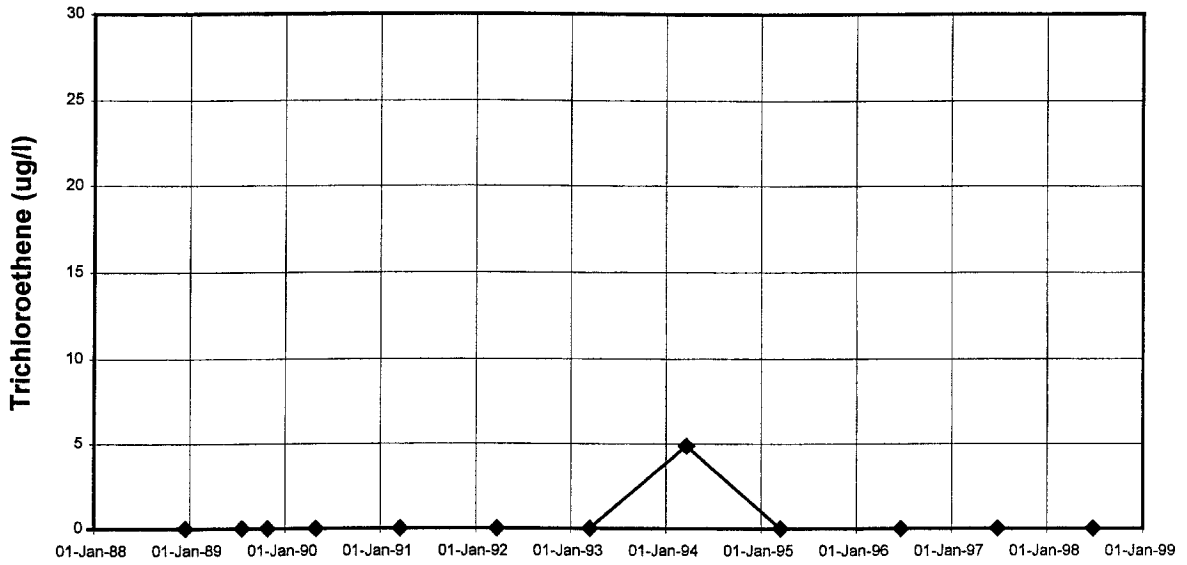


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

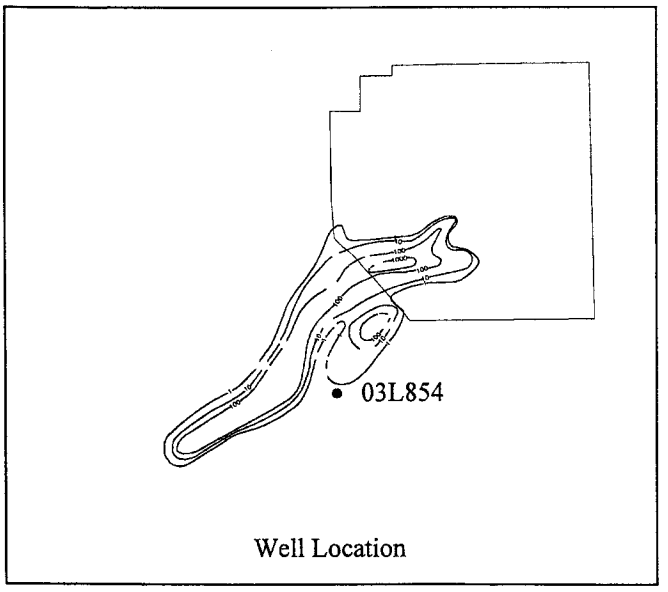


03L854



Well Purpose:
Verify the downgradient extent of contamination in Unit 3.

Note:
Plume map is from FY 1998.



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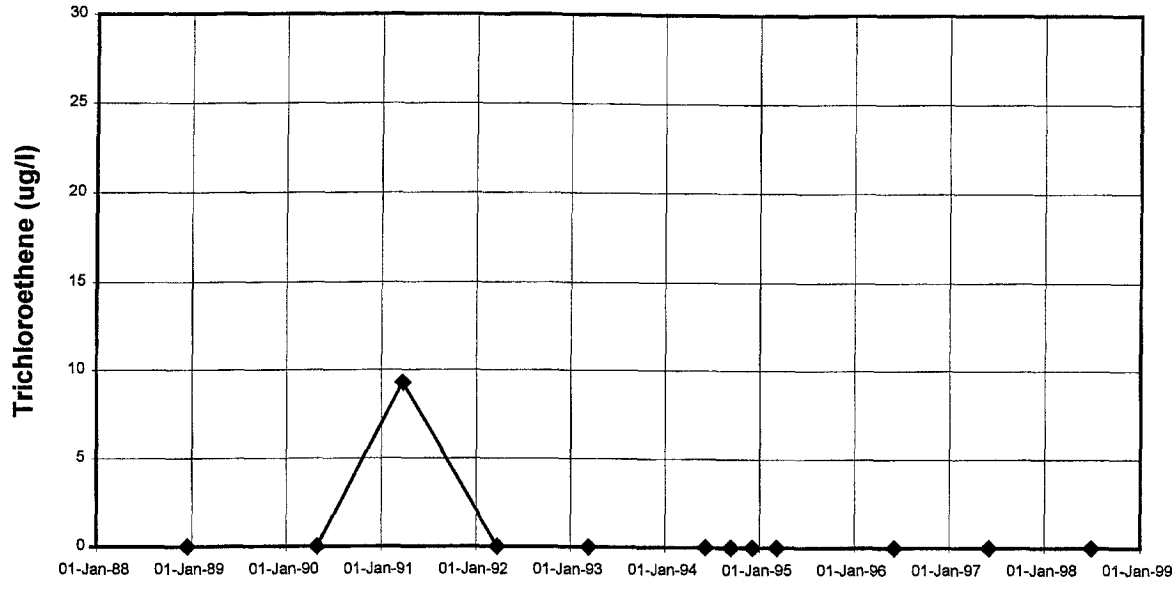
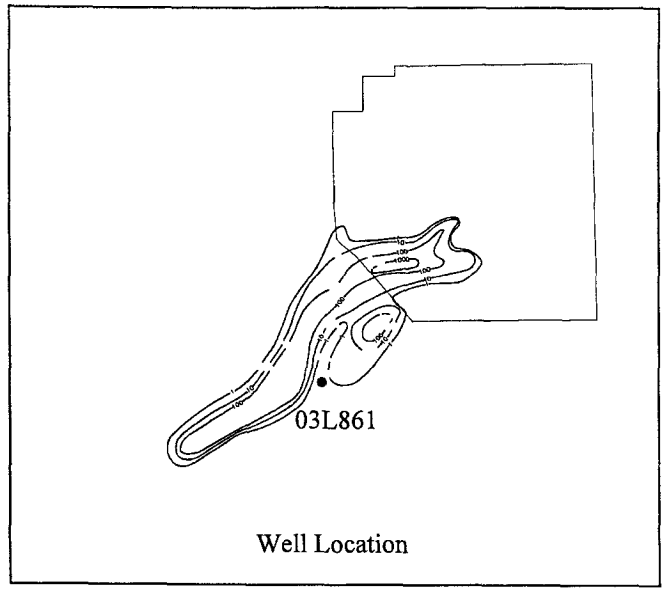
03L861

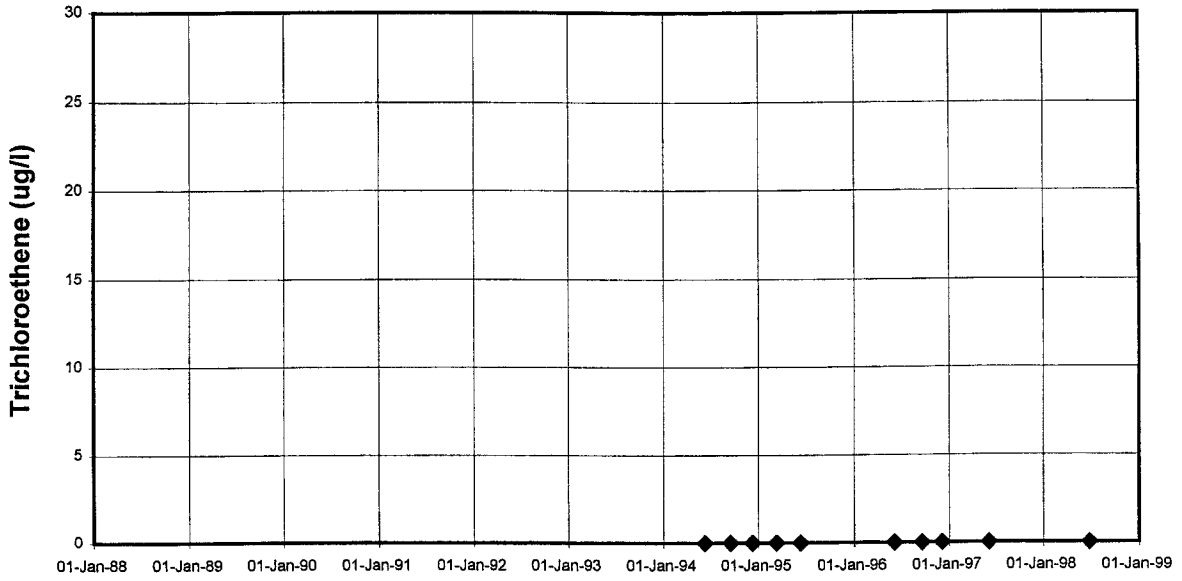


Well Purpose:
Verify the downgradient extent of contamination in Unit 3.

Note:
Plume map is from FY 1998.

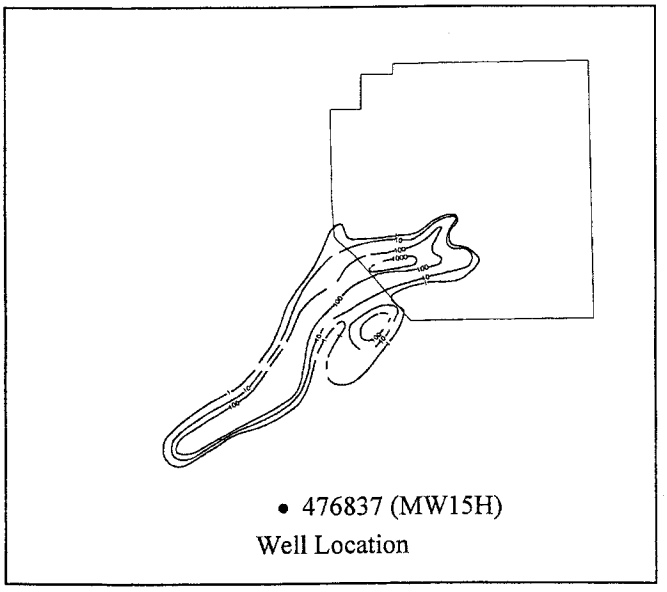


476837 (MW15H)



Well Purpose:
Verify the downgradient extent of contamination in Unit 3.

Note:
Plume map is from FY 1998.



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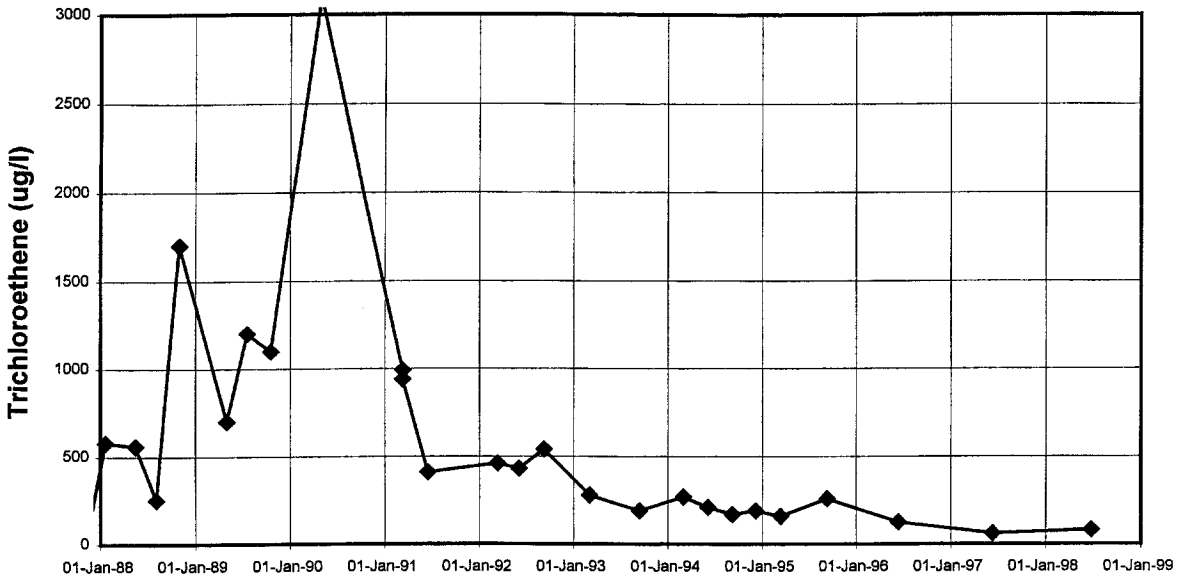
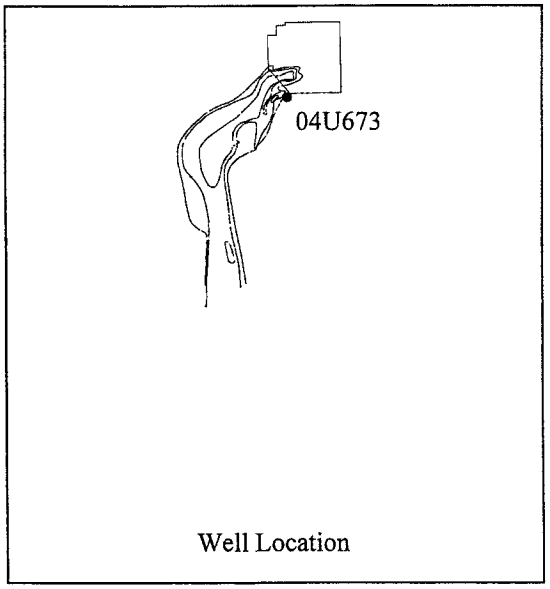
Unit 4 Wells

04U673



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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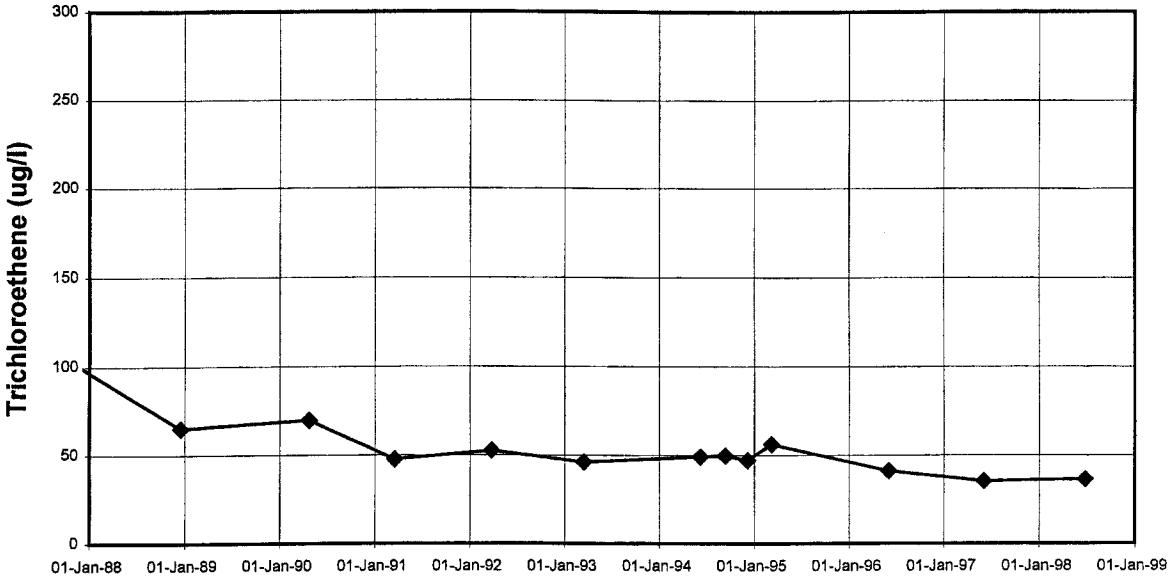
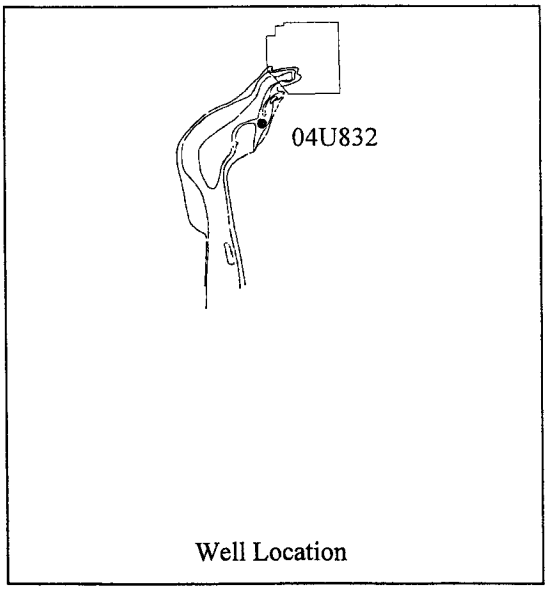
04U832



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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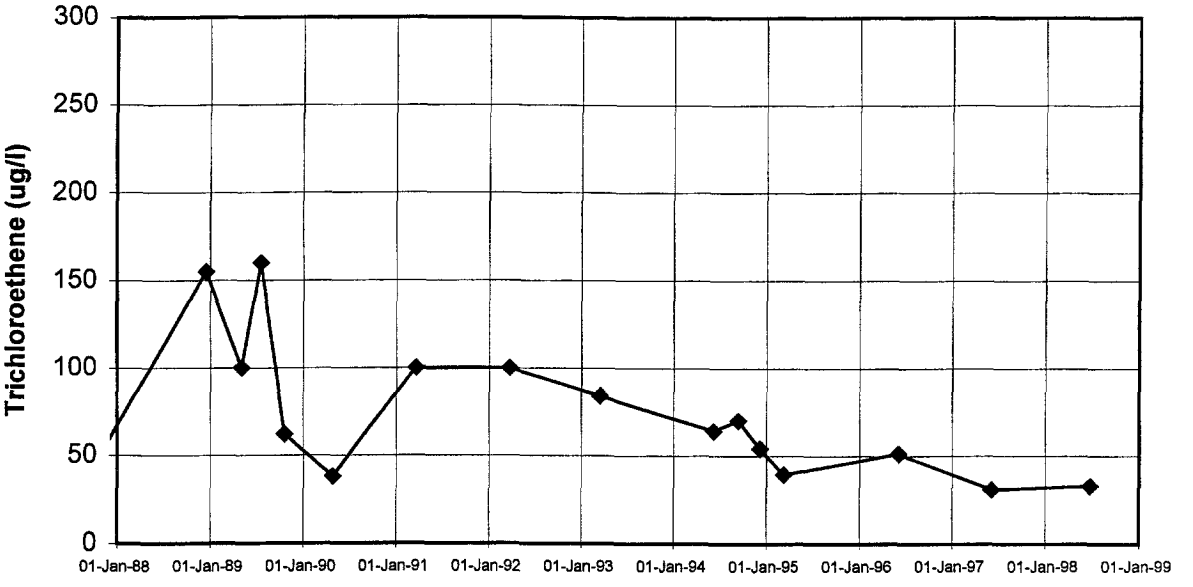
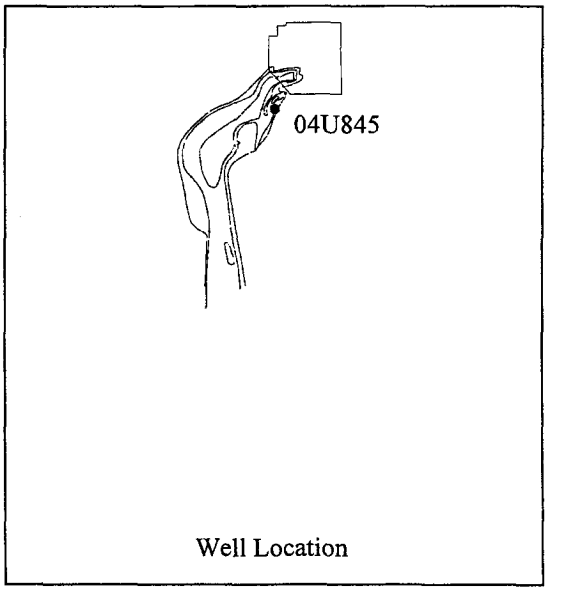
04U845

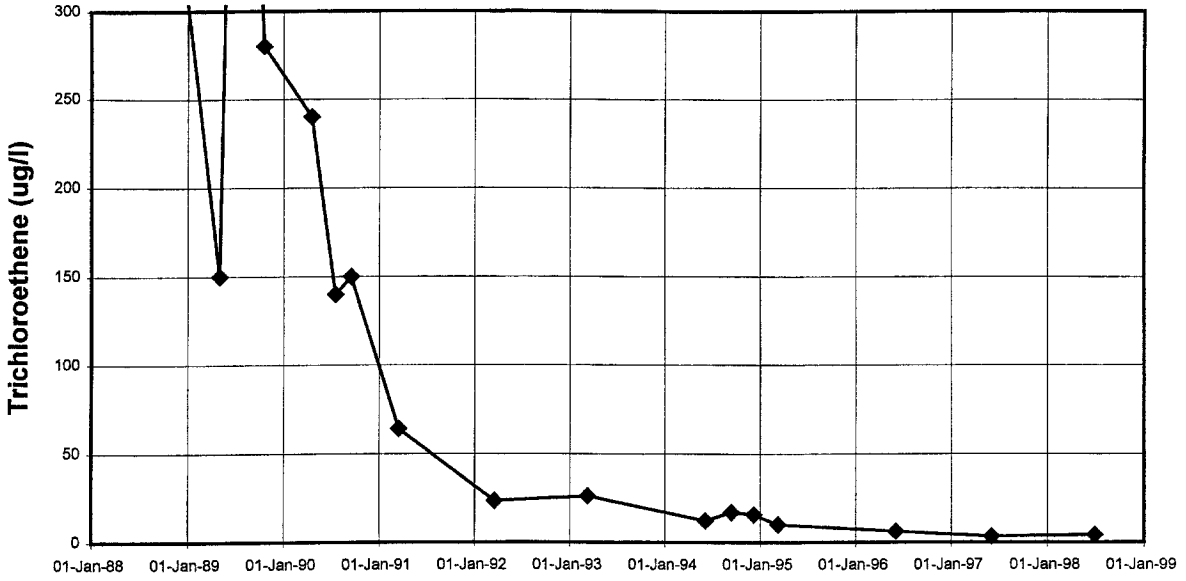


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

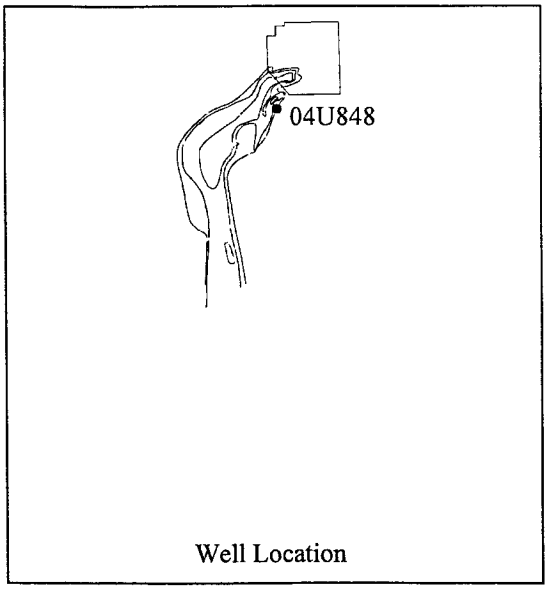


04U848



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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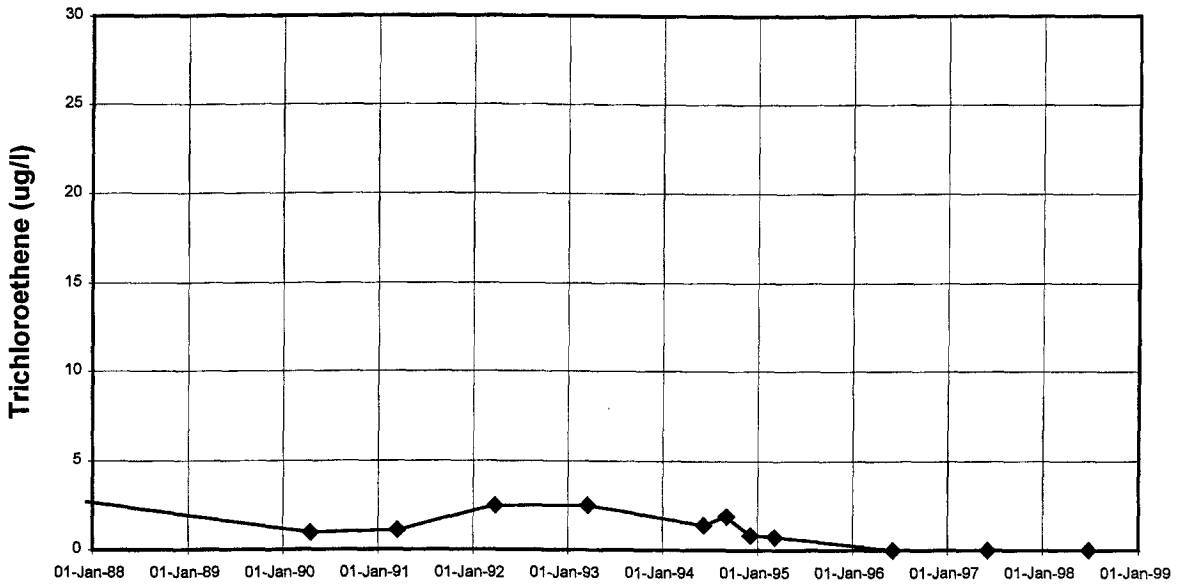
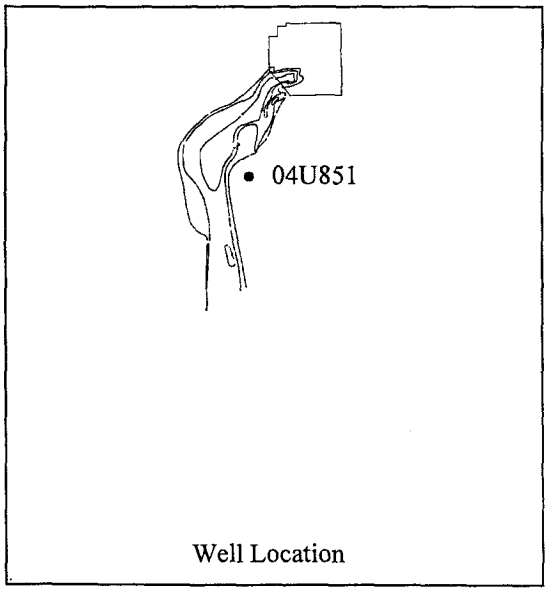
04U851



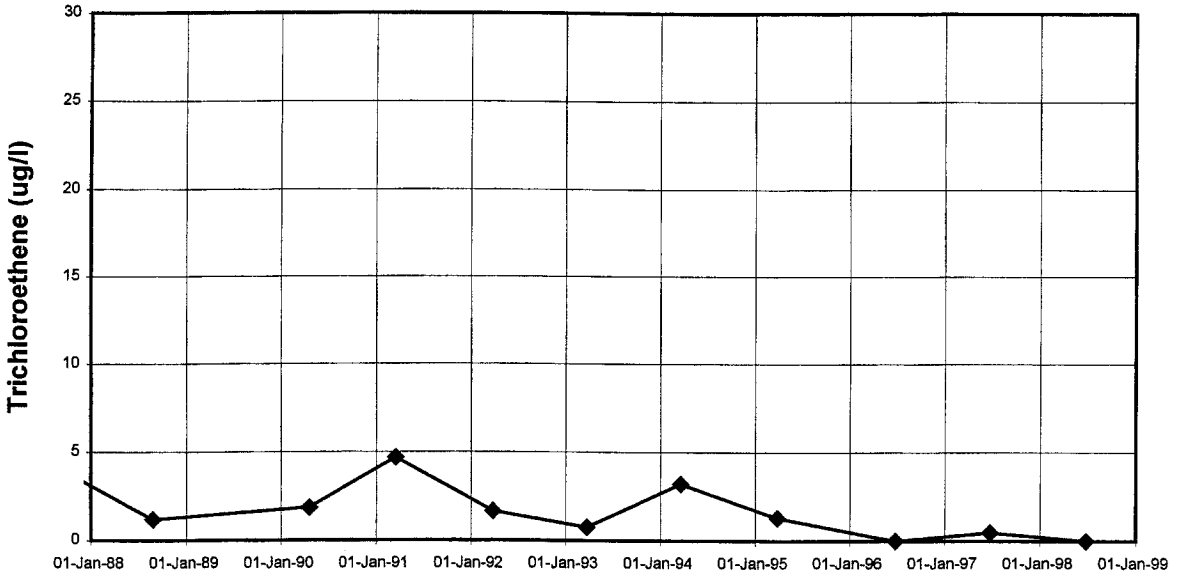
Well Purpose:
Monitor the progress of groundwater cleanup downgradient of the PGRS.

Note:
Plume map is from FY 1998.



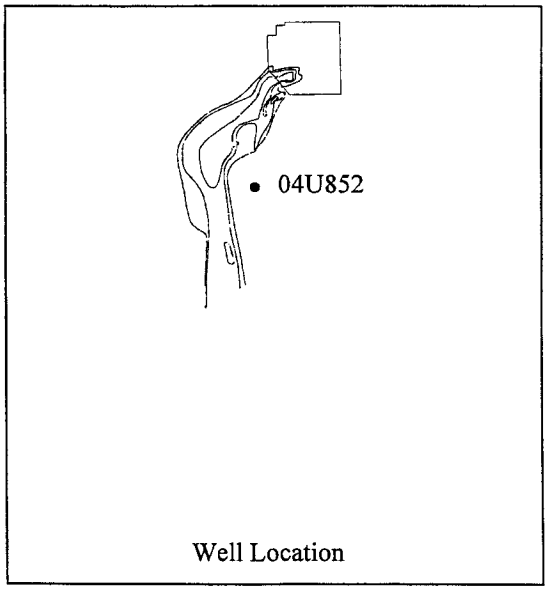
N:\0003\60\GRAPHS\OFF-U4\04U851.DOC\TNW-lmh

04U852

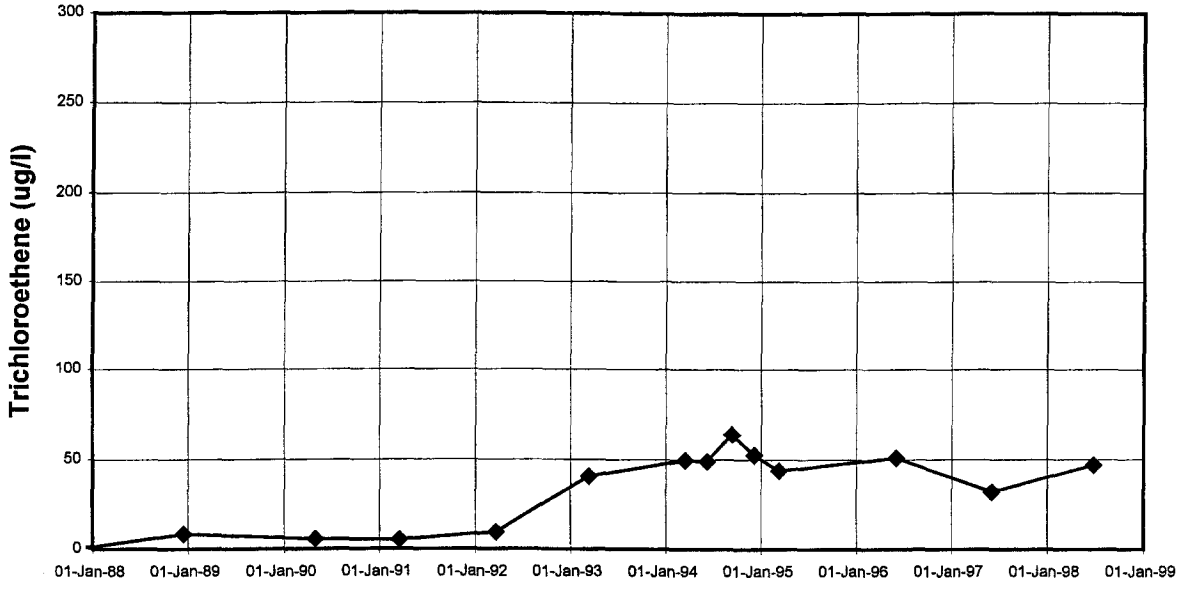


Well Purpose:
Monitor the progress of groundwater cleanup downgradient of the PGRS.

Note:
Plume map is from FY 1998.

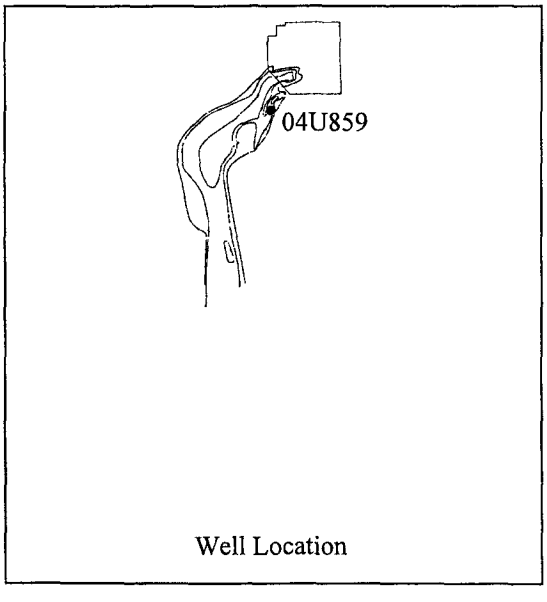


04U859

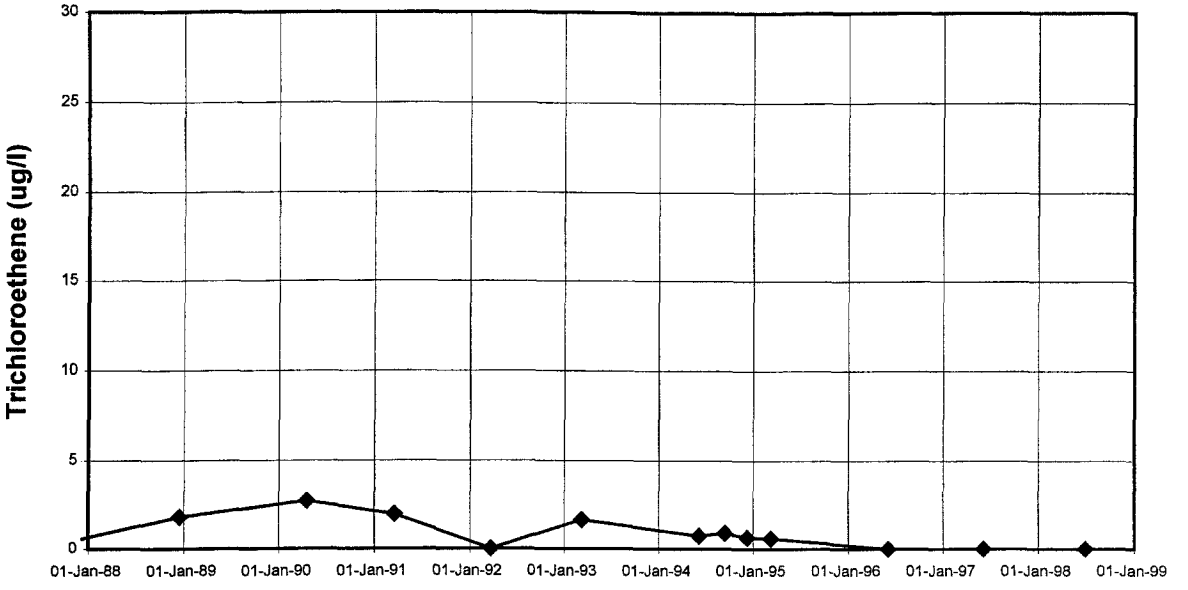


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

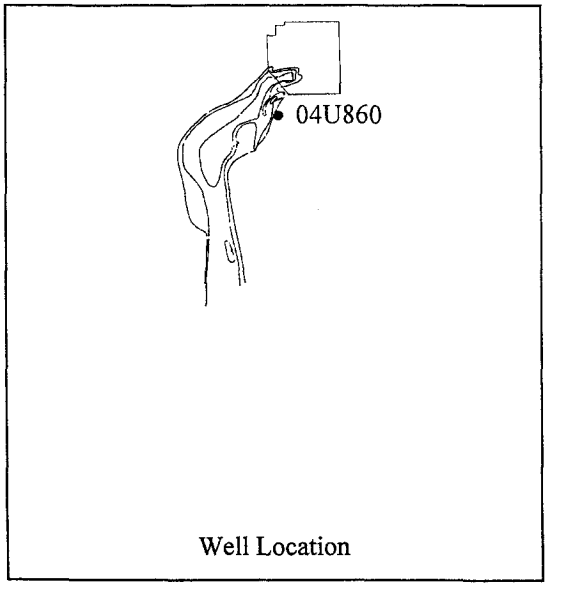


04U860



Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGAC system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.



