INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

FISCAL YEAR 2003 ANNUAL PERFORMANCE REPORT

Prepared for:

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

TECUMSEH/WENCK
INSTALLATION SUPPORT SERVICES

ALLIANT TECHSYSTEMS INC.
CONESTOGA-ROVERS & ASSOCIATES, INC.
SECOR INTERNATIONAL, INC.

JULY 2004
FINAL REPORT

Minnesota Pollution Control Agency

June 30, 2004

Mr. Michael R. Fix
Remedial Project Manager
Twin Cities Army Ammunition Plant
4700 Highway 10 – Suite A
Arden Hills, MN 55112- 3928

RE: Consistency Test for the Fiscal Year 2003 Annual Performance Report
Twin Cities Army Ammunition Plant
Arden Hills, Minnesota

Dear Mr. Fix:

Staff at the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (U.S. EPA) have completed review of the Fiscal Year 2003 Annual Performance Report (Report). Our review included the draft version of the Report dated February 12, 2004; MPCA comments dated March 31, 2004; U.S. EPA comments dated April 2, 2004; and Army's responses to our comments dated April 29, 2004. A comments resolution meeting was held on May 18, 2004. Redline changes were submitted on June 3, 2004. Both MPCA and U.S. EPA concurred with the redline changes on June 28, 2004.

You are hereby advised that, in accordance with Chapter XIV of the Federal Facility Agreement, with the incorporation of the aforementioned redline change pages as well as the additional items mentioned for inclusion in the Report in the June 3, 2004 cover letter from Mike Fix, the <u>Twin Cities Army Ammunition Plant Fiscal Year 2003 Annual Performance Report</u> passes the Consistency Test.

If you have any questions, please contact Dagmar Romano at (651) 296-7776 or Tom Barounis at (312) 353-5577.

Sincerely

Dagmar Romano

Dagmar M. Romano
Project Manager
Superfund Section
Majors and Remediation Division

Dagmar Romano

for Tom Barounis
Remedial Project Manager
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DMR:ais

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List of Acronyms

Alliant	-	Alliant Techsystems Inc.
Army	-	U.S. Army
AS/SVE	-	Air Sparging/Soil Vapor Extraction
BGRS	-	Boundary Groundwater Recovery System
CRA	-	Conestoga-Rovers and Associates, Inc.
CRDL	-	Contract Required Detection Limit
DNAPL	-	Dense Non-Aqueous Phase Liquid
EE/CA	-	Engineering Evaluation/Cost Analysis
ERIS	-	Environmental Restoration Information System
FFA	-	Federal Facilities Agreement
FY	-	Fiscal Year
GAC	-	Granular Activated Carbon
GOS	-	TGRS Global Operating Stratey
gpm	-	Gallons per Minute
HRC	-	Hydrogen Release Compound
IRA	-	Interim Remedial Action
LUC	-	Land Use Control
LUCIP	-	Land Use Control Implementation Plan
MCES	-	Metropolitan Council Environmental Services
MCLs	-	Maximum Contaminant Levels
MCLGs	-	Maximum Contaminant Level Goals
MDH	-	Minnesota Department of Health
MDL	-	Method Detection Limit
MOS	-	TGRS Micro Operating Strategy
MPCA	-	Minnesota Pollution Control Agency
NBM	-	New Brighton Municipal
NPL	-	National Priorities List

List of Acronyms (Cont.)

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
QAPP	-	Quality Assurance Project Plan
ROD	-	Record of Decision
scfm	-	Standard Cubic Feet per Minute
SDWA	-	Safe Drinking Water Act
SECOR	-	SECOR International, Inc.
SHAW	-	Shaw Environmental & Infrastructure, Inc. (formerly Stone & Webster)
SVE	-	Soil Vapor Extraction
TCAAP	-	Twin Cities Army Ammunition Plant
Tecumseh	-	Tecumseh Professional Associates, Inc.
TGRS	-	TCAAP Groundwater Recovery System
TSCA	-	Toxic Substances Control Act
TWISS	-	Tecumseh/Wenck Installation Support Services
µg/l	-	Micrograms per liter
USAEC	-	United States Army Environmental Center
USEPA	-	United States Environmental Protection Agency
VOC	-	Volatile Organic Compound
Wenck	-	Wenck Associates, Inc.

List of Chemical Abbreviations

Note: The abbreviations below are those that were required for data entry into the U.S. Army Environmental Center (USAEC) Installation Restoration Data Management Information System (IRDMIS), which was replaced by the USAEC Environmental Restoration Information System (ERIS) in November 2001. These abbreviations, though not used in ERIS, are still used in some tables and appendices presented in this report.

111TCE	-	1,1,1-Trichloroethane
112TCE	-	1,1,2-Trichloroethane
11DCE	-	1,1-Dichloroethene
11DCLE	-	1,1-Dichloroethane
12DCE	-	1,2-Dichloroethenes (*cis* and *trans* isomers)
12DCLB	-	1,2-Dichlorobenzene
12DCLE	-	1,2-Dichloroethane
12DCLP	-	1,2-Dichloropropane
13DCLB	-	1,3-Dichlorobenzene
14DCLB	-	1,4-Dichlorobenzene
2CLEVE	-	2-Chloroethyl vinyl ether
AG	-	Silver
BRDCLM	-	Bromodichloromethane
C12DCE	-	cis-1,2-Dichloroethene
C13DCP	-	cis-1,3-Dichloropropene
C2H3CL	-	Vinyl chloride
C2H5CL	-	Chloroethane
C6H6	-	Benzene
CCL3F	-	Trichlorofluoromethane
CCL4	-	Carbon tetrachloride
CH2CL2	-	Methylene chloride
CH3CL	-	Chloromethane

List of Chemical Abbreviations (Cont.)

CHBR3	-	Bromoform
CHCL3	-	Chloroform
CLC6H5	-	Chlorobenzene
CU	-	Copper
CYN	-	Cyanide
DBRCLM	-	Dibromochloromethane
ETC6H5	-	Ethylbenzene
HG	-	Mercury
MEC6H5	-	Toluene
P4	-	Phosphorus
PB	-	Lead
SB	-	Antimony
T12DCE	-	trans-1,2-Dichloroethene
T13DCP	-	trans-1,3-Dichloropropene
TCLEA	-	Tetrachloroethane
TCLEE	-	Tetrachloroethene
TCLTFE	-	1,1,2-Trichloro-1,2,2-trifluoroethane
TRCLE	-	Trichloroethene
XYLEN	-	Xylenes
ZN	-	Zinc

1.0 Executive Summary

This Fiscal Year 2003 (FY 2003) 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 2003 is defined as the period from October 1, 2002, through September 30, 2003.

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 supposed to?*

Table 1-1, at the end of this section, summarizes the status of remedial actions at the end of FY 2003. Following are highlights of the accomplishments for each operable unit.

Operable Unit 1 (OU1): Deep Groundwater

OU1 consists of the "north" plume of Volatile Organic Compound (VOC) groundwater contamination off the TCAAP installation. The final remedy for OU1 consists of pumping three primary 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 2003 are:

- Five private wells were sampled in FY 2003. Results for all five wells showed that no VOCs were detectable, indicating that none of these wells required offers for well abandonment and/or alternate water supply. Well #234352 (Nutter) was abandoned in FY 2003, based on sampling conducted prior to FY 2003. Also, a new well owner for well #234301 (Wolf) contacted the Army in FY 2003 and requested that this well be abandoned. The prior well owner had previously refused an Army offer for abandonment; however, the Army agreed to abandon this well for the new owner. Well #234301 (Wolf) was also abandoned in FY 2003.
- The Minnesota Department of Health (MDH) Special Well Construction Area remains in effect. The MDH has the regulatory responsibility to assure that wells constructed in the advisory area meet appropriate well construction and human health requirements.
- Evaluation of pumping rates and water quality trends support the interpretation that the extraction system is effectively containing contamination in the Prairie du Chien aquifer. The degree of containment remains under discussion between the Army, United States Environmental Protection Agency (USEPA), Minnesota Pollution Control Agency (MPCA), City of New Brighton, and Restoration Advisory Board.

- The Army, USEPA, MPCA, Restoration Advisory Board, and City of New Brighton continued discussions regarding modifying the OU1 ROD to remove the requirement for containment, and replacing it with a requirement to demonstrate that the plume is not spreading and that aquifer restoration is occurring. It is anticipated that the ROD modification will require demonstration of decreasing contaminant trends.
- The PGAC treated nearly 1.5 billion gallons of water and removed 835 pounds of VOCs during FY 2003. Approximately 16,814 pounds of VOCs have been removed since system startup.
- The effluent of the PGAC was in compliance with the applicable Safe Drinking Water Act criteria for the OU1 chemicals of concern.
- The treated groundwater was beneficially used in the New Brighton municipal water supply system.
- The overall monitoring data indicate that restoration is occurring in all three aquifers (Hillside Sand, Prairie du Chien, and Jordan), although the number of monitoring locations in the Jordan is more limited. Both the extent and magnitude of contamination appear to be stable or improving.

Operable Unit 2 (OU2)

OU2 is defined as the original 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 2003 are:

- Shallow Soil Sites
  - The Closeout Reports for Site 129-3 and Site 129-15 received regulatory approval, but final consistency will not be provided until concurrence on the land use control sections of these reports has been reached between the Army and the regulators or, alternatively, until the TCAAP LUCIP has received consistency approval from the regulators. A modification to the ROD that

will document the remedy selection for Site 129-15 was being prepared at the end of FY 2003.

- Closeout Reports for Sites A (excluding VOC-contaminated soils), E, H and 129-5 (which received regulatory approval prior to FY 2003) continued to await final consistency based on resolution of land use controls.
- At Site C, soil remediation work remained suspended during FY 2003 (work had been suspended in Summer 2002 due to high water table conditions). At that time, the project-to-date total soil quantity was 21,417 tons of soil stabilized and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. Additional characterization of Site C was completed in FY 2003 to provide information for evaluating soil remediation options. Options for completing soil remediation at this site were under discussion at the end of FY 2003.
- The Site A soil vapor extraction (SVE) system was removed and 688 cubic yards of VOC-contaminated soils were excavated from the Former 1945 Trench area and transported offsite to a permitted disposal facility (see additional discussion under Site A Shallow Groundwater below).

- Deep Soil Sites
  - At Site D, 1381 cubic yards of soils contaminated with metals and nitroglycerin were excavated by Shaw and transported off-site for disposal at a permitted disposal facility. A Site D Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003. A modification to the ROD to document the remedy selection for Site D shallow soils was being prepared at the end of FY 2003.
  - The Site G SVE system was dismantled. A technical memorandum recommending improvements to the Site G cover received regulatory approval and a subsequent work plan for the cover design also received regulatory approval. Cover construction was started in late FY 2003, with planned completion in early FY 2004.

- Site A Shallow Groundwater
    - Four extraction wells continued to provide containment and mass removal.
    - The system pumped at an average rate of 16.6 gallons per minute (gpm), exceeding the 15 gpm target rate.
    - The system removed approximately 2.1 pounds of VOCs during FY 2003, with a cumulative mass removal of 39 pounds since system start-up on May 31, 1994.
    - The extracted water was discharged to the sanitary sewer system in compliance with all discharge criteria.
    - Overall, the groundwater extraction system has reduced contaminant concentrations in groundwater. The two areas where chemicals of concern exceed cleanup levels are: in the vicinity of extraction well 01U352 for cis-1,2-dichloroethene and benzene, and in the vicinity of monitoring well 01U108 (source area) for tetrachloroethene.
    - In early FY 2001, the air sparging/soil vapor extraction (AS/SVE) system began operation to remediate VOC-contaminated soils and source area groundwater. Operation of the AS system was ceased in June 2001, due to concern regarding the lateral travel distance of sparged air. The AS system was implemented voluntarily and was not a requirement of the OU2 ROD. The SVE system operated continuously until August 21, 2002, when it was permanently shut down. The AS/SVE system removed approximately 536 pounds of VOCs during its period of operation.
    - Soil samples were collected within the source area in July 2002 (and previously in August 2001). In both events, the results showed minimal reduction in soil VOC concentrations. Since it appeared that many years of SVE system operation would be required before cleanup levels would be reached (if ever), the Army ceased SVE system operation on August 21, 2002, and submitted a work plan clarification to the USEPA and MPCA for excavation of the VOC-contaminated soils in the source area. The work plan clarification received regulatory approval in early FY 2003, and 688 cubic

yards of contaminated soil were excavated by Shaw and transported off-site to a permitted disposal facility. The Site A Former 1945 Trench Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003.

- Site I Shallow Groundwater
  - Sampling at Site I indicated no significant changes in VOC concentrations in Unit 1 monitoring wells in FY 2003. 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 5,169,650 gallons of water and maintained a continuous zone of capture downgradient of Building 103. A total of 7.1 pounds of VOCs were removed in FY 2003.
  - The extracted water was discharged to Rice Creek in compliance with all discharge criteria.

- Deep Groundwater
  - The TGRS operated in accordance with the OU2 ROD.
  - The TGRS probably operated at a rate sufficient to support the conclusion that the 5-µg/l TRCLE contour is hydraulically contained.
  - In FY 2003, the TGRS extracted and treated 891,274,000 gallons of water. The mass of VOCs removed was 3,041 pounds. The total VOC mass removed by the TGRS through FY 2003 is 185,977 pounds.
  - In November 1996, wells B12 and SC4 were shut down due to reductions in the plume size, as per agreements with the MPCA and USEPA.
  - The TGRS Operating Strategy (OS) was approved by the regulatory agencies and finalized in FY2003. The OS presents a Global Operation Strategy

(GOS) for the entire TGRS extraction system and a Micro Operation Strategy (MOS) for well groups.

- In November 2002, well B2 was shutdown and replaced with well B13 that began production in December 2002, as per the OS. The pumping capacity of Well B13 was approximately 100 gpm lower than expected.
- Beginning in December 2002, wells B7, B10, and SC3 were shut down and a larger capacity pump was installed at well B9 as per the OS.

<u>Operable Unit 3 (OU3): Deep Groundwater</u>

- The PGRS extraction well (NB13) was not used for remediation purposes during FY 2003. The City did operate the treatment system and well NMM#13 to satisfy peak water supply demands during the months of May 2003 through October 2003. The PGRS, including NB13 well were then returned to "standby" status in the event groundwater must be treated for contamination. This pumping was performed for municipal water supply purposes only; not for the purpose of groundwater remediation.

  Monitoring continued to show that the OU3 plume no longer extends to the extraction well.

Table 1-1

Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 1: Deep Groundwater				
#1: Alternate Water Supply/Well Abandonment	Yes	Yes	No	
#2: Drilling Advisories	Yes	Yes	No	
#3: Groundwater Containment	Yes	Yes	No	The containment requirement is under review.
#4: Removal of VOCs by GAC (Discharge Quality)	Yes	Yes	No	
#5: Discharge of Treated Water	Yes	Yes	No	
#6: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	
Operable Unit 2: Shallow Soil Sites				
#1-7: Soil Remediation				
Site A	Yes	Yes	Partially	Closeout Report for metals was partially approved; however, see Note 1 at the end of the OU2 section of this table. See OU2 Site A Shallow Groundwater (below) for status on VOC soils.
Site C	Yes	Partially	No	Site was partially excavated FY 2000 - 2002. Excavation was suspended in FY 2002 due to high water table. Additional characterization was done in FY 2003. An alternatives analysis for this site was under review at the end of FY 2003.
Site E	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.

Table 1-1 (continued)

Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Shallow Soil Sites (continued)				
#1-7: Soil Remediation (continued)				
Site H	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
Site 129-3	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
Site 129-5	Yes	Yes	Partially	Closeout Report was partially approved; however, see Note 1 at the end of the OU2 section of this table.
#8: Groundwater Monitoring	Yes	Yes	No	The 5-year monitoring was started in FY 2003, and will tentatively end in FY 2007.
#9: Characterization of Dumps:				
Site B	Yes	Yes	Yes	
Site 129-15	Yes	Yes	Partially	Closeout Report was partially approved in FY 2003; however, see Note 1 at the end of the OU2 section of this table. A modification to the ROD was being prepared at end of FY 2003.
Overall Remedy	Yes	Yes	Partially	

Note 1: Closeout report has been approved, but final consistency will not be provided until concurrence on the land use control section of the report has been reached between the Army and the regulators or, alternatively, until the TCAAP LUCIP has received consistency approval from the regulators.

Table 1-1 (continued)

Status of Remedial Actions: FY 2003

Remedy Component		Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Deep Soil Sites					
#1:	Groundwater Monitoring	Yes	Yes	No	
#2:	Restrict Site Access	Yes	Yes	No	
#3:	SVE Systems (Deep)	Yes	Yes	Partially	Deep SVE systems will not be required at Sites D or G. The Site D VOC Closeout Report received consistency in FY 2002. The Site G VOC Closeout Report is in progress.
#4:	Enhancements to SVE Systems	Yes	Yes	Yes	Neither system required operation with enhancements. The Site D SVE system was dismantled in FY 2001. The Site G SVE was dismantled in FY 2003.
#5:	Maintain Existing Site Caps	Yes	Yes	No	
#6:	Maintain Surface Drainage Controls	Yes	Yes	No	
#7:	Characterize Shallow Soils and Dump	Yes	Partially	No	For Site D, 1381 cubic yards of contaminated soil were removed and transported off-site for disposal in FY 2003. A Closeout Report and a modification to the ROD were under review at the end of FY 2003. For Site G, a tech memo recommending improvements to the Site G cover received regulatory approval in FY 2003. A work plan for the cover design was also approved in FY 2003 and cover construction was in progress at the end of FY 2003.
Overall Remedy		Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Site A Shallow Groundwater				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Groundwater Containment/Mass Removal	Yes	Yes	No	
#3: Drilling Advisory/Alternate Water Supply/Well Abandonment	Yes	Yes	No	
#4: Discharge of Extracted Water	Yes	Yes	No	
#5: Source Characterization/Remediation	Yes	Yes	No	SVE system operation was ceased near the end of FY 2002, due to minimal VOC removal rates. In FY 2003, a work plan to excavate the contaminated soil received regulatory approval. The SVE system was removed and 688 cubic yards of contaminated soil were excavated and transported off-site for disposal. A Closeout Report for the Former 1945 Trench soils was under regulatory review at the end of FY 2003.
Overall Remedy	Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Site I Shallow Groundwater				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Groundwater Extraction	No	No	No	Pilot study determined that extraction remedies are not feasible. An amendment to the OU2 ROD is being pursued to change to a monitoring based remedy.
#3: POTW Discharge	No	No	No	See above.
#4: Additional Investigation	Yes	Yes	No	See above.
Overall Remedy	Yes	Yes	No	See above.
Operable Unit 2: Site K Shallow Groundwater				
#1: Groundwater Monitoring	Yes	Yes	No	
#2: Sentinel Wells	Yes	Yes	Yes	
#3: Hydraulic Containment	Yes	Yes	No	
#4: Groundwater Treatment	Yes	Yes	No	
#5: Treated Water Discharge	Yes	Yes	No	
#6: Discharge Monitoring	Yes	Yes	No	
#7: Additional Investigation	Yes	Yes	Yes	Well 03U621 was added as a sentinel well and is sampled annually, as listed in the monitoring plan
Overall Remedy	Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2003

Remedy Component	Is the component being implemented?	Is the component doing what it is supposed to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Deep Groundwater				
#1: Hydraulic Containment and Contaminant Mass Removal	Yes	Yes	No	The TGRS Operating Strategy received consistency in FY2003 and was implemented in FY2003.
#2: Groundwater Treatment	Yes	Yes	No	
#3: Treated Water Discharge	Yes	Yes	No	
#4: Institutional Controls	Yes	Yes	No	
#5: Review of New Technologies	Yes	Yes	No	
#6: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	
Operable Unit 3: Deep Groundwater				
#1: Groundwater Extraction	Yes	Yes	No	The PGRS flowrate was reduced to 0 gpm in FY 2001 & 2002. Operation during FY 2003 was solely to satisfy peak water demand; not for the purpose of groundwater remediation.
#2: Groundwater Treatment	Yes	Yes	No	See above comment under Remedy Component #1.
#3: Use of Water for Municipal Supply	Yes	Yes	No	See above comment under Remedy Component #1.
#4: Groundwater Monitoring	Yes	Yes	No	
Overall Remedy	Yes	Yes	No	

2.0 Introduction

2.1 PURPOSE

This Fiscal Year 2003 Annual Performance Report is intended to:

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

for remedial actions at the New Brighton/Arden Hills Superfund site. Fiscal Year 2003 (FY 2003) extended from October 1, 2002, through September 30, 2003.

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 the original TCAAP property. OU2 also includes the shallow Site A plume that 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 5, 1992
- March 3, 1992
- November 23, 1993
- January 9, 1998
- May 12, 1998
- June 30, 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. Performance standards are then presented 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 2003, this document presents proposed monitoring for future years (Appendix A). Monitoring locations or items that are new in this year's report are shown in red color. The monitoring plan shows FY 2003 through FY 2007. The FY 2003 monitoring plan indicates the work that generated the results presented in this report. The FY 2004 monitoring plan is in progress. The monitoring plan is a moving 5-year time span (i.e., next year FY 2003 will drop off and FY 2008 will be added).

This report represents the collaboration of work performed by the Army and Alliant Techsystems Inc. (Alliant). On behalf of the Army, Tecumseh/Wenck Installation Support Services (TWISS) prepared Sections 2.0 through 6.0, and 11.0 of this report. On behalf of Alliant, SECOR International, Inc. (SECOR) prepared Sections 7.0, 8.0 and 10.0, and Conestoga-Rovers & Associates, Inc. (CRA) prepared Section 9.0. TWISS, SECOR, and CRA all contributed to Section 1.0.

2.2 SITE DESCRIPTION

The Twin Cities Army Ammunition Plant is a government-owned facility located in the northern portion of the Minneapolis – St. Paul metropolitan area, in Ramsey County, and is surrounded by the cities of New Brighton, Arden Hills, Mounds View, and Shoreview, Minnesota (Figure 2-1). For purposes of the TCAAP restoration program, the facility occupied approximately a four square mile area (approximately 2,370 acres) immediately east of U.S. Interstate Highway 35W and north of Ramsey County Highway 96 (i.e., this was the original TCAAP boundary). Alliant is the prime tenant on the installation. TWISS is the contracted operator.

TCAAP was constructed between August 1941 and January 1943, and formerly included 323 buildings with associated utilities and services to support production activities. TCAAP produced small-caliber ammunition and related materials, proof-tested small-caliber ammunition and items as required, and handled/stored strategic and critical materials for other government agencies. Production began in 1941 and then alternated between periods of activity and standby. The size of TCAAP has periodically shrunk as a result of property transfers. Most recently, in 2001, approximately 1,521 acres were reassigned to the National Guard Bureau. The remaining 774 acres of TCAAP was declared excess to the needs of the Department of Defense in 2002.

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 (see Figure 2-2 for locations). Sites F and J were remediated prior to the 1997 OU2 ROD, while the remaining sites are addressed in the OU2 ROD. Surface water and sediment on TCAAP are being addressed separately from the OU2 ROD.

Five other sites (the Grenade Range, the Outdoor Firing Range, the Trap Range, and the 135 and 535 Primer/Tracer Areas) are being addressed as Removal Actions separate from the OU2 ROD.

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 B, 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 in Tables B-1 and B-2 in Appendix B. The well index lists wells of concern, including the TCAAP designation, Minnesota unique number, and any other name(s) the wells may have. Locations of wells that are included in the TCAAP monitoring plan are shown on Figure B-2 (off-TCAAP wells) and Figure B-3 (on-TCAAP wells) in Appendix B. With a known well name, the location of that well can be determined using the "Edit, Find" or "Edit, Search" function and typing in the well name, which will highlight the desired well name on the figure. Available well logs can be viewed by selecting the well of interest in Table B-3 (on-TCAAP wells) and Table B-4 (off-TCAAP wells) in Appendix B (click on the well name with the mouse).

2.4 DATA COLLECTION, MANAGEMENT, AND PRESENTATION

Performance monitoring data was collected in accordance with the:

- FY 2003 Monitoring Plan for Groundwater Monitoring Wells
- FY 2003 Monitoring Plan for Remedial Treatment Systems
- FY 2003 Monitoring Plan for Surface Water
- New Brighton Water System Sampling and Analysis Plan

Data was collected principally by four parties: TWISS on behalf of the Army, SECOR and CRA on behalf of Alliant, and Barr Engineering on behalf of the City of New Brighton. Appendix C presents information on data collection, management, and presentation. Tables showing FY 2003 data are presented following the text at the end of each section in which it is referenced. The comprehensive groundwater level and groundwater quality databases from 1987 to present are contained in Appendix D. Groundwater quality trend graphs for the primary chemical of concern (trichloroethene) can be viewed by selecting the well of interest on Figure B-2 (off-TCAAP wells) and B-3 (on-TCAAP wells) in Appendix B (click on the well name with the mouse). The trend graphs for Site A also include tetrachloroethene and cis-1,2-dichloroethene, in addition to trichloroethene.

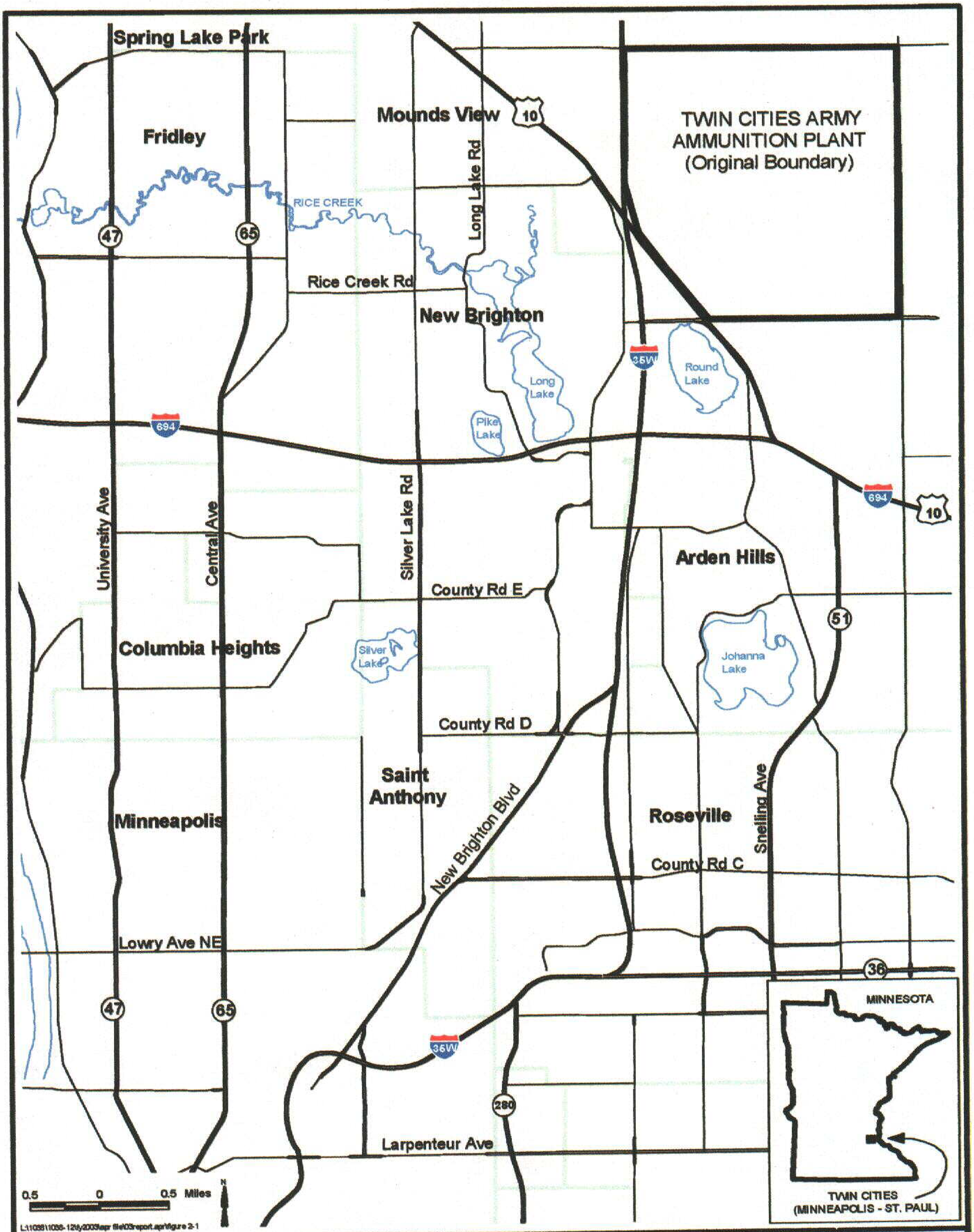
Is the data complete and representative (are we making decisions based on complete and technically-sound information)?

Yes. The data was collected, assessed, and validated in accordance with the FY 2003 Monitoring Plan and the "Remedial Design/Remedial Action, Quality Assurance Project Plan" (Montgomery Watson, 1996). The data tables in the various report sections and the comprehensive water quality databases (Appendix D) show the data qualifiers and flagging codes that were assigned to the data as a result of data assessment/validation. The data qualifiers and flagging codes applied to FY 2003 data are explained in footnotes on the data tables in the various report sections. Data assessments (performed on 100 percent of the data) and "full validation" (performed on at least 10 percent of the data) were provided to the MPCA and

USEPA in submittals dated March 4, June 3, October 9, and December 1, 2003. MPCA and USEPA approval letters for these submittals are included in Appendix C.3.

With regard to completeness, Appendix C.2 summarizes a few minor deviations from the FY 2003 Monitoring Plan. Field completeness for FY 2003 was 99% and laboratory completeness was 100%, meeting the QAPP completeness goal of 95%. Field duplicates, equipment rinse blanks, and matrix spike/matrix spike duplicates were collected at overall frequencies of 15%, 10% and 12%, exceeding the QAPP-specified frequencies of 10%, 10% and 5%, respectively. For the subset of metals analyses, matrix spike/matrix spike duplicates were collected at an overall frequency of 46%, also meeting the QAPP-specified frequency. Data validation was performed on 21% of the data, meeting the QAPP-specified requirement of 10%. No problems with analytical procedures/reporting were identified in the data validations.

The data for FY 2003 is deemed to be representative based on: 1) adherence to QAPP-specified sampling and laboratory analytical procedures; 2) completion of data assessments and data validation; and 3) comparability to historical results (any substantial deviations from historical/anticipated results are discussed within the site-specific sections of this report).



TWIN CITIES ARMY AMMUNITION PLANT

Site Location Map

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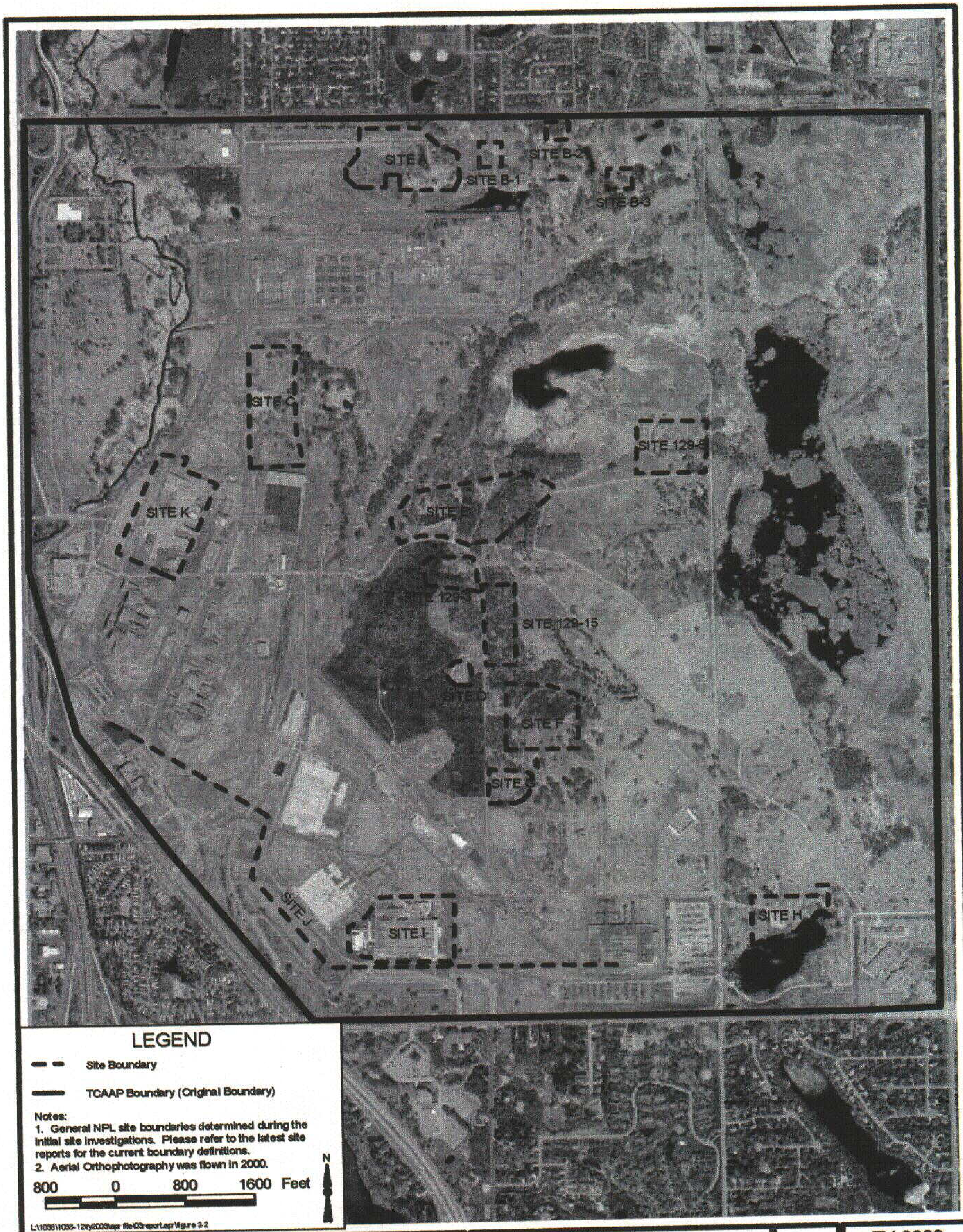
Wenck

Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2003

Figure 2-1



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
TCAAP Site Boundaries		Figure 2-2

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 primary municipal wells: New Brighton Municipal (NBM) #4, #14 and #15. NBM #3, which is located next to NBM #4, also contributes to containment, especially when one of the other three wells is off. 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 #3 and #4 were pre-existing wells. NBM #14 and NBM #15 began pumping in December 1996 and March 1998, respectively.

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 the owners of <u>all</u> wells that meet all of the following criteria have been offered and provided with an alternate water supply (or when the well owners have rejected the offers):
  - i. The well is located within the area affected by groundwater plumes that originate at TCAAP, as shown on Figures E-2 and E-3; 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 the owners of all wells that meet all of the following criteria have been offered and provided abandonment (or when the well owners have rejected the offers):
  - 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 has been implemented and is an ongoing program maintained by the Army. The process of identifying wells eligible for alternate water supply and/or abandonment is accomplished by maintaining a "well inventory." The well inventory is a database that was initially developed in 1992, and which has been periodically updated since then. For the purposes of the well inventory, a study area was established which encompasses the groundwater plume (the study area boundary is the same as the MDH Special Well Construction Area). The well inventory is intended to include all wells within the study area. Within the study area, areas of concern are defined by the edge of the groundwater plume, plus additional buffer area. The wells are grouped into categories based on factors such as location relative to the area of concern, type of use, active/non-active status, sealed, etc. Wells in categories with the potential to be impacted are periodically sampled to see if they qualify for alternate water supply and/or abandonment.

Thus, maintenance of the well inventory consists of the following tasks:

1. Check if the area of concern needs to be adjusted based on the extent of contamination,
2. Check if there are any previously unknown wells to be added to the database (in coordination with the MDH as described in Appendix E),
3. Sample wells on a prescribed schedule,
4. Take the appropriate course of action depending on the results,
5. Update the well inventory database with any new information (e.g., water quality results, owner information, construction information, well re-categorizing)
6. Report findings through the Annual Performance Report.

Additional information on the well inventory is presented in Appendix E. The following questions and answers summarize developments since the last Annual Performance Report with respect to Operable Unit 1.

Did the area of concern within OU1 change during FY 2003, as defined by the 1 μg/l contour line?

Yes. Figure 3-1 shows that the 1 ug/l contour line remained essentially the same between FY 2001 and FY 2003. However, due to the FY 2003 result for 04U843 (trichloroethene was nondetect), the 1 ug/l contour line moved inward in this area, thus decreasing the size of the area of concern in this vicinity.

Were any additional water supply wells discovered within the area of concern for OU1 that are completed within an aquifer of concern?

Yes (see Appendix E for additional information).

Were any water supply wells within the area of concern for OU1 sampled during FY 2003 (outside of those included in the OU1 performance monitoring plan)? If yes, what were the findings?

Yes, five wells were sampled in FY 2003, as discussed in Appendix E. Analytical results are summarized in Table E-2 and the well locations are illustrated on Figure E-5. Results for all five wells showed that no VOCs were detected.

Were any well owners offered an alternate water supply and/or well abandonment during FY 2003?

Yes. The owner of well #234352 (Nutter), who was offered well abandonment based on sampling conducted prior to FY 2003, accepted the offer and this well was abandoned in FY 2003 as part of Shaw's Phase II Well Abandonment work. Also, a new well owner for well #234301 (Wolf) contacted the Army and requested that this well be abandoned. The prior well owner had previously refused an offer for abandonment; however, the Army agreed to abandon this well for the new owner. Well #234301 (Wolf) was also abandoned in FY 2003 as part of Shaw's Phase II Well Abandonment work.

For OU1, are there any well owners that meet the criteria, but have not yet been provided an alternate water supply? No.

For OU1, are there any wells that meet the criteria, but have not yet been abandoned? No.

Is any sampling of water supply wells (excluding those included in the OU1 performance monitoring plan) proposed prior to the next report?
Yes, one well that should have been sampled in FY 2003 was inadvertently not sampled (see Appendix E for additional information). This well will be sampled in FY 2004. The next "major" sampling event will be in FY 2005.

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. In June 1999, the MPCA requested that the MDH extend the boundary of the Special Well Construction Area further to the southwest to the Mississippi River and Marshall Avenue to ensure that the southern boundary fully encompassed the plume. The MDH revised the Special Well Construction Area in December 1999. The current boundary is shown on Figure E-1 (Appendix E).

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 and began pumping in December 1996 and March 1998, respectively. The locations of the three recovery wells are 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 is not in operation. NBM #5 and NBM #6 are considered secondary alternates.

The extracted groundwater is used as part of the New Brighton water supply system, and as such, New Brighton took the lead on design and construction of the system, and is responsible for operation of the system. New Brighton contracted Barr Engineering to provide design and construction oversight 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 capture of groundwater with contaminant concentrations exceeding the cleanup standards specified on page 18 of the OU1 ROD.

During FY 2003, did the OU1 extraction system provide capture (at the containment boundary) of groundwater exceeding the cleanup standards specified on page 18 of the OU1 ROD?

The degree of containment remains under discussion between the Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board. In FY 2002, the Army prepared a technical memorandum (TWISS, December 2001) regarding the feasibility of a modification to the ROD. The contemplated change would be to switch from a requirement for containment, to a requirement for demonstrating that the plume is not spreading and that aquifer restoration is occurring. The Army, USEPA, MPCA, Restoration Advisory Board, and City of New Brighton have been meeting to work out technical issues regarding monitoring wells, frequency of sampling, and how to evaluate the data. These discussions are anticipated to be completed in FY 2004, which will enable the ROD modification process to move forward.

In the meantime, the extraction system has continued to operate. Following is a discussion of the performance of the system with respect to containment.

Pumping Rates

Table 3-1 presents the monthly pumping volumes for each extraction well and Figure 3-2 illustrates the average monthly pumping rate targets and actual monthly volumes pumped for NBM #3/4, #15 and #14 (west to east order). The pumping targets were derived by Barr Engineering based on their Final Conceptual Design Report, Containment/Production Wells (Barr, 1995). The operating system devised by Barr includes different operational conditions (named A thru G), which were designed to respond to maintenance issues by altering the target rates at each extraction well. Condition A is the normal operating condition for when NBM #4, #14 and #15 are all in operation, and has pumping targets (lower limits) of 1.19, 0.99 and 0.99 million gallons per day, respectively. Conditions B through F have different pumping targets for when different wells are out of service (e.g. a pumping target for NBM #3 is added whenever NBM #4, #14 or #15 are out of service, and pumping targets for NBM#5 and #6 are added whenever both NBM #3 and #4 are out of service). Condition G is unique from the other conditions because it does not have a pumping target (i.e., the targets for all wells are zero).

Condition G primarily applies during carbon change-outs for the GAC treatment system. Hence, the daily pumping targets can vary depending on what operating condition the system is in. The targets depicted on Figure 3-2 represent a collective or cumulative monthly target based on the daily operating conditions.

For FY 2003, the NBCGRS was in the normal operating condition (Condition A) approximately 79 percent of the time. The system was in Condition G (primarily for carbon change-outs) for 17 percent of the time, with other operating conditions comprising the remaining 4 percent of the time.

Figure 3-2 indicates that the NBCGRS, as a whole, exceeded the monthly targets in all months during FY 2003. The graph shows much lower targets in January and April 2003, and somewhat lower targets in February and May 2003. Also, the monthly pumping volumes in January, February and April 2003, were noticeably lower than the typical pumping volume in the other months. For substantial portions of the months cited above, the NBCGRS was in Condition G due to GAC change-outs that were performed in January/February and April/May. Although 3 months had noticeably lower pumping volumes, the pumping volumes for the other 9 months typically exceeded pumping targets by 20 to 40 percent. Looking at the total NBCGRS pumping volume for FY 2003 of 1470 million gallons, the average monthly pumping volume (if pumping was at a uniform rate) would be about 122 million gallons. Compared with the typical monthly pumping target of about 100 million gallons (for the normal operating condition), it is clear that the NBCGRS pumped substantially more than the minimum target rate.

The graphs for the extraction wells on Figure 3-2 show that all of the wells generally exceeded targets throughout the year, indicating that the pumping was appropriately distributed. NBM #4 was just slightly below the target in June 2003, but the volume pumped from NBM #3 in this month was in excess of the deficient amount. NBM #14 was about 10 percent below the target in October 2002. Pumping targets for the extraction wells were met in all other months.

The overall adherence to the pumping targets supports the interpretation that the extraction system is providing substantial containment in the Prairie du Chien.

Water Level Contour Analysis

Table 3-2 presents groundwater elevation data and Figure 3-3 shows water level contours in the Prairie du Chien, the interpreted capture boundary, and the 1 ug/l trichlorethene contour. The water level contours suggest that the extraction wells are containing the contamination in the Prairie du Chien along the required boundary across the plume.

Extraction Well Water Quality

Trend graphs for trichloroethene in NBM #3, #4, #14 and #15 are shown on Figure 3-4. At NBM #3, trichloroethene decreased dramatically between 1994 and 1998, then stabilized between 1998 and 2000, then increased slightly between 2000 and 2002, and has decreased slightly since then. The range in FY 2003 was 22 µg/l to 54 µg/l, with an average of 42 µg/l. NBM #4 also exhibits a similar decrease between 1994 and 1998, and has been relatively stable since then. The range in FY 2003 was 38 µg/l to 63 µg/l, with an average of 53 µg/l. NBM #14 has generally shown a decreasing trend since its startup in December 1996, though there seems to have been an upward spike in the latter part of 2003 (not in excess of typical concentrations observed in 2002). The range in FY 2003 was 14 µg/l to 62 µg/l, with an average of 27 µg/l. NBM #15 fluctuated between its startup in March 1998 and 2000, decreased slightly during 2001, and has been relatively stable since then. The range in FY 2003 was 62 µg/l to 99 µg/l, with an average of 85 µg/l.

While not conclusive in and of itself, the decreasing water quality trends at the extraction wells support the interpretation that the OU1 system is making progress towards aquifer restoration.

Monitoring Well Water Quality

Over the long-term, water quality data will be useful in evaluating containment. If containment is being achieved, decreases in contaminant concentrations should be evident in wells near and downgradient of the extraction wells. Trichloroethene versus time graphs are presented in

Figure B-2 of Appendix B (in electronic format, the graphs can be viewed by clicking on the well of interest). Following are some comments regarding key wells near the extraction system. (In electronic format, the individual graphs can be viewed by clicking on the well name below. To return to this point in the text, use the "Go to Previous View" button.)

04U839: Located west of the extraction wells near the west edge of the plume. The concentration has decreased to less than 1 ug/l, suggesting that the extraction system is effectively containing the west edge of the plume. All parameters are now below the cleanup levels at this well.

04U875: Located downgradient of the extraction system, south of 04U839. The concentration has decreased from 23 μg/l in 1993 to 7.1 μg/l in 2003, suggesting that the extraction system is effectively containing the west edge of the plume.

04U877: Located near the capture line south of NBM #14 and #15. The TCE concentration decreased to 1.9 μg/l, suggesting effective containment of the east edge of the plume.

409555: Located south of 04U877, near the east edge of the plume. This well has remained clean, indicating that conditions are not worsening downgradient of the extraction system along the east edge of the plume.

04U871: Located downgradient of NBM #4 and NBM #15, near the center of the plume. The concentration had declined from approximately 225 μg/l in 1996 to 25 μg/l in 2001, increasing slightly to 41 μg/l in 2002, and then declining to 32 ug/l in 2003.

04U872: Located downgradient of 04U871, this well shows a similar decline with the concentrations decreasing from approximately 170 μg/l in 1996 to 11 μg/l in 2003.

Overall, the declining concentrations support the Army's belief that the OU1 extraction system is effectively containing contamination in the Prairie du Chien, although other factors are contributing to the decreases (i.e., natural attenuation). The Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board continued discussions evaluating the performance of the OU1 remedy.

Are any changes or additional actions required for this remedy component?
Potential changes and/or additional actions will be addressed through the ROD modification process discussed previously.

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)

- Treatment by the PGAC (along with iron and manganese removal and chlorination) makes the recovered groundwater suitable for municipal drinking water purposes. The PGAC is located approximately one-third mile south of Interstate 694 near Silver Lake Road. 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) for the chemicals of concern, as identified on page 18 of the OU1 ROD.

Did the treated water meet the MCLs and non-zero MCLGs established by the SDWA for the OU1 chemicals of concern?

Yes. Table 3-3 shows that the PGAC effluent met the performance standard during FY 2003.

Each of the 8 pairs of GAC Contractors (labeled A and B) is normally run in series (i.e., water passes through A then B, or B then A, depending on whether the most recent carbon change-out was the A or B vessel). The sampling data is not from a combined effluent after the GAC vessels; instead, it is from sampling ports between the lead and lag GAC vessel *and/or* after the lag GAC vessel for each of the 8 GAC vessel pairs in the PGAC. The sampling between the lead and lag vessels is performed every month and determines when breakthrough of the lead GAC vessels has occurred. When there are no contaminant detections between the lead and lag vessels, there is no reason to sample after the lag vessels. When breakthrough of a lead vessel has occurred, a carbon change-out of all 8 lead vessels is scheduled. Until the change-out occurs, monthly samples are collected after each lag vessel (in addition to the monthly between-vessel samples) to ensure that water leaving the PGAC meets the treatment requirements. When the carbon change-out of the lead vessels is completed, the lead vessels are switched to the lag position and vice versa. Monthly sampling then reverts to only between the lead and lag vessels until a contaminant detection occurs, whereupon the process repeats.

Table 3-3 shows that two carbon change-outs occurred in FY 2003: one in January/February 2003 that was triggered by breakthrough detection, and one in April/May 2003, which was electively done to avoid having to conduct a change-out during the peak demand months of the summer (breakthrough had not yet been detected). The sampling results that represent PGAC effluent water quality are highlighted in Table 3-3 for ease of viewing the compliance portion of the data. There were no detections of VOCs in the samples representing PGAC effluent water quality.

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

Yes. Sampling will continue to 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 ongoing 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 through #5. Table 3-4 summarizes the

performance monitoring requirements, implementing parties, and the specific documents which contain the monitoring plans.

Were the groundwater monitoring requirements for this remedy met?
Yes, with one exception. Saint Anthony #3 was not sampled, since it was not in service at the time of the June sampling event. The monitoring plan does not require this well to be sampled unless it is in service.

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 Appendix E. The next "major" event will be in FY 2005.
- 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 A.1.

Are any changes or additional actions required for this remedy component?
Yes. The Army proposes to cease monitoring of 03L853, and instead, begin biennial monitoring of 03U821. The EPA had requested that 03U821 be sampled in FY 2003 as a "one-time event". As evident on Figure 3-8, these two wells are relatively close together and their screened intervals are very similar. 03L853 is really more indicative of Upper Unit 3 and is basically redundant to 03U821 (note that trichloroethene results were very similar for these two wells in FY 2003 at 27 and 41 ug/l). The proposed change is shown in Appendix A.1.

As part of the OU1 ROD Modification discussions, the USEPA and MPCA requested that the Army install three additional monitoring wells completed in the Jordan aquifer. The Army agreed and funding was secured in September 2003. The goal is to obtain regulatory approval for locations and construction details, secure access agreements, and complete installation in time for the June 2004 sampling event. Since the wells were not completed at the end of FY 2003, they are not yet shown on maps, but they are listed in the monitoring plan (Appendix A.1).

Also related to the OU1 ROD Modification, additional sampling has been added to support future statistical analysis. Wells O3U711/O4U711, O3M802/O3L802/O4U802, and O3L806 were changed from a biennial frequency to annual. Well O3M806 was changed from no sampling to annual. Wells O4U821, O4U849, and 191942 were changed from no sampling to biennially. Wells O3L859, O4U854, and 206688 were added for sampling in June 2004, and thereafter biennially. These changes are shown in Appendix A.1. While the changes are the result of OU1 discussions, note that some of the wells are listed in Appendix A.1 under the heading of TGRS or OU3.

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?

Table 3-5 presents the FY 2003 groundwater quality data for OU1. The trichloroethene concentrations are shown in plan view on Figures 3-5, 3-6, and 3-7, and in cross-section view on Figures 3-8, 3-9, and 3-10. As mentioned previously, Figure 3-1 shows how the 1 ug/l contour has changed with time for Upper Unit 4. Similarly, Figure 3-11 shows how the 100 ug/l contour has changed.

Collectively, these figures indicate that the extent of contamination has remained generally the same, with the following comments regarding comparison of FY 2001 versus FY 2003:

Upper Unit 3:

1) Well 409596 decreased to 1.5 ug/l, shifting the 1 ug/l and 10 ug/l contours inward.
2) Well 03U821, which had not been sampled in recent events, was 27 ug/l and resulted in slight shifting of the 100 ug/l contour location in this vicinity.

Lower Unit 3:

1) Well 03L673 decreased to 6.3 ug/l, eliminating the 10 ug/l contour in this vicinity.
2) Well 409557 decreased to 4.1 ug/l, shifting the 10 ug/l contour inward.
3) Well 409597 decreased to 87 ug/l, shifting the 100 ug/l contour inward.

Upper Unit 4:

1) Well 04U843, which had been on an increasing trend and was 38 ug/l in FY 2001, decreased to <1.0 ug/l, shifting the 1 and 10 ug/l contours inward.
2) 04U673 increased to 15 ug/l, creating an isolated 10 ug/l contour in this vicinity.
3) Well 04U846 increased to 21 ug/l, shifting the 1 and 10 ug/l contours outward (this well has been fluctuating from near zero to near 100 ug/l).
4) Well 409549 increased to 20 ug/l, shifting the 10 ug/l contour outward.
5) Well 206688 increased to 13 ug/l, shifting the 10 ug/l contour outward (this well has been fluctuating from just above to just below 10 ug/l).
6) Well 234546 increased to 22 ug/l, shifting the 10 ug/l contour outward (this well had been fluctuating in a range of approximately 30 to 60 ug/l, until the FY 2001 result of 1.1 ug/l, suggesting that the FY 2001 value may be anomalous).

Trichloroethene trend graphs can be viewed from Figure B-2 (Appendix B). The graphs best illustrate the long-term changes that have occurred throughout OU1. Wells both upgradient and downgradient of the extraction system generally show comparable to decreasing concentrations relative to FY 2001 (see specific discussions of trichlorethene trends below). Decreases in concentrations can be attributed to a combination of:

1) Plume containment at the TCAAP boundary,
2) Mass removal through the OU1 extraction system, and

3) Natural attenuation.

For Upper Unit 3, Well 409550 decreased from 200 to 100 ug/l, continuing its steady decrease in concentration. Well 03U822 increased slightly, going from 250 to 280 ug/l, but was still down from the historic high of close to 400 ug/l in 1999. Other Upper Unit 3 wells are all perimeter wells, and all remained at or near non-detectable concentrations.

For Lower Unit 3, most wells decreased or were basically the same, except that 03M848 increased from 370 to 450 ug/l. However, looking at the data since the historic high of approximately 1400 ug/l in 1996, the trend still appears to be generally decreasing.

For Upper Unit 4, most wells decreased or were basically the same. Exceptions include the five previously-mention wells (04U673, 04U846, 409549, 206688, and 234546). A few other exceptions include 04U861, where the concentration increased from 19 to 48 ug/l. The cause for the increasing trend in this well is not clear. At 04U844, the concentration increased from 400 to 470 ug/l. The trend graph shows that the concentration had generally decreased from the initial concentration of over 1000 ug/l in 1993 to about 500 ug/l in 1998. Ignoring an anomalous value of 22 ug/l in 1999, this well seems to be remaining relatively stable in the 400 to 500 ug/l range. At 04U836, the concentration increased from 11 to 18 ug/l. The trend graph shows that the concentration has generally decreased from the initial concentration of almost 40 ug/l in 1998.

Overall, the monitoring data indicates that aquifer restoration is occurring in the Prarie du Chien. Both the extent and magnitude appear to be stable or improving.

Vertical gradients for well nests throughout OU1 are presented in Table 3-6. In general for OU1, the gradients indicate that groundwater moves downward from the Prairie du Chien into the Jordan. At the 836 well 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, near NBM #4, most of the trichloroethene is in the Prairie du Chien (18 µg/l) versus the Jordan (0.82 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 well nest near NBM #15 and the 838 well nest near NBM #14, the gradients are downward; however, pumping has reduced the magnitude. The gradients are approximately two times less than at the 839 well nest located further west, near the capture limit of the wells. The gradient at the 846 nest (upgradient of NBM #14), which had previously been consistently downward, appeared to be upward in FY 2003. Based on the consistency of prior data, this may be the result of a data collection error. In particular, it appears that 04U846 may be an errantly high reading, as it appears to be higher than expected when looking at groundwater elevations in surrounding Unit 4 wells (Figure 3-3).

With respect to the Jordan, near the TCAAP boundary at PJ #806, the trichloroethene concentration decreased from 180 µg/l in 2001 to 80 µg/l in 2003, continuing a downward trend. In the vicinity of the OU1 extraction wells, from west to east, the trichloroethene concentrations were:

	FY 1998	FY 1999	FY 2001	FY 2003
04J839	1.74 µg/l	1.80 µg/l	<1.0 µg/l	0.48 µg/l
04J836	3.91 µg/l	4.20 µg/l	0.41 µg/l	0.82 µg/l
04J837	147 µg/l	60 µg/l	27 µg/l	13 µg/l
04J838	39.8 µg/l	46 µg/l	12 µg/l	4.2 µg/l

Downgradient of the extraction system at NBM #5 and #6 (both completed in the Jordan only), the trichloroethene concentrations were similar from 2001 to 2003 (130 versus 140 µg/l and 85 versus 90 µg/l, respectively). Further south at St. Anthony Municipal #5 and #4 (both completed in the Jordan only), the trichloroethene concentrations were similar from 2001 to 2003 (16 versus 16 µg/l and 23 versus 22 µg/l, respectively).

Overall, the monitoring data indicates that aquifer restoration is occurring in the Jordan, as contaminant concentrations appear to be stable or improving. This conclusion is based on a more limited number of monitoring locations, relative to the other aquifers.

How much VOC mass has been removed (at each well and total)?
Table 3-1 shows that the NBCGRS removed 835 pounds of VOCs during FY 2003. The relative contribution from each extraction well was 38% from NBM #3/4, 14% from NBM #14, and 46% from NBM #15 (with a combined 2% from other extraction wells). The total cumulative VOCs removed by the NBCGRS is 16,814 pounds.

Figure 3-12 shows annual VOCs removed (listed at the top of the graph), annual pumping volumes, and the trend in annual mass removal per unit volume pumped since FY 1997 (when NBM #14 was brought online). Although the mass removal in FY 2003 was slightly increased over FY 2002 (835 versus 767 pounds), this is due to the increase in pumping volumes between those two years (1.5 versus 1.2 billion gallons). The trend in annual mass removal per unit volume pumped continued to decrease from FY 2002 to FY 2003 and has been on a decreasing trend since FY 1998, when the last extraction well was brought online (NBM #15). This overall decline in the mass removal trend agrees with the trichloroethene trends in OU1 deep groundwater, which generally show a decreasing trend, and suggests that aquifer restoration is progressing.

Besides the changes already discussed, are any other changes or additional actions required for OU1? No. The Army, USEPA, MPCA, City of New Brighton, and Restoration Advisory Board are continuing to discuss the contemplated change from a requirement for containment, to a requirement for demonstrating that the plume is not spreading and that aquifer restoration is occurring. The parties will continue to work out technical issues regarding monitoring wells and frequency of sampling (as noted by the changes described in Section 3.6), and how to evaluate the data in support of a ROD modification. As also discussed in Section 3.6, the Army is proceeding with installation of three additional monitoring wells in the Jordan aquifer.

Table 3-1
OU1 Pumping/VOC Mass Removal Data

Fiscal Year 2003

		NBCGRS Wells						Total NBCGRS Wells
		Well # 3	Well # 4	Well # 5	Well # 6	Well # 14	Well # 15	
Oct-02	Pumpage (1000 gals)	10,874	39,392	4,394	136	27,777	39,909	122,482
	VOC Level (ug/l)	55	63	170	100	34	120	
	Total VOCs (lbs)	5.0	21	6.2	0.1	7.9	40	80
Nov-02	Pumpage (1000 gals)	18,080	38,527	180	160	32,600	38,540	128,087
	VOC Level (ug/l)	49	58	140	96	27	120	
	Total VOCs (lbs)	7.4	19	0.2	0.1	7.3	39	72
Dec-02	Pumpage (1000 gals)	16,877	39,745	138	137	39,216	40,190	136,303
	VOC Level (ug/l)	46	54	140	86	29	100	
	Total VOCs (lbs)	6.5	18	0.2	0.1	9.5	34	68
Jan-03	Pumpage (1000 gals)	3,075	26,499	185	150	26,637	26,839	83,385
	VOC Level (ug/l)	50	62	170	100	30	120	
	Total VOCs (lbs)	1.3	14	0.3	0.1	6.7	27	49
Feb-03	Pumpage (1000 gals)	12,991	28,214	244	203	25,983	31,361	98,996
	VOC Level (ug/l)	68	77	160	92	18	77	
	Total VOCs (lbs)	7.4	18	0.3	0.2	3.9	20	50
Mar-03	Pumpage (1000 gals)	16,874	37,827	136	110	37,515	39,955	132,417
	VOC Level (ug/l)	69	70	170	100	25	97	
	Total VOCs (lbs)	9.7	22	0.2	0.1	7.8	32	72
Apr-03	Pumpage (1000 gals)	3,861	26,736	117	98	23,222	28,653	82,687
	VOC Level (ug/l)	48	72	160	100	15	78	
	Total VOCs (lbs)	1.5	16	0.2	0.1	2.9	19	39
May-03	Pumpage (1000 gals)	19,602	33,651	98	96	34,863	39,282	127,592
	VOC Level (ug/l)	69	78	170	100	27	96	
	Total VOCs (lbs)	11	22	0.1	0.1	7.9	31	73
Jun-03	Pumpage (1000 gals)	21,680	36,348	106	6,026	39,385	31,397	134,942
	VOC Level (ug/l)	63	73	160	110	31	110	
	Total VOCs (lbs)	11	22	0.1	5.5	10	29	78
Jul-03	Pumpage (1000 gals)	22,463	39,294	88	70	41,195	41,101	144,211
	VOC Level (ug/l)	61	72	171	113	41	123	
	Total VOCs (lbs)	11	24	0.1	0.1	14	42	92
Aug-03	Pumpage (1000 gals)	17,439	44,560	54	44	43,953	44,631	150,681
	VOC Level (ug/l)	46	60	170	110	75	110	
	Total VOCs (lbs)	6.7	22	0.1	0.04	28	41	98
Sep-03	Pumpage (1000 gals)	12,282	39,987	317	236	35,362	40,183	128,367
	VOC Level (ug/l)	28	48	140	88	41	97	
	Total VOCs (lbs)	2.9	16	0.4	0.2	12	33	64
Fiscal Year 2003 Totals:								
	Pumpage (1000 gals)	176,098	430,780	6,057	7,466	407,708	442,041	1,470,150
	Total VOCs (lbs)	82	233	8	7	118	386	835

Table 3-2
OU1 Groundwater Level Data

Fiscal Year 2003

Well ID	TOS (ft)	Groundwater Elevation (ft)	Well ID	TOS (ft)	Groundwater Elevation (ft)
03L811	908.43	846.37	04U847	916.84	846.36
03L822	876.60	837.30	04U849	873.00	831.64
03L841	911.27	845.27	04U850	916.80	831.05
03L846	887.61	830.56	04U855	896.10	835.32
03L853	888.80	838.10	04U871	957.10	821.52
03M843	885.70	838.26	04U872	952.20	819.87
03U811	908.19	847.30	04U875	1013.60	821.12
03U821	878.00	837.68	04U877	920.86	829.69
03U822	876.70	837.29	04U879	945.60	830.48
03U831	888.60	837.39	04U880	972.00	818.24
04J834	946.11	809.78	04U881	976.50	816.69
04J836	1000.88	825.13	04U882	917.70	813.26
04J837	928.62	827.23	04U883	948.60	811.70
04J838	879.80	829.43	PJ#318	983.00	814.79
04J839	987.43	826.83	191942	880.50	837.13
04J882	884.80	808.33	409547	896.00	840.07
04U821	877.60	837.32	409548	867.00	832.79
04U834	945.70	814.17	409549	921.30	830.86
04U836	1000.15	821.36	409550	912.00	847.51
04U837	928.38	829.90	409555	923.00	823.52
04U838	879.97	831.78	409556	960.00	829.83
04U839	987.15	829.96	409557	896.00	837.40
04U841	911.49	846.77	409596	880.40	837.19
04U843	886.10	837.64	409597	880.30	837.23
04U844	884.49	835.89	512761	891.20	810.24
04U846	888.39	833.51			

Notes:

TOS = Top of Surface which represents the ground surface elevation in feet above mean sea level (MSL).

Groundwater elevations were measured on June 4, 2003.

Table 3-3
OU1, PGAC Effluent Water Quality

Fiscal Year 2003

	Influent Well Monitoring						Operational Performance Monitoring															
Sampling	Well	Well	Well	Well	Well	Well	Contactor #1		Contactor #2		Contactor #3		Contactor #4		Contactor #5		Contactor #6		Contactor #7		Contactor #8	
Date	#3	#4	#5	#6	#14	#15	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
"A" Vessels are the Lead Vessels.																						
31-Oct-02	55	63	170	100	34	120	0	NS	0	NS	1.6	NS	0	NS	0	NS	0	NS	0	NS	0	NS
3-Nov-02	49	58	140	96	27	120	0	0	1.2	0	2.2	0	1.4	0	1.2	0	1.1	0	0	0	0	0
31-Dec-02	46	54	140	86	29	100	1.6	0	1.8	0	3.7	0	1.8	0	1.6	0	1.9	0	1.7	0	1	0
31-Jan-03	50	62	170	100	30	120	2.1	0	2.1	0	4.4	0	2.3	0	2	0	2.1	0	2.1	0	1.3	0
GAC replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between January 7, 2003 and February 3, 2003. "B" Vessels become the Lead Vessels.																						
28-Feb-03	68	77	160	92	18	77	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
31-Mar-03	69	70	170	100	25	97	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
GAC replaced in contactors 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B between April 8, 2003 and May 6, 2003. "A" Vessels become the Lead Vessels.																						
30-Apr-03	48	72	160	100	15	78	0	NS	0	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
31-May-03	69	78	170	100	27	96	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
30-Jun-03	63	73	160	110	31	110	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
31-Jul-03	61	72	171	113	41	123	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
31-Aug-03	46	60	170	110	75	110	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
30-Sep-03	28	48	140	88	41	97	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS

Notes:

1) All water quality results shown are for Total VOCs (ug/l).

2) NS = Not Sampled.

3) The highlighted results indicate those results that are representative of effluent water quality for the given pair of contactor vessels (only the A or B vessel result is highlighted since vessels are operating in series).

Table 3-4
Summary of OU1 Monitoring Requirements

Remedy Component	Monitoring Requirements	Implementing 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	a. Verification that drilling advisories are in place and functioning as intended	Army/MDH	N/A
#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
	c. Water quality, especially downgradient of the extraction system, to assist in evaluation of containment.	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	a. Verification of discharge	New Brighton	N/A
#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

Table 3-5
OU1 Groundwater Quality Data

Fiscal Year 2003

			Trichloro-ethene (ug/l)	1,1-Dichloro-ethene (ug/l)	cis-1,2-Dichloro-ethene (ug/l)	1,1,1-Trichloro-ethane (ug/l)	1,1,2-Trichloro-ethane (ug/l)	1,1-Dichloro-ethane (ug/l)
OU1 Cleanup Level (1)			5	6	70	200	3	70
03L811		6/6/2003	<1.0	2.0	JP 0.39	<1.0	<1.0	4.9
03L822		6/16/2003	410 (JH4)	16 (JH4)	4.0 (JH4)	14 (JH4)	<1.0 (JH4)	10 (JH4)
03L822	D	6/16/2003	620	20	4.1	19	<1.0	11
03L841		6/11/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
03L846		6/9/2003	<1.0	JP 0.20	<1.0	<1.0	<1.0	6.6
03L853		6/12/2003	41	1.6	<1.0	2.6	<1.0	1.6
03M843		6/6/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
03U811		6/6/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
03U821		6/16/2003	27	1.1	<1.0	<1.0	<1.0	1.4
03U822		6/16/2003	280	12	2.5	7.0	<1.0	14
03U831		6/9/2003	<1.0	<1.0	JP 0.83	<1.0	<1.0	JP 0.32
04J834		6/9/2003	JP 0.29	<1.0	<1.0	<1.0	<1.0	<1.0
04J836		6/10/2003	JP 0.82	<1.0	<1.0	<1.0	<1.0	<1.0
04J837		6/16/2003	11	JP 0.90	<1.0	<1.0	<1.0	1.4
04J837	D	6/16/2003	13	JP 0.95	<1.0	<1.0	<1.0	1.7
04J838		6/9/2003	4.2	JP 0.80	JP 0.78	<1.0	<1.0	2.8
04J839		6/5/2003	JP 0.48	<1.0	<1.0	<1.0	<1.0	<1.0
04J882		6/6/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U821		6/16/2003	33	2.3	<1.0	2.3	<1.0	2.1
04U834		6/16/2003	15	<1.0	<1.0	<1.0	<1.0	1.2
04U836		6/10/2003	18	1.2	<1.0	<1.0	<1.0	2.1
04U837		6/10/2003	2.2	<1.0	<1.0	<1.0	<1.0	<1.0

Table 3-5
OU1 Groundwater Quality Data

Fiscal Year 2003

			Trichloro-ethene (ug/l)	1,1-Dichloro-ethene (ug/l)	cis-1,2-Dichloro-ethene (ug/l)	1,1,1-Trichloro-ethane (ug/l)	1,1,2-Trichloro-ethane (ug/l)	1,1-Dichloro-ethane (ug/l)
OU1 Cleanup Level [(1)]			5	6	70	200	3	70
04U838		6/9/2003	JP 0.30	JP 0.18	<1.0	<1.0	<1.0	JP 0.95
04U839		6/6/2003	JP 0.34	<1.0	<1.0	<1.0	<1.0	<1.0
04U841		6/11/2003	5.0	JP 0.77	<1.0	<1.0	<1.0	1.0
04U843		6/12/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U844		6/17/2003	470	29	3.0	50	<1.0	16
04U846		6/9/2003	21	5.2	1.7	2.2	<1.0	10
04U847		6/17/2003	680	43	5.3	41	<1.0	30
04U849		6/12/2003	43	5.9	JP 0.45	4.7	<1.0	4.8
04U850		6/12/2003	32	3.2	JP 0.61	<1.0	<1.0	3.3
04U850	D	6/12/2003	34	3.2	JP 0.60	<1.0	<1.0	3.5
04U855		6/9/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U871		6/17/2003	32	1.6	<1.0	<1.0	<1.0	1.8
04U871	D	6/17/2003	26	1.3	<1.0	<1.0	<1.0	<1.0
04U872		6/13/2003	11	JP 0.47	<1.0	<1.0	<1.0	<1.0
04U872	D	6/13/2003	8.8	<1.0	<1.0	<1.0	<1.0	<1.0
04U875		6/12/2003	7.1	JP 0.59	<1.0	<1.0	<1.0	<1.0
04U877		6/13/2003	1.9	<1.0	<1.0	<1.0	<1.0	<1.0
04U879		6/10/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U879	D	6/10/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U880		6/11/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U881		6/9/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
04U882		6/11/2003	5.7	<1.0	<1.0	<1.0	<1.0	<1.0
04U883		6/11/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PJ#318		6/12/2003	4.2	<1.0	<1.0	<1.0	<1.0	<1.0

Table 3-5
OU1 Groundwater Quality Data

Fiscal Year 2003

			Trichloro-ethene (ug/l)	1,1-Dichloro-ethene (ug/l)	cis-1,2-Dichloro-ethene (ug/l)	1,1,1-Trichloro-ethane (ug/l)	1,1,2-Trichloro-ethane (ug/l)	1,1-Dichloro-ethane (ug/l)
OU1 Cleanup Level [(1)]			5	6	70	200	3	70
191942		6/13/2003	**81**	**10**	1.5	7.7	<1.0	11
200154		6/16/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
200524 *(SAM#5)*		6/16/2003	**16**	JP 0.82	<1.0	<1.0	<1.0	JP 0.86
200803 *(SAM#4)*		6/16/2003	**22**	1.0	<1.0	<1.0	<1.0	1.1
206688		8/5/2003	**13**	0.88	<1.0	<1.0	<1.0	0.95
206688	D	8/5/2003	**13**	0.96	<1.0	<1.0	<1.0	1.0
234546		6/17/2003	**22**	1.2	<1.0	<1.0	<1.0	<1.0
234549		6/17/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
409547		6/9/2003	<1.0	JP 0.78	1.2	2.0	<1.0	1.2
409548		6/11/2003	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
409549		6/11/2003	**20**	1.7	<1.0	<1.0	<1.0	1.8
409550		6/13/2003	**100**	4.3	1.2	2.8	<1.0	4.7
409555		6/5/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
409556		6/5/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
409557		6/11/2003	4.1	2.8	1.5	<1.0	<1.0	3.5
409596		6/13/2003	1.5	<1.0	<1.0	<1.0	<1.0	<1.0
409597		6/13/2003	**87**	**11**	1.6	4.6	<1.0	12
512761		6/17/2003	**30**	1.7	<1.0	<1.0	<1.0	1.6

Notes:

(1) Cleanup levels for OU1 deep groundwater are from page 18 of the OU1 ROD. Bolding (in red color) indicates exceedance of the cleanup level.

D Duplicate sample.

JH The sample was was analyzed after the allowable holding time (number of days after holding time is listed after "JH"). Results should be considered estimated.

JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

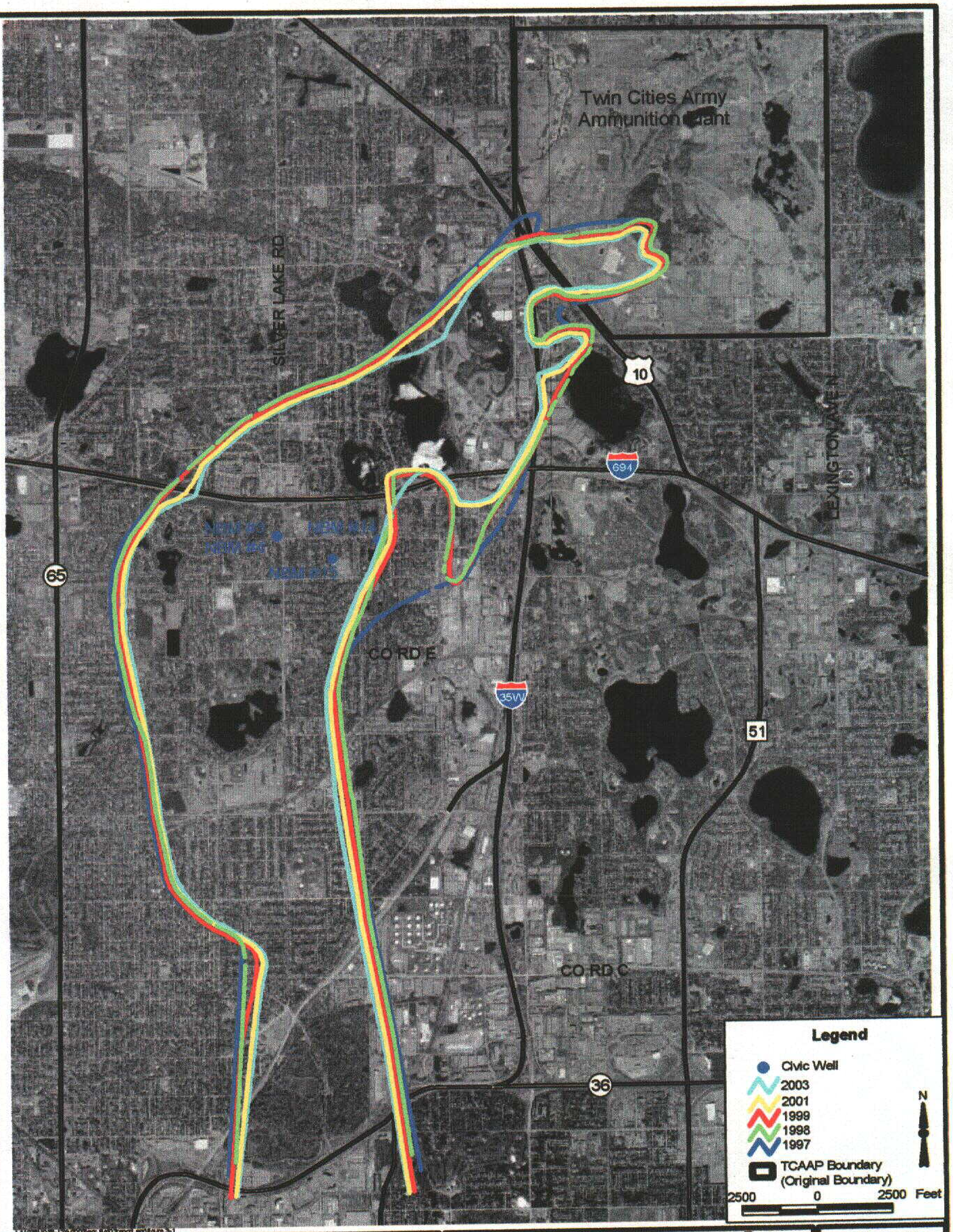
Table 3-6

OU1 Vertical Hydraulic Gradients

Groundwater Elevation (ft)

	Mid-Screen (or open hole) Elevation (ft)	12/3/1996	5/29/1997	12/2/1997	6/1/1998	9/1/1998	6/1/1999	5/31/2001	6/4/2003
03U811	803	842.5	842.1	842.3	843.0	No Data	842.8	842.9	847.3
03L811	689	841.8	841.2	841.5	842.1		842.0	842.1	846.4
Difference	114	0.7	0.9	0.8	0.9		0.8	0.9	0.9
Vertical Gradient		.006	.008	.007	.008		.007	.008	.008
03U822	786	No Data	No Data	833.0	833.7	No Data	833.3	833.5	837.3
03L822	761	833.9	830.6	833.0	833.7		833.2	833.5	837.3
Difference	25	---	---	0.0	0.0		0.1	0.0	0.0
Vertical Gradient		---	---	.000	.000		.004	.000	.000
04U834	570	811.0	809.0	811.4	808.8	No Data	809.2	812.2	814.2
04J834	496	807.8	804.7	808.1	804.9		805.4	808.1	809.8
Difference	74	3.2	4.3	3.3	3.9		3.8	4.1	4.4
Vertical Gradient		.043	.058	.045	.053		.051	.056	.059
03L841	760	840.3	840.4	840.3	841.2	No Data	841.0	841.0	845.3
04U841	682	841.2	841.1	841.9	842.7		842.5	841.9	846.8
Difference	78	-0.9	-0.7	-1.60	-1.5		-1.5	-0.9	-1.5
Vertical Gradient		-.012	-.009	-.021	-.019		-.019	-.012	-.019
03L846	760	829.5	828.4	828.5	829.3	No Data	828.5	828.7	830.6
04U846	674	828.5	827.6	827.3	828.1		827.1	827.5	833.5
Difference	86	1.0	0.8	1.2	1.2		1.4	1.2	-3.0
Vertical Gradient		.012	.009	.014	.014		.016	.014	-.034
04U882	600	810.2	808.0	810.4	807.4	No Data	807.9	811.3	813.3
04J882	455	772.8	769.3	806.9	803.2		803.1	806.8	808.3
Difference	145	37.4	38.7	3.5	4.2		4.8	4.5	4.9
Vertical Gradient		.258	.267	.024	.029		.033	.031	.034
04U836	663					824.0	822.7	821.9	821.4
04J836	554					824.2	823.7	823.5	825.1
Difference	109					-0.2	-1.0	-1.5	-3.8
Vertical Gradient						-.002	-.009	-.014	-.035
04U837	653					826.5	826.2	825.6	829.9
04J837	555					824.6	824.2	823.8	827.2
Difference	98					1.9	2.0	1.8	2.7
Vertical Gradient						.019	.020	.019	.027
04U838	659					827.5	827.3	827.5	831.8
04J838	556					826.1	825.7	826.0	829.4
Difference	103					1.4	1.6	1.5	2.4
Vertical Gradient						.014	.016	.014	.023
04U839	626					827.3	827.1	826.6	830.0
04J839	556					824.1	824.3	824.2	826.8
Difference	70					3.2	2.8	2.5	3.1
Vertical Gradient						.046	.040	.035	.045

Note: Negative sign denotes upward vertical gradient.



TWIN CITIES ARMY AMMUNITION PLANT

Upper Unit 4,
1 ug/l Trichloroethene Isoconcentration Map

Wenck

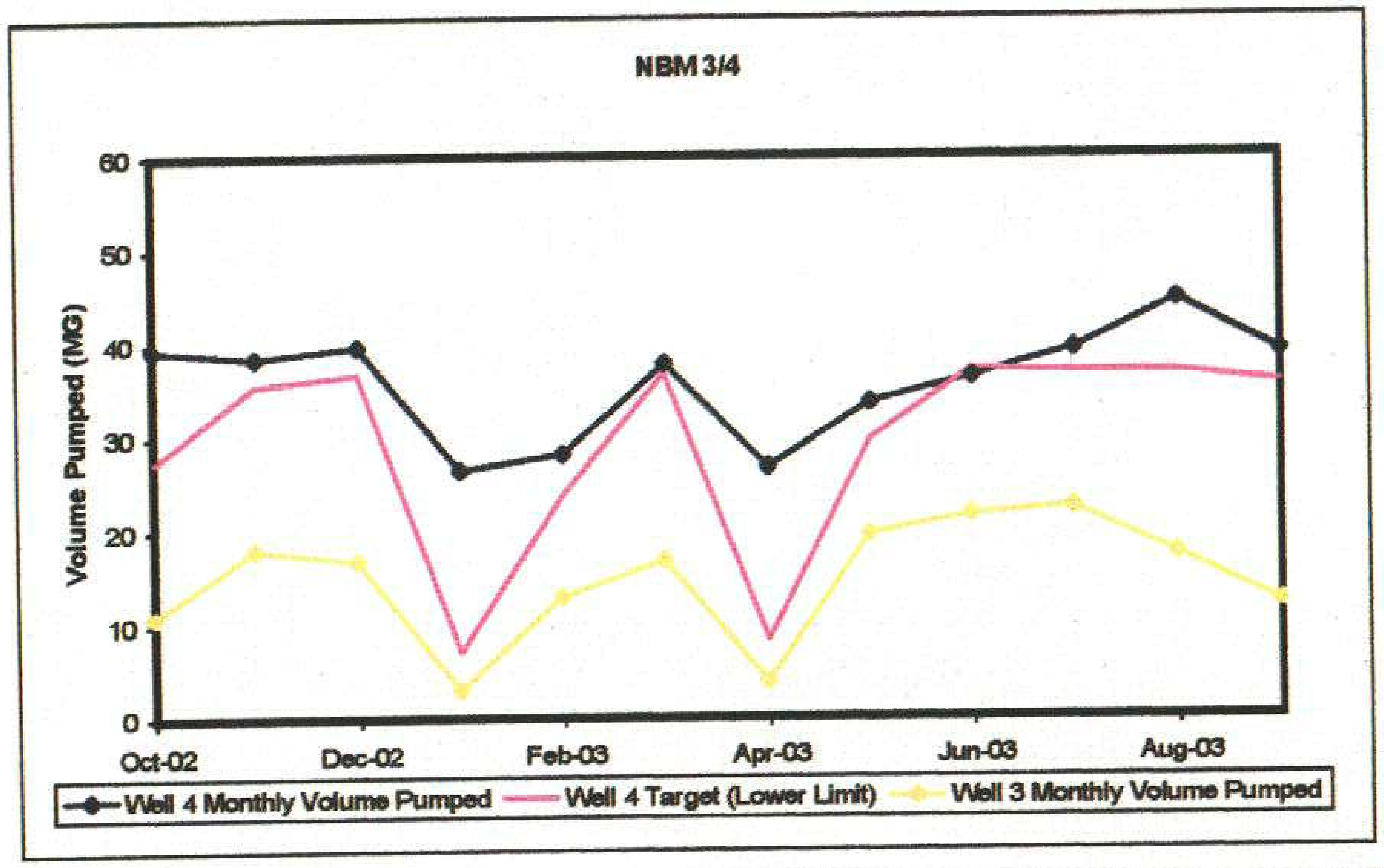
Wenck Associates, Inc.
Environmental Engineers

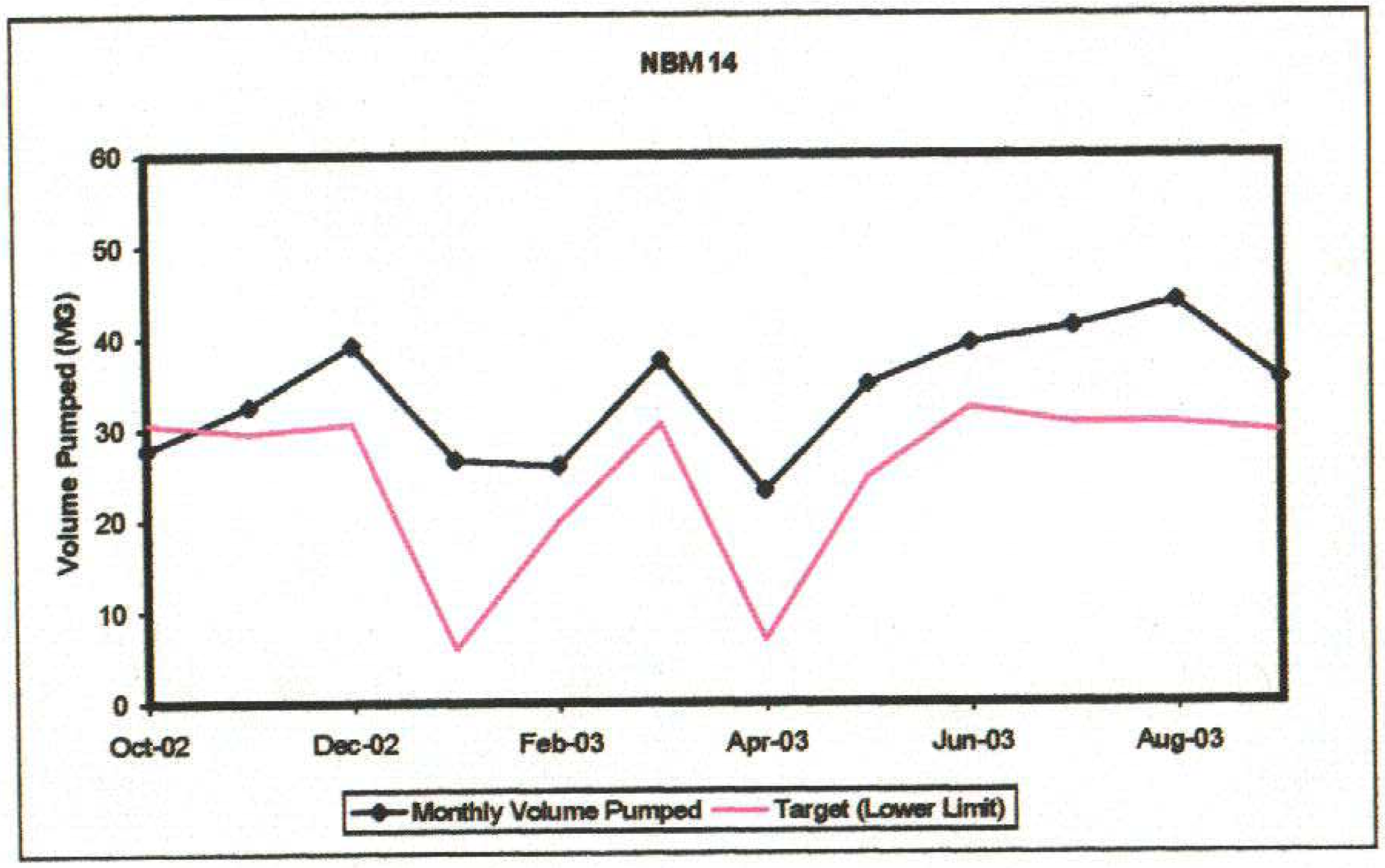
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429

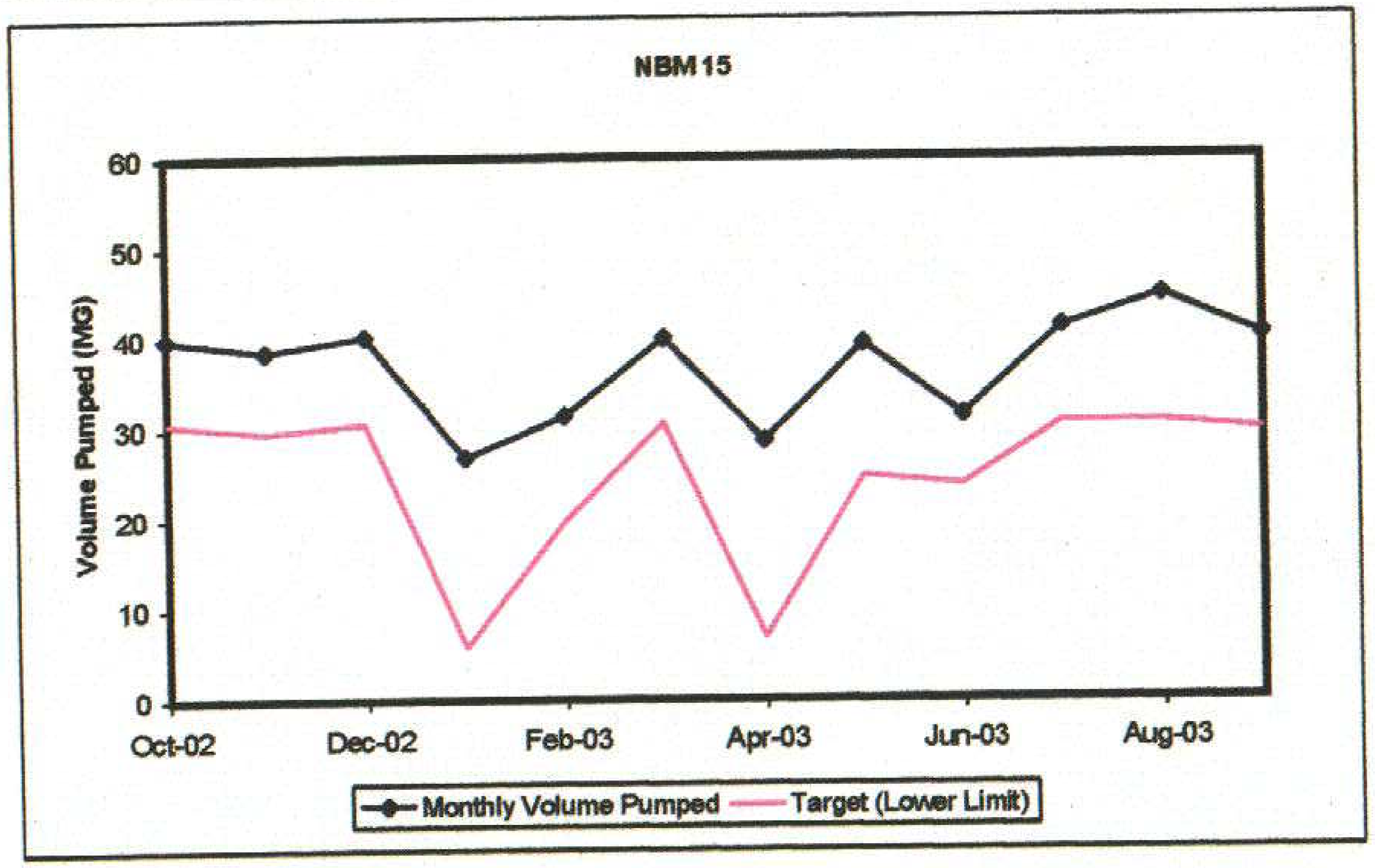
FY 2003

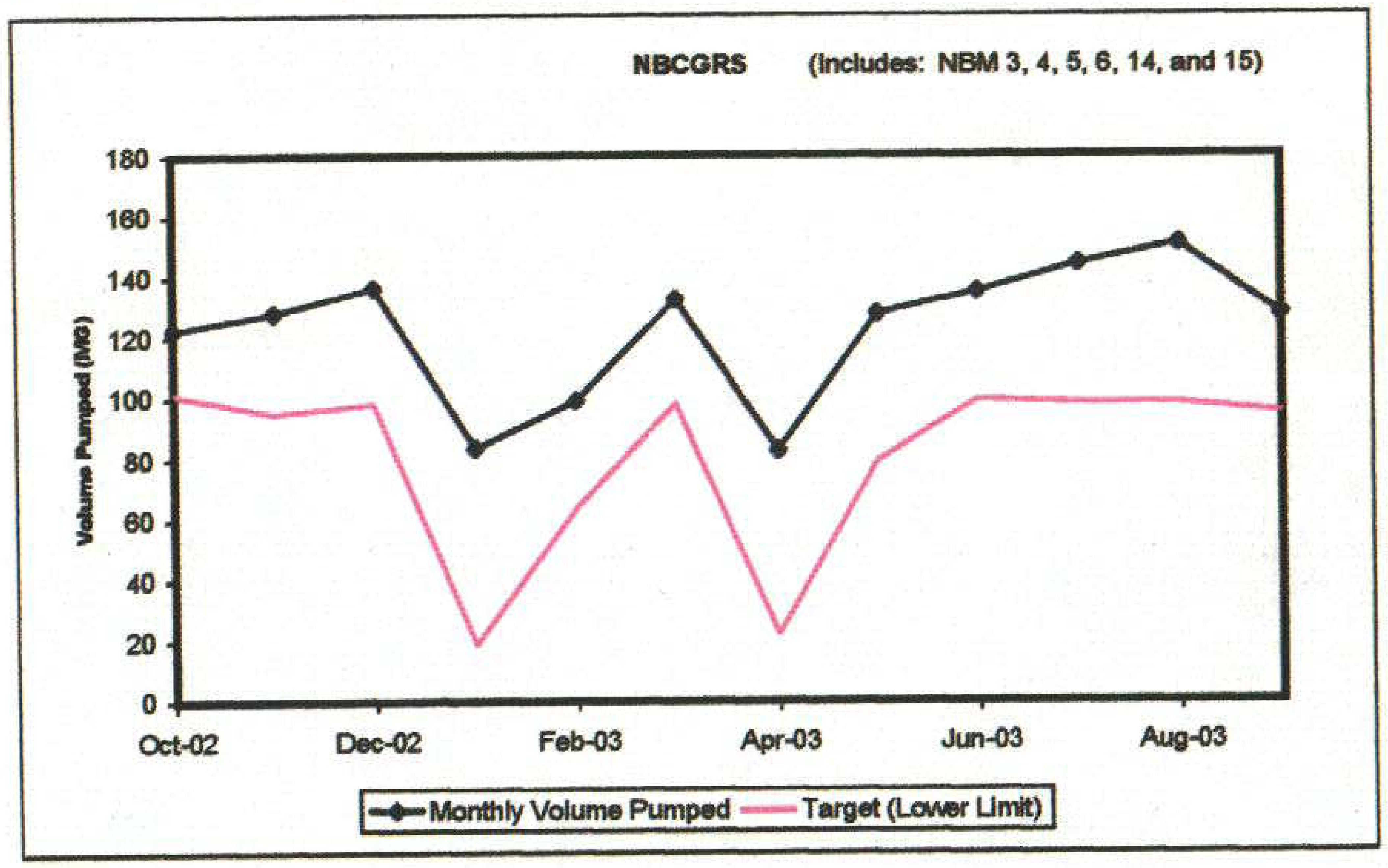
Figure 3-1

FIGURE 3-2
OU1 WELL PUMPING RATES VS. TARGETS
TWIN CITIES ARMY AMMUNITION PLANT



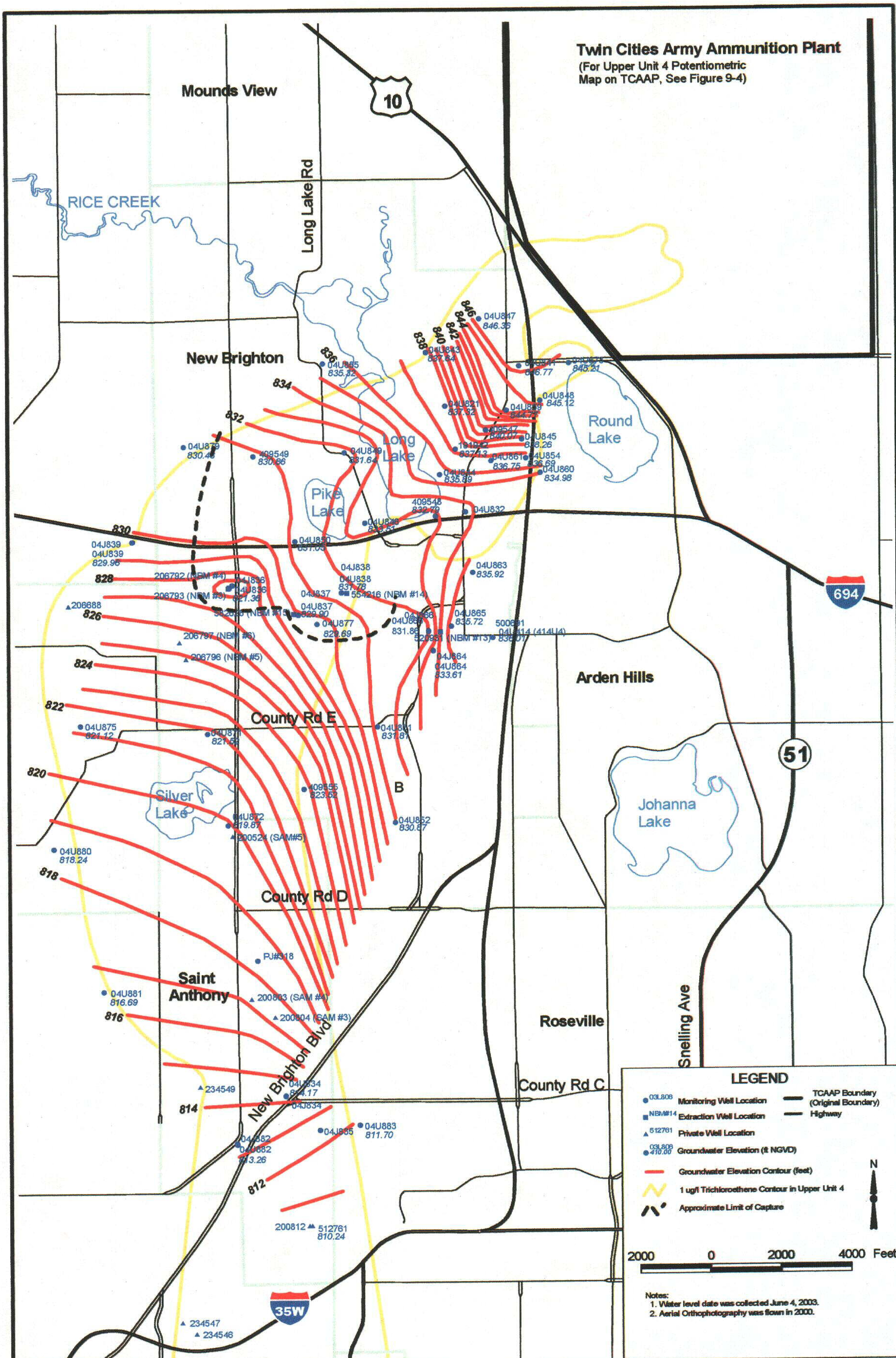






T:\1036\12\FY03 APR\APR Figures\Fig 3-2

Wenck Associates, Inc.



TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 4, Potentiometric Map, Summer 2003

Wenck

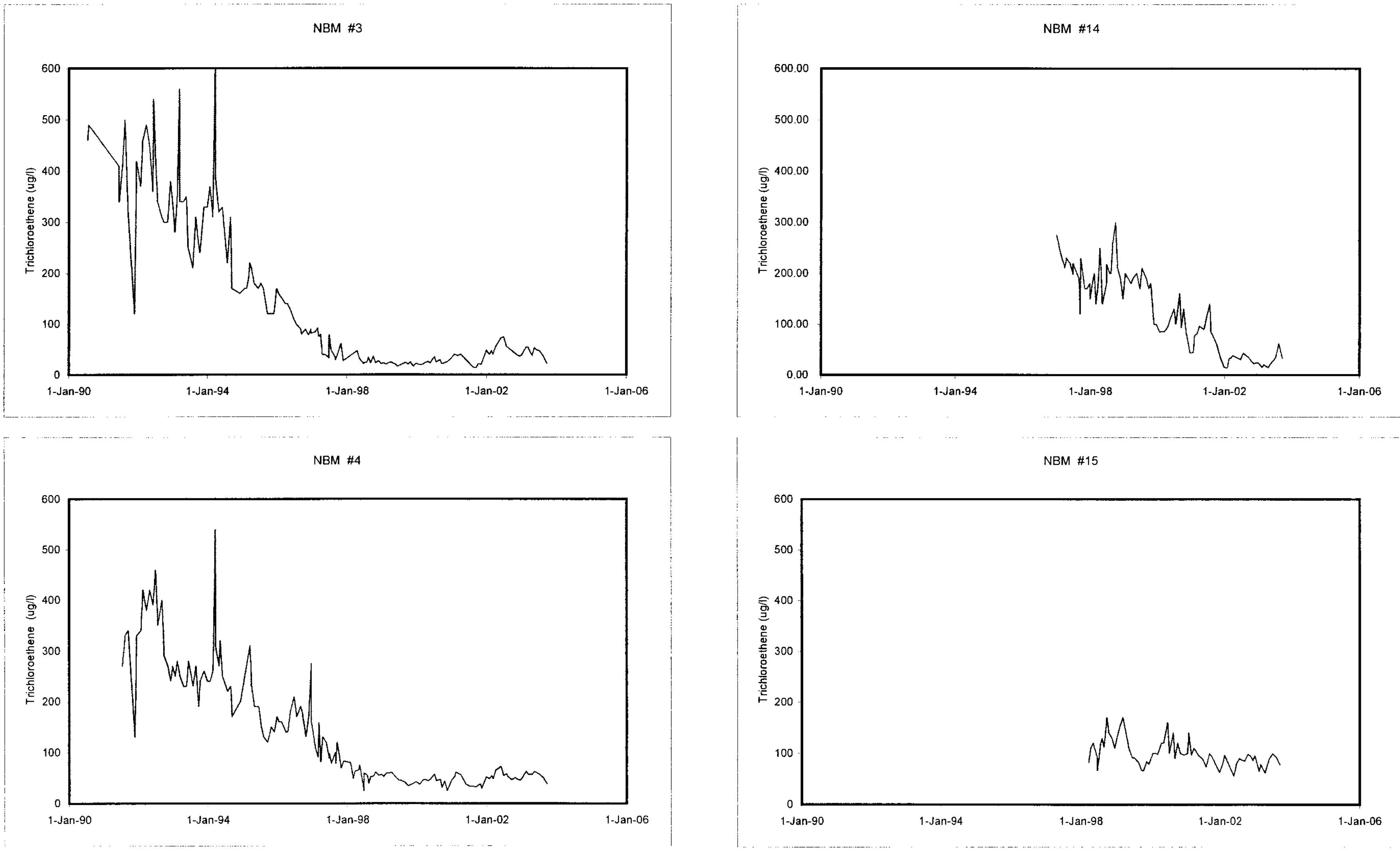
Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2003

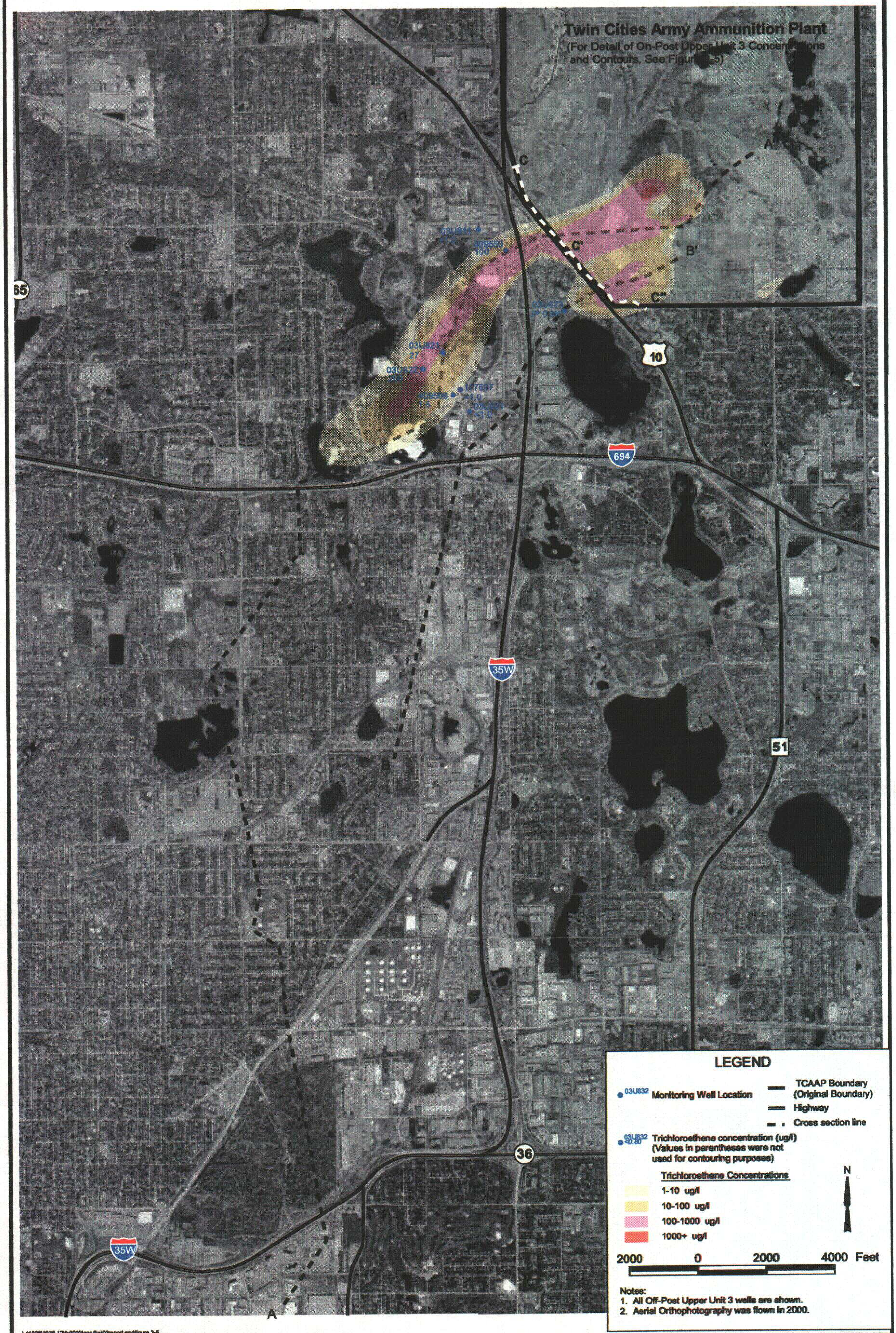
Figure 3-3

FIGURE 3-4
NEW BRIGHTON MUNICIPAL WELLS: TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

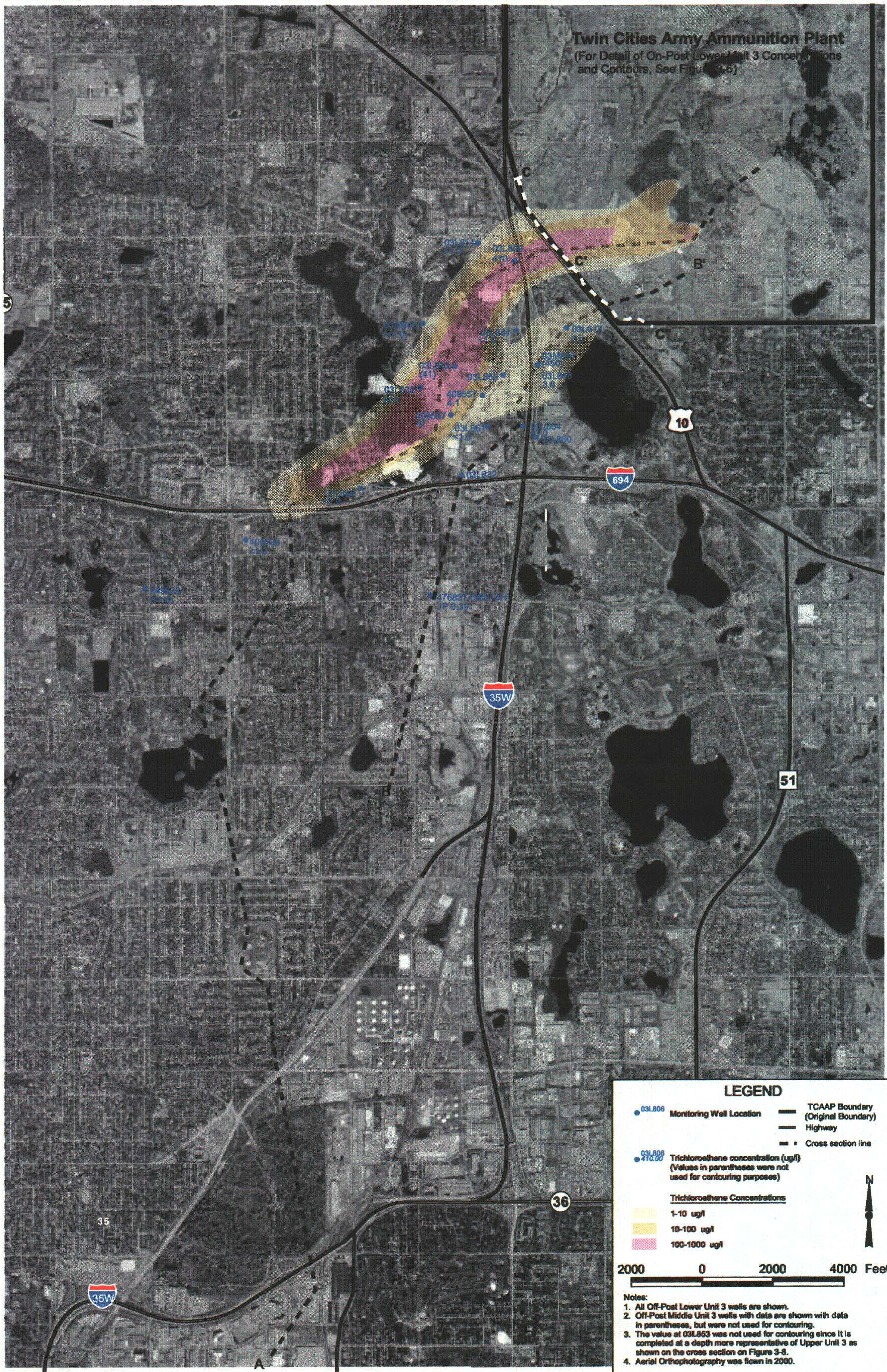


T:\1038\12\FY03 APR\APR Figures\Fig 3-4

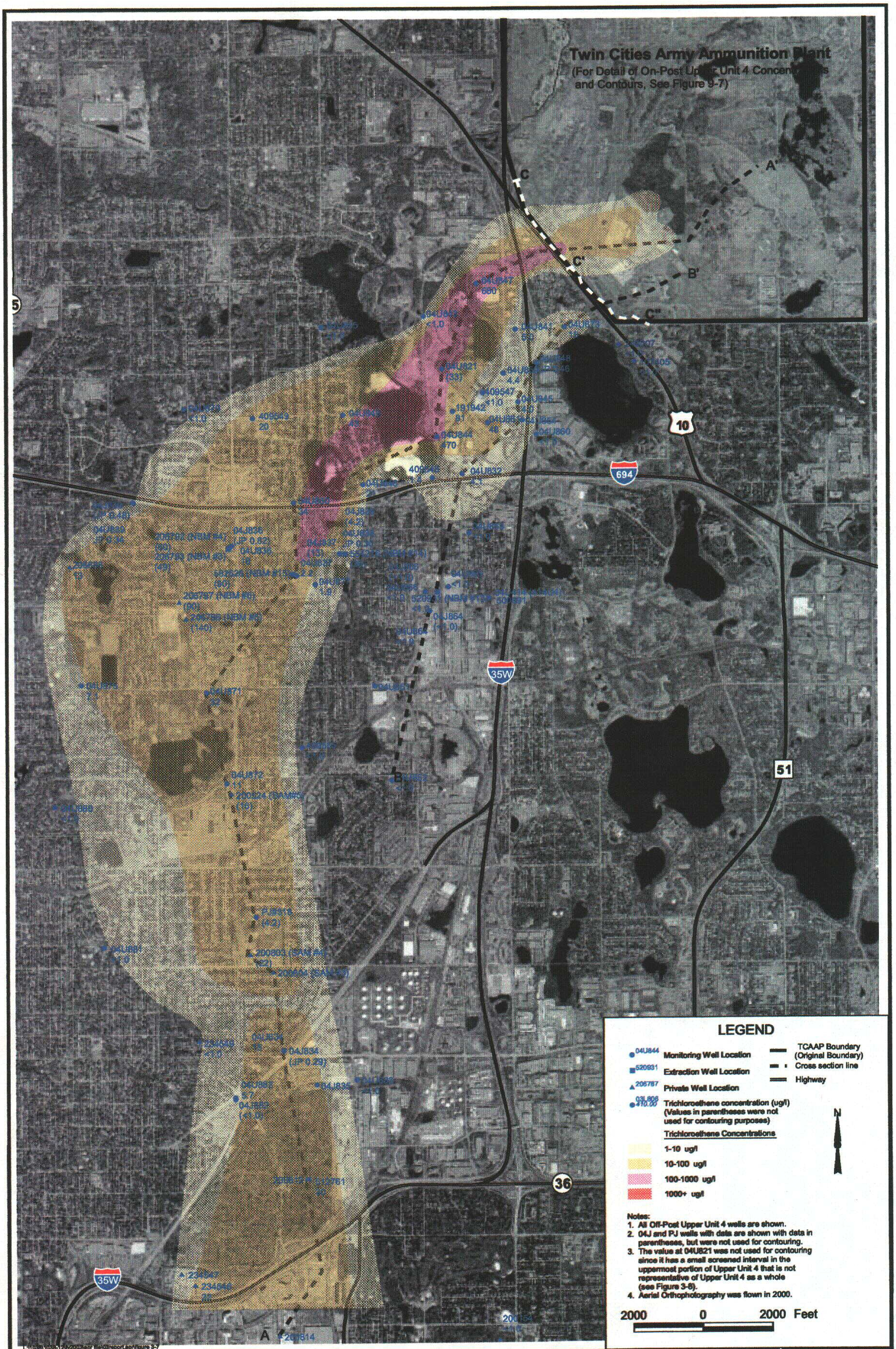
Wenck Associates, Inc.



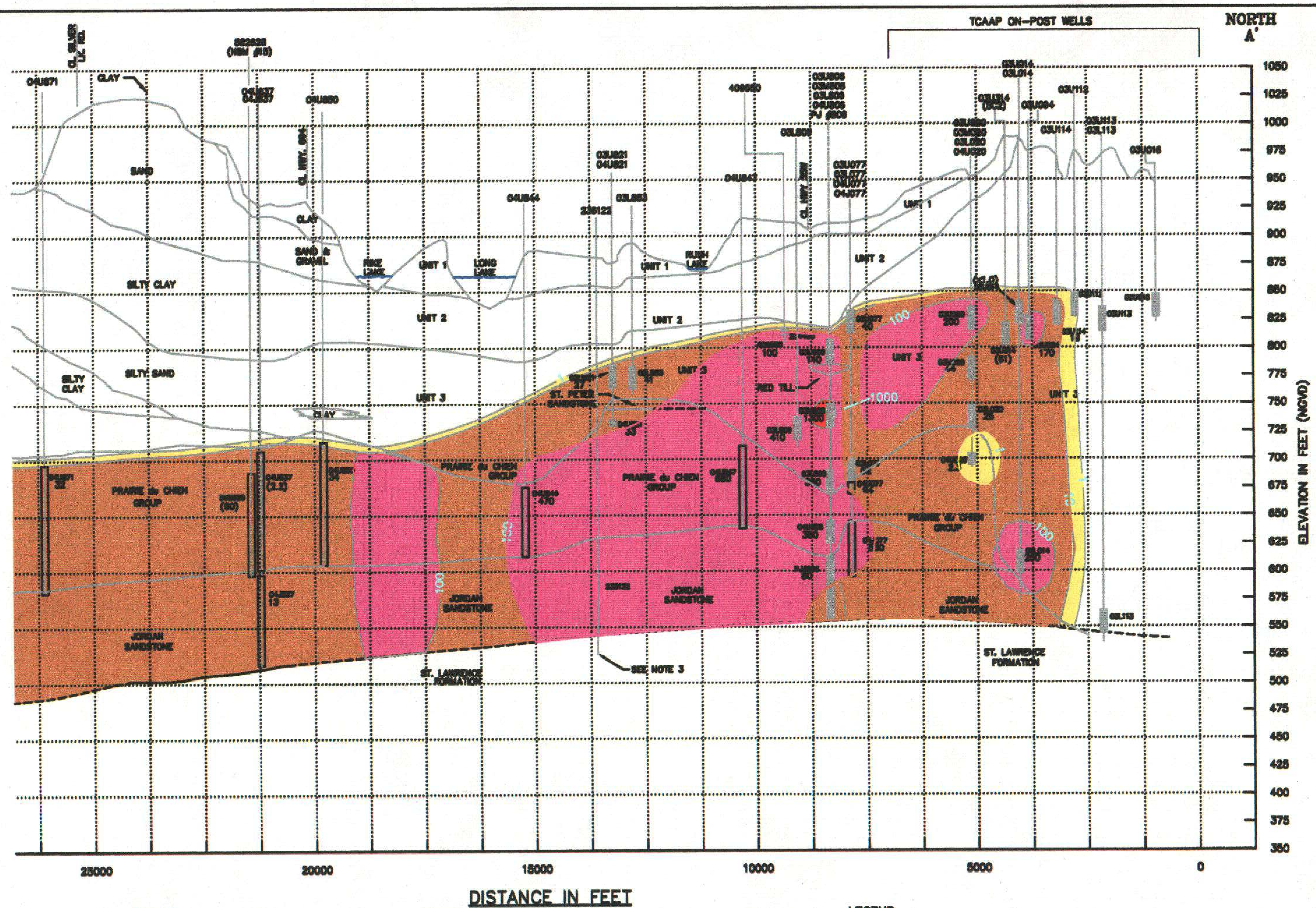
TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2003
OU1 & OU3, Upper Unit 3, Trichloroethene Isoconcentration Map Summer 2003	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 3-5



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2003
OU1 & OU3, Lower Unit 3, Trichloroethene Isoconcentration Map Summer 2003	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 3-6



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
OU1 & OU3, Upper Unit 4, Trichloroethene Isoconcentration Map Summer 2003		Figure 3-7



NOTES

(1) CROSS SECTION: TOPOGRAPHY CONSTRUCTED WITH DATA FROM U.S.G.S. NEW BRIGHTON 7.5 MINUTE SERIES QUAD MAP DATED 1967 (PHOTOREVISED 1972, AND 1980); WELL LOCATIONS AND THE "LINE" OF SECTION ARE SHOWN ON FIGURES 3-5 THROUGH 3-7.

(2) WELL NESTS, CONSISTING OF INDIVIDUAL WELLS IN THE SAME PROXIMITY, ARE REPRESENTED ON THE CROSS SECTION BY A SINGLE LINE WITH MULTIPLE WELL SCREENS

(3) WELL 236122 HAS BEEN SEALED, BUT IS SHOWN SINCE IT WAS USED TO PREPARE THE CROSS SECTION

LEGEND

GEOLOGIC CONTACT

INFERRED GEOLOGIC CONTACT

SCREENED INTERVAL OF WELL

OPEN HOLE INTERVAL OF WELL

TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)

ISOCONCENTRATION CONTOUR (ug/l)

ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)

THE VALUE IS ESTIMATED BECAUSE THE VALUE IS BELOW THE REPORTING LIMIT, BUT ABOVE THE METHOD DETECTION LEVEL.

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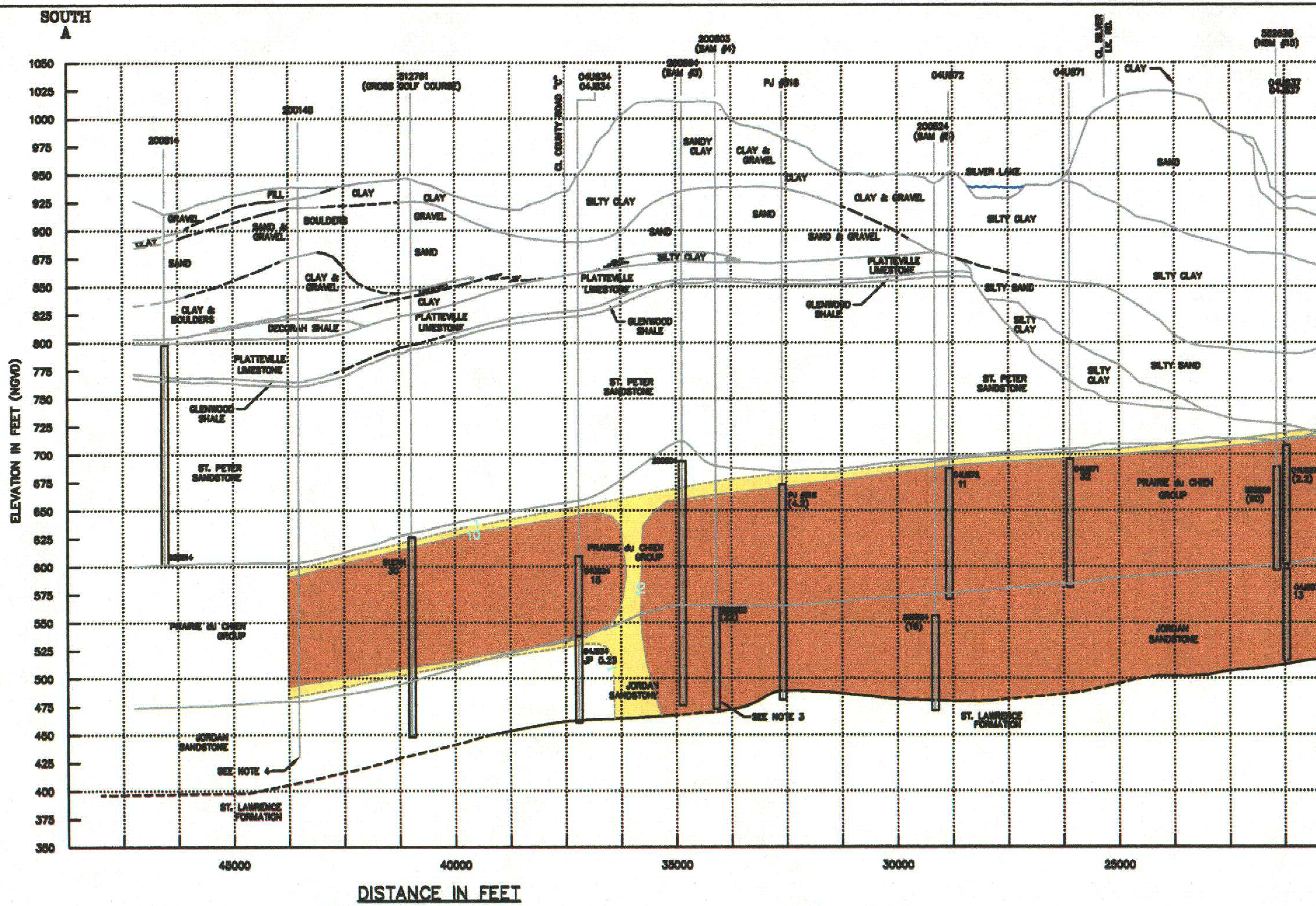
TWIN CITIES ARMY AMMUNITION PALN

OU1 Trichloroethene Cross-Section A-A' (North Half), Summer 2003

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

FY 2003

Figure 3-8



NOTES

(1) CROSS SECTION: TOPOGRAPHY CONSTRUCTED WITH DATA FROM U.S.G.S. NEW BRIGHTON 7.5 MINUTE SERIES QUAD MAP DATED 1967 (PHOTOREVISED 1972, AND 1980); WELL LOCATIONS AND THE "LINE" OF SECTION ARE SHOWN ON FIGURES 3-5 THROUGH 3-7.

(2) WELL NESTS, CONSISTING OF INDIVIDUAL WELLS IN THE SAME PROXIMITY, ARE REPRESENTED ON THE CROSS SECTION BY A SINGLE LINE WITH MULTIPLE WELL SCREENS

(3) NO INFORMATION WAS PROVIDED ON THE WELL LOG FOR 200803 (SAM #4) CONCERNING WELL CONSTRUCTION DETAILS, ESPECIALLY THE OPEN HOLE INTERVAL. AS THIS IS REFERRED TO AS A JORDAN WELL, THE OPEN HOLE WAS ASSUMED TO EXTEND FROM THE TOP OF THE JORDAN TO THE BOTTOM OF THE BOREHOLE.

(4) WELL 200148 HAS BEEN SEALED, BUT IS SHOWN SINCE IT WAS USED TO PREPARE THE CROSS SECTION

LEGEND

GEOLOGIC CONTACT

INFERRED GEOLOGIC CONTACT

SCREENED INTERVAL OF WELL

OPEN HOLE INTERVAL OF WELL

TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)

ISOCONCENTRATION CONTOUR (ug/l)

ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)

THE VALUE IS ESTIMATED BECAUSE THE VALUE IS BELOW THE REPORTING LIMIT, BUT ABOVE THE METHOD DETECTION LEVEL.

M:/1036/ARDENHILLS/OCT-03/TCX_A_SOUTH.DWG

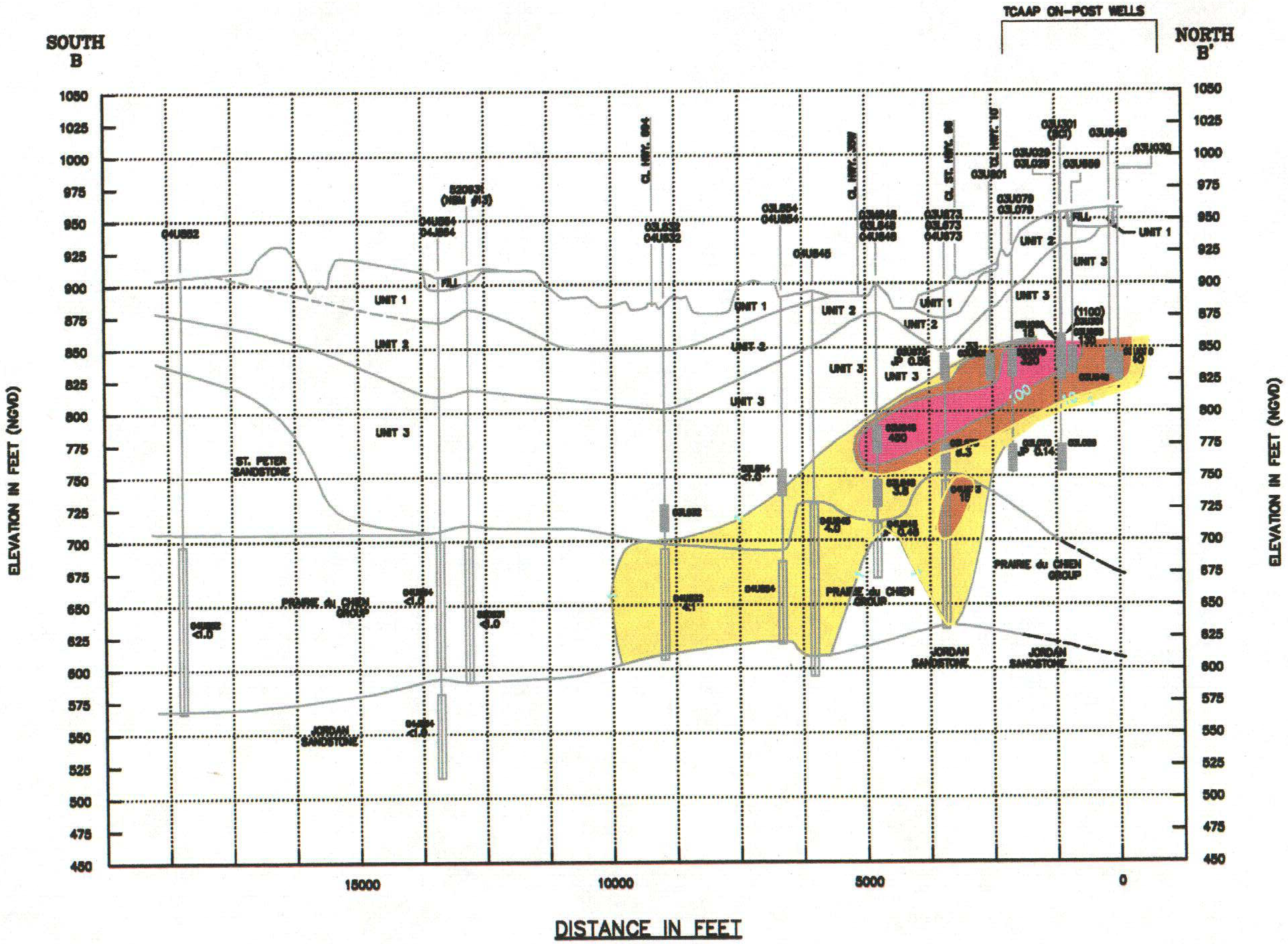
TWIN CITIES ARMY AMMUNITON PLANT

OU1 Trichloroethene Cross-Section A-A' (South Half), Summer 2003

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

FY 2003

Figure 3-9



NOTES

(1) CROSS SECTION: TOPOGRAPHY CONSTRUCTED WITH DATA FROM U.S.G.S. NEW BRIGHTON 7.5 MINUTE SERIES QUAD MAP DATED 1967 (PHOTOREVISED 1972, AND 1980); WELL LOCATIONS AND THE "LINE" OF SECTION ARE SHOWN ON FIGURES 3-5 THROUGH 3-7.

(2) WELL NESTS, CONSISTING OF INDIVIDUAL WELLS IN THE SAME PROXIMITY, ARE REPRESENTED ON THE CROSS SECTION BY A SINGLE LINE WITH MULTIPLE WELL SCREENS

(3) NO INFORMATION WAS AVAILABLE ON THE WELL LOG FOR 03U029 AND 03U673 CONCERNING WELL CONSTRUCTION DETAILS, ESPECIALLY THE SCREENED INTERVALS. THE SCREENED INTERVALS FOR THESE WELLS WERE ASSUMED TO BE SIMILAR TO OTHER NEARBY UPPER UNIT 3 WELLS.

LEGEND

GEOLOGIC CONTACT

INFERRED GEOLOGIC CONTACT

SCREENED INTERVAL OF WELL

OPEN HOLE INTERVAL OF WELL

TRICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)

10 ISOCONCENTRATION CONTOUR (ug/l)

10 ESTIMATED ISOCONCENTRATION CONTOUR (ug/l)

THE VALUE IS ESTIMATED BECAUSE THE VALUE IS BELOW THE REPORTING LIMIT, BUT ABOVE THE METHOD DETECTION LEVEL.

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TWIN CITIES ARMY AMMUNITION PLANT

OU3 Trichloroethene Cross-Section B-B', Summer 2003

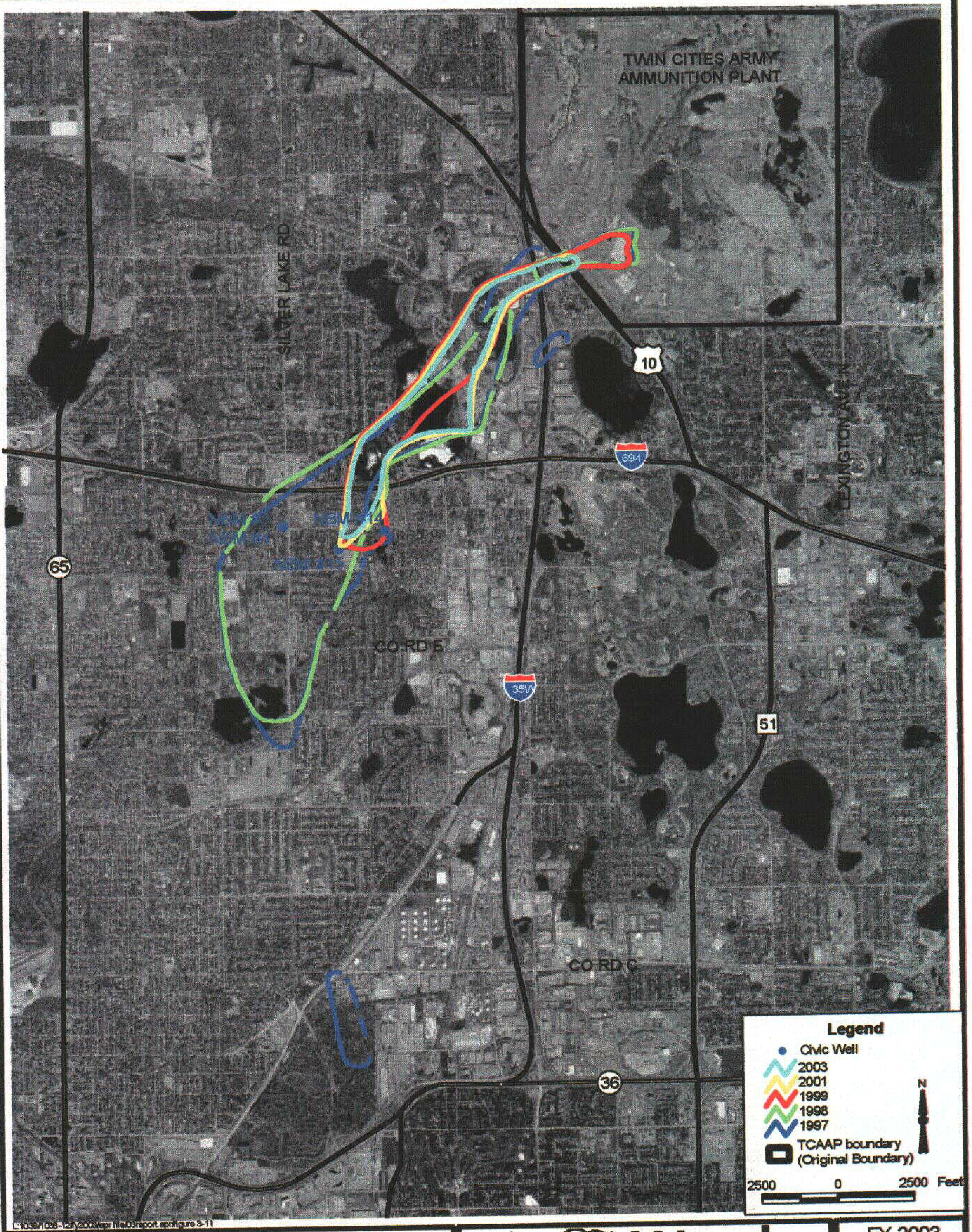
Wenck

Wenck Associates, Inc. Environmental Engineers

1800 Pioneer Creek Center Maple Plain, MN 55359

FY 2003

Figure 3-10



TWIN CITIES ARMY AMMUNITION PLANT

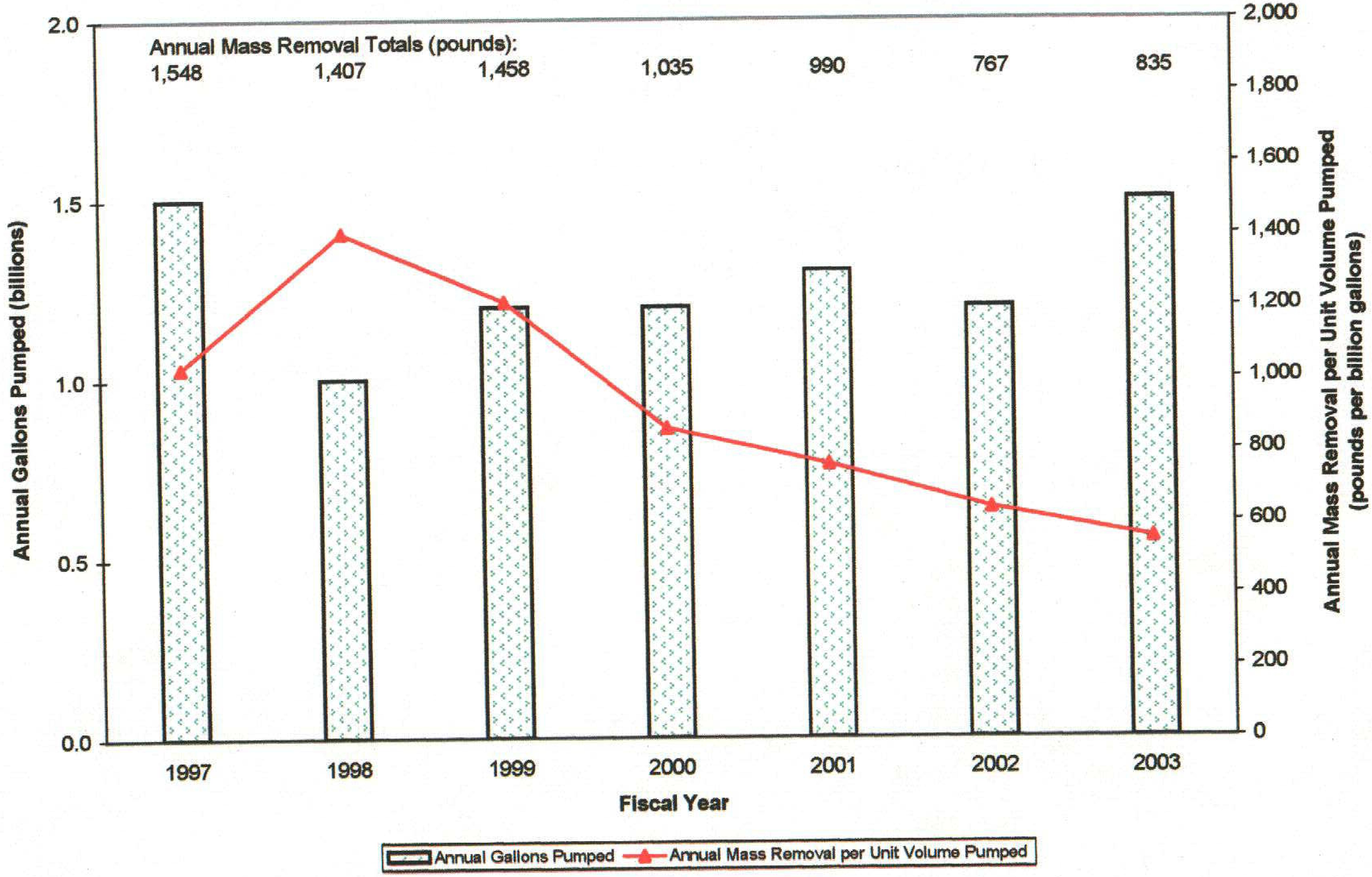
Upper Unit 4,
100 ug/l Trichloroethene Isoconcentration Map

Wenck
Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429

FY 2003

Figure 3-11

FIGURE 3-12
OU1, NBCGRS MASS REMOVAL HISTORY
Twin Cities Army Ammunition Plant



T:\1038\12\FY03 APR\APR Figures\Fig 3-12

Wenck Associates, Inc.

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, were identified 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 THROUGH 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. Soil remediation field work was completed at Sites A (excluding VOC-contaminated soils), E, H, and 129-5 prior to FY 2002. The Closeout Reports for each of these sites (prepared by Shaw Environmental & Infrastructure, Inc. (Shaw)) received regulatory approval in FY 2002, but final consistency will not be provided until concurrence on the land use control section of each report has been reached between the Army and the regulators or, alternatively, until the TCAAP Land Use Control Implementation Plan (LUCIP) has received consistency approval from the regulators (see Section 11.0 for information on land use controls). Activities during FY 2003 were:

- Soil remediation field work was completed at Site 129-3 prior to FY 2003. The Site 129-3 Closeout Report (prepared by Shaw) received regulatory approval in FY 2003, but final consistency will not be provided until concurrence on the land use control section of each report has been reached between the Army and the regulators or, alternatively, until the TCAAP LUCIP has received consistency approval from the regulators.
- At Site C, no additional soil excavation, treatment, or disposal occurred. Work was suspended in Summer 2002, due to high water table conditions. At that time, the project-to-date total soil quantity was 21,417 tons of soil stabilized and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. Additional characterization of Site C was completed in FY 2003 to provide information for evaluating soil remediation options. Options for completing soil remediation at this site were under discussion at the end of FY 2003.
- Field work for removal of the on-TCAAP Corrective Action Management Unit (CAMU) was initiated by Shaw in late FY 2002 and was completed in early FY 2003. Monitoring wells were sampled by TWISS a final time in September 2003, to verify

that CAMU operations did not impact the groundwater beneath it. A CAMU Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003.

- Operation of the Site A soil vapor extraction (SVE) system to remediate VOC-contaminated soils in the Site A shallow groundwater source area was discontinued on August 21, 2002, when it was permanently shut down due to low VOC levels in the SVE discharge (while soil concentrations within the source were not significantly improving). A work plan clarification for excavation and off-site disposal of the VOC-contaminated soils was approved at the beginning of FY 2003. The air sparging (AS)/SVE system was then removed by Shaw, and 688 cubic yards of VOC-contaminated soils were excavated and transported off-site as non-hazardous waste for disposal at a permitted disposal facility. The Site A Former 1945 Trench Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003.

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

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?
Yes. The intent of this remedy component is to verify that soil remediation activities did not somehow cause impacts to groundwater. As such, the five-year monitoring period was intended to start after completion of remedy components #1 through 7 described in the previous section.

With the exception of Site C, the shallow soil remediation has been completed and this groundwater monitoring component was started in FY 2003 (and will tentatively end in FY 2007). As discussed in Section 5.7, shallow soil remediation work was also completed at Site D (for non-VOC contaminants) in early FY 2003, and the Closeout Report (prepared by Shaw) indicated that Site D should also be monitored for any impacts to groundwater that could have resulted from soil remediation activities. Site D was, therefore, added to the list of sites to be monitored under this remedy component.

The monitoring plan for each of the sites is presented below (these monitoring activities are included in the monitoring plan for groundwater monitoring wells presented in Appendix A.1). In general, the well most likely to be affected from a hypothetical release from the soil was selected for each Site. Thus, several wells are in the middle of the Site, since this would be the most likely location to see an impact under an assumption that impact would be due to vertical leaching from the soil. A monitoring well in the first encountered aquifer was selected at each Site. For Sites A and H, Unit 1 wells were selected. At the Sites on the kame (D, E, 129-3, and 129-5), where Unit 1 is not present, upper Unit 3 wells were selected since Unit 3 is the first encountered aquifer. The groundwater parameter list for each Site mirrors the soil chemicals of concern for that Site.

There are no groundwater cleanup standards in the ROD for the chemicals of concern in soils at these Sites, with the exception of antimony at Site A, so the data collected under this monitoring program are screened against TCAAP background values that were developed during the OU2 Feasibility Study (as presented in the OU2 ROD). For chemicals not expected to be naturally occurring (VOCs and explosives), the results are screened against the Minnesota Health Risk Limits (HRLs). Since there are not any expected groundwater impacts, the screening will serve to identify possible concerns.

Monitoring Plan:

Site A

Monitoring point: 01U119

Rationale for selected location: Well is located in Unit 1 near to and downgradient of the area of soil excavation at Site A.

Parameters: Antimony, barium, copper, lead

Frequency: Annual

Site C

Shallow groundwater at Site C is known to be impacted and there is an ongoing Corrective Action for Site C groundwater that the Army is conducting under MPCA oversight. This Corrective Action is not part of the OU2 ROD. The Army and MPCA have developed the list of groundwater chemicals of concern and a monitoring plan for sampling locations/frequencies, which is being implemented by the Army.

Site D

Monitoring point: 03U093

Rationale for selected location: Well is a shallow Unit 3 well (the first encountered aquifer) located near and downgradient of the soil remediation area.

Parameters: Antimony, lead, nitroglycerine

Frequency: Annual

Site E

Monitoring point: 03U089

Rationale for selected location: Well is a shallow Unit 3 well (the first encountered aquifer) located near and downgradient of the soil remediation area.

Parameters: Antimony, barium, copper, lead, manganese

Frequency: Annual

Site H

Monitoring point: 01U060

Rationale for selected location: Well is on the downgradient edge of Site H and is also the only available Unit 1 monitoring well at the Site.

Parameters: Antimony, arsenic, copper, lead, manganese

Frequency: Annual

129-3

Monitoring point: 03U087

Rationale for selected location: Well is a Unit 3 well (the first encountered aquifer) located in the center of the Site and below the area of soil remediation.

Parameters: Antimony, lead, manganese, nitroglycerine, VOCs

Frequency: Annual

129-5

Monitoring point: 03U097

Rationale for selected location: Well is a Unit 3 well (the first encountered aquifer) located in the center of the Site and below the area of soil remediation.

Parameters: Antimony, barium, lead

Frequency: Annual

Monitoring Results for FY 2003:

Results for the June 2003 sampling event are summarized in Table 4-1. There were no exceedances of screening criteria at Sites A, E, or 129-3. At Site H, only copper exceeded the background value (9.6 ug/L versus 4 ug/L). The only other time this same well was sampled for copper (1987), the result was 1.44 ug/L. The HRL for copper is 1,000 ug/L so no remedial action is needed at this time. At Site 129-5, only barium exceeded the background value (310 ug/L versus 206 ug/L). Historical barium results are 290 ug/L in 1987 and 130 ug/L in 1988. The HRL for barium is 2,000 ug/L so no remedial action is needed at this time. Both of these exceedances warrant attention during

Are any changes or additional actions required for this remedy component? Yes. Per a request from USEPA, water levels will be measured at all Site E wells during the June 2004 monitoring event (adding water levels at 519288, 519289, and 519290). The FY 2004 Annual Performance Report will present the results and assess if there is a more appropriate well(s) to monitor Site E for the remaining three years of the five-year period. This change is shown in Appendix A.1.

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, and if they are, when the remedy is in place.

Is this remedy component being implemented?
Yes. Field work was performed at both sites in early FY 1999. At Site B, characterization revealed that a no further action remedy was appropriate. A Closeout Report (prepared by Stone & Webster) received consistency in FY 2001 ("Site B Dump Investigation, Characterization, and Closeout Report"). At Site 129-15, characterization led to construction of a soil cover in FY 2002. The Closeout Report for Site 129-15 (prepared by Shaw) received regulatory approval in FY 2003, but final consistency will not be provided until concurrence on the land use control section of each report has been reached between the Army and the regulators or, alternatively, until the TCAAP Land Use Control Implementation Plan (LUCIP) has received consistency approval from the regulators (see Section 11.0 for information on land use controls). A

section of each report has been reached between the Army and the regulators or, alternatively, until the TCAAP Land Use Control Implementation Plan (LUCIP) has received consistency approval from the regulators (see Section 11.0 for information on land use controls). A modification to the ROD that will document the remedy selection for Site 129-15 was being prepared at the end of FY 2003.

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

Table 4-1
Groundwater Quality Data for OU2 Shallow Soil Site
5-Year Groundwater Monitoring

Fiscal Year 2003

	Unit 1 Wells		Unit 3 Wells				TCAAP	TCAAP	
	01U119 (Site A)	01U060 (Site H)	03U089 (Site E)	03U087 (Site 129-3)	03U087D (Site 129-3)	03U097 (Site 129-5)	Unit 1 GW Background (1)	Units 3/4 GW Background (1)	MDH HRL
	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003			
VOCs (ug/L)									
1,1,1-Trichloroethane				<1.0			None	None	600
1,1,2,2-Tetrachloroethane				<1.0			None	None	2
1,1,2-Trichloroethane				<1.0			None	None	3
1,1-Dichloroethane				<1.0			None	None	70
1,1-Dichloroethene				<1.0			None	None	6
1,2-Dichloroethane				<1.0			None	None	4
1,2-Dichloropropane				<1.0			None	None	5
2-Butanone				<10			None	None	4000
2-Hexanone				<10			None	None	(Note 2)
4-Methyl-2-Pentanone				<10			None	None	300
Acetone				JP 5.3			None	None	700
Benzene				<1.0			None	None	10
Bromodichloromethane				<1.0			None	None	6
Bromoform				<1.0			None	None	40
Bromomethane				<1.0			None	None	10
Carbon Disulfide				<1.0			None	None	700
Carbon Tetrachloride				<1.0			None	None	3
Chlorobenzene				<1.0			None	None	100
Chloroethane				<1.0			None	None	280
Chloroform				<1.0			None	None	60
Chloromethane				<1.0			None	None	80
cis-1,2-Dichloroethene				<1.0			None	None	70
cis-1,3-Dichloropropene				<1.0			None	None	2
Dibromochloromethane				<1.0			None	None	80
Ethylbenzene				<1.0			None	None	700
m&p-Xylene				<2.0			None	None	10,000
Methylene Chloride				<1.0			None	None	50
o-Xylene				<1.0			None	None	10,000
Styrene				<1.0			None	None	(Note 2)
Tetrachloroethene				<1.0			None	None	7
Toluene				<1.0			None	None	1000
trans-1,2-Dichloroethene				<1.0			None	None	100
trans-1,3-Dichloropropene				<1.0			None	None	2
Trichloroethene				JP 0.17			None	None	30
Vinyl Chloride				<1.0			None	None	0.2

Table 4-1
Groundwater Quality Data for OU2 Shallow Soil Site
5-Year Groundwater Monitoring

Fiscal Year 2003

	Unit 1 Wells		Unit 3 Wells				TCAAP	TCAAP	
	01U119 (Site A)	01U060 (Site H)	03U089 (Site E)	03U087 (Site 129-3)	03U087D (Site 129-3)	03U097 (Site 129-5)	Unit 1 GW Background (1)	Units 3/4 GW Background (1)	MDH HRL
	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003	6/18/2003			
Metals (ug/L)									
Antimony	<5.00	UB 1.3	UB 1.3	<5.00		<5.00	<10	<10	6 (3)
Arsenic		3.3					6.80	14	(Note 2)
Barium	48		31			**310**	240	206	2000
Copper	B 1.8 (JI69)	**9.8** (JI69)	B 1.2 (JI69)				4	27	1000
Lead	<2.00	B 0.38 (UB0.2)	B 0.20 (UB0.2)	B 0.24 (UB0.2)		<2.00	4.2	3.8	15 (4)
Manganese		1200	B 0.75 (UB0.4)	B 0.53 (UB0.4)			7,500	760	1000
Explosives (ug/L)									
Nitroglycerine				<0.970	<0.970		None	None	(Note 2)

Notes:

(1) Background values for Unit 1 groundwater from Appendix C, Table 6 in the OU2 ROD.
Background values for Unit 3/4 groundwater from Appendix C, Table 7 in the OU2 ROD.
Bolding (in red color) indicates exceedance of the respective background value.
(2) No HRL has been established for this analyte.
(3) For Site A Shallow Groundwater, this is also the Cleanup level from Table 1 of the OU2 ROD.
(4) No HRL has been established for this analyte. MDH utilizes 15 ug/l as the Action Level "at the tap".
D Duplicate sample.
JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.
B The value is below the reporting level, but above the method detection limit. Results should be considered estimated.
JI The percent recovery for the interference check sample was below the lower QC limit (the percent recovery is listed after "JI").
The sample result could be biased low.
UB The sample result was less than 5 times the level detected in a blank (the result for the blank is listed after "UB").
The sample result can be considered non detect at an elevated detection limit.

5.0 Operable Unit 2: Deep Soil Sites

Sites D and G were impacted primarily by VOC contaminants at depths extending to between 50 and 170 feet. Some additional shallow soil contaminants were also present 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 incorporated 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 that are nearest to Sites D and G in accordance with the FY 2003 Monitoring Plan.

What impact did the SVE systems have on contaminant concentrations in groundwater adjacent to Sites D and G?

Figures 9-5, 9-6, 9-7 and the trichloroethene cross-section A-A' (Figures 3-8 and 3-9) show the location of the wells nearest to Site D (03U018, 03U093, 03U096 and 03L018) and Site G (03U014, 03U094 and 03L014). Figures 5-1 through 5-7 present trichloroethene trend graphs for these wells. Trichloroethene trends in other nearby wells can also be viewed from Figure B-3 (Appendix B).

Downgradient of Site D, at 03L018 (Figure 5-4), the concentrations have remained below the cleanup level for the past five years. At 03U018 (Figure 5-1), 03U093 (Figure 5-2), and 03U096 (Figure 5-3), the concentrations over the past five years show stable or decreasing trends.

Downgradient of Site G, at 03U014 (Figure 5-5), the concentrations have remained below the cleanup level for the past five years. At 03U094 (Figure 5-6) and 03L014 (Figure 5-7), the concentrations over the past five years show decreasing trends.

Table 5-1 presents the FY 2003 data for the deep groundwater chemicals of concern for the seven wells nearest Sites D and G. The table shows that five of the seven wells still exceed the cleanup level for trichloroethene. The only other cleanup level exceedance among these seven wells is 1,1-dichloroethene in 03U094 (18 ug/l versus cleanup level of 6 ug/l).

During the years of SVE operation (1986 to 1998), trichloroethene concentrations in groundwater decreased from 10,000's to less than 800 μg/l. The most dramatic improvement has been at 03U093 (Figure 5-2). Overall, these results indicate that SVE systems at Sites D and G effectively minimized (or eliminated) further contamination of the deep groundwater beneath these sites. However, the contaminant concentrations are still up to 50 times greater than the cleanup levels. This suggests that residual contamination is acting as an ongoing source for groundwater contamination. The residual source has not been defined and could be in either the saturated or unsaturated zone. It is possible that natural attenuation will cause reductions in contaminant concentrations in the future, as suggested by the findings of the USEPA's Natural Attenuation Study (finalized in FY 2000).

Is any groundwater sampling proposed prior to the next report?
Yes. As shown in Appendix A.1, wells 03U093 (Site D) and 03U094 (Site G) will be sampled in June 2004 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 (see Section 11.0 for information on land use controls).

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, which were then incorporated into the final remedy. The Site D system included 39 shallow vents (depths of 33–54 feet) and one deep vent (depth of 150 feet). The Site G system included 89 shallow vents (depths of 23–55 feet). The systems removed a combined total of over 220,000 pounds of VOCs from both shallow and deep soils between startup in 1986 and shutdown in 1998 (116,199 pounds for Site D and 104,418 pounds for Site G).

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. The intent of this remedy component was to add additional deep vents at both sites, as needed, to address the presumed existence of contaminated soils below the existing SVE systems. Also, the existing systems were to be modified, as needed, to improve VOC mass removal. The site investigation conducted in FY 2000 showed that all Site D soils (shallow and deep) were below the Site D VOC cleanup levels, and that all Site G soils (shallow and deep) were below the subsequently-developed, higher cleanup goals, as documented in "Technical Memorandum, Soil Leaching Values, Site G," dated July 31, 2002. Therefore, neither deep SVE systems nor modifications to the shallow SVE systems will be required at either site. The Site D SVE system was dismantled in FY 2001, and the Site G SVE system was dismantled in FY 2003. The Site D Shallow and Deep Soil VOC Investigation and Closeout Report received regulatory approval in FY 2002. The Site G Closeout Report was being prepared at the end of FY 2003.

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. No enhancements to either SVE system were required, since soil cleanup levels were reached without the need for any such modifications.

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 cap is maintained in adequate condition.

Is this remedy component being implemented?
Yes. The caps for Sites D and G were originally intended to minimize infiltration of precipitation and to minimize short-circuiting of air during SVE system operation. With achievement of the soil cleanup goals at Site D, there is no longer a need for a cap relative to VOCs in the soil. At Site G, the revised cleanup goal for trichloroethene was based on maintaining a cap with a specified permeability over the area with trichloroethene contamination (see Section 11.0 for information on land use controls and long-term O&M).

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

Is this remedy component being implemented?
Yes. As discussed above, drainage controls are no longer required for Site D relative to VOCs in the soil, but still apply for Site G (see Section 11.0 for information on land use controls and long-term O&M).

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. For Site D, shallow soil characterization work was completed in FY 2002. In FY 2003, 1381 cubic yards of soils contaminated with metals and nitroglycerin were excavated by Shaw and transported off-site for disposal at a permitted disposal facility. A Site D Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003. A modification to the ROD to document the remedy selection for Site D shallow soils was being prepared at the end of FY 2003.

For Site G, a technical memorandum recommending improvements to the Site G cover received regulatory approval in FY 2003. A work plan for the cover design also received regulatory approval in FY 2003. Cover construction was started in late FY 2003, and is anticipated to be completed in early FY 2004.

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)?
Yes, subject to the revised Site G cleanup levels cited previously.

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?
For Site D, the additional soil removal that was determined to be required has been completed. For Site G, construction of the improvements to the cover was initiated in late FY 2003, and is anticipated to be completed in early FY 2004.

Table 5-1
Deep Groundwater Data Near Sites D and G

Fiscal Year 2003

		Tetrachloro-ethene (ug/l)	Trichloro-ethene (ug/l)	1,1-Dichloro-ethene (ug/l)	cis-1,2-Dichloro-ethene (ug/l)	1,1-Dichloro-ethane (ug/l)	1,1,1-Trichloro-ethane (ug/l)	1,2-Dichloro-ethane (ug/l)
OU2 Cleanup Level (1)		5	5	6	70	70	200	4
Site D								
03U018	6/17/03	< 1.0	**140**	2.8	12	4.9	18	< 1.0
03U093	6/16/03	< 1.0	**69**	1.7	JP 0.69	JP 0.48	23	< 1.0
03U096	6/16/03	< 1.0	**15**	1.9	< 1.0	5.4	2.9	< 1.0
03L018	6/17/03	< 1.0	JP 0.20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Site G								
03U014	6/19/03	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
03U094	6/11/03	< 1.0	**170**	**18**	2.5	5.7	96	< 1.0
03L014	6/19/03	< 1.0 U	**250**	4.8	1.0	4.5	140	< 1.0

Notes:

(1) Cleanup levels for Deep Groundwater are from Table 1 of the OU2 ROD. Bolding (in red color) indicates exceedance of the cleanup level.

JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

U The analyte is non-detect with the associated value being the quantitation limit.