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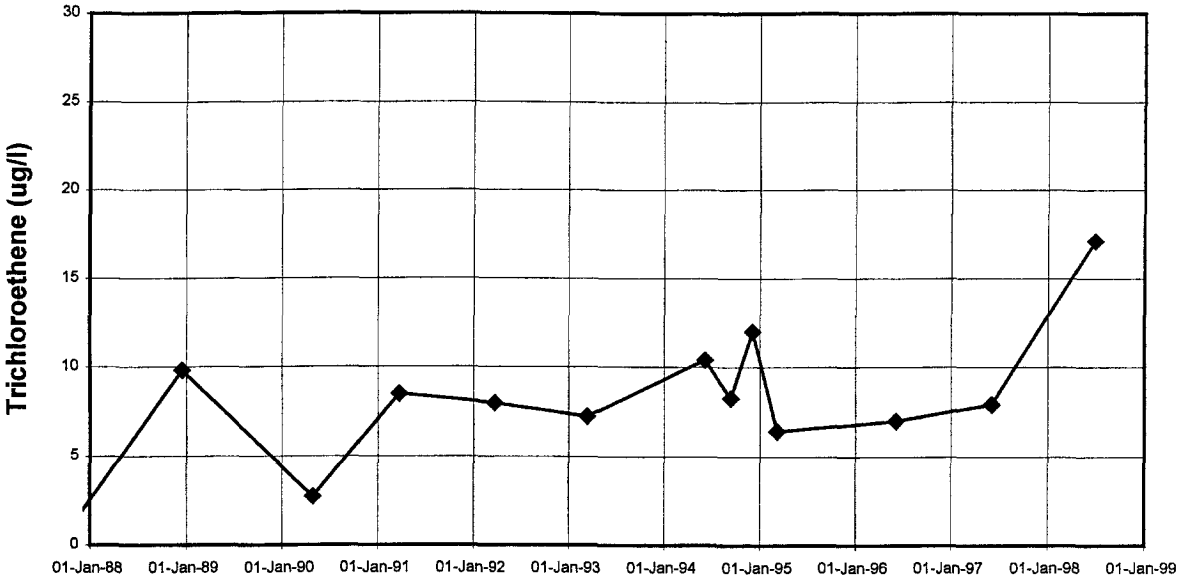
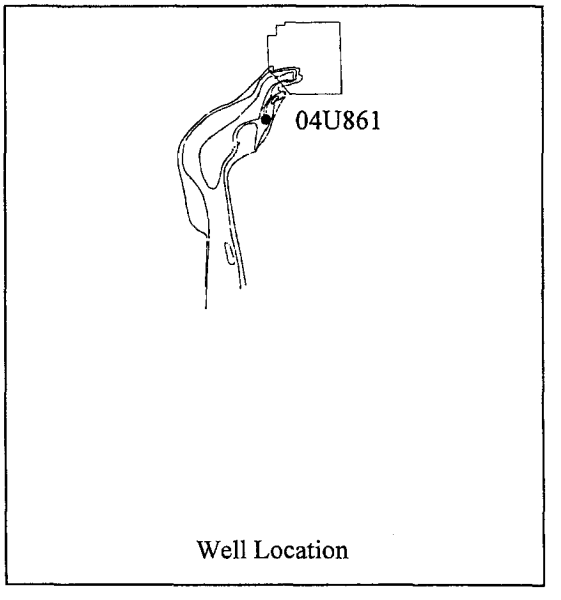
04U861

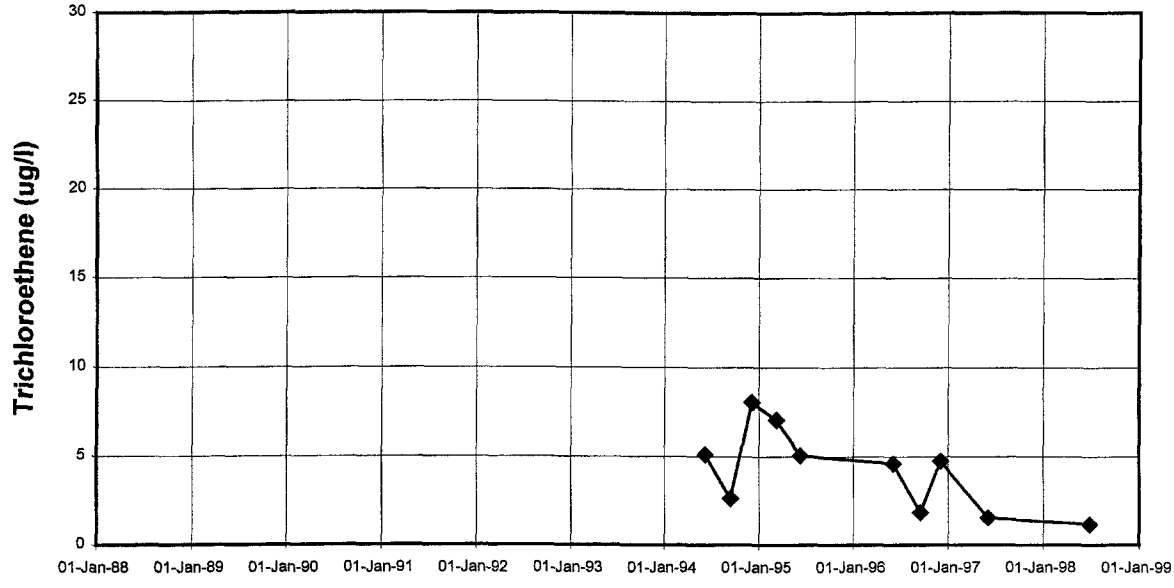


Well Purpose:
Monitor the separation between OU1 and OU3.

Note:
Plume map is from FY 1998.

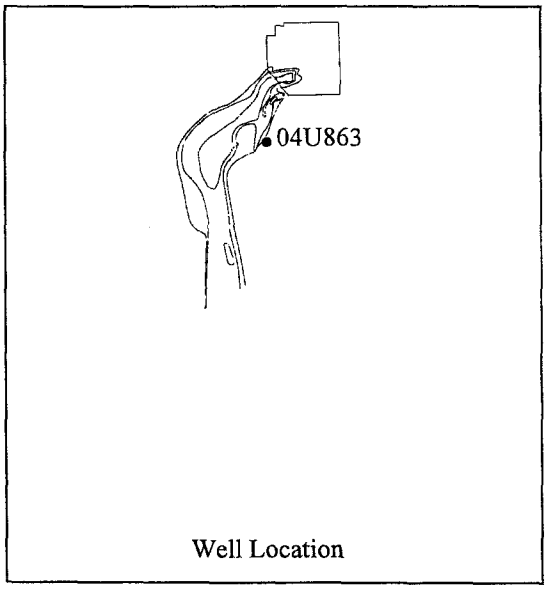


04U863



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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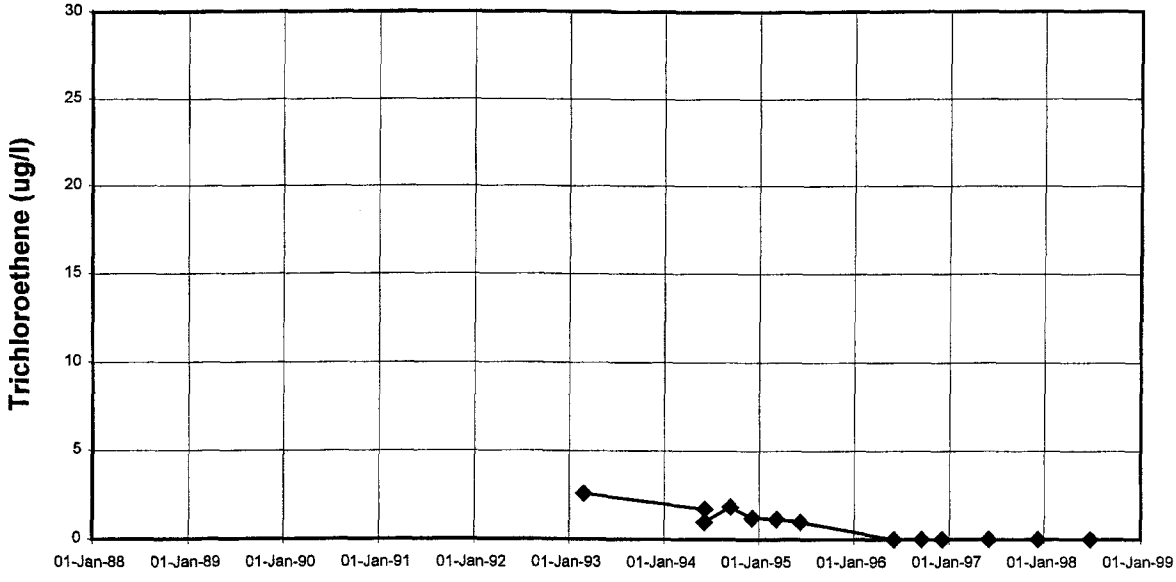
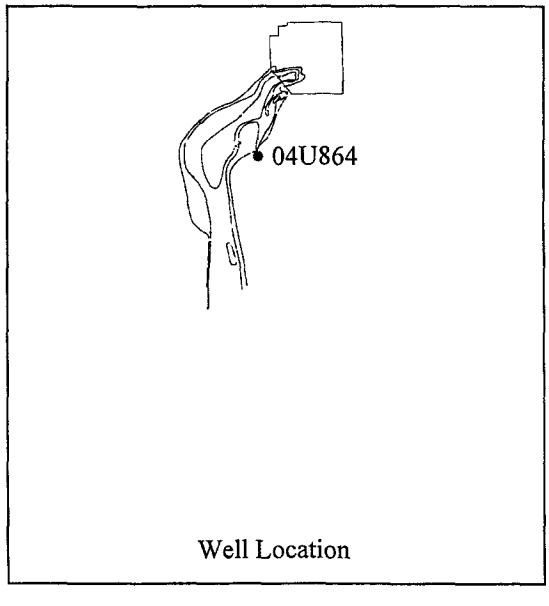
04U864



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the PGRS.

Note:
Plume map is from FY 1998.



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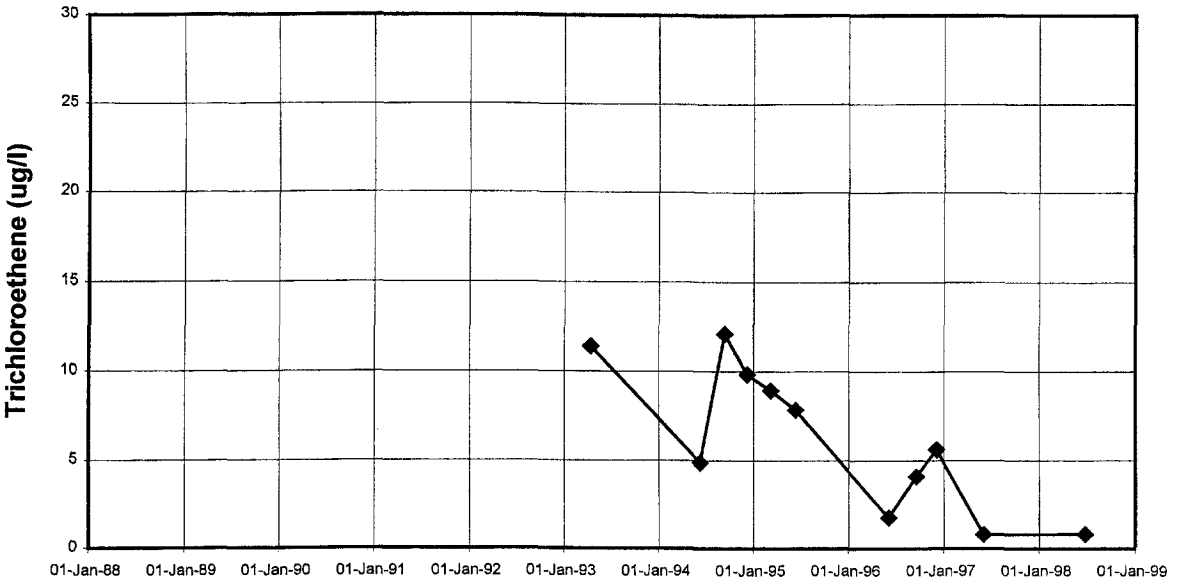
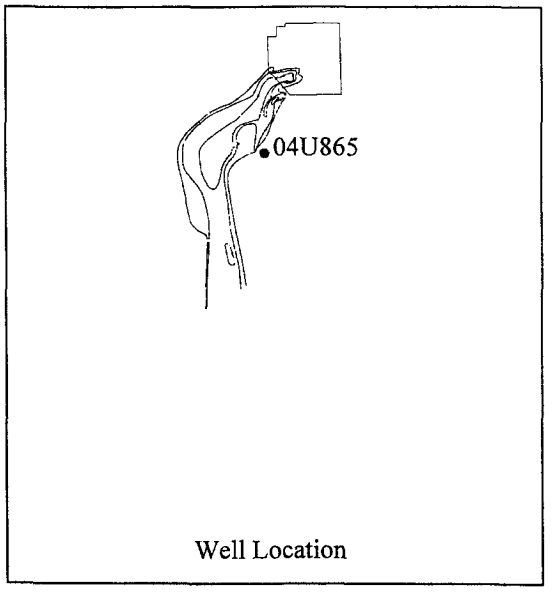
04U865

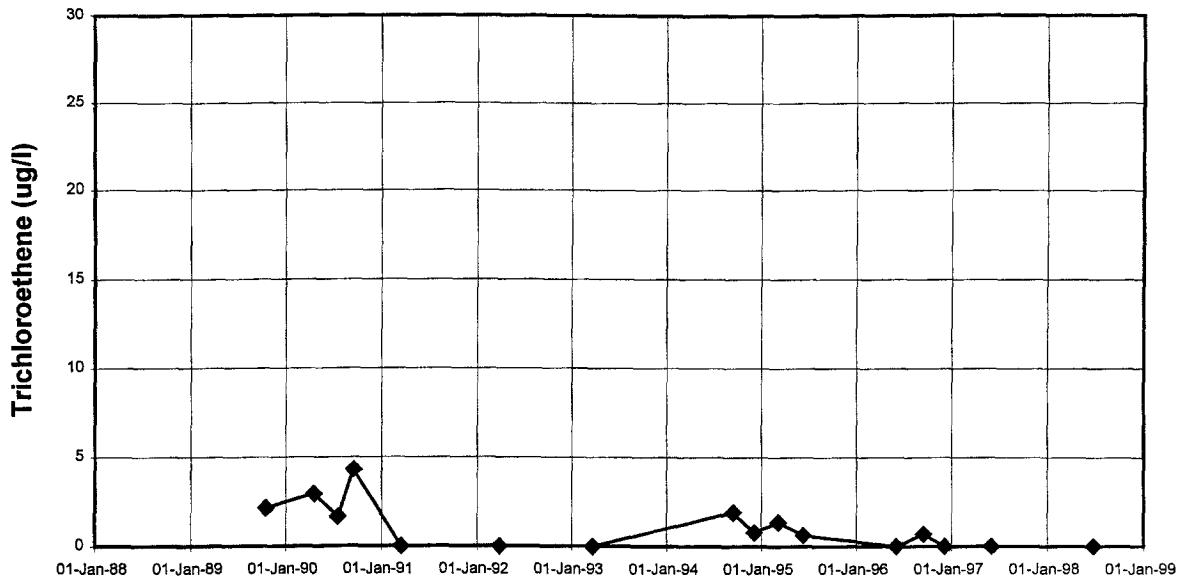


Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.

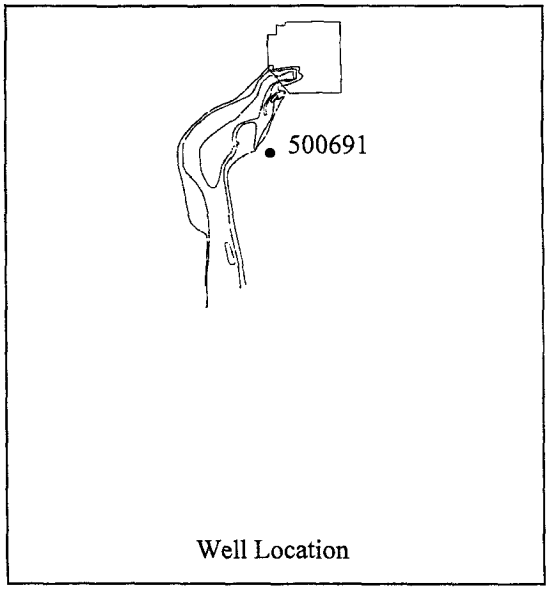


500691

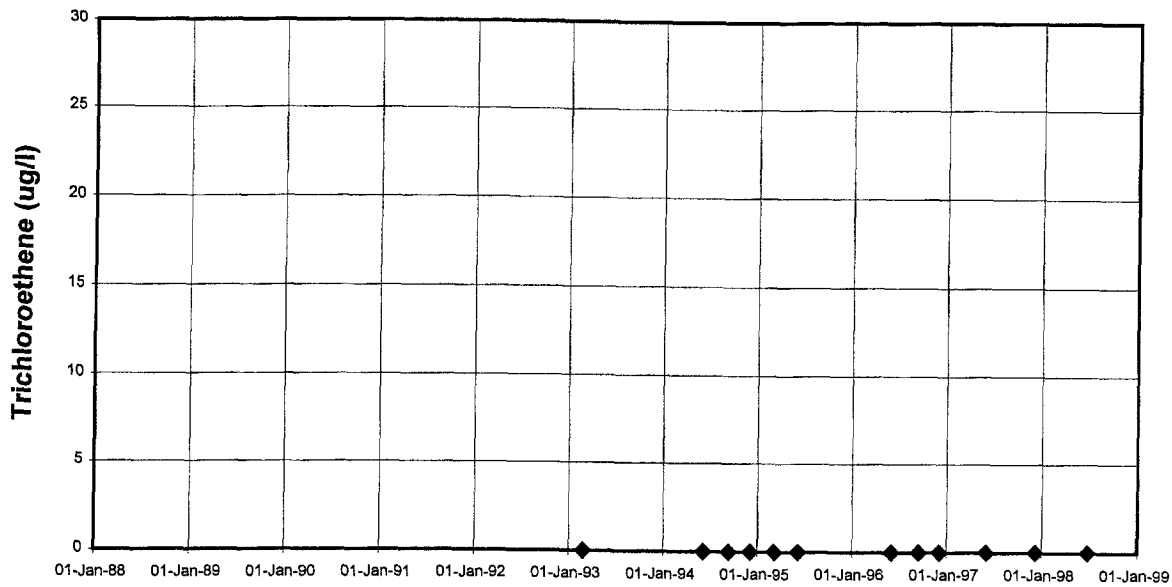


Well Purpose:
To check that the edge of the plume does not spread outside the containment boundary of the PGRS system, or outside the area for alternate water supply and abandonment.

Note:
Plume map is from FY 1998.

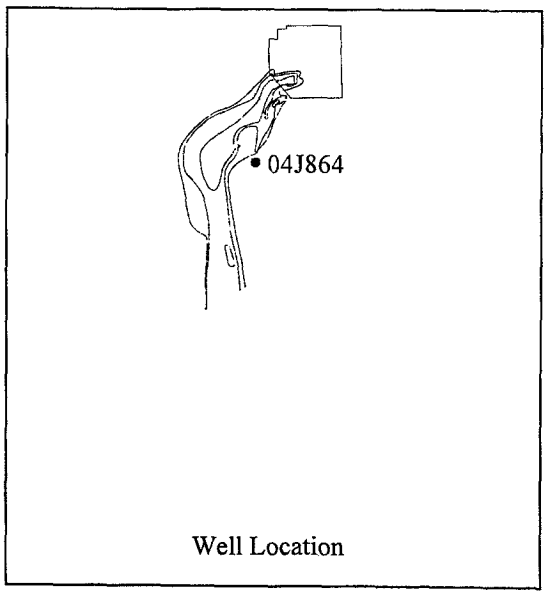


04J864



Well Purpose:
Monitor the progress of groundwater cleanup immediately downgradient of the PGRS.

Note:
Plume map is from FY 1998.



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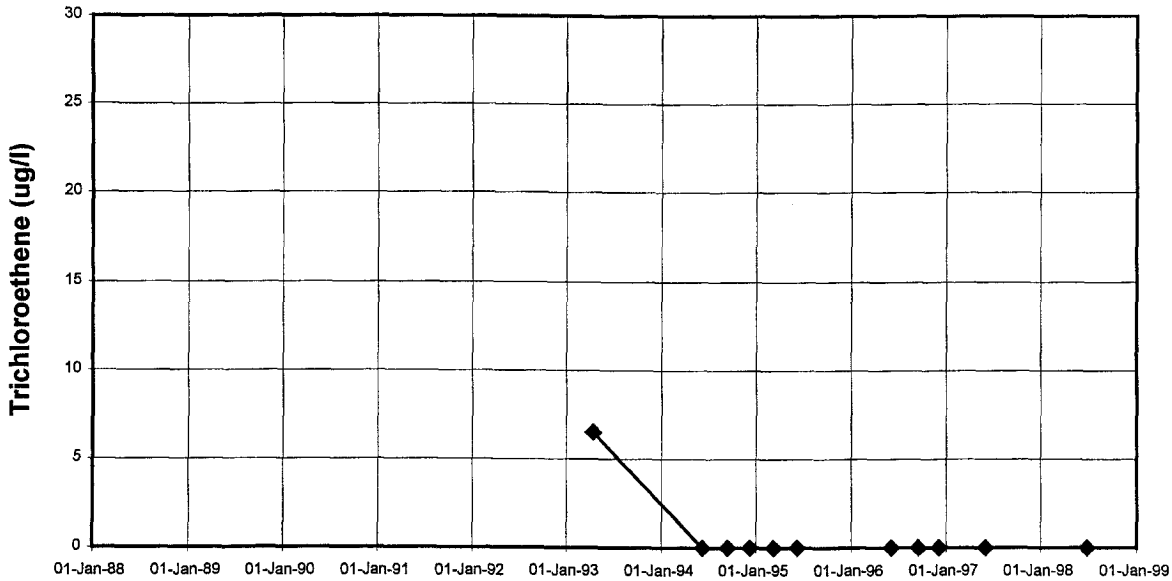
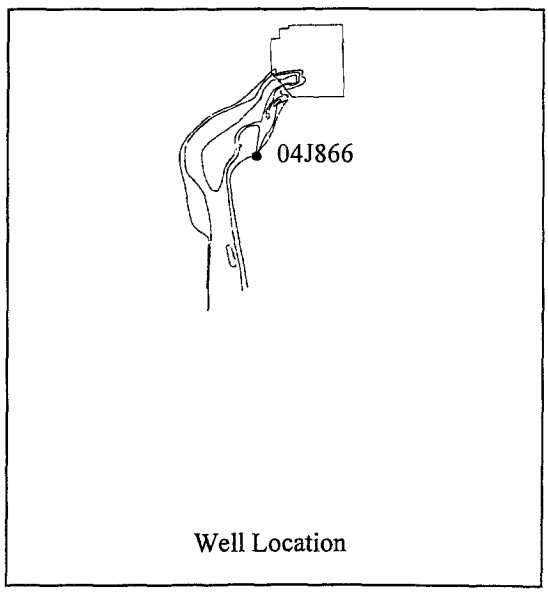
04J866



Well Purpose:
Monitor the progress of groundwater cleanup.

Note:
Plume map is from FY 1998.



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APPENDIX G

Appendix G

Municipal/Private Well Groundwater Pumping Data

Appendix G
Municipal/Private Well Groundwater Pumping Data

Permit No.	Applicant	Permitted Appropriation (MMGal/yr)	Permitted Pumping Rate (GPM)	MN Unique Well No.	Township	Range	Section	Quarter Sections	Pumping Volume 1994 (MMGal)	Pumping Volume 1995 (MMGal)	Pumping Volume 1996 (MMGal)	Pumping Volume 1997 (MMGal)	Pumping Volume 1998 (MMGal)
High Capacity Wells													
690434	American Linen Supply	156.0	850.0	200814	29	23	18	DABC	NA	NA	68.800	73.800	NA
236512	Darling International, Inc.	20.0	100.0	236512	30	23	20	DDB	NA	1.159	1.100	1.000	NA
756231	Honeywell Inc	565.0	2000.0										
				234547	29	23	18	BB	NA	195.669	176.800	121.300	NA
				234546	29	23	18	BB	NA	420.857	283.800	456.800	NA
756255	Mengelkoch Company	18.0											
	Well No. 1		100.0	NA	30	23	21	CACD	NA	0.000	NA	0.000	NA
	Well No. 2		60.0	231878	30	23	21	CACD	NA	2.503	2.500	2.300	NA
886105	Midland Hills	49.0	1000.0										
	Well No. 2			NA	29	23	17	NA	27.300	0.270	1.200	20.900	NA
	Well No. 3			NA	29	23	17	NA	0.000	0.000	NA	19.400	NA
866124	Minneapolis Park/RC	26.0	500.0	200812	29	23	7	DACA	NA	0.061	NA	0.000	NA
936161	Minneapolis Park/RC	41.0	700.0	512761	29	23	7	DAC	8.300	9.648	18.500	12.700	NA
700157	City of New Brighton	1725.0	11425.0										
	Well # 3			206793	30	23	29	BADD	168.800	96.091	219.379	194.964	70.927
	Well # 4			206792	30	23	30	BADD	181.200	110.130	297.390	245.673	278.577
	Well # 5			206796	30	23	30	CBD	198.300	171.438	91.214	35.685	47.099
	Well # 6			206797	30	23	30	CBAA	248.200	214.601	97.004	21.319	16.040
	Well #7			206791	30	23	29	CCDC	0.000	0.000	0.000	PT	0.000
	Well #8			206795	30	23	30	BDA	22.300	6.866	2.847	0.490	5.812
	Well #9			206794	30	23	30	CABA	0.000	0.000	0.000	0.000	0.023
	Well #10			161432	30	23	32	DBC	19.600	23.810	20.152	7.246	20.732
	Well #11			509083	30	23	29	BCA	5.200	5.572	6.535	6.154	5.221
	Well #12			110485	30	23	18	AC	19.400	26.957	4.637	4.973	15.499
	Well #13			520931	30	23	29	AC	334.700	477.422	460.495	525.921	471.048
	Well #14			554216	30	23	29	BDB	NC	NC	2.192	563.592	401.057
	Well #15			582628	30	23	30		NC	NC	NC	NC	223.032

Appendix G
Municipal/Private Well Groundwater Pumping Data

Permit No.	Applicant	Permitted Appropriation (MMGal/yr)	Permitted Pumping Rate (GPM)	MN Unique Well No.	Township	Range	Section	Quarter Sections	Pumping Volume 1994 (MMGal)	Pumping Volume 1995 (MMGal)	Pumping Volume 1996 (MMGal)	Pumping Volume 1997 (MMGal)	Pumping Volume 1998 (MMGal)
856084	Paper Calmenson & Co.	30.000	500.000	200148	29	23	17	BBB	NA	0.000	NA	0.000	NA
600907	City of St. Anthony	NA	NA										
	Well # 3			200804	29	23	6	DA	99.800	0.000	107.209	115.837	35.485
	Well #4			200803	29	23	6	AC	151.600	143.229	39.501	75.392	116.956
	Well #5			200524	30	23	31	CA	62.900	160.793	195.401	157.039	162.216
836056	Twin Cities Army # 1	450.0	2300.0	206754	30	23	16	ABBB	NA	0.000	NA	0.000	NA
	Twin Cities Army #2		1100.0	206756	30	23	16	BADA	NA	0.000	NA	0.000	NA
796041	U of MN	60.0	700.0	149740	29	23	16	BDB	4.300	6.619	4.300	5.600	NA
856178	U of MN	27.0	675.0	200154	29	23	17	DBC	16.900	14.957	22.800	20.500	NA
946217	Fore, Inc.	18.0	120.0	NA	30	23	26	CAC	NC	NC	5.500	1.100	NA
976069	*Concordia Academy*	1.0	100.0	NA	29	23	12	CBB	NC	NC	0.000	0.500	NA
Other Wells													
916084	Alliant Techsystems Inc.(PW-1)	21.0	9.0	462112	30	23	20	ADC	NA	4.592	2.700	0.000	NA
916084	Alliant Techsystems Inc.(PW-2)		4.0	462968	30	23	20	ADC	NA	1.969	1.000	0.000	NA
866104	Bell Lumber and Pole Co.(PW-	26.3	0.0	439723	30	23	29	DCC	0.000	0.626	5.300	5.300	NA
	Bell Lumber and Pole Co.(PW-3)		1.1	449194	30	23	29	CDD	0.200	0.177	0.300	0.300	NA
	Bell Lumber and Pole Co.(PW-2)		1.2	449193	30	23	29	DCC	0.500	0.159	0.300	0.300	NA
866053	Indianhead Truck Line	10.0	NA	200067	29	23	4	CCD	0.000	0.016	0.000	0.000	NA
846113	Minn Metal Finish	6.0	48.0	122253	29	24	13	CDBC	NA	4.812	13.100	14.300	NA
670637	Old Dutch Foods Inc.	88.0	NA	200076	29	23	8	BDC	40.400	NA	35.900	27.500	NA

Notes: NA = Data Not Available
NC = Well Not Yet Constructed
P[redacted]ater Appropriation Permit Terminated, No Water Being Pumped

APPENDIX H

Appendix H

FY 1998 - FY 2002 Monitoring Plans

H.1 FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Unit Designations

01U - Upper Fridley Formation	03L - Lower Hillside Formation	SL - St. Lawrence
01L - Lower Fridley Formation	SP - St. Peter	UNK - Unknown
03U - Upper Hillside Formation	PC - Prairie du Chien	
03M - Middle Hillside Formation	J - Jordan	

Notes:

(A) Indicates that the monitoring is the responsibility of Alliant Techsystems Inc., the tenant.
(B) Indicates that the monitoring is the responsibility of the U.S. Army.
(1) "L (A or B)" denotes a water level measurement by the appropriate party.
(2) "1 (A or B) denotes a water quality sampling by the appropriate party, with the numbers representing analytical parameter categories. The parameters within each category are outlined in Appendix D.
(3) The designations refer to the following purposes:
- Operable Unit 1 Water Quality
  - 1.a. = To contour the perimeter of the plume which defines the area of concern for alternate water supply/well abandonment
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- Operable Unit 1 Water Levels
  - 3.b = To contour water levels for evaluation of containment
- Site A Water Quality
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- Site A Water Levels
  - 3.b = To contour water levels for evaluation of containment
- Site I Water Quality
  - 1.a = To track remedy progress
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- Site I Water Levels
  - 1.a = To track remedy progress
- Site K Water Quality
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- Site K Water Levels
  - 3.a = To contour water levels for evaluation of containment
- TGRS Water Quality
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- TGRS Water Levels
  - 1.a = To contour water levels for evaluation of containment
- Operable Unit 3 Water Quality
  - OR = Overall remedy. To evaluate attainment of the cleanup levels throughout the plume
- Operable Unit 3 Water Levels
  - 1.a = To contour water levels for evaluation of containment

(4) Sample for Category 1 if in production at time of sample collection.
(5) For Category 2, analysis is only required for antimony.
(6) Background monitoring location.
(7) For Category 7, analysis is only required for benzene.