FIGURE 5-1
SITE D, WELL 03U018, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

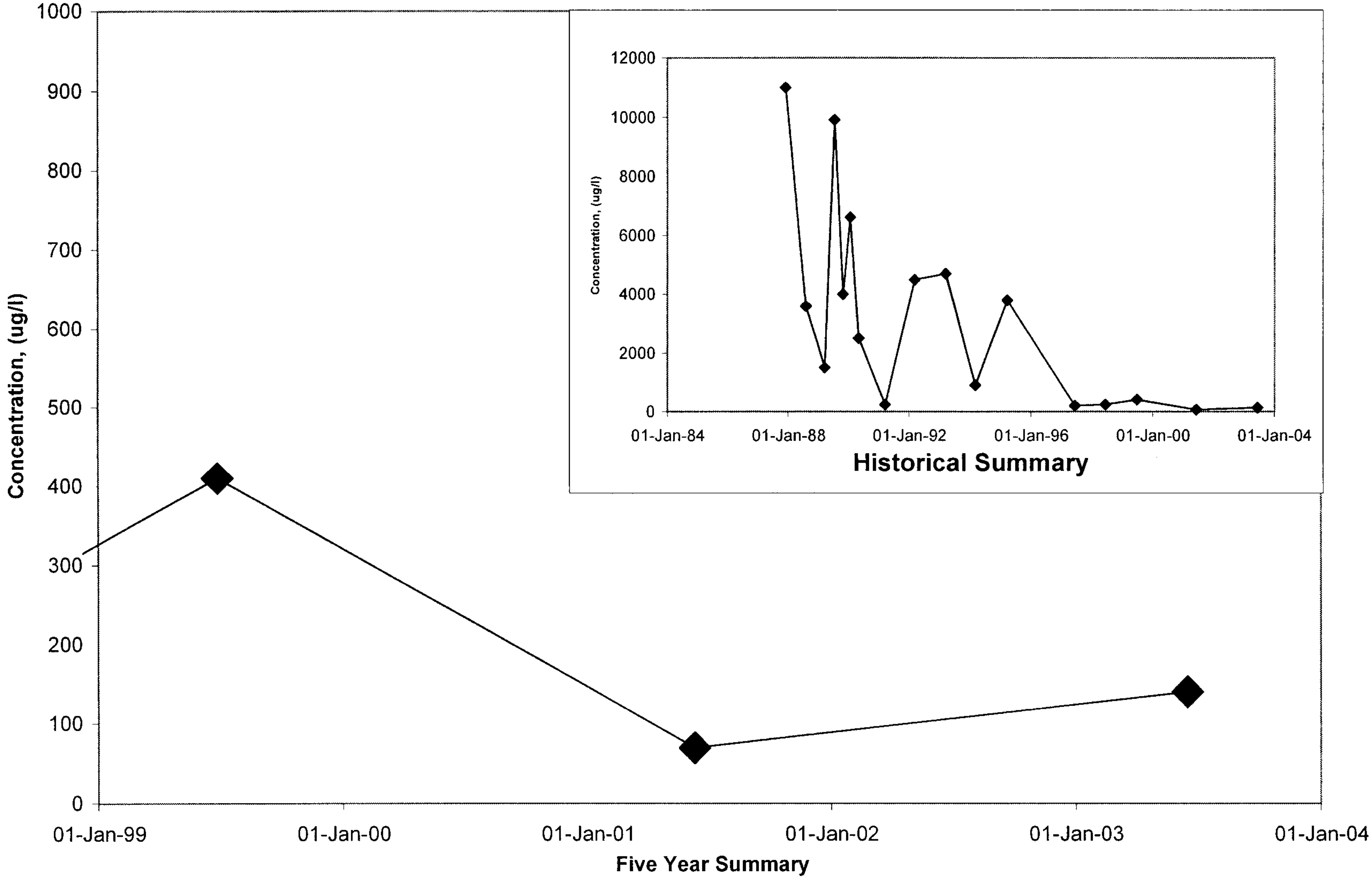


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FIGURE 5-2
SITE D, WELL 03U093, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

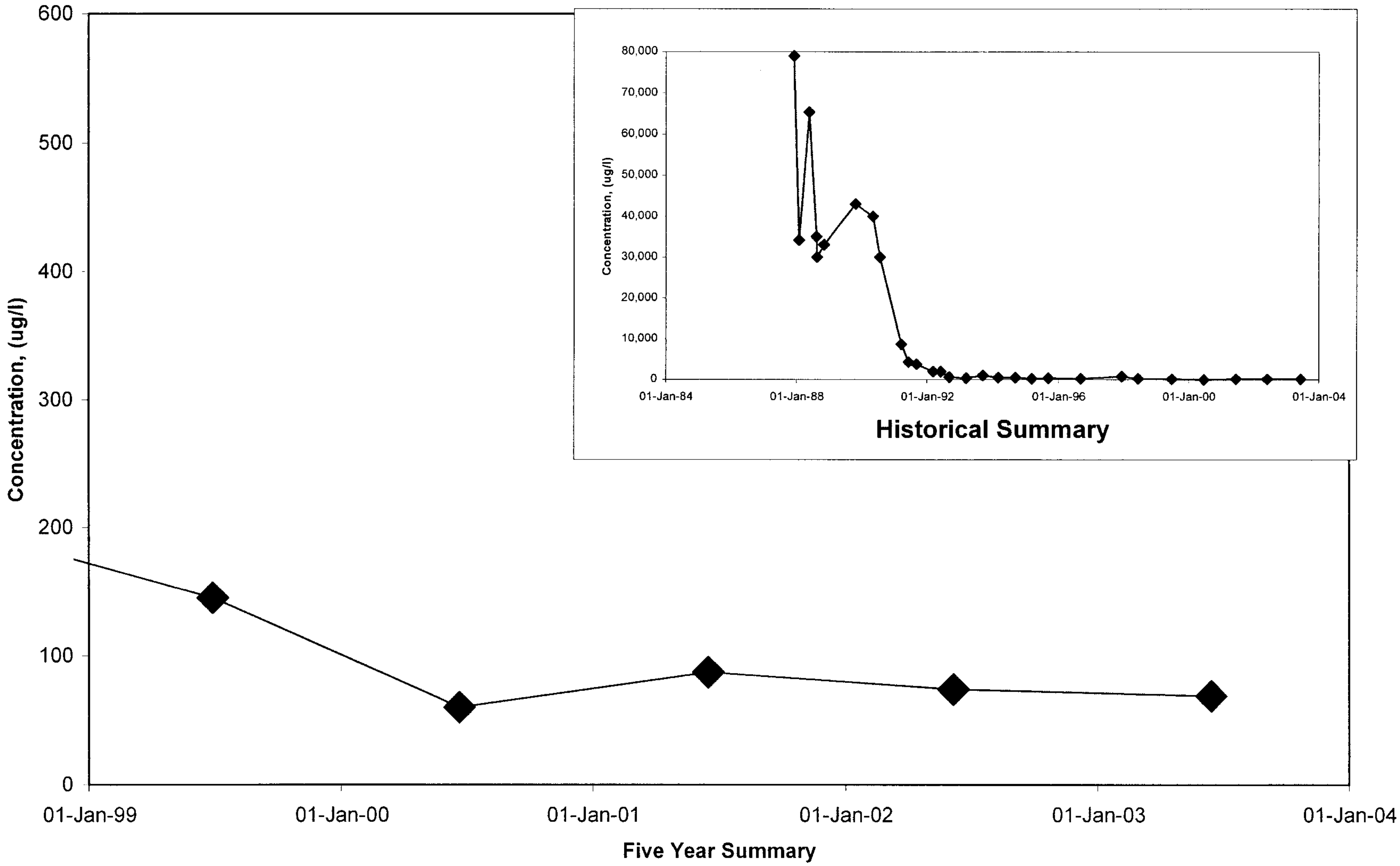

FIGURE 5-3
SITE D, WELL 03U096, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

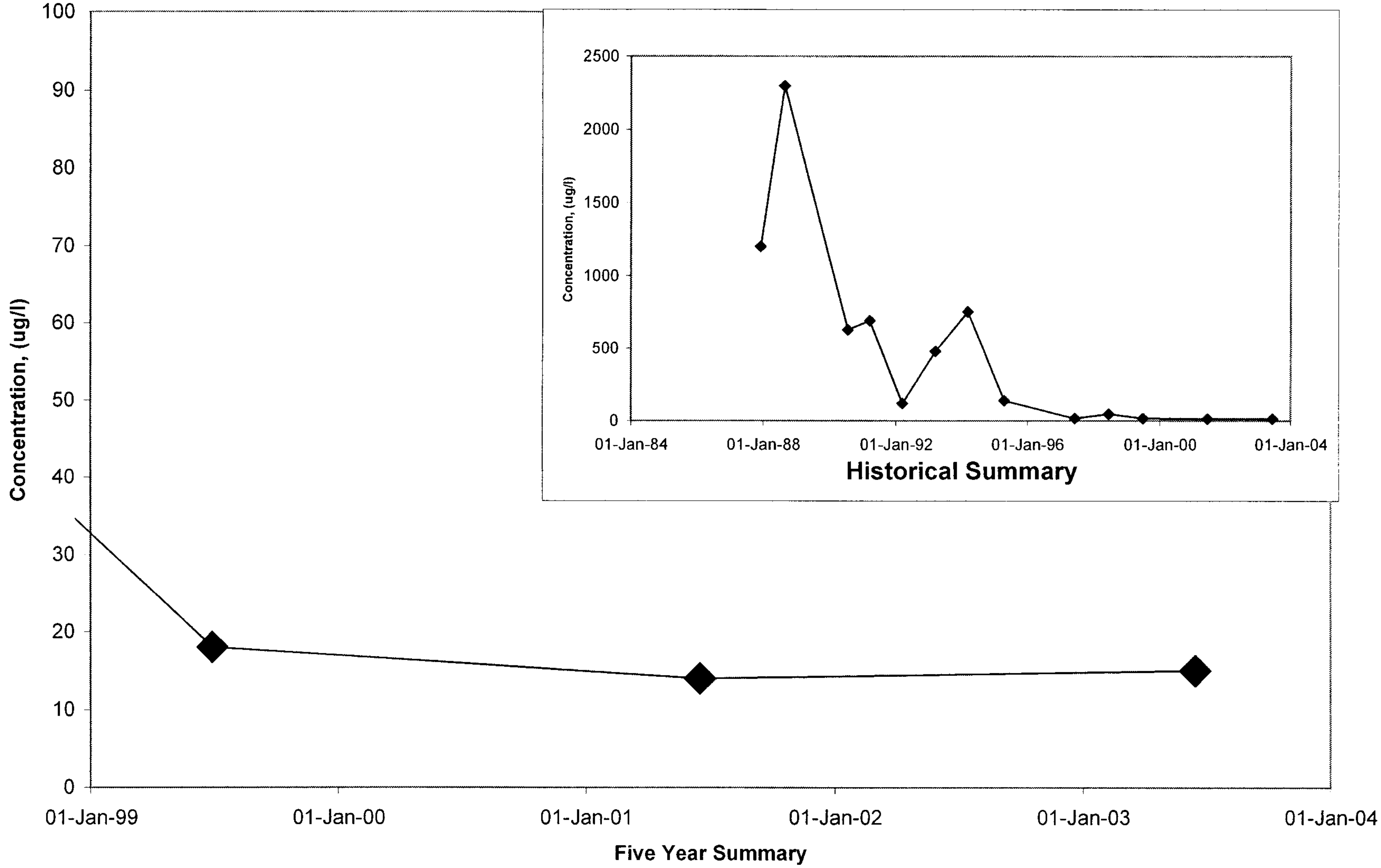

FIGURE 5-4
SITE D, WELL 03L018, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

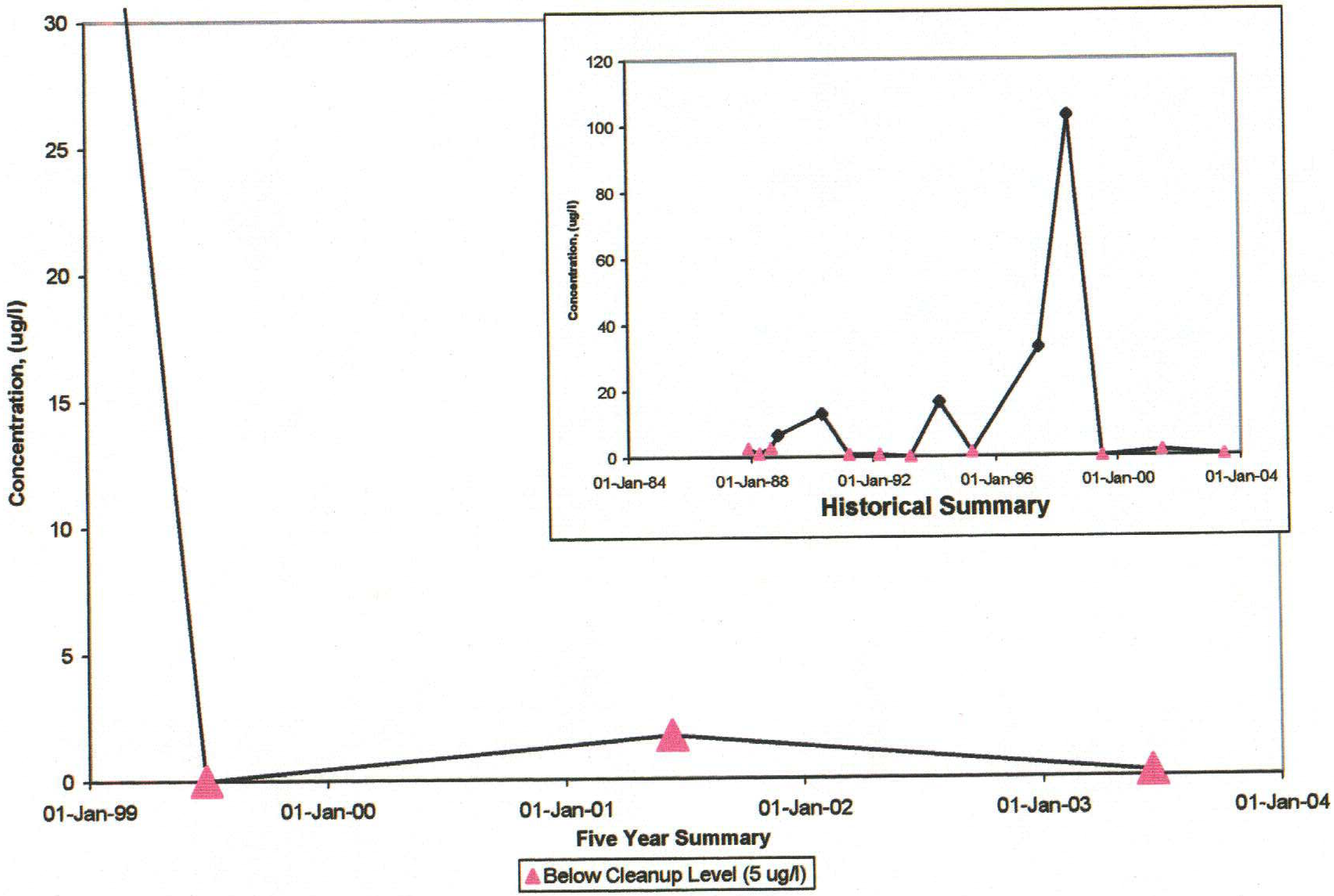

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FIGURE 5-5
SITE G, WELL 03U014, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

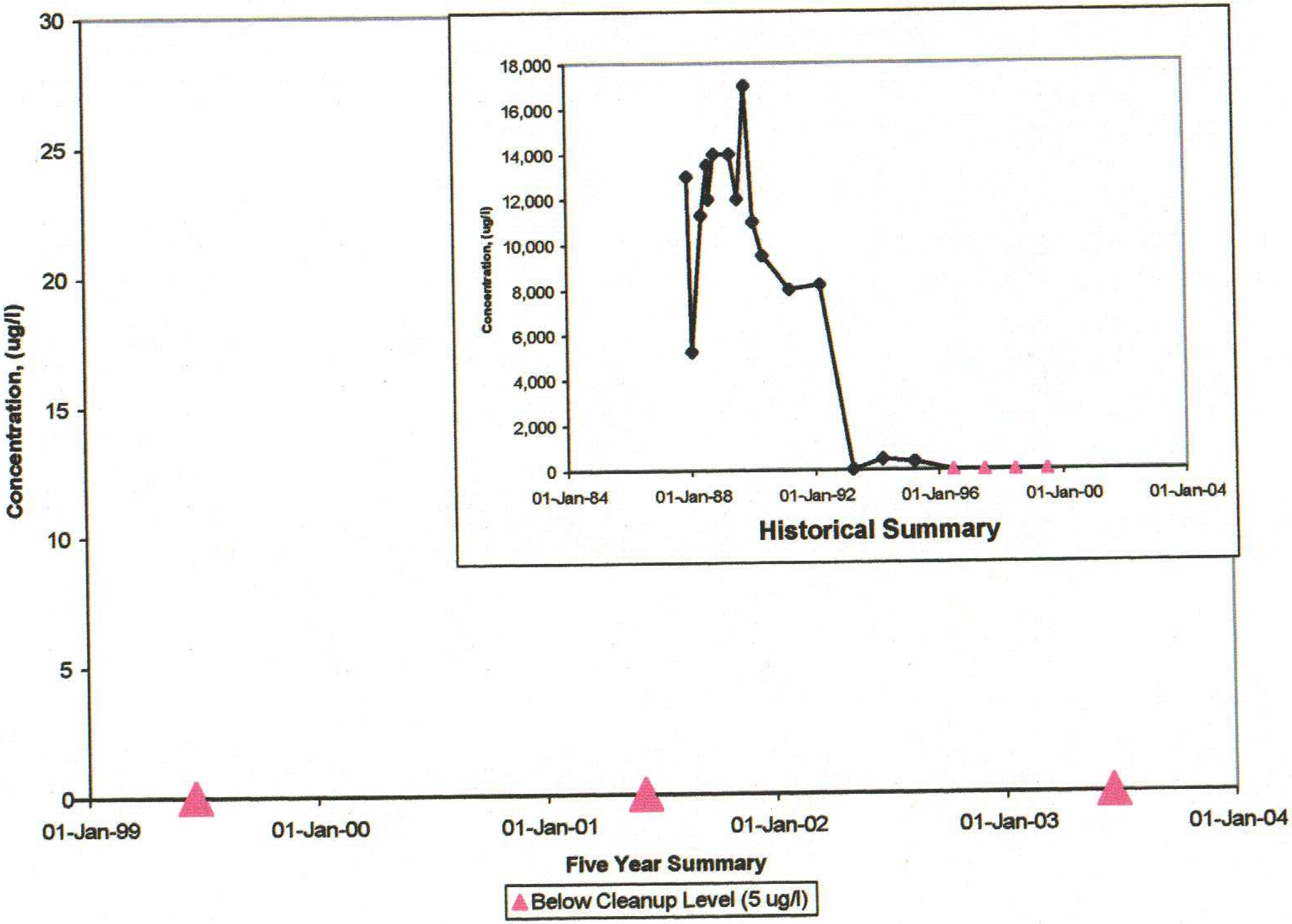

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FIGURE 5-6
SITE G, WELL 03U094, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

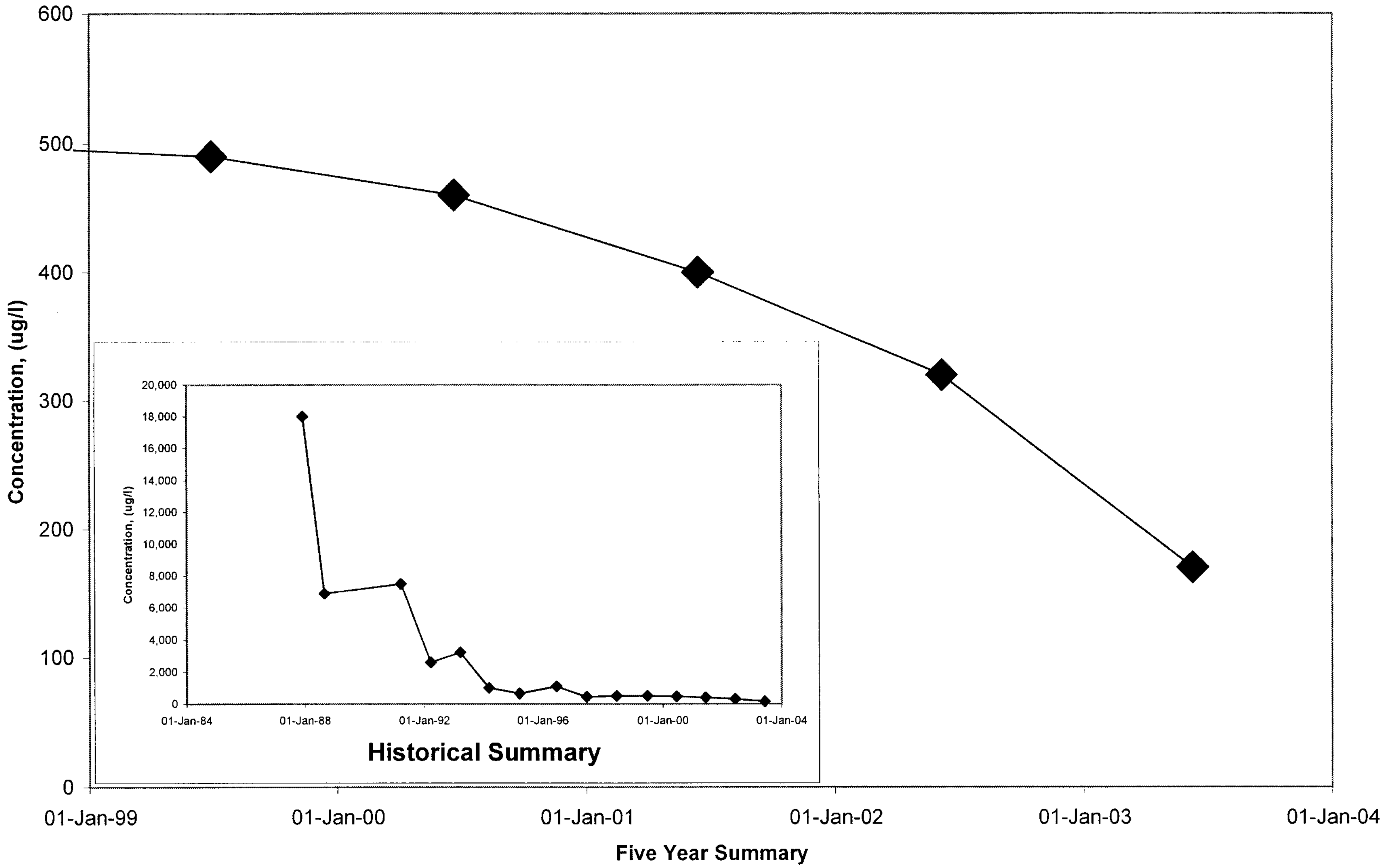
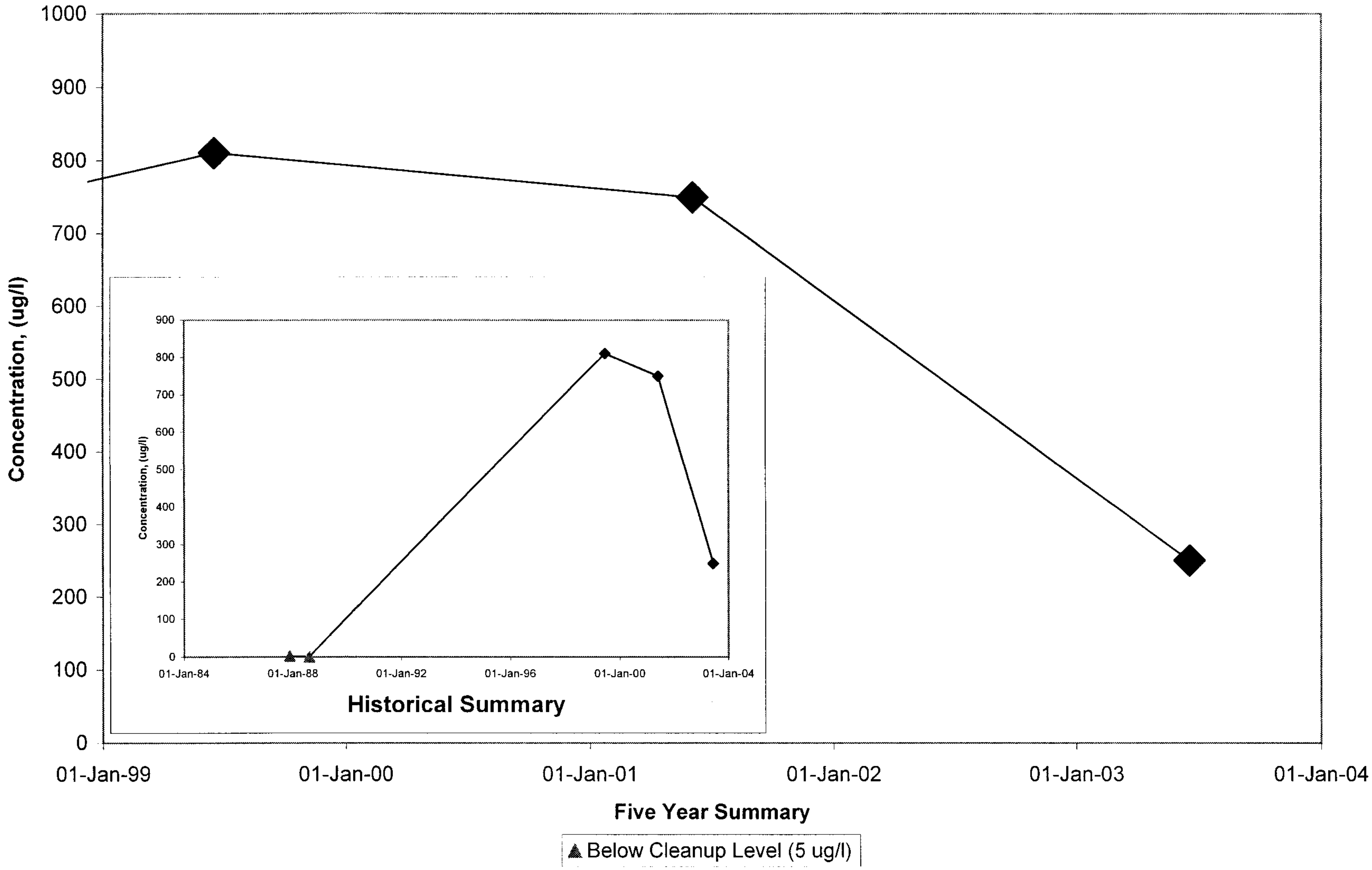


FIGURE 5-7
SITE G, WELL 03L014, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT



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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 originally consisted of eight extraction wells installed along two lines downgradient of the source area. Only four of the eight extraction wells currently need to be operated to provide the necessary containment. 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 that 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 ongoing 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 to #4 and evaluation of the overall remedy. Table 6-1 summarizes the performance monitoring requirements, the implementing parties, and the documents that contain the monitoring plans. The FY 2003 Monitoring Plan is included in Appendix A. Figure 6-1

illustrates the wells and piezometers associated with Site A, and highlights the wells that were sampled in FY 2003.

Were the groundwater monitoring requirements for this remedy met? Yes.

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 Appendix E. No wells are recommended for FY 2004. The next "major" event will be in FY 2005.
- Monitoring of the extraction wells (pumping volumes, water levels, and water quality) and treatment system effluent will be in accordance with Appendix A.2.
- Other groundwater monitoring will be in accordance with the Groundwater Monitoring Plan included as Appendix A.1.

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

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 extraction wells, 01U351 – 01U358 (EW1 - EW8), were installed in two capture lines as shown on Figure 6-1. Seven of the eight extraction wells fully penetrate the Unit 1 aquifer and range in depth from 31 to 48 feet, as shown in cross-sectional view on Figure 6-2. The one partially penetrating well, 01U353 (EW3), was completed in silt to sandy clay units that 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.

- Wells 01U355 - 01U358 (EW5 – EW8), the line of extraction wells downgradient of the "first line" of extraction wells, were shut off (with regulatory approval) on July 11, 2000, and have remained off since that time. These wells were shut off because: 1) they were below the cleanup levels, and 2) the known area of groundwater having cleanup goal exceedances was within the capture area of the first line of extraction wells.

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 6-2 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 6-3 shows the monthly average pumping rate for each extraction well and the combined system total, along with the target pumping rate for containment. The original target pumping rate for wells 01U351 - 01U355 (EW1 – 5) was 15 gpm. Even with 01U355 (EW5) off, the system has been operated to maintain a target pumping rate of 15 gpm. Table 6-3 shows that monthly total flowrates exceeded the target of 15 gpm in all months, with an average pumping rate for FY 2003 of 16.6 gpm.

Water level data collected at Site A on June 2, 2003, is shown in Table 6-4, and a water level contour map prepared from this data is presented on Figure 6-3. This figure shows the influence from pumping the four extraction wells and the interpreted capture boundary, which supports the statement that the system is providing complete capture of all groundwater exceeding the Site A cleanup levels.

Table 6-2 (and also Figure 6-4 and Figure 6-5) show that the locations where groundwater exceeds cleanup levels continue to be at and upgradient of the first line of recovery wells. The decreasing concentration of cis-1,2-dichloroethene in 01U902 (downgradient of the extraction system) is also evidence of the extraction system's capture zone (Figure 6-6). The cis-1,2-dichloroethene concentration in this well has dropped from a historical high around 100 μg/l to 5.2 μg/l in FY 2003.

Were there any significant operation and maintenance problems (greater than 24 hour shutdown)?
Yes. Table 6-5 summarizes O&M notes for FY 2003.

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 for more information on this program.

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

Yes, it was issued in June 1996 and revised in December 1999; however, this revision did not affect the boundary for the Site A vicinity.

Did the boundary of the Site A plume get any bigger during FY 2003, as defined by the 1 μg/l contour?

No. Figure 6-4 shows the 1 μg/l contour line for cis-1,2-dichloroethene (the chemical of concern at Site A with the biggest plume footprint). There were no significant increases in the plume footprint from last year.

Were any additional water supply wells discovered within the area of concern for the Site A plume that are completed within the aquifer of concern? No.

Were any water supply wells within the Site A plume sampled during FY 2003? If yes, what were the findings? No.

Were any well owners offered an alternate supply and/or well abandonment in FY 2003? No.

Within the Site A plume, are there any well owners that meet the criteria, but have not yet been provided an alternate water supply? No.

Within the Site A plume, are there any wells that meet the criteria, but have not yet been abandoned? No.

Is any sampling of water supply wells proposed prior to the next report? No.

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 Industrial Discharge Permit, as shown in Table 6-6.

During FY 2003, was the discharge water in compliance with the Industrial Discharge Permit requirements?
Yes. Table 6-6 shows that the effluent water quality was below the discharge criteria in every month of FY 2003.

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 (cis and trans), trichloroethene, 1,1,1-trichloroethane, and mercury (see Appendix A.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. Shaw performed investigation work in 1997 and the final "Site A Investigation Report" was issued December 12, 1997. The report delineated the extent of both VOC-contaminated and metal-contaminated soils requiring remediation.

Remediation has been completed. Shaw completed removal of metal-contaminated soils in FY 1999. Construction of an air sparging/soil vapor extraction (AS/SVE) system to remediate VOC-contaminated soils was completed by Shaw in FY 2000, which began operation in early FY 2001. The AS system was operated minimally in FY 2001 and was shut off permanently in June 2001 due to a lack of increase in SVE VOC levels and due to concern regarding potential plume spreading. The AS system was being implemented voluntarily and was not a requirement of the OU2 ROD. Soil samples were collected within the source area in July 2002 (and previously in August 2001). In both events, the results showed minimal reduction in soil VOC concentrations. Since it appeared that many years of SVE system operation would be required before cleanup levels would be reached (if ever), the Army ceased SVE system operation on August 21, 2002, and submitted a work plan clarification to the USEPA and MPCA for excavation of the VOC-contaminated soils in the source area. The work plan clarification received regulatory approval in early FY 2003, and 688 cubic yards of contaminated soil were excavated by Shaw and transported off-site to a permitted disposal facility. The Site A Former

1945 Trench Closeout Report (prepared by Shaw) was under regulatory review at the end of FY 2003.

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 6-2 shows the exceedances in wells at Site A during FY 2003. Figure 6-5 shows that the area with tetrachloroethene exceedances (greater than 7 µg/l) extends from the source area (near 01U108) downgradient to near 01U126. The tetrachloroethene exceedances do not extend to the first line of extraction wells. There were no cis-1,2-dichloroethene exceedances (greater than 70 µg/l) in the June 2003 event (Figure 6-4). However, Table 6-2 shows that extraction well 01U352 (EW2), which was just below the cleanup level in June 2003, was over the cleanup level in December 2002 at 160 µg/l. This suggests that an area with cis-1,2-dichloroethene exceedances (greater than 70 µg/l) may still persist in the vicinity of EW2, though it does not extend back to the source area. Similarly, the benzene concentration in EW2 was below the cleanup level of 10 µg/l in the June 2003 event, but was above the cleanup level in the December 2002 event (detected at 21 µg/l). The benzene cleanup level was not exceeded in any other wells.

What impact is the groundwater extraction system having on contaminant concentrations? Groundwater contaminant concentrations at Site A were generally comparable to last year's data, with the cis-1,2-dichloroethene plume extent decreasing slightly and the tetrachloroethene plume extent remaining about the same. Some minor changes in plume contours in Figure 6-4 (cis-1,2-dichloroethene) and Figure 6-5 (tetrachloroethene) from the FY 2002 plume contours are noted as follows:

- Figure 6-4:
  1) 01U904 decreased from 3.0 to <1.0 µg/l, moving the 1 µg/l contour inward.
  2) 01U139 decreased from 12 to 5.8 µg/l, eliminating the 10 µg/l contour in this area.
  3) 01U158 decreased from 1.7 to 0.67 µg/l, moving the 1 µg/l contour inward.
  4) 01U157 decreased from 1.3 to <0.1 µg/l, creating a separation in the 1 µg/l contour. As shown on Figure 6-3, 01U157 is located at the approximate limit of the downgradient edge of the capture zone for the operating extraction wells.
  5) 01U102 decreased from 1.3 to 0.22 µg/l, moving the 1 µg/l contour inward.
- Figure 6-5:
  1) 01U108 increased from 7.6 to 65, moving the 10 µg/l contour outward.
  2) 01U351 (EW1) increased from 0.29 to 1.5 ug/l, moving the 1 µg/l contour slightly outward.

Wells at, and downgradient, of the first line of extraction wells generally showed slightly decreasing concentrations. All wells downgradient of the first line of extraction wells had water quality results that remained below the cleanup levels. The well adjacent to the source area (01U108) showed a considerable increase in tetrachloroethene (from 7.6 to 65 ug/l); however, the 7.6 ug/l result was likely an artifact of sporadic air sparging efforts. Sparged air tended to exit the saturated zone through the 01U108 well screen, and sampling events for this well that showed dramatic drops in tetrachloroethene concentrations may have been impacted by very localized, transient air sparging effects. The following figures present trend graphs of cis-1,2-dichloroethene, trichloroethene, and tetrachloroethene for representative wells that illustrate these points:

- Figures 6-6 01U902 (Downgradient of the extraction system)
- Figures 6-7 Extraction Wells EW1 to EW4 (the first line of extraction wells) (cis-1,2-dichloroethene only)
- Figures 6-8 01U108 (Near the source area)

Note that some of the data points prior to FY 1999 may be showing total 1,2-dichloroethene (cis and trans isomers combined), since analysis of the cis isomer alone has not always been performed.

What impact is source removal having on contaminant concentrations?

Since the contaminated soils from the Former 1945 Trench were only removed from the site in early FY 2003, the source removal may not have influenced the FY 2003 monitoring data. At 01U108, the closest monitoring well downgradient of the source area, the concentration of tetrachloroethene actually increased substantially from FY 2002. However, as explained above, recent trends at this well were likely influenced by the sporadic operation of the air sparging system. Additional monitoring will be required to verify the trend at 01U108. The groundwater travel time from the source area to the first line of recovery wells is approximately 2 years, and therefore, the potential effects of source removal will be even more delayed at the recovery wells.

How much VOC mass has been removed?

Based on the calculated VOC mass removal rates for the total effluent, the groundwater extraction system removed approximately 2.1 pounds of VOCs in FY 2003, with a cumulative VOC mass removal of approximately 39 pounds since system startup on May 31, 1994 (Table 6-7).

Has 10 years elapsed since signing of the OU2 ROD? No. The June 2003 sampling event marked six years of extraction system operation since the signing of the OU2 ROD. The ROD states, "should aquifer restoration not be attained within the anticipated ten-year lifespan of the remedy, additional remedial measures will be addressed". Based on the FY 2003 contaminant concentrations and trends, it appears that cleanup levels could potentially be reached throughout the areal extent of the plume by the tenth year. However, even if cleanup levels are not reached by the tenth year, the situation might be that exceedances will persist only in the source area vicinity and will not extend to the first line of recovery wells.

Do additional remedial measures need to be addressed? No.

Table 6-1
Summary of Site A Shallow Groundwater Monitoring Requirements

Remedy Component	Monitoring Requirements	Implementing 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	a. AS/SVE system flowrates and air quality data to evaluate system effectiveness and emissions (this system was permanently shut down on August 21, 2001)	Army	Site A Monitoring Plan in the Annual Report
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 Groundwater Quality Data

Fiscal Year 2003

			Tetra-chloro-ethene (ug/l)	Tri-chloro-ethene (ug/l)	1,1-Di-chloro-ethene (ug/l)	1,2-Di-chloro-ethane (ug/l)	cis-1,2-Di-chloro-ethene (ug/l)	Cholor-form (ug/l)	Benzene (ug/l)	Antimony (ug/l)
Site A Cleanup Level [1]			7	30	6	4	70	60	10	6
01U039		6/3/2003	<1.0	JP 0.34 (UB0.8)	<1.0	<1.0	<1.0	<1.0	<1.0	
01U102		6/4/2003	1.9	JP 0.27 (UB0.8)	<1.0	<1.0	JP 0.22	<1.0	<1.0	
01U103		6/4/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	B 3.8
01U103	D	6/4/2003	---	---	---	---	---	---	---	B 2.8
01U108		6/5/2003	64	8.0	<1.0	<1.0	JP 0.64	<1.0	<1.0	
01U108	D	6/5/2003	65	8.0	<1.0	<1.0	JP 0.70	<1.0	<1.0	
01U115		6/3/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U116		6/3/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U117		6/4/2003	3.0	1.9 (UB0.8)	<1.0	<1.0	12	<1.0	<1.0	
01U126		6/4/2003	12	JP 0.26 (UB0.8)	<1.0	<1.0	<1.0	<1.0	<1.0	
01U126	D	6/4/2003	12	JP 0.19 (UB0.8)	<1.0	<1.0	<1.0	<1.0	<1.0	
01U127		6/3/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U138		6/3/2003	JP 0.15 (UB0.2)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U139		6/4/2003	<1.0	JP 0.25 (UB0.8)	<1.0	<1.0	5.8	<1.0	JP 0.30	
01U140		6/4/2003	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	1.0	
01U157		6/3/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U158		6/3/2003	<1.0	<1.0	<1.0	<1.0	JP 0.67	<1.0	<1.0	
01U901		6/5/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U902		6/5/2003	<1.0	JP 0.16 (UB0.8)	<1.0	<1.0	5.2	<1.0	<1.0	<5.0
01U903		6/4/2003	<1.0	JP 0.38 (UB0.8)	<1.0	<1.0	<1.0	<1.0	<1.0	
01U904		6/5/2003	<1.0	<1.0	JP 0.11	<1.0	<1.0	<1.0	<1.0	<5.0

T:\1038\12\FY03 APR\APR Tables\Table 6-2

Table 6-2
Site A Groundwater Quality Data

Fiscal Year 2003

			Tetra-chloro-ethene (ug/l)	Tri-chloro-ethene (ug/l)	1,1-Di-chloro-ethene (ug/l)	1,2-Di-chloro-ethane (ug/l)	cis-1,2-Di-chloro-ethene (ug/l)	Cholor-form (ug/l)	Benzene (ug/l)	Antimony (ug/l)
Site A Cleanup Level (1)			7	30	6	4	70	60	10	6
Extraction Wells:										
01U351 (EW1)		6/9/2003	1.5	1.4	<1.0	<1.0	3.8	<1.0	<1.0	
01U352 (EW2)		12/12/2002	JP 0.42	1.3	JP 0.20	<1.0	**160** (JS69)	<1.0	**21**	
01U352 (EW2)		6/9/2003	JP 0.41	1.0	<1.0	JP 0.47	66	<1.0	8.9	
01U352 (EW2)	D	6/9/2003	JP 0.43	JP 0.93	<1.0	JP 0.47	68	<1.0	10	
01U353 (EW3)		12/12/2002	JP 0.25	JP 0.88	<1.0	<1.0	19 (JS69)	<1.0	JP 0.24	
01U353 (EW3)		6/9/2003	JP 0.25	JP 0.90	<1.0	<1.0	22	<1.0	JP 0.94	
01U354 (EW4)		6/9/2003	<1.0	JP 0.19	<1.0	<1.0	JP 0.65	<1.0	<1.0	

Notes:

(1) Cleanup levels for Site A Shallow Groundwater are from Table 1 of the OU2 ROD. Bolding (in red color) indicates exceedance of the cleanup level.

D Duplicate sample.

JP The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

B The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

UB The sample result was less than 5 times the level detected in a blank (the result for the blank is listed after "UB"). The sample result can be considered non detect at an elevated detection limit.

JS The percent recovery for the matrix spike was below the lower QC limit (the percent recovery is listed after "JS"). The sample result could be biased low.

Table 6-3
Site A Pumping Data

Fiscal Year 2003

Monthly Average Flowrate (gpm)

	01U351 (EW1)	01U352 (EW2)	01U353 (EW3)	01U354 (EW4)	Total
				Target Flowrate:	15.0
Oct-02	3.9	3.2	3.7	4.3	15.1
Nov-02	4.4	3.9	4.6	5.2	18.1
Dec-02	4.5	3.6	4.1	5.0	17.2
Jan-03	4.8	3.2	3.7	5.4	17.1
Feb-03	4.4	3.9	3.6	4.7	16.5
Mar-03	4.5	3.0	3.8	4.7	16.0
Apr-03	4.5	3.0	4.1	4.9	16.4
May-03	4.3	2.7	4.0	4.9	15.9
Jun-03	4.7	3.3	4.2	4.8	17.1
Jul-03	4.6	4.0	4.1	4.2	16.9
Aug-03	4.5	3.3	4.1	4.7	16.5
Sep-03	3.0	4.3	4.3	4.9	16.5
FY 2003 Averages:	**4.3**	**3.5**	**4.0**	**4.8**	**16.6**

Table 6-4
Site A Groundwater Level Data

Fiscal Year 2003

Well ID	TOS (ft)	Groundwater Elevation (ft)
01U038	900.30	894.85
01U039	897.50	886.19
01U040	892.54	886.21
01U041	898.33	894.44
01U063	892.61	885.81
01U067	897.40	894.54
01U102	905.20	891.96
01U103	904.14	893.30
01U104	899.12	895.23
01U105	901.39	896.37
01U106	896.80	892.94
01U107	899.16	894.91
01U108	904.30	892.86
01U110	897.22	895.83
01U115	900.33	888.04
01U116	902.71	888.24
01U117	902.69	889.50
01U118	901.79	892.81
01U119	898.08	894.84
01U120	902.15	892.16
01U126	903.34	891.07
01U127	902.93	892.84
01U133	900.73	894.57
01U135	899.94	885.16
01U136	898.84	881.06
01U137	900.51	890.87
01U138	904.38	888.25
01U139	901.15	887.69
01U140	898.83	886.73
01U141	897.74	888.41
01U145	902.56	889.69
01U146	902.89	887.62
01U147	902.80	888.92
01U148	902.60	888.71
01U149	901.30	888.58
01U150	901.30	887.81
01U151	904.70	887.93
01U152	901.00	887.84
01U153	899.90	887.45
01U154	898.90	887.03
01U155	897.90	886.01
01U156	897.80	885.46
01U157	901.90	887.88
01U158	901.10	887.50
01U901	901.48	884.37
01U902	901.29	887.00
01U903	903.70	888.54
01U904	899.40	885.54

Extraction Wells:
(Elevations measured while pumping.)

Well ID	TOS (ft)	Groundwater Elevation (ft)
01U351 (EW1)	904.00	885.94
01U352 (EW2)	901.00	887.01
01U353 (EW3)	902.00	882.34
01U354 (EW4)	903.80	886.62

Notes:
TOS = Top of Surface which represents the ground surface elevation in feet above mean sea level (MSL).
Groundwater elevations were measured on June 2, 2003.

Table 6-5
Site A Monthly Operation and Maintenance Notes

Fiscal Year 2003

October
10/28 - 10/30 System off for scheduled cleanings. Total down time approximately 50 hours.

November
No significant operational problems or changes this month.

December
12/16 - 12/17 System off for scheduled cleanings. Total down time approximately 31.75 hours.

January
No significant operational problems or changes this month.

February
2/4 - 2/5 System off for scheduled cleanings. Total down time 30.75 hours.

March
3/24 - 3/25 System off for scheduled cleanings. Total down time: 30.5 hours.
3/31 Ponded water was observed behind the Site A pumphouse building. The system was shut down for troubleshooting and it was determined that influent piping from EW-2 was leaking and causing the ponding. The system was restarted with EW-2 shut down for further investigation. Total down time: 2 hours.

April
4/2 Power shut down to all Extraction Wells (EW-1 through EW-4). Extraction Well EW-2 was found to be leaking at the 90 degree elbow stemming up from the trench to the pumphouse building. Elbow was replaced and the wells were put back in operation. Down time: 5.5 hours.

May
5/8 - 5/9 System off for scheduled cleanings. Total down time: 32 hours.
5/13 EW-3 has a bad seal on the pitless adapter, causing some water to flow back into well.
5/15 Pitless adapter for EW-3 was replaced.

June
6/1- 6/10 Due to a malfunctioning flow meter for EW-2, the flow rate was estimated at 2.7 gpm based on historical data.

July
7/1- 7/4 System shutdown for scheduled acid and welgicide treatment. Down time: 59.5 hours.

August
8/25 - 8/26 System shutdown for scheduled acid treatment and repairs. Down time: 32 hours.

September
9/19 - 9/24 The pump for EW-1 failed on 9/19. The remaining three operational wells were adjusted to optimize recovery. A new pump was installed at EW-1 on 9/24 and the system resumed normal operation.

Table 6-6
Site A Effluent Water Quality

Fiscal Year 2003

	cis-1,2-Dichloroethene (ug/l)	trans-1,2-Dichloroethene (ug/l)	Trichloroethene (ug/l)	1,1,1-Trichloroethane (ug/l)	Mercury (ug/l)
Discharge Limits:	3000	3000	3000	3000	2
22-Oct-02	31	JP 0.63	JP 0.82	<1.0	<0.100
14-Nov-02	36	JP 0.67	JP 0.95	<1.0	<0.100
12-Dec-02	24 (JS69)	JP 0.48	JP 0.75	<1.0	<0.100
28-Jan-03	18	JP 0.53	JP 0.82	<1.0	<0.100
13-Feb-03	35	JP 0.78	JP 0.86	<1.0	<0.100
12-Mar-03	23	JP 0.61	JP 0.85	<1.0	<0.100
29-Apr-03	14	JP 0.53	JP 0.67	<1.0	<0.100 (JS45)
28-May-03	17	JP 0.48	JP 0.64	<1.0	<0.100
09-Jun-03	16	JP 0.58	JP 0.80	<1.0	<0.100
28-Jul-03	32	JP 0.67	JP 0.97	<1.0	<0.100
28-Aug-03	61	1.1	1.1	<1.0	<0.100
29-Sep-03	20	JP 0.39	JP 0.66	<1.0	<0.100

Notes:

JP The value is below the reporting limit, but above the method detection limit. Results should be considered estimated.

JS The percent recovery for the matrix spike was below the lower QC limit (the percent recovery is listed after "JS"). The sample result could be biased low.

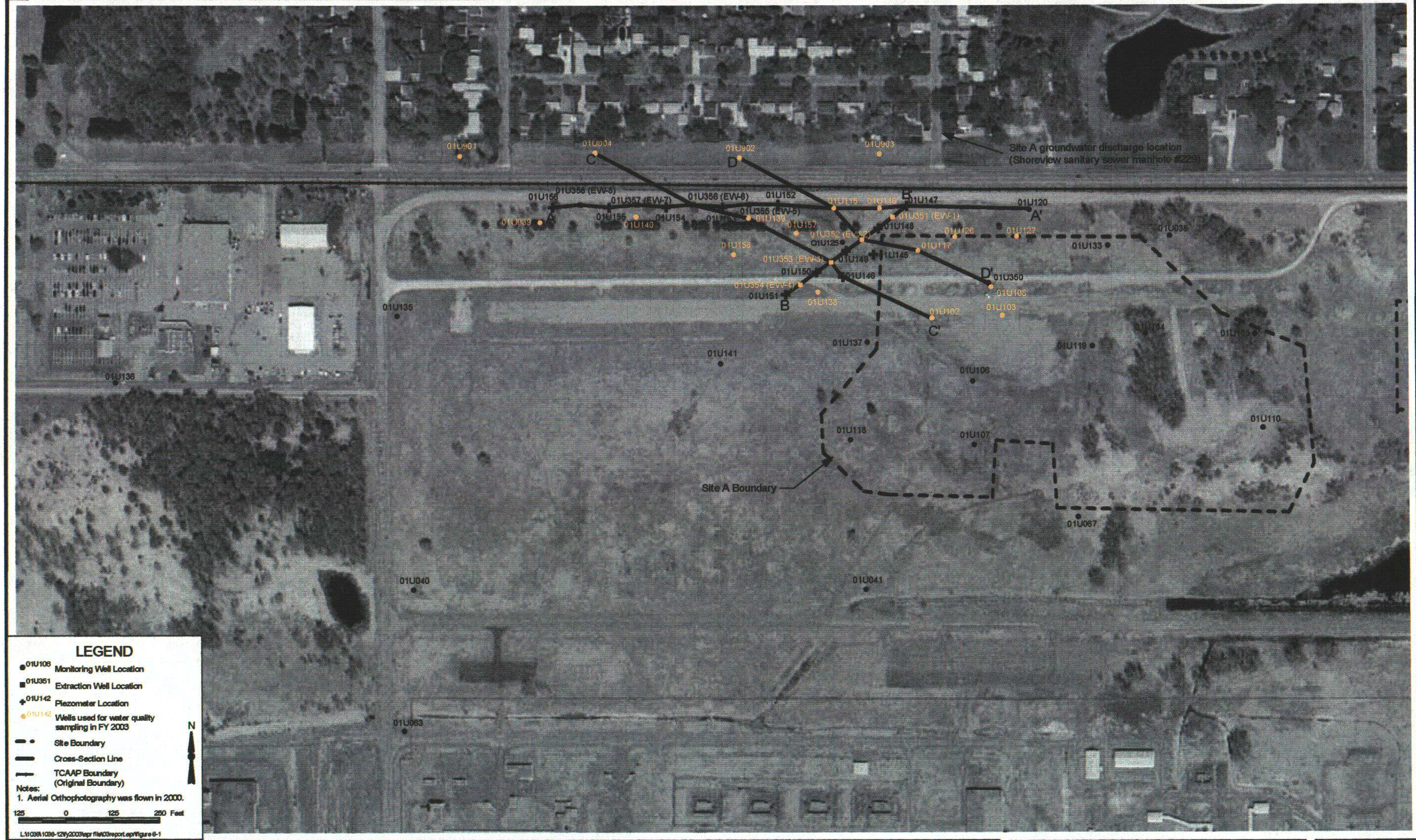
Table 6-7
Site A Monthly VOC Removal

Fiscal Year 2003

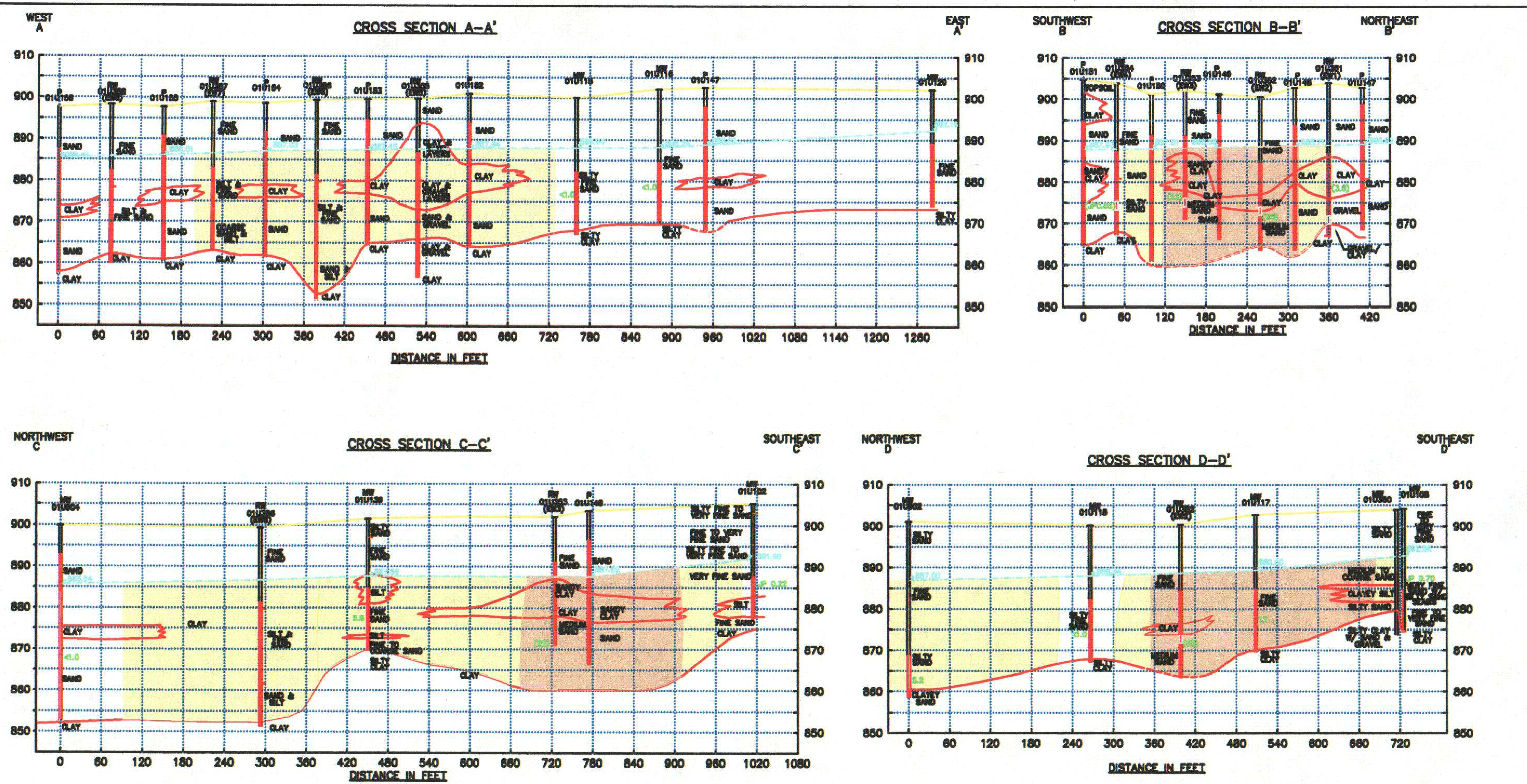
Month	1,2-Dichloroethene (cis and trans) (ug/l)	Trichloroethene (ug/l)	Total VOCs in System Effluent (ug/l)	Conversion Factor (l*lb)/(ug*gal)	Water Pumped (gallons)	Total VOCs Removed by Extraction System (lbs)
Total Gallons Pumped and VOCs Removed Through September 30, 2002:					121,591,443	37.0
Oct-02	31.63	0.82	32.45	8.35E-09	674,203	0.18
Nov-02	36.67	0.95	37.62	8.35E-09	701,968	0.22
Dec-02	24.48	0.75	25.23	8.35E-09	839,844	0.18
Jan-03	18.53	0.82	19.35	8.35E-09	762,300	0.12
Feb-03	35.78	0.86	36.64	8.35E-09	666,502	0.20
Mar-03	23.61	0.85	24.46	8.35E-09	715,971	0.15
Apr-03	14.53	0.67	15.20	8.35E-09	709,070	0.09
May-03	17.48	0.64	18.12	8.35E-09	678,693	0.10
Jun-03	16.58	0.80	17.38	8.35E-09	762,727	0.11
Jul-03	32.67	0.97	33.64	8.35E-09	729,134	0.20
Aug-03	62.10	1.1	63.20	8.35E-09	704,121	0.37
Sep-03	20.39	0.66	21.05	8.35E-09	753,465	0.13
Total Gallons Pumped and VOCs Removed for Fiscal Year 2003:					**8,697,998**	**2.1**
Total Gallons Pumped and VOCs Removed Since System Start-up:					**130,289,441**	**39.1**

Note:

1) Total VOC concentrations and mass removal calculations do not include estimated concentrations for compounds reported as "not detected".



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
Site A, Well Location Map		Figure 6-1



NOTES:

1. RESULTS ARE FROM GROUNDWATER SAMPLES COLLECTED BETWEEN JUNE 3-6, 2003.

2. CONSTRUCTION INFORMATION ON RECOVERY WELLS AND PIEZOMETERS WAS GENERATED BY DAHL AND ASSOCIATES, INC. AS PART OF THE SITE A REMOVAL ACTION SYSTEM CONSTRUCTION. CONSTRUCTION INFORMATION ON MONITORING WELLS WAS PROVIDED BY FEDERAL CARTRIDGE COMPANY.

LEGEND

- GEOLOGIC CONTACT
- INFERRED GEOLOGIC CONTACT
- SCREENED INTERVAL OF WELL
- PUMP LOCATION
- WATER LEVEL SURFACE
- SLIGHT CHANGE IN GEOLOGIC UNIT (MARK LOCATED ALONG WELL STAFF)
- MW MONITORING WELL
- RW RECOVERY WELL
- P PIEZOMETER

MW 01U117 — cis-1,2-DICHLOROETHENE CONCENTRATION (ug/l) (VALUES IN PARENTHESES WERE NOT USED FOR CONTOURING PURPOSES)

cis-1,2-DICHLOROETHENE CONCENTRATIONS

- 1-10 ug/l
- 10-100 ug/l

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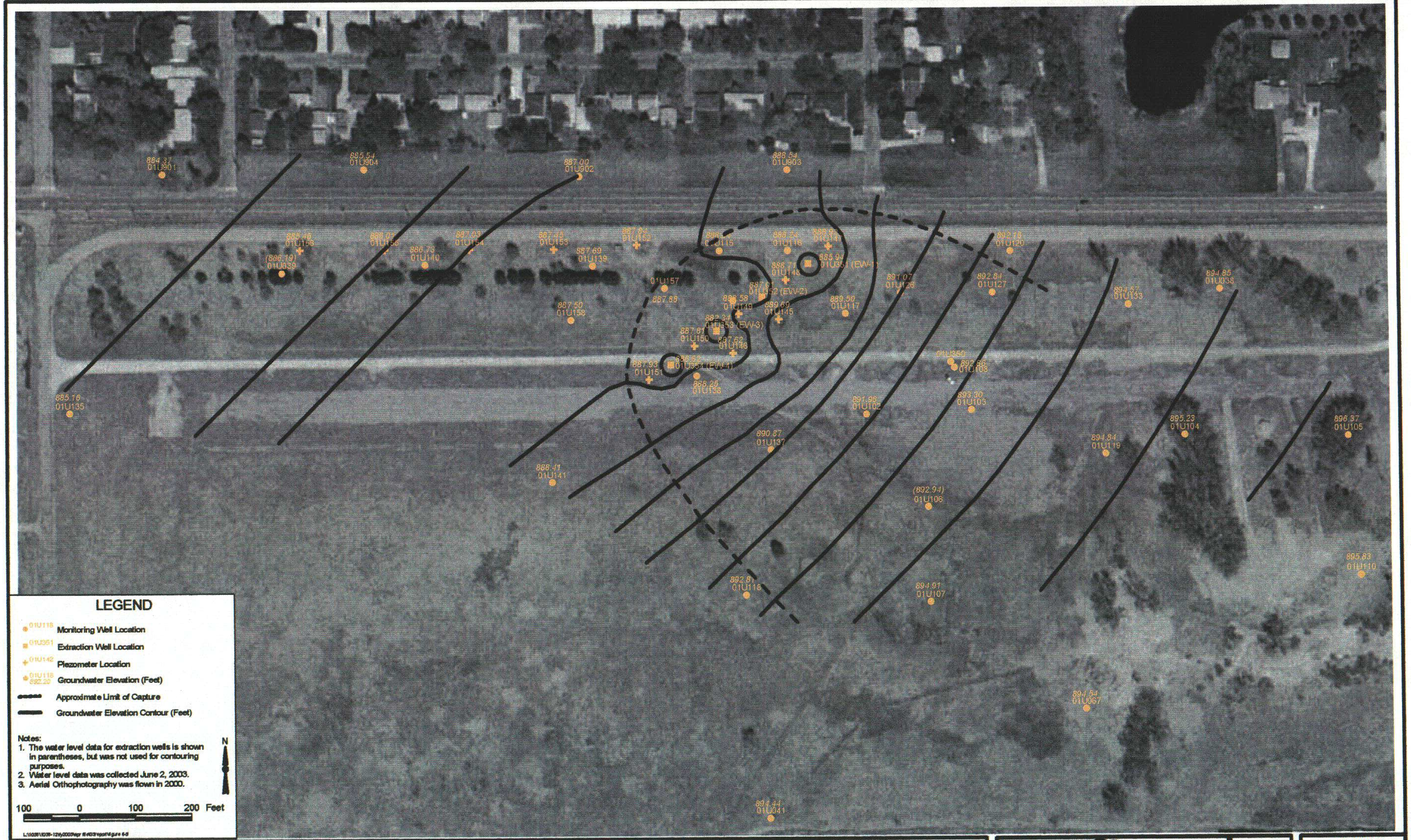
TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers	FY 2003
Site A, cis-1,2-Dichloroethene Cross Sections A-A', B-B', C-C' and D-D' Summer 2003	24 Weston Southwest Grand Rapids, MI 49503	Figure 6-2



TWIN CITIES ARMY AMMUNITION PLANT

Site A, Unit 1, Potentiometric Map -- Summer 2003

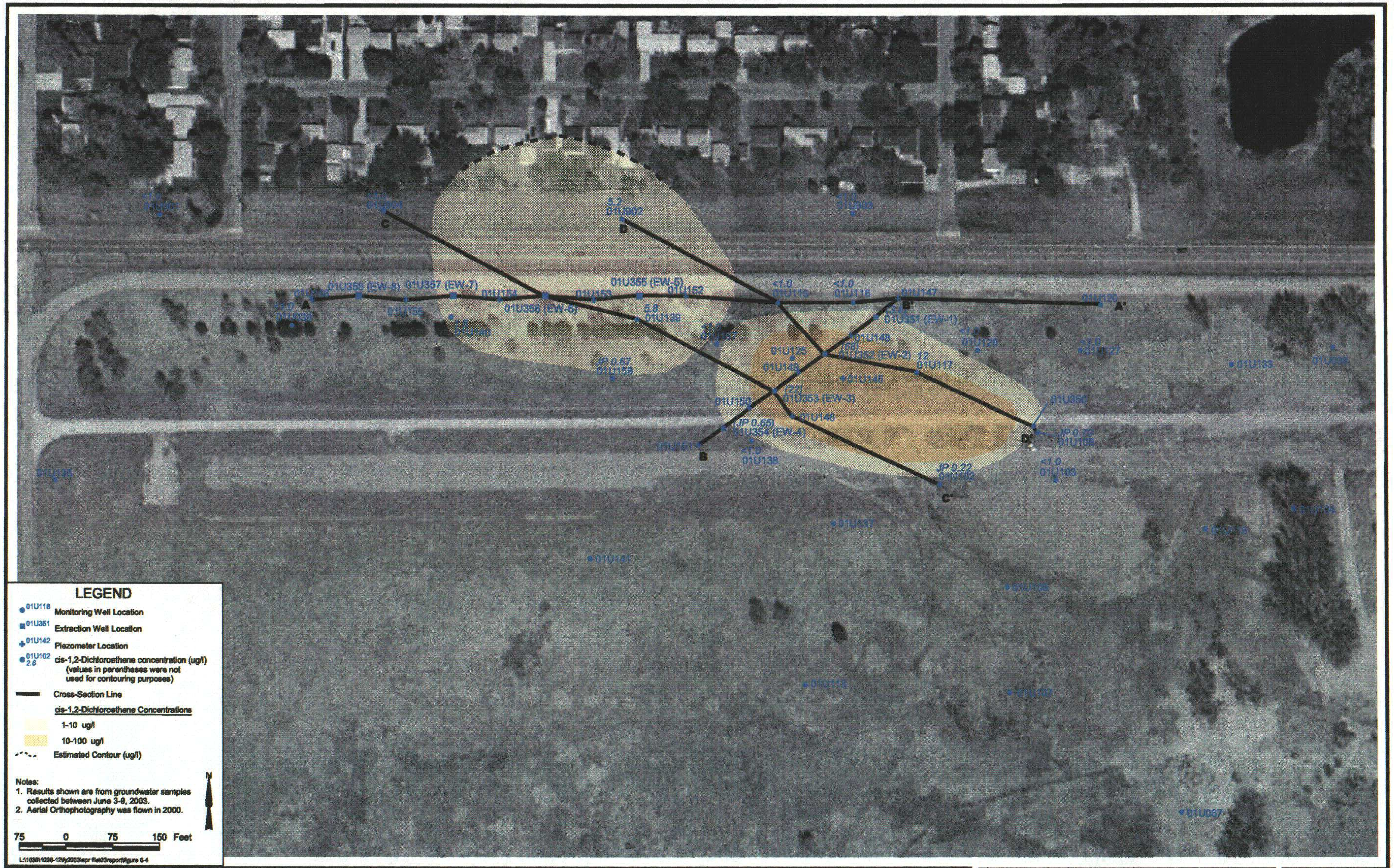
Wenck

Wenck Associates, Inc.
Environmental Engineers

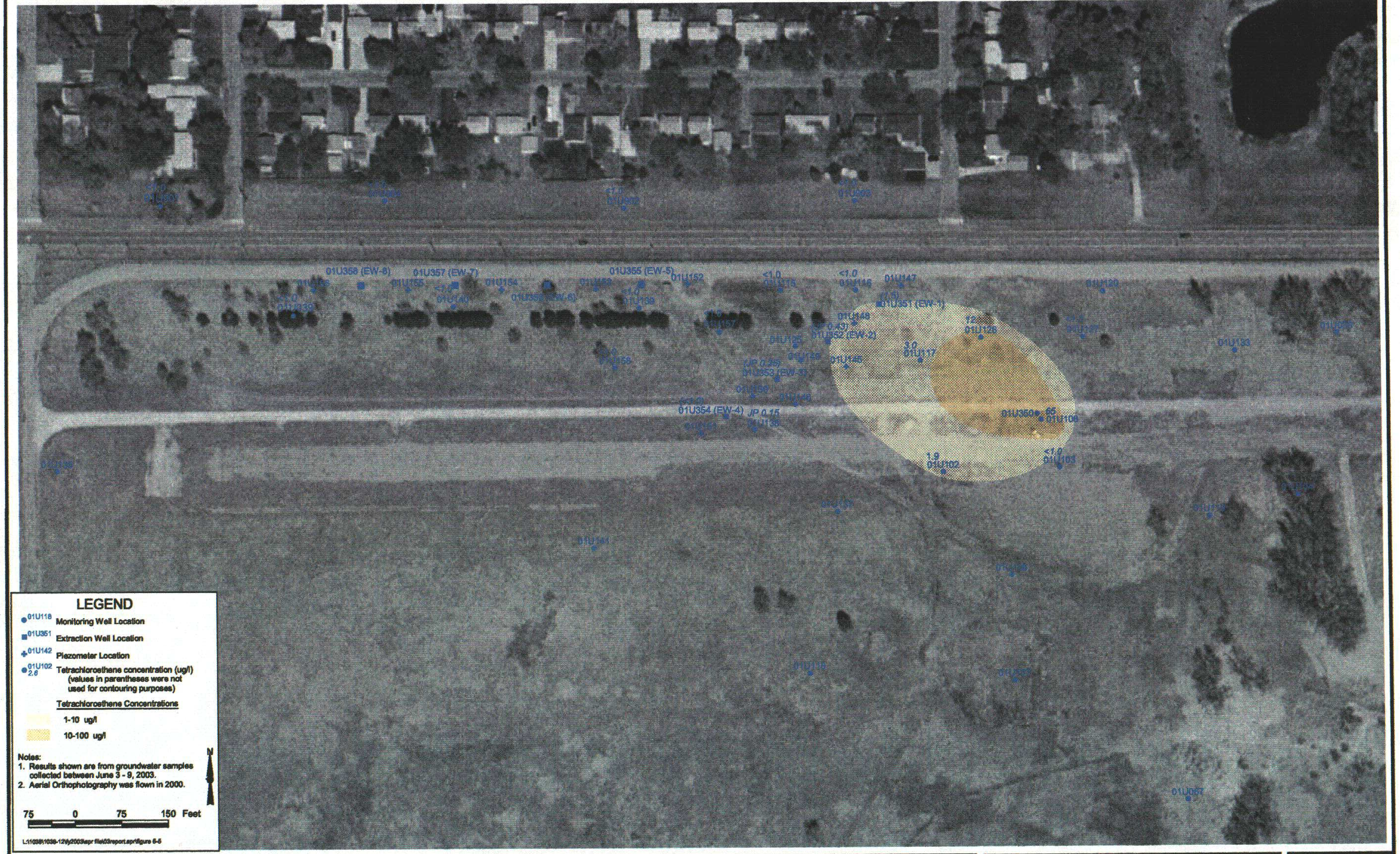
1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2003

Figure 6-3



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2003
Site A, Unit 1, cis-1,2-Dichloroethene Isoconcentration Map, Summer 2003	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 6-4



TWIN CITIES ARMY AMMUNITION PLANT

Site A, Unit 1 Tetrachloroethene Isoconcentration Map, Summer 2003

Wenck
Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359-0429

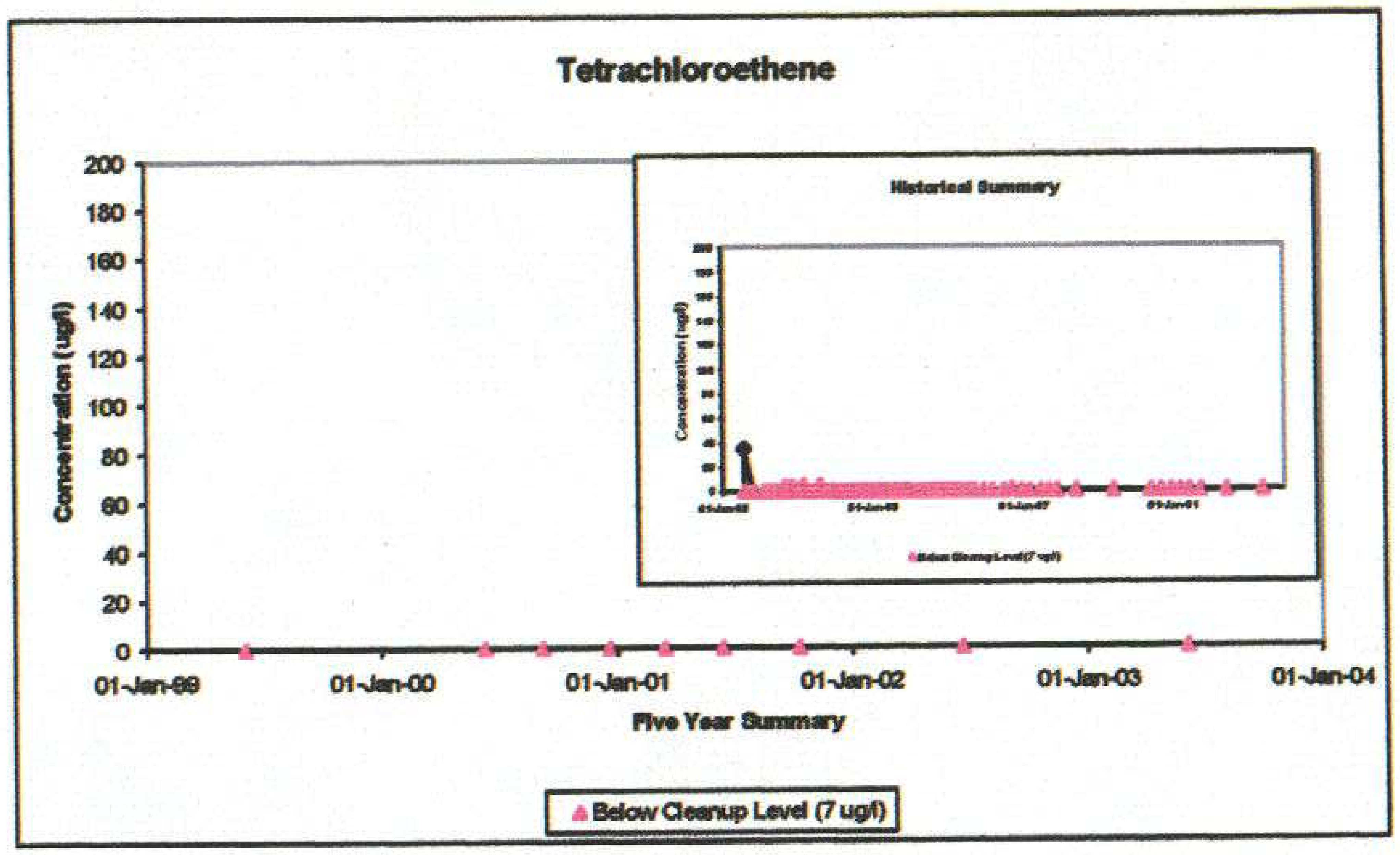
FY 2003

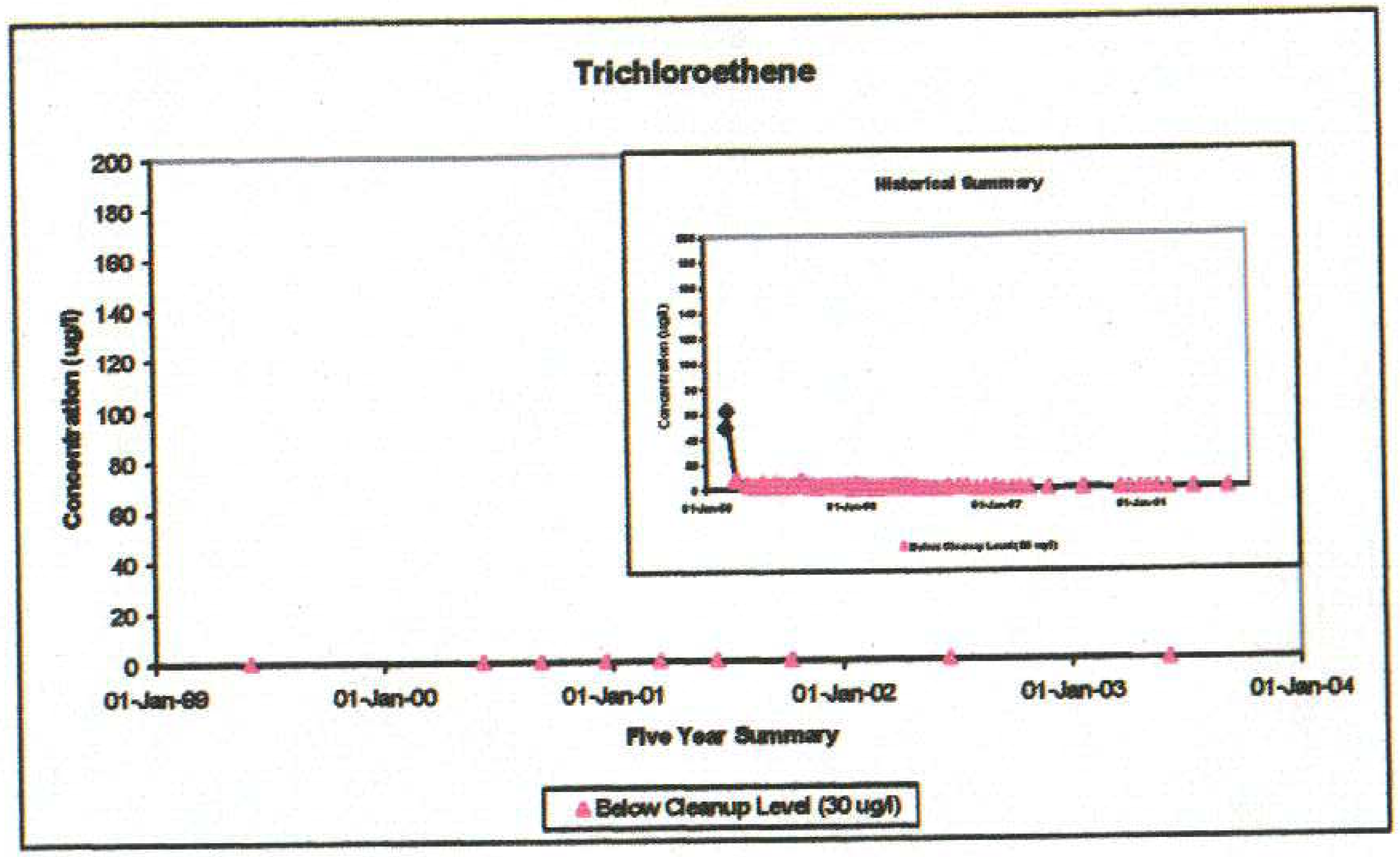
Figure 6-5

FIGURE 6-6

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

TWIN CITIES ARMY AMMUNITION PLANT





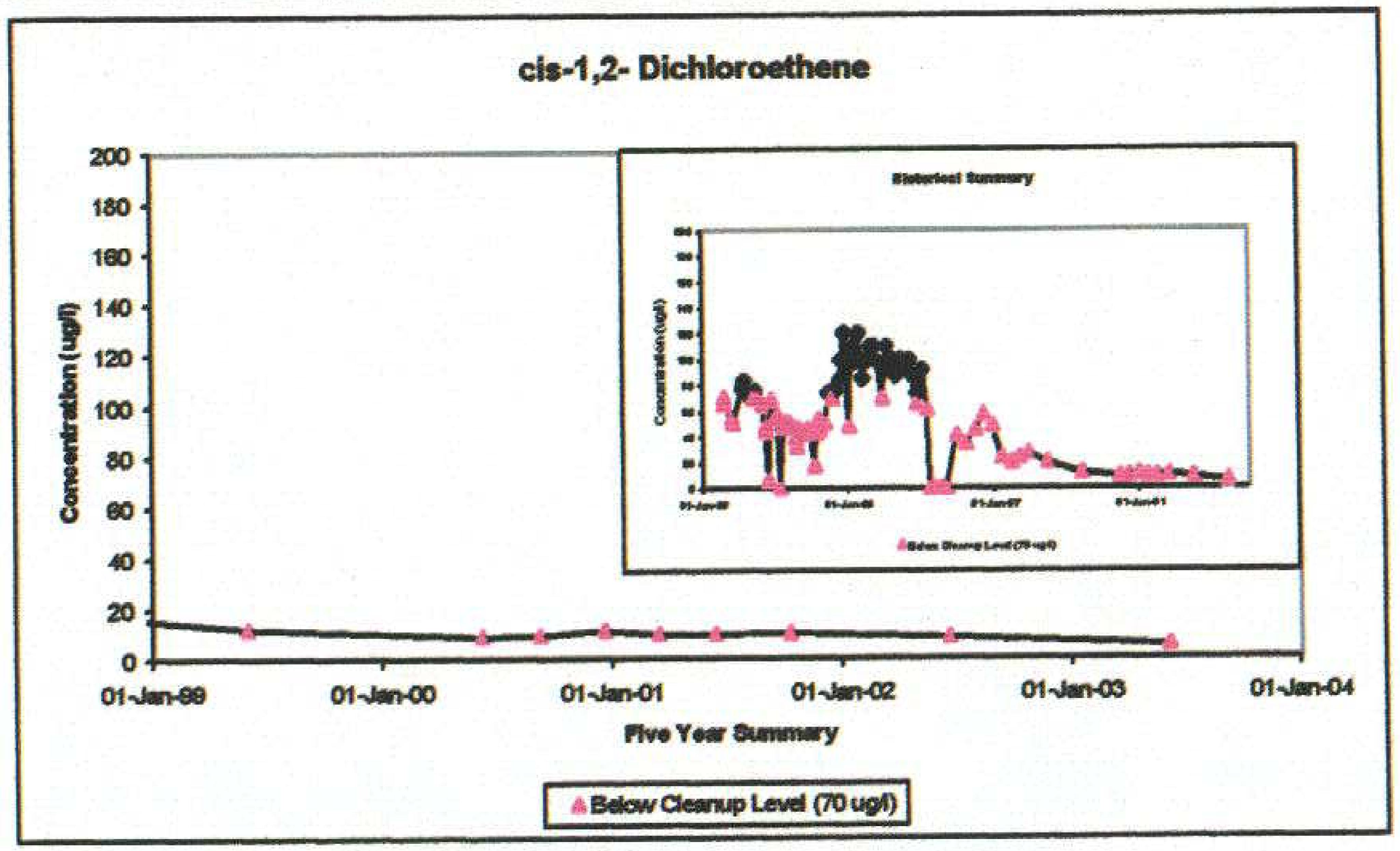


FIGURE 6-7
SITE A, cis-1,2-DICHLOROETHENE WATER QUALITY TRENDS: RECOVERY WELLS
TWIN CITIES ARMY AMMUNITION PLANT

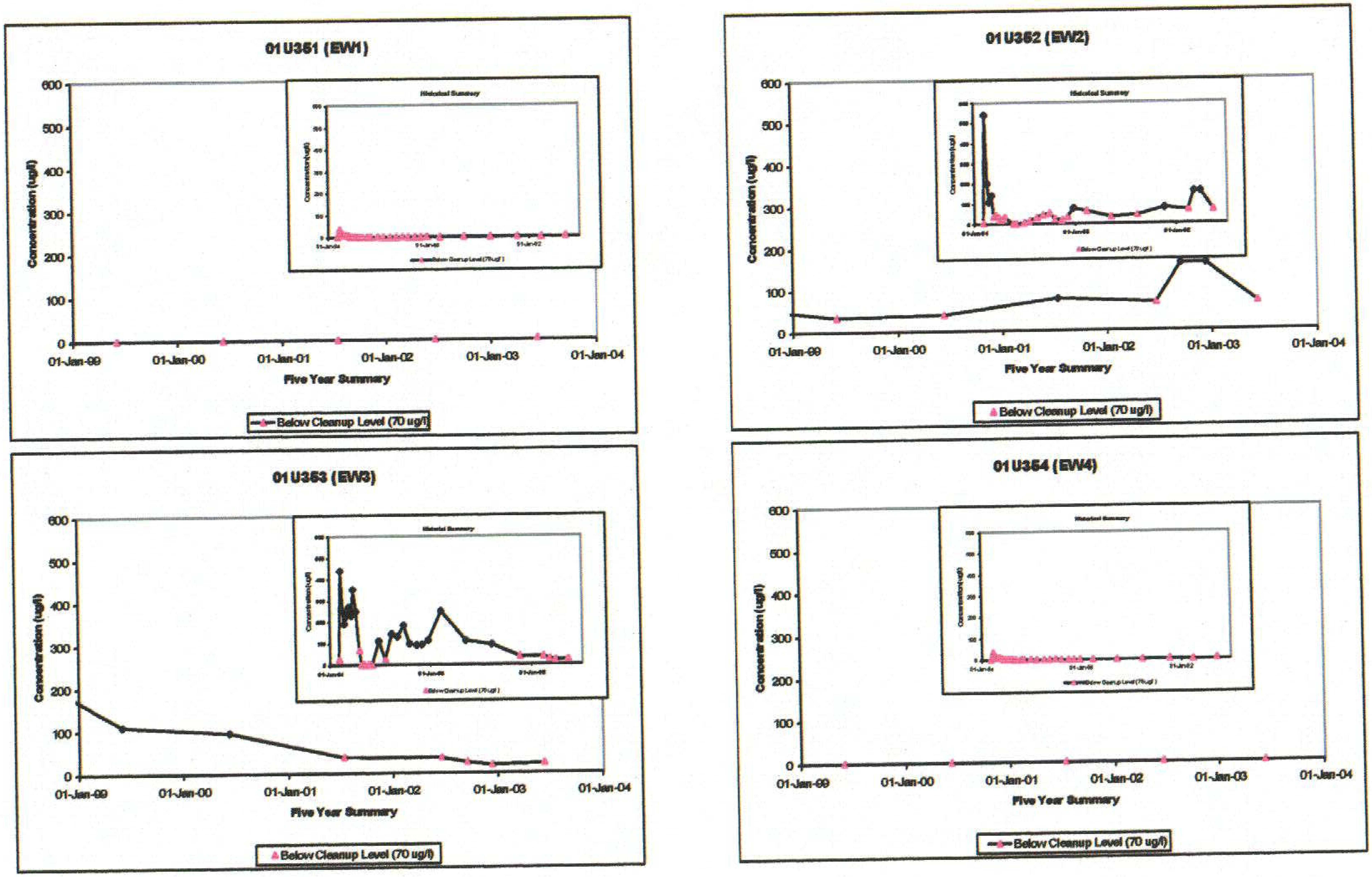
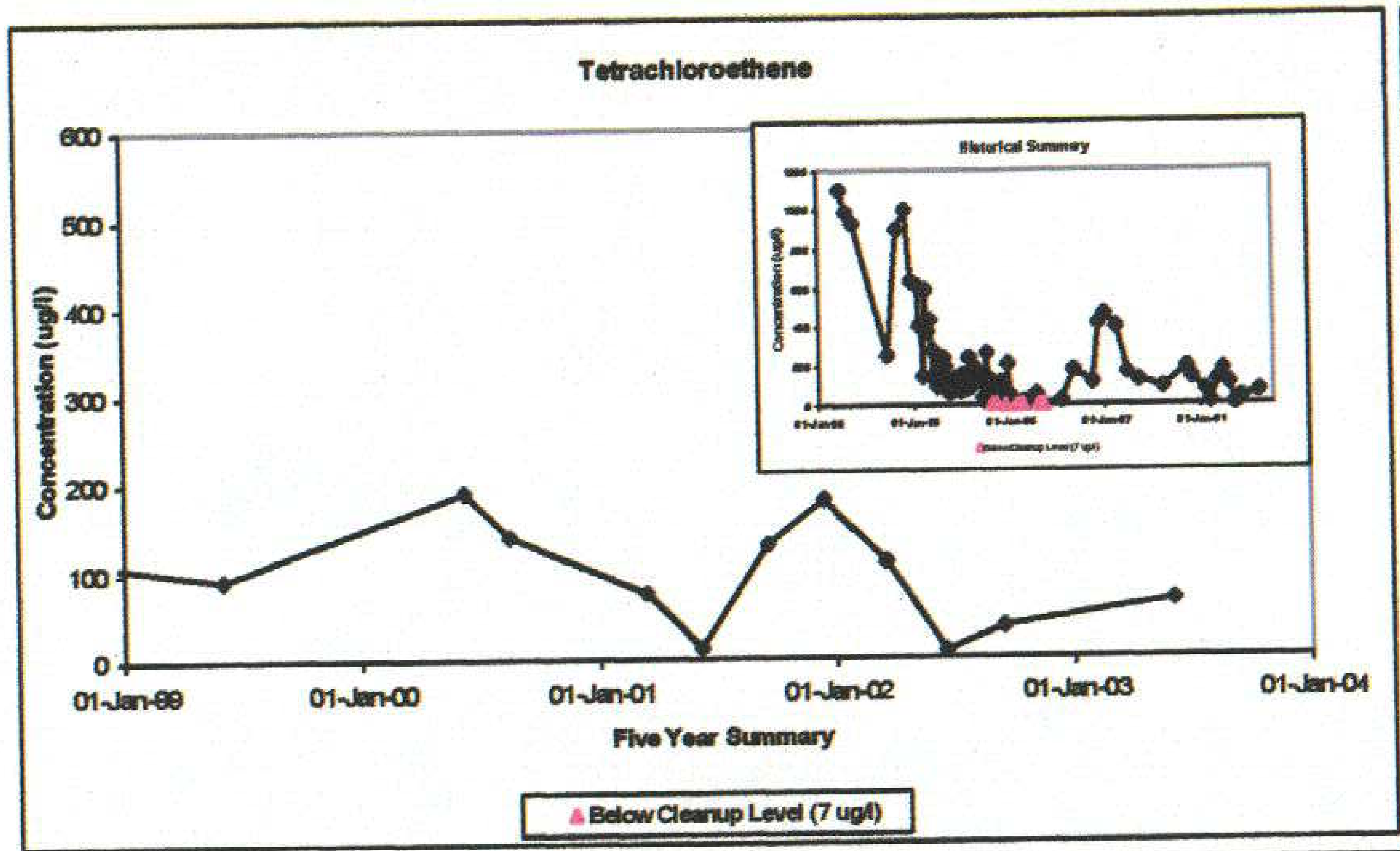
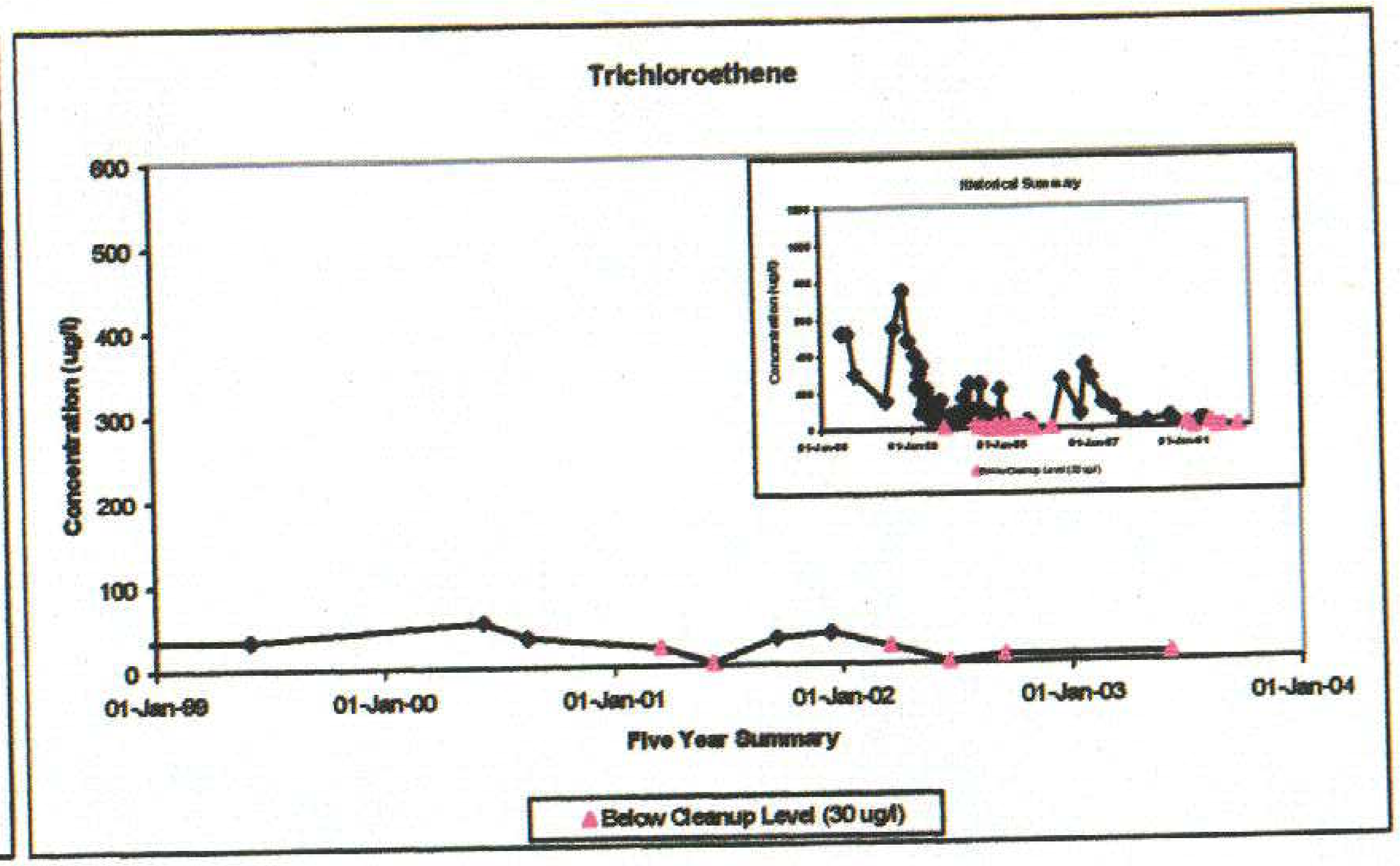


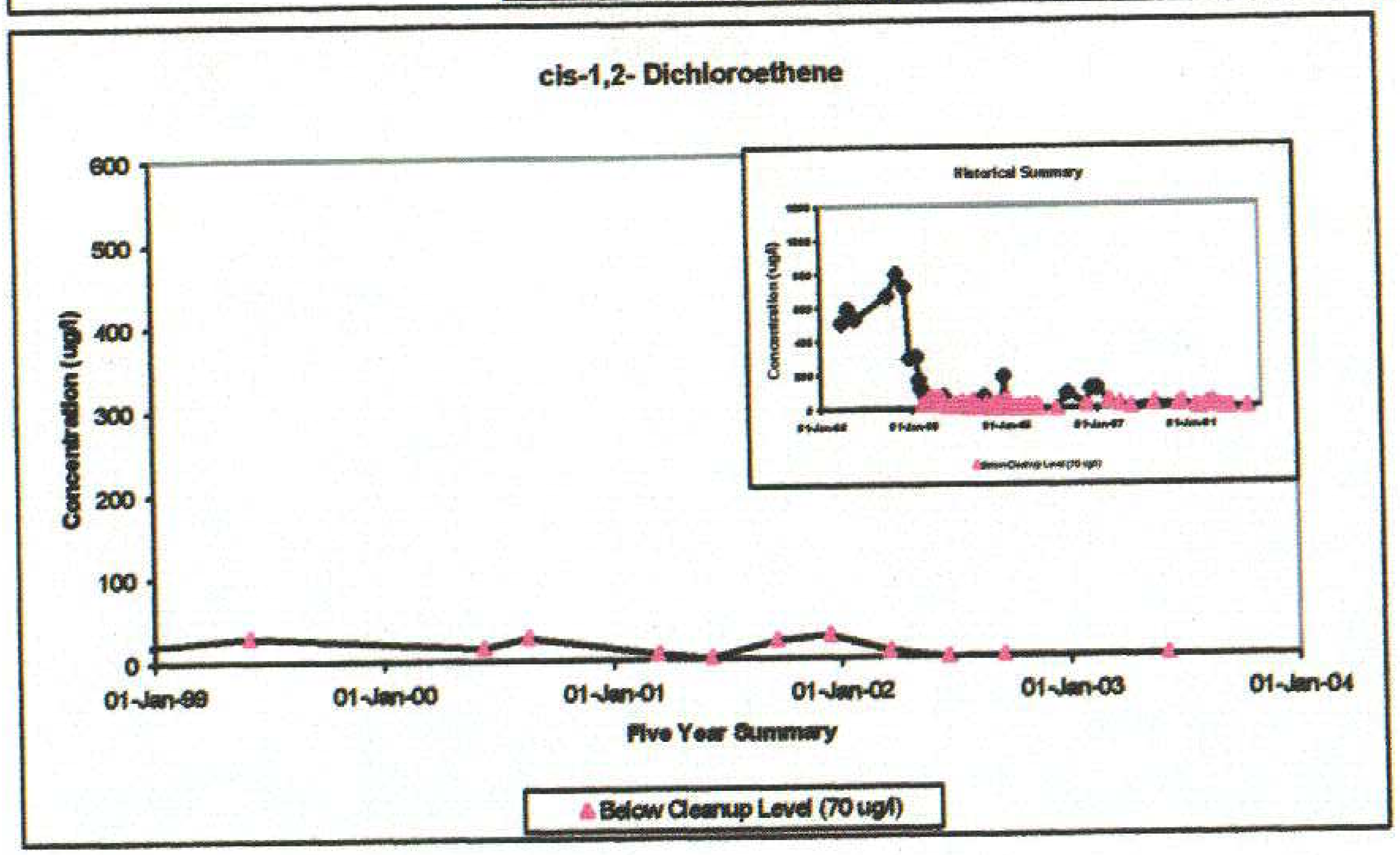
FIGURE 6-8

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

TWIN CITIES ARMY AMMUNITION PLANT







Wenck Associates, Inc.

T:\1088\12\FY03 APR\APR Figures\Fig 6-8

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. Groundwater monitoring was conducted for PCBs through FY 1997. PCBs were not detected in groundwater and the monitoring was discontinued. Information on this work is included in the OU2 Remedial Investigation (Argonne National Laboratory 1991).

Monitoring in FY 2003 addressed the VOCs identified in the Unit 1 groundwater beneath the western portion of Building 502. The selected remedy in the OU2 ROD consists of four components that incorporate the use of an existing well for groundwater extraction as well as additional investigation beneath the building slab. The additional investigation and Predesign Investigation Work Plan (Work Plan) were completed in FY 2000. Based on these documents, the selected remedy was modified to consist of a dual-phase vacuum extraction system, which combines groundwater extraction with soil vapor extraction, to be installed beneath Building 502. A pilot test of dual-phase extraction subsequently determined that the technology was not feasible due to the low permeability of the Unit 1 aquifer beneath the building. An amendment to the OU2 ROD will be pursued in FY 2004 to change the preferred remedy from groundwater pump and treat to a groundwater monitoring based remedy.

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 ongoing monitoring is in compliance with the plan.

Is the remedy component being implemented?
Yes. Monitoring at Site I in FY 2003 was conducted according to the monitoring plan for FY 2003. Appendix A summarizes the FY 2003 monitoring plan and any deviations are explained in Appendix C.2.

Seven Unit 1 monitoring wells were planned for sampling at Site I (Building 502) during FY 2003. These wells were 01U064, 01U636, 01U640, I01MW, I02MW, I04MW and I05MW. Figure 7-1 shows these well locations. During FY 2003 monitoring well 01U639 was deleted from the list of locations for sample collection and monitoring well 482089 (I04MW) was added to this list. For FY 2004 monitoring wells 01U639 and 482089 (I04MW) will also be included on the list of monitoring locations. Of the two wells, well 01U639 will be the primary sampling location and 482089 (I04MW) will be the alternate sampling location. If it is not possible to collect a groundwater sample from 01U639, then an attempt will be made to collect a sample from 482089 (I04MW). Well 01U639 is selected as the primary location because there is more analytical data associated with this location.

Well I02MW was dry at the time of sampling (June, 2003). Wells I01MW and I05MW had insufficient volumes of water to collect a sample. These wells have yielded water or had measurable water levels since original installation. Samples from the remaining wells were analyzed using EPA Method 8260 for VOCs.

What were the monitoring results for FY 2003?

Table 7-1 presents the results of the FY 2003 analyses. Monitoring wells 01U064 and 01U640, have both shown overall declines in concentration of trichloroethene and 1,2 dichloroethene since the early 1990's. Well 01U640 remains below the clean up standards for Site I. Well 01U064 rebounded to slightly above the clean up standards in FY 2003. The results for well 01U636 remain non-detect for site-specific required analytes. Well 482089 (I04MW) analytical results for trichloroethene and 1,2 dichloroethene are below clean up standards for Site I. Figure 7-2 presents the groundwater elevations.

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 report on the dual-phase vacuum extraction pilot test was submitted to the Agencies and received a consistency determination on March 16, 2000. The report concluded that neither dual-phase extraction nor groundwater extraction is feasible. The pilot test found that the soil permeability is low. As a result the test yielded only approximately 1 gallon per hour. The report recommended that no further remedial action is considered until the building is demolished.

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 report on dual-phase vacuum extraction determined that extraction remedies are not currently feasible.

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 an Agency 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 a pilot study to evaluate the applicability of dual-phase vacuum extraction technology to the site.

Overall Remedy for Site I Shallow Groundwater
The remedy specified in the OU2 ROD was modified in the RD work plan. Based on the results presented in the dual-phase pilot test report, the preferred remedy is in need of further modification so as to only consist of groundwater monitoring. This is acceptable, in large part, due to the fact that groundwater in the Unit 1 aquifer does not flow off site. Contaminants from the Unit 1 leak downward into the Unit 3. The deeper Unit 3 aquifer is hydraulically contained by the TGRS.

Monitoring in FY 2003 was consistent with the FY 2003 monitoring plan. The following conclusions are made for FY 2003:

- 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 an evaluation of dual- phase vacuum extraction technology to be completed. The evaluation determined that extraction technologies are not feasible beneath the building.

Is additional monitoring proposed prior to the next report?

Yes. Appendix A presents the FY 2003 – FY 2007 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 anticipated OU2 ROD amendment.
Based on a USEPA request, water quality sampling has been added at wells O1U632, O1U666, O1U667, and O1U668 as a one-time event in June 2004, and water levels will be measured at these wells on an annual frequency.

Note that monitoring wells 01U132 and 01U631 have been deleted from the monitoring plan, and on Figures 7-1, 7-2 and B-1, because these wells cannot be located. No further efforts are planned to locate these wells. Multiple and substantial efforts were been made to locate wells 01U132 and 01U631with no success.

Field searches have been performed using information gathered from:

1) the TCAAP Figures in the annual performance report and the IRP: Remedial Investigation Report for TCAAP, dated 4/91, Argone (RI report);
2) survey data from the Kemper 1992 TCAAP survey; and
3) interviews with staff familiar with the Site.

A GPS was also used to attempt to locate the wells using available UTM data. Well 1U132 was not located during the 1992 Kemper well survey and no water level or chemical data was found to indicate when the well was last monitored. Well 01U631 was reportedly located during the Kemper survey, but its UTM coordinates do not reflect a location where any monitoring well was likely located, (i.e. asphalt in area is old and undisturbed, with no patches or holes).

TABLE 7-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
SITE I, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	Trichloroethylene TRCLE	1,2-Dichloroethane 12DCLE
01U064	6/5/2003	<1	<1	<1	<1	79	9.4	<1	5.6	<1	1.3	<1
01U064 dup	6/5/2003	<1	<1	<1	<1	76	9.0	<1	5.3	<1	1.2	<1
01U636	6/5/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
482089 (I04MW)	6/5/2003	<1	<1	<1	<1	2.2	<1	<1	<1	<1	66.0	<1
01U640	6/5/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.29JP	<1
482086 (I01MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
482088 (I02MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
482087 (I05MW)	6/5/2003	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

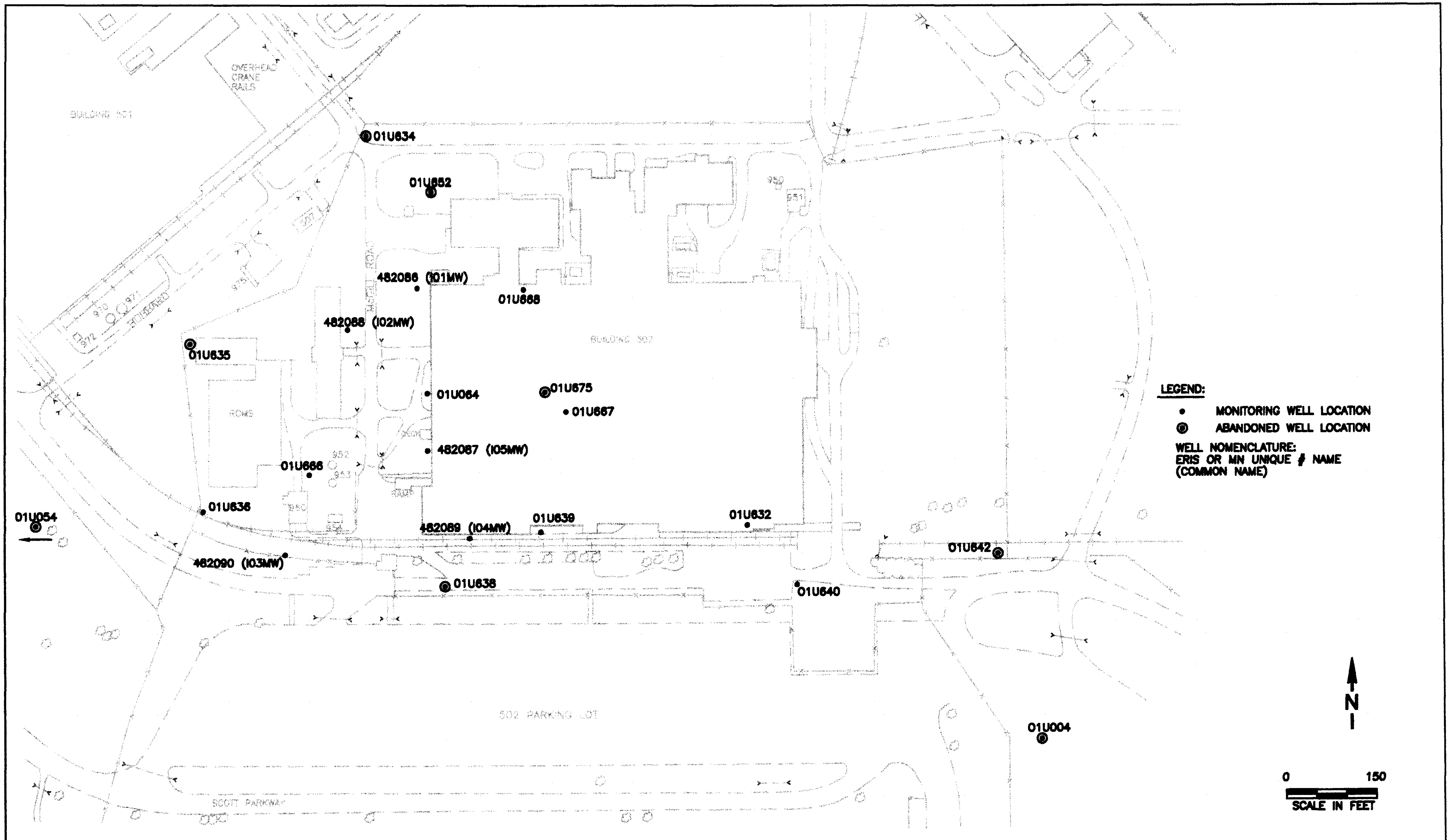
Notes:
Concentrations in ug/L.
J - Value is estimated.
P - Results less than reporting level but greater than instrumental detection limit.

TABLE 7-2

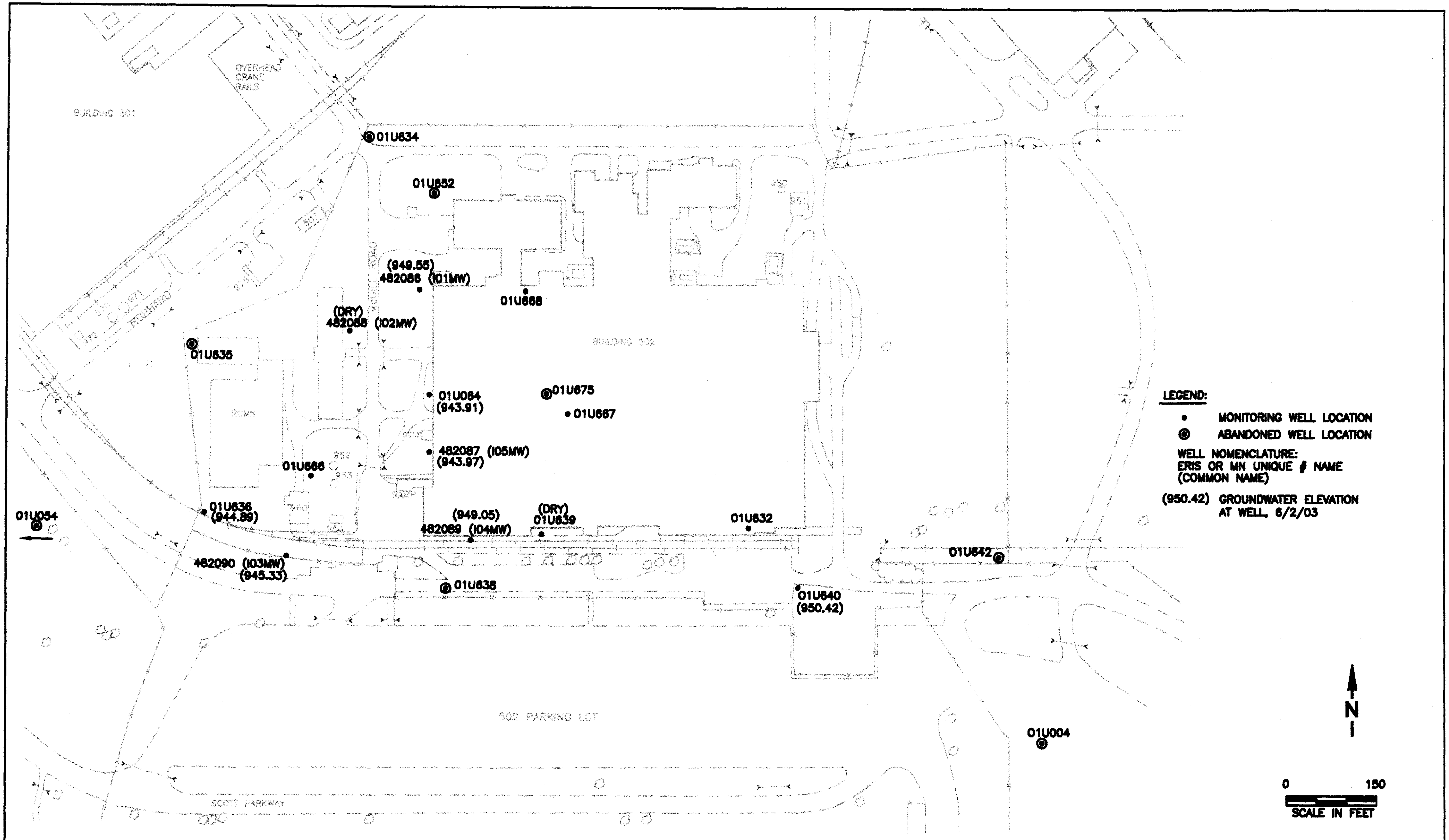
SUMMARY OF GROUNDWATER MONITORING REQUIREMENTS
FISCAL YEAR 2003
SITE I, TCAAP
ARDEN HILLS, MINNESOTA

	Remedy Component		Monitoring Requirements	Responsible Party	Document Containing the Monitoring Plan
#1	Groundwater Monitoring	a.	Groundwater quality and water levels to track remedy progress.	Alliant	Site I Monitoring Plan in Annual Performance Report
#2	Groundwater Extraction (1)	a.	Extracted water volumes and rates.	Alliant	Not applicable (1)
#3	POTW Discharge (1)	a.	Water quality data for system effluent to demonstrate compliance with discharge requirement.	Alliant	Not applicable (1)
#4	Additional Investigation	a.	As per work plan (completed).	Alliant	Not applicable
	Overall Remedy	a.	Water quality data to evaluate attainment.	Alliant	Site I Monitoring Plan in Annual Performance Report

Note:
(1) Currently there is no pumping required based on results of additional investigation and pilot test results.



SECOR INTERNATIONAL INCORPORATED 4463 WHITE BEAR PARKWAY, SUITE 105 WHITE BEAR LAKE, MINNESOTA 55110	TWIN CITY ARMY AMMUNITION PLANT ARDEN HILLS, MINNESOTA SITE I, UNIT 1 GROUNDWATER QUALITY MONITORING LOCATIONS	030T.18508.00.0382 SITE-I-03-A 12/31/03	FIGURE 7-1



SECOR

INTERNATIONAL INCORPORATED
4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITION PLANT
ARDEN HILLS, MINNESOTA

SITE I, UNIT 1
GROUNDWATER ELEVATIONS, 6/2/03

0307.18606.00.0362
SITE-I-03-A
12/31/03

FIGURE 7-2

8.0 Operable Unit 2: Site K Shallow Groundwater

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 A summarizes the FY 2003 monitoring plan and any deviations are explained in Appendix C.2.

Water levels are collected annually from the monitoring wells and bundle piezometers in the vicinity of the groundwater collection and treatment system. FY 2003 monitoring was performed in accordance with the Monitoring Plan included as Appendix A. The comprehensive monitoring well sampling round was conducted in June 2003. Figure 8-1 presents 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?
Yes. The OU2 ROD was signed in December 1997 (FY 1998). The Predesign Investigation Work Plan for Site K was approved in February 1999. The upper Unit 3 sentinel well was installed in February 2000.

Existing piezometers were used to accomplish the deep Unit 1 sentry monitoring. Piezometers 01U625D, 01U626D, 01U627D and 01U628D were used since they monitor the base of the Unit 1 aquifer near the trench. The issue is the potential for DNAPLs to migrate beneath the trench along the Unit 1/Unit 2 interface. These four piezometers are screened at that interface.

Figure 8-1 shows the location of the upper Unit 3 sentinel well (03U621) and the piezometers. The sentinel well was installed to monitor the potential for VOCs to migrate through the Unit 2 till and into the Unit 3 aquifer.

What are the results of the Unit 1 piezometer and Unit 3 Sentinel well sampling?
The piezometers (Unit 1 sentinel wells) were sampled in March 2000 and the results were discussed in the FY 2000 APR. The results did not indicated the presence of DNAPLs at the Unit 2/Unit 3 interface. This was a one-time sampling event, as required by the MPCA/USEPA approved Predesign Investigation Work Plan, Site K, TCAAP, CRA, February 1999, and as documented in the Predesign Investigation Report, Site K, TCAAP, CRA, December 2001, for which concurrence was received.

The Unit 3 sentinel well (03U621) was sampled in March, July and September 2000, of FY 2000, and in January 2001 for the quarterly sampling required by the Work Plan. After that, the well was incorporated into the regular TCAAP monitoring plan. The well was sampled in June 2003 for FY 2003. The results of the sample collected during FY 2003 are presented in Table 8-1. VOCs were not detected in the Unit 3 sentinel well

8.3 REMEDY COMPONENT #3: HYDRAULIC CONTAINMENT

Description: "Use of existing interceptor/recovery trench to contain the 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 8-2. Figure 8-2 presents a plan view of the groundwater contours from the June round of groundwater level measurement. At nested wells, the numerically 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 8-3. 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 piezometer demonstrates complete vertical and horizontal hydraulic capture.

Figure 8-4 presents the trichloroethene concentrations from the June 2003 annual sampling event. Trichloroethene concentrations range from non-detect to 16,000μg/l. The concentrations at wells 01U615 and 01U611, which monitor the core of the plume, were higher than in FY 2001 or FY 2002. Water levels associated with FY 2003 (and FY 2002) were approximately 0.5 feet lower than FY 2001, which may account for the higher concentrations at these wells. These wells have historically exhibited fluctuating concentrations.

Comparison of Figure 8-4 to the groundwater contour maps indicates that the VOC plume is hydraulically contained by the treatment system. Table 8-1 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, the contours on Figure 8-4 were 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 exhibited 1,2-dichloroethene since September 1993. The concentrations at these wells were consistent with those measured in FY 2002 and previous years.

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.

Were there any major operational changes during the year?
No. The original air stripping tower and controls were replaced with a new fluidized bed type air stripper system on June 21, 1999. During FY 2003, the treatment system functioned properly. The new air stripper is less prone to fouling and requires less maintenance. The treatment system was operational over 97% of the time in FY 2003. During FY 2003, a regular maintenance schedule was maintained. Appendix F.1 summarizes operational data and events at the groundwater extraction and treatment system.

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), which contains the state-accepted discharge limits for surface water. Sampling and analysis are performed to monitor performance (see below).

Is the remedy component being implemented?
Yes. See discussion in Section 8.6.

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. Treatment system monitoring consisted of quarterly influent and effluent sampling. 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 5,169,650 gallons of water and 7.1 pounds of VOCs were removed from the aquifer in FY 2003. The cumulative mass removal is 137.6 pounds of VOCs.

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. The Work Plan was approved in FY 1999. Work began in February 2000. A report of the investigation results was submitted in November 2001 and received a consistency determination from the Agencies on December 6, 2001. The report defined the extent of VOC contaminated soils beneath Building 103 and refined the location of the source area. The report and subsequent follow up sampling resolved anomalous dissolved zinc, lead and nickel data at two monitoring wells. Zinc, lead and nickel are no longer groundwater concerns.

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 A presents the FY 2003 – 2007 Monitoring Plan. Table 8-6 presents the Site K monitoring requirements. The monitoring plan is subject to review based on the results of on-going performance monitoring.

8.9 OTHER ACTIVITY

Alliant conducted pilot scale tests of two new technologies at Site K. These are Hydrogen Release Compound™ (HRC), and direct hydrogen injection with gas-permeable membranes. Both technologies are intended to enhance natural anaerobic degradation of chlorinated VOCs. These tests were completed in late FY 2000 and a report of the results was issued in FY 2001. The report determined that HRC was not effective under the specific conditions beneath the building slab at Site K. The direct hydrogen injection test yielded promising results but more research is needed for full-scale operation.

In FY 2002, no research field work was conducted; however, Alliant allowed the University of Minnesota to continue its research into direct hydrogen injection by making the test plot available for its use.

In June 2002 a Remedial Action Report for Site K, TCAAP, CRA, was submitted to the EPA and MPCA. The purpose of the report was to document the remedial action implementation as required by the FFA. The report discussed implementation of the components required by the TCAAP OU2 ROD. A consistency letter for this report was received in FY 2003.

TABLE 8-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	Trichloroethylene TRCLE	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	1,2-Dichloroethane 12DCLE
01U128	6/4/2003	<1	<1	<1	<1	<1	7.0	<1	<1	<1	<1	<1
OW103 (01U603)	6/4/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
01U604	6/4/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
01U604 D	6/4/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OW111 (01U611) (1)	6/4/2003	16000	<4.2	<3.1	<2.1	<2.2	1800	<5.5	<1.5	300	<1.6	<3.0
01U613	6/4/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OW115 (01U615) (2)	6/4/2003	7300	<2.1	<1.5	<1.1	<1.1	1400	<2.8	<0.76	420	<0.82	<1.5
OW117 (01U617)	6/4/2003	0.32 JP	<1	<1	<1	<1	3.8	<1	<1	0.73 JP	<1	<1
OW118 (01U618)	6/4/2003	1.4	<1	<1	<1	<1	0.55 JP	<1	<1	<1	<1	<1
OW119 (01U619)	6/4/2003	0.60 JP	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
01U620	6/4/2003	2.4	<1	<1	<1	<1	1.0	<1	<1	<1	<1	<1

TABLE 8-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	Trichloroethylene TRCLE	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	1,2-Dichloroethane 12DCLE
OW121 (01U621)	6/4/2003	<1	<1	<1	<1	<1	5.1	<1	<1	<1	<1	<1
03U621	6/4/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
482083 (K04MW)	6/4/2003	1.6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:
Concentrations in ug/L.
D - Duplicate analysis.
J - Value is estimated.
P - Results less than reporting level but greater than instrumental detection limit.
Sample dilution = 1, unless noted otherwise.
(1) Sample dilution = 20.
(2) Sample dilution = 10.

TABLE 8-2

GROUNDWATER ELEVATIONS (FT. AMSL)
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Well ID	TOC Elevation	Groundwater Elevation 6/2/2003
01U047	880.31	875.28
01U048	885.32	875.50
01U052	886.51	875.88
01U065	883.90	874.59
01U128	883.69	876.16
01U601	892.68	884.37
01U602	889.35	883.56
01U603	887.31	878.68
01U604	888.98	877.62
01U605	887.76	878.66
01U607	891.01	885.22
01U608	889.30	883.79
01U609	889.33	883.59
01U611	889.29	884.06
01U612	886.91	877.76
01U613	892.07	884.05
01U615	888.66	876.90
01U616	890.37	879.38
01U617	887.72	877.74
01U618	891.52	879.96
01U619	891.75	883.73
01U620	888.65	878.87
01U621	886.57	878.64
01U622	889.43	NR
01U623	889.44	NR
01U624A	889.88	878.43
01U624B	889.88	878.41
01U624C	889.91	878.42
01U624D	889.89	878.42
01U625A	886.92	877.57
01U625B	886.91	877.54
01U625C	886.91	877.54
01U625D	886.92	877.54
01U626A	886.87	877.54
01U626B	886.88	877.13
01U626C	886.88	877.20
01U626D	886.88	877.27
01U627A	886.46	878.66
01U627B	886.47	877.50
01U627C	886.47	877.41
01U627D	886.48	877.43
01U628A	887.82	878.57
01U628B	887.83	878.28
01U628C	887.82	877.87

TABLE 8-2

GROUNDWATER ELEVATIONS (FT. AMSL)
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Well ID	TOC Elevation	Groundwater Elevation 6/2/2003
01U628D	887.84	877.87
482085 (K01MW)	891.24	886.30
482084 (K02MW)	891.35	885.77
482083 (K04MW)	887.66	880.89
03U621	887.01	854.29

Notes:
NR - Not Required.

TABLE 8-3

TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Sample Date	1,1-Dichloroethane 11DCLE		1,1-Dichloroethene 11DCE		1,2-Dichloroethane 12DCLE		cis-1,2-Dichloroethene C12DCE		trans-1,2-Dichloroethene T12DCE		Trichloroethene TRCLE		Vinyl chloride C2H3CL	
Effluent	12/4/2002	ND		ND		ND		0.092	JP	ND		0.15	JP	ND	
Effluent	12/4/2002	ND	D	ND	D	ND	D	0.1	JPD	ND	D	0.15	JPD	ND	D
Effluent	3/6/2003	ND		ND		ND		0.62	JP	ND		1.0		ND	
Effluent	3/6/2003	ND	D	ND	D	ND	D	0.53	JPD	ND	D	0.93	JPD	ND	D
Effluent	6/16/2003	ND		ND		ND		0.64	JP	ND		1.1		ND	
Effluent	6/16/2003	ND	D	ND	D	ND	D	0.48	JPD	ND	D	0.89	JPD	ND	D
Effluent	9/10/2003	ND		ND		ND		0.20	JP	ND		ND		ND	
Effluent	9/10/2003	ND	D	ND	D	ND	D	0.25	JPD	ND	D	ND	D	ND	D
Influent	12/4/2002	ND		ND		ND		7.0		1.1		23		0.14	JP
Influent	3/6/2003	ND		ND		ND		51		6.7		160		1.10	
Influent	6/16/2003	ND		ND		ND		72		8.6		180		0.68	JP
Influent	9/10/2003	ND		ND		ND		59		7.4		110		0.63	JP
MDL	12/02	0.069		0.164		0.0736		0.084		0.072		0.0909		0.093	
MDL	3/03, 6/03	0.108		0.107		0.148		0.171		0.158		0.126		0.277	
MDL	9/03	0.355		0.199		0.297		0.171		0.168		0.195		0.456	
CRDL		1		1		1		1		1		1		1	
REQ.		--		7.0		3.8		70		100		10		0.18	

TABLE 8-3

TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Notes:

Results are reported in µg/L unless otherwise noted.

D - Duplicate Analysis

J - Value Estimated

P - Results less than reporting level but greater than instrument detection limit.

ND - Not Detected

MDL - Method Detection Limit

CRDL - Contract Required Detection Limit

REQ - Substantive Requirement Document Concentration Limit, Maximum Daily Concentration

TABLE 8-4

TREATMENT SYSTEM CONCENTRATIONS (INORGANICS)
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Sample Date	Phosphorus Total		Copper		Cyanide		Lead		Mercury		Silver		Zinc
Effluent	12/4/2002	349		12.6	P	ND		ND	U	ND	U	ND	U, JS48	82.4
Effluent	3/6/2003	338	JS73	ND	U	ND	(1)	ND	U	ND	U	ND	U, JS50	34.3
Effluent	6/16/2003	174		ND	U	ND		ND	U	ND	U	ND	U, JS48, D41	21.7
Effluent	9/10/2003	300		ND	U	ND		ND		ND	U	ND		33.5
MDL	12/02	11.6		8.42		8.16		2.920		0.0469		0.109		6.71
MDL	3/03, 6/03 & 9/03	18.1		4.49		8.71		0.416		0.0221		0.410		2.33
CRDL		20		20		10		3		0.100		1.0		20
REQ.		1000		21		17		106		0.2		3.4		134

Notes:
Results are reported in ug/L unless otherwise noted.
D# - the # is the RPD value of that particular analyte; a high RPD value indicates possible matrix inhomogeneity resulting in an indeterminate bias.
J - Estimated Value
JS# - The # is the percent recovery of that particular analyte. A low matrix spike recovery indicates a possible low bias to the reported result.
NA - Sample not analyzed for this parameter.
P - Estimated value, between MDL and CRDL.
REQ. - Substantive Requirement Document Concentration Limit, Maximum Daily.
U - Not detected at or above the MDL or IDL.
(1) - March 6, 2003 Cyanide sample preservation was improper. Replacement sample collected on March 12, 2003.

TABLE 8-5

SUMMARY OF MONTHLY VOC REMOVAL
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

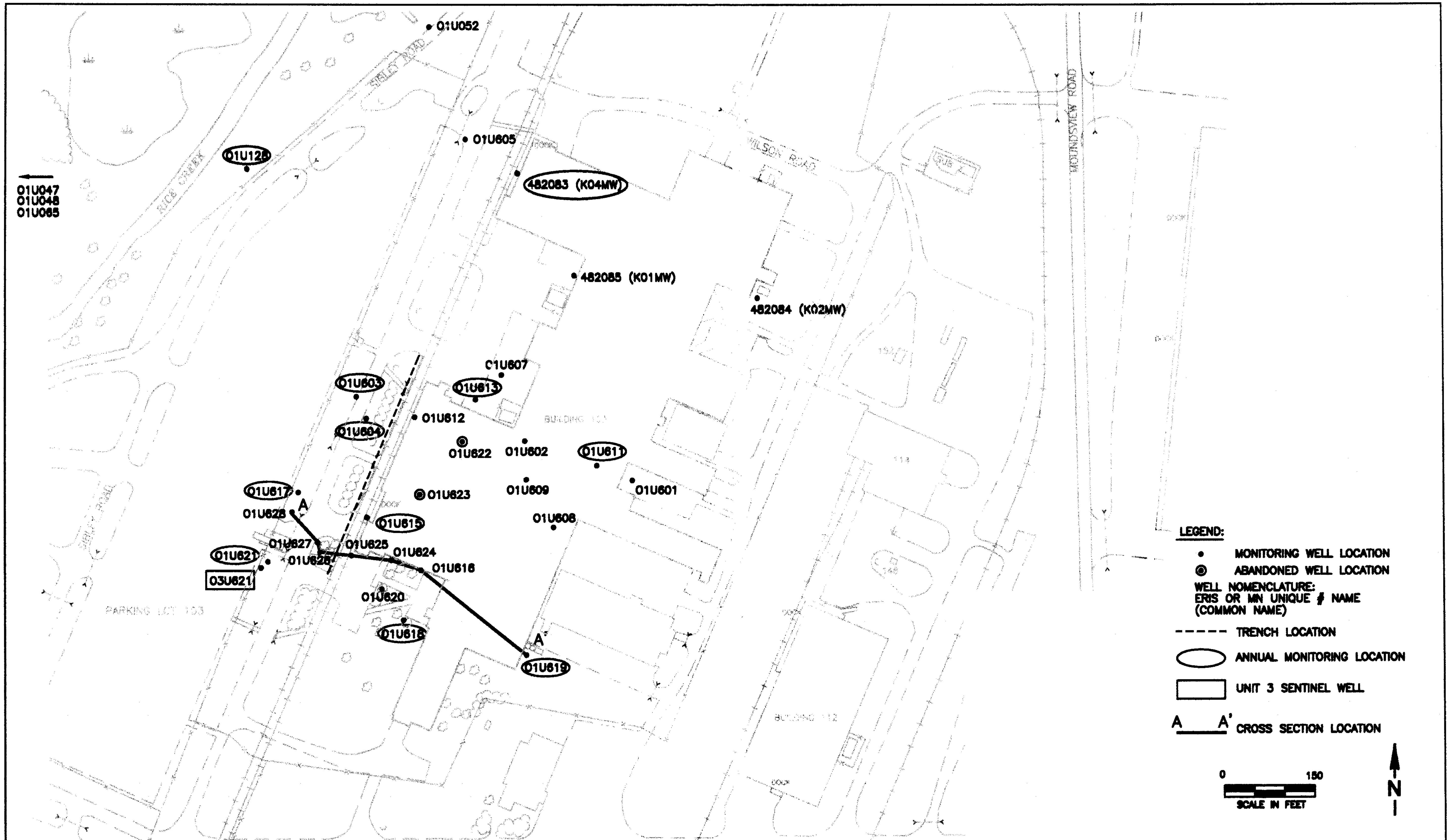
Month	Total Monthly Flow (million gallons)	Total VOC Influent Concentration (ug/L)	Total VOC Effluent Concentration (ug/L)	Total VOCs in Treatment Center Discharge (grams)	Total VOC Mass Removed (grams)	Total VOC Mass Removed (lbs)
Cumulative As Of September 2002 (FY02)						130.5
October	0.66911	31.2	0	0.00	79.01	0.17
November	0.46468	31.2	0	0.00	54.87	0.12
December	0.36588	31.2	0	0.00	43.21	0.10
January	0.32265	218.8	1	1.22	265.63	0.59
February	0.27574	218.8	1	1.04	227.01	0.50
March	0.28837	218.8	1	1.09	237.41	0.52
April	0.32299	260.6	1.1	1.34	316.83	0.70
May	0.58311	260.6	1.1	2.42	571.98	1.26
June	0.53737	260.6	1.1	2.23	527.11	1.16
July	0.55898	176.4	0	0.00	372.72	0.82
August	0.42103	176.4	0	0.00	280.74	0.62
September	0.35974	176.4	0	0.00	239.87	0.53
Totals - FY03	5.16965			9.4	3216.4	7.1
Cumulative To Date						137.6

Notes:
(1) Influent and Effluent VOC concentrations from 12/04/02, 3/06/03, 6/16/03 and 9/11/03 quarterly samples, respectively.
(2) Calculations based on compounds with concentrations above the CRDL only.

TABLE 8-6

SUMMARY OF GROUNDWATER MONITORING REQUIREMENTS
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

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



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INTERNATIONAL INCORPORATED
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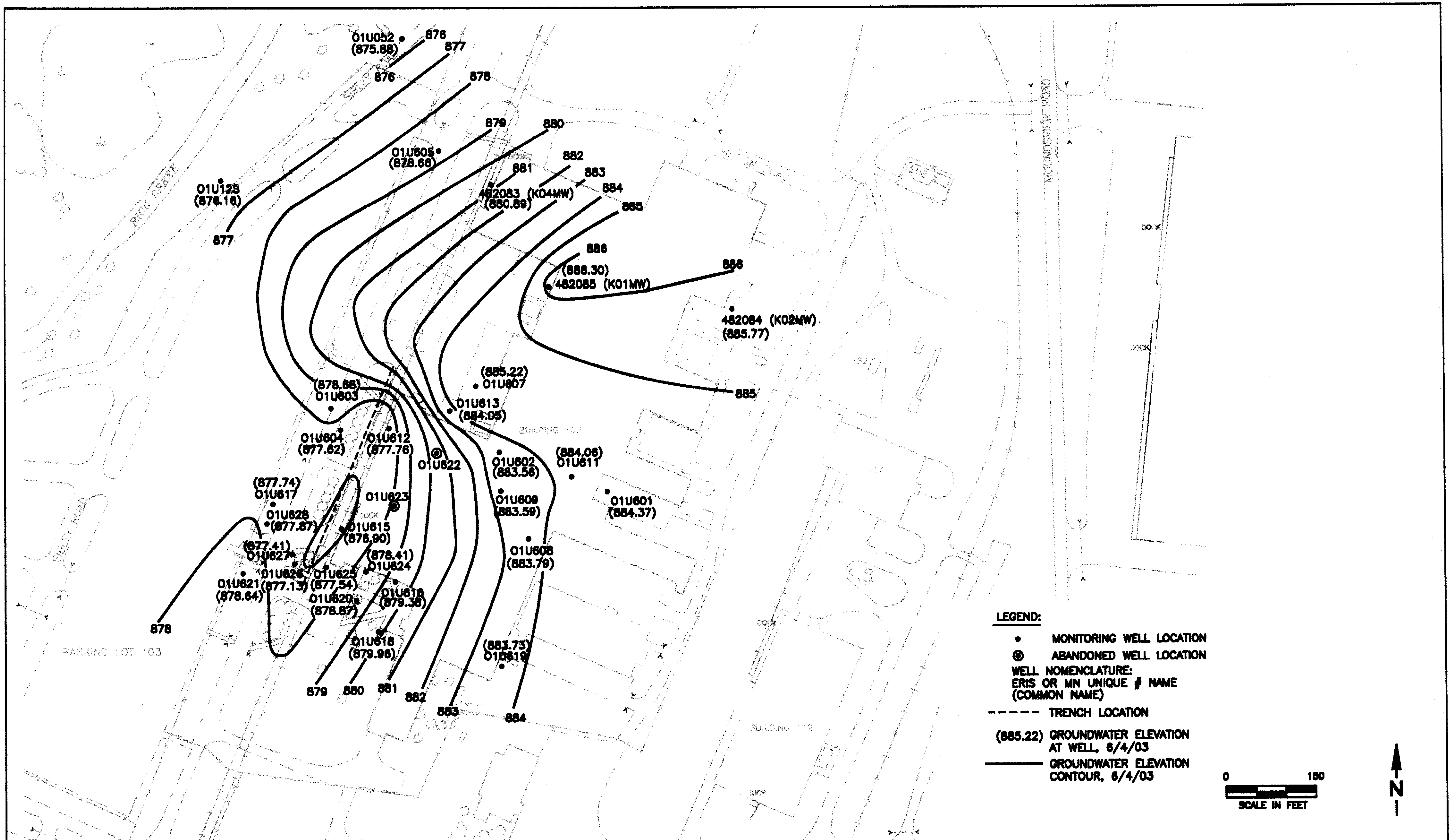
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA

SITE K, UNIT 1 AND UNIT 3
GROUNDWATER MONITORING LOCATIONS

030T.18608.00.00462
SITE-K-03-A
12/31/03

FIGURE
8-1



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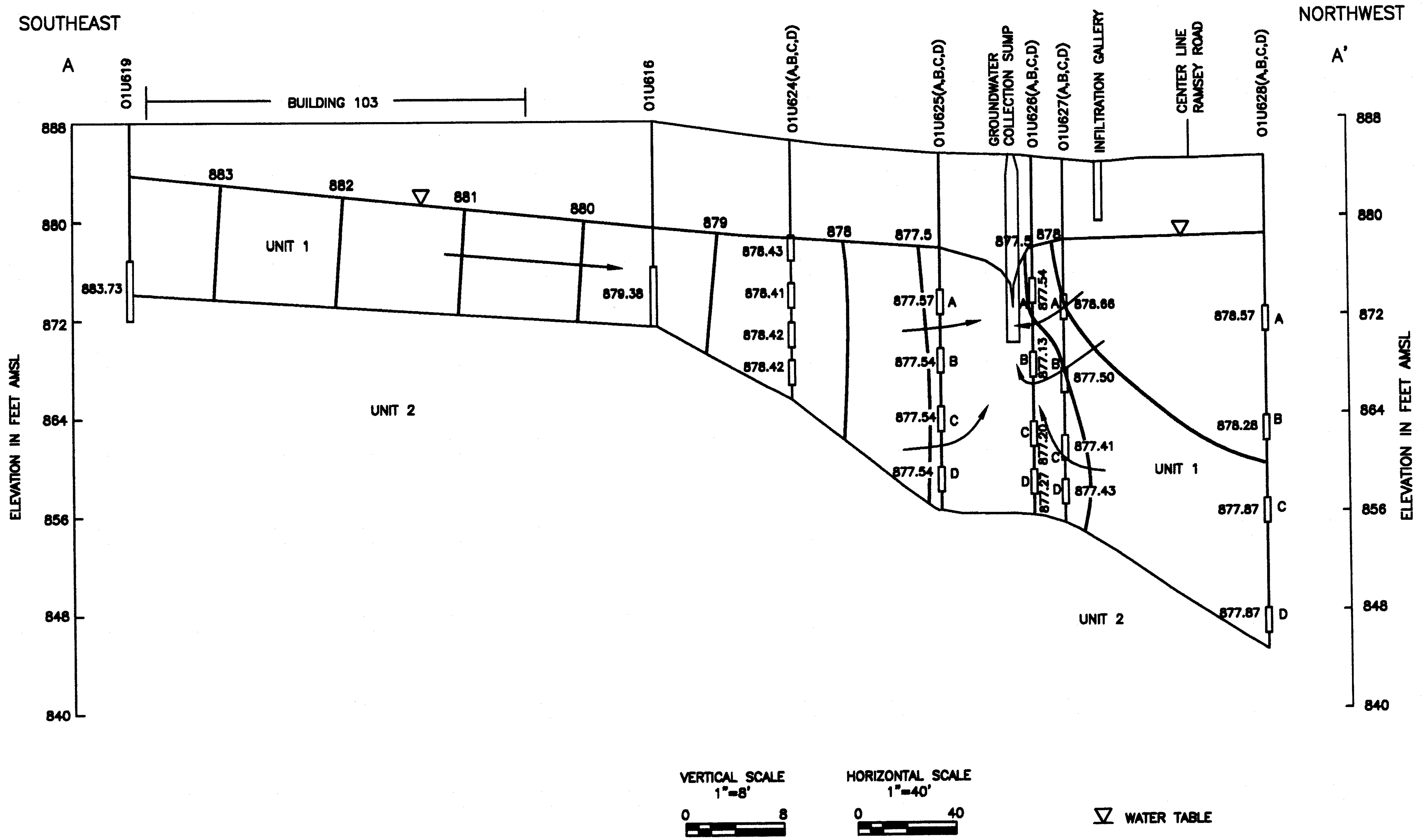
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA

SITE K, UNIT 1
POTENTIOMETRIC MAP, 6/4/03 (Q79)

03ot.18808.00.00462
SITE-K-GW-03
12/31/03

FIGURE
8-2



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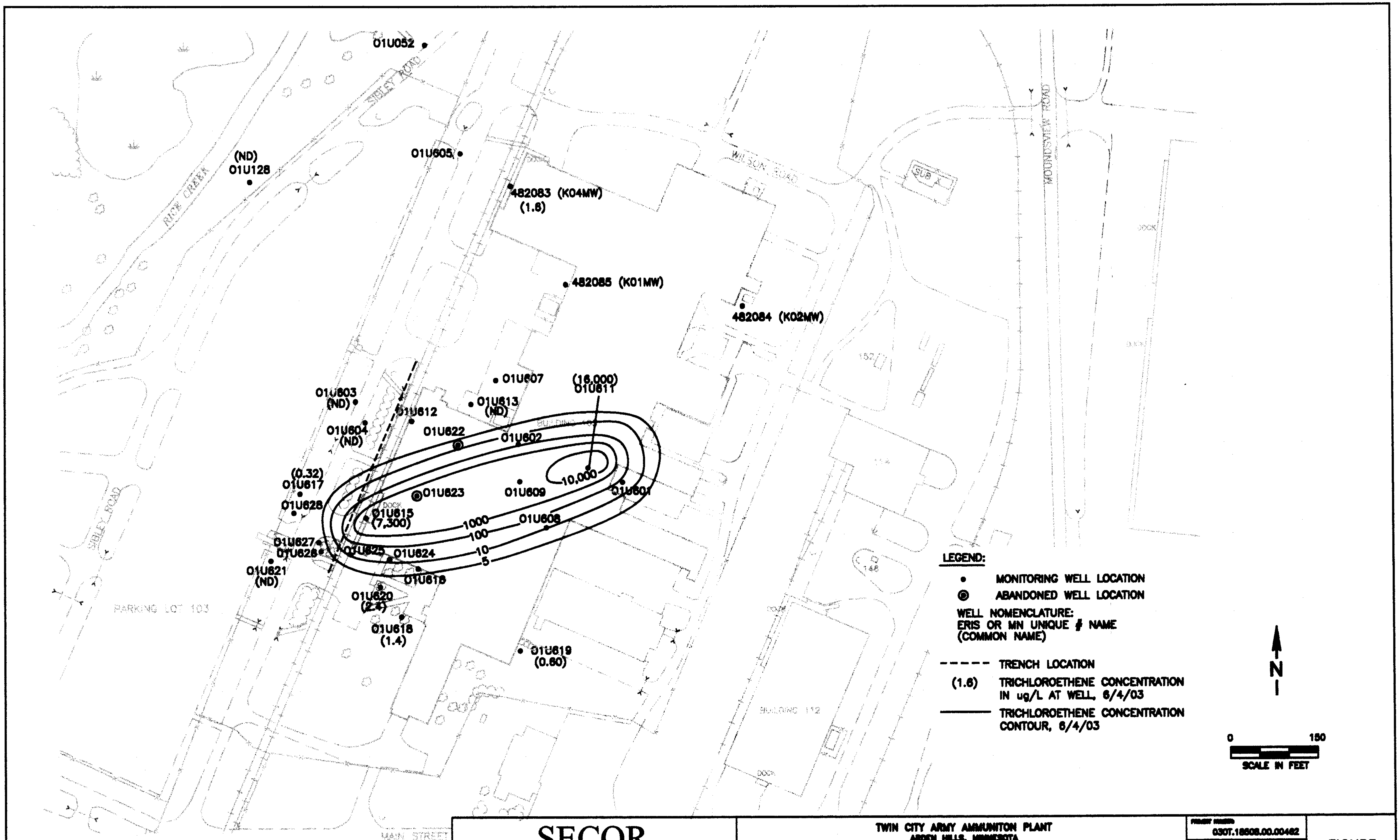
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA

SITE K
HYDROGEOLGIC CROSS SECTION A-A', 6/2/03 (Q79)

030T.18608.00.0482
CROSS-03-A
12/31/03

FIGURE 8-3



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WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA
SITE K, UNIT 1
TRICHLOROETHENE CONCENTRATION MAP,
6/4/03 (Q79)

PROJECT NUMBER: 030T.18608.00.00462
CAD FILE NUMBER: SITE-K-TCE-03
DATE: 12/31/03

FIGURE
8-4

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 2002 through September 2003.

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. 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), that 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 test, and the previous pumping tests, were utilized to determine the pumping rate required to achieve the necessary zone of capture for the TGRS; based on the plume size at that time. The PAR stated that the overall pumping rate needed for the 17 extraction wells was 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 was approximately 4,500 feet wide at the TCAAP boundary. The zone of capture widened 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. Between 1990 and 2002, the system continued to operate at an essentially steady state condition, so the TGRS was evaluated by comparing the pumping rates to those achieved for the 1989 evaluation.

In FY 2003, the Army received agency approval on the TGRS Operating Strategy (OS) document. The OS was based in part on findings from the 1989 Annual Monitoring Report and presented a Global Operation Strategy (GOS) for the entire TGRS extraction system and a Micro Operation Strategy (MOS) for selected well groups. Future evaluations will consider and compare actual pumping rates to those rates presented in the OS.

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 the major changes is presented below:

1. Source control well SC4 was shut down in November 1996 in response to insignificant VOC mass removal by this well. SC4 operated at an average extraction rate of 29 gpm in 1989 and 45 gpm prior to shut down.
2. Boundary extraction well B12 was shut down in November 1996. The plume in the B12 area had dropped below cleanup standards for several years. Well B12 operated at an average extraction rate of 139 gpm in 1989 and 190 gpm prior to shut down.
3. As per the OS, boundary extraction well B2 was shutdown and replaced with well B13 that began production in December 2002. The well screen in B2 became fouled and flow rates decreased from an average of nearly 200 gpm in the early 1990s to 52 gpm in 2002. During FY2003, well B13 operated at maximum pumping capacity of nearly 100 gpm, which is nearly 100 gpm lower than expected.
4. As per the OS, boundary extraction wells B7 and B10, and source control well SC3 were officially shut down in December 2002 due to the low TRCLE concentrations.
5. As per the OS, a larger capacity pump was installed at well B9 in December 2002 to raise the pumping rate from 150 gpm to approximately 300 gpm.
6. Flow rates at individual wells have been modified from time to time due to plume configuration changes, operational issues, and to maintain the OS.

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 TRCLE 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 TRCLE 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 2003 consistent with the requirements of the OU2 ROD. Table 9-1 presents the cleanup requirements for the TGRS from the OU2 ROD. The TGRS Operating Strategy was completed in June 2003, and provided the following base pumping rates to ensure acceptable hydraulic containment:

Estimated Base Containment Rate:	1,200 gpm
Immediate Response Minimum (25% Safety Factor):	1,500 gpm
Operational Minimum (50% Safety Factor):	1,800 gpm

During FY 2003, the total extraction well water pumped was approximately 1,696 gpm. When corrected for downtime, the system averaged approximately 1,804 gpm. The main reason for the lower pumping rate was due to the performance of well B13 which operated over 100 gpm less than what was initially predicted. As such, the Army submitted an evaluation of potential remedial response actions to the regulatory agencies in September 2003. The evaluation document is currently under review with an anticipated revision to the OS in early 2004.

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

Summary of Operations

During FY 2003, the system operation changed to conform to the OS. Under the OS, groundwater is extracted from 8 wells along the southwest boundary of TCAAP (B1, B3 through B6, B8, B9, B11 and B13) and three wells downgradient of interior source areas on TCAAP (SC1, SC2 and SC5). Prior to this, wells B2, B7, B10 and SC3 were also operating components of the system. Submersible pumps in the extraction wells discharge into a common pressurized forcemain that 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 "softened" and then "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 55,000 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 are designed to provide 6,000 – 7,000 standard cubic feet per minute (scfm) each. The blowers for Towers 3 and 4 are designed to 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 (e.g., 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. However, the extraction well field will cycle if necessary, starting with the least contaminated extraction well, B7 (if operating), 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 2003 Maintenance and Inspection Activity

During FY 2003, the following inspection and maintenance activities occurred:

Preventive Maintenance (PM): The extensive PM program allowed the operations staff to identify and repair or replace equipment to avoid a downtime failure. The program consists of monthly, quarterly and annual maintenance tasks. 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 is used to direct future repair work.

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. Electrical components that were identified as failing were replaced

Verification of Flow Meters: As part of the annual PM, flow meters in the pumphouses were interchanged as were the flow meters in the treatment center. Flow volume measurements before and after conducting maintenance on the meters were compared to verify the consistency of measurements. In September 2002, pumphouse flow meters were compared to a factory-calibrated flow meter.

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 was critical in early identification of failing equipment. By early detection of flow rate changes, equipment repair was typically scheduled before a failure occurred.

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

Probably, although total extraction rates were lower than the operational minimum rate presented in the OS. The monthly and annual volume of water pumped is presented in Table 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. As shown on Table 9-3 the TGRS successfully captured and treated 891,274,000 gallons of contaminated water from October 2002 through September 2003. This volume converts to an average rate of 1,696 gpm, of which, the boundary wells contributed 1,538 gpm and the source control wells contributed 158 gpm. The above pumphouse volumes are corrected to reflect the total from treatment center meters #1 and #2, which historically have been the most accurate for overall flow measurement. Review of Table 9-3 shows that the sum of the individual pumphouse extraction volumes was larger (904,295,450 gallons in FY2003 that converts to an average flow rate of 1,721 gpm). While this is only a 1.5 percent difference from the sum of treatment center meters #1 and #2, it correlates to an average difference of 25 gpm over the year.

The TGRS as a whole was operational 94 percent of the time. When the flow rate was corrected for down time, the average operational flow rate using treatment center meters #1 and #2 was 1,804 gpm.

The main reason for the pumping rate below the OS global operational minimum (1,800 gpm) was the under performance of well B13 which operated over 100 gpm less than what was initially predicted (and incorporated into the language of the OS). As expected, the lower than predicted pumping capacity at B13 also resulted in southern MOS well group (Wells B1, B2/B13, and B11) not meeting the MOS operating minimum. Review of Table 9-2 shows that the MOS operational minimums for well groupings related to north plume were adequately met when considering well downtime.

The Army does not consider rates below the operation minimum to be evidence that the 5 ug/l TRCLE plume is not being adequately captured (especially at the rates achieved for FY 2003). Please also note that the OS criteria did not go into effect until June 2003 when the OS document was finalized. This is important to consider when reviewing the MOS operational rates because the system was significantly changed in December 2003. Regardless, additional corrective actions were determined to be needed for the southern well group to meet the spirit of the OS. As such, the Army submitted an evaluation of potential remedial response actions to the regulatory agencies in September 2003. The evaluation considered 11 different alternatives including pumping below the B13 well screen and installing a new well. The evaluation document is currently under review with an anticipated revision to the OS in early 2004.

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 2003 operational notes is presented in Appendix F-2. During FY 2003, treatment center flow meters #1 and #2 were used to measure total flow volumes used in monthly reports, and in this report, because they have historically been 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 five 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 F-2. The same descriptions organized by affected pumphouse, treatment center, and forcemain is presented in Appendix F-3.

Treatment center and extraction well down times resulted primarily from failure and subsequent repair of components in the pumphouses, treatment center, and electrical service. The treatment center and extraction wells were shut down for repairs less in FY 2003 then they were in FY 2002.

Description of Down Time Categories

Pumphouse component failures accounted for an average of 5.2 days down time per pumphouse. Compared to FY 2002, down times due to pumphouse maintenance were minimal in FY 2003. The major pumphouse repairs causing down time were:

- Pumphouse B1: the pump and motor were replaced following the diagnosis of a hole in the well screen. Also the well was shut down for the performance test of the south plume wells.
- Pumphouse B4: the pump and motor were replaced.
- Pumphouse B5: the pump and motor were replaced.

Treatment center component failures and repairs that caused pumphouse down time consisted of electric check valve maintenance, malfunctions and repairs, and electrical control equipment failures and subsequent repairs. A significant portion of the down time in FY 2003 occurred during the pumping test in January 2003; primarily B1, B3, B11, B13, and SC1. Treatment center component failures, repairs, and adjustments accounted for an average of 8.3 days of down time.

Electrical service system failures accounted for an average of 2.4 days down time per pumphouse. Electrical storm damage was the primary cause of down time.

Preventative maintenance procedures accounted for an average of 0.6 days of down time per pumphouse. Preventative maintenance procedures are described in the project Operation and Maintenance Manual.

System modifications accounted for an average of 2.9 days down time per pumphouse. The performance evaluation test of the south plume was the primary cause of down time in FY 2003 for this item.

Forcemain issues accounted for an average of 4.8 days down time per pumphouse. Diagnosis and repair of a forcemain failure on the raw water loop and the repair of the water tower altitude valve were another primary cause of downtime in FY 2003.

Were there any major operational changes during the year?

Yes. The TGRS Operating Strategy was implemented in FY 2003, which resulted in installing one extraction well (B13), shutting down 4 extraction wells (B2, B7, B10 and SC3) and adjusting flow rates to conform with the operational extraction rates contained in the OS. These changes resulted in focused groundwater extraction within the centers of the VOC plumes, which, in turn should accelerate shrinking the width of the plumes and provide more efficient VOC removal.

Did the system achieve hydraulic capture?

Probably, since the total extraction rate was approximately 94 percent of the OS operational minimum that is based on a 50 percent safety factor over the theoretical minimum for capture (1,200 gpm). Additional groundwater elevation and chemical sampling was performed in FY 2003 due to the installation of well B13 and the shutdown of B2. A pumping test was performed on the extraction wells at the southwest portion of the TGRS (wells B11, B1, B13, B3 and SC1) to evaluate the effect of the operational change. The findings were contained in the document titled "Technical Memorandum, Well B13 Performance Evaluation" by CRA dated January 2004. The Memorandum concluded, in part, the following:

1. The maximum pumping capacity (96 gpm) at Well B13 is about 100 gpm less than what was expected (based on the historical performance of wells B1 and B2) and approximately 80 gpm less than the operational minimum pumping rate contained in the TGRS Operating Strategy document (June 2003). The difference in pumping rates is attributed to hydrogeologic differences (i.e., transmissivity) between the B1 and B13 areas and to shallower screened interval of B13.
2. Pumping B13 at approximately 90 gpm over a 24 hour period did not result in any measurable hydrogeologic response at the nearest monitoring point (well B1) located approximately 300 feet downgradient (southwest). As a result, a single well pumping test on B13 was not conducted.
3. The pumping test was performed over 5 days on the full southern portion of the TGRS (involving 5 extraction wells) consistent with the proposed work plan contained in Technical Memorandum for TGRS Modification No. 2.
4. Groundwater elevation measurements conducted during the 5-day pumping test continued to affirm a hydraulic connection between the Unit 3 and Unit 4 aquifers. Calculated transmissivities in the area of the pumping test (average of 28,700 ft^2/day) were consistent with those determined for 1989 pumping tests (average of 30,900 ft^2/day).
5. The mass removal of TRCLE provided by well B2 has been dramatically increased with its replacement by well B13 (from 34 µg/l in December 2002 to 300 µg/l in June 2003).

Appendix D contains the water level database for the monitoring wells. Figures 9-2, 9-3, and 9-4 present the groundwater contours for Upper Unit 3, Lower Unit 3, and Unit 4, respectively for June 2003. These figures present the potentiometric contours from three vertical portions of the aquifer.

As a result of the modification between extraction wells B10 (shutdown) and B9 (increased pumping), groundwater elevations within the Unit 4 have changed compared to those in FY 2002. As shown on Figure 9-7, the estimated capture limit for the Unit 4, north of B9, has decreased. Despite the reduced estimated capture limit; however, it appears that the 5 μg/l TRCLE plume is still contained in the Unit 4 aquifer.

The capture limits for the Unit 3 aquifer have also changed as a result of the system modification. As such, the Unit 3 capture limit has decreased approximately 900 feet (in width) in the northern portion of the boundary wells. This change however, has not affected containment of that portion of the plume above the 5 μg/l TRCLE contour.

Table 9-6 presents the groundwater quality data for the monitoring wells in FY 2003. Figure 9-5 Figure 9-6, and Figure 9-7 present the TRCLE contours for the Upper Unit 3, Lower Unit 3, and Upper Unit 4 Aquifers, respectively (see Figures 3-7 through 3-9 for a continuation of these plume maps off-TCAAP). Along the TCAAP boundary, the width of the source area above 5-μg/l TRCLE has been shrinking since approximately 1993. Figures 9-8 and 9-9 provide a cross sectional view of the TRCLE concentrations across the southwestern boundary of TCAAP. Currently, there are no Unit 3 wells north of B7 above 5-μg/l TRCLE and B7 has had a TRCLE concentration below 5 μg/l since March 1995. In Unit 4, there were no monitoring wells north of B10 above 5 μg/l. Extraction well B12 was shutdown 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 discussed above, the zone of capture created by the TGRS very likely extends beyond the 5-μg/l TRCLE contour, 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 891,274,000 gallons of water from October 2002 through September 2003. 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 3,041 pounds of VOCs from October 2002 through September 2003. The VOC mass removal is over 6 percent higher than the FY 2002 VOC mass removal of 2,852 pounds. The VOC mass removal rate for the TGRS has been declining since FY 1991. This reflects the overall decrease in plume concentration. The most significant increases in VOC mass removal rate were noted at B2/B13 and B9. Table 9-7 summarizes the individual VOC mass contribution of each extraction well and the entire system. Overall, the TGRS has removed 185,977 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 B2, B7, B10, B12, SC3, 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 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 G-1 presents TRCLE versus time graphs for each extraction well. Wells B1, B2, B6, B7, B8, B9, B10, B11, B12, SC2, SC3 and SC5 exhibit declining TRCLE concentrations over time. As is typical, these wells exhibit asymptotic decreases over time. In the past, wells B3 and B4 exhibited rising TRCLE concentrations with time, but now B3 appears to be leveling off and B4 is declining. Well B5 was increasing through 1992 and has been decreasing since then. TRCLE concentrations have been gradually declining at SC1 since 1993. TRCLE concentrations peaked at SC4 in 1999, then leveled off. Since its installation in November 2002, TRCLE concentrations at B13 have been increasing. Overall, the trends indicate a long-term decrease in VOC concentrations.

Extraction well B6 exhibited a slight concentration increase in FY 1998 and was stable or slightly declining through FY 2003. This is probably due to plume redistribution following the shutdown of B12 in FY 1996. Extraction well B7 has been stable and below the contaminant-specific requirement for TRCLE (5 μg/l), and all other VOCs from March 1995 through FY 2003.

These trends reflect the overall decline in OU2 deep groundwater 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,seven wells, B1, B4, B5, B6, B9, SC1 and SC5, that are located in the centers of the plume, achieve the largest rates of VOC removal. These six wells together accounted for over 97 percent of the VOC mass removed. Wells B7, B10 and B11, which pumped on the south and north edges of the plume, removed only about 0.1 percent (1.9 pounds) of the total VOC mass.

The source control wells, SC1 through SC5, together accounted for 55 percent of the VOC mass removed while accounting for only 9 percent of the water pumped by the system. SC5, in particular, removed 50 percent of the total VOC mass at a rate of only approximately 105 gpm (6 percent of the total water pumped by the system). This illustrates the efficiency of extracting groundwater from near the source areas. At the opposite extreme, SC3 has had very low VOC concentrations and accounted for less than 1 pound of VOCs removed during the year. Since

SC3 no longer provided useful mass removal it was removed from service during December 2003.

What do the long-term trends in the monitoring wells show?

Appendix B presents the TRCLE graphs over time for monitoring wells on and off TCAAP. Although a formal statistical analysis has not been conducted, the large majority of these graphs reflect downward trends in TRCLE concentration, indicating an overall improvement in water quality both up gradient and down gradient of the TGRS. Due to the complexity of the flow system, changes in flow direction over time, and the variation in chemical transport properties across the study area, the graphs are not expected to reflect a uniform or easily predictable pattern.

Several wells were identified in previous APRs or when reviewing the FY 2003 database that have inconsistent or upward trends in TRCLE concentrations that warrant further observation and discussion:

Well	**Trend Observation**
03U030	Trend identified during FY2003 data review. Under 30 ppb through 1998, peaked over 60 ppb in 1999, recently at 40 ppb. Maintain biennial sampling frequency.
03U806, 03L806 and 04U806	Trend identified in FY2001 APR. Dropped from 1000's of ppb in mid 1990's, recently stable in 100's of ppb. Maintain sampling frequency.
03M806	Trend identified during FY2003 data review. Dropped from near 900 ppb in 1987, to below 100 ppb from 1993 through 1996. Recently increased to 1300 ppb, a historical high concentration. Recommend annual sampling to confirm.

Well	Trend Observation
03U708	No clear trend in TRCLE concentration is evident at this time. Concentrations have fluctuated between 170 µg/L and 270 µg/L over the last 5 sampling events, with the 2003 sample having a concentration of 190 µg/L.
03U711	Trend identified in FY2001 APR. Dropped from near 1000 ppb in 1994, to 89 ppb in 1999, recently increased to 230 ppb. Maintain biennial sampling frequency.
03L014	Trend identified during FY2003 data review. Increased from near non-detect in late 1980s to over 800 ppb in 1999, recently decreased to below 1 ppb. Maintain biennial sampling frequency.
03L809	Trend identified in FY2001 APR. Dropped from over 3000 ppb to 67 ppb through 1998, recently at 410 ppb. Maintain biennial sampling frequency.
04U861	Trend identified in FY2001 APR. Below 10 ppb during late 1980s through 1993, increased to high 20's during 1999, recently increased to 48 ppb. Maintain biennial sampling frequency.
04U843	Trend identified in FY2001 APR. Below 15 ppb from late 1980s through 1997, increased to above 30 ppb in 1998, peaked at 38 ppb, recently dropped to below 1 ppb. Maintain biennial sampling frequency.
04U841	Trend identified in FY2001 APR. Below 10 ppb through 1995, increased to 25 ppb, recently decreased to 5 ppb. Maintain biennial sampling frequency.

Well	Trend Observation
03U822	Trend identified during FY2003 data review. Below 25 ppb through 1998, peaked over 350 ppb in 1999, recently at 280 ppb. Maintain biennial sampling frequency.
03L822	Trend identified in FY2001 APR. Increased from below 5 ppb during early 1990s to over 600 ppb in 1999 and 2003. Approximately 1 mile from TGRS. Well historically showed 1,1,1 trichloroethane as major contaminant. Maintain biennial sampling frequency.

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 2003. The influent/effluent database for FY 2003 is contained in Appendix G-2. Figure 9-10 presents a graph of influent TRCLE versus time. This graph is cumulative and includes data from before 1989, when the system consisted of only six extraction wells. The average FY 2003 influent TRCLE concentration was 330 μg/l, up from 292 μg/l in FY 2002. This was expected since

greater pumping is now occurring in the centers of the VOC plumes and less pumping is occurring on the edges of the plumes where VOC concentrations are much lower.

Figure 9-10 also presents a graph of the effluent TRCLE concentration versus time. As indicated, the effluent was below 5-µg/l TRCLE for all sampling events in FY 2003. A review of the FY 2003 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 TRCLE concentrations indicates average removal efficiency over 99.7 percent.

What was the mass of VOCs emitted into the air?

The air stripping towers remove VOCs with an efficiency of approximately 99.7 percent. Thus, the air emissions are essentially equal to the VOC mass removal rates presented in Table 9-7. Air emissions therefore averaged 8.3 pounds/day based on the VOC mass removal rates. The total VOC emissions from October 2002 through September 2003 were 3,041 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. Based on visual observation during FY 2003, 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 supply 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 currently a government reservation, is fenced, and access is restricted to authorized personnel.

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, and 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 Army will evaluate the technology. 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 reports annually on the status of any reviews of emerging technologies.

- In September 2002, the MPCA and USEPA announced they would be conducting a natural attenuation microcosm study using carbon dating. In October 2002, Army drilled a boring at Site G to collect soil for the study. The study results are expected to be published in early FY2004.
- Tom Barounis, the USEPA Remedial Project Manager for TCAAP, attended a USEPA Technology conference in December 2002, and reported there were no new technologies with merit for application at TCAAP.
- "New technologies" is an ongoing agenda item for the monthly Technical Review Committee meetings between the Army, USEPA, and MPCA. No emerging technologies were identified through the process during FY 2003.
- The MPCA is continuing to monitor the results of a vegetable oil injection pilot study at the Navy site in Fridley, Minnesota.

Were any new technologies identified and considered to have merit during FY 2002?
No. The Army's review did not identify any new or emerging technologies that have the potential to cost-effectively accelerate the timeframe for aquifer restoration.

What is the status and/or findings of any previously initiated reviews of emerging technologies?
MPCA continued its research into natural attenuation processes at TCAAP.

Are any new reviews planned at this time for the coming year?
No. The Army will continue to have new technologies on the agenda for the monthly Technical Review Committee meeting, and attend conferences that highlight emerging and new technologies. However, reviews of specific technologies are not planned in FY 2004.

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 2003 was consistent with the OU2 ROD. Appendix A summarizes the FY 2003 monitoring plan and any deviations are explained in Appendix C-2. Monitoring was as follows:

<u>Groundwater</u>
Monitoring well groundwater samples were collected, and water levels measured in June 2003 in accordance with the FY 2003 monitoring plan. Samples were analyzed for VOCs.

Treatment System

The TGRS treatment system influent and effluent was sampled monthly during FY 2003 in accordance with the FY 2003 monitoring plan. Groundwater samples from the extraction wells were collected in December 2002 and June 2003 in accordance with the FY 2003 monitoring plan.

Is additional monitoring proposed prior to the next report?

Yes. Table 9-9 presents the monitoring requirements for Deep Groundwater. Beginning in FY 2000, a biennial monitoring well sampling and water level measurement schedule was implemented, with selected wells sampled annually. FY 2004 will be an "off year" in the biennial sample program, so only a few wells will be sampled. The TGRS extraction wells (including B13, the new extraction well) will be monitored semiannually and the TGRS treatment system influent and effluent will continue to be monitored monthly for detailed system tracking.

Appendix A presents the FY 2002 to FY 2006 monitoring plan. There were a few minor changes to the monitoring plan. Two former extraction wells that are no longer pumped (B12 and SC4) have been placed on the biennial-monitoring schedule beginning in FY 2004. The three wells that were shutdown in FY 2003 (B7, B10, and SC3) will be sampled annually in FY 2004 and then go on the biennial schedule in FY 2005. Extraction well B2, which was shutdown and replaced by B13, has been placed on the annual monitoring schedule.

Based on a USEPA request, the following wells have been added for sampling in FY 2007, in order to provide a check prior to the next five-year review: O3U002, O3M002, O3U004, O3U005, O3U027, O3U092, O3U715, and O3L021.

9.7 OVERALL REMEDY FOR DEEP GROUNDWATER

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

- Hydraulic capture in Unit 3 probably extends beyond the 5-µg/l TRCLE contour. This meets the VOC capture criterion in the OU2 ROD. Hydraulic capture in Unit 4 very likely extends beyond the 5-µg/l TRCLE contour. This meets the VOC capture criterion in the OU2 ROD.
- The TGRS extracted and treated 891,274,000 gallons of water and removed 3,041 pounds of VOCs from October 2002 to September 2003.
- Groundwater analytical data of the source area shows a general decrease in TCE concentration. This demonstrates that the TGRS is effectively removing VOC mass from the aquifer.
- Effluent VOC concentrations were below contaminant-specific requirements for all sampling events.

Do any additional measures need to be addressed?

Yes. Due to the less than predicted performance of well B13, additional corrective measures for the south VOC plume are being evaluated and will be implemented in FY 2004. Barring unforeseen major system malfunctions total extraction rates are expected to be greater than in FY 2003 and above operating minimums established in OS.

TABLE 9-1

GROUNDWATER CLEANUP LEVELS
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Substance	*Expected Level in Discharge (ppb)*	*Operable Unit 2 Rod Requirements (ppb)*
Volatile Organic Compounds (VOCs)		
cis-1,2-Dichloroethene plus trans-1,2-Dichloroethene	<1	70
1,1-Dichloroethene	<1	6
1,1,1-Trichloroethane	<1	200
1,2-Dichloroethane	--	4
Trichloroethene	<5	5
1,1-Dichloroethane	--	70
Tetrachloroethene	--	5

TABLE 9-2

EXTRACTION WELL WATER PUMPED
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

	Volume of Water Pumped (gallons)																		
	B1	***B2***	***B3***	***B4***	***B5***	***B6***	***B7***	***B8***	***B9***	***B10***	***B11***	***B12***	***B13***	***SC1***	***SC2***	***SC3***	***SC4***	***SC5***	***TOTAL***
October 2002	7,346,800	2,667,100	8,752,100	8,812,800	8,697,900	9,635,900	0	6,189,900	7,771,200	7,235,400	4,189,800	0		1,177,000	1,455,600	287,300	0	5,063,700	79,282,500
November 2002	4,289,400	1,576,300	9,206,000	9,156,700	8,872,000	9,954,800	0	6,255,100	8,124,200	9,757,400	4,447,000	0		1,205,300	1,587,100	0	0	5,207,300	79,638,600
December 2002	5,809,100	0	8,891,100	9,038,500	8,809,200	10,592,200	7,900	6,413,100	11,234,800	3,498,200	4,350,600	0	2,031,700	1,185,600	1,459,000	6,900	9,400	5,409,400	78,746,700
January 2003	7,577,300	0	5,624,800	8,819,200	6,460,000	10,205,500	0	6,090,300	12,579,200	0	2,777,700	0	2,986,300	804,700	1,133,500	0	0	5,082,300	70,140,800
February 2003	9,404,800	0	7,112,800	7,588,900	7,815,700	9,879,400	0	5,816,900	11,458,800	0	3,519,100	0	3,526,600	1,280,000	1,229,500	0	0	4,754,200	73,386,700
March 2003	10,383,200	0	8,091,000	8,225,900	8,989,100	9,767,900	0	5,773,200	12,963,200	0	3,994,300	0	3,950,700	1,152,400	875,100	0	0	4,679,400	78,845,400
April 2003	9,896,000	0	7,041,300	7,681,000	9,003,300	8,704,900	0	5,477,900	12,369,500	0	3,768,200	0	4,010,000	1,319,800	1,048,500	0	0	4,617,450	74,937,850
May 2003	9,862,400	0	8,864,900	7,111,100	9,319,400	9,396,300	0	6,103,000	12,737,500	0	3,856,800	0	4,233,300	1,384,000	1,032,700	0	0	4,773,600	78,675,000
June 2003	9,169,000	0	8,361,900	7,213,600	8,757,700	8,270,900	0	5,710,100	11,736,000	0	3,656,300	0	3,777,500	1,321,900	999,400	0	0	3,969,400	72,943,700
July 2003	9,058,800	0	8,542,600	8,633,900	9,119,700	9,324,800	0	5,723,600	12,234,400	0	3,509,400	0	3,741,200	1,291,700	921,000	0	0	4,065,200	76,166,300
August 2003	8,980,400	0	8,215,800	8,569,900	8,257,900	8,937,900	0	5,460,500	11,524,400	0	3,289,900	0	3,844,700	1,222,800	858,900	0	0	4,188,800	73,351,900
September 2003	7,856,800	0	8,171,200	7,668,300	7,334,600	8,834,200	0	5,398,400	11,119,300	0	3,237,200	0	2,706,400	1,211,800	1,016,500	0	0	3,625,300	68,180,000
TOTAL FY 2003	99,634,000	4,243,400	96,875,500	98,519,800	101,436,500	113,504,700	7,900	70,412,000	135,852,500	20,491,000	44,596,300	0	34,808,400	14,557,000	13,616,800	294,200	9,400	55,436,050	904,295,450

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	SC1	SC2	SC3	SC4	SC5	TOTAL
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	0	13,867,660	20,078,880	36,660,309	12,593,300	39,307,600	1,033,353,676
gpm	156	161	167	174	177	233	320	98	140	126	217	139	0	32	46	85	29	91	2,392
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	0	11,281,750	19,278,830	35,609,300	15,260,500	37,275,400	1,008,415,750
gpm	135	132	140	153	137	200	224	78	114	181	78	122	0	21	37	68	29	71	1,919
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	0	17,111,600	23,724,440	46,611,600	20,228,000	54,182,500	1,382,327,590
gpm	189	195	187	199	200	261	291	121	147	247	103	181	0	33	45	89	38	103	2,630
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	0	17,472,600	21,165,900	50,254,500	22,045,100	53,891,100	1,401,346,600
gpm	197	200	198	201	203	267	296	116	149	245	100	177	0	33	40	95	42	102	2,659
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	0	16,887,368	24,623,700	51,413,200	25,104,180	55,980,600	1,388,206,172
gpm	199	185	194	196	201	267	292	115	149	246	95	171	0	32	47	98	48	107	2,641
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	0	17,351,750	19,244,100	45,125,400	20,715,000	46,698,300	1,261,279,850
gpm	190	143	187	174	178	241	267	121	135	220	93	167	0	33	37	86	39	89	2,400
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	0	16,572,496	23,173,800	47,176,100	24,037,800	51,323,400	1,385,933,996
gpm	224	131	219	198	195	269	281	130	143	245	102	191	0	32	44	90	46	98	2,637
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	0	7,152,620	22,803,400	50,843,300	23,411,400	51,382,800	1,341,763,220
gpm	237	105	245	196	201	270	190	129	152	248	96	180	0	14	43	96	44	97	2,546
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	0	15,381,400	24,099,800	48,925,600	3,166,500	51,146,000	1,213,035,110
gpm	196	120	223	174	197	268	255	115	148	246	90	20	0	29	46	93	6	97	2,308
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	0	15,379,800	21,415,000	51,647,100	200	49,964,500	1,196,007,900
gpm	220	111	227	168	199	247	261	120	132	229	98	0	0	29	41	98	0	95	2,276
FY99	98,763,900	49,003,200	96,200,600	109,201,100	111,041,600	125,486,690	133,823,800	66,488,100	77,138,800	127,121,800	47,648,300	35,500	0	15,373,580	22,786,400	46,156,600	8,600	31,946,300	1,158,224,870
gpm	188	93	183	208	211	239	255	126	147	242	91	0	0	29	43	88	0	61	2,204
FY00	101,335,000	49,614,400	108,593,300	98,476,400	107,988,300	106,634,800	132,057,200	73,093,500	78,949,500	126,707,800	56,705,000	9,500	0	17,193,900	20,904,400	33,691,100	2,850	36,491,400	1,148,448,350
gpm	192	94	206	187	205	202	251	139	150	240	108	0	0	33	40	64	0	69	2,179
FY01	119,183,600	40,051,700	114,852,000	93,556,600	104,756,160	108,585,000	80,152,100	73,738,600	77,474,700	127,575,700	53,743,900	58,400	0	14,039,400	25,913,900	24,268,000	5,200	55,208,400	1,113,163,360
gpm	227	76	219	178	199	207	152	140	147	243	102	0	0	27	49	46	0	105	2,118
FY02	108,090,530	27,491,872	68,481,181	105,492,918	102,639,752	114,021,382	37,292,226	52,533,798	73,184,102	87,751,296	36,575,692	0	0	11,635,280	14,009,400	18,054,231	0	60,065,219	917,318,879
gpm	206	52	130	201	195	217	71	100	139	167	70	0	0	22	27	34	0	114	1,745
FY03	99,634,000	4,243,400	96,875,500	98,519,800	101,436,500	113,504,700	7,900	70,412,000	135,852,500	20,491,000	44,596,300	0	34,808,400	14,557,000	13,616,800	294,200	9,400	55,436,050	904,295,450
gpm	190	8	184	187	193	216	0	134	258	39	85	0	66	28	26	1	0	105	1,721
Days of Downtime	46	1	26	21	29	19	0	18	15	2	23	0	19	29	27	0	0	18	
Downtime Corrected Flow Rate	213	8	197	198	208	227	0	141	269	39	90	0	70	30	28	1	0	111	1,830
Corrected for FM 1 and 2 rates	187	8	182	185	190	213	0	132	255	38	84	0	65	27	26	1	0	104	1696
Corrected for FM 1 and 2 rates and DT	210	8	195	195	205	224	0	139	265	39	89	0	69	29	27	1	0	109	1804.4
Operational Minimum	190	0	180	195	195	210	0	135	275	0	90	0	190	20	30	0	0	100	1800

OPERATING STRATEGY COMPARISON

	B11, B1, B2, B13	B4, B5, B6	B4, B5, B6, B8, B9	B4, B5, B6, B8, B9,B10	Total System
FY03 Uncorrected Flow Rate (gpm)	349	596	989	1,028	1,721
FY03 Corrected For Downtime Flow Rate (gpm)	381	634	1,043	1,083	1,830
MOS Operational Minimum (gpm)	460	600	1,010	1,010	1,800

CRA 51783 (4)

TABLE 9-3

TREATMENT CENTER WATER METER TOTALS
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, 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 2002	79,282,500	46,081,000	33,155,000	79,236,000	15,233,000	60,911,000	76,144,000	0	0	0
November 2002	79,638,600	47,268,000	31,584,000	78,852,000	11,691,000	64,750,000	76,441,000	0	0	0
December 2002	78,746,700	51,855,000	25,647,000	77,502,000	5,884,000	69,379,000	75,263,000	0	0	0
January 2003	70,140,800	48,449,000	20,246,000	68,695,000	5,091,000	61,443,000	66,534,000	0	0	0
February 2003	73,386,700	43,461,000	27,243,000	70,704,000	7,310,000	63,701,000	71,011,000	0	0	0
March 2003	78,845,400	44,356,000	32,045,000	76,401,000	19,089,000	58,240,000	77,329,000	0	0	0
April 2003	74,937,850	46,607,000	27,796,000	74,403,000	9,419,000	63,885,000	73,304,000	0	0	0
May 2003	78,675,000	48,790,000	29,426,000	78,216,000	7,736,000	69,334,000	77,070,000	0	0	0
June 2003	72,943,700	37,650,000	34,172,000	71,822,000	8,218,000	62,615,000	70,833,000	0	0	0
July 2003	76,166,300	42,878,000	32,027,000	74,905,000	12,424,000	61,365,000	73,789,000	0	0	0
August 2003	73,351,900	44,877,000	26,648,000	71,525,000	14,446,000	56,140,000	70,586,000	0	0	0
September 2003	68,180,000	43,009,000	26,004,000	69,013,000	9,424,000	58,755,000	68,179,000	0	0	0
TOTAL FY 2003	904,295,450	545,281,000	345,993,000	891,274,000	125,965,000	750,518,000	876,483,000	0	0	0
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
FY99	1,158,224,870	623,500,000	496,773,200	1,177,206,200	398,620,000	718,384,000	1,117,004,000	26,000	17,000	43,000
FY 2000	1,148,448,350	635,724,000	489,669,000	1,183,258,000	389,709,000	663,807,000	1,053,516,000	0	0	0
FY 2001	1,113,163,360	614,341,000	443,167,000	1,113,164,000	318,517,000	718,661,000	1,037,178,000	0	0	0
FY 2002	917,318,879	491,082,800	434,959,700	926,042,500	225,460,000	650,839,000	876,299,000	0	0	0
FY 2003	904,295,450	545,281,000	345,993,000	891,274,000	125,965,000	750,518,000	876,483,000	0	0	0

TABLE 9-4

PUMPHOUSE DOWN TIME (DAYS)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well Name	*FY03 Down Time (Days)*	*FY02 Down Time (Days)*	*FY01 Down Time (Days)*	*FY00 Down Time (Days)*	*FY99 Down Time (Days)*
B1	46	22	3.4	7.5	12.1
B2	1	63	3.9	18.7	39.7
B3	26	118	1.8	8.8	30.6
B4	21	12	1.7	5.7	17.8
B5	29	9	3.3	6.0	9.4
B6	19	11	1.6	32.3	10.3
B7	0	109	2.9	11.8	28.4
B8	18	108	1.3	9.0	21.2
B9	15	51	1.3	4.8	9.1
B10	2	110	2.4	8.0	29.0
B11	23	91	1.5	12.0	31.9
B12	0	--	--	--	--
B13	19	--	--	--	--
SC1	29	36	2.9	18.7	47.8
SC2	27	108	3.0	6.8	7.5
SC3	0	108	1.5	7.2	8.2
SC4	0	--	--	--	--
SC5	18	6	2.0	12.1	14.7

Note:
(1) Days down do not include down time resulting from automatic cycling of well field due to electric check valve failures.

TABLE 9.5

DOWN TIME (DAYS) BY CATEGORY
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Category	*Down Time (Days)*
Pumphouse Component	5.2
Treatment Center Component	8.3
Electrical Service	2.4
Miscellaneous	0.0
Preventive Maintenance	0.6
System Modification	2.9
Forcemain	4.8
Total System Equivalent	23.5
Anticipated Down Time for Fiscal Year 2004	
Pumphouse Component	3
Treatment Center Component	5
Electrical Service	3
Miscellaneous	0.1
Preventive Maintenance	1
System Modification	1
Forcemain	2

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethane*	*1,1-Dichloroethene*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroethene*
TGRS Cleanup Level[1]		200	70	6	4	70	5	5
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
03L002	6/11/03	2	0.84 JP	1.2	< 1	0.19 JP	< 1	34
03L003	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03L007	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03L007	6/10/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
03L014	6/19/03	140	4.5	4.8	< 1	1	< 1 U	250
03L017	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03L018	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	0.2 JP
03L020	6/12/03	< 1	< 1	< 1	< 1	0.44 JP	< 1	25
03L021	6/19/03	< 1	0.47 JP	0.25 JP	< 1	< 1	< 1	< 4.3 U
03L077	6/13/03	6.1	0.55 JP	1.6	< 1	0.37 JP	< 1	62
03L077	6/13/03	6 D	0.5 JPD	1.5 D	< 1 D	0.34 JPD	< 1 D	61 D
03L078	6/13/03	< 1	< 1	< 1	< 1	< 1	< 1	0.34 JP
03L078	6/13/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.6 JPD
03L079	6/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U
03L084	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03L802	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	4.3
03L806	6/12/03	21	33	26	< 1	4.7	0.3 JP	360
03L809	6/19/03	50	40	31	0.87 JP	13	< 1 U	410
03L833	6/13/03	0.22 JP	0.14 JP	0.15 JP	< 1	< 1	< 1	7.8
03M002	6/12/03	3.5	7.7	4.7	< 1	1 JP	< 1	77
03M003	6/17/03	< 1	1.2	0.82 JP	< 1	1.1	< 1	1.2
03M020	6/12/03	2.3	< 1	< 1	< 1	< 1	< 1	44

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethane*	*1,1-Dichloroethene*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroethene*
TGRS Cleanup Level[1]		200 µg/L	70 µg/L	6 µg/L	4 µg/L	70 µg/L	5 µg/L	5 µg/L
03M802	6/17/03	< 1	< 1	< 1	< 1	0.19 JP	< 1	10
03M806	6/12/03	1.1	270	150	1.9	16	< 1	1300 JP
03U002	6/20/03	5.1	3.4	2.4	< 1	0.19 JP	< 1	30
03U003	6/17/03	15	2.3	2.2	0.42 JP	6	< 1	78
03U007	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U009	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U014	6/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U017	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	3.3
03U018	6/17/03	18	4.9	2.8	< 1	12	< 1	140
03U020	6/12/03	100	5.2	19	< 1	0.88 JP	< 1	200
03U020	6/12/03	100 D	5.1 D	21 D	< 1 D	0.85 JPD	< 1 D	190 D
03U021	6/19/03	140	55	33	1.3	32	< 1 U	820
03U028	6/12/03	15	0.65 JP	3.7	< 1	11	0.58 JP	190
03U029	6/11/03	< 1	< 1	< 1	< 1	1.3	< 1	15
03U030	6/12/03	< 1	< 1	< 1	< 1	3.4	< 1	40
03U032	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U075	6/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U077	6/13/03	4.5	0.42 JP	0.89 JP	0.38 JP	< 1	1 JP	40
03U078	6/13/03	4.7	0.29 JP	1.4	< 1	2	9	110
03U079	6/19/03	31	6	6.8	< 1	19	< 1	320
03U079	6/19/03	41 D	8.2 D	7.8 D	0.5 JPD	19 D	< 1 D	310 D
03U093	6/16/03	23	0.48 JP	1.7	< 1	0.69 JP	< 1	69

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethane*	*1,1-Dichloroethene*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroethene*
TGRS Cleanup Level(1)		200	70	6	4	70	5	5
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
03U094	6/11/03	96	5.7	18	< 1	2.5	< 1	170
03U096	6/16/03	2.9	5.4	1.9	< 1	< 1	< 1	15
03U099	6/17/03	2.7	< 1	0.18 JP	< 1	< 1	0.095 JP	8
03U114	6/11/03	2.2	< 1	< 1	< 1	< 1	< 1	18
03U659	6/11/03	14	< 1	2.6	< 1	16	< 1	130
03U671	6/19/03	0.32 JP	< 1	< 1	< 1	< 1	< 1 U	< 1.4 U
03U672	6/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U
03U701	6/16/03	0.39 JP	0.13 JP	< 1	< 1	< 1	0.14 JP	5.4
03U702	6/16/03	< 1	< 1	< 1	< 1	< 1	< 1	0.94 JP
03U703	6/19/03	5.2	< 1	1.2	< 1	2.8	8	57
03U708	6/12/03	47	7.2	11	< 1	5.4	2.4	190
03U709	6/19/03	12	5.8	4.8	0.39 JP	0.46 JP	< 1	58
03U710	6/20/03	59	4.5	5.5	0.53 JP	14	< 1	260
03U711	6/17/03	53	11	10	0.6 JP	5.3	1.9	230
03U801	6/17/03	< 1	< 1	< 1	< 1	0.74 JP	< 1	33
03U803	6/20/03	0.28 JP	< 1	< 1	< 1	< 1	< 1	3.5
03U804	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	0.22 JP
03U805	6/23/03	0.66 JP	0.47 JP	0.23 JP	< 1	< 1	0.17 JP	2.2
03U806	6/16/03	0.46 JP	6.9	4.6	< 1	0.89 JP	1.3	140
04J077	6/13/03	93	58	47	1	19	0.094 JP	530
04J702	6/16/03	0.68 JP	< 1	0.19 JP	< 1	< 1	< 1	8.2
04J708	6/12/03	< 1	0.41 JP	0.18 JP	< 1	< 1	< 1	3.7

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
TGRS Cleanup Level[(1)]		200	70	6	4	70	5	5
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
04J713	6/12/03	< 1	< 1	< 1	< 1	< 1	< 1	0.15 JP
04U002	6/11/03	< 1	0.33 JP	< 1	< 1	< 1	< 1	4.3
04U003	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	0.27 JP
04U007	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
04U020	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	2.3
04U027	6/12/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
04U077	6/13/03	9.5	1.1	2.7	< 1	0.63 JP	< 1	94
04U510	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
04U701	6/16/03	0.49 JP	< 1	0.2 JP	< 1	< 1	< 1	7.1
04U702	6/16/03	< 1	< 1	< 1	< 1	< 1	< 1	1.6
04U702	6/16/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	1.5 D
04U708	6/20/03	< 1	0.14 JP	< 1	< 1	< 1	< 1	1.1
04U709	6/19/03	1.1	0.78 JP	0.66 JP	< 1	< 1	< 1	14
04U711	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	1.1
04U713	6/12/03	< 1	< 1	< 1	< 1	< 1	< 1	0.9 JP
04U802	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	0.87 JP
04U806	6/16/03	19	53	33	0.73 JP	7.4	0.18 JP	360
04U833	6/13/03	0.77 JP	0.24 JP	0.33 JP	< 1	< 1	< 1	15

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethane*	*1,1-Dichloroethene*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroethene*
TGRS Cleanup Level[(1)]		200	70	6	4	70	5	5
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PJ#003	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
PJ#802	6/17/03	< 1	< 1	< 1	< 1	< 1	< 1	0.21 JP
PJ#806	6/12/03	2.8	4.7	3.8	< 1	0.74 JP	< 1	80
PJ#806	6/12/03	2.8 D	4.7 D	3.6 D	< 1 D	0.81 JPD	< 1 D	77 D

Notes:
(1) Cleanup levels for TGRS are from the OU2 ROD. Shading indicates exceedence of the cleanup level.
D - Duplicate Analysis
J - Value is estimated
P - Results less than reporting level but greater than instrument detection limit.
U - The analyte is non-detect with the associated value being the quantitation limit.

TABLE 9-7

VOC MASS LOADING SUMMARY
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well	*Percent Contribution to VOC Mass Removal*	*FY 2003 Total Pounds VOC Mass Removed*
B1	5.6%	170.4
B2	0.1%	2.1
B3	0.2%	6.6
B4	14.9%	452.9
B5	10.1%	305.8
B6	5.7%	174.5
B7	0.0%	0.0
B8	0.5%	14.9
B9	6.2%	187.6
B10	0.0%	0.2
B11	0.1%	1.7
B13	1.6%	48.8
SC1	4.1%	125.2
SC2	0.3%	9.7
SC3	0.0%	0.0
SC4	0.0%	0.0
SC5	50.7%	1540.7
Fiscal Year 2003 Total (lbs)		*3041*
Daily Average (lbs/day)		*8.3*

HISTORICAL TOTAL

Fiscal Year		*Pounds VOC Mass Removed*
2003		3,041
2002		2,852
2001		3,418
2000		4,499
1999		4,878
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		*185,977*

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (μg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*1,1,1-Trichloroethane μg/L*	*1,1,2-Trichloroethane μg/L*	*1,1-Dichloroethane μg/L*	*1,1-Dichloroethene μg/L*	*1,2-Dichloroethane μg/L*	*Carbon Tetrachloride μg/L*	*Chloroform μg/L*
03F302	B1	12/13/02	10	0.59 JP	2.4	2.5	< 1	< 1	0.19 JP
03F302	B1	6/10/03	11	0.52 JP	3.2	3.1	< 1	< 1	< 1
03F303	B2	12/16/02	1.5	2.8	1.2	1.9	0.31 JP	< 1	0.3 JP
03F303	B2	6/11/03	< 1	2.8	< 1	1.6	< 1	< 1	< 1
03F303	B2	6/11/03	< 1 D	2.9 D	< 1 D	2.5 D	< 1 D	< 1 D	< 1 D
03F304	B3	12/13/02	0.81 JP	0.35 JP	1	1	< 1	< 1	< 1
03F304	B3	6/10/03	1.3	< 1	< 1	1.3	< 1	< 1	< 1
03F305	B4	12/13/02	52	< 5	24	19	< 5	< 5	< 5
03F305	B4	12/13/02	58 D	< 5 D	26 D	23 D	< 5 D	< 5 D	< 5 D
03F305	B4	6/10/03	60	< 1	26	27	< 1	< 1	< 1
03F306	B5	12/13/02	13	< 5	11	8.6	< 5	< 5	< 5
03F306	B5	6/10/03	15	< 1	12	11	< 1	< 1	< 1
03F307	B6	12/13/02	5.2	< 1	6.1	4.8	< 1	< 1	< 1
03F307	B6	12/13/02	5.9 D	< 1 D	6.4 D	5.2 D	< 1 D	< 1 D	< 1 D
03F307	B6	6/10/03	4.6	< 1	6.4	5.7	< 1	< 1	< 1
03F308	B7	12/13/02	0.13 JP	< 1	< 1	< 1	< 1	< 1	< 1
03F308	B7	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*1,1,1-Trichloroethane µg/L*	*1,1,2-Trichloroethane µg/L*	*1,1-Dichloroethane µg/L*	*1,1-Dichloroethene µg/L*	*1,2-Dichloroethane µg/L*	*Carbon Tetrachloride µg/L*	*Chloroform µg/L*
PJ#309	B8	12/13/02	2.8	< 1	1.3	1.2	< 1	< 1	< 1
PJ#309	B8	6/10/03	2.8	< 1	< 1	1.4	< 1	< 1	< 1
PJ#310	B9	12/13/02	17	< 1	8	7.4	< 1	< 1	0.099 JP
PJ#310	B9	6/10/03	23	< 1	11	13	< 1	< 1	< 1
PJ#311	B10	12/13/02	0.14 JP	< 1	< 1	< 1	< 1	< 1	< 1
PJ#311	B10	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03F312	B11	12/13/02	< 1	< 1	0.45 JP	0.28 JP	< 1	< 1	< 1
03F312	B11	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
PJ#313	B12	12/16/02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
PJ#313	B12	6/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03F319	B13	12/13/02	0.71 JP	< 1	0.096 JP	< 1	< 1	< 1	< 1
03F319	B13	1/7/03	3.1	< 1	0.62	1.1	< 1	< 1	< 1
03F319	B13	2/19/03	4.1	< 1	0.74 JP	1.2	< 1	< 1	0.13 JP
03F319	B13	3/5/03	5.1	< 1	0.86 JP	1.4	< 1	< 1	< 1
03F319	B13	4/10/03	3.6	< 1	0.69 JP	0.89 JP	< 1	< 1	0.14 JP
03F319	B13	5/8/03	5.6	< 1	0.95 JP	1.2	< 1	< 1	0.16 JP
03F319	B13	6/10/03	6.8	< 1	< 1	1.6	< 1	< 1	< 1
03F319	B13	6/10/03	6.7 D	< 1 D	< 1 D	1.6 D	< 1 D	< 1 D	< 1 D
03F319	B13	7/2/03	5.5	< 1	1.2	1.3	< 1	< 1	0.16 JP
03F319	B13	8/13/03	5.9	< 1	< 1	1.4	< 1	< 1	< 1
03F319	B13	9/9/03	5.2	< 1	1.2	1.4	< 1	< 1	< 1

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*1,1,1-Trichloroethane µg/L*	*1,1,2-Trichloroethane µg/L*	*1,1-Dichloroethane µg/L*	*1,1-Dichloroethene µg/L*	*1,2-Dichloroethane µg/L*	*Carbon Tetrachloride µg/L*	*Chloroform µg/L*
03U301	SC1	12/13/02	22	< 10	1.9 JP	2.9 JP	< 10	< 10	0.88 JP
03U301	SC1	6/11/03	21	< 1	1.5	2.3	< 1	< 1	0.54 JP
03U314	SC2	12/13/02	20	< 1	1.5	2.1	< 1	< 1	0.19 JP
03U314	SC2	6/11/03	8.8	< 1	1.4	1.2	< 1	< 1	0.18 JP
03U315	SC3	12/13/02	0.18 JP	< 1	< 1	< 1	< 1	< 1	< 1
03U315	SC3	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U316	SC4	12/13/02	0.68 JP	< 1	0.12 JP	< 1	< 1	< 1	0.82 JP
03U316	SC4	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	0.9 JP
03U317	SC5	12/13/02	750	< 10	18	26	2.9 JP	< 10	0.86 JP
03U317	SC5	6/11/03	860	< 5	17	24	< 5	< 5	< 5

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (μg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*cis-1,2-Dichloroethene* μg/L	*Freon 113* μg/L	*Methylene Chloride* μg/L	*Tetrachloroethene* μg/L	*trans-1,2-Dichloroethene* μg/L	*Trichloroethene* μg/L	*Vinyl Chloride* μg/L
03F302	B1	12/13/02	9.8	< 1	< 1 U	2.2	0.11 JP	190	< 1
03F302	B1	6/10/03	12	< 1	< 1	2.5	< 1	190	< 1
03F303	B2	12/16/02	1.9	< 1	< 1 U	2.5	< 1	51	< 1
03F303	B2	6/11/03	2.6	< 1	< 1	1.9	< 1	47	< 1
03F303	B2	6/11/03	2.5 D	< 1 D	< 1 D	1.9 D	< 1 D	49 D	< 1 D
03F304	B3	12/13/02	0.35 JP	< 1	< 1 U	< 1	< 1	5.1	< 1
03F304	B3	6/10/03	< 1	< 1	< 1	< 1	< 1	7.1	< 1
03F305	B4	12/13/02	13	< 5	< 5 U	< 5	< 5	440	< 5
03F305	B4	12/13/02	14 D	< 5 D	< 5 UD	< 5 D	< 5 D	420 D	< 5 D
03F305	B4	6/10/03	15	< 1	< 1	< 1	< 1	520	< 1
03F306	B5	12/13/02	1.9 JP	< 5	< 5	1.2 JP	< 5	310	< 5
03F306	B5	6/10/03	2.2	< 1	< 1	1.4	< 1	400	< 1
03F307	B6	12/13/02	1.3	< 1	< 1 U	< 1	0.078 JP	180	< 1
03F307	B6	12/13/02	1.3 D	< 1 D	< 1 UD	< 1 D	0.073 JPD	180 D	< 1 D
03F307	B6	6/10/03	1.4	< 1	< 1	< 1	< 1	170	< 1
03F308	B7	12/13/02	< 1	< 1	< 1 U	< 1	< 1	1.2	< 1
03F308	B7	6/10/03	< 1	< 1	< 1	< 1	< 1	1.7	< 1

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Alias	Date	*cis-1,2-Dichloroethene µg/L*		*Freon 113 µg/L*		*Methylene Chloride µg/L*		*Tetrachloroethene µg/L*		*trans-1,2-Dichloroethene µg/L*		*Trichloroethene µg/L*		*Vinyl Chloride µg/L*	
PJ#309	B8	12/13/02	0.56	JP	< 1		< 1	U	< 1		< 1		20		< 1	
PJ#309	B8	6/10/03	0.56	JP	< 1		< 1		< 1		< 1		23		< 1	
PJ#310	B9	12/13/02	3.3		< 1		< 1	U	< 1		< 1		120		< 1	
PJ#310	B9	6/10/03	4.9		< 1		< 1		< 1		< 1		140		< 1	
PJ#311	B10	12/13/02	< 1		< 1		< 1	U	< 1		< 1		1.1		< 1	
PJ#311	B10	6/10/03	< 1		< 1		< 1		< 1		< 1		0.75	JP	< 1	
03F312	B11	12/13/02	0.33	JP	< 1		< 1	U	< 1		< 1		4.2		< 1	
03F312	B11	6/10/03	< 1		< 1		< 1		< 1		< 1		4.6		< 1	
PJ#313	B12	12/16/02	< 1		< 1		< 1	U	< 1		< 1		0.093	JP	< 1	
PJ#313	B12	6/10/03	< 1		< 1		< 1		< 1		< 1		< 1		< 1	
03F319	B13	12/13/02	0.87	JP	< 1		< 1	U	0.15	JP	< 1		34		< 1	
03F319	B13	1/7/03	2.6		< 1		0.15	U	0.19		< 1		55		< 1	
03F319	B13	2/19/03	4.8		< 1		< 1		0.31	JP	0.095	JP	100		< 1	
03F319	B13	3/5/03	5.2		< 1		< 1		0.42	JP	< 1		150		< 1	
03F319	B13	4/10/03	4.7		< 1		< 1		0.36	JP	< 1		130		< 1	
03F319	B13	5/8/03	7		< 1		< 1		0.54	JP	< 1		200		< 1	
03F319	B13	6/10/03	9.6		< 1		< 1		0.57	JP	< 1		300		< 1	
03F319	B13	6/10/03	9.7	D	< 1	D	< 1	D	0.51	JPD	< 1	D	290	D	< 1	D
03F319	B13	7/2/03	7.5		< 1		< 1		0.55	JP	< 1		240		< 1	
03F319	B13	8/13/03	8.9		< 1		< 1		< 1		< 1		320		< 1	
03F319	B13	9/9/03	8.4		< 1		< 1		0.55	JP	< 1		240		< 1	

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*cis-1,2-Dichloroethene µg/L*	*Freon 113 µg/L*	*Methylene Chloride µg/L*	*Tetrachloroethene µg/L*	*trans-1,2-Dichloroethene µg/L*	*Trichloroethene µg/L*	*Vinyl Chloride µg/L*
03U301	SC1	12/13/02	64	< 10	< 10	< 10	< 10	1000	< 10
03U301	SC1	6/11/03	70	< 1	< 1	0.46 JP	1.2	1100	< 1
03U314	SC2	12/13/02	0.63 JP	< 1	< 1 U	< 1	< 1	78	< 1
03U314	SC2	6/11/03	0.61 JP	< 1	< 1	< 1	< 1	61	< 1
03U315	SC3	12/13/02	< 1	< 1	< 1 U	< 1	< 1	2.1	< 1
03U315	SC3	6/11/03	< 1	< 1	< 1	< 1	< 1	1.9	< 1
03U316	SC4	12/13/02	< 1	< 1	< 1 U	< 1	< 1	5	< 1
03U316	SC4	6/11/03	< 1	< 1	< 1	< 1	< 1	7	< 1
03U317	SC5	12/13/02	2 JP	14	< 10 U	6.8 JP	< 10	2500	< 10
03U317	SC5	6/11/03	1.9 JP	13	< 5	6.4	< 5	2600	< 5

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Alias*	*Date*	*Alkalinity* µg/L	*Calcium* µg/L	*Hardness* µg/L	*Iron* µg/L	*Magnesium* µg/L	*Manganese* µg/L	*Zinc* µg/L
03F302	B1	12/13/02							
03F302	B1	6/10/03							
03F303	B2	12/16/02							
03F303	B2	6/11/03							
03F303	B2	6/11/03							
03F304	B3	12/13/02							
03F304	B3	6/10/03							
03F305	B4	12/13/02							
03F305	B4	12/13/02							
03F305	B4	6/10/03							
03F306	B5	12/13/02							
03F306	B5	6/10/03							
03F307	B6	12/13/02							
03F307	B6	12/13/02							
03F307	B6	6/10/03							
03F308	B7	12/13/02							
03F308	B7	6/10/03							

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Alias	Date	Alkalinity µg/L	Calcium µg/L	Hardness µg/L	Iron µg/L	Magnesium µg/L	Manganese µg/L	Zinc µg/L	
PJ#309	B8	12/13/02								
PJ#309	B8	6/10/03								
PJ#310	B9	12/13/02								
PJ#310	B9	6/10/03								
PJ#311	B10	12/13/02								
PJ#311	B10	6/10/03								
03F312	B11	12/13/02								
03F312	B11	6/10/03								
PJ#313	B12	12/16/02								
PJ#313	B12	6/10/03								
03F319	B13	12/13/02	288,000	75,600	340,000	203	26,600	240	12	JP
03F319	B13	1/7/03								
03F319	B13	2/19/03								
03F319	B13	3/5/03								
03F319	B13	4/10/03								
03F319	B13	5/8/03								
03F319	B13	6/10/03								
03F319	B13	6/10/03								
03F319	B13	7/2/03								
03F319	B13	8/13/03								
03F319	B13	9/9/03								

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (µg/L)
FISCAL YEAR 2002
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

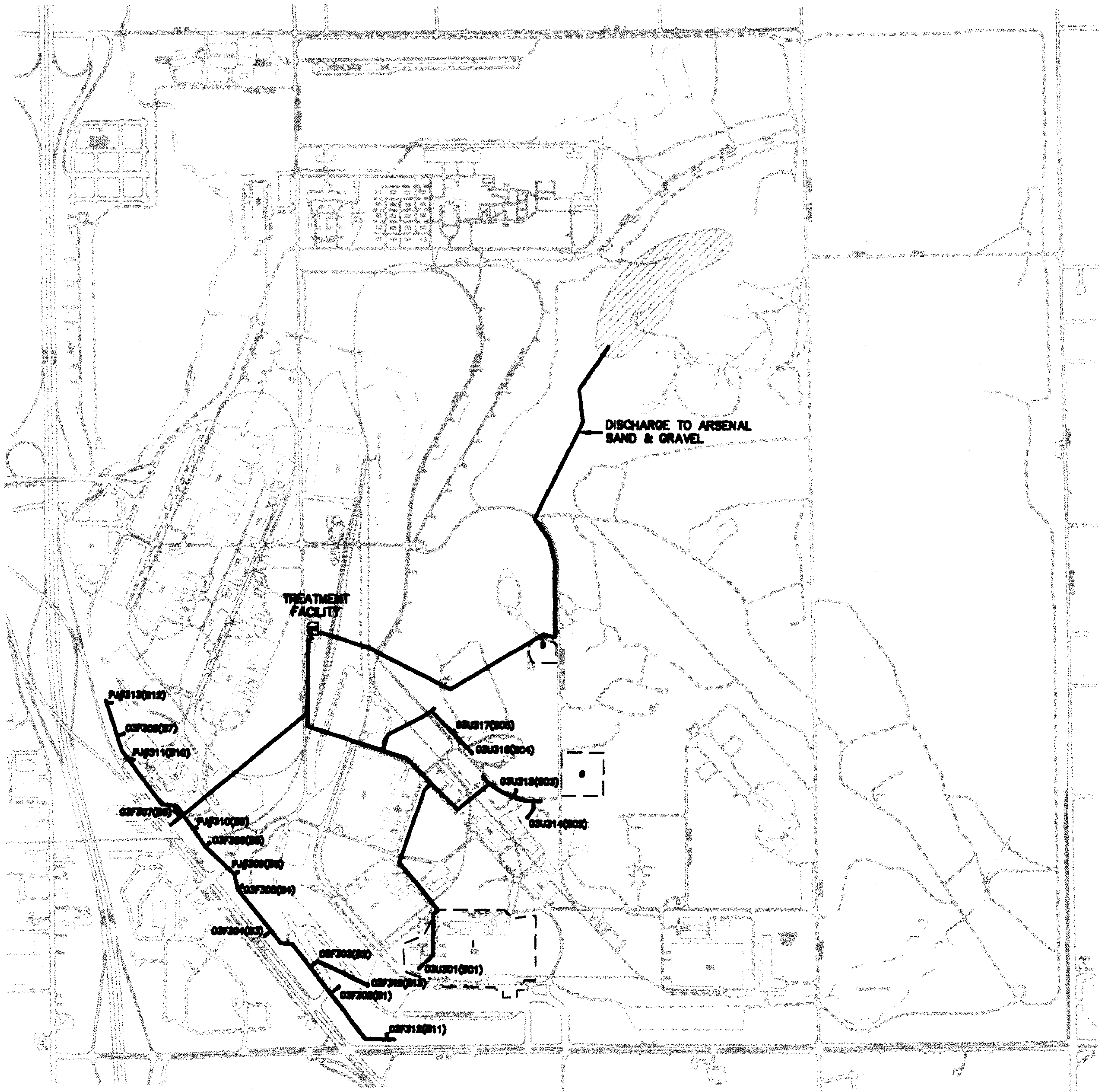
Location	*Alias*	*Date*	*Alkalinity µg/L*	*Calcium µg/L*	*Hardness µg/L*	*Iron µg/L*	*Magnesium µg/L*	*Manganese µg/L*	*Zinc µg/L*
03U301	SC1	12/13/02							
03U301	SC1	6/11/03							
03U314	SC2	12/13/02							
03U314	SC2	6/11/03							
03U315	SC3	12/13/02							
03U315	SC3	6/11/03							
03U316	SC4	12/13/02							
03U316	SC4	6/11/03							
03U317	SC5	12/13/02							
03U317	SC5	6/11/03							

Notes:
D - Duplicate analysis
J - Value is estimated
P - Results less than reporting level but greater than instrument detection limit.
U - The analyte is non-detect with the associated value being the quantitation limit.

TABLE 9-9

SUMMARY OF OU2 DEEP GROUNDWATER MONITORING REQUIREMENTS
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Remedy Component	*Monitoring Requirements*	*Implementing 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



N

0 400 1200ft

LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- RAILROAD
- DRAINAGE
- BUILDING
- BUILDING REMOVED
- SOURCE AREA
- WELL LOCATION

EXTRACTION WELL NAME CROSS REFERENCE

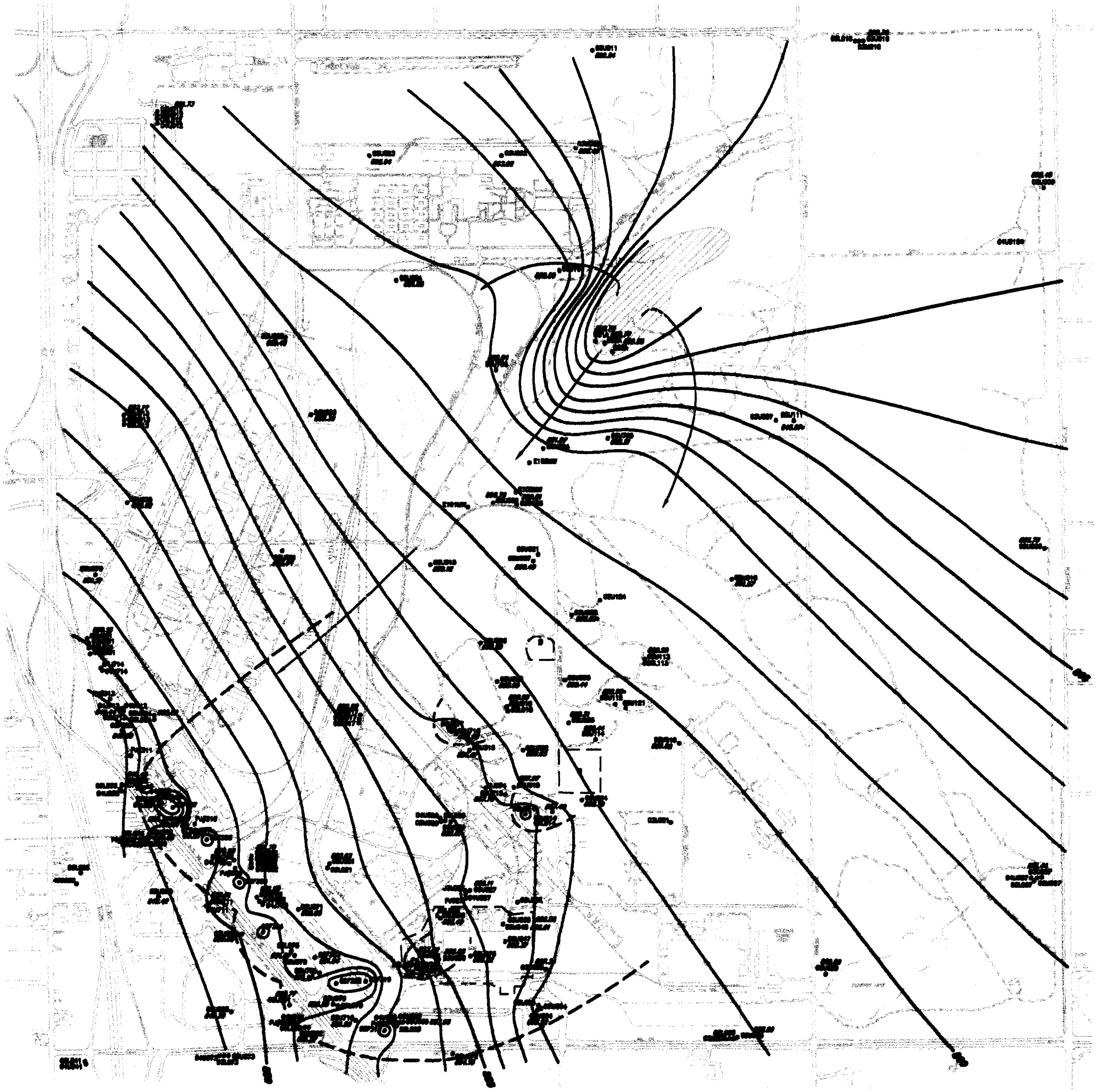
B1	03F302
B2	03F303
B3	03F304
B4	03F305
B5	03F306
B6	03F307
B7	03F308
B8	PJ#309
B9	PJ#310
B10	PJ#311
B11	03F312
B12	PJ#313
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

figure 9–1

TGRS LAYOUT
Twin Cities Army Ammunition Plant

CRA

31783-43(004)GN-SP003 JAN 06/2004



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
- * GROUNDWATER ELEVATION NOT USED IN CONTOURING
- 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
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

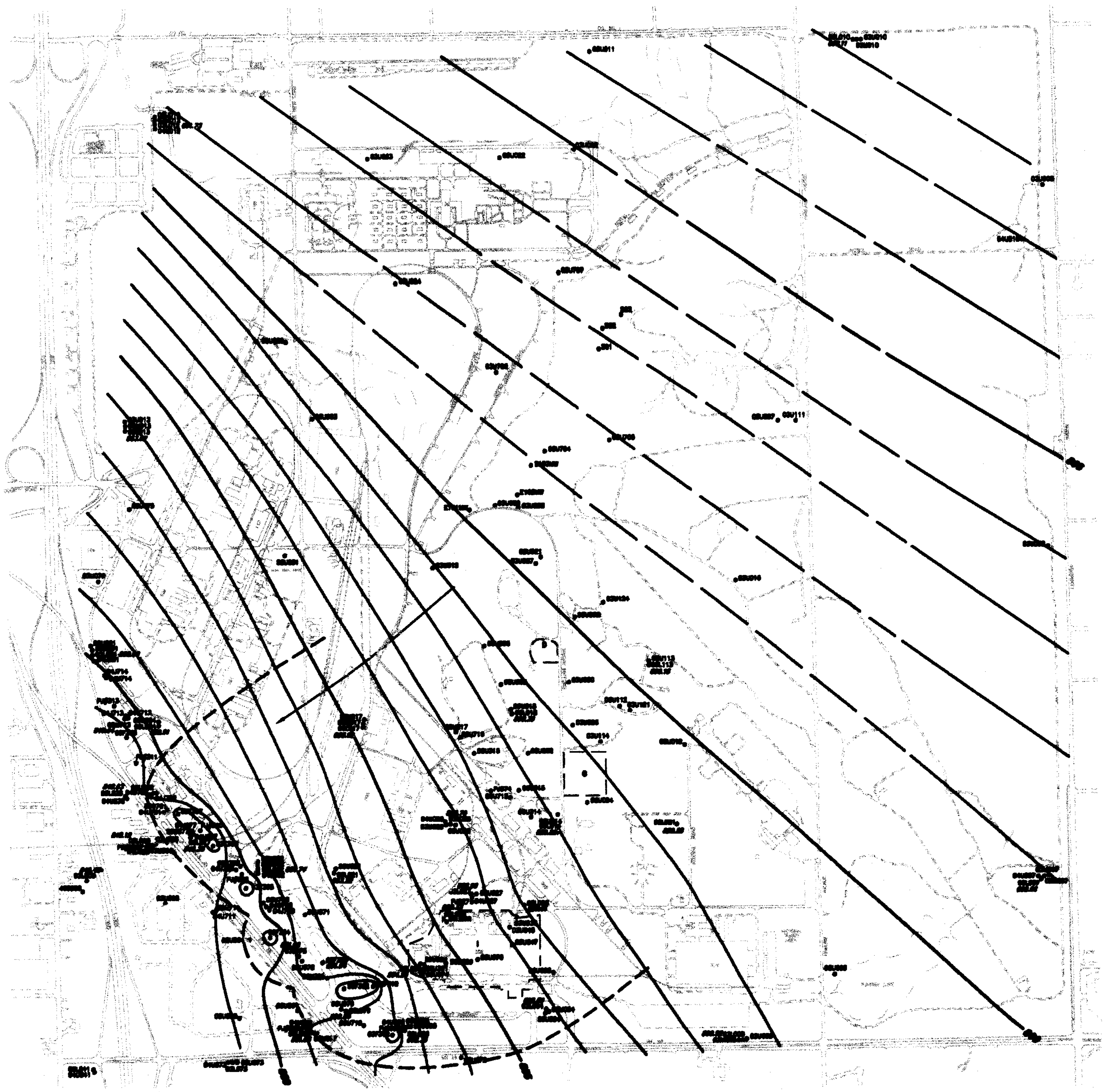
figure 9–2

OU2, UPPER UNIT 3, POTENTIOMETRIC MAP, 6/9/03 (Q79)

Twin Cities Army Ammunition Plant

CRA

31783-43(004)GN-SP004 JAN 09/2004



N

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
- GROUNDWATER ELEVATION NOT USED IN CONTOURING
- 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
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

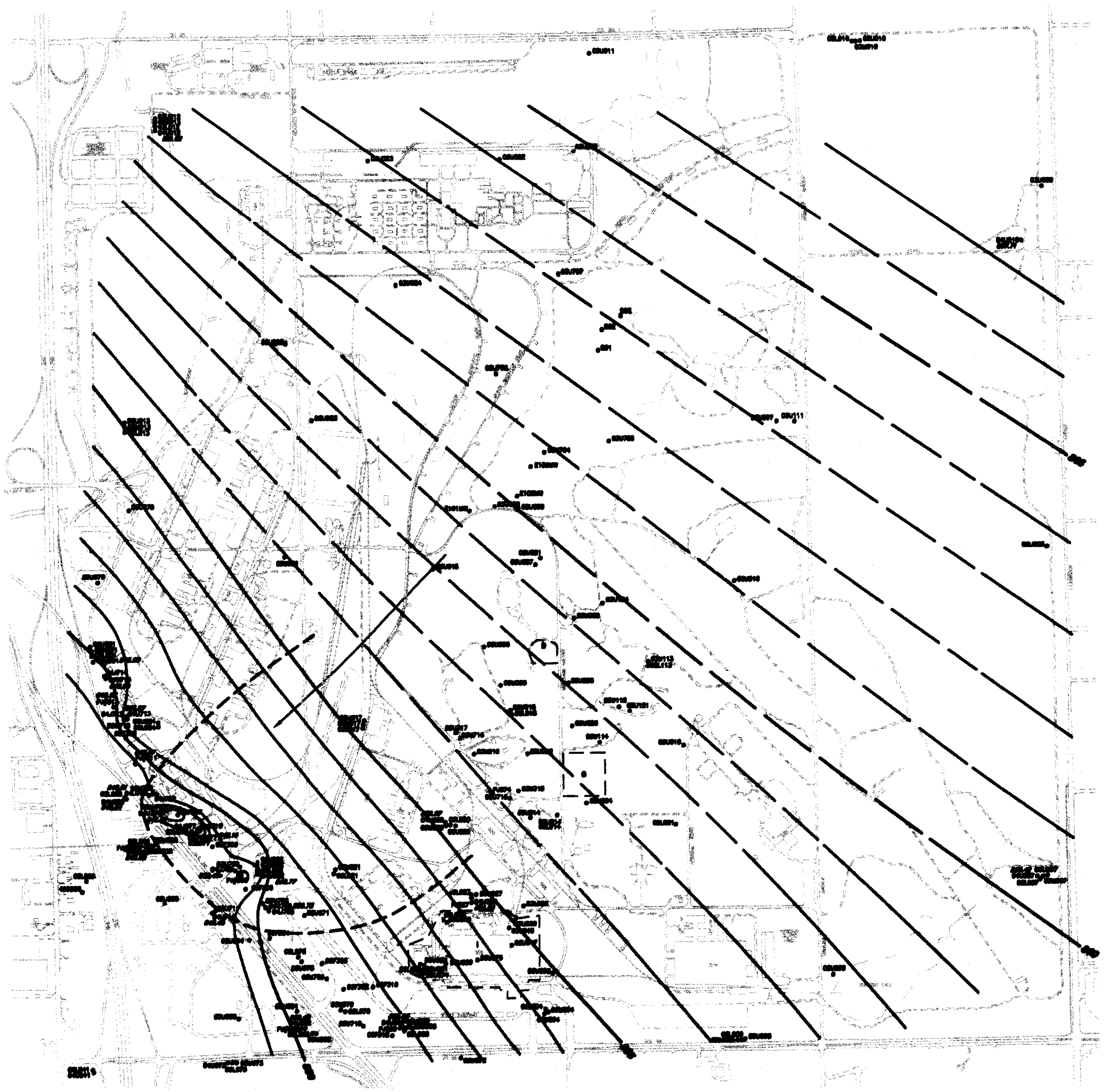
figure 9–3

OU2, LOWER UNIT 3, POTENTIOMETRIC MAP, 6/9/03 (Q79)

Twin Cities Army Ammunition Plant

CRA

31783-43(004)GN-SP005 JAN 09/2004



N

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
* GROUNDWATER ELEVATION NOT USED IN CONTOURING
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
B13	03F319
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

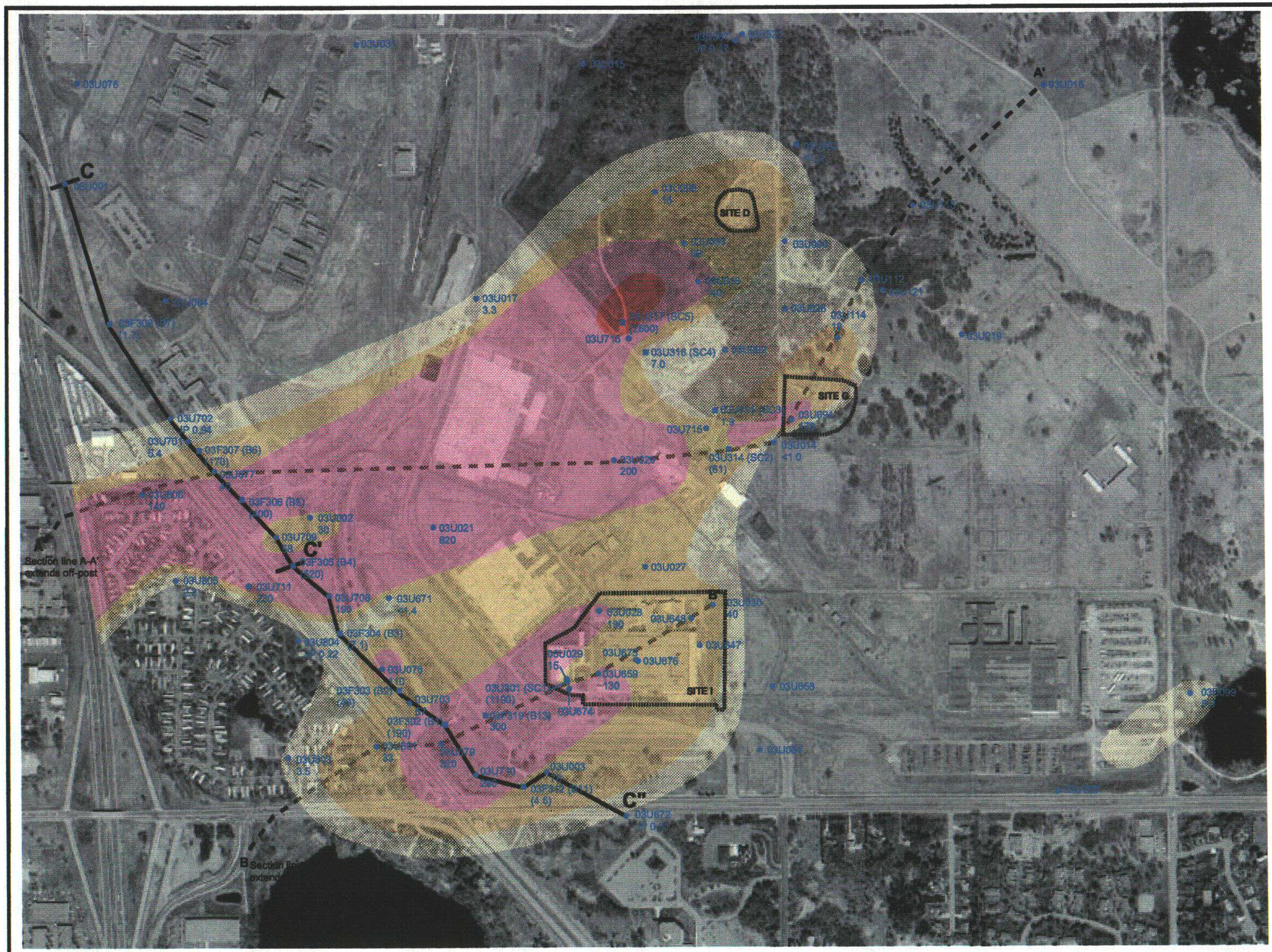
figure 9–4

OU2, UPPER UNIT 4, POTENTIOMETRIC MAP, 6/9/03 (Q79)

Twin Cities Army Ammunition Plant

CRA

31783–43(004)GN–SP006 JAN 09/2004



LEGEND

- 03U096 Monitoring Well Location
- 03U315 Extraction Well Location
- 03U096 15 Trichloroethene concentration (ug/l) (values in parentheses were not used for contouring purposes)
- Site Boundary
- Cross-Section Line

Trichloroethene Concentrations

- 1-10 ug/l
- 10-100 ug/l
- 100-1000 ug/l
- 1000+ ug/l

Notes:

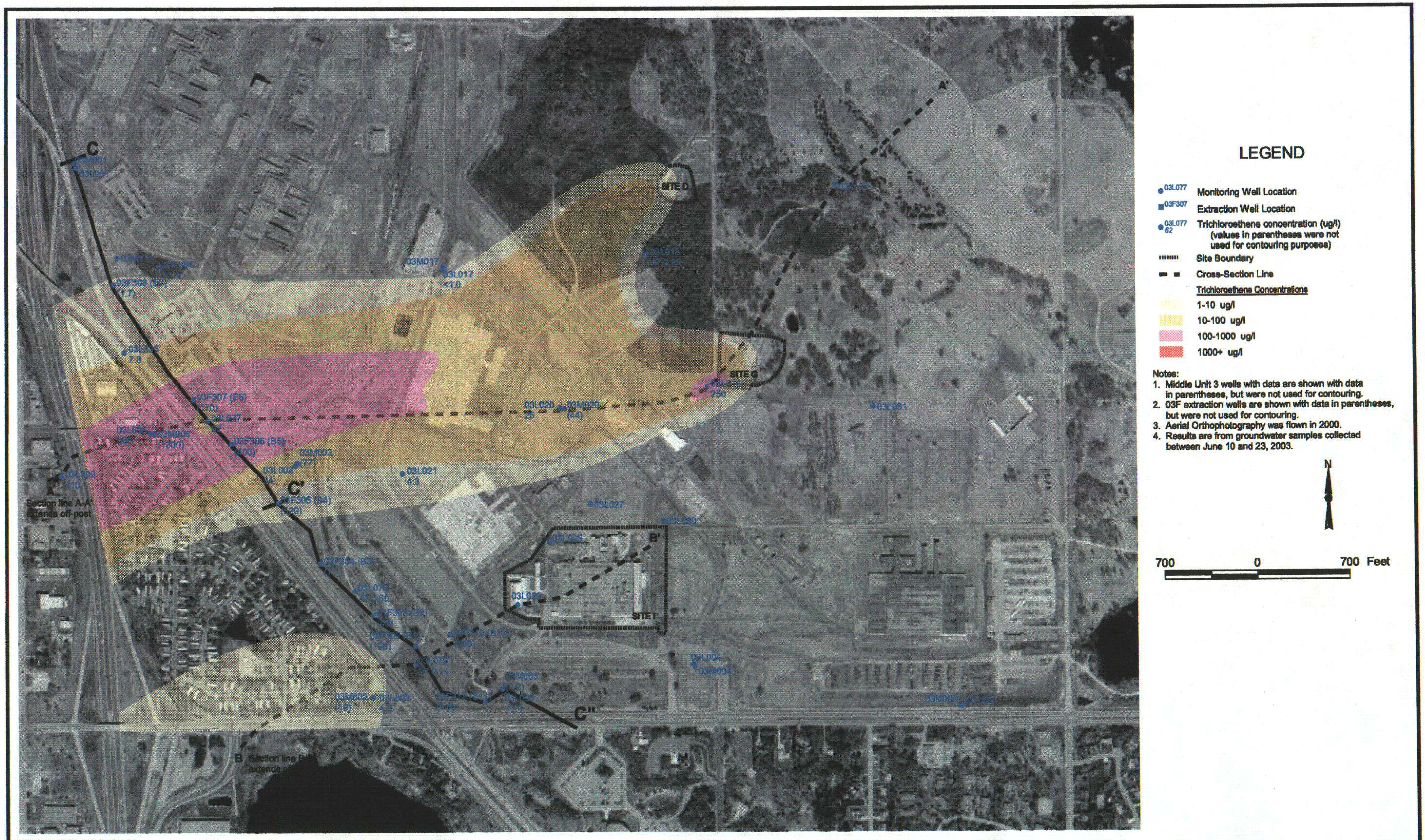
1. 03F and 03U extraction wells are shown with data in parentheses, but concentrations were not used for contouring (except for SC-3 and SC-4, which were used for contouring since they are being sampled as monitoring wells and since they are screened only within Upper Unit 3.)
2. Aerial Orthophotography was flown in 2000.
3. Results are from groundwater samples collected between June 10 and 23, 2003.

N

700 0 700 Feet

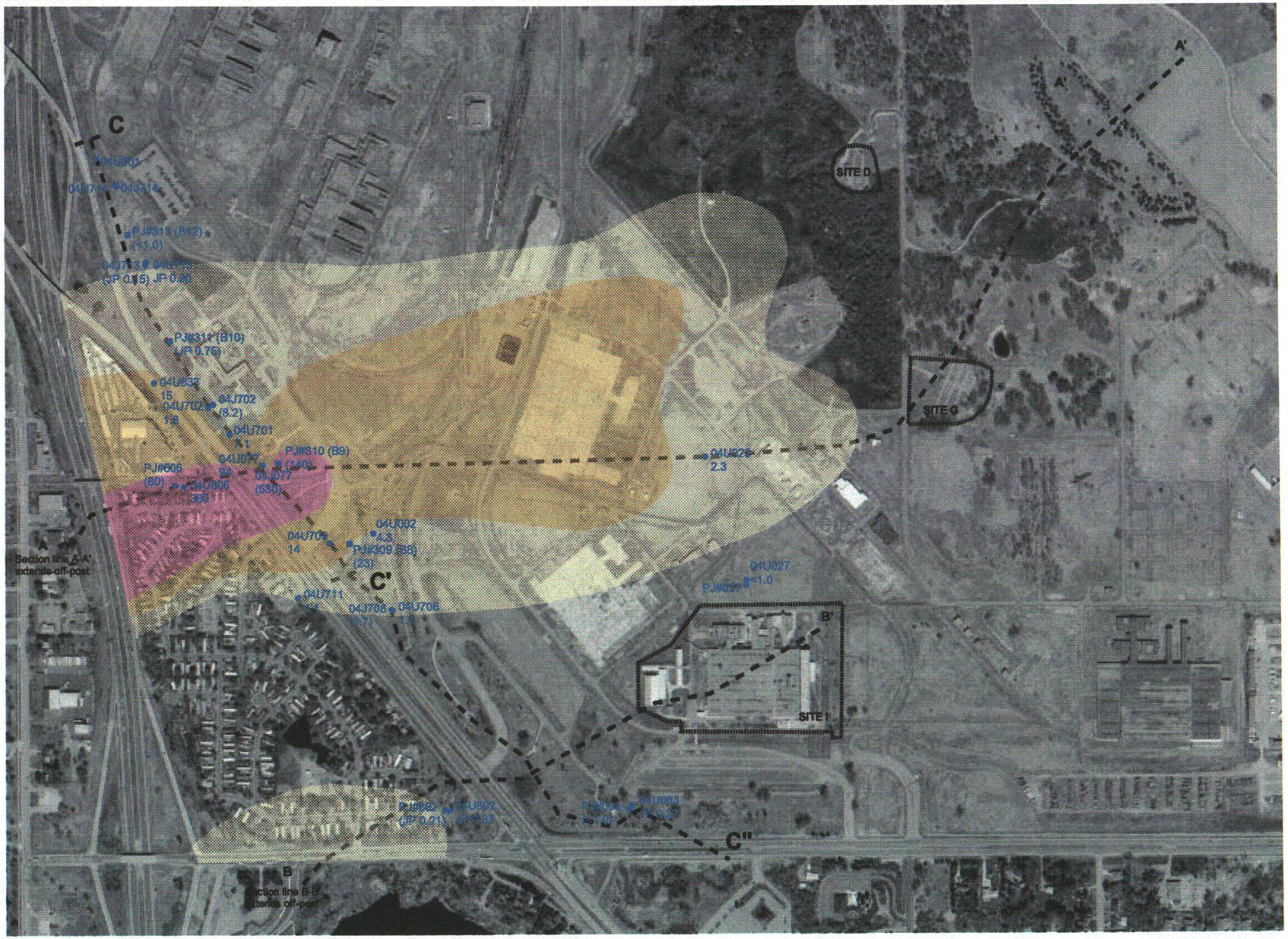
L:\1036\1036-12\fy2003\apr file\03report.apr\figure 9-5

TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
OU2, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 2003		Figure 9-5



L:\1038\1038-12\apr file\03report.apr\figure 9-6

TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
OU2, Lower Unit 3, Trichloroethene Isoconcentration Map, Summer 2003		Figure 9-6



LEGEND

- 04U020 Monitoring Well Location
- PJ#307 Extraction Well Location
- 04U020 62 Trichloroethene concentration (ug/l) (values in parentheses were not used for contouring purposes)
- Site Boundary
- Cross-Section Line

Trichloroethene Concentrations

- 1-10 ug/l
- 10-100 ug/l
- 100-1000 ug/l
- 1000+ ug/l

Notes:

1. All 04J wells (Jordan Wells) with data are shown with data in parentheses, but were not used for contouring.
2. All PJ# Extraction wells are shown with data in parentheses, but were not used for contouring.
3. PJ# monitoring wells are shown with data in parentheses, but were not used for contouring.
4. Aerial Orthophotography was flown in 2000.
5. Results are from groundwater samples collected between June 10 and 23, 2003.

N

700 0 700 Feet

L:\1038\1038-12\apr file\03\report.apr\figure 9-7

TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2003
OU2, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 2003		Figure 9-7

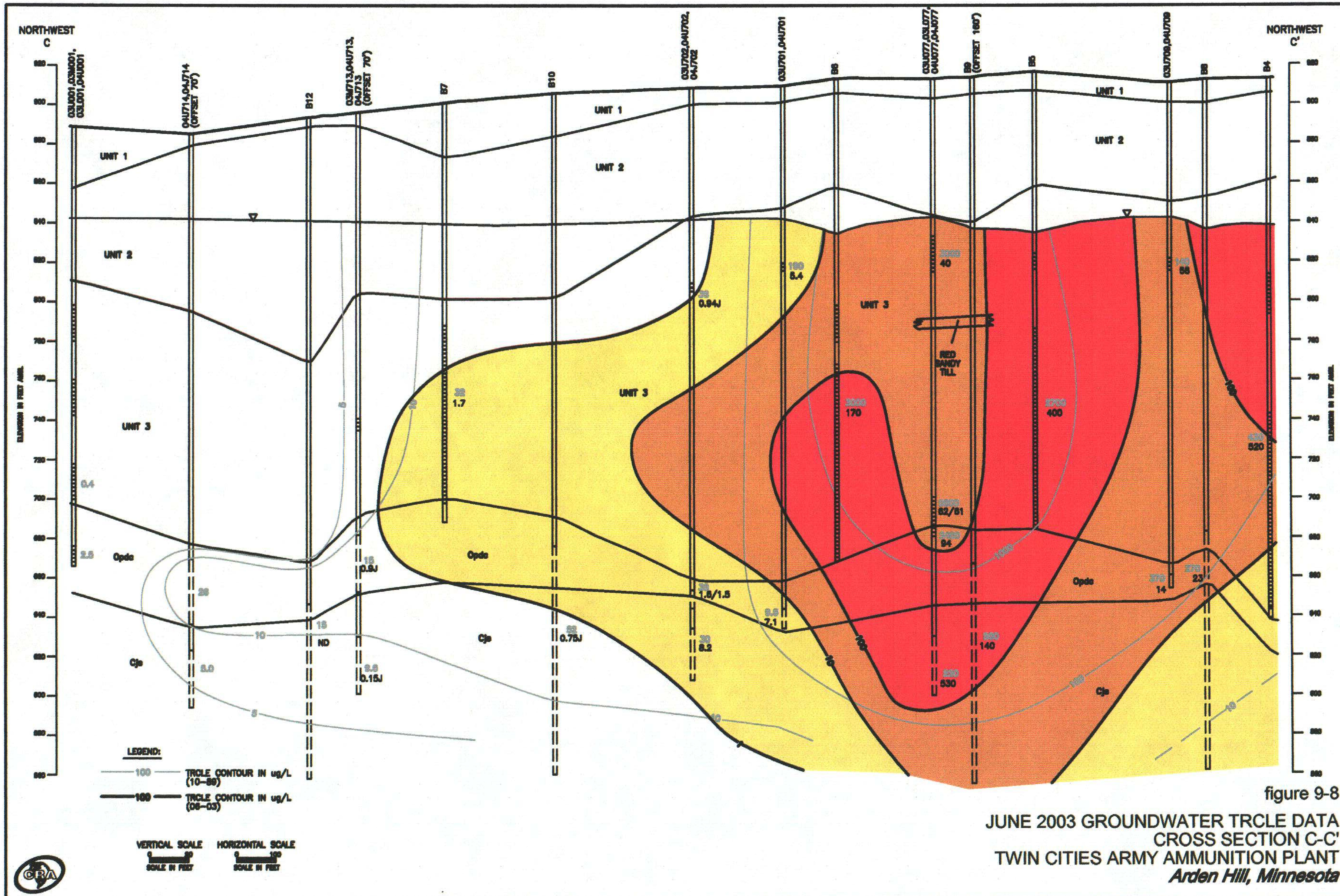


figure 9-8

JUNE 2003 GROUNDWATER TRCLE DATA
CROSS SECTION C-C'
TWIN CITIES ARMY AMMUNITION PLANT
Arden Hill, Minnesota

31783-43(004)GN-SP001 JUN 01/2004

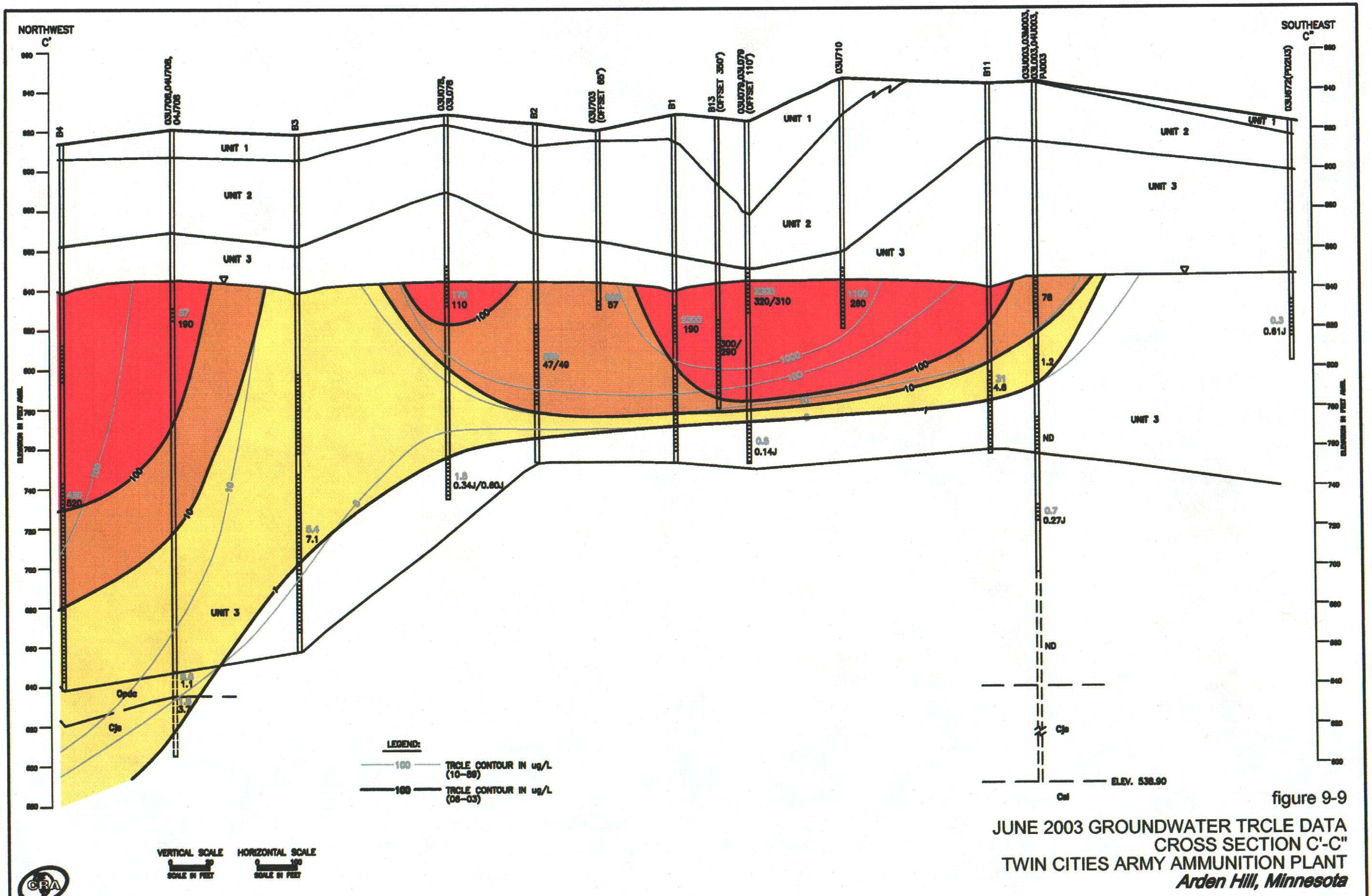
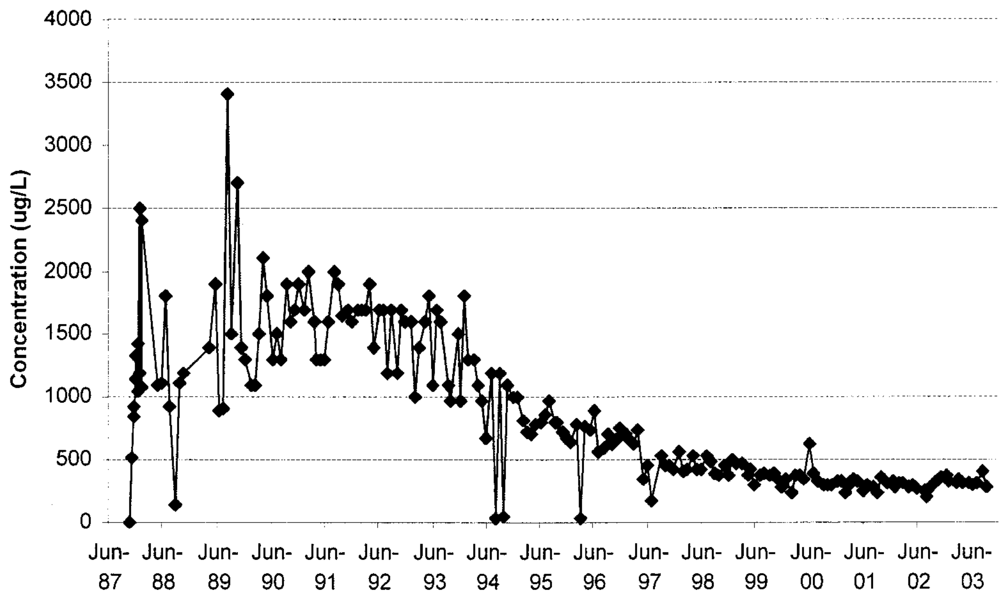


figure 9-9

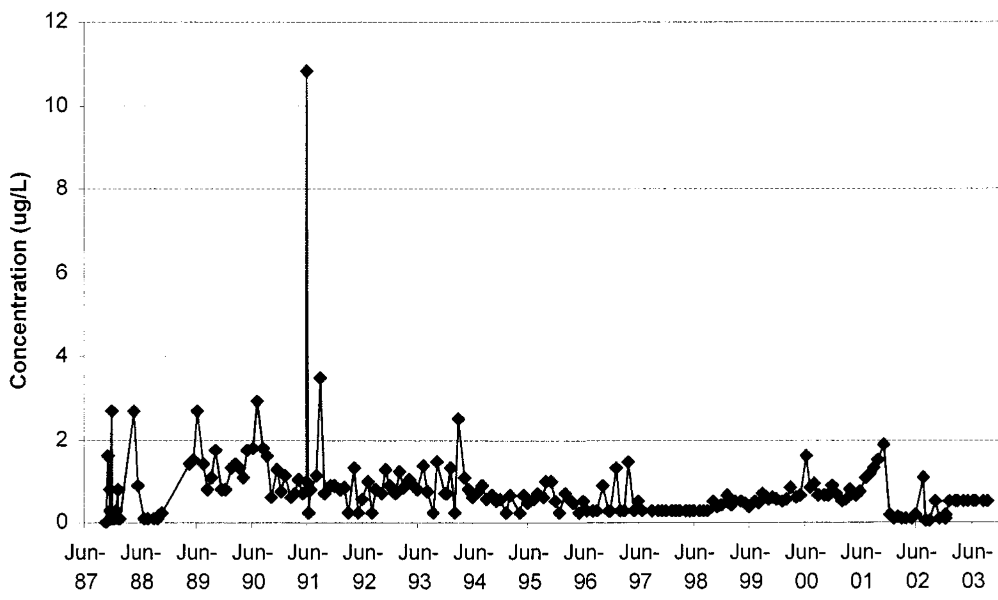
JUNE 2003 GROUNDWATER TRCLE DATA
CROSS SECTION C'-C"
TWIN CITIES ARMY AMMUNITION PLANT
Arden Hill, Minnesota

31783-43(004)GN-SP002 JUN 01/2004

TRCLE vs. TIME
TGRS INFLUENT



TRCLE vs. TIME
TGRS EFFLUENT



NOTE: SAMPLES REPORTING CONCENTRATIONS LESS THAN THE DETECTION LIMIT WERE PLOTTED AS HALF THE DETECTION LIMIT. WHEN DUPLICATE SAMPLES WERE COLLECTED, THE HIGHER CONCENTRATION WAS PLOTTED.

figure 9–10

TGRS TREATMENT SYSTEM PERFORMANCE
Twin Cities Army Ammunition Plant

CRA

10.0 Operable Unit 3: Deep Groundwater

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 during FY 2003.

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. In 1997 the PGRS influent dropped to below the ROD required limits for all VOCs. In December 1999, under an agreement with the Agencies, the PGRS pumping rate was reduced from a nominal rate of 1000 gpm to 400 gpm to help determine if the reductions in concentration were the result of actual plume decreases or the result of dilution from over pumping. In conjunction with the flow rate decrease, a quarterly monitoring program was undertaken to monitor for potential "rebound" in VOC concentrations. As of the end of FY 2000, no rebound was observed and a review of the historical database for all of OU3 and the associated source area in OU2 revealed that the entire south plume had dramatically decreased in size and concentration since the early 1990s. The concentration decreases were such that the leading edge of the south plume, at the PGRS, dropped below the ROD requirements.

The results of this evaluation were presented to the Agencies on September 6, 2000, and a report titled "Plume History Evaluation, Operable Unit 3", CRA, was submitted to the Agencies on October 10, 2000. The report documents the history of plume size and concentration reductions throughout OU3. Based on the dramatic reductions in plume size and concentration, the report recommended shutting down the PGRS. The Agencies subsequently accepted the recommendation. The City of New Brighton stopped significant pumping in August 2001 and the PGRS was maintained in standby status. During the period May '03 through October '03, the PGRS was operated solely to satisfy peak water supply demands and then was placed back into standby status. The City has conducted an evaluation of its municipal system to, in part, determine the future use of the PGRS extraction well and treatment system. The City has decided the PGRS treatment system and well NBM #13 are not part of City's long term water supply plan.

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 began full-scale operation in May 1994. The flow rate was reduced to zero in August 2001 due to the reduction in plume size and concentration. The PGRS was operated from May '03 through October '03, solely to satisfy municipal peak water supply demand

requirements, and then placed back in standby mode. The system is being maintained in a "standby" condition in the event groundwater must be treated for contamination.

Is the PGRS containing the south plume?

The intent of this ROD requirement is being met. The monitoring data indicates that the south plume no longer extends as far as the PGRS at concentrations above the ROD requirements. Samples collected in FY 2003 from the extraction well and monitoring wells in the vicinity of the extraction well were below 1 μg/l, indicating that the southern edge of the South Plume was north of monitoring well 04U863. Table 10-1 presents a summary of the monitoring well sample analyses.

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 City of New Brighton operated the PGRS on an intermittent schedule during from May '03 through October '03 solely to satisfy peak water supply demand requirements. The PGRS was then returned to standby status. This pumping was performed for municipal water supply purposes only; not for the purpose of groundwater remediation.

Is treatment meeting the requirements of the OU3 ROD?

Yes. The influent and effluent water was sampled by the City of New Brighton after returning the system to operational status and on a monthly basis during the months the system was in operation. This data is provided in Appendix H.1.

The FY 2003 influent and effluent trichloroethene concentrations were <1.0 ug/L (below detection limits for all sampling events). Figure 10-2 presents a summary of the influent and effluent trichloroethene concentrations versus time.

How much VOC mass did the system remove?

The PGRS extracted 32,579,000 gallons of water during FY 2003. Of this volume, 32,546,000 gallons were treated for water supply use and 33,000 gallons were sewered as part of the sampling process. A new batch of GAC was installed by the City of New Brighton during the FY 2003.

Since all monthly influent VOC concentrations from NBM#13 were non-detect the PGRS removed a negligible amount of mass of VOC's from May 2003 through September 2003. A summary of the monthly pumping volumes and VOC removal is shown in Table 10-2. The total mass removed by the PGRS since start up is 132.0 pounds.

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

Description: "Discharge of treated groundwater 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. Although the PGRS is no longer operated for environmental remediation purposes, the City did operate the system during FY 2003 to meet peak water supply demands. The City placed the system back into standby status in October 2003.

10.4 REMEDY COMPONENT #4: GROUNDWATER MONITORING

Description: "Monitoring of the groundwater 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 A summarizes the FY 2003 monitoring plan and any deviations are explained in Appendix C.2. Monitoring was as follows:

<u>Groundwater</u>

Groundwater samples were collected from seven wells, including the extraction well, in the vicinity of the PGRS (south of Interstate 694) during the months of December 2002, March 2003, and September 2003. The seven sentinel wells are : O4U863, O4U864, O4U865, O4U866, O4J864, O4J866, and 520931 (NBM #13). Monitoring well 04U863 was not part of the monitoring network but was voluntarily added to the quarterly monitoring program beginning in March 2002. These wells provide a sentry-monitoring network near the extraction well to monitor for any potential rebound in concentrations. A larger list of wells, which included the seven sentinel wells, was sampled in June 2003 as part of the OU1, OU2 and OU3 comprehensive sampling round. All samples were analyzed for VOCs using SW846 8260. Monitoring wells used for sampling for the

PGRS are shown on Figure 10-1. The specific role of each well is provided in Appendix A. Water elevations were gathered during monitoring events and Appendix H.2 presents the water level database. Table 10-1 presents a summary of the analytical results. Trichloroethene was detected below the contract detection limit of 1 ug/L in two of the seven sentinel wells, which is down from FY 2002, in which four sentinel wells had detections below the contract detection limit of 1 ug/L. These concentrations are consistent with expected residual levels in this area.

Treatment System

Samples were collected by the City of New Brighton from the treatment system after returning the system to operational status and on a monthly basis during the months the system was in operation. This data is provided in Appendix H.1.

Is additional monitoring proposed prior to the next report?

Yes. The existing OU3 monitoring requirements are presented in Table 10-3. For FY 2003 through FY 2007, quarterly monitoring well sampling and water level measurements are planned. Appendix A presents the FY 2003 – FY 2007 monitoring plan. This monitoring plan is subject to change pending the results and recommendations of a plume stability study and a proposed ROD amendment that would remove groundwater extraction as a component of the OU3 remedy. These activities are anticipated to be completed by the first quarter of FY 2005.

10.5 OVERALL REMEDY FOR OU3

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

The PGRS extraction well was shut down in FY 2001. In FY 2003 there were no wells exhibiting VOC concentrations above the ROD requirements in the vicinity of the PGRS. All detection limits were below the requirements of the ROD.

Are any changes or additional actions required for OU3?

Yes. An amendment to the ROD is anticipated to document permanent shutdown of NBM #13 for remediation purposes. Monitoring will continue, to confirm that the plume remains below ROD standards.

TABLE 10-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well	Date	Trichloroethylene TRCLE	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Carbon Tetrachloride CCL4	Methylene Chloride CH2CL2	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	1,1,2-Trichlorotrifluoroethane TCLTFE	1,2-Dichloroethane 12DCLE
PGRS Cleanup Level (1)		5	200	3	6	70	70	--			--	--	--		--
03L673	6/10/2003	6.3	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
03U673	6/10/2003	0.59 JP	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U673	6/10/2003	15	<1	<1	<1	<1	1.1	<1			<1	<1	<1		<1
04U832	6/11/2003	4.1	<1	<1	<1	0.71 JP	0.36 JP	<1			<1	<1	<1		<1
04U845	6/9/2003	4	<1	<1	<1	<1	2.3	<1			<1	<1	<1		<1
03M848	6/9/2003	450	<1	<1	2.4	<1	23	<1			<1	0.50 JP	0.55 JP	[illegible]	<1
03L848	6/11/2003	3.8	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U848	6/11/2003	0.46 JP	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U851	6/11/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U851 D	6/11/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U852	6/11/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
03L854	6/9/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U859	6/11/2003	4.4	<1	<1	0.45 JP	1.2	<1	<1			<1	<1	<1		<1
04U860	6/9/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
03L861	6/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
03L861 D	6/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U861	6/10/2003	48	<1	<1	0.77 JP	<1	13	<1			<1	<1	<1		<1

TABLE 10-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well	Date	Trichloroethylene TRCLE	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Carbon Tetrachloride CCL4	Methylene Chloride CH2CL2	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	1,1,2-Trichlorotrifluoroethane TCLTFE	1,2-Dichloroethane 12DCLE
PGRS Cleanup Level (1)		5	200	3	6	70	70	--			--	--	--		--
04U863	12/3/2002	0.12 JP	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04U863	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	0.16 JP,UB.2	<1	<1	<1	<1	<1
04U863	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U863	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U864	12/4/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04U864D	12/4/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04U864	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.2	<1	<1	<1	<1	<1
04U864	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U864	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04J864	12/4/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04J864	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.2	<1	<1	<1	<1	<1
04J864	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04J864	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U865	12/3/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04U865	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	0.18 JP,UB.2	<1	<1	<1	<1	<1
04U865	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		2.0
04U865 D	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U865	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04J866	12/3/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04J866	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	0.26 JP,UB.2	<1	<1	<1	<1	<1
04J866D	3/3/2003	<1	0.28 JP	<1	<1	<1	<1	<1	<1	0.34 JP,UB.2	<1	<1	<1	<1	<1
04J866	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04J866	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
04U866	12/3/2002	0.40 JP	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1
04U866D	12/3/2002	0.47 JP	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	<1	<1	<1	<1	<1
04U866	3/3/2003	0.23 JP	<1	<1	<1	<1	<1	<1	<1	0.36 JP,UB.2	<1	<1	<1	<1	<1
04U866	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1

TABLE 10-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well	Date	Trichloroethylene TRCLE	1,1,1-Trichloroethane 111TCE	1,1,2-Trichloroethane 112TCE	1,1-Dichloroethylene 11DCE	1,1-Dichloroethane 11DCLE	cis-1,2-Dichloroethylene C12DCE	Vinyl chloride C2H3CL	Carbon Tetrachloride CCL4	Methylene Chloride CH2CL2	Chloroform CHCL3	trans-1,2-Dichloroethylene T12DCE	Tetrachloroethylene TCLEE	1,1,2-Trichlorotrifluoroethane TCLTFE	1,2-Dichloroethane 12DCLE
PGRS Cleanup Level (1)		5	200	3	6	70	70	--			--	--	--		--
04U866	9/10/2003	0.22 J	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
520931 (NBM #13)	12/3/2002	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.28	0.091 JP	<1	<1	<1	<1
520931 (NBM #13)	3/3/2003	<1	<1	<1	<1	<1	<1	<1	<1	<1 UB.2	<1	<1	<1	<1	<1
520931 (NBM #13)	6/3/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1
520931 (NBM #13)	9/10/2003	<1	<1	<1	<1	<1	<1	<1			<1	<1	<1		<2
476837 (MW15H)	6/11/2003	0.39 JP	<1	<1	<1	<1	<1	<1			<1	<1	<1		<1

Notes:
- Indicates a detection.
D - Duplicate analysis.
J - Value Estimated.
P - Results less than reporting level but greater than instrument detection limit.
(1) Clean up level from OU3 ROD.
UB.28 - Non-detect, method blank yielded concentration of compound.
UB.2 - Field blank yielded concentration 0.2 ug/L of compound..
1U - Non-detect, trip blank yielded concentrations of compound.

TABLE 10-2

SUMMARY OF MONTHLY VOC REMOVAL
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

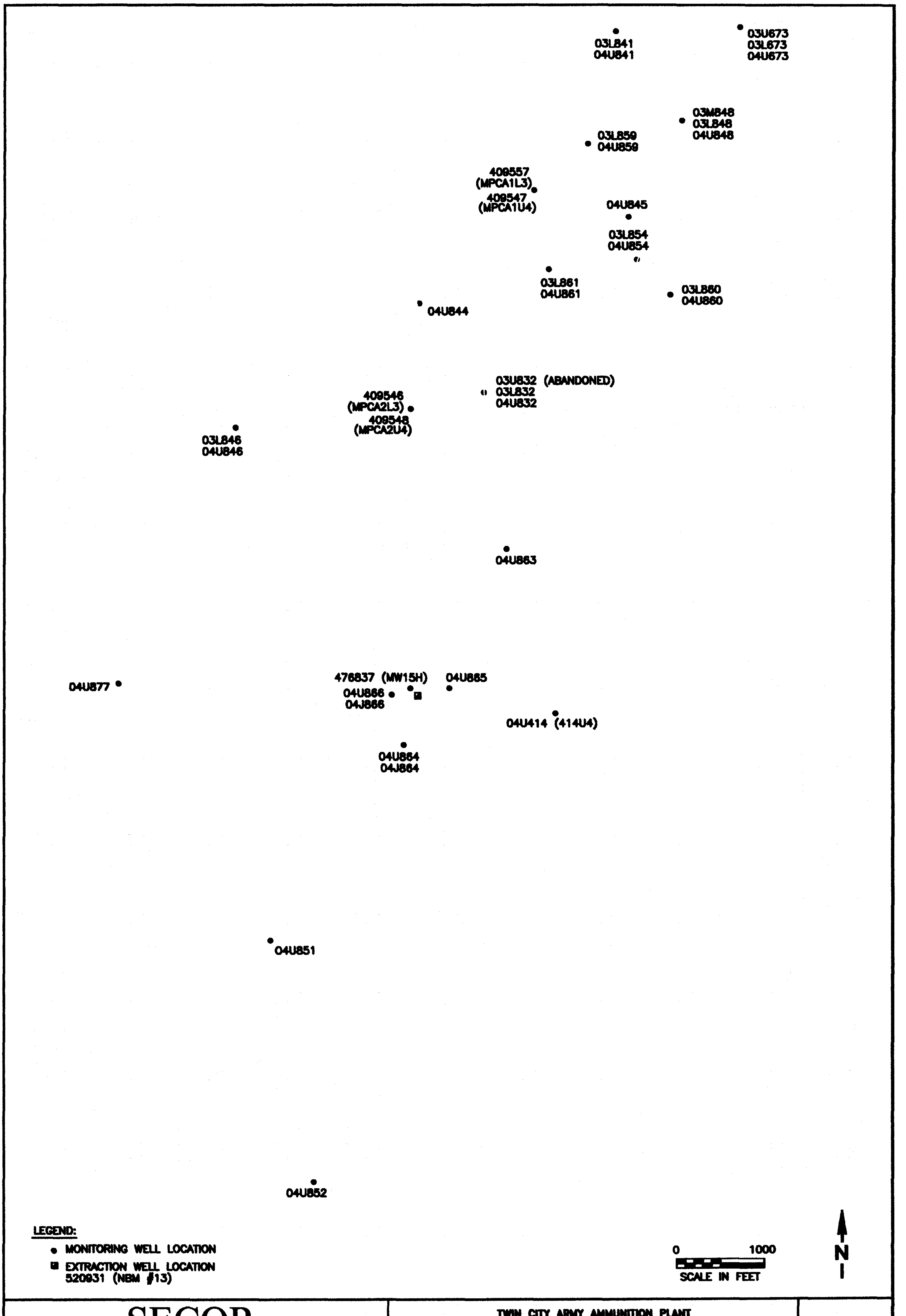
Month	Total Monthly Flow[1] (million gallons)	Total VOC Influent[2] Concentration	Total VOC Effluent Concentration	Total VOCs in Treatment Center Discharge (gm)	Total VOC Mass Removed (gm)	Total VOC Mass Removed (lb)
Cumulative As Of September 2002 (FY02)						132.0
October	0.00000	0.0	0	0.00	0.00	0.00
November	0.00000	0.0	0	0.00	0.00	0.00
December	0.01300	0.0	0	0.00	0.00	0.00
January	0.00000	0.0	0	0.00	0.00	0.00
February	0.00000	0.0	0	0.00	0.00	0.00
March	0.02000	0.0	0	0.00	0.00	0.00
April	0.00000	0.0	0	0.00	0.00	0.00
May	0.37300	0.0	0	0.00	0.00	0.00
June	2.80000	0.0	0	0.00	0.00	0.00
July	4.29900	0.0	0	0.00	0.00	0.00
August	17.54700	0.0	0	0.00	0.00	0.00
September	7.52700	0.0	0	0.00	0.00	0.00
Totals - FY03	32.57900			0.0	0.0	0.0
Cumulative To Date						132.0

Notes:
[1] Data collected by City of New Brighton.
[2] Data collected by City of New Brighton and SECOR.
Calculations based on compounds with concentrations above the CRDL only.

TABLE 10-3

SUMMARY OF GROUNDWATER MONITORING REQUIREMENTS
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

	Remedy Component		Monitoring Requirements	Implementing Party	Documents Containing the Monitoring Plan
#1	Groundwater Extraction	a.	Water levels for use in drawing contour maps demonstrating capture (currently not applicable).	Alliant	OU3 Monitoring Plan in Annual Report
		b.	Pumping rates and volumes for reporting (currently not applicable).	Alliant	OU3 Monitoring Plan in Annual Report
#2	Groundwater Treatment	a.	Influent/effluent monitoring to verify compliance and calculate mass removal (currently not applicable).	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 (currently not applicable).	New Brighton	New Brighton's Monitoring Plan
#4	Groundwater Monitoring	a.	Groundwater sampling to track progress of clean-up.	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



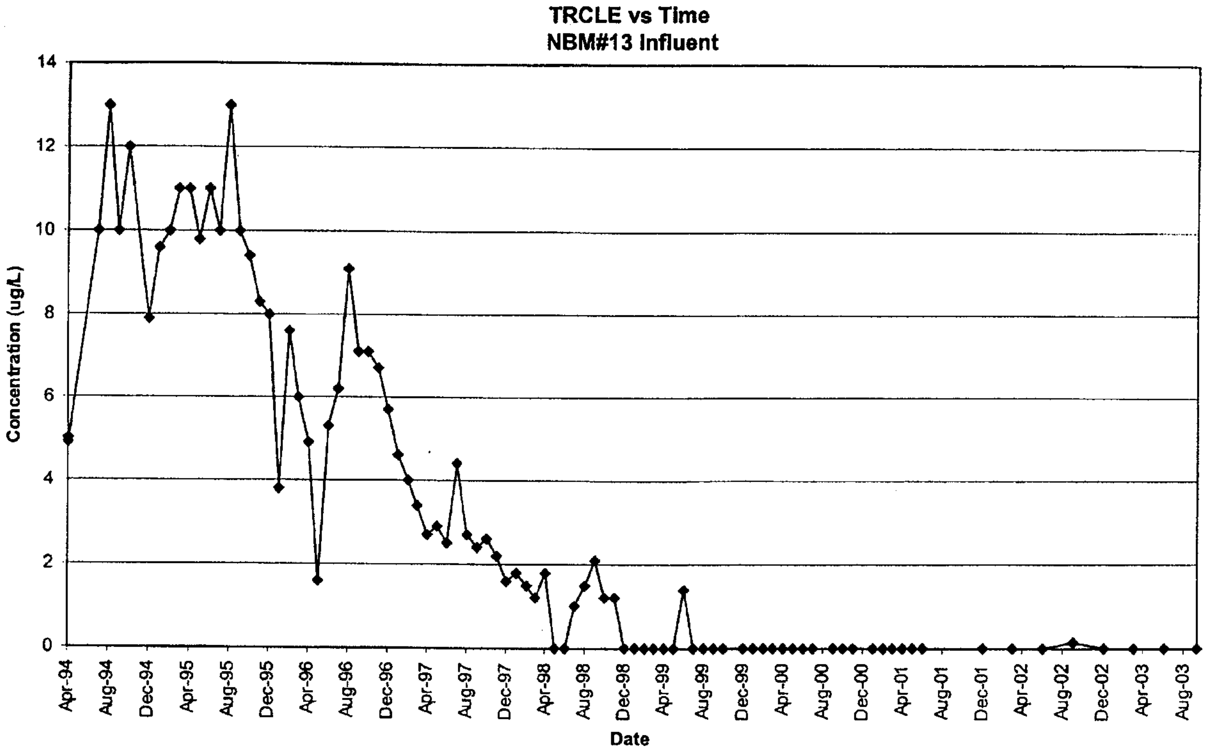
SECOR
INTERNATIONAL INCORPORATED
4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 55110

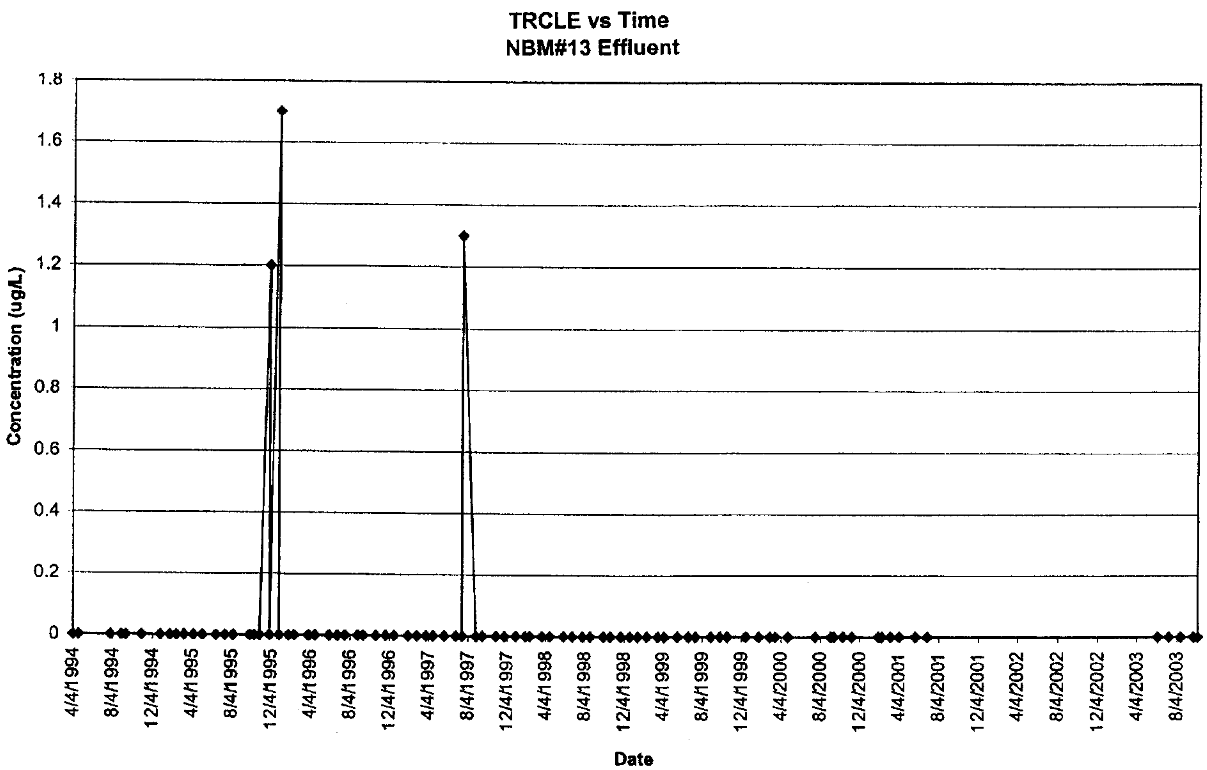
TWIN CITY ARMY AMMUNITION PLANT
ARDEN HILLS, MINNESOTA

OU3 (PGRS) SITE PLAN

SECOR PROJECT #: 030T.18508.00.0262 | FILENAME: SITE-03 | DATE: 12/31/03

FIGURE
10-1





SECOR *INTERNATIONAL INCORPORATED* *4463 WHITE BEAR PARKWAY, SUITE 106* *WHITE BEAR LAKE, MINNESOTA 55110*	TWIN CITIES ARMY AMMUNITION PLANT ARDEN HILLS, MINNESOTA OU3 (PGRS) TRCLE VS. TIME SECOR PROJECT #: 003.18508.00.0262 | FILENAME: SITE-13 | DATE: 12/31/03	FIGURE 10-2

11.0 Land Use Controls

Has a Land Use Control Implementation Plan (LUCIP) been prepared to address land use control (LUC) issues and is it being implemented?

The Army prepared a LUCIP for TCAAP, dated February 2003. During FY 2003, the LUCIP was implemented by the Army, the National Guard, and Alliant. Although the LUCIP is already being implemented, it was under review by the MPCA and USEPA at the end of FY 2003 (comment resolution was still in progress). The LUCIP is not receiving consistency review at this time due to a national-level debate between the USEPA and DOD regarding LUC enforcement authority. The Army has agreed to address the O&M-related regulatory comments on the LUCIP, but will not address other LUCIP comments where resolution of such comments could be affected by resolution of the national-level debate. It is expected that these issues will be resolved in FY 2004.

Was the annual site inspection for land use controls conducted in FY 2003, as specified in the LUCIP?

On July 30, 2003, the Army, the National Guard, and TWISS conducted the annual inspection of TCAAP sites. The checklist that was completed during the inspection is included as Appendix J.

Were any items requiring additional actions identified in the annual site inspection?

Other than completing cover construction at Site C, Site G (which was to include removing woody vegetation from the cover), and the Outdoor Firing Range, the only item requiring additional action was that signs marking the edges of the soil covers had not yet been installed. The Army anticipates installation of these signs in early FY 2004.

12.0 Other Installation Restoration Activities During FY 2003

Appendix I briefly summarizes the status of other activities at TCAAP that are related to the Installation Restoration Program, but are not required in the RODs for OU1 through OU3.

13.0 References

Argonne National Laboratory, 1991. "Installation Restoration Program: Remedial Investigation Report for the Twin Cities Army Ammunition Plant." Final Report, April 1991.

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Conestoga-Rovers & Associates, 1986. "Groundwater Remediation Program Plan (GRPP)." June 1986.

Conestoga-Rovers & Associates, 1987. "BGRS Extraction Well Pumping Test." April 1987.

Conestoga-Rovers & Associates, 1988. "IRA-BGRS Performance Assessment Report." August 1988.

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Conestoga-Rovers & Associates, 1999. "Predesign Investigation Work Plan, Site K." February 1999.

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"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, 1996. "Remedial Design/Remedial Action, Quality Assurance Project Plan." September 1996.

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

Montgomery Watson, 1999. "Final Alternate Water Supply Construction Report for Period 1997 through 1998". March 1999 (updated April 17, 2000 and August 2, 2000).

"Record of Decision (ROD) for Gradient Control System for TCAAP." September 1987.

"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.

Tecumseh/Wenck Installation Support Services, 2003. "Land Use Control Implementation Plan". February 2003.

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

APPENDIX A.1
FY 2003 – FY 2007 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.
(B) Indicates that the monitoring is the responsibility of the Army.
(1) "L (A or B)" denotes a water level measurement by the appropriate party.
(2) "Q (A or B)" denotes a water quality sampling by the appropriate party. The required analyte list for each specific site is shown in Appendix A.4.
(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
  - 2.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 if in production at time of sample collection.
(5) Sample semiannually through FY 2003 as an extraction well. Beginning in FY 2004, sample biennially because it is no longer pumped.
(6) Quarterly water levels and water quality (December, March, June, and September).
(7) Sample annually for five years (FY 2003 through FY 2007) to verify that there have been no adverse impacts to groundwater due to shallow soil remediation work.
(8) Of the two wells, well 01U639 will be the primary sampling location and 482089 (I04MW) will be the alternate sampling location. If it is not possible to collect a groundwater sample from 01U639, then an attempt will be made to collect a sample from 482089 (I04MW).

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Operable Unit 1											
03U	03U811			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
03U	03U821			Q,L(B)	---	**Q,L(B)**	---	**Q,L(B)**	OR	3.b	
03U	03U822			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03U	03U831			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03U	409550	PCA 6U3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
03U	409596	BS118U3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
03M	03M843			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03L	03L811			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
03L	03L822			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
03L	03L841			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03L	03L846			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03L	03L853			Q,L(B)	---	**---**	---	**---**	OR	None	
03L	409556	PCA4L3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03L	409557	PCA1L3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	None	
03L	409597	BS118L3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
PC	04U821			Q,L(B)	---	**Q,L(B)**	---	**Q,L(B)**	OR	3.b	
PC	04U834			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
PC	04U836	MW-1		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U837	MW-3		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U838	MW-5		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U839	MW-7		Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U841			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U843			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	3.b	
PC	04U844			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U846			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U847			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U849			Q,L(B)	---	**Q,L(B)**	---	**Q,L(B)**	OR	3.b	
PC	04U850			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
PC	04U855			Q,L(B)	---	Q,L(B)	---	Q,L(B)	1.a, OR	3.b	

Note: Changes from the monitoring plan presented in the previous Annual Performance Report are shown in bold (red color) in this appendix.

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
PC	04U871			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	
PC	04U872			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	
PC	04U875			Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	3.b	
PC	04U877			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	
PC	04U879			Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	3.b	
PC	04U880			Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	3.b	
PC	04U881			Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	None	
PC	04U882			Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	None	
PC	04U883			Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	None	
PC	191942	BS118U4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
PC	200154	UM Golf Course		Q(B)	—	Q(B)	—	Q(B)	1.a, OR	—	
PC	200814	American Linen		—	—	—	—	—	—	—	
PC	206688	Cloverpond		Q(B)	Q(B)	Q(B)	—	Q(B)	1.a, OR	—	
PC	234547	Hnywell Ridgway		—	—	—	—	—	—	—	
PC	409547	PCA1U4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
PC	409548	PCA2U4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
PC	409549	PCA3U4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
PC	409555	PCA5U4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	1.a, OR	3.b	
PC	512761	Gross Golf Course #2		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
PC	554216	New Brighton #14									See Appendix A.2
PC	582628	New Brighton #15									See Appendix A.2
J	04J822			—	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	Sample in June & Aug 2004
J	04J834			Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	None	
J	04J835			—	—	—	—	—	—	—	
J	04J836	MW-2		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
J	04J837	MW-4		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
J	04J838	MW-6		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
J	04J839	MW-8		Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	3.b	
J	04J847			—	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	Sample in June & Aug 2004
J	04J849			—	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	3.b	Sample in June & Aug 2004
J	04J882			Q,L(B)	—	Q,L(B)	—	Q,L(B)	OR	None	
J	200524	St. Anthony #5	(4)	Q(B)	—	Q(B)	—	Q(B)	OR	—	Army gets St. Anthony Data
J	200803	St. Anthony #4	(4)	Q(B)	—	Q(B)	—	Q(B)	OR	—	Army gets St. Anthony Data

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
J	206796	New Brighton #5									See Appendix A.2
J	206797	New Brighton #6									See Appendix A.2
PC/J	200804	St. Anthony #3	(4)	Q(B)	---	Q(B)	---	Q(B)	OR	---	Army gets St. Anthony Data
PC/J	200812	Gross Golf #1		---	---	---	---	---	---	---	
PC/J	206792	New Brighton #4									See Appendix A.2
PC/J	206793	New Brighton #3									See Appendix A.2
PC/J	233221	R&D Systems, N. Well		---	---	---	---	---	---	---	
PC/J	234549	Reiner		Q(B)	---	Q(B)	---	Q(B)	1.a, OR	---	
PC/J	PJ#318			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
UNK	234546	Hnywell Ridgway		Q(B)	---	Q(B)	---	Q(B)	OR	---	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments

Operable Unit 2

Site A Removal Action

Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
01U	01U038			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U039			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U040			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U041			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U063			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U067			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U102			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U103			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U104			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U105			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U106			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U107			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U108			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U110			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U115			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U116			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U117			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U118			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U119		(7)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	(Note 7)	2.b	See Page 2 of Appendix A.4
01U	01U120			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U125			---	---	---	---	---	OR	2.b	
01U	01U126			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U127			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U133			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U135			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U136			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U137			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	

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FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
01U	01U138			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U139			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U140			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U141			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U145	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U146	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U147	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U148	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U149	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U150	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U151	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U152	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U153	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U154	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U155	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U156	Piezometer		L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
01U	01U157			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U158			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U350			---	---	---	---	---	---	---	
01U	01U351	EW-1									See Appendix A.2
01U	01U352	EW-2									See Appendix A.2
01U	01U353	EW-3									See Appendix A.2
01U	01U354	EW-4									See Appendix A.2
01U	01U355	EW-5		---	---	---	---	---	---	---	
01U	01U356	EW-6		---	---	---	---	---	---	---	
01U	01U357	EW-7		---	---	---	---	---	---	---	
01U	01U358	EW-8		---	---	---	---	---	---	---	
01U	01U901			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U902			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U903			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U904			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	

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FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Site I Remedial Action											
01U	01U064			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U632			Q,L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	One-time WQ event in 2004
01U	01U636			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U639		(8)	L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U640			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U666			Q,L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	One-time WQ event in 2004
01U	01U667			Q,L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	One-time WQ event in 2004
01U	01U668			Q,L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	One-time WQ event in 2004
01U	482086	I01MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482087	I05MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482088	I02MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482089	I04MW	(8)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482090	I03MW		L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Site K Remedial Action											
01U	01U047			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U048			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U052			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U065			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U128			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U601			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U602			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U603			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U604			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U605			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U607			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U608			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U609			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U611			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U612			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U613			Q,L(A)	L(A)	L(A)	L(A)	L(A)	OR	3.a	
01U	01U615			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U616			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U617			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U618			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U619			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U620			Q,L(A)	L(A)	L(A)	L(A)	L(A)	OR	3.a	
01U	01U621			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U624			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U625			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U626			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U627			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	01U628			L(A)	L(A)	L(A)	L(A)	L(A)	---	3.a	
01U	482083	K04-MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	

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Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
01U	482084	K02-MW		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)	---	3.a	
03U	03U621			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	

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FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
TCAAP Groundwater Recovery System											
03F	03F302	B1									See Appendix A.2
03F	03F303	B2		See App. A.2	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03F	03F304	B3									See Appendix A.2
03F	03F305	B4									See Appendix A.2
03F	03F306	B5									See Appendix A.2
03F	03F307	B6									See Appendix A.2
03F	03F308	B7	(5)	See App. A.2	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	1.a	
03F	03F312	B11									See Appendix A.2
03F	03F319	B13									See Appendix A.2
03U	03U001			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U002			Q,L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U003			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U004			L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U005			L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U007			Q,L(A)	---	Q,L(A)	---	Q,L(A)	Background	1.a	
03U	03U008			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U009			Q,L(A)	---	Q,L(A)	---	Q,L(A)	Background	1.a	
03U	03U010			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U011			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U012			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U013			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U014			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U015			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U016			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U017			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U018			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U019			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U020			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	

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FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
03U	03U021			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U022			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U023			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U024			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U025			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U026			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U027			L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U028			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U029			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U030			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U031			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U032			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U075			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U076			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U077			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U078			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U079			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U082			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U083			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U084			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U087		(7)	Q(B),L(A)	Q(B)	Q(B),L(A)	Q(B)	Q(B),L(A)	(Note 7)	1.a	See Page 2 of Appendix A.4
03U	03U088			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U089		(7)	Q(B),L(A)	Q(B)	Q(B),L(A)	Q(B)	Q(B),L(A)	(Note 7)	1.a	See Page 2 of Appendix A.4
03U	03U090			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U092			L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U093		(7)	Q,L(A)	Q,L(A),Q(B)	Q,L(A),Q(B)	Q,L(A),Q(B)	Q,L(A),Q(B)	OR, (Note 7)	1.a	See Page 2 of Appendix A.4
03U	03U094			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	03U096			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U097		(7)	Q(B)	Q(B)	Q(B)	Q(B)	Q(B)	(Note 7)	---	See Page 2 of Appendix A.4
03U	03U099			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	03U111			L(A)	---	L(A)	---	L(A)	---	1.a	

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FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
03U	03U112			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U113			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U114			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U121			---	---	---	---	---	---	---	
03U	03U129			---	---	---	---	---	---	---	
03U	03U301	SC1									See Appendix A.2
03U	03U314	SC2									See Appendix A.2
03U	03U315	SC3	(5)	See App. A.2	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U316	SC4	(5)	See App. A.2	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U317	SC5									See Appendix A.2
03U	03U521			---	---	---	---	---	---	---	
03U	03U647			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U648			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U658			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U659			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U671			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U672			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U674			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U675			---	---	---	---	---	---	---	
03U	03U676			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U701			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U702			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U703			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U704			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U705			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U706			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U707			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U708			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	03U709			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U710			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U711			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
03U	03U715			L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03U	03U716			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U801			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	03U803			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U804			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U805			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	519288	E101-MW		---	L(A)	---	---	---	---	---	One-time event
03U	519289	E102-MW		---	L(A)	---	---	---	---	---	One-time event
03U	519290	E103-MW		---	L(A)	---	---	---	---	---	One-time event
03M	03M001			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M002			Q,L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03M	03M003			Q,L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M004			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M005			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M007			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M010			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M012			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M013			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M017			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M020			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03M	03M713			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M802			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03M	03M806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03L	03L001			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L002			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L003			Q,L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L004			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L005			L(A)	---	L(A)	---	L(A)	---	1.a	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
03L	03L007			Q,L(A)	---	Q,L(A)	---	Q,L(A)	Background	1.a	
03L	03L010			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L012			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L013			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L014			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L017			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L018			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L020			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L021			Q,L(A)	---	L(A)	---	Q,L(A)	OR	1.a	
03L	03L027			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L028			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L029			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L077			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L078			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L079			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L080			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L081			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L084			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L113			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L802			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03L	03L806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03L	03L809			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L833			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U001			L(A)	---	L(A)	---	L(A)	---	1.a	
PC	04U002			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U003			Q,L(A)	---	L(A)	---	L(A)	---	1.a	
PC	04U007			Q,L(A)	---	Q,L(A)	---	Q,L(A)	Background	1.a	
PC	04U012			L(A)	---	L(A)	---	L(A)	---	1.a	
PC	04U020			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U027			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
PC	04U077			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U510			Q,L(A)	---	Q,L(A)	---	Q,L(A)	Background	1.a	
PC	04U701			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U702			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U708			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U709			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U711			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U713			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U714			L(A)	---	L(A)	---	L(A)	---	1.a	
PC	04U802			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U833			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
J	04J077			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
J	04J702			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
J	04J708			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
J	04J713			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
J	04J714			L(A)	---	L(A)	---	L(A)	---	1.a	
PC/J	PJ#003			Q,L(A)	---	L(A)	---	L(A)	---	1.a	
PC/J	PJ#027			L(A)	---	L(A)	---	L(A)	---	1.a	
PC/J	PJ#309	B8									See Appendix A.2
PC/J	PJ#310	B9									See Appendix A.2
PC/J	PJ#311	B10		See App. A.2	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	1.a	
PC/J	PJ#313	B12	(5)	See App. A.2	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC/J	PJ#802			Q,L(A)	---	L(A)	---	L(A)	---	1.a	
PC/J	PJ#806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
---	Staff Gauges			L(A)	---	L(A)	---	L(A)	---	---	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Unit 1 Wells											
01U	01U035			---	---	---	---	---	---	---	
01U	01U043			---	---	---	---	---	---	---	
01U	01U044			---	---	---	---	---	---	---	
01U	01U045			---	---	---	---	---	---	---	
01U	01U046			---	---	---	---	---	---	---	
01U	01U060		(7)	Q(B)	Q(B)	Q(B)	Q(B)	Q(B)	(Note 7)	---	See Page 2 of Appendix A.4
01U	01U072			---	---	---	---	---	---	---	
01U	01U085			---	---	---	---	---	---	---	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Operable Unit 3											
03U	03U673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03M	03M848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L832			---	---	---	---	---	---	---	
03L	03L848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L854			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L859			L(A)	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L860			L(A)	---	L(A)	---	L(A)	---	1.a	
03L	03L861			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	476837	MW15H		Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U414	414U4		---	---	---	---	---	---	---	
PC	04U673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U832			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U845			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U851			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U852			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U854			L(A)	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U859			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U860			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U861			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
PC	04U863	323U4	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U864	324U4	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U865	325U4	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	04U866	326U4	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
PC	520931	NBM #13									See Appendix A.2

T:\1038\12\FY03 APR\APR Appendices\App A-1-revised (May 04)

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
J	04J864	324 J	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
J	04J866	326 J	(6)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Other Installation Restoration Activities											
TCAAP Well Inventory											
(Entries under "Notes" refer to the well inventory category)											
---	234356	Nordquist, Bob	1a	---	---	Q(B)	---	---	Well Inventory	---	1873 Old Hwy 8
---	249608	Rapit Printing, Inc	1a	---	---	Q(B)	---	---	Well Inventory	---	2520 Larpenteur Ave
---	433298	Town & Cntry Golf Crse	1a	---	---	Q(B)	---	---	Well Inventory	---	2279 Marshall Ave
---	509052	Shriners Hospital	1a	---	---	Q(B)	---	---	Well Inventory	---	2025 E River Rd
---	S00311	Inglebrech, Brenda	1a	---	---	Q(B)	---	---	Well Inventory	---	1390 Silver Lake Rd
---	S00444	Mnpls Parks & Rec Dept	1a	---	---	Q(B)	---	---	Well Inventory	---	Ontario & E River Rd
---	200173	KSTP Radio TV	1b	---	---	Q(B)	---	---	Well Inventory	---	3415 University Ave
---	234355	Kingdom Hall	1b	---	---	Q(B)	---	---	Well Inventory	---	1987 Mound St
---	234421	BioChem	1b	---	---	Q(B)	---	---	Well Inventory	---	2151 Mustang Dr
---	234469	Palwski, T.	1b	---	---	Q(B)	---	---	Well Inventory	---	2816 Hwy 88
---	234544	R&D Systems	1b	---	---	Q(B)	---	---	Well Inventory	---	2201 Kennedy St NE
---	249632	Montzka, Harold	1b	---	---	Q(B)	---	---	Well Inventory	---	2301 N Upland Crest NE
---	537801	Midwest Industrial	1b	---	---	Q(B)	---	---	Well Inventory	---	4759 Old Hwy 8
---	200180	Town & Cntry Golf Crse	1c	---	---	Q(B)	---	---	Well Inventory	---	2279 Marshal Ave
---	200522	Pemtom	1c	---	---	Q(B)	---	---	Well Inventory	---	Silver Lake Rd
---	200523	Pemtom	1c	---	---	Q(B)	---	---	Well Inventory	---	Silver Lake Rd & Co Rd E
---	756236	Pechiney Plastic Pckging	1c	---	---	Q(B)	---	---	Well Inventory	---	150 26th Ave SE
---	S00437	Northern Star Co.	1c	---	---	Q(B)	---	---	Well Inventory	---	3171 5th St SE
---	107405	Anderson, Paul	2a	---	---	Q(B)	---	---	Well Inventory	---	4355 Hwy 10
---	249007	Walton, Reggie	2a	---	---	Q(B)	---	---	Well Inventory	---	4453 Hwy 10
---	249113	Wyttenbach, Daniel	2a	---	---	Q(B)	---	---	Well Inventory	---	990 11th Ave NW
---	127537	Midwest Asphalt	2b	---	---	Q(B)	---	---	Well Inventory	---	1400 Old Hwy 8
---	200176	Waldorf Paper Products	2b	---	---	Q(B)	---	---	Well Inventory	---	2236 Myrtle Ave
---	234571	Leiser, Mark	2b	---	---	Q(B)	---	---	Well Inventory	---	1901 17th St NW
---	S00002	Midland Hills Cntry Club	2b	---	---	Q(B)	---	---	Well Inventory	---	2001 N Fulham St
---	200076	Old Dutch Foods, Inc.	2c	---	---	Q(B)	---	---	Well Inventory	---	2375 Terminal Rd

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
---	236029	R&D Systems, S. Well	2c	---	---	Q(B)	---	---	Well Inventory	---	2201 Kennedy St NE
---	236439	Waldorf Paper Products	2c	---	---	Q(B)	---	---	Well Inventory	---	2250 Wabash Ave
---	234474	Hodson, Randy	4a	---	Q(B)	Q(B)	---	---	Well Inventory	---	2601 Silver Lane NE
---	249150	Coldor, Lisa	4a	---	---	Q(B)	---	---	Well Inventory	---	3511 Stinson Blvd NE
---	249185	Novotny, Mark	4a	---	---	Q(B)	---	---	Well Inventory	---	1706 Malvern St
---	249191	Wells, Henry	4a	---	---	Q(B)	---	---	Well Inventory	---	1651 Millwood Ave
---	S00294	Western Remodelers	4a	---	---	Q(B)	---	---	Well Inventory	---	2520 W Larpenteur Ave
---	S00295	Alfson, Loren	4a	---	---	Q(B)	---	---	Well Inventory	---	2351 Summer St
---	S00409	Ohara, Rose	4a	---	---	Q(B)	---	---	Well Inventory	---	3553 Stinson Blvd NE
---	S00608	Grundtner, James	4a	---	---	Q(B)	---	---	Well Inventory	---	136 Oakwood Dr
---	---	Beach, Larry	4a	---	---	Q(B)	---	---	Well Inventory	---	1615 Silver Lake Rd
---	---	City of New Brighton	4a	---	---	Q(B)	---	---	Well Inventory	---	19 14th St NW
---	---	Burton, Jason	4a	---	---	Q(B)	---	---	Well Inventory	---	2073 Tenth St NW
---	---	Lube-Tech	4a	---	---	Q(B)	---	---	Well Inventory	---	2420 Co Rd C West
---	---	Tabalka, Dorothy	4a	---	---	Q(B)	---	---	Well Inventory	---	2512 27th Ave NE
---	---	Willig, Allan	4a	---	---	Q(B)	---	---	Well Inventory	---	2600 Pahl Ave
---	---	Weisenberger, Heidi	4a	---	---	Q(B)	---	---	Well Inventory	---	2816 Silver Lake Rd
---	---	Hinton/Hermes	4a	---	---	Q(B)	---	---	Well Inventory	---	2935 Old Hwy 8

APPENDIX A.1

FY 2003 - FY 2007 MONITORING PLAN FOR GROUNDWATER MONITORING WELLS

Well Information									Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	June 03	June 04	June 05	June 06	June 07	Water Quality	Water Level	Comments
Grenade Range											
---	653903	GR1-1		Q(B)	Q(B)	---	---	---	OR	---	
---	653904	GR1-2		Q(B)	Q(B)	---	---	---	OR	---	
---	653905	GR2-1		Q(B)	Q(B)	---	---	---	OR	---	
---	675976	GR-DF1		Q(B)	Q(B)	---	---	---	OR	---	
CAMU Monitoring											
---	589650	CM1MW		Q(B)	---	---	---	---	OR	---	Sample in Sept 03 (not June)
---	616601	CM2MW		Q(B)	---	---	---	---	OR	---	Sample in Sept 03 (not June)
---	616602	CM3MW		Q(B)	---	---	---	---	OR	---	Sample in Sept 03 (not June)
---	624019	CM5MW		Q(B)	---	---	---	---	OR	---	Sample in Sept 03 (not June)

APPENDIX A.2
FY 2003 - FY 2007 MONITORING PLAN FOR REMEDIAL TREATMENT SYSTEMS

OU1: DEEP GROUNDWATER (1)

Location	Sampling Frequency	Parameters
• Extraction Wells NBM#4, #14, and #15	- Monthly	- Pumping Volumes
(and also NBM#3, #5, and #6)	- Monthly	- Water Quality (2)
• PGAC Effluent	- Monthly	- Water Quality (2)

OU2: SITE A SHALLOW GROUNDWATER

Location	Sampling Frequency	Parameters
• Extraction Wells (EW1 through EW4)	- Monthly	- Pumping Volumes
	- Annual	- Water Levels
	- Annual	- Water Quality (2)
• Extraction/Discharge System Effluent	- Monthly	- Trichloroethene; 1,1,1-Trichloroethane; 1,2-Dichloroethene (cis and trans); and Mercury (3)

OU2: SITE K REMEDIAL ACTION

Location	Sampling Frequency	Parameters
• Extracted Groundwater	- Monthly	- Pumping Volume
• Treatment System Effluent [Outfall 391 (010)]	- See Appendix A.3	- See Appendix A.3

OU2: TCAAP GROUNDWATER RECOVERY SYSTEM (TGRS)

Location	Sampling Frequency	Parameters
• Extraction Wells	- Monthly	- Pumping Volumes
	- Semi-Annually	- Water Levels
	- Semi-Annually	- Water Quality (2)
• Treatment System Influent	- Monthly	- Pumping Volumes
	- Monthly	- Water Quality (2)
• Treatment System Effluent	- Monthly	- Water Quality (2)

OU3: PLUME GROUNDWATER RECOVERY SYSTEM (PGRS) [Not Operating]

Location	Sampling Frequency	Parameters
• Extraction Well (NBM#13)	- Quarterly	- Water Quality (2)

Notes:

(1) Performed by the City of New Brighton using their Sampling and Analysis Plan.
(2) The required analyte list for each specific site is presented in Appendix A.4.
(3) Site A effluent sampling frequency and parameters are as required by the MCES Special Discharge Permit (#2194).

APPENDIX A.3
FY 2003 - FY 2007 MONITORING PLAN
FOR SURFACE WATER

Analysis	Analytical Method	Units	Site K Effluent (Outfall 010)	Rice Creek (Entering TCAAP) (20700)	Rice Creek (Leaving TCAAP) (20800)
Flow Rate	- -	M gal/day	Continuous	- -	- -
Total Flow	- -	M gal	M	- -	- -
pH	(field)	(pH)	Q	A	A
Cyanide	9012A	ug/l	Q	A	A
Copper	6020	ug/l	Q	A	A
Lead	6020	ug/l	Q	A	A
Mercury	7470A	ug/l	Q	A	A
Phosphorus (Total)	365.4	mg/l	Q	A	A
Silver	6020	ug/l	Q	- -	- -
Silver	7761	ug/l	- -	A	A
Zinc	6020	ug/l	Q	A	A
Trichloroethene	8260B	ug/l	Q	A	A
1,1-Dichloroethene	8260B	ug/l	Q	A	A
1,1-Dichloroethane	8260B	ug/l	Q	A	A
Cis-1,2-Dichloroethene	8260B	ug/l	Q	A	A
Trans-1,2-Dichloroethene	8260B	ug/l	Q	A	A
Vinyl Chloride	8260B	ug/l	Q	A	A
1,2-Dichloroethane	8260B	ug/l	Q	A	A

Notes:

M = Measurement required once per month
Q = Analysis required once per quarter
A = Analysis required once per year

APPENDIX A.4
SITE SPECIFIC LISTS OF REQUIRED ANALYTES

Note: Cleanup levels (in ug/l) from each Record of Decision are shown below for use in determining the required method detection limits. Also note that these lists represent the minimum list of analytes. A larger analyte list may be utilized by the monitoring organization, if so desired.

OU1 (DEEP GROUNDWATER) (1)

1,1-Dichloroethane	70
1,1-Dichloroethene	6
cis-1,2-Dichloroethene	70
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	3
Trichloroethene	5

SITE A (SHALLOW GROUNDWATER) (2)

Antimony*	6
1,1-Dichloroethene	6
1,2-Dichloroethane	4
Benzene	10
Chloroform	60
cis-1,2-Dichloroethene	70
Tetrachloroethene	7
Trichloroethene	30

*Antimony is only monitored at these wells: 01U103, 01U902 and 01U904.

SITE I (SHALLOW GROUNDWATER) (2)

1,2-Dichloroethene (cis and trans)	70
Trichloroethene	30
Vinyl Chloride	0.2

SITE K (SHALLOW GROUNDWATER) (2)

1,2-Dichloroethene (cis and trans)	70
Trichloroethene	30

OU2 (DEEP GROUNDWATER) (2)

1,1,1-Trichloroethane	200
1,1-Dichloroethane	70
1,1-Dichloroethene	6
1,2-Dichloroethane	4
cis-1,2-Dichloroethene	70
Tetrachloroethene	5
Trichloroethene	5

OU3 (DEEP GROUNDWATER) (3)

1,1-Dichloroethane	70
1,1-Dichloroethene	6
cis-1,2-Dichloroethene	70
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	3
Trichloroethene	5

Notes:

(1) From page 18 of the OU1 Record of Decision.

(2) From Table 1 of the OU2 Record of Decision.

(3) From Page 26 of the OU3 Record of Decision.

Analytical Methods:

VOCs: SW-846 Method 8260B

Antimony: SW-846 Method 6020

APPENDIX A.4 (cont'd)
SITE SPECIFIC LISTS OF REQUIRED ANALYTES

OTHER INSTALLATION RESTORATION ACTIVITIES

WELL INVENTORY SAMPLING

VOCs (report full VOC list)

OU2 SHALLOW SOIL SITE 5-YEAR GROUNDWATER MONITORING

01U119 (Site A)	Metals (antimony, barium, copper, lead)
03U093 (Site D)	Metals (antimony, lead), Explosives (nitroglycerine)
03U089 (Site E)	Metals (antimony, barium, copper, lead, manganese)
01U060 (Site H)	Metals (antimony, arsenic, copper, lead, manganese)
03U087 (Site 129-3)	Metals (antimony, lead, manganese), Explosives (nitroglycerine), VOCs (report full VOC list)
03U097 (Site 129-5)	Metals (antimony, barium, lead)

GRENADE RANGE

SVOCs (bis (2-ethylhexyl) phthalate)
PCBs (PCB-1016, 1221, 1232, 1242, 1248, 1254, 1260)
Metals (aluminum, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, nickel, silver, thallium, vanadium, zinc)
Radionuclides (gross alpha, gross beta, radium 226, radium 228)

CAMU MONITORING

Explosives (1,3,5-TNB)
VOCs (1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, cis-1,2-dichloroethene, 1,1,1-trichloroethane, benzene, chloroform, ethylbenzene, methylene chloride, trichloroethene, tetrachloroethene)
Metals (antimony, arsenic, barium, beryllium, cadmium, copper, lead, manganese, nickel, thallium, zinc)

Analytical Methods:
- VOCs: SW-846 Method 8260B
- Metals: SW-846 Method 6020
- Explosives (nitroglycerine): SW-846 Method 8332
- Explosives (1,3,5-TNB): SW-846 Method 8330
- SVOCs (bis (2-ethylhexyl) phthalate): SW-846 Method 8270C
- PCBs: SW-846 Method 8082
- Radionuclides (gross alpha/gross beta): EPA Method 900.0
- Radionuclides (radium 226/radium 228): EPA Method 9315/9320

APPENDIX B
DESCRIPTION OF HYDROGEOLOGIC UNITS/WELL NOMENCLATURE AND TRICHLOROETHENE TRENDS

On- and off-TCAAP wells have been installed in four hydrogeologic units beneath the site. These hydrogeologic units, as referred to in this report, are conceptually illustrated on Figure B-1 and 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 (referred to as the IRDMIS number). 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 <u>or</u> Jordan Formation
PJ	-	Unit 4: Prairie du Chien Group <u>and</u> 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 wells.
801 thru 999	Off-post Alliant wells.

Off-TCAAP wells installed by parties other than USAEC, TCAAP, or Alliant are designated by their Minnesota unique number. For reference, a well-designation cross-reference guide is included as Tables B-1 and B-2, which lists all wells of concern, the Minnesota unique number, the IRDMIS number, and any other name(s) the wells may have. Table B-1 is sorted by unique number and Table B-2 is sorted by IRDMIS number. The well type in these two tables is 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

Tables B-3 and B-4, which contain the same list of wells as Table B-2 (i.e., a listing that is sorted by IRDMIS number), can be used to view the boring log for a given well, if available. To view the well log, click on the desired well name in the table with the mouse. Table B-3 provides the boring logs for on-TCAAP wells and Table B-4 provides the boring logs for off-TCAAP wells.

Figures B-2 and B-3 show locations for off- and on-TCAAP wells, respectively. With a known well name, the location of that well can be determined using the "Edit, Find" or "Edit, Search" function and then typing in the desired well name, which will highlight this well name on the figure. Using either of the figures, the trichloroethene trend graph for a specific well can be viewed by clicking on the desired well name with the mouse. Some of the wells do not have trend graphs available (primarily sealed wells). Refer to the historical water quality database in Appendix D for this information.

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
107405		ROEBKE	OFF	UN		
110485		NEW BRIGHTON #12	OFF	MUNI		
114410	03U521		OFF	MON		
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		
191942		118PDC/MODEL STONE	OFF	MON		
194701	01U620	OW120U1	ON	MON		
194702	01U621	PW121U1	ON	MON		
194703	01U622	OW122U1	ON	MON	✓	
194704	01U623	OW123U1	ON	MON	✓	
194716	01U634	OW504U1	ON	MON	✓	
194717	01U638	OW508U1		MON	✓	
194718	01U639	OW509U1	ON	MON		
194719	01U640	OW510U1	ON	MON		
194720	01U631	OW501U1	ON	MON		
194721	01U632	OW502U1		MON		
194722	01U635	OW505U1	ON	MON	✓	
194723	01U636	OW506U1	ON	MON.		
194724	01U642	OW512U1	ON	MON	✓	
194725	01U612	OW112U1	ON	MON		194758
194726	01U613		ON	MON		194759
194727	01U615	OW115U1	ON	MON		194760
194728	01U616	OW116U1	ON	MON		194761
194729	01U617	OW117U1	ON	MON		194770
194730	01U618	OW118U1	ON	MON		194771
194772	01U619	PW119U1	ON	MON		
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		
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	✓	
200154		U OF M GOLF COURSE	OFF	IRR		
200167		KOPPERS COKE #1	OFF	IND		
200171		PLATING INC	OFF	IND		
200197		SNOW FLAKE DAIRY	OFF	COM		
200264		1620 CENTRAL	OFF	IND		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
200384		METALLURGICAL INC. WELL #1	OFF	IND		
200524		ST. ANTHONY #5	OFF	MUNI		
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.		
200804		ST. ANTHONY #3	OFF	MUNI		
200812		GROSS GOLF COURSE #1	OFF	COM		
200814		AMERICAN LINEN	OFF	IND		
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		
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	✓	
206725	03L523	ARSENAL GRAVEL PIT	ON	ABAND	✓	
206750		SHORE #4	OFF	MUNI		
206753	PJ#506	TWIN CITIES ARSENAL NO. 6	ON		✓	
206754	PJ#501	TWIN CITIES ARSENAL NO. 1	ON	P.S.	✓	
206755	PJ#507	TWIN CITIES ARSENAL NO. 7	ON	ABAND	✓	
206756	PJ#502	TWIN CITIES ARSENAL NO. 2	ON	IND	✓	
206758	PJ#503	TWIN CITIES ARSENAL NO. 3	ON	IND	✓	
206759	PJ#508	TWIN CITIES ARSENAL NO. 8	ON	ABAND	✓	
206760	03M509		ON		✓	
206760	PJ#509	TWIN CITIES ARSENAL NO.9	ON	DOM	✓	
206787		MOUNDSVIEW H.S.	OFF	P.S.		
206789		NEW BRIGHTON #1	OFF	MUNI	✓	
206791		NEW BRIGHTON #7	OFF	MUNI		
206792		NEW BRIGHTON #4				
206793		NEW BRIGHTON #3	OFF	MUNI		
206794		NEW BRIGHTON #9	OFF	MUNI		
206795		NEW BRIGHTON #8	OFF	MUNI		
206796		NEW BRIGHTON #5	OFF	MUNI		
206797		NEW BRIGHTON #6	OFF	MUNI		
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		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
231742	04U510	GRENADE PLANT PROOF RANGES	ON	IND		
231845		MNDOT CIVIL DEFENSE TRAIN.	ON/OFF	P.S.		
231854	03L522	ARSENAL GRAVEL PIT	ON	ABAND 8/9	✓	
231857	03M505			ABAND	✓	
231878		MENGELKOCH #2	OFF	UN		
232067		NBR 135	OFF	UN		
232069		UHIL	OFF	UN		
233221		REUBEN MEAT	OFF	DOM		
233222		LOWRY GROVE TRAILER	OFF	ABAND	✓	
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		
234136	03M001	S1M3	ON	MON		
234137	03L001	S1L3	ON	MON		
234138	04U001	S1U4	ON	MON		
234139	03U002	S2U3	ON	MON		
234140	03M002	S2M3	ON	MON		
234141	03L002	S2L3	ON	MON		
234142	03U003	S3U3	ON	MON		
234143	03M003	S3M3	ON	MON		
234144	03L003	S3L3	ON	MON		
234145	03U004	S4U3	ON	MON		
234146	03M004	S4M3	ON	MON		
234147	03L004	S4L3	ON	MON		
234148	03U005	S5U3	ON	MON		
234149	03U006	S6U3	ON	MON	✓	
234150	03U007	S7U3	ON	MON		
234151	03M007	S7M3	ON	MON		
234152	03L007	S7L3	ON	MON		
234153	03U008	S8U3	ON	MON		
234154	03U009	S9U3	ON	MON		
234155	03U010	S10U3	ON	MON		
234156	03M010	S10M3	ON	MON		
234157	03L010	S10L3	ON	MON		
234158	03U011	S11U3	ON	MON		
234159	03U012	S12U3	ON	MON		
234160	03M012	S12M3	ON	MON		
234161	03L012	S12L3	ON	MON		
234162	03U013	S13U3	ON	MON		
234163	03M013	S13M3	ON	MON		
234164	03L013	S13L3	ON	MON		
234165	03U014	S14U3	ON	MON		
234166	03U015	S15U3	ON	MON		
234167	03U016	S16U3	ON	MON		
234168	03U017	S17U3	ON	MON		
234169	03M017	S17M3	ON	MON		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
234170	03L017	S17L3	ON	MON		
234171	03U018	S18U3	ON	MON		
234172	03U019	S19U3	ON	MON		
234173	03U020	S20U3	ON	MON		
234174	03M020	S20M3	ON	MON		
234175	03L020	S20L3	ON	MON		
234176	03U021	S21U3	ON	MON		
234193	04U003	S3U4	ON	MON		
234194	04U002	S2U4	ON	MON		
234195	04U007	S7U4	ON	MON		
234196	04U012	S12U4	ON	MON		
234197	04U020	S20U4	ON	MON		
234198	01U004	S4U1	ON	MON	✓	
234199	01U011	S11U1	ON	MON	✓	
234200	01U012	S12U1	ON	MON	✓	
234201	01U022	S22U1	ON	MON	✓	
234202	01U033	S33U1	ON	MON	✓	
234204	01U034	S34U1	ON	MON	✓	
234205	01U035	S35U1	ON	TEST		
234206	01U036	S36U1	ON	MON	✓	
234207	01U037	S37U1		MON	✓	
234208	01U038	S38U1		MON		
234209	01U039	S39U1	ON	MON		
234210	01U040	S40U1	ON	MON		
234211	01U041	S41U1	ON	MON		
234212	01U044	S44U1	ON	MON		
234215	01U045	S45U1	ON	MON		
234216	01U046	S46U1	ON	MON		
234217	01U047	S47U1	ON	MON		
234218	01U048	S48U1		MON		
234221	01U050	S50AU1		MON	✓	
234222	01U051	S51U1	ON	MON	✓	
234223	01U052	S52U1	ON	MON		
234225	01U053	S53AU1	ON	MON	✓	
234227	01U054	S54AU1		MON	✓	
234235	01U060	S60U1	ON	MON		
234237	01U062	S62U1	ON	MON	✓	
234239	01U063	S63U1	ON	MON		
234240	01U064	S64U1	ON	MON		
234241	01U065	S65U1	ON	MON		
234243	01U067	S67U1	ON	MON		
234250	01U072	S72AU1	ON	MON		
234301		DEWITT	OFF	UN	✓	
234305		GLENN BEGGIN	OFF	UN		
234319		HIDE & TALLOW #1	OFF	UN		
234327		BRESKE	OFF	UN		
234335		MENGELKOCH #1	OFF	UN		
234337		MENGELKOCH #3	OFF	UN	✓	
234350		GORDON	OFF	UN		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
234351		YEMPA	OFF	UN		
234352		1206 12TH AV NW	OFF	UN	✓	
234353		LENTSCH'S ICE WK.	OFF	UN		
234355		KINGDOM HALL	OFF	UN		
234356		NORDQUIST P43	OFF	UN		
234357		PHILLIPS PET P46	OFF	UN		
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	✓	
234430		CMIEL	OFF	UN	✓	
234431		HARSTAD	OFF	UN		
234463		KEN SOLIE	OFF	UN		
234546		HONEYWELL RIDGEWAY	OFF	UN		
234547		HONEYWELL RIDGEWAY	OFF	UN		
234549		REINER	OFF	IRR		
235539		OLD HOTEL	OFF	UN		
235557		HIDDEN FALLS PARK W.WELL	OFF	P.S.		
235565	PJ#074	S74PJ		MON	✓	
235619		SHRINERS HOSPITAL	OFF	P.S.		
235735		FLOUR CITY ARCHITECTURAL	OFF	COM		
235748	03L014	S14L3	ON	MON		
235749	03L018	S18L3	ON	MON		
235750	03L021	S21L3	ON	MON		
235751	03L027	S27L3	ON	MON		
235752	03L028	S28L3		MON		
235753	03L029	S29L3		MON		236066
236066	03U094	S94U3	ON	MON		
236067	03L091	S91L3	ON	MON	✓	
236068	03L086	S86L3	ON	MON	✓	
236069	03U084	S84U3	ON	MON		
236070	03L081	S81L3	ON	MON		
236071	03L080	S80L3	ON	MON		
236072	03U079	S79U3	ON	MON		
236073	03U078	S78U3	ON	MON		
236074	03L078	S78L3	ON	MON		
236075	03U077	S77U3	ON	MON		
236076	03L077	S77L3	ON	MON		
236077	03U076	S76U3	ON	MON		
236078	03U075	S75U3	ON	MON		
236079	03L005	S5L3	ON	MON		
236080	03L113	WF1L3	ON	MON		
236122		NWR	OFF	ABAND		
236176	01U003	S3U1	ON	MON	✓	
236177	01U043	S43AU1		MON		
236178	03U022	S22U3		MON		
236179	03U023	S23U3		MON		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236180	03U024	S24U3		MON		
236181	03U025	S25U3		MON		
236182	03U026	S26U3	ON	MON		
236183	03U027	S27U3		MON		
236184	03U028	S28U3		MON		
236185	03U029	S29U3		MON		
236186	03U030	S30U3		MON		
236187	03U031	S31U3		MON		
236188	03U032	S32U3		MON		
236189	01U601	OW101U1	ON	MON		
236190	01U602	OW102U1	ON	MON		
236191	01U603	OW103U1	ON	MON		
236192	01U604	OW104U1	ON	MON		
236193	01U605	OW10571	ON	MON		
236194	01U524	FA4U1	ON	PIEZ.	✓	
236195	01U527	FV8U1	ON	PIEZ.	✓	
236196	01U525	FW5U1	ON	PIEZ.	✓	
236197	01U526	FV12U1	ON	PIEZ.	✓	
236437	PJ#802	T2PJ	OFF	MON		421437
236449	03U801	T1U3	OFF	MON		
236450	04U802	T2U4	OFF	MON		
236452	01U803	T3U1	OFF	TEST	✓	424053
236453	03U803	T3U3	OFF	MON		421434
236455	03U804	T4U3	OFF	MON		421433
236457	01U805	T5U1	OFF	MON	✓	424060
236458	03U805	T5U3	OFF	MON		421432
236460	01U806	T6U1	OFF	MON	✓	424058
236461	03U806	T6U3	OFF	MON		421431
236462	03M806	T6M3	OFF	MON		421430
236463	03L806	T6L3	OFF	MON		421429
236464	04U806	T6U4	OFF	MON		421428
236465	PJ#806	T6PJ	OFF	MON		421427
236468	PJ#003	S3PJ	ON	MON		
236469	PJ#027	S27PJ	ON	MON		
236471	01U807	T7U1	OFF	TEST	✓	424059
236476	03U082	S82U3	ON	MON		
236478	03U083	S83U3	ON	MON		
236479	01U085	S85U1	ON	MON		
236480	03U087	S87U3	ON	MON		
236482	03U088	S88U3	ON	MON		
236483	03U089	S89U3	ON	MON		
236485	03U090	S90U3	ON	MON		
236487	03U092	S92U3	ON	MON		
236489	03U093	S93U3	ON	MON		
236491	03U096	S96U3	ON	MON		
236493	03U097	S97U3	ON	MON		
236494	01U098	S98U1	ON	MON	✓	
236495	03U099	S99U3	ON	MON		
236497	01U100	S100U1	ON	MON	✓	

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236498	01U101	S101U1	ON	MON	✓	
236499	01U102	S102U1	ON	MON		
236500	01U103	S103U1	ON	MON		
236501	01U104	S104U1	ON	MON		
236502	01U105	S105U1	ON	MON		
236503	01U106	S106U1	ON	MON		
236504	01U107	S107U1	ON	MON		
236505	01U108	S108U1	ON	MON		
236506	01U109	S109U1	ON	MON	✓	
236507	01U110	S11OU1	ON	MON		
236508	03U111	S111U3	ON	MON		
236510	03U112	S112U3	ON	MON		
242124	03U113	WF1U3	ON	MON		
242125	03U114	WF2U3	ON	MON		
242127	01U607	OW107U1	ON	MON		
242128	01U608	OW108U1	ON	MON		
242129	01U609	OW109U1	ON	MON		
242130	01U610	OW110U1	ON	MON		
242131	01U611	OW111U1	ON	MON		
242132	03U647	OW517U3	ON	MON		
242133	03U648	OW518U3	ON	MON		
242134	01U652	OW522U1	ON	MON	✓	
242135	01U666	OW536U1	ON	MON		
242136	01U667	OW537U1	ON	MON		
242137	01U668	OW538U1	ON	MON		
242138	04U027	S27U4		MON		
242153	01U813	H3U1	OFF	MON	✓	
242160	03L079	S79L3	ON	MON		
242162		301PB	OFF	UN		
242182	01U624A	BP185A	ON	PIEZ		
242183	01U624B	BP185B	ON	PIEZ		
242184	01U624C	BP185C	ON	PIEZ		
242185	01U624D	BP185D	ON	PIEZ		
242186	01U625A	BP285A	ON	PIEZ		
242187	01U625B	BP285B	ON	PIEZ		
242188	01U625C	BP285C	ON	PIEZ		
242189	01U625D	BP285D	ON	PIEZ		
242190	01U626A	BP385A	ON	PIEZ		
242191	01U626B	BP385B	ON	PIEZ		
242192	01U626C	BP385C	ON	PIEZ		
242193	01U626D	BP385D	ON	PIEZ		
242194	01U627A	BP485A	ON	PIEZ		
242195	01U627B	BP485B	ON	PIEZ		
242196	01U627C	BP485C	ON	PIEZ		
242197	01U627D	BP485D	ON	PIEZ		
242198	01U628A	BP585A	ON	PIEZ		
242199	01U628B	BP585B	ON	PIEZ		
242200	01U628C	BP585C	ON	PIEZ		
242201	01U628D	BP585D	ON	PIEZ		

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
409546		PCA2L3	OFF	TEST	✓	
409547		PCA1U4	OFF	TEST		
409548		PCA2U4	OFF	TEST		
409549		PCA3U4	OFF	TEST		
409550		PCA6U3	OFF	TEST		
409555		PCA5U4	OFF	TEST		
409556		PCA4L3	OFF	TEST		
409557		PCA1L3	OFF	TEST		
409595		B109U3	OFF	ABAND		
409596		B118U3	OFF	MON		
409597		B118L3	OFF	IND		
409598		B117U3	OFF	ABAND		
416051	03M848	308M3	OFF	MON		
416078	04U848	308U4	OFF	TEST		
416080	04U852	312U4	OFF	MON		
416081	03L858	318L3	OFF	MON	✓	
416082	04U849	309U4	OFF	MON		
416143			OFF	ABAND		
416198		311U4	OFF	MON		
416199	03L848	308L3	OFF	MON		
416200	04U850	310U4	OFF	MON		
420713		HERBST LANDFILL	OFF	MON		
421425	03U659	OW529U3	ON	MON		
421426	03U658	OW528U3	ON	MON		
421438	03U671	PO-1	ON	MON		
421440	03U672	PD2U3	OFF	MON		
421441	03U673	PD3U3	OFF	MON		
424052	01L822	NW2L1	OFF	TEST	✓	
424054	01L821	NW1L1	OFF	TEST	✓	
424055	01L811	H1L1; MDNR Well	OFF	TEST		
424056	01L816	H6L1	OFF	ABAND	✓	
424057	01U808	T8U1	ON	MON	✓	
424061	01L823	NW3L1	OFF	TEST	✓	
424062	01L813	H3L1	OFF	TEST	✓	
426808	03U811	H1U3	OFF	TEST		
426809	03L811	H1L3	OFF	TEST		
426810	03U821	NW1U3	OFF	TEST		
426811	04U821	NW1U4	OFF	TEST		
426812	03U822	NW2U3	OFF	TEST		
426813	03L822	NW2L3	OFF	TEST		
426814	03U824	NW4U3	OFF	TEST	✓	
426815	03L673	PD3L3	OFF	TEST		
426816	03L813	H3L3	OFF	TEST	✓	

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
426817	03L802	T2L3	OFF	TEST		
426818	03M802	T2M3	OFF	TEST		
426842	03F302	B1	ON	REM		
426843	03F303	B2	ON	REM		
426844	03F304	B3	ON	REM		
426845	03F305	B4	ON	REM		
426846	03F306	B5	ON	REM		
426847	03F307	B6	ON	REM		
426848	03U701	701U3	ON	MON		
426849	04U701	701U4	ON	MON		
426850	03U702	702U3	ON	MON		
426851	04U841	301U4	OFF	TEST		
426852	03M843	303M3	OFF	TEST		
426853	04U843	303U4	OFF	TEST		
426854	04U844	304U4	OFF	TEST		
426855	04U845	305U4	OFF	MON		
426856	04U846	306U4	OFF	MON		
426857	04U847	307U4	OFF	MON		
426858	03L853	313L3	OFF	MON		
426859	03L854	314L3	OFF	MON		
426860	04U855	315U4	OFF	MON		
426861	03L856	316L3	OFF	MON	✓	
426862	03U815	H5U3	OFF	TEST	✓	
426863	03U831	OM1U3	OFF	TEST		
426864	03U832	OM2U3	OFF	TEST	✓	
426865	03L832	OM2L3	OFF	TEST		
426866	04U832	OM2U4	OFF	TEST		
426867	04U673	PD3U4	OFF	TEST		
426868	03L809	T9L3	OFF	MON		
426876	04U702	702U4	ON	MON		
426877	04U077	ST77U4	ON	MON		
426878	03U703	703U3		MON		
426879	03U708	708U3	ON	MON		
426880	04U708	708U4	ON	MON		
426881	03U709	709U3	ON	MON		
426882	04U709	709U4	ON	MON		
426883	03U704	704U3	ON	MON		
426884	03U705	705U3	ON	MON		
426885	03U706	706U3	ON	MON		
426886	03U707	707U3	ON	MON		
427410	01U120		ON	MON		
427411	01U115		ON	MON		
427412	01U116		ON	MON		
427413	01U117		ON	MON		
427414	01U118		ON	MON		
427415	01U119		ON	MON		
434031	04U711	711U4	OFF	MON		
434032	03U710	71OU3	ON	MON		
434033	03U711	711U3	OFF	MON		

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
434034	04U861	321U4	OFF	MON		
434035	04U860	320U4	OFF	MON		
434036	04U859	319U4	OFF	MON		
434037	03L841	301L3	OFF	MON		
434038	03L860	320L3	OFF	MON		
434039	03L861	321L3	OFF	MON		
434040	03L859	319L3	OFF	MON		
439701	04U854	314U4	OFF	MON		
440884	03U121		ON	MON		
440885	03M005	ST-5-M3	ON	MON		
440886	03U129		ON	MON		
440887	03L084	ST84L3	ON	MON		
440888	01U122		ON	MON	✓	
440889	01U125		ON	MON		
440890	01U126		ON	MON		
440891	01U127		ON	MON		
440892	01U128		ON	MON		
440893	01U133		ON	MON		
440894	01U134		OFF	MON		
440895	01U130		ON	MON	✓	
440896	03U124		ON	MON	✓	
447889	04U871	401U4	OFF	MON		
447890	04U882	412U4	OFF	MON		
447891	04U881	411U4	OFF	MON		
447892	04U883	413U4	OFF	MON		
447893	01U350		ON	MON		
447894	PJ#318	318U4	OFF	MON		
447895	04U880	410U4	OFF	MON		
447896	04U877	407U4	OFF	MON		
447898	04U875	405U4	OFF	MON		
447899	03L846	306L3	OFF	MON		
447900	04U879	409U4	OFF	MON		
447988	04U872	402U4	OFF	MON		
447998	01U135		ON	MON		
447999	01U136		ON	MON		
453821	03U317	SC-5	ON	REM		
453822	03U316	SC-4	ON	REM		
453823	03F308	B7	ON	REM		
453824	03F312	B11	ON	REM		
453825	PJ#309	B8	ON	REM		
453826	PJ#310	B9	ON	REM		
453827	PJ#311	B10	ON	REM		
453828	PJ#313	B12	ON	REM		
453829	04J708		ON	MON		
453830	04J713		ON	MON		
453831	03M713		ON	MON		
453832	04U714		ON	MON		
453833	03U715	SM1	ON	MON		
453834	03U716	SM2	ON	MON		

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
482708	04J835		OFF	MON		
482709	04J834		OFF	MON		
500691	04U414	414U4/EZ SELF SERVICE	OFF	MON		
500694	03L137		ON	MON	✓	
505189	01U137		ON	MON		
505190	01U138		ON	MON		
505191	01U139		ON	MON		
505192	01U140		ON	MON		
505193	01U141		ON	MON		
505209	01U902		OFF	MON		
505210	01U901	H3U1	OFF	MON		
505618	03L138		ON	MON	✓	
508115	04U322	322U4	OFF	MON		
508117	04J702		ON	MON		
508118	04J077		ON	MON		
508119	04U713		ON	MON		
508120	04J714		ON	MON		
508122	03U314	SC-2	ON	REM		
509083		NEW BRIGHTON #11	OFF	MUNI		
512761		GROSS GOLF #2	OFF	IRR		
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		
519956	03L833		OFF	MON		
519957	04U833		OFF	MON		
520931		NEW BRIGHTON #13	OFF	MUNI		
524047	04U865	325U4	OFF	MON		
524048	04J866	326J	OFF	MON		
524049	04U866	326U4	OFF	MON		
524050	04U864	324U4	OFF	MON		
524051	04J864	324J	OFF	MON		
538039	01U145		ON	PIEZ.		
538040	01U146		ON	PIEZ.		
538041	01U147		ON	PIEZ.		
538042	01U148		ON	PIEZ.		
538043	01U149		ON	PIEZ.		