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Operable Unit 1																	
01U	01U807			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U813			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L813			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L816			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L821			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L822			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L823			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U815			--L(B)	---	--L(B)	---	---	---	---	---	---	---	---	---	---	---
03U	03U821			--L(B)	---	--L(B)	---	---	---	---	---	---	---	---	---	---	---
03U	03U822			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03U	03U824			---	---	---	---	---	---	---	---	1,L(B)	---	1,L(B)	---	OR	None
03U	03U831			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03U	409550	PCA 6U3		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
03U	409596	BS118U3		---	---	---	---	---	---	---	---	---	---	---	---	---	---
03M	03M843			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03L	03L813			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L822			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
03L	03L841			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03L	03L846			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03L	03L853			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
03L	03L856			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L858			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	409546	PCA2L3		--L(B)	---	--L(B)	---	---	---	---	---	---	---	---	---	---	---
03L	409556	PCA4L3		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03L	409557	PCA1L3		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
03L	409597	BS118L3		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
PC	04U821			---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC	04U834			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
PC	04U836	MW-1		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U837	MW-3		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U838	MW-5		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U839	MW-7		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U841			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U843			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	3.b
PC	04U844			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U846			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U847			---	---	---	---	---	---	---	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U849			---	---	---	---	---	---	---	---	---	---	---	---	---	---

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
PC	04U850			--L(B)	--L(B)	--L(B)	--L(B)	---	---	---	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U855			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	1,L(B)	1,L(B)	1,L(B)	1.a, OR	3.b
PC	04U871			--L(B)	--L(B)	--L(B)	--L(B)	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U872			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U875			--L(B)	--L(B)	--L(B)	--L(B)	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	3.b
PC	04U877			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	04U879			--L(B)	--L(B)	--L(B)	--L(B)	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	3.b
PC	04U880			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	3.b
PC	04U881			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
PC	04U882			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
PC	04U883			--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	None
PC		200154 UM Golf Course		---	---	---	---	---	---	1(B)	---	1 (B)	---	1 (B)	---	1.a, OR	---
PC	206688	Cloverpond		---	---	---	---	---	---	1(B)	---	1 (B)	---	1 (B)	---	1.a, OR	---
PC	234547	Hnywell Ridgway		---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC	409547	PCA1U4		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	409548	PCA2U4		--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	409549	PCA3U4		--L(B)	--L(B)	--L(B)	--L(B)	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC	409555	PCA5U4		--L(B)	--L(B)	--L(B)	--L(B)	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	1.a, OR	3.b
PC	512761	Gross Golf Course #2		---	---	---	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	---
PC	554216	New Brighton #14		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC		582628 New Brighton #15		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
J	04J834			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
J	04J835			---	---	---	---	---	---	---	---	---	---	---	---	---	---
J	04J836	MW-2		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
J	04J837	MW-4		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
J	04J838	MW-6		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
J	04J839	MW-8		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
J	04J882			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
J	200524	St. Anthony #5	(4)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1(B)	---	1(B)	---	OR	---
J	200803	St. Anthony #4	(4)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1(B)	---	1(B)	---	OR	---
J	206796	New Brighton #5	(4)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
J	206797	New Brighton #6	(4)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	3.b
PC/J	200804	St. Anthony #3	(4)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1(B)	---	1(B)	---	OR	---
PC/J	200812	Gross Golf #1		---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC/J	206792	New Brighton #4		--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC/J	206793	New Brighton #3	(4)	--L(B)	--L(B)	--L(B)	--L(B)	1(B)	1(B)	1(B)	1(B)	1,L(B)	---	1,L(B)	---	OR	3.b
PC/J		234549 Reiner		---	---	---	---	---	---	1(B)	---	1(B)	---	1(B)	---	1.a, OR	---
PC/J	PJ#318			--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,L(B)	---	1,L(B)	---	OR	None
PC/J/SL		233221 Reuben Meats		---	---	---	---	---	---	---	---	1(B)	---	1(B)	---	1a	---
UNK	234546	Hnywell Ridgway		---	---	---	---	---	---	1(B)	---	1(B)	---	1(B)	---	OR	---

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Operable Unit 2																	
Site A Removal Action																	
01U	01U038			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U039		(7)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U040			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U041			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U063			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U067			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U102		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U103		(7)(5)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	OR	4.b
01U	01U104			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U105			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U106			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U107			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U108		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U109			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U110			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U115		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U116		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U117		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U118			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U119			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U120			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U125		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U126		(7)	--L(B)	---	--L(B)	---	---	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U127			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U133			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U135			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U136			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U137			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U138		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U139		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U140		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U141			--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U142	Piezometer		---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U143	Piezometer		---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U144	Piezometer		---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U145	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U146	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U147	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b

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FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
01U	01U148	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U149	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U150	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U151	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U152	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U153	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U154	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U155	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U156	Piezometer		--L(B)	---	--L(B)	---	---	---	---	---	L(B)	L(B)	L(B)	L(B)	---	4.b
01U	01U157		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U158		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U350			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U351			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U352			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U353			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U354			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U355			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U356			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U357			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U358			LLL (B)	LLL (B)	LLL (B)	LLL (B)	1(B)	---	1,2,3(B)	---	(Moved to App. H.2)	---	---	---	---	---
01U	01U901		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U902		(7)(5)	--L(B)	---	--L(B)	---	1(B)	---	1,2,7(B)	---	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	OR	4.b
01U	01U903		(7)	--L(B)	---	--L(B)	---	1(B)	---	1(B)	---	1,7,L(B)	1,7,L(B)	1,7,L(B)	1,7,L(B)	OR	4.b
01U	01U904		(7)(5)	--L(B)	---	--L(B)	---	1(B)	---	1,2,7(B)	---	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	1,2,7,L(B)	OR	4.b

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Site I Remedial Action																	
01U	01U004			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U054			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U064			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	01U132			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U631			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U632			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U634			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U635			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U636			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	01U638			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U639			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	01U640			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	01U642			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U652			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U666			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U667			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U668			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U675			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	482086	I01MW		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	482087	I05MW		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	482088	I02MW		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	1a, OR	1a, OR
01U	482089	I04MW		--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	1a, OR
01U	482090	I03MW		--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	1a, OR

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Site K Remedial Action																	
01U	01U047			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U048			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U052			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U065			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U128			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U601			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U602			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U603			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U604			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U605			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U607			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U608			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U609			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U611			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U612			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U613			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U615			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U616			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U617			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U618			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U619			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U620			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U621			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	01U622			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U623			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U624			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U625			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U626			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U627			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	01U628			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	482083	K04-MW		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	3.a
01U	482084	K02-MW		--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a
01U	482085	K01-MW		--L(A)	---	--L(A)	---	---	---	---	---	L(A)	L(A)	L(A)	L(A)	---	3.a

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
TCAAP Groundwater Recovery System																	
03F	03F302			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F303			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F304			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F305			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F306			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F307			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F308			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03F	03F312			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U001			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U002			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U003			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U004			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U005			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U006			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U007		(6)	--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	Background	1.a
03U	03U008			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U009		(6)	--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	Background	1.a
03U	03U010			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U011			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U012			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U013			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U014			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U015			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03U	03U016			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U017			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U018			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U019			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U020			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U021			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U022			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U023			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U024			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U025			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U026			---	---	---	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U027			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U028			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U029			--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U030			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U031			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
03U	03U032			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U075			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U076			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U077			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U078			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U079			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U082			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U083			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U084			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03U	03U087			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U088			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U089			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U090			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U092			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U093			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U094			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U096			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U097			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U099			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U111			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U112			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U113			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U114			---	---	---	---	---	---	---	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U121			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U124			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U129			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U301			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U314			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U315			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U316			--L(A)	---	--L(A)	---	---	---	---	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U317			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	(Moved to App. H.2)	---	---
03U	03U521			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U647			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U648			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U658			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03U	03U659			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	---	1.a
03U	03U671			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U672			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U674			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U675			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U676			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	03U701			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
03U	03U702			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U703			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U704			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U705			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03U	03U706			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03U	03U707			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U708			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U709			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U710			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U711			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U715			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U716			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03U	03U801			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U803			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U804			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U805			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U806			---	---	---	---	---	---	---	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
03U	03U811			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	519288	E101-MW		---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	519289	E102-MW		---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	519290	E103-MW		---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	519291	1291501-MW		---	---	---	---	---	---	---	---	---	---	---	---	---	---
03U	OW543U3			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M001			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M002			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M003			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M004			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M005			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M007			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M010			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M012			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M013			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M017			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03M	03M020			--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	OR	1.a
03M	03M713			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03M	03M802			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03M	03M806			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03L	03L001			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03L	03L002			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L003			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
03L	03L004			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L005			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L007		(6)	--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	Background	1.a
03L	03L010			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L012			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L013			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L014			--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L017			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L018			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L020			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L021			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
03L	03L027			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L028			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L029			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L077			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L078			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L079			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L080			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L081			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L084			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L086			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L091			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L113			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L137			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L138			---	---	---	---	---	---	---	---	---	---	---	---	---	---
03L	03L802			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L806			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L809			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L811			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L833			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U001			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
PC	04U002			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U003			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
PC	04U007		(6)	--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	Background	1.a
PC	04U012			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
PC	04U020			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U027			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U077			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U510		(6)	--L(A)	---	--L(A)	---	---	---	---	---	1,L(A)	---	1,L(A)	---	Background	1.a
PC	04U701			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U702			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
PC	04U708			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U709			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U711			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U713			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U714			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
PC	04U802			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U806			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
PC	04U833			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
J	04J077			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
J	04J702			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
J	04J708			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
J	04J713			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
J	04J714			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
PC/J	PJ#003			--L(A)	---	--L(A)	---	---	---	1(A)	---	L(A)	---	L(A)	---	---	1.a
PC/J	PJ#027			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
PC/J	PJ#074			---	---	---	---	---	---	---	---	---	---	---	---	---	1.a
PC/J	PJ#309			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC/J	PJ#310			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC/J	PJ#311			--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC/J	PJ#313			--L(A)	---	--L(A)	---	---	---	---	---	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
PC/J	PJ#501	TCAAP #1		---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC/J	PJ#502	TCAAP #2		---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC/J	PJ#503			---	---	---	---	---	---	---	---	---	---	---	---	---	---
PC/J	PJ#802			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
PC/J	PJ#806			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
SG	Staff Gauges			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	---	---	---	---

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Unit 1 Wells																	
01U	01U003			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U011			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U012			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U022			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U033			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U034			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U035			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U036			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U037			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U043			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U044			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U045			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U046			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U050			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U051			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U053			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U054			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U060			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U062			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U072			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U085			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U098			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U100			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U101			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U122			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U130			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U131			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U524			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U525			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U526			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U527			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U803			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U805			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01U	01U806			---	---	---	---	---	---	---	---	---	---	---	---	---	---
01L	01L811			---	---	---	---	---	---	---	---	---	---	---	---	---	---

Appendix H.1

FY 1998 - FY 2002 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Groundwater Level Monitoring Plan			(1)	Groundwater Quality Monitoring Plan			(2)	Combined Water Level/Water Quality Plan			(1,2)	Purpose For Monitoring (3)	
				Q57	Q58	Q59	Q60	Q57	Q58	Q59	Q60						
Unit	Well I.D.	Common Name	Notes	Dec 97	Mar 98	Jun 98	Sep 98	Dec 97	Mar 98	Jun 98	Sep 98	Jun 99	Jun 00	Jun 01	Jun 02	Water Quality	Water Level
Operable Unit 3																	
03U	03U673			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03U	03U832			--L(B)	---	--L(B)	---	---	---	1(B)	---	---	---	---	---	---	---
03M	03M848			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L673			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L832			--L(B)	---	--L(B)	---	---	---	1(B)	---	L(B)	---	L(B)	---	---	1.a
03L	03L848			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L854			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	03L859			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L860			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
03L	03L861			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
03L	476837	MW15H		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U673			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U832			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U845			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U848			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U851			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U852			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U854			--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	---	1.a
PC	04U859			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U860			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U861			--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U863	323U4		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U864	324U4		--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
PC	04U865	325U4		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a
PC	04U866	326U4		--L(A)	---	--L(A)	---	---	---	---	---	L(A)	---	L(A)	---	OR	1.a
PC	500691	414U4		--L(A)	---	--L(A)	---	---	---	1(A)	---	---	---	---	---	---	---
PC	520931	NBM #13		--L(A)	--L(A)	--L(A)	--L(A)	1(A)	1(A)	1(A)	1(A)	(Moved to App. H.2)	---	(Moved to App. H.2)	---	---	---
J	04J864	324 J		--L(A)	---	--L(A)	---	1(A)	---	1(A)	---	1,L(A)	1,L(A)	1,L(A)	1,L(A)	OR	1.a
J	04J866	326 J		--L(A)	---	--L(A)	---	---	---	1(A)	---	1,L(A)	---	1,L(A)	---	OR	1.a

H.2 FY 1998 - FY 2002 Monitoring Plan for Remedial Treatment Systems

Appendix H.2
FY 2000 - FY 2002 Monitoring Plan for Remedial Treatment Systems

OU1: DEEP GROUNDWATER(1)

Location	Sampling Frequency	Parameters
Extraction Wells NBM#4, #14, and #15	- Monthly	- Pumping Volumes
	- Monthly	- Cat. 1(2)
PGAC Effluent	- Monthly	- Cat. 1(2)

OU2: SITES D & G SOIL VAPOR EXTRACTION (SVE) SYSTEMS [If Operating!]

Location	Sampling Frequency	Parameters
Site D	- Monthly	- Flowrate, TRCLE, 111TCE
Site G	- Monthly	- Flowrate, cis-12DCE, TRCLE, 111TCE

OU2: SITE A SHALLOW GROUNDWATER

Location	Sampling Frequency	Parameters
Extraction Wells 01U351-01U358	- Monthly	- Pumping Volumes
	- Monthly	- Water Levels
	- Annual	- Cat. 1(2), Benzene
Extraction/Discharge System Effluent (3)	- Monthly	- 12DCE, TRCLE, TCLEE, Hg
	- Annually (4)	- pH, COD, and TSS

OU2: SITE K REMEDIAL ACTION

Location	Sampling Frequency	Parameters
Treatment System Effluent (Outfall 391 (010))	- See Appendix H.3	- See Appendix H.3
Extracted Groundwater	- Monthly	- Volume

OU2: TCAAP GROUNDWATER RECOVERY SYSTEM (TGRS)

Location	Sampling Frequency	Parameters
Extraction Wells	- Semi-Annually	- Water Levels and Cat. 1(2)
Treatment System Influent	- Monthly	- Cat. 1(2)
	- Monthly	- Volume
Treatment System Effluent	- Monthly	- Cat. 1(2)

OPERABLE UNIT 3 PLUME GROUNDWATER RECOVERY SYSTEM (PGRS)(1)

Location	Sampling Frequency	Parameters
Extraction Well (NBM#13)	- Monthly	- Pumping Volume
	- Monthly	- Cat. 1(2)
Treatment System Effluent	- Monthly	- Cat. 1(2)

NOTE:

(1) Performed by the City of New Brighton using their QAPP.

(2) The parameter list for Category 1 is presented in Appendix D.

(3) USEPA and not USAEC analytical protocol required by Metropolitan Council Environmental Services on waters discharged to the sanitary sewer.

(4) Sampling TSS/COD annually if the following conditions are met:
- After an Industrial Discharge permit issuance, four consecutive routine self-monitoring reports must exhibit a TSS of 125 mg/l or less and a COD of 250 mg/l or less (50% of the Strength Charge limits).
- The Permittee must have no history of Strength Charge from this system.
- The Permittee must formally apply for this reduced reporting requirement through a letter illustrating the above points.

H.3 FY 1999 - FY 2002 Monitoring Plan for Surface Water

Appendix H.3

FY 1999 - FY 2002 Monitoring Plan for Surface Water

Analysis	Units	Outfall 010 Site K Effluent	20700 Rice Crk In	20800 Rice Crk Out
Flow Rate	M gal/day	Continuous	Q	Q
Total Flow	M gal	M	- -	- -
pH		Q	Q	Q
Cyanide	ug/l	Q	Q	Q
Copper	ug/l	Q	Q	Q
Lead	ug/l	Q	Q	Q
Mercury	ug/l	Q	Q	Q
Phosphorus (Total)	mg/l	Q	Q	Q
Silver	ug/l	Q	Q	Q
Zinc	ug/l	Q	Q	Q
Trichloroethene	ug/l	Q	Q	Q
1,1-Dichloroethene	ug/l	Q	Q	Q
1,1-Dichloroethane	ug/l	Q	Q	Q
cis-1,2-Dichloroethene	ug/l	Q	Q	Q
Trans-1,2-Dichloroethen	ug/l	Q	Q	Q
Vinyl Chloride	ug/l	Q	Q	Q
1,2-Dichloroethane	ug/l	Q	Q	Q