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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	EW1	ON	REM		
538052	01U352	EW2	ON	REM		
538053	01U353	EW3	ON	REM		
538054	01U354	EW4	ON	REM		
538055	01U355	EW5	ON	REM		
538056	01U356	EW6	ON	REM		
538057	01U357	EW7	ON	REM		
538058	01U358	EW8	ON	REM		
538059	01U904		OFF	MON		
538060	01U903		OFF	MON		
538062	01U157		ON	MON		
538063	01U158		ON	MON		
554216		NEW BRIGHTON #14	OFF	MUNI		
582628		NEW BRIGHTON #15	OFF	MUNI		
589650		CM1MW	ON	MON		
596628	04U836	MW-1	OFF	MON		
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		
616601		CM2MW	ON	MON		
616602		CM3MW	ON	MON		
624019		CM5MW	ON	MON		
643379			ON	PIEZ.	✓	
643380			ON	PIEZ.	✓	
643381			ON	PIEZ.	✓	
643382			ON	PIEZ.	✓	
653903		GR1-1	ON	MON		
653904		GR1-2	ON	MON		
653905		GR2-1	ON	MON		
675976		GR-DF1	ON	MON		
687112	03F319	B13	ON	REM		
	01U131				✓	
	01U132					
	01U142				✓	
	01U143				✓	
	01U144				✓	
	01U653			MON		
	01U675				✓	

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
	03L306		ON	MON		
	03L843	303L3	OFF	MON		
	03U301	SC-1	ON	REM		
	03U315	SC-3		REM		
	03U674	OW541U3	ON	MON		
	03U675					
	03U676	OW543U3	ON	MON		
	04U842			MON		
	PJ#006		ON	MON		
		MW15D	OFF	MON		
		MW15S	OFF	MON		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
424055	01L811	H1L1; MDNR Well	OFF	TEST		
424062	01L813	H3L1	OFF	TEST	✓	
424056	01L816	H6L1	OFF	ABAND	✓	
424054	01L821	NW1L1	OFF	TEST	✓	
424052	01L822	NW2L1	OFF	TEST	✓	
424061	01L823	NW3L1	OFF	TEST	✓	
236176	01U003	S3U1	ON	MON	✓	
234198	01U004	S4U1	ON	MON	✓	
234199	01U011	S11U1	ON	MON	✓	
234200	01U012	S12U1	ON	MON	✓	
234201	01U022	S22U1	ON	MON	✓	
234202	01U033	S33U1	ON	MON	✓	
234204	01U034	S34U1	ON	MON	✓	
234205	01U035	S35U1	ON	TEST		
234206	01U036	S36U1	ON	MON	✓	
234207	01U037	S37U1		MON	✓	
234208	01U038	S38U1		MON		
234209	01U039	S39U1	ON	MON		
234210	01U040	S40U1	ON	MON		
234211	01U041	S41U1	ON	MON		
236177	01U043	S43AU1		MON		
234212	01U044	S44U1	ON	MON		
234215	01U045	S45U1	ON	MON		
234216	01U046	S46U1	ON	MON		
234217	01U047	S47U1	ON	MON		
234218	01U048	S48U1		MON		
234221	01U050	S50AU1		MON	✓	
234222	01U051	S51U1	ON	MON	✓	
234223	01U052	S52U1	ON	MON		
234225	01U053	S53AU1	ON	MON	✓	
234227	01U054	S54AU1		MON	✓	
234235	01U060	S60U1	ON	MON		
234237	01U062	S62U1	ON	MON	✓	
234239	01U063	S63U1	ON	MON		
234240	01U064	S64U1	ON	MON		
234241	01U065	S65U1	ON	MON		
234243	01U067	S67U1	ON	MON		
234250	01U072	S72AU1	ON	MON		
236479	01U085	S85U1	ON	MON		
236494	01U098	S98U1	ON	MON	✓	
236497	01U100	S100U1	ON	MON	✓	
236498	01U101	S101U1	ON	MON	✓	
236499	01U102	S102U1	ON	MON		
236500	01U103	S103U1	ON	MON		
236501	01U104	S104U1	ON	MON		
236502	01U105	S105U1	ON	MON		
236503	01U106	S106U1	ON	MON		
236504	01U107	S107U1	ON	MON		
236505	01U108	S108U1	ON	MON		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236506	01U109	S109U1	ON	MON	✓	
236507	01U110	S11OU1	ON	MON		
427411	01U115		ON	MON		
427412	01U116		ON	MON		
427413	01U117		ON	MON		
427414	01U118		ON	MON		
427415	01U119		ON	MON		
427410	01U120		ON	MON		
440888	01U122		ON	MON	✓	
440889	01U125		ON	MON		
440890	01U126		ON	MON		
440891	01U127		ON	MON		
440892	01U128		ON	MON		
440895	01U130		ON	MON	✓	
	01U131				✓	
	01U132					
440893	01U133		ON	MON		
440894	01U134		OFF	MON		
447998	01U135		ON	MON		
447999	01U136		ON	MON		
505189	01U137		ON	MON		
505190	01U138		ON	MON		
505191	01U139		ON	MON		
505192	01U140		ON	MON		
505193	01U141		ON	MON		
	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		
538051	01U351	EW1	ON	REM		
538052	01U352	EW2	ON	REM		
538053	01U353	EW3	ON	REM		
538054	01U354	EW4	ON	REM		
538055	01U355	EW5	ON	REM		
538056	01U356	EW6	ON	REM		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
538057	01U357	EW7	ON	REM		
538058	01U358	EW8	ON	REM		
236194	01U524	FA4U1	ON	PIEZ.	✓	
236196	01U525	FW5U1	ON	PIEZ.	✓	
236197	01U526	FV12U1	ON	PIEZ.	✓	
236195	01U527	FV8U1	ON	PIEZ.	✓	
236189	01U601	OW101U1	ON	MON		
236190	01U602	OW102U1	ON	MON		
236191	01U603	OW103U1	ON	MON		
236192	01U604	OW104U1	ON	MON		
236193	01U605	OW10571	ON	MON		
242127	01U607	OW107U1	ON	MON		
242128	01U608	OW108U1	ON	MON		
242129	01U609	OW109U1	ON	MON		
242130	01U610	OW110U1	ON	MON		
242131	01U611	OW111U1	ON	MON		
194725	01U612	OW112U1	ON	MON		194758
194726	01U613		ON	MON		194759
194727	01U615	OW115U1	ON	MON		194760
194728	01U616	OW116U1	ON	MON		194761
194729	01U617	OW117U1	ON	MON		194770
194730	01U618	OW118U1	ON	MON		194771
194772	01U619	PW119U1	ON	MON		
194701	01U620	OW120U1	ON	MON		
194702	01U621	PW121U1	ON	MON		
194703	01U622	OW122U1	ON	MON	✓	
194704	01U623	OW123U1	ON	MON	✓	
242182	01U624A	BP185A	ON	PIEZ		
242183	01U624B	BP185B	ON	PIEZ		
242184	01U624C	BP185C	ON	PIEZ		
242185	01U624D	BP185D	ON	PIEZ		
242186	01U625A	BP285A	ON	PIEZ		
242187	01U625B	BP285B	ON	PIEZ		
242188	01U625C	BP285C	ON	PIEZ		
242189	01U625D	BP285D	ON	PIEZ		
242190	01U626A	BP385A	ON	PIEZ		
242191	01U626B	BP385B	ON	PIEZ		
242192	01U626C	BP385C	ON	PIEZ		
242193	01U626D	BP385D	ON	PIEZ		
242194	01U627A	BP485A	ON	PIEZ		
242195	01U627B	BP485B	ON	PIEZ		
242196	01U627C	BP485C	ON	PIEZ		
242197	01U627D	BP485D	ON	PIEZ		
242198	01U628A	BP585A	ON	PIEZ		
242199	01U628B	BP585B	ON	PIEZ		
242200	01U628C	BP585C	ON	PIEZ		
242201	01U628D	BP585D	ON	PIEZ		
194720	01U631	OW501U1	ON	MON		
194721	01U632	OW502U1		MON		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
194716	01U634	OW504U1	ON	MON	✓	
194722	01U635	OW505U1	ON	MON	✓	
194723	01U636	OW506U1	ON	MON.		
194717	01U638	OW508U1		MON	✓	
194718	01U639	OW509U1	ON	MON		
194719	01U640	OW510U1	ON	MON		
194724	01U642	OW512U1	ON	MON	✓	
242134	01U652	OW522U1	ON	MON	✓	
	01U653			MON		
242135	01U666	OW536U1	ON	MON		
242136	01U667	OW537U1	ON	MON		
242137	01U668	OW538U1	ON	MON		
	01U675				✓	
236452	01U803	T3U1	OFF	TEST	✓	424053
236457	01U805	T5U1	OFF	MON	✓	424060
236460	01U806	T6U1	OFF	MON	✓	424058
236471	01U807	T7U1	OFF	TEST	✓	424059
424057	01U808	T8U1	ON	MON	✓	
242153	01U813	H3U1	OFF	MON	✓	
505210	01U901	H3U1	OFF	MON		
505209	01U902		OFF	MON		
538060	01U903		OFF	MON		
538059	01U904		OFF	MON		
426842	03F302	B1	ON	REM		
426843	03F303	B2	ON	REM		
426844	03F304	B3	ON	REM		
426845	03F305	B4	ON	REM		
426846	03F306	B5	ON	REM		
426847	03F307	B6	ON	REM		
453823	03F308	B7	ON	REM		
453824	03F312	B11	ON	REM		
687112	03F319	B13	ON	REM		
234137	03L001	S1L3	ON	MON		
234141	03L002	S2L3	ON	MON		
234144	03L003	S3L3	ON	MON		
234147	03L004	S4L3	ON	MON		
236079	03L005	S5L3	ON	MON		
234152	03L007	S7L3	ON	MON		
234157	03L010	S10L3	ON	MON		
234161	03L012	S12L3	ON	MON		
234164	03L013	S13L3	ON	MON		
235748	03L014	S14L3	ON	MON		
234170	03L017	S17L3	ON	MON		
235749	03L018	S18L3	ON	MON		
234175	03L020	S20L3	ON	MON		
235750	03L021	S21L3	ON	MON		
235751	03L027	S27L3	ON	MON		
235752	03L028	S28L3		MON		
235753	03L029	S29L3		MON		236066

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236076	03L077	S77L3	ON	MON		
236074	03L078	S78L3	ON	MON		
242160	03L079	S79L3	ON	MON		
236071	03L080	S80L3	ON	MON		
236070	03L081	S81L3	ON	MON		
440887	03L084	ST84L3	ON	MON		
236068	03L086	S86L3	ON	MON	✓	
236067	03L091	S91L3	ON	MON	✓	
236080	03L113	WF1L3	ON	MON		
500694	03L137		ON	MON	✓	
505618	03L138		ON	MON	✓	
	03L306		ON	MON		
231854	03L522	ARSENAL GRAVEL PIT	ON	ABAND	✓	
206725	03L523	ARSENAL GRAVEL PIT	ON	ABAND	✓	
426815	03L673	PD3L3	OFF	TEST		
426817	03L802	T2L3	OFF	TEST		
236463	03L806	T6L3	OFF	MON		421429
426868	03L809	T9L3	OFF	MON		
426809	03L811	H1L3	OFF	TEST		
426816	03L813	H3L3	OFF	TEST	✓	
426813	03L822	NW2L3	OFF	TEST		
426865	03L832	OM2L3	OFF	TEST		
519956	03L833		OFF	MON		
434037	03L841	301L3	OFF	MON		
	03L843	303L3	OFF	MON		
447899	03L846	306L3	OFF	MON		
416199	03L848	308L3	OFF	MON		
426858	03L853	313L3	OFF	MON		
426859	03L854	314L3	OFF	MON		
426861	03L856	316L3	OFF	MON	✓	
416081	03L858	318L3	OFF	MON	✓	
434040	03L859	319L3	OFF	MON		
434038	03L860	320L3	OFF	MON		
434039	03L861	321L3	OFF	MON		
234136	03M001	S1M3	ON	MON		
234140	03M002	S2M3	ON	MON		
234143	03M003	S3M3	ON	MON		
234146	03M004	S4M3	ON	MON		
440885	03M005	ST-5-M3	ON	MON		
234151	03M007	S7M3	ON	MON		
234156	03M010	S10M3	ON	MON		
234160	03M012	S12M3	ON	MON		
234163	03M013	S13M3	ON	MON		
234169	03M017	S17M3	ON	MON		
234174	03M020	S20M3	ON	MON		
231857	03M505			ABAND	✓	
206760	03M509		ON		✓	
453831	03M713		ON	MON		
426818	03M802	T2M3	OFF	TEST		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236462	03M806	T6M3	OFF	MON		421430
426852	03M843	303M3	OFF	TEST		
416051	03M848	308M3	OFF	MON		
234135	03U001	S1U3	ON	MON		
234139	03U002	S2U3	ON	MON		
234142	03U003	S3U3	ON	MON		
234145	03U004	S4U3	ON	MON		
234148	03U005	S5U3	ON	MON		
234149	03U006	S6U3	ON	MON	✓	
234150	03U007	S7U3	ON	MON		
234153	03U008	S8U3	ON	MON		
234154	03U009	S9U3	ON	MON		
234155	03U010	S10U3	ON	MON		
234158	03U011	S11U3	ON	MON		
234159	03U012	S12U3	ON	MON		
234162	03U013	S13U3	ON	MON		
234165	03U014	S14U3	ON	MON		
234166	03U015	S15U3	ON	MON		
234167	03U016	S16U3	ON	MON		
234168	03U017	S17U3	ON	MON		
234171	03U018	S18U3	ON	MON		
234172	03U019	S19U3	ON	MON		
234173	03U020	S20U3	ON	MON		
234176	03U021	S21U3	ON	MON		
236178	03U022	S22U3		MON		
236179	03U023	S23U3		MON		
236180	03U024	S24U3		MON		
236181	03U025	S25U3		MON		
236182	03U026	S26U3	ON	MON		
236183	03U027	S27U3		MON		
236184	03U028	S28U3		MON		
236185	03U029	S29U3		MON		
236186	03U030	S30U3		MON		
236187	03U031	S31U3		MON		
236188	03U032	S32U3		MON		
236078	03U075	S75U3	ON	MON		
236077	03U076	S76U3	ON	MON		
236075	03U077	S77U3	ON	MON		
236073	03U078	S78U3	ON	MON		
236072	03U079	S79U3	ON	MON		
236476	03U082	S82U3	ON	MON		
236478	03U083	S83U3	ON	MON		
236069	03U084	S84U3	ON	MON		
236480	03U087	S87U3	ON	MON		
236482	03U088	S88U3	ON	MON		
236483	03U089	S89U3	ON	MON		
236485	03U090	S90U3	ON	MON		
236487	03U092	S92U3	ON	MON		
236489	03U093	S93U3	ON	MON		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
236066	03U094	S94U3	ON	MON		
236491	03U096	S96U3	ON	MON		
236493	03U097	S97U3	ON	MON		
236495	03U099	S99U3	ON	MON		
236508	03U111	S111U3	ON	MON		
236510	03U112	S112U3	ON	MON		
242124	03U113	WF1U3	ON	MON		
242125	03U114	WF2U3	ON	MON		
440884	03U121		ON	MON		
440896	03U124		ON	MON	✓	
440886	03U129		ON	MON		
	03U301	SC-1	ON	REM		
508122	03U314	SC-2	ON	REM		
	03U315	SC-3		REM		
453822	03U316	SC-4	ON	REM		
453821	03U317	SC-5	ON	REM		
114410	03U521		OFF	MON		
242132	03U647	OW517U3	ON	MON		
242133	03U648	OW518U3	ON	MON		
421426	03U658	OW528U3	ON	MON		
421425	03U659	OW529U3	ON	MON		
421438	03U671	PO-1	ON	MON		
421440	03U672	PD2U3	OFF	MON		
421441	03U673	PD3U3	OFF	MON		
	03U674	OW541U3	ON	MON		
	03U675					
	03U676	OW543U3	ON	MON		
426848	03U701	701U3	ON	MON		
426850	03U702	702U3	ON	MON		
426878	03U703	703U3		MON		
426883	03U704	704U3	ON	MON		
426884	03U705	705U3	ON	MON		
426885	03U706	706U3	ON	MON		
426886	03U707	707U3	ON	MON		
426879	03U708	708U3	ON	MON		
426881	03U709	709U3	ON	MON		
434032	03U710	71OU3	ON	MON		
434033	03U711	711U3	OFF	MON		
453833	03U715	SM1	ON	MON		
453834	03U716	SM2	ON	MON		
236449	03U801	T1U3	OFF	MON		
236453	03U803	T3U3	OFF	MON		421434
236455	03U804	T4U3	OFF	MON		421433
236458	03U805	T5U3	OFF	MON		421432
236461	03U806	T6U3	OFF	MON		421431
426808	03U811	H1U3	OFF	TEST		
426862	03U815	H5U3	OFF	TEST	✓	
426810	03U821	NW1U3	OFF	TEST		
426812	03U822	NW2U3	OFF	TEST		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
426814	03U824	NW4U3	OFF	TEST	✓	
426863	03U831	OM1U3	OFF	TEST		
426864	03U832	OM2U3	OFF	TEST	✓	
508118	04J077		ON	MON		
508117	04J702		ON	MON		
453829	04J708		ON	MON		
453830	04J713		ON	MON		
508120	04J714		ON	MON		
482709	04J834		OFF	MON		
482708	04J835		OFF	MON		
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		
524048	04J866	326J	OFF	MON		
482707	04J882		OFF	MON		
234138	04U001	S1U4	ON	MON		
234194	04U002	S2U4	ON	MON		
234193	04U003	S3U4	ON	MON		
234195	04U007	S7U4	ON	MON		
234196	04U012	S12U4	ON	MON		
234197	04U020	S20U4	ON	MON		
242138	04U027	S27U4		MON		
426877	04U077	ST77U4	ON	MON		
508115	04U322	322U4	OFF	MON		
500691	04U414	414U4/EZ SELF SERVICE	OFF	MON		
231742	04U510	GRENADE PLANT PROOF RANGES	ON	IND		
426867	04U673	PD3U4	OFF	TEST		
426849	04U701	701U4	ON	MON		
426876	04U702	702U4	ON	MON		
426880	04U708	708U4	ON	MON		
426882	04U709	709U4	ON	MON		
434031	04U711	711U4	OFF	MON		
508119	04U713		ON	MON		
453832	04U714		ON	MON		
236450	04U802	T2U4	OFF	MON		
236464	04U806	T6U4	OFF	MON		421428
426811	04U821	NW1U4	OFF	TEST		
426866	04U832	OM2U4	OFF	TEST		
519957	04U833		OFF	MON		
519836	04U834		OFF	MON		
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		
	04U842			MON		
426853	04U843	303U4	OFF	TEST		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
426854	04U844	304U4	OFF	TEST		
426855	04U845	305U4	OFF	MON		
426856	04U846	306U4	OFF	MON		
426857	04U847	307U4	OFF	MON		
416078	04U848	308U4	OFF	TEST		
416082	04U849	309U4	OFF	MON		
416200	04U850	310U4	OFF	MON		
406198	04U851	311U4	OFF	MON		
416080	04U852	312U4	OFF	MON		
439701	04U854	314U4	OFF	MON		
426860	04U855	315U4	OFF	MON		
434036	04U859	319U4	OFF	MON		
434035	04U860	320U4	OFF	MON		
434034	04U861	321U4	OFF	MON		
471394	04U863	323U4	OFF	MON		
524050	04U864	324U4	OFF	MON		
524047	04U865	325U4	OFF	MON		
524049	04U866	326U4	OFF	MON		
447889	04U871	401U4	OFF	MON		
447988	04U872	402U4	OFF	MON		
447898	04U875	405U4	OFF	MON		
447896	04U877	407U4	OFF	MON		
447900	04U879	409U4	OFF	MON		
447895	04U880	410U4	OFF	MON		
447891	04U881	411U4	OFF	MON		
447890	04U882	412U4	OFF	MON		
447892	04U883	413U4	OFF	MON		
236468	PJ#003	S3PJ	ON	MON		
	PJ#006		ON	MON		
236469	PJ#027	S27PJ	ON	MON		
235565	PJ#074	S74PJ		MON	✓	
453825	PJ#309	B8	ON	REM		
453826	PJ#310	B9	ON	REM		
453827	PJ#311	B10	ON	REM		
453828	PJ#313	B12	ON	REM		
447894	PJ#318	318U4	OFF	MON		
206754	PJ#501	TWIN CITIES ARSENAL NO. 1	ON	P.S.	✓	
206756	PJ#502	TWIN CITIES ARSENAL NO. 2	ON	IND	✓	
206758	PJ#503	TWIN CITIES ARSENAL NO. 3	ON	IND	✓	
206724	PJ#504	TWIN CITIES ARSENAL	OFF	ABAND	✓	
206753	PJ#506	TWIN CITIES ARSENAL NO. 6	ON		✓	
206755	PJ#507	TWIN CITIES ARSENAL NO. 7	ON	ABAND	✓	
206759	PJ#508	TWIN CITIES ARSENAL NO. 8	ON	ABAND	✓	
206760	PJ#509	TWIN CITIES ARSENAL NO.9	ON	DOM	✓	
236437	PJ#802	T2PJ	OFF	MON		421437
236465	PJ#806	T6PJ	OFF	MON		421427
107405		ROEBKE	OFF	UN		
110485		NEW BRIGHTON #12	OFF	MUNI		
122210		ST. PAUL PORT AUTH. #3	OFF	IND		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
191942		118PDC/MODEL STONE	OFF	MON		
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		
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	✓	
200154		U OF M GOLF COURSE	OFF	IRR		
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		
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.		
200804		ST. ANTHONY #3	OFF	MUNI		
200812		GROSS GOLF COURSE #1	OFF	COM		
200814		AMERICAN LINEN	OFF	IND		
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		
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.		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
206789		NEW BRIGHTON #1	OFF	MUNI	✓	
206791		NEW BRIGHTON #7	OFF	MUNI		
206792		NEW BRIGHTON #4				
206793		NEW BRIGHTON #3	OFF	MUNI		
206794		NEW BRIGHTON #9	OFF	MUNI		
206795		NEW BRIGHTON #8	OFF	MUNI		
206796		NEW BRIGHTON #5	OFF	MUNI		
206797		NEW BRIGHTON #6	OFF	MUNI		
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.		
231878		MENGELKOCH #2	OFF	UN		
232067		NBR 135	OFF	UN		
232069		UHIL	OFF	UN		
233221		REUBEN MEAT	OFF	DOM		
233222		LOWRY GROVE TRAILER	OFF	ABAND	✓	
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		
234327		BRESKE	OFF	UN		
234335		MENGELKOCH #1	OFF	UN		
234337		MENGELKOCH #3	OFF	UN	✓	
234350		GORDON	OFF	UN		
234351		YEMPA	OFF	UN		
234352		1206 12TH AV NW	OFF	UN	✓	
234353		LENTSCH'S ICE WK.	OFF	UN		
234355		KINGDOM HALL	OFF	UN		
234356		NORDQUIST P43	OFF	UN		
234357		PHILLIPS PET P46	OFF	UN		
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	✓	
234430		CMIEL	OFF	UN	✓	
234431		HARSTAD	OFF	UN		
234463		KEN SOLIE	OFF	UN		
234546		HONEYWELL RIDGEWAY	OFF	UN		

TABLE B-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
234547		HONEYWELL RIDGEWAY	OFF	UN		
234549		REINER	OFF	IRR		
235539		OLD HOTEL	OFF	UN		
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		
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	✓	
409547		PCA1U4	OFF	TEST		
409548		PCA2U4	OFF	TEST		
409549		PCA3U4	OFF	TEST		
409550		PCA6U3	OFF	TEST		
409555		PCA5U4	OFF	TEST		
409556		PCA4L3	OFF	TEST		
409557		PCA1L3	OFF	TEST		
409595		B109U3	OFF	ABAND		
409596		B118U3	OFF	MON		
409597		B118L3	OFF	IND		
409598		B117U3	OFF	ABAND		
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		
512761		GROSS GOLF #2	OFF	IRR		
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		
554216		NEW BRIGHTON #14	OFF	MUNI		
582628		NEW BRIGHTON #15	OFF	MUNI		
589650		CM1MW	ON	MON		
616601		CM2MW	ON	MON		
616602		CM3MW	ON	MON		

TABLE B-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
624019		CM5MW	ON	MON		
643379			ON	PIEZ.	✓	
643380			ON	PIEZ.	✓	
643381			ON	PIEZ.	✓	
643382			ON	PIEZ.	✓	
653903		GR1-1	ON	MON		
653904		GR1-2	ON	MON		
653905		GR2-1	ON	MON		
675976		GR-DF1	ON	MON		
		MW15D	OFF	MON		
		MW15S	OFF	MON		

Appendix B: Table B-3

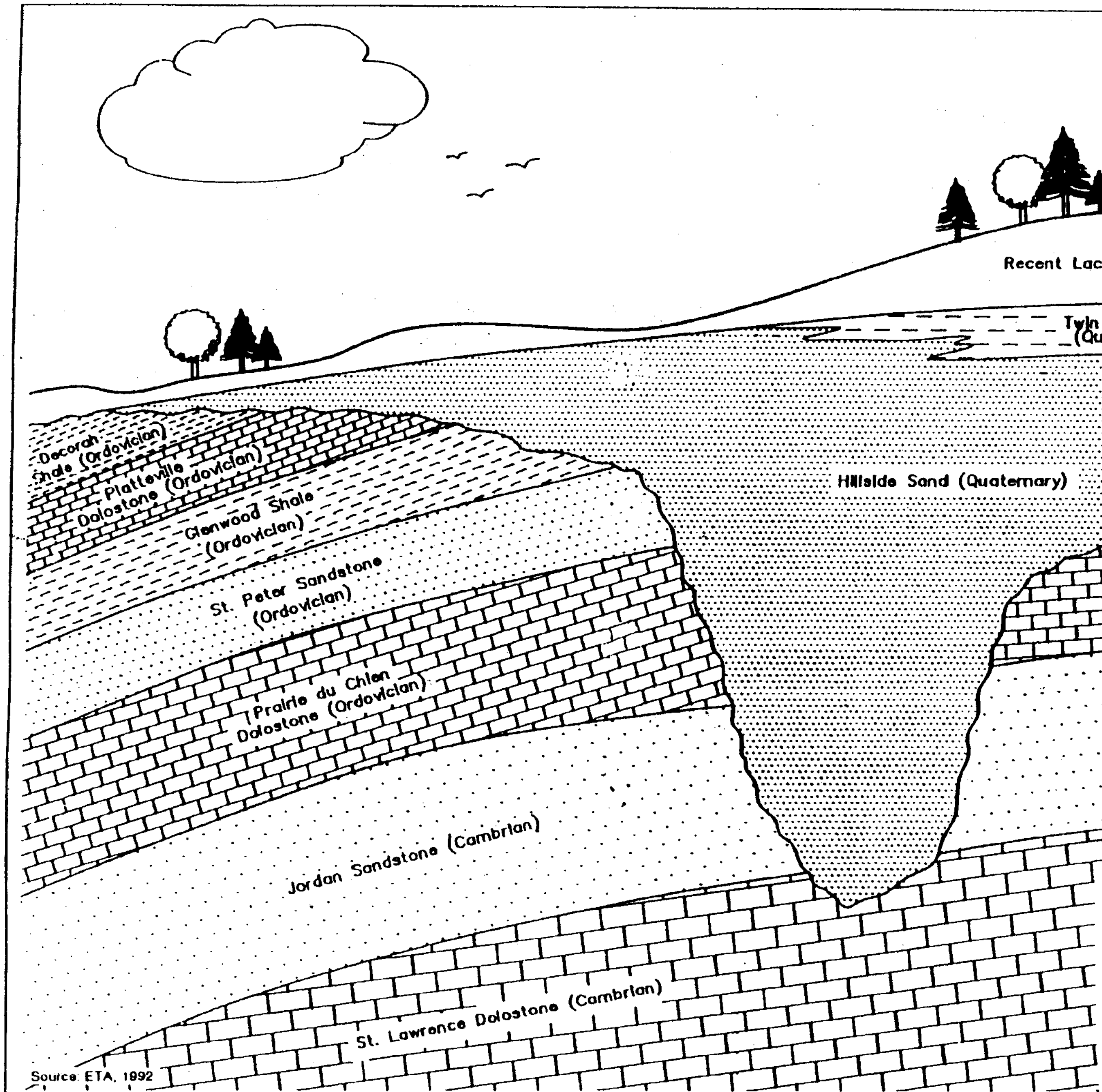
Boring Logs On-TCAAP Wells
Sorted By IRDMIS Number

TCAAP Well Boring logs are include on this CD ROM as Table B-3 and Table B-4

Appendix B: Table B-4

Boring Logs Off-TCAAP Wells
Sorted By IRDMIS Number

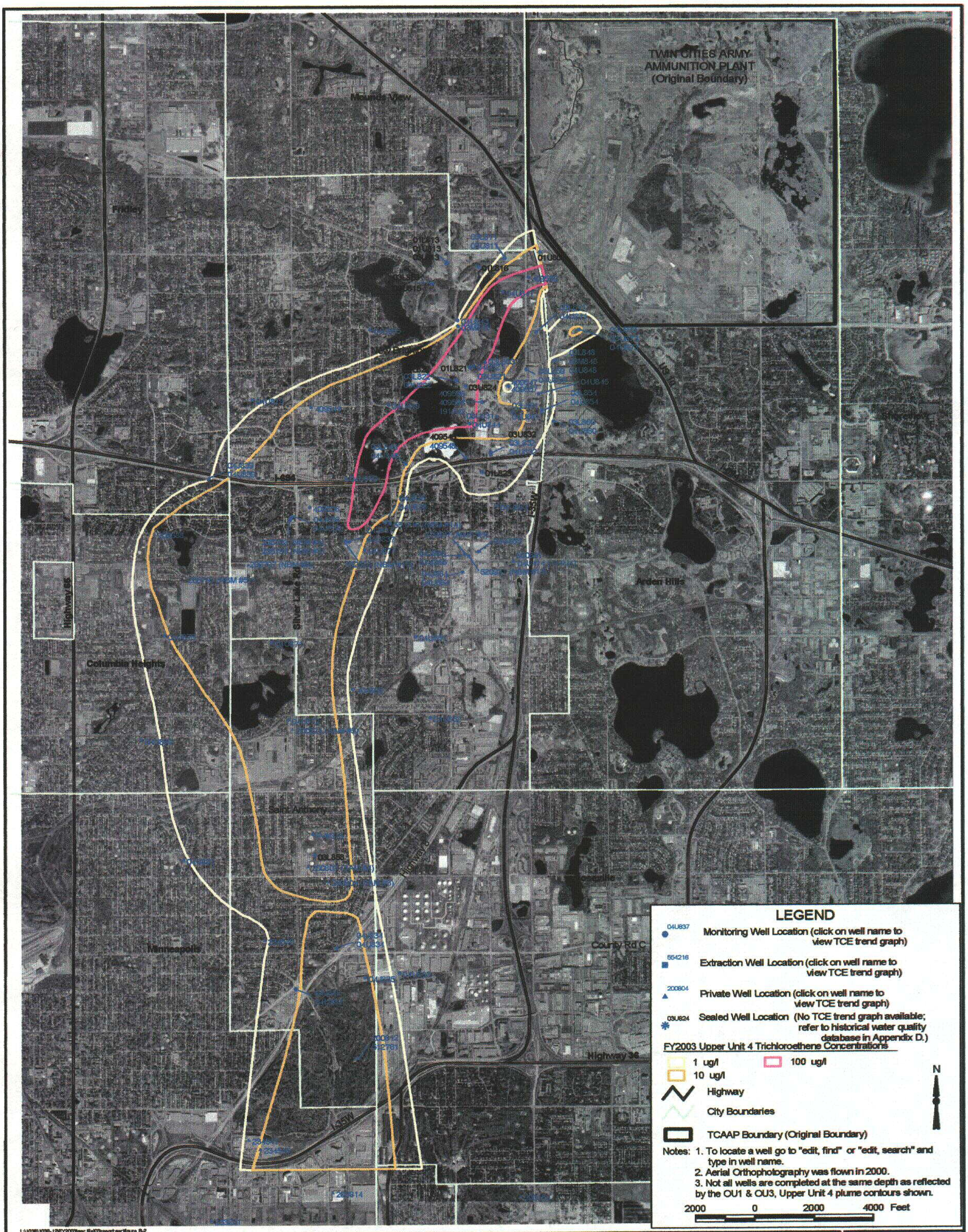
TCAAP Well Boring logs are include on this CD ROM as Table B-3 and Table B-4



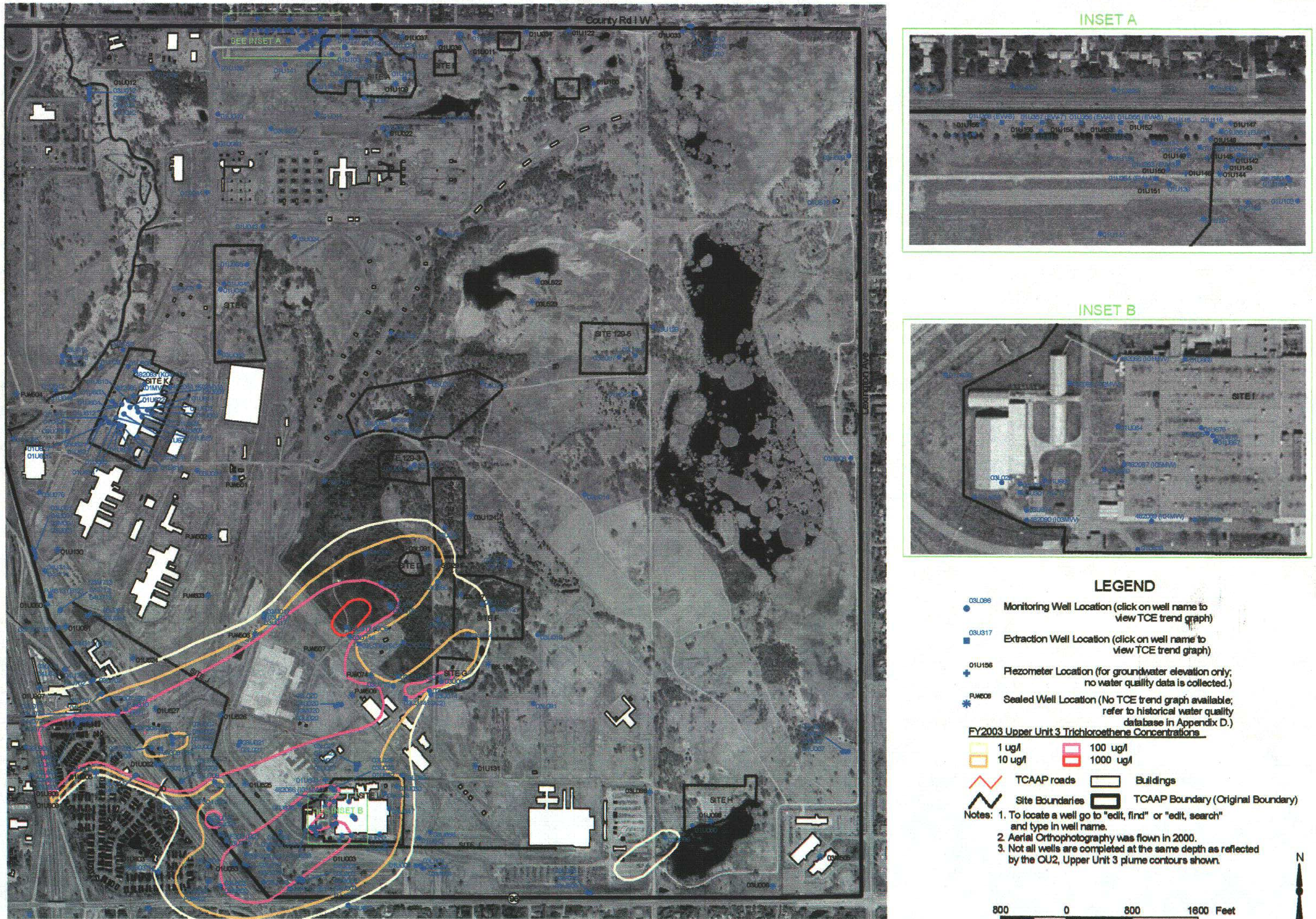
Twin Cities Army Ammunition Plant

Figure B-1

Conceptual Illustration of TCAAP Site Geology



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center, Maple Plain, MN 55359-0249	FY 2003
OU1 & OU3 Well Location and TCE History Map		Figure B-2



TWIN CITIES ARMY AMMUNITION PLANT

OU2 Well Location and TCE History Map

Wenck

Wenck Associates, Inc.
Environmental Engineers
1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2003

Figure B-3

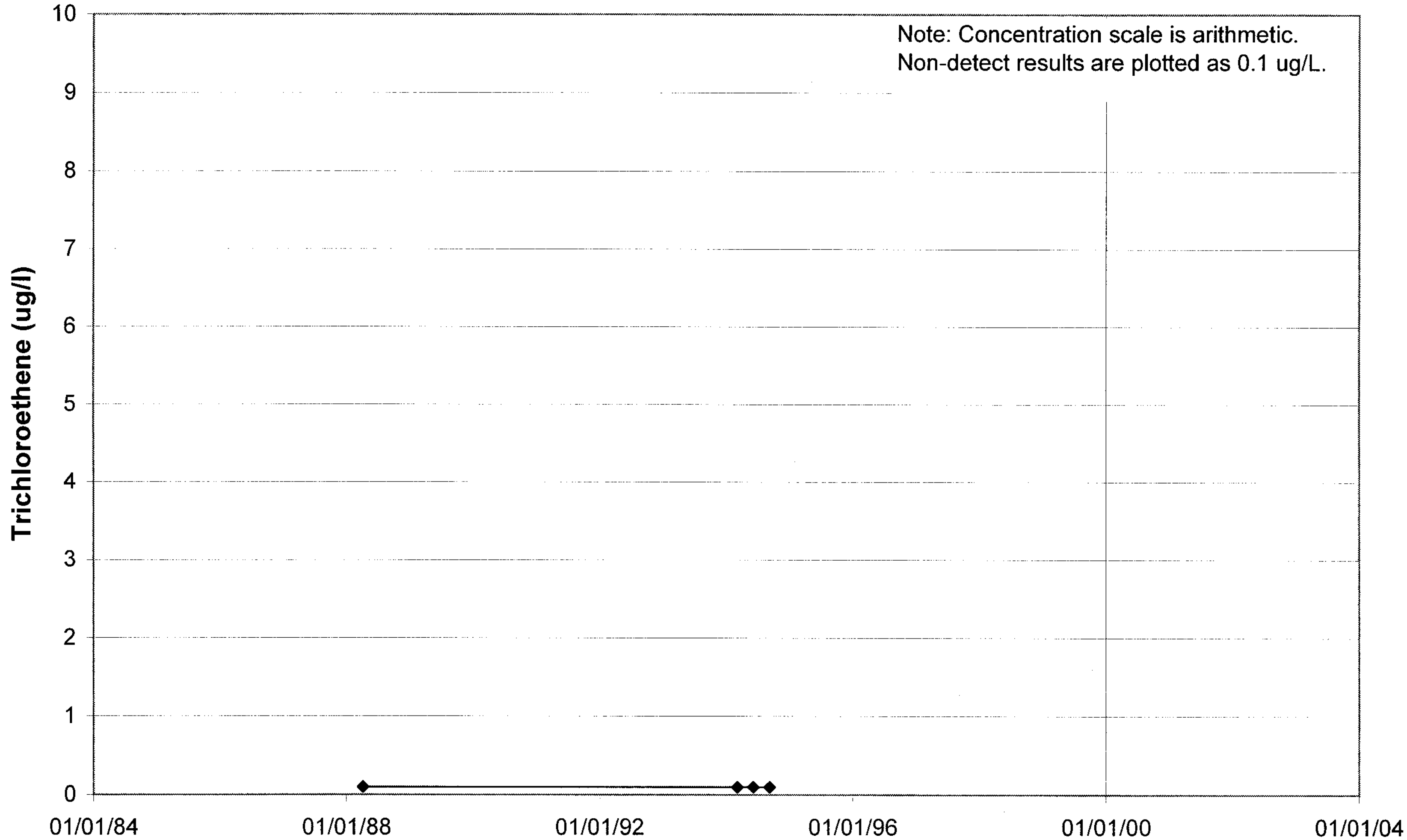
Trend Graph Not Available,
Well No Longer Routinely Sampled

TO RETURN TO MAP: Click on "Go to Previous View" Button in the Tool Bar

Monitoring Well Has Been Sealed

TO RETURN TO MAP: Click on "Go to Previous View" Button in the Tool Bar

01U038



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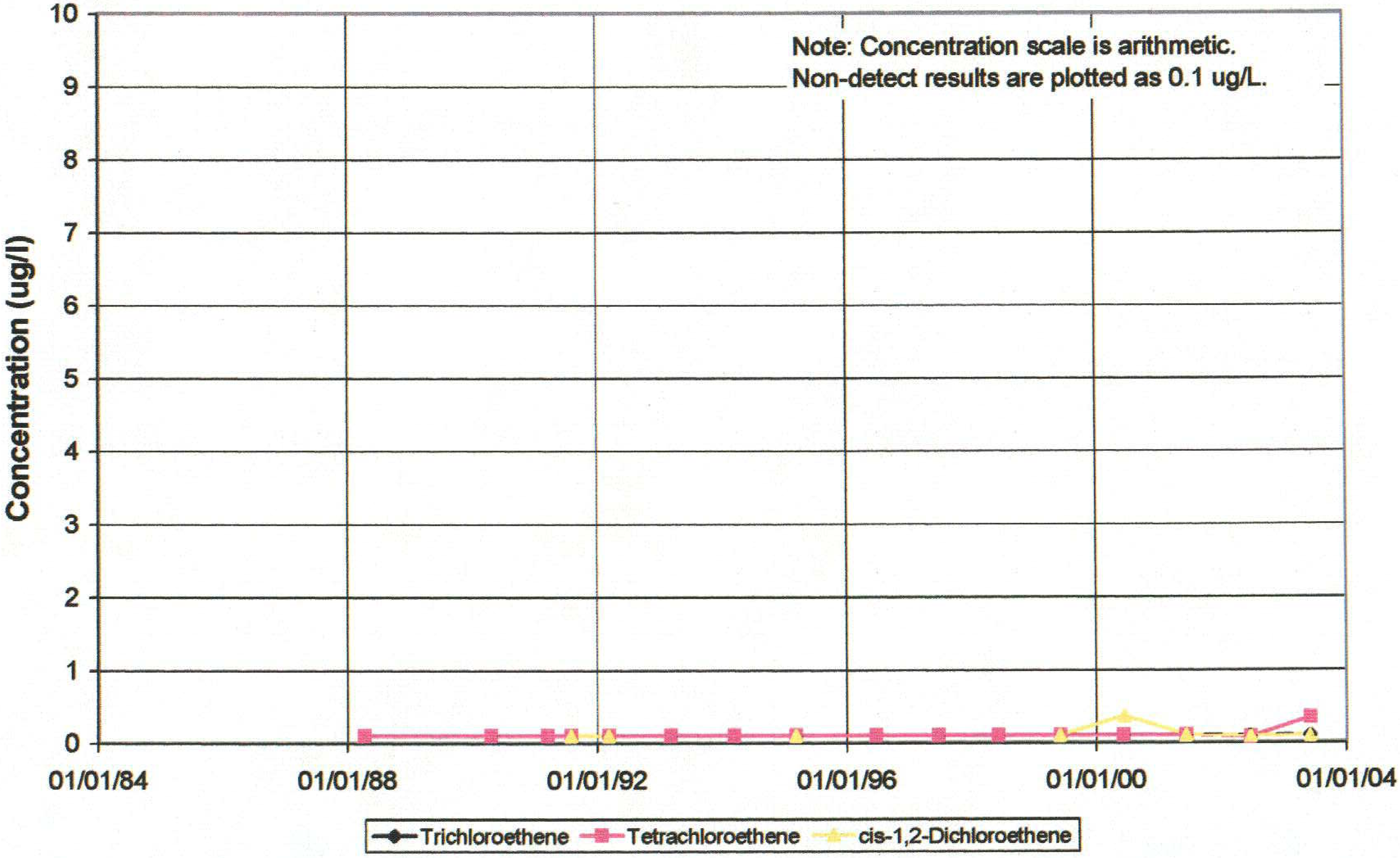

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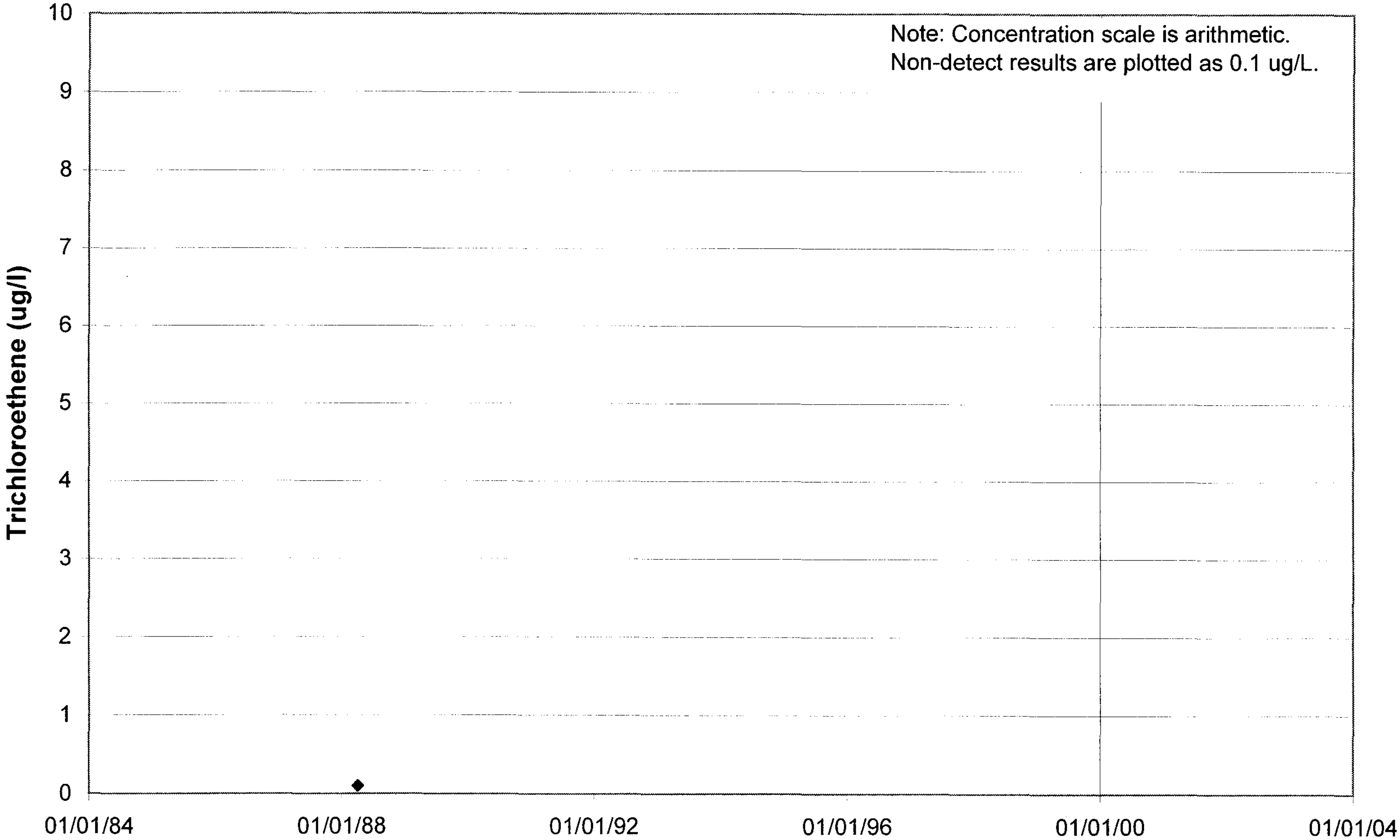

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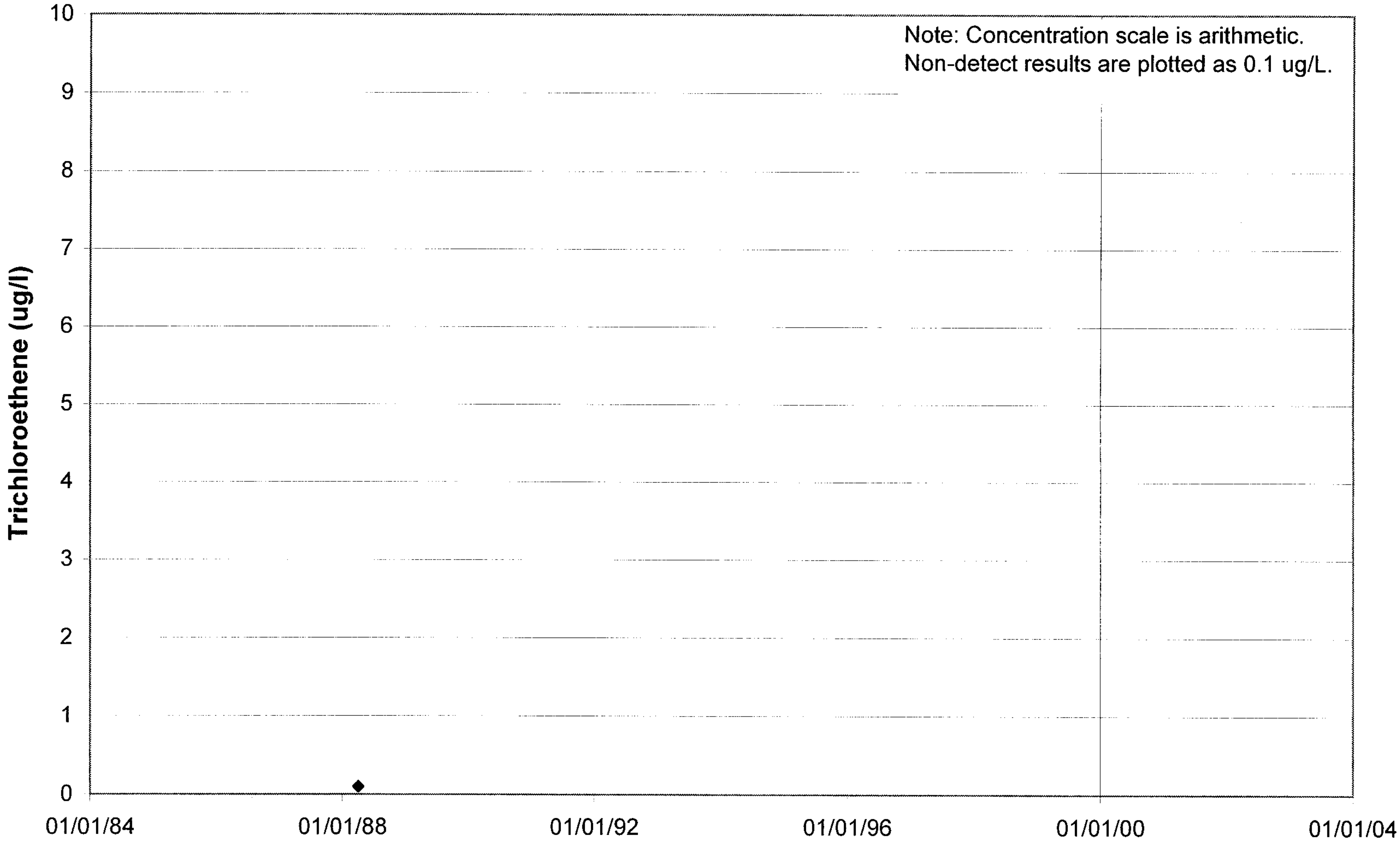

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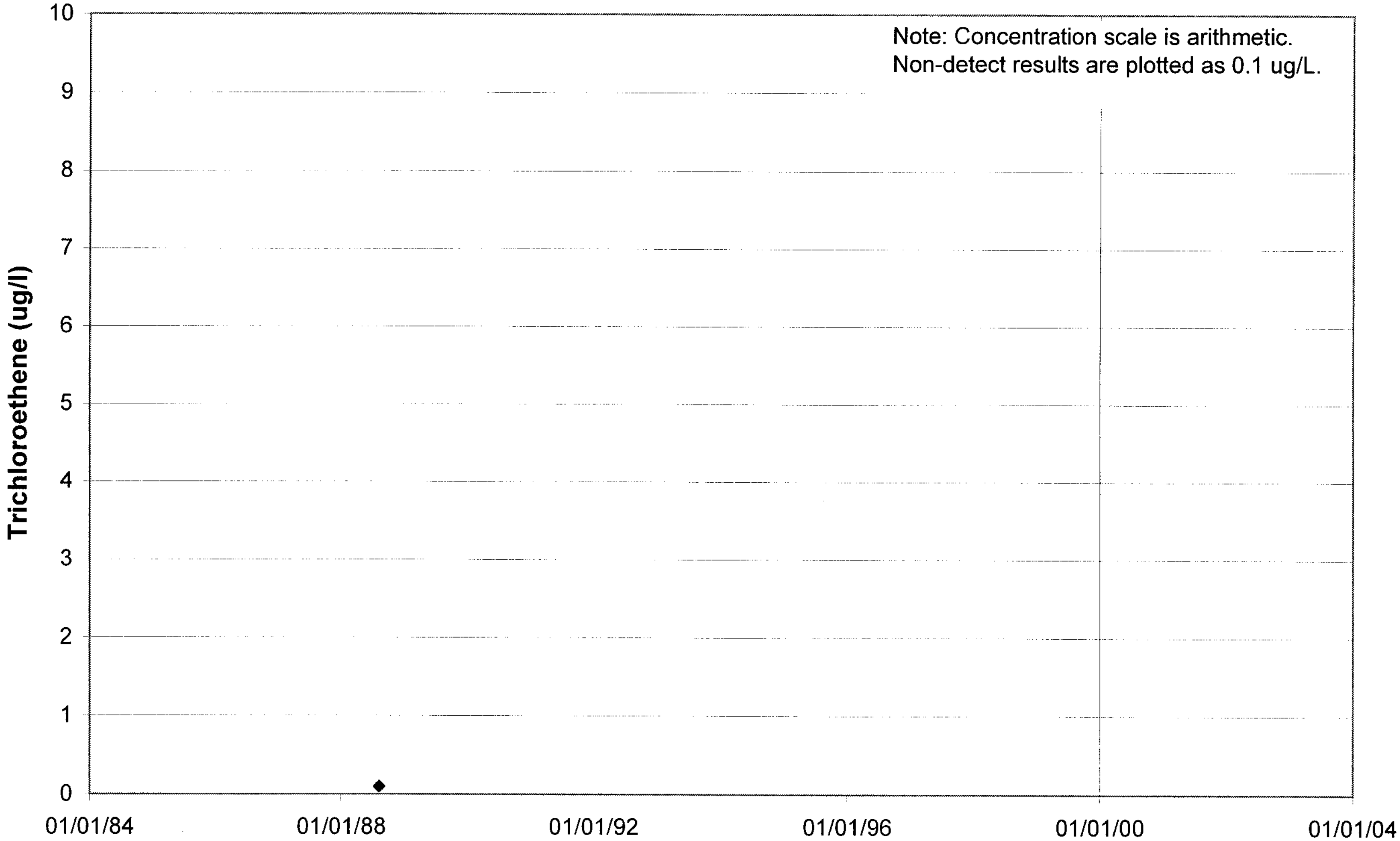

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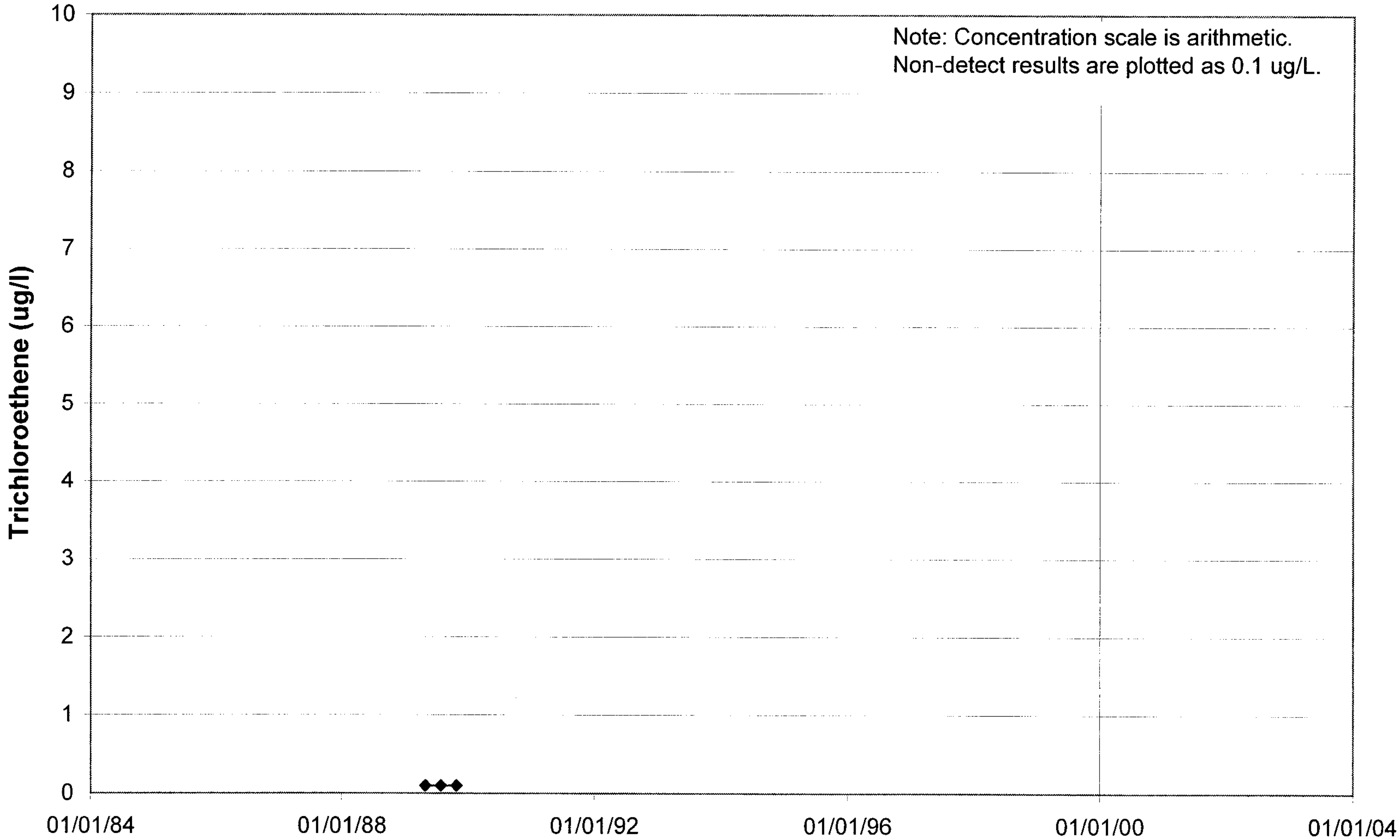

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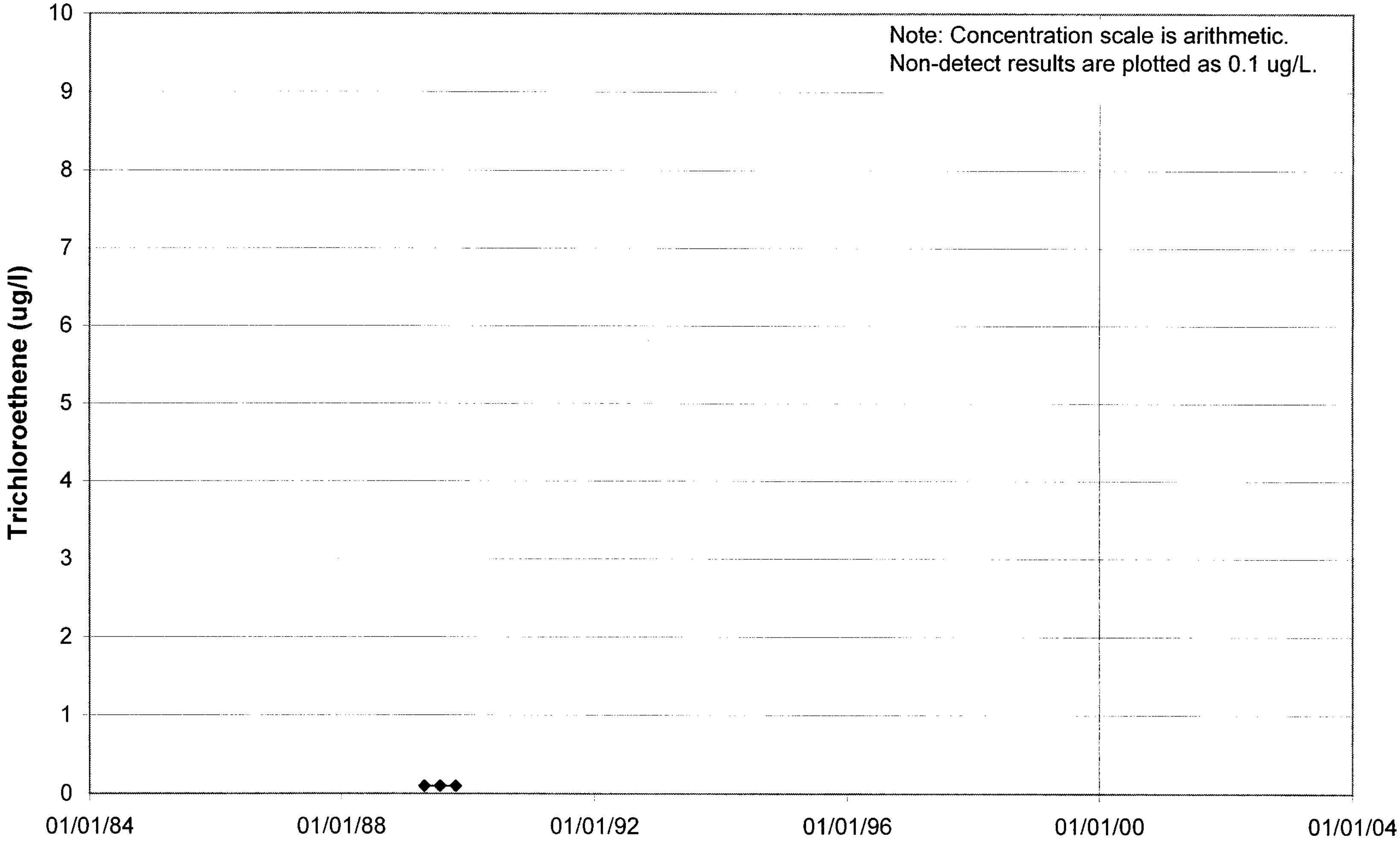

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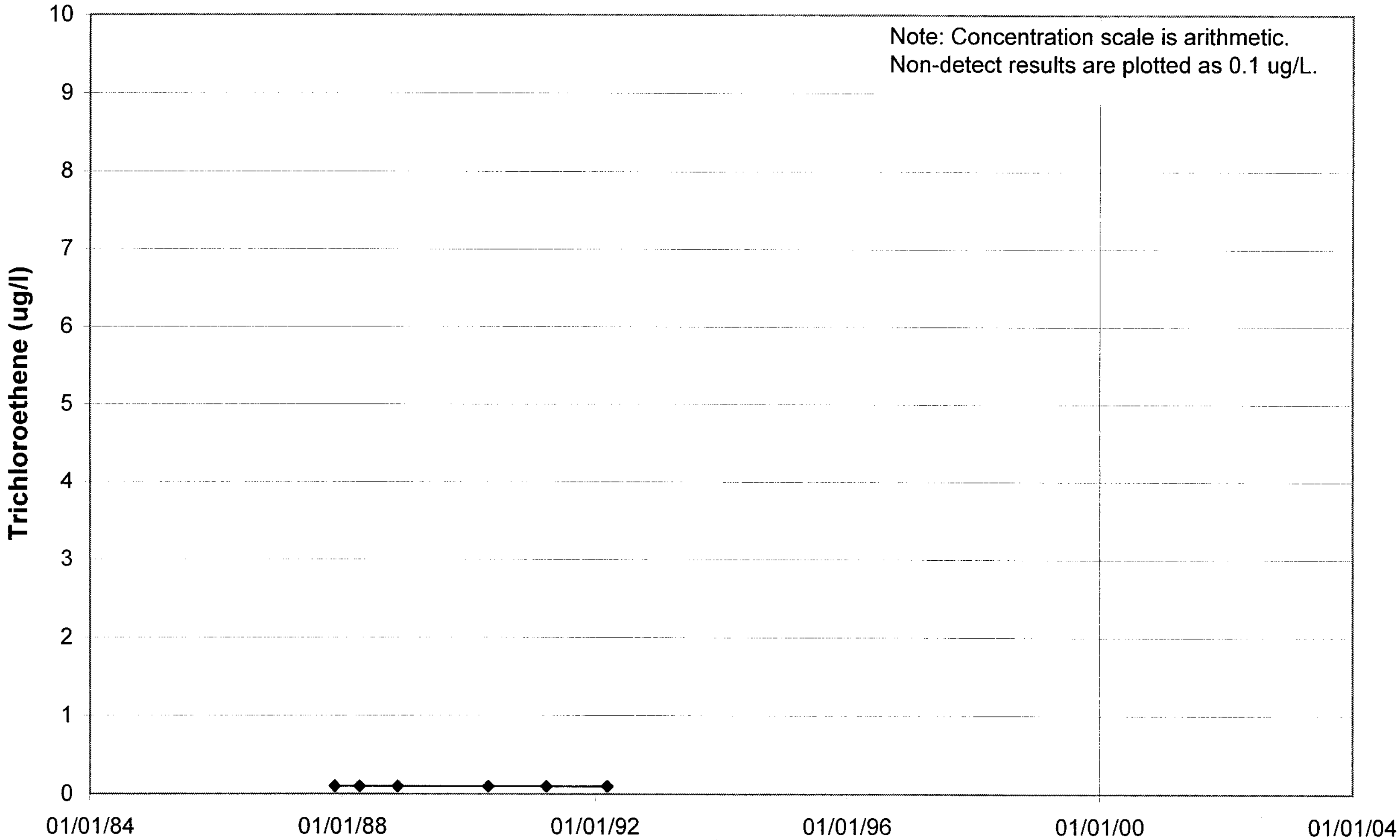

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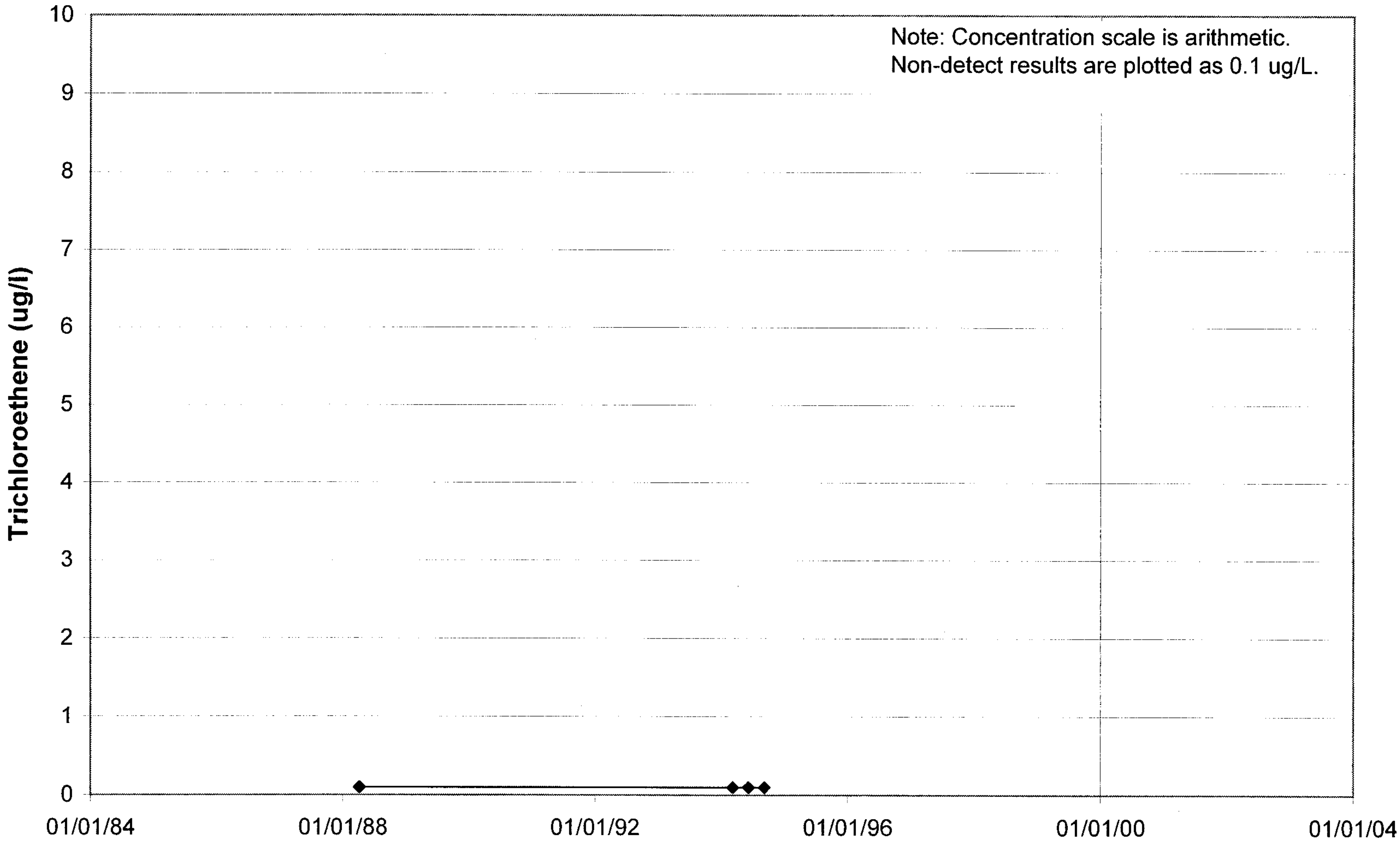

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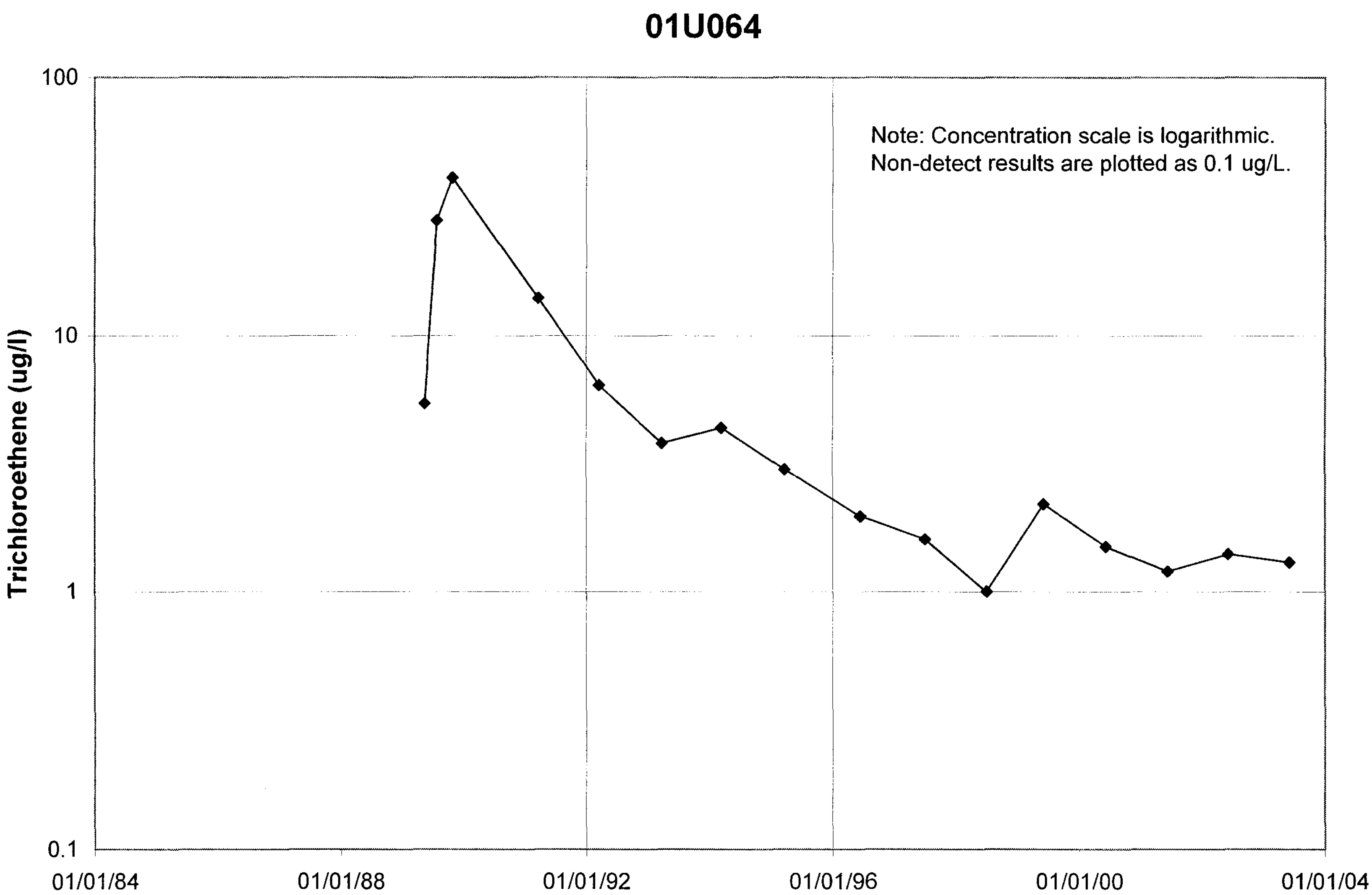

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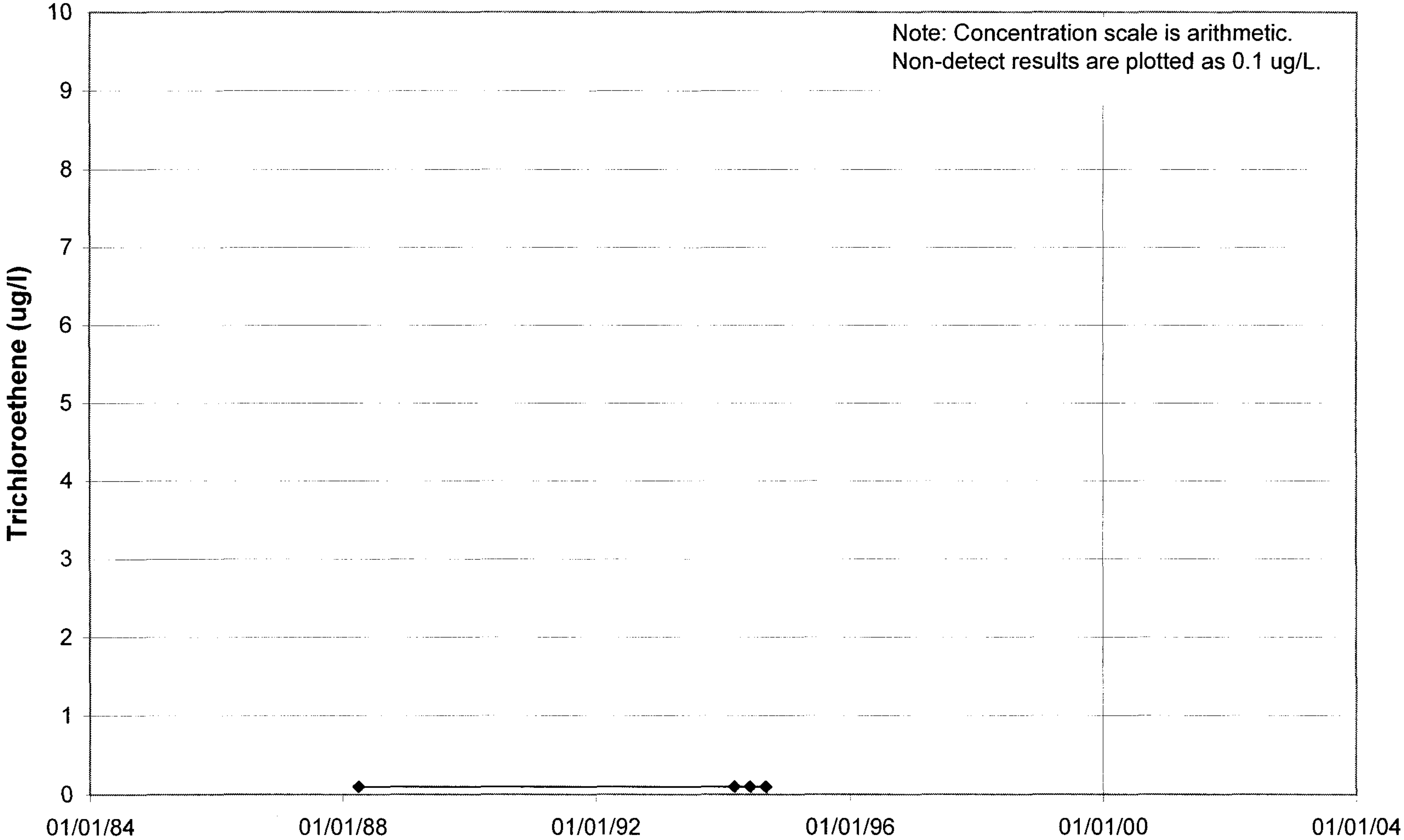

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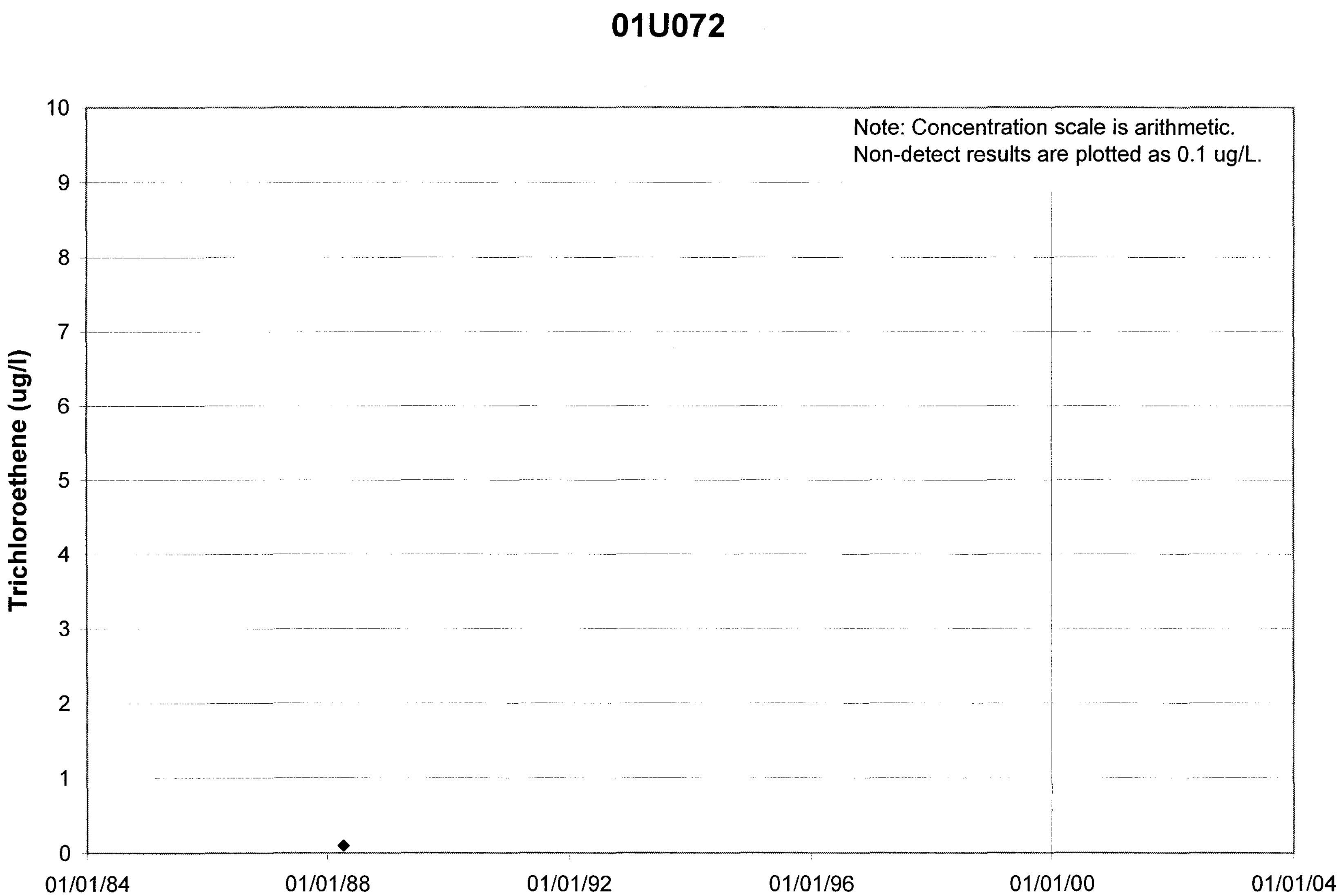

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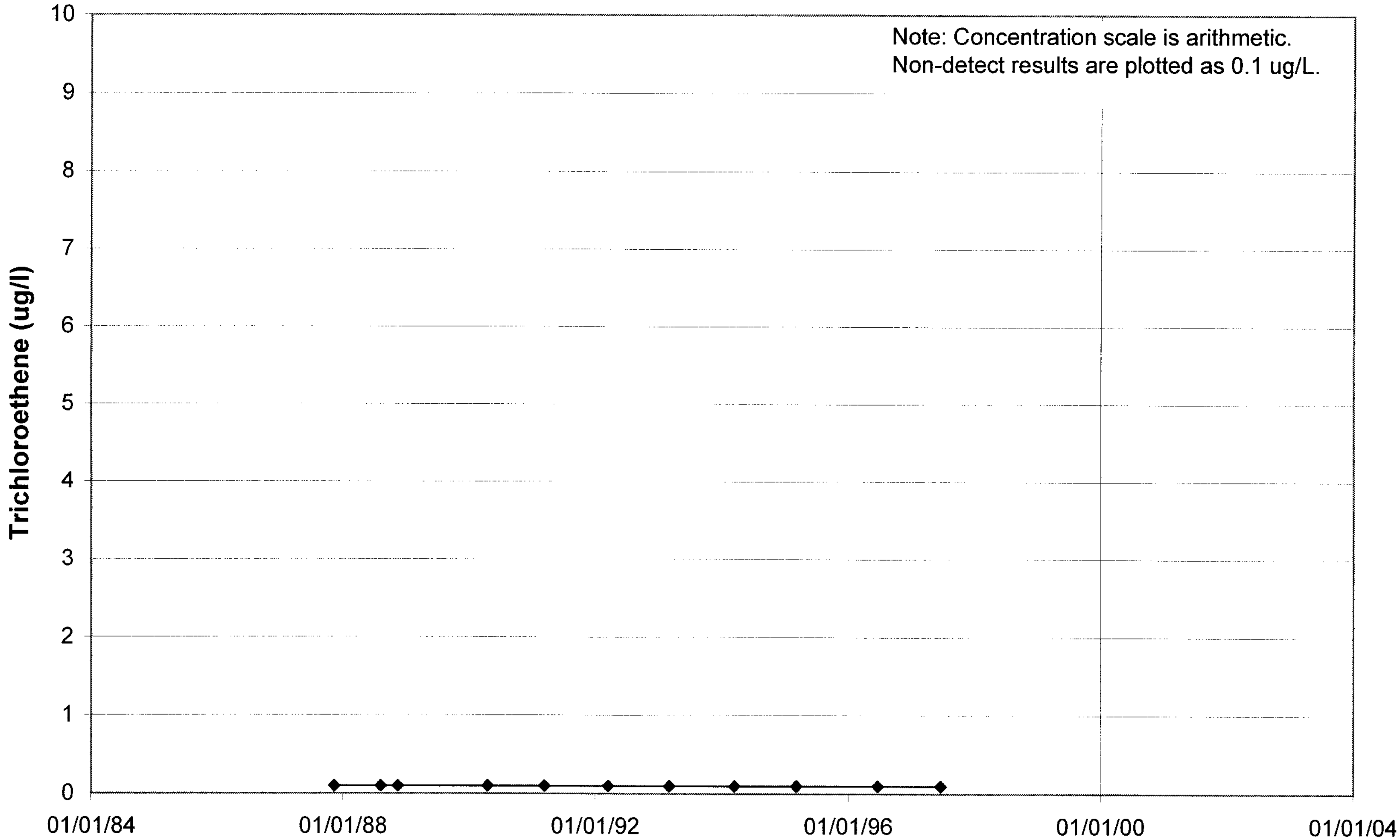

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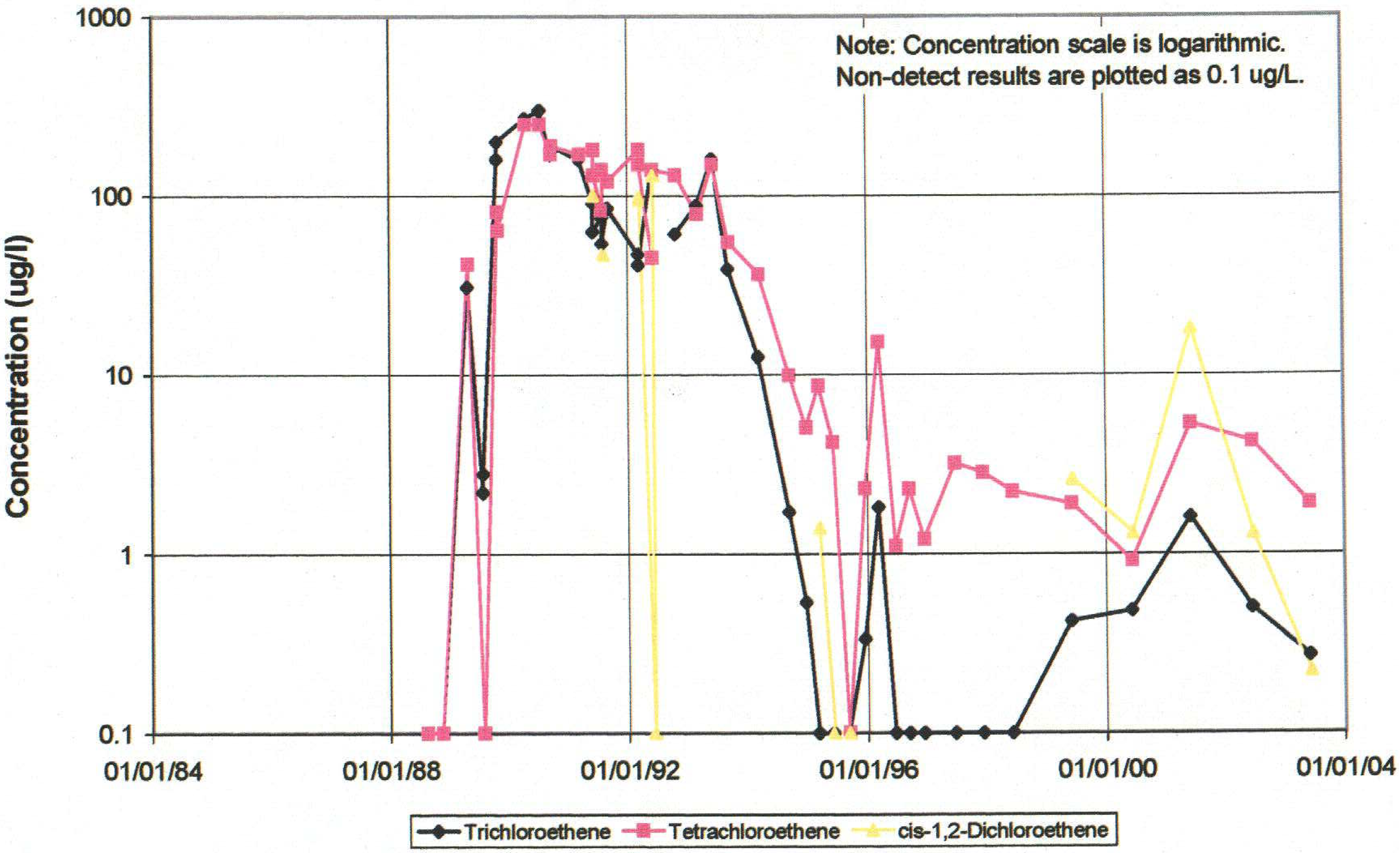
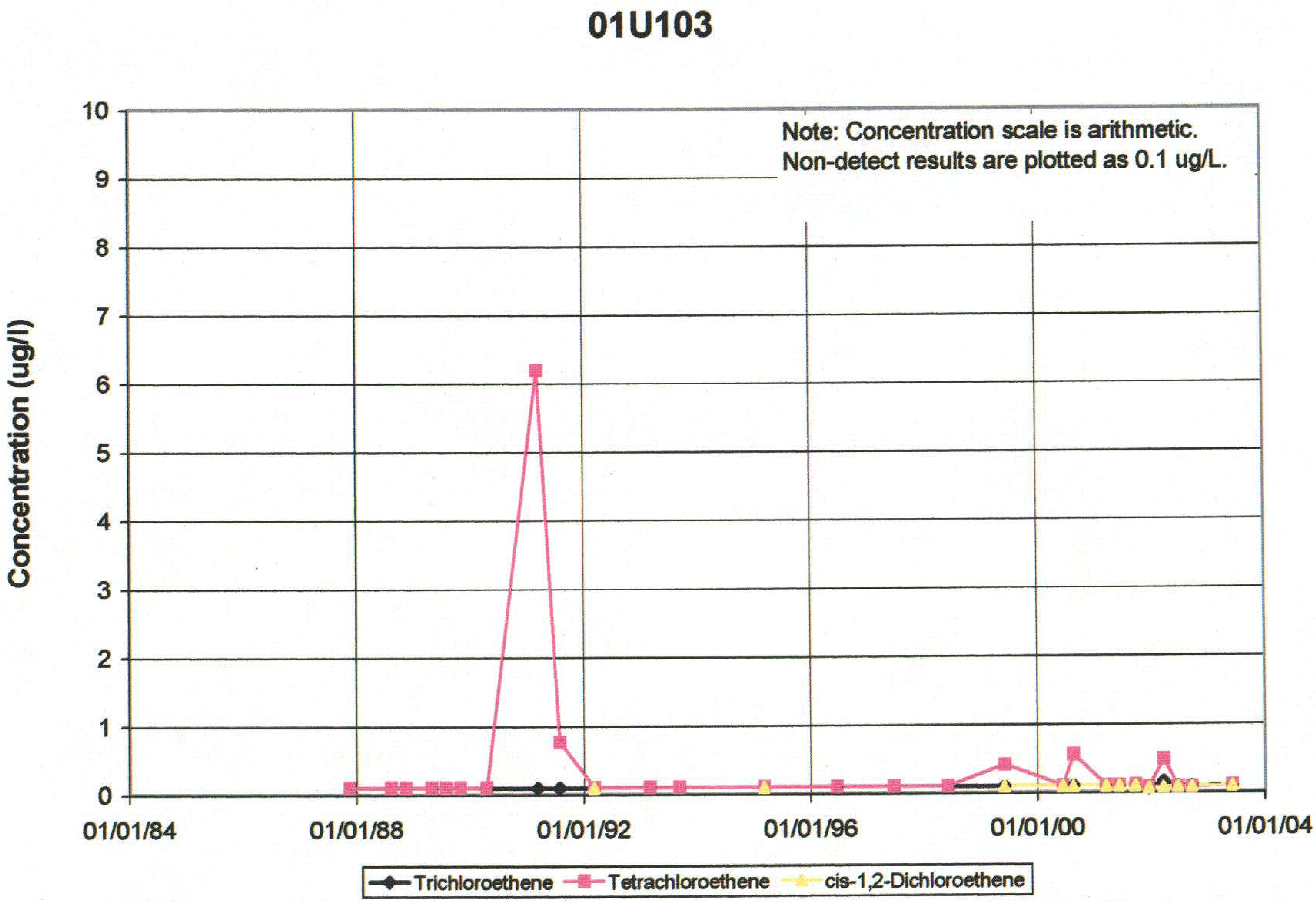


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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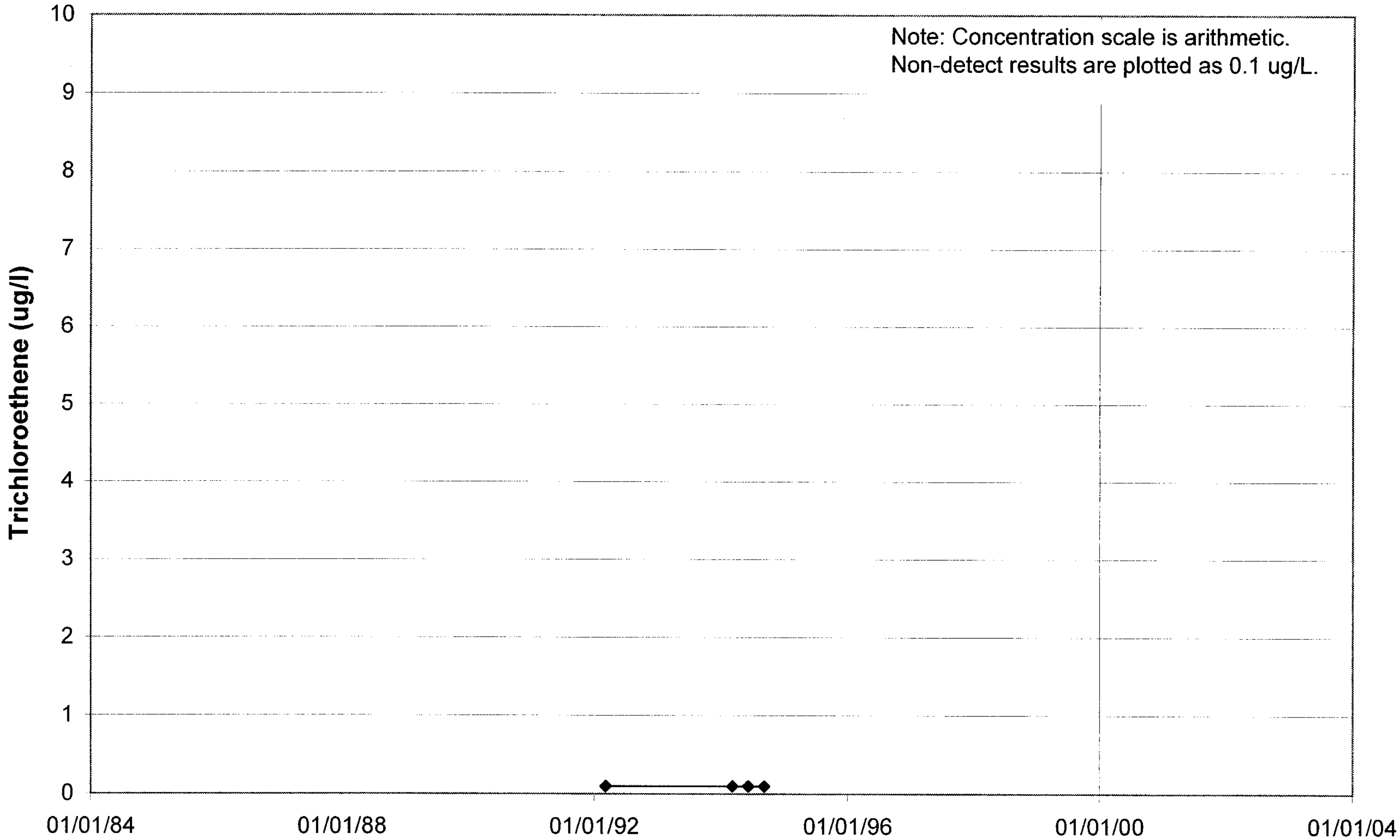

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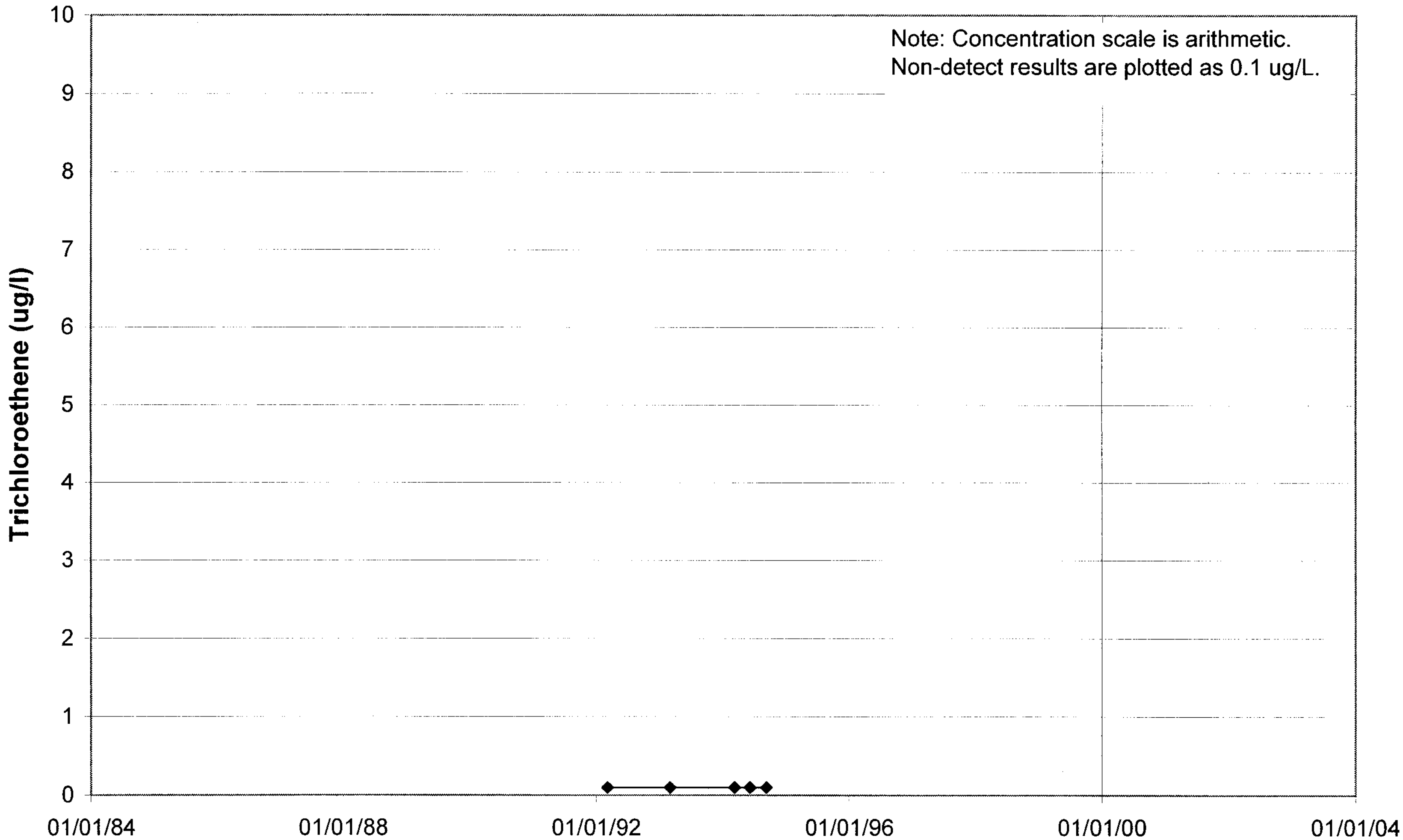
01U105



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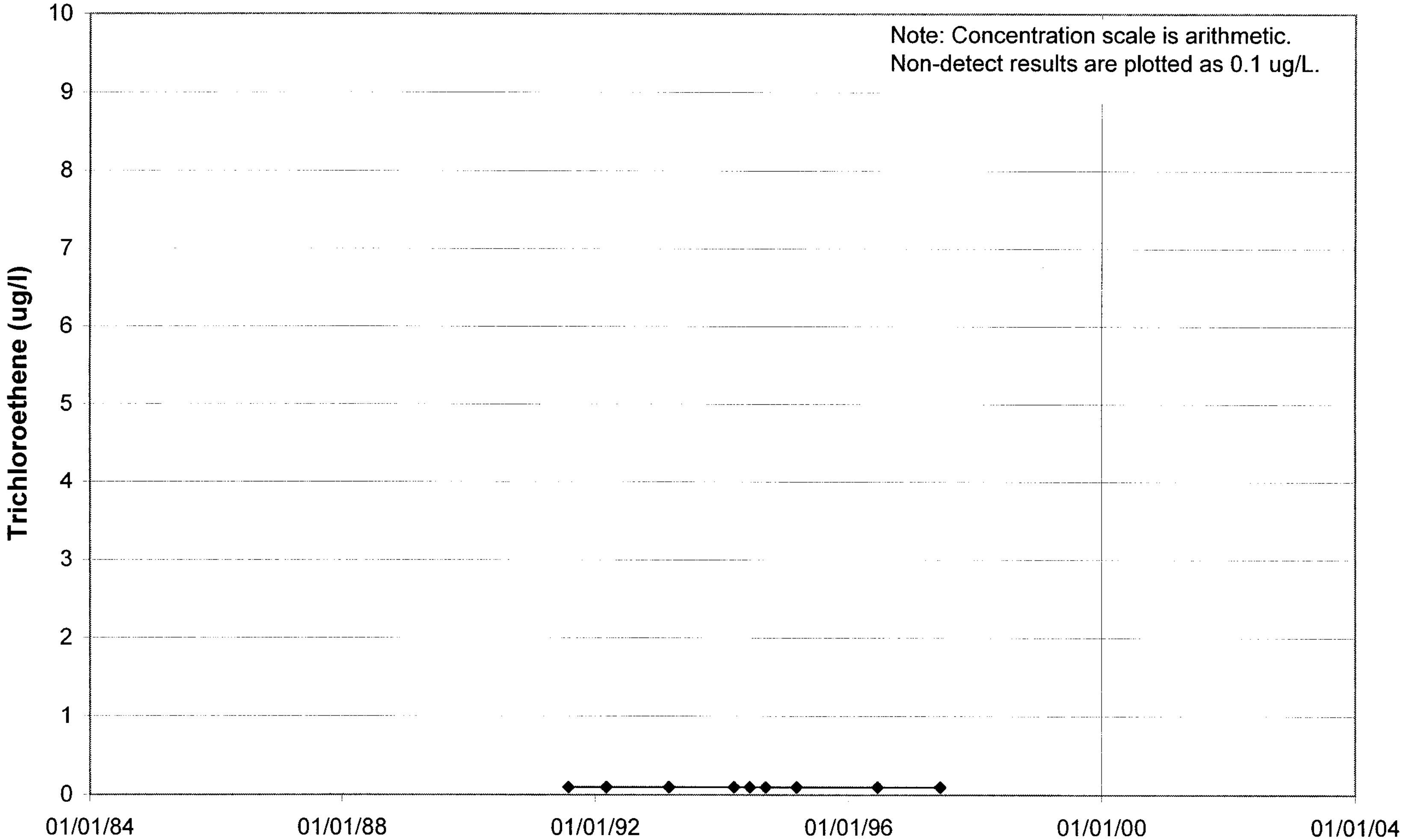

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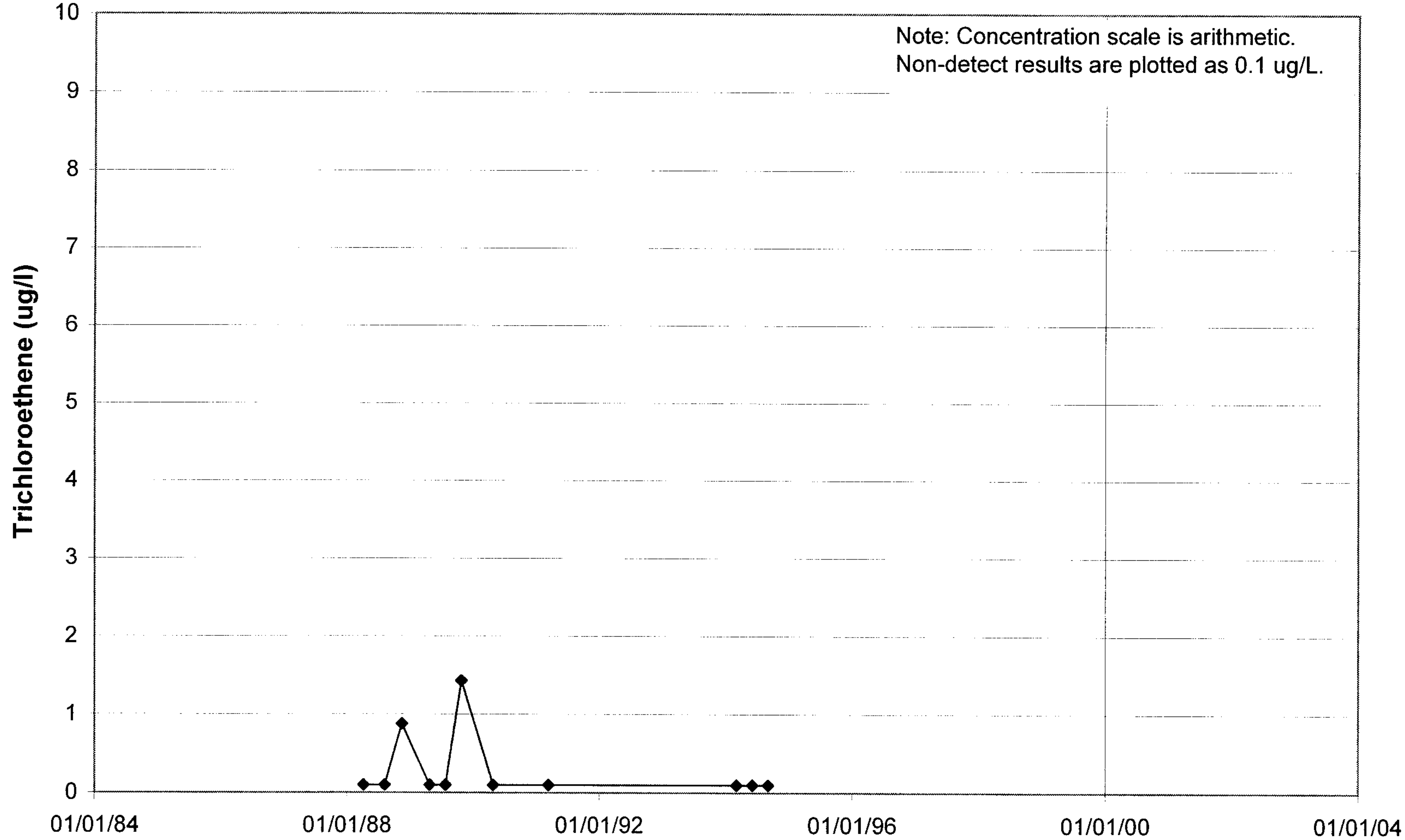

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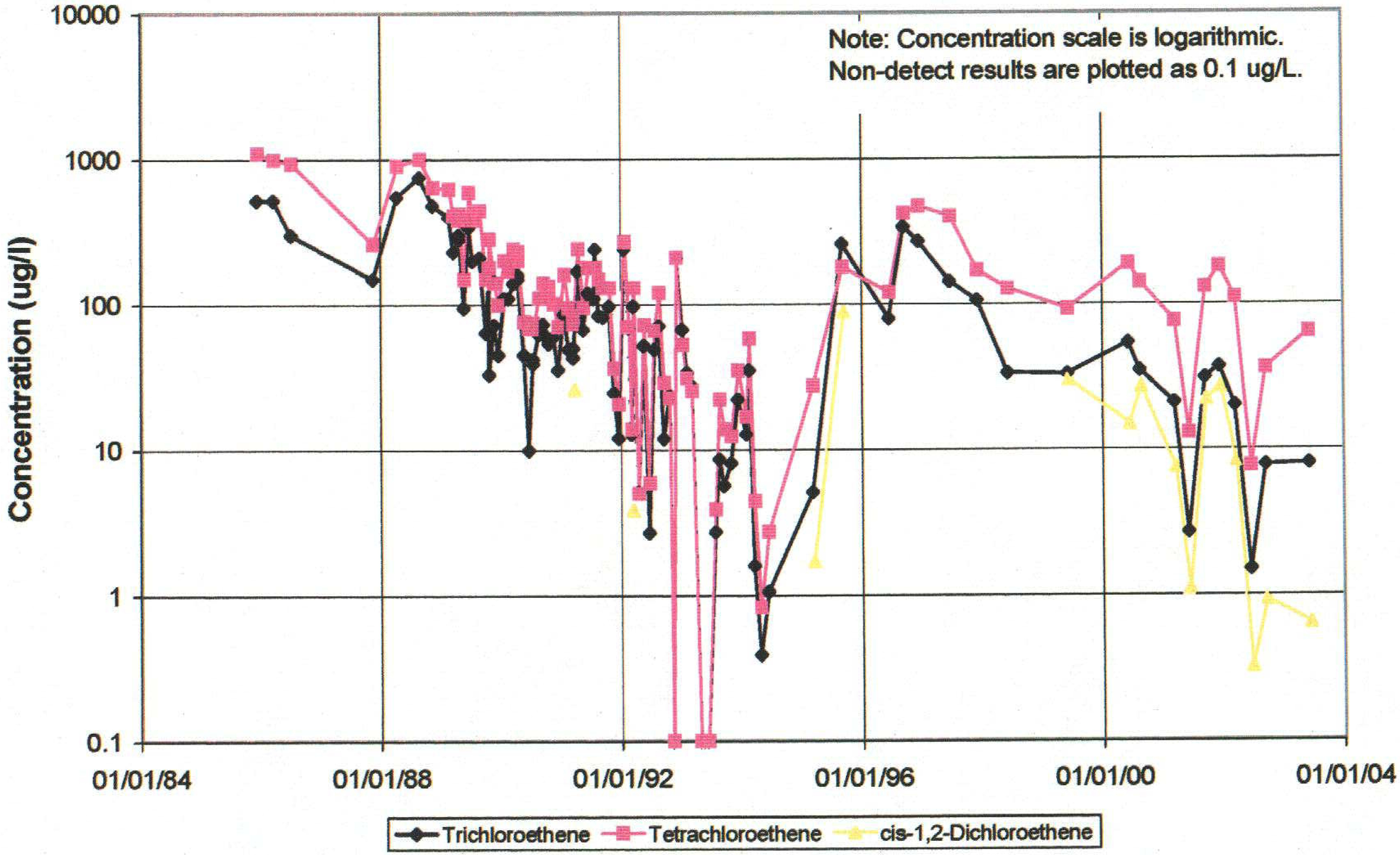

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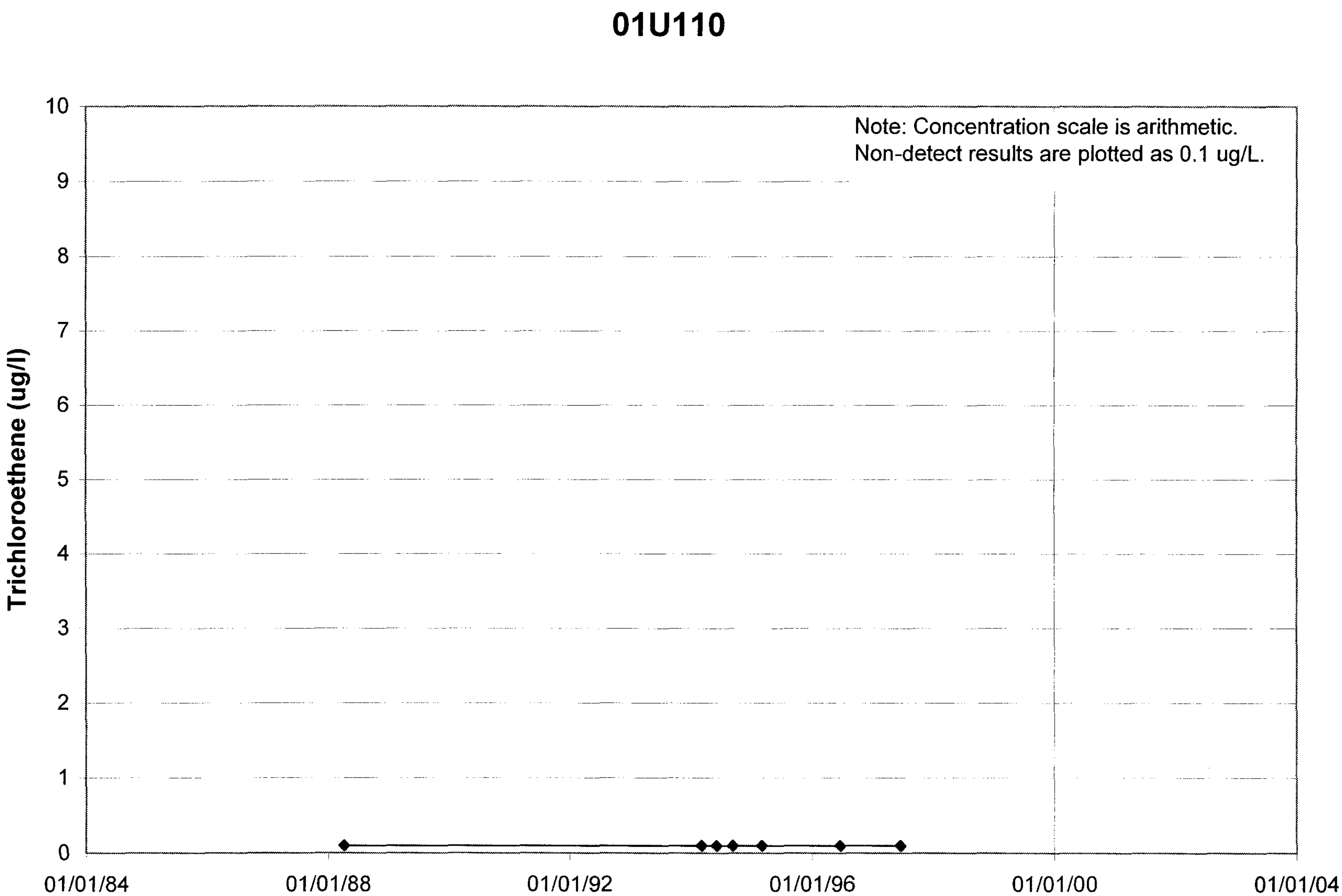

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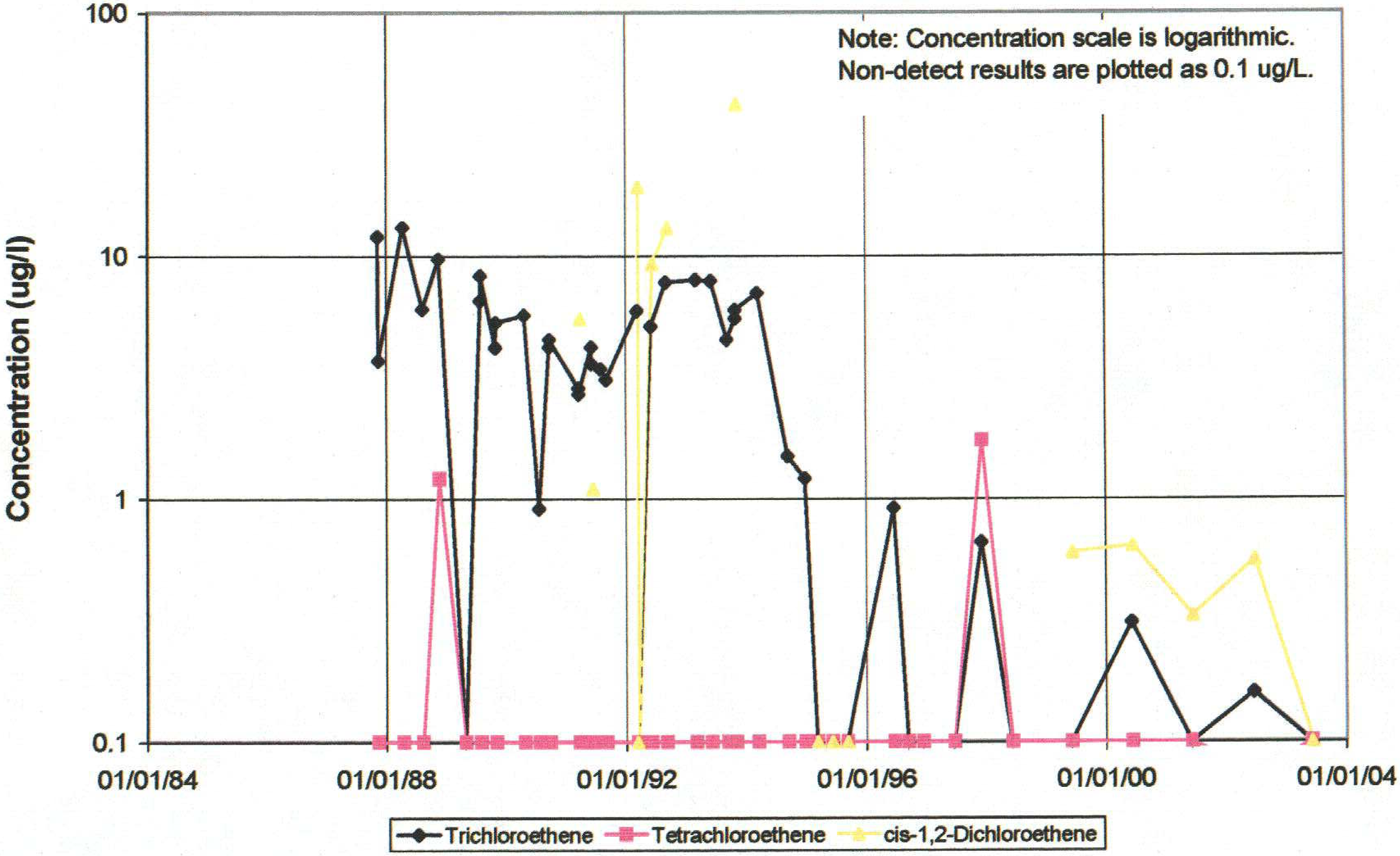

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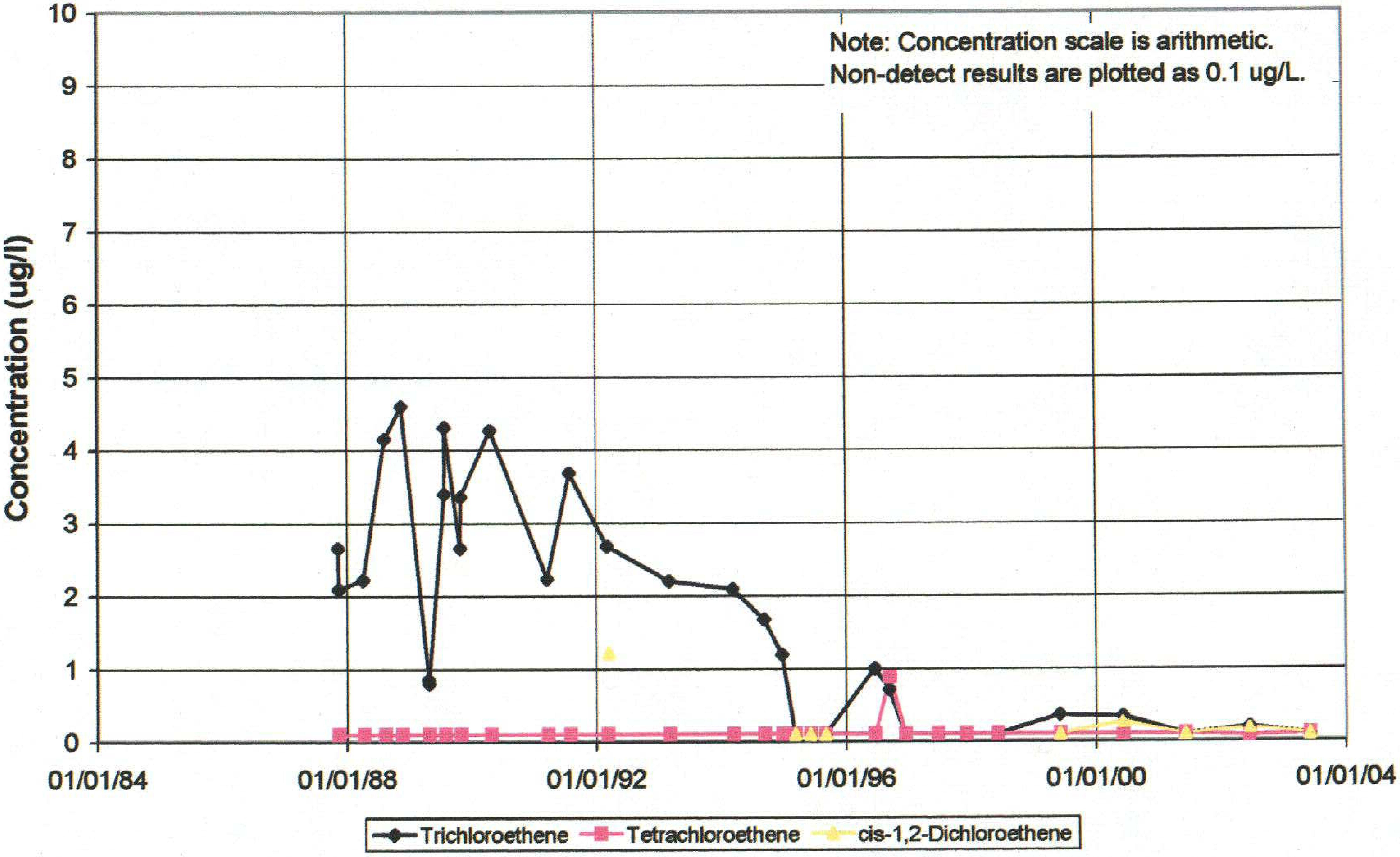

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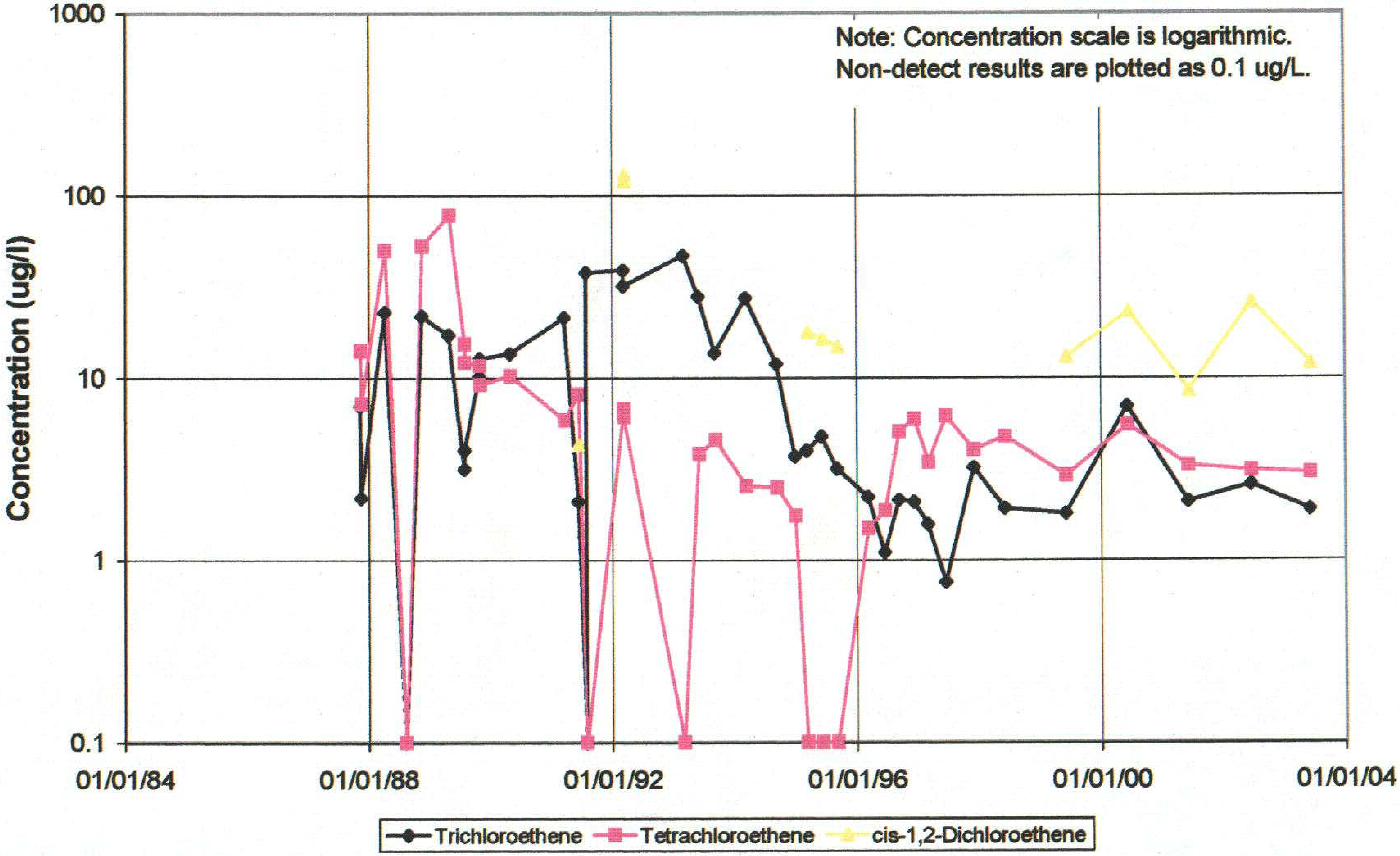

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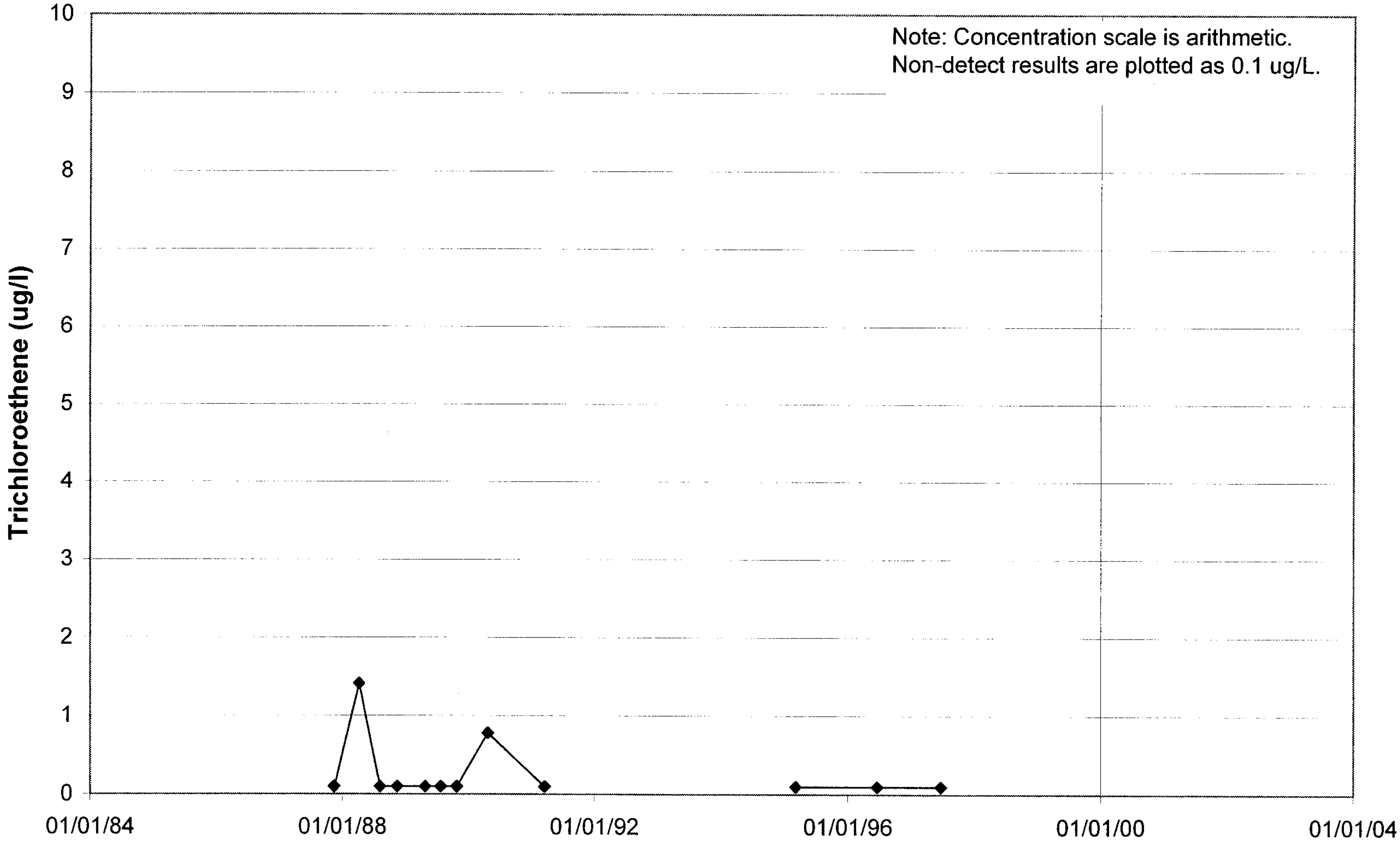

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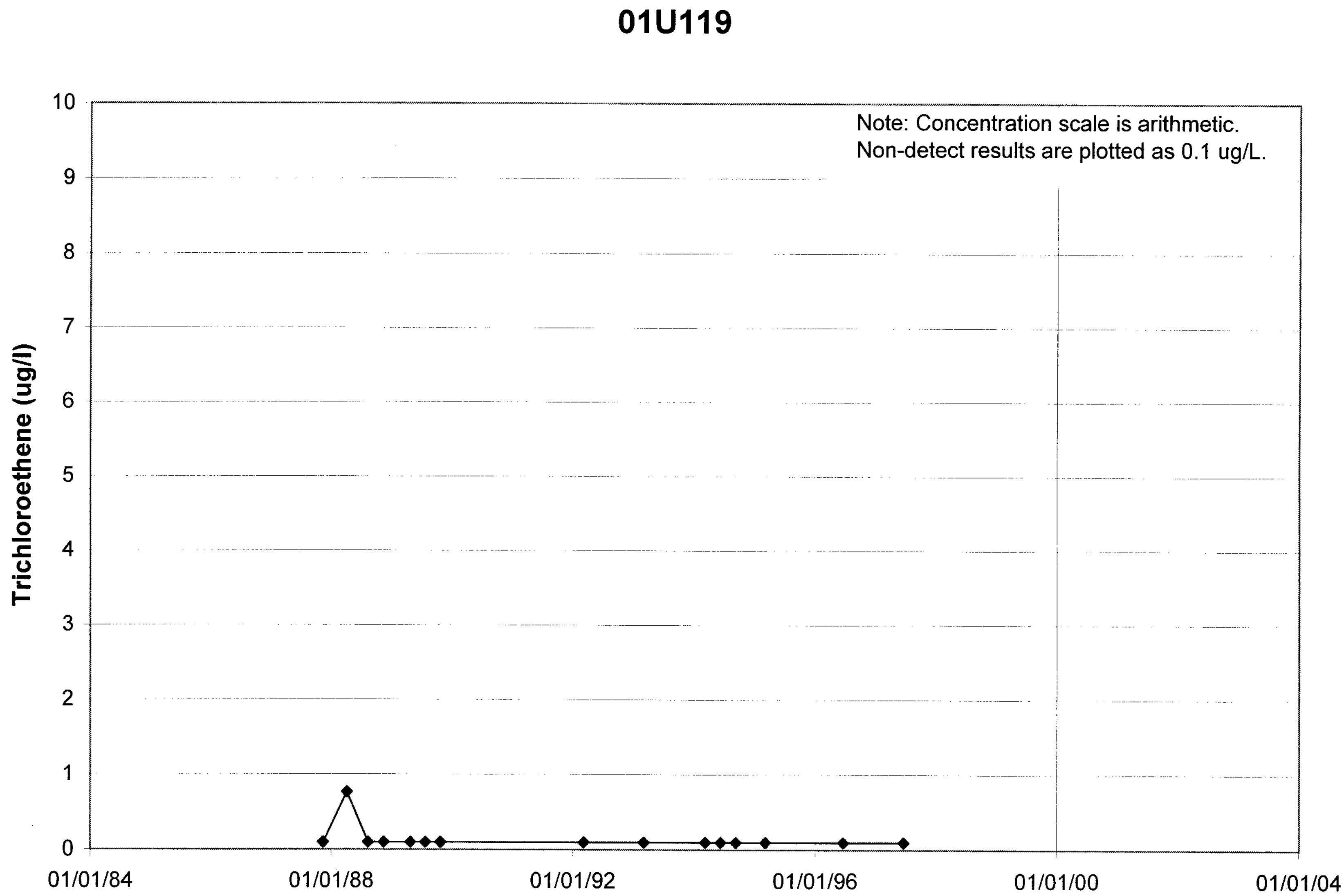

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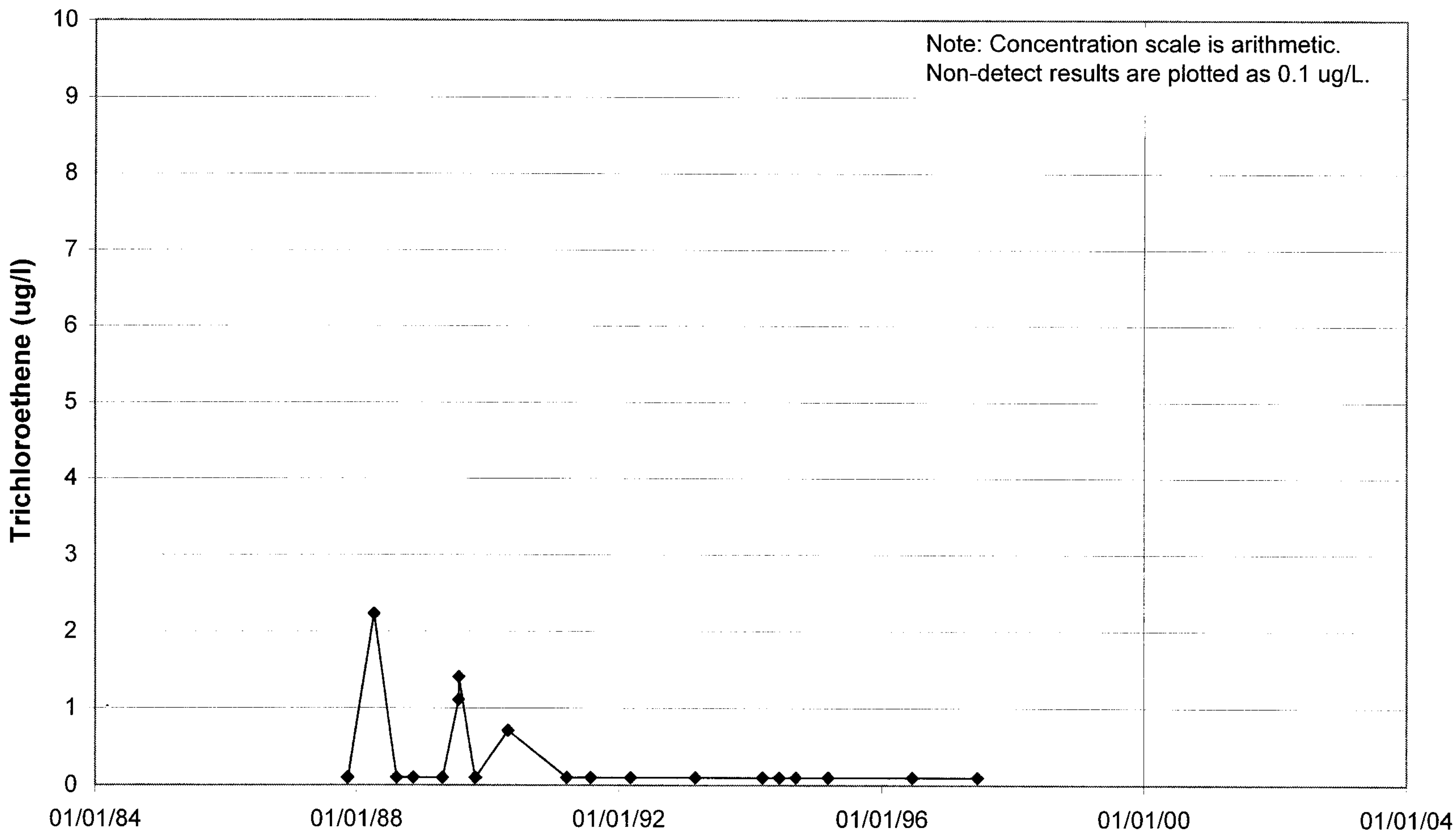

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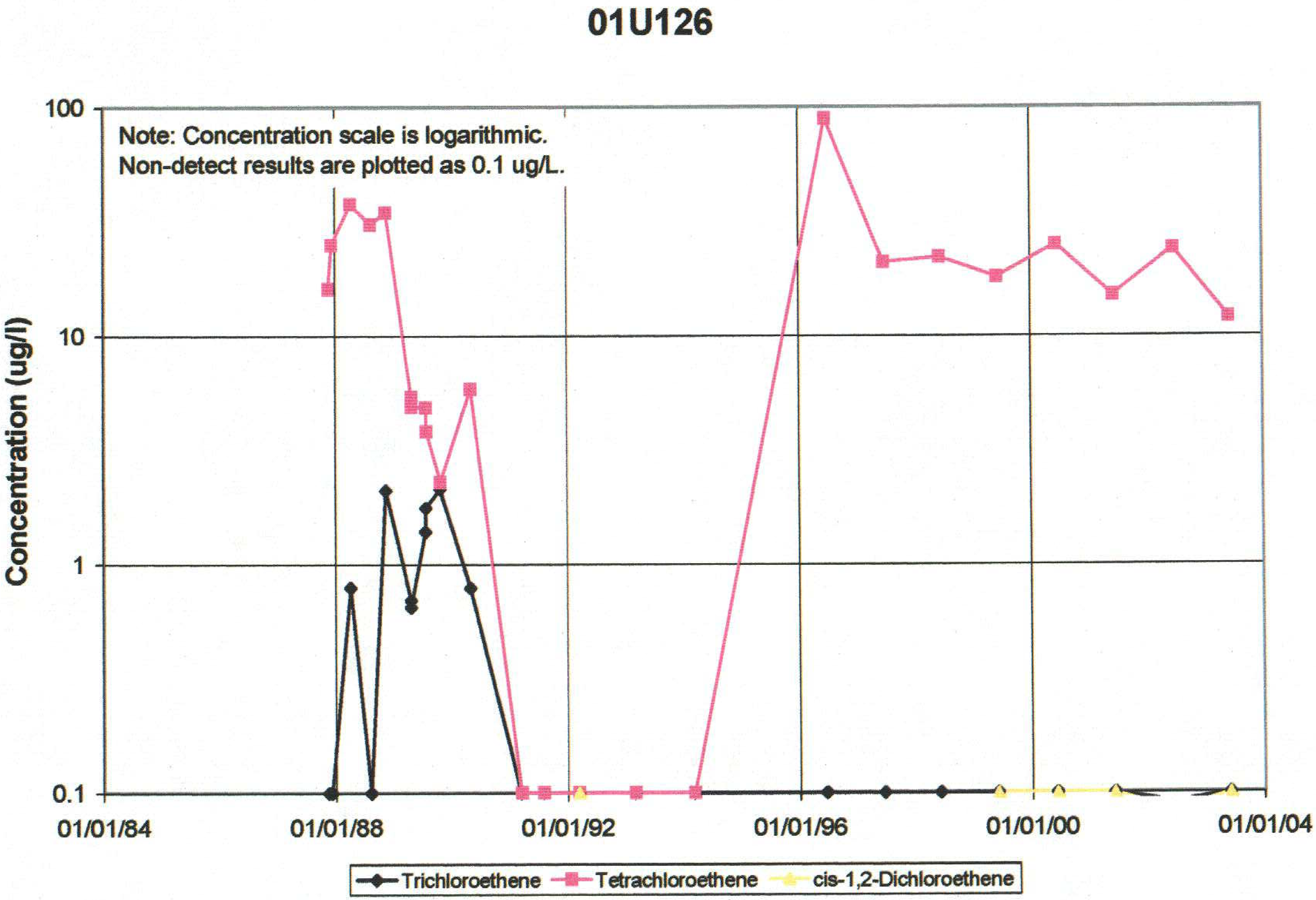

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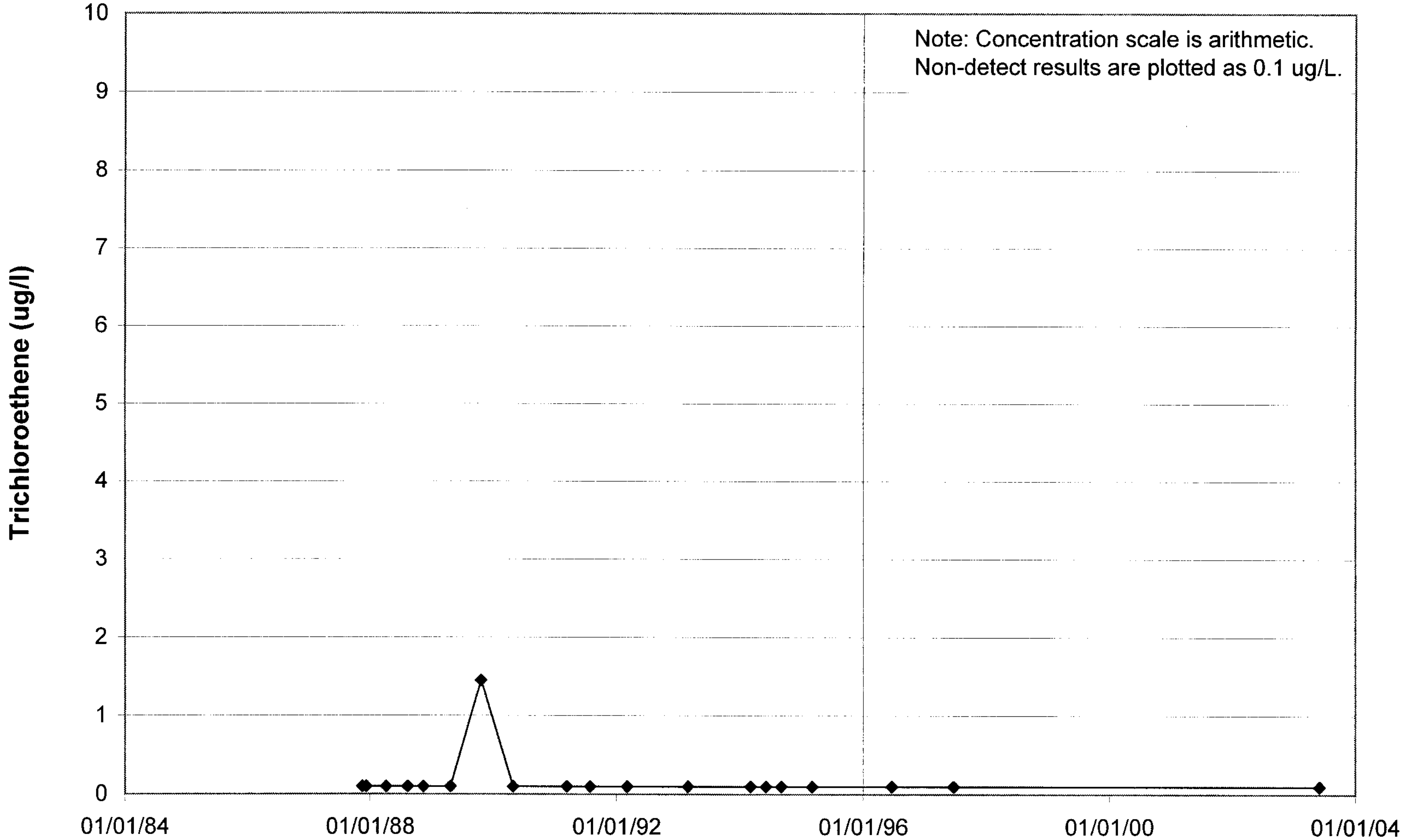

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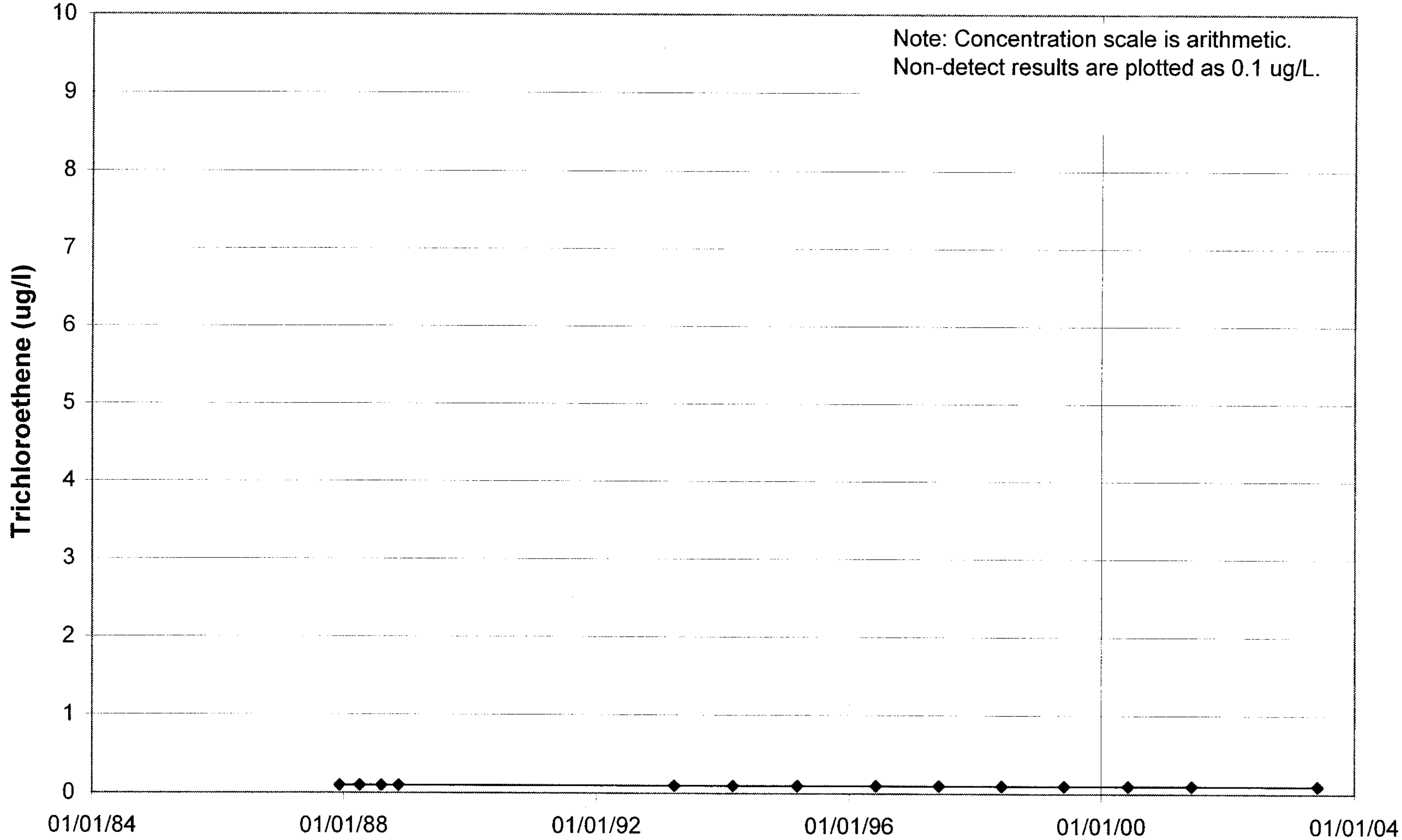

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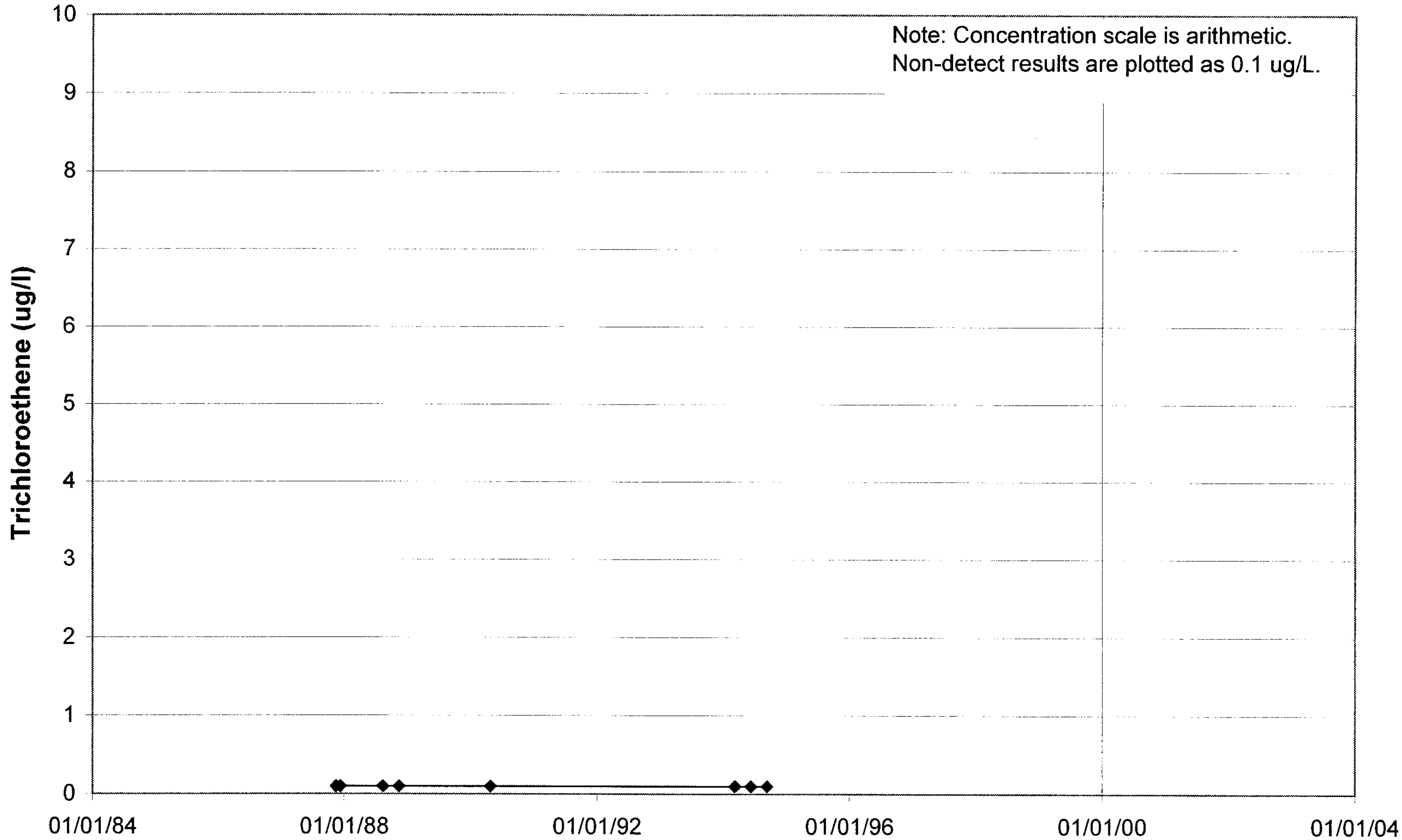

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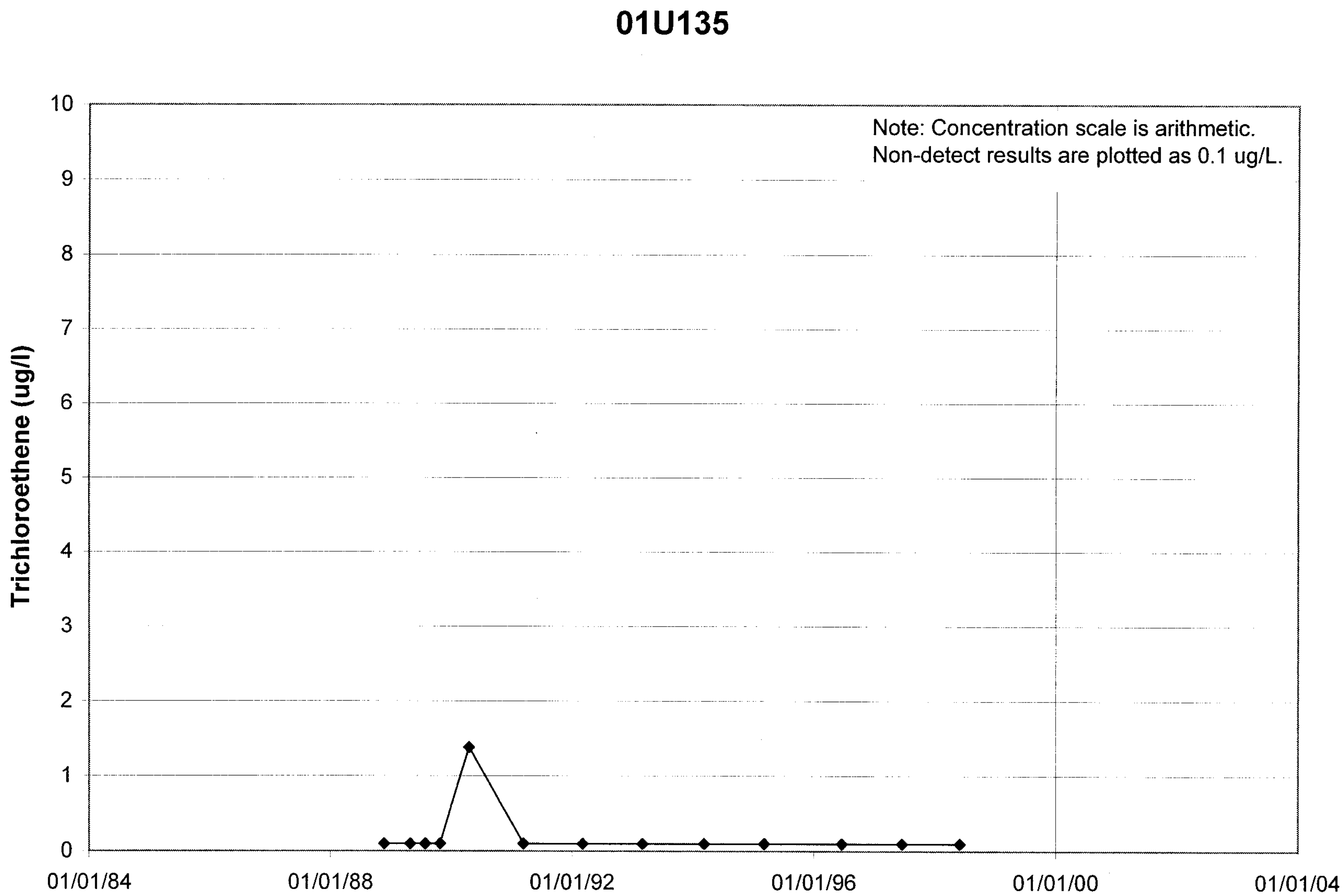

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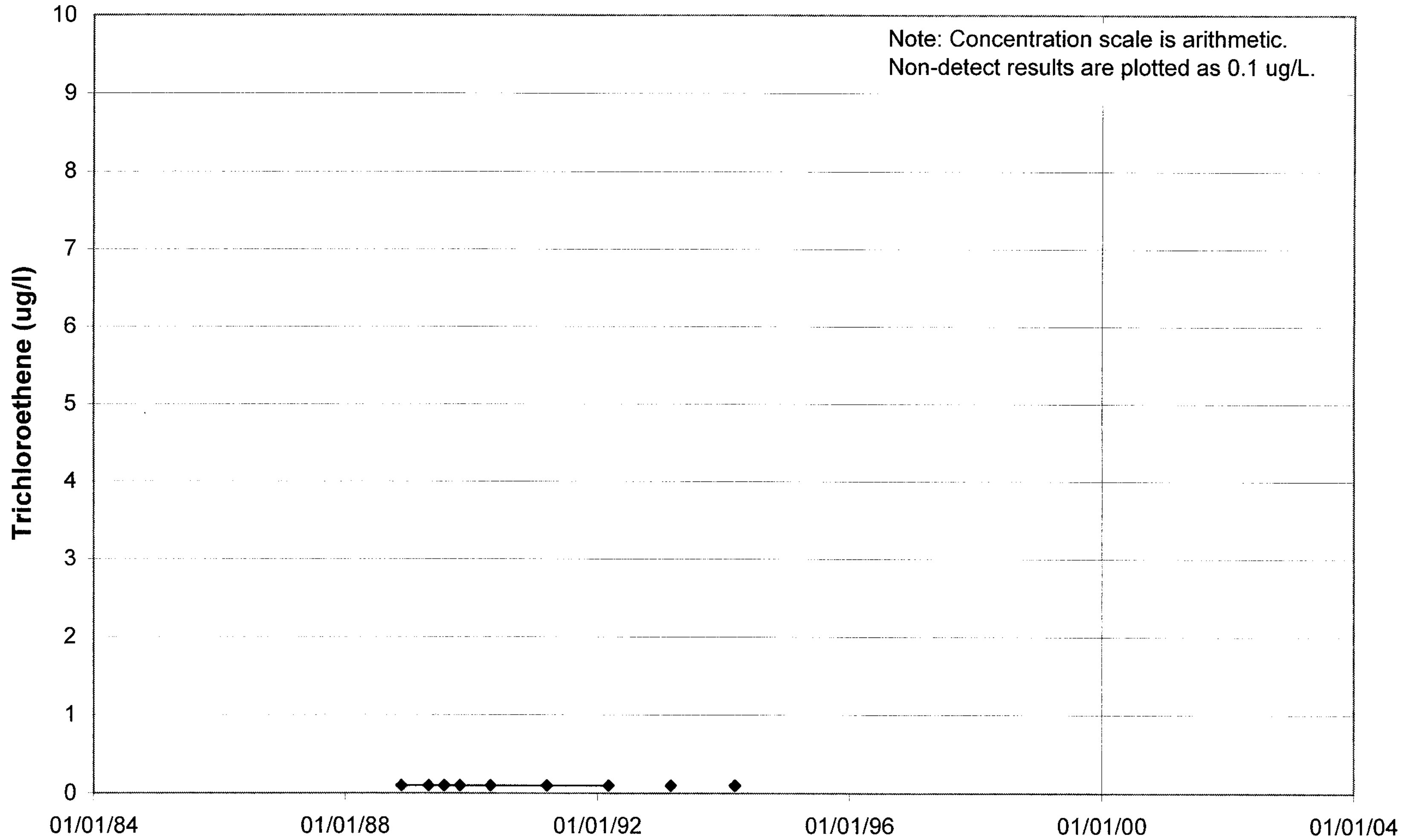

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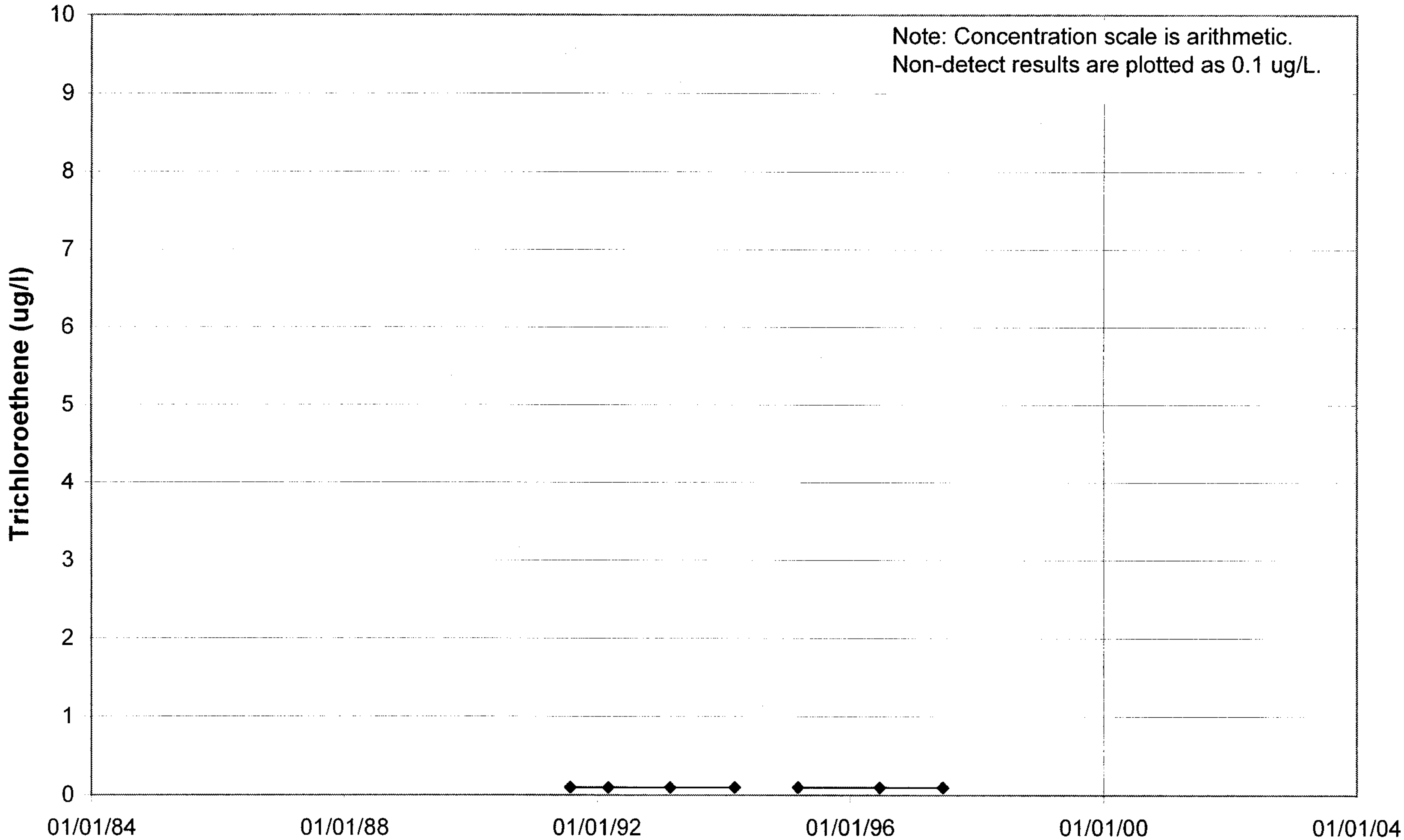

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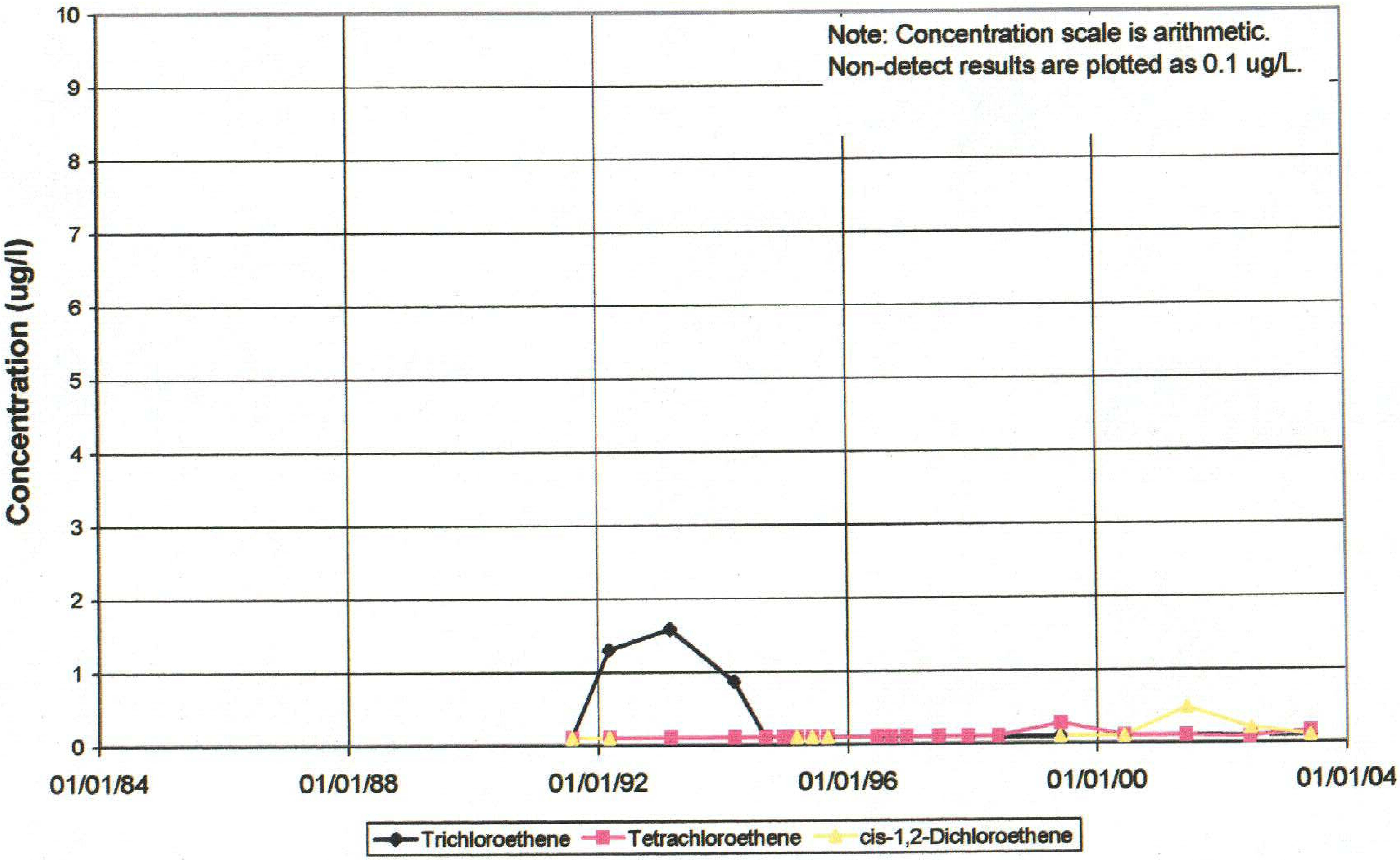

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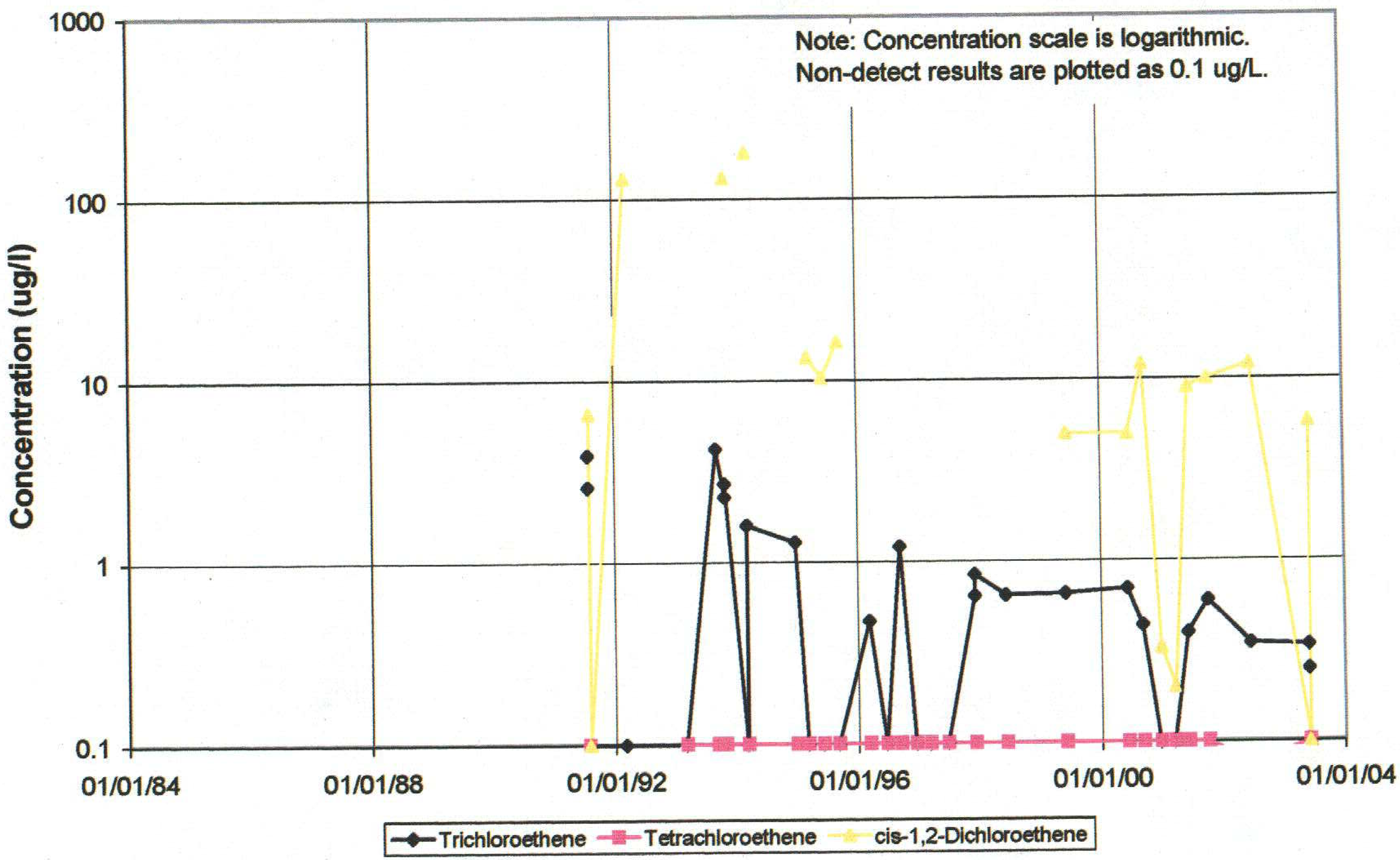

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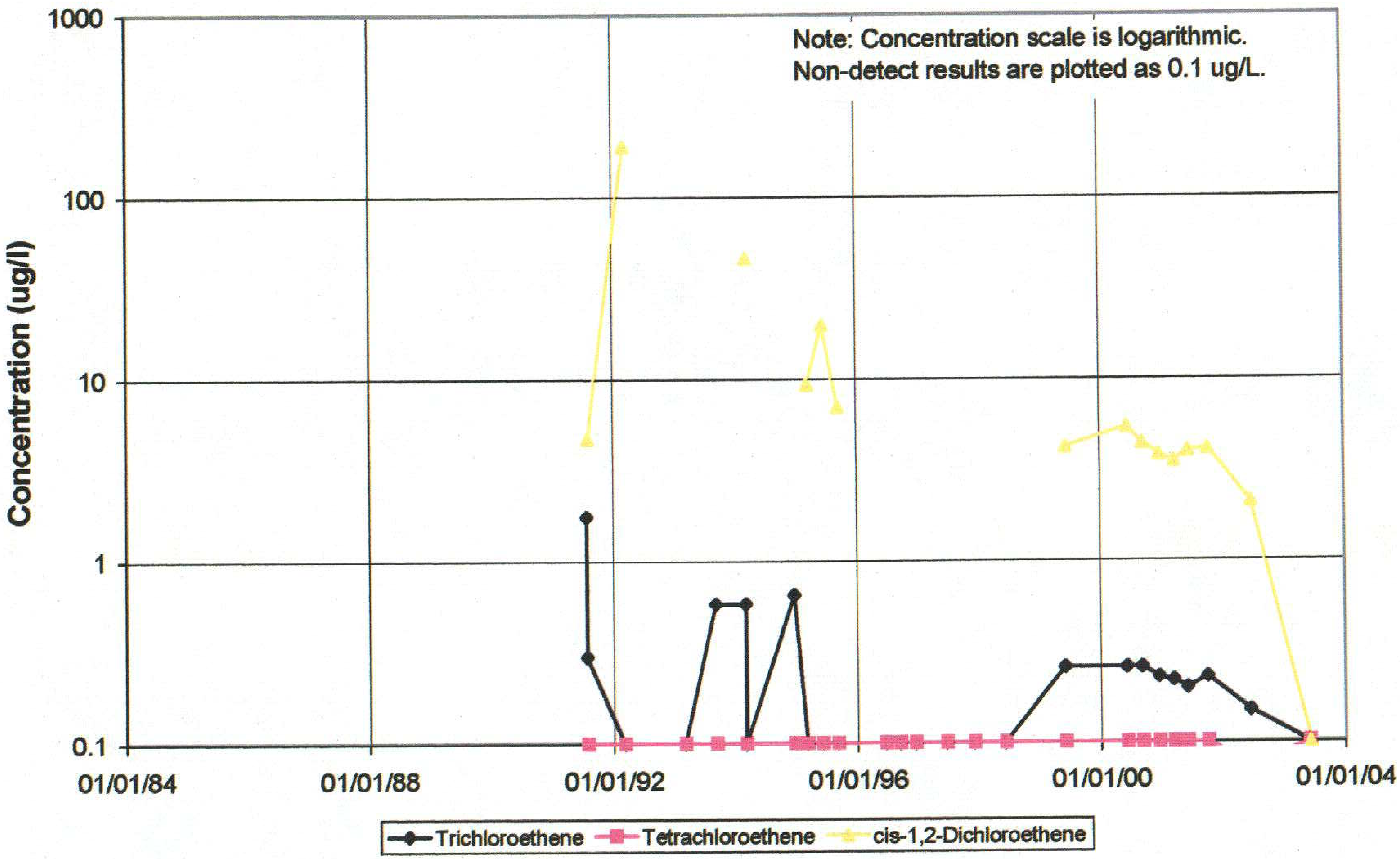

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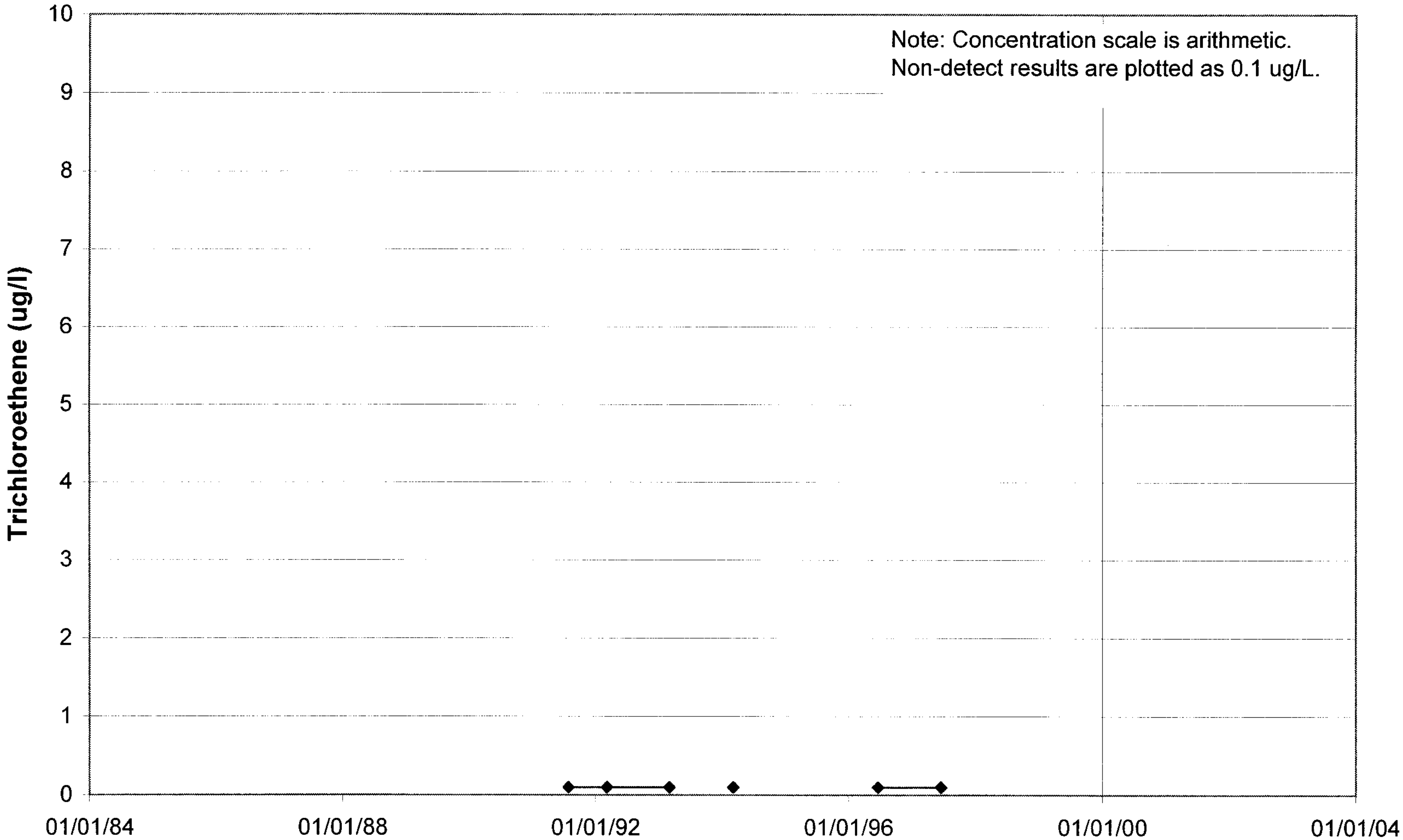

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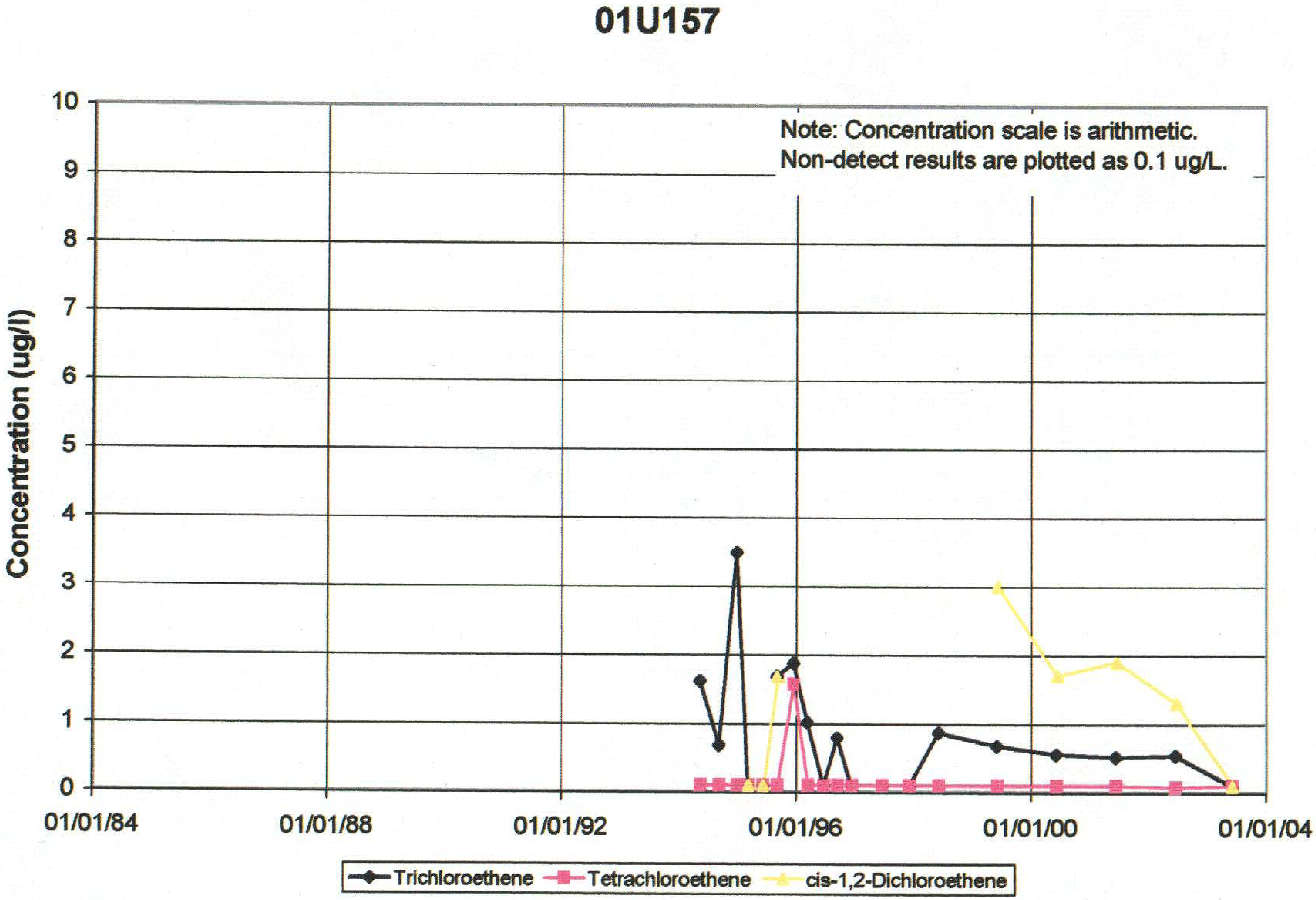

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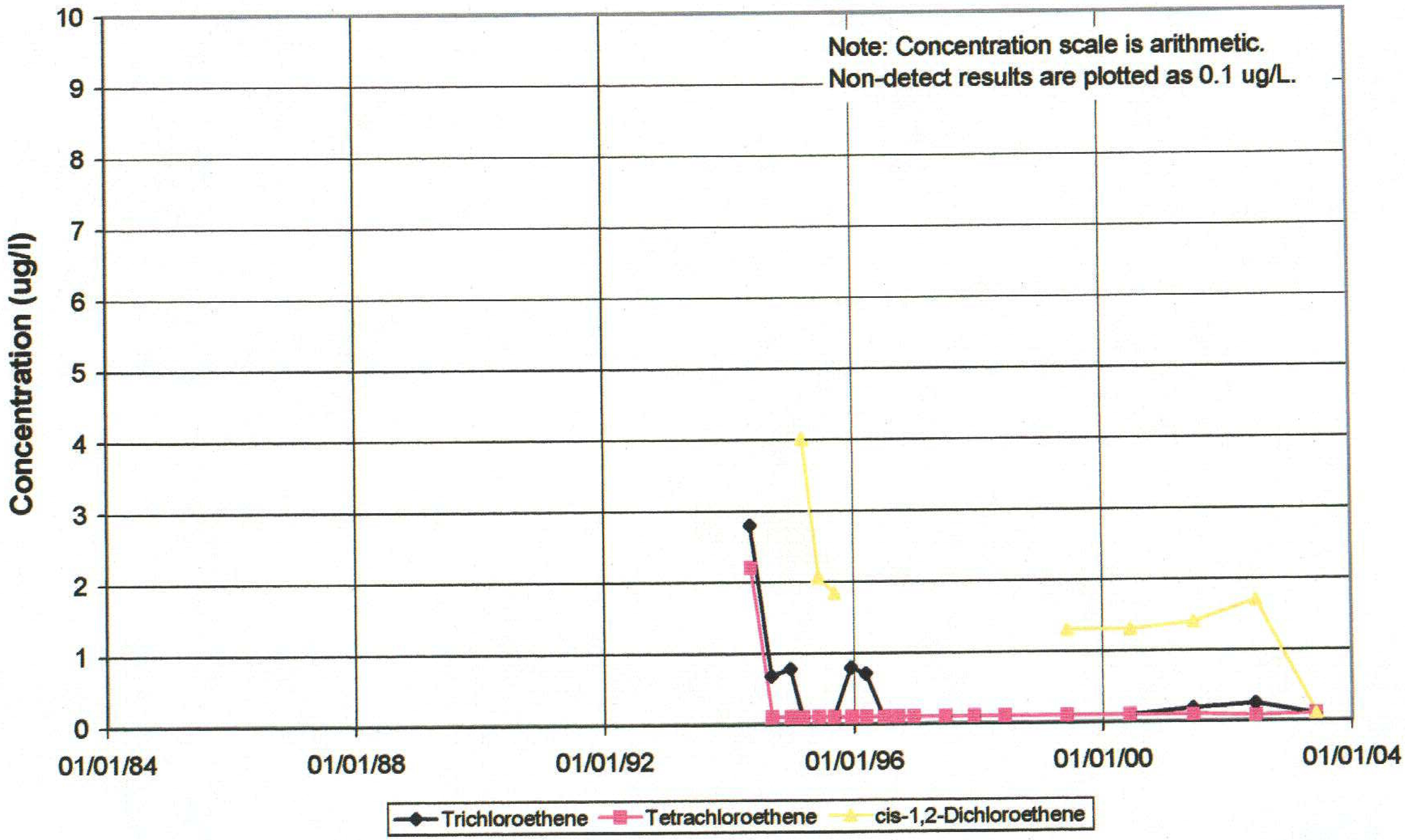

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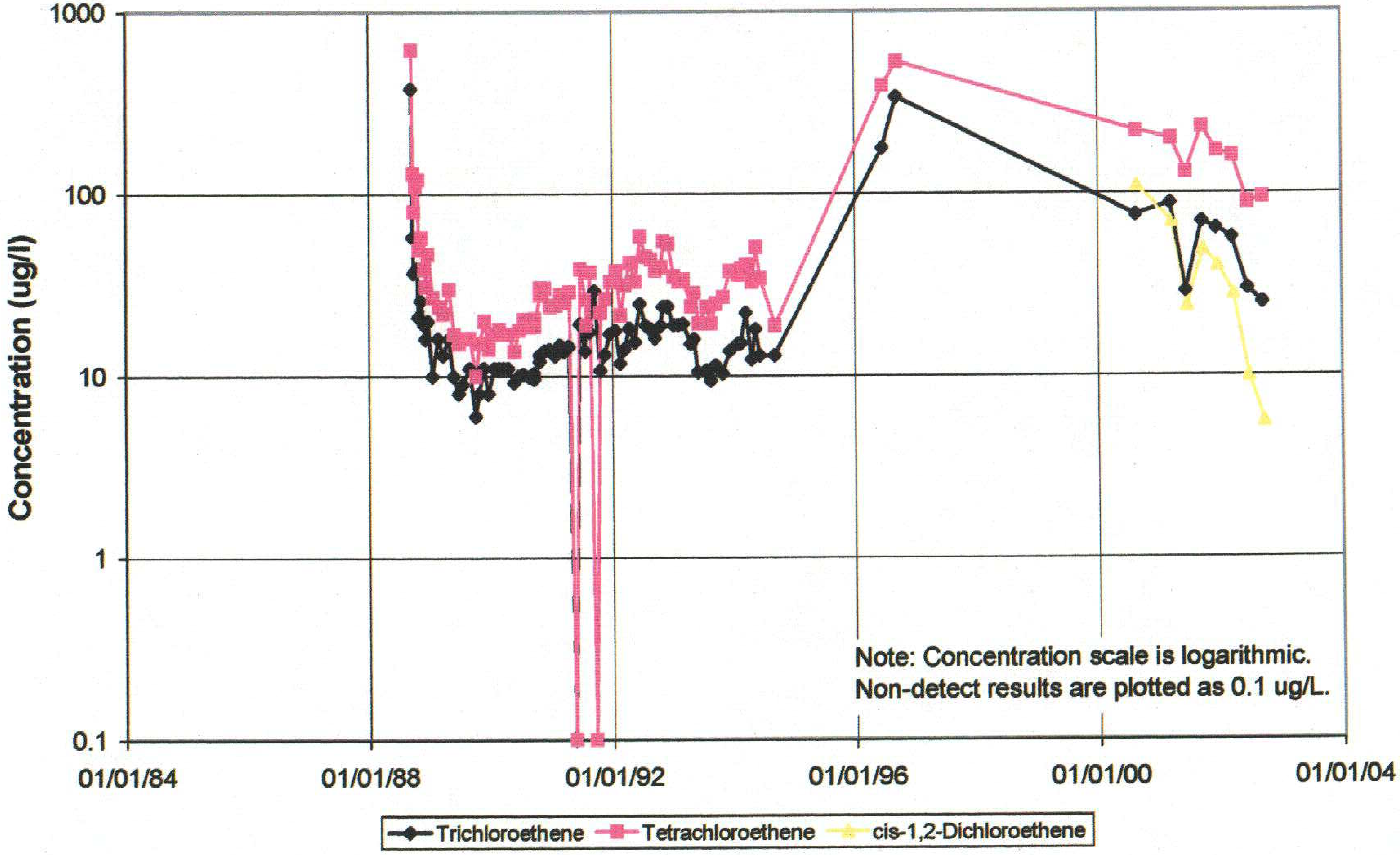
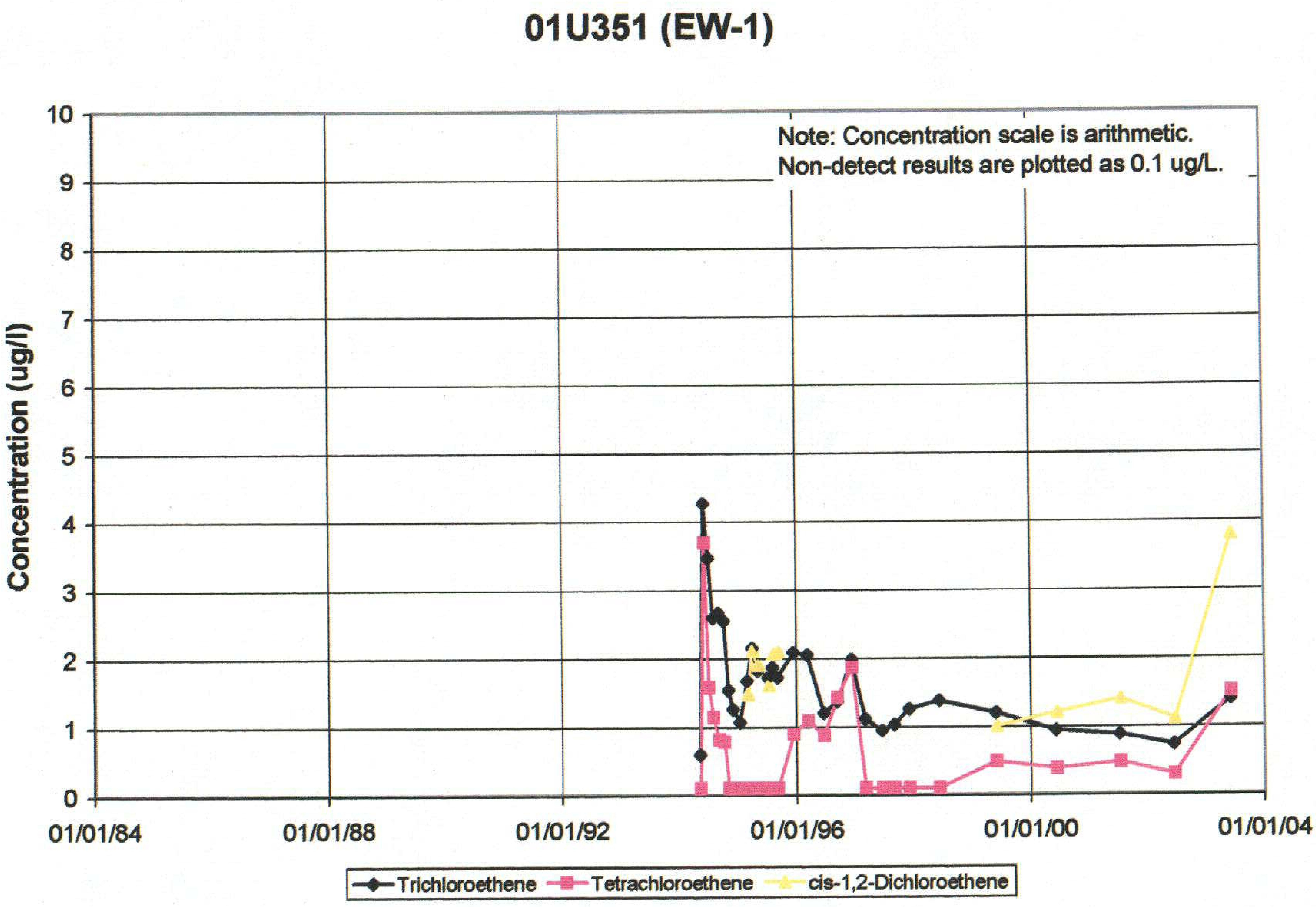
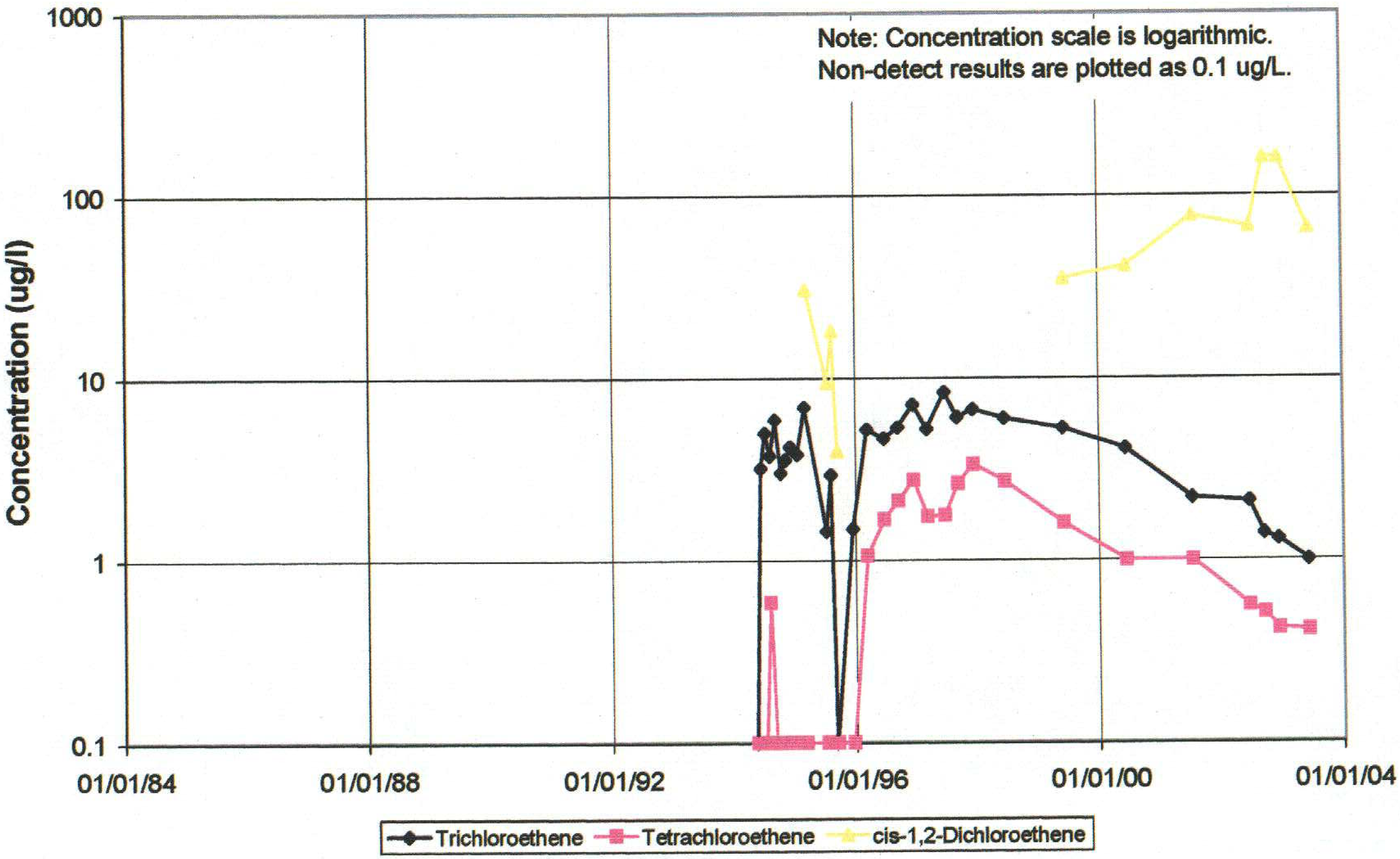


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

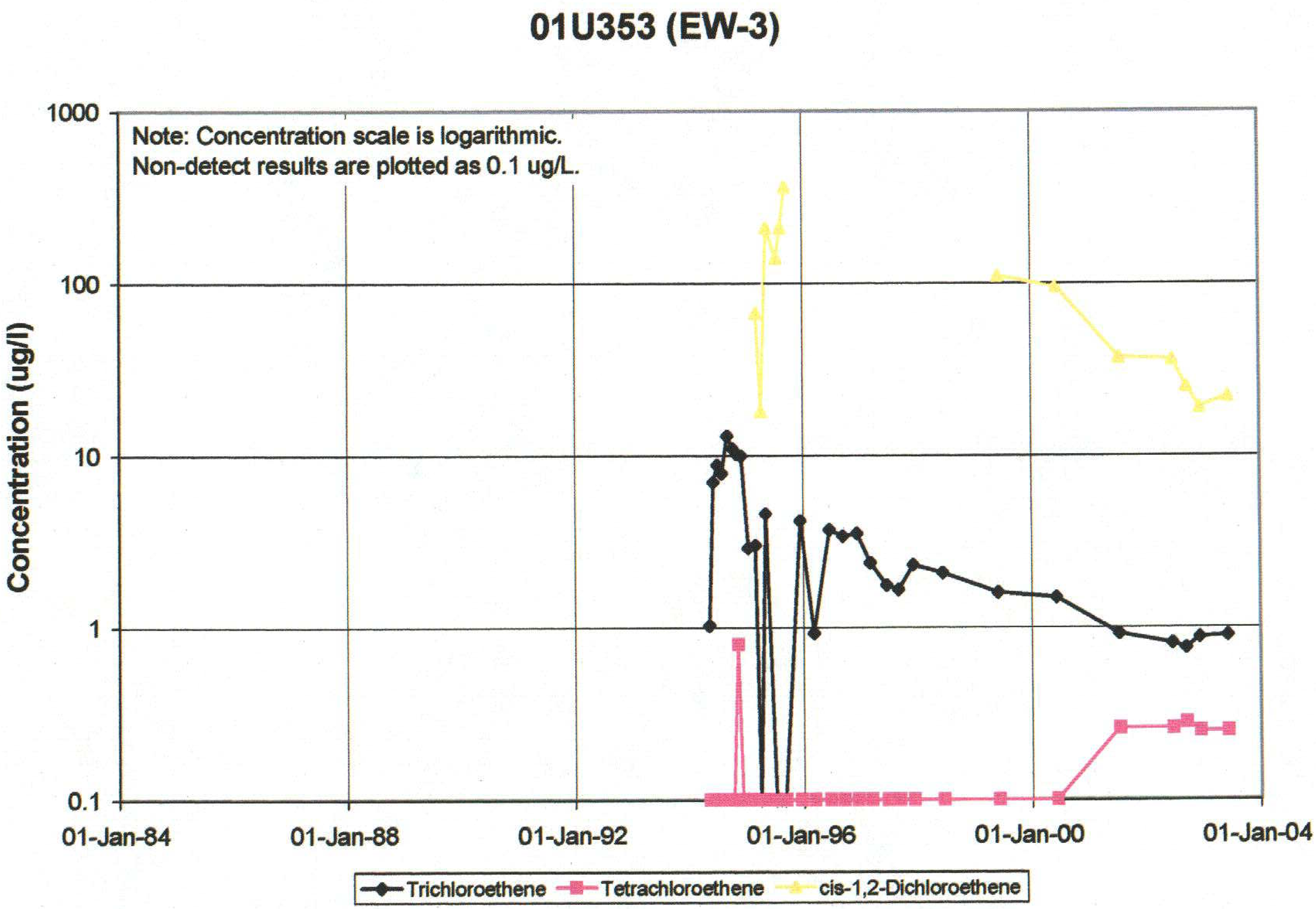


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

01U352 (EW-2)

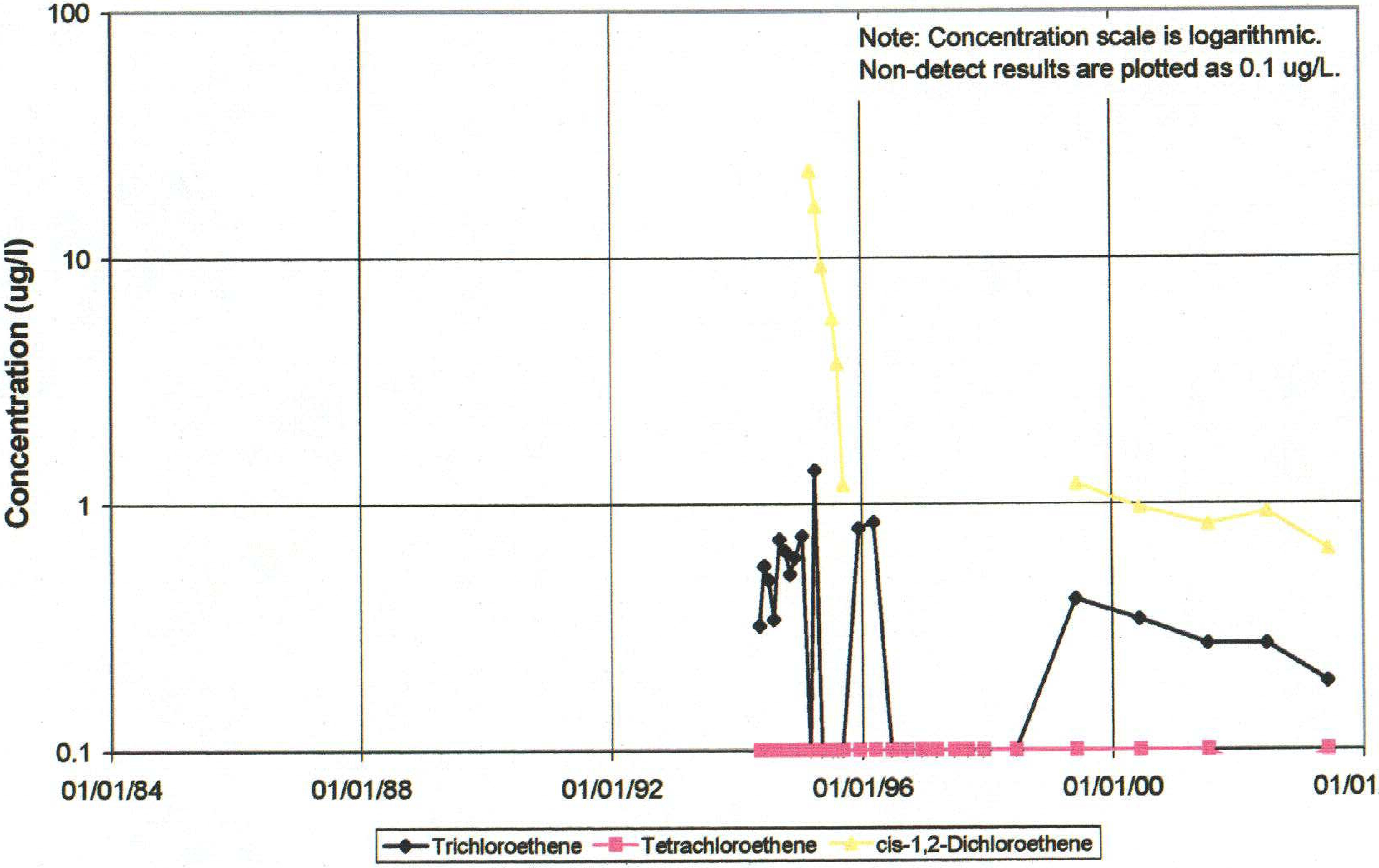


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



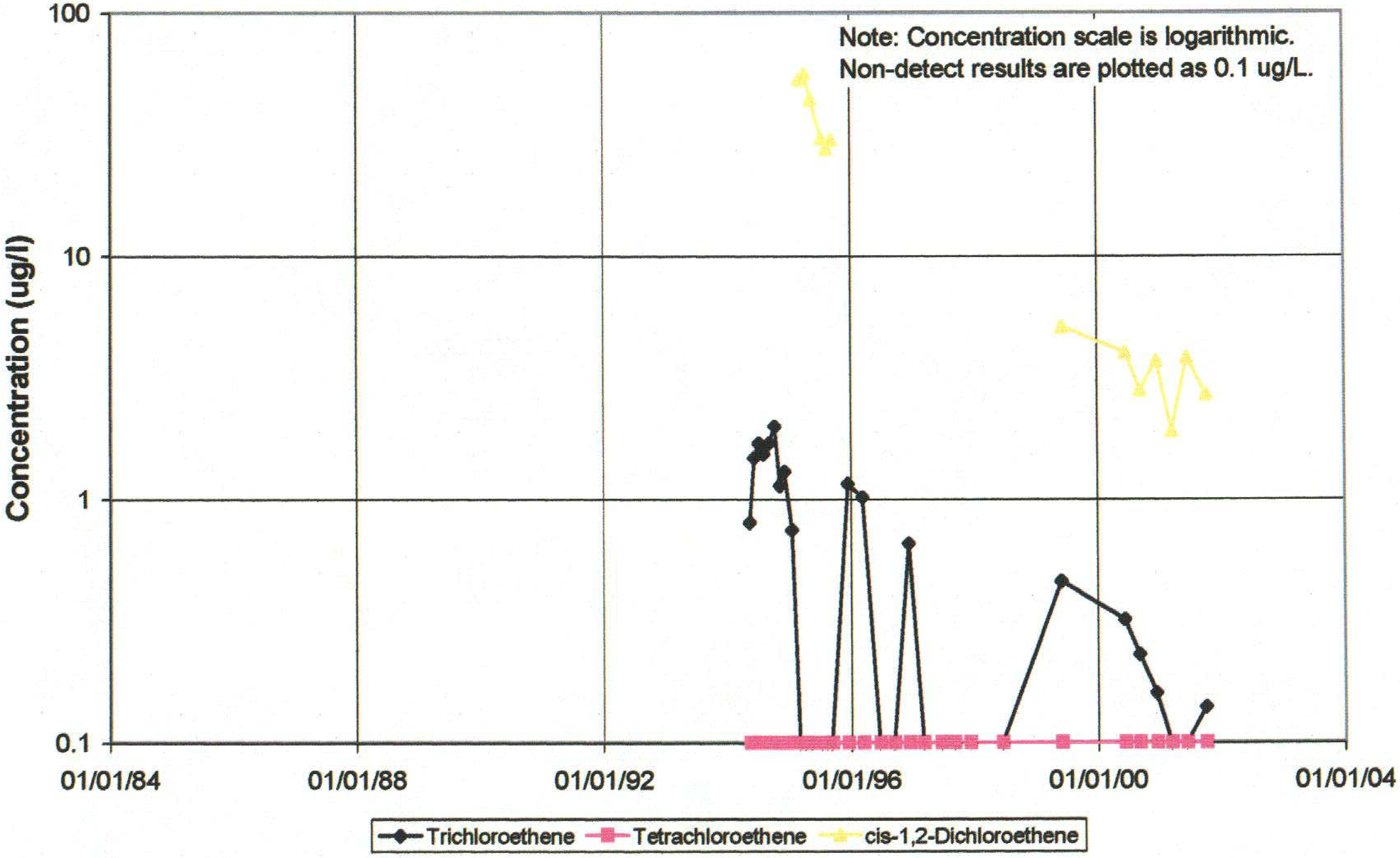
TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

01U354 (EW-4)



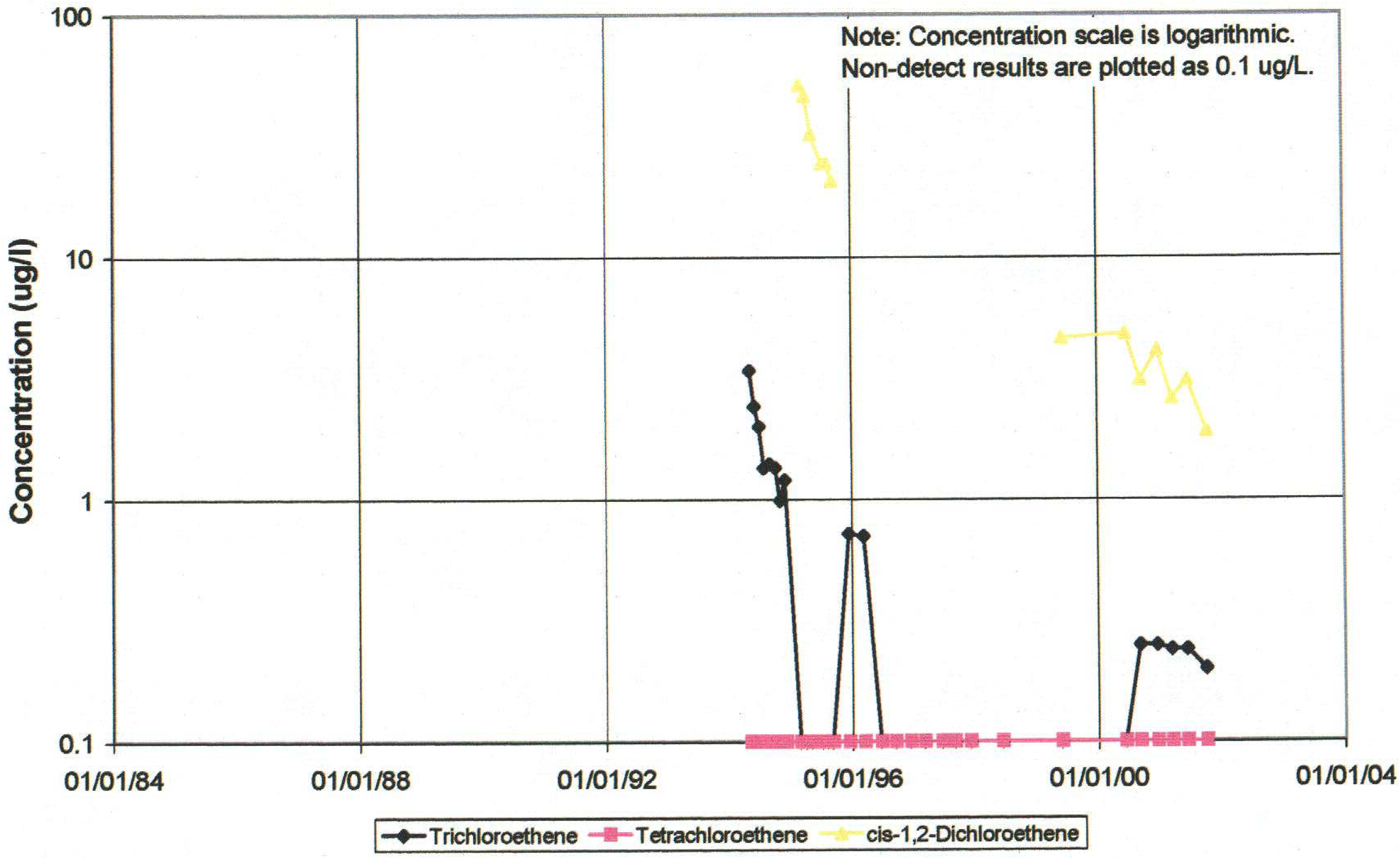
TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

01U355 (EW-5)



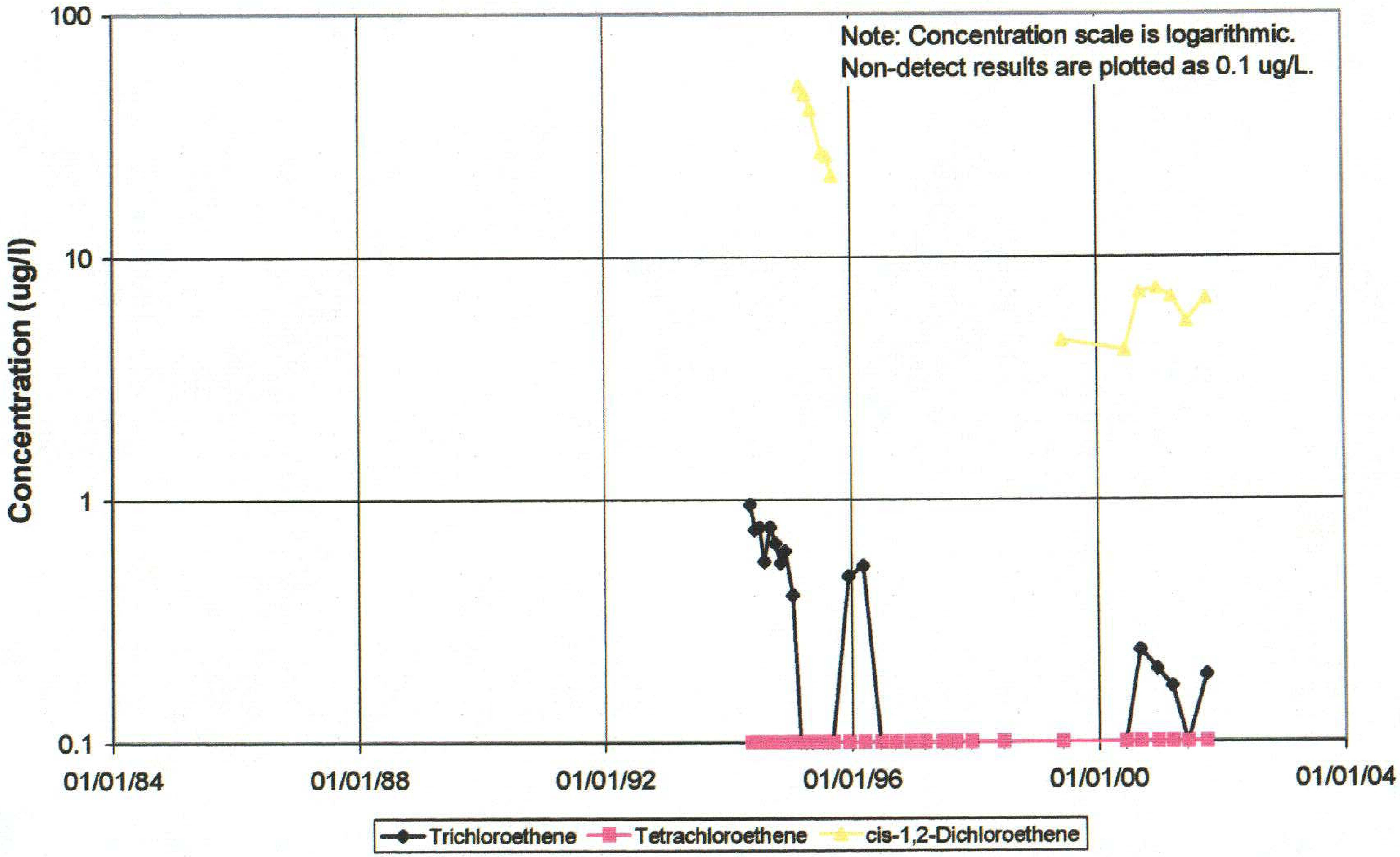
TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

01U356 (EW-6)

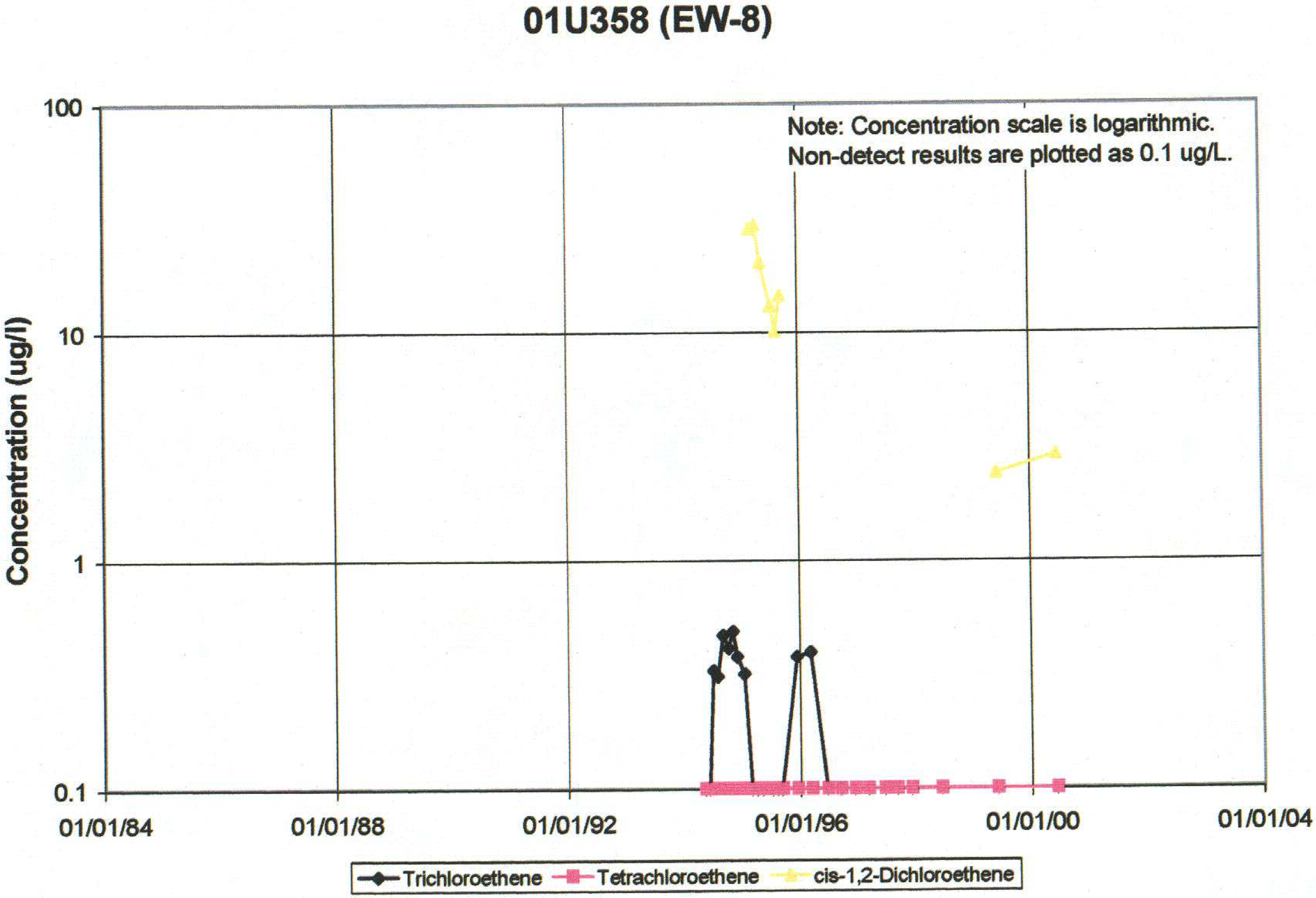


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

01U357 (EW-7)



TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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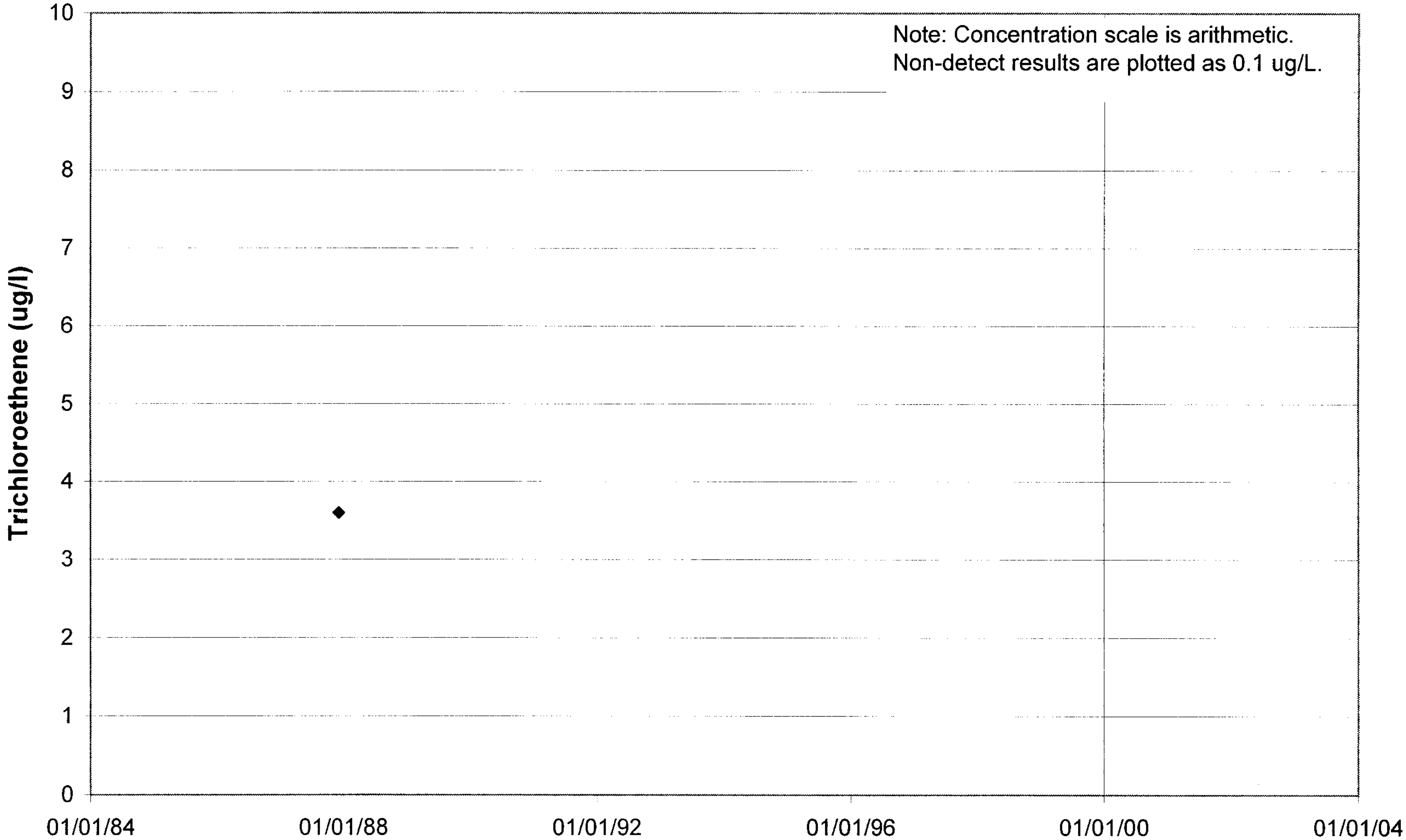
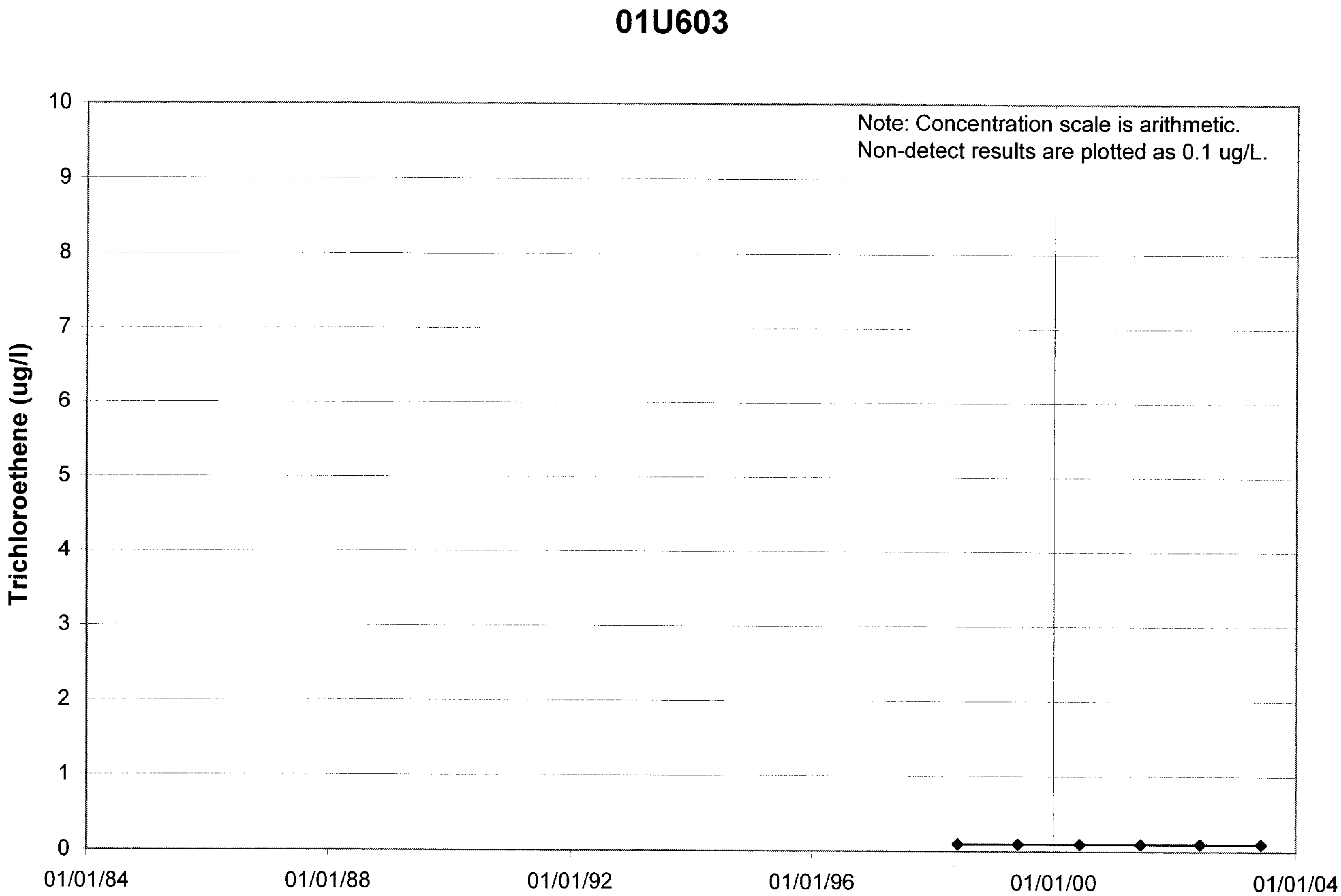
01U601



TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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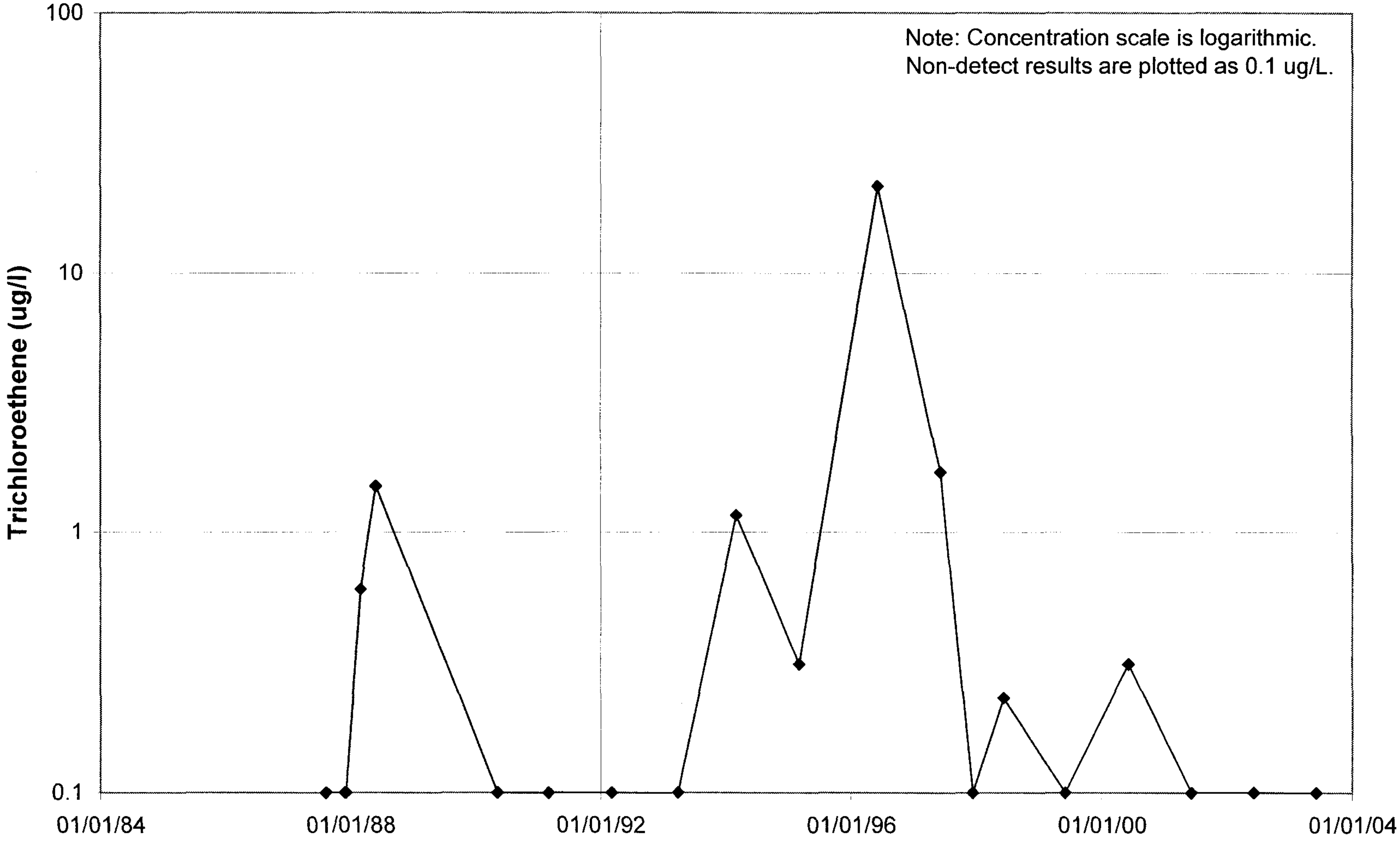

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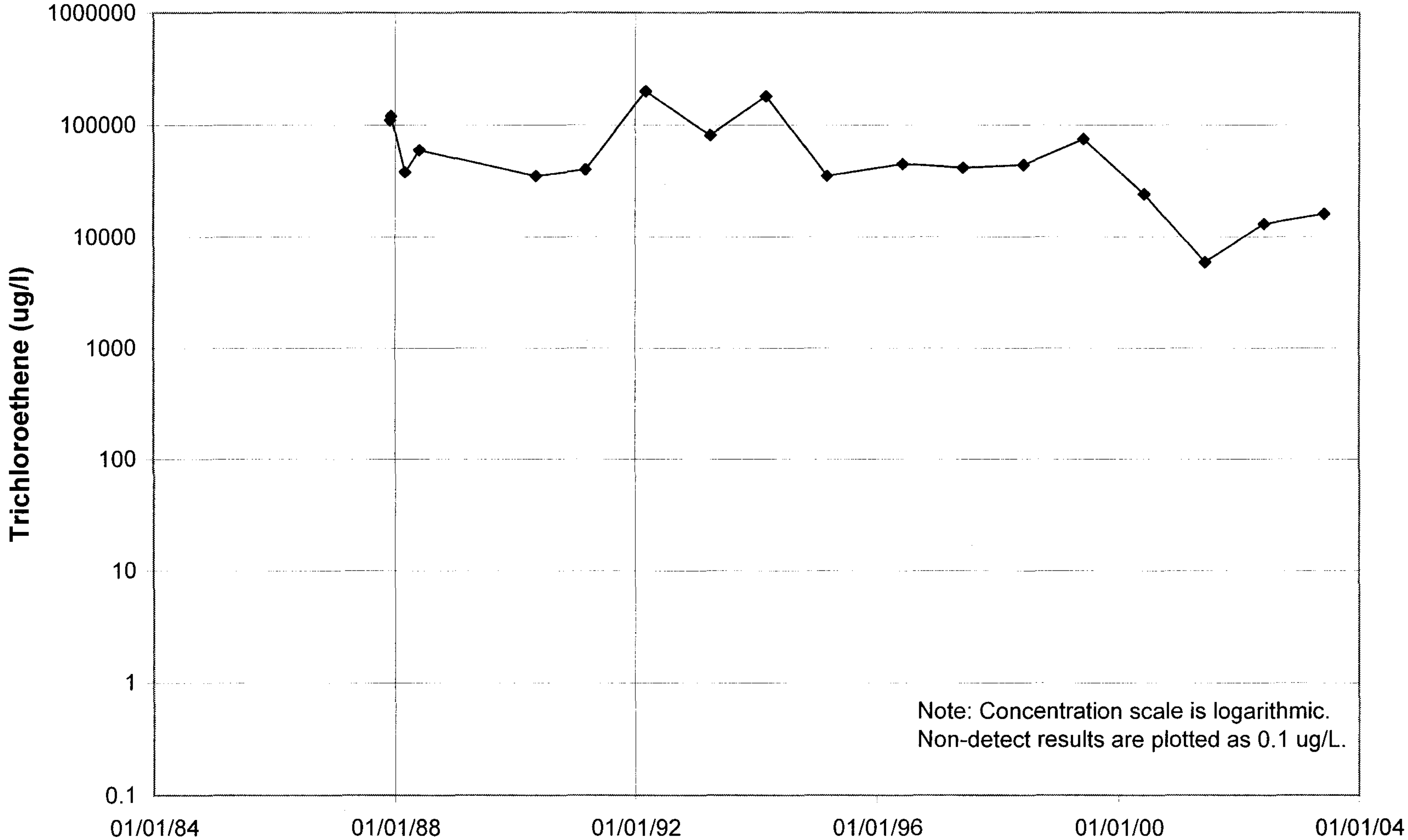
01U611



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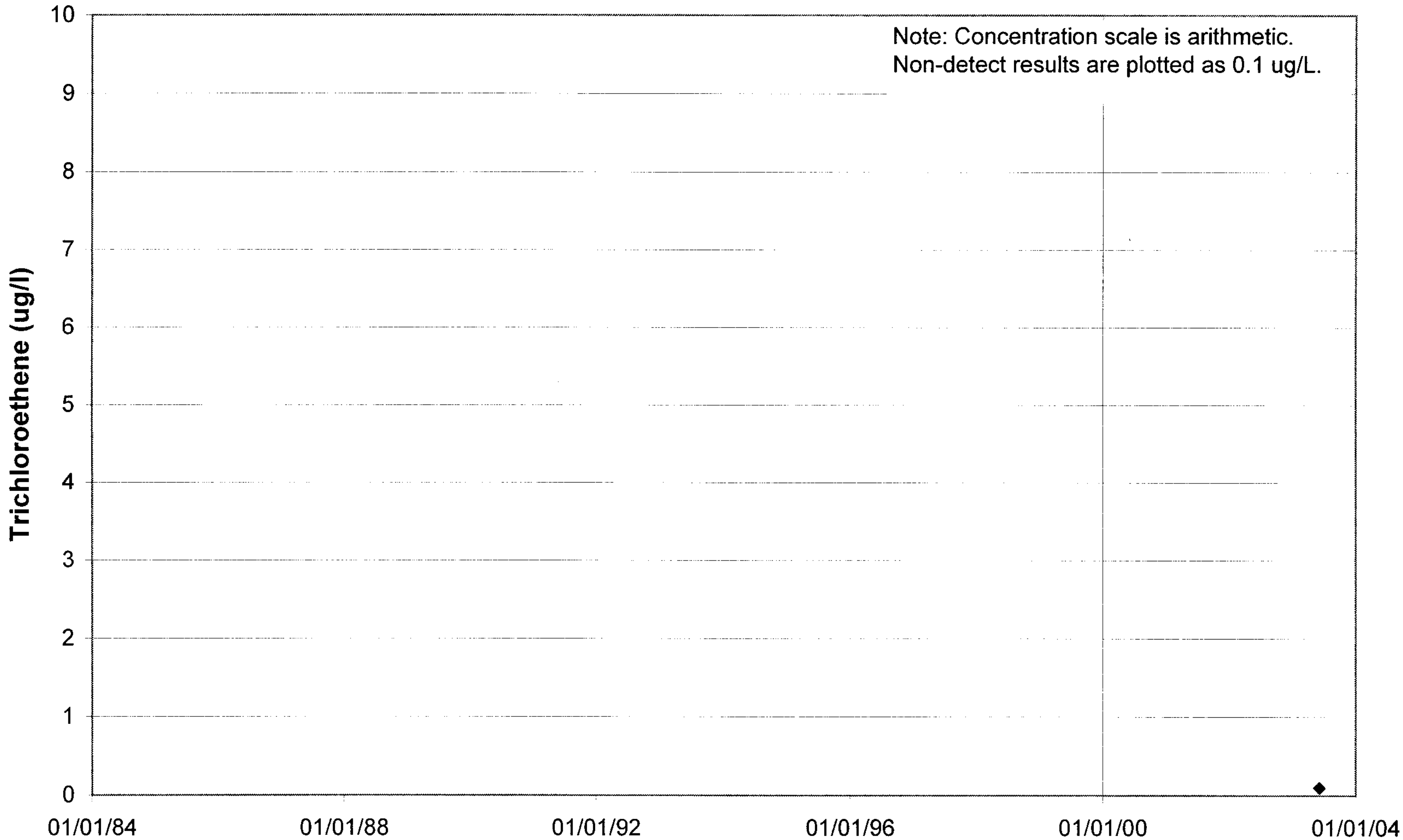

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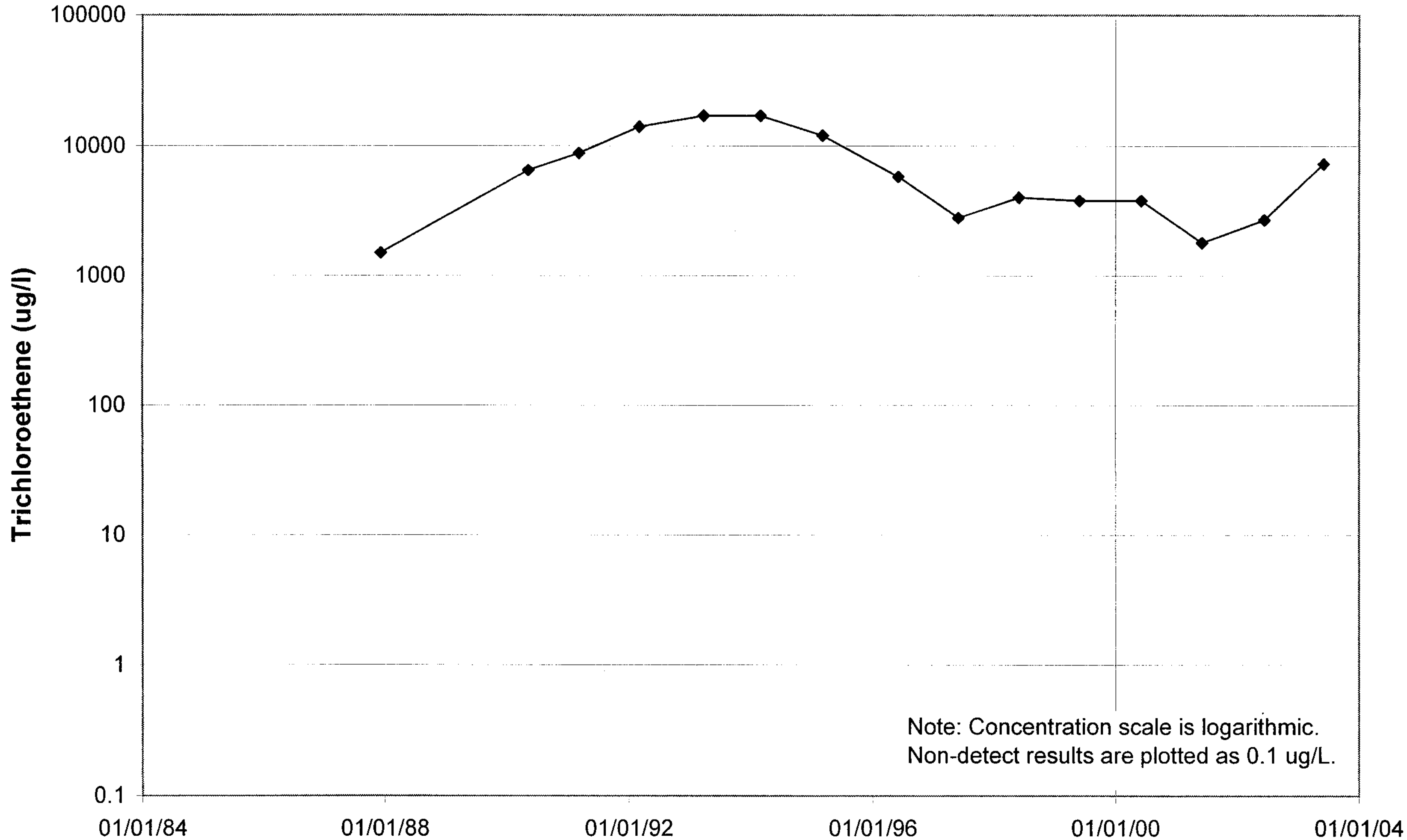

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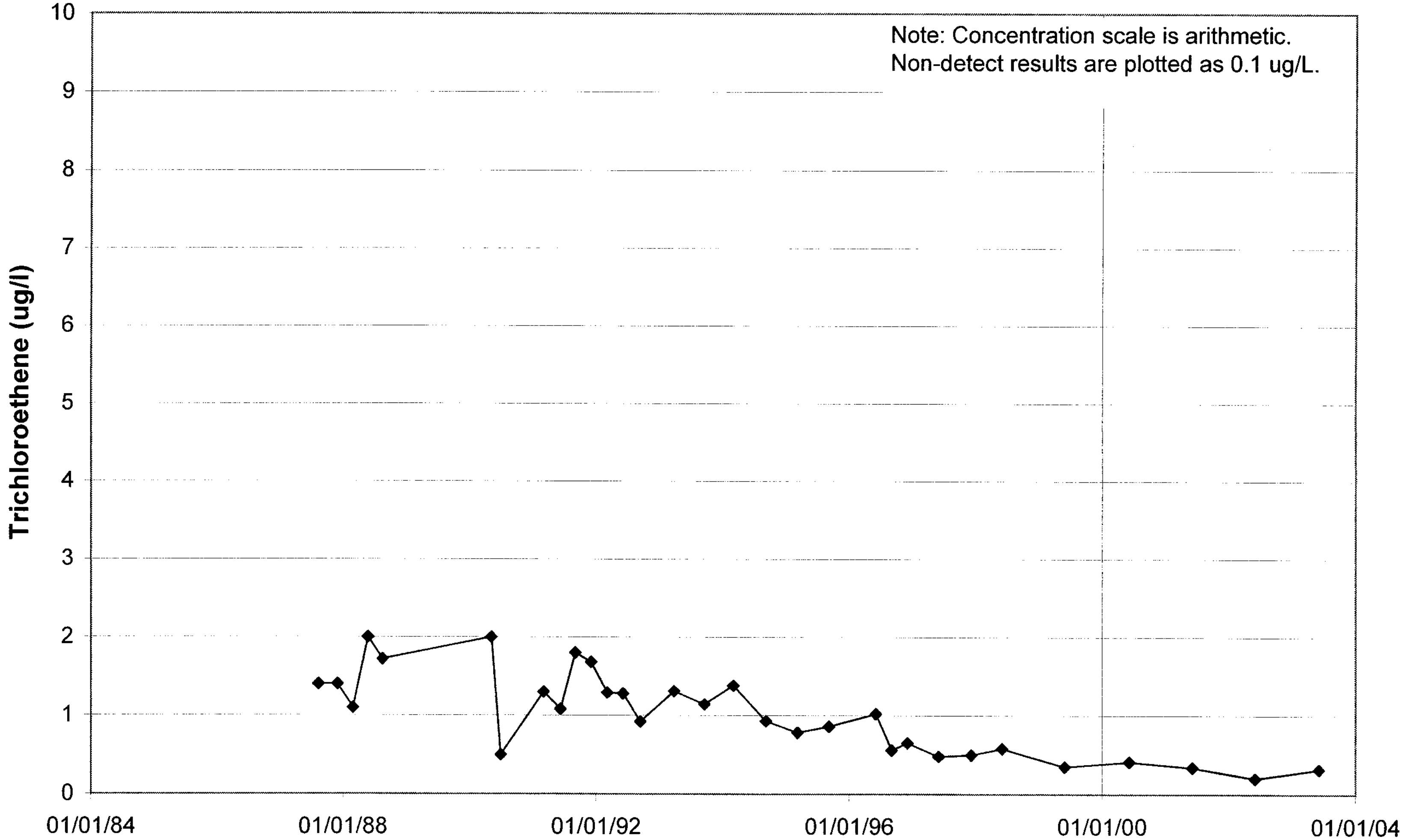

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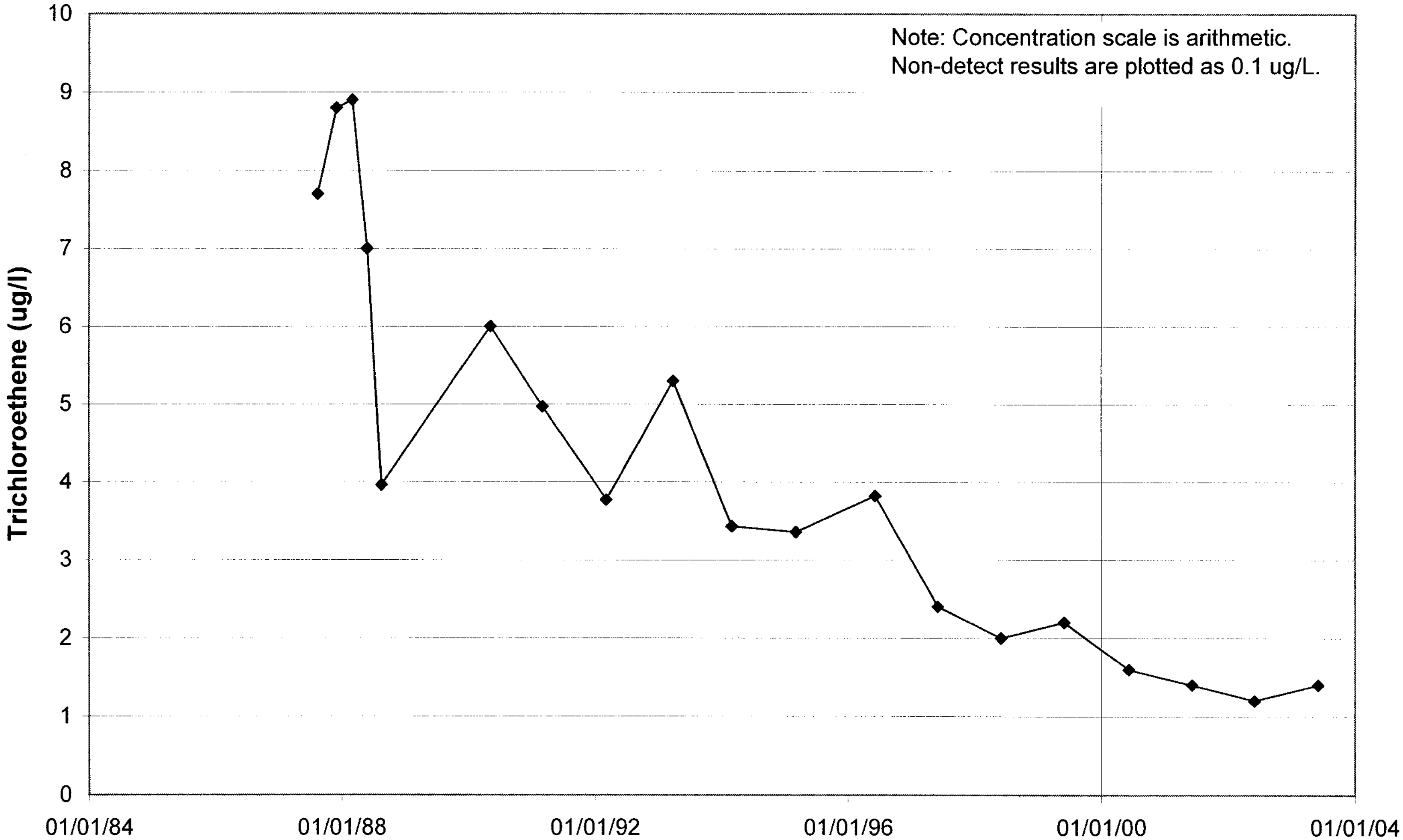

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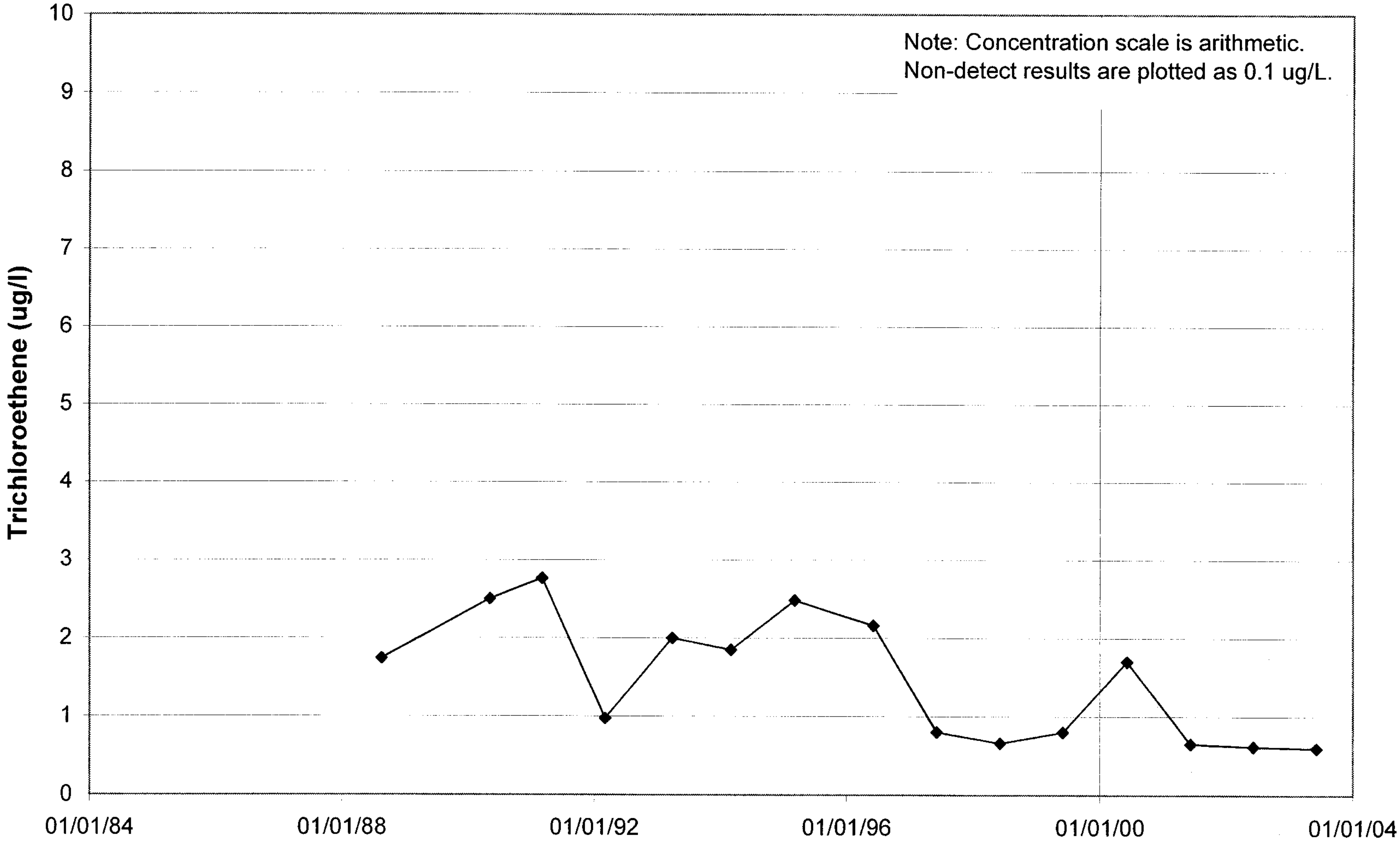
01U619



TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

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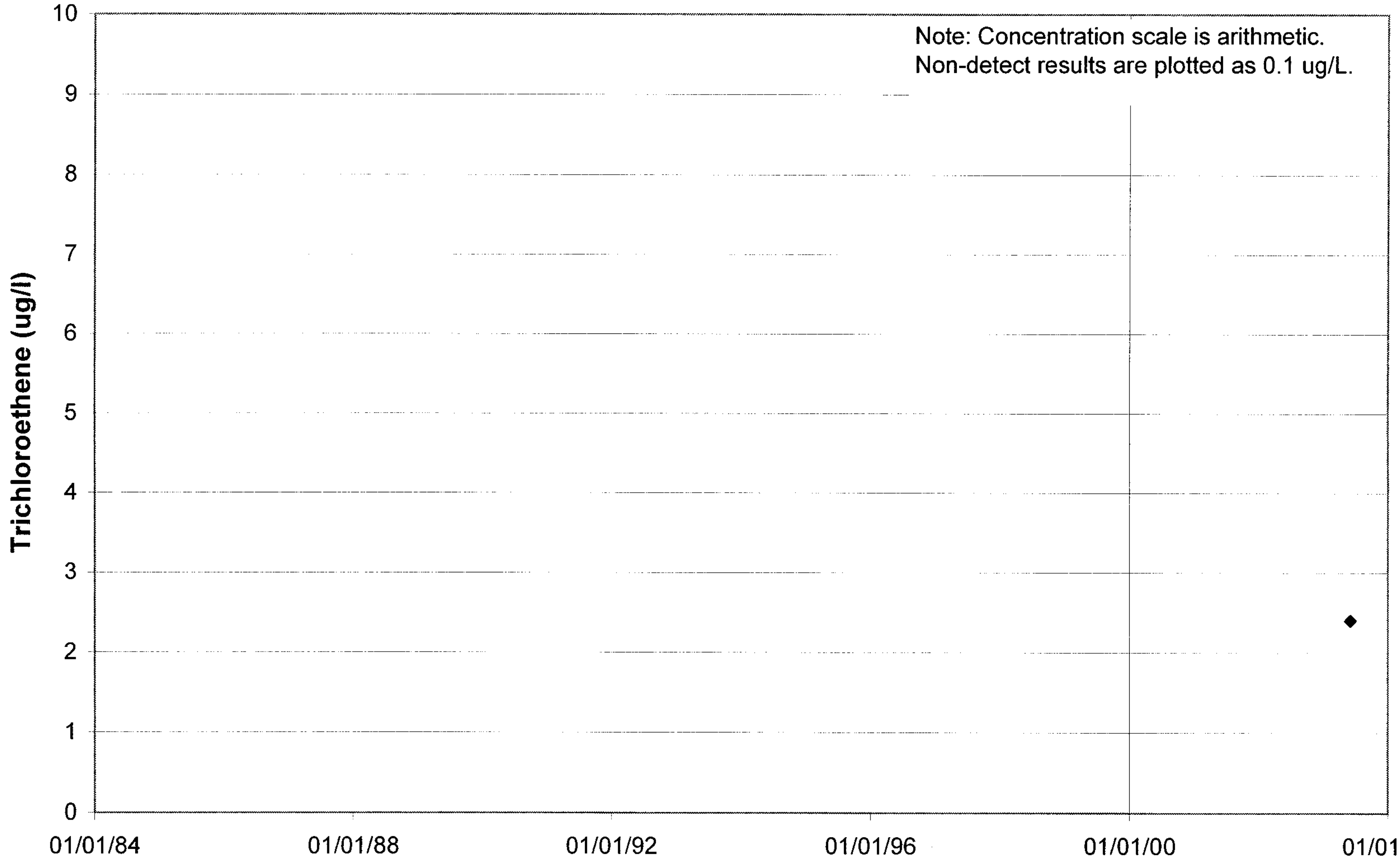
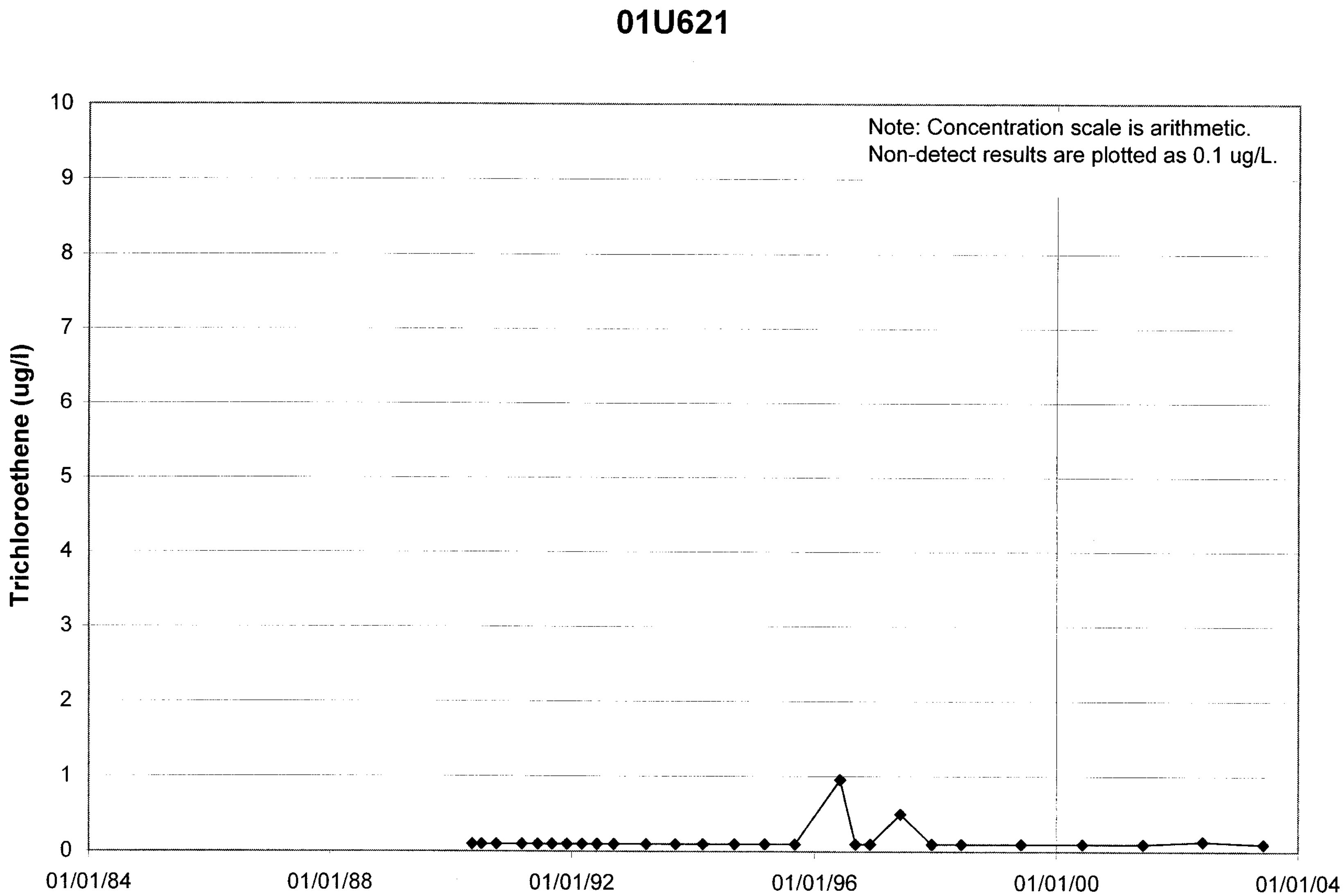


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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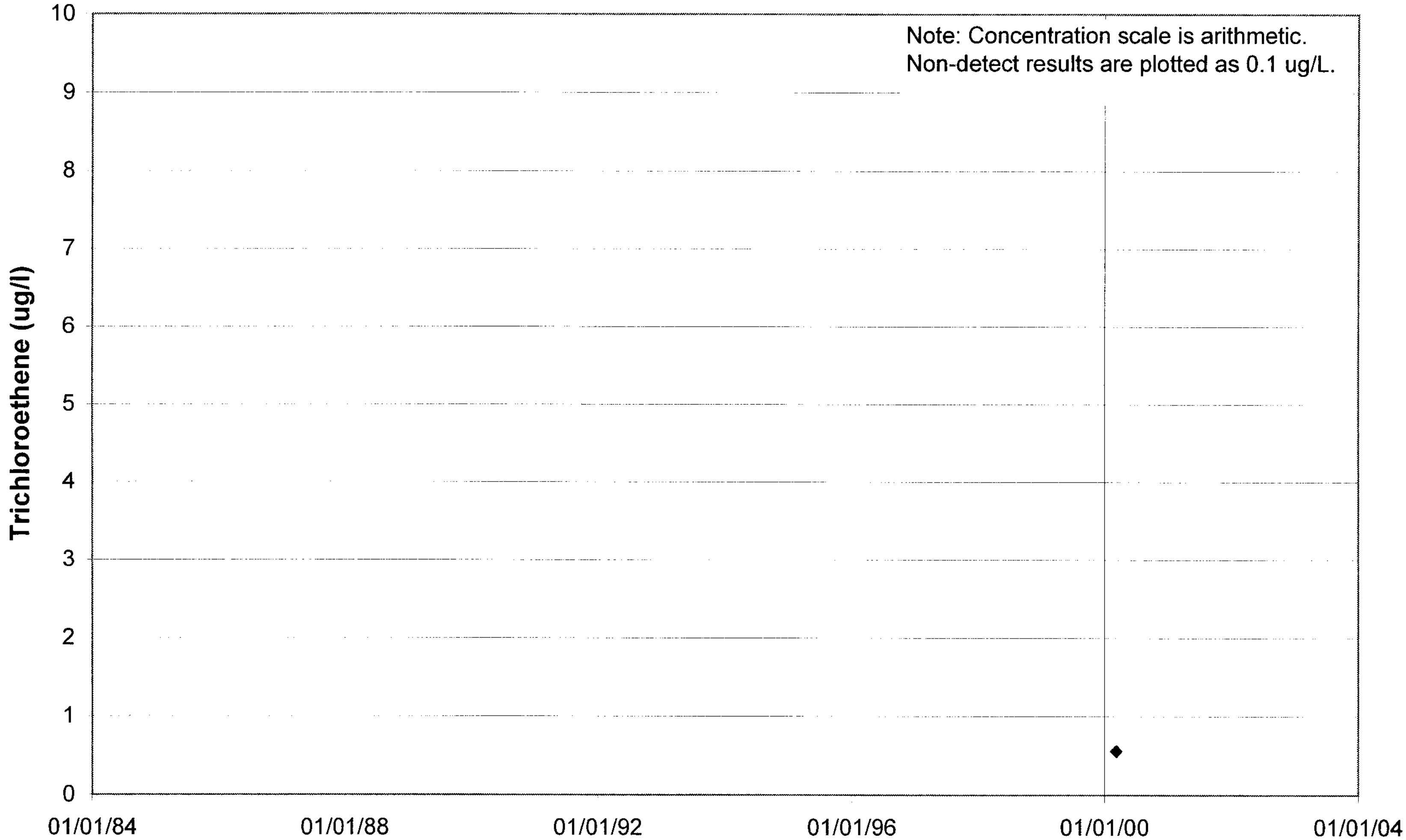

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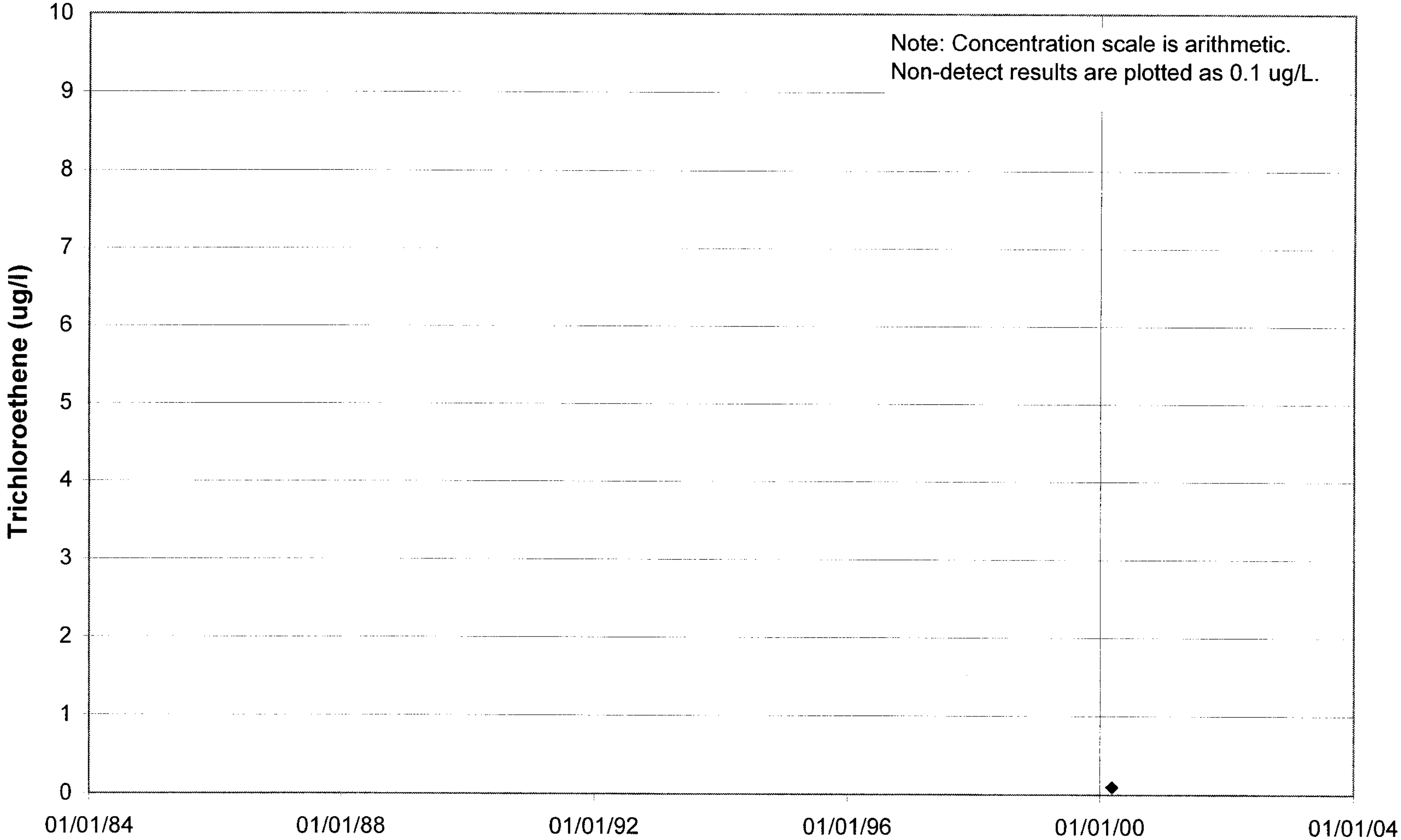

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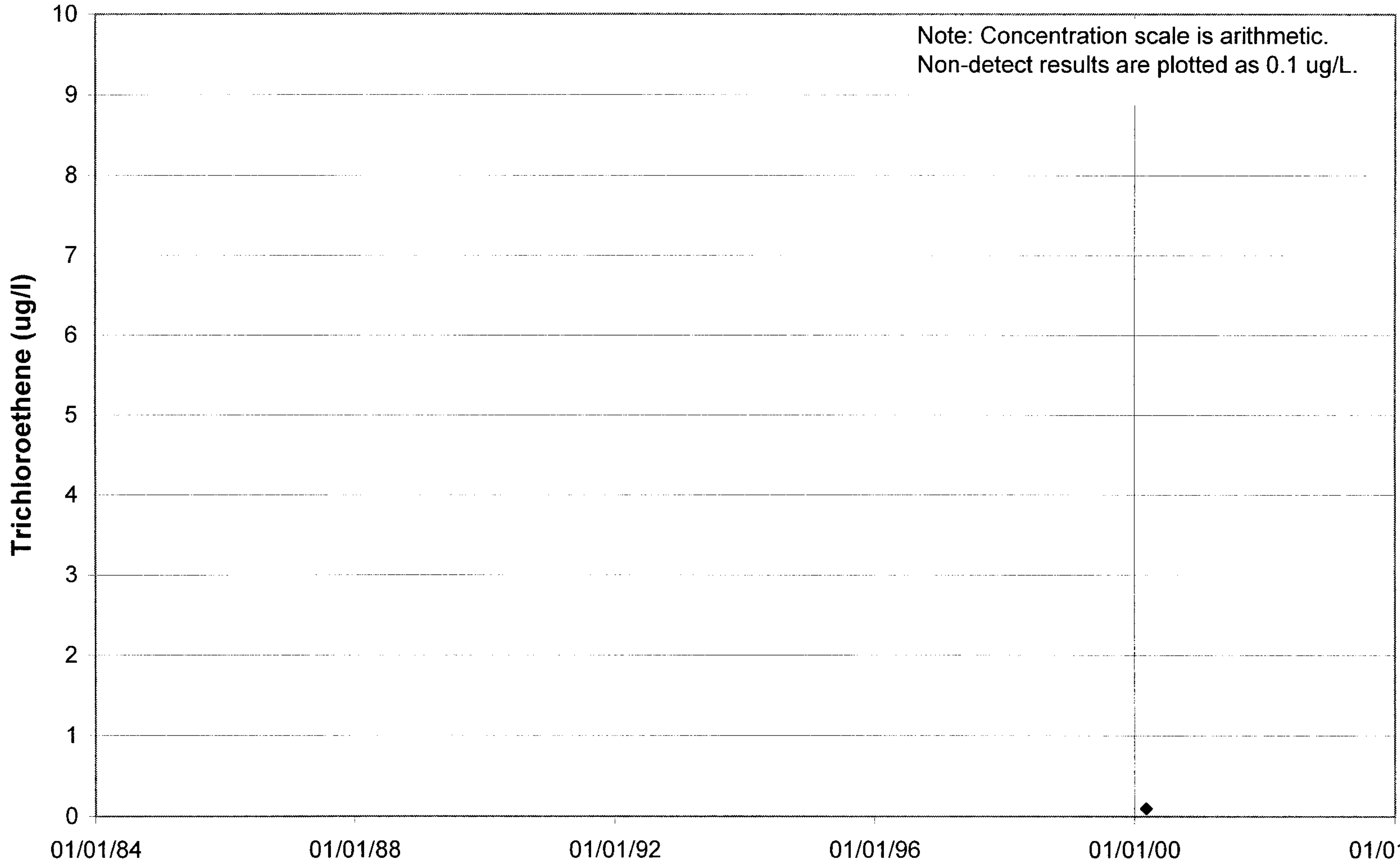

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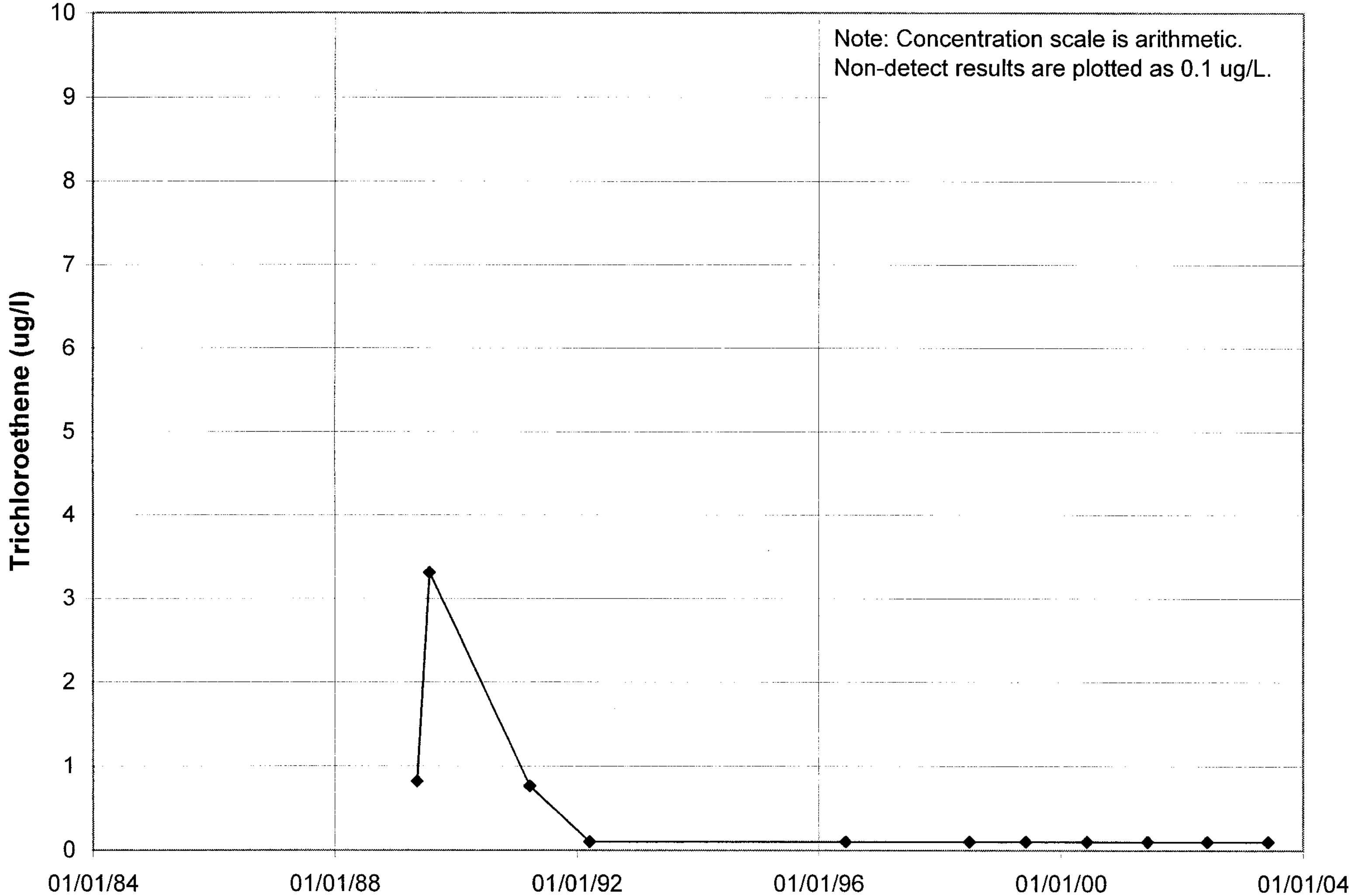
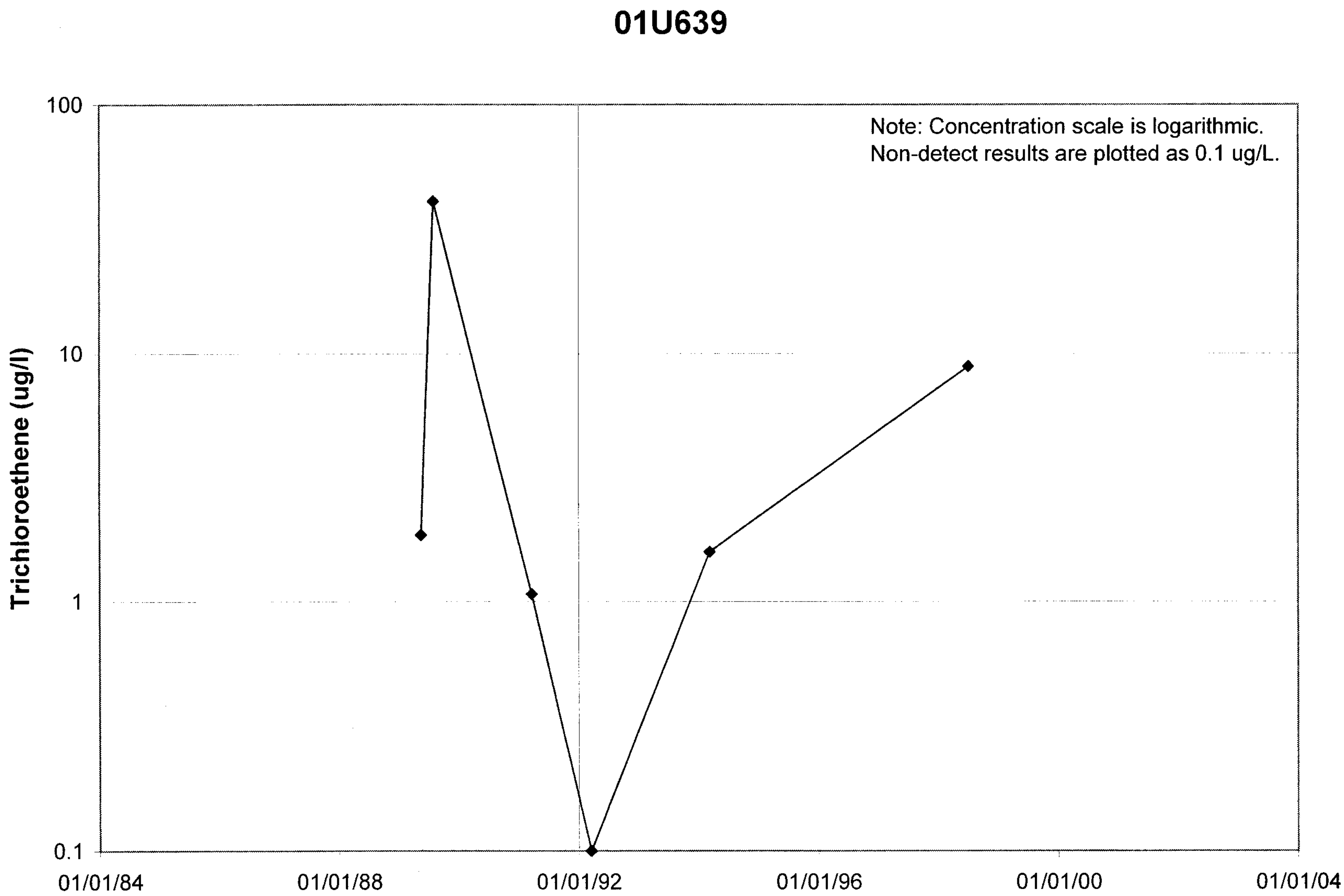


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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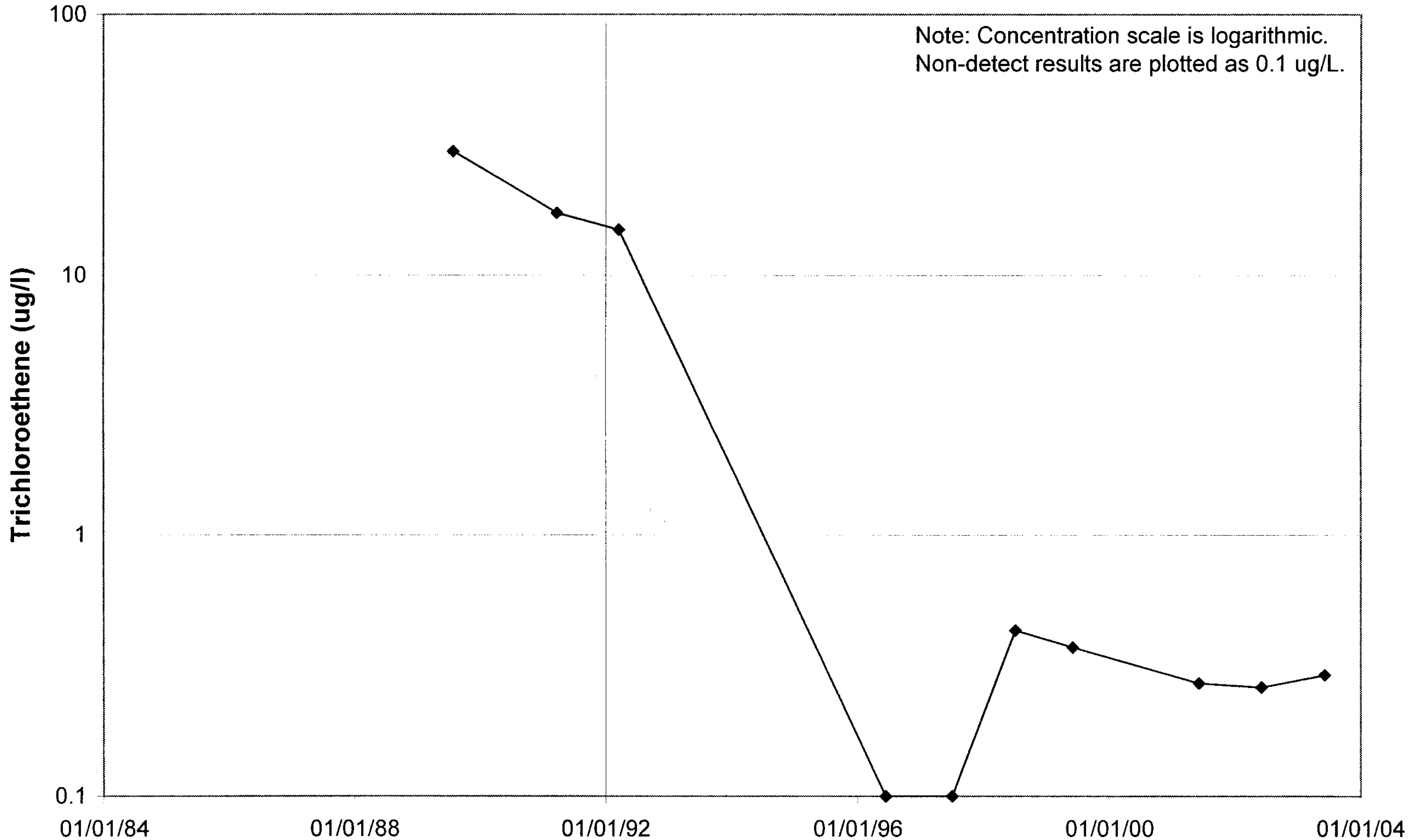

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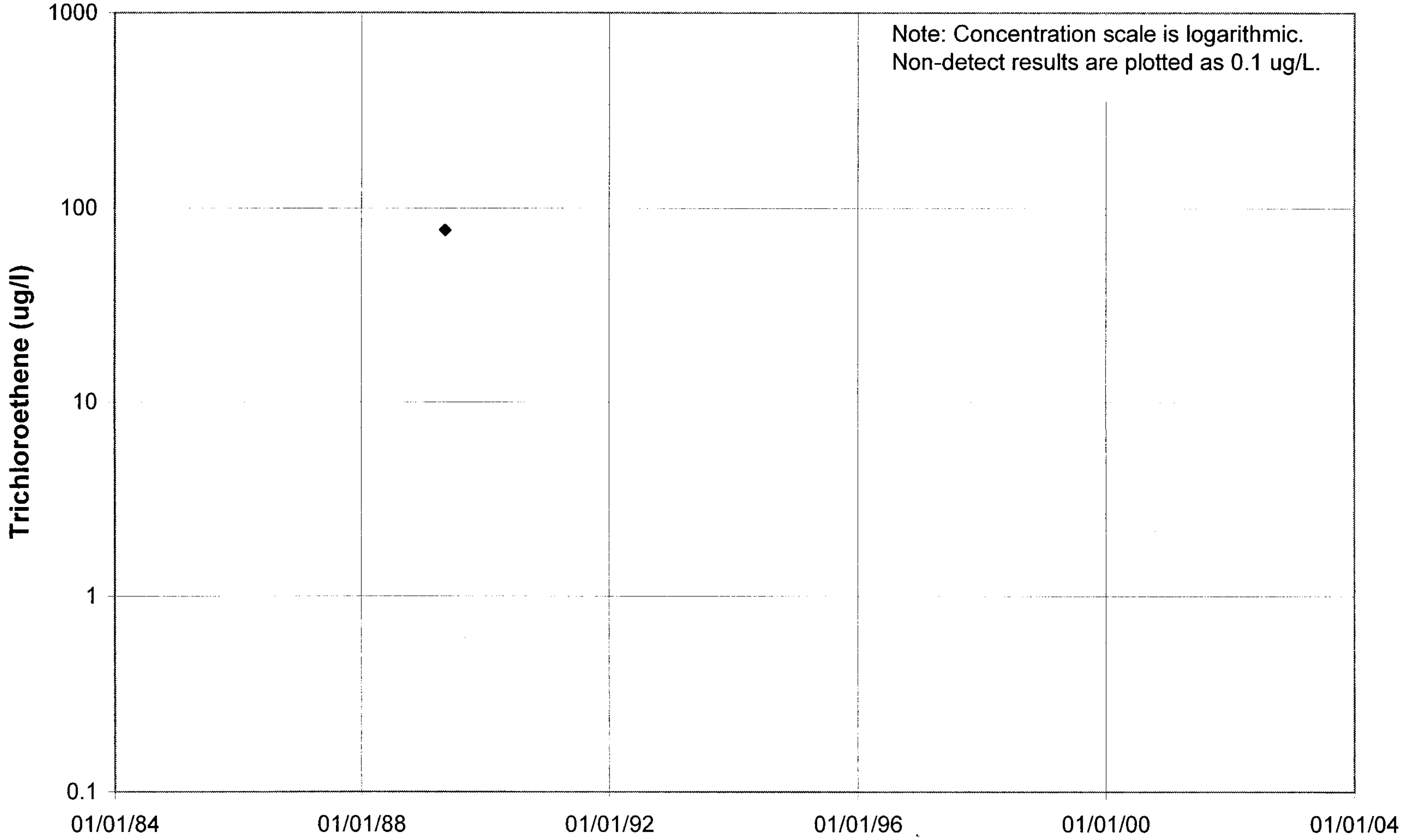
01U666



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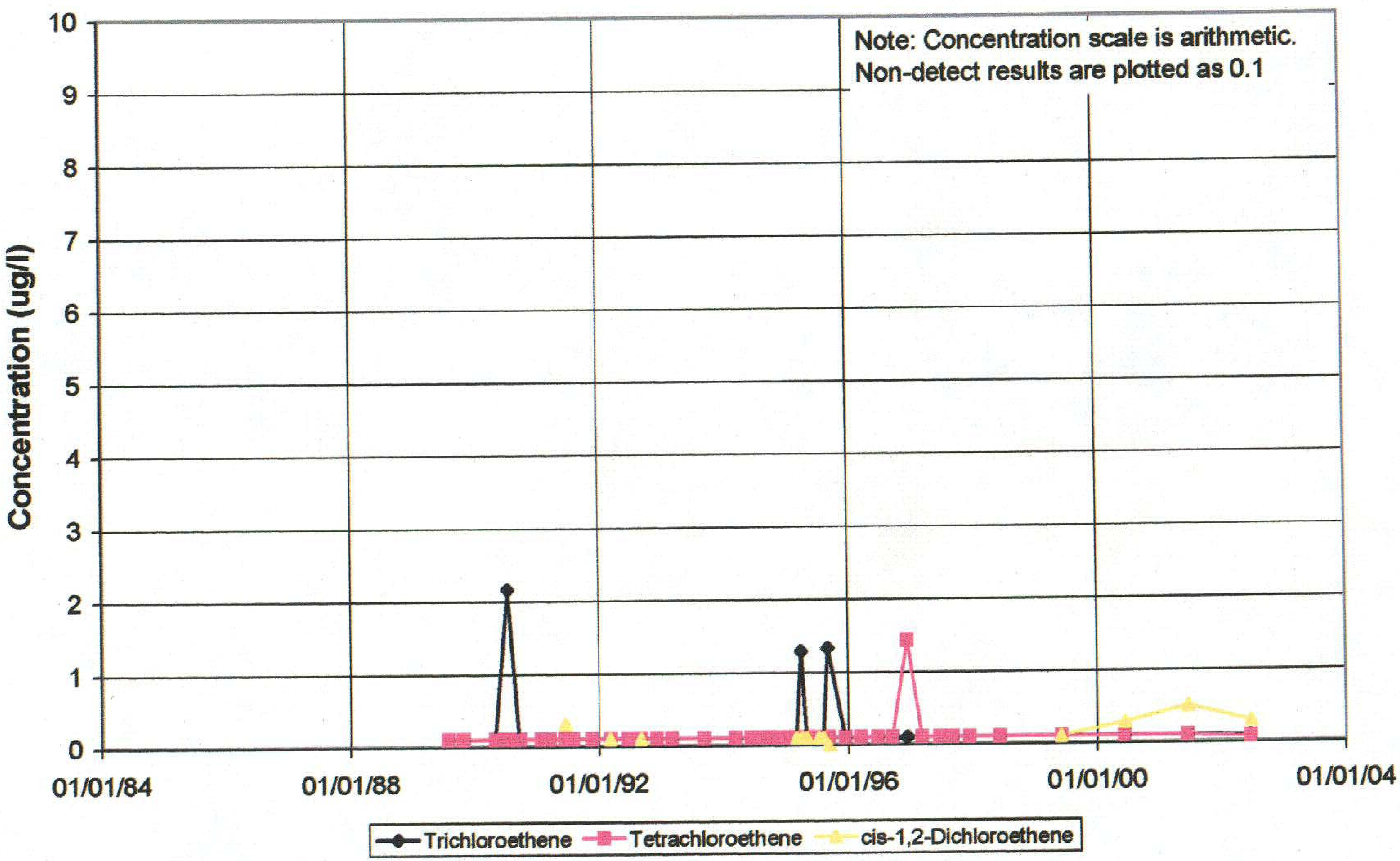

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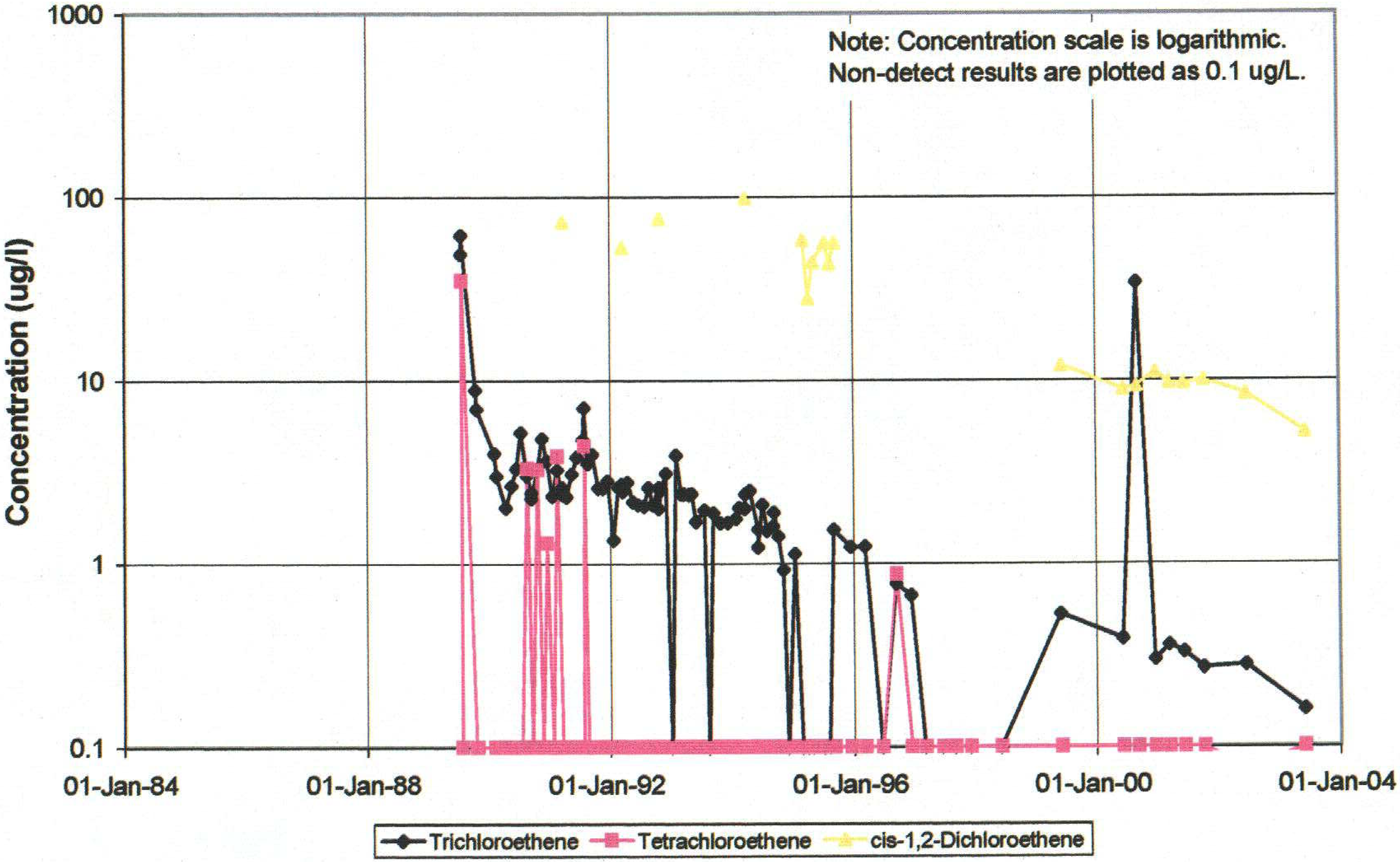

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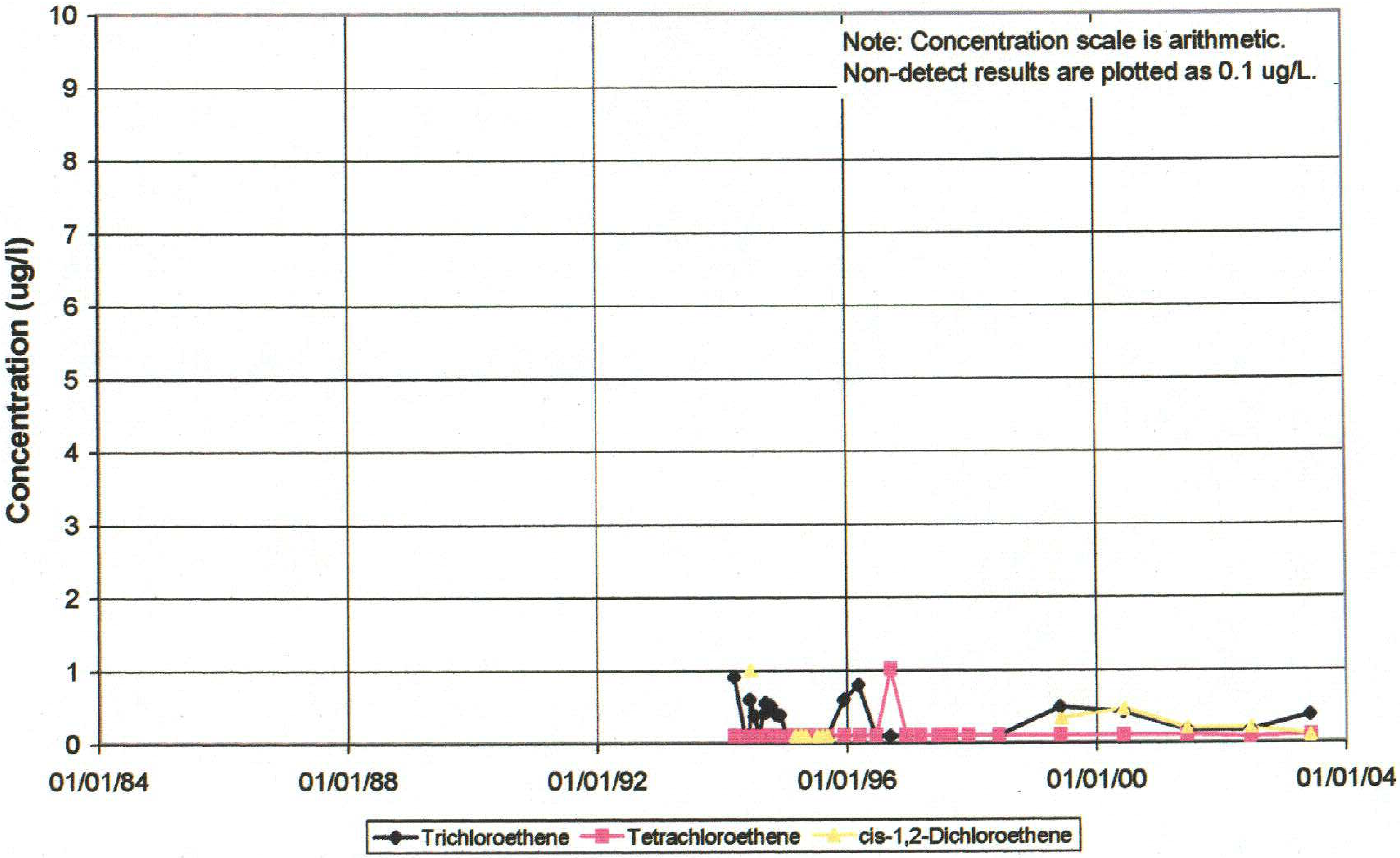

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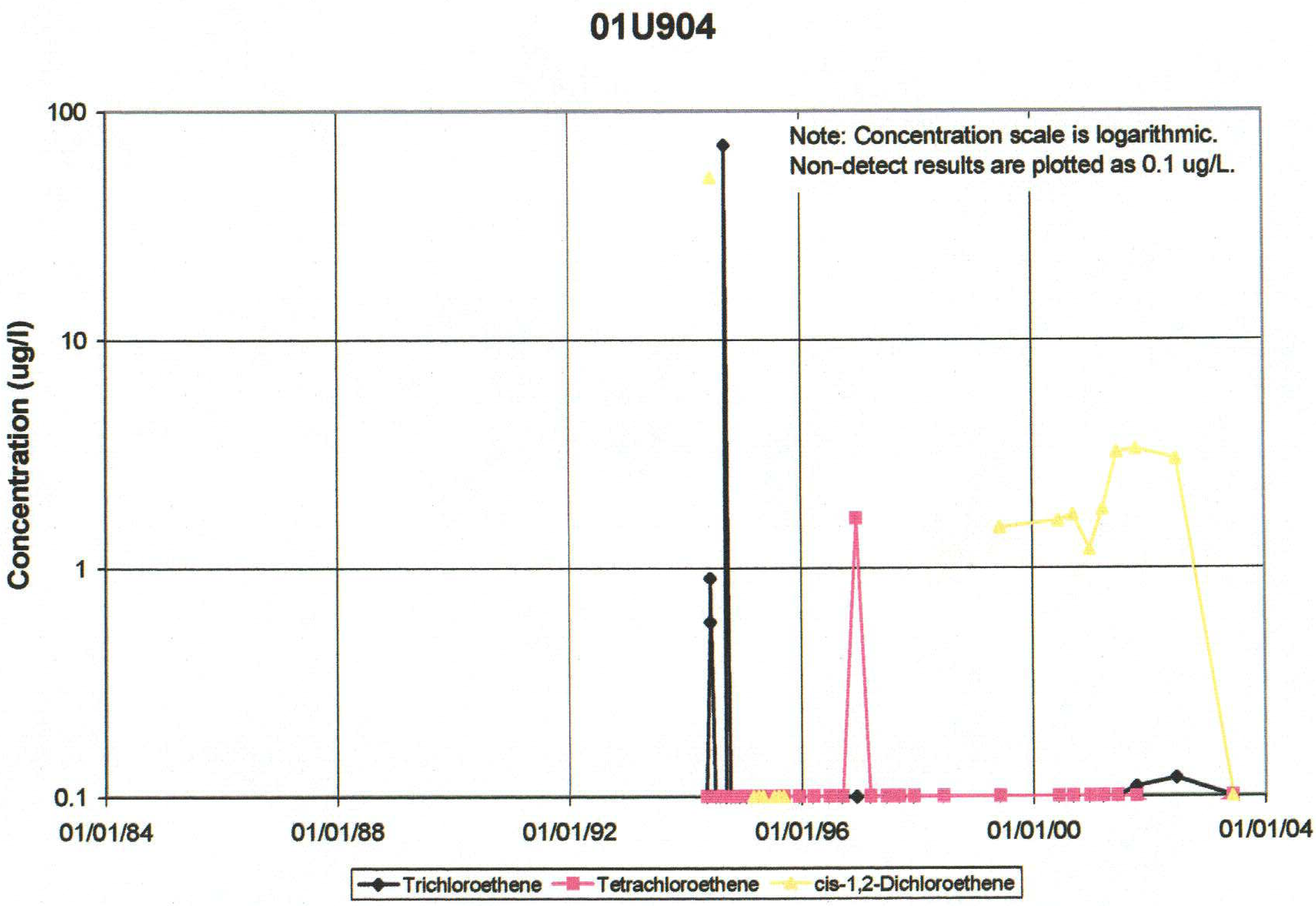

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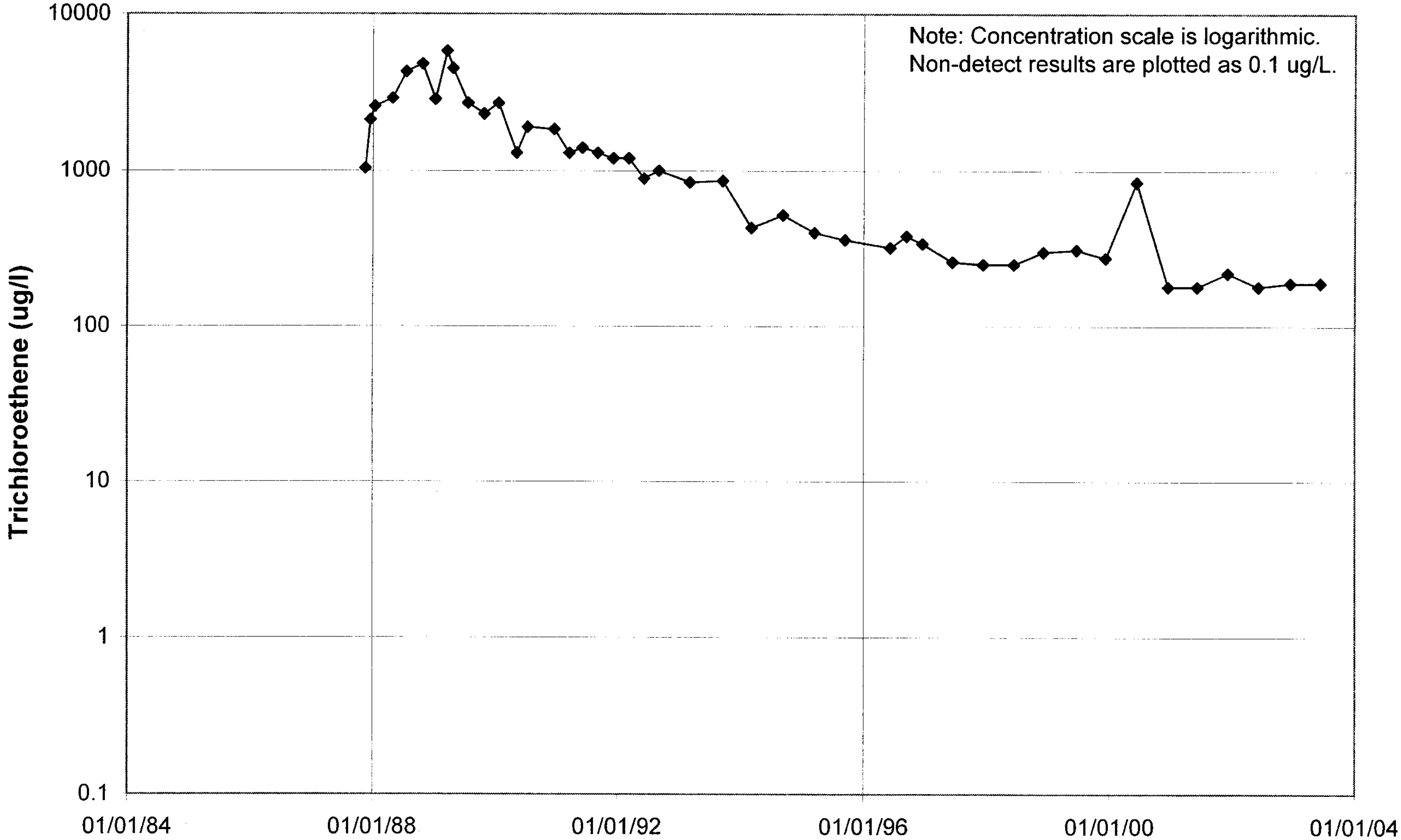
03F302 (B1)



TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

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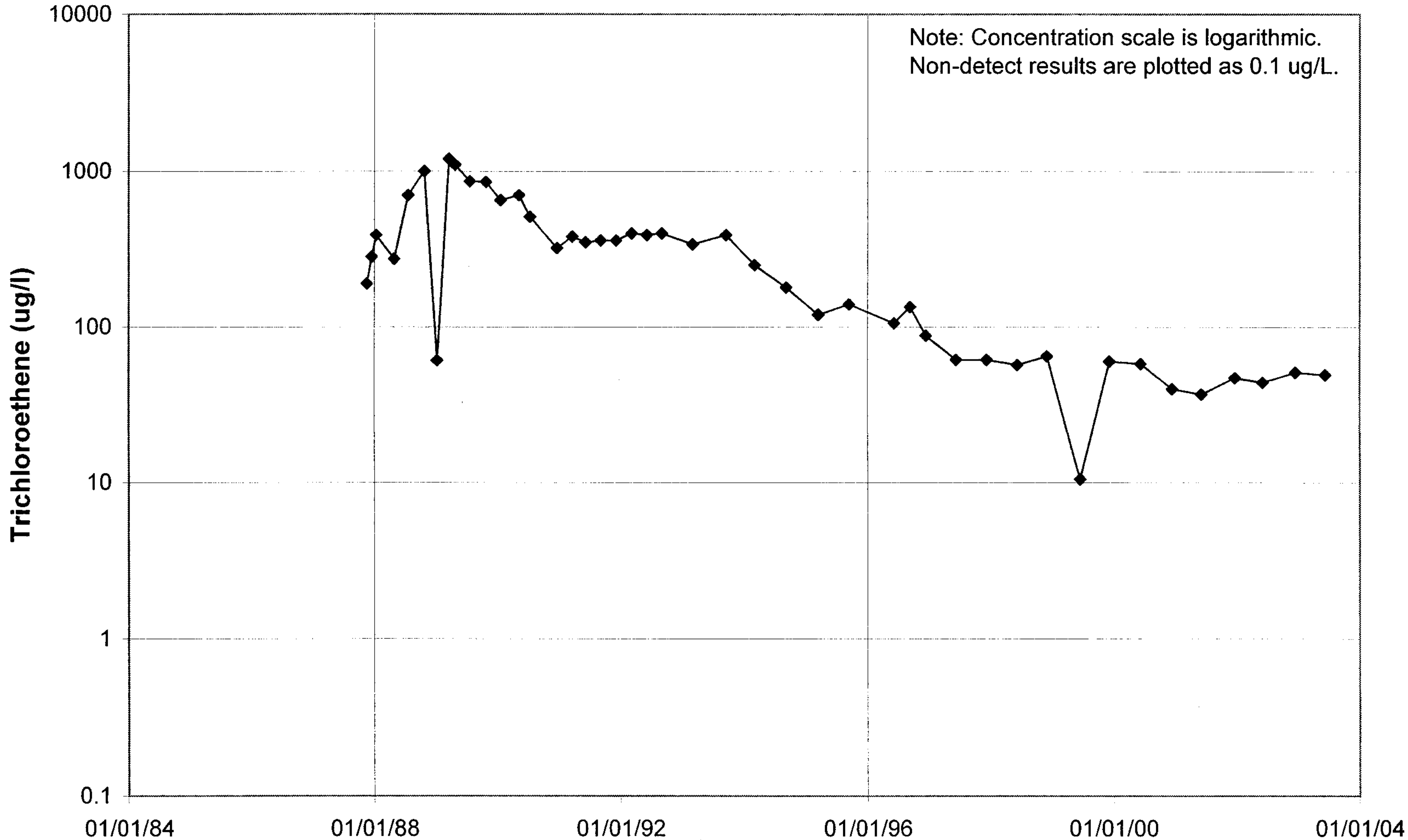

TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

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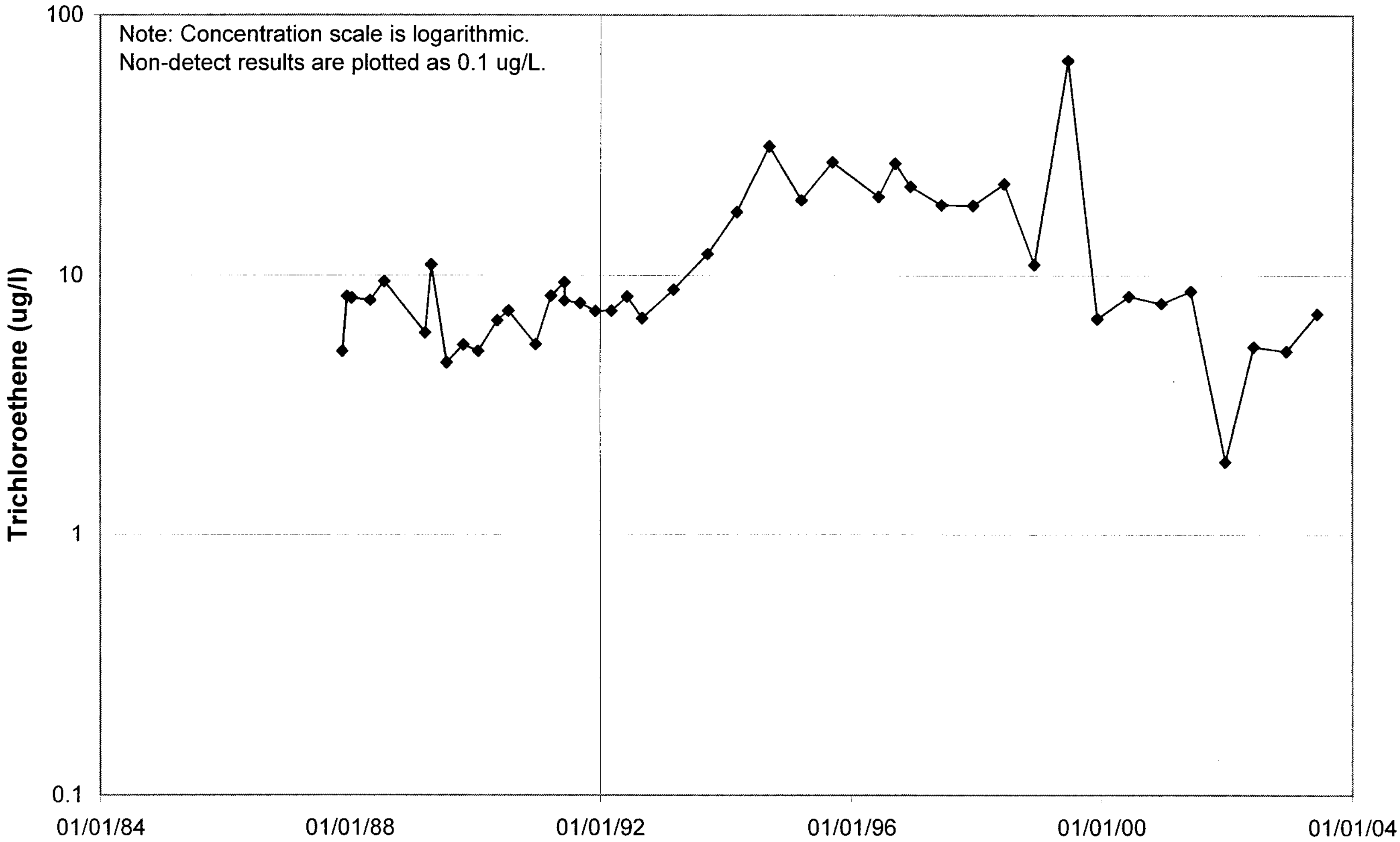

TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

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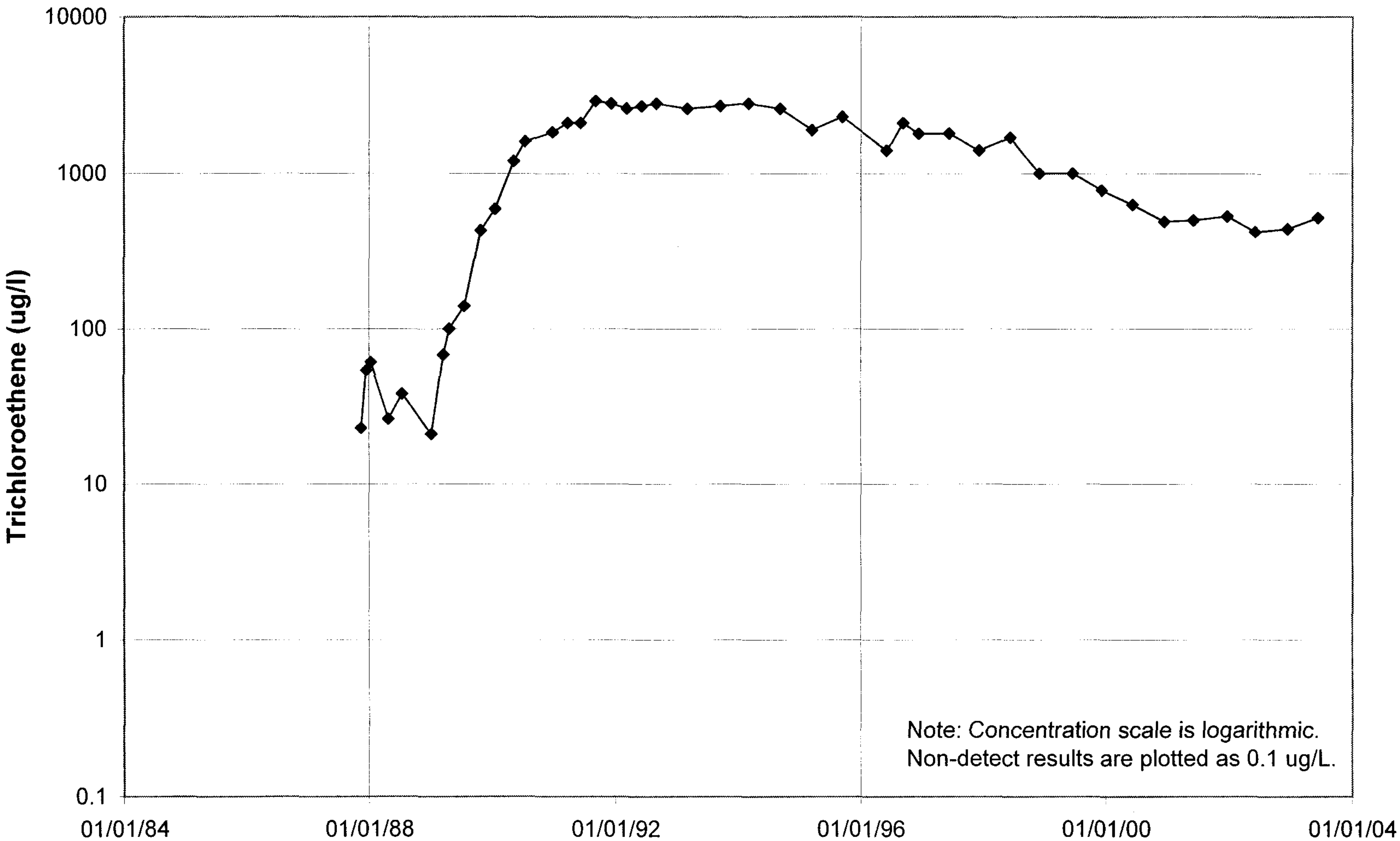

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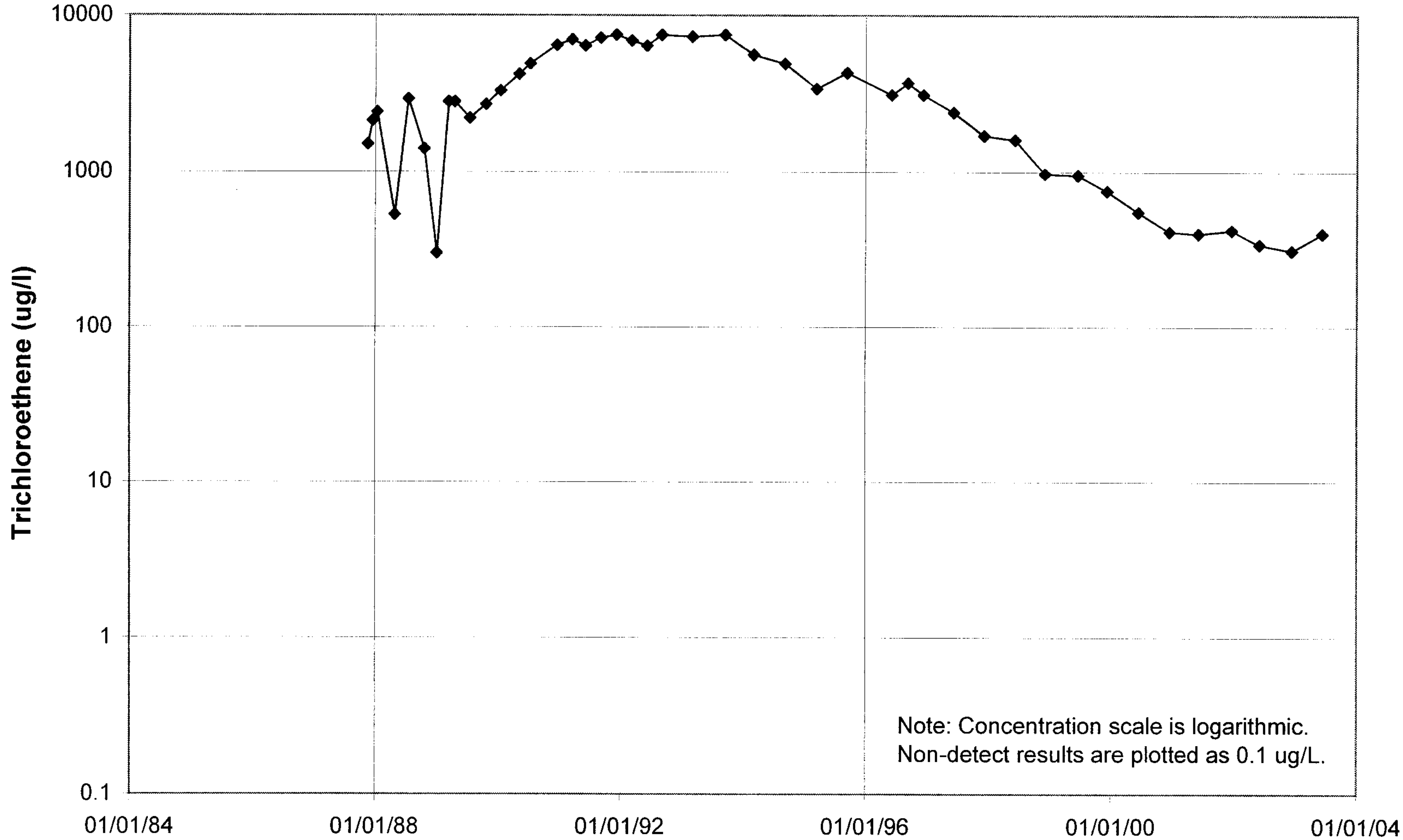

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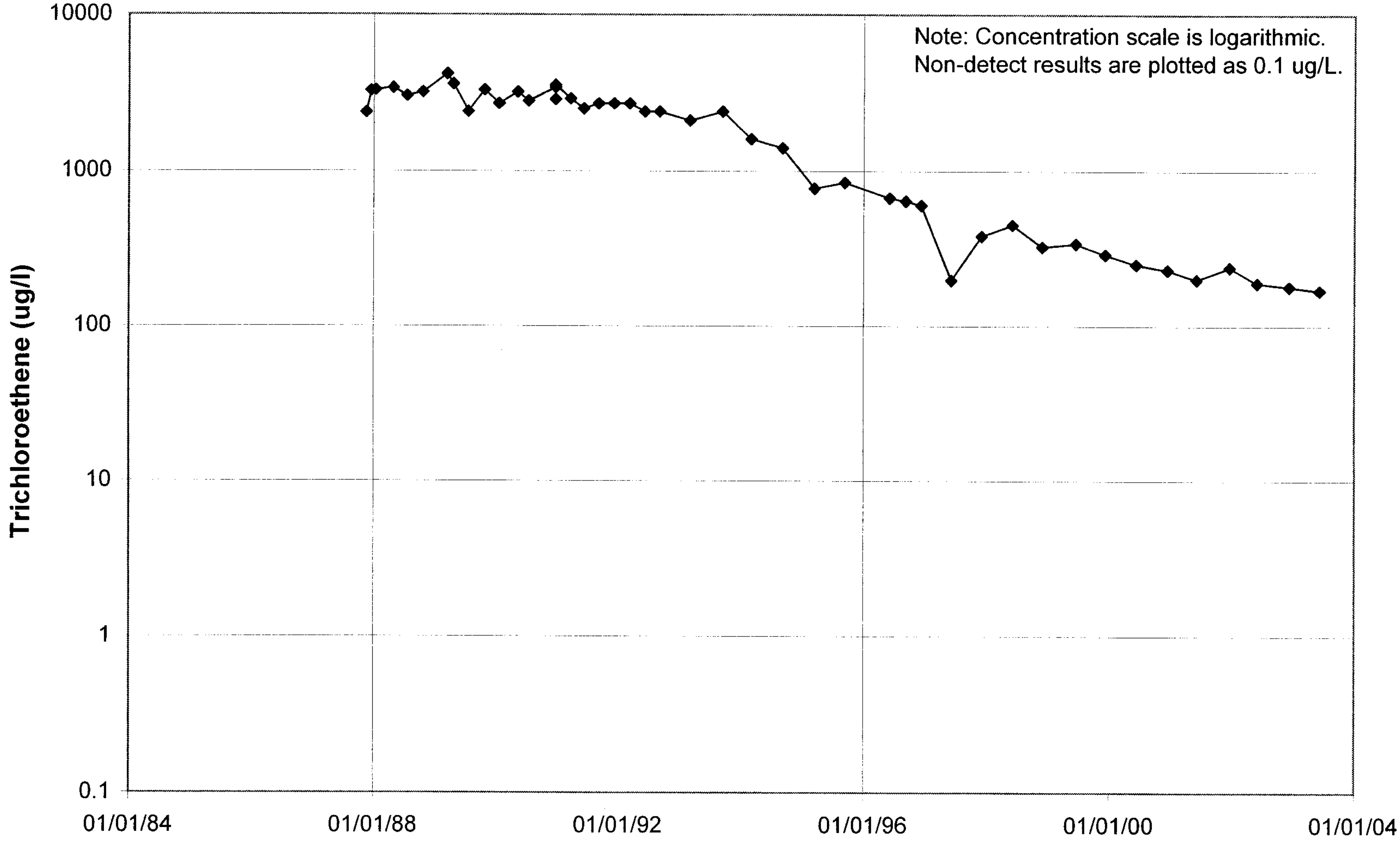

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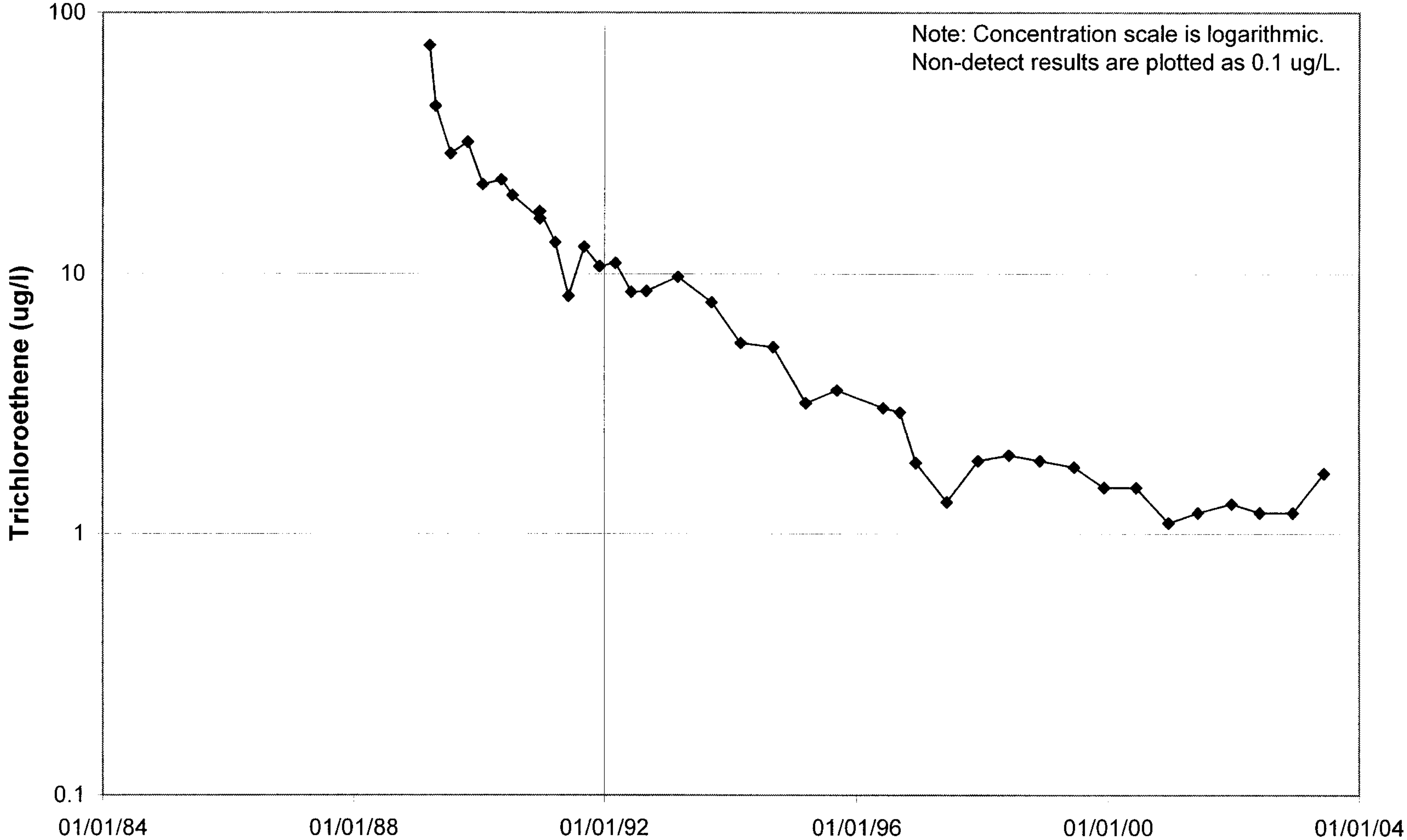

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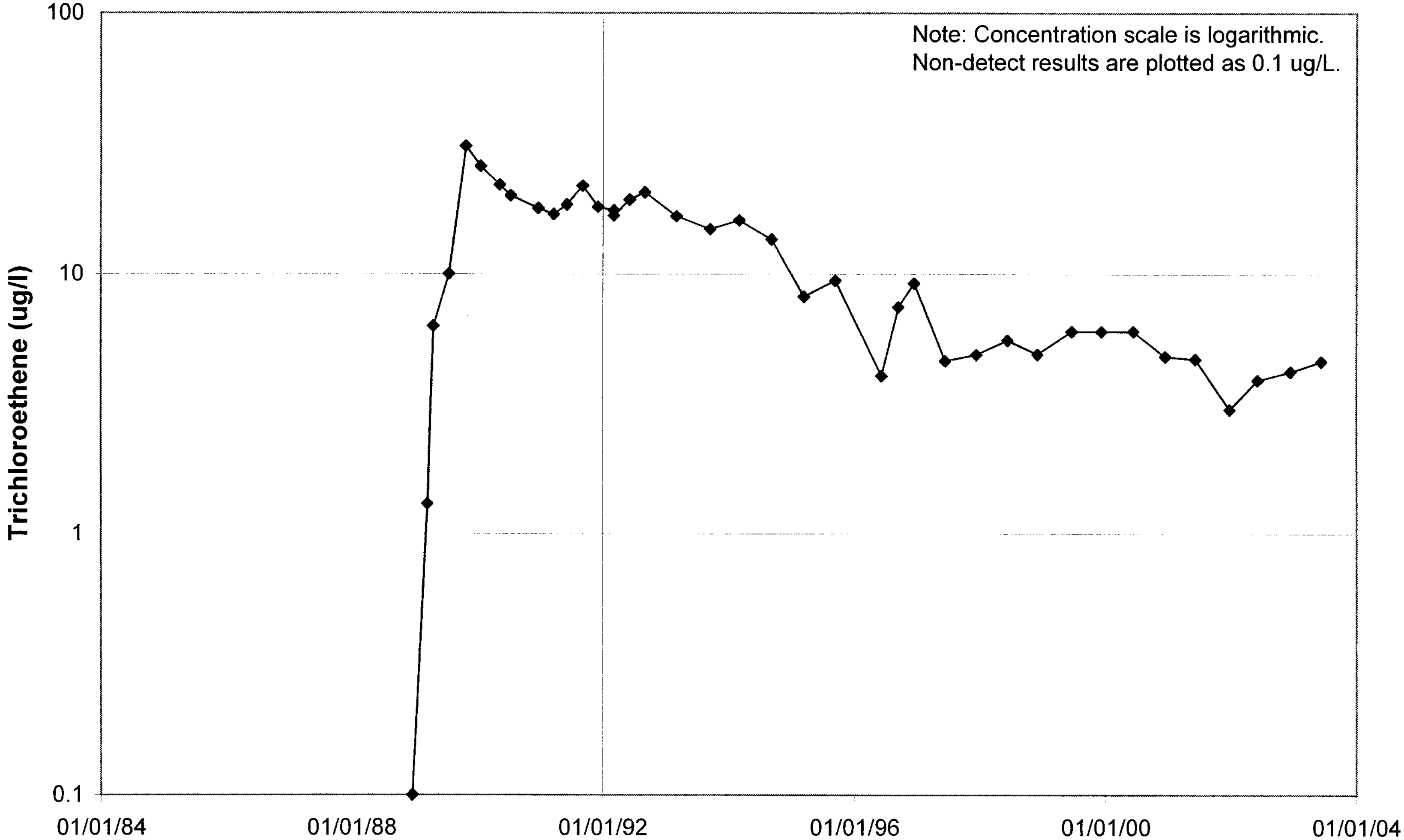

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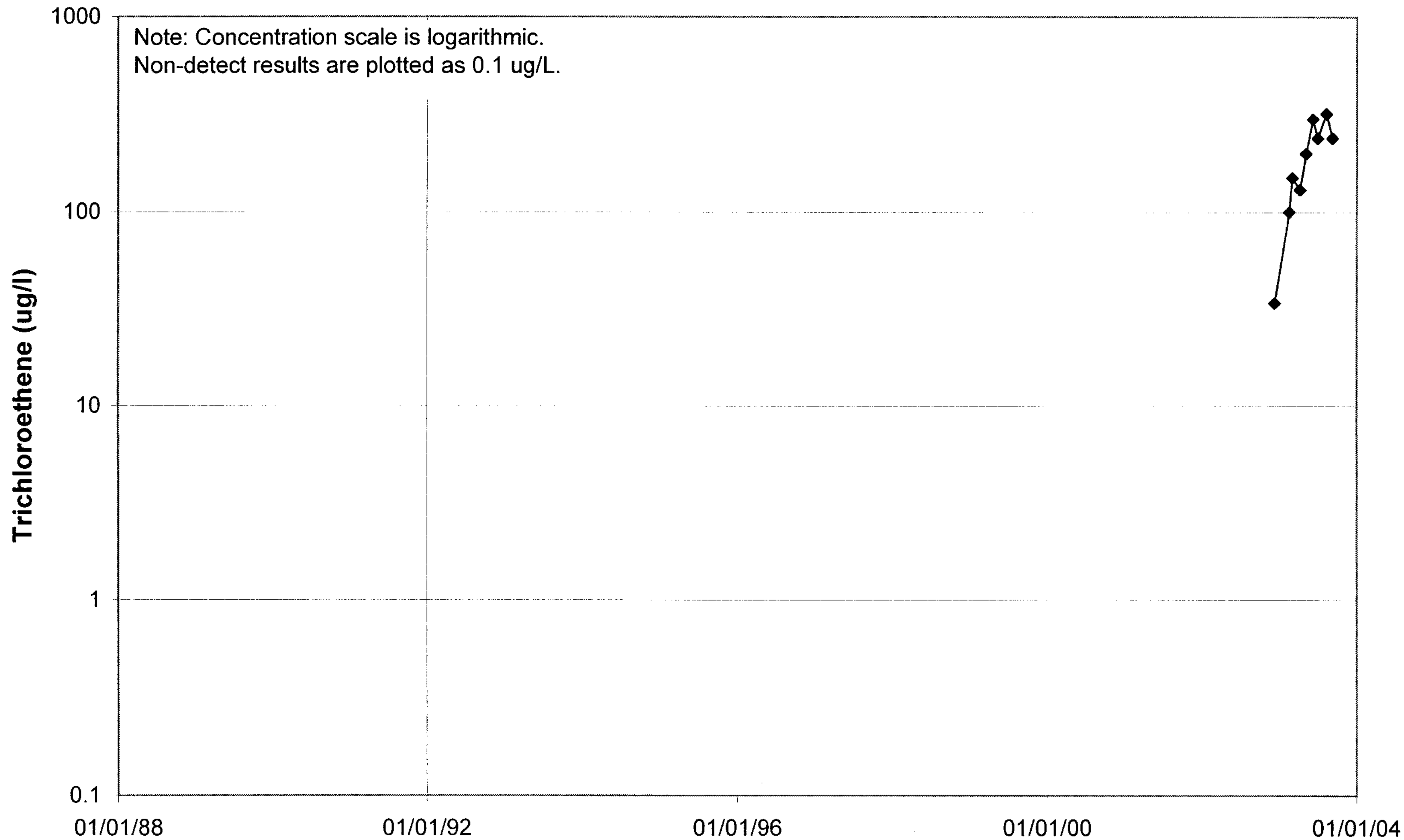

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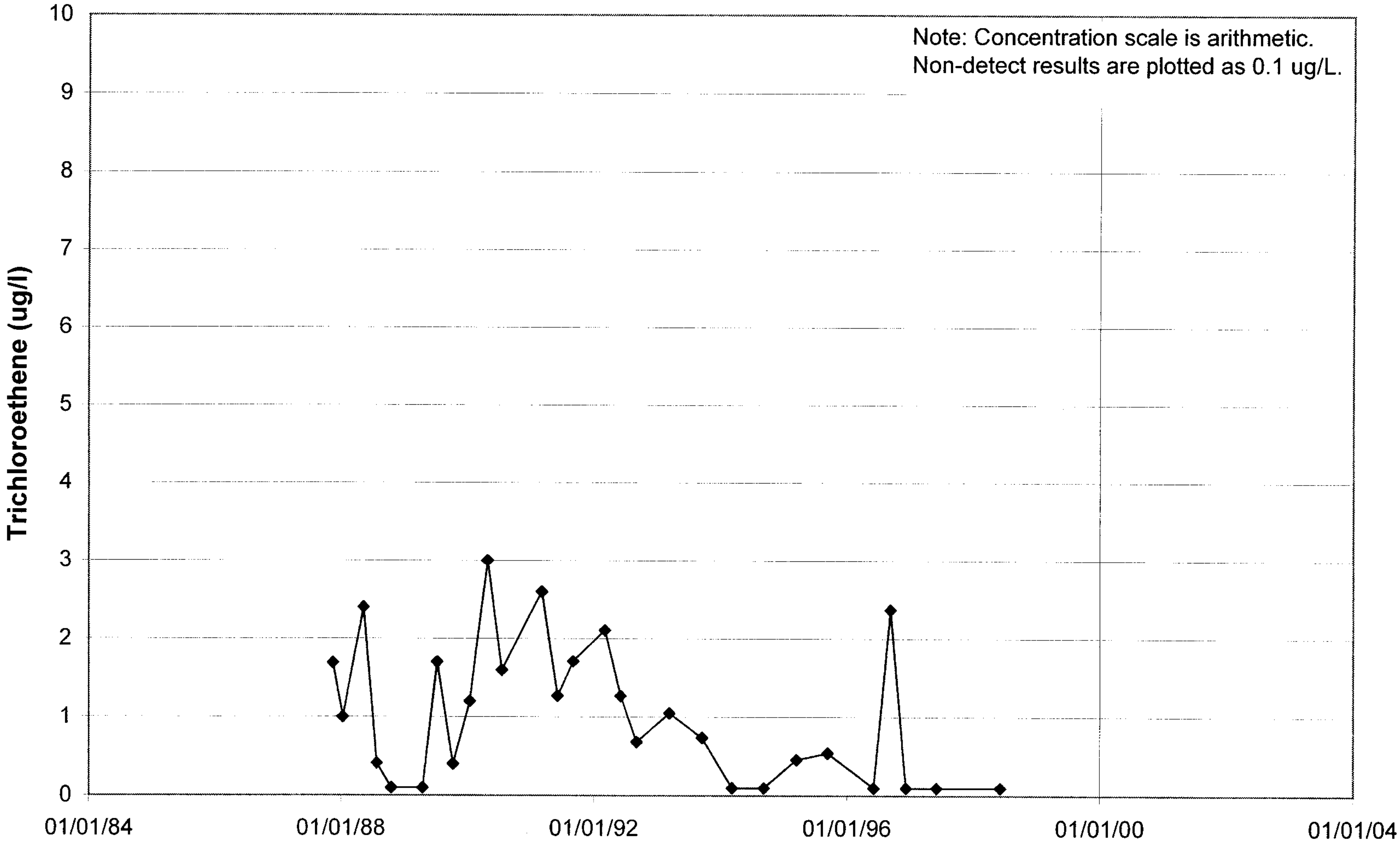
03L001



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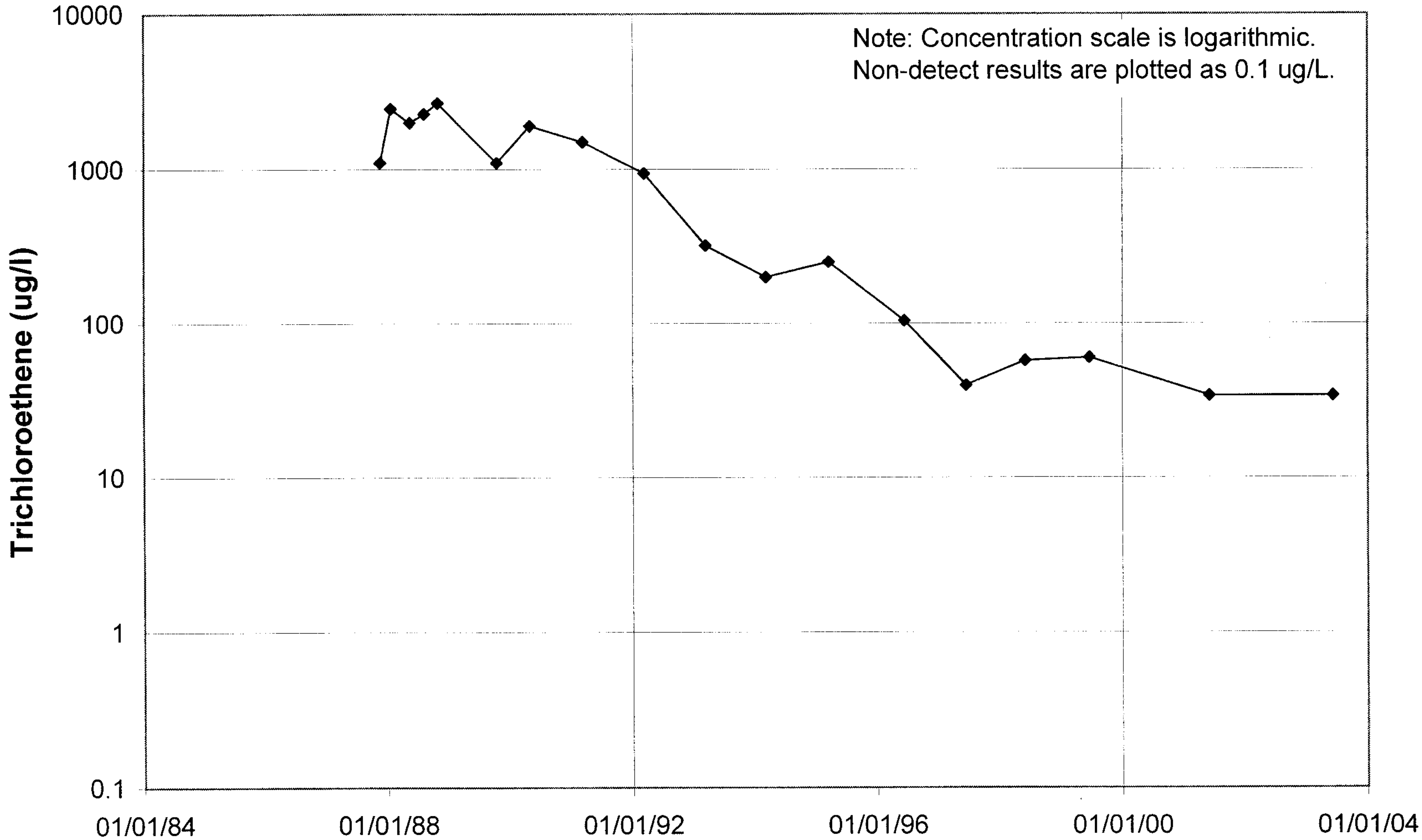

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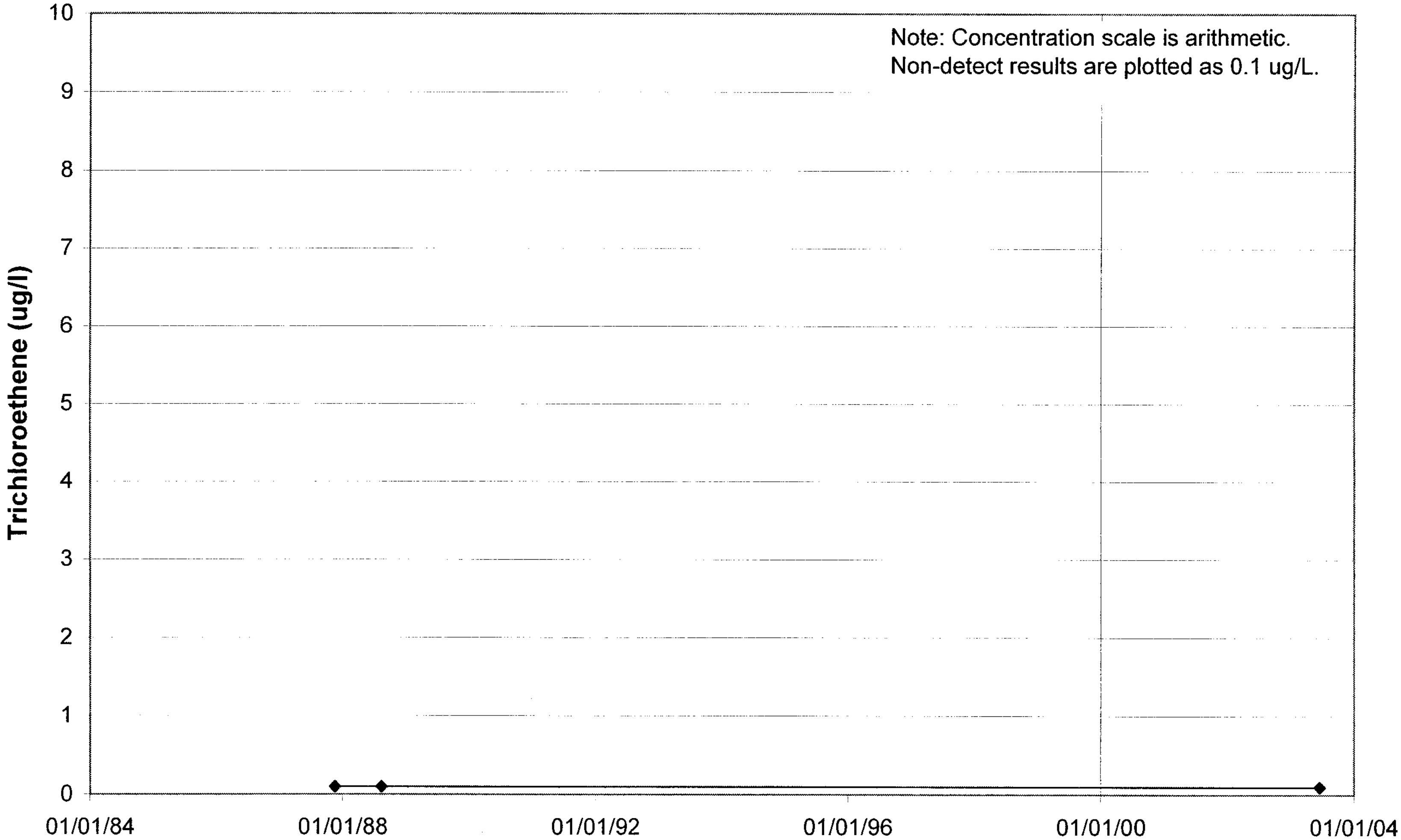

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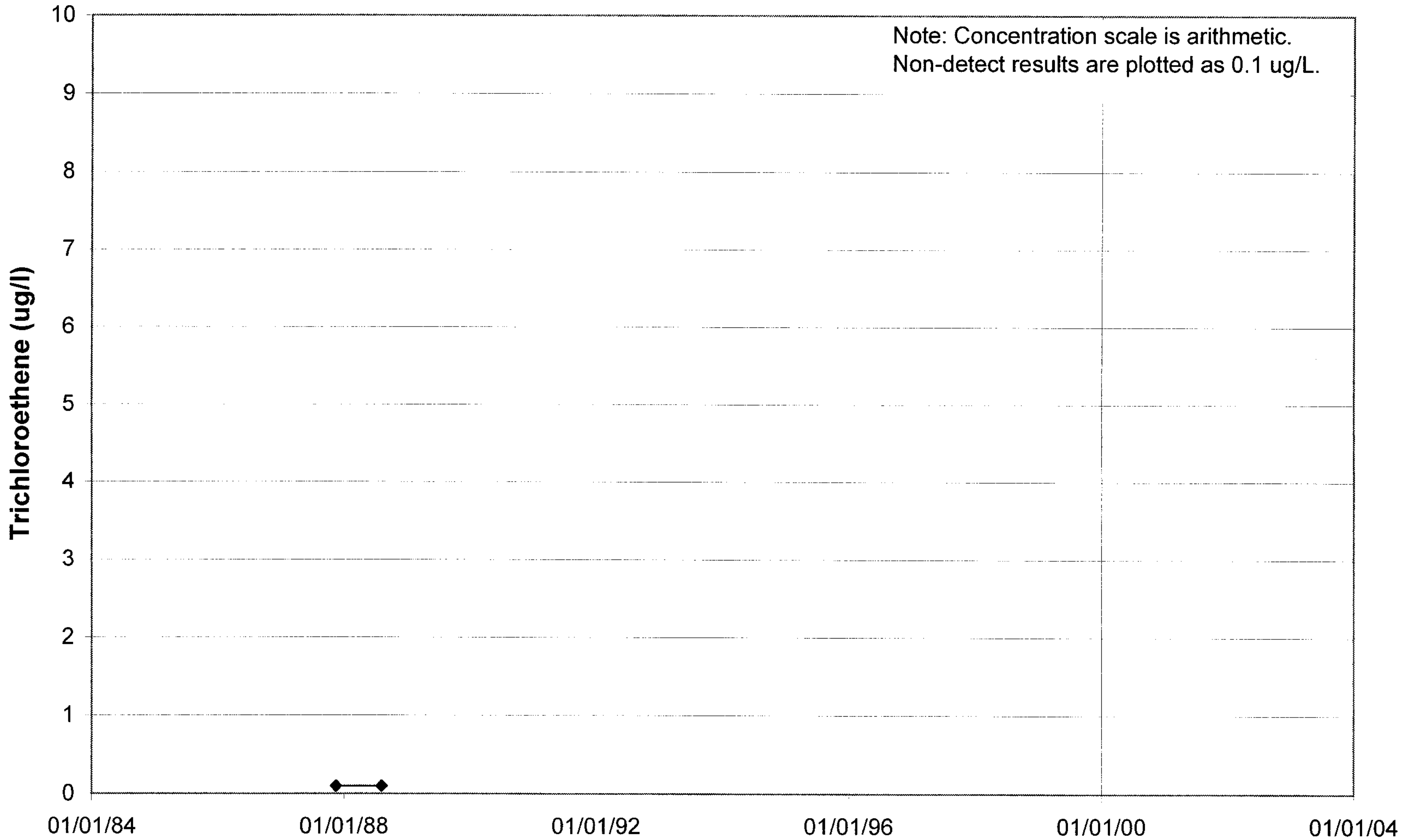

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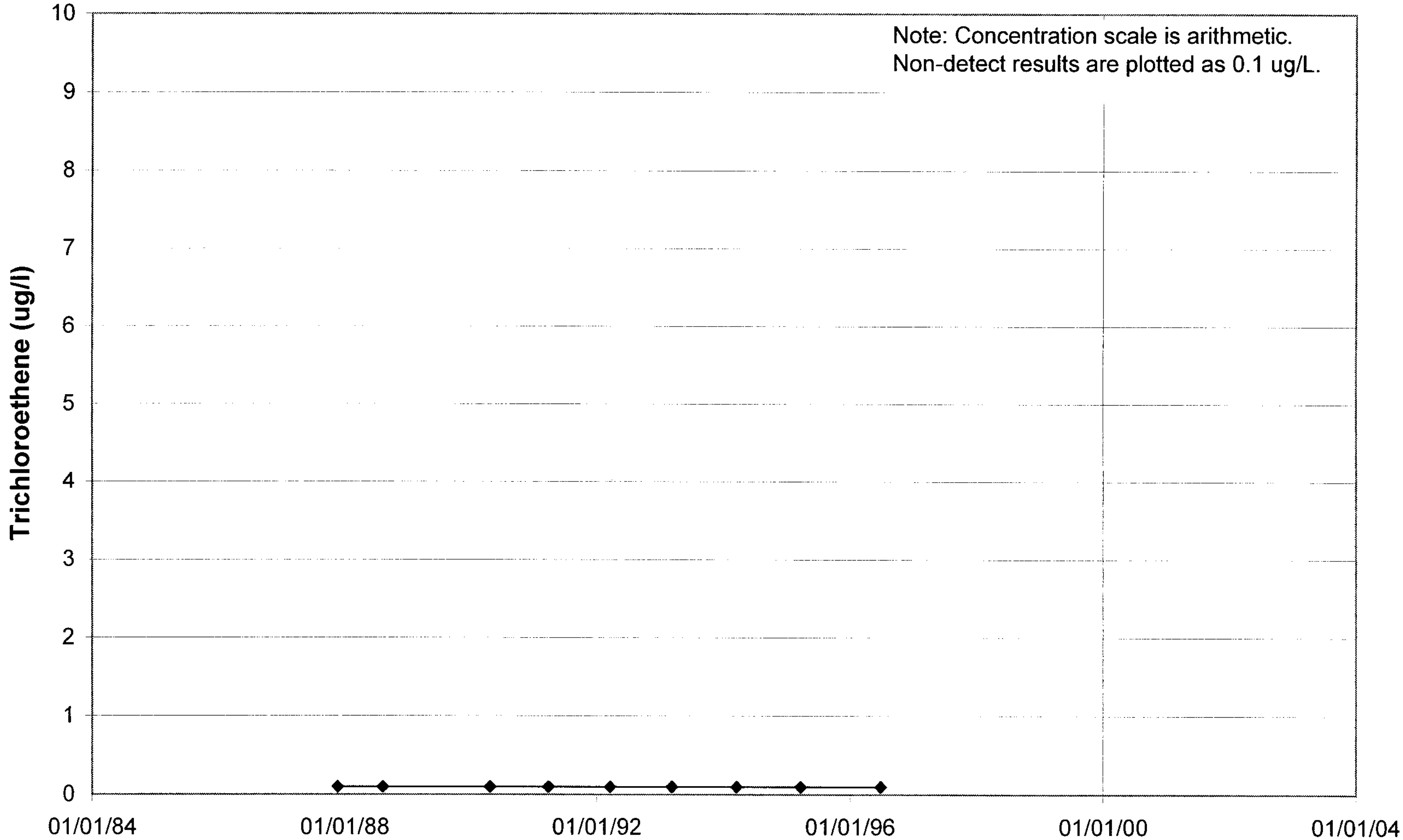