Notes:
M = Analysis required once a month
Q = Analysis required once a quarter

APPENDIX I

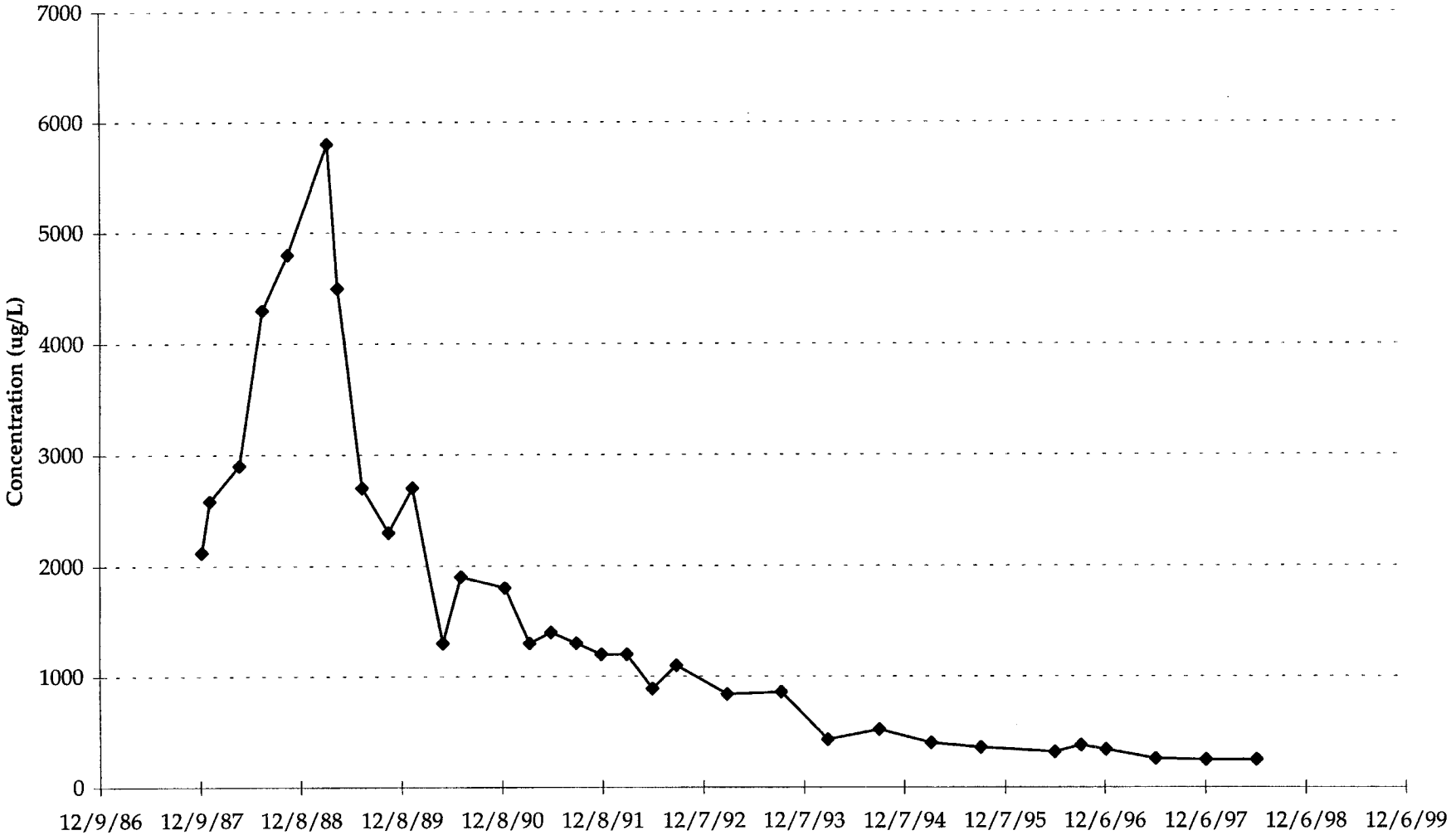
Appendix I

TGRS Chemical Data

I.1 Extraction Well - TRCLE vs. Time

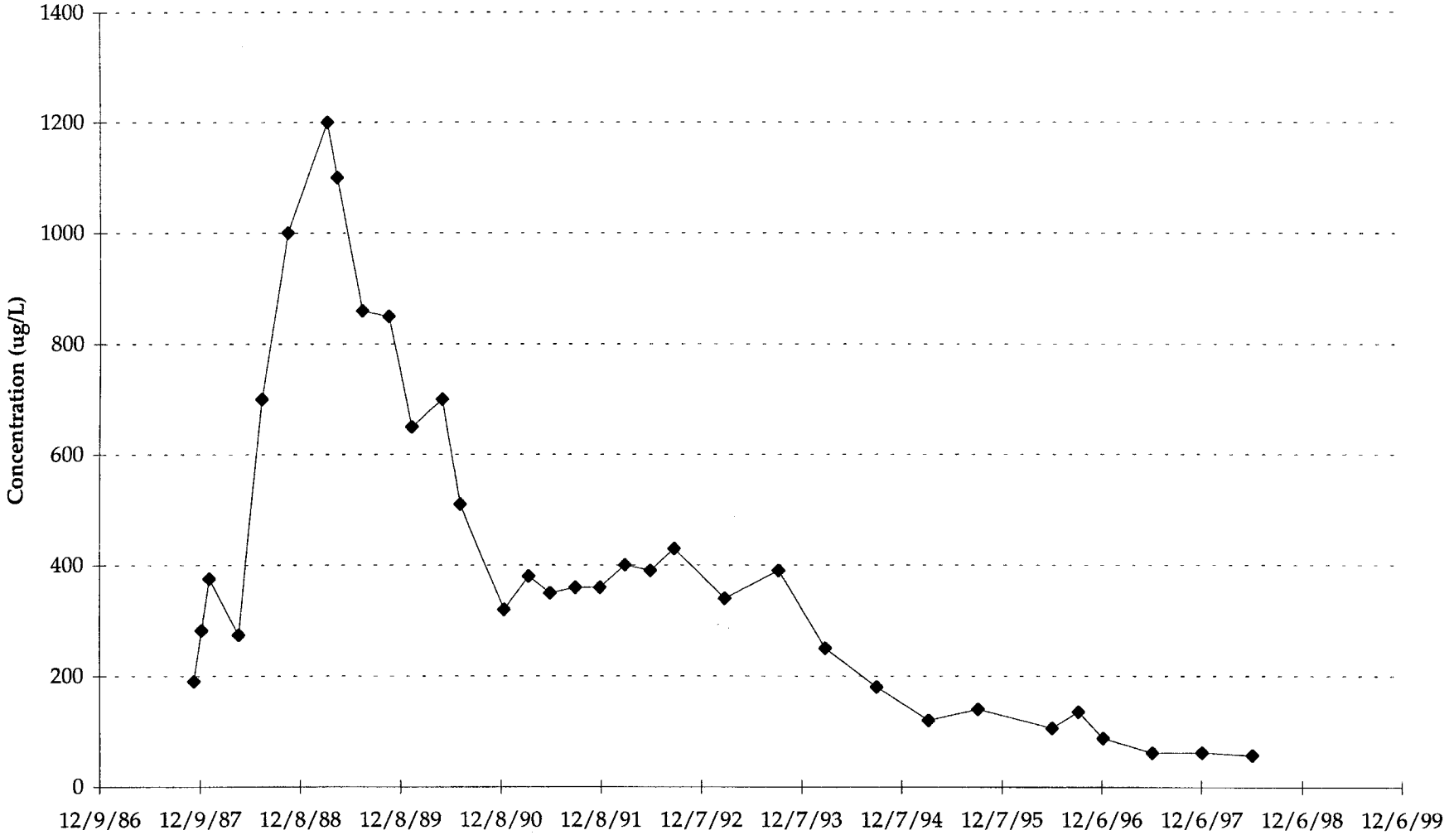
APPENDIX I.1

EXTRACTION WELL B1 - TRCLE VS.TIME



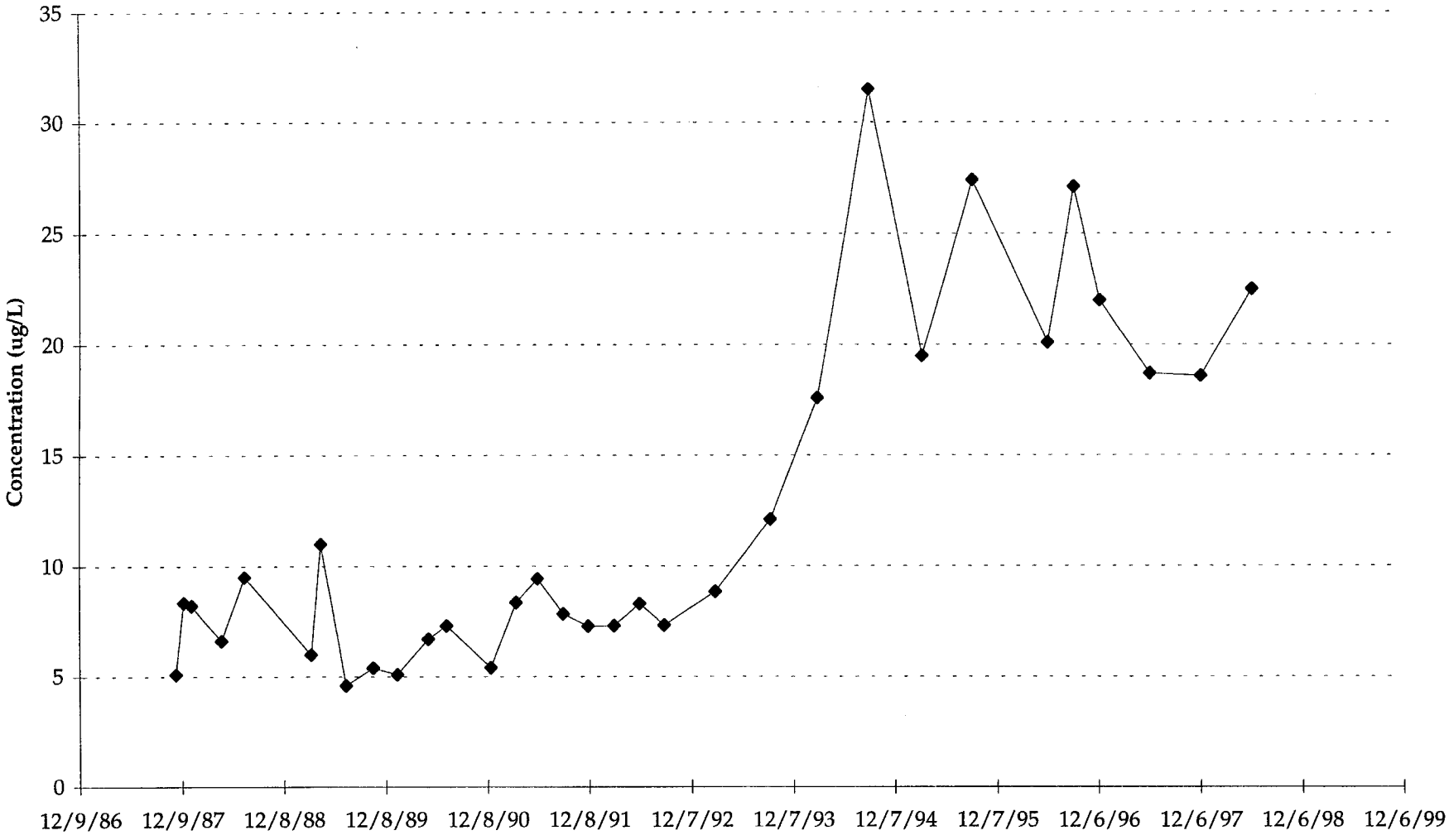
APPENDIX I.1

EXTRACTION WELL B2 - TRCLE VS. TIME



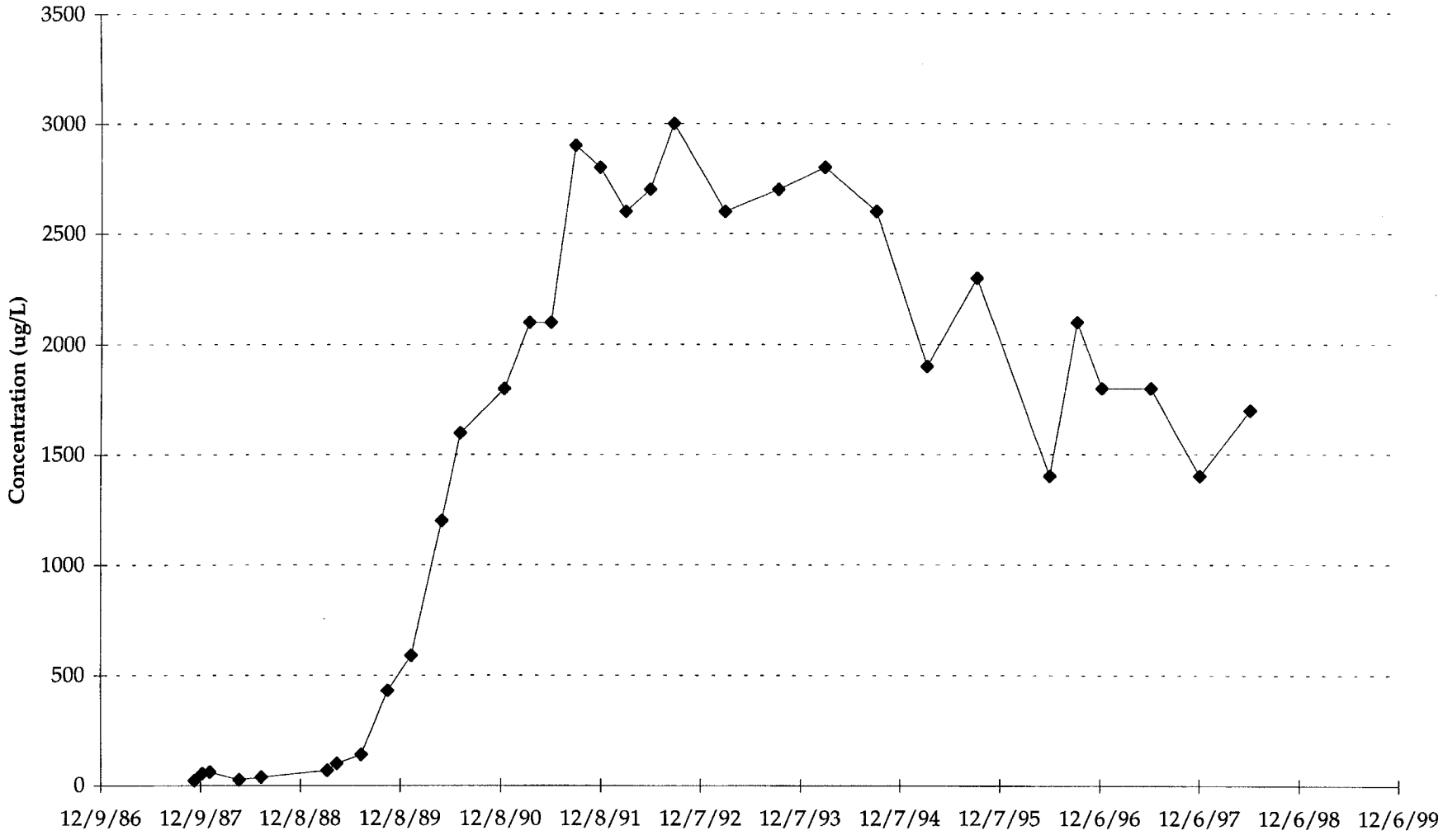
APPENDIX I.1

EXTRACTION WELL B3 - TRCLE VS. TIME



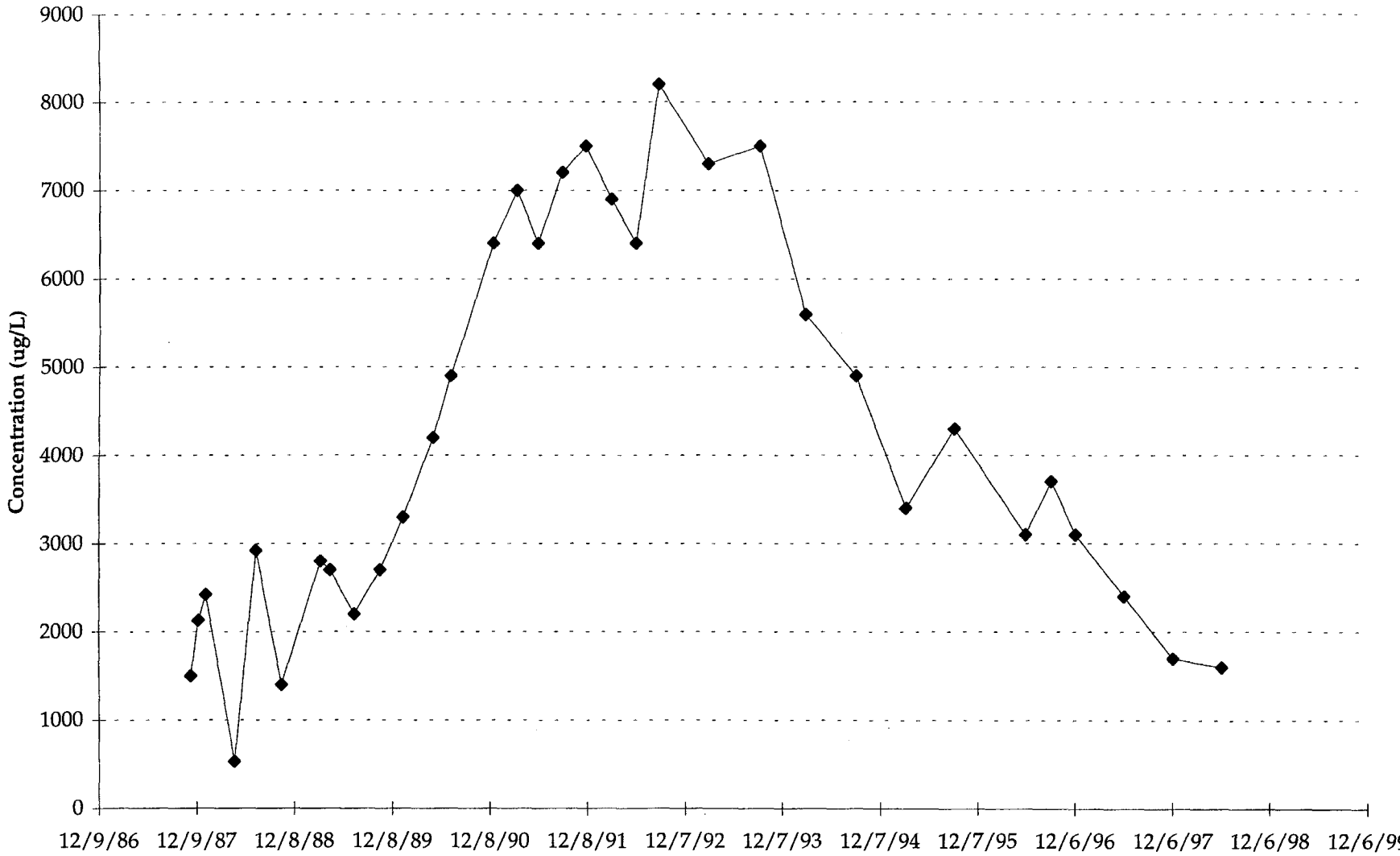
APPENDIX I.1

EXTRACTION WELL B4 - TRCLE VS. TIME



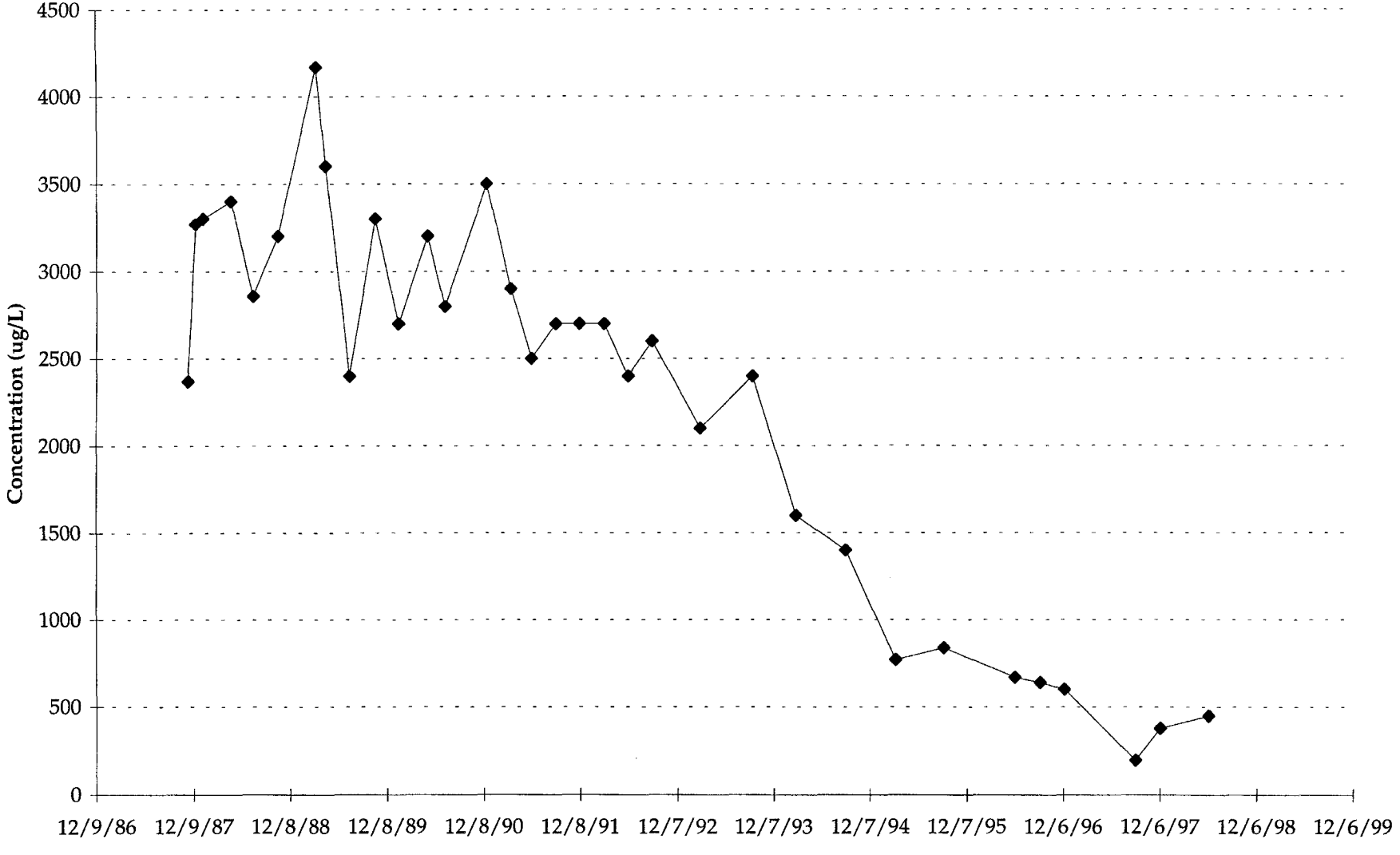
APPENDIX I.1

EXTRACTION WELL B5 - TRCLE VS. TIME



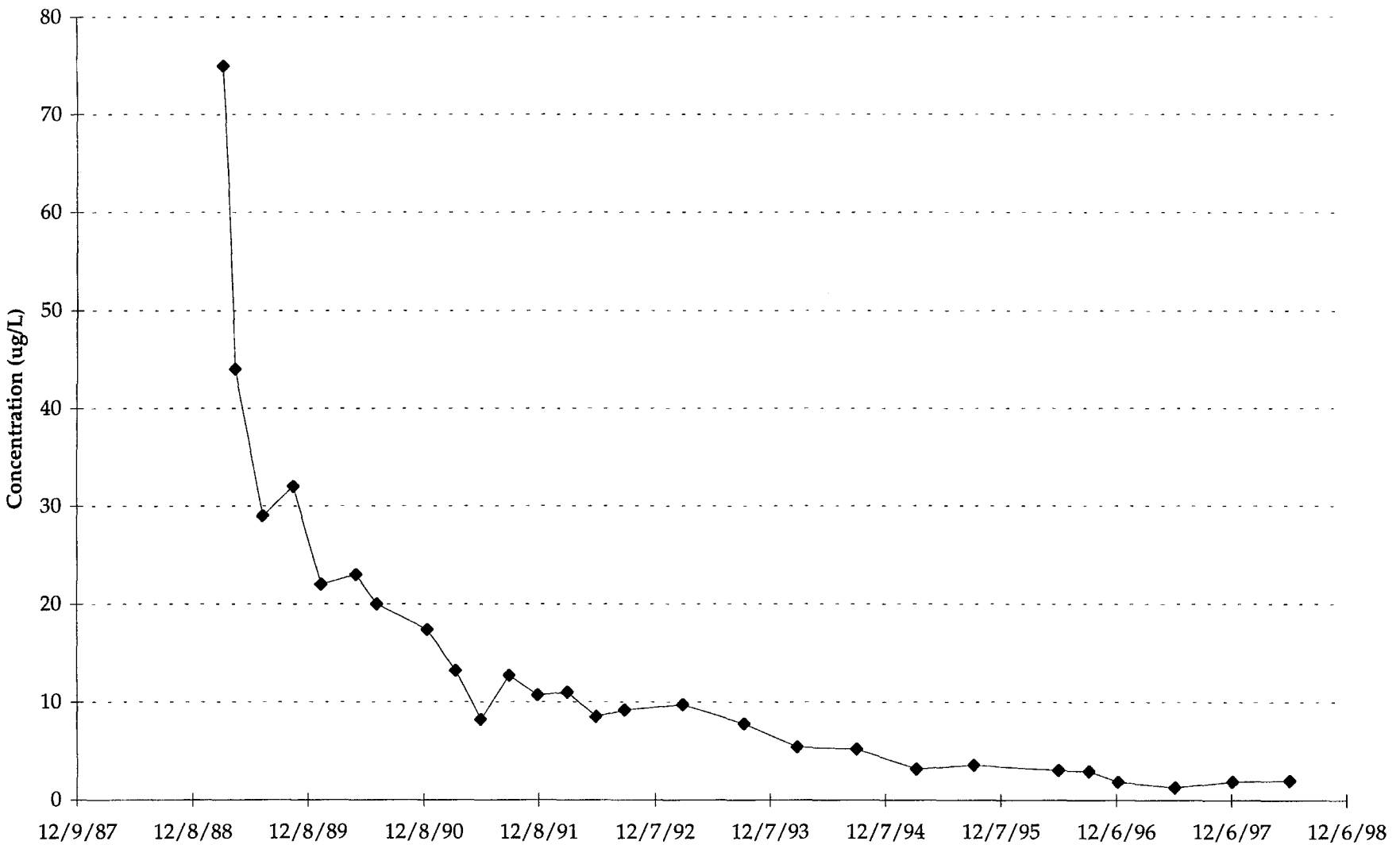
APPENDIX I.1

EXTRACTION WELL B6 - TRCLE VS. TIME



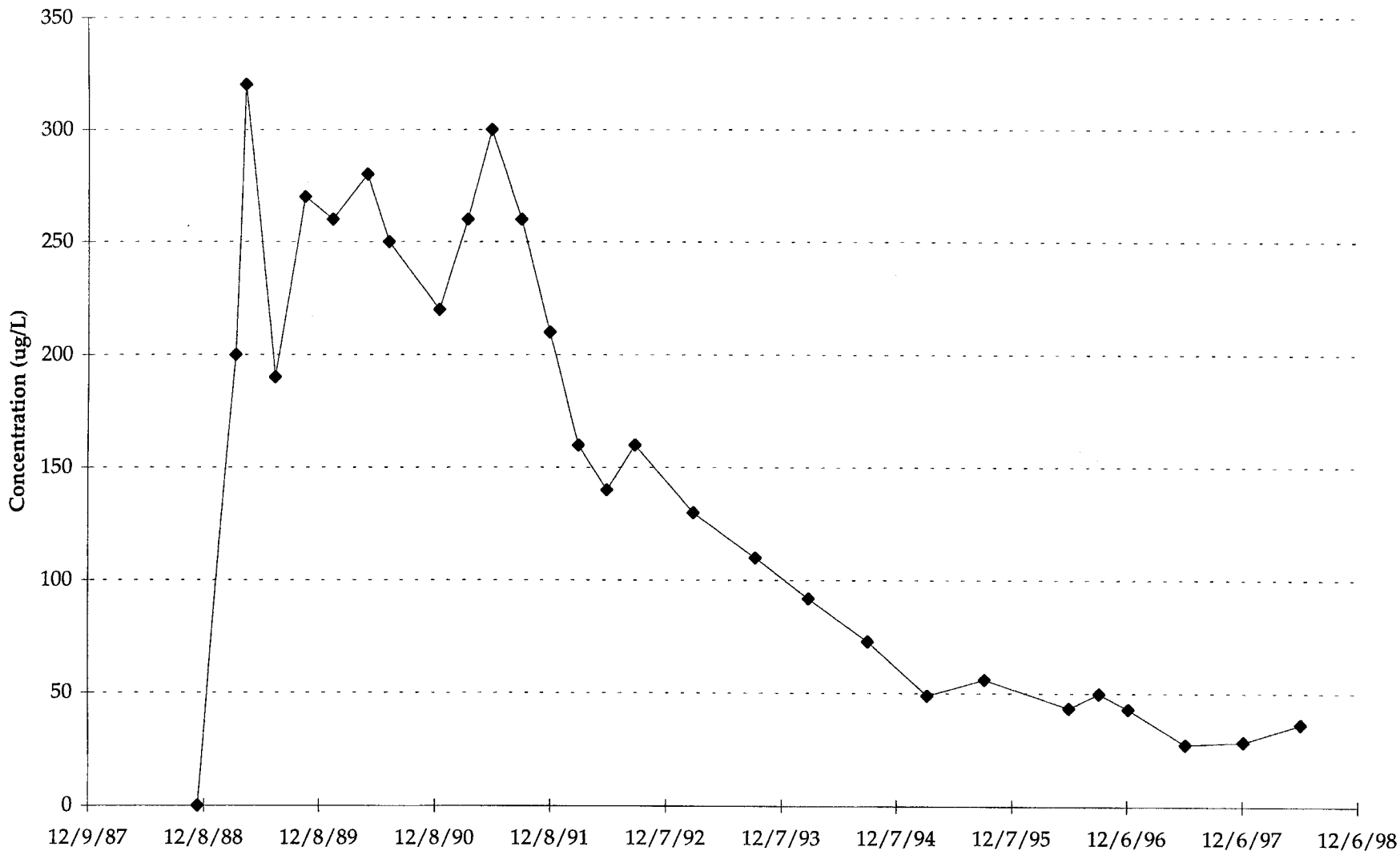
APPENDIX I.1

EXTRACTION WELL B7 - TRCLE VS. TIME



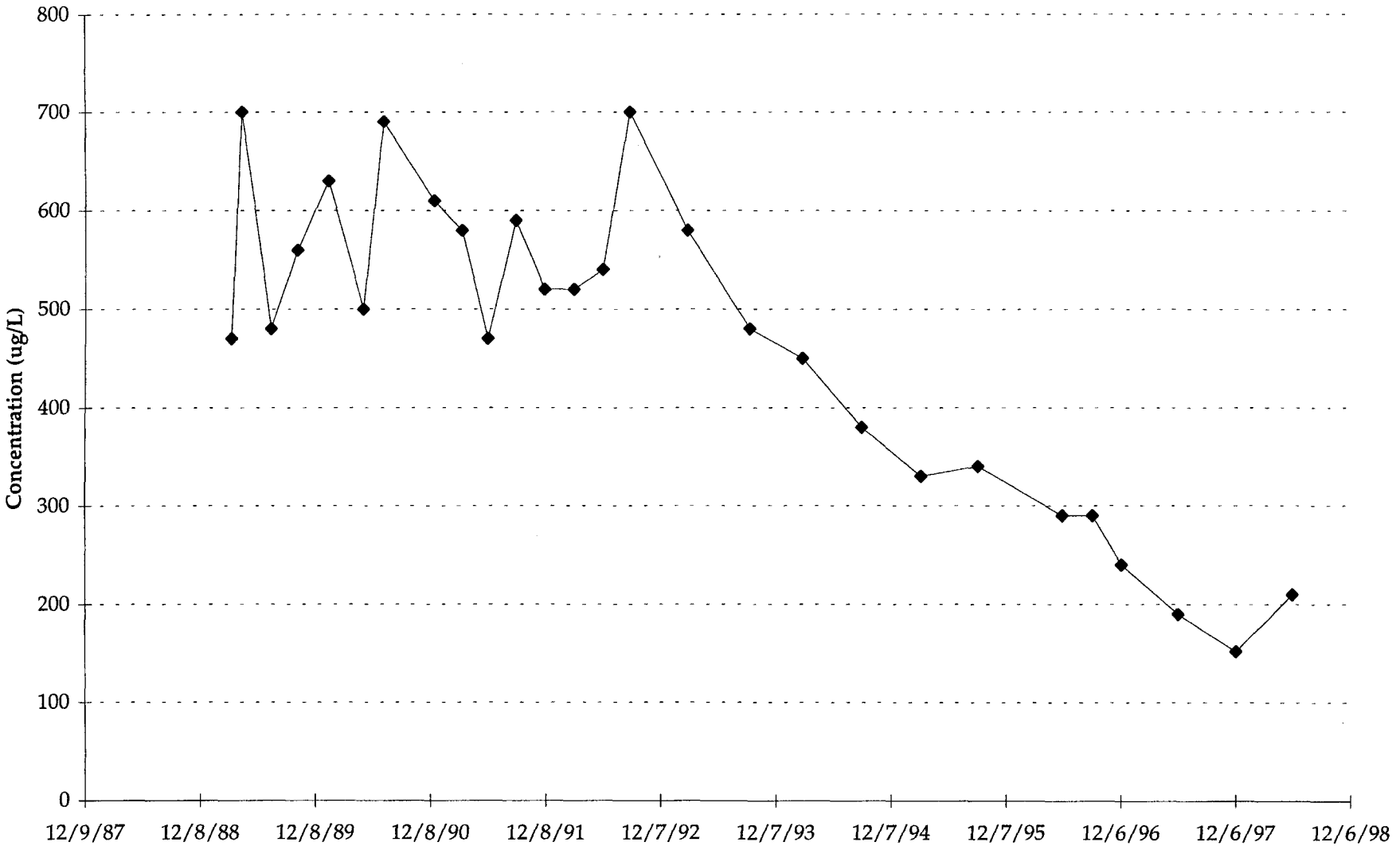
APPENDIX I.1

EXTRACTION WELL B8 - TRCLE VS. TIME



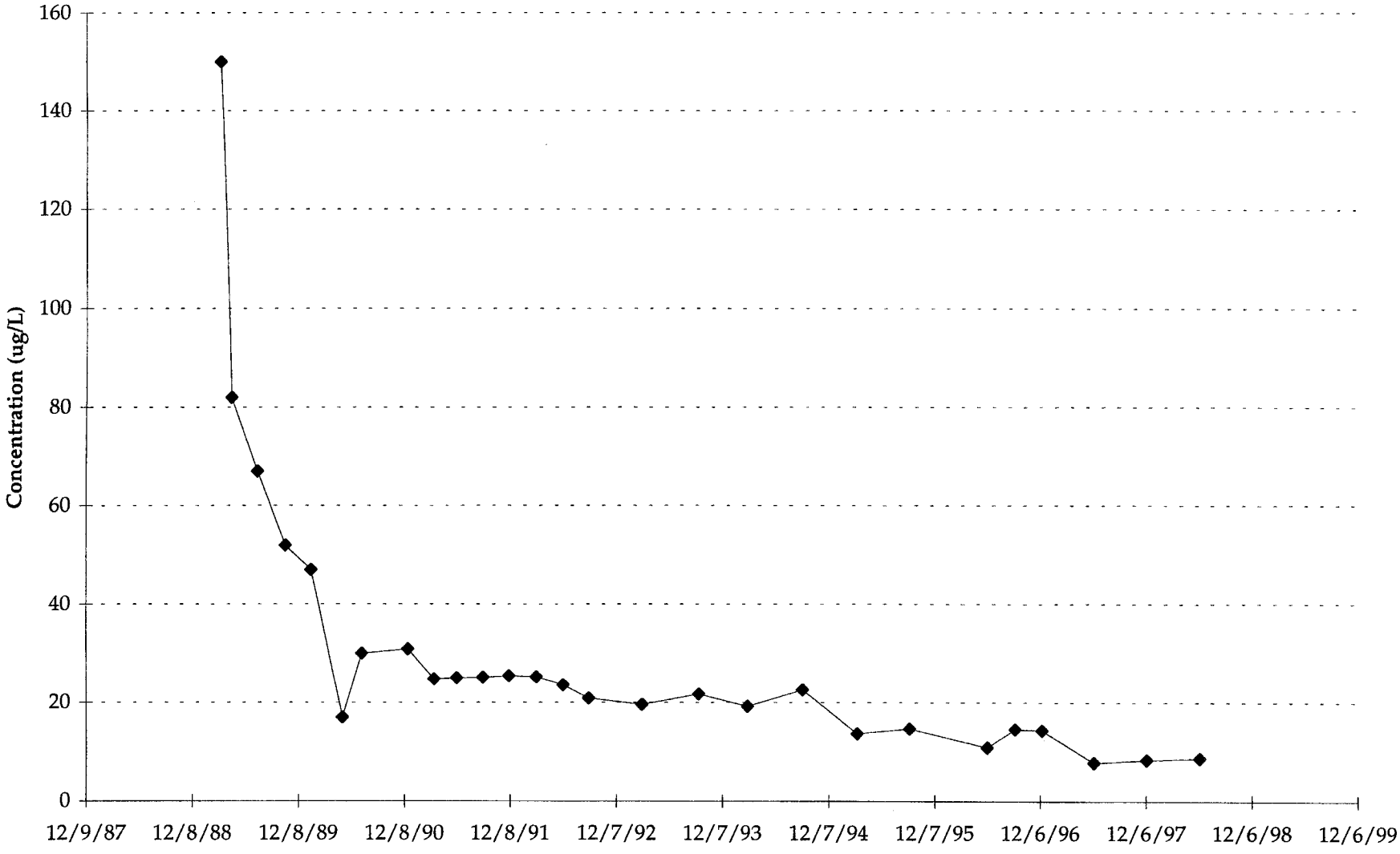
APPENDIX I.1

EXTRACTION WELL B9 - TRCLE VS. TIME



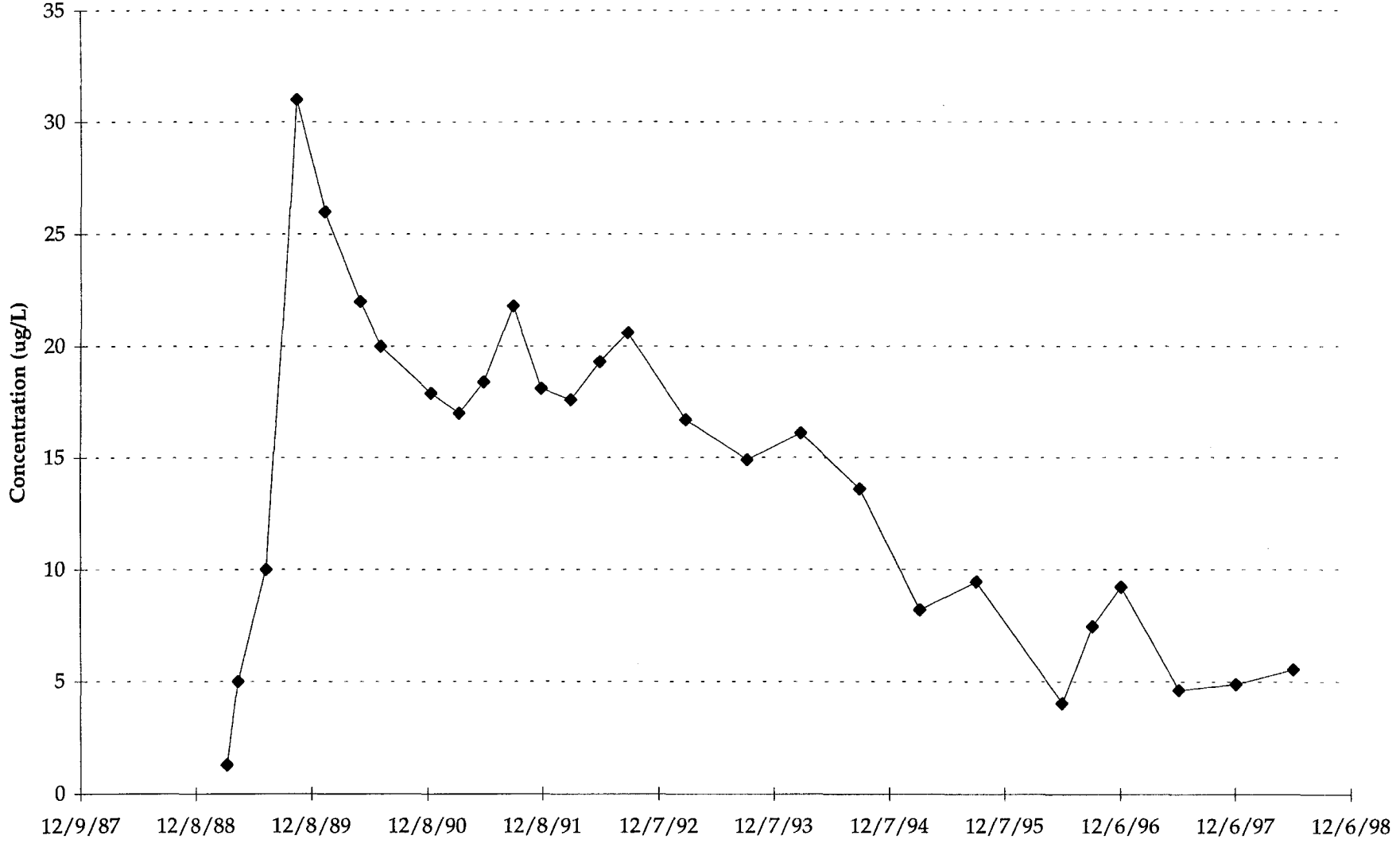
APPENDIX I.1

EXTRACTION WELL B10 - TRCLE VS. TIME



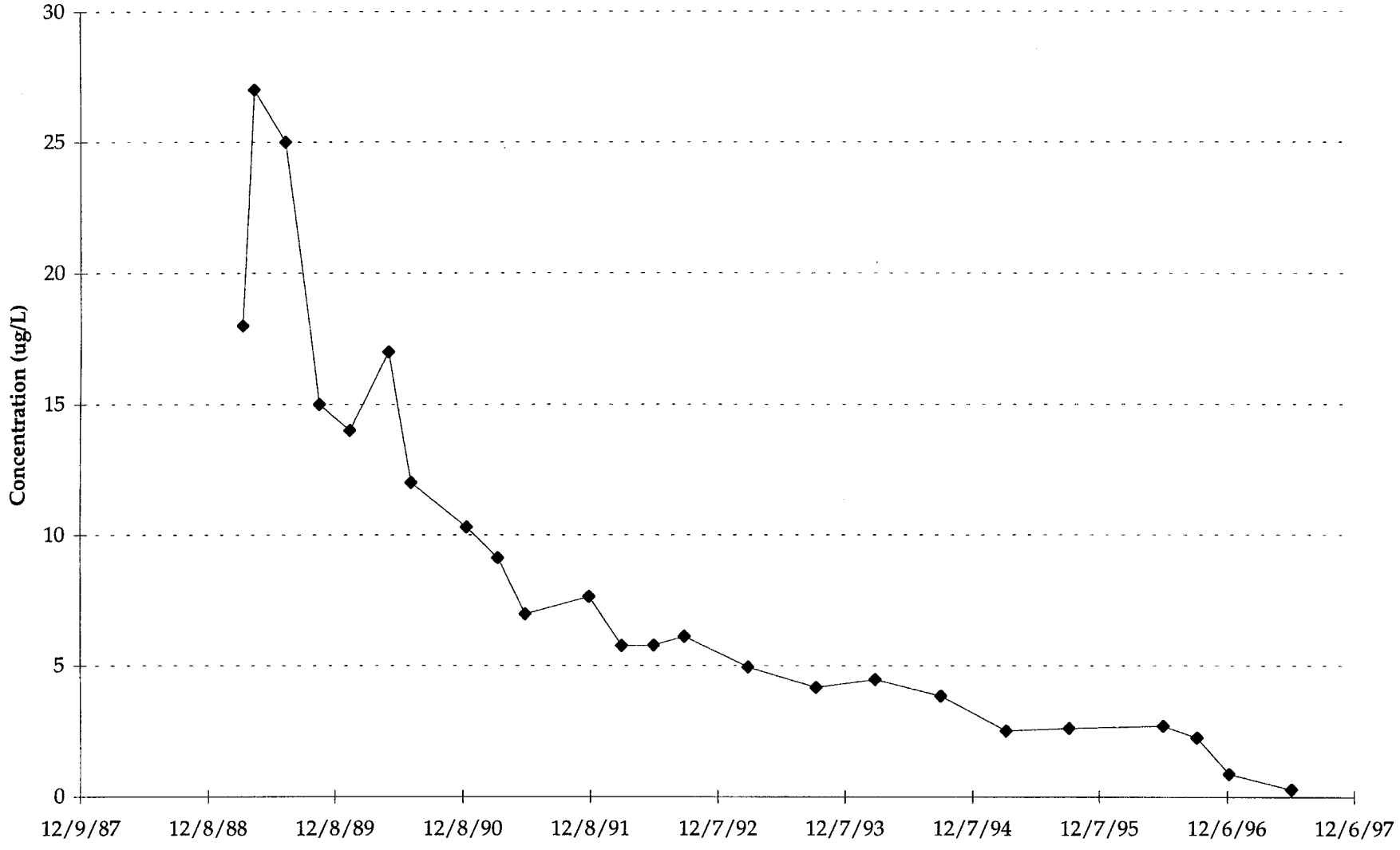
APPENDIX I.1

EXTRACTION WELL B11 - TRCLE VS. TIME



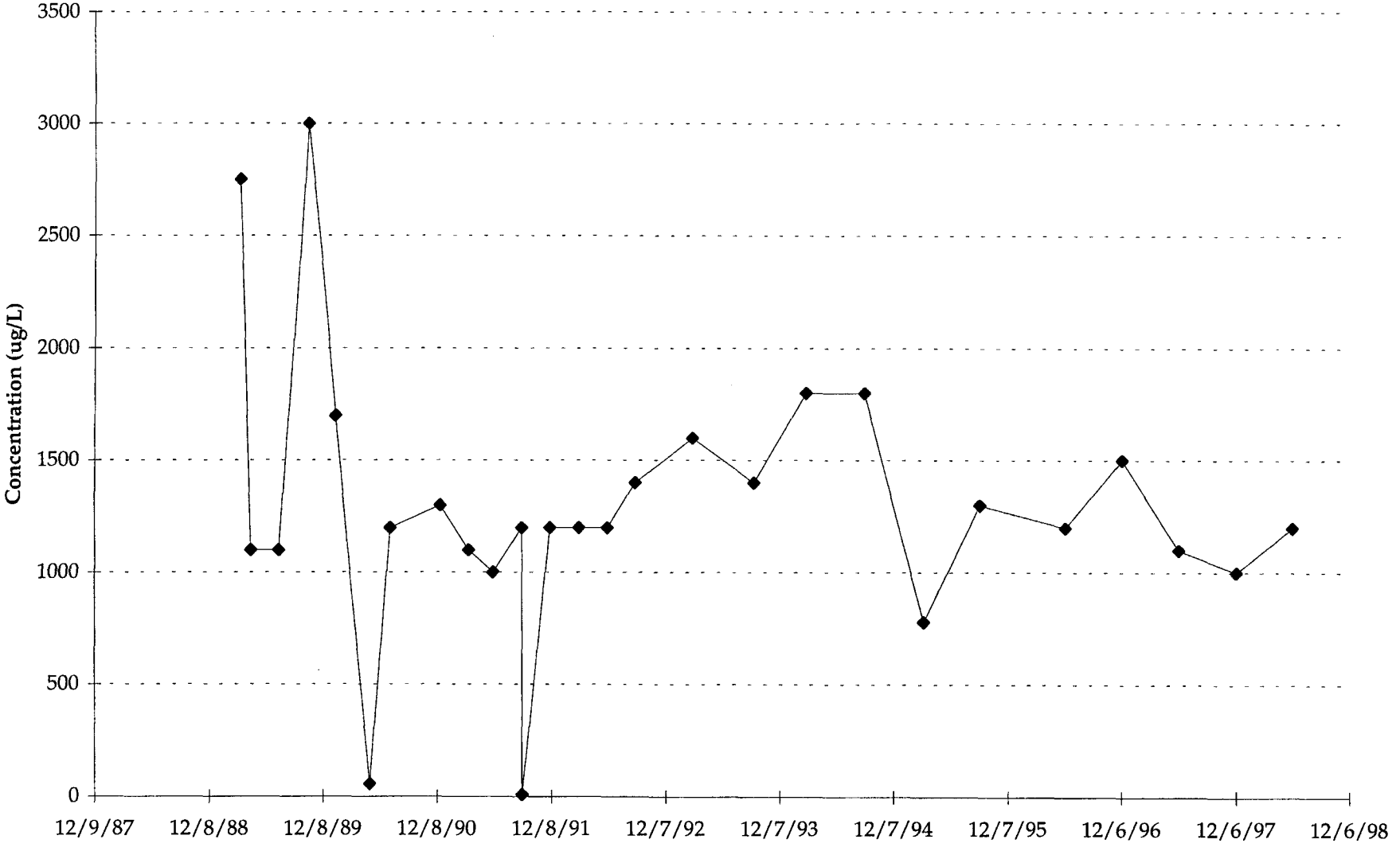
APPENDIX I.1

EXTRACTION WELL B12 - TRCLE VS. TIME



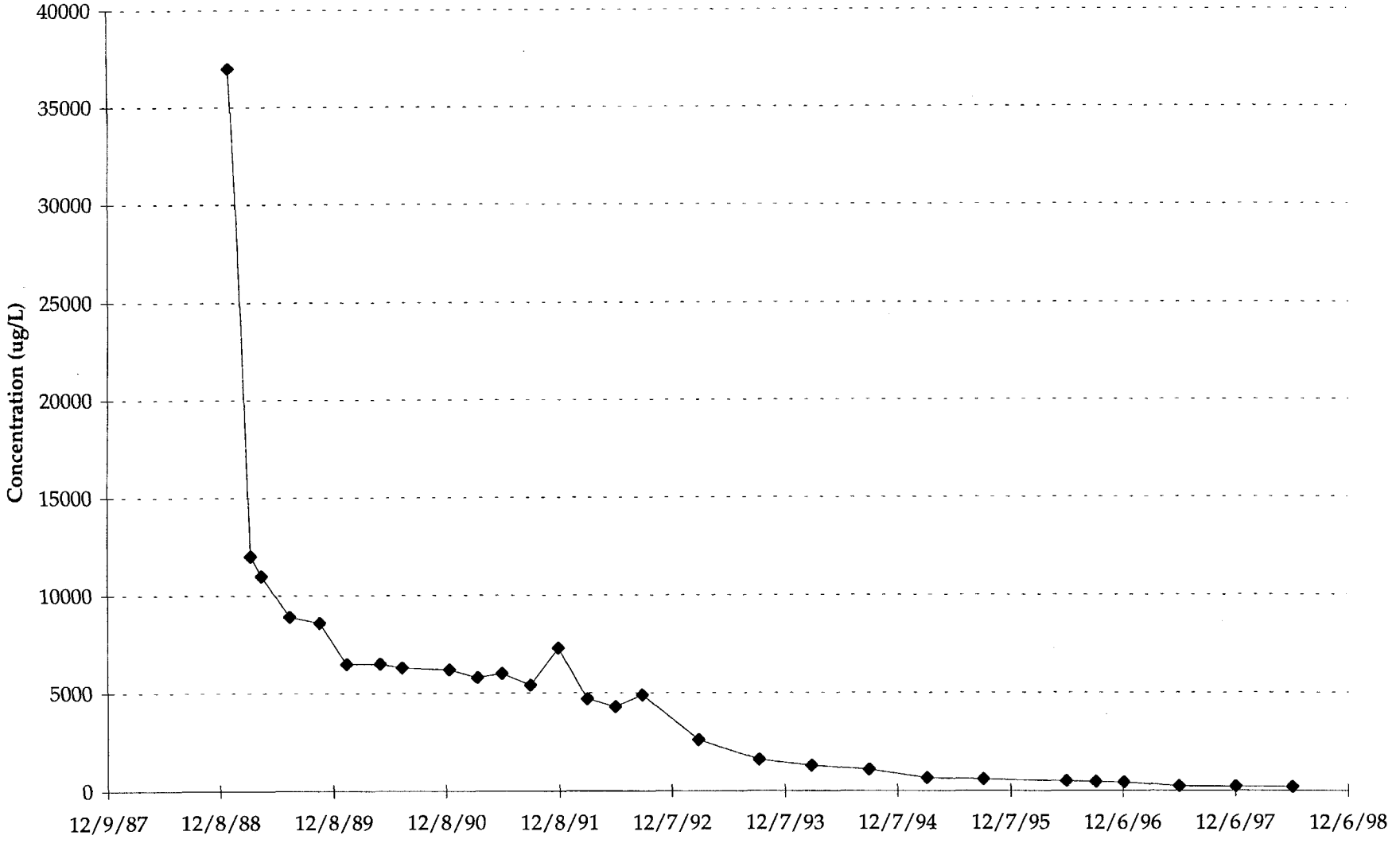
APPENDIX I.1

EXTRACTION WELL SC1 - TRCLE VS. TIME



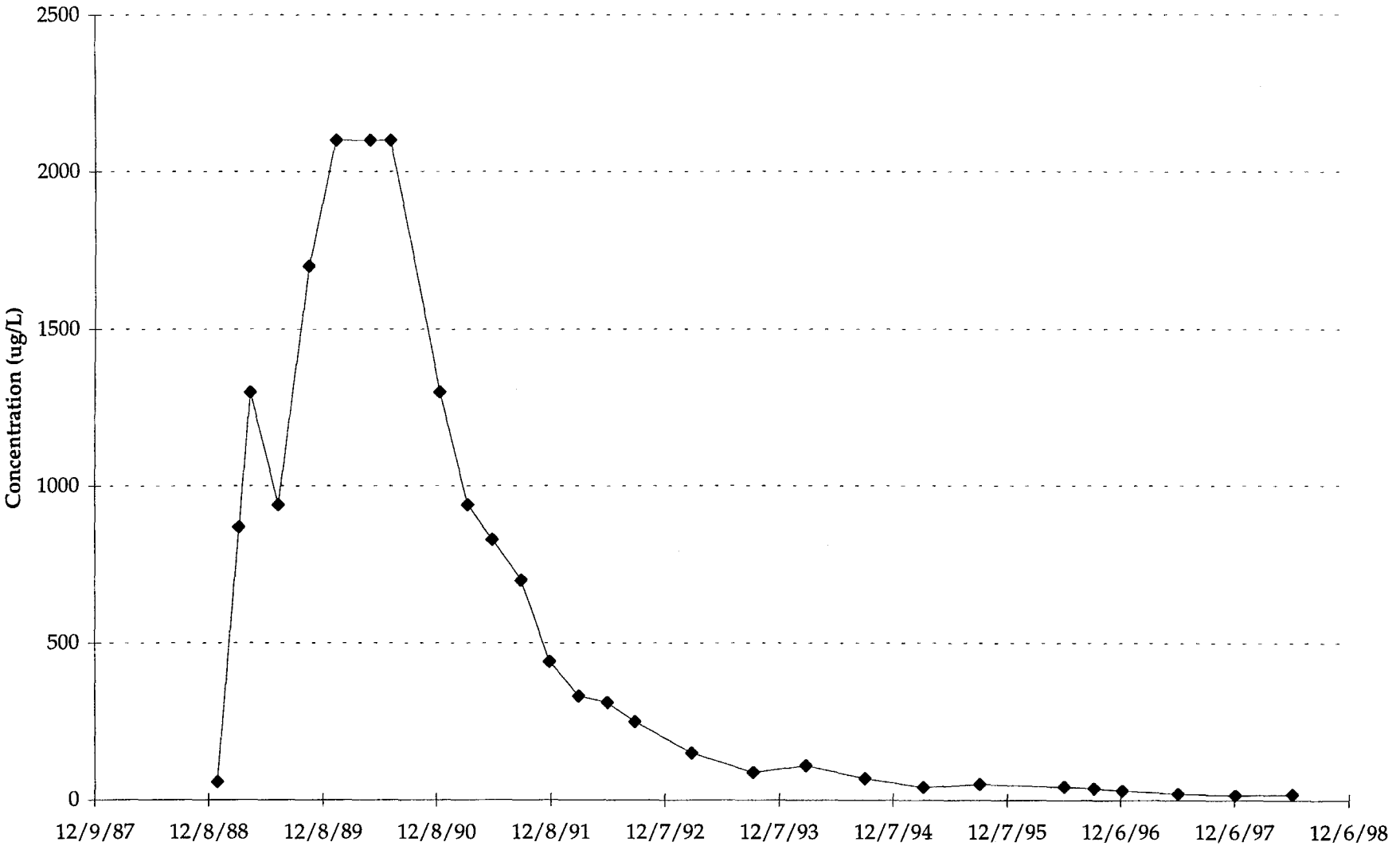
APPENDIX I.1

EXTRACTION WELLSC2 - TRCLE VS. TIME



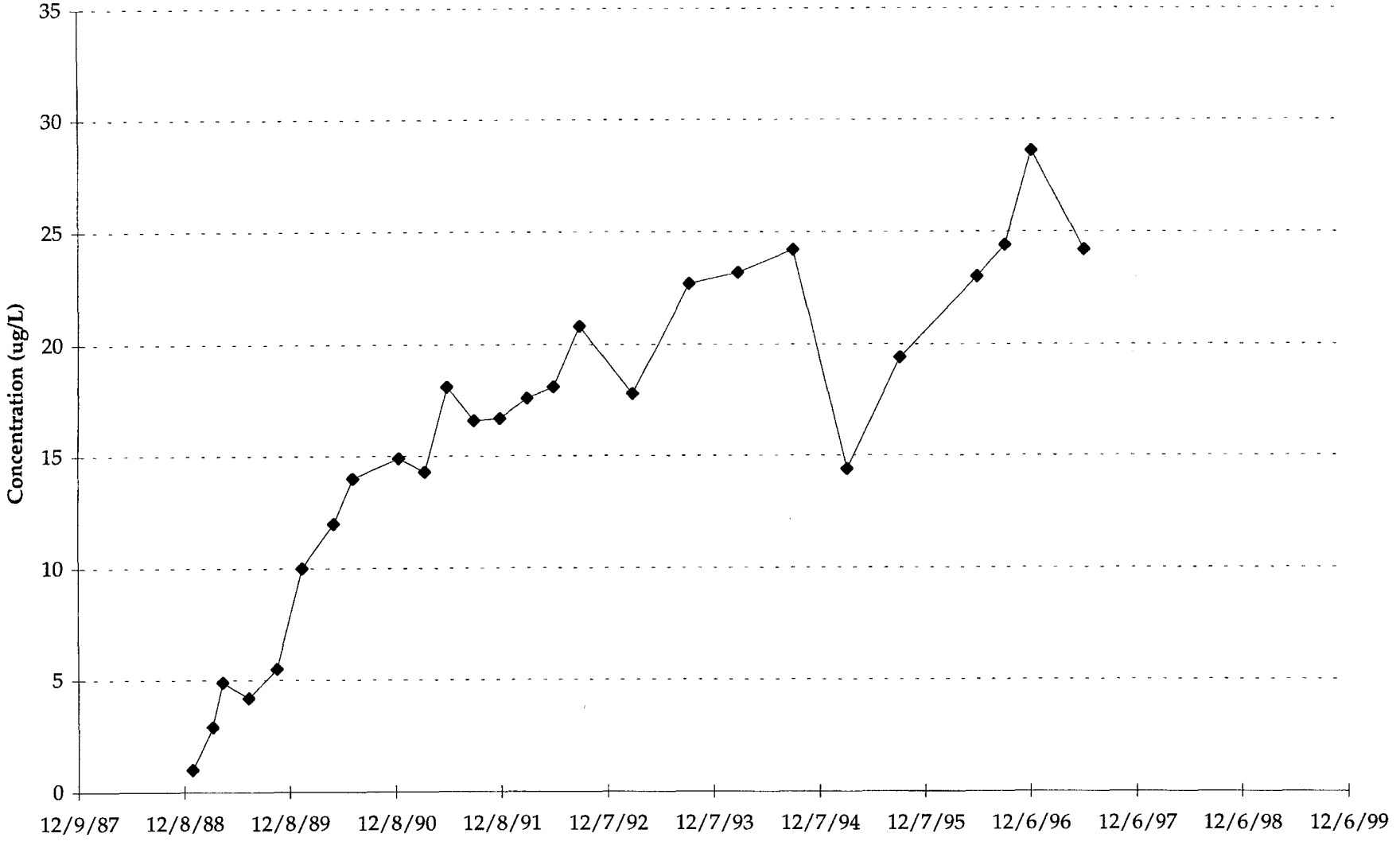
APPENDIX I.1

EXTRACTION WELL SC3 - TRCLE VS. TIME

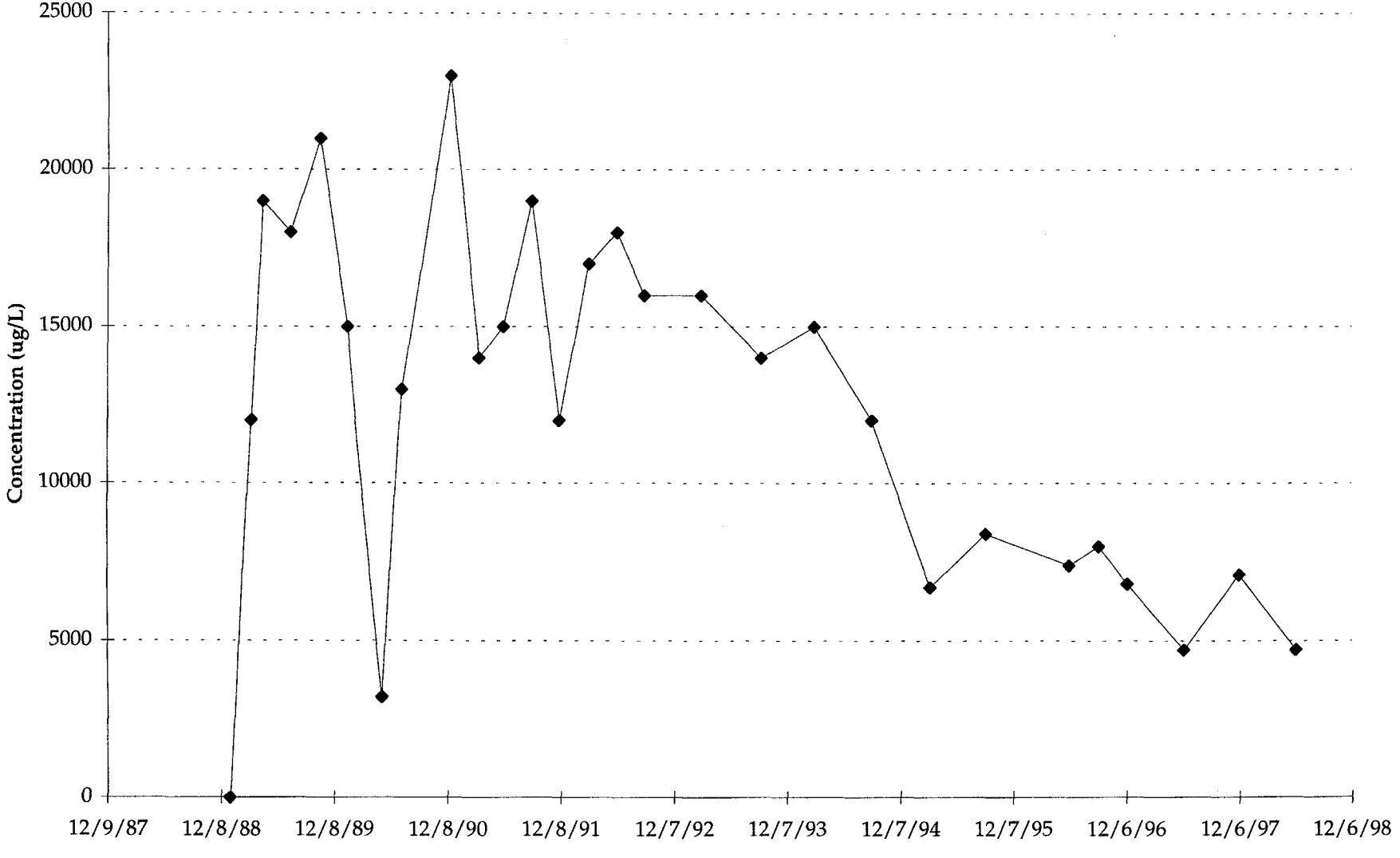


APPENDIX I.1

EXTRACTION WELL SC4 - TRCLE VS. TIME



EXTRACTION WELL SC5 - TRCLE VS. TIME



I.2 Fiscal Year 1998 Influent/Effluent Database TGRS, TCAAP

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	10/7/97	111TCE	BHDG 010	<	0.76	D
TGRSE	10/7/97	111TCE	BHDG 009	<	0.76	
TGRSE	11/4/97	111TCE	BHSV 005	<	0.76	?
TGRSE	11/4/97	111TCE	BHSV 006	<	0.76	D?
TGRSE	12/2/97	111TCE	BJBJ 009	<	0.76	?
TGRSE	12/2/97	111TCE	BJBJ 010	<	0.76	?
TGRSE	1/6/98	111TCE	BJJX 012	<	0.76	?
TGRSE	1/6/98	111TCE	BJJX 013	<	0.76	D?
TGRSE	2/3/98	111TCE	BJNK 006	<	0.76	?
TGRSE	2/3/98	111TCE	BJNK 007	<	0.76	D?
TGRSE	3/3/98	111TCE	BJQQ 006	<	0.76	D?
TGRSE	3/3/98	111TCE	BJQQ 005	<	0.76	?
TGRSE	4/7/98	111TCE	BJRN 008	<	0.76	?
TGRSE	4/7/98	111TCE	BJRN 009	<	0.76	D?
TGRSE	5/5/98	111TCE	BJVJ 006	<	0.76	D?
TGRSE	5/5/98	111TCE	BJVJ 005	<	0.76	?
TGRSE	6/2/98	111TCE	BJWN 012	<	0.76	?
TGRSE	6/2/98	111TCE	BJWN 013	<	0.76	D?
TGRSE	7/7/98	111TCE	BJZW 008	<	0.76	
TGRSE	7/7/98	111TCE	BJZW 009	<	0.76	D
TGRSE	9/1/98	111TCE	BKHW 008	<	0.76	?
TGRSE	9/1/98	111TCE	BKHW 009	<	0.76	D?
TGRSE	8/4/98	111TCE	BKCX 005	<	0.76	?
TGRSE	8/4/98	111TCE	BKCX 006	<	0.76	D?
TGRSE	10/7/97	112TCE	BHDG 010	<	0.78	D
TGRSE	10/7/97	112TCE	BHDG 009	<	0.78	
TGRSE	11/4/97	112TCE	BHSV 005	<	0.78	?
TGRSE	11/4/97	112TCE	BHSV 006	<	0.78	D?
TGRSE	12/2/97	112TCE	BJBJ 010	<	0.78	?
TGRSE	12/2/97	112TCE	BJBJ 009	<	0.78	?
TGRSE	1/6/98	112TCE	BJJX 012	<	0.78	?
TGRSE	1/6/98	112TCE	BJJX 013	<	0.78	D?
TGRSE	2/3/98	112TCE	BJNK 006	<	0.78	?
TGRSE	2/3/98	112TCE	BJNK 007	<	0.78	D?
TGRSE	3/3/98	112TCE	BJQQ 006	<	0.78	D?
TGRSE	3/3/98	112TCE	BJQQ 005	<	0.78	?
TGRSE	4/7/98	112TCE	BJRN 008	<	0.78	?
TGRSE	4/7/98	112TCE	BJRN 009	<	0.78	D?
TGRSE	5/5/98	112TCE	BJVJ 006	<	0.78	D?
TGRSE	5/5/98	112TCE	BJVJ 005	<	0.78	?
TGRSE	6/2/98	112TCE	BJWN 013	<	0.78	D?
TGRSE	6/2/98	112TCE	BJWN 012	<	0.78	?
TGRSE	7/7/98	112TCE	BJZW 008	<	0.78	
TGRSE	7/7/98	112TCE	BJZW 009	<	0.78	D

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	9/1/98	112TCE	BKHW 008	<	0.78	?
TGRSE	9/1/98	112TCE	BKHW 009	<	0.78	D?
TGRSE	8/4/98	112TCE	BKCX 005	<	0.78	?
TGRSE	8/4/98	112TCE	BKCX 006	<	0.78	D?
TGRSE	10/7/97	11DCE	BHDG 010	<	1.7	D
TGRSE	10/7/97	11DCE	BHDG 009	<	1.7	
TGRSE	11/4/97	11DCE	BHSV 006	<	1.7	D?
TGRSE	11/4/97	11DCE	BHSV 005	<	1.7	?
TGRSE	12/2/97	11DCE	BJBJ 010	<	1.7	?
TGRSE	12/2/97	11DCE	BJBJ 009	<	1.7	?
TGRSE	1/6/98	11DCE	BJJX 012	<	1.7	?
TGRSE	1/6/98	11DCE	BJJX 013	<	1.7	D?
TGRSE	2/3/98	11DCE	BJNK 007	<	1.7	D?
TGRSE	2/3/98	11DCE	BJNK 006	<	1.7	?
TGRSE	3/3/98	11DCE	BJQQ 005	<	1.7	?
TGRSE	3/3/98	11DCE	BJQQ 006	<	1.7	D?
TGRSE	4/7/98	11DCE	BJRN 008	<	1.7	?
TGRSE	4/7/98	11DCE	BJRN 009	<	1.7	D?
TGRSE	5/5/98	11DCE	BJVJ 006	<	1.7	D?
TGRSE	5/5/98	11DCE	BJVJ 005	<	1.7	?
TGRSE	6/2/98	11DCE	BJWN 013	<	1.7	D?
TGRSE	6/2/98	11DCE	BJWN 012	<	1.7	?
TGRSE	7/7/98	11DCE	BJZW 008	<	1.7	
TGRSE	7/7/98	11DCE	BJZW 009	<	1.7	D
TGRSE	9/1/98	11DCE	BKHW 008	<	1.7	?
TGRSE	9/1/98	11DCE	BKHW 009	<	1.7	D?
TGRSE	8/4/98	11DCE	BKCX 005	<	1.7	?
TGRSE	8/4/98	11DCE	BKCX 006	<	1.7	D?
TGRSE	10/7/97	11DCLE	BHDG 010	<	0.73	D
TGRSE	10/7/97	11DCLE	BHDG 009	<	0.73	
TGRSE	11/4/97	11DCLE	BHSV 006	<	0.73	D?
TGRSE	11/4/97	11DCLE	BHSV 005	<	0.73	?
TGRSE	12/2/97	11DCLE	BJBJ 010	<	0.73	?
TGRSE	12/2/97	11DCLE	BJBJ 009	<	0.73	?
TGRSE	1/6/98	11DCLE	BJJX 012	<	0.73	?
TGRSE	1/6/98	11DCLE	BJJX 013	<	0.73	D?
TGRSE	2/3/98	11DCLE	BJNK 007	<	0.73	D?
TGRSE	2/3/98	11DCLE	BJNK 006	<	0.73	?
TGRSE	3/3/98	11DCLE	BJQQ 006	<	0.73	D?
TGRSE	3/3/98	11DCLE	BJQQ 005	<	0.73	?
TGRSE	4/7/98	11DCLE	BJRN 008	<	0.73	?
TGRSE	4/7/98	11DCLE	BJRN 009	<	0.73	D?
TGRSE	5/5/98	11DCLE	BJVJ 005	<	0.73	?
TGRSE	5/5/98	11DCLE	BJVJ 006	<	0.73	D?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	6/2/98	11DCLE	BJWN 013	<	0.73	D?
TGRSE	6/2/98	11DCLE	BJWN 012	<	0.73	?
TGRSE	7/7/98	11DCLE	BJZW 008	<	0.73	
TGRSE	7/7/98	11DCLE	BJZW 009	<	0.73	D
TGRSE	9/1/98	11DCLE	BKHW 008	<	0.73	?
TGRSE	9/1/98	11DCLE	BKHW 009	<	0.73	D?
TGRSE	8/4/98	11DCLE	BKCX 005	<	0.73	?
TGRSE	8/4/98	11DCLE	BKCX 006	<	0.73	D?
TGRSE	10/7/97	12DCE	BHDG 010	<	0.76	D
TGRSE	10/7/97	12DCE	BHDG 009	<	0.76	
TGRSE	11/4/97	12DCE	BHSV 006	<	0.76	D?
TGRSE	11/4/97	12DCE	BHSV 005	<	0.76	?
TGRSE	12/2/97	12DCE	BJBJ 009	<	0.76	?
TGRSE	12/2/97	12DCE	BJBJ 010	<	0.76	?
TGRSE	1/6/98	12DCE	BJJX 012	<	0.76	?
TGRSE	1/6/98	12DCE	BJJX 013	<	0.76	D?
TGRSE	2/3/98	12DCE	BJNK 007	<	0.76	D?
TGRSE	2/3/98	12DCE	BJNK 006	<	0.76	?
TGRSE	3/3/98	12DCE	BJQQ 006	<	0.76	D?
TGRSE	3/3/98	12DCE	BJQQ 005	<	0.76	?
TGRSE	4/7/98	12DCE	BJRN 008	<	0.76	?
TGRSE	4/7/98	12DCE	BJRN 009	<	0.76	D?
TGRSE	5/5/98	12DCE	BJVJ 006	<	0.76	D?
TGRSE	5/5/98	12DCE	BJVJ 005	<	0.76	?
TGRSE	6/2/98	12DCE	BJWN 013	<	0.76	D?
TGRSE	6/2/98	12DCE	BJWN 012	<	0.76	?
TGRSE	7/7/98	12DCE	BJZW 008	<	0.76	
TGRSE	7/7/98	12DCE	BJZW 009	<	0.76	D
TGRSE	9/1/98	12DCE	BKHW 008	<	0.76	?
TGRSE	9/1/98	12DCE	BKHW 009	<	0.76	D?
TGRSE	8/4/98	12DCE	BKCX 005	<	0.76	?
TGRSE	8/4/98	12DCE	BKCX 006	<	0.76	D?
TGRSE	10/7/97	12DCLE	BHDG 010	<	1.1	D
TGRSE	10/7/97	12DCLE	BHDG 009	<	1.1	
TGRSE	11/4/97	12DCLE	BHSV 006	<	1.1	D?
TGRSE	11/4/97	12DCLE	BHSV 005	<	1.1	?
TGRSE	12/2/97	12DCLE	BJBJ 010	<	1.1	?
TGRSE	12/2/97	12DCLE	BJBJ 009	<	1.1	?
TGRSE	1/6/98	12DCLE	BJJX 012	<	1.1	?
TGRSE	1/6/98	12DCLE	BJJX 013	<	1.1	D?
TGRSE	2/3/98	12DCLE	BJNK 006	<	1.1	?
TGRSE	2/3/98	12DCLE	BJNK 007	<	1.1	D?
TGRSE	3/3/98	12DCLE	BJQQ 006	<	1.1	D?
TGRSE	3/3/98	12DCLE	BJQQ 005	<	1.1	?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	4/7/98	12DCLE	BJRN 008	<	1.1	?
TGRSE	4/7/98	12DCLE	BJRN 009	<	1.1	D?
TGRSE	5/5/98	12DCLE	BJVJ 006	<	1.1	D?
TGRSE	5/5/98	12DCLE	BJVJ 005	<	1.1	?
TGRSE	6/2/98	12DCLE	BJWN 013	<	1.1	D?
TGRSE	6/2/98	12DCLE	BJWN 012	<	1.1	?
TGRSE	7/7/98	12DCLE	BJZW 008	<	1.1	
TGRSE	7/7/98	12DCLE	BJZW 009	<	1.1	D
TGRSE	9/1/98	12DCLE	BKHW 008	<	1.1	?
TGRSE	9/1/98	12DCLE	BKHW 009	<	1.1	D?
TGRSE	8/4/98	12DCLE	BKCX 005	<	1.1	?
TGRSE	8/4/98	12DCLE	BKCX 006	<	1.1	D?
TGRSE	10/7/97	12DCLP	BHDG 009	<	1	T
TGRSE	10/7/97	12DCLP	BHDG 010	<	1	TD
TGRSE	11/4/97	12DCLP	BHSV 006	<	1	DT?
TGRSE	11/4/97	12DCLP	BHSV 005	<	1	T?
TGRSE	12/2/97	12DCLP	BJBJ 010	<	1	T?
TGRSE	12/2/97	12DCLP	BJBJ 009	<	1	T?
TGRSE	1/6/98	12DCLP	BJJX 012	<	1	T?
TGRSE	1/6/98	12DCLP	BJJX 013	<	1	DT?
TGRSE	2/3/98	12DCLP	BJNK 007	<	1	DT?
TGRSE	2/3/98	12DCLP	BJNK 006	<	1	T?
TGRSE	3/3/98	12DCLP	BJQQ 006	<	1	DT?
TGRSE	3/3/98	12DCLP	BJQQ 005	<	1	T?
TGRSE	4/7/98	12DCLP	BJRN 008	<	1	T?
TGRSE	4/7/98	12DCLP	BJRN 009	<	1	DT?
TGRSE	5/5/98	12DCLP	BJVJ 006	<	1	DT?
TGRSE	5/5/98	12DCLP	BJVJ 005	<	1	T?
TGRSE	6/2/98	12DCLP	BJWN 013	<	1	DT?
TGRSE	6/2/98	12DCLP	BJWN 012	<	1	T?
TGRSE	7/7/98	12DCLP	BJZW 008	<	1	T
TGRSE	7/7/98	12DCLP	BJZW 009	<	1	TD
TGRSE	9/1/98	12DCLP	BKHW 008	<	1	T?
TGRSE	9/1/98	12DCLP	BKHW 009	<	1	DT?
TGRSE	8/4/98	12DCLP	BKCX 005	<	1	T?
TGRSE	8/4/98	12DCLP	BKCX 006	<	1	T?
TGRSE	10/7/97	C2H3CL	BHDG 009	<	1.01	
TGRSE	10/7/97	C2H3CL	BHDG 010	<	1.01	D
TGRSE	11/4/97	C2H3CL	BHSV 006	<	1.01	D?
TGRSE	11/4/97	C2H3CL	BHSV 005	<	1.01	?
TGRSE	12/2/97	C2H3CL	BJBJ 010	<	1.01	?
TGRSE	12/2/97	C2H3CL	BJBJ 009	<	1.01	?
TGRSE	1/6/98	C2H3CL	BJJX 012	<	1.01	?
TGRSE	1/6/98	C2H3CL	BJJX 013	<	1.01	D?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
TGRSE	2/3/98	C2H3CL	BJNK 007	< 1.01	D?
TGRSE	2/3/98	C2H3CL	BJNK 006	< 1.01	?
TGRSE	3/3/98	C2H3CL	BJQQ 006	< 1.01	D?
TGRSE	3/3/98	C2H3CL	BJQQ 005	< 1.01	?
TGRSE	4/7/98	C2H3CL	BJRN 008	< 1.01	?
TGRSE	4/7/98	C2H3CL	BJRN 009	< 1.01	D?
TGRSE	5/5/98	C2H3CL	BJVJ 005	< 1.01	?
TGRSE	5/5/98	C2H3CL	BJVJ 006	< 1.01	D?
TGRSE	6/2/98	C2H3CL	BJWN 013	< 1.01	D?
TGRSE	6/2/98	C2H3CL	BJWN 012	< 1.01	?
TGRSE	7/7/98	C2H3CL	BJZW 008	< 1.01	
TGRSE	7/7/98	C2H3CL	BJZW 009	< 1.01	D
TGRSE	9/1/98	C2H3CL	BKHW 008	< 1.01	?
TGRSE	9/1/98	C2H3CL	BKHW 009	< 1.01	D?
TGRSE	8/4/98	C2H3CL	BKCX 005	< 1.01	?
TGRSE	8/4/98	C2H3CL	BKCX 006	< 1.01	D?
TGRSE	10/7/97	CCL4	BHDG 009	< 0.99	
TGRSE	10/7/97	CCL4	BHDG 010	< 0.99	D
TGRSE	11/4/97	CCL4	BHSV 006	< 0.99	D?
TGRSE	11/4/97	CCL4	BHSV 005	< 0.99	?
TGRSE	12/2/97	CCL4	BJBJ 010	< 0.99	?
TGRSE	12/2/97	CCL4	BJBJ 009	< 0.99	?
TGRSE	1/6/98	CCL4	BJJX 012	< 0.99	?
TGRSE	1/6/98	CCL4	BJJX 013	< 0.99	D?
TGRSE	2/3/98	CCL4	BJNK 007	< 0.99	D?
TGRSE	2/3/98	CCL4	BJNK 006	< 0.99	?
TGRSE	3/3/98	CCL4	BJQQ 006	< 0.99	D?
TGRSE	3/3/98	CCL4	BJQQ 005	< 0.99	?
TGRSE	4/7/98	CCL4	BJRN 008	< 0.99	?
TGRSE	4/7/98	CCL4	BJRN 009	< 0.99	D?
TGRSE	5/5/98	CCL4	BJVJ 006	< 0.99	D?
TGRSE	5/5/98	CCL4	BJVJ 005	< 0.99	?
TGRSE	6/2/98	CCL4	BJWN 013	< 0.99	D?
TGRSE	6/2/98	CCL4	BJWN 012	< 0.99	?
TGRSE	7/7/98	CCL4	BJZW 008	< 0.99	
TGRSE	7/7/98	CCL4	BJZW 009	< 0.99	D
TGRSE	9/1/98	CCL4	BKHW 008	< 0.99	?
TGRSE	9/1/98	CCL4	BKHW 009	< 0.99	D?
TGRSE	8/4/98	CCL4	BKCX 005	< 0.99	?
TGRSE	8/4/98	CCL4	BKCX 006	< 0.99	D?
TGRSE	10/7/97	CH2CL2	BHDG 009	< 7.4	
TGRSE	10/7/97	CH2CL2	BHDG 010	< 7.4	D
TGRSE	11/4/97	CH2CL2	BHSV 006	< 7.4	D?
TGRSE	11/4/97	CH2CL2	BHSV 005	< 7.4	?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	12/2/97	CH2CL2	BJBJ 009	<	7.4	?
TGRSE	12/2/97	CH2CL2	BJBJ 010	<	7.4	?
TGRSE	1/6/98	CH2CL2	BJJX 012	<	7.4	?
TGRSE	1/6/98	CH2CL2	BJJX 013	<	7.4	D?
TGRSE	2/3/98	CH2CL2	BJNK 007	<	7.4	D?
TGRSE	2/3/98	CH2CL2	BJNK 006	<	7.4	?
TGRSE	3/3/98	CH2CL2	BJQQ 006	<	7.4	D?
TGRSE	3/3/98	CH2CL2	BJQQ 005	<	7.4	?
TGRSE	4/7/98	CH2CL2	BJRN 008	<	7.4	?
TGRSE	4/7/98	CH2CL2	BJRN 009	<	7.4	D?
TGRSE	5/5/98	CH2CL2	BJVJ 006	<	7.4	D?
TGRSE	5/5/98	CH2CL2	BJVJ 005	<	7.4	?
TGRSE	6/2/98	CH2CL2	BJWN 013	<	7.4	D?
TGRSE	6/2/98	CH2CL2	BJWN 012	<	7.4	?
TGRSE	7/7/98	CH2CL2	BJZW 008	<	7.4	
TGRSE	7/7/98	CH2CL2	BJZW 009	<	7.4	D
TGRSE	9/1/98	CH2CL2	BKHW 008	<	7.4	?
TGRSE	9/1/98	CH2CL2	BKHW 009	<	7.4	D?
TGRSE	8/4/98	CH2CL2	BKCX 005	<	7.4	?
TGRSE	8/4/98	CH2CL2	BKCX 006	<	7.4	D?
TGRSE	10/7/97	CHCL3	BHDG 010	<	0.5	D
TGRSE	10/7/97	CHCL3	BHDG 009	<	0.5	
TGRSE	11/4/97	CHCL3	BHSV 006	<	0.5	D?
TGRSE	11/4/97	CHCL3	BHSV 005	<	0.5	?
TGRSE	12/2/97	CHCL3	BJBJ 010	<	0.5	?
TGRSE	12/2/97	CHCL3	BJBJ 009	<	0.5	?
TGRSE	1/6/98	CHCL3	BJJX 012	<	0.5	?
TGRSE	1/6/98	CHCL3	BJJX 013	<	0.5	D?
TGRSE	2/3/98	CHCL3	BJNK 006	<	0.5	?
TGRSE	2/3/98	CHCL3	BJNK 007	<	0.5	D?
TGRSE	3/3/98	CHCL3	BJQQ 005	<	0.5	?
TGRSE	3/3/98	CHCL3	BJQQ 006	<	0.5	D?
TGRSE	4/7/98	CHCL3	BJRN 008	<	0.5	?
TGRSE	4/7/98	CHCL3	BJRN 009	<	0.5	D?
TGRSE	5/5/98	CHCL3	BJVJ 006	<	0.5	D?
TGRSE	5/5/98	CHCL3	BJVJ 005	<	0.5	?
TGRSE	6/2/98	CHCL3	BJWN 013	<	0.5	D?
TGRSE	6/2/98	CHCL3	BJWN 012	<	0.5	?
TGRSE	7/7/98	CHCL3	BJZW 008	<	0.5	
TGRSE	7/7/98	CHCL3	BJZW 009	<	0.5	D
TGRSE	9/1/98	CHCL3	BKHW 008	<	0.5	?
TGRSE	9/1/98	CHCL3	BKHW 009	<	0.5	D?
TGRSE	8/4/98	CHCL3	BKCX 005	<	0.5	?
TGRSE	8/4/98	CHCL3	BKCX 006	<	0.5	D?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	10/7/97	TCLEE	BHDG 010	<	0.75	D
TGRSE	10/7/97	TCLEE	BHDG 009	<	0.75	
TGRSE	11/4/97	TCLEE	BHSV 006	<	0.75	D?
TGRSE	11/4/97	TCLEE	BHSV 005	<	0.75	?
TGRSE	12/2/97	TCLEE	BJBJ 010	<	0.75	?
TGRSE	12/2/97	TCLEE	BJBJ 009	<	0.75	?
TGRSE	1/6/98	TCLEE	BJJX 012	<	0.75	?
TGRSE	1/6/98	TCLEE	BJJX 013	<	0.75	D?
TGRSE	2/3/98	TCLEE	BJNK 007	<	0.75	D?
TGRSE	2/3/98	TCLEE	BJNK 006	<	0.75	?
TGRSE	3/3/98	TCLEE	BJQQ 006	<	0.75	D?
TGRSE	3/3/98	TCLEE	BJQQ 005	<	0.75	?
TGRSE	4/7/98	TCLEE	BJRN 008	<	0.75	?
TGRSE	4/7/98	TCLEE	BJRN 009	<	0.75	D?
TGRSE	5/5/98	TCLEE	BJVJ 005	<	0.75	?
TGRSE	5/5/98	TCLEE	BJVJ 006	<	0.75	D?
TGRSE	6/2/98	TCLEE	BJWN 013	<	0.75	D?
TGRSE	6/2/98	TCLEE	BJWN 012	<	0.75	?
TGRSE	7/7/98	TCLEE	BJZW 008	<	0.75	
TGRSE	7/7/98	TCLEE	BJZW 009	<	0.75	D
TGRSE	9/1/98	TCLEE	BKHW 008	<	0.75	?
TGRSE	9/1/98	TCLEE	BKHW 009	<	0.75	D?
TGRSE	8/4/98	TCLEE	BKCX 005	<	0.75	?
TGRSE	8/4/98	TCLEE	BKCX 006	<	0.75	D?
TGRSE	10/7/97	TCLTFE	BHDG 010	<	1	TD
TGRSE	10/7/97	TCLTFE	BHDG 009	<	1	T
TGRSE	11/4/97	TCLTFE	BHSV 006	<	1	DT?
TGRSE	11/4/97	TCLTFE	BHSV 005	<	1	T?
TGRSE	12/2/97	TCLTFE	BJBJ 010	<	1	T?
TGRSE	12/2/97	TCLTFE	BJBJ 009	<	1	T?
TGRSE	1/6/98	TCLTFE	BJJX 012	<	1	T?
TGRSE	1/6/98	TCLTFE	BJJX 013	<	1	DT?
TGRSE	2/3/98	TCLTFE	BJNK 007	<	1	DT?
TGRSE	2/3/98	TCLTFE	BJNK 006	<	1	T?
TGRSE	3/3/98	TCLTFE	BJQQ 006	<	1	DT?
TGRSE	3/3/98	TCLTFE	BJQQ 005	<	1	T?
TGRSE	4/7/98	TCLTFE	BJRN 008	<	1	T?
TGRSE	4/7/98	TCLTFE	BJRN 009	<	1	DT?
TGRSE	5/5/98	TCLTFE	BJVJ 006	<	1	DT?
TGRSE	5/5/98	TCLTFE	BJVJ 005	<	1	T?
TGRSE	6/2/98	TCLTFE	BJWN 013	<	1	DT?
TGRSE	6/2/98	TCLTFE	BJWN 012	<	1	T?
TGRSE	7/7/98	TCLTFE	BJZW 008	<	1	T
TGRSE	7/7/98	TCLTFE	BJZW 009	<	1	TD