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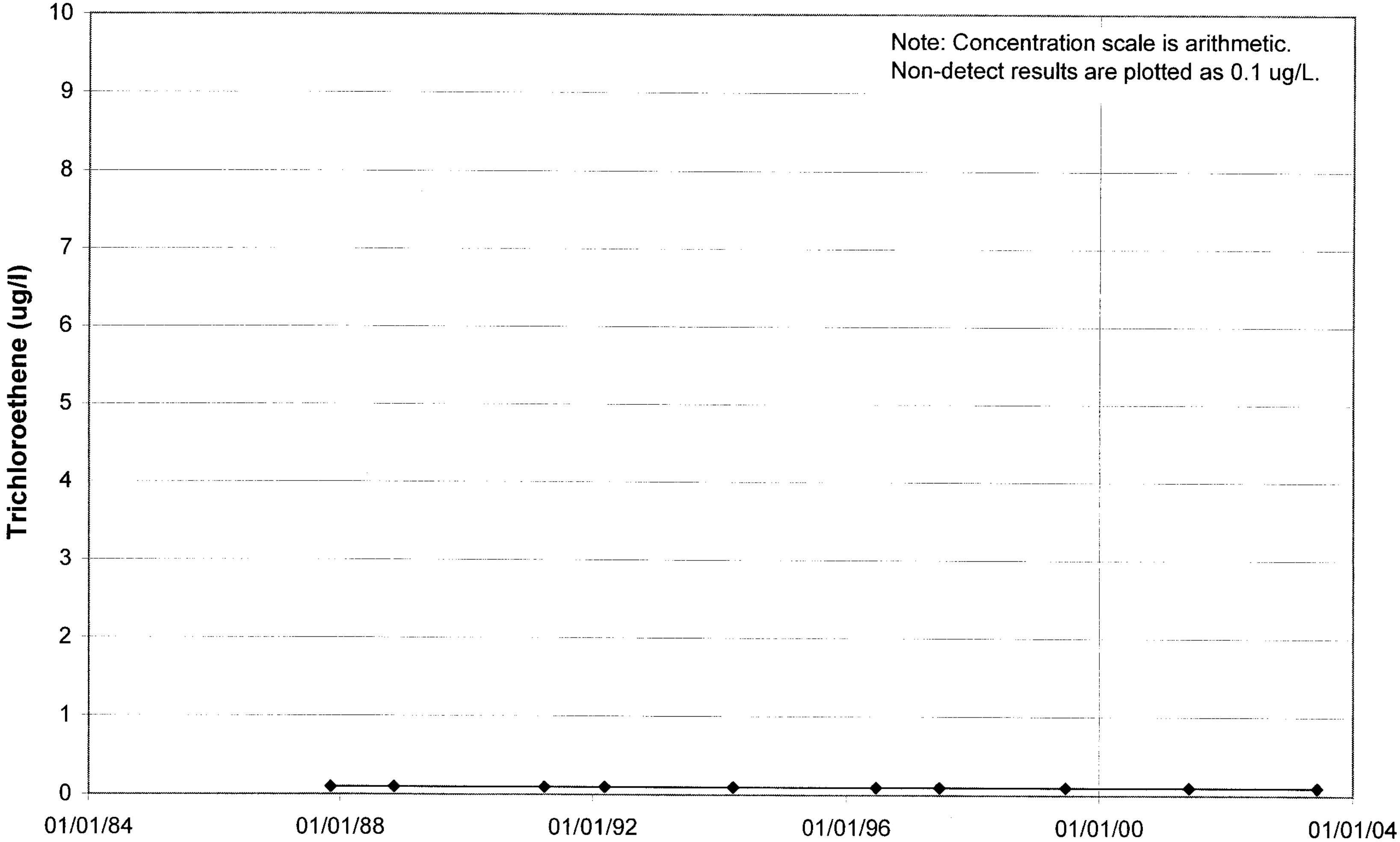

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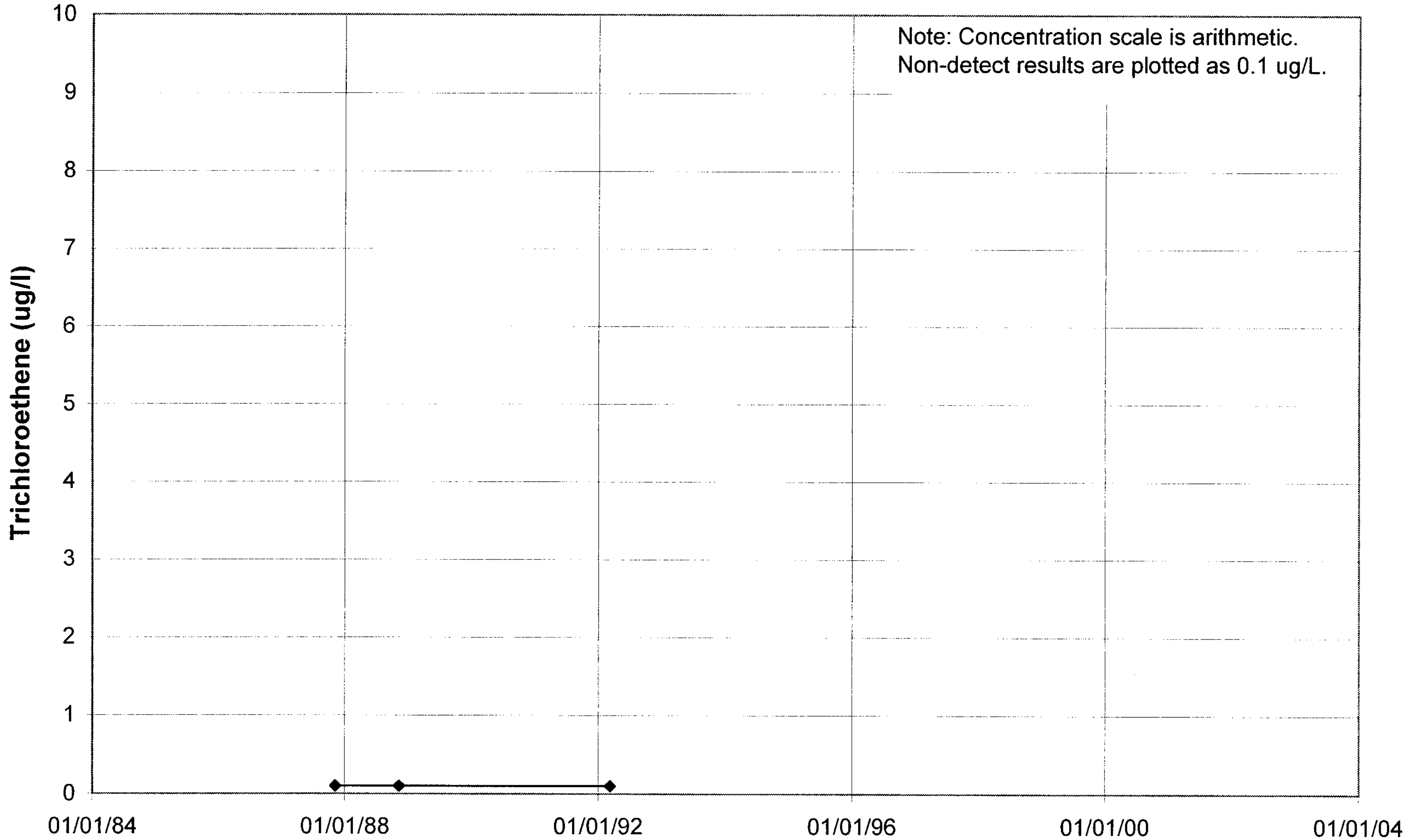

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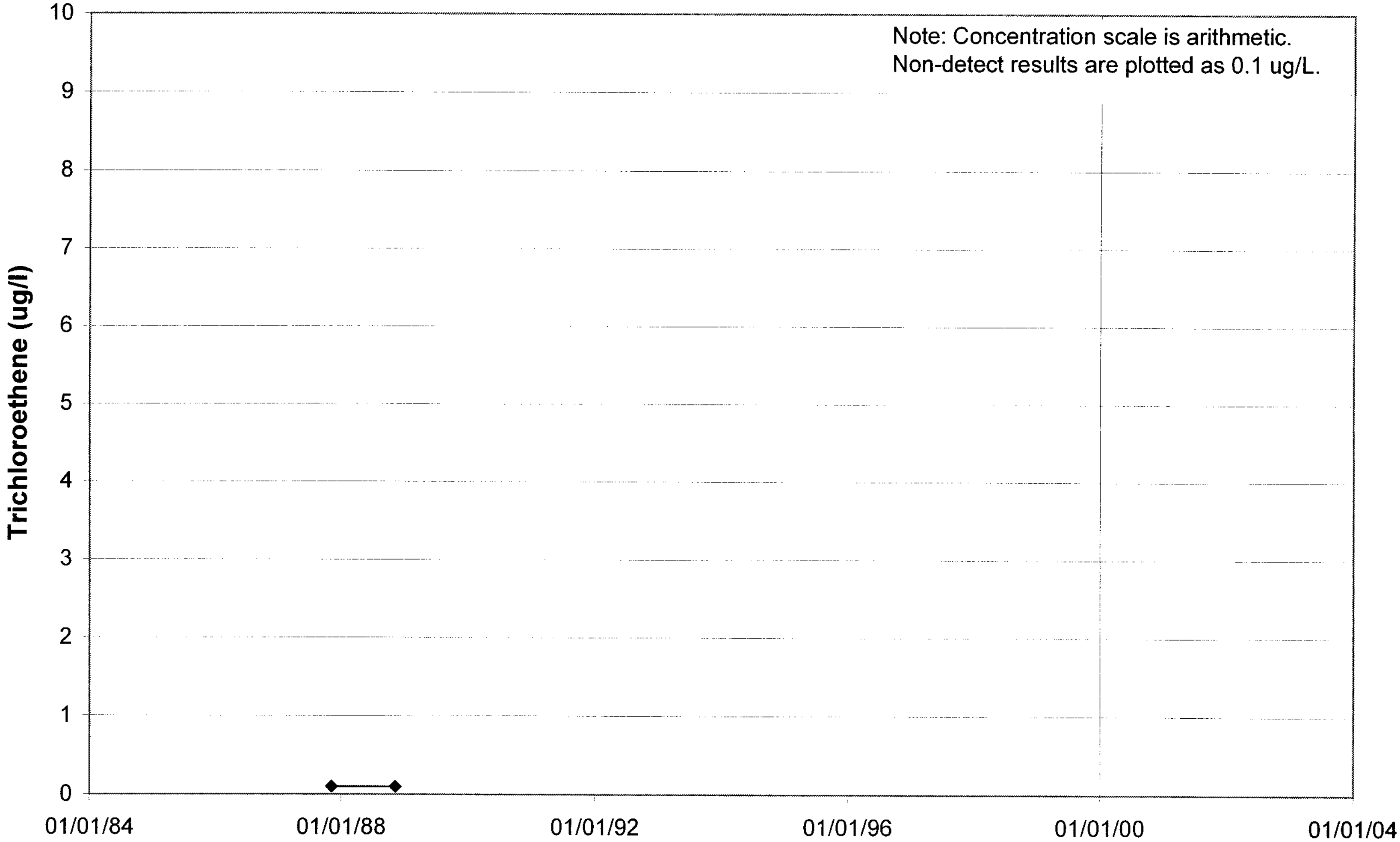

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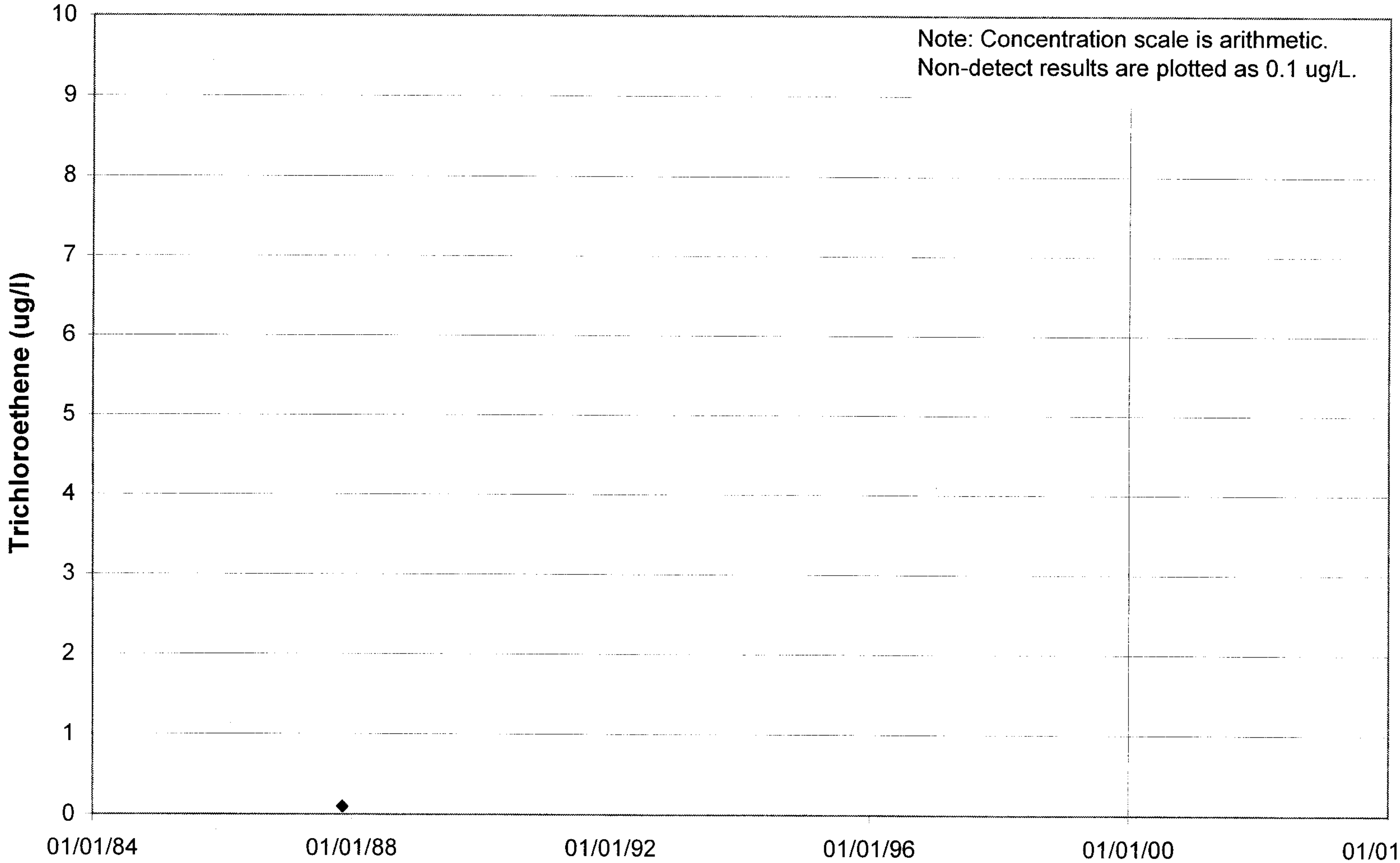

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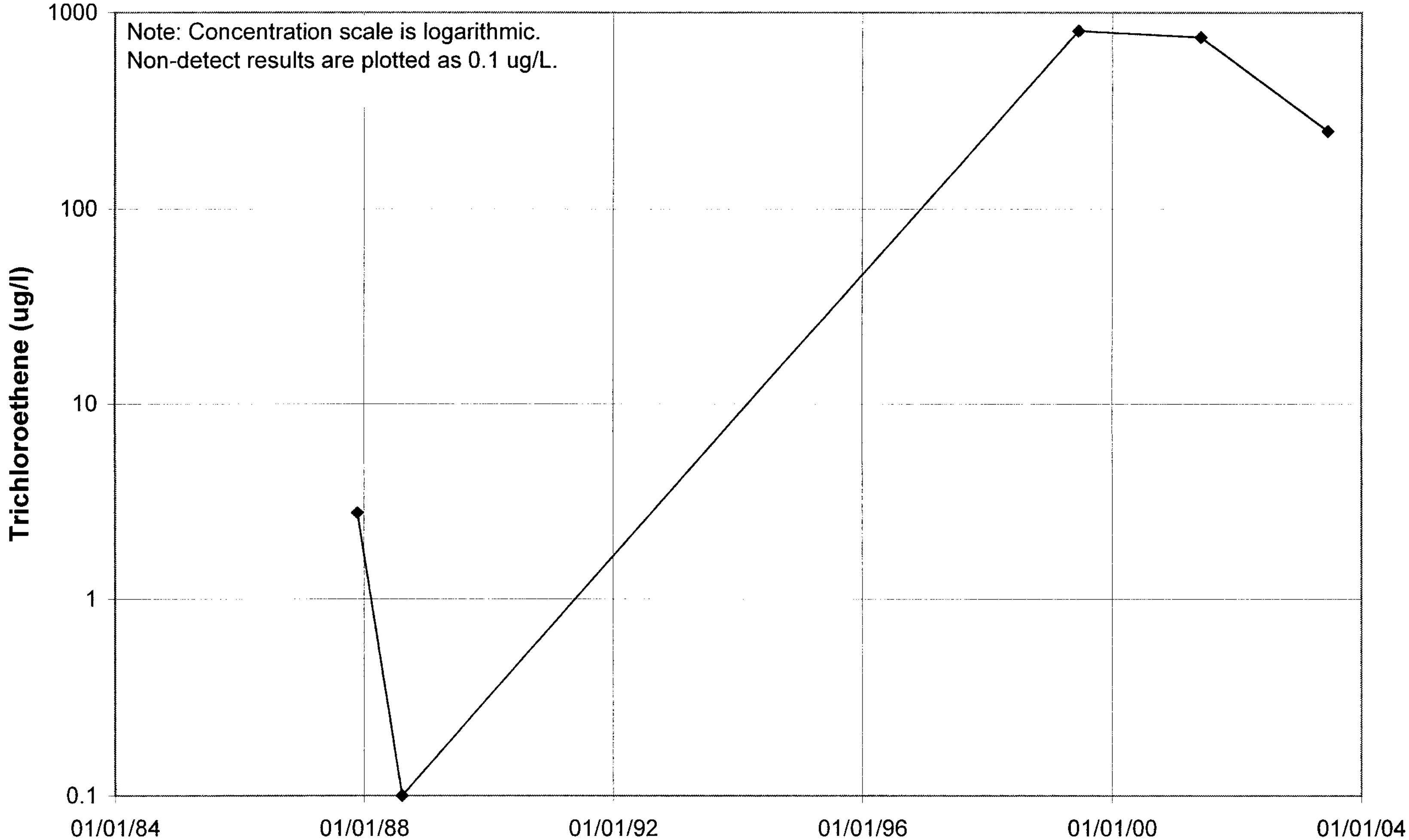

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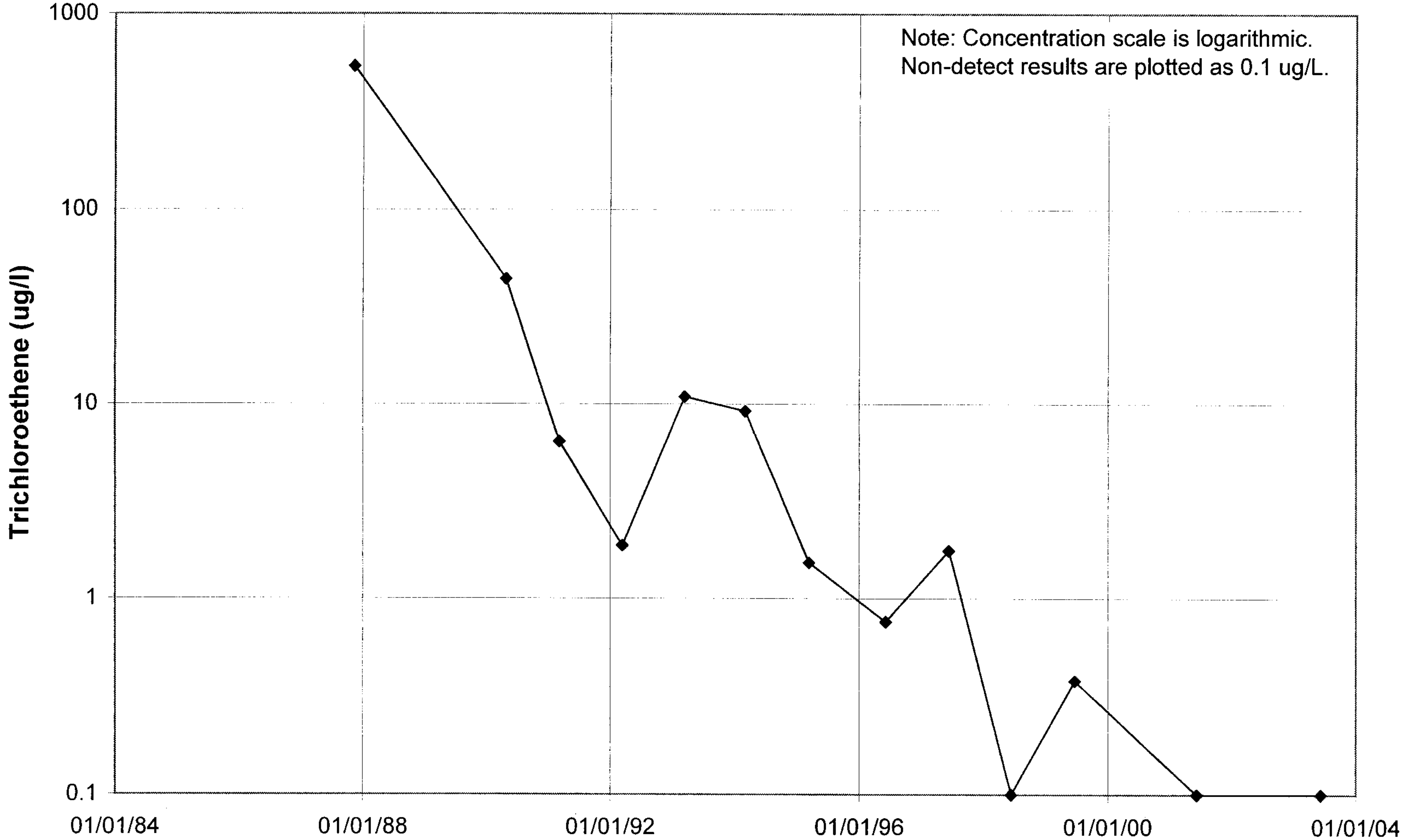

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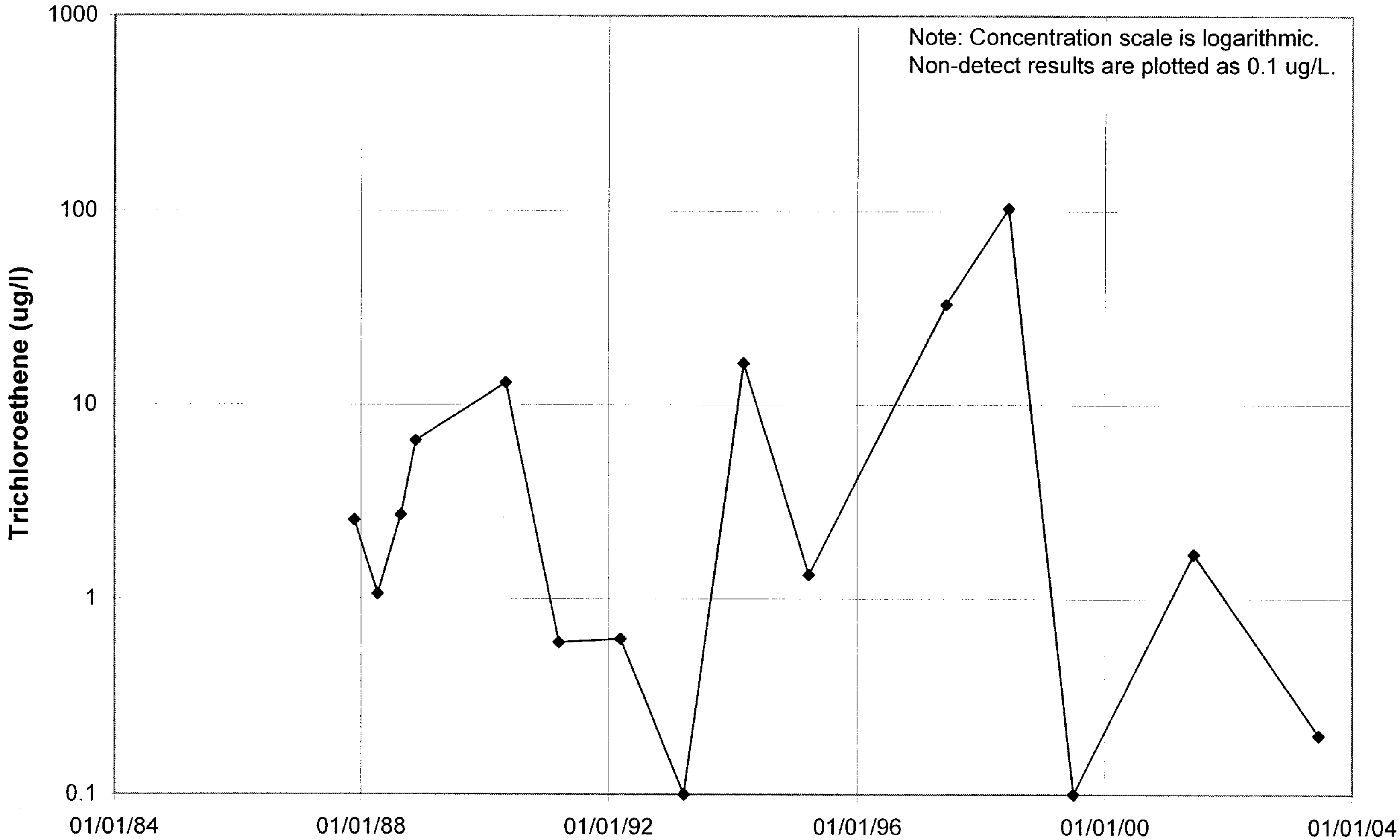

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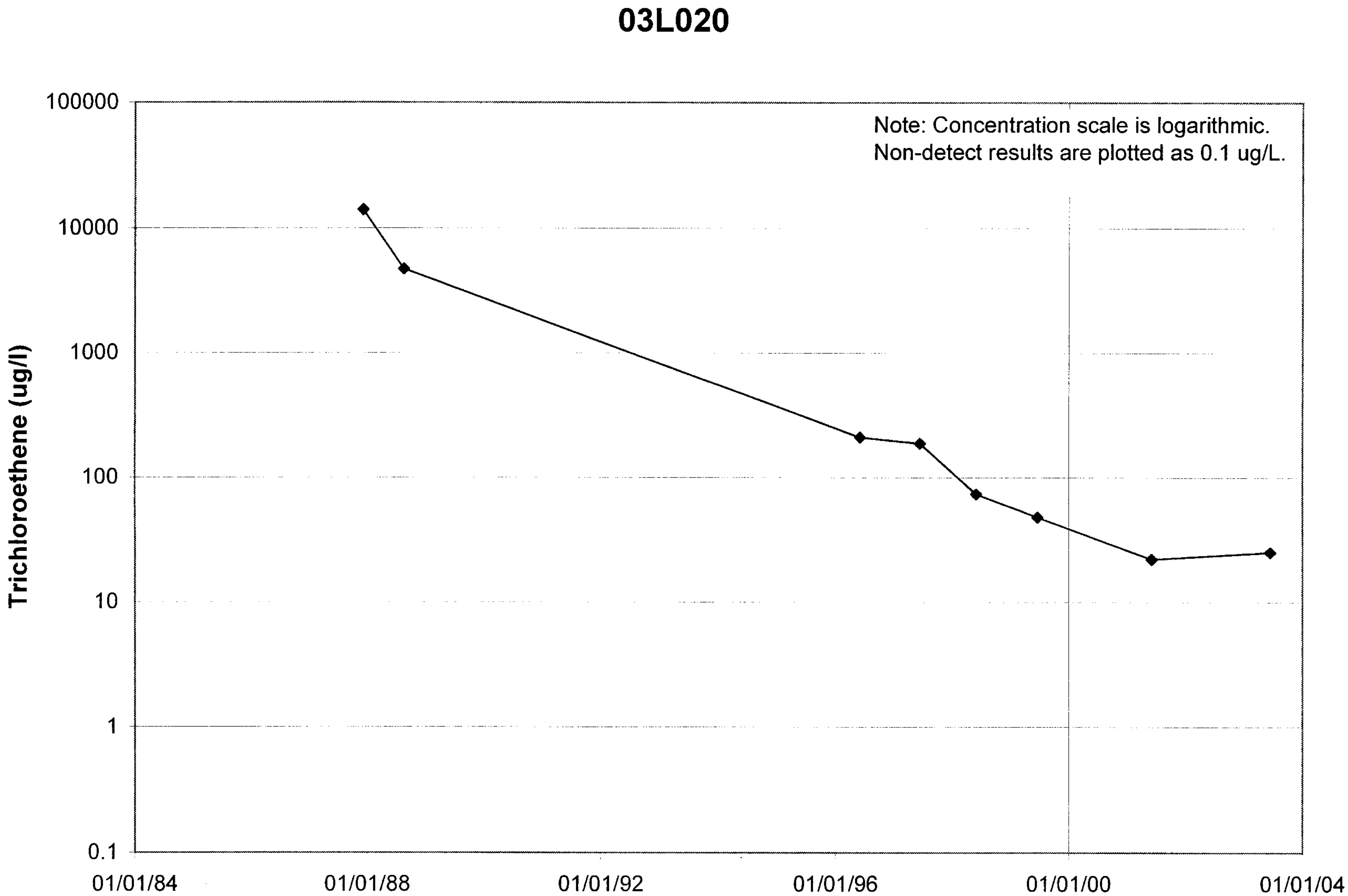

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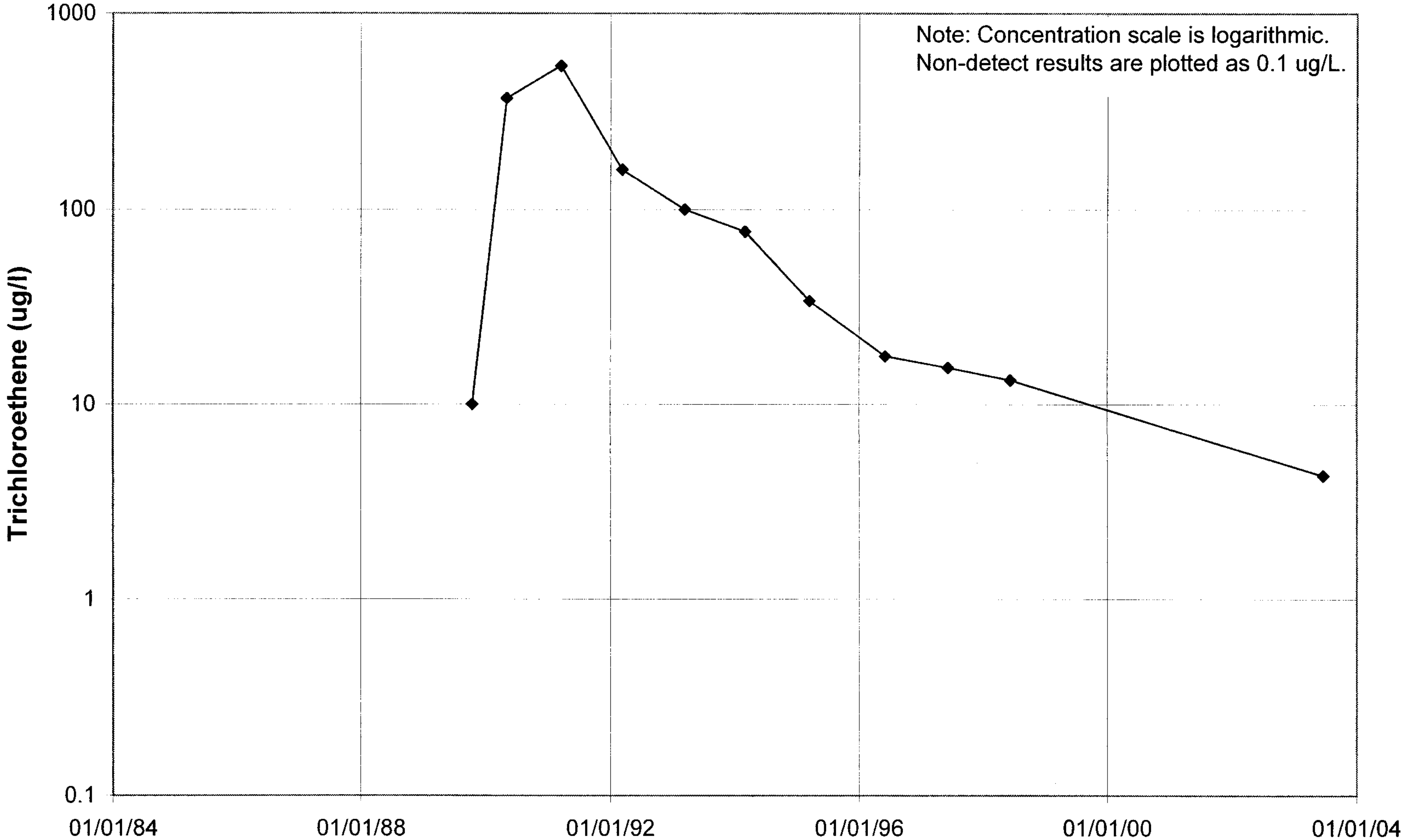
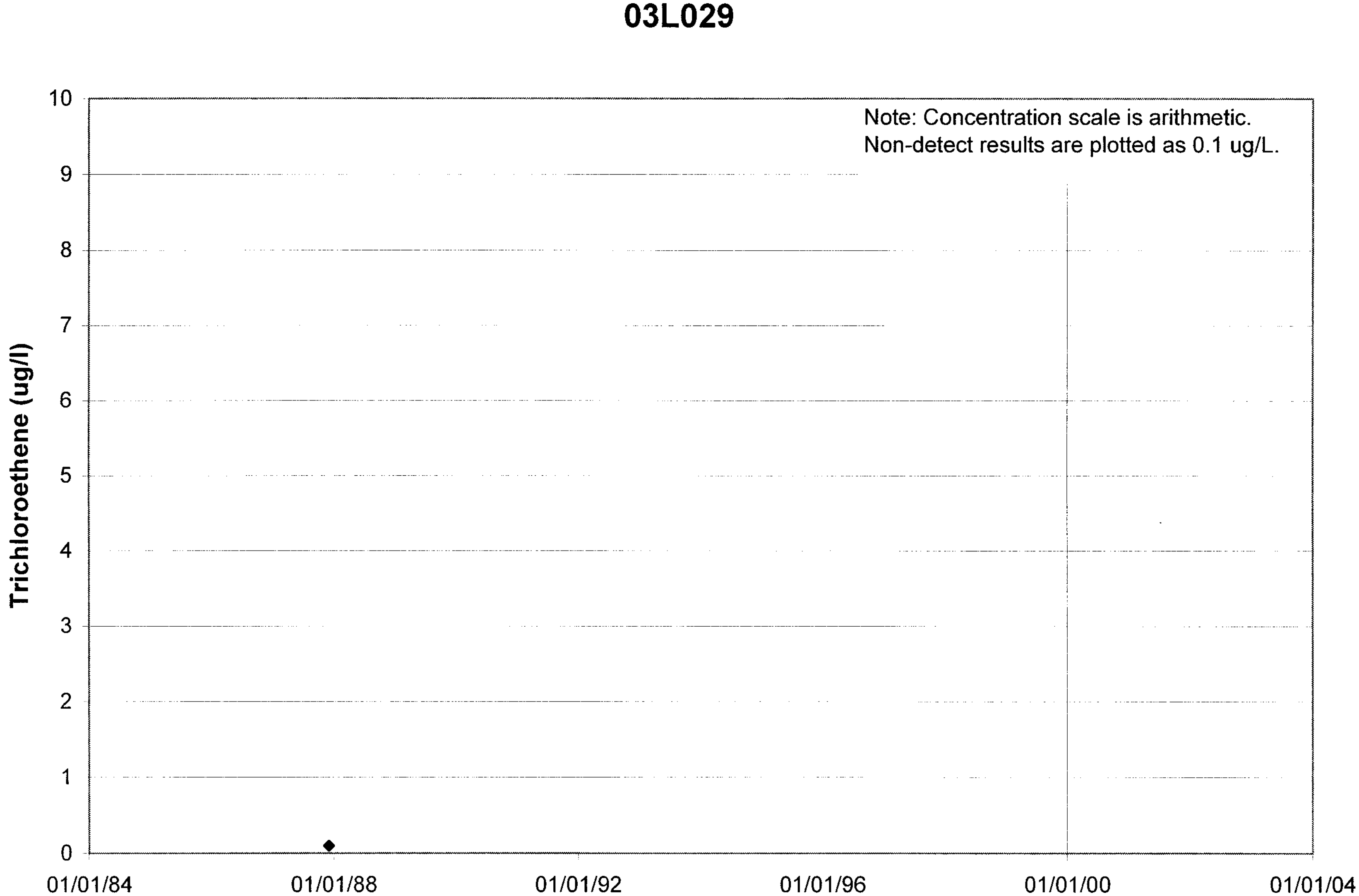


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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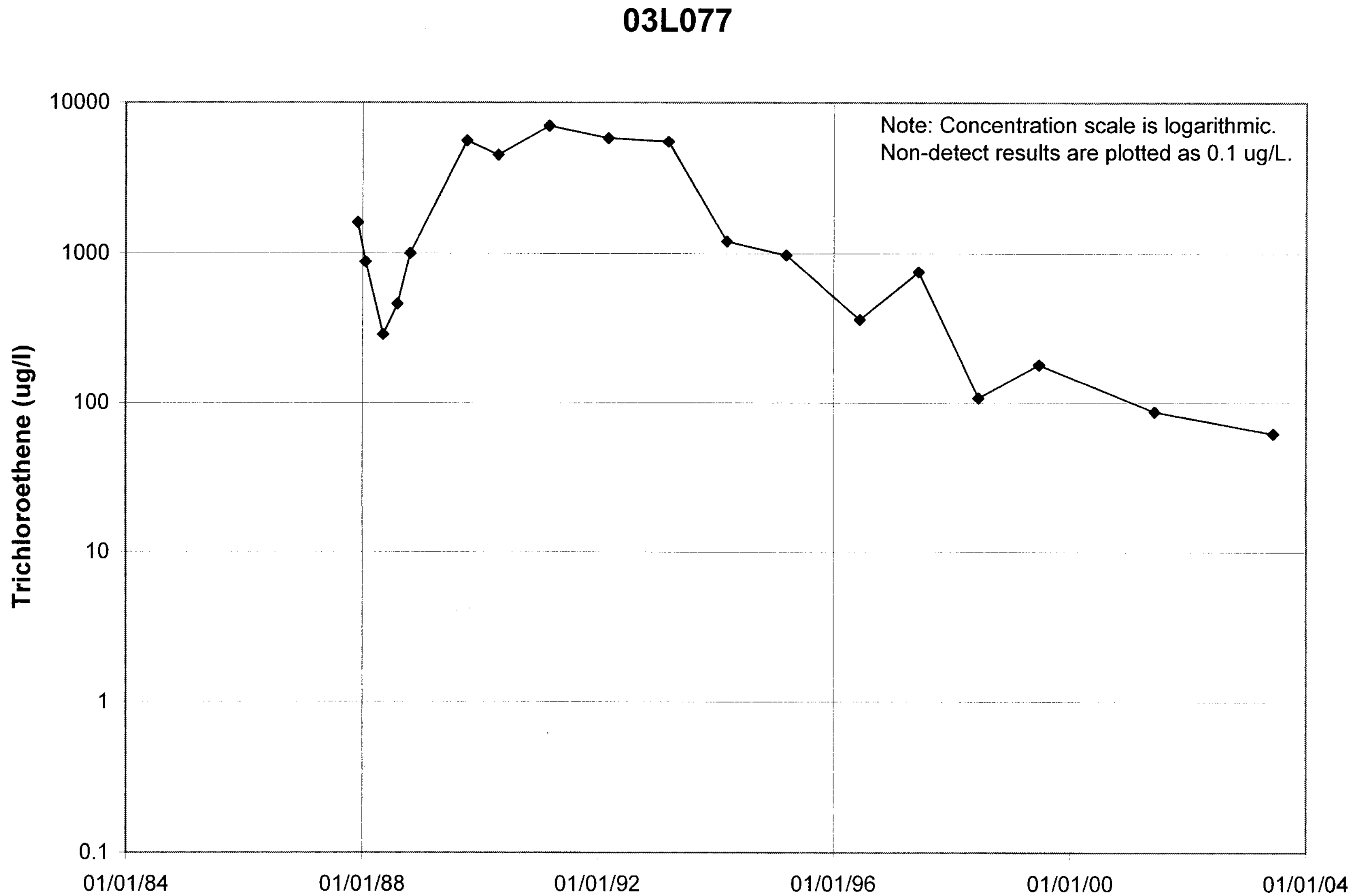

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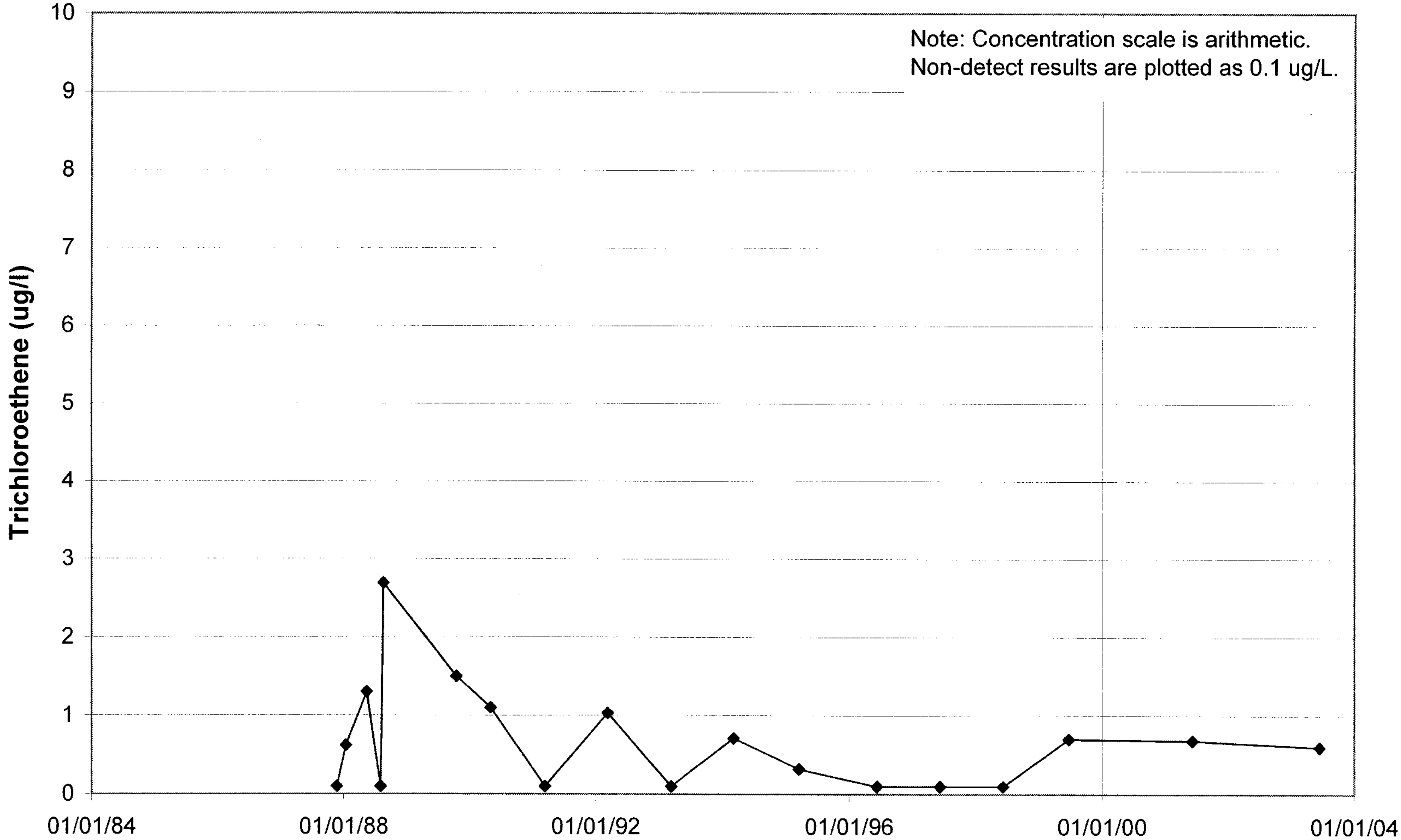

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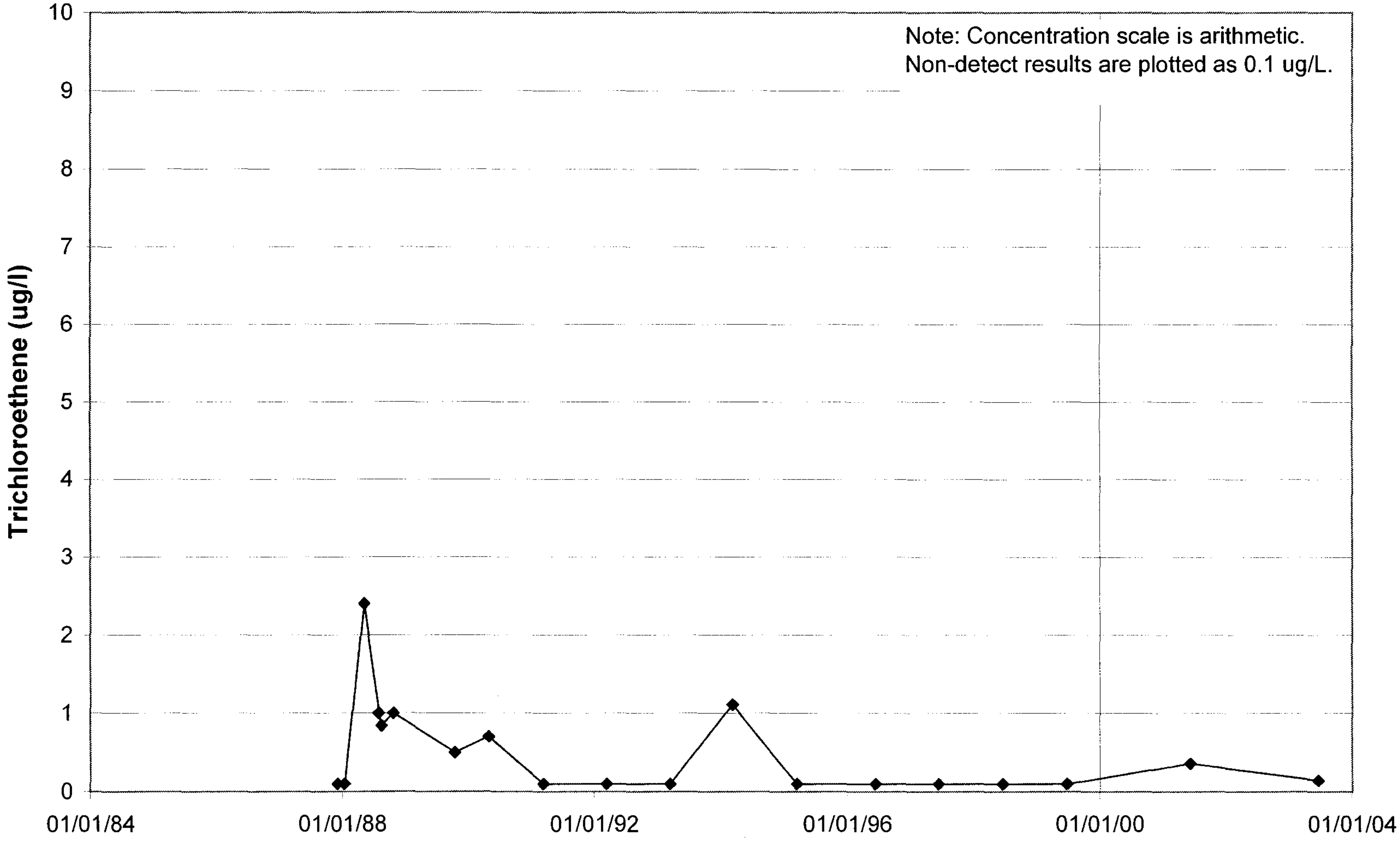

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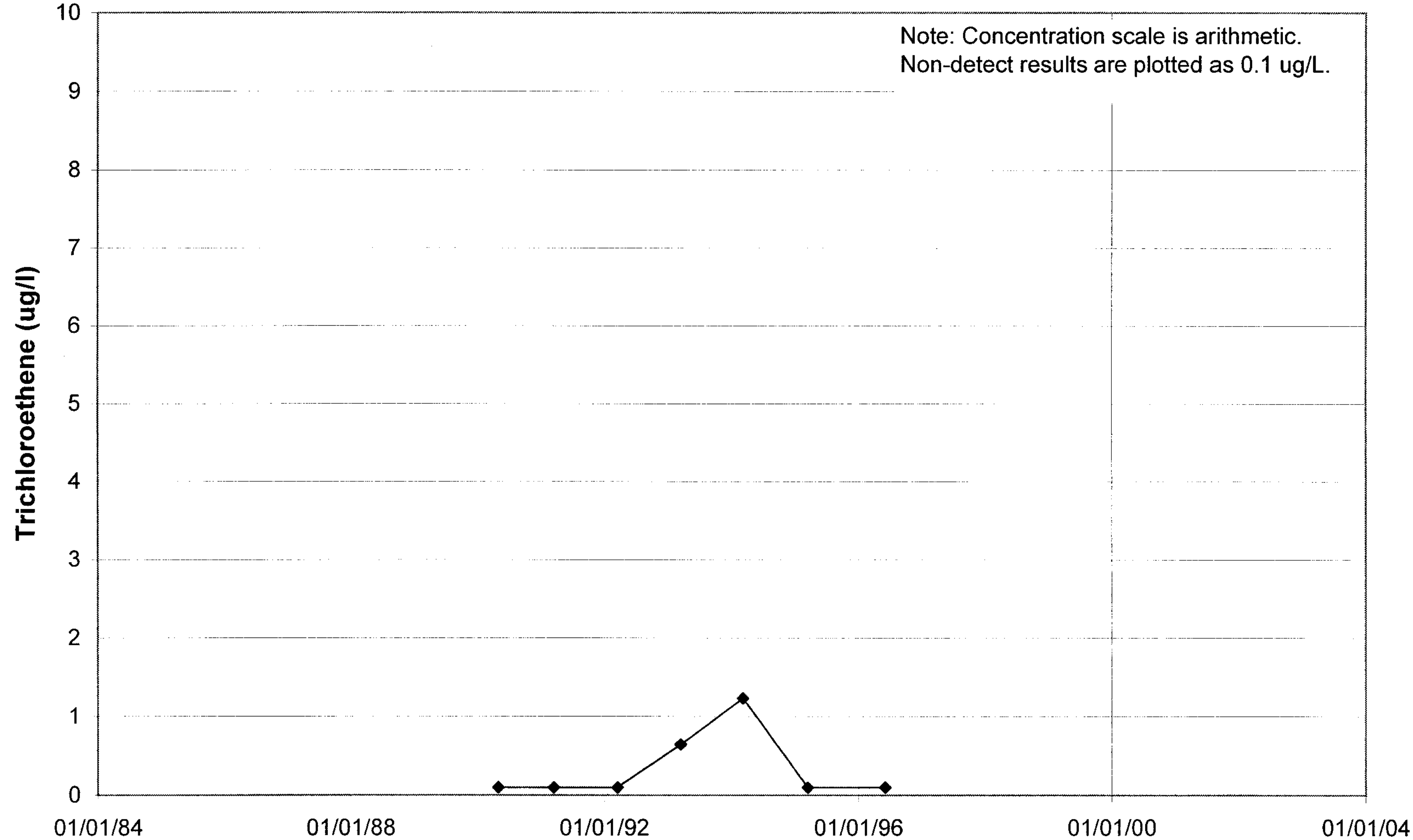

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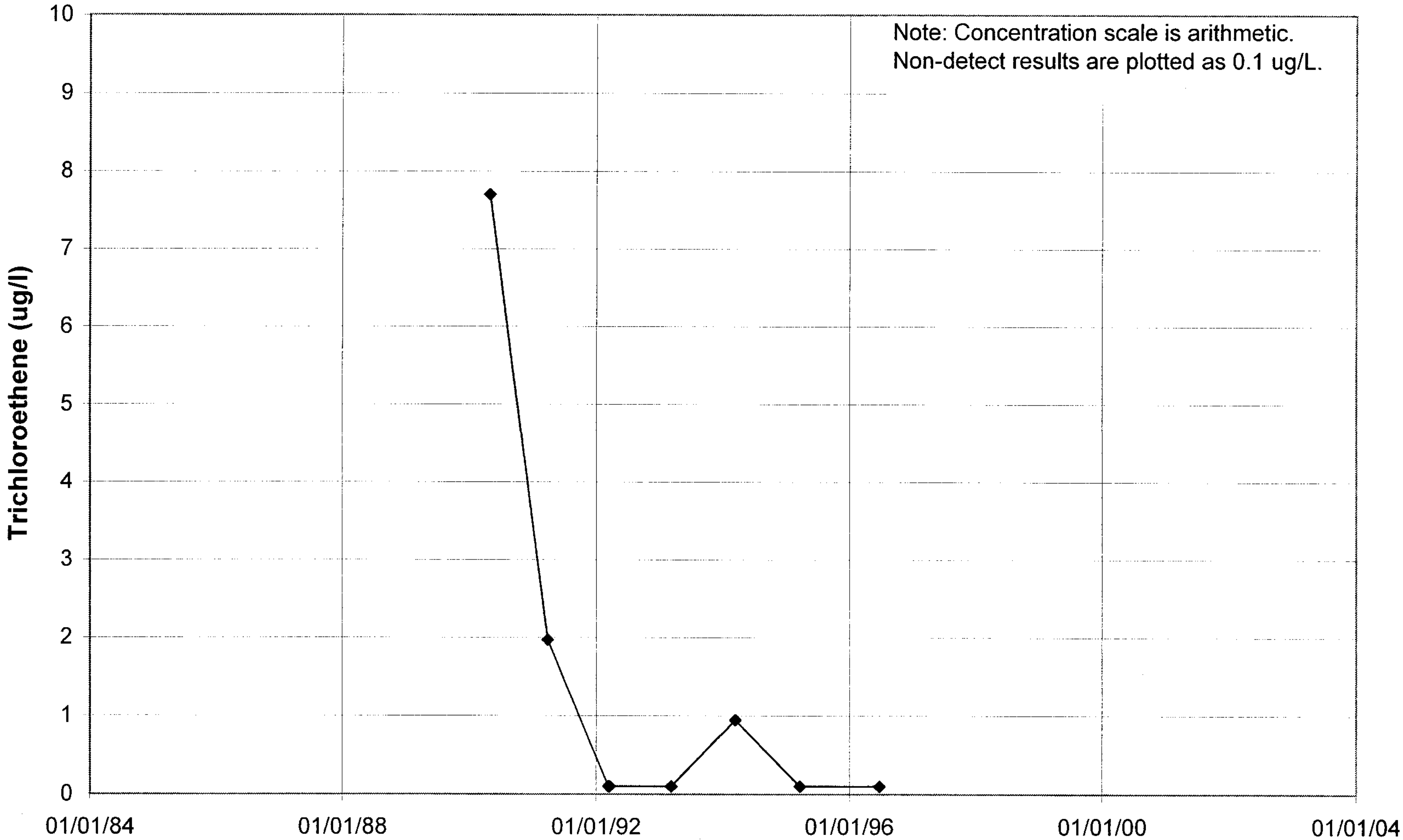

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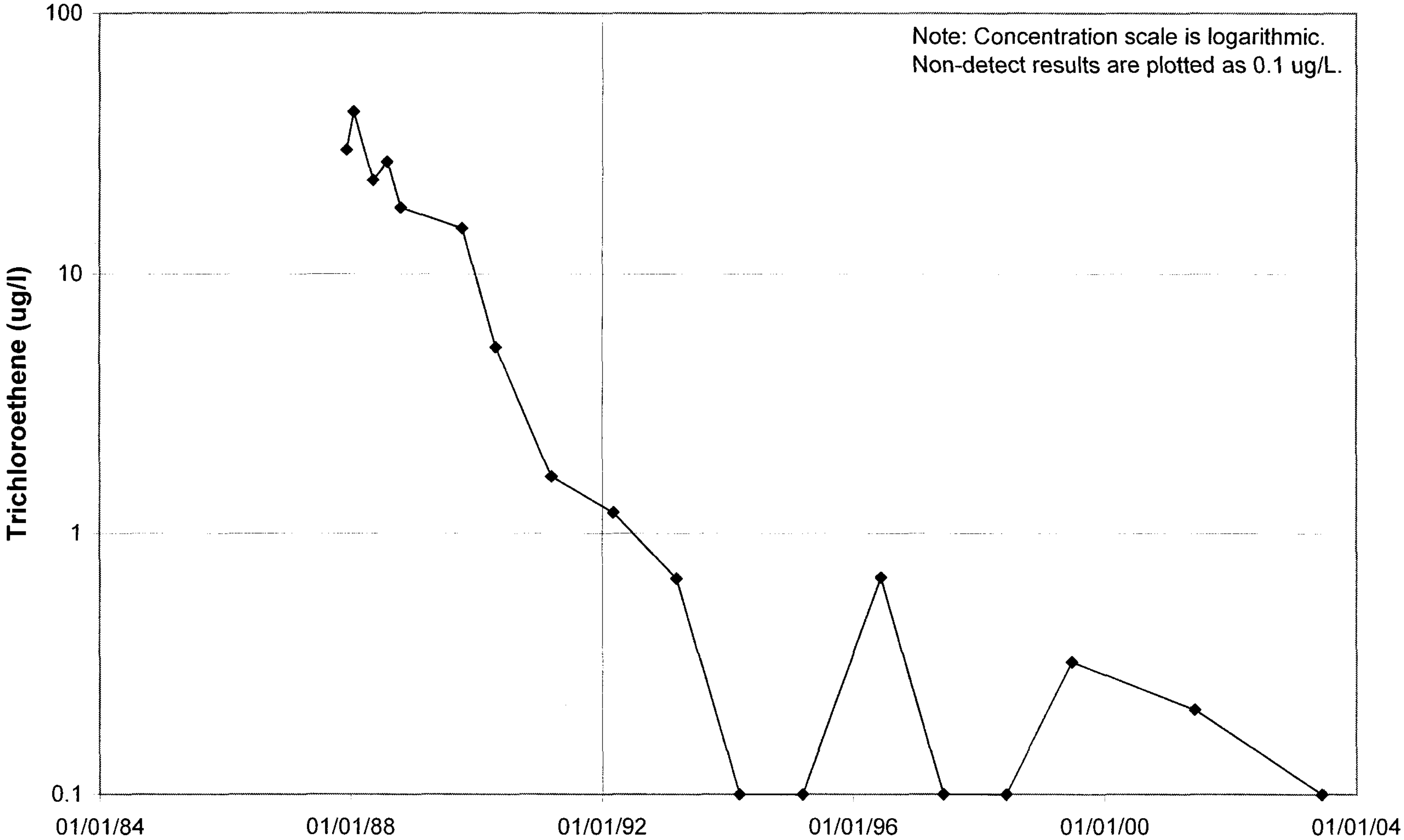

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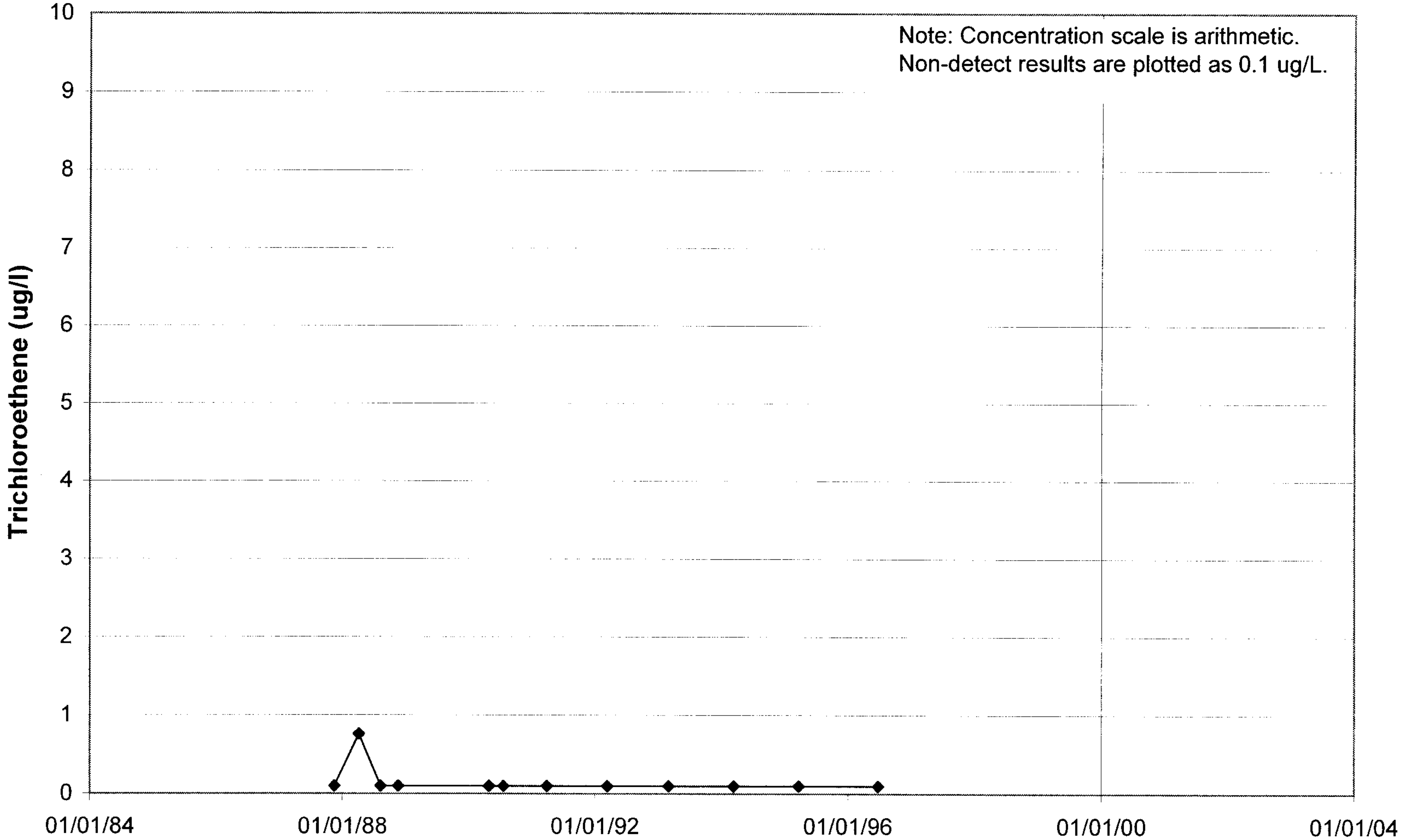
03L113



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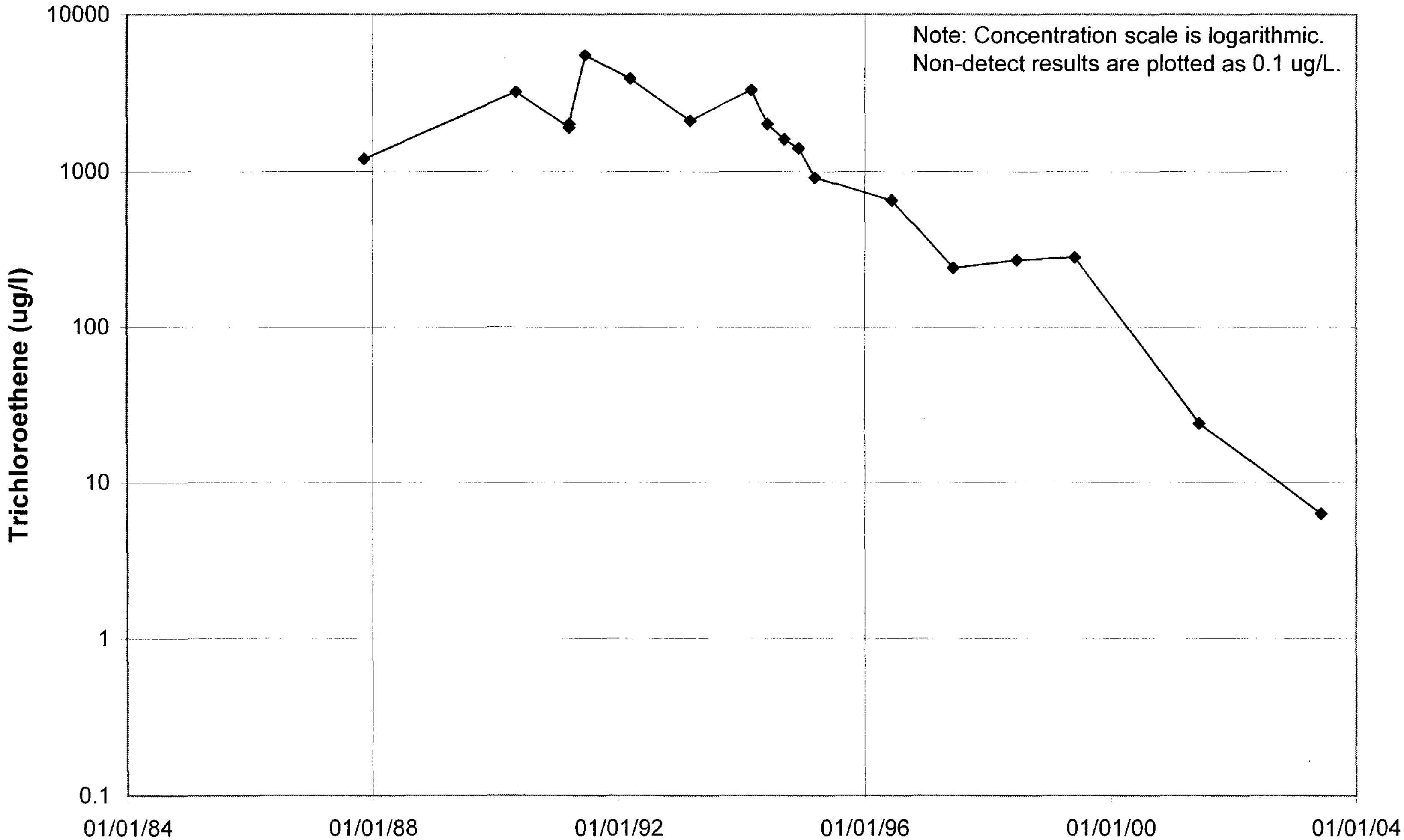
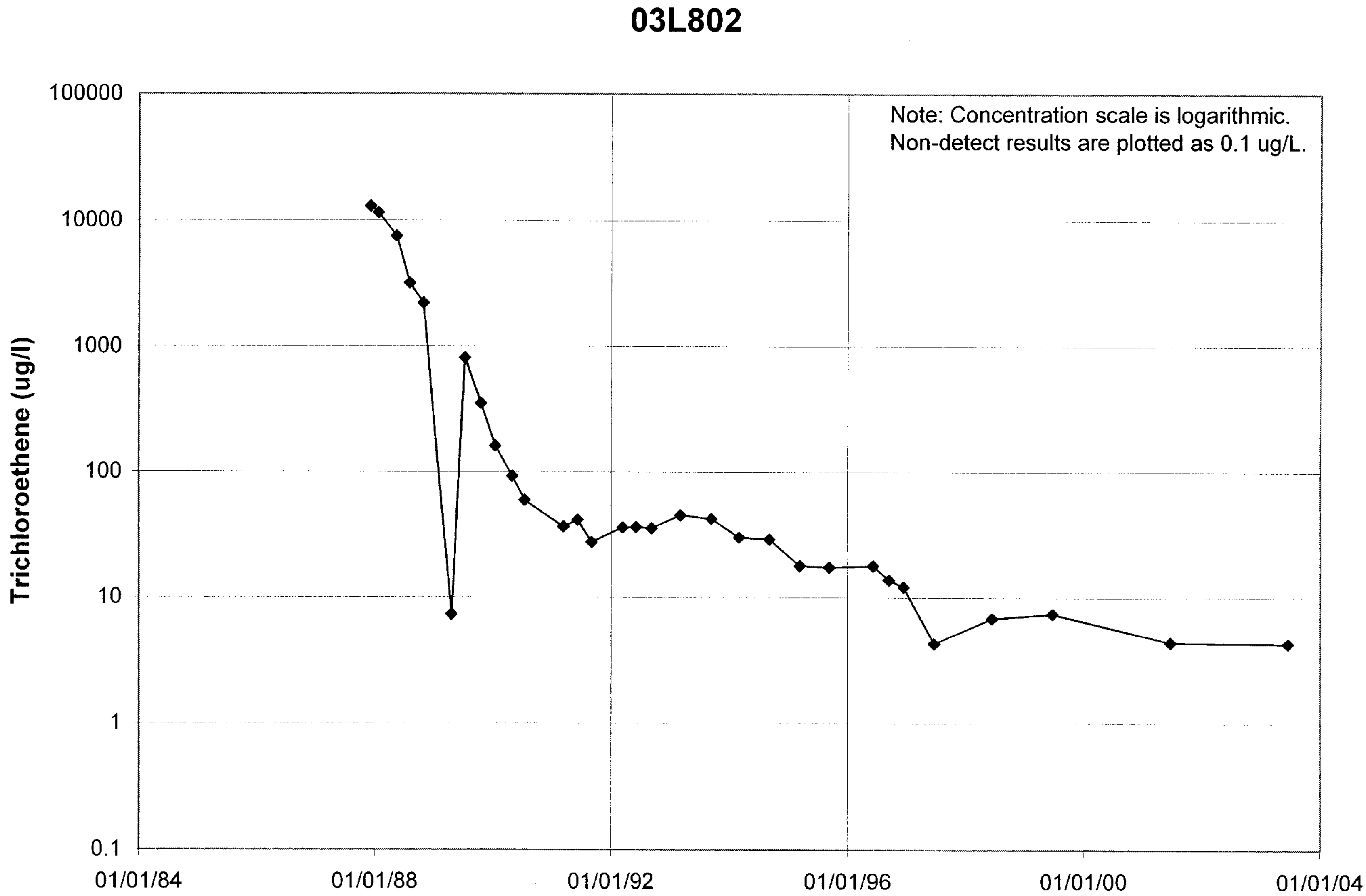
03L673



TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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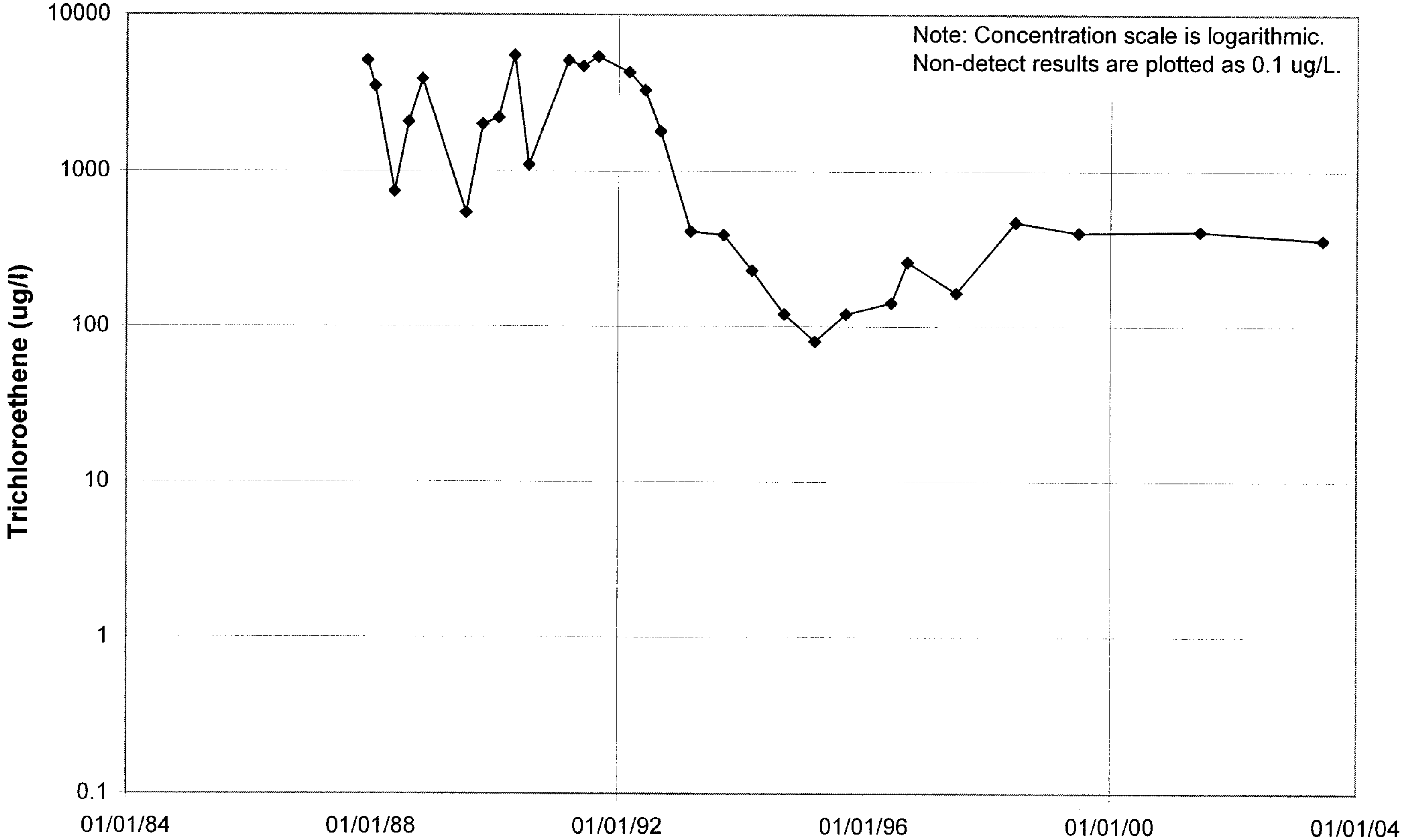
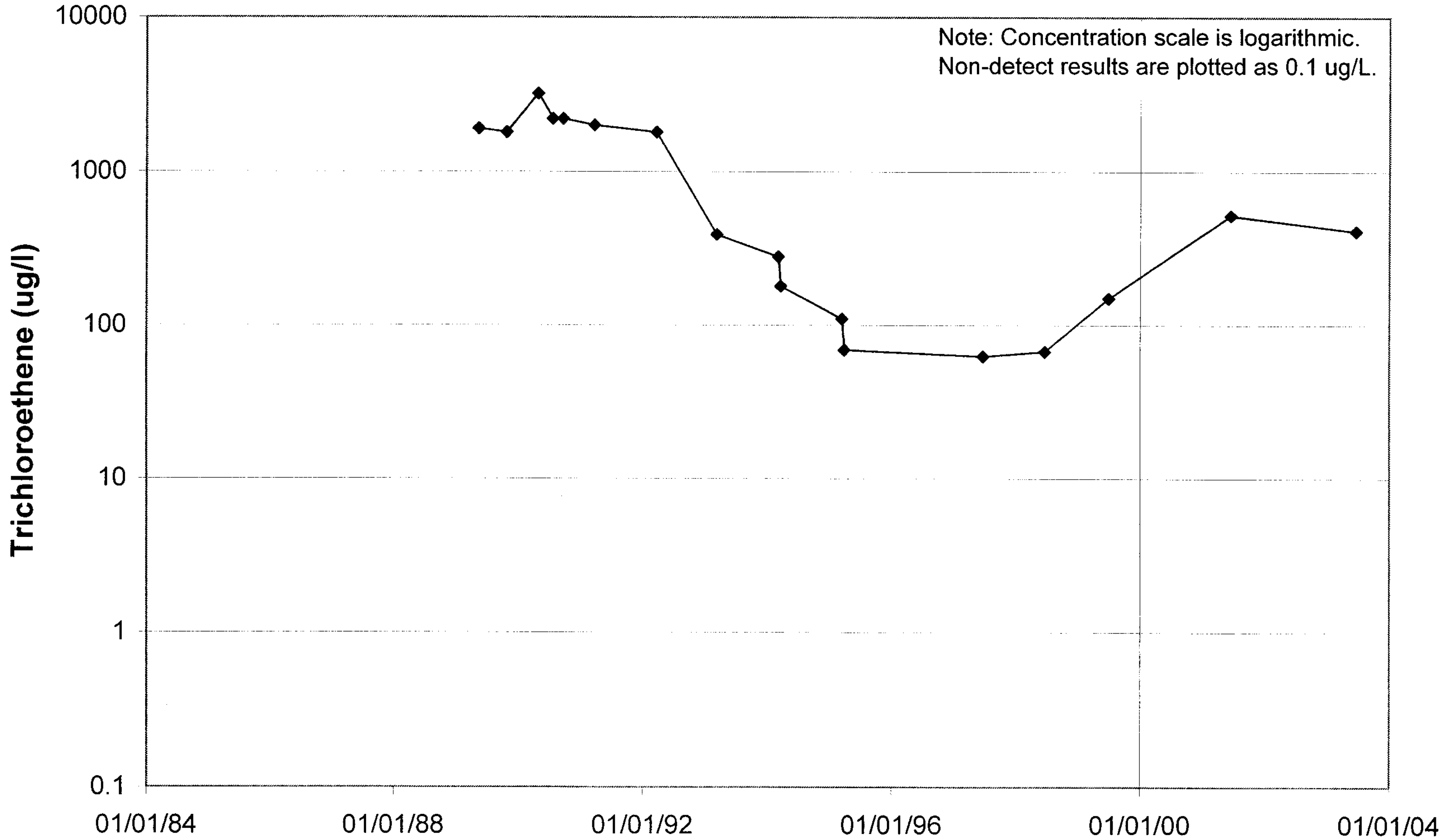


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar

03L809



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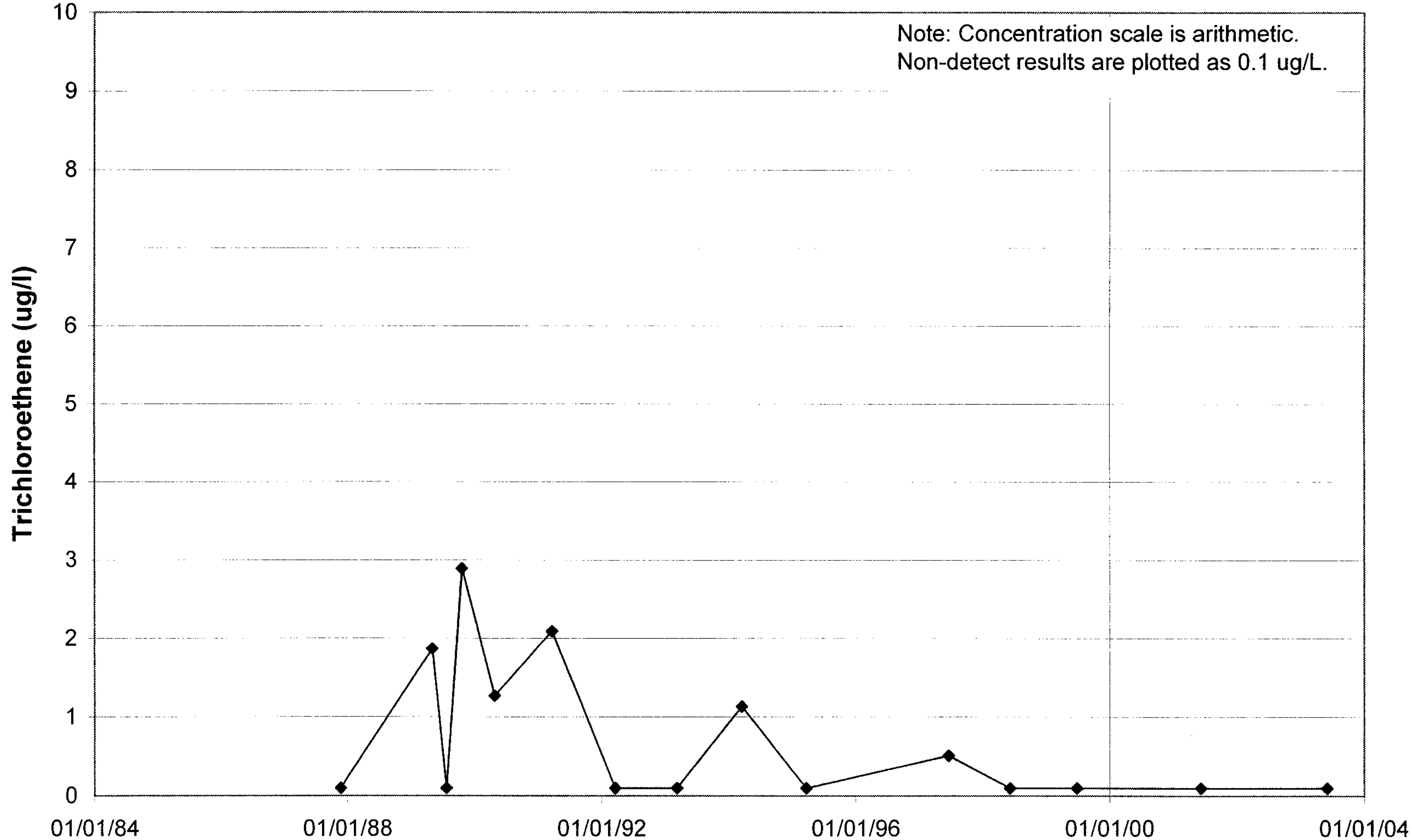

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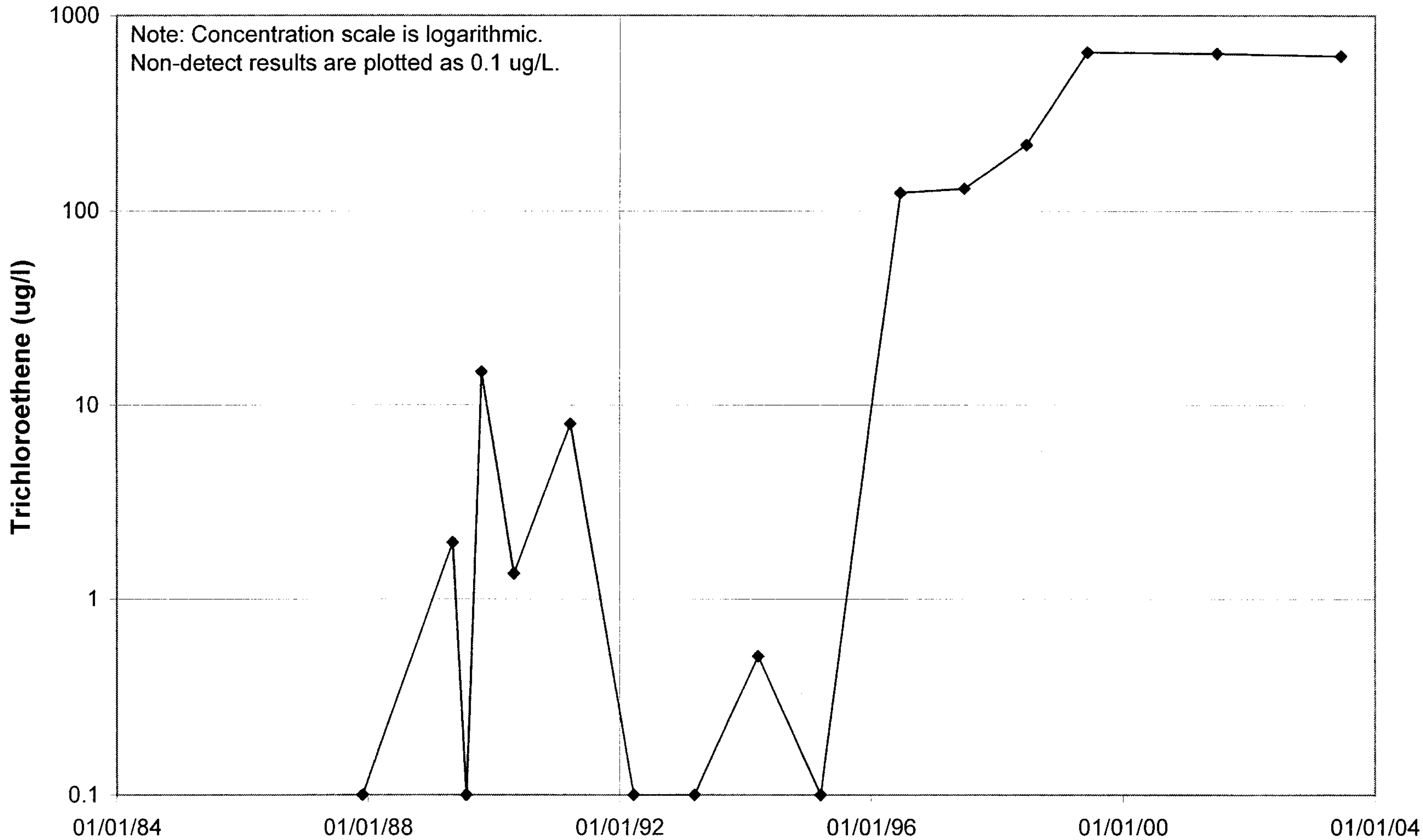

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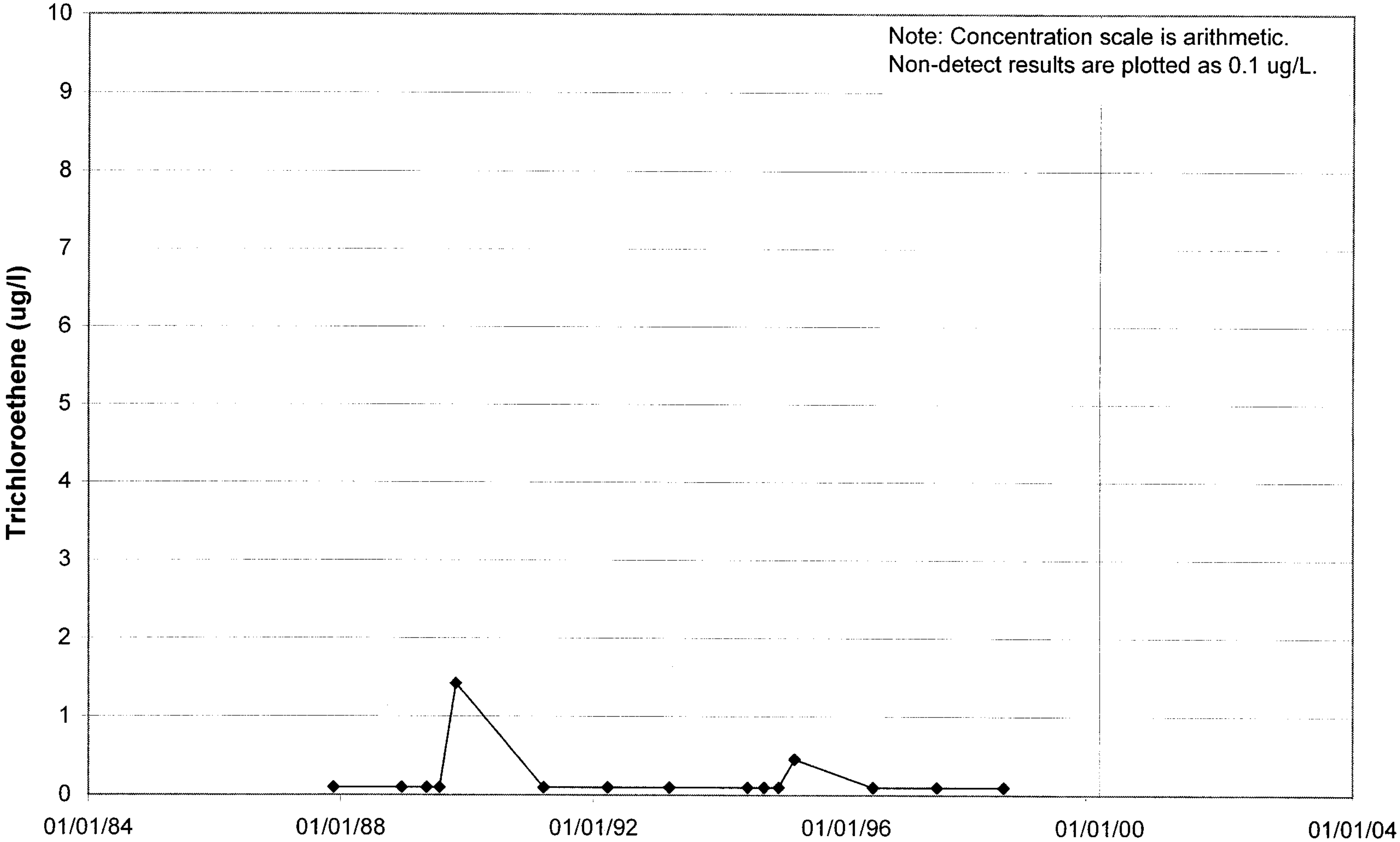

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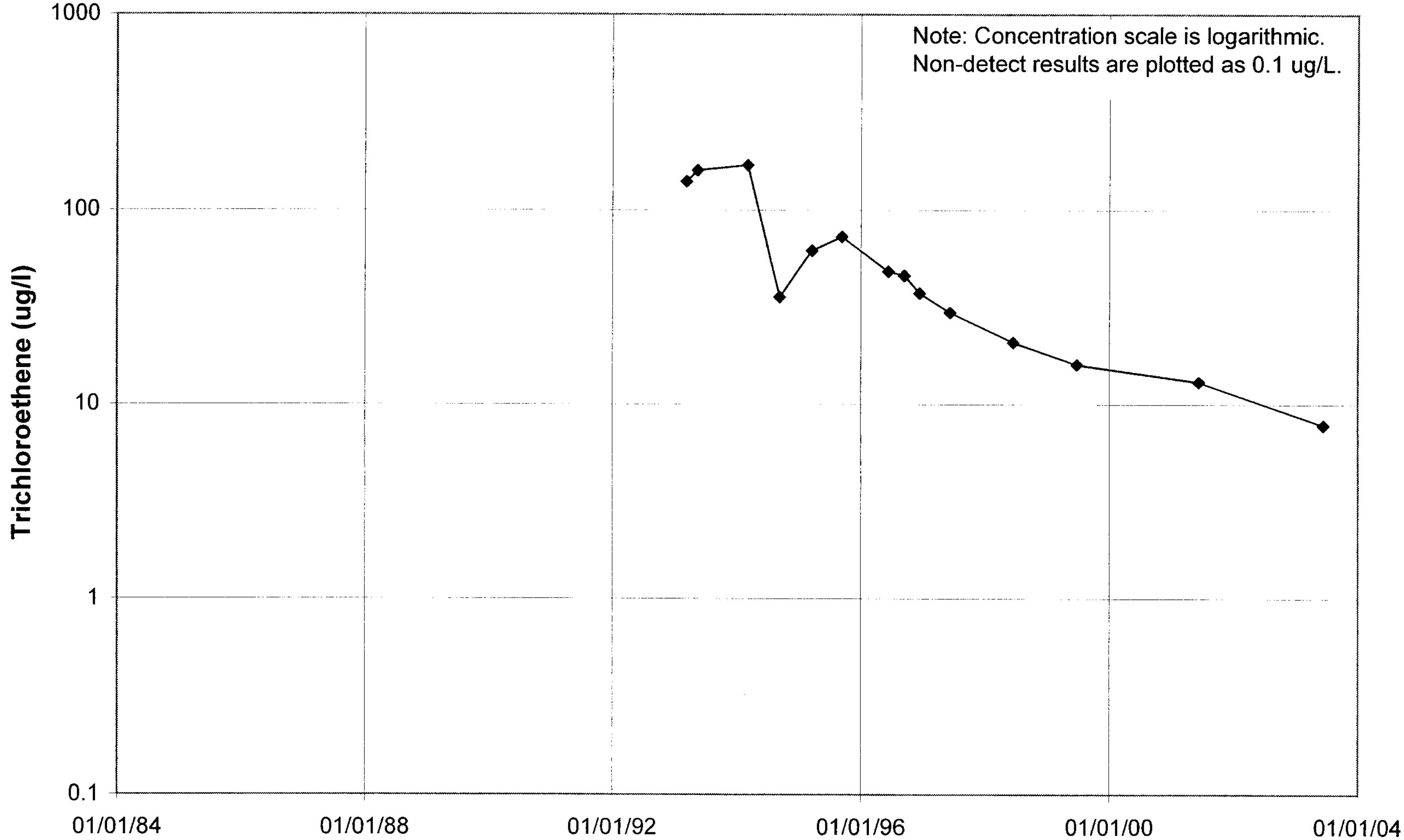

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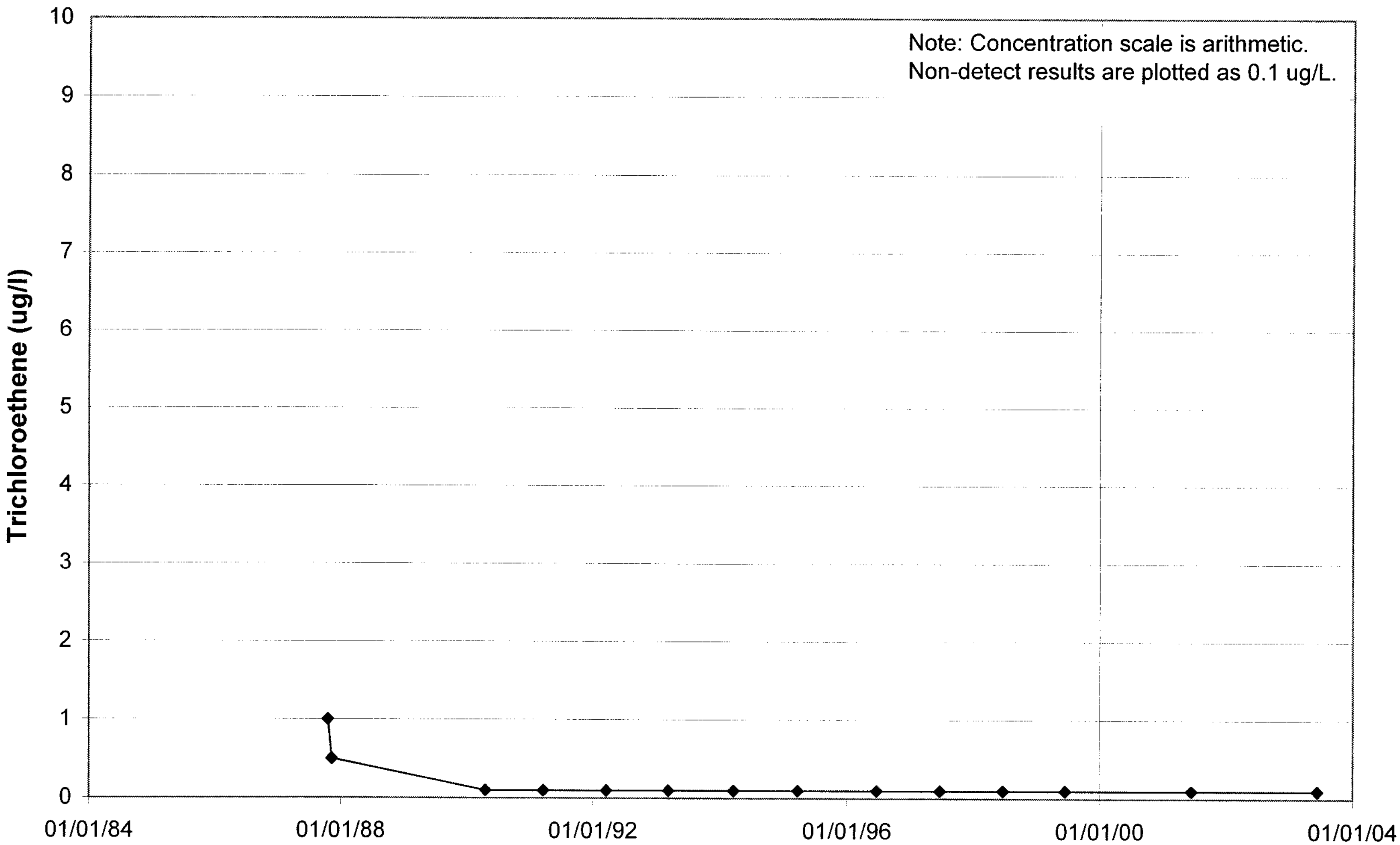

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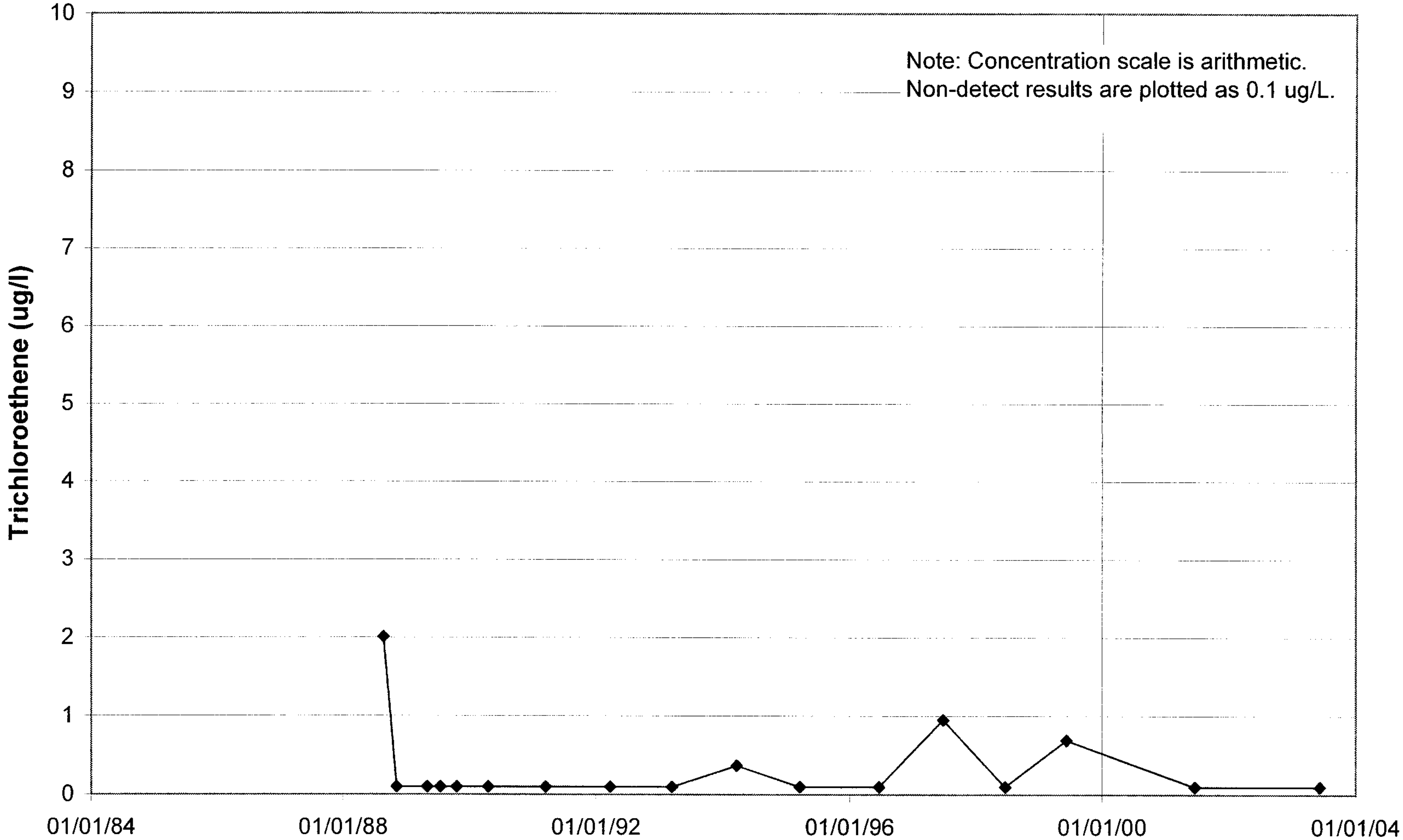

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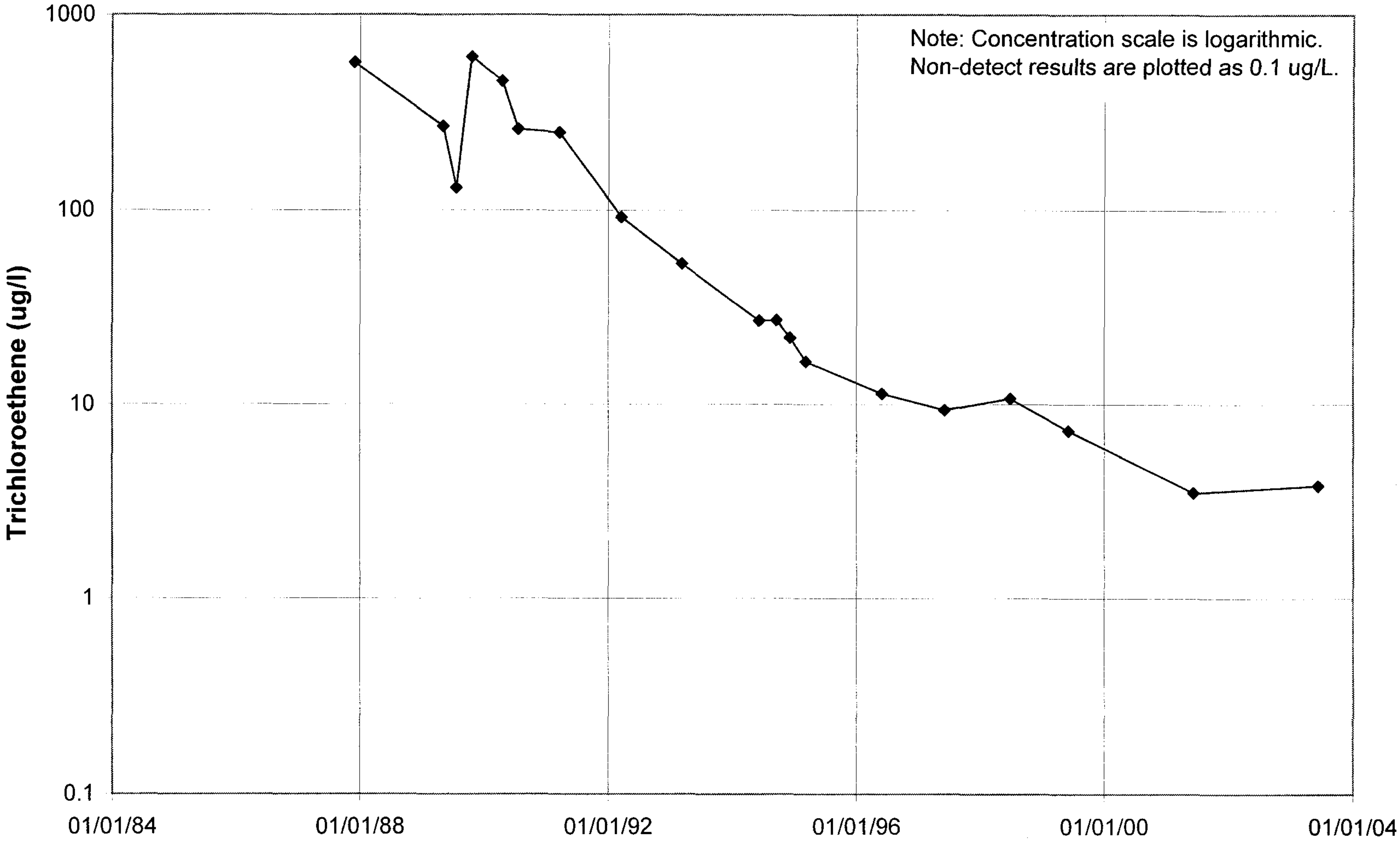

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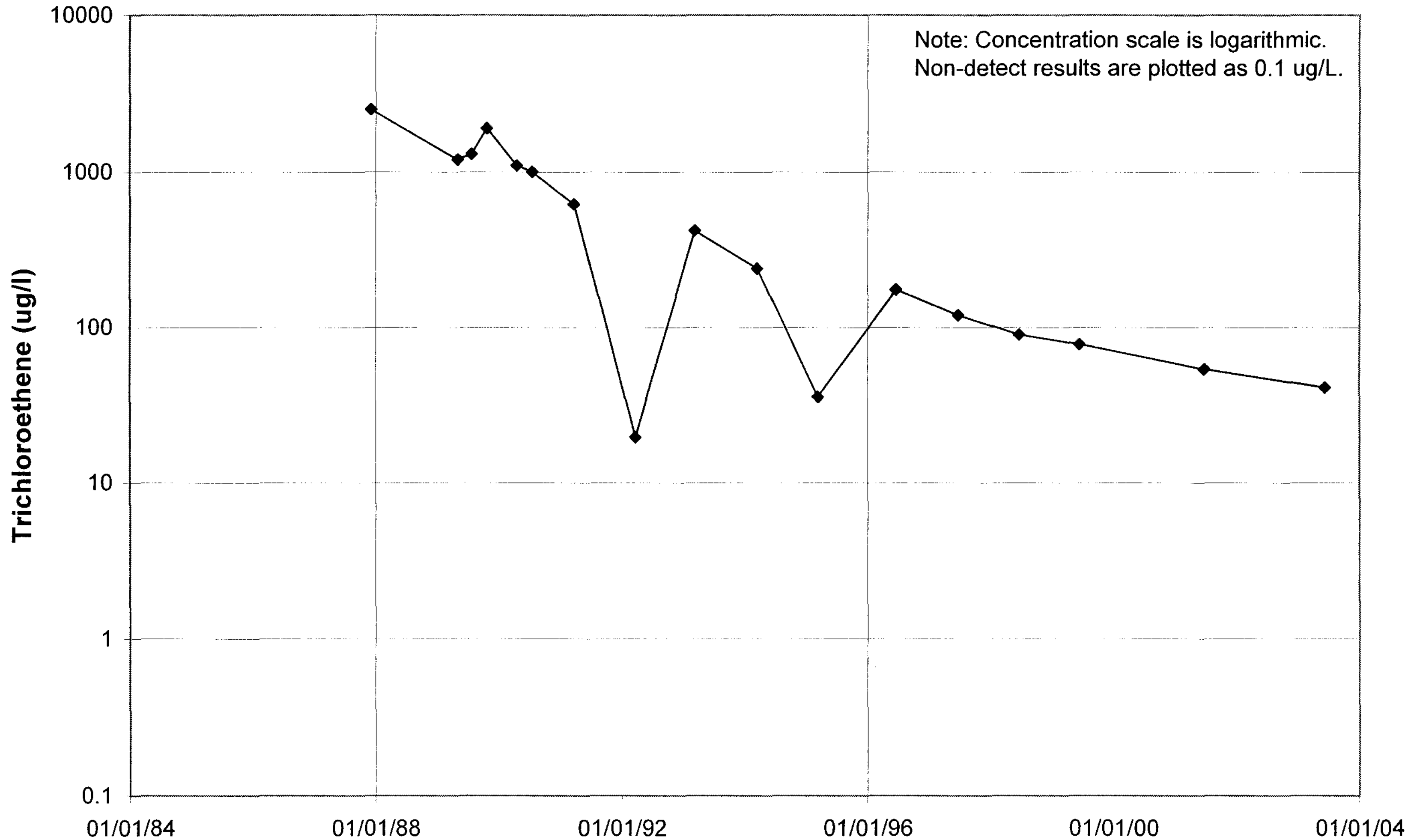

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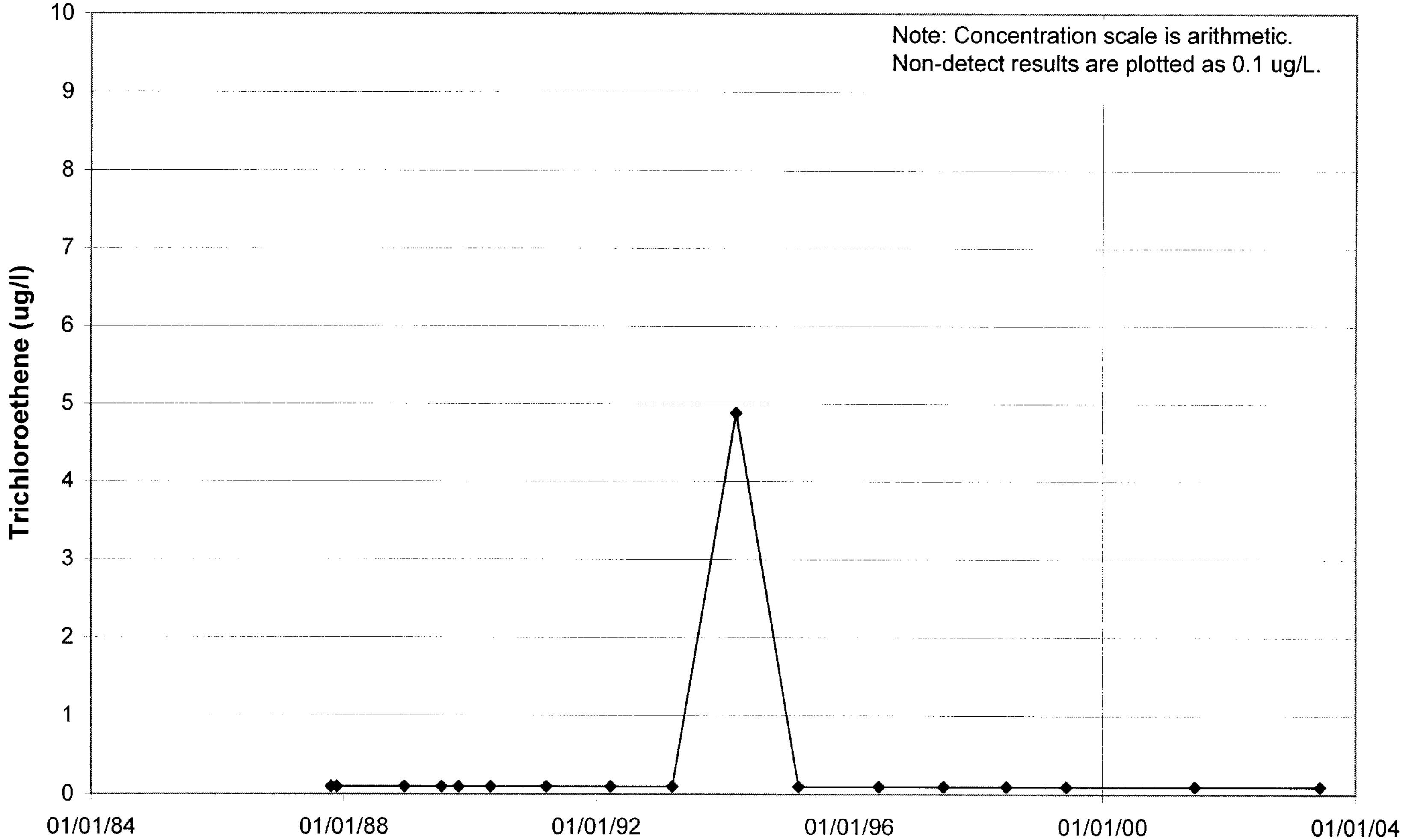

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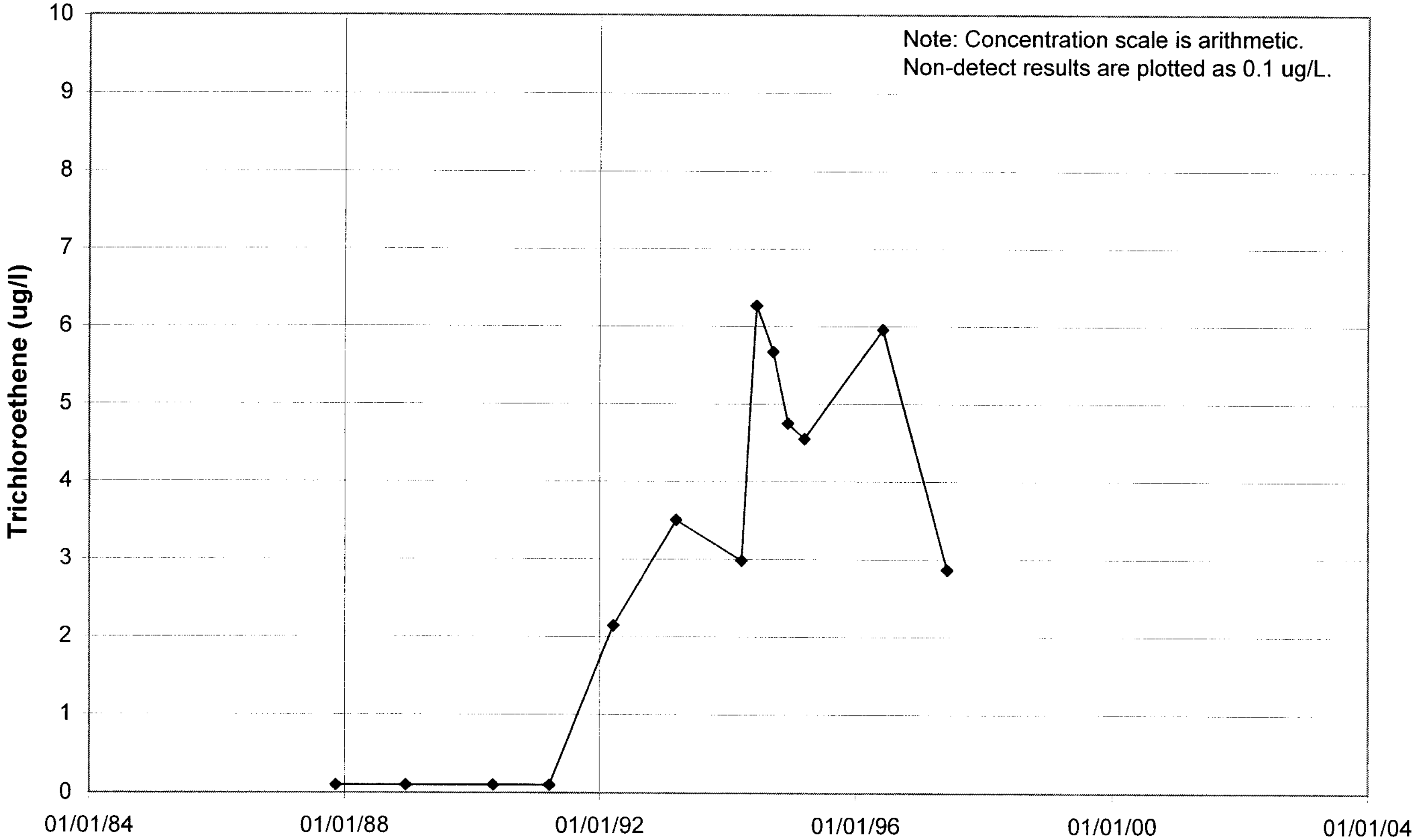

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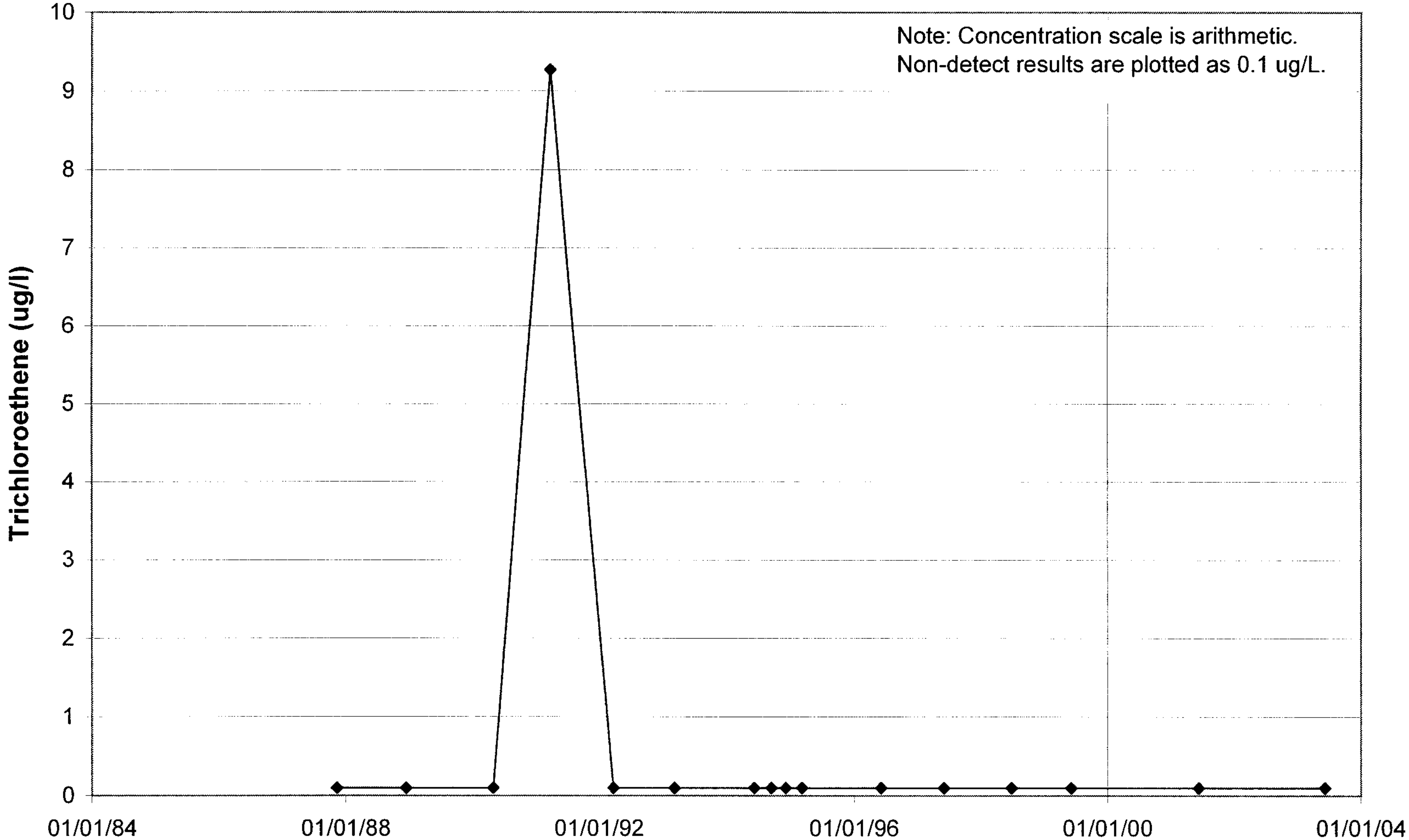

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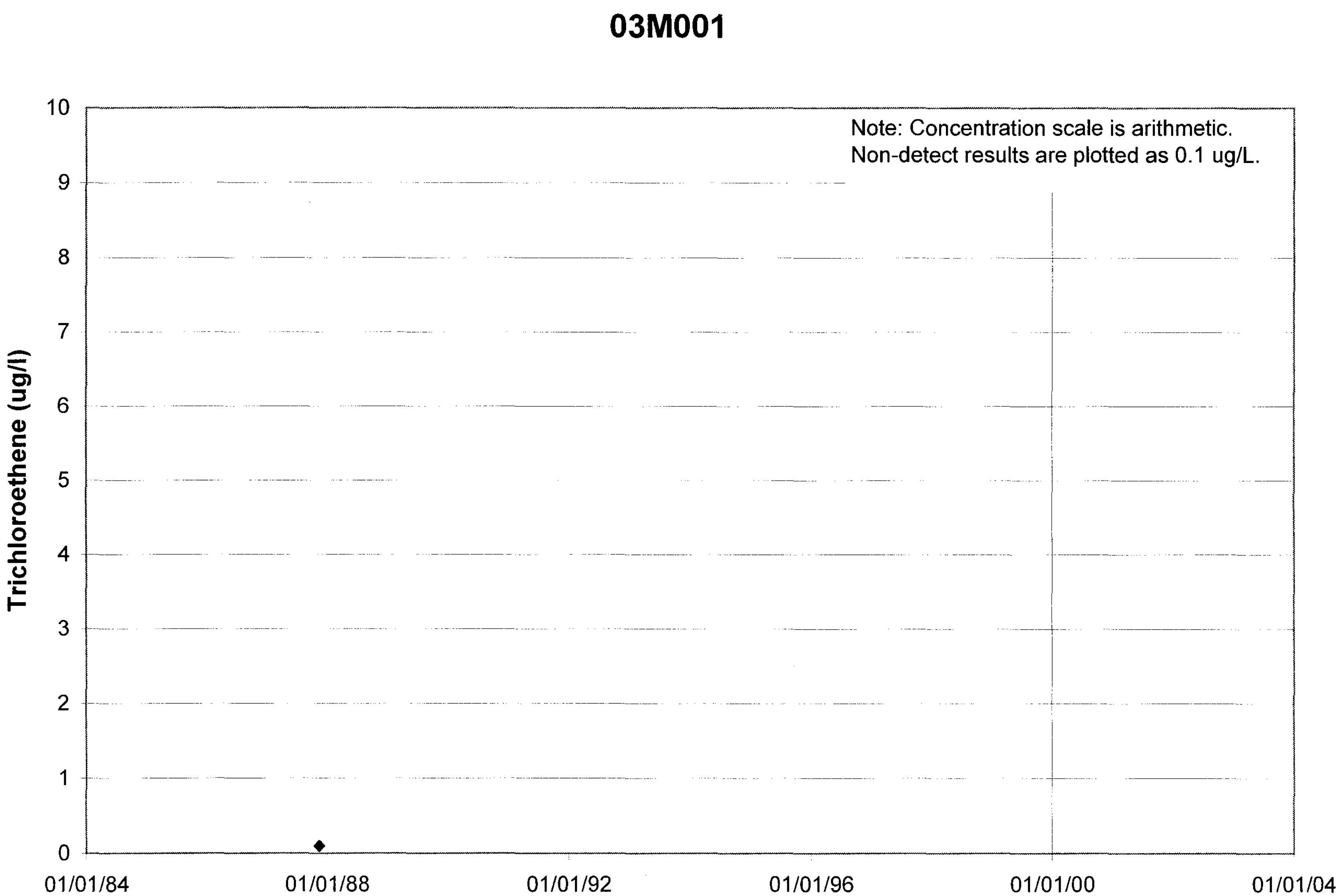

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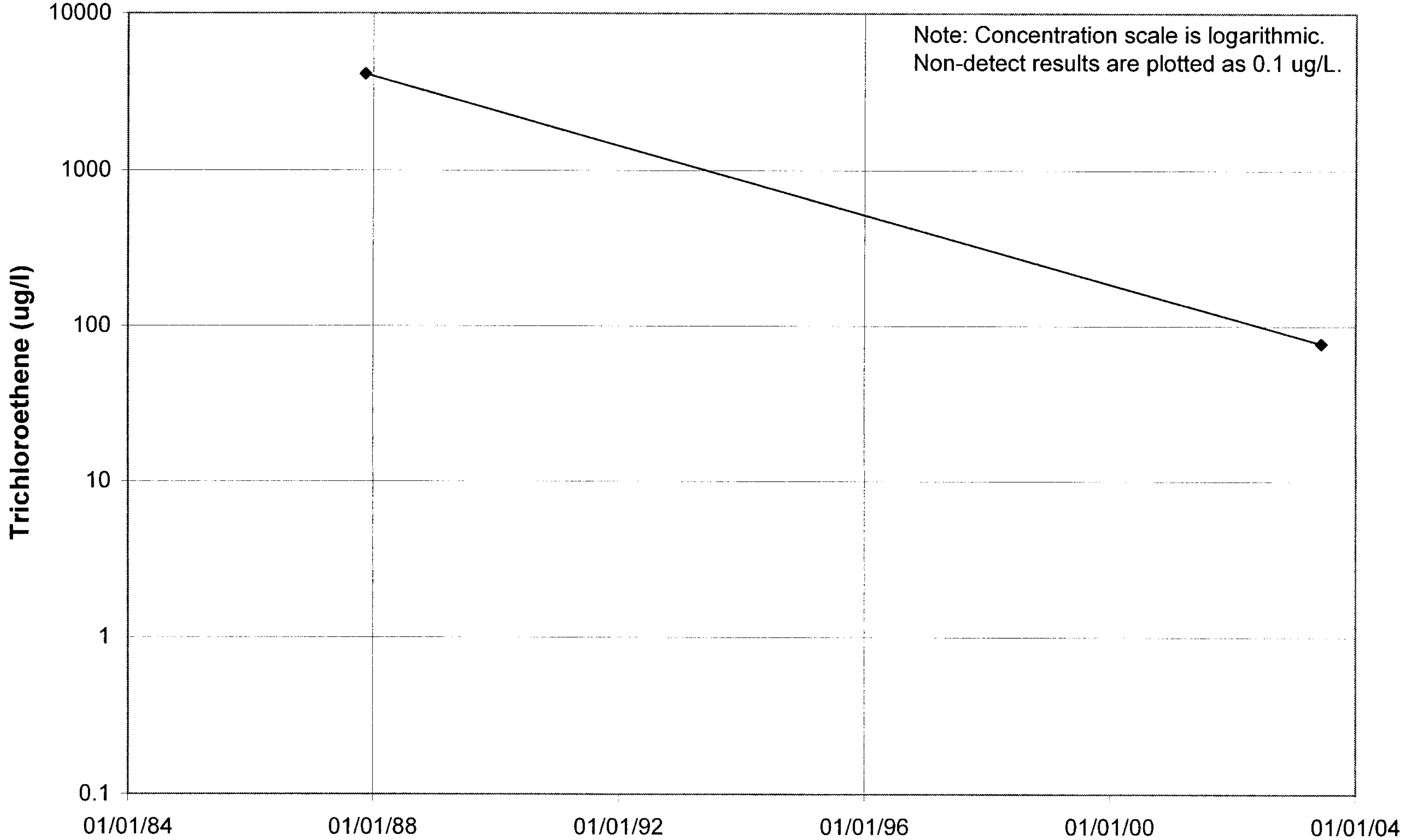

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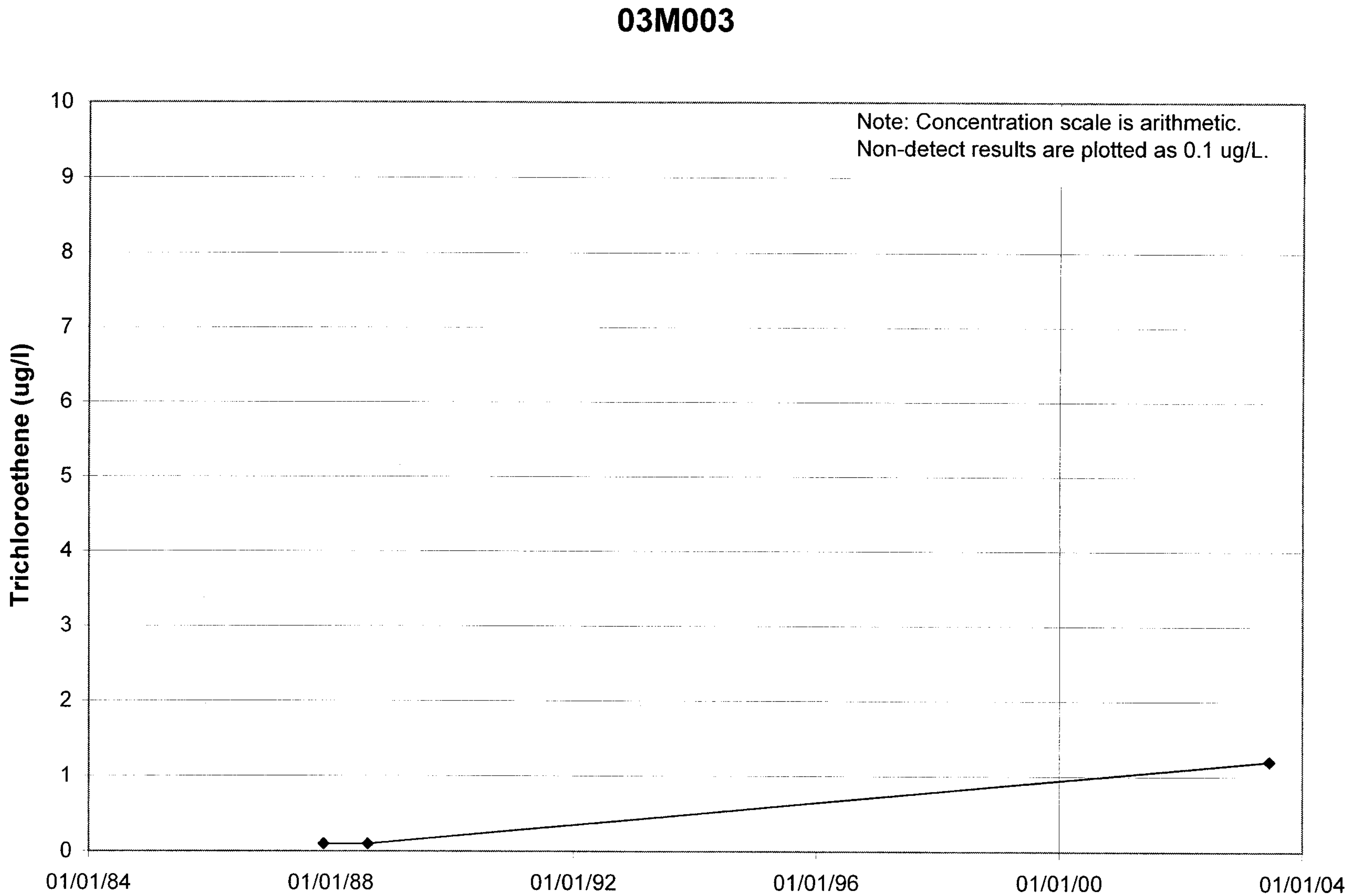

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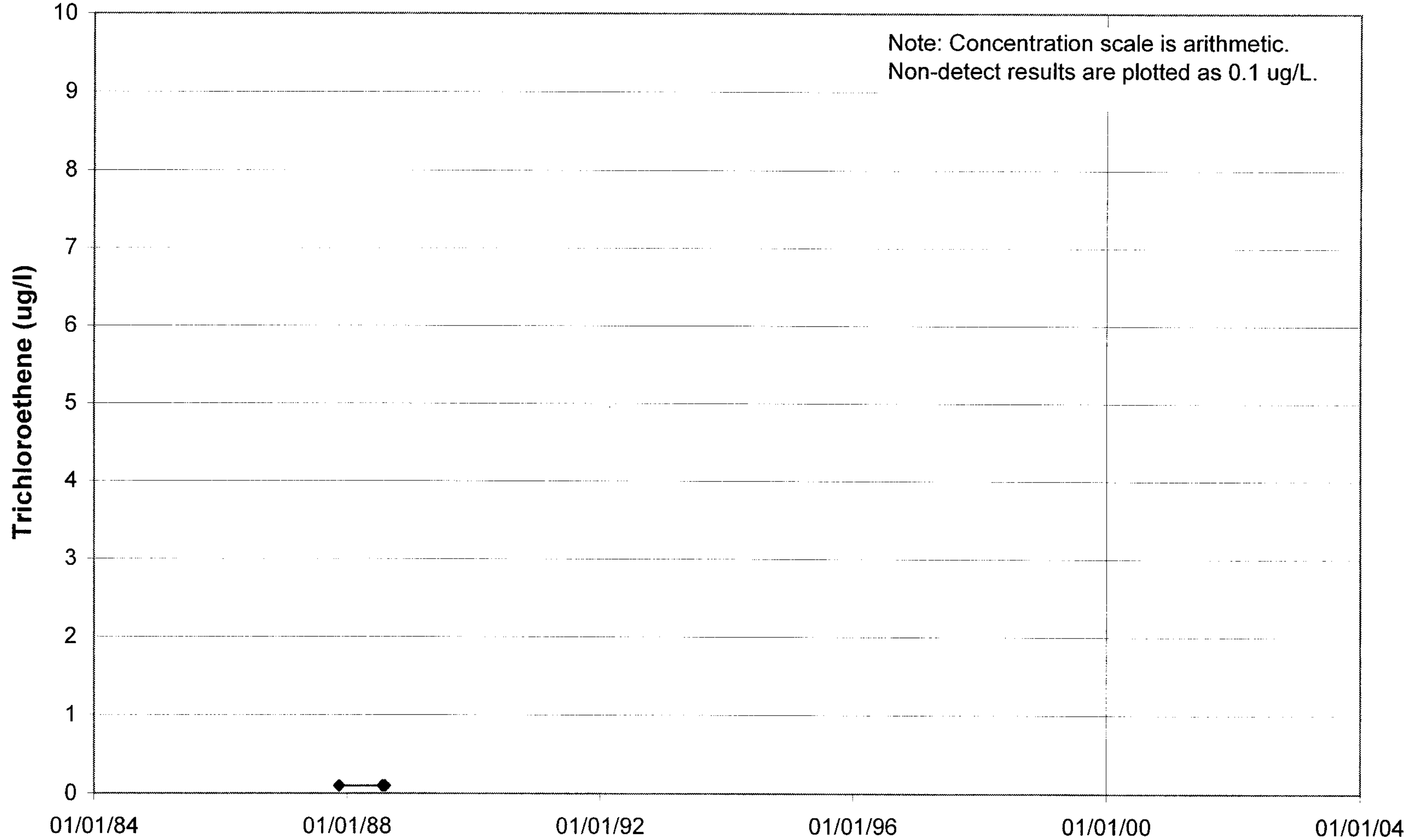

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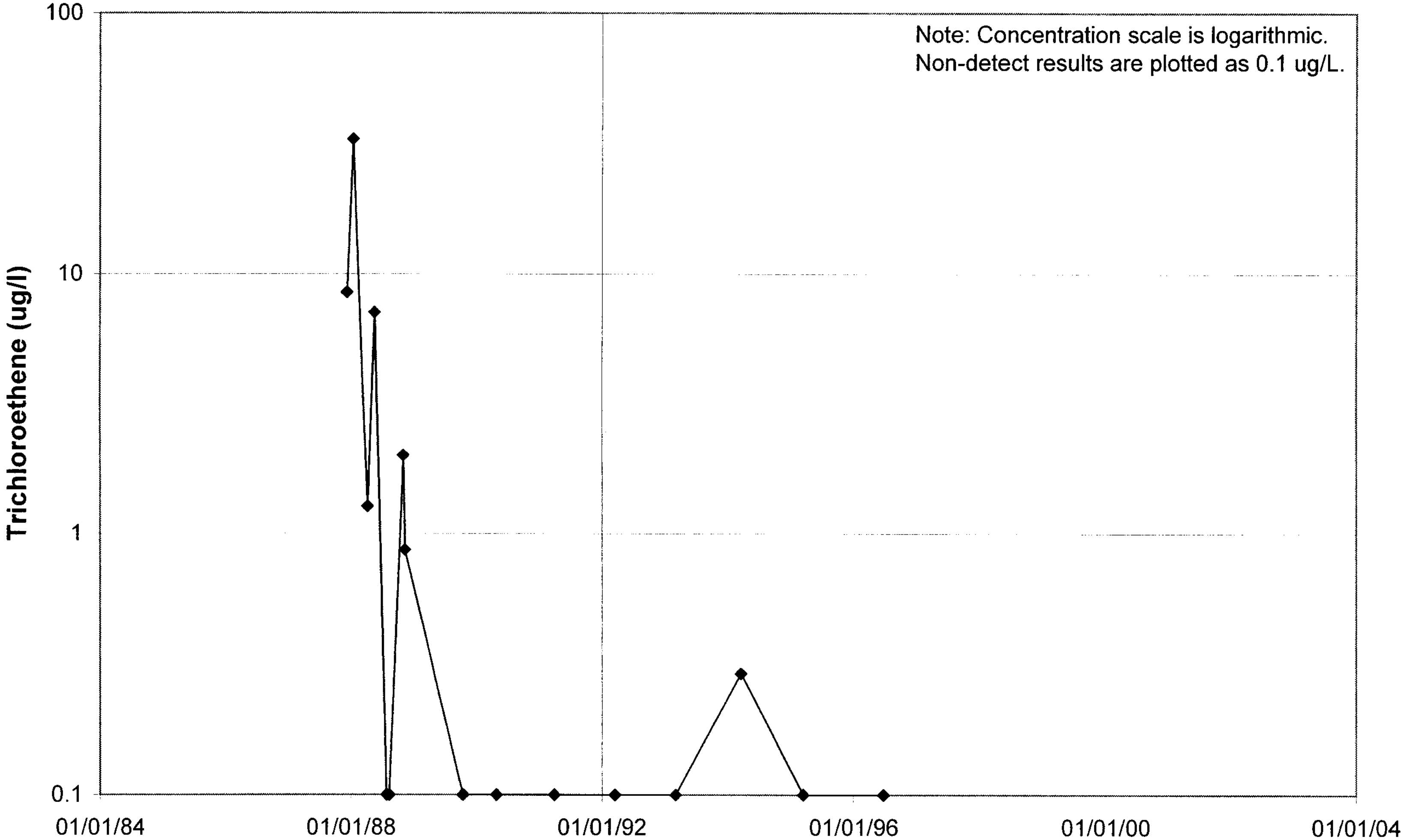

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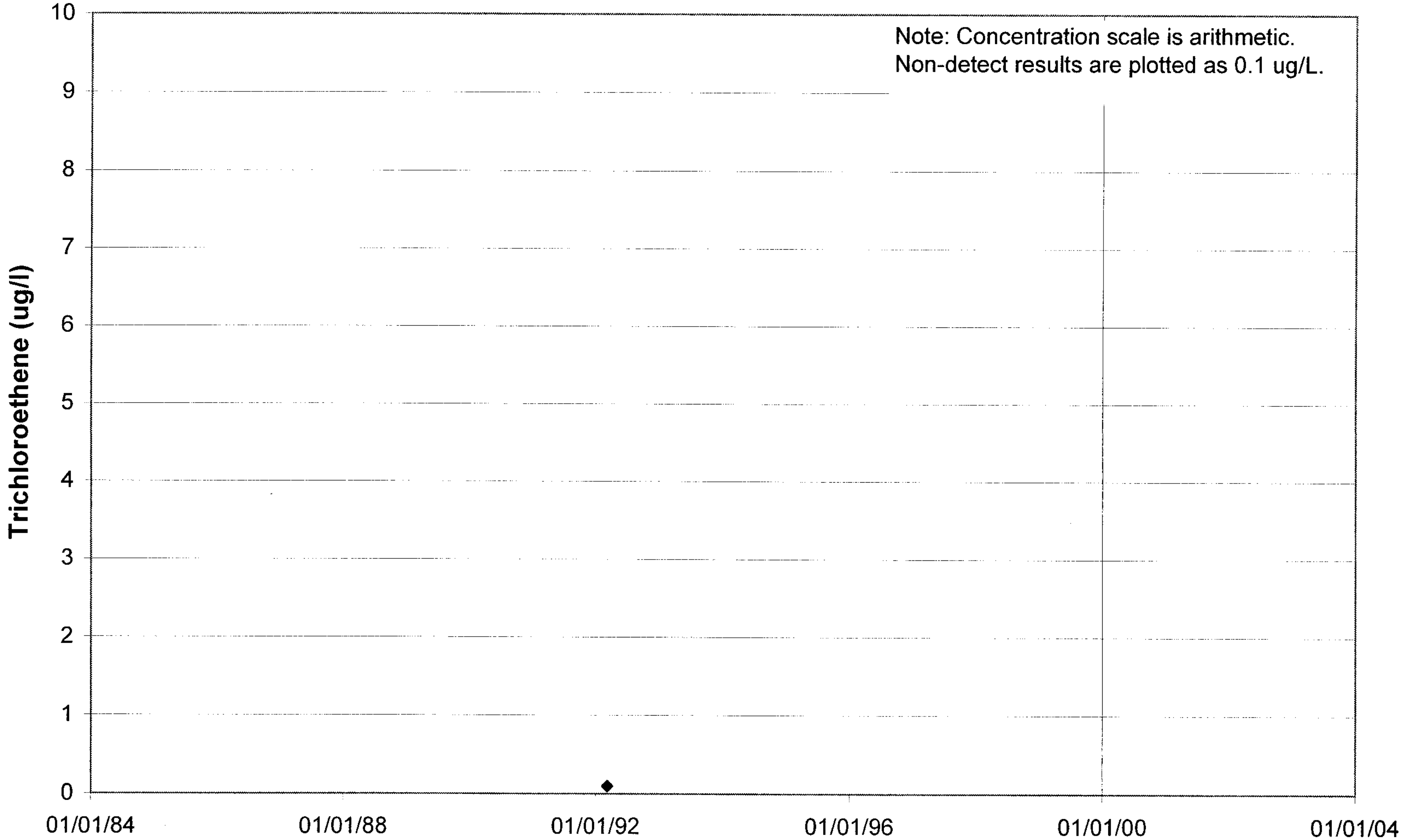

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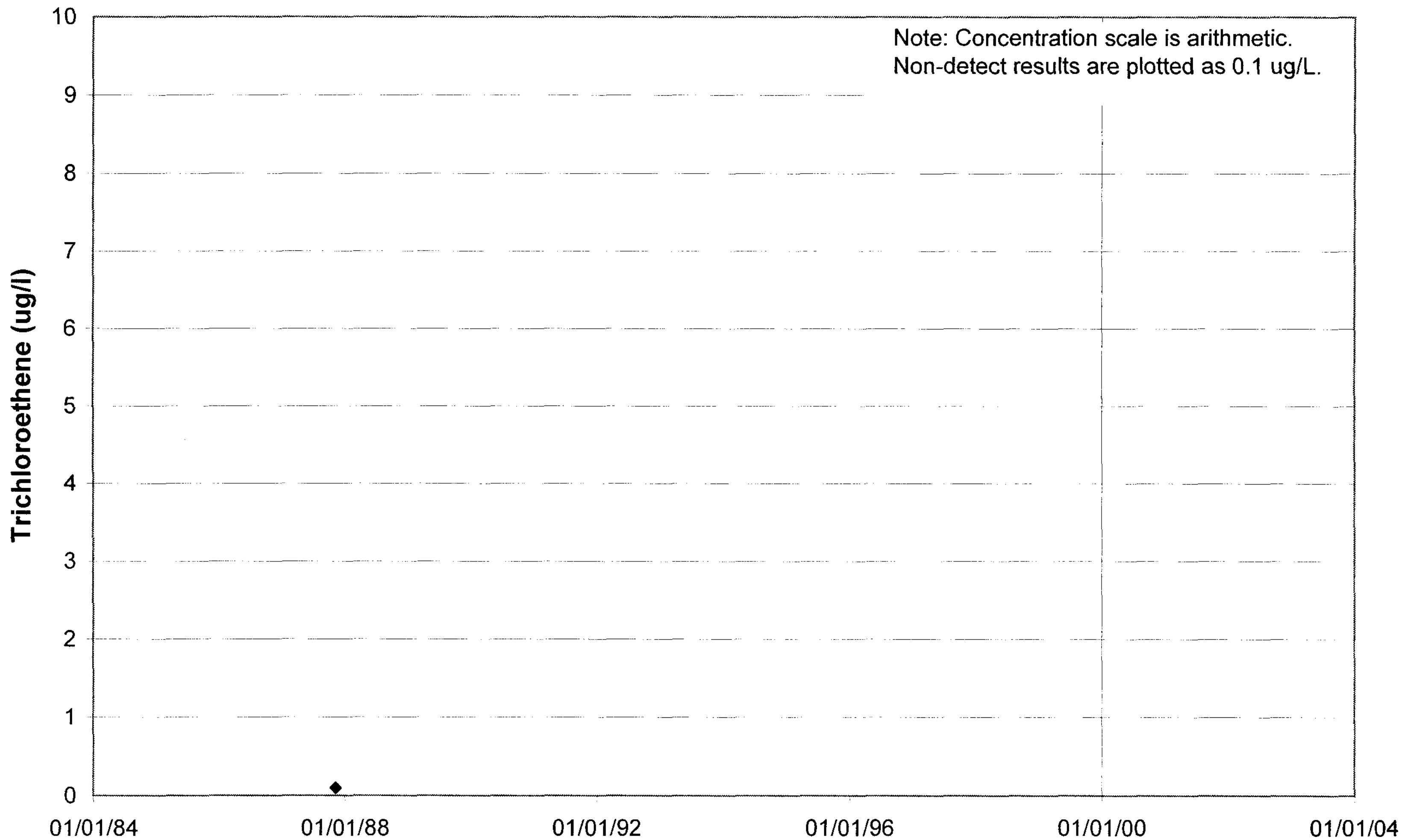

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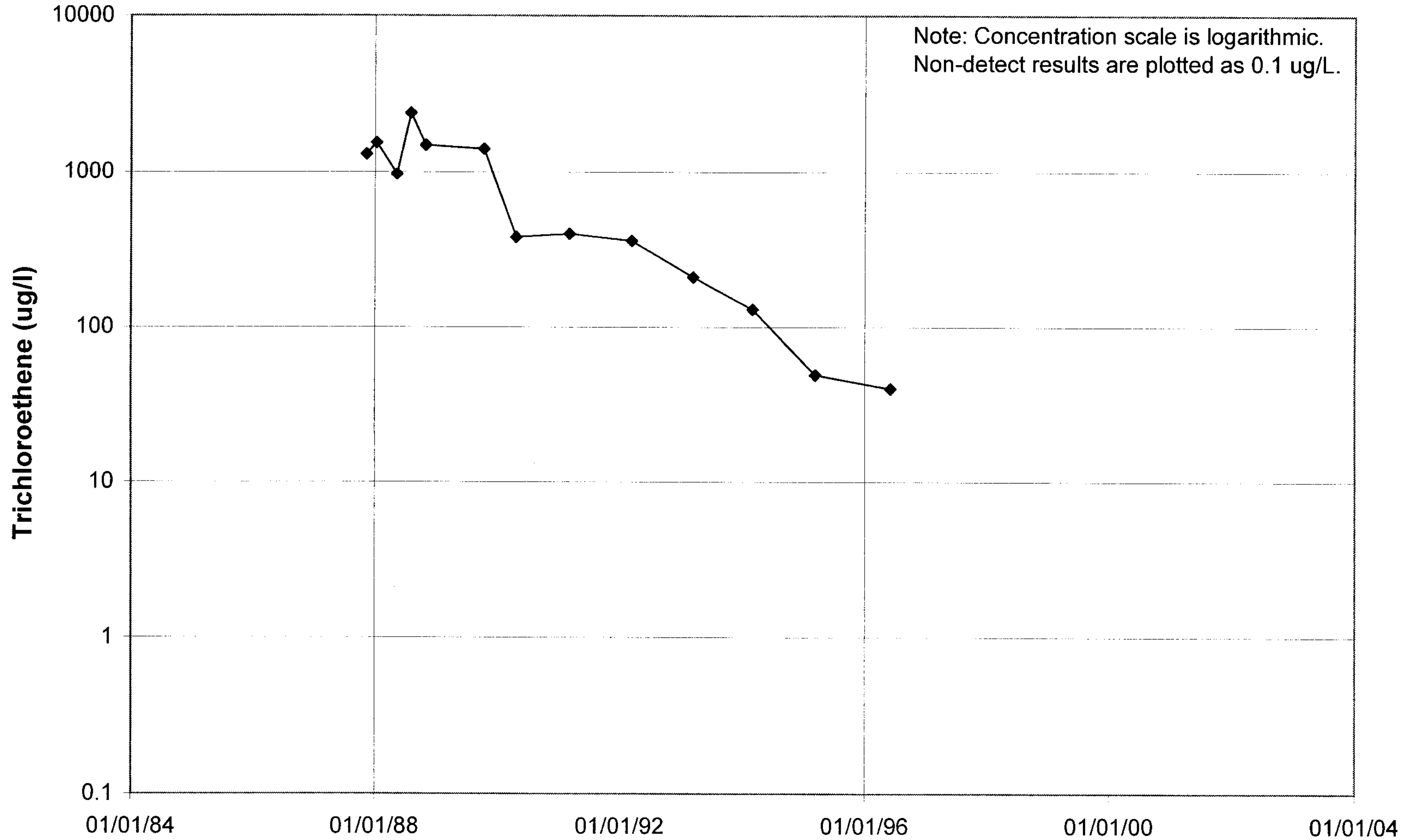

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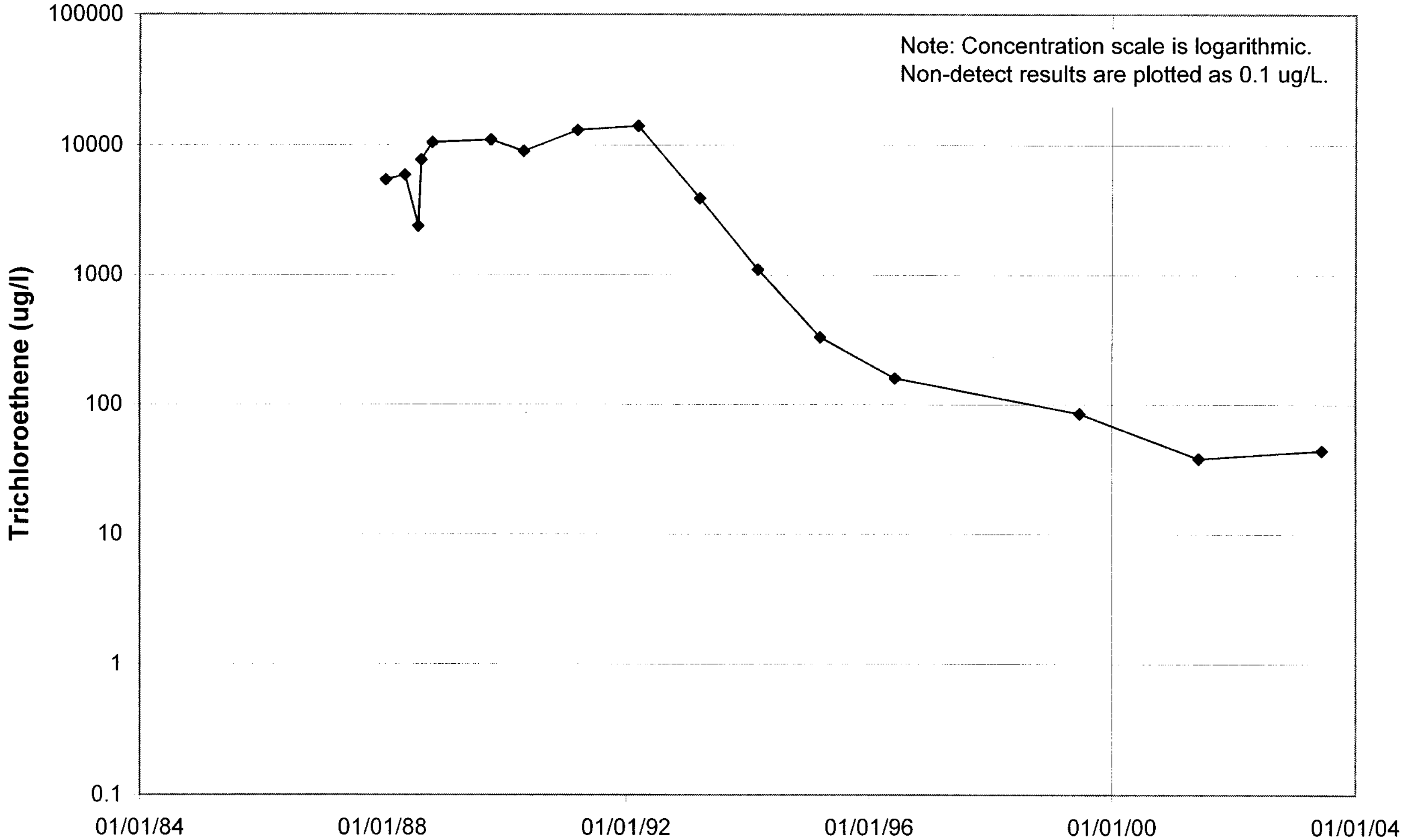

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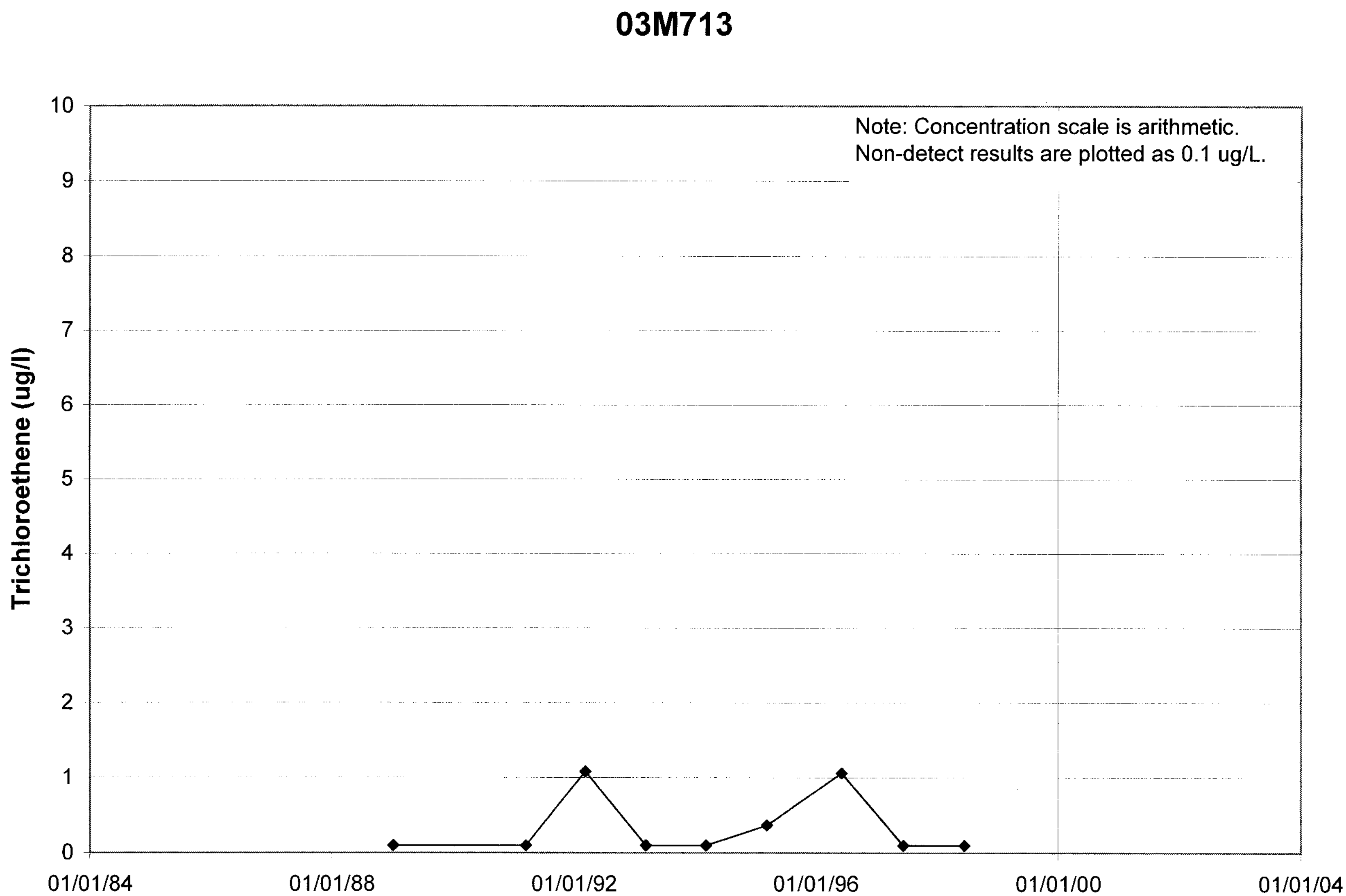

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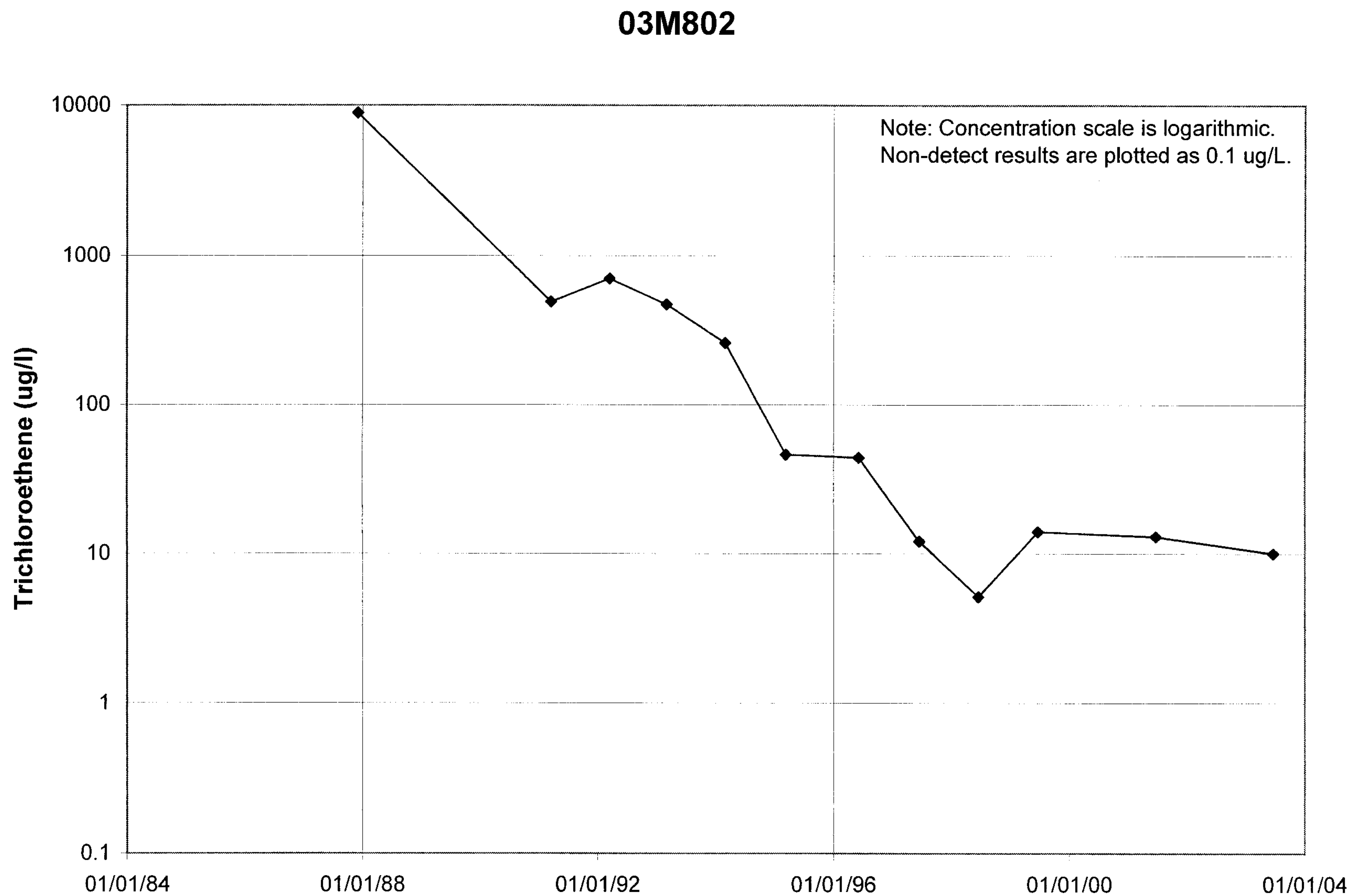

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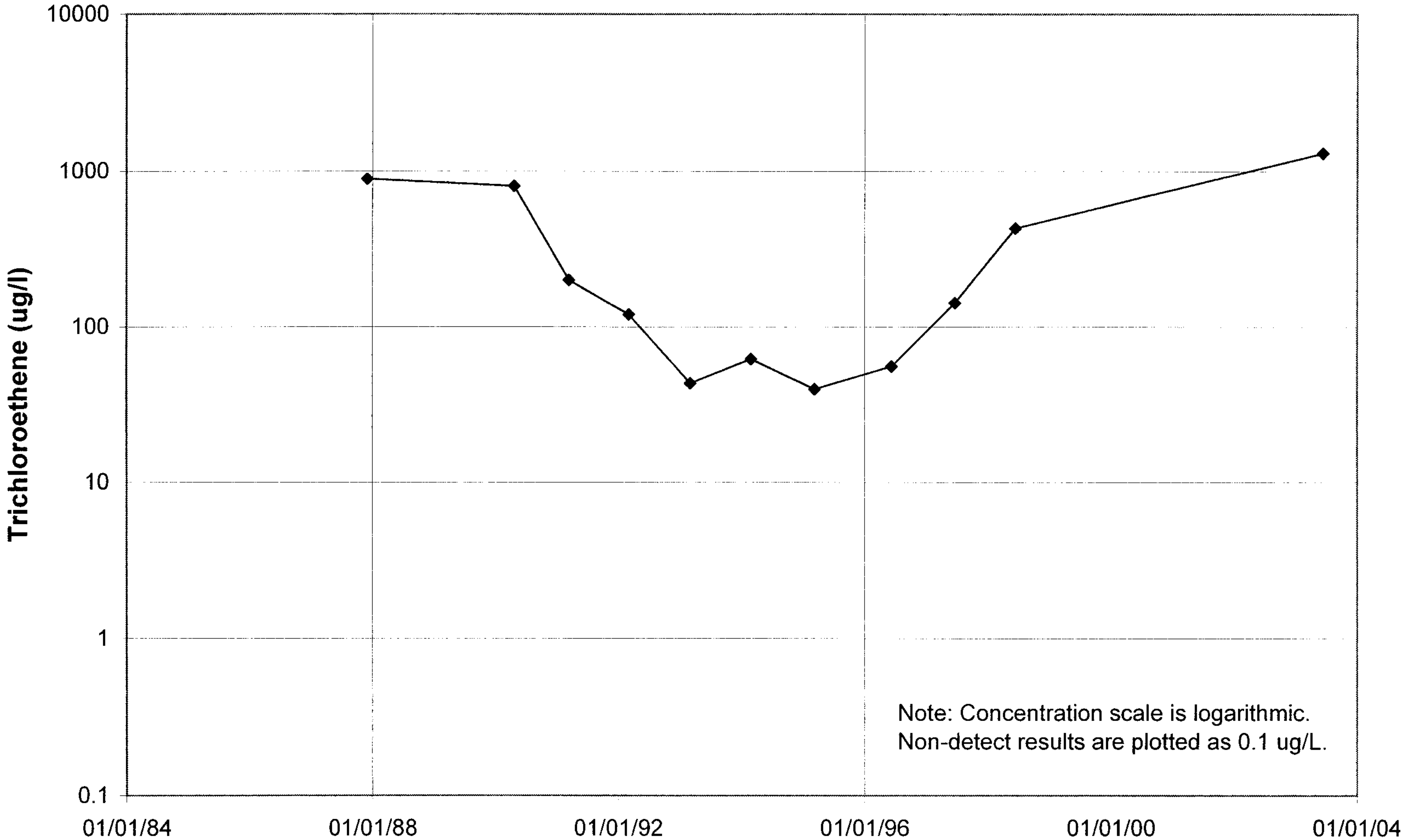

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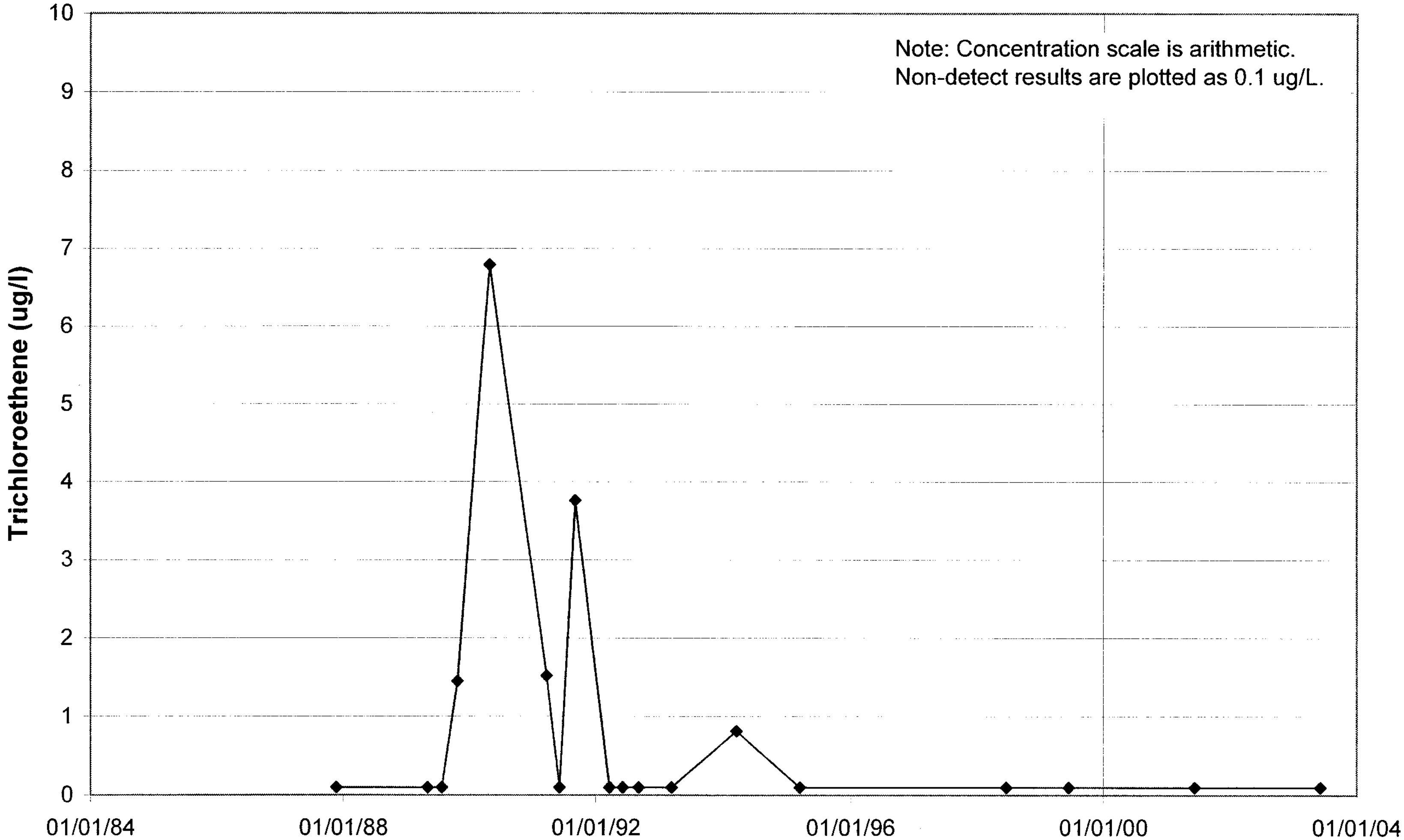

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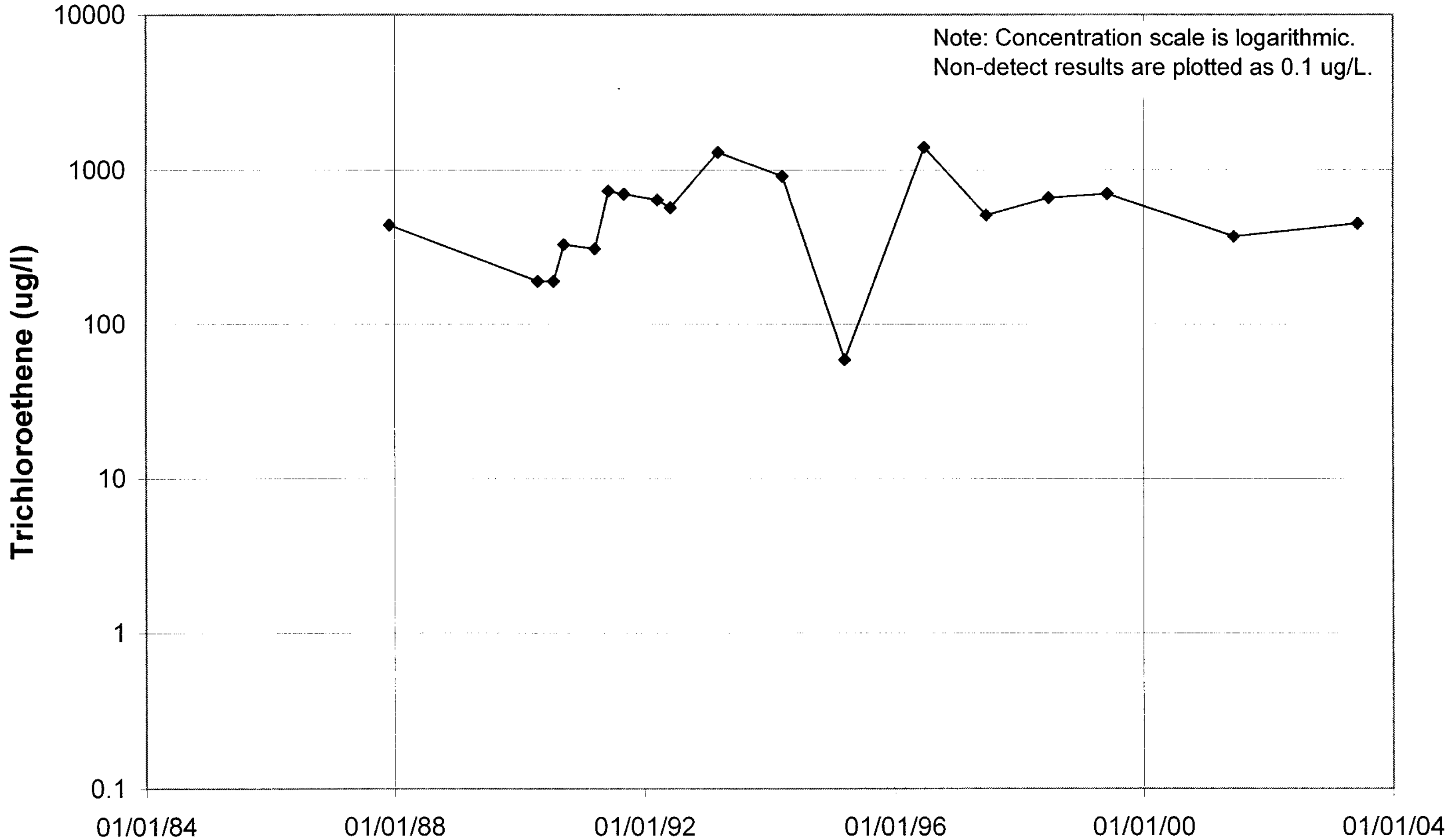

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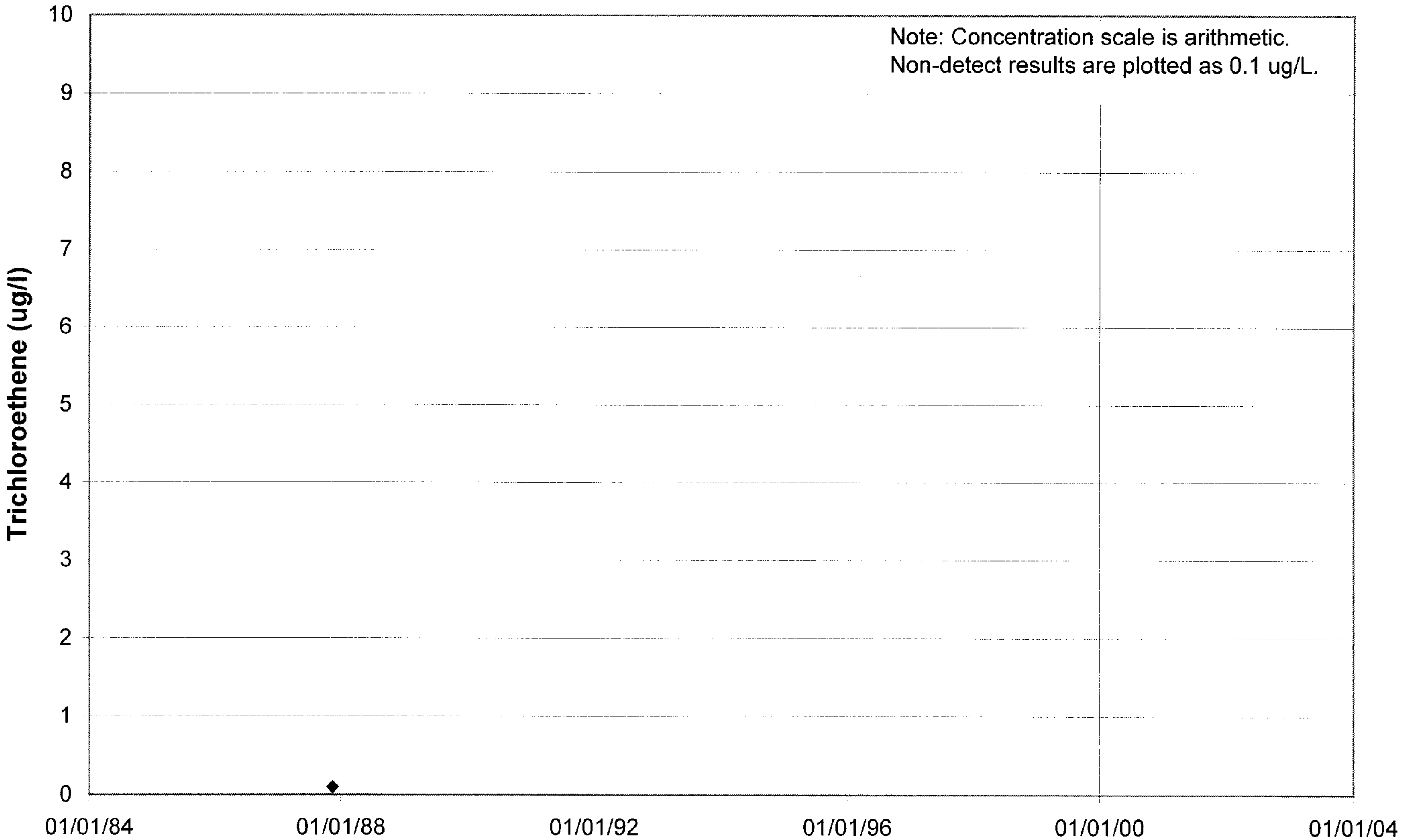
03U001



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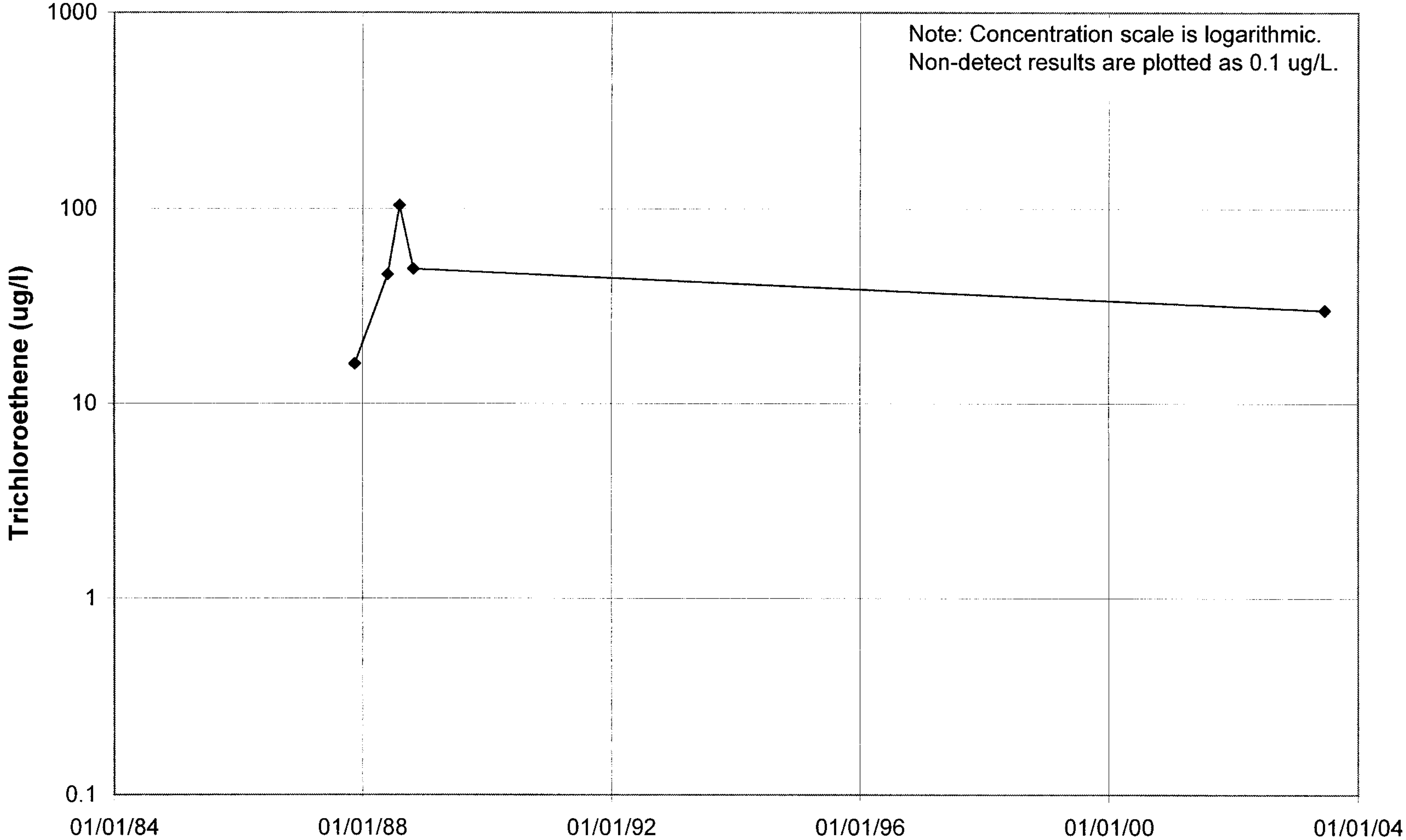

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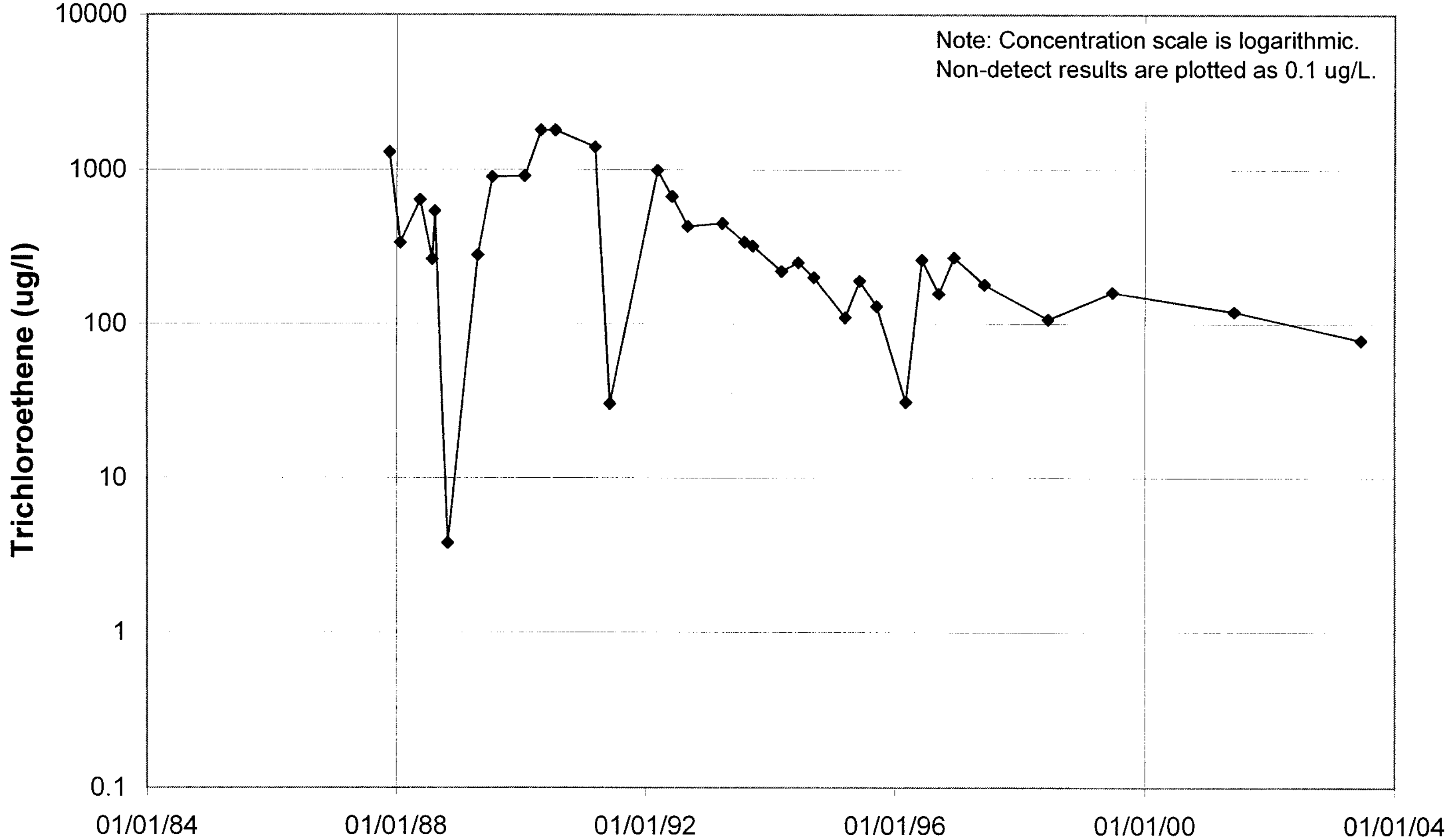

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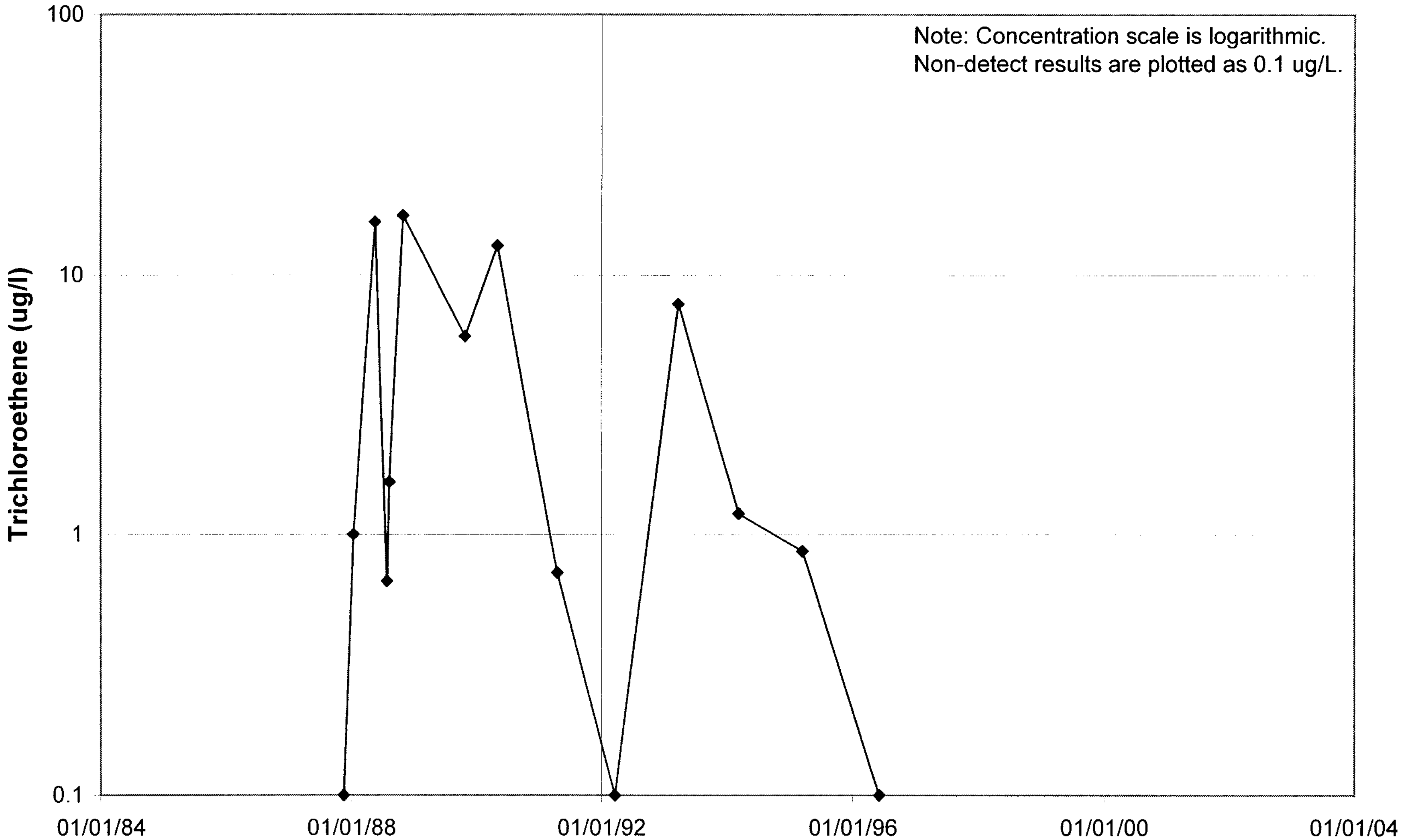

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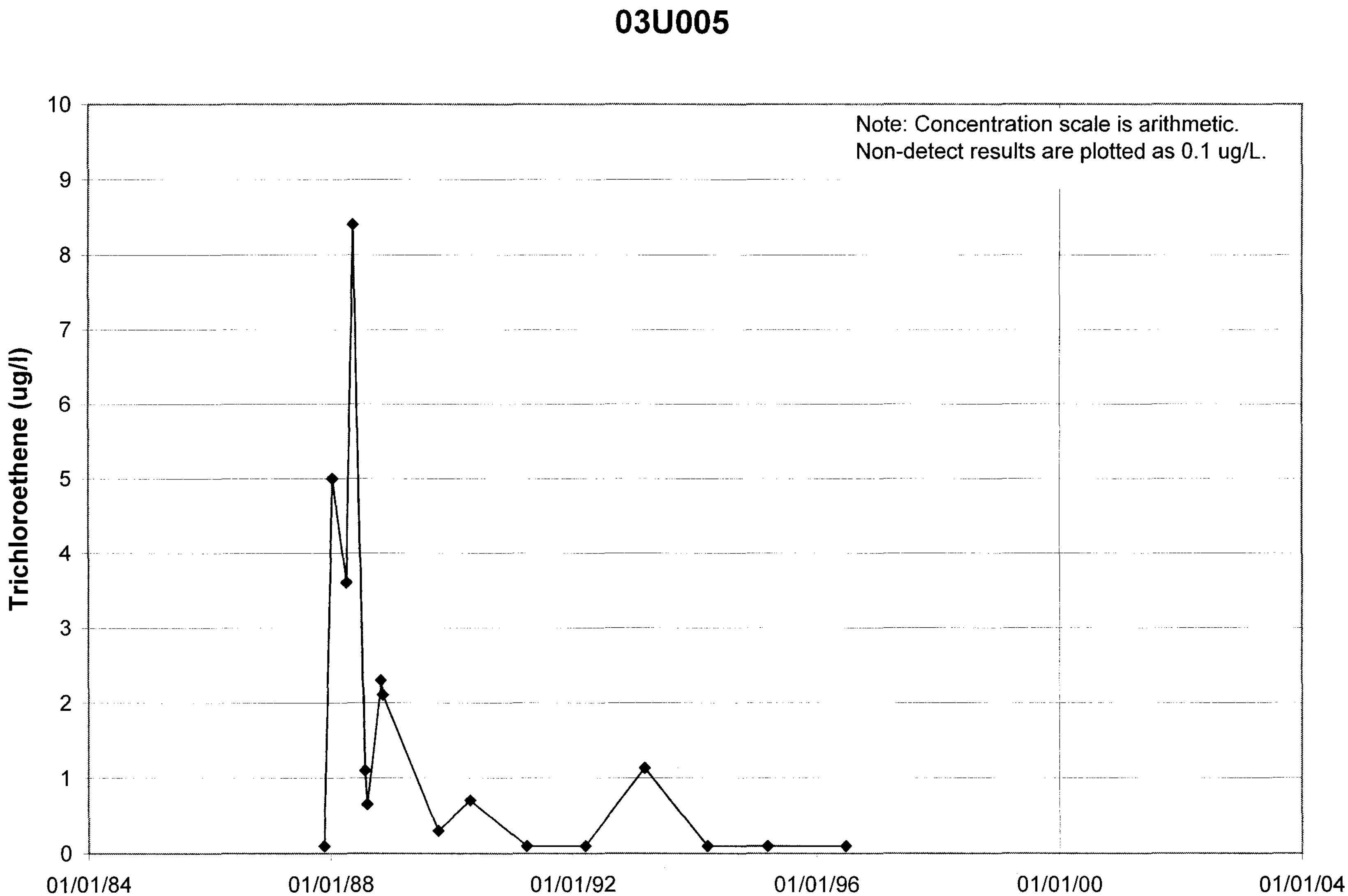

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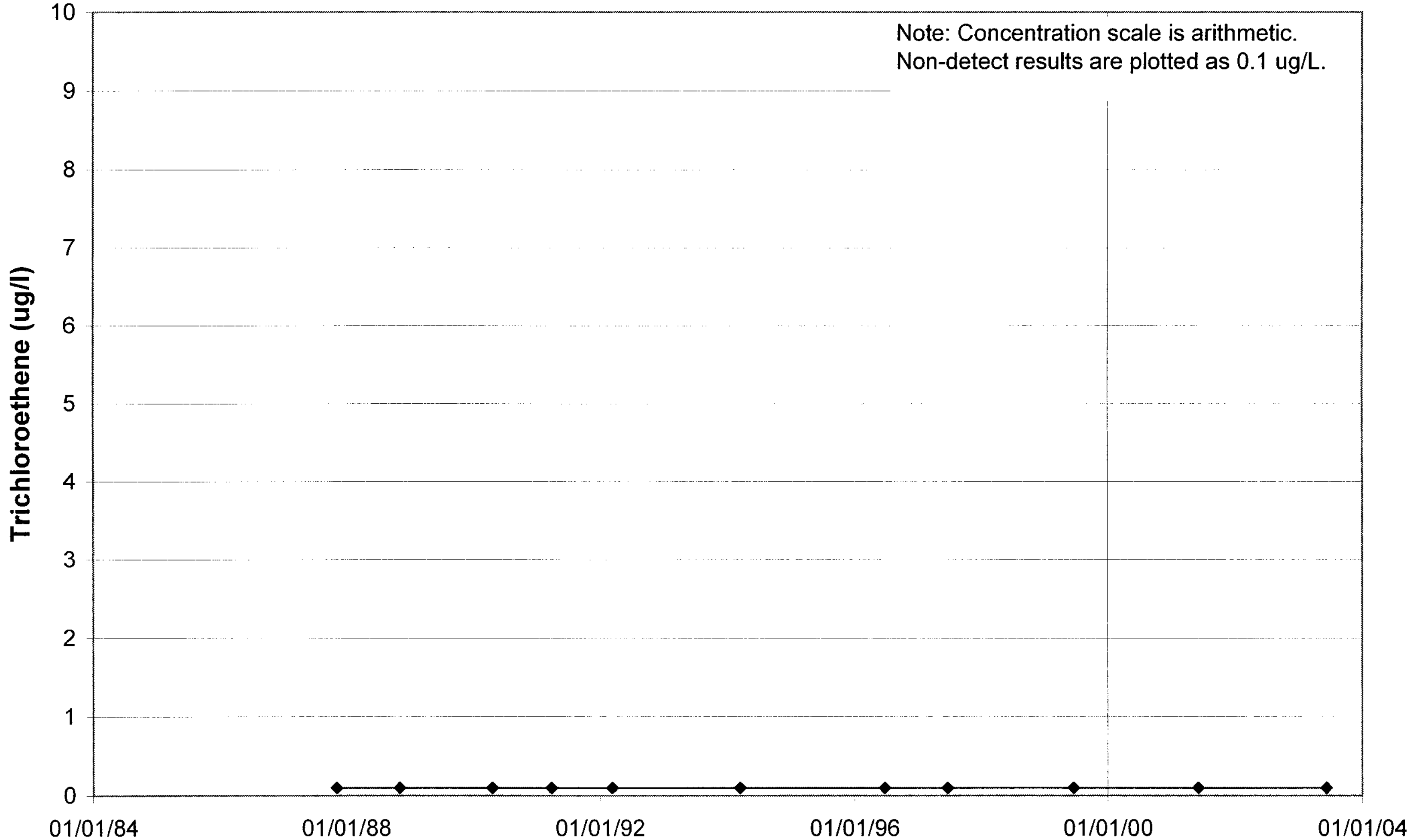

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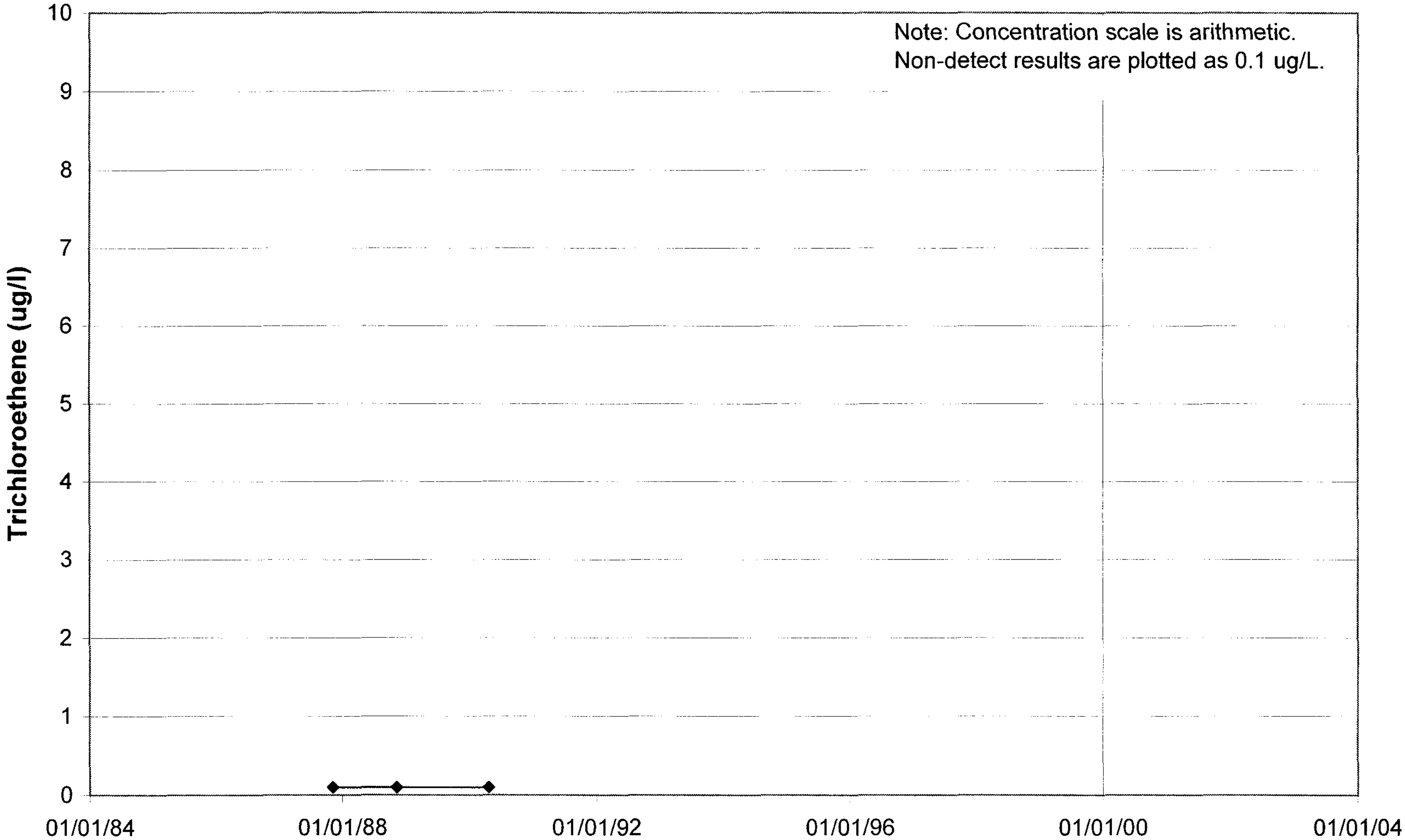

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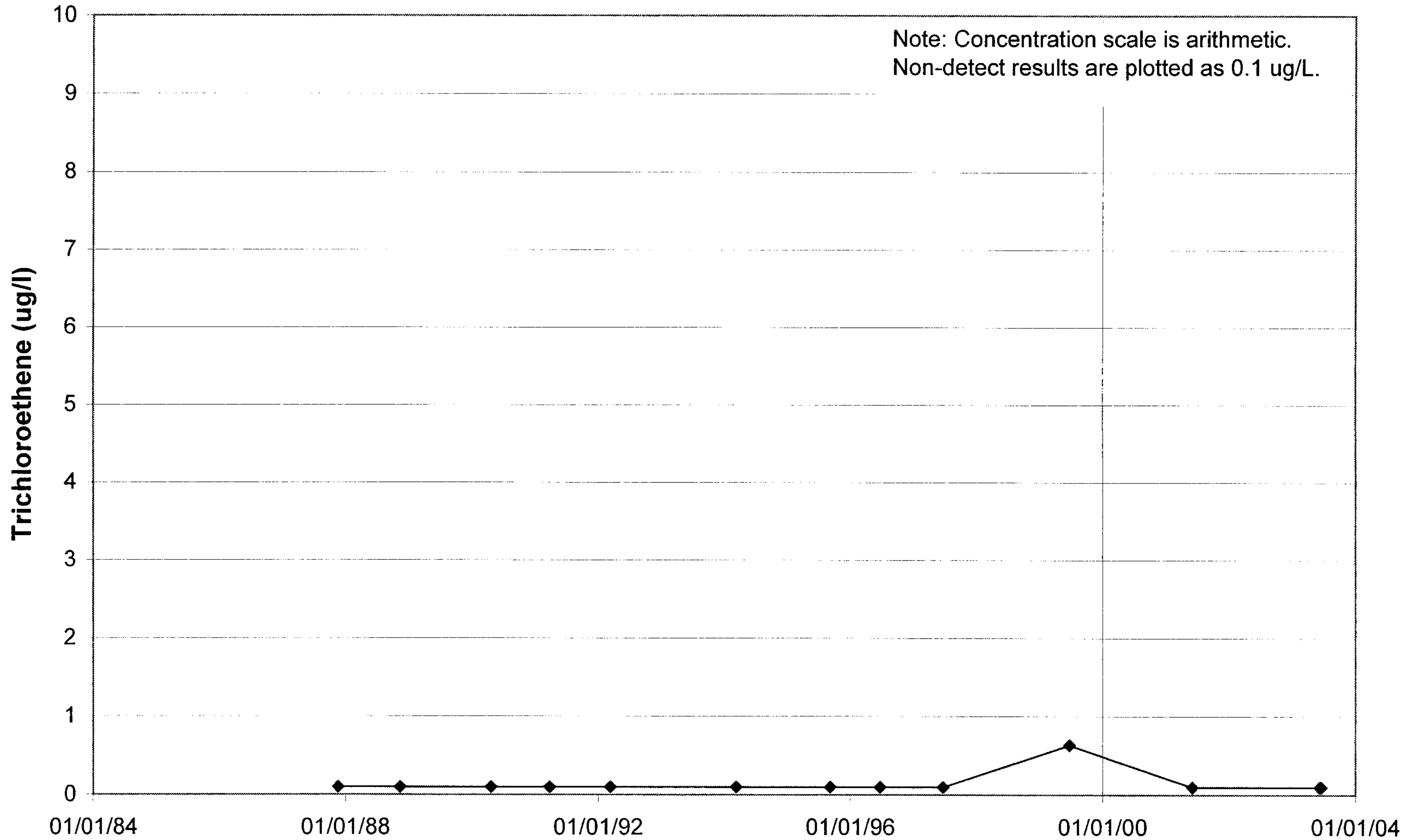

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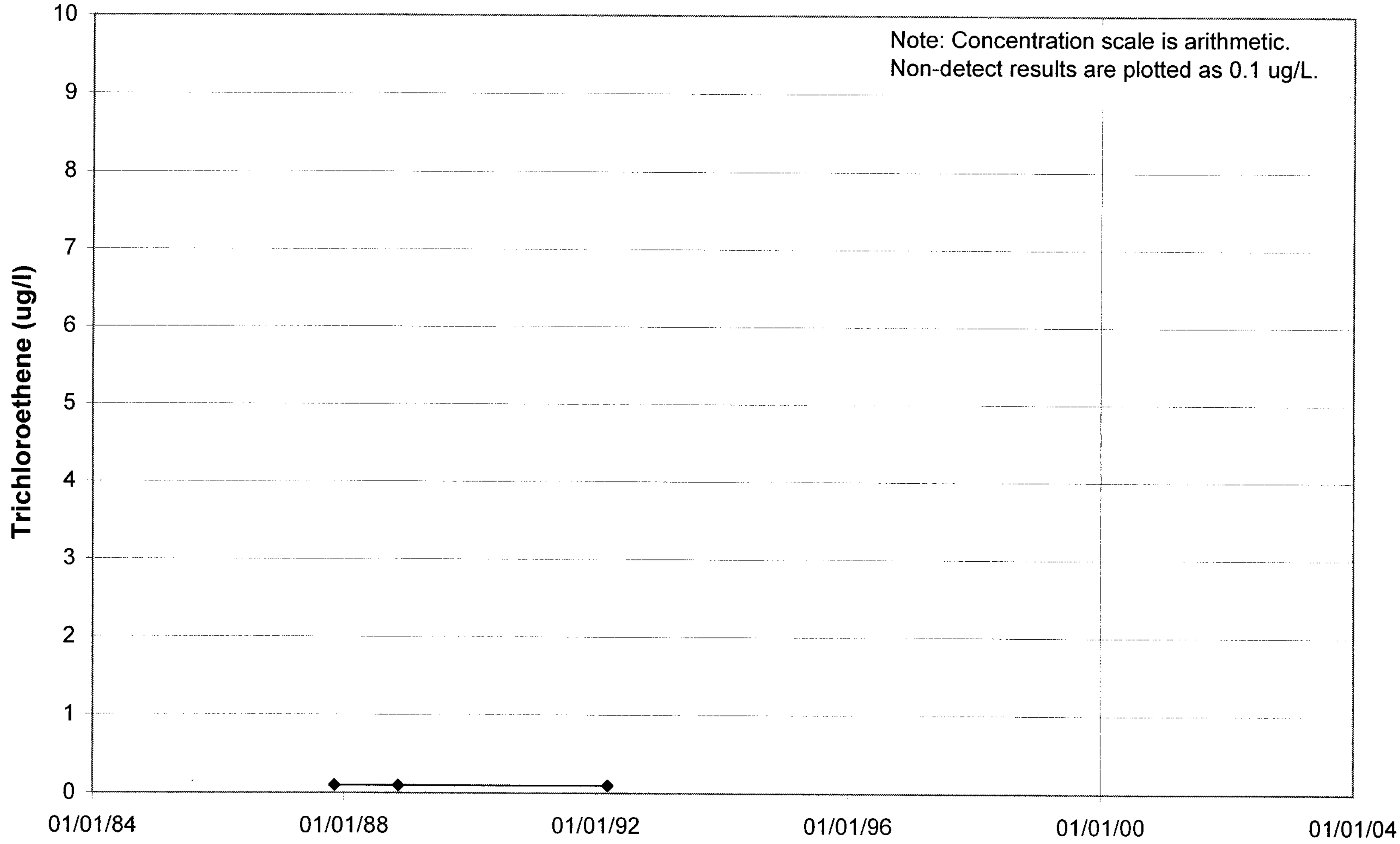

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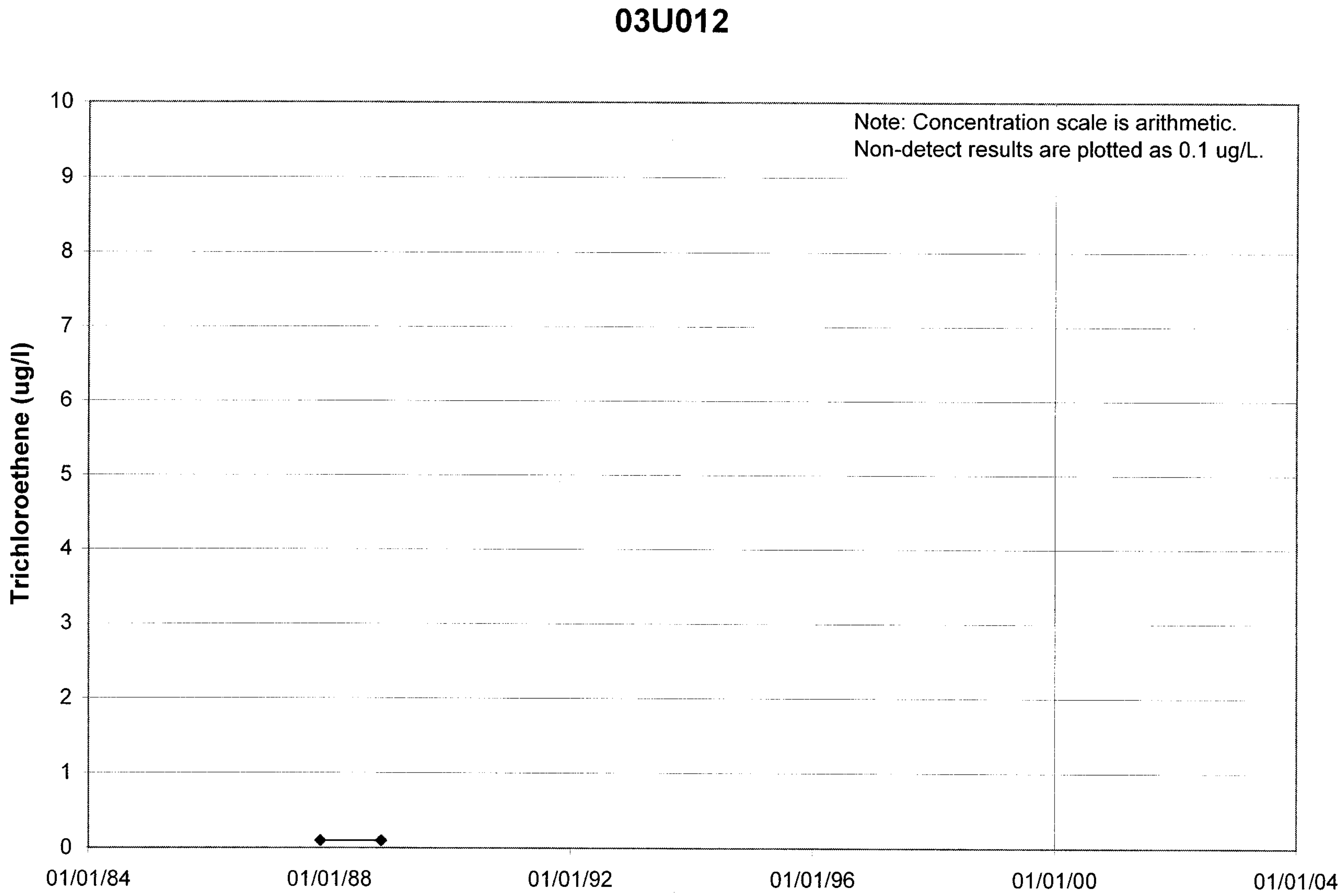

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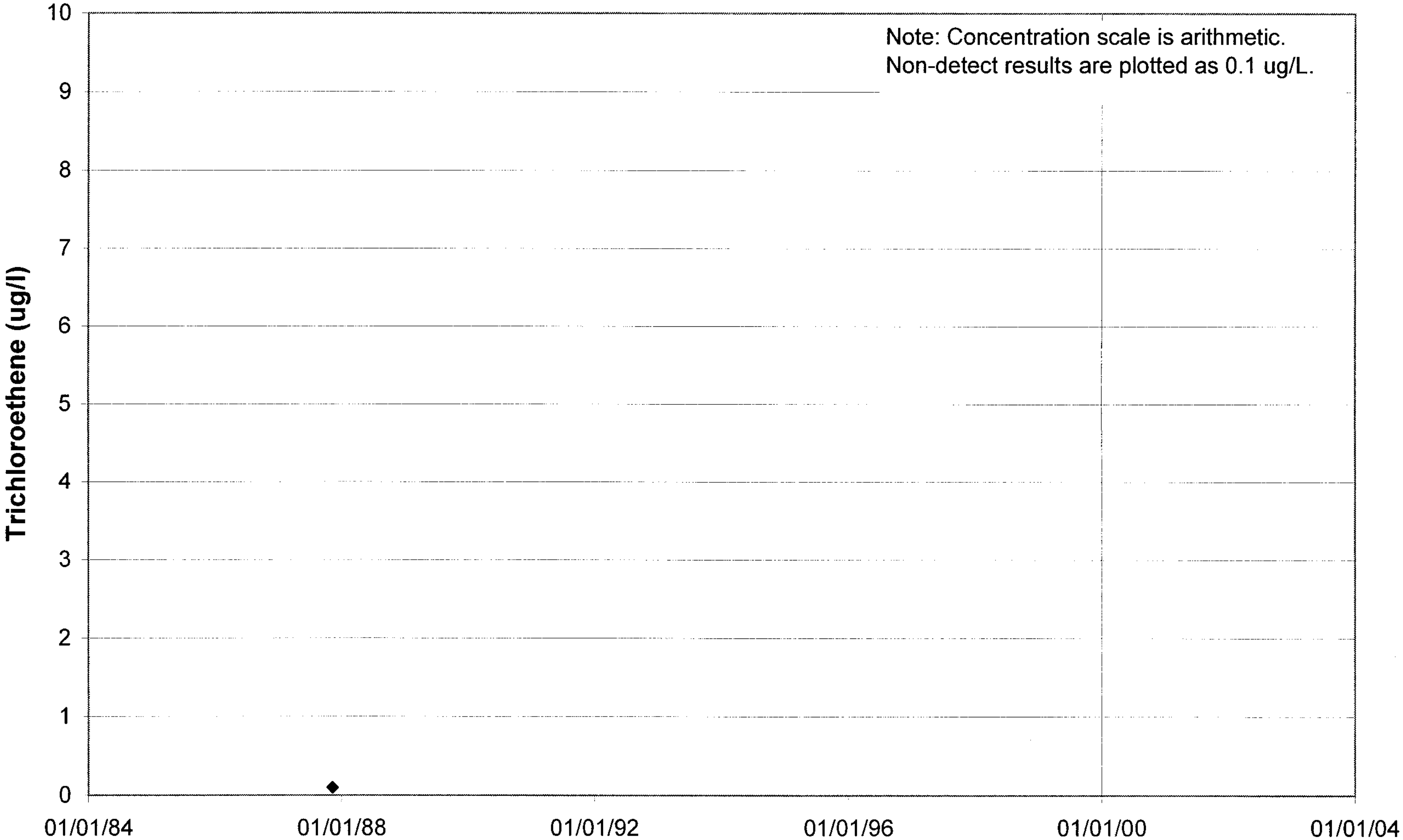

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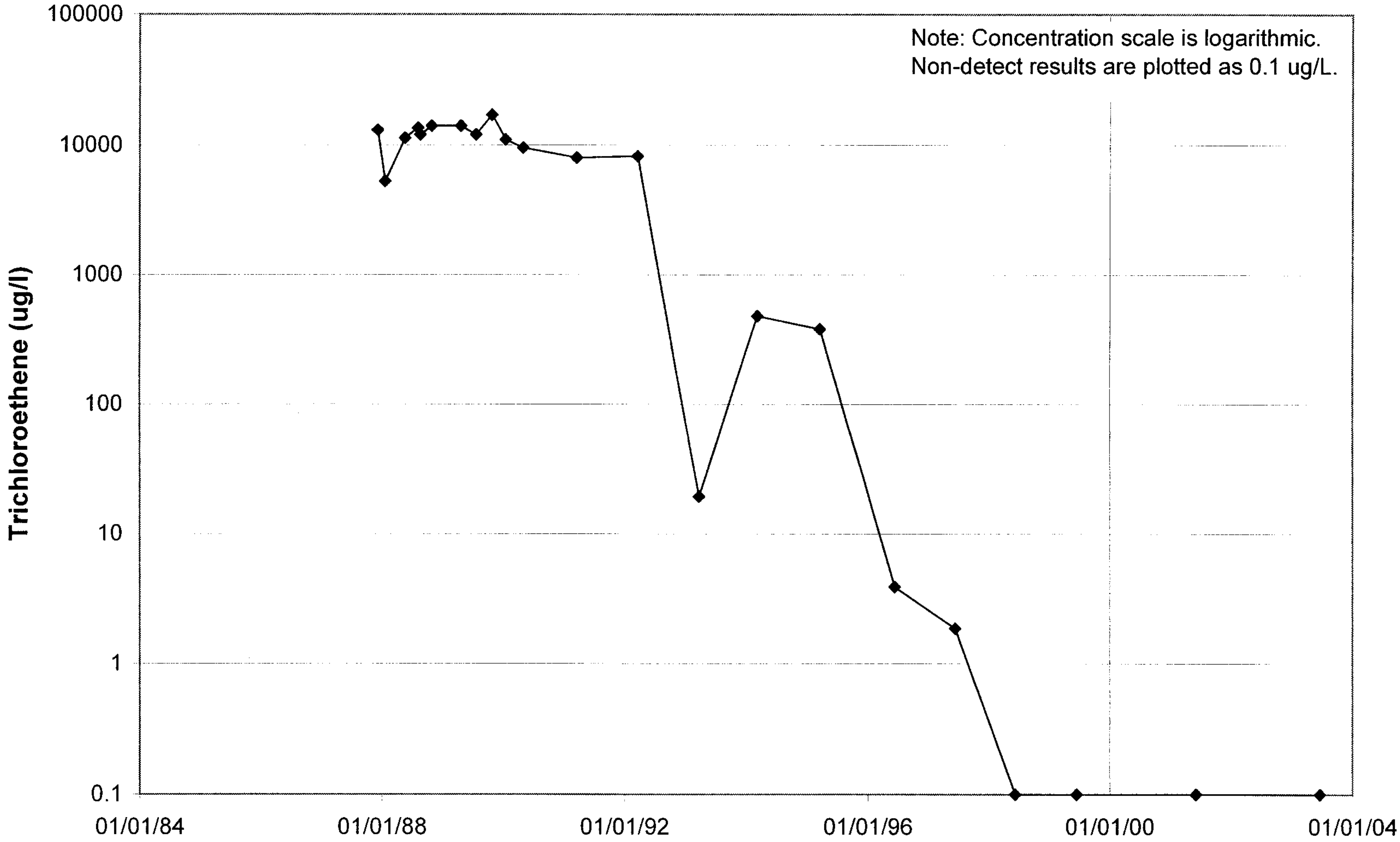

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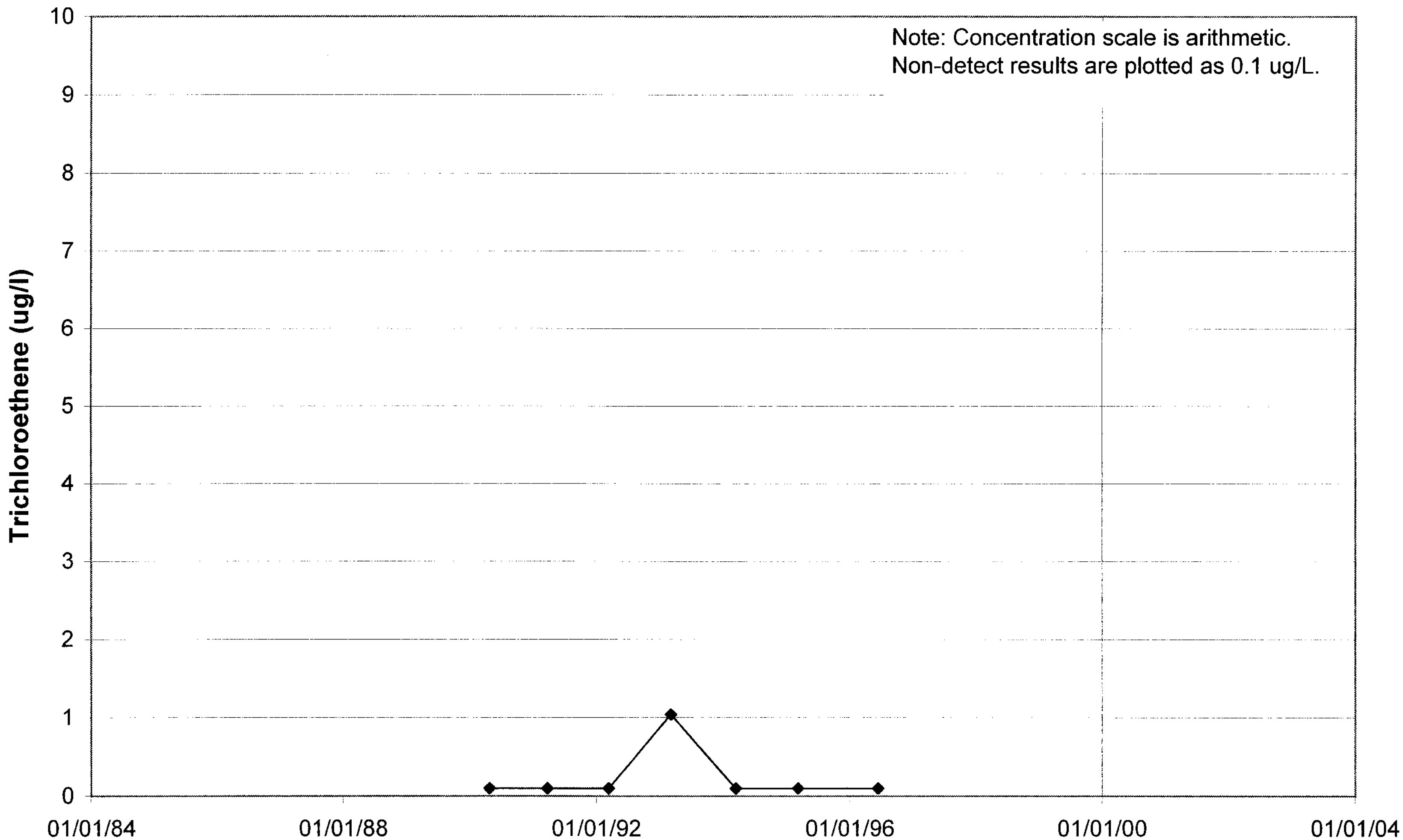

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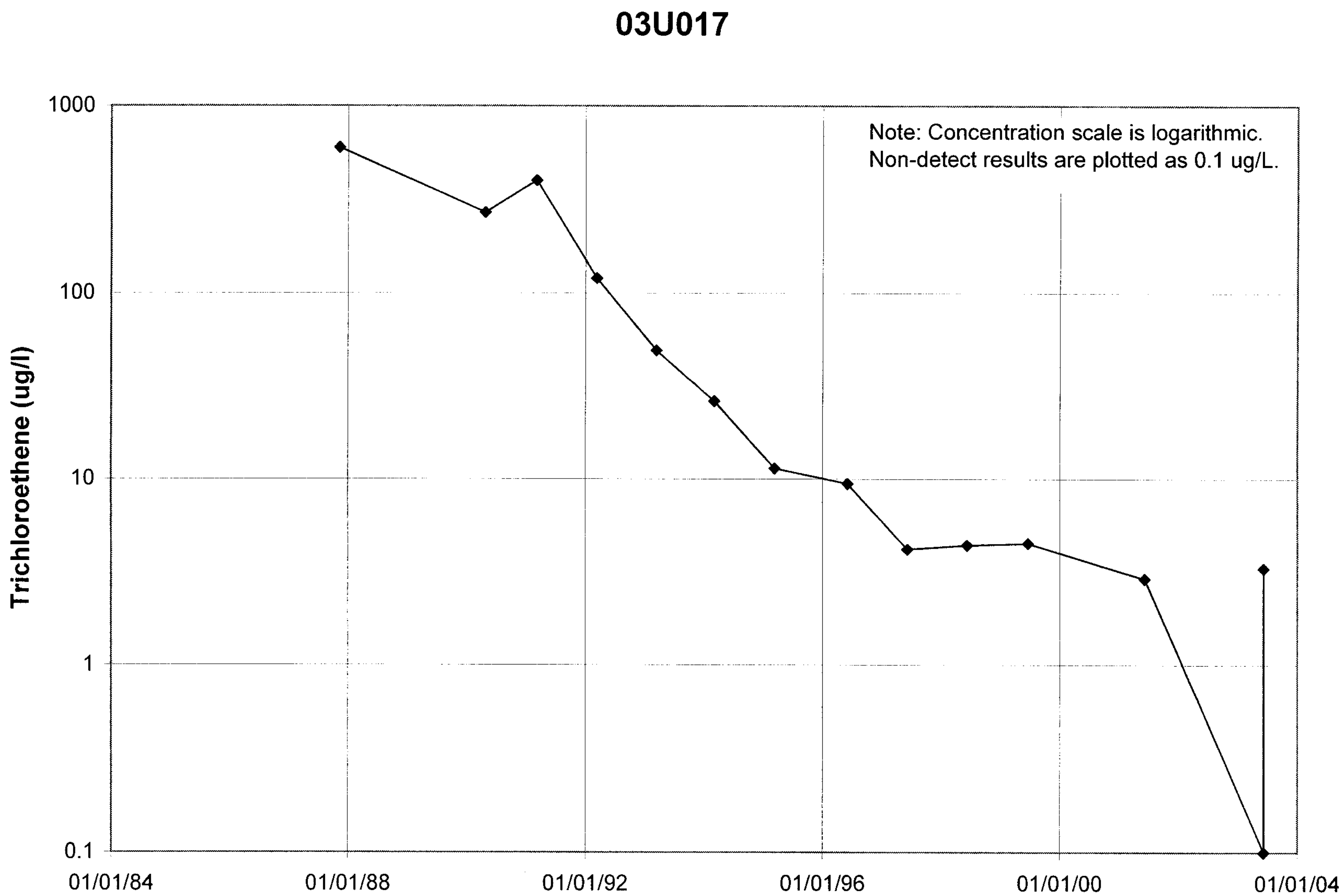

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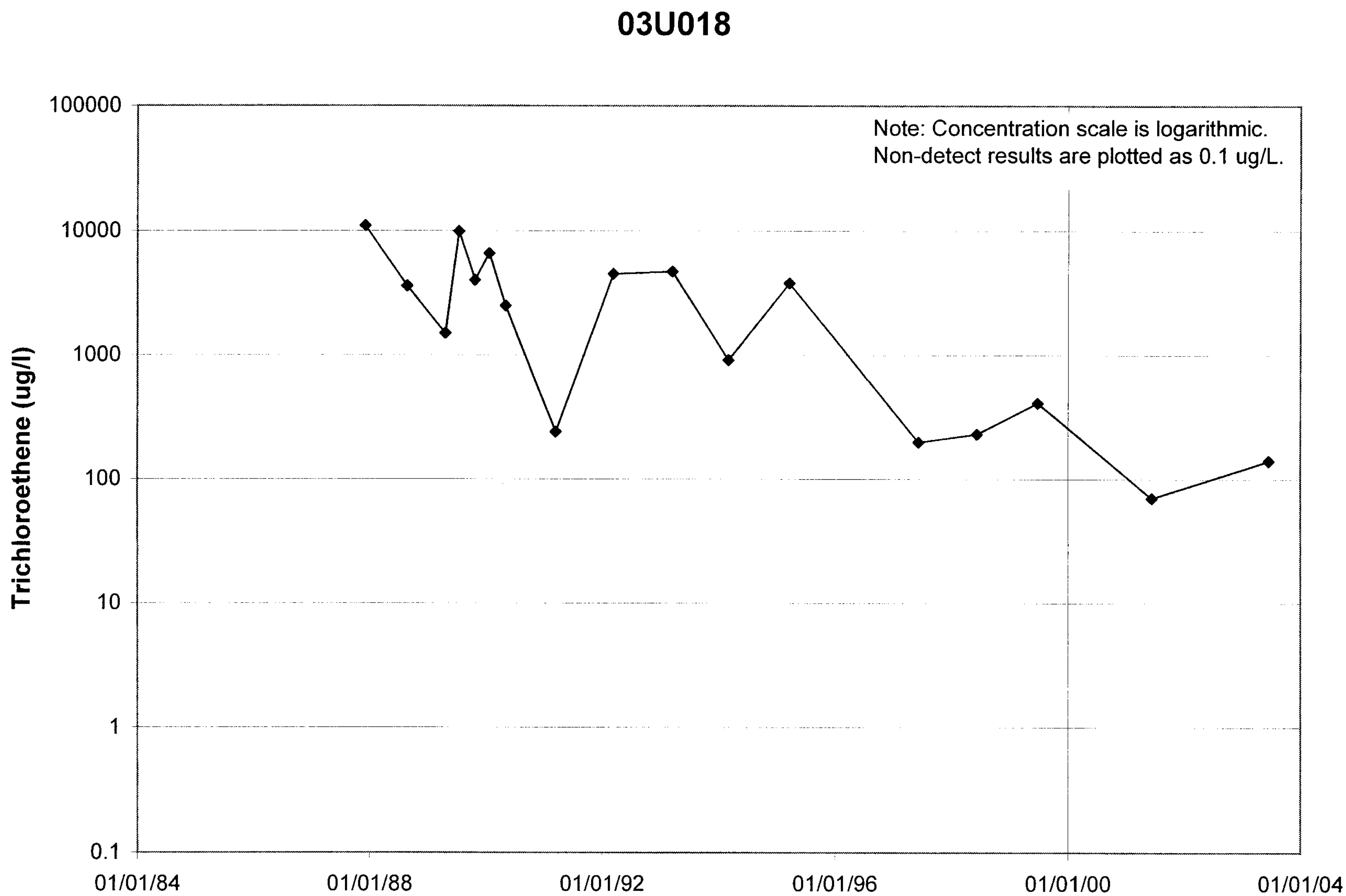

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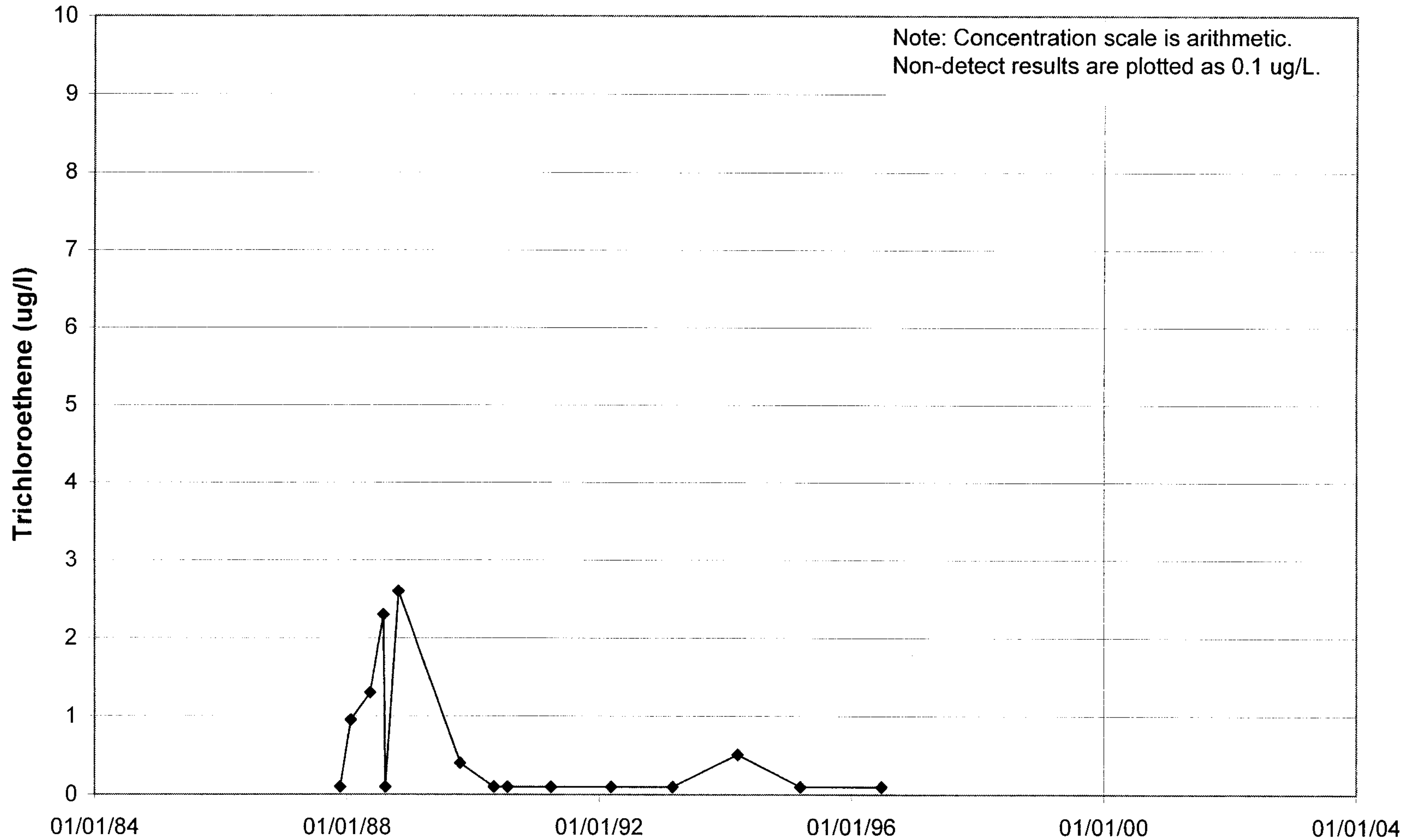

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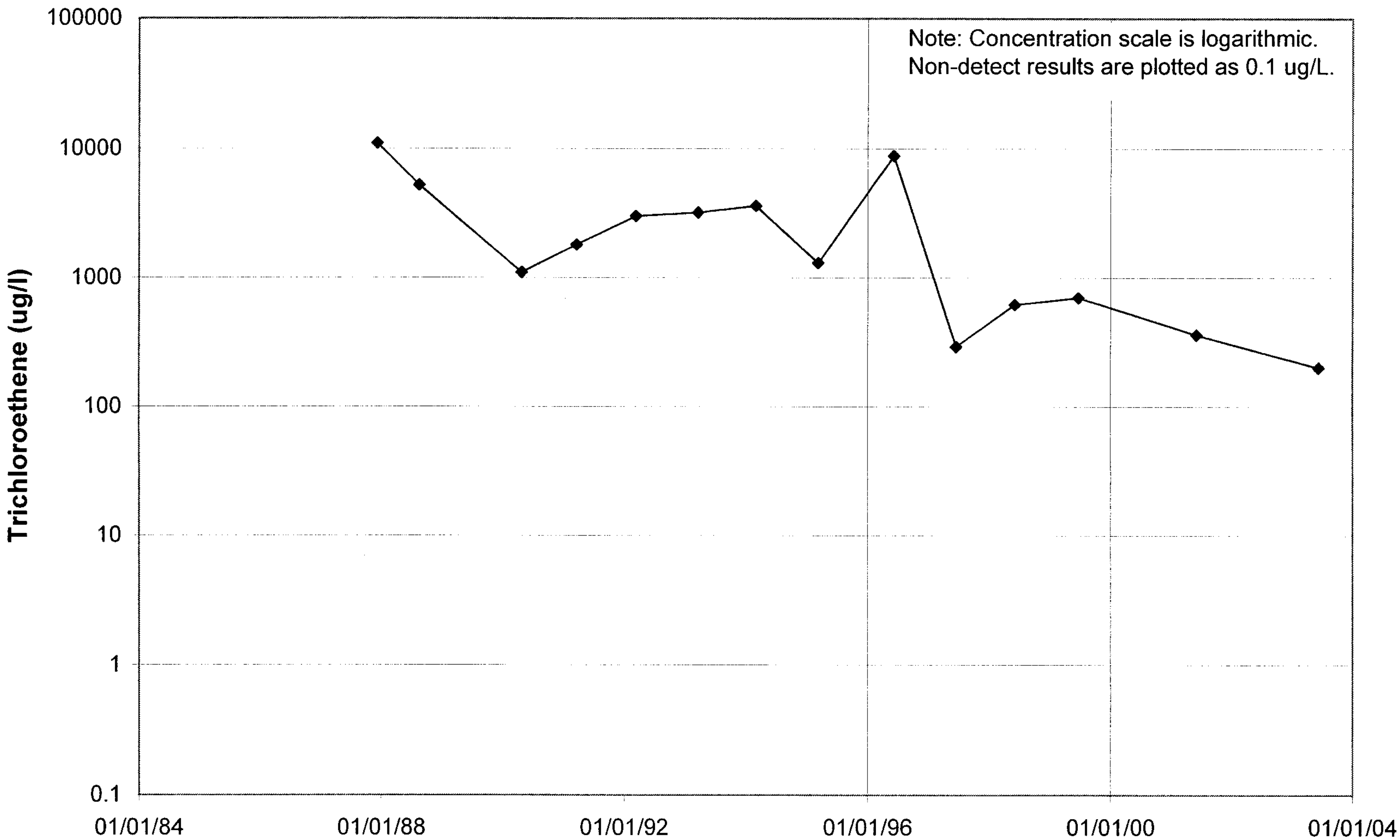

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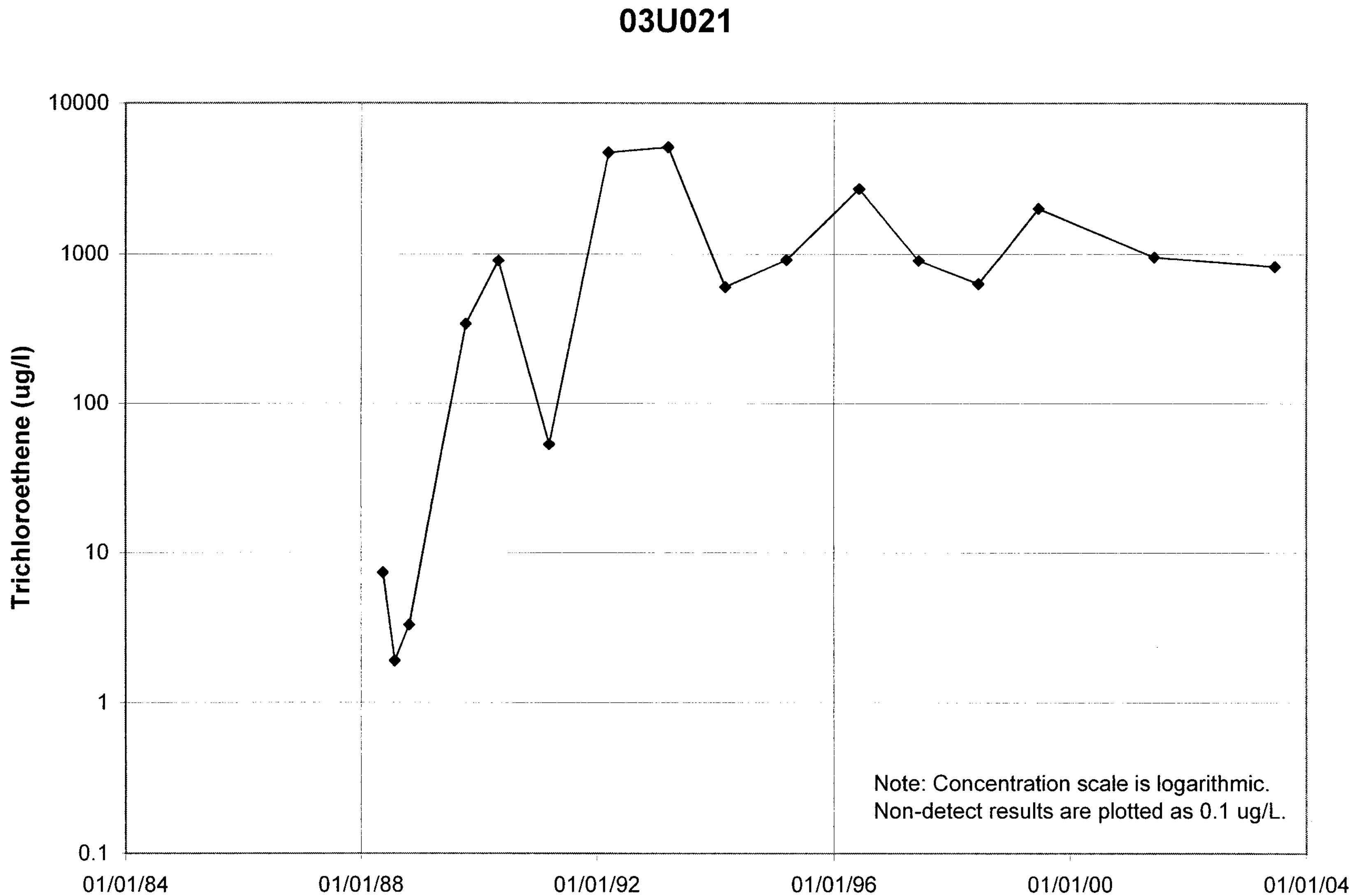

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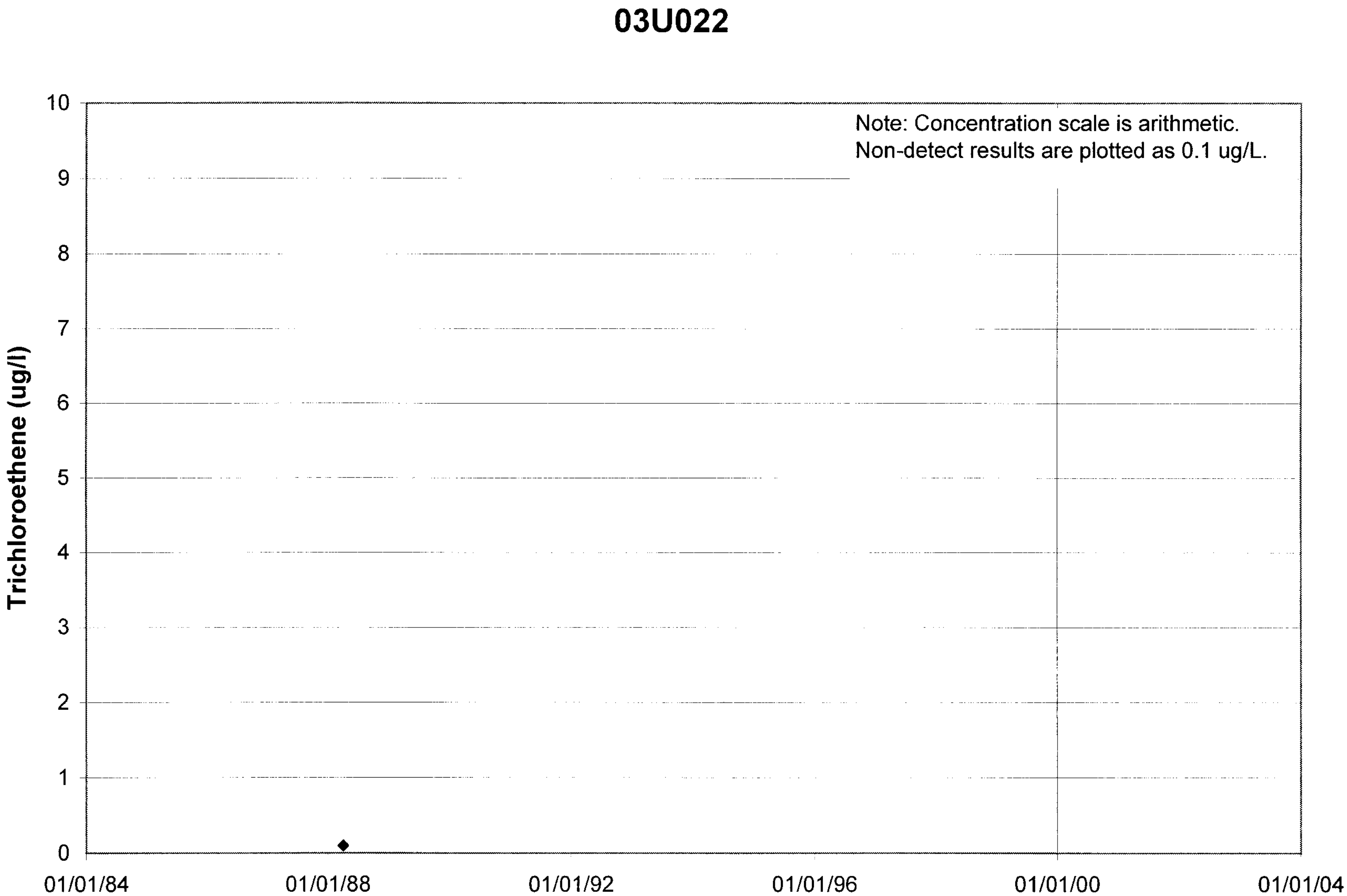

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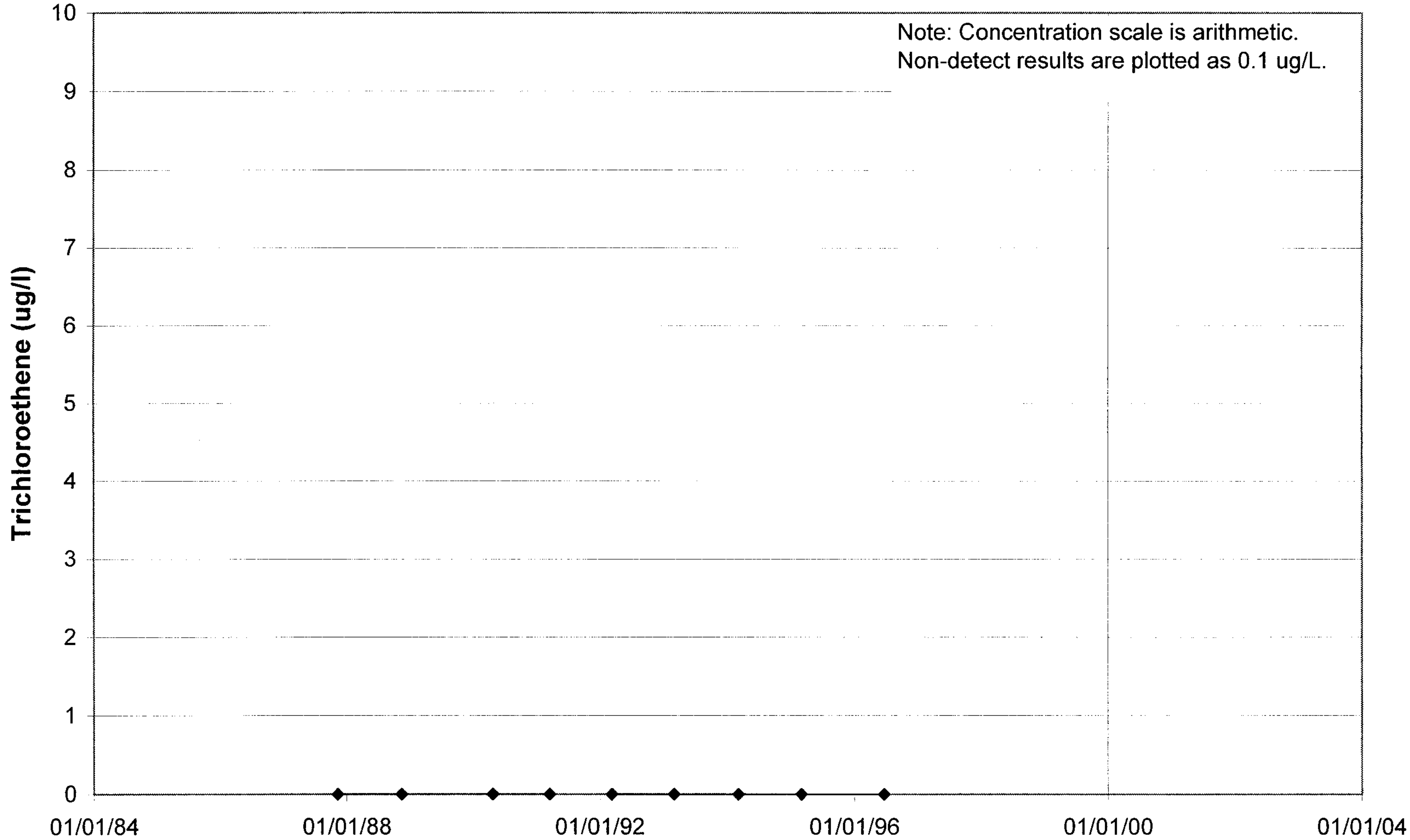

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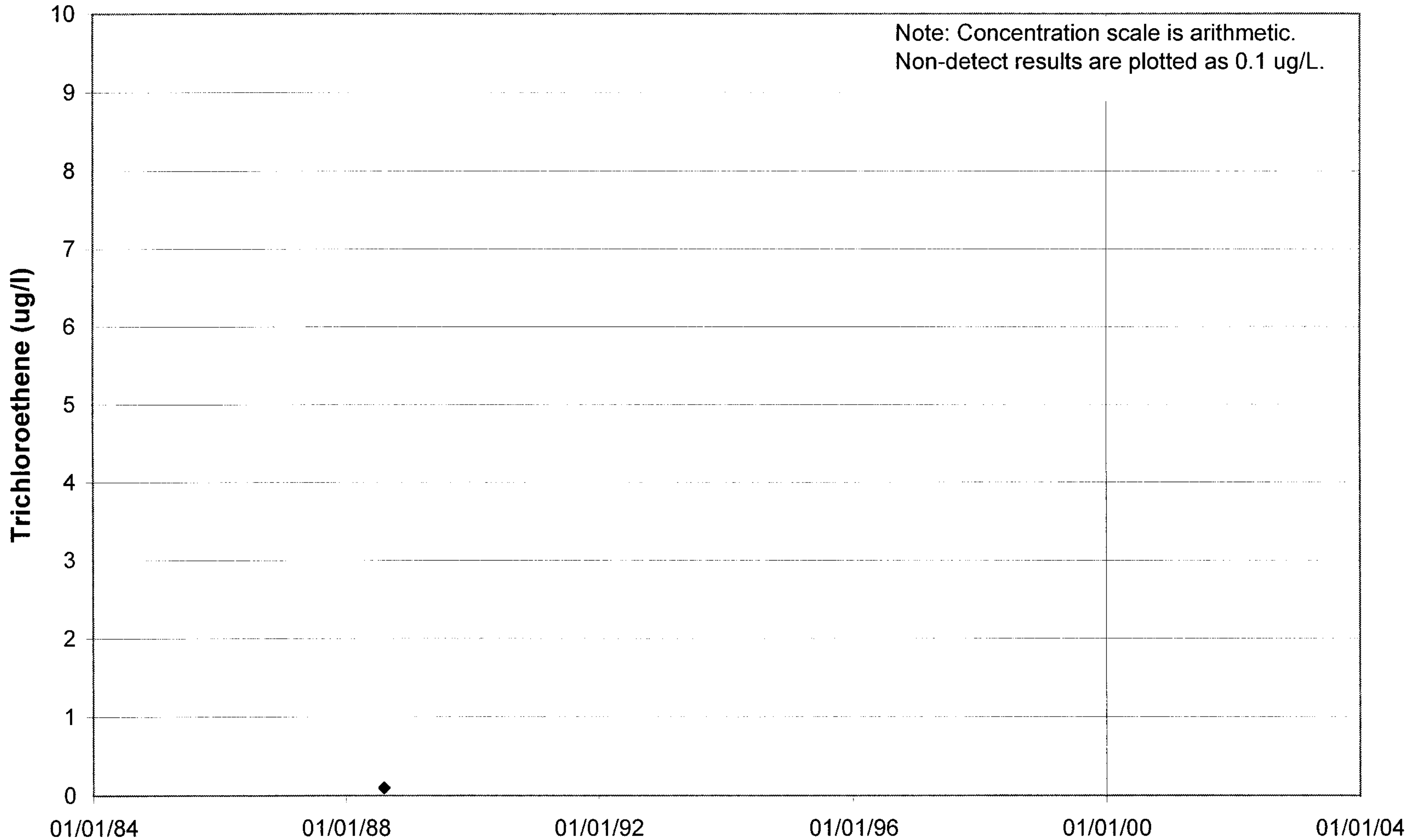

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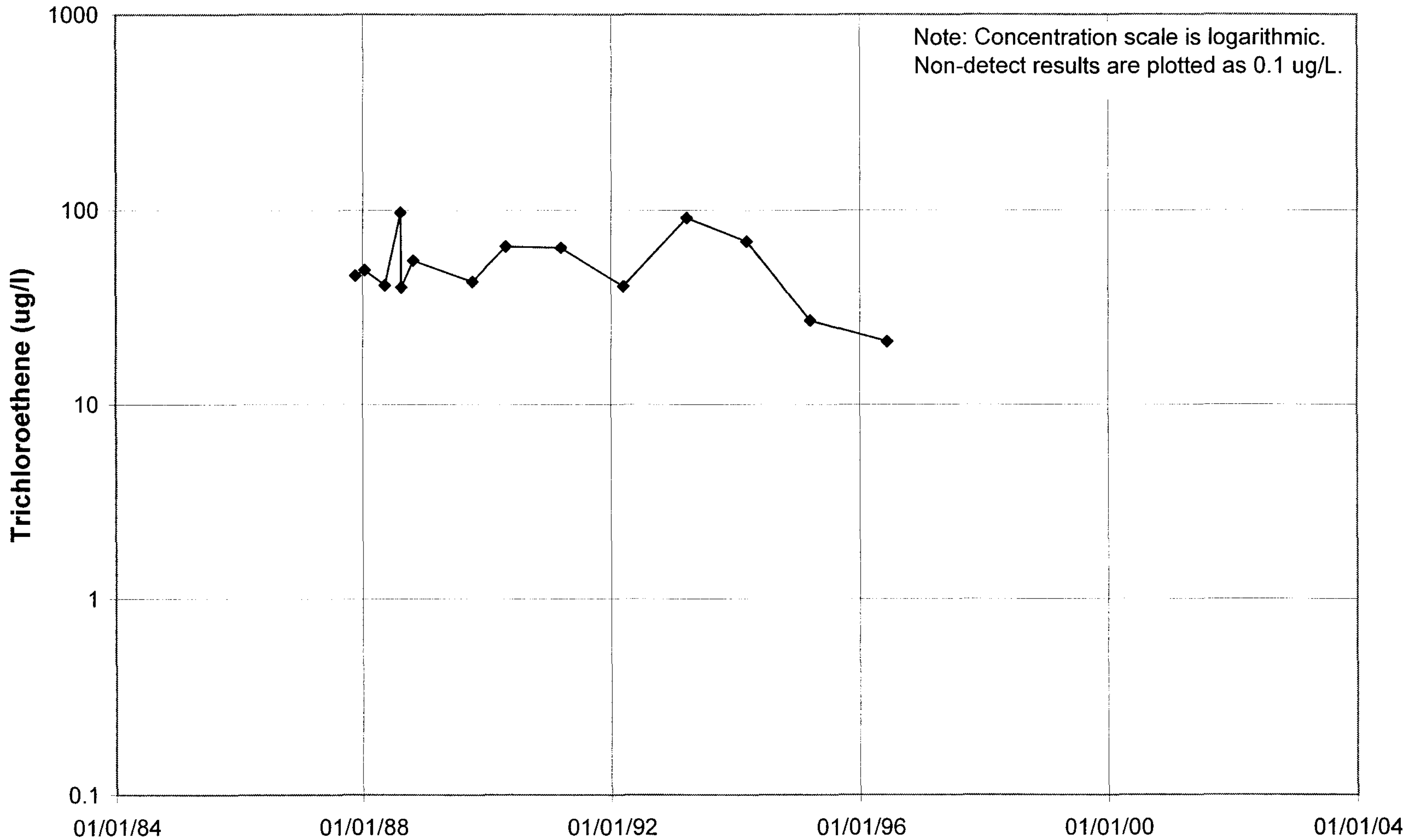

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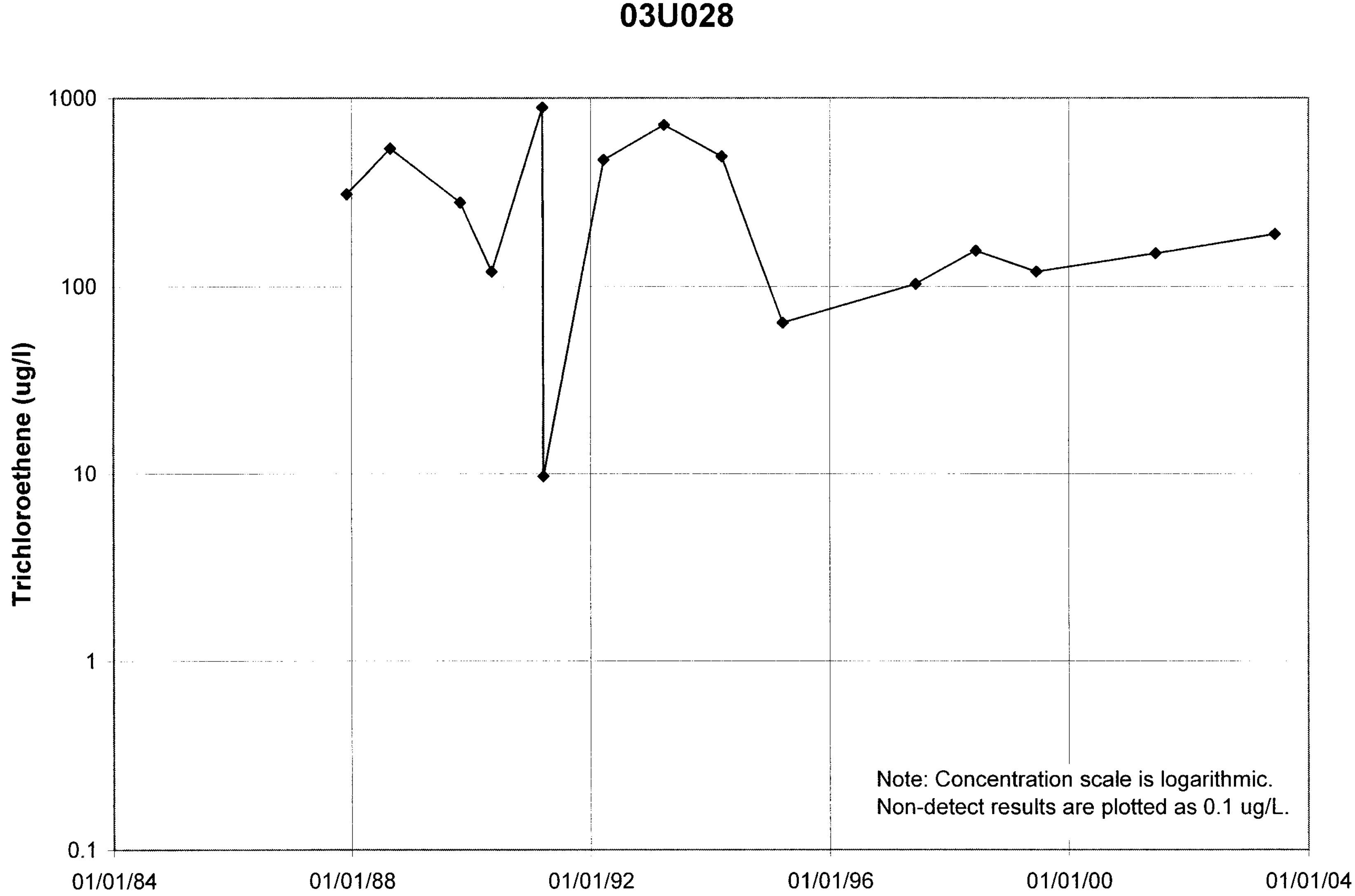

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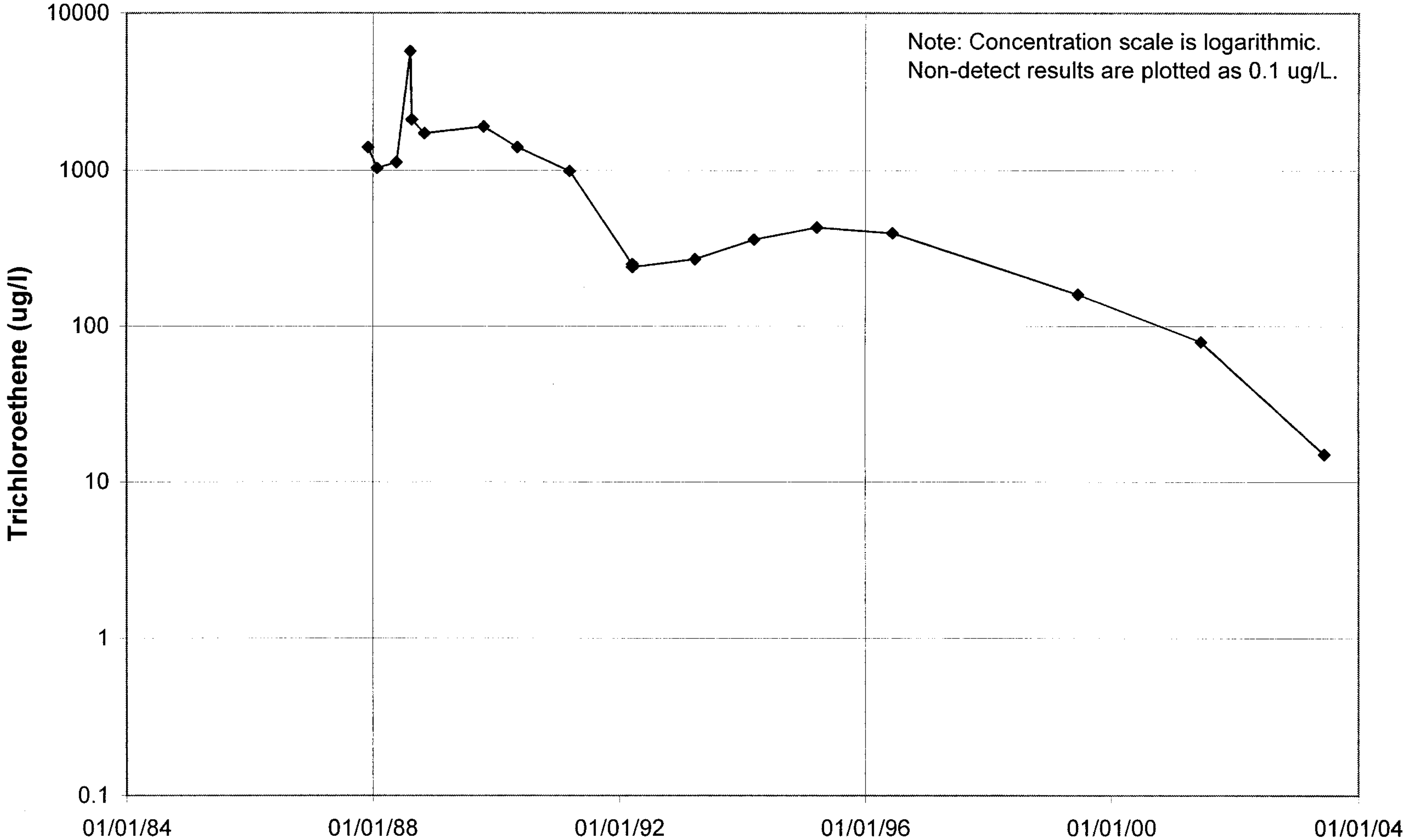

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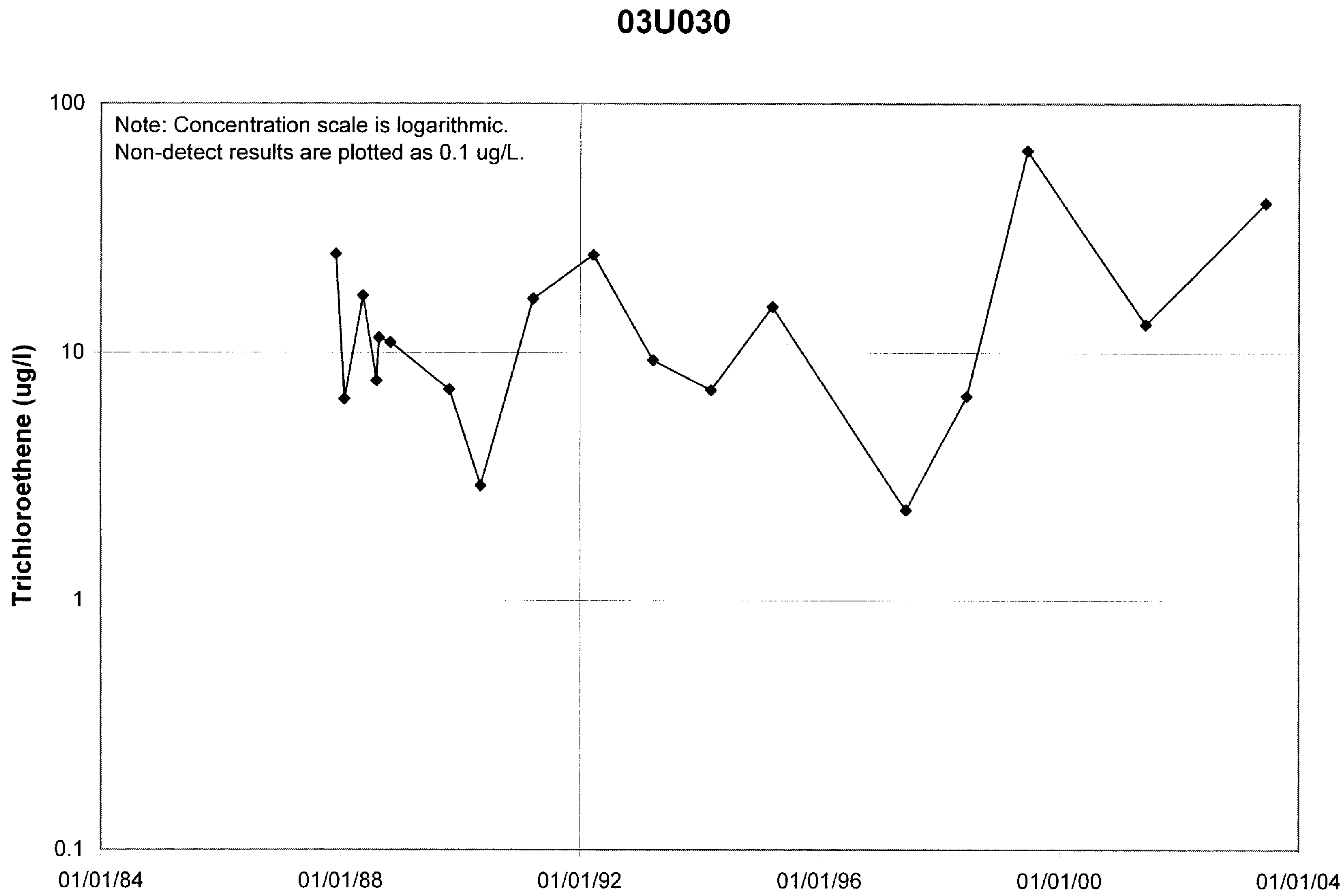

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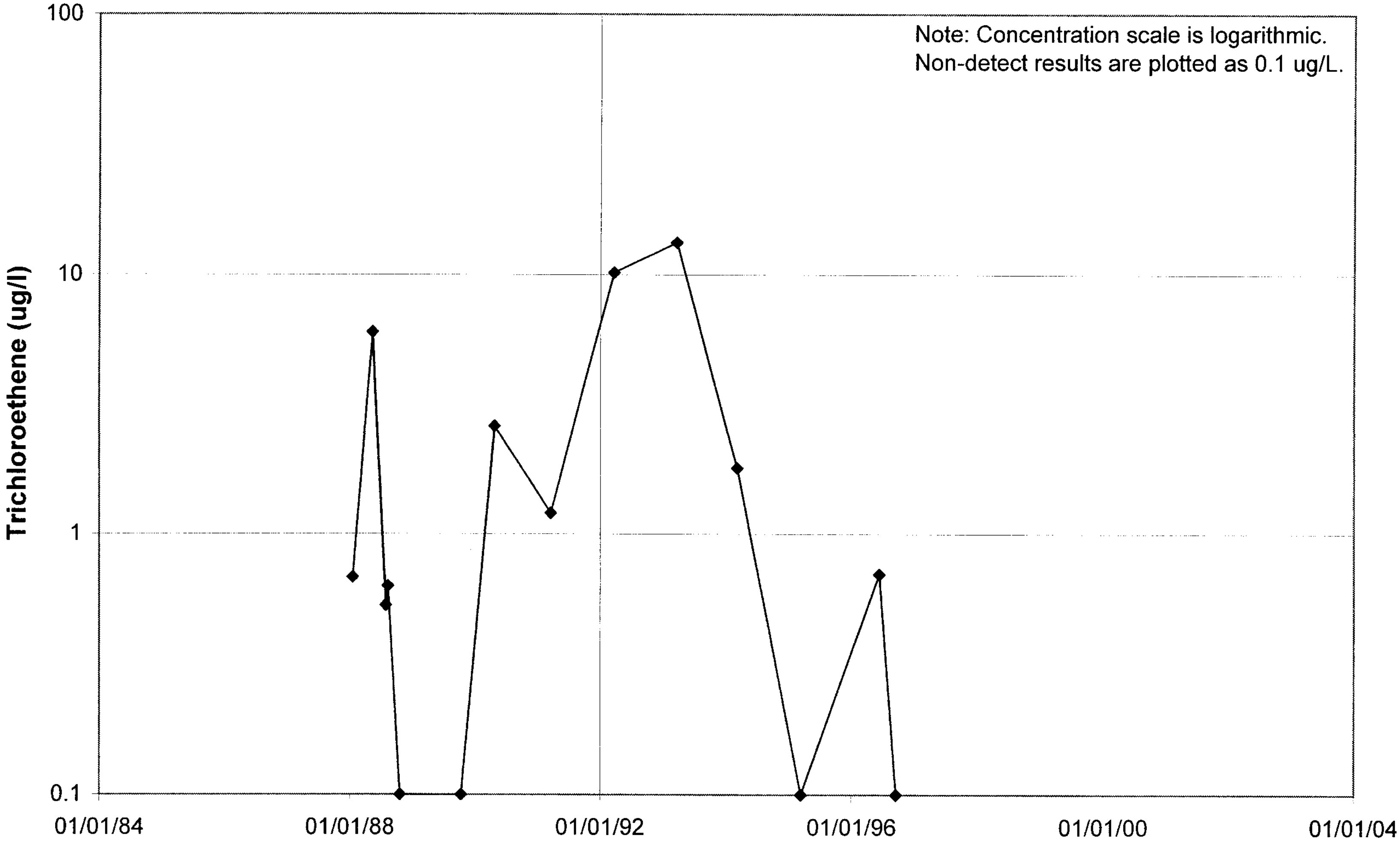

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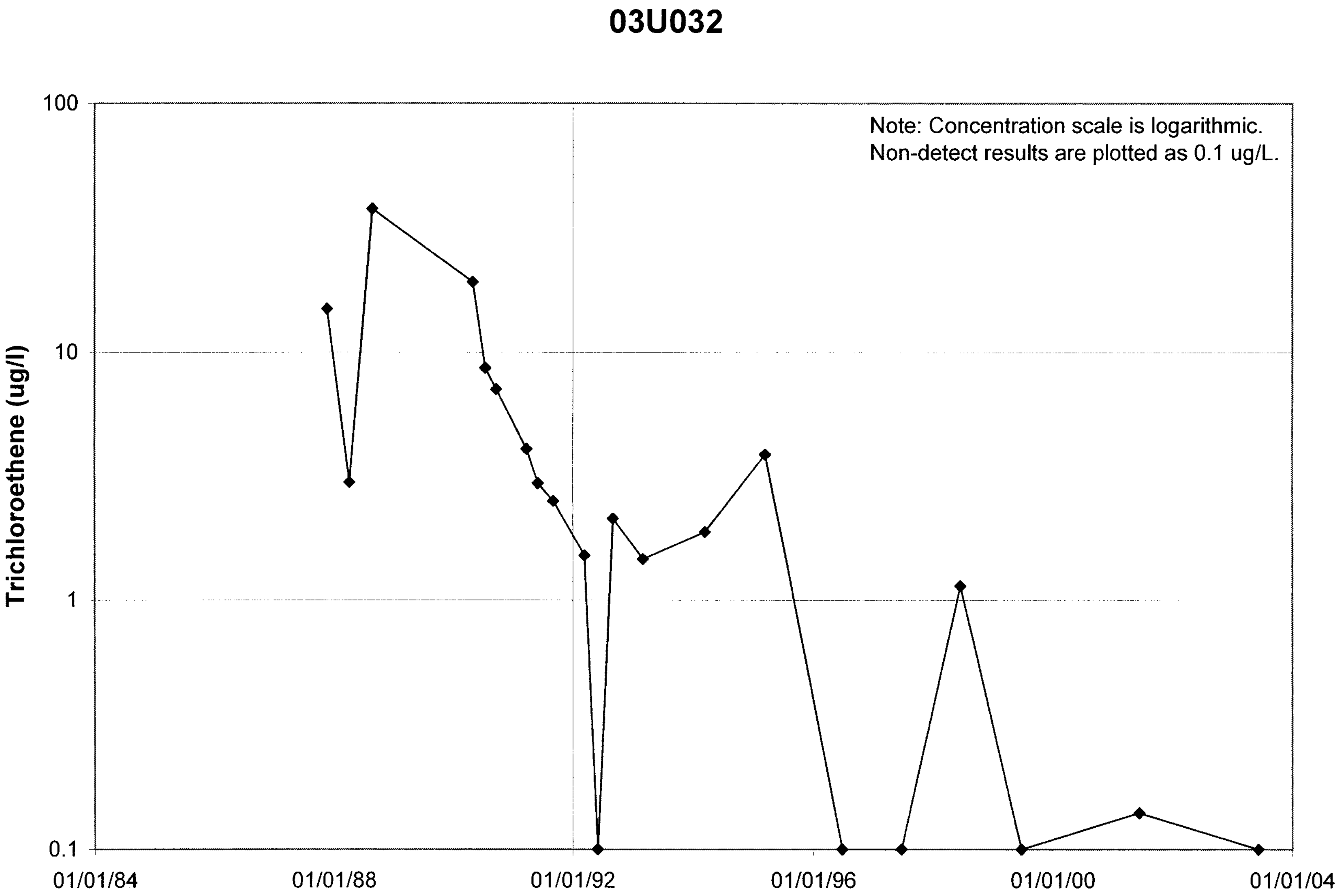

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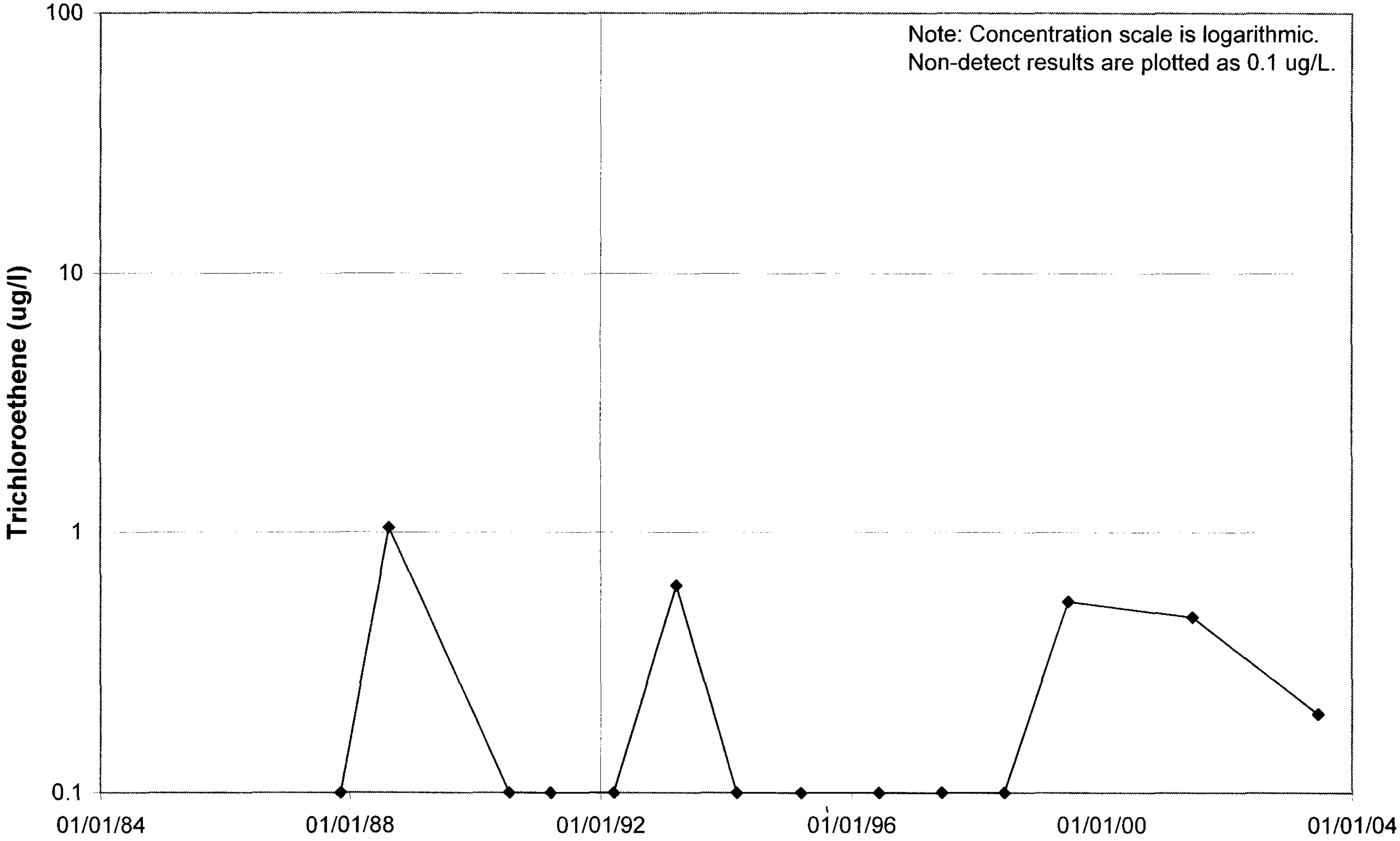

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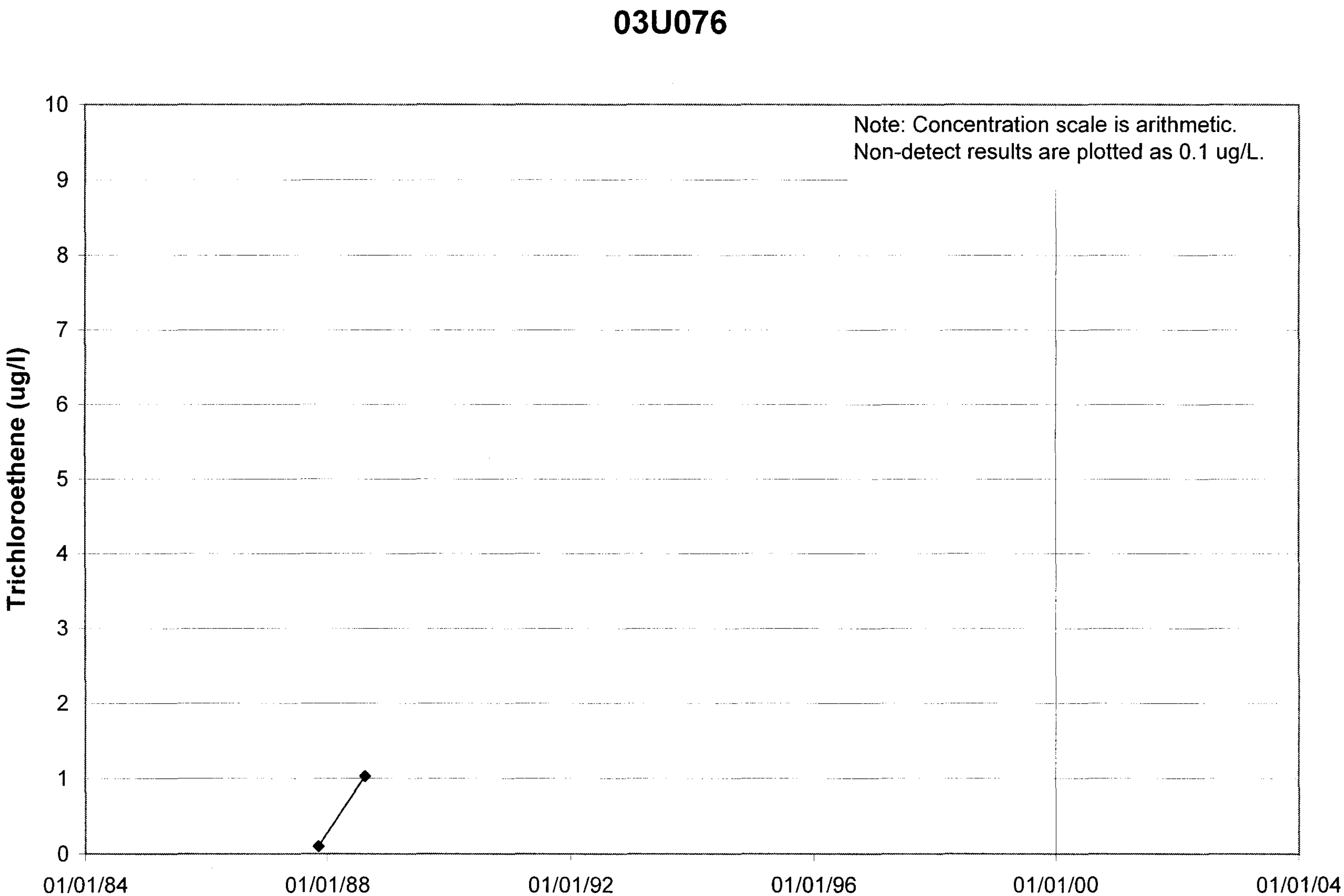

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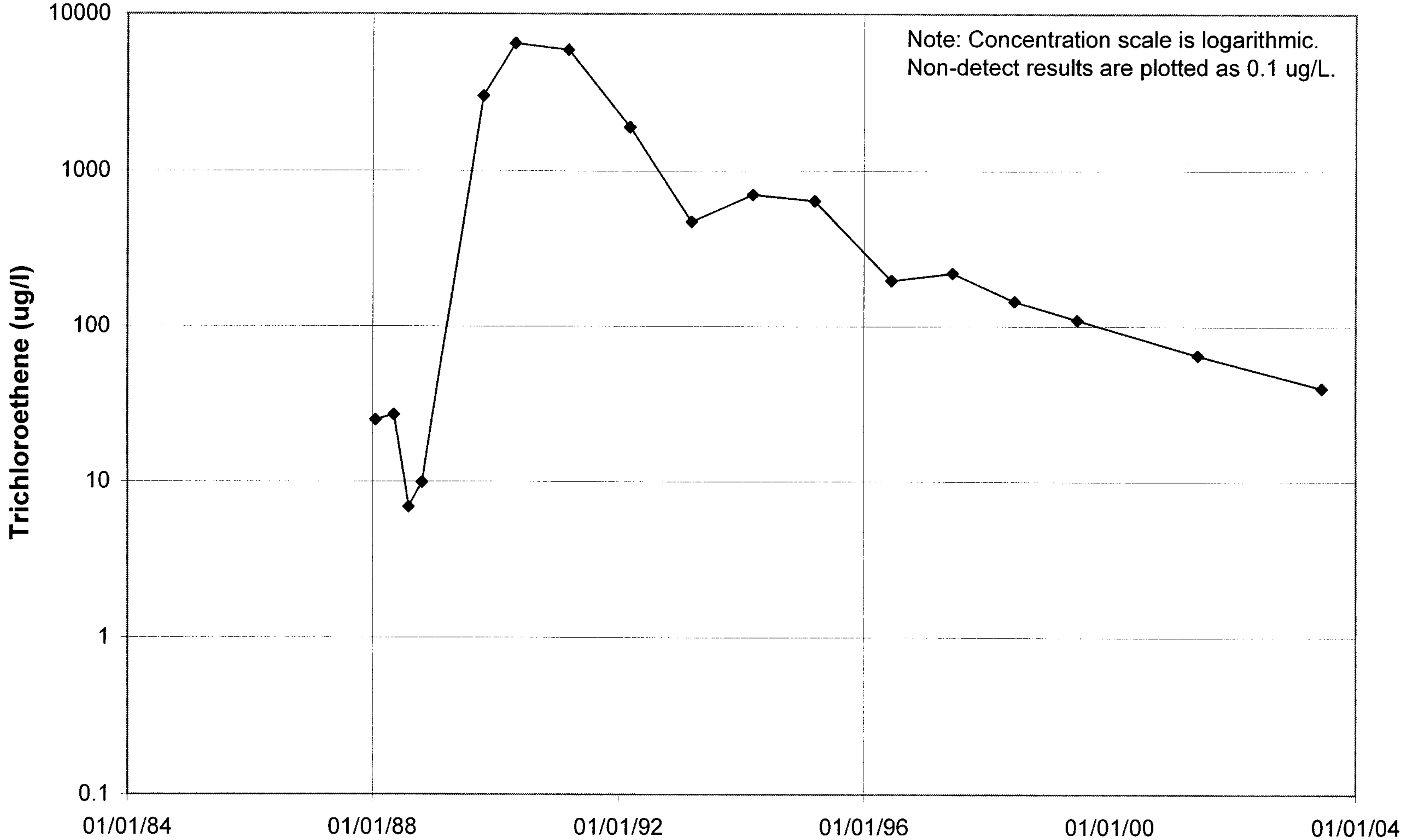

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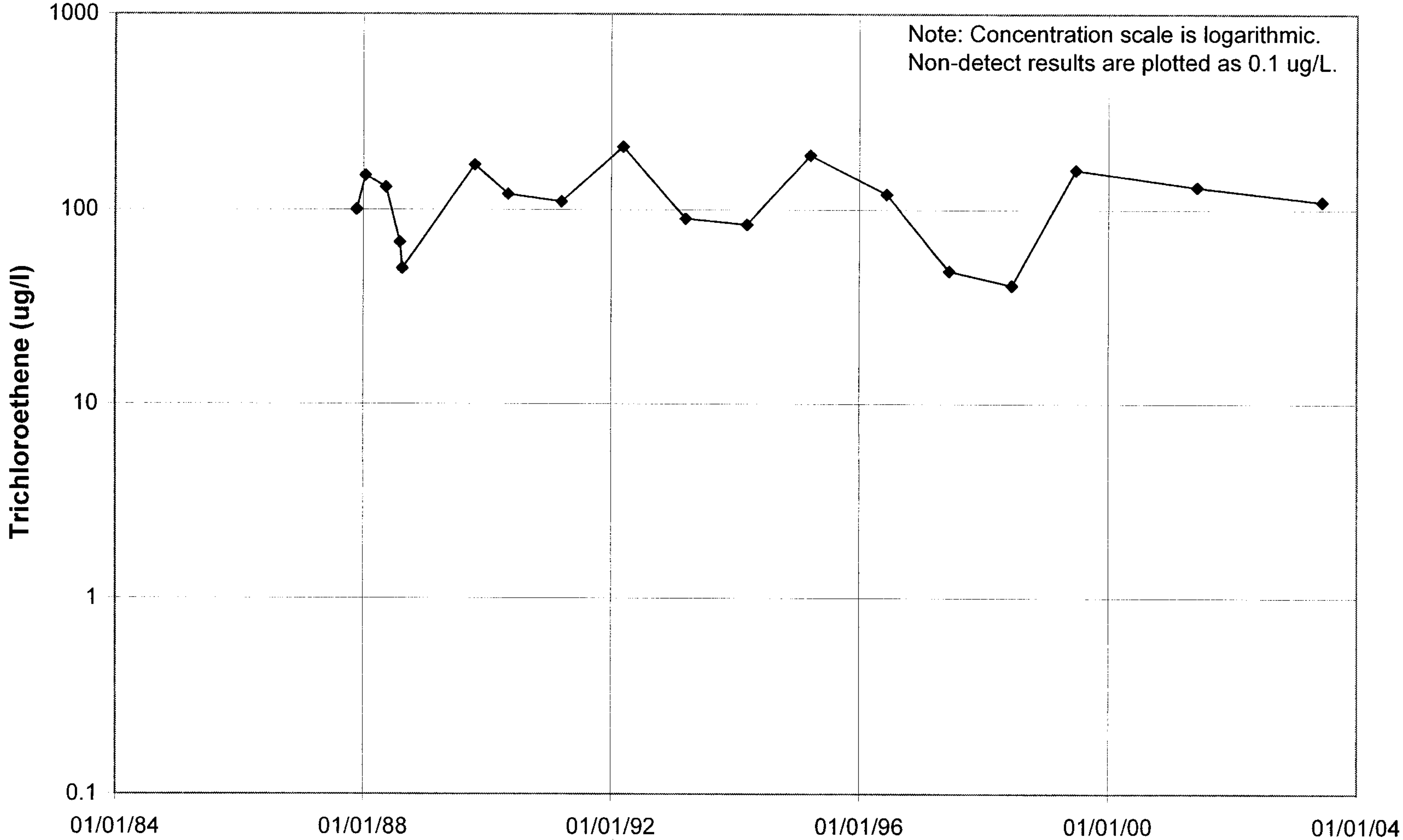

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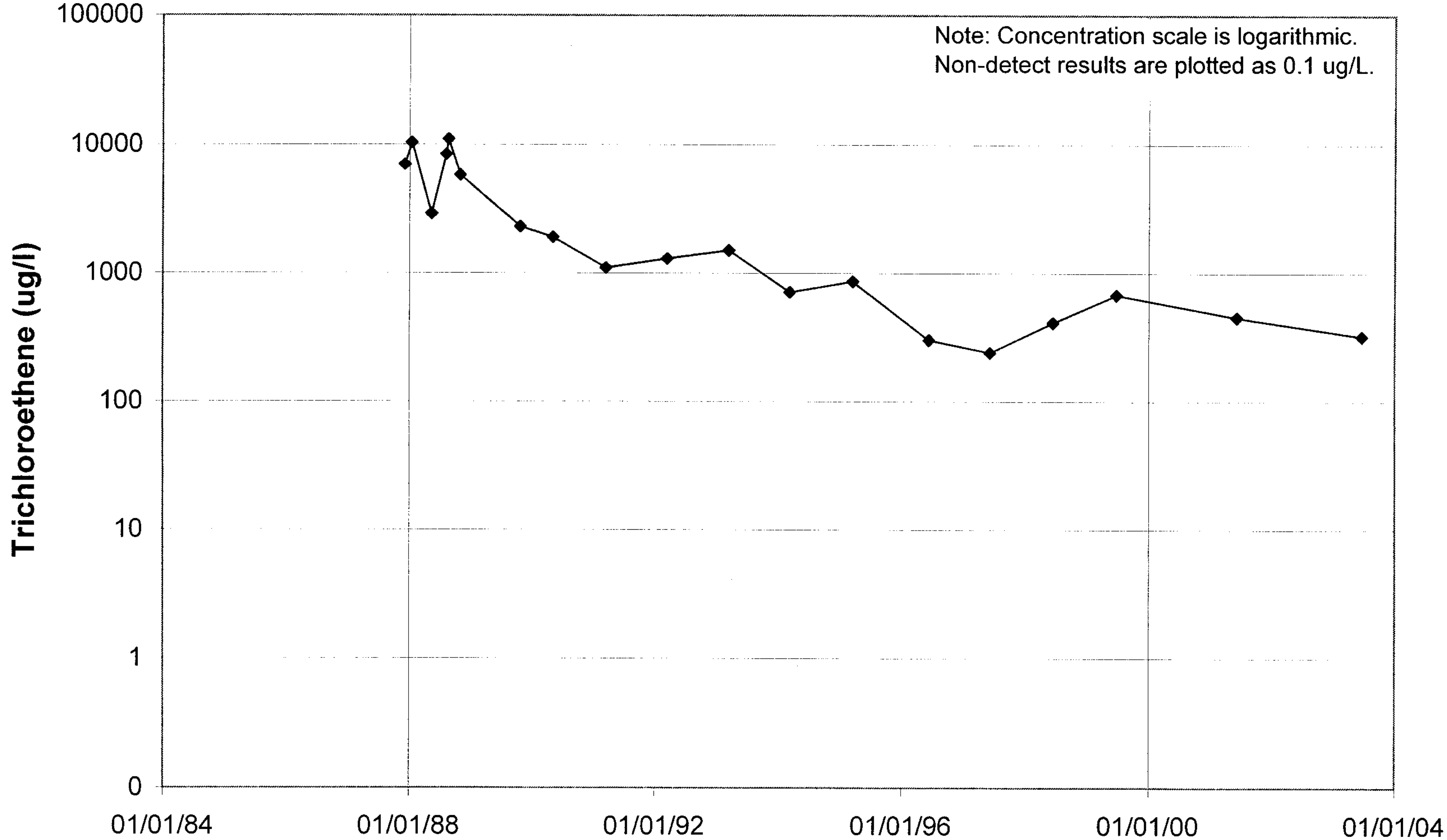

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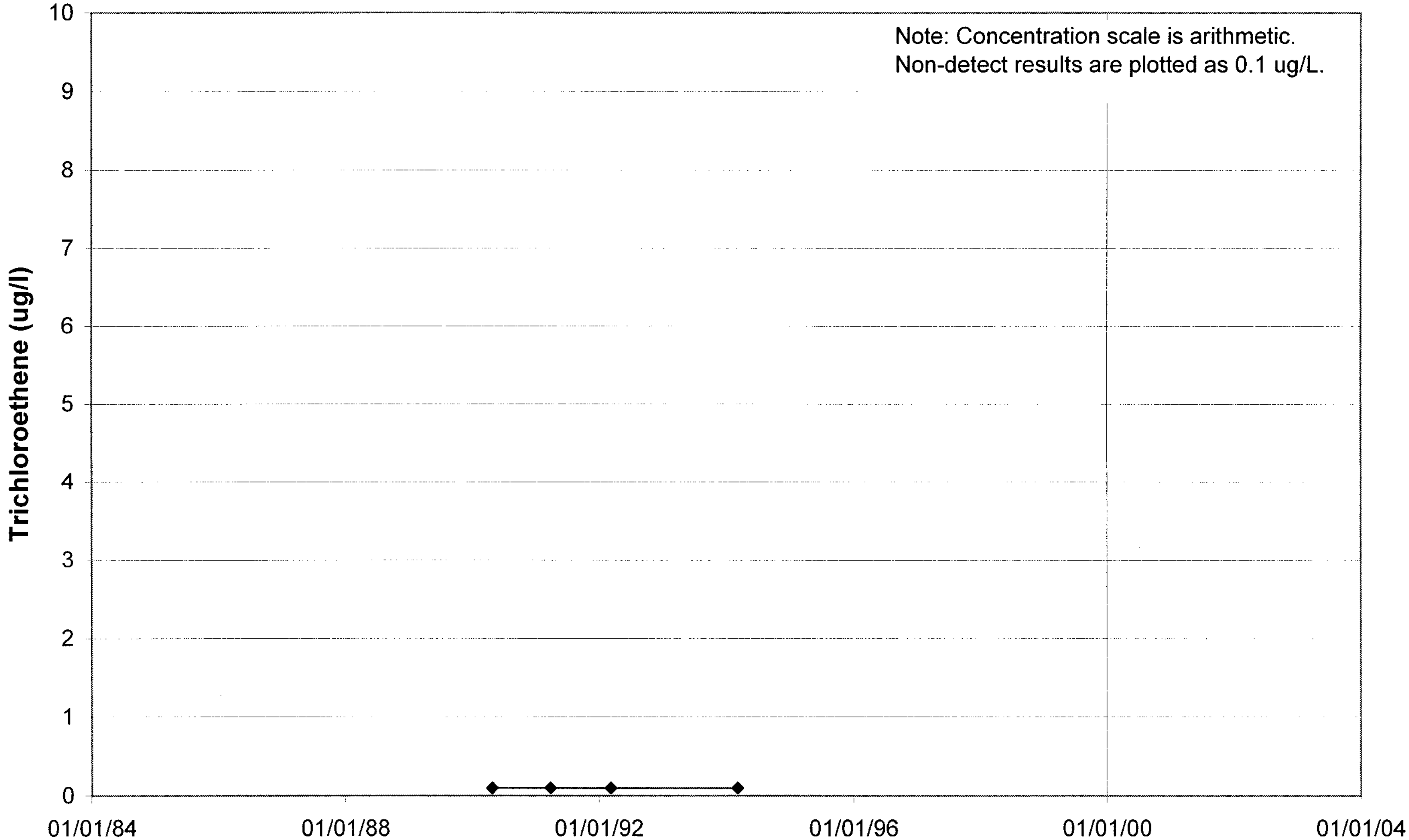

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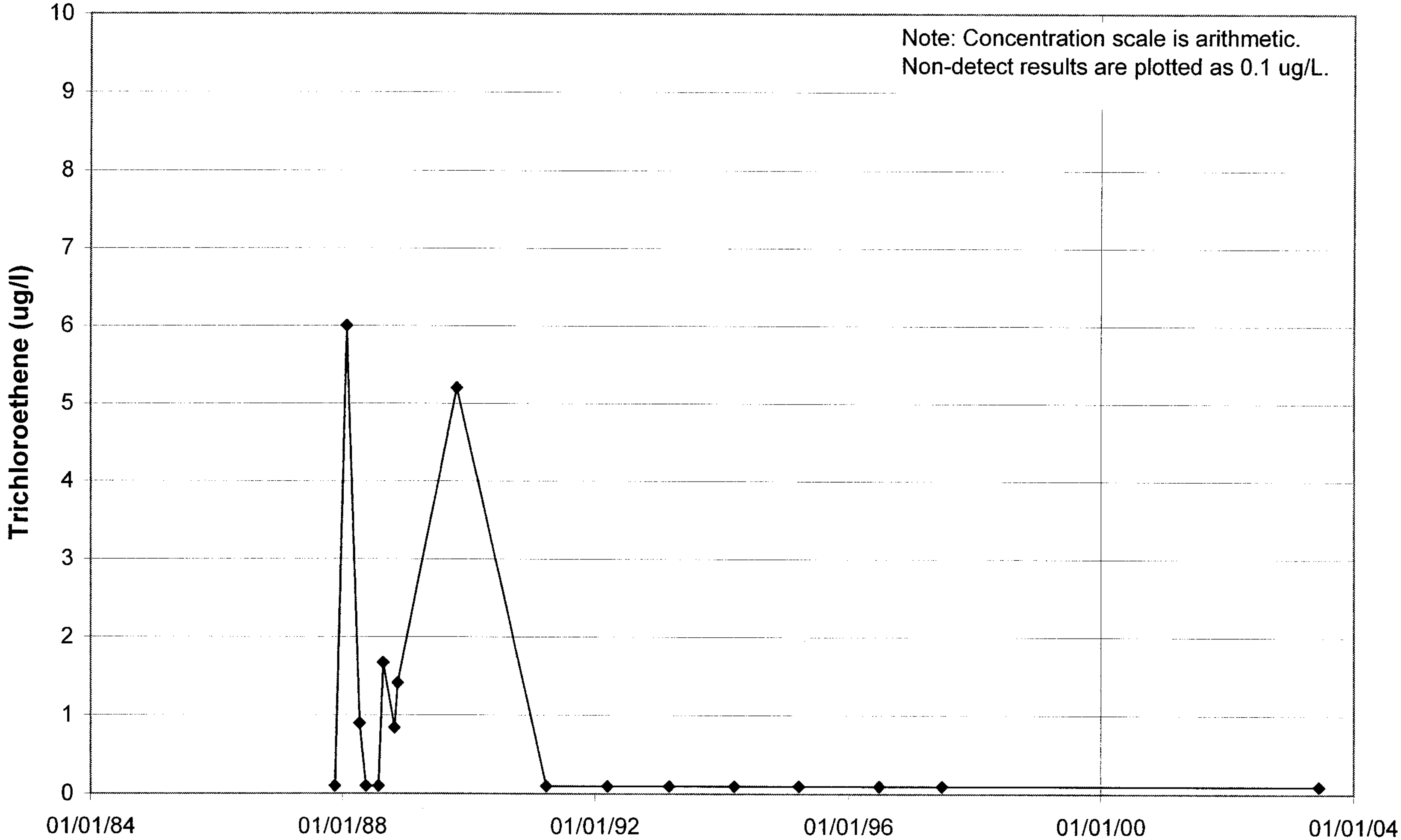

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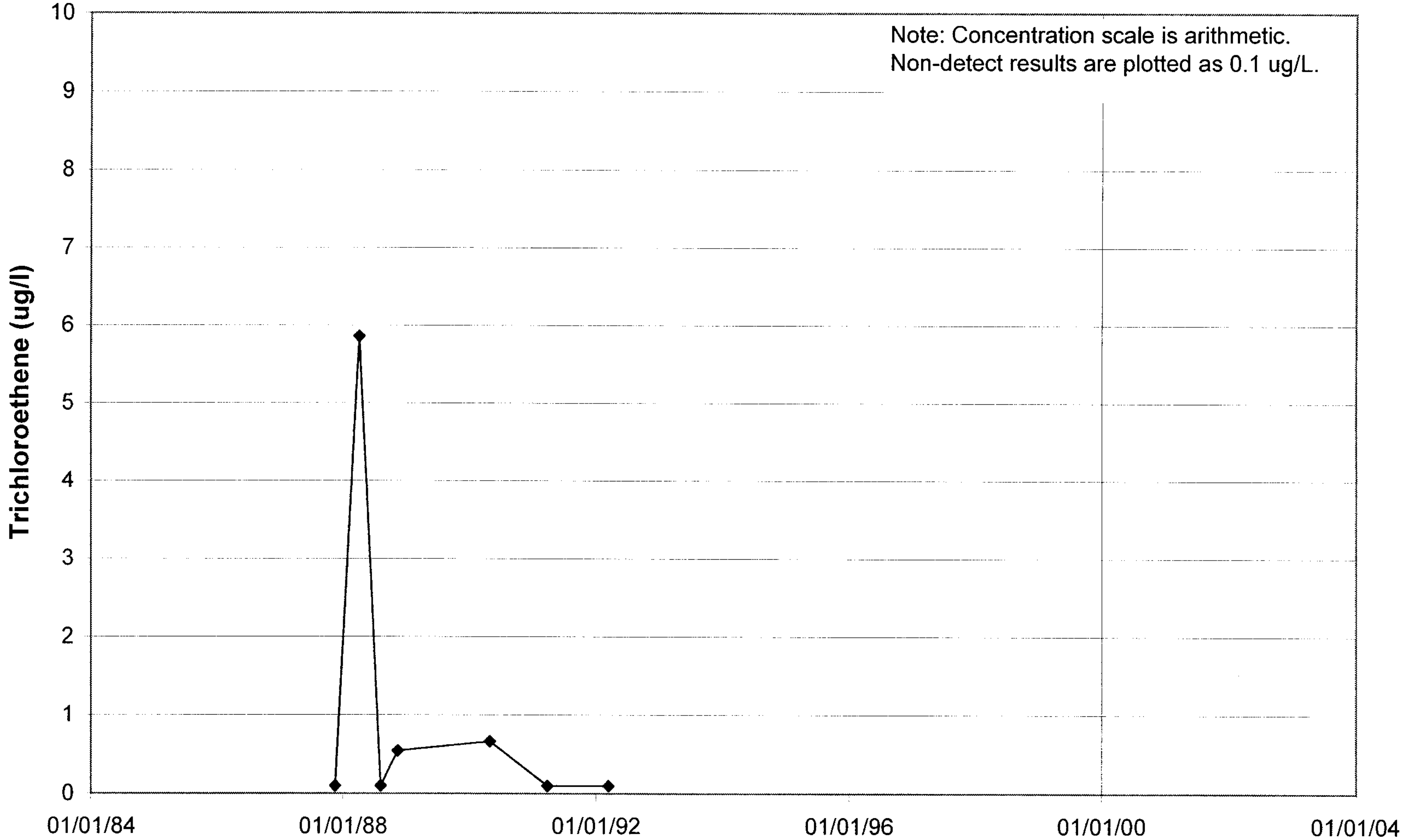

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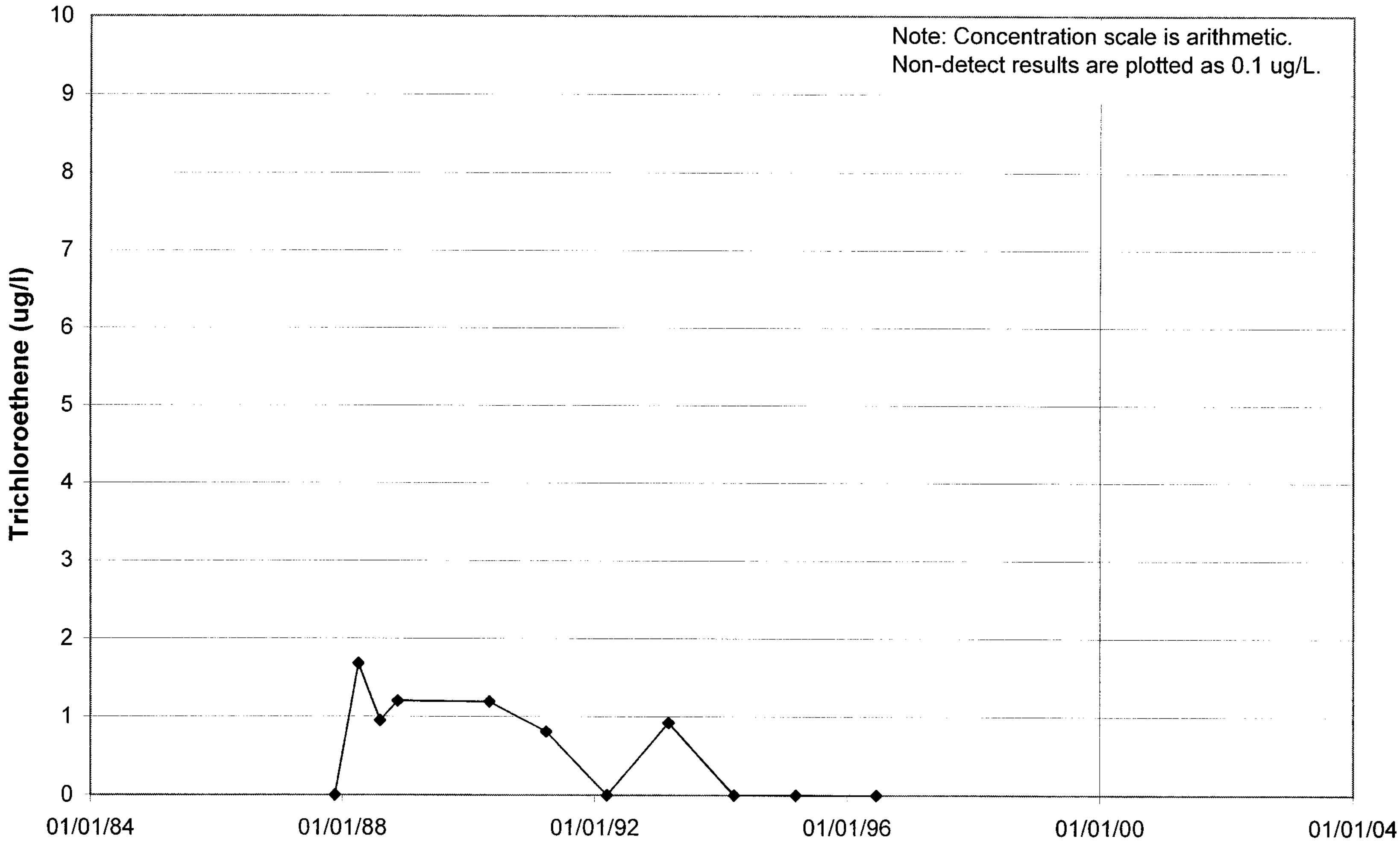

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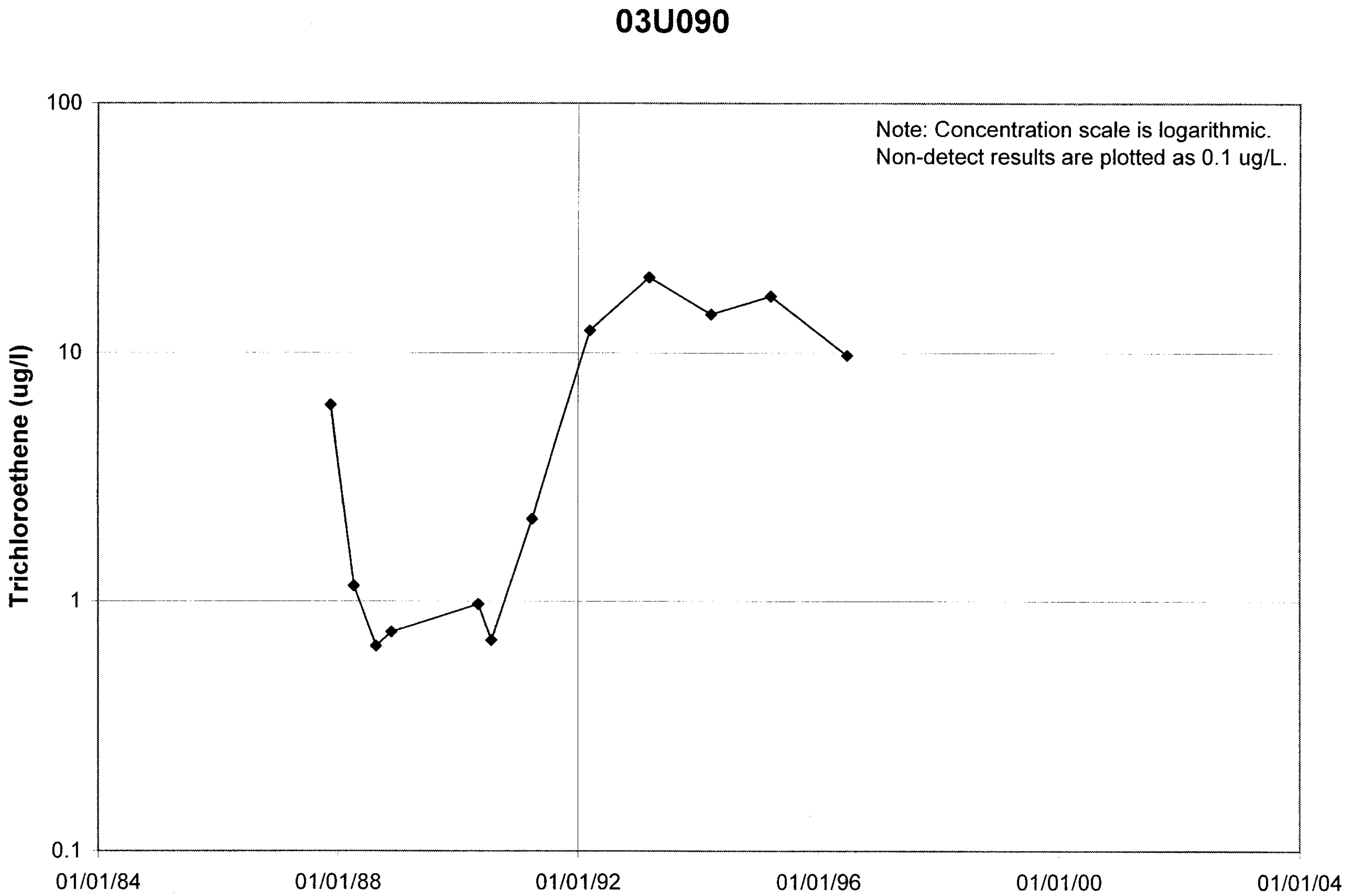

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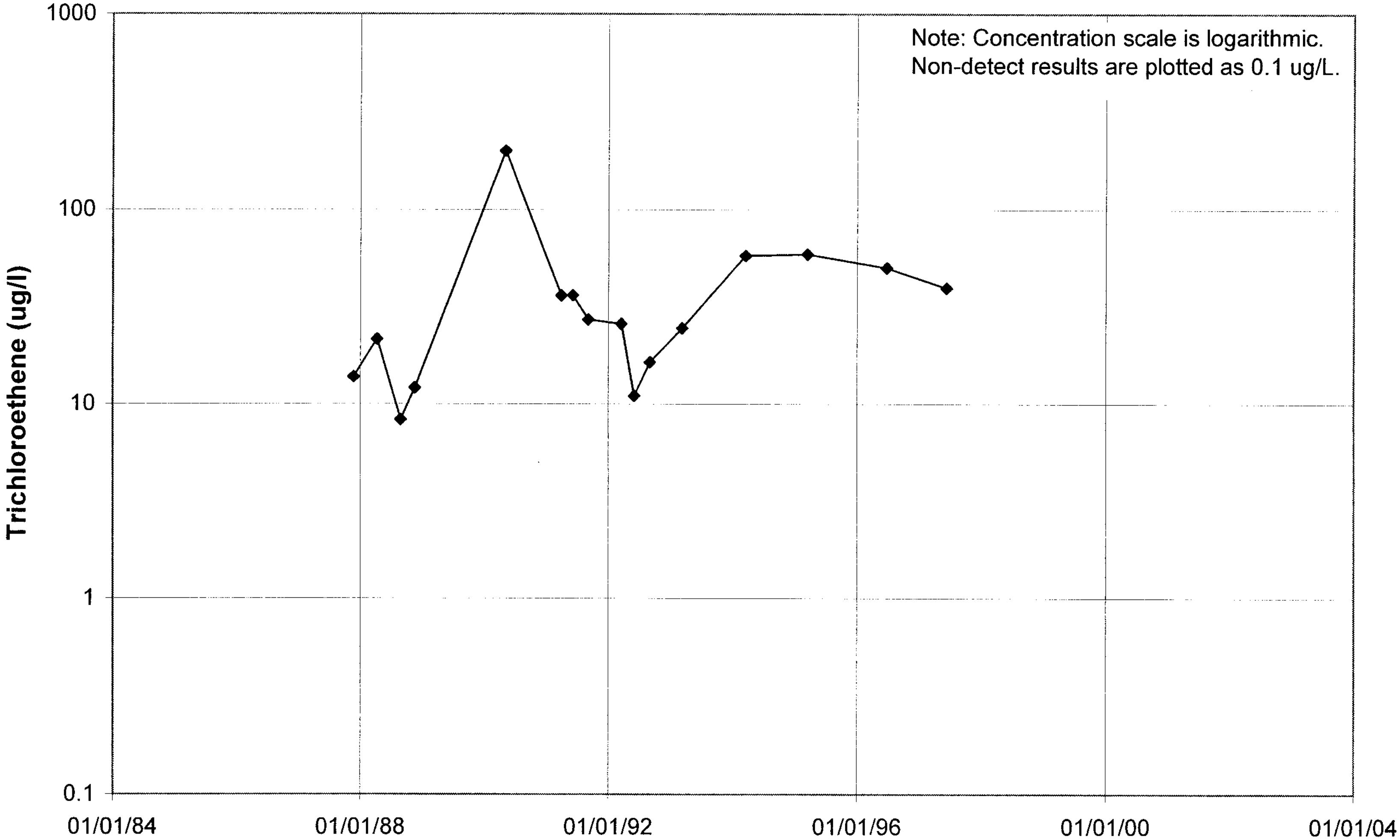

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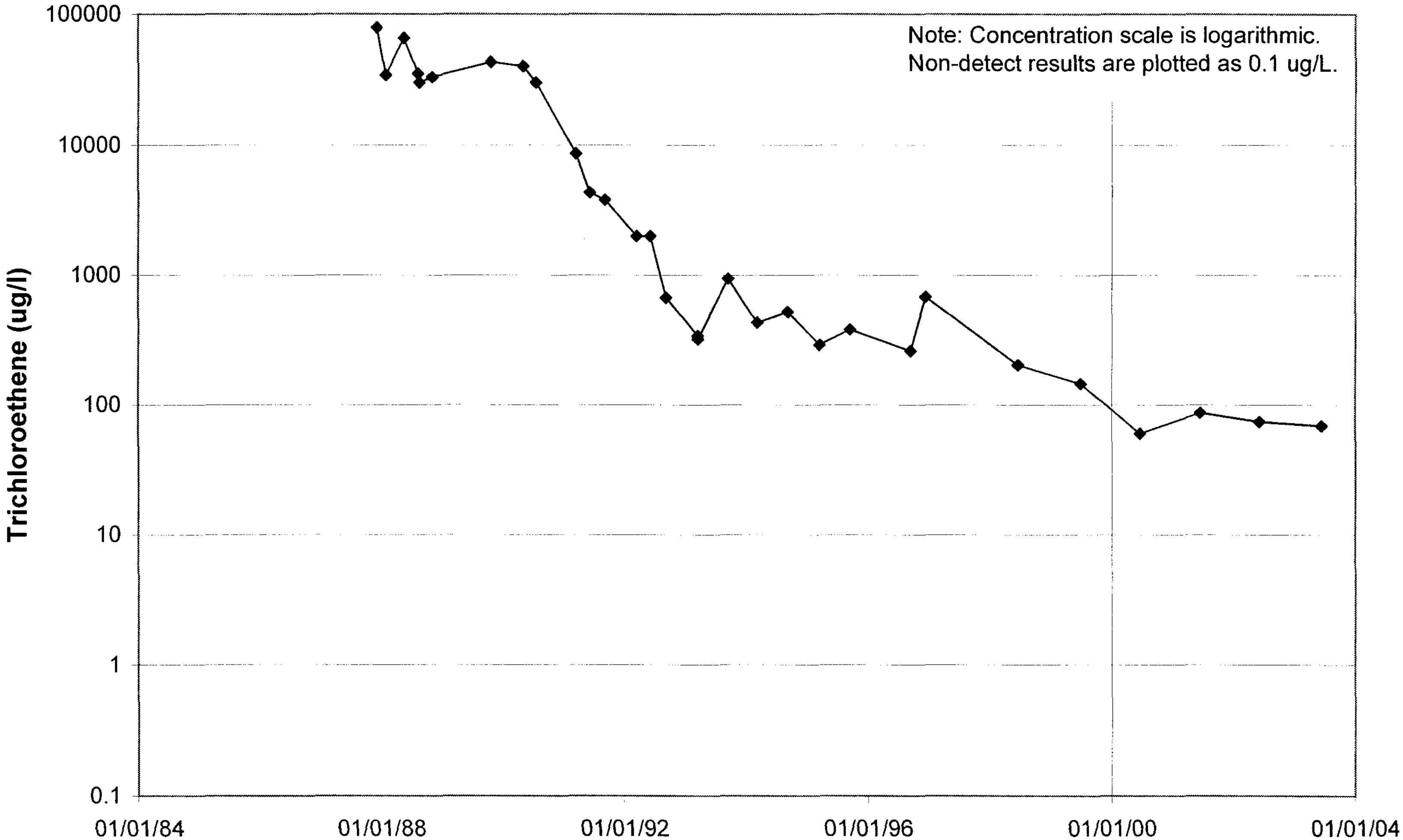

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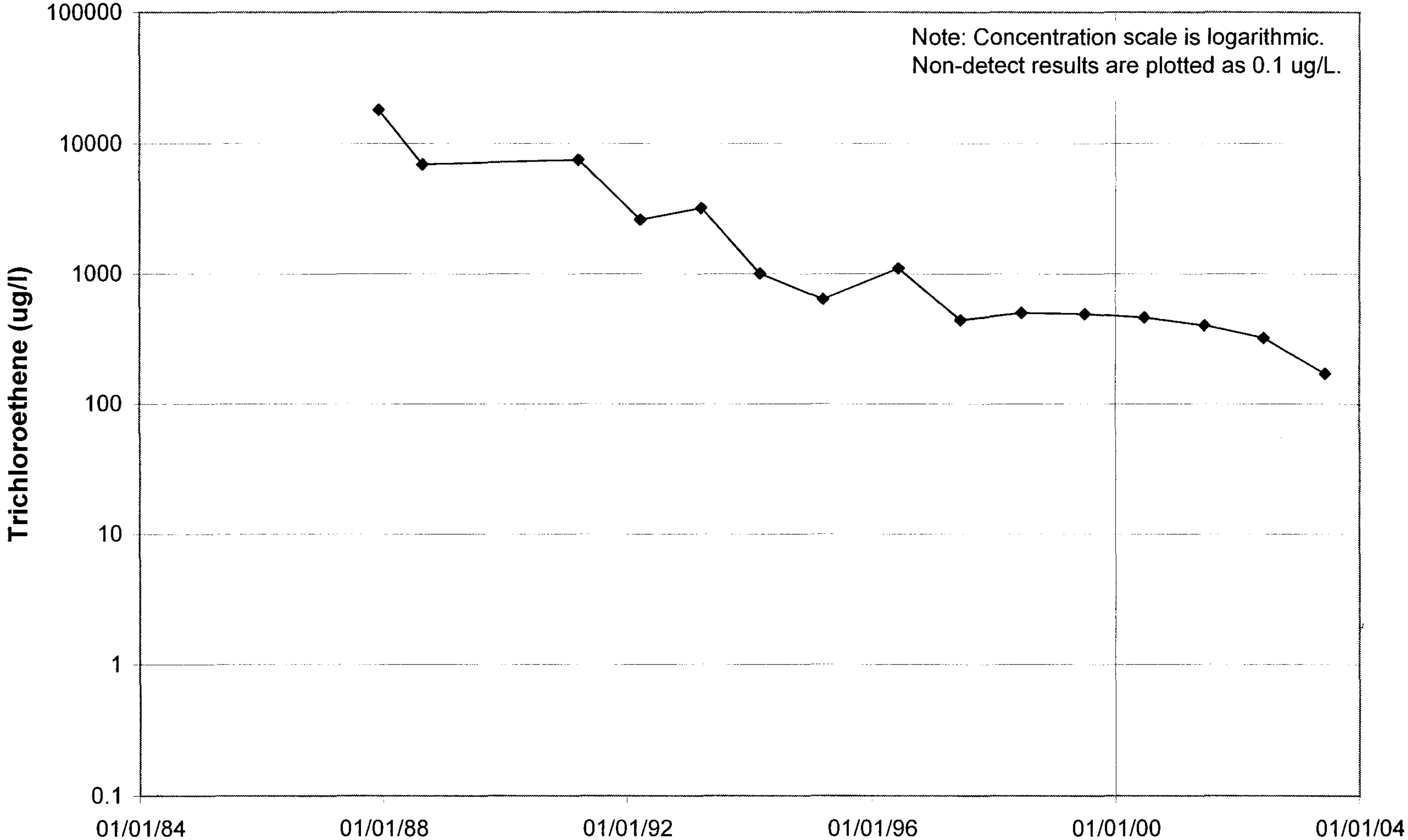

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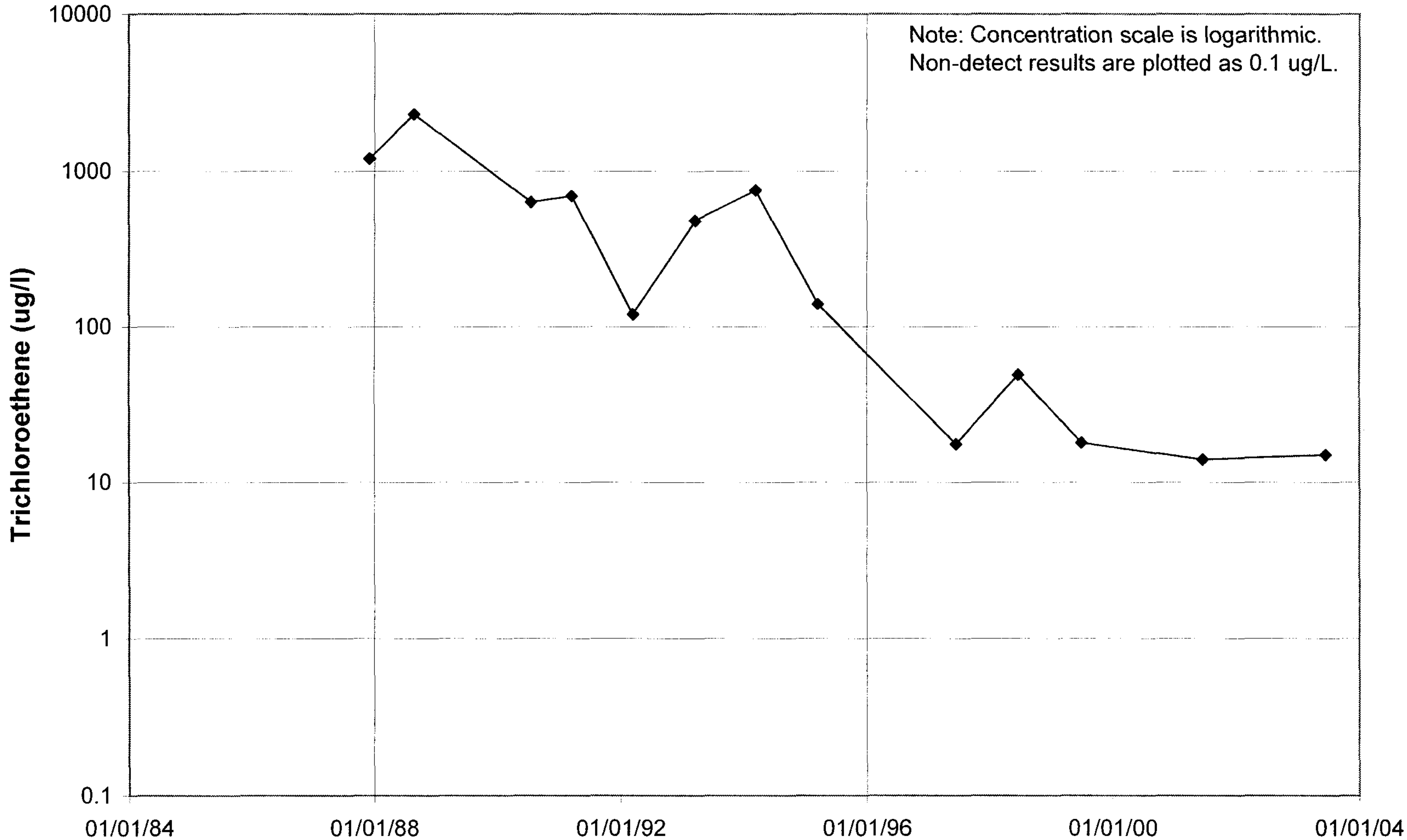

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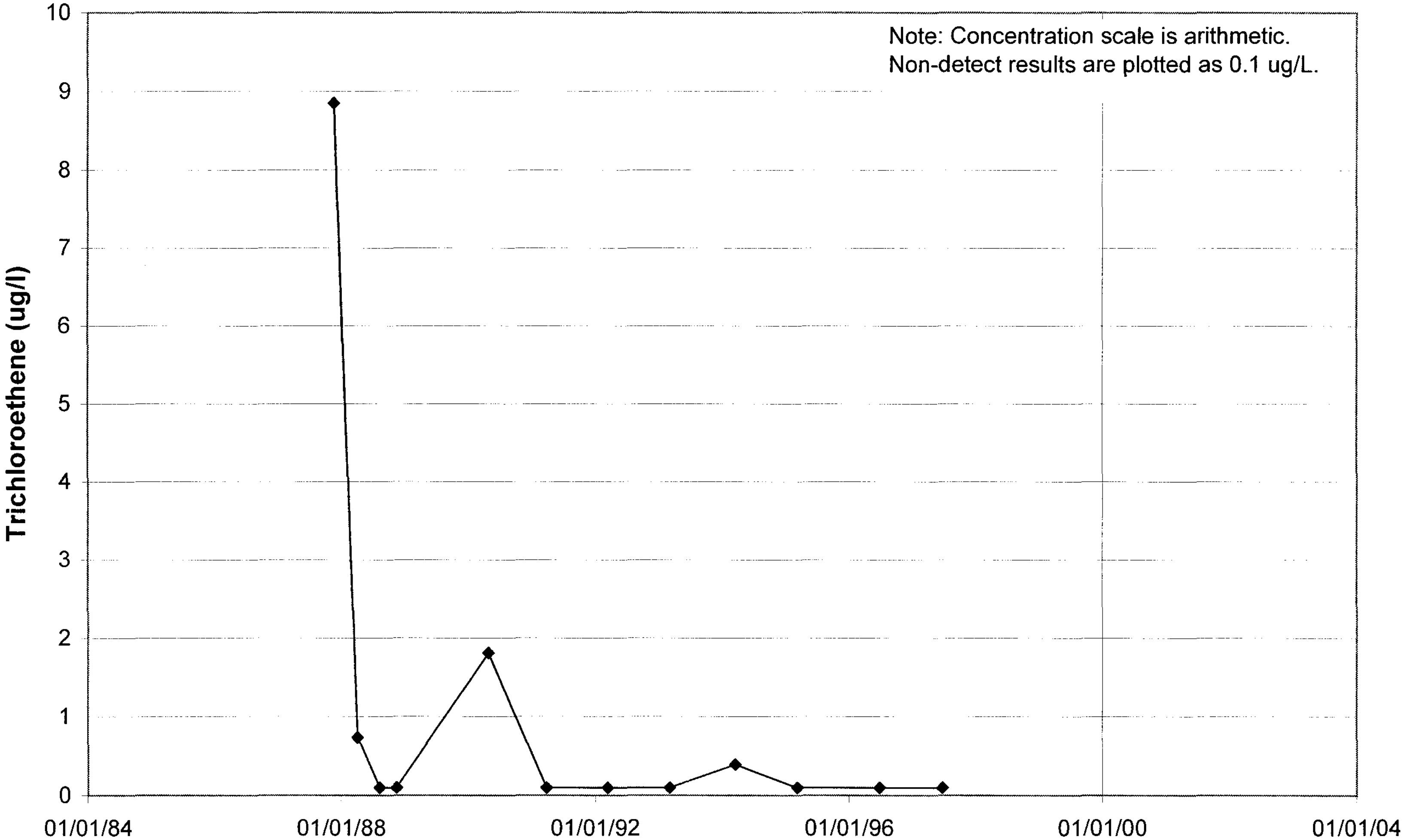

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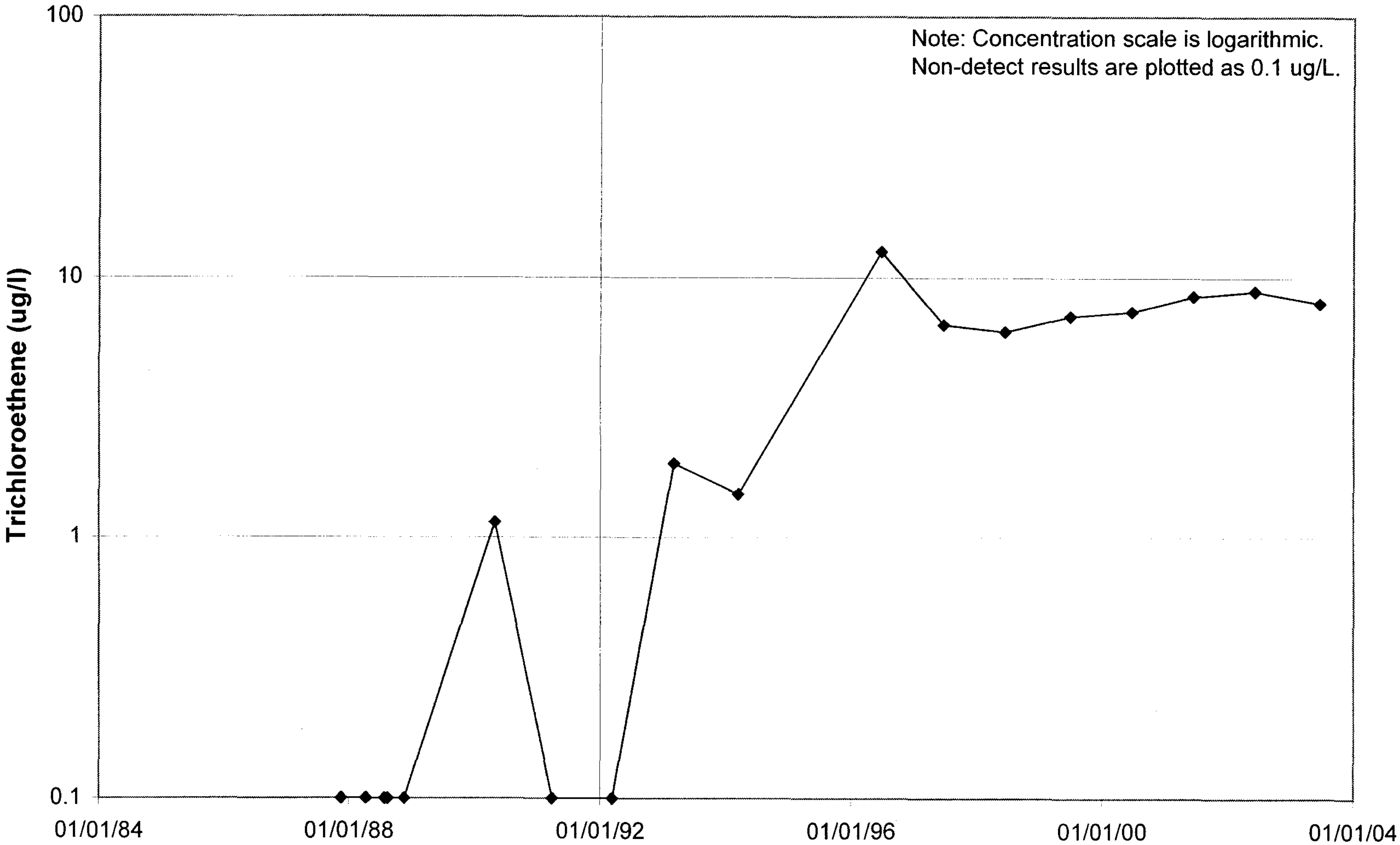