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSE	9/1/98	TCLTFE	BKHW 008	<	1	T?
TGRSE	9/1/98	TCLTFE	BKHW 009	<	1	DT?
TGRSE	8/4/98	TCLTFE	BKCX 005	<	1	T?
TGRSE	8/4/98	TCLTFE	BKCX 006	<	1	T?
TGRSE	10/7/97	TRCLE	BHDG 010	<	0.56	D
TGRSE	10/7/97	TRCLE	BHDG 009	<	0.56	
TGRSE	11/4/97	TRCLE	BHSV 006	<	0.56	D?
TGRSE	11/4/97	TRCLE	BHSV 005	<	0.56	?
TGRSE	12/2/97	TRCLE	BJBJ 009	<	0.56	?
TGRSE	12/2/97	TRCLE	BJBJ 010	<	0.56	?
TGRSE	1/6/98	TRCLE	BJJX 012	<	0.56	?
TGRSE	1/6/98	TRCLE	BJJX 013	<	0.56	D?
TGRSE	2/3/98	TRCLE	BJNK 007	<	0.56	D?
TGRSE	2/3/98	TRCLE	BJNK 006	<	0.56	?
TGRSE	3/3/98	TRCLE	BJQQ 006	<	0.56	D?
TGRSE	3/3/98	TRCLE	BJQQ 005	<	0.56	?
TGRSE	4/7/98	TRCLE	BJRN 008	<	0.56	?
TGRSE	4/7/98	TRCLE	BJRN 009	<	0.56	D?
TGRSE	5/5/98	TRCLE	BJVJ 006	<	0.56	D?
TGRSE	5/5/98	TRCLE	BJVJ 005	<	0.56	?
TGRSE	6/2/98	TRCLE	BJWN 013	<	0.56	D?
TGRSE	6/2/98	TRCLE	BJWN 012	<	0.56	?
TGRSE	7/7/98	TRCLE	BJZW 008	<	0.56	
TGRSE	7/7/98	TRCLE	BJZW 009	<	0.56	D
TGRSE	9/1/98	TRCLE	BKHW 008	<	0.56	?
TGRSE	9/1/98	TRCLE	BKHW 009	<	0.56	D?
TGRSE	8/4/98	TRCLE	BKCX 005	<	0.56	?
TGRSE	8/4/98	TRCLE	BKCX 006	<	0.56	D?
TGRSI	10/7/97	111TCE	BHDG 011		111	
TGRSI	11/4/97	111TCE	BHSV 007		113	?
TGRSI	12/2/97	111TCE	BJBJ 011		92.7	?
TGRSI	1/6/98	111TCE	BJJX 014		127	?
TGRSI	2/3/98	111TCE	BJNK 005		58.3	?
TGRSI	3/3/98	111TCE	BJQQ 007	<	0.76	?
TGRSI	4/7/98	111TCE	BJRN 010		111	?
TGRSI	5/5/98	111TCE	BJVJ 007		88.3	?
TGRSI	6/2/98	111TCE	BJWN 014		87.2	?
TGRSI	7/7/98	111TCE	BJZW 010		115	
TGRSI	9/1/98	111TCE	BKHW 010		75.2	?
TGRSI	8/4/98	111TCE	BKCX 007		108	?
TGRSI	10/7/97	112TCE	BHDG 011	<	0.78	
TGRSI	11/4/97	112TCE	BHSV 007	<	0.78	?
TGRSI	12/2/97	112TCE	BJBJ 011	<	0.78	?
TGRSI	1/6/98	112TCE	BJJX 014	<	0.78	?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
TGRSI	2/3/98	112TCE	BJNK 005	< 0.78	?
TGRSI	3/3/98	112TCE	BJQQ 007	< 0.78	?
TGRSI	4/7/98	112TCE	BJRN 010	< 0.78	?
TGRSI	5/5/98	112TCE	BJVJ 007	< 0.78	?
TGRSI	6/2/98	112TCE	BJWN 014	< 0.78	?
TGRSI	7/7/98	112TCE	BJZW 010	< 0.78	
TGRSI	9/1/98	112TCE	BKHW 010	< 0.78	?
TGRSI	8/4/98	112TCE	BKCX 007	< 0.78	?
TGRSI	10/7/97	11DCE	BHDG 011	14.5	
TGRSI	11/4/97	11DCE	BHSV 007	15.8	?
TGRSI	12/2/97	11DCE	BJBJ 011	13.8	?
TGRSI	1/6/98	11DCE	BJJX 014	21	?
TGRSI	2/3/98	11DCE	BJNK 005	23.6	?
TGRSI	3/3/98	11DCE	BJQQ 007	11.5	?
TGRSI	4/7/98	11DCE	BJRN 010	17.3	?
TGRSI	5/5/98	11DCE	BJVJ 007	13.6	?
TGRSI	6/2/98	11DCE	BJWN 014	13.5	?
TGRSI	7/7/98	11DCE	BJZW 010	19.7	
TGRSI	9/1/98	11DCE	BKHW 010	9.96	?
TGRSI	8/4/98	11DCE	BKCX 007	22.1	?
TGRSI	10/7/97	11DCLE	BHDG 011	15.3	
TGRSI	11/4/97	11DCLE	BHSV 007	16.6	?
TGRSI	12/2/97	11DCLE	BJBJ 011	14.7	?
TGRSI	1/6/98	11DCLE	BJJX 014	18.4	?
TGRSI	2/3/98	11DCLE	BJNK 005	20.1	?
TGRSI	3/3/98	11DCLE	BJQQ 007	13.3	?
TGRSI	4/7/98	11DCLE	BJRN 010	16.7	?
TGRSI	5/5/98	11DCLE	BJVJ 007	13.9	?
TGRSI	6/2/98	11DCLE	BJWN 014	12.2	?
TGRSI	7/7/98	11DCLE	BJZW 010	18.8	
TGRSI	9/1/98	11DCLE	BKHW 010	11.5	?
TGRSI	8/4/98	11DCLE	BKCX 007	17.9	?
TGRSI	10/7/97	12DCE	BHDG 011	9.22	
TGRSI	11/4/97	12DCE	BHSV 007	9.73	?
TGRSI	12/2/97	12DCE	BJBJ 011	8.71	?
TGRSI	1/6/98	12DCE	BJJX 014	9.17	?
TGRSI	2/3/98	12DCE	BJNK 005	16	?
TGRSI	3/3/98	12DCE	BJQQ 007	7.74	?
TGRSI	4/7/98	12DCE	BJRN 010	< 0.76	?
TGRSI	5/5/98	12DCE	BJVJ 007	7.61	?
TGRSI	6/2/98	12DCE	BJWN 014	9.16	?
TGRSI	7/7/98	12DCE	BJZW 010	10.5	
TGRSI	9/1/98	12DCE	BKHW 010	7.39	?
TGRSI	8/4/98	12DCE	BKCX 007	9.6	?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
TGRSI	10/7/97	12DCLE	BHDG 011	<	1.1	
TGRSI	11/4/97	12DCLE	BHSV 007	<	1.1	?
TGRSI	12/2/97	12DCLE	BJBJ 011		1.37	?
TGRSI	1/6/98	12DCLE	BJJX 014	<	1.1	?
TGRSI	2/3/98	12DCLE	BJNK 005	<	1.1	?
TGRSI	3/3/98	12DCLE	BJQQ 007	<	1.1	?
TGRSI	4/7/98	12DCLE	BJRN 010		10.7	?
TGRSI	5/5/98	12DCLE	BJVJ 007	<	1.1	?
TGRSI	6/2/98	12DCLE	BJWN 014	<	1.1	?
TGRSI	7/7/98	12DCLE	BJZW 010	<	1.1	
TGRSI	9/1/98	12DCLE	BKHW 010	<	1.1	?
TGRSI	8/4/98	12DCLE	BKCX 007	<	1.1	?
TGRSI	10/7/97	12DCLP	BHDG 011	<	1	T
TGRSI	11/4/97	12DCLP	BHSV 007	<	1	T?
TGRSI	12/2/97	12DCLP	BJBJ 011	<	1	T?
TGRSI	1/6/98	12DCLP	BJJX 014	<	1	T?
TGRSI	2/3/98	12DCLP	BJNK 005	<	1	T?
TGRSI	3/3/98	12DCLP	BJQQ 007	<	1	T?
TGRSI	4/7/98	12DCLP	BJRN 010	<	1	T?
TGRSI	5/5/98	12DCLP	BJVJ 007	<	1	T?
TGRSI	6/2/98	12DCLP	BJWN 014	<	1	T?
TGRSI	7/7/98	12DCLP	BJZW 010	<	1	T
TGRSI	9/1/98	12DCLP	BKHW 010	<	1	T?
TGRSI	8/4/98	12DCLP	BKCX 007	<	1	T?
TGRSI	10/7/97	C2H3CL	BHDG 011	<	1.01	
TGRSI	11/4/97	C2H3CL	BHSV 007	<	1.01	?
TGRSI	12/2/97	C2H3CL	BJBJ 011	<	1.01	?
TGRSI	1/6/98	C2H3CL	BJJX 014	<	1.01	?
TGRSI	2/3/98	C2H3CL	BJNK 005	<	1.01	?
TGRSI	3/3/98	C2H3CL	BJQQ 007	<	1.01	?
TGRSI	4/7/98	C2H3CL	BJRN 010	<	1.01	?
TGRSI	5/5/98	C2H3CL	BJVJ 007	<	1.01	?
TGRSI	6/2/98	C2H3CL	BJWN 014	<	1.01	?
TGRSI	7/7/98	C2H3CL	BJZW 010	<	1.01	
TGRSI	9/1/98	C2H3CL	BKHW 010	<	1.01	?
TGRSI	8/4/98	C2H3CL	BKCX 007	<	1.01	?
TGRSI	10/7/97	CCL4	BHDG 011	<	0.99	
TGRSI	11/4/97	CCL4	BHSV 007	<	0.99	?
TGRSI	12/2/97	CCL4	BJBJ 011	<	0.99	?
TGRSI	1/6/98	CCL4	BJJX 014	<	0.99	?
TGRSI	2/3/98	CCL4	BJNK 005	<	0.99	?
TGRSI	3/3/98	CCL4	BJQQ 007		83.8	?
TGRSI	4/7/98	CCL4	BJRN 010	<	0.99	?
TGRSI	5/5/98	CCL4	BJVJ 007	<	0.99	?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
TGRSI	6/2/98	CCL4	BJWN 014	< 0.99	?
TGRSI	7/7/98	CCL4	BJZW 010	< 0.99	
TGRSI	9/1/98	CCL4	BKHW 010	< 0.99	?
TGRSI	8/4/98	CCL4	BKCX 007	< 0.99	?
TGRSI	10/7/97	CH2CL2	BHDG 011	< 7.4	
TGRSI	11/4/97	CH2CL2	BHSV 007	< 7.4	?
TGRSI	12/2/97	CH2CL2	BJBJ 011	< 7.4	?
TGRSI	1/6/98	CH2CL2	BJJX 014	< 7.4	?
TGRSI	2/3/98	CH2CL2	BJNK 005	< 7.4	?
TGRSI	3/3/98	CH2CL2	BJQQ 007	< 7.4	?
TGRSI	4/7/98	CH2CL2	BJRN 010	< 7.4	?
TGRSI	5/5/98	CH2CL2	BJVJ 007	< 7.4	?
TGRSI	6/2/98	CH2CL2	BJWN 014	< 7.4	?
TGRSI	7/7/98	CH2CL2	BJZW 010	< 7.4	
TGRSI	9/1/98	CH2CL2	BKHW 010	< 7.4	?
TGRSI	8/4/98	CH2CL2	BKCX 007	< 7.4	?
TGRSI	10/7/97	CHCL3	BHDG 011	< 0.5	
TGRSI	11/4/97	CHCL3	BHSV 007	0.585	?
TGRSI	12/2/97	CHCL3	BJBJ 011	< 0.5	?
TGRSI	1/6/98	CHCL3	BJJX 014	< 0.5	?
TGRSI	2/3/98	CHCL3	BJNK 005	< 0.5	?
TGRSI	3/3/98	CHCL3	BJQQ 007	< 0.5	?
TGRSI	4/7/98	CHCL3	BJRN 010	< 0.5	?
TGRSI	5/5/98	CHCL3	BJVJ 007	< 0.5	?
TGRSI	6/2/98	CHCL3	BJWN 014	< 0.5	?
TGRSI	7/7/98	CHCL3	BJZW 010	< 0.5	
TGRSI	9/1/98	CHCL3	BKHW 010	< 0.5	?
TGRSI	8/4/98	CHCL3	BKCX 007	< 0.5	?
TGRSI	10/7/97	TCLEE	BHDG 011	< 0.75	
TGRSI	11/4/97	TCLEE	BHSV 007	0.824	?
TGRSI	12/2/97	TCLEE	BJBJ 011	< 0.75	?
TGRSI	1/6/98	TCLEE	BJJX 014	< 0.75	?
TGRSI	2/3/98	TCLEE	BJNK 005	< 0.75	?
TGRSI	3/3/98	TCLEE	BJQQ 007	< 0.75	?
TGRSI	4/7/98	TCLEE	BJRN 010	0.852	?
TGRSI	5/5/98	TCLEE	BJVJ 007	< 0.75	?
TGRSI	6/2/98	TCLEE	BJWN 014	< 0.75	?
TGRSI	7/7/98	TCLEE	BJZW 010	< 0.75	
TGRSI	9/1/98	TCLEE	BKHW 010	< 0.75	?
TGRSI	8/4/98	TCLEE	BKCX 007	< 0.75	?
TGRSI	10/7/97	TCLTFE	BHDG 011	< 1	T
TGRSI	11/4/97	TCLTFE	BHSV 007	1.21	Z?
TGRSI	12/2/97	TCLTFE	BJBJ 011	< 1	T?
TGRSI	1/6/98	TCLTFE	BJJX 014	1.52	Z?

APPENDIX I.2

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
TGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
TGRSI	2/3/98	TCLTFE	BJNK 005	< 1	T?
TGRSI	3/3/98	TCLTFE	BJQQ 007	< 1	T?
TGRSI	4/7/98	TCLTFE	BJRN 010	< 1	T?
TGRSI	5/5/98	TCLTFE	BJVJ 007	< 1	T?
TGRSI	6/2/98	TCLTFE	BJWN 014	< 1	T?
TGRSI	7/7/98	TCLTFE	BJZW 010	< 1	T
TGRSI	9/1/98	TCLTFE	BKHW 010	< 1	T?
TGRSI	8/4/98	TCLTFE	BKCX 007	< 1	T?
TGRSI	10/7/97	TRCLE	BHDG 011	450	
TGRSI	11/4/97	TRCLE	BHSV 007	450	?
TGRSI	12/2/97	TRCLE	BJBJ 011	420	?
TGRSI	1/6/98	TRCLE	BJJX 014	570	?
TGRSI	2/3/98	TRCLE	BJNK 005	410	?
TGRSI	3/3/98	TRCLE	BJQQ 007	420	?
TGRSI	4/7/98	TRCLE	BJRN 010	530	?
TGRSI	5/5/98	TRCLE	BJVJ 007	430	?
TGRSI	6/2/98	TRCLE	BJWN 014	430	?
TGRSI	7/7/98	TRCLE	BJZW 010	540	
TGRSI	9/1/98	TRCLE	BKHW 010	390	?
TGRSI	8/4/98	TRCLE	BKCX 007	490	?

Notes:

Concentrations in µg/L.
See Appendix D.2 for chemical abbreviation cross references.

? Control chart not yet approved by USAEC.
D Duplicate analysis.
T Non-target compound analyzed for but not detected (non-GS/MS methods)
Z Non -target compound analyzed for and detected (non-GC/MS methods)

APPENDIX J

Appendix J

TGRS Operational Data and Site K Operational Data

J.1 Fiscal Year 1998 Inspection and Maintenance Activities TGRS, TCAAP

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

October 1997	Notes:
10/2/97	Treatment Center, Pumphouses B1-B11, SC1-3 and SC5: Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
10/13/97	Pumphouse B2: Flow rate was adjusted up. Down time: 0.0 hour
10/16/97	Treatment Center: Potable water supply piping for ECV #1 and #2 was repaired to stop it from leaking. Down time: 0.0 hour
10/27/97	Treatment Center: Potable water supply piping for ECV #1 and #2 was replaced, as the repairs were unsuccessful. Down time: 0.0 hour
10/29/97	Pumphouse SC-2: Pumphouse was shut down to clean the flowmeter assembly. Down time: 0.5 hour
10/29/98	Pumphouse B8: Neptune flowmeter cover plate was leaking and the gasket was replaced. Down time: 0.5 hour
November 1997	**Notes:**
11/15/98	Pumphouse B8: Flowrate had fallen and was adjusted up. Down time: 0.0 hour
11/20/98	Treatment Center: Blower #2 had broken the drive belt which was replaced. Down time: 0.0 hour
11/20-24/98	Pumphouse B11: Pump was pulled and replaced using the existing motor. Down time: 105.0 hour
11/25/98	Pumphouse B11: Flowmeter assembly had failed and was replaced. Down time: 0.5 hour
11/25/98	Pumphouse SC3: Pump was pulled and replaced using existing motor. Down time: 10.5 hour
11/27/98	Daily Inspection was not done due to the Thanksgiving Holiday. Down time: 0.0 hour
December 1997	**Notes:**
12/10/97	Pumphouse B11: Flowrate was too high and was adjusted down. Down time: 0.0 hour
12/11/97	Pumphouse B2: Flowrate had fallen and was adjusted up. Down time: 0.0 hour
12/15/97	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses shut down and restarted for unknown reasons. Down time: 4.0 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

12/17/97	Treatment Center, Pumphouses B1-11, SC1-3 and SC-5: Pumphouses were shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
12/25/97	Daily inspection was not performed due to the Christmas Holiday. Down time: 0.0 hour
12/31/97	Pumphouse B1: During daily inspection, the pump was found to have failed. Down time: 26.0 hour
12/23-31/97	Pumphouse B9: Flowmeter was clogging during this period, these readings are inaccurate, the meter was replaced in January. Down time: 0.0 hour
January 1998	**Notes:**
1/1-5/98	Pumphouse B9: Flow meter had clogged and was replaced. Down time: 1.0 hour
1/1-6/98	Pumphouse B1: Pump had failed and was replaced. Down time: 144.0 hour
1/19/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV #4 had closed without command and was reset. Down time: 4.5 hour
1/28-31/98	Pumphouse SC2: Flow meter had clogged and was replaced. Down time: 0.5 hour
February 1998	**Notes:**
2/4/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/4/98	Move all inventory stored in Building 576 to Building 116. Down time: 0.0 hour
2/7/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

2/12/98	Pumphouse SC2: Pump and motor were pulled, the riser pipe cleaned, and a new pump and motor installed. Down time: 8.5 hour
2/17/98	Treatment Center, Pumphouses B1-B11, SC1-3 and SC5: ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/17/98	Pumphouse B3: Pump and motor were pulled and replaced. Down time: 7.5 hour
2/18/98	Treatment Center, Pumphouses B2, B3, B7, B10, B11 and SC1: ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	Treatment Center, Pumphouses B2, B3, B7, B10, B11 and SC1: ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
March 1998	**Notes:**
3/4/98	Treatment Center, Pumphouses B1-B11, SC1-3 and SC5: Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
3/13/98	Water tower: Trouble shoot data cable and complete required repairs. Down time: 0.0 hour
3/17/98	Altitude Valve: Replaced cartridge filter. Down time: 0.0 hour
3/30/98	Treatment Center: Blower #2 drive belt had failed and was replaced. Down time: 0.0 hour
April 1998	**Notes:**
4/11/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were without power due to undetermined work by NSP. Down time: 2.5 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

4/22-30/98	Pumphouse B4: ECV was malfunctioning causing reduced flow. Temporary repairs were performed on 04/30/98, after trouble shooting. Down time: 0.0 hour
May 1998	**Notes:**
5/15-19/98	Treatment Center, Pumphouses B1-6, B8-11, and SC-1: Electrical storm knocked out power to pump houses. Down time: 93.0 hour
5/19-28/98	Pumphouse B5: Pumphouse was shut down until the failed check valve could be repaired. Down time: 288.0 hour
5/22/98	Treatment Center, Pumphouse B1-11, SC1-3 and SC5: ECV #1 had closed without command and was reset. Down time: 4.5 hour
5/26/98	Treatment Center experienced a power spike triggering the alarm which was reset. Down time: 0.0 hour
5/30/98	Pumphouse B5: Computer communication was interrupted causing the well shut down. Down time: 44.0 hour
5/30/98	Treatment Center: Blower #2, blower belt was broken was replaced. Down time: 0.5 hour
June 1998	**Notes:**
5/30-6/2/98	Pumphouse B5: ECV control components (CRL and hytrol) were replaced. Down time: 58.0 hour
6/16/98	Altitude Valve: ATK-SEI reported valve problem. Valve was repaired. Down time: 0.0 hour
6/16/98	Data cable to the ground storage reservoir: Data cable splices had failed and were repaired. Down time: 0.0 hour
6/18/98	Annual electrical inspection repairs: Various locations were repaired after the inspection found trouble spots. Down time: 0.0 hour
6/23/98	Treatment Center: ECV #2 had closed without command and was reset. Down time: 1.0 hour
6/24/98	Treatment Center Pumphouses B1-11, SC1-3 and SC5: ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Pumphouses B1, B5, B7-9, B11, SC1-3 and SC5: Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/25-30/98	Pumphouse B2: Well was cycling due to decreasing pumping water level. Pumping rate was reduced to stop the pump cycling. Down time: 10.0 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

6/26-29/98	Pumphouses SC2, SC3, and SC5: Electrical storm knocked out power to the pumphouses. Down time: 68.0 hour
6/26/98	Pumphouse B4: Flowrate has decreased. Pump and well check valve are failing. Repairs are scheduled for July. Down time: 0.0 hour
6/30/98	Treatment Center, Pumphouse B1-11, SC1-3 and SC5: ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
6/30/98	Pumphouse SC5: Flowmeter had failed and was replaced. Down time: 1.0 hour
July 1998	**Notes:**
7/2/98	Pumphouse B4: Well check valve had developed a leak. Well check valve and pump were pulled and replaced. Down time: 9.5 hour
7/12-13/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	Treatment Center, Pumphouses B1-B11, SC1-3 and SC5: A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/16/98	Pumphouse B6: Pumphouse B6 had a failing disconnect switch which was replaced. Down time: 1.0 hour
7/16/98	Pumphouse B9: Pumphouse B9 had a failing starter coil which was replaced. Down time: 1.5 hour
7/20-22/98	Pumphouse SC2: Flowmeter had clogged with iron deposits and was replaced. New replacement flowmeter indicated a lower flow rate. Further repair may be required. Down time: 58.0 hour
7/23-24/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/24-27/98	Pumphouses SC2 and SC3: Flowmeter totalizers were exchanged as part of the annual preventive maintenance. Down time: 0.0 hour
7/24-27/98	Pumphouse SC2: Flange adapter compression gasket had failed and was repaired. Down time: 102.0 hour
7/27/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

7/28-31/98	Pumphouse B2: Flow rates have decreased and trouble shooting is proceeding. Well cleaning is anticipated. Down time: 2.0 hour
August 1998	**Notes:**
8/6-18/98	Pumphouse B9: Pumphouse B9 was shut down until the pump and check valve could be replaced.
8/10-12/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/21-24/98	Pumphouse SC2: Pumphouse was shut down to facilitate pump replacement and cleaning of the piping. Down time: 71.5 hour
8/27/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to facilitate piping changes in building 116. Down time: 6.0 hour
September 1998	**Notes:**
8/31-9/1/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Pumphouses were shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/7/98	Daily inspection was not performed due to the Labor Day Holiday. Down time: 0.0 hour
9/5-7/98	Pumphouse B2: Pumphouse was treated with acid to clean the riser piping and screen. Down time: 49.0 hour
9/12/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Building 116 had a power failure. Down time: 5.0 hour
9/15/98	Treatment Center: ECV #2 had closed without command and was reset. Down time: 0.5 hour

APPENDIX J.1

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
TGRS, TCAAP

9/16-22/98	Pumphouse B11: Flowmeter had failed and was replaced. Pump was running and flow is estimated for that time. Down time: 0.5 hour
9/19/98	Treatment Center: ECV #1 had closed without command and was reset. Down time: 0.5 hour
9/26-30/98	Pumphouse B4: Pump at pumphouse failed during quarterly maintenance. Down time: 96 hour
9/28-30/98	Treatment Center, Pumphouses B2-3, B7-11, SC1 and SC5: Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

J.2 1998 Events, TGRS, TCAAP

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B1

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
12/31/97	During daily inspection, the pump was found to have failed. Down time: 26.0 hour
1/1-6/98	Pump had failed and was replaced. Down time: 144.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B1

5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B1

8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour

B2

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
10/13/97	Flow rate was adjusted up. Down time: 0.0 hour
12/11/97	Flowrate had fallen and was adjusted up. Down time: 0.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B2

2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25-30/98	Well was cycling due to decreasing pumping water level. Pumping rate was reduced to stop the pump cycling. Down time: 10.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B2

7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
7/28-31/98	Pumphouse B2: Flow rates have decreased and trouble shooting is proceeding. Well cleaning is anticipated. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/5-7/98	Pumphouse was treated with acid to clean the riser piping and screen. Down time: 49.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/28-30/98	Treatment Center, Pumphouses B1-11, SC1-3 and SC5: Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

B3

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B3

12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/17/98	Pump and motor were pulled and replaced. Down time: 7.5 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B3

6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure in one phase, which shut power off. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B4

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
4/22-30/98	ECV was malfunctioning causing reduced flow. Temporary repairs were performed on 04/30/98, after trouble shooting. Down time: 0.0 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B4

5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/26/98	Flowrate has decreased. Pump and well check valve are failing. Repairs are scheduled for July. Down time: 0.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/2/98	Well check valve had developed a leak. Well check valve and pump were pulled and replaced. Down time: 9.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B4

8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/26-30/98	Pump failed during quarterly preventive maintenance. Down time: 96 hour

B5

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B5

4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/19-28/98	Pumphouse was shut down until the failed check valve could be repaired. Down time: 288.0 hour
5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
5/30/98	Computer communication was interrupted causing the well shut down. Down time: 44.0 hour
5/30-6/2/98	ECV control components (CRL and hytrol) were replaced. Down time: 58.0 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B5

8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour

B6

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B6

2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	Pumphouse B6 had a failing disconnect switch which was replaced. Down time: 1.0 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B6

7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour

B7

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B7

2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B7

7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

B8

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
10/29/98	Neptune flowmeter cover plate was leaking and the gasket was replaced. Down time: 0.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B8

11/15/98	Flowrate had fallen and was adjusted up. Down time: 0.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B8

6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B8

9/12/98	Building 116 had a power failure in one phase, which shut power off. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

B9

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
12/23-31/97	Flowmeter was clogging during this period, these readings are inaccurate, the meter was replaced in January. Down time: 0.0 hour
1/1-5/98	Flow meter had clogged and was replaced. Down time: 1.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B9

4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/16/98	Pumphouse B9 had a failing starter coil which was replaced. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/6-18/98	Pumphouse B9 was shut down until the pump and check valve could be replaced. Down time: 296.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B9

8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure in one phase, which shut power off. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

B10

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B10

2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B10

7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 CLA-VAL was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed some additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

B11

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
11/20-24/98	Pump was pulled and replaced using the existing motor. Down time: 105.0 hour
11/25/98	Flowmeter assembly had failed and was replaced. Down time: 0.5 hour
12/10/97	Flowrate was too high and was adjusted down. Down time: 0.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B11

12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B11

5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 CLA-VAL was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed some additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

B11

8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure in one phase, which shut power off. Down time: 5.0 hour
9/16-22/98	Flowmeter had failed and was replaced. Pump was running and flow is estimated for that time. Down time: 0.5 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

SC1

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC1

3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to pumphouses. Down time: 93.0 hour
5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and tripped the circuit breaker on B1. Down time: 7.5 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC1

8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

SC2

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
10/29/97	Pumphouse was shut down to clean the flowmeter assembly. Down time: 0.5 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC2

1/28-31/98	Flow meter had clogged and was replaced. Down time: 0.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/12/98	Pump and motor were pulled, the riser pipe cleaned, and a new pump and motor installed. Down time: 8.5 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/22/98	Wet Well #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/26-29/98	Electrical storm knocked out power to the pumphouses. Down time: 68.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour

APPENDIX J.2

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SC2

7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/20-22/98	Flowmeter had clogged with iron deposits and was replaced. New replacement flowmeter indicated a lower flow rate. Further repair may be required. Down time: 58.0 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/24-27/98	Flowmeter totalizers were exchanged as part of the annual preventive maintenance. Down time: 0.0 hour
7/24-27/98	Flange adapter compression gasket had failed and was repaired. Down time: 102.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/21-24/98	Pumphouse was shut down to facilitate pump replacement and cleaning of the piping. Down time: 71.5 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure in one phase, which shut power off. Down time: 5.0 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC2

9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

SC3

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
11/25/98	Pump was pulled and replaced using existing motor. Down time: 10.5 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse was shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour

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FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC3

4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/26-29/98	Electrical storm knocked out power to the pumphouses. Down time: 68.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/24-27/98	Flowmeter totalizers were exchanged as part of the annual preventive maintenance. Down time: 0.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC3

8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour

SC5

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
12/15/97	Pumphouse shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Pumphouse shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Pumphouse shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Pumphouse shut down to inspect float switches in wet wells. Down time: 1.0 hour
1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Pumphouse shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
4/11/98	Pumphouse shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC5

4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Pumphouse was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Pumphouse was without power due to undetermined work by NSP. Down time: 2.5 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/25/98	Electrical storm the night before had caused temporary power outages and also tripped the circuit breaker on B1. Down time: 7.5 hour
6/26-29/98	Electrical storm knocked out power to the pumphouse. Down time: 68.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
6/30/98	Flowmeter had failed and was replaced. Down time: 1.0 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Pumphouse was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Pumphouse was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Pumphouse was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

SC5

8/17/98	Pumphouse was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Pumphouse was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Building 116 had a power failure. Down time: 5.0 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

TREATMENT CENTER

10/2/97	Wet well pump motors were shut down to change the oil. Down time: 1.0 hour
10/16/97	Potable water supply piping for ECV #1 and #2 was repaired to stop it from leaking. Down time: 0.0 hour
10/27/97	Potable water supply piping for ECV #1 and #2 was replaced, as the repairs were unsuccessful. Down time: 0.0 hour
11/20/98	Blower #2 had broken the drive belt which was replaced. Down time: 0.0 hour
12/15/97	Treatment Center shut down and restarted for unknown reasons. Down time: 4.0 hour
12/17/97	Treatment Center shut down to facilitate repair and modification of the altitude control valve. Down time: 5.5 hour
12/18/97	Treatment Center shut down to facilitate repair and modification of the altitude control valve. Down time: 11.5 hour
12/23/97	Treatment Center shut down to facilitate reconfiguration of the altitude control valve controls. Down time: 5.0 hour
1/19/98	Treatment Center shut down to inspect float switches in wet wells. Down time: 1.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

TREATMENT CENTER

1/27/98	ECV #4 had closed without command and was reset. Down time: 4.5 hour
2/4/98	Treatment Center shut down to allow as installed measurements of wet well pump float switches. Down time: 1.0 hour
2/7/98	ECV #1 and ECV #4 closed without command causing the well field to cycle. Down time: 2.0 hour
2/17/98	ECV #3 closed without command causing the well field to cycle. Down time: 1.0 hour
2/18/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 15.0 hour
2/19/98	ECV #3 was shut down for repairs. Pumphouses were shut down to prevent well field cycling. Down time: 16.0 hour
3/4/98	Flowmeter for wet well #1 had failed and was replaced. Down time: 1.0 hour
3/30/98	Blower #2 drive belt had failed and was replaced. Down time: 0.0 hour
4/11/98	Treatment Center shut down due to power outage at Building 116. Down time: 7.5 hour
4/15/98	ECV #2 had closed without command, and was reset. Down time: 2.0 hour
4/18/98	ECV #2 had closed without command, and was reset. Down time: 1.0 hour
4/22/98	Treatment Center was without power due to undetermined work by NSP. Down time: 4.5 hour
4/24/98	Treatment Center was without power due to undetermined work by NSP. Down time: 2.5 hour
5/15-19/98	Electrical storm knocked out power to treatment center. Down time: 93.0 hour
5/22/98	ECV #1 had closed without command and was reset. Down time: 4.5 hour
5/26/98	Treatment Center experienced a power spike triggering the alarm which was reset. Down time: 0.0 hour
5/30/98	Blower #2, blower belt was broken was replaced. Down time: 0.5 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

TREATMENT CENTER

6/23/98	ECV #2 had closed without command and was reset. Down time: 1.0 hour
6/24/98	ECV #2 had closed without command and was reset. Down time: 6.0 hour
6/30/98	ECV #2 had closed without command causing the well field to cycle. Down time: 6.5 hour
7/12-13/98	Wet Well Pump No. 1 heater (a type of fusing) had tripped and was reset, and the pump restarted. Down time: 28.5 hour
7/16/98	A downed power line interrupted electrical service to the TGRS. NSP repaired line and the TGRS was restarted. Down time: 1.5 hour
7/23-24/98	Treatment Center was shut down for performance of a portion of the annual preventative maintenance. Down time: 22.5 hour
7/24/98	Treatment Center was shut down for performance of a portion of the annual preventative maintenance. Down time: 6.0 hour
7/27/98	Treatment Center was shut down for performance of a portion of the annual maintenance inspection. Down time: 2.0 hour
8/10-12/98	Treatment Center was shut down for forcemain repairs. Down time: 37.0 hour
8/14/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
8/17/98	Treatment Center was shut down to facilitate the completion of repairs to the forcemain. Down time: 2.0 hour
8/20-21/98	ECV#2 was malfunctioning and was repaired. Down time: 16.0 hour
8/27/98	ECV#2 needed additional repairs and the treatment center was shut down to facilitate the repairs. Down time: 3.0 hour
8/31/98	Treatment Center was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
8/31-9/1/98	Treatment Center was shut down to facilitate piping changes in building 116. Down time: 6.0 hour
9/12/98	Treatment Center had a power failure. Down time: 5.0 hour

APPENDIX J.2

FISCAL YEAR 1998 EVENTS
TGRS, TCAAP

TREATMENT CENTER

9/15/98	ECV #2 had closed without command and was reset. Down time: 0.5 hour
9/19/98	ECV #1 had closed without command and was reset. Down time: 0.5 hour
9/28-30/98	Wet Well #1 failed on startup after maintenance work. Down time: 48 hour

J.3 Fiscal Year 1998 Inspection and Maintenance Activities Site K, TCAAP

APPENDIX J.3

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
SITE K, TCAAP

October 1997	**Notes:**
10/22/97	Tower packing changed out and distribution nozzle cleaned. Down time: 6.0 hours.
10/24/97	Influent line flushed to remove iron precipitate. Down time: 4.0 hours.
December 1997	**Notes:**
12/9/97	Tower packing changed out and distribution nozzle cleaned. Down time: 21.5 hours
12/11/97	Cracked blower belt replaced Down time: 0.5 hour
February 1998	**Notes:**
2/11/98	Tower packing changed out and distribution nozzle cleaned. Influent line flushed to remove iron precipitate. Down time: 5 hours.
March 1998	**Notes:**
3/20/98	Threaded plug on above-ground influent line was replaced to remedy a minor leak (drip). Down time: 0.17 hours.
April 1998	**Notes:**
4/1/98	Tower packing changed out. Pump in untreated groundwater collection manhole cleaned to remove iron precipitate. Down time: 6.5 hours

APPENDIX J.3

FISCAL YEAR 1998 INSPECTION AND MAINTENANCE ACTIVITIES
SITE K, TCAAP

May 1998	**Notes:**
5/19/98	Tower packing changed. Influent line flushed to remove iron precipitate. Down time: 30 hours.
July 1998	**Notes:**
7/6/98	Tower packing changed out and distribution nozzle cleaned. Treatment system sump pump, influent piping, air stripper sump, and discharge pipe cleaned. Down time: 14.5 hours.
August 1998	**Notes:**
8/10/98	Tower packing changed out and distribution nozzle cleaned. Influent line piping flushed to remove iron precipitate. Down time: 48 hours
8/24/98	Influent line coupling tightened due to detected leak. Down time: 0.25 hour
8/26/98	Two couplings on influent line were replaced Down time: 0.3 hour
September 1998	**Notes:**
9/3/98	Two couplings on influent line were replaced Down time: 0.5 hour
9/16/98	Tower packing changed out and blower belt was replaced Down time: 46 hours.

APPENDIX K

Appendix K

PGRS Hydraulic, Operational and Chemical Data

K.1 Historical Groundwater Elevations (FT. AMSL) PGRS, TCAAP

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*3/30/94*	*3/31/94*	*4/10/94*	*4/17/94*	*4/18/94 (AM)*	*4/18/94 (noon)*
03U673	897.84	843.91	844.33	844.11	843.94	844.70	844.74
03L673	898.44	843.01	843.37	843.15	842.99	843.94	843.95
04U673	898.34	843.16	843.54	843.32	843.16	844.13	844.13
03U832	886.82	834.71	835.06	834.98	835.03	835.52	835.54
03L832	886.85	834.58	834.90	834.89	834.95	835.40	835.42
04U832	885.31	834.45	834.74	834.79	835.29	835.29	835.29
03L841	911.91	842.37	842.76	842.53	842.26	843.29	843.31
04U841	912.47	842.56	842.91	842.70	842.45	843.50	843.52
04U844	886.74	834.39	834.72	834.69	834.76	835.23	835.24
04U845	894.91	--	836.46	836.43	836.43	836.99	836.98
03L846	888.54	--	--	--	832.63	832.95	832.89
04U846	889.46	831.87	831.96	832.13	832.31	832.56	832.06
03M848	904.12	840.95	841.39	841.15	841.02	841.77	841.80
03L848	903.91	841.44	841.84	841.61	841.47	842.28	842.30
04U848	903.92	842.18	842.57	842.37	842.18	843.11	843.15
04U851	914.51	831.29	831.38	831.63	831.81	832.05	831.69
04U852	905.66	829.18	829.28	829.61	829.76	830.03	829.71
03L854	892.41	838.39	838.88	838.58	838.55	839.16	839.19
04U854	891.95	834.73	835.14	835.20	835.27	835.66	835.71
03L859	903.55	838.96	839.48	839.16	839.08	839.77	839.79
04U859	903.73	841.83	842.22	841.98	841.81	842.75	842.78
03L860	896.79	838.65	839.10	838.83	838.81	839.43	839.45
04U860	896.61	834.70	835.04	835.11	835.18	835.61	835.61
03L861	891.35	836.95	837.47	837.18	837.15	837.77	837.80
04U861	890.91	834.90	835.25	835.28	835.31	835.77	835.76
04U863	895.33	834.31	834.59	834.67	834.79	835.13	835.13
04U864	908.67	832.60	832.70	832.91	833.07	833.25	832.07
04J864	908.79	827.76	828.03	828.45	829.15	829.53	829.42
04U865	915.60	833.15	833.30	833.45	833.63	833.83	832.46
04U866	910.60	831.97	832.05	832.27	832.44	832.60	831.25
04J866	910.69	828.46	828.73	829.14	829.87	830.19	830.07
04U877	923.08	831.31	831.30	831.57	831.77	831.95	831.53
MPCA1L3	898.25	--	838.03	837.71	837.65	838.30	838.35
MPCA1U4	898.60	--	836.33	836.18	836.13	836.74	836.75
MPCA2L3	872.05	--	833.60	833.59	833.68	834.10	833.95
MPCA2U4	872.19	--	832.71	832.78	832.93	833.29	832.99
414U4	893.95	834.05	834.33	834.45	834.61	834.94	834.85
MW15H	911.52	--	834.81	834.67	834.77	835.28	835.27
NB WELL 13	914.66	--	--	--	--	--	820.66

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*4/18/94 (PM)*	*4/19/94*	*4/20/94*	*4/21/94*	*4/22/94*	*4/25/94*
03U673	897.84	844.74	844.10	844.00	844.04	844.13	844.67
03L673	898.44	843.86	843.12	843.09	843.09	843.17	843.58
04U673	898.34	844.04	843.29	843.27	843.26	843.34	843.73
03U832	886.82	835.43	834.87	834.98	835.08	835.17	835.37
03L832	886.85	835.27	834.71	834.85	834.99	835.07	835.24
04U832	885.31	835.11	834.59	834.74	834.89	834.98	835.12
03L841	911.91	843.21	842.42	842.39	842.39	842.50	842.90
04U841	912.47	843.42	842.59	842.59	842.56	842.67	843.03
04U844	886.74	835.08	834.47	834.64	834.76	834.83	835.01
04U845	894.91	836.84	836.26	836.38	836.47	836.53	836.80
03L846	888.54	832.81	832.48	832.63	832.71	832.72	832.83
04U846	889.46	831.91	831.51	832.16	832.27	832.22	832.31
03M848	904.12	841.79	841.15	841.11	841.15	841.25	841.69
03L848	903.91	842.27	841.58	841.55	841.59	841.70	842.11
04U848	903.92	843.07	842.32	842.29	842.28	842.42	842.80
04U851	914.51	831.44	830.98	831.45	831.70	831.65	831.76
04U852	905.66	829.40	828.94	829.32	829.49	829.41	829.59
03L854	892.41	839.21	838.66	838.62	838.70	838.93	839.27
04U854	891.95	835.50	834.97	835.11	835.22	835.40	835.49
03L859	903.55	839.79	839.21	839.16	838.72	839.47	839.77
04U859	903.73	842.68	841.93	841.92	841.92	842.12	842.39
03L860	896.79	839.45	838.92	838.89	838.94	839.06	839.52
04U860	896.61	835.46	834.89	835.08	835.21	835.23	835.46
03L861	891.35	837.80	837.24	837.21	837.29	837.54	837.83
04U861	890.91	835.61	835.06	835.22	835.36	835.49	835.60
04U863	895.33	834.93	834.44	834.63	834.70	834.88	835.06
04U864	908.67	831.80	831.30	832.26	833.04	833.04	833.16
04J864	908.79	829.15	828.31	828.54	828.52	828.28	828.45
04U865	915.60	832.16	831.66	832.80	833.64	833.69	833.79
04U866	910.60	830.96	830.51	831.60	832.40	832.39	832.46
04J866	910.69	829.79	828.94	829.23	829.21	829.22	829.13
04U877	923.08	831.34	830.95	831.54	831.71	831.64	831.76
MPCA1L3	898.25	838.34	837.76	837.73	837.81	838.02	838.33
MPCA1U4	898.60	836.68	836.08	836.14	836.20	836.36	836.57
MPCA2L3	872.05	833.83	833.33	833.60	833.74	833.74	833.88
MPCA2U4	872.19	832.85	832.39	832.83	832.93	832.93	832.98
414U4	893.95	834.61	834.10	834.37	834.59	834.65	834.82
MW15H	911.52	835.23	834.61	834.72	834.83	834.92	835.14
NB WELL 13	914.66	--	824.16	829.86	--	832.78	--

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*4/26/94*	*4/28/94*	*4/29/94*	*5/2/94*	*5/9/94*	*5/16/94*
					0.49	*0.43*	*0.48*
03U673	897.84	844.90	843.92	843.92	844.20	844.37	843.97
03L673	898.44	843.76	842.98	842.94	843.21	843.27	842.91
04U673	898.34	843.91	843.15	843.11	843.38	843.43	843.08
03U832	886.82	835.44	834.81	834.82	835.25	835.04	834.44
03L832	886.85	835.28	834.64	834.70	835.13	834.91	834.31
04U832	885.31	835.15	834.50	834.61	835.02	834.81	834.19
03L841	911.91	843.10	842.28	842.26	842.52	842.56	842.26
04U841	912.47	843.22	842.45	842.44	842.69	842.72	842.39
04U844	886.74	835.00	834.39	834.45	834.86	834.65	834.05
04U845	894.91	836.84	836.20	836.30	836.69	836.51	835.93
03L846	888.54	832.87	832.39	832.44	832.69	832.45	832.07
04U846	889.46	832.01	831.32	831.91	832.15	831.68	831.18
03M848	904.12	841.90	841.04	841.02	841.30	841.41	841.01
03L848	903.91	842.31	841.46	841.45	841.72	841.81	841.40
04U848	903.92	842.96	842.20	842.17	842.42	842.46	842.10
04U851	914.51	831.66	830.84	830.88	831.60	831.26	830.60
04U852	905.66	829.48	828.93	828.86	829.51	829.29	828.53
03L854	892.41	839.51	838.57	838.58	838.88	839.03	838.55
04U854	891.95	835.52	834.87	835.10	835.49	835.23	834.58
03L859	903.55	840.02	839.09	839.08	839.40	839.50	839.04
04U859	903.73	842.59	841.78	841.79	842.05	842.08	841.71
03L860	896.79	839.72	838.84	838.81	839.12	839.28	838.78
04U860	896.61	835.39	834.84	835.00	835.35	835.11	834.47
03L861	891.35	838.04	837.14	837.15	837.47	837.54	836.99
04U861	890.91	835.62	835.00	835.13	835.53	835.30	834.71
04U863	895.33	834.94	834.38	834.40	834.95	834.73	834.02
04U864	908.67	832.61	831.25	831.28	832.89	832.27	830.77
04J864	908.79	828.25	828.26	827.87	828.51	828.76	827.29
04U865	915.60	832.15	831.59	831.62	833.75	832.68	831.35
04U866	910.60	830.94	830.35	830.44	832.08	831.65	830.15
04J866	910.69	828.84	828.98	828.54	829.17	829.48	827.90
04U877	923.08	831.58	830.62	830.83	831.45	831.11	830.61
MPCA1L3	898.25	838.54	837.63	837.64	837.97	838.01	837.51
MPCA1U4	898.60	836.67	835.95	836.02	836.38	836.19	835.69
MPCA2L3	872.05	833.91	833.25	833.32	833.77	833.45	832.93
MPCA2U4	872.19	832.94	832.24	832.41	832.89	832.52	831.96
414U4	893.95	834.60	834.02	834.04	834.72	834.45	833.68
MW15H	911.52	835.24	834.60	834.62	835.04	834.76	834.14
NB WELL 13	914.66	822.66	822.16	822.21	822.66	830.87	821.81

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*5/23/94*	*6/20/94* *0.49*	*7/19/94* *0.60*	*10/10/94*	*1/27/95*	*3/6/95*
03U673	897.84	844.35	844.01	845.00	843.06	843.42	843.31
03L673	898.44	843.20	842.81	844.33	842.23	842.24	842.12
04U673	898.34	843.34	842.95	843.93	842.43	842.39	842.24
03U832	886.82	834.31	833.55	833.48	832.65	833.36	833.24
03L832	886.85	834.14	833.33	833.25	832.49	833.20	833.48
04U832	885.31	833.99	833.19	833.09	832.39	833.07	833.14
03L841	911.91	842.50	842.10	843.37	841.48	841.55	841.42
04U841	912.47	842.60	842.20	843.55	841.71	841.65	841.53
04U844	886.74	833.90	833.18	833.20	832.29	833.09	833.16
04U845	894.91	835.83	835.16	835.29	834.23	834.94	834.94
03L846	888.54	831.96	831.16	830.78	830.16	830.74	830.92
04U846	889.46	830.91	830.06	829.74	829.44	830.11	830.23
03M848	904.12	841.31	840.84	841.46	839.75	840.21	840.14
03L848	903.91	841.69	841.18	841.95	840.28	840.62	frozen
04U848	903.92	842.36	841.94	843.02	841.27	841.40	841.27
04U851	914.51	830.23	829.20	829.01	828.85	829.72	829.87
04U852	905.66	827.90	plugged	826.62	826.83	827.91	828.13
03L854	892.41	838.81	838.26	838.30	836.93	837.56	837.59
04U854	891.95	834.44	833.63	833.60	832.83	833.52	833.54
03L859	903.55	839.30	838.79	839.07	837.48	838.14	838.15
04U859	903.73	841.92	841.51	842.57	840.83	840.96	840.88
03L860	896.79	839.09	838.51	838.54	837.22	837.86	837.84
04U860	896.61	834.31	833.57	833.41	832.75	833.38	833.43
03L861	891.35	837.17	836.55	836.54	835.25	835.99	836.03
04U861	890.91	834.53	833.78	833.76	832.97	833.63	833.66
04U863	895.33	833.82	832.92	832.79	832.18	832.85	832.95
04U864	908.67	830.76	829.72	829.55	829.07	829.71	829.88
04J864	908.79	826.49	825.46	825.93	825.04	826.81	826.92
04U865	915.60	831.14	830.22	830.04	829.54	830.14	830.24
04U866	910.60	829.96	828.90	828.72	828.28	828.97	829.22
04J866	910.69	827.25	826.26	826.71	825.71	827.46	827.57
04U877	923.08	830.30	829.34	828.98	828.84	829.50	829.76
MPCA1L3	898.25	837.70	837.13	837.27	835.82	836.58	836.59
MPCA1U4	898.60	835.64	835.03	835.22	834.05	834.74	834.80
MPCA2L3	872.05	832.75	831.94	831.81	831.12	831.89	831.93
MPCA2U4	872.19	831.78	830.93	830.71	830.14	830.91	830.99
414U4	893.95	833.44	832.55	832.43	831.91	832.59	832.67
MW15H	911.52	834.12	833.30	833.12	832.36	833.11	833.19
NB WELL 13	914.66	- -	820.58	820.26	819.41	819.66	819.66

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*6/21/95 8:00 A.M.*	*9/5/95*	*12/14/95*	*3/5/96*	*5/28/96*	*9/16/96*
03U673	897.84	843.59	842.55	843.33	843.28	843.84	842.44
03L673	898.44	842.76	841.34	842.14	842.23	842.84	840.97
04U673	898.34	842.96	841.49	842.29	842.38	843.00	841.08
03U832	886.82	833.02	832.57	833.26	833.55	834.26	831.27
03L832	886.85	832.82	832.40	833.11	833.40	834.55	831.09
04U832	885.31	832.63	832.27	832.97	833.27	833.89	830.93
03L841	911.91	842.03	840.53	841.48	841.47	842.13	840.18
04U841	912.47	842.23	840.69	841.59	841.63	842.30	840.27
04U844	886.74	832.59	832.22	833.00	833.26	833.75	830.99
04U845	894.91	834.64	834.06	834.87	835.07	835.70	832.94
03L846	888.54	830.62	830.20	830.51	830.94	831.51	828.83
04U846	889.46	829.35	829.25	829.69	830.08	830.17	827.71
03M848	904.12	840.39	839.38	840.18	frozen	840.85	838.97
03L848	903.91	840.91	840.48	840.61	frozen	841.28	839.39
04U848	903.92	841.82	840.49	841.33	frozen	841.99	840.08
04U851	914.51	828.58	828.55	829.49	829.91	829.86	827.25
04U852	905.66	826.08	826.04	827.66	828.16	827.76	obstructed
03L854	892.41	837.56	836.87	837.63	837.65	838.41	836.06
04U854	891.95	833.00	832.68	833.46	833.71	834.36	831.41
03L859	903.55	838.12	837.33	838.14	838.13	838.95	836.53
04U859	903.73	841.42	840.09	840.95	841.00	841.63	839.47
03L860	896.79	837.83	837.11	837.90	837.92	838.66	836.58
04U860	896.61	832.98	832.57	833.40	833.59	834.30	831.38
03L861	891.35	835.86	835.23	836.03	836.09	836.89	834.22
04U861	890.91	833.20	832.80	833.59	833.75	834.45	831.56
04U863	895.33	832.42	832.09	832.76	833.14	833.75	830.86
04U864	908.67	829.10	829.01	829.50	829.97	830.23	827.63
04J864	908.79	824.22	824.77	827.23	827.49	826.50	823.55
04U865	915.60	829.50	829.33	829.67	830.41	830.63	827.84
04U866	910.60	828.24	828.14	828.40	829.06	829.14	826.74
04J866	910.69	825.13	825.55	827.80	828.07	827.17	824.83
04U877	923.08	828.63	828.71	829.14	829.53	829.48	827.06
MPCA1L3	898.25	836.45	835.79	836.58	836.63	837.35	834.80
MPCA1U4	898.60	834.49	833.89	834.68	834.85	835.45	832.73
MPCA2L3	872.05	831.43	831.08	831.63	832.03	832.55	829.74
MPCA2U4	872.19	830.31	830.07	830.62	830.99	831.36	828.69
414U4	893.95	832.03	830.77	832.48	832.90	833.36	830.57
MW15H	911.52	832.85	832.41	833.02	833.34	834.10	831.10
NB WELL 13	914.66	819.66	819.66	816.10	820.01	819.66	819.66

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Location	*TOC Elevation*	*12/3/96*	*5/30/97*	*9/2/97*	*12/6/97*	*6/1/98*
03U673	897.84	842.16	842.39	--	842.03	843.33
03L673	898.44	840.99	841.06	--	840.99	842.11
04U673	898.34	841.13	841.21	--	841.19	842.3
03U832	886.82	832.31	831.36	--	--	--
03L832	886.85	832.16	831.22	--	--	--
04U832	885.31	832.04	831.11	--	831.76	832.38
03L841	911.91	840.31	840.34	--	--	--
04U841	912.47	840.48	840.42	--	--	--
04U844	886.74	832.02	831.23	--	--	--
04U845	894.91	833.93	833.23	--	833.74	834.46
03L846	888.54	829.46	828.41	--	--	--
04U846	889.46	828.49	827.60	--	--	--
03M848	904.12	839.01	838.99	--	838.8	839.95
03L848	903.91	frozen	839.40	--	839.27	840.41
04U848	903.92	840.22	840.18	--	840.17	841.2
04U851	914.51	828.46	827.97	--	827.93	828.61
04U852	905.66	obstructed	--	--	826.57	826.74
03L854	892.41	836.38	836.20	--	836.1	837.29
04U854	891.95	832.56	831.68	--	832.44	832.98
03L859	903.55	836.68	836.77	--	836.62	837.81
04U859	903.73	839.84	839.82	--	839.83	840.97
03L860	896.79	836.68	836.49	--	836.39	837.46
04U860	896.61	832.53	831.41	--	832.33	832.81
03L861	891.35	834.79	834.41	--	834.47	835.53
04U861	890.91	832.65	831.79	--	832.43	833.09
04U863	895.33	831.88	830.92	--	831.8	832.33
04U864	908.67	828.59	828.68	--	828.02	828.87
04J864	908.79	825.99	825.07	--	826.32	826.4
04U865	915.60	829.01	829.05	--	828.57	829.3
04U866	910.60	827.43	826.23	--	826.3	827.42
04J866	910.69	826.54	825.76	--	826.8	827.02
04U877	923.08	827.85	827.45	--	--	--
MPCA1L3	898.25	835.34	835.04	--	--	--
MPCA1U4	898.60	833.66	832.99	--	--	--
MPCA2L3	872.05	830.62	829.66	--	--	--
MPCA2U4	872.19	829.54	828.58	--	--	--
414U4	893.95	831.64	830.72	830.40	831.64	832.12
MW15H	911.52	832.11	831.08	--	831.66	832.36
NB WELL 13	914.66	818.33	827.94	--	816.59	816.21

K.2 Daily Pumping Summary for Fiscal Year 1998
(in 1,000 Gallons)
PGRS, TCAAP

APPENDIX K.2

DAILY PUMPING SUMMARY FOR FISCAL YEAR 1998 (IN 1,000 GALLONS)
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Day	*October 1997*	*November 1997*	*December 1997*	*January 1998*	*February 1998*	*March 1998*	*April 1998*	*May 1998*	*June 1998*	*July 1998*	*August 1998*	*September 1998*
1	1402	1480	1394	1792	1421	1382	1381	0	1440	1381	1728	1465
2	1454	1402	1551	1356	1429	1440	*	*	1376	1441	1649	1647
3	1430	1436	1291	1345	1447	1382	2823	0	1440	1382	1535	1740
4	1328	1638	1528	1466	1387	1441	1440	0	1382	*	1381	1635
5	1389	1731	1309	1350	1468	655	1322	0	1439	*	1440	1729
6	1524	1698	1579	1414	1366	1016	1440	0	1383	4261	1382	1649
7	1396	1700	1323	1402	1476	1440	1421	0	1441	1383	1377	1727
8	1458	1728	1395	1459	1343	1381	1440	0	1368	1440	1382	1642
9	1379	1610	1446	1376	1487	1481	1382	0	1440	720	1440	1727
10	1466	1815	1484	1470	1439	1577	1440	0	1328	0	449	1647
11	1509	1598	1310	1388	1410	1441	1383	0	1440	*	755	1618
12	1373	1805	1447	1424	1399	1381	1439	0	1383	*	1430	1383
13	1346	1647	1313	1440	1349	1440	1383	0	1317	0	1337	1440
14	1452	1781	1468	1409	1400	1382	1439	0	1351	0	1440	1381
15	1471	1813	1341	1448	1480	1440	1382	38	1195	0	1383	1574
16	1452	1702	1467	1413	1368	1383	1441	394	1441	0	1439	1647
17	1377	1605	1391	1473	1439	1473	1338	0	1382	0	1381	1730
18	1572	1760	1443	1427	1443	1381	1441	0	1407	0	1440	1641
19	1302	1612	1400	1429	1368	1440	1381	950	1266	0	1383	1728
20	1414	1737	1561	1387	1589	1382	1440	1440	1440	0	1439	1648
21	1400	1674	1318	1390	1438	1441	1382	1147	1383	715	1350	1732
22	1448	1584	1415	1443	1354	1382	1441	1424	1439	1433	*	1647
23	1395	1315	1397	1402	1495	1440	1381	1381	1356	1382	*	1559
24	1449	1430	1437	1457	1385	1381	1440	1440	1405	*	4126	1382
25	1347	1391	1451	1457	1456	1441	1382	1382	1278	*	1382	1439
26	1596	1348	1394	1394	1388	1382	1440	*	1318	*	1440	1383
27	1352	1522	1429	1382	1465	1439	550	2823	1382	6586	1381	1440
28	1448	1489	1396	1452	1405	1383	0	1440	1440	1729	1440	1381
29	1401	1399	1479	1385	--	1440	0	1371	1382	1648	1381	1440
30	1469	1268	1392	1456	--	1381	0	1433	1440	1713	1440	1150
31	1367	--	1462	1391	--	1441	--	1382	--	1647	1172	--
Total:	44166	47718	44011	44277	39894	42889	37172	18045	41482	28861	42302	46951

Notes:

* Midnight volume totalized values needed for daily volume calculations are missing from historic database. The first non-null value shown following missing data represents total volume for all preceding missing days.

K.3 Fiscal Year 1998 Influent/Effluent Database PGRS, TCAAP

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	Chemical	Lot ID	Concentration		Flag Codes/ Data Qualifiers
NB13E	10/7/97	111TCE	BHDG 007	<	0.76	
NB13E	11/4/97	111TCE	BHSV 009	<	0.76	?
NB13E	12/2/97	111TCE	BJBJ 005	<	0.76	?
NB13E	1/6/98	111TCE	BJJX 009	<	0.76	?
NB13E	2/3/98	111TCE	BJNK 009	<	0.76	?
NB13E	3/3/98	111TCE	BJQQ 009	<	0.76	?
NB13E	4/7/98	111TCE	BJRN 007	<	0.76	?
NB13E	5/28/98	111TCE	BJWN 007	<	0.76	?
NB13E	6/2/98	111TCE	BJWN 009	<	0.76	?
NB13E	7/7/98	111TCE	BJZW 007	<	0.76	
NB13E	8/4/98	111TCE	BKCX 011	<	0.76	?
NB13E	9/1/98	111TCE	BKHW 005	<	0.76	?
NB13E	10/7/97	112TCE	BHDG 007	<	0.78	
NB13E	11/4/97	112TCE	BHSV 009	<	0.78	?
NB13E	12/2/97	112TCE	BJBJ 005	<	0.78	?
NB13E	1/6/98	112TCE	BJJX 009	<	0.78	?
NB13E	2/3/98	112TCE	BJNK 009	<	0.78	?
NB13E	3/3/98	112TCE	BJQQ 009	<	0.78	?
NB13E	4/7/98	112TCE	BJRN 007	<	0.78	?
NB13E	5/28/98	112TCE	BJWN 007	<	0.78	?
NB13E	6/2/98	112TCE	BJWN 009	<	0.78	?
NB13E	7/7/98	112TCE	BJZW 007	<	0.78	
NB13E	8/4/98	112TCE	BKCX 011	<	0.78	?
NB13E	9/1/98	112TCE	BKHW 005	<	0.78	?
NB13E	10/7/97	11DCE	BHDG 007	<	1.7	
NB13E	11/4/97	11DCE	BHSV 009	<	1.7	?
NB13E	12/2/97	11DCE	BJBJ 005	<	1.7	?
NB13E	1/6/98	11DCE	BJJX 009	<	1.7	?
NB13E	2/3/98	11DCE	BJNK 009	<	1.7	?
NB13E	3/3/98	11DCE	BJQQ 009	<	1.7	?
NB13E	4/7/98	11DCE	BJRN 007	<	1.7	?
NB13E	5/28/98	11DCE	BJWN 007	<	1.7	?
NB13E	6/2/98	11DCE	BJWN 009	<	1.7	?
NB13E	7/7/98	11DCE	BJZW 007	<	1.7	
NB13E	8/4/98	11DCE	BKCX 011	<	1.7	?
NB13E	9/1/98	11DCE	BKHW 005	<	1.7	?
NB13E	10/7/97	11DCLE	BHDG 007	<	0.73	
NB13E	11/4/97	11DCLE	BHSV 009	<	0.73	?
NB13E	12/2/97	11DCLE	BJBJ 005	<	0.73	?
NB13E	1/6/98	11DCLE	BJJX 009	<	0.73	?
NB13E	2/3/98	11DCLE	BJNK 009	<	0.73	?
NB13E	3/3/98	11DCLE	BJQQ 009	<	0.73	?
NB13E	4/7/98	11DCLE	BJRN 007	<	0.73	?
NB13E	5/28/98	11DCLE	BJWN 007	<	0.73	?
NB13E	6/2/98	11DCLE	BJWN 009	<	0.73	?
NB13E	7/7/98	11DCLE	BJZW 007	<	0.73	
NB13E	8/4/98	11DCLE	BKCX 011	<	0.73	?
NB13E	9/1/98	11DCLE	BKHW 005	<	0.73	?
NB13E	10/7/97	12DCE	BHDG 007	<	0.76	

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	Chemical	Lot ID	Concentration		Flag Codes/ Data Qualifiers
NB13E	11/4/97	12DCE	BHSV 009	<	0.76	?
NB13E	12/2/97	12DCE	BJBJ 005	<	0.76	?
NB13E	1/6/98	12DCE	BJJX 009	<	0.76	?
NB13E	2/3/98	12DCE	BJNK 009	<	0.76	?
NB13E	3/3/98	12DCE	BJQQ 009	<	0.76	?
NB13E	4/7/98	12DCE	BJRN 007	<	0.76	?
NB13E	5/28/98	12DCE	BJWN 007	<	0.76	?
NB13E	6/2/98	12DCE	BJWN 009	<	0.76	?
NB13E	7/7/98	12DCE	BJZW 007	<	0.76	
NB13E	8/4/98	12DCE	BKCX 011	<	0.76	?
NB13E	9/1/98	12DCE	BKHW 005	<	0.76	?
NB13E	10/7/97	12DCLE	BHDG 007	<	1.1	
NB13E	11/4/97	12DCLE	BHSV 009	<	1.1	?
NB13E	12/2/97	12DCLE	BJBJ 005	<	1.1	?
NB13E	1/6/98	12DCLE	BJJX 009	<	1.1	?
NB13E	2/3/98	12DCLE	BJNK 009	<	1.1	?
NB13E	3/3/98	12DCLE	BJQQ 009	<	1.1	?
NB13E	4/7/98	12DCLE	BJRN 007	<	1.1	?
NB13E	5/28/98	12DCLE	BJWN 007	<	1.1	?
NB13E	6/2/98	12DCLE	BJWN 009	<	1.1	?
NB13E	7/7/98	12DCLE	BJZW 007	<	1.1	
NB13E	8/4/98	12DCLE	BKCX 011	<	1.1	?
NB13E	9/1/98	12DCLE	BKHW 005	<	1.1	?
NB13E	10/7/97	12DCLP	BHDG 007	<	1	T
NB13E	11/4/97	12DCLP	BHSV 009	<	1	T?
NB13E	12/2/97	12DCLP	BJBJ 005	<	1	T?
NB13E	1/6/98	12DCLP	BJJX 009	<	1	T?
NB13E	2/3/98	12DCLP	BJNK 009	<	1	T?
NB13E	3/3/98	12DCLP	BJQQ 009	<	1	T?
NB13E	4/7/98	12DCLP	BJRN 007	<	1	T?
NB13E	5/28/98	12DCLP	BJWN 007	<	1	T?
NB13E	6/2/98	12DCLP	BJWN 009	<	1	T?
NB13E	7/7/98	12DCLP	BJZW 007	<	1	T
NB13E	8/4/98	12DCLP	BKCX 011	<	1	T?
NB13E	9/1/98	12DCLP	BKHW 005	<	1	T?
NB13E	10/7/97	C2H3CL	BHDG 007	<	1.01	
NB13E	11/4/97	C2H3CL	BHSV 009	<	1.01	?
NB13E	12/2/97	C2H3CL	BJBJ 005	<	1.01	?
NB13E	1/6/98	C2H3CL	BJJX 009	<	1.01	?
NB13E	2/3/98	C2H3CL	BJNK 009	<	1.01	?
NB13E	3/3/98	C2H3CL	BJQQ 009	<	1.01	?
NB13E	4/7/98	C2H3CL	BJRN 007	<	1.01	?
NB13E	5/28/98	C2H3CL	BJWN 007	<	1.01	?
NB13E	6/2/98	C2H3CL	BJWN 009	<	1.01	?
NB13E	7/7/98	C2H3CL	BJZW 007	<	1.01	
NB13E	8/4/98	C2H3CL	BKCX 011	<	1.01	?
NB13E	9/1/98	C2H3CL	BKHW 005	<	1.01	?
NB13E	10/7/97	CCL4	BHDG 007	<	0.99	
NB13E	11/4/97	CCL4	BHSV 009	<	0.99	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
NB13E	12/2/97	CCL4	BJBJ 005	<	0.99	?
NB13E	1/6/98	CCL4	BJJX 009	<	0.99	?
NB13E	2/3/98	CCL4	BJNK 009	<	0.99	?
NB13E	3/3/98	CCL4	BJQQ 009	<	0.99	?
NB13E	4/7/98	CCL4	BJRN 007	<	0.99	?
NB13E	5/28/98	CCL4	BJWN 007	<	0.99	?
NB13E	6/2/98	CCL4	BJWN 009	<	0.99	?
NB13E	7/7/98	CCL4	BJZW 007	<	0.99	
NB13E	8/4/98	CCL4	BKCX 011	<	0.99	?
NB13E	9/1/98	CCL4	BKHW 005	<	0.99	?
NB13E	10/7/97	CH2CL2	BHDG 007	<	7.4	
NB13E	11/4/97	CH2CL2	BHSV 009	<	7.4	?
NB13E	12/2/97	CH2CL2	BJBJ 005	<	7.4	?
NB13E	1/6/98	CH2CL2	BJJX 009	<	7.4	?
NB13E	2/3/98	CH2CL2	BJNK 009	<	7.4	?
NB13E	3/3/98	CH2CL2	BJQQ 009	<	7.4	?
NB13E	4/7/98	CH2CL2	BJRN 007	<	7.4	?
NB13E	5/28/98	CH2CL2	BJWN 007	<	7.4	?
NB13E	6/2/98	CH2CL2	BJWN 009	<	7.4	?
NB13E	7/7/98	CH2CL2	BJZW 007	<	7.4	
NB13E	8/4/98	CH2CL2	BKCX 011	<	7.4	?
NB13E	9/1/98	CH2CL2	BKHW 005	<	7.4	?
NB13E	10/7/97	CHCL3	BHDG 007	<	0.5	
NB13E	11/4/97	CHCL3	BHSV 009	<	0.5	?
NB13E	12/2/97	CHCL3	BJBJ 005	<	0.5	?
NB13E	1/6/98	CHCL3	BJJX 009	<	0.5	?
NB13E	2/3/98	CHCL3	BJNK 009	<	0.5	?
NB13E	3/3/98	CHCL3	BJQQ 009	<	0.5	?
NB13E	4/7/98	CHCL3	BJRN 007	<	0.5	?
NB13E	5/28/98	CHCL3	BJWN 007	<	0.5	?
NB13E	6/2/98	CHCL3	BJWN 009	<	0.5	?
NB13E	7/7/98	CHCL3	BJZW 007	<	0.5	
NB13E	8/4/98	CHCL3	BKCX 011	<	0.5	?
NB13E	9/1/98	CHCL3	BKHW 005	<	0.5	?
NB13E	10/7/97	TCLEE	BHDG 007	<	0.75	
NB13E	11/4/97	TCLEE	BHSV 009	<	0.75	?
NB13E	12/2/97	TCLEE	BJBJ 005	<	0.75	?
NB13E	1/6/98	TCLEE	BJJX 009	<	0.75	?
NB13E	2/3/98	TCLEE	BJNK 009	<	0.75	?
NB13E	3/3/98	TCLEE	BJQQ 009	<	0.75	?
NB13E	4/7/98	TCLEE	BJRN 007	<	0.75	?
NB13E	5/28/98	TCLEE	BJWN 007	<	0.75	?
NB13E	6/2/98	TCLEE	BJWN 009	<	0.75	?
NB13E	7/7/98	TCLEE	BJZW 007	<	0.75	
NB13E	8/4/98	TCLEE	BKCX 011	<	0.75	?
NB13E	9/1/98	TCLEE	BKHW 005	<	0.75	?
NB13E	10/7/97	TCLTFE	BHDG 007	<	1	T
NB13E	11/4/97	TCLTFE	BHSV 009	<	1	T?
NB13E	12/2/97	TCLTFE	BJBJ 005	<	1	T?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
NB13E	1/6/98	TCLTFE	BJJX 009	< 1	T?
NB13E	2/3/98	TCLTFE	BJNK 009	< 1	T?
NB13E	3/3/98	TCLTFE	BJQQ 009	< 1	T?
NB13E	4/7/98	TCLTFE	BJRN 007	< 1	T?
NB13E	5/28/98	TCLTFE	BJWN 007	< 1	T?
NB13E	6/2/98	TCLTFE	BJWN 009	< 1	T?
NB13E	7/7/98	TCLTFE	BJZW 007	< 1	T
NB13E	8/4/98	TCLTFE	BKCX 011	< 1	T?
NB13E	9/1/98	TCLTFE	BKHW 005	< 1	T?
NB13E	10/7/97	TRCLE	BHDG 007	< 0.56	
NB13E	11/4/97	TRCLE	BHSV 009	< 0.56	?
NB13E	12/2/97	TRCLE	BJBJ 005	< 0.56	?
NB13E	1/6/98	TRCLE	BJJX 009	< 0.56	?
NB13E	2/3/98	TRCLE	BJNK 009	0.899	?
NB13E	3/3/98	TRCLE	BJQQ 009	< 0.56	?
NB13E	4/7/98	TRCLE	BJRN 007	< 0.56	?
NB13E	5/28/98	TRCLE	BJWN 007	< 0.56	?
NB13E	6/2/98	TRCLE	BJWN 009	< 0.56	?
NB13E	7/7/98	TRCLE	BJZW 007	< 0.56	
NB13E	8/4/98	TRCLE	BKCX 011	< 0.56	?
NB13E	9/1/98	TRCLE	BKHW 005	< 0.56	?
NB13I	10/7/97	111TCE	BHDG 006	< 0.76	
NB13I	11/4/97	111TCE	BHSV 011	< 0.76	D?
NB13I	11/4/97	111TCE	BHSV 010	< 0.76	?
NB13I	12/2/97	111TCE	BJBJ 006	< 0.76	?
NB13I	12/2/97	111TCE	BJBJ 007	< 0.76	?
NB13I	1/6/98	111TCE	BJJX 010	< 0.76	?
NB13I	1/6/98	111TCE	BJJX 011	< 0.76	D?
NB13I	2/3/98	111TCE	BJNK 010	< 0.76	?
NB13I	3/3/98	111TCE	BJQQ 011	< 0.76	D?
NB13I	3/3/98	111TCE	BJQQ 010	< 0.76	?
NB13I	4/7/98	111TCE	BJRN 005	< 0.76	?
NB13I	4/7/98	111TCE	BJRN 006	< 0.76	D?
NB13I	5/28/98	111TCE	BJWN 006	< 0.76	D?
NB13I	5/28/98	111TCE	BJWN 005	< 0.76	?
NB13I	6/2/98	111TCE	BJWN 010	< 0.76	?
NB13I	6/2/98	111TCE	BJWN 011	< 0.76	D?
NB13I	7/7/98	111TCE	BJZW 005	< 0.76	
NB13I	7/7/98	111TCE	BJZW 006	< 0.76	D
NB13I	8/4/98	111TCE	BKCX 009	< 0.76	?
NB13I	8/4/98	111TCE	BKCX 010	< 0.76	D?
NB13I	9/1/98	111TCE	BKHW 006	< 0.76	?
NB13I	9/1/98	111TCE	BKHW 007	< 0.76	D?
NB13I	10/7/97	112TCE	BHDG 006	< 0.78	
NB13I	11/4/97	112TCE	BHSV 010	< 0.78	?
NB13I	11/4/97	112TCE	BHSV 011	< 0.78	D?
NB13I	12/2/97	112TCE	BJBJ 007	< 0.78	?
NB13I	12/2/97	112TCE	BJBJ 006	< 0.78	?
NB13I	1/6/98	112TCE	BJJX 010	< 0.78	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
NB13I	1/6/98	112TCE	BJJX 011	< 0.78	D?
NB13I	2/3/98	112TCE	BJNK 010	< 0.78	?
NB13I	3/3/98	112TCE	BJQQ 011	< 0.78	D?
NB13I	3/3/98	112TCE	BJQQ 010	< 0.78	?
NB13I	4/7/98	112TCE	BJRN 005	< 0.78	?
NB13I	4/7/98	112TCE	BJRN 006	< 0.78	D?
NB13I	5/28/98	112TCE	BJWN 006	< 0.78	D?
NB13I	5/28/98	112TCE	BJWN 005	< 0.78	?
NB13I	6/2/98	112TCE	BJWN 011	< 0.78	D?
NB13I	6/2/98	112TCE	BJWN 010	< 0.78	?
NB13I	7/7/98	112TCE	BJZW 005	< 0.78	
NB13I	7/7/98	112TCE	BJZW 006	< 0.78	D
NB13I	8/4/98	112TCE	BKCX 009	< 0.78	?
NB13I	8/4/98	112TCE	BKCX 010	< 0.78	D?
NB13I	9/1/98	112TCE	BKHW 006	< 0.78	?
NB13I	9/1/98	112TCE	BKHW 007	< 0.78	D?
NB13I	10/7/97	11DCE	BHDG 006	< 1.7	
NB13I	11/4/97	11DCE	BHSV 011	< 1.7	D?
NB13I	11/4/97	11DCE	BHSV 010	< 1.7	?
NB13I	12/2/97	11DCE	BJBJ 007	< 1.7	?
NB13I	12/2/97	11DCE	BJBJ 006	< 1.7	?
NB13I	1/6/98	11DCE	BJJX 010	< 1.7	?
NB13I	1/6/98	11DCE	BJJX 011	< 1.7	D?
NB13I	2/3/98	11DCE	BJNK 010	< 1.7	?
NB13I	3/3/98	11DCE	BJQQ 011	< 1.7	D?
NB13I	3/3/98	11DCE	BJQQ 010	< 1.7	?
NB13I	4/7/98	11DCE	BJRN 005	< 1.7	?
NB13I	4/7/98	11DCE	BJRN 006	< 1.7	D?
NB13I	5/28/98	11DCE	BJWN 006	< 1.7	D?
NB13I	5/28/98	11DCE	BJWN 005	< 1.7	?
NB13I	6/2/98	11DCE	BJWN 011	< 1.7	D?
NB13I	6/2/98	11DCE	BJWN 010	< 1.7	?
NB13I	7/7/98	11DCE	BJZW 005	< 1.7	
NB13I	7/7/98	11DCE	BJZW 006	< 1.7	D
NB13I	8/4/98	11DCE	BKCX 009	< 1.7	?
NB13I	8/4/98	11DCE	BKCX 010	< 1.7	D?
NB13I	9/1/98	11DCE	BKHW 006	< 1.7	?
NB13I	9/1/98	11DCE	BKHW 007	< 1.7	D?
NB13I	10/7/97	11DCLE	BHDG 006	< 0.73	
NB13I	11/4/97	11DCLE	BHSV 011	< 0.73	D?
NB13I	11/4/97	11DCLE	BHSV 010	< 0.73	?
NB13I	12/2/97	11DCLE	BJBJ 007	< 0.73	?
NB13I	12/2/97	11DCLE	BJBJ 006	< 0.73	?
NB13I	1/6/98	11DCLE	BJJX 010	< 0.73	?
NB13I	1/6/98	11DCLE	BJJX 011	< 0.73	D?
NB13I	2/3/98	11DCLE	BJNK 010	< 0.73	?
NB13I	3/3/98	11DCLE	BJQQ 010	< 0.73	?
NB13I	3/3/98	11DCLE	BJQQ 011	< 0.73	D?
NB13I	4/7/98	11DCLE	BJRN 005	< 0.73	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	Chemical	Lot ID	Concentration	Flag Codes/ Data Qualifiers
NB13I	4/7/98	11DCLE	BJRN 006	< 0.73	D?
NB13I	5/28/98	11DCLE	BJWN 005	< 0.73	?
NB13I	5/28/98	11DCLE	BJWN 006	< 0.73	D?
NB13I	6/2/98	11DCLE	BJWN 011	< 0.73	D?
NB13I	6/2/98	11DCLE	BJWN 010	< 0.73	?
NB13I	7/7/98	11DCLE	BJZW 005	< 0.73	
NB13I	7/7/98	11DCLE	BJZW 006	< 0.73	D
NB13I	8/4/98	11DCLE	BKCX 009	< 0.73	?
NB13I	8/4/98	11DCLE	BKCX 010	< 0.73	D?
NB13I	9/1/98	11DCLE	BKHW 006	< 0.73	?
NB13I	9/1/98	11DCLE	BKHW 007	< 0.73	D?
NB13I	10/7/97	12DCE	BHDG 006	< 0.76	
NB13I	11/4/97	12DCE	BHSV 010	< 0.76	?
NB13I	11/4/97	12DCE	BHSV 011	< 0.76	D?
NB13I	12/2/97	12DCE	BJBJ 007	< 0.76	?
NB13I	12/2/97	12DCE	BJBJ 006	< 0.76	?
NB13I	1/6/98	12DCE	BJJX 010	< 0.76	?
NB13I	1/6/98	12DCE	BJJX 011	< 0.76	D?
NB13I	2/3/98	12DCE	BJNK 010	< 0.76	?
NB13I	3/3/98	12DCE	BJQQ 011	< 0.76	D?
NB13I	3/3/98	12DCE	BJQQ 010	< 0.76	?
NB13I	4/7/98	12DCE	BJRN 005	< 0.76	?
NB13I	4/7/98	12DCE	BJRN 006	< 0.76	D?
NB13I	5/28/98	12DCE	BJWN 006	< 0.76	D?
NB13I	5/28/98	12DCE	BJWN 005	< 0.76	?
NB13I	6/2/98	12DCE	BJWN 011	< 0.76	D?
NB13I	6/2/98	12DCE	BJWN 010	< 0.76	?
NB13I	7/7/98	12DCE	BJZW 005	< 0.76	
NB13I	7/7/98	12DCE	BJZW 006	< 0.76	D
NB13I	8/4/98	12DCE	BKCX 009	< 0.76	?
NB13I	8/4/98	12DCE	BKCX 010	< 0.76	D?
NB13I	9/1/98	12DCE	BKHW 006	< 0.76	?
NB13I	9/1/98	12DCE	BKHW 007	< 0.76	D?
NB13I	10/7/97	12DCLE	BHDG 006	< 1.1	
NB13I	11/4/97	12DCLE	BHSV 011	< 1.1	D?
NB13I	11/4/97	12DCLE	BHSV 010	< 1.1	?
NB13I	12/2/97	12DCLE	BJBJ 007	< 1.1	?
NB13I	12/2/97	12DCLE	BJBJ 006	< 1.1	?
NB13I	1/6/98	12DCLE	BJJX 010	< 1.1	?
NB13I	1/6/98	12DCLE	BJJX 011	< 1.1	D?
NB13I	2/3/98	12DCLE	BJNK 010	< 1.1	?
NB13I	3/3/98	12DCLE	BJQQ 011	< 1.1	D?
NB13I	3/3/98	12DCLE	BJQQ 010	< 1.1	?
NB13I	4/7/98	12DCLE	BJRN 005	< 1.1	?
NB13I	4/7/98	12DCLE	BJRN 006	< 1.1	D?
NB13I	5/28/98	12DCLE	BJWN 005	< 1.1	?
NB13I	5/28/98	12DCLE	BJWN 006	< 1.1	D?
NB13I	6/2/98	12DCLE	BJWN 011	< 1.1	D?
NB13I	6/2/98	12DCLE	BJWN 010	< 1.1	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*		*Flag Codes/ Data Qualifiers*
NB13I	7/7/98	12DCLE	BJZW 005	<	1.1	
NB13I	7/7/98	12DCLE	BJZW 006	<	1.1	D
NB13I	8/4/98	12DCLE	BKCX 009	<	1.1	?
NB13I	8/4/98	12DCLE	BKCX 010	<	1.1	D?
NB13I	9/1/98	12DCLE	BKHW 006	<	1.1	?
NB13I	9/1/98	12DCLE	BKHW 007	<	1.1	D?
NB13I	10/7/97	12DCLP	BHDG 006	<	1	T
NB13I	11/4/97	12DCLP	BHSV 011	<	1	DT?
NB13I	11/4/97	12DCLP	BHSV 010	<	1	T?
NB13I	12/2/97	12DCLP	BJBJ 006	<	1	T?
NB13I	12/2/97	12DCLP	BJBJ 007	<	1	T?
NB13I	1/6/98	12DCLP	BJJX 010	<	1	T?
NB13I	1/6/98	12DCLP	BJJX 011	<	1	DT?
NB13I	2/3/98	12DCLP	BJNK 010	<	1	T?
NB13I	3/3/98	12DCLP	BJQQ 011	<	1	DT?
NB13I	3/3/98	12DCLP	BJQQ 010	<	1	T?
NB13I	4/7/98	12DCLP	BJRN 005	<	1	T?
NB13I	4/7/98	12DCLP	BJRN 006	<	1	DT?
NB13I	5/28/98	12DCLP	BJWN 006	<	1	DT?
NB13I	5/28/98	12DCLP	BJWN 005	<	1	T?
NB13I	6/2/98	12DCLP	BJWN 011	<	1	DT?
NB13I	6/2/98	12DCLP	BJWN 010	<	1	T?
NB13I	7/7/98	12DCLP	BJZW 005	<	1	T
NB13I	7/7/98	12DCLP	BJZW 006	<	1	TD
NB13I	8/4/98	12DCLP	BKCX 009	<	1	T?
NB13I	8/4/98	12DCLP	BKCX 010	<	1	T?
NB13I	9/1/98	12DCLP	BKHW 006	<	1	T?
NB13I	9/1/98	12DCLP	BKHW 007	<	1	DT?
NB13I	10/7/97	C2H3CL	BHDG 006	<	1.01	
NB13I	11/4/97	C2H3CL	BHSV 011	<	1.01	D?
NB13I	11/4/97	C2H3CL	BHSV 010	<	1.01	?
NB13I	12/2/97	C2H3CL	BJBJ 007	<	1.01	?
NB13I	12/2/97	C2H3CL	BJBJ 006	<	1.01	?
NB13I	1/6/98	C2H3CL	BJJX 010	<	1.01	?
NB13I	1/6/98	C2H3CL	BJJX 011	<	1.01	D?
NB13I	2/3/98	C2H3CL	BJNK 010	<	1.01	?
NB13I	3/3/98	C2H3CL	BJQQ 010	<	1.01	?
NB13I	3/3/98	C2H3CL	BJQQ 011	<	1.01	D?
NB13I	4/7/98	C2H3CL	BJRN 005	<	1.01	?
NB13I	4/7/98	C2H3CL	BJRN 006	<	1.01	D?
NB13I	5/28/98	C2H3CL	BJWN 006	<	1.01	D?
NB13I	5/28/98	C2H3CL	BJWN 005	<	1.01	?
NB13I	6/2/98	C2H3CL	BJWN 011	<	1.01	D?
NB13I	6/2/98	C2H3CL	BJWN 010	<	1.01	?
NB13I	7/7/98	C2H3CL	BJZW 005	<	1.01	
NB13I	7/7/98	C2H3CL	BJZW 006	<	1.01	D
NB13I	8/4/98	C2H3CL	BKCX 009	<	1.01	?
NB13I	8/4/98	C2H3CL	BKCX 010	<	1.01	D?
NB13I	9/1/98	C2H3CL	BKHW 006	<	1.01	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
NB13I	9/1/98	C2H3CL	BKHW 007	< 1.01	D?
NB13I	10/7/97	CCL4	BHDG 006	< 0.99	
NB13I	11/4/97	CCL4	BHSV 011	< 0.99	D?
NB13I	11/4/97	CCL4	BHSV 010	< 0.99	?
NB13I	12/2/97	CCL4	BJBJ 007	< 0.99	?
NB13I	12/2/97	CCL4	BJBJ 006	< 0.99	?
NB13I	1/6/98	CCL4	BJJX 010	< 0.99	?
NB13I	1/6/98	CCL4	BJJX 011	< 0.99	D?
NB13I	2/3/98	CCL4	BJNK 010	< 0.99	?
NB13I	3/3/98	CCL4	BJQQ 011	< 0.99	D?
NB13I	3/3/98	CCL4	BJQQ 010	< 0.99	?
NB13I	4/7/98	CCL4	BJRN 005	< 0.99	?
NB13I	4/7/98	CCL4	BJRN 006	< 0.99	D?
NB13I	5/28/98	CCL4	BJWN 006	< 0.99	D?
NB13I	5/28/98	CCL4	BJWN 005	< 0.99	?
NB13I	6/2/98	CCL4	BJWN 011	< 0.99	D?
NB13I	6/2/98	CCL4	BJWN 010	< 0.99	?
NB13I	7/7/98	CCL4	BJZW 005	< 0.99	
NB13I	7/7/98	CCL4	BJZW 006	< 0.99	D
NB13I	8/4/98	CCL4	BKCX 009	< 0.99	?
NB13I	8/4/98	CCL4	BKCX 010	< 0.99	D?
NB13I	9/1/98	CCL4	BKHW 006	< 0.99	?
NB13I	9/1/98	CCL4	BKHW 007	< 0.99	D?
NB13I	10/7/97	CH2CL2	BHDG 006	< 7.4	
NB13I	11/4/97	CH2CL2	BHSV 010	< 7.4	?
NB13I	11/4/97	CH2CL2	BHSV 011	< 7.4	D?
NB13I	12/2/97	CH2CL2	BJBJ 006	< 7.4	?
NB13I	12/2/97	CH2CL2	BJBJ 007	< 7.4	?
NB13I	1/6/98	CH2CL2	BJJX 010	< 7.4	?
NB13I	1/6/98	CH2CL2	BJJX 011	< 7.4	D?
NB13I	2/3/98	CH2CL2	BJNK 010	< 7.4	?
NB13I	3/3/98	CH2CL2	BJQQ 010	< 7.4	?
NB13I	3/3/98	CH2CL2	BJQQ 011	< 7.4	D?
NB13I	4/7/98	CH2CL2	BJRN 005	< 7.4	?
NB13I	4/7/98	CH2CL2	BJRN 006	< 7.4	D?
NB13I	5/28/98	CH2CL2	BJWN 006	< 7.4	D?
NB13I	5/28/98	CH2CL2	BJWN 005	< 7.4	?
NB13I	6/2/98	CH2CL2	BJWN 011	< 7.4	D?
NB13I	6/2/98	CH2CL2	BJWN 010	< 7.4	?
NB13I	7/7/98	CH2CL2	BJZW 005	< 7.4	
NB13I	7/7/98	CH2CL2	BJZW 006	< 7.4	D
NB13I	8/4/98	CH2CL2	BKCX 009	< 7.4	?
NB13I	8/4/98	CH2CL2	BKCX 010	< 7.4	D?
NB13I	9/1/98	CH2CL2	BKHW 006	< 7.4	?
NB13I	9/1/98	CH2CL2	BKHW 007	< 7.4	D?
NB13I	10/7/97	CHCL3	BHDG 006	< 0.5	
NB13I	11/4/97	CHCL3	BHSV 011	< 0.5	D?
NB13I	11/4/97	CHCL3	BHSV 010	< 0.5	?
NB13I	12/2/97	CHCL3	BJBJ 007	< 0.5	?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	Sample Date	Chemical	Lot ID	Concentration		Flag Codes/ Data Qualifiers
NB13I	12/2/97	CHCL3	BJBJ 006	<	0.5	?
NB13I	1/6/98	CHCL3	BJJX 010	<	0.5	?
NB13I	1/6/98	CHCL3	BJJX 011	<	0.5	D?
NB13I	2/3/98	CHCL3	BJNK 010	<	0.5	?
NB13I	3/3/98	CHCL3	BJQQ 011	<	0.5	D?
NB13I	3/3/98	CHCL3	BJQQ 010	<	0.5	?
NB13I	4/7/98	CHCL3	BJRN 005	<	0.5	?
NB13I	4/7/98	CHCL3	BJRN 006	<	0.5	D?
NB13I	5/28/98	CHCL3	BJWN 005	<	0.5	?
NB13I	5/28/98	CHCL3	BJWN 006	<	0.5	D?
NB13I	6/2/98	CHCL3	BJWN 011	<	0.5	D?
NB13I	6/2/98	CHCL3	BJWN 010	<	0.5	?
NB13I	7/7/98	CHCL3	BJZW 005	<	0.5	
NB13I	7/7/98	CHCL3	BJZW 006	<	0.5	D
NB13I	8/4/98	CHCL3	BKCX 009	<	0.5	?
NB13I	8/4/98	CHCL3	BKCX 010	<	0.5	D?
NB13I	9/1/98	CHCL3	BKHW 006	<	0.5	?
NB13I	9/1/98	CHCL3	BKHW 007	<	0.5	D?
NB13I	10/7/97	TCLEE	BHDG 006	<	0.75	
NB13I	11/4/97	TCLEE	BHSV 010	<	0.75	?
NB13I	11/4/97	TCLEE	BHSV 011	<	0.75	D?
NB13I	12/2/97	TCLEE	BJBJ 007	<	0.75	?
NB13I	12/2/97	TCLEE	BJBJ 006	<	0.75	?
NB13I	1/6/98	TCLEE	BJJX 010	<	0.75	?
NB13I	1/6/98	TCLEE	BJJX 011	<	0.75	D?
NB13I	2/3/98	TCLEE	BJNK 010	<	0.75	?
NB13I	3/3/98	TCLEE	BJQQ 011	<	0.75	D?
NB13I	3/3/98	TCLEE	BJQQ 010	<	0.75	?
NB13I	4/7/98	TCLEE	BJRN 005	<	0.75	?
NB13I	4/7/98	TCLEE	BJRN 006	<	0.75	D?
NB13I	5/28/98	TCLEE	BJWN 006	<	0.75	D?
NB13I	5/28/98	TCLEE	BJWN 005	<	0.75	?
NB13I	6/2/98	TCLEE	BJWN 011	<	0.75	D?
NB13I	6/2/98	TCLEE	BJWN 010	<	0.75	?
NB13I	7/7/98	TCLEE	BJZW 005	<	0.75	
NB13I	7/7/98	TCLEE	BJZW 006	<	0.75	D
NB13I	8/4/98	TCLEE	BKCX 009	<	0.75	?
NB13I	8/4/98	TCLEE	BKCX 010	<	0.75	D?
NB13I	9/1/98	TCLEE	BKHW 006	<	0.75	?
NB13I	9/1/98	TCLEE	BKHW 007	<	0.75	D?
NB13I	10/7/97	TCLTFE	BHDG 006	<	1	T
NB13I	11/4/97	TCLTFE	BHSV 011	<	1	DT?
NB13I	11/4/97	TCLTFE	BHSV 010	<	1	T?
NB13I	12/2/97	TCLTFE	BJBJ 007	<	1	T?
NB13I	12/2/97	TCLTFE	BJBJ 006	<	1	T?
NB13I	1/6/98	TCLTFE	BJJX 010	<	1	T?
NB13I	1/6/98	TCLTFE	BJJX 011	<	1	DT?
NB13I	2/3/98	TCLTFE	BJNK 010	<	1	T?
NB13I	3/3/98	TCLTFE	BJQQ 010	<	1	T?

APPENDIX K.3

FISCAL YEAR 1998 INFLUENT/EFFLUENT DATABASE
PGRS, TCAAP
NEW BRIGHTON, MINNESOTA

Site ID	*Sample Date*	*Chemical*	*Lot ID*	*Concentration*	*Flag Codes/ Data Qualifiers*
NB13I	3/3/98	TCLTFE	BJQQ 011	< 1	DT?
NB13I	4/7/98	TCLTFE	BJRN 005	< 1	T?
NB13I	4/7/98	TCLTFE	BJRN 006	< 1	DT?
NB13I	5/28/98	TCLTFE	BJWN 006	< 1	DT?
NB13I	5/28/98	TCLTFE	BJWN 005	< 1	T?
NB13I	6/2/98	TCLTFE	BJWN 011	< 1	DT?
NB13I	6/2/98	TCLTFE	BJWN 010	< 1	T?
NB13I	7/7/98	TCLTFE	BJZW 005	< 1	T
NB13I	7/7/98	TCLTFE	BJZW 006	< 1	TD
NB13I	8/4/98	TCLTFE	BKCX 009	< 1	T?
NB13I	8/4/98	TCLTFE	BKCX 010	< 1	T?
NB13I	9/1/98	TCLTFE	BKHW 006	< 1	T?
NB13I	9/1/98	TCLTFE	BKHW 007	< 1	DT?
NB13I	10/7/97	TRCLE	BHDG 006	1.76	
NB13I	11/4/97	TRCLE	BHSV 010	1.36	?
NB13I	11/4/97	TRCLE	BHSV 011	1.54	D?
NB13I	12/2/97	TRCLE	BJBJ 007	1.54	?
NB13I	12/2/97	TRCLE	BJBJ 006	1.42	?
NB13I	1/6/98	TRCLE	BJJX 010	1.84	?
NB13I	1/6/98	TRCLE	BJJX 011	1.57	D?
NB13I	2/3/98	TRCLE	BJNK 010	1.91	?
NB13I	3/3/98	TRCLE	BJQQ 011	1.23	D?
NB13I	3/3/98	TRCLE	BJQQ 010	1.34	?
NB13I	4/7/98	TRCLE	BJRN 005	1.07	?
NB13I	4/7/98	TRCLE	BJRN 006	1.11	D?
NB13I	5/28/98	TRCLE	BJWN 006	0.729	D?
NB13I	5/28/98	TRCLE	BJWN 005	0.741	?
NB13I	6/2/98	TRCLE	BJWN 011	0.621	D?
NB13I	6/2/98	TRCLE	BJWN 010	0.681	?
NB13I	7/7/98	TRCLE	BJZW 005	1.01	
NB13I	7/7/98	TRCLE	BJZW 006	0.953	D
NB13I	8/4/98	TRCLE	BKCX 009	0.98	?
NB13I	8/4/98	TRCLE	BKCX 010	1.14	D?
NB13I	9/1/98	TRCLE	BKHW 006	1.47	?
NB13I	9/1/98	TRCLE	BKHW 007	1.68	D?

Notes:

Concentrations in µg/L.
See Appendix D.2 for chemical abbreviation cross references.

? Control chart not yet approved by USAEC.
D Duplicate analysis.
T Non-target compound analyzed for but not detected (non-GS/MS methods)

APPENDIX L

Appendix L

Other Installation Restoration Activities During FY 1998

L.1 Other Installation Restoration Activities During FY 1998

Appendix L.1

Other Installation Restoration Activities During FY 1998

This appendix is intended to give the reader a brief overview of other activities at TCAAP which are related to the Installation Restoration Program, but are not required by the RODs for OU1 through OU3. These activities are not part of the performance evaluation or the performance monitoring programs.

A. BACKGROUND MONITORING

1. Deep Groundwater

In order to periodically assess the quality of deep groundwater flowing from off-site to beneath TCAAP, monitoring is performed at locations near the upgradient side of TCAAP (the northeast corner and east side). Monitoring for this purpose is performed at well locations.

03U007, 03L007, 03U009, 04U007, 04U510

For FY 1998, these wells were not scheduled for sampling. These locations will be sampled again in FY 1999 as shown in Appendix H.1 (the wells are listed under TGRS in the appendix).

2. Surface Water

The FY 1999 - FY 2002 Surface Water Monitoring Plan is presented in Appendix H.3. The FY 1998 monitoring plan was previously submitted and approved as part of the FY 1996 Annual Monitoring Report. Although an NPDES permit is no longer in effect, monitoring for the Building 103 (Site K) treatment system effluent (Outfall 010) is being done to meet the Final Modified Substantive Requirements Document (MN U000579) dated November 19, 1997. The data for Outfall 010 is presented in Table 8.4, where it is listed as "effluent."

In addition, the Army has chosen to monitor Rice Creek as it enters and exits TCAAP (monitoring points 20700 and 20800, respectively). This monitoring is simply intended to establish baseline characteristics for Rice Creek. The FY 1998 data is presented in Appendix L.2.

B. AQUATIC STUDIES

The U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM) led the following studies for Sunfish Lake and Round Lake during FY 1998:

- Tier I Screening Risk Assessment (approved)
- Tier II Bioavailability Study (approved)
- Tier II Sediment Toxicity Study (approved)
- Tier II Ecological Risk Assessment Work Plan (under review)

C. GRENADE RANGE

Alliant Techsystems prepared and submitted an Engineering Evaluation/Cost Analysis (EE/CA) during FY 1997. Approval was received in FY 1998. Pending the availability of funds, the removal action to address contaminated soils may begin in FY 1999.

D. OUTDOOR FIRING RANGE

Alliant Techsystems prepared and submitted an Engineering Evaluation/Cost Analysis (EE/CA) during FY 1997. Approval was received in FY 1998 and the removal action Work Plan was started. The removal action to address contaminated soils is scheduled to begin in FY 1999.

E. NATURAL ATTENUATION STUDY

The USEPA funded and led a study of natural attenuation processes for the deep groundwater beneath TCAAP. Water quality sampling was performed in FY 1997 and additional sampling was performed in FY 1998. A report is expected in FY 1999.

F. PHYTOREMEDIATION STUDY

In FY 1997, the U.S. Army Environmental Center agreed to fund and lead a demonstration study of phytoremediation of soil at TCAAP. In FY 1998, a Work Plan was approved and the study was initiated. Corn was planted at Sites C and 129-3 in May 1998. The corn was harvested in August, at which time mustard was planted. The mustard was harvested later in the fall, early FY 1999. The study is scheduled for one more growing season, in 1999.

L.2 Surface Water Quality Data: FY 1998

APPENDIX L.2
Surface Water Data

Site ID		Sample Date		111TCE (ug/l)	11DCE (ug/l)	11DCLE (ug/l)	12DCLE (ug/l)	C12DCE (ug/l)	C2H3CL (ug/l)	CH2CL2 (ug/l)	T12DCE (ug/l)	TRCLE (ug/l)
20700		04-Dec-97	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20700		04-Dec-97	Lot	BJFN 009	BJFN 009	BJFN 009	BJFN 009	BJFN 009	BJFN 009	BJFN 009	BJFN 009	BJFN 009
20700		03-Mar-98	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20700		03-Mar-98	Lot	BJQF 003	BJQF 003	BJQF 003	BJQF 003	BJQF 003	BJQF 003	BJQF 003	BJQF 003	BJQF 003
20700		03-Mar-98	Value									
20700		03-Mar-98	Lot									
20700		03-Jun-98	Value	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00
20700		03-Jun-98	Lot	BJXV 005	BJXV 005	BJXV 005	BJXV 005	BJXV 005	BJXV 005	BJXV 005	BJXV 005	BJXV 005
20700		03-Jun-98	Value									
20700		03-Jun-98	Lot									
20700		01-Sep-98	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20700		01-Sep-98	Lot	BKHR 006	BKHR 006	BKHR 006	BKHR 006	BKHR 006	BKHR 006	BKHR 006	BKHR 006	BKHR 006
20700		01-Sep-98	Value									
20700		01-Sep-98	Lot									
20800		04-Dec-97	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20800		04-Dec-97	Lot	BJFN 008	BJFN 008	BJFN 008	BJFN 008	BJFN 008	BJFN 008	BJFN 008	BJFN 008	BJFN 008
20800	D	04-Dec-97	Value									
20800	D	04-Dec-97	Lot									
20800		03-Mar-98	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20800		03-Mar-98	Lot	BJQF 006	BJQF 006	BJQF 006	BJQF 006	BJQF 006	BJQF 006	BJQF 006	BJQF 006	BJQF 006
20800		03-Mar-98	Value									
20800		03-Mar-98	Lot									
20800		03-Jun-98	Value	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00
20800		03-Jun-98	Lot	BJXV 003	BJXV 003	BJXV 003	BJXV 003	BJXV 003	BJXV 003	BJXV 003	BJXV 003	BJXV 003
20800	D	03-Jun-98	Value	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00	V <1.00
20800	D	03-Jun-98	Lot	BJXV 004	BJXV 004	BJXV 004	BJXV 004	BJXV 004	BJXV 004	BJXV 004	BJXV 004	BJXV 004
20800		03-Jun-98	Value									
20800		03-Jun-98	Lot									
20800	D	03-Jun-98	Value									
20800	D	03-Jun-98	Lot									
20800		01-Sep-98	Value	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
20800		01-Sep-98	Lot	BKHR 003	BKHR 003	BKHR 003	BKHR 003	BKHR 003	BKHR 003	BKHR 003	BKHR 003	BKHR 003
20800	D	01-Sep-98	Value									
20800	D	01-Sep-98	Lot									
20800		01-Sep-98	Value									
20800		01-Sep-98	Lot									

APPENDIX L.2
Surface Water Data

Site ID		Sample Date		OILGR (ug/l)	TOC (ug/l)	AG (ug/l)	CD (ug/l)	CR (ug/l)	CU (ug/l)	CYN (ug/l)	HG (ug/l)	NI (ug/l)
20700		04-Dec-97	Value	108.00	13000.00	<10.00	<5.00	<10.00	<20.00	<10.00	<0.20	<40.00
20700		04-Dec-97	Lot	BJFM 003	BHZV 003	BJCK 007	BJCK 007	BJCK 007	BJCK 007	BJCM 003	BJCD 006	BJCK 007
20700		03-Mar-98	Value	132.00	8760.00	<10.00	<5.00	<10.00	<20.00	JP 2.13	0.10	<40.00
20700		03-Mar-98	Lot	BJRF 002	BJQJ 002	BJPZ 003	BJPZ 003	BJPZ 003	BJPZ 003	BJQS 002	BJPX 003	BJPZ 003
20700		03-Mar-98	Value									
20700		03-Mar-98	Lot									
20700		03-Jun-98	Value	V <200.00	V 18900.00					V <10.00	V <0.10	
20700		03-Jun-98	Lot	BJYX 004	BJWR 004					BJZD 004	BJWH 012	
20700		03-Jun-98	Value									
20700		03-Jun-98	Lot									
20700		01-Sep-98	Value		19300.00					JP <10.00		
20700		01-Sep-98	Lot		BKHP 003					BKHB 003		
20700		01-Sep-98	Value									
20700		01-Sep-98	Lot									
20800		04-Dec-97	Value	144.00	12100.00	<10.00	<5.00	<10.00	<20.00	<10.00	<0.20	<40.00
20800		04-Dec-97	Lot	BJFM 002	BHZV 002	BJCK 003	BJCK 003	BJCK 003	BJCK 003	BJCM 002	BJCD 003	BJCK 003
20800	D	04-Dec-97	Value			<10.00	<5.00	<10.00	<20.00			<40.00
20800	D	04-Dec-97	Lot			BJCK 004	BJCK 004	BJCK 004	BJCK 004			BJCK 004
20800		03-Mar-98	Value	159.00	8890.00	<10.00	<5.00	<10.00	<20.00	JP 2.70	<0.10	<40.00
20800		03-Mar-98	Lot	BJRF 003	BJQJ 003	BJPZ 007	BJPZ 007	BJPZ 007	BJPZ 007	BJQS 003	BJPX 006	BJPZ 007
20800		03-Mar-98	Value									
20800		03-Mar-98	Lot									
20800		03-Jun-98	Value	<200.00	V 14600.00					V <10.00	V <0.10	
20800		03-Jun-98	Lot	BJYX 002	BJWR 002					BJZD 002	BJWH 010	
20800	D	03-Jun-98	Value	V <200.00	V 15400.00					V <10.00	V <0.10	
20800	D	03-Jun-98	Lot	BJYX 003	BJWR 003					BJZD 003	BJWH 011	
20800		03-Jun-98	Value									
20800		03-Jun-98	Lot									
20800	D	03-Jun-98	Value									
20800	D	03-Jun-98	Lot									
20800		01-Sep-98	Value		17400.00					JP <10.00		
20800		01-Sep-98	Lot		BKHP 002					BKHB 002		
20800	D	01-Sep-98	Value									
20800	D	01-Sep-98	Lot									
20800		01-Sep-98	Value									
208		01-Sep-98	Lot									

APPENDIX L.2
Surface Water Data

Site ID		Sample Date		ZN (ug/l)	BOD (ug/l)	CL (ug/l)	COD (ug/l)	COLI (cpm)	NH3N2 (ug/l)	P4 (ug/l)	PO4ORT (ug/l)	TSS (ug/l)
20700		04-Dec-97	Value	<20.00		36300.00	50200.00		719.00	45.50	<200.00	9000.00
20700		04-Dec-97	Lot	BJCK 007		BJBF 003	BJFK 003		BJCN 003	BJDC 003	BJDL 003	BJDP 003
20700		03-Mar-98	Value	<20.00		F 37900.00	30900.00		624.00	75.00		5000.00
20700		03-Mar-98	Lot	BJPZ 003		BJRB 002	BJQC 002		BJQG 002	BJPR 002		BJQT 002
20700		03-Mar-98	Value		<6.00			<10.00				
20700		03-Mar-98	Lot		EYV 001			EYU 001				
20700		03-Jun-98	Value			FV 31100.00	V 75500.00		JPV 35.70	V 205.00	FV <200.00	V 38000.00
20700		03-Jun-98	Lot			BJWB 004	BJWS 005		BJYY 006	BJXY 004	BJWB 008	BJYW 005
20700		03-Jun-98	Value		30000.00			80.00				
20700		03-Jun-98	Lot		EZA 003			EYZ 003				
20700		01-Sep-98	Value			F 35600.00					F <100.00	
20700		01-Sep-98	Lot			BKJB 006					BKJB 006	
20700		01-Sep-98	Value		18.00			120.00				
20700		01-Sep-98	Lot		EZE 001			EZD 002				
20800		04-Dec-97	Value	JP 6.99		42900.00	58800.00		685.00	46.20	<200.00	
20800		04-Dec-97	Lot	BJCK 003		BJBF 002	BJFK 002		BJCN 002	BJDC 002	BJDL 002	
20800	D	04-Dec-97	Value	<20.00								14000.00
20800	D	04-Dec-97	Lot	BJCK 004								BJDP 002
20800		03-Mar-98	Value	<20.00		F 39100.00	33000.00		591.00	72.60		<4000.00
20800		03-Mar-98	Lot	BJPZ 007		BJRB 003	BJQC 003		BJQG 003	BJPR 003		BJQT 003
20800		03-Mar-98	Value		<6.00			<10.00				
20800		03-Mar-98	Lot		EYV 002			EYU 002				
20800		03-Jun-98	Value			FV 32600.00	V 86500.00		V 117.00	V 210.00	FV <200.00	V 35000.00
20800		03-Jun-98	Lot			BJWB 002	BJWS 003		BJYY 004	BJXY 002	BJWB 006	BJYW 003
20800	D	03-Jun-98	Value			FV 32600.00	V 79900.00		JPV 36.20	V 201.00	FV <200.00	V 36000.00
20800	D	03-Jun-98	Lot			BJWB 003	BJWS 004		BJYY 005	BJXY 003	BJWB 007	BJYW 004
20800		03-Jun-98	Value		56000.00			50.00				
20800		03-Jun-98	Lot		EZA 001			EYZ 001				
20800	D	03-Jun-98	Value		35000.00			30.00				
20800	D	03-Jun-98	Lot		EZA 002			EYZ 002				
20800		01-Sep-98	Value			F 38500.00					F <100.00	
20800		01-Sep-98	Lot			BKJB 003					BKJB 003	
20800	D	01-Sep-98	Value			F 38400.00					F <100.00	
20800	D	01-Sep-98	Lot			BKJB 004					BKJB 004	
20800		01-Sep-98	Value		19.00			280.00				
20800		01-Sep-98	Lot		EZE 002			EZD 001				