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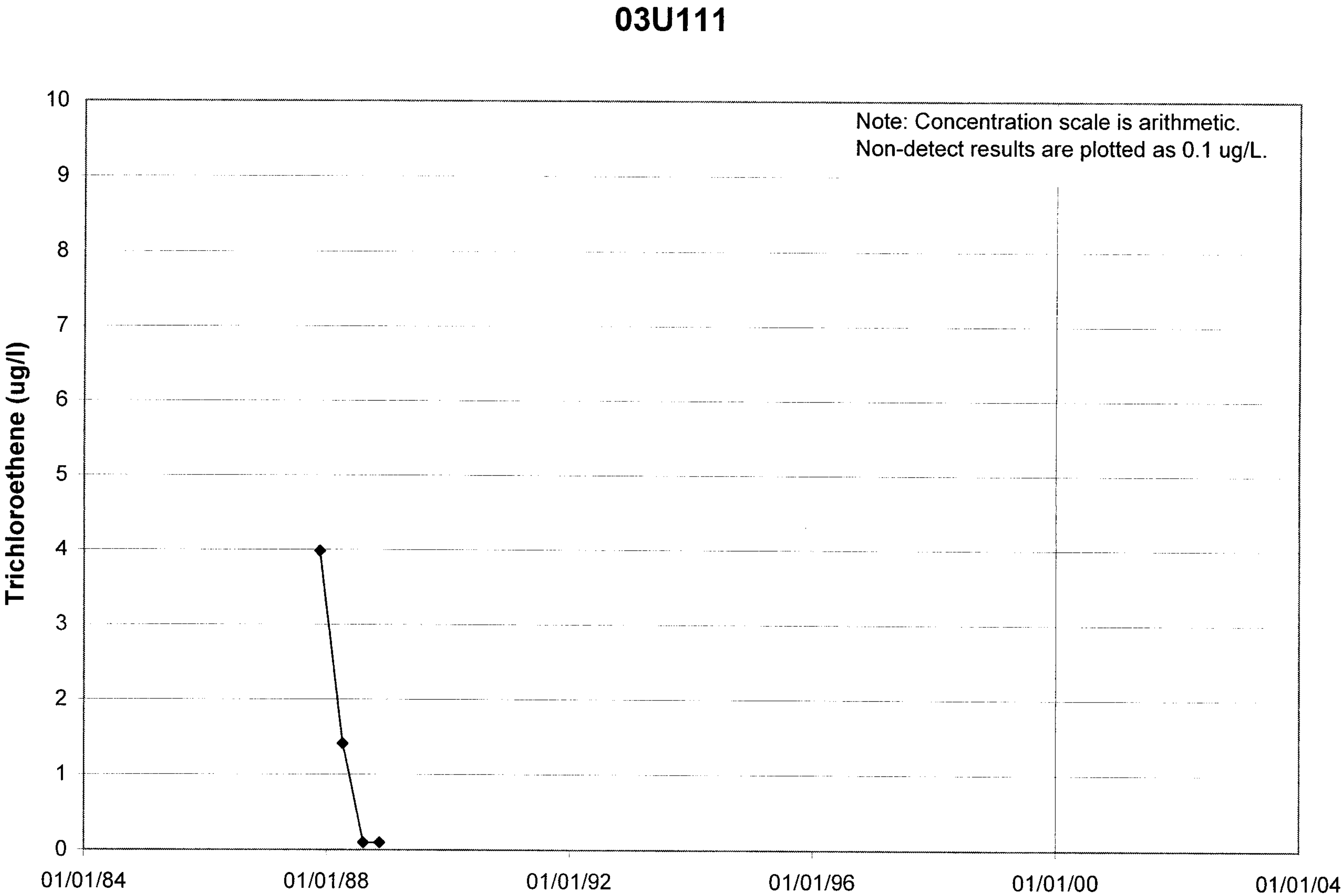

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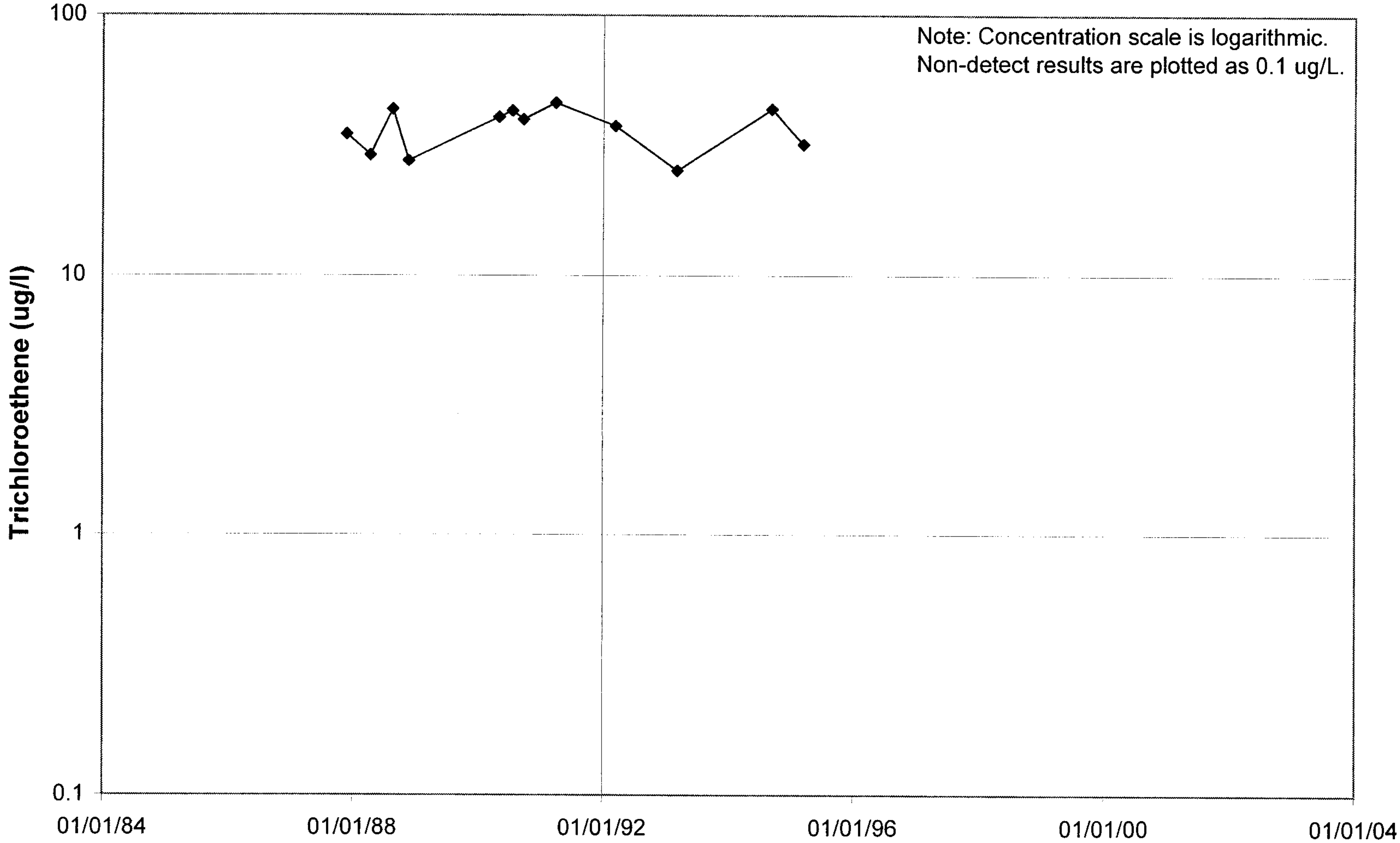

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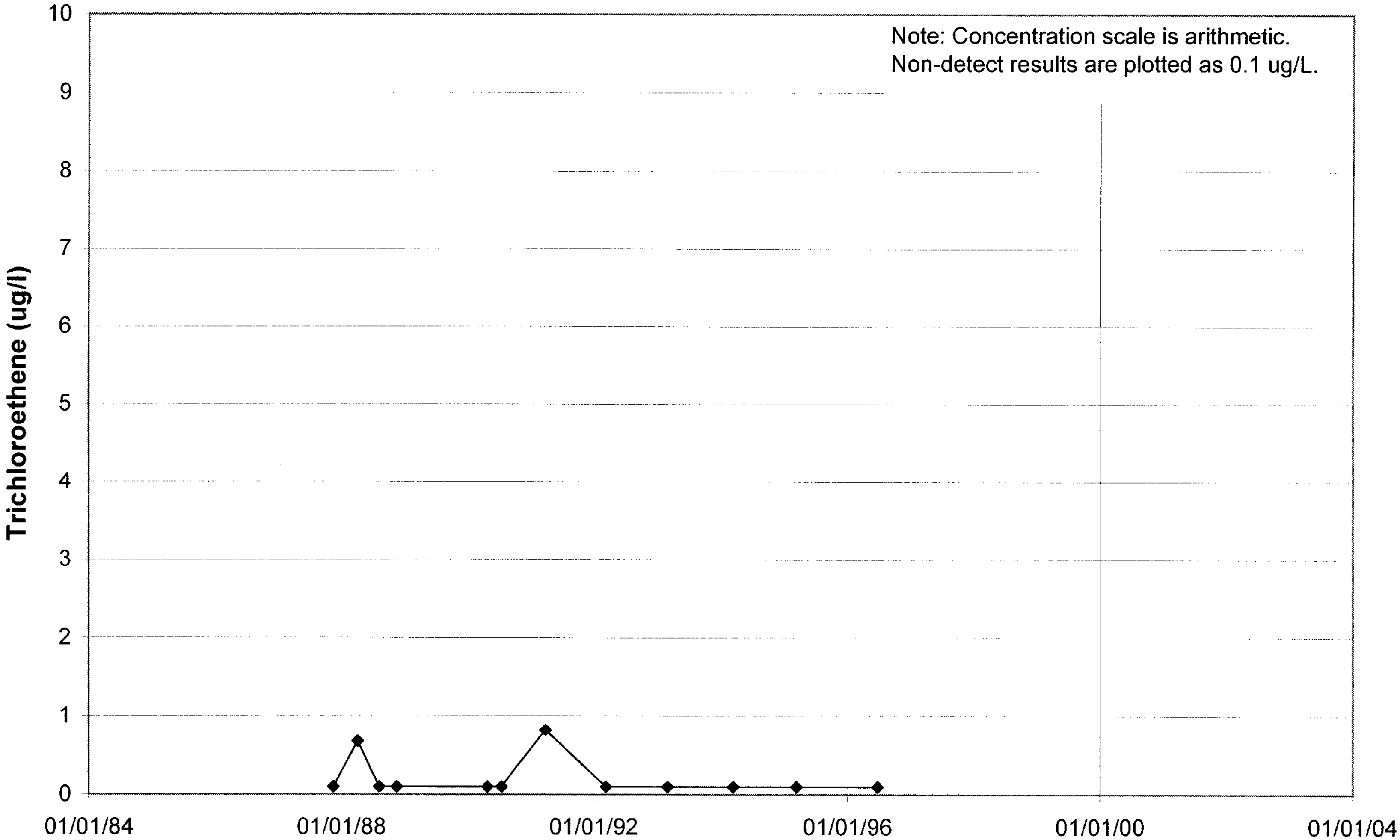

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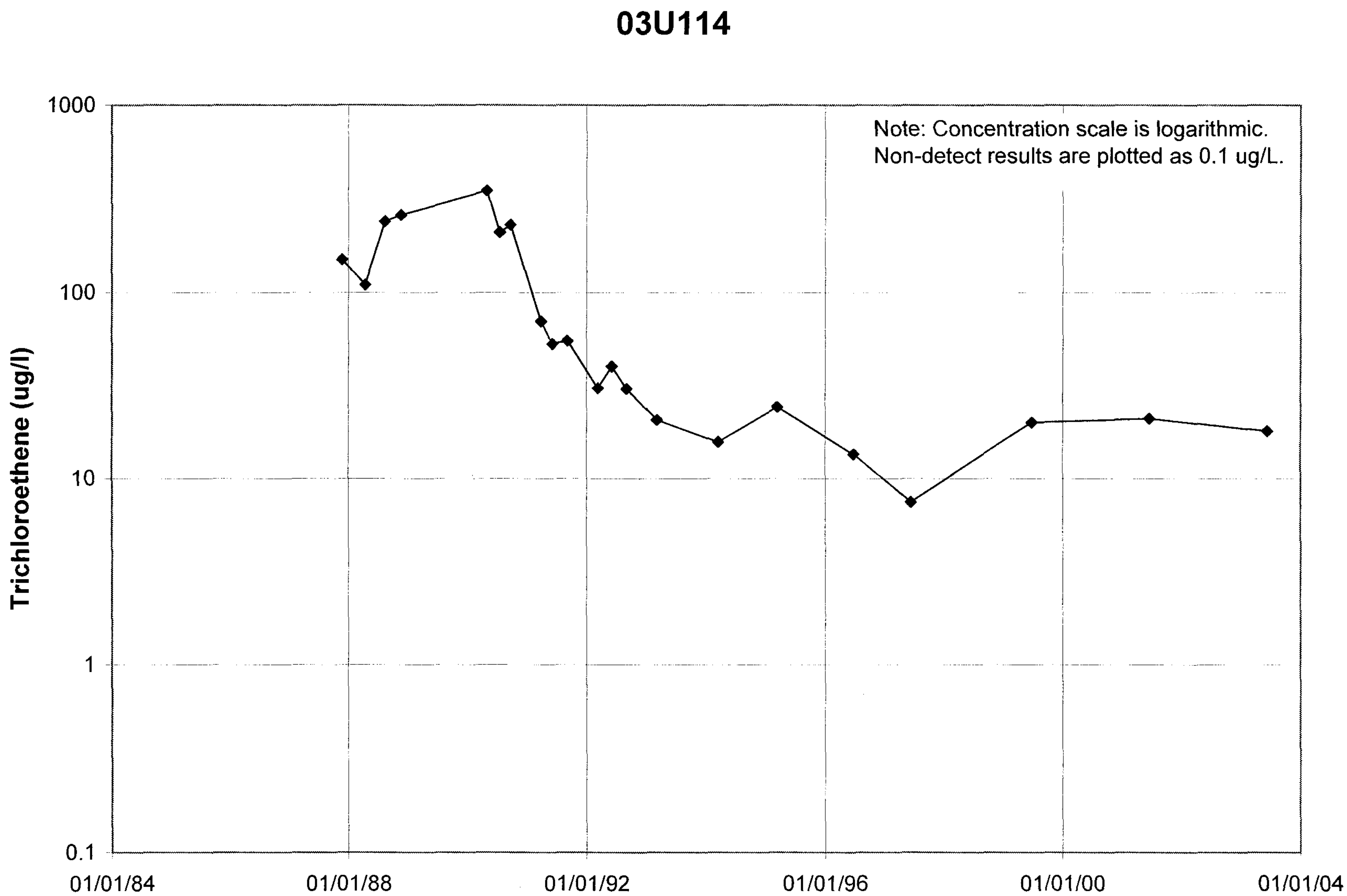

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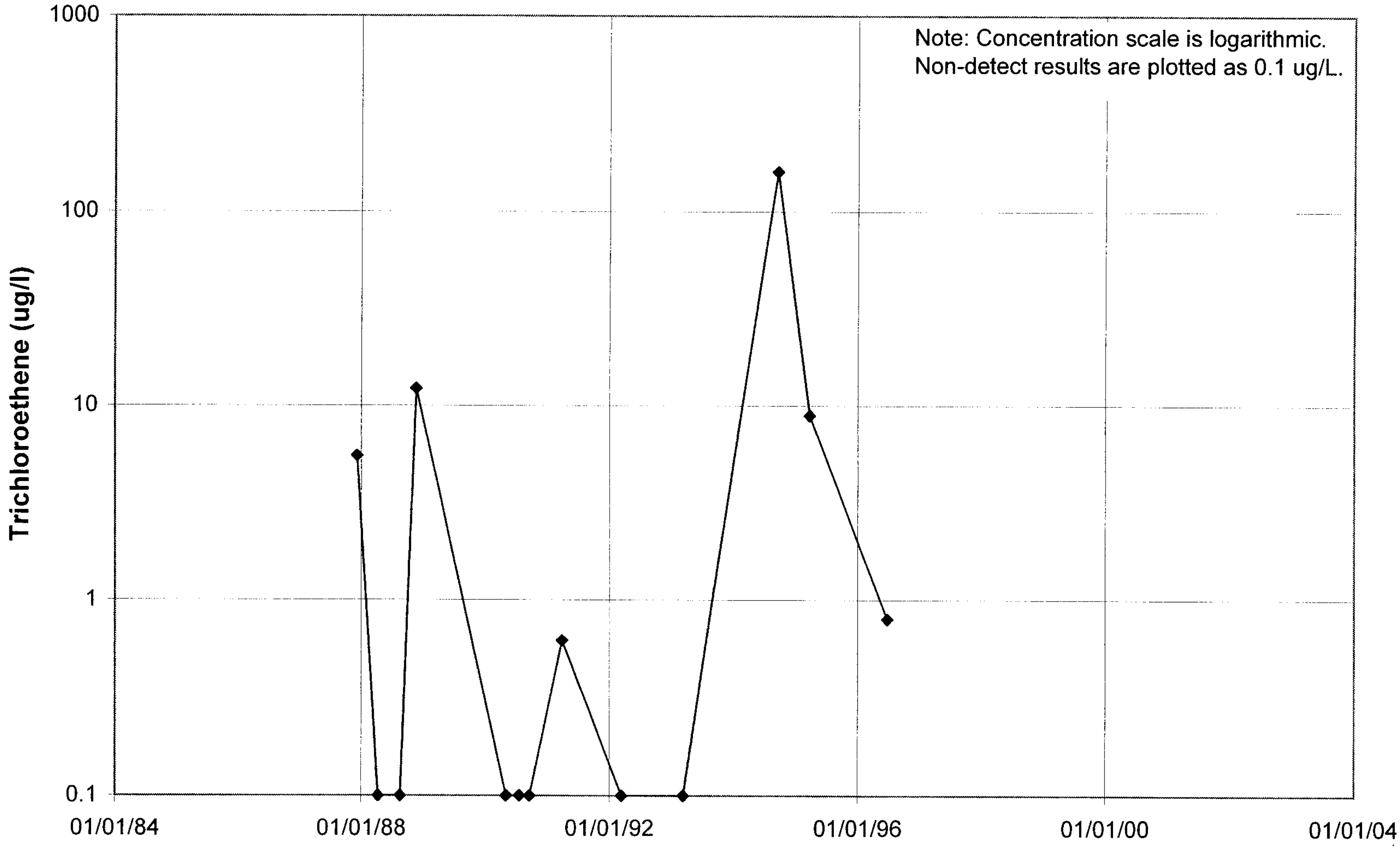

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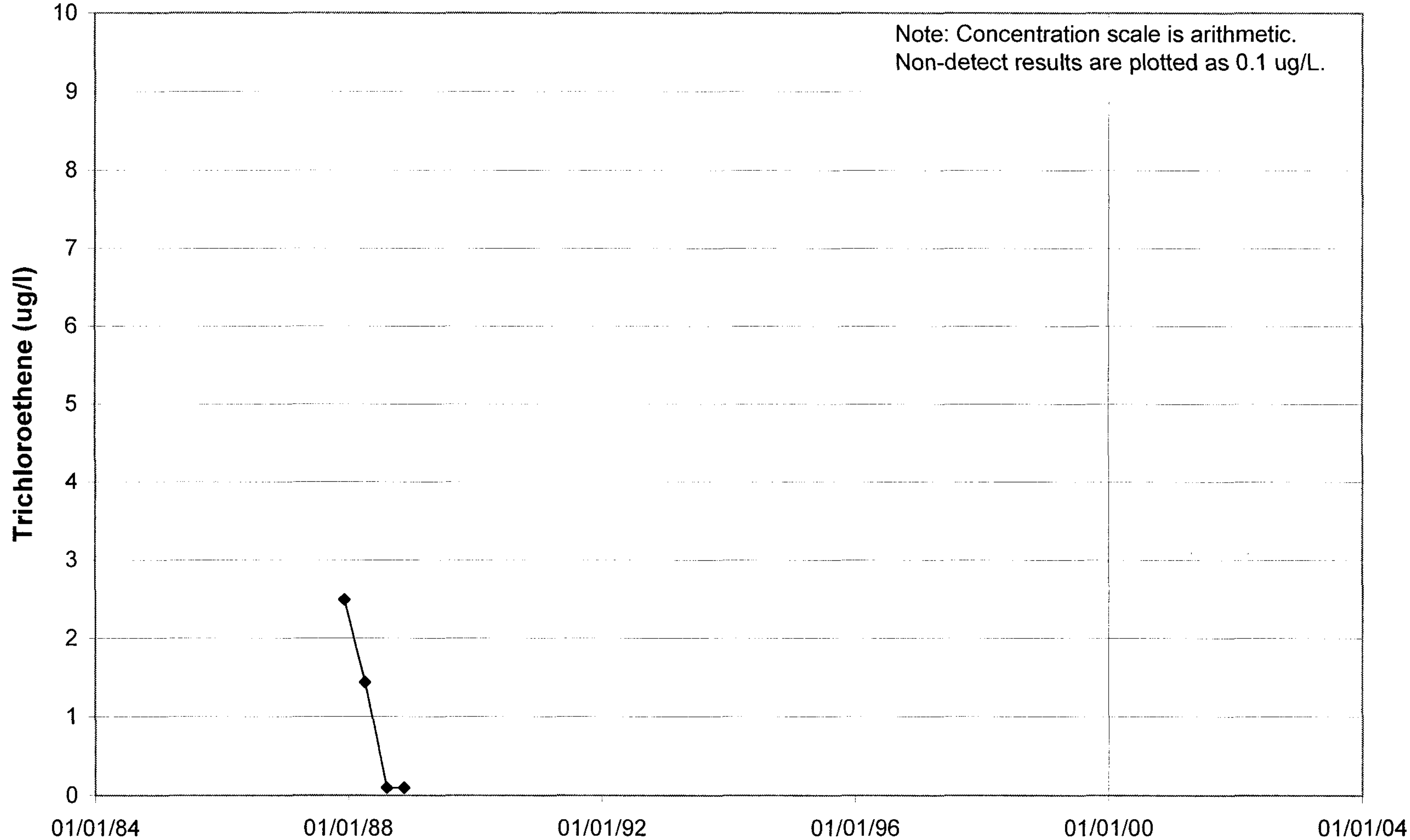

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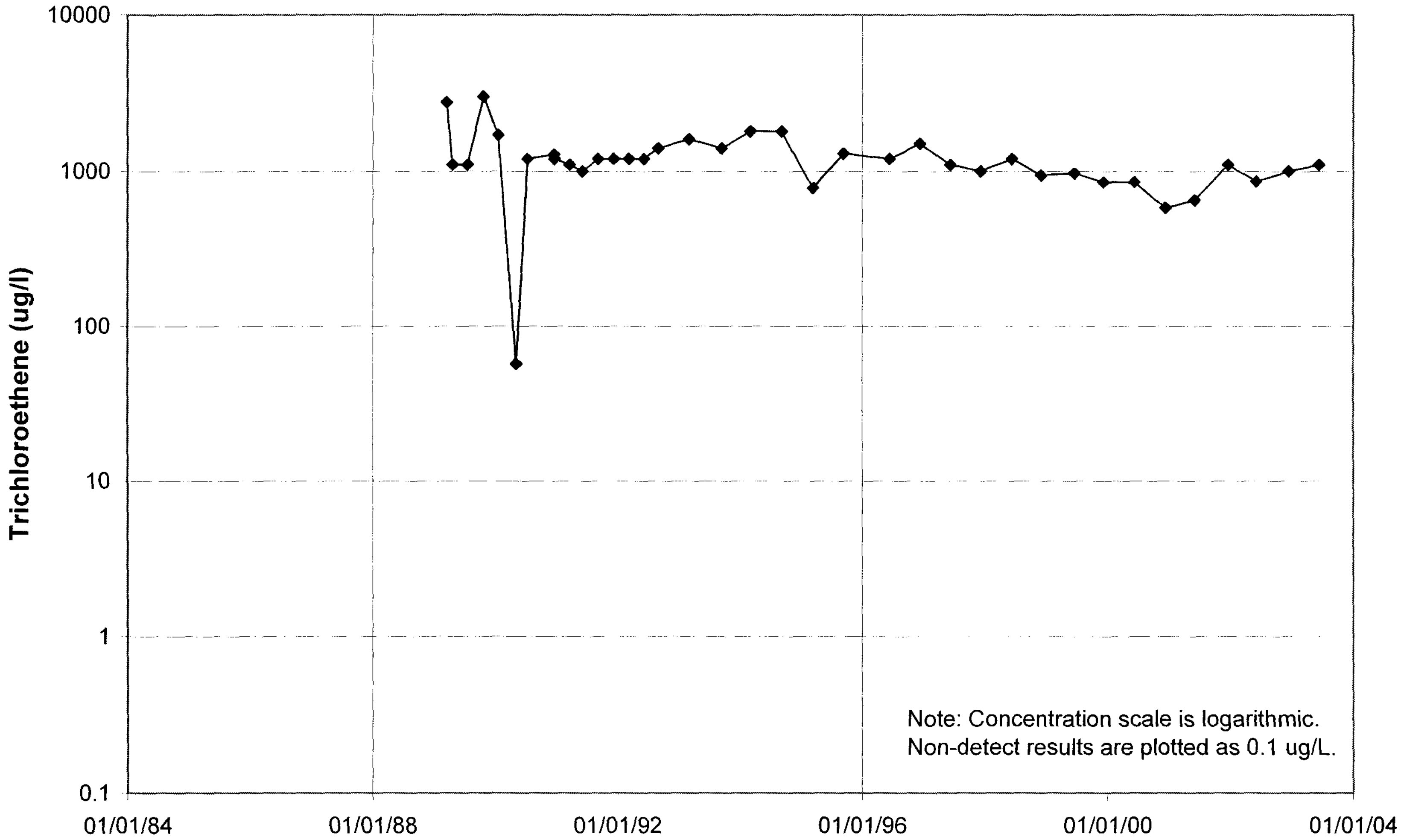
03U301 (SC1)



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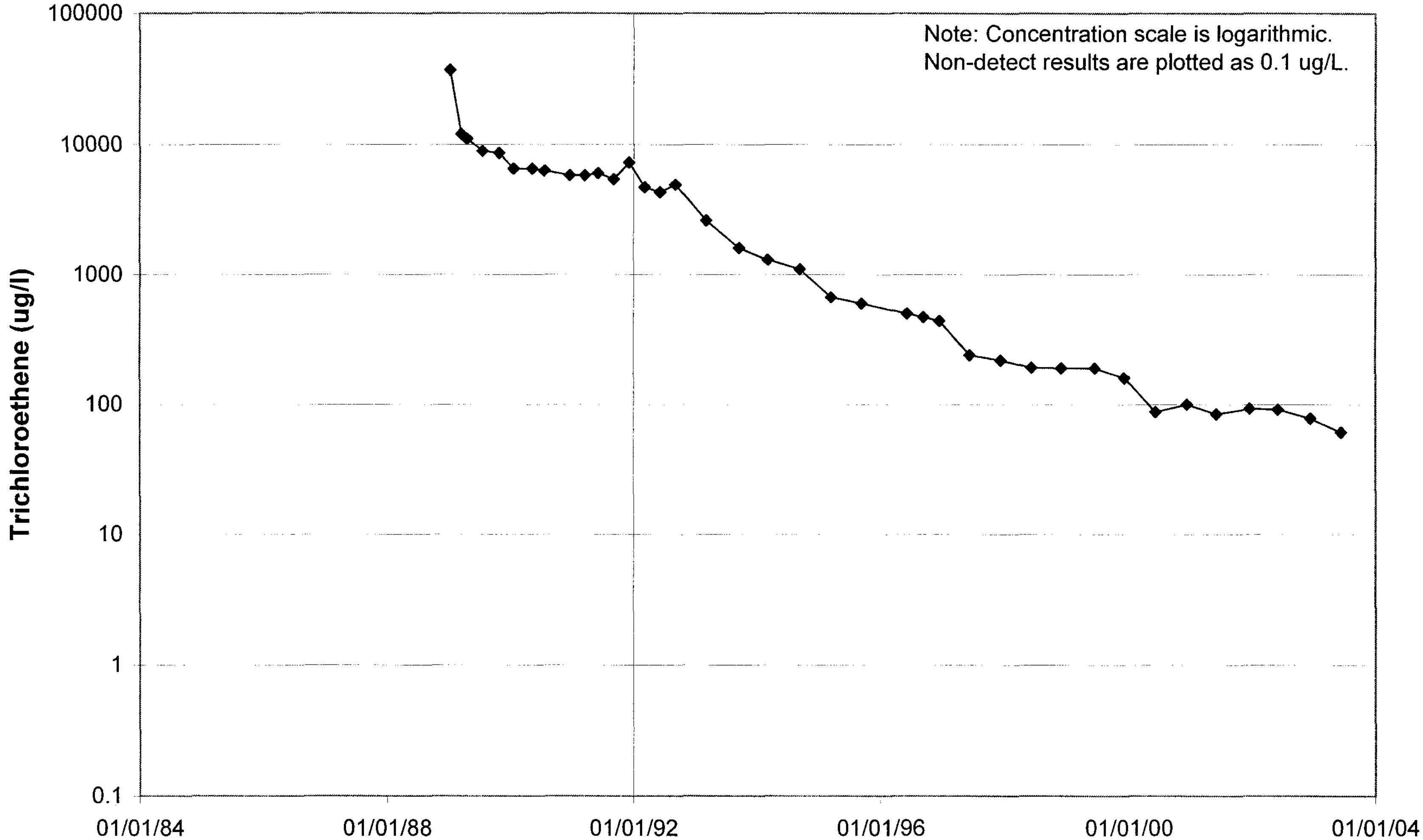

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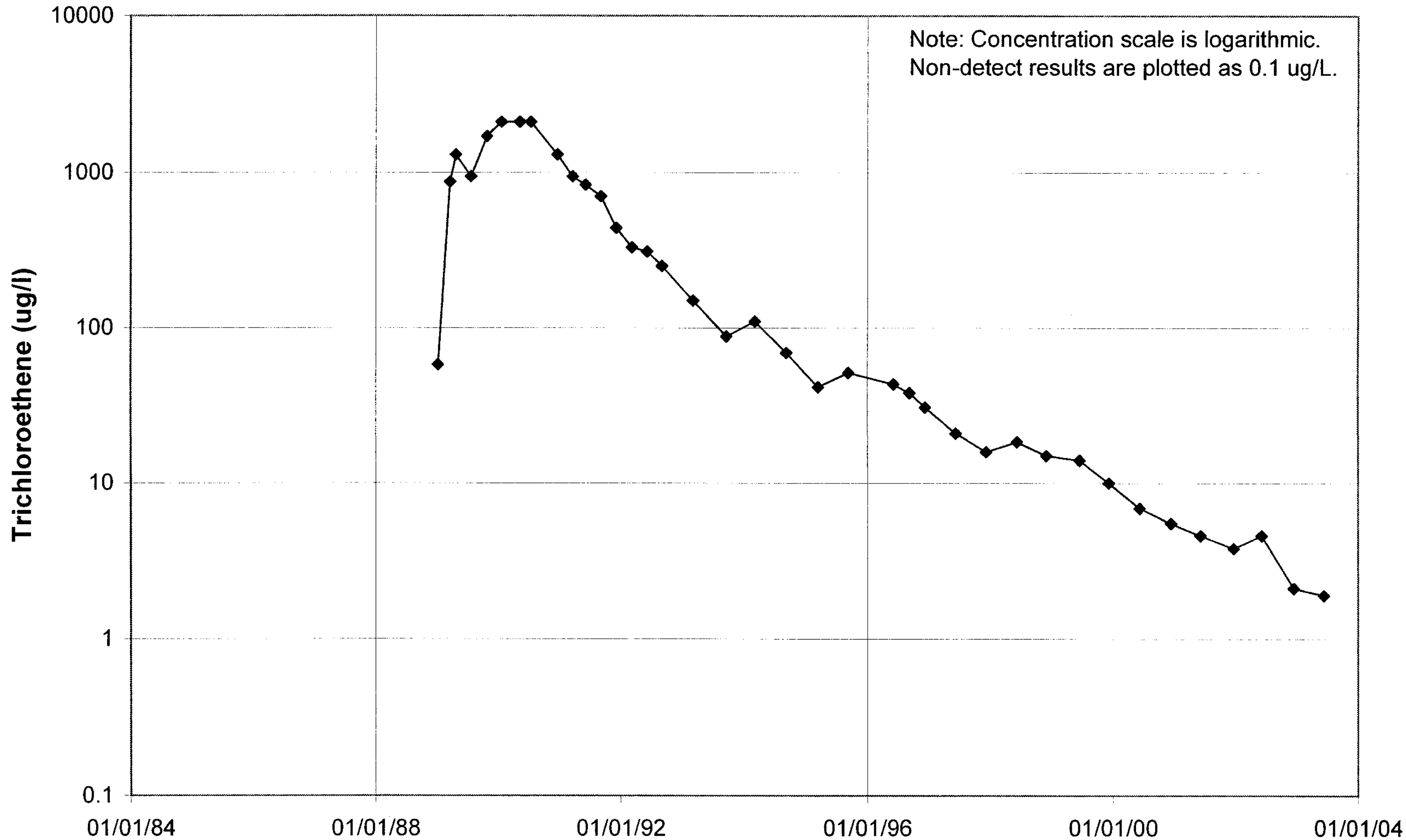

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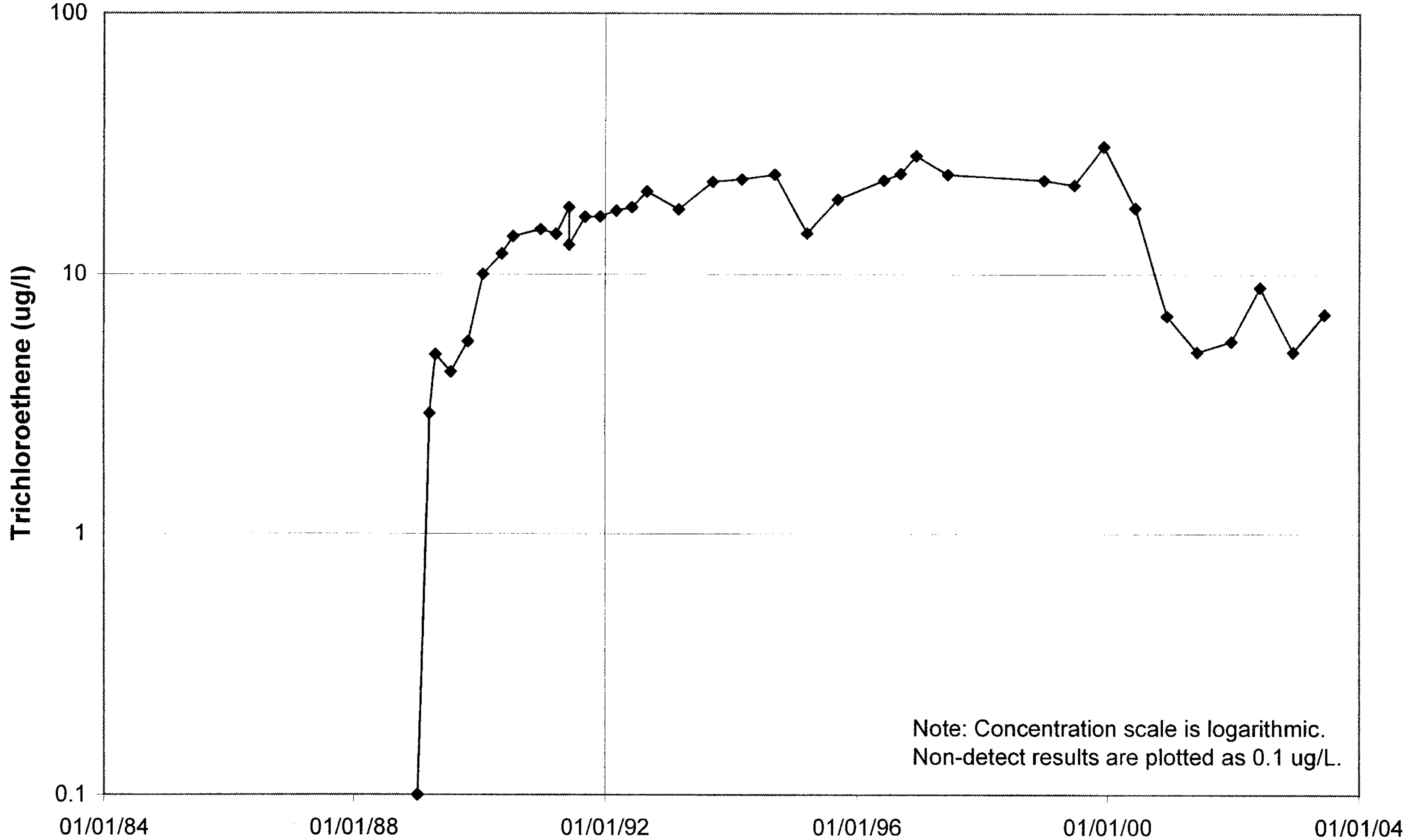

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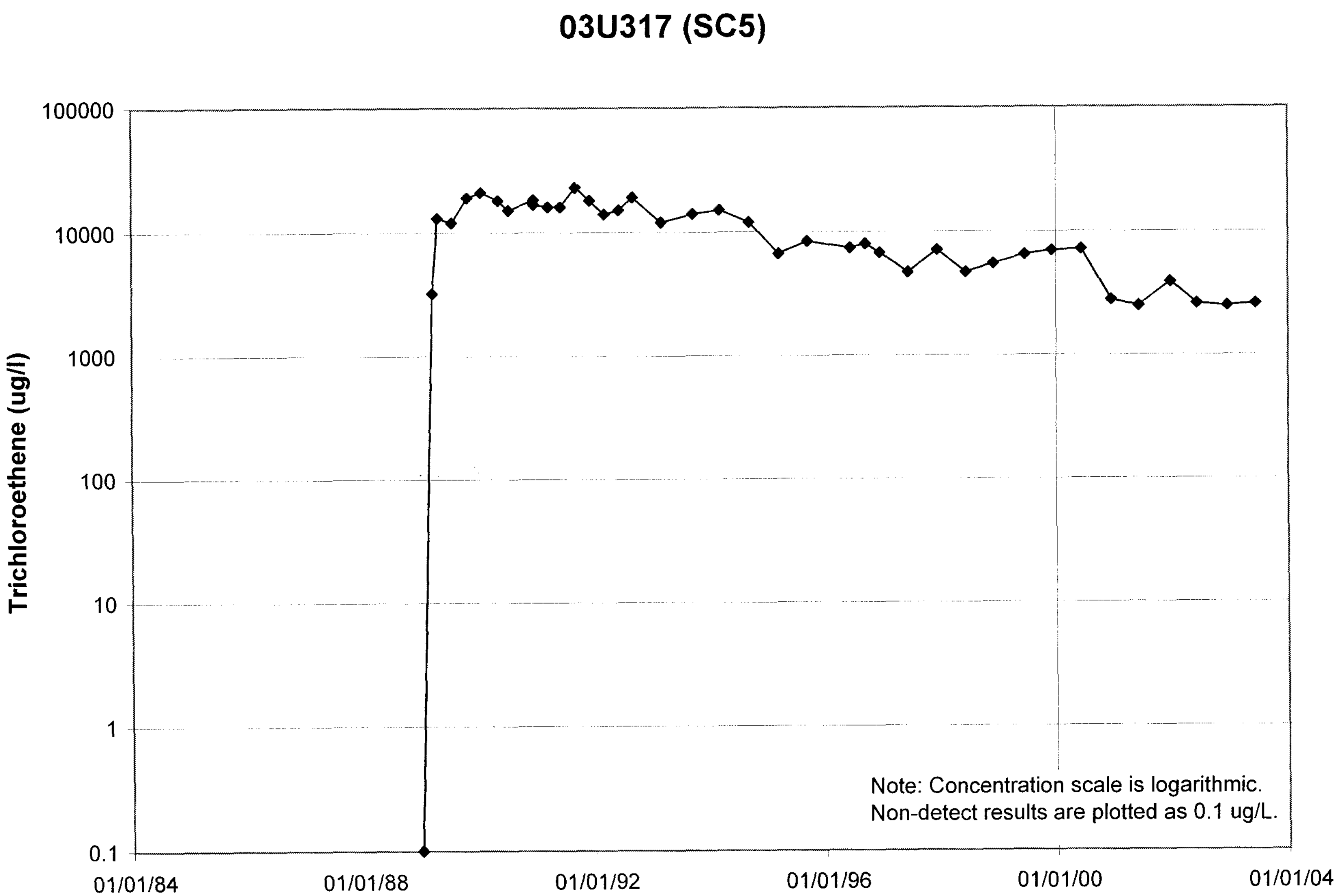

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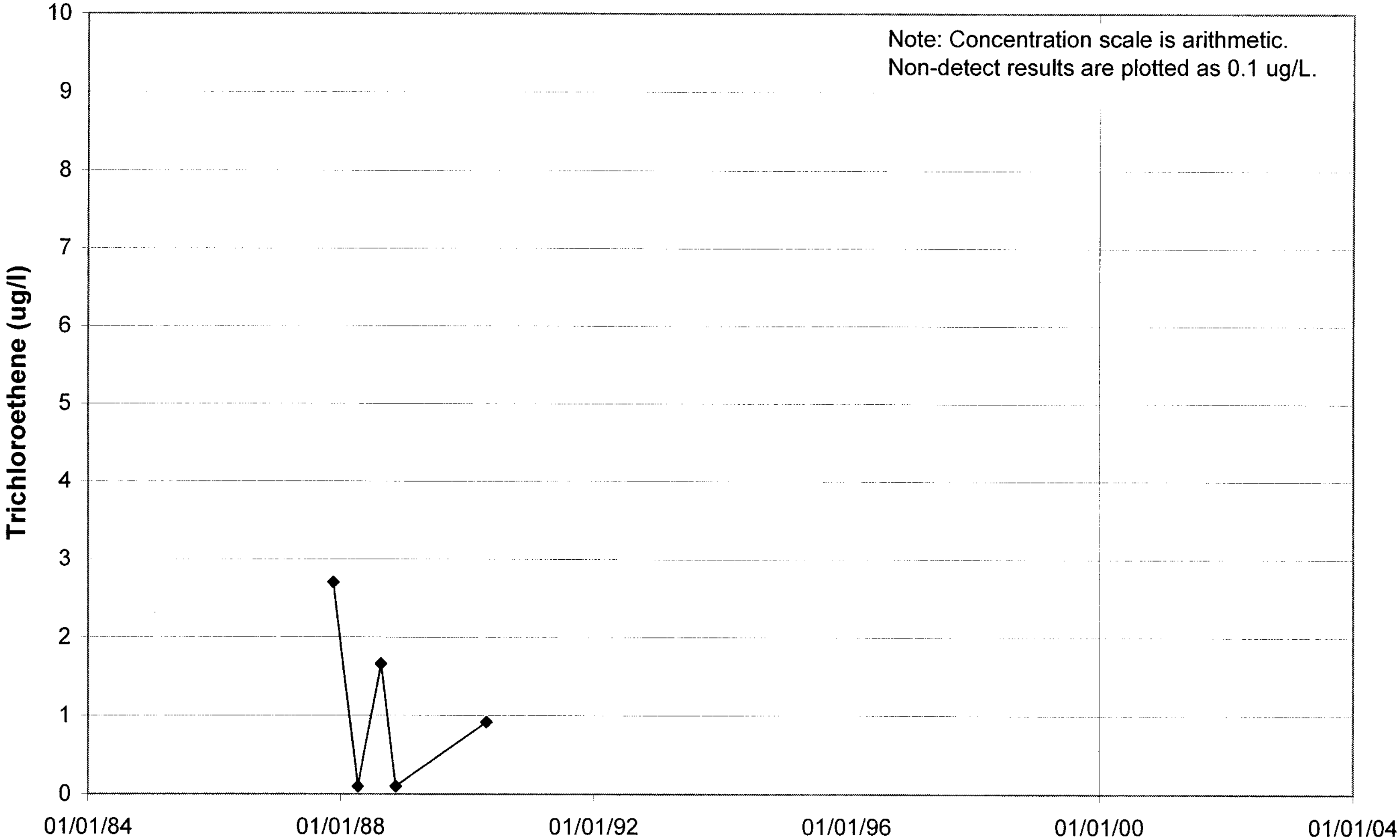

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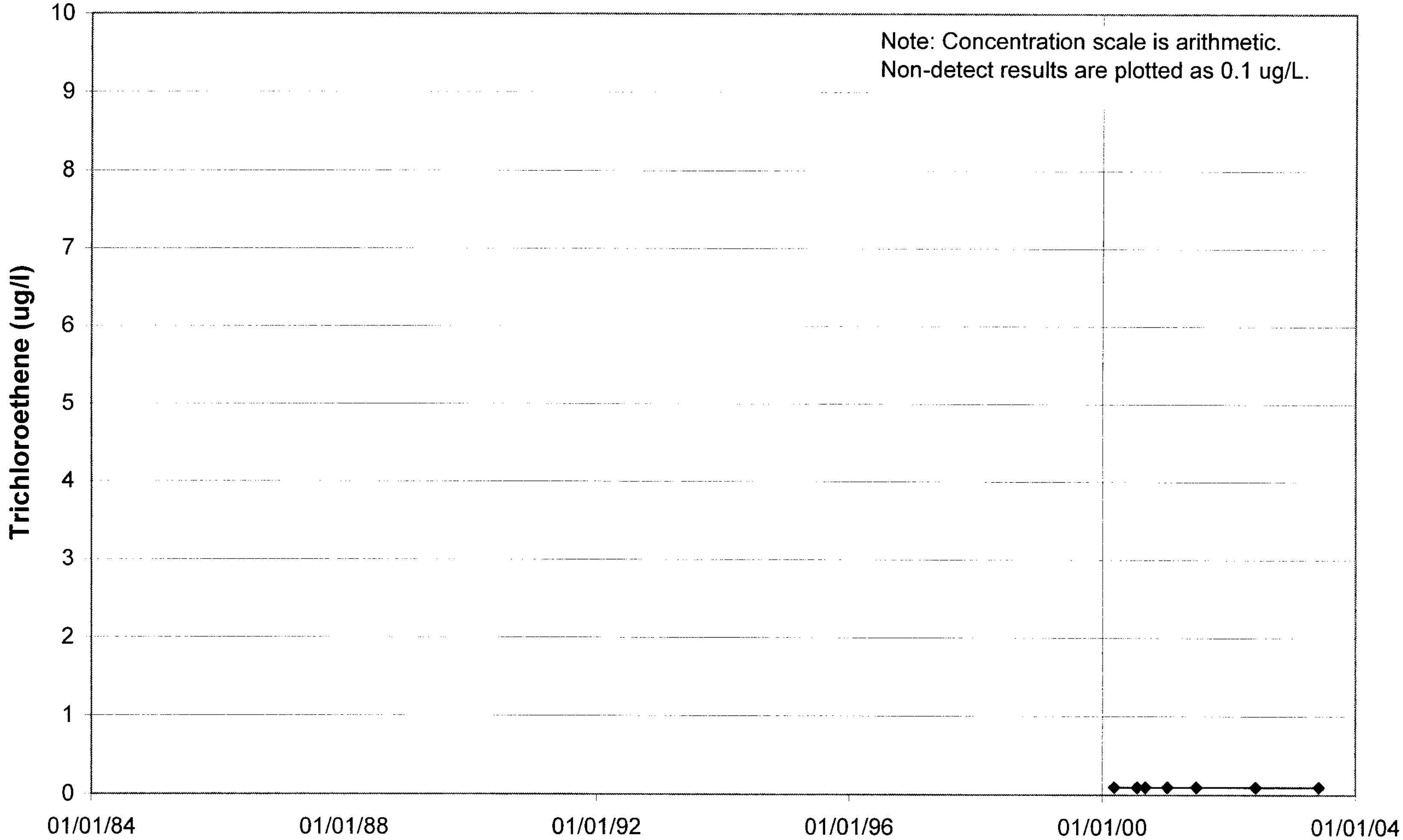

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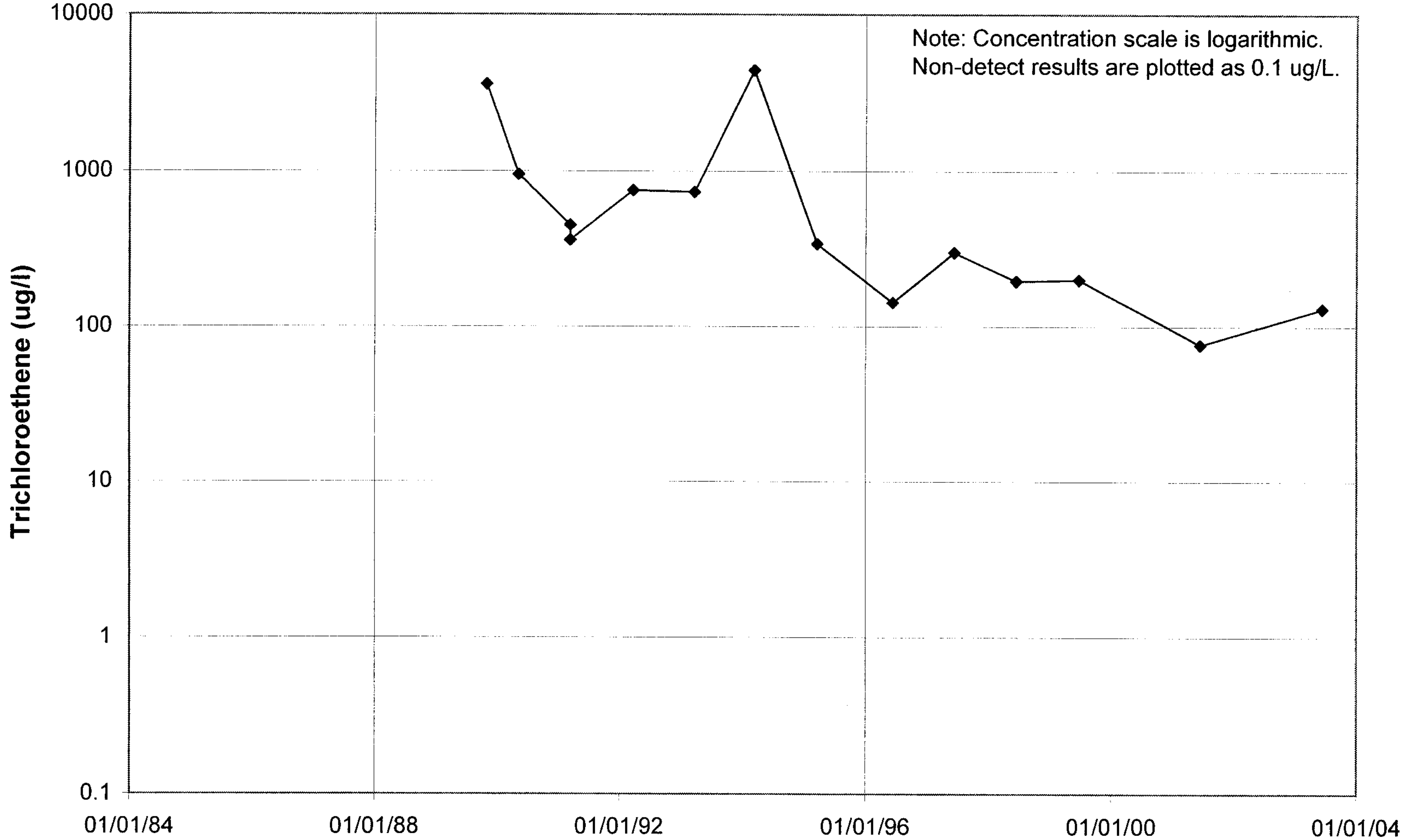

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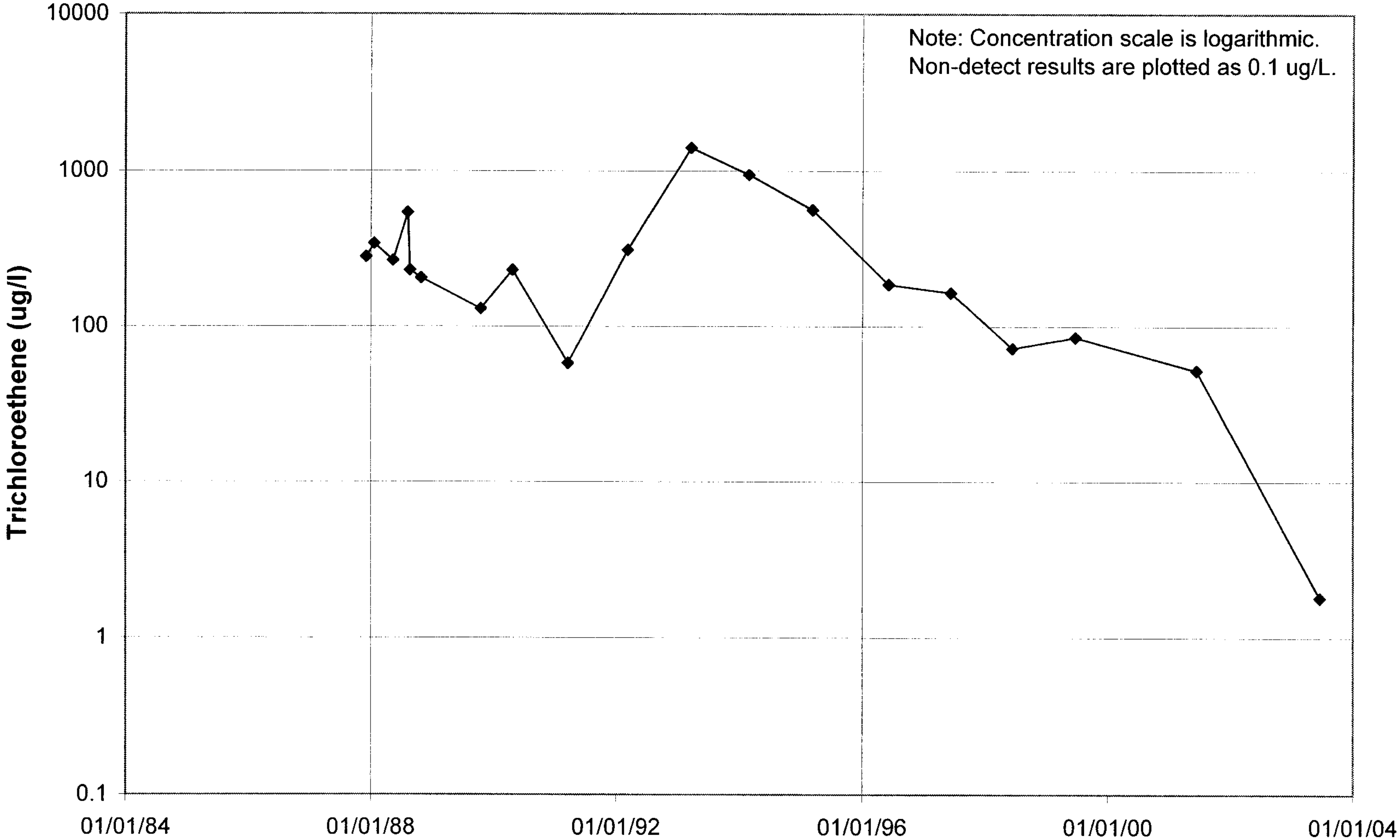

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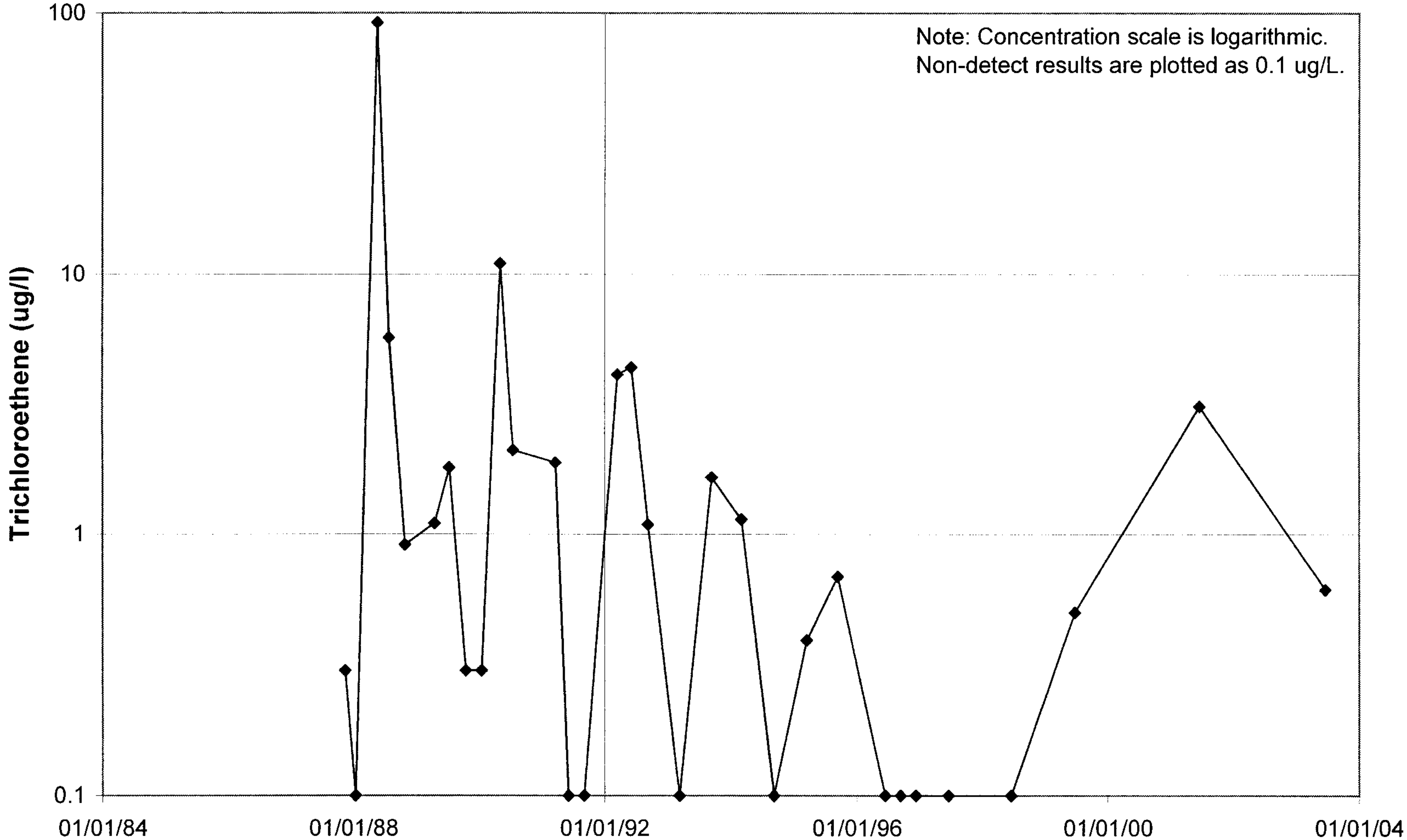

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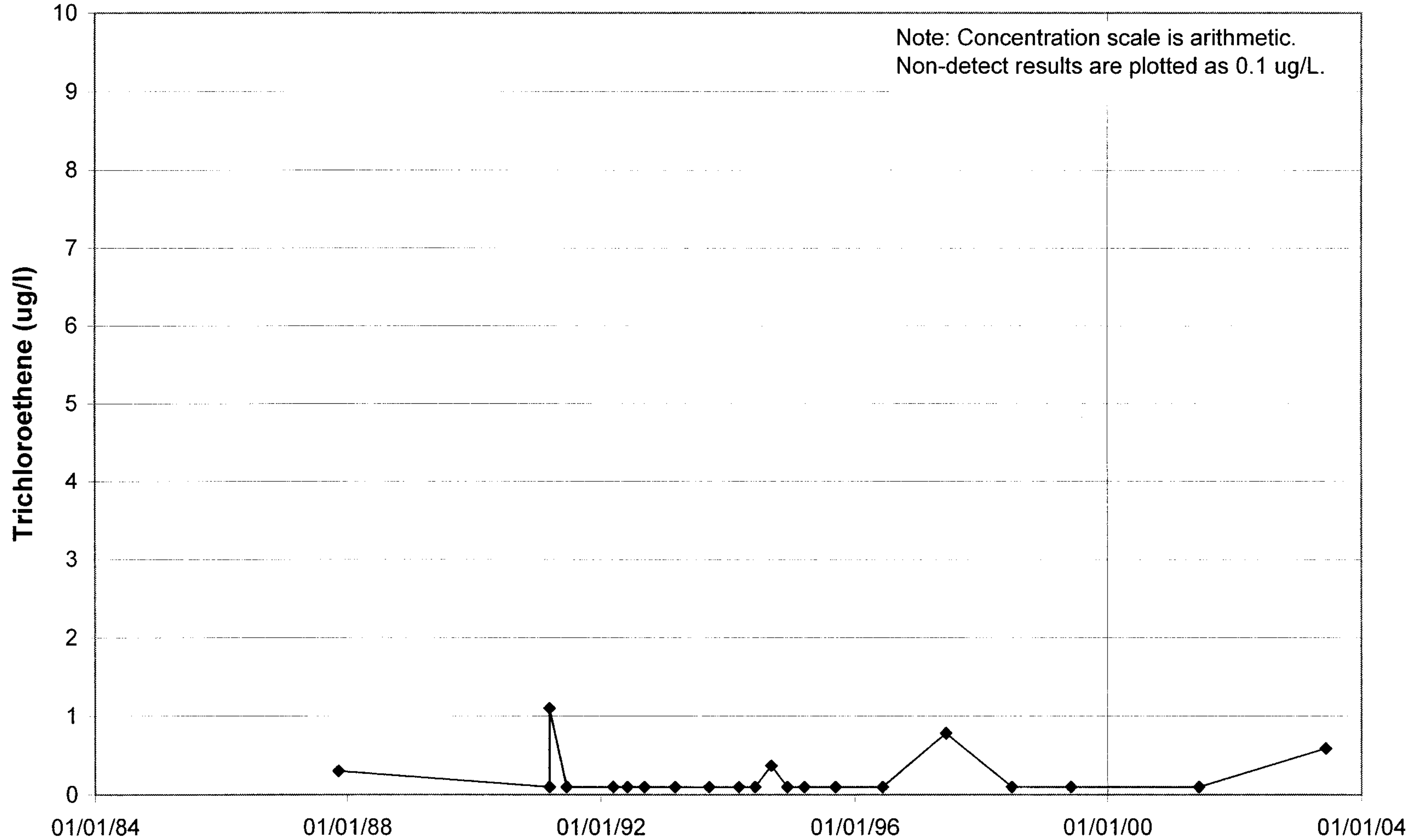

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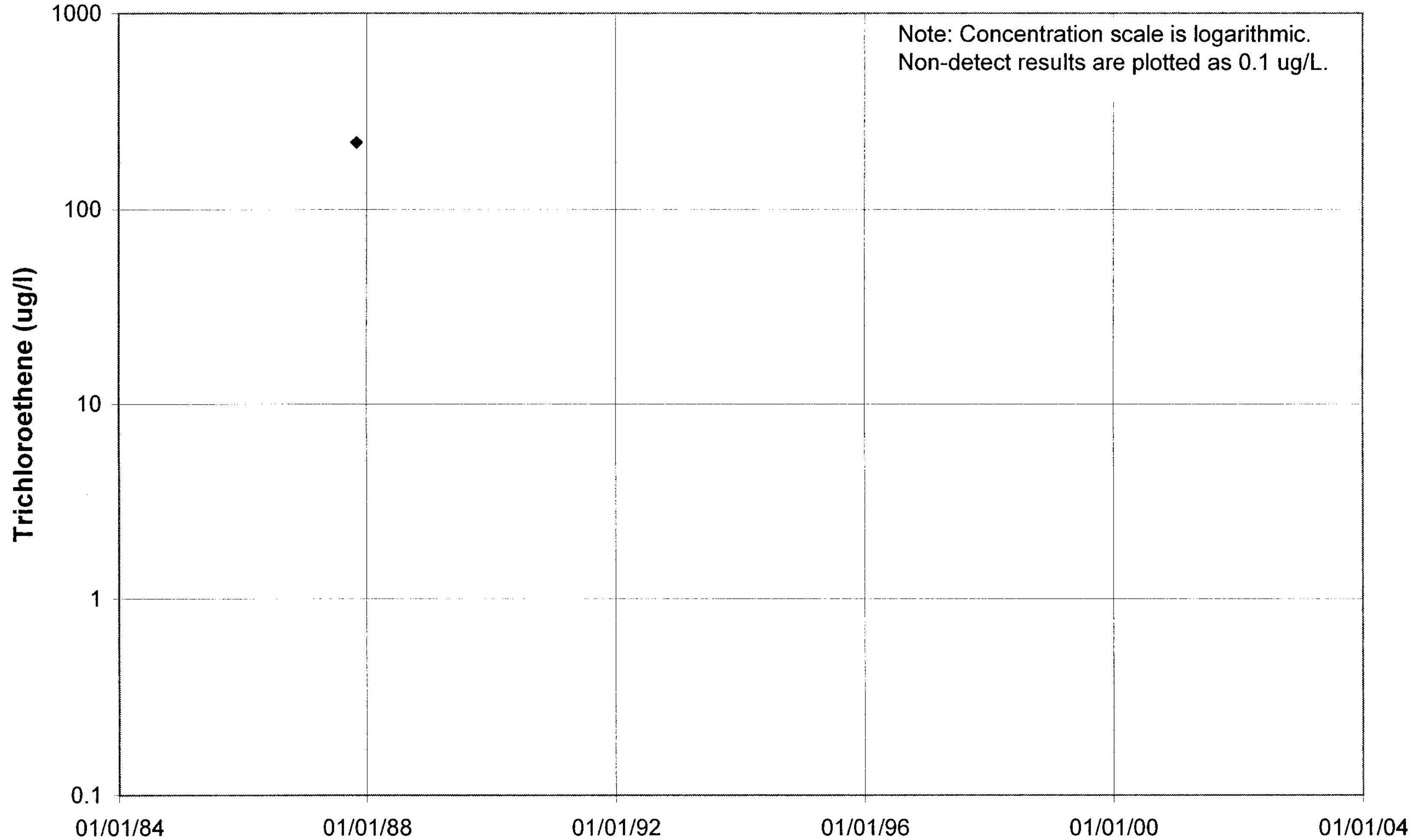

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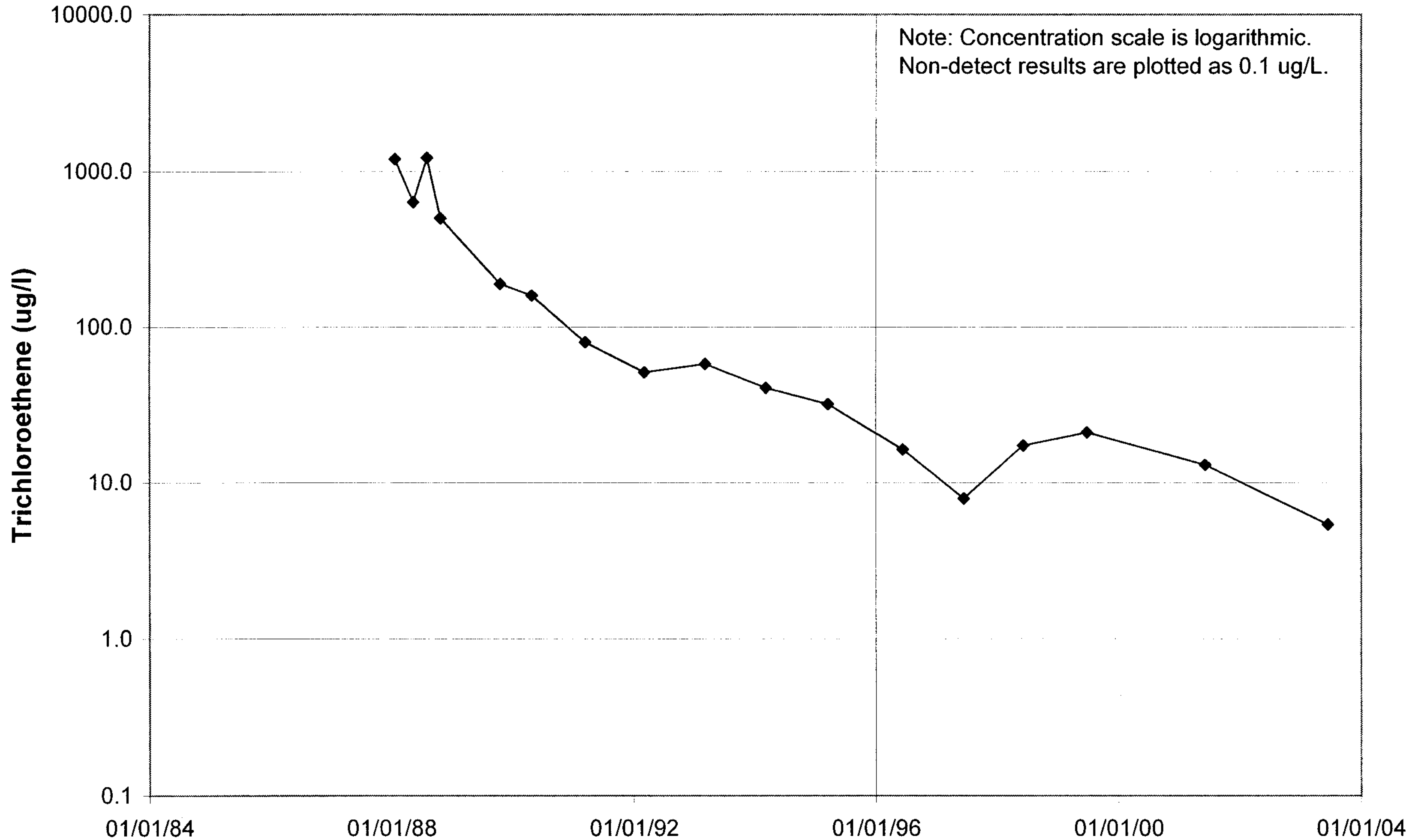

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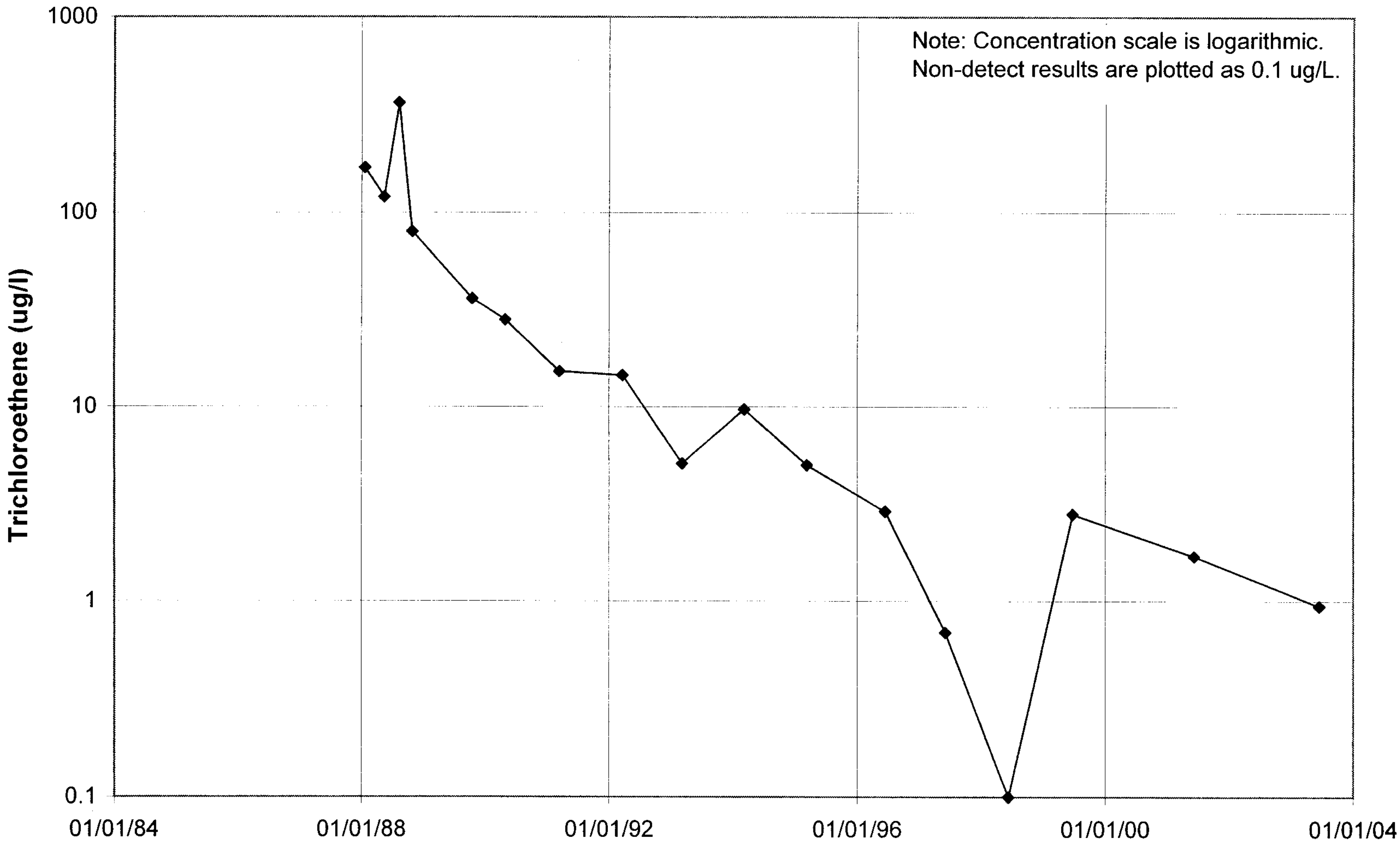

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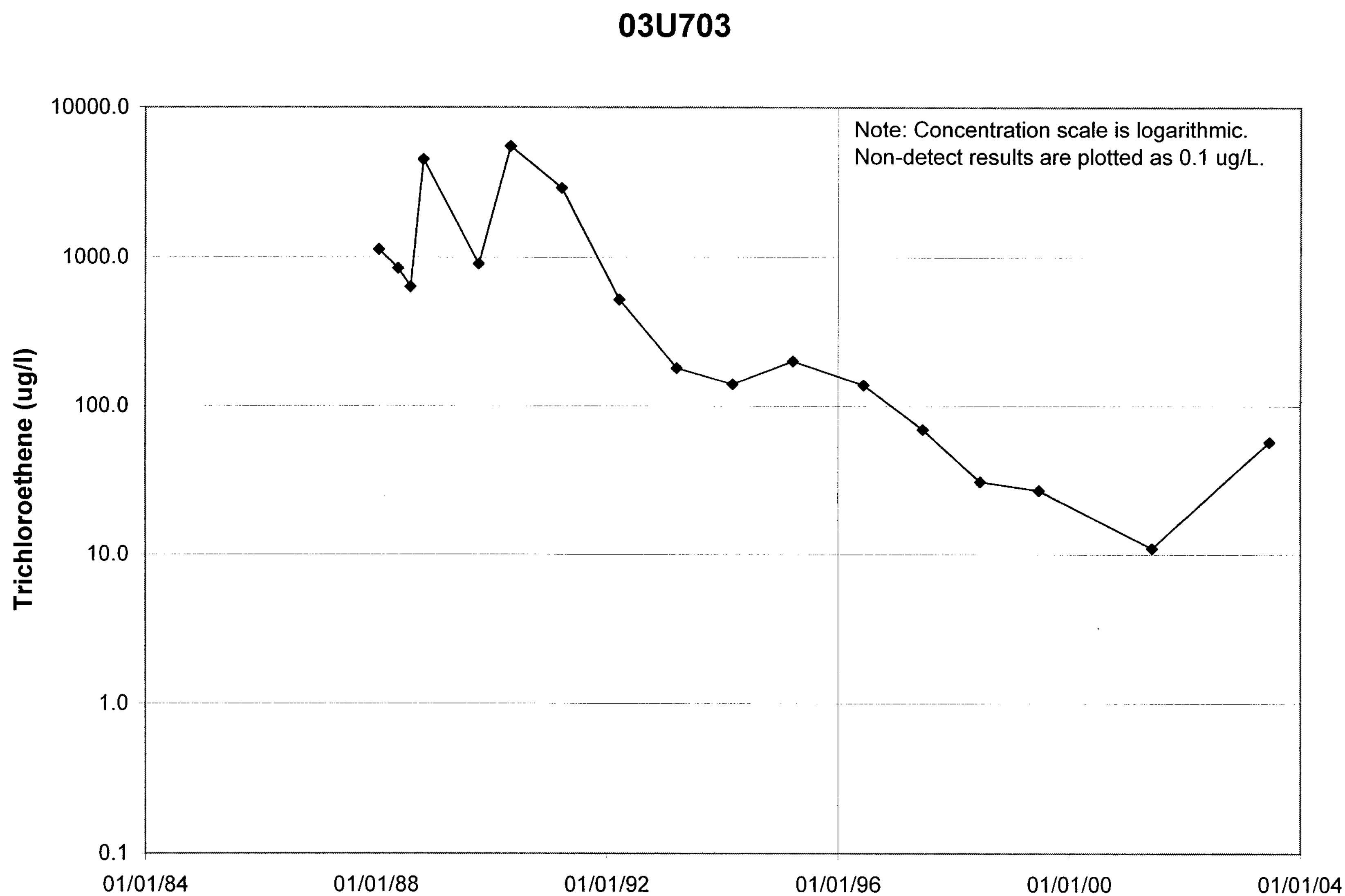

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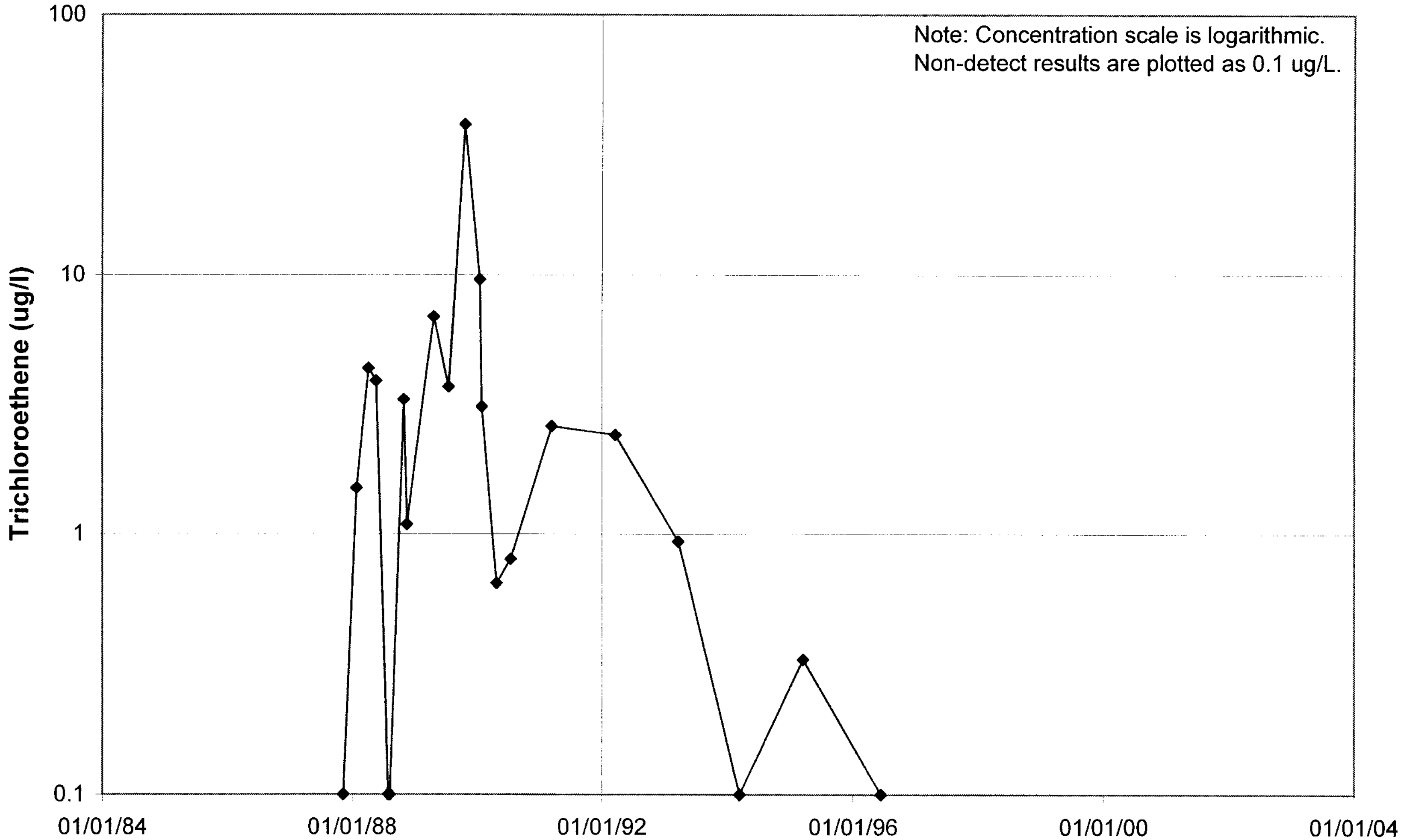

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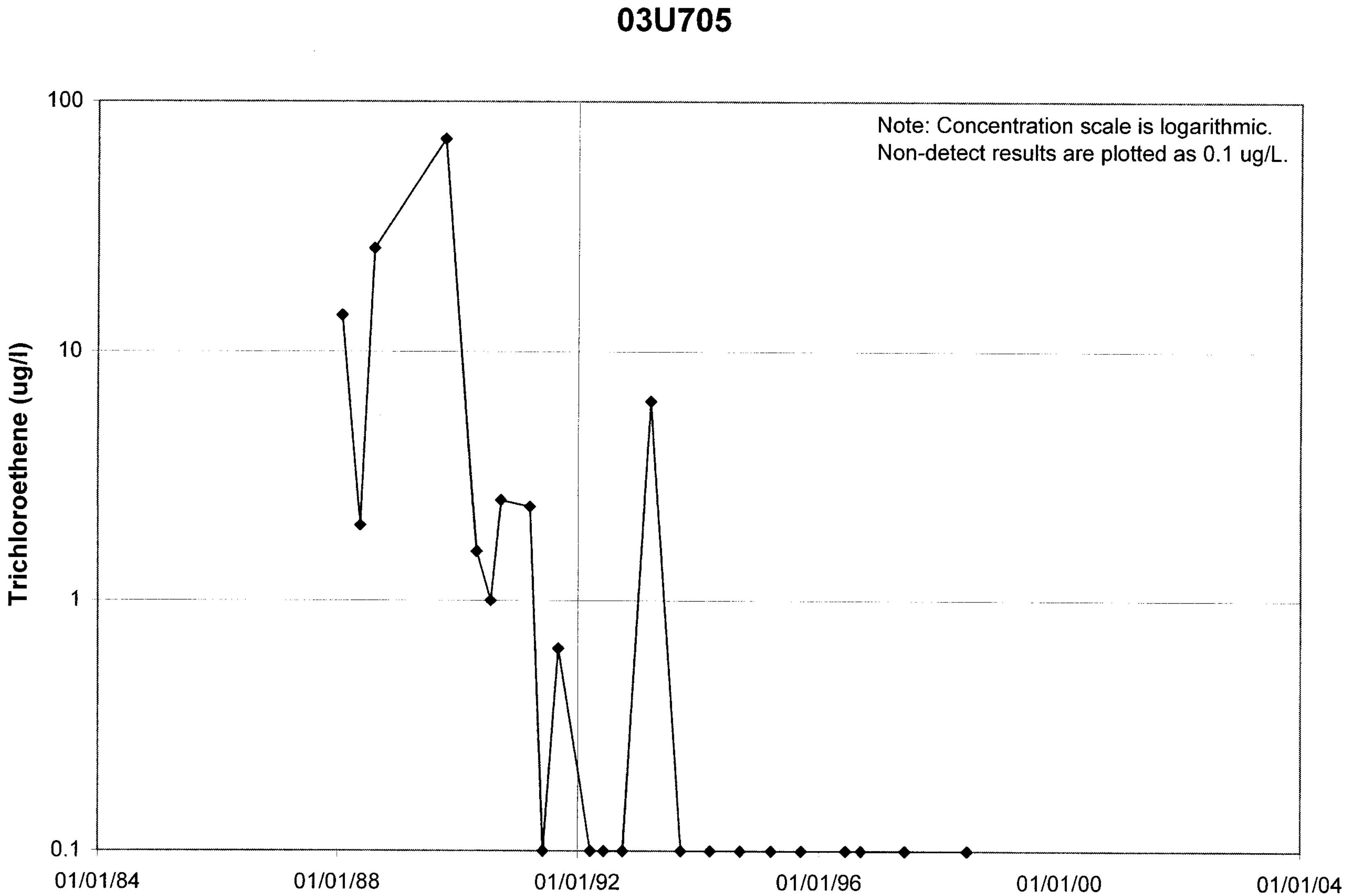

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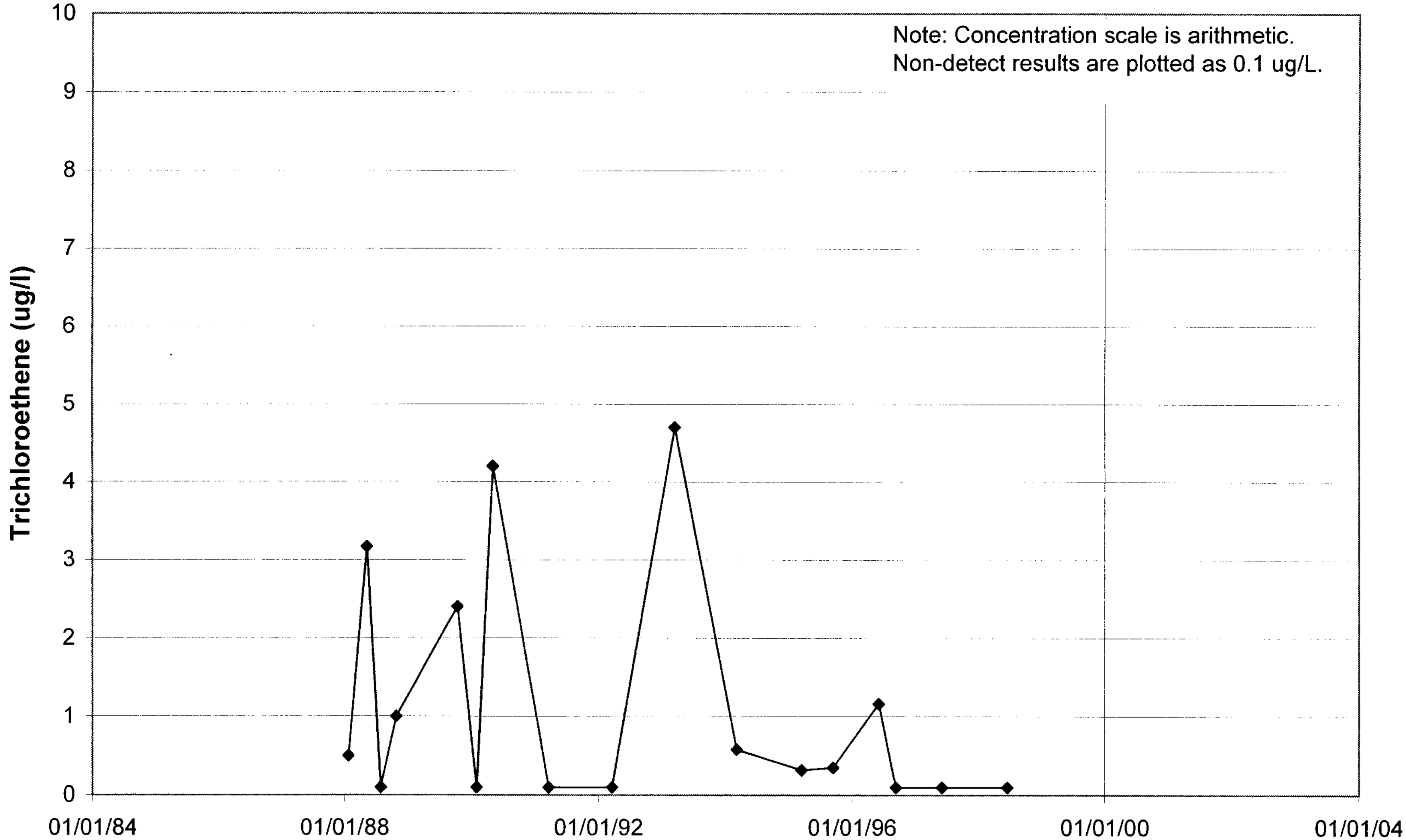

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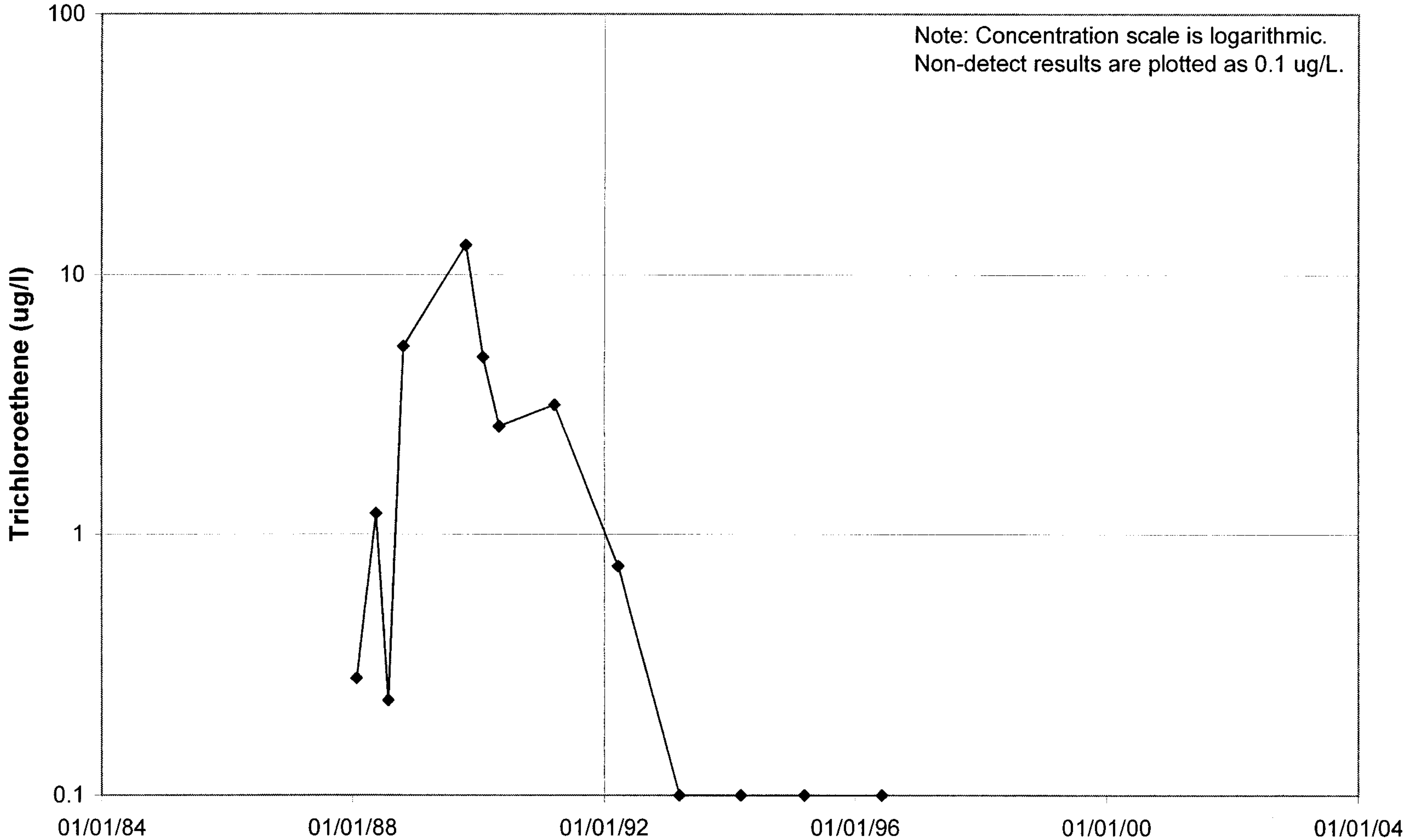

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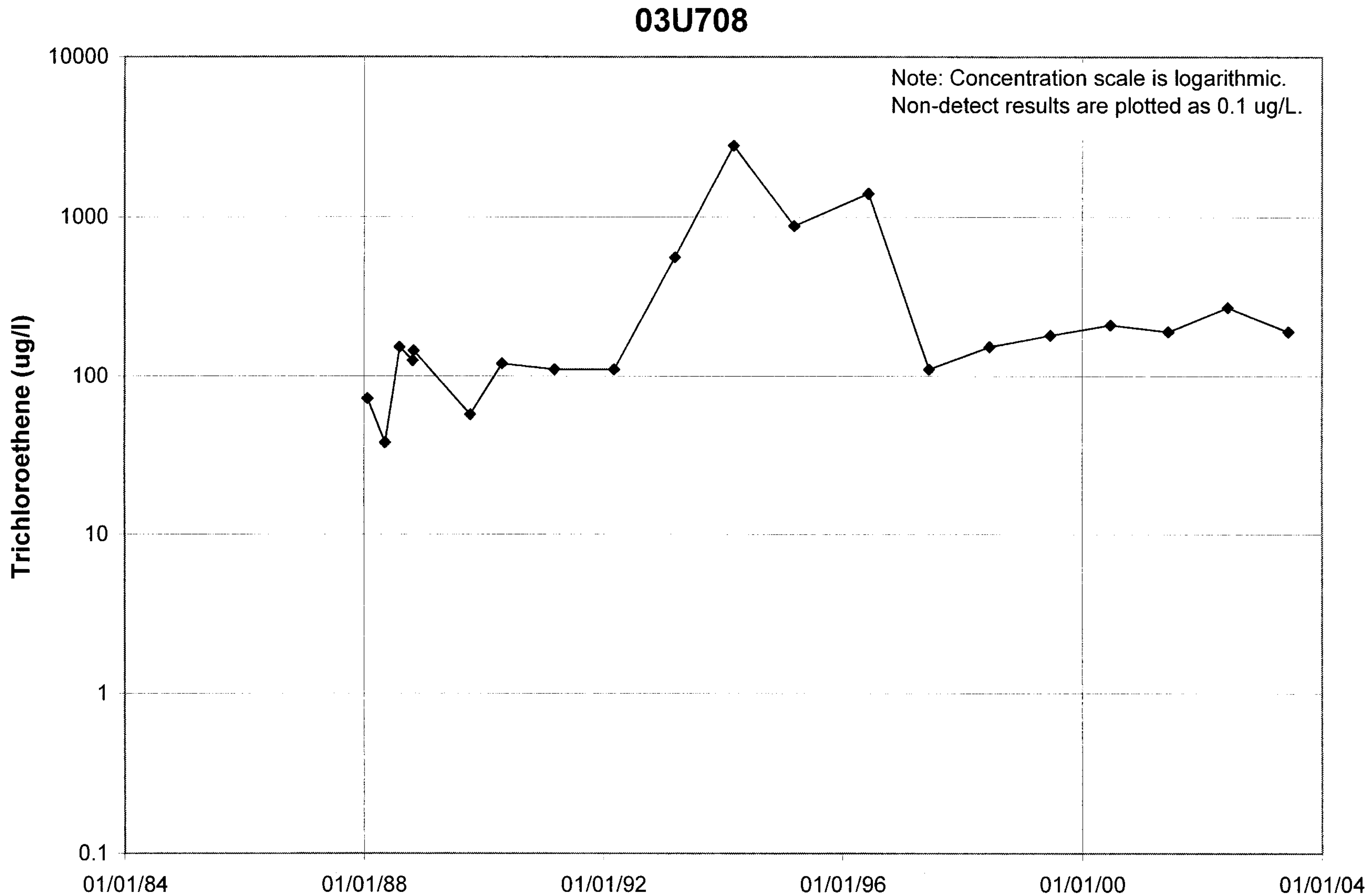

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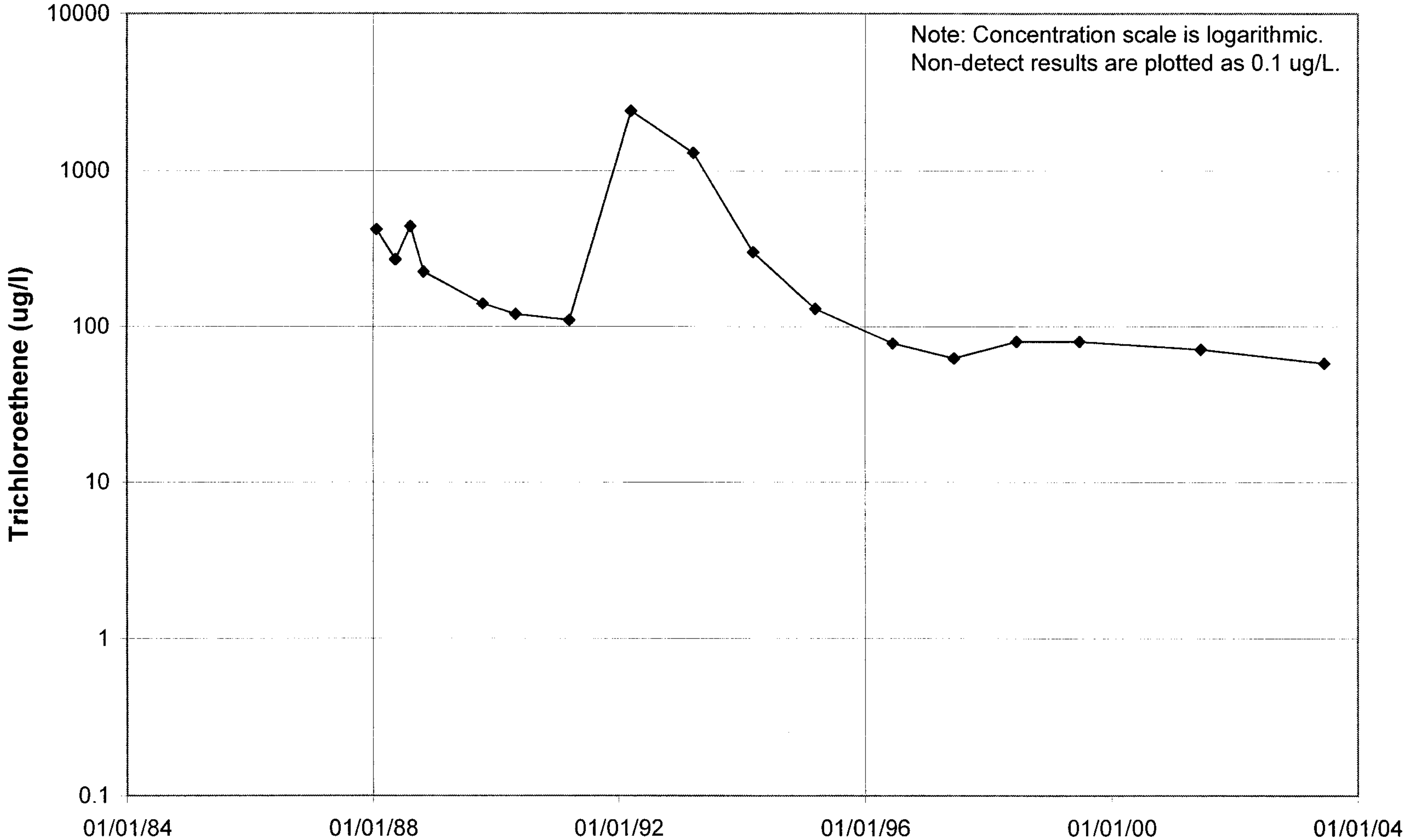

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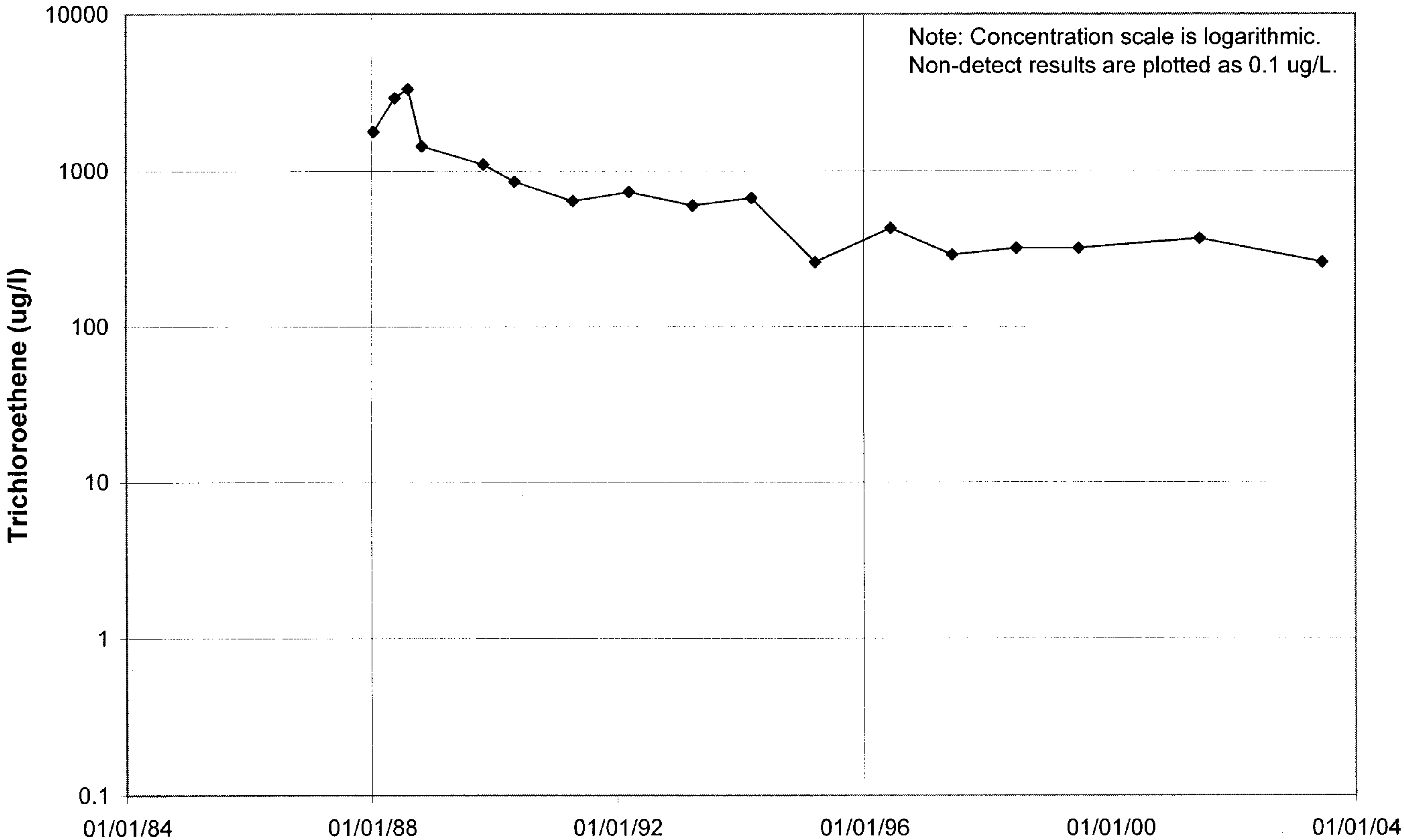

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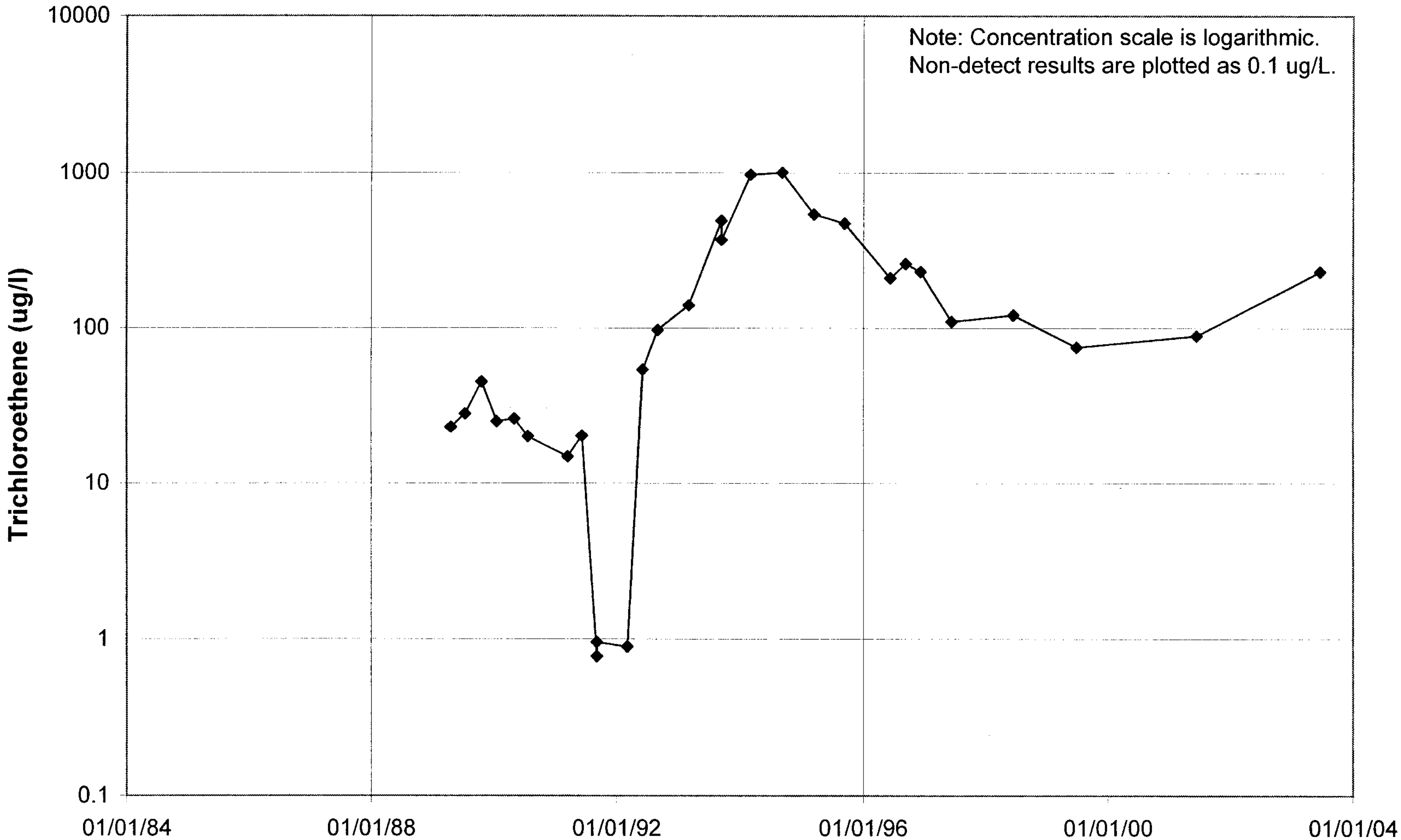

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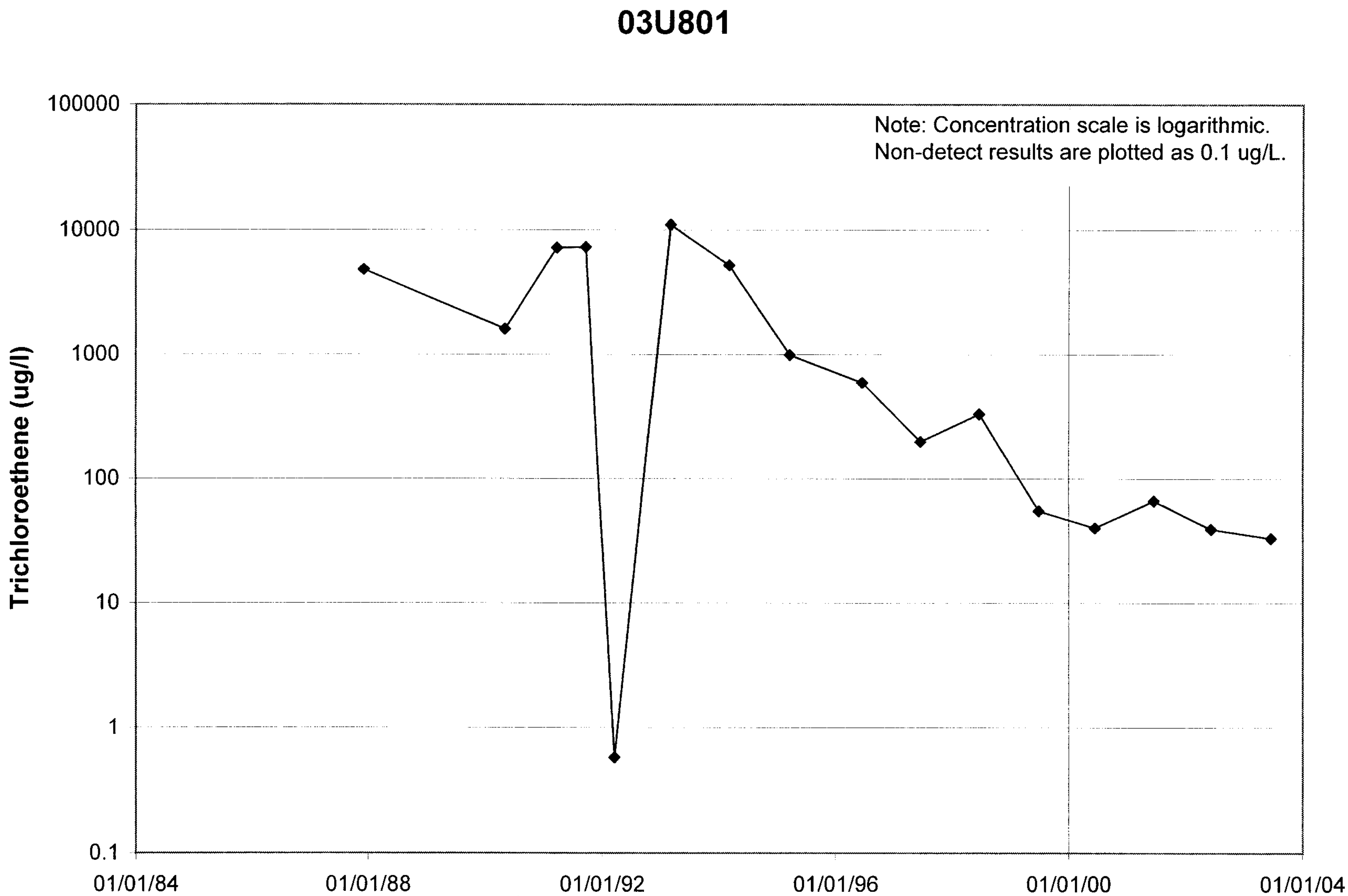

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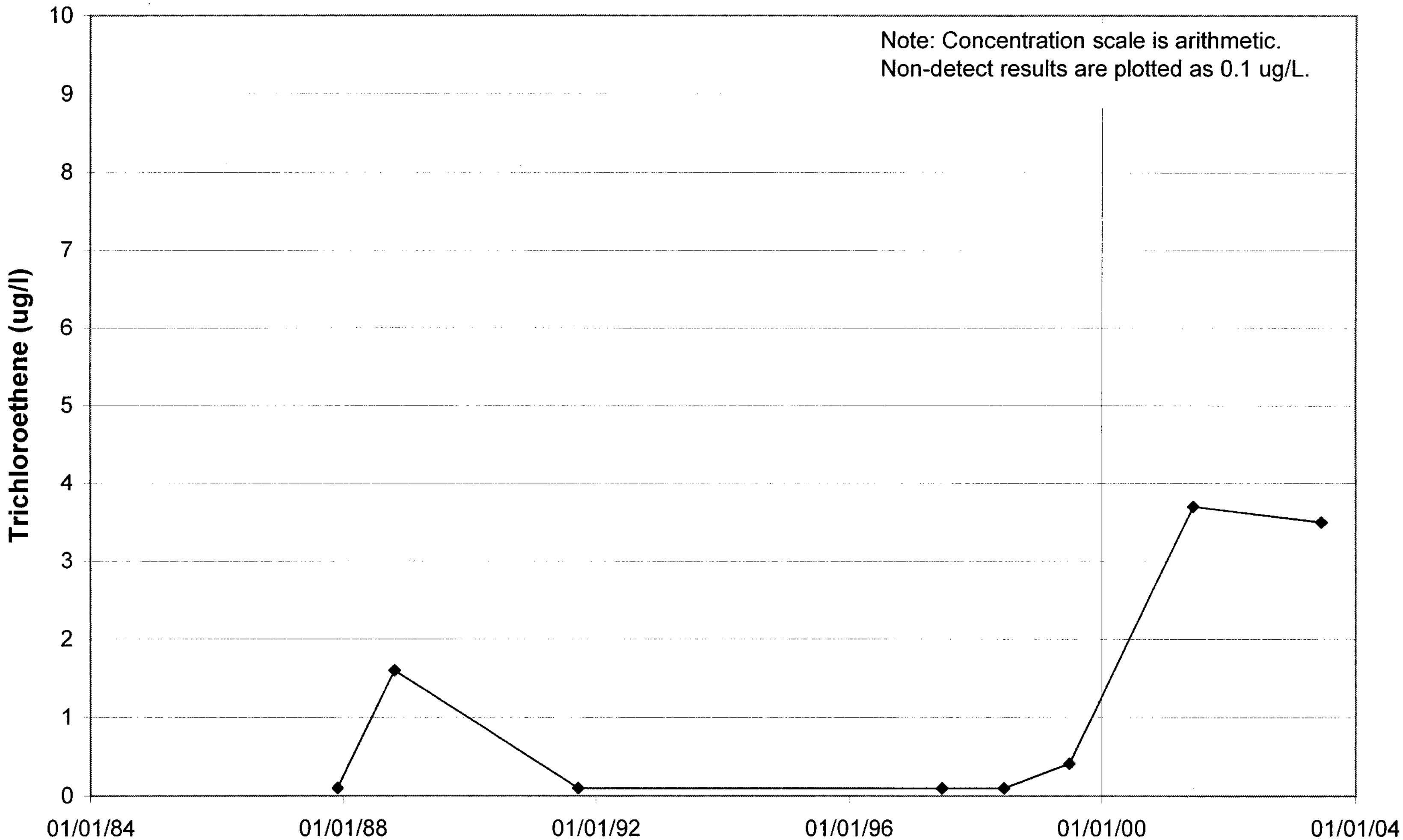

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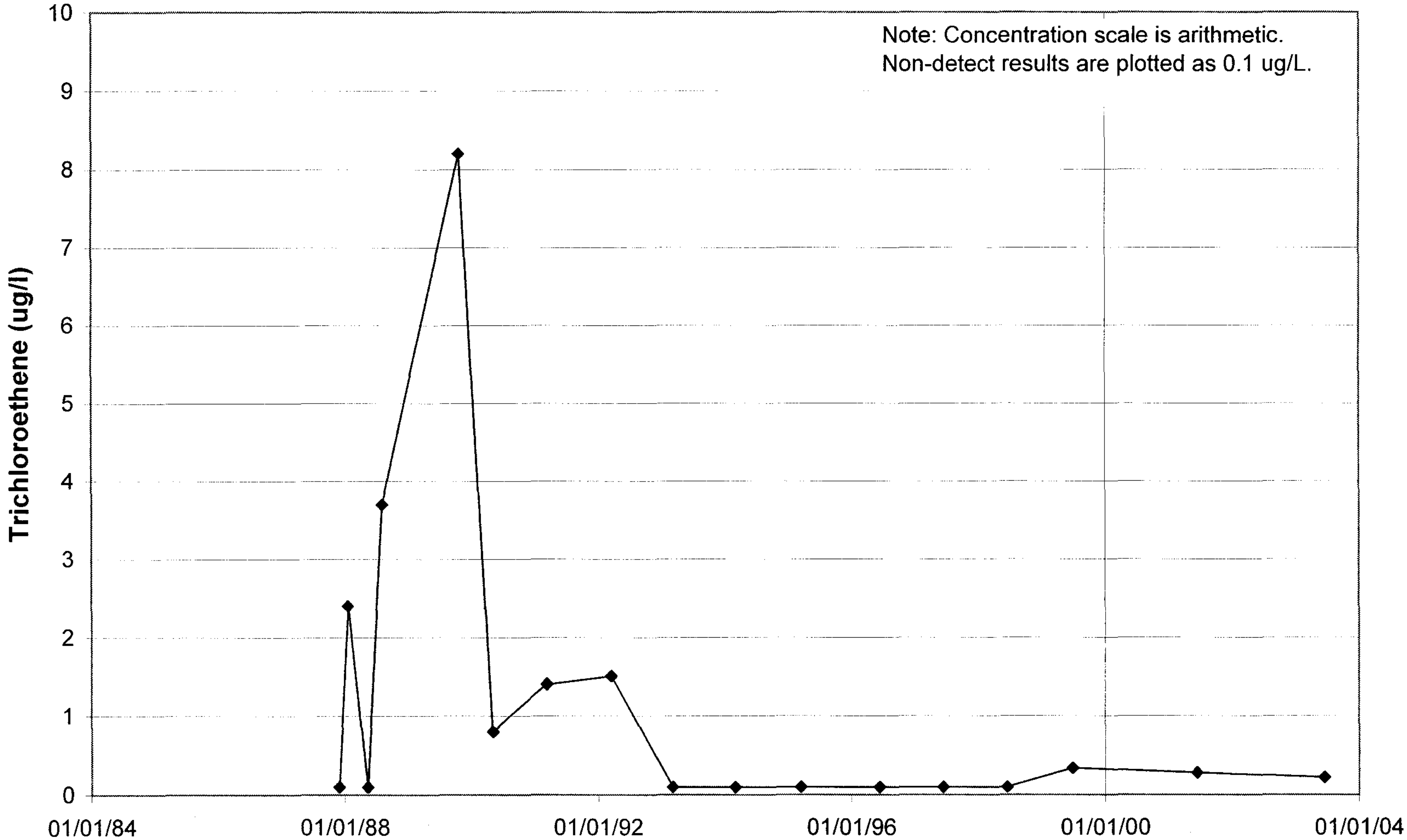

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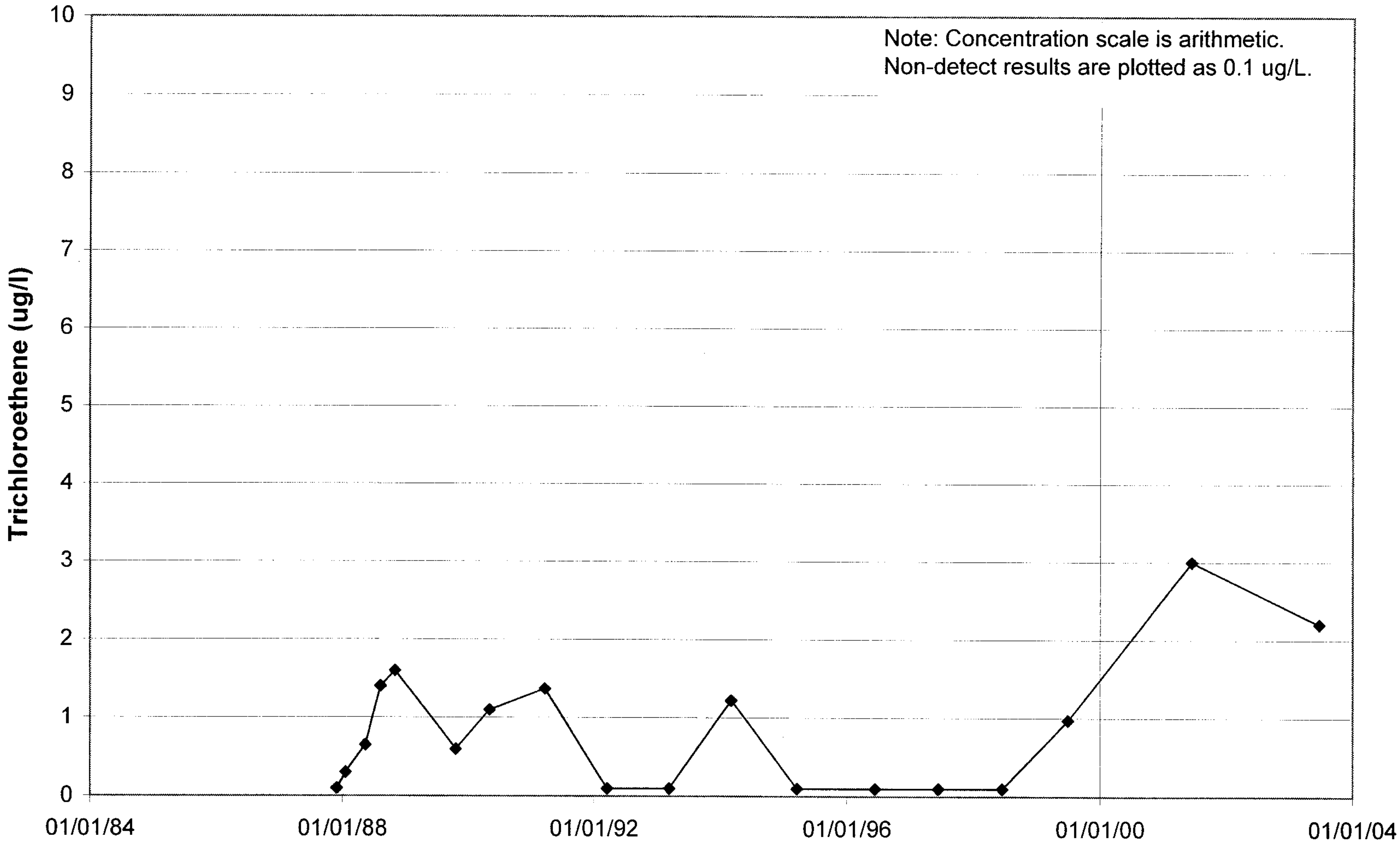

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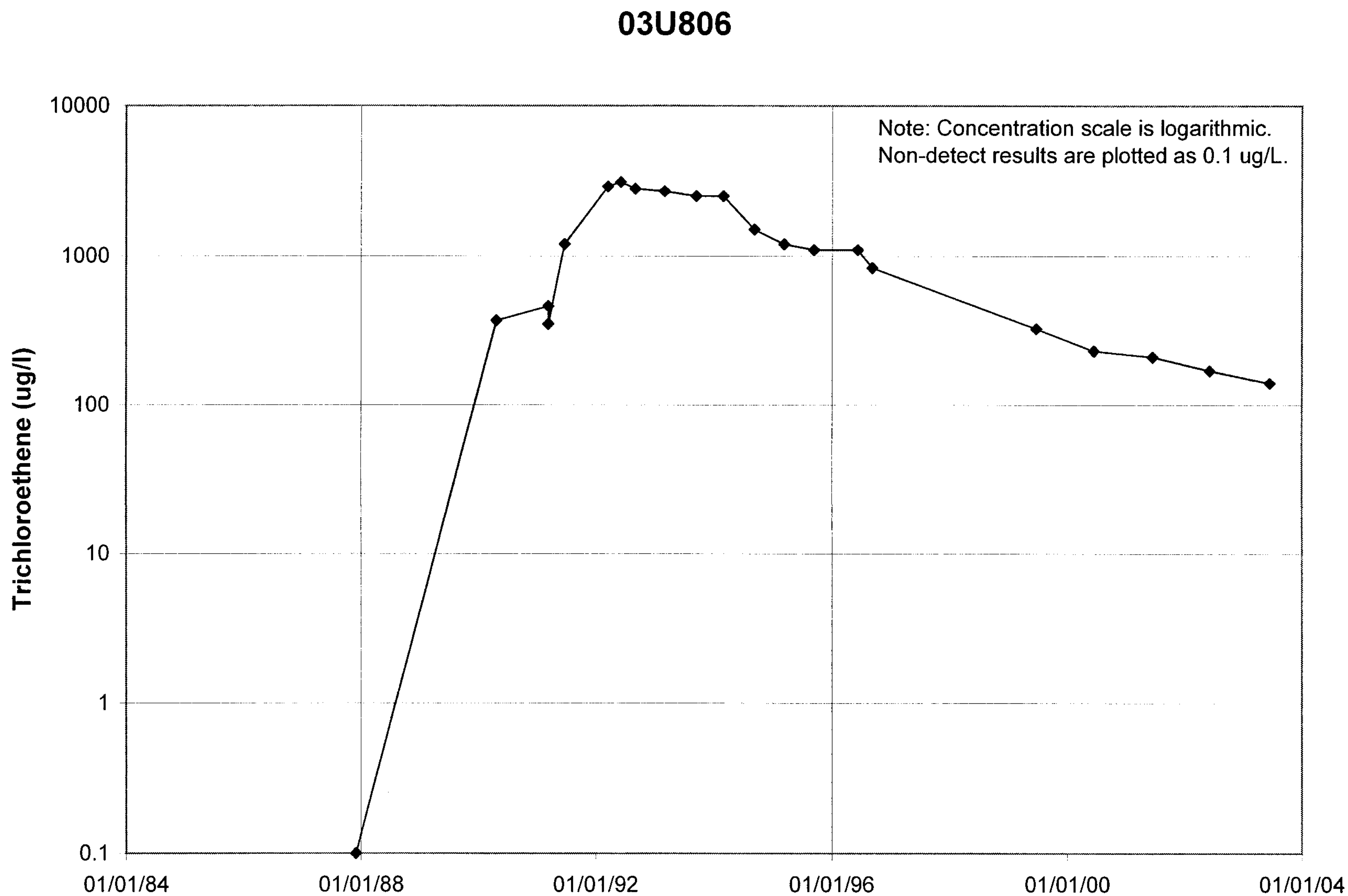

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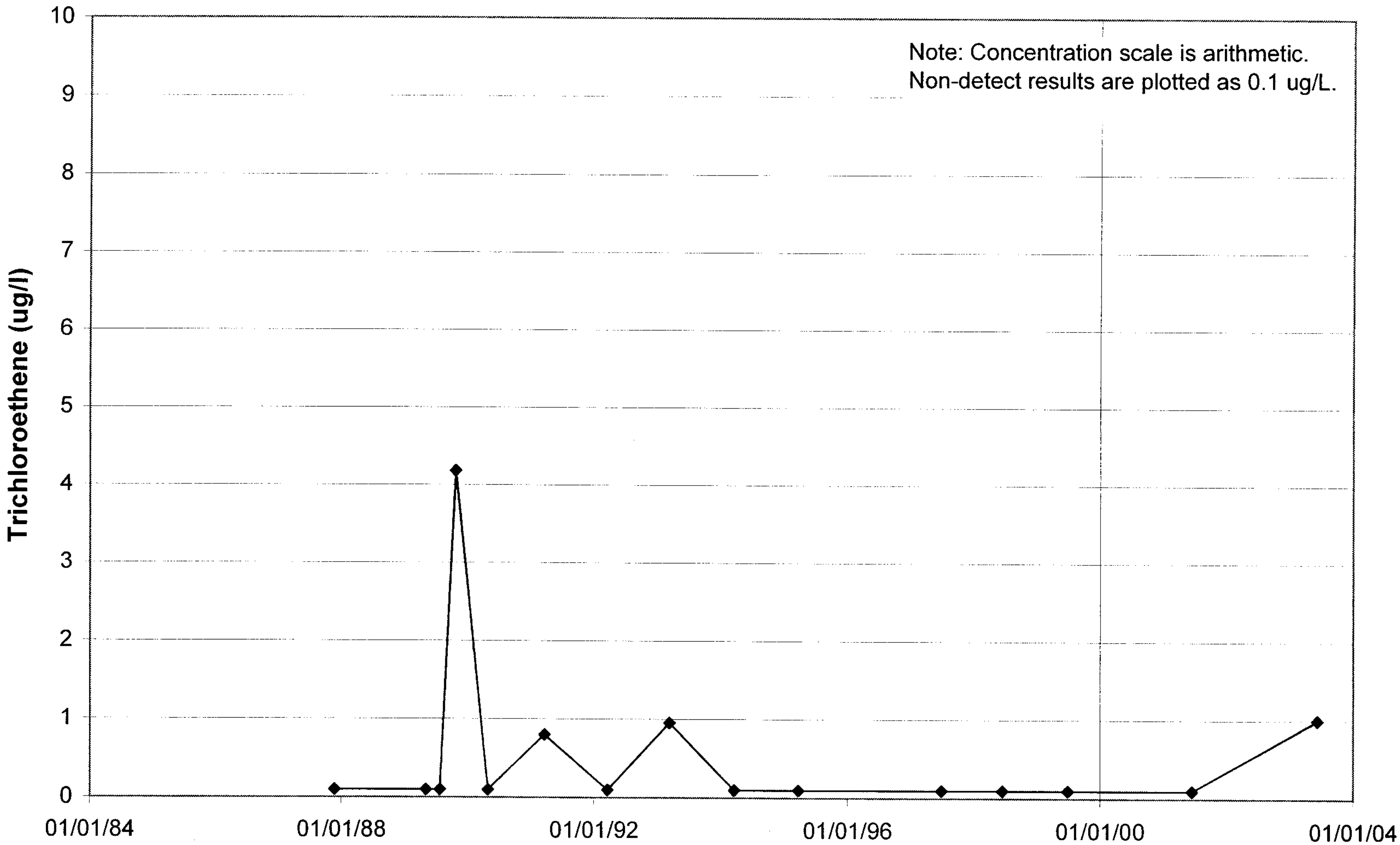

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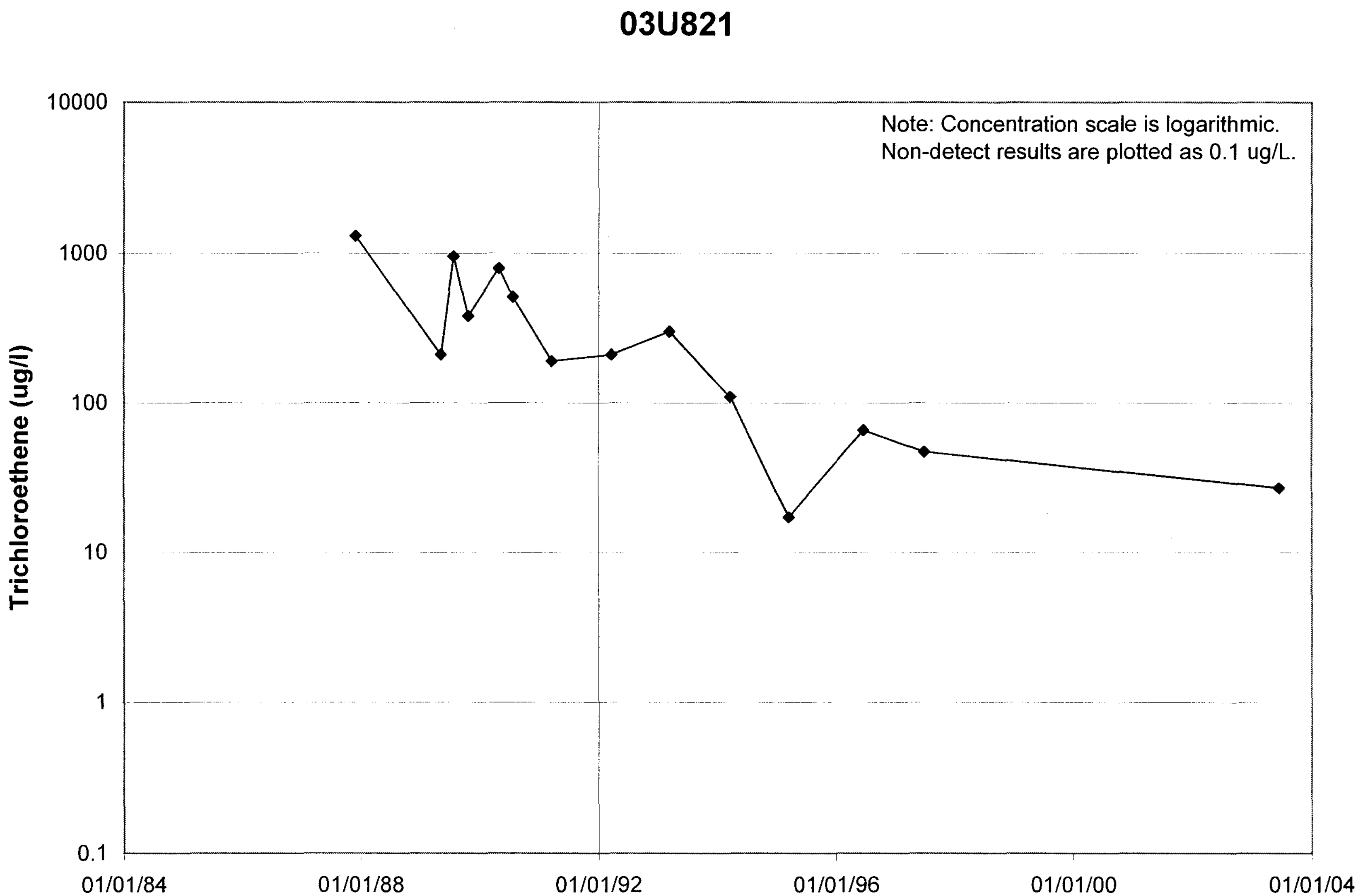

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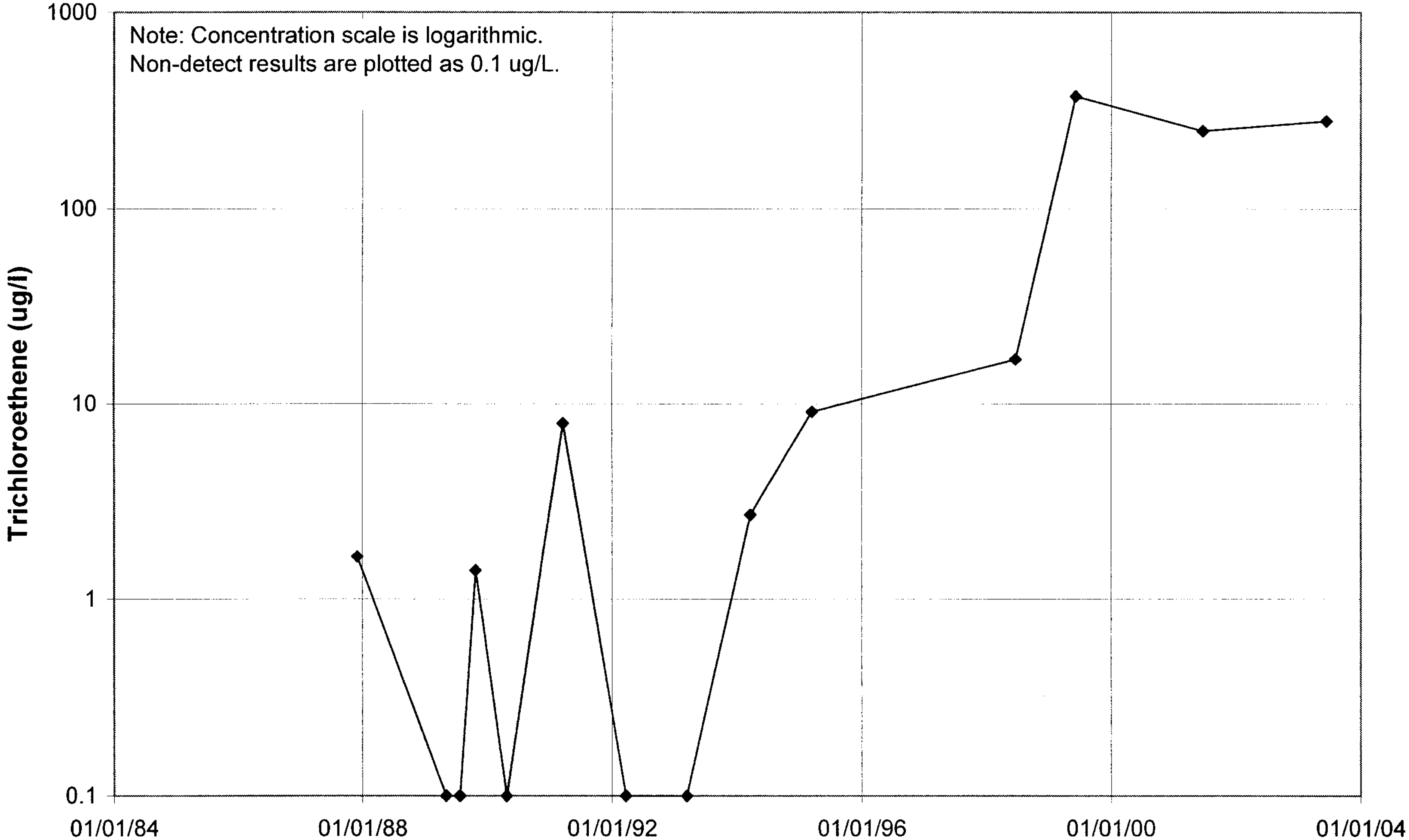

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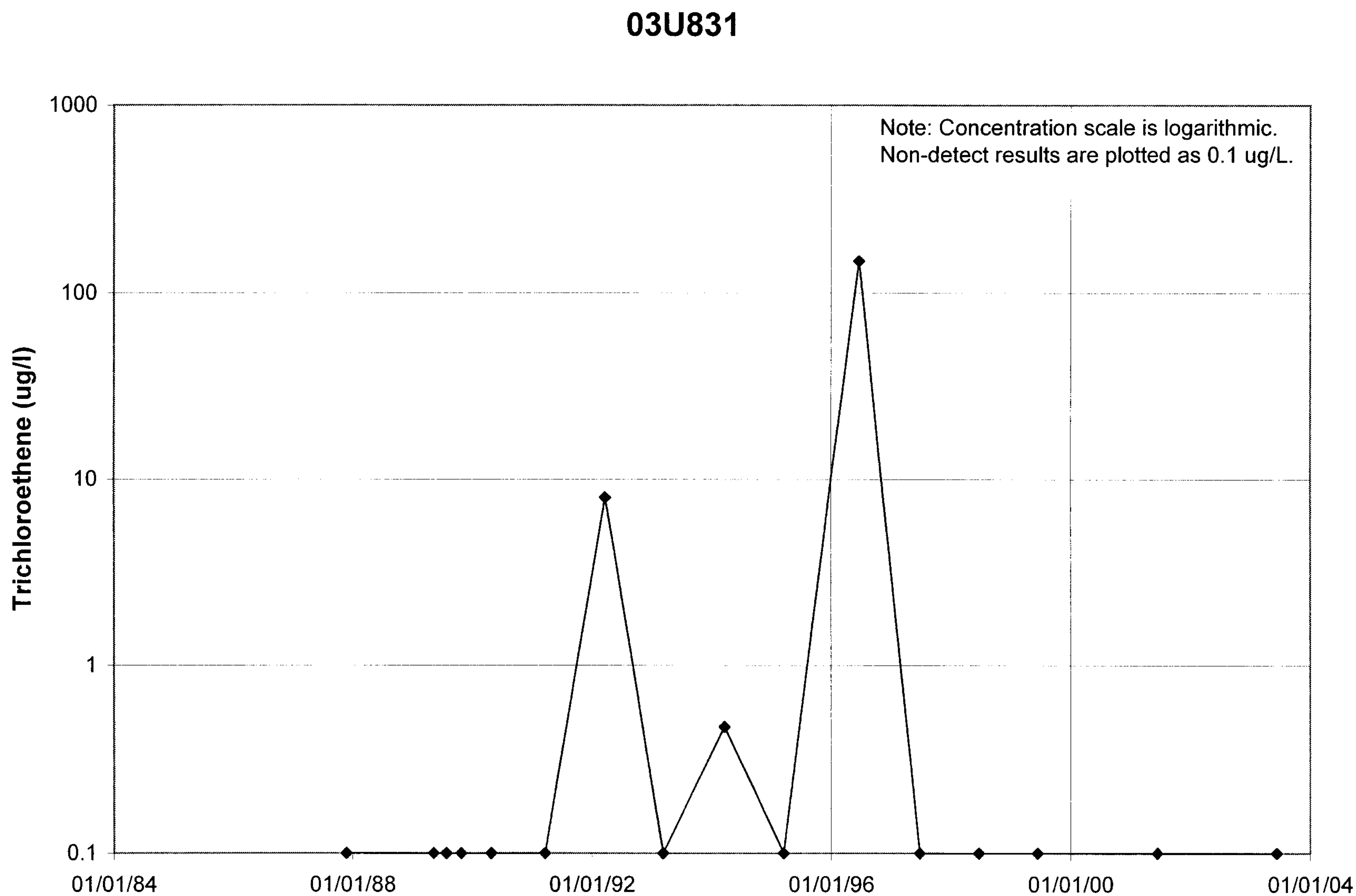

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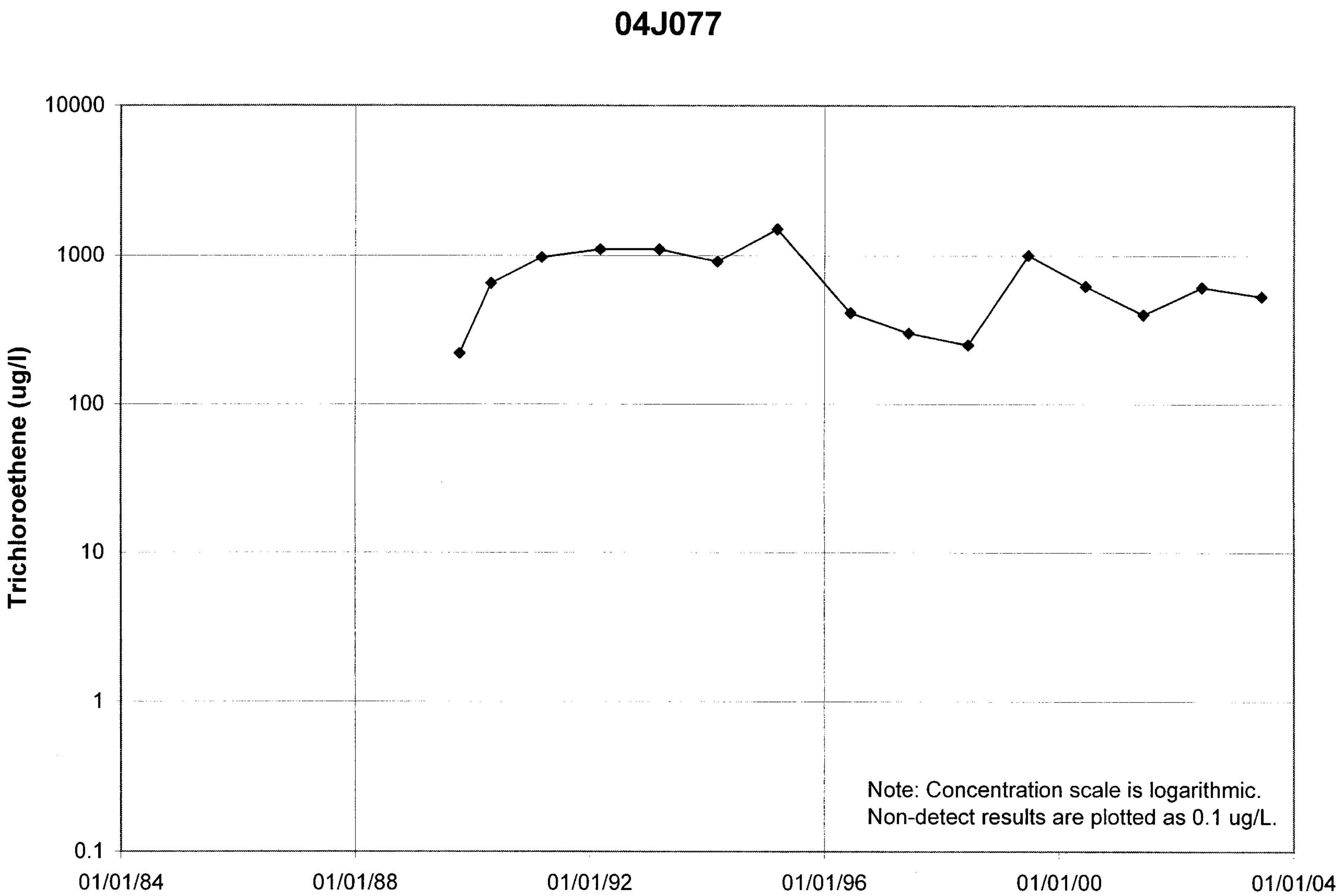

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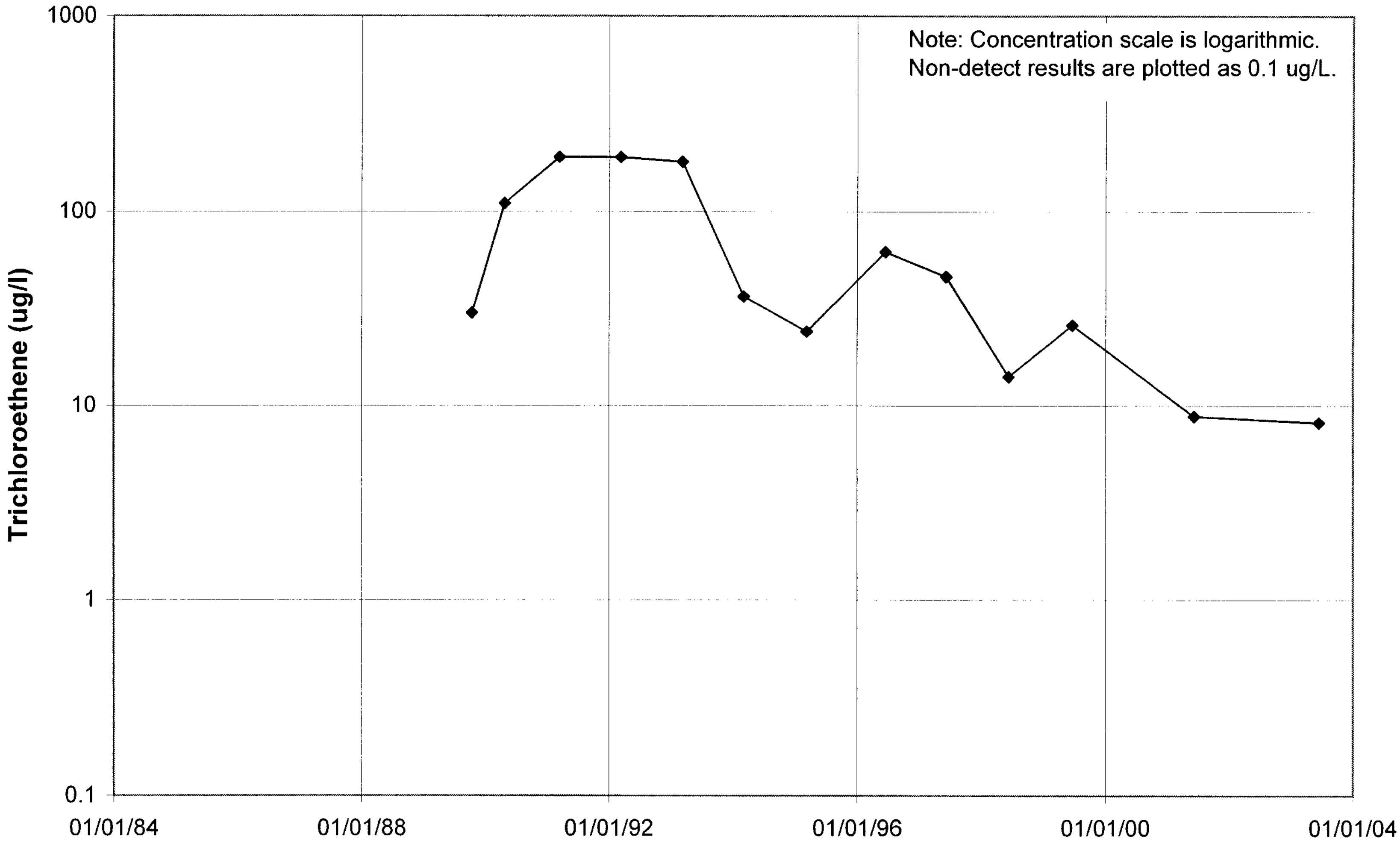

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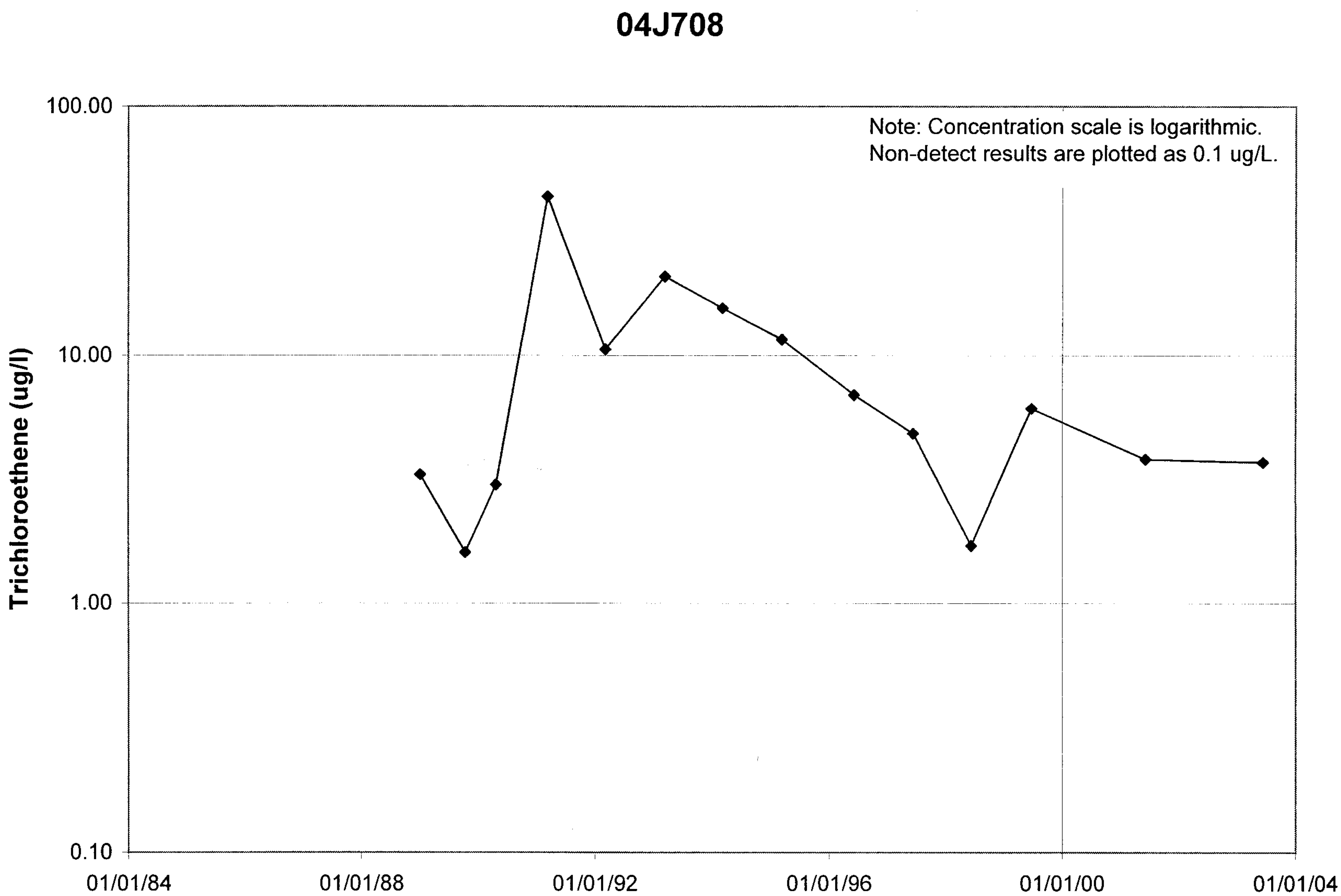

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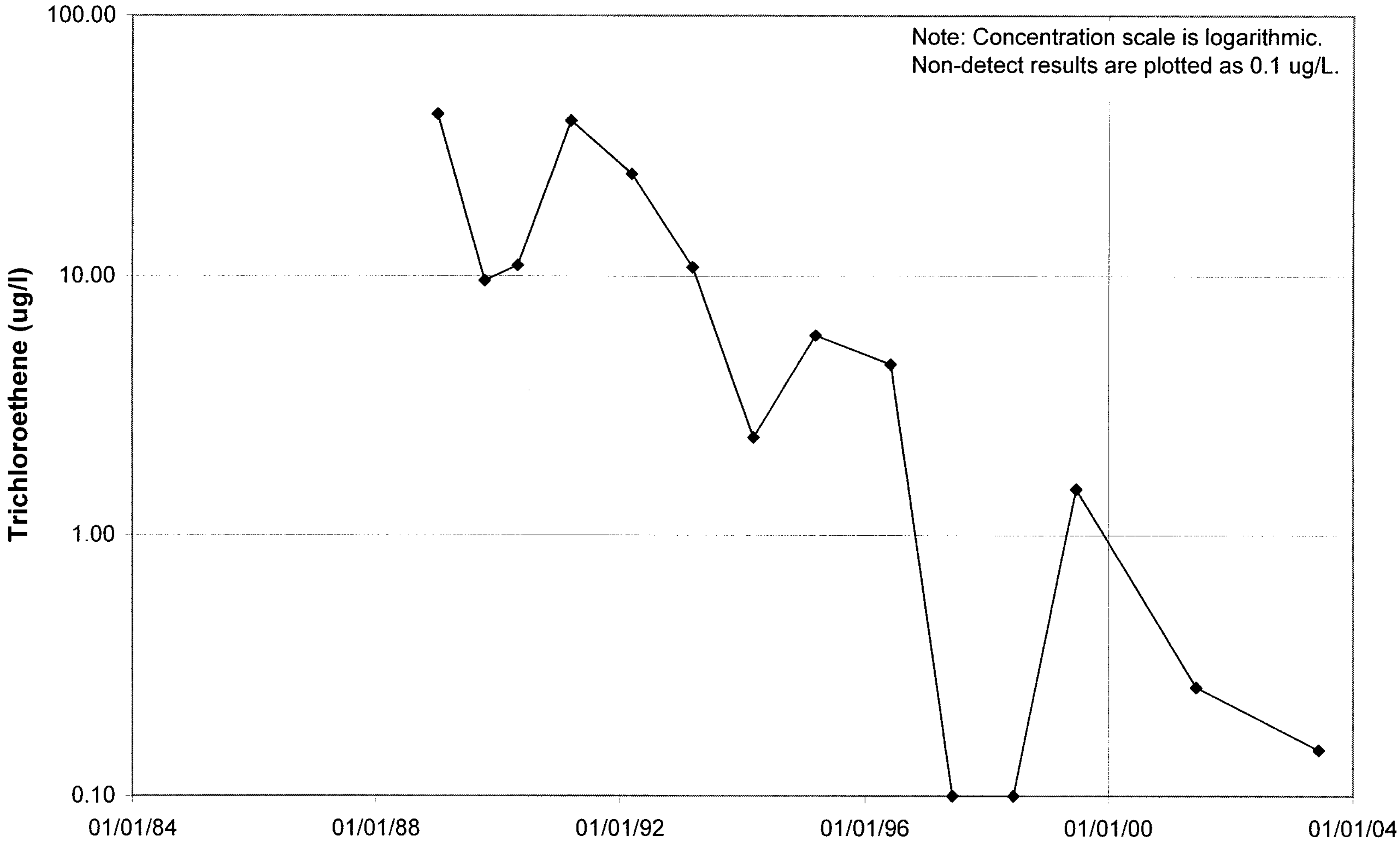

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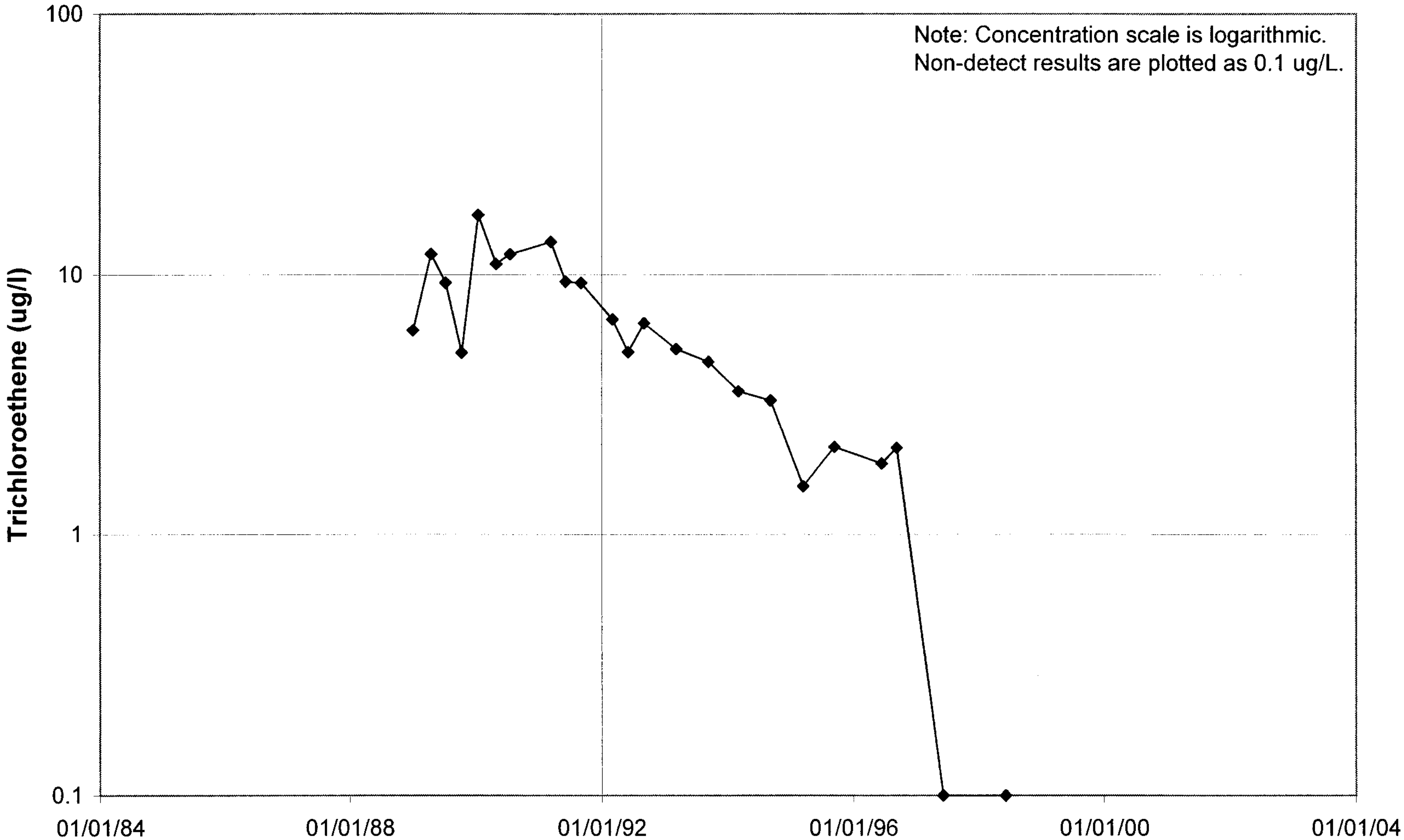

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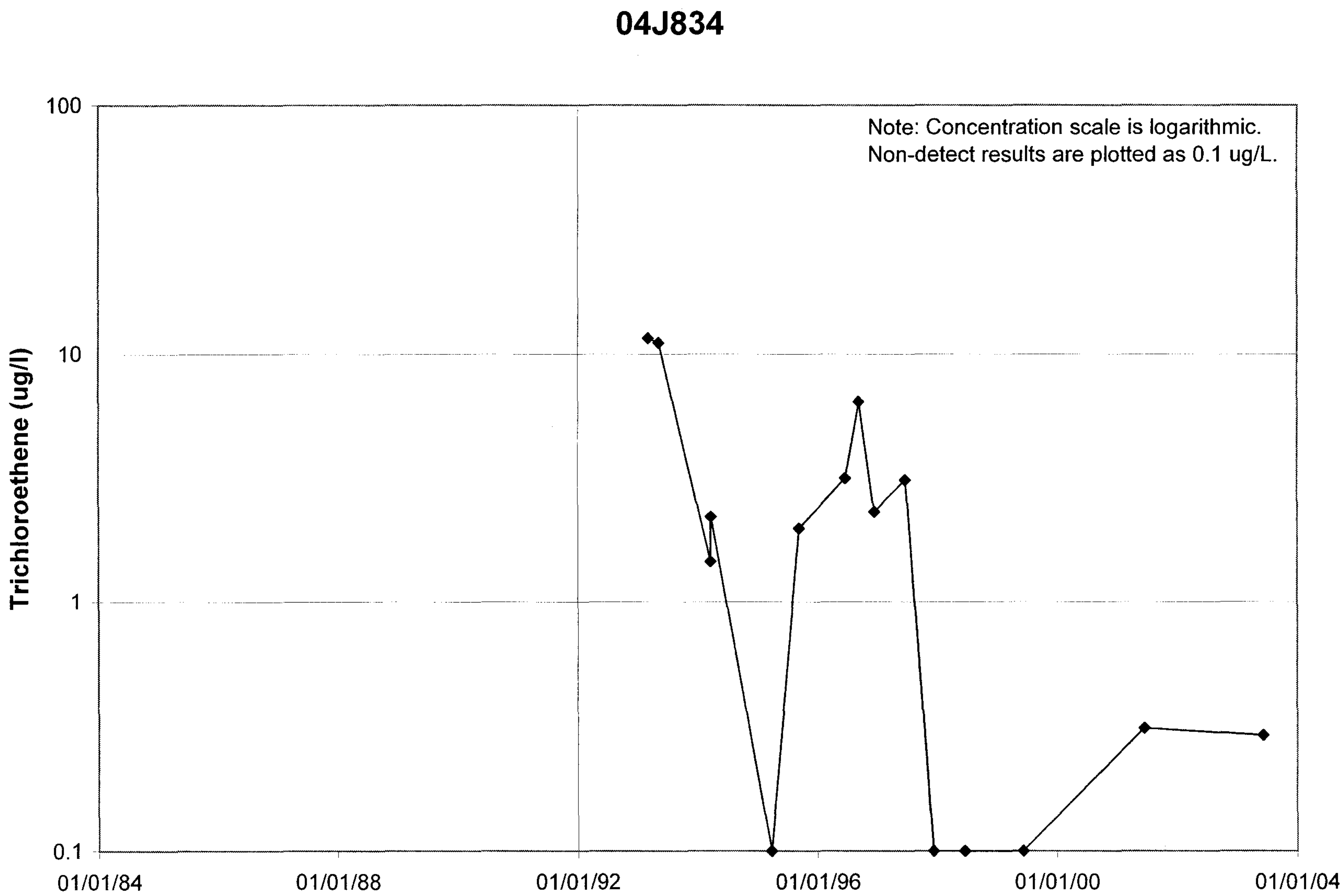

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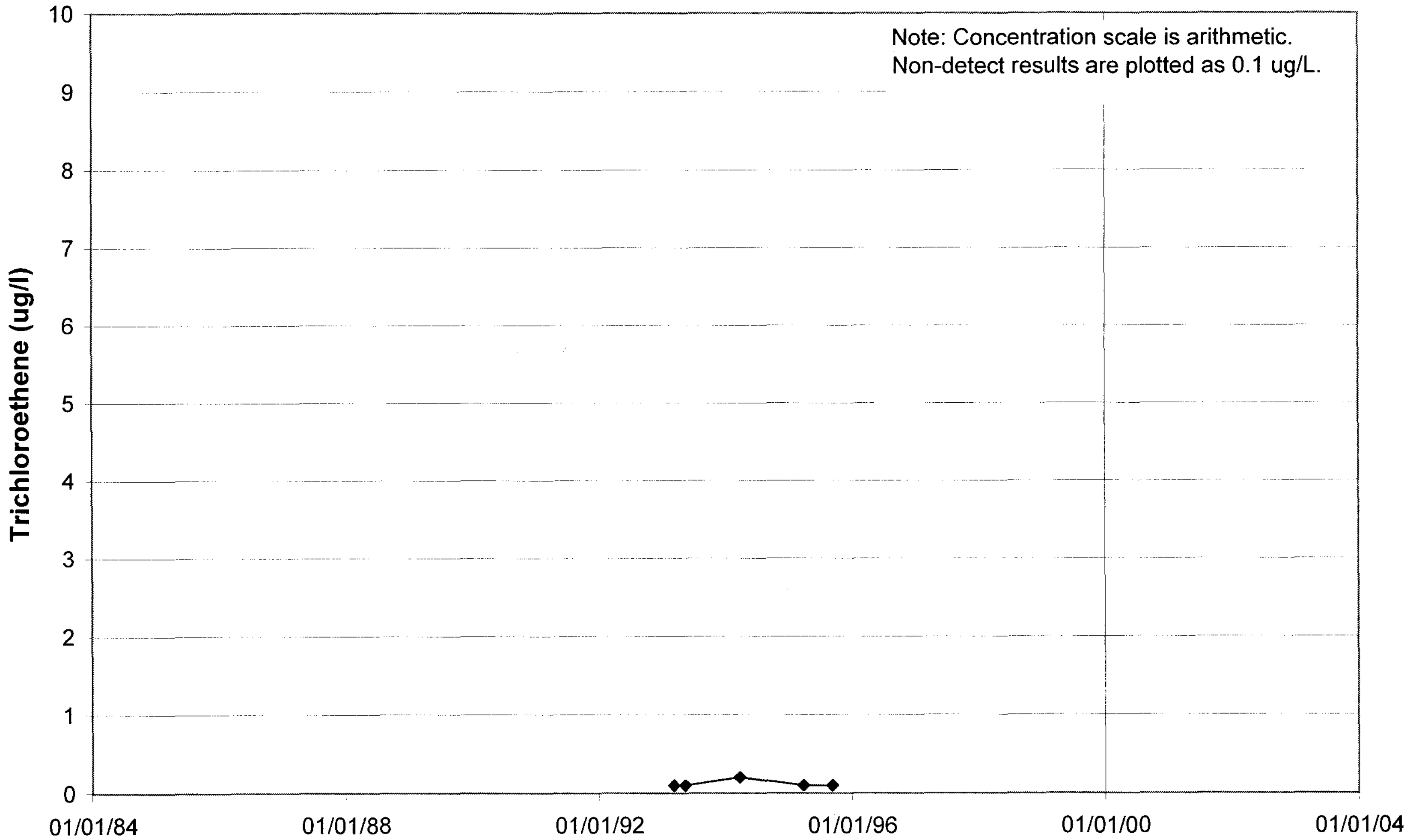

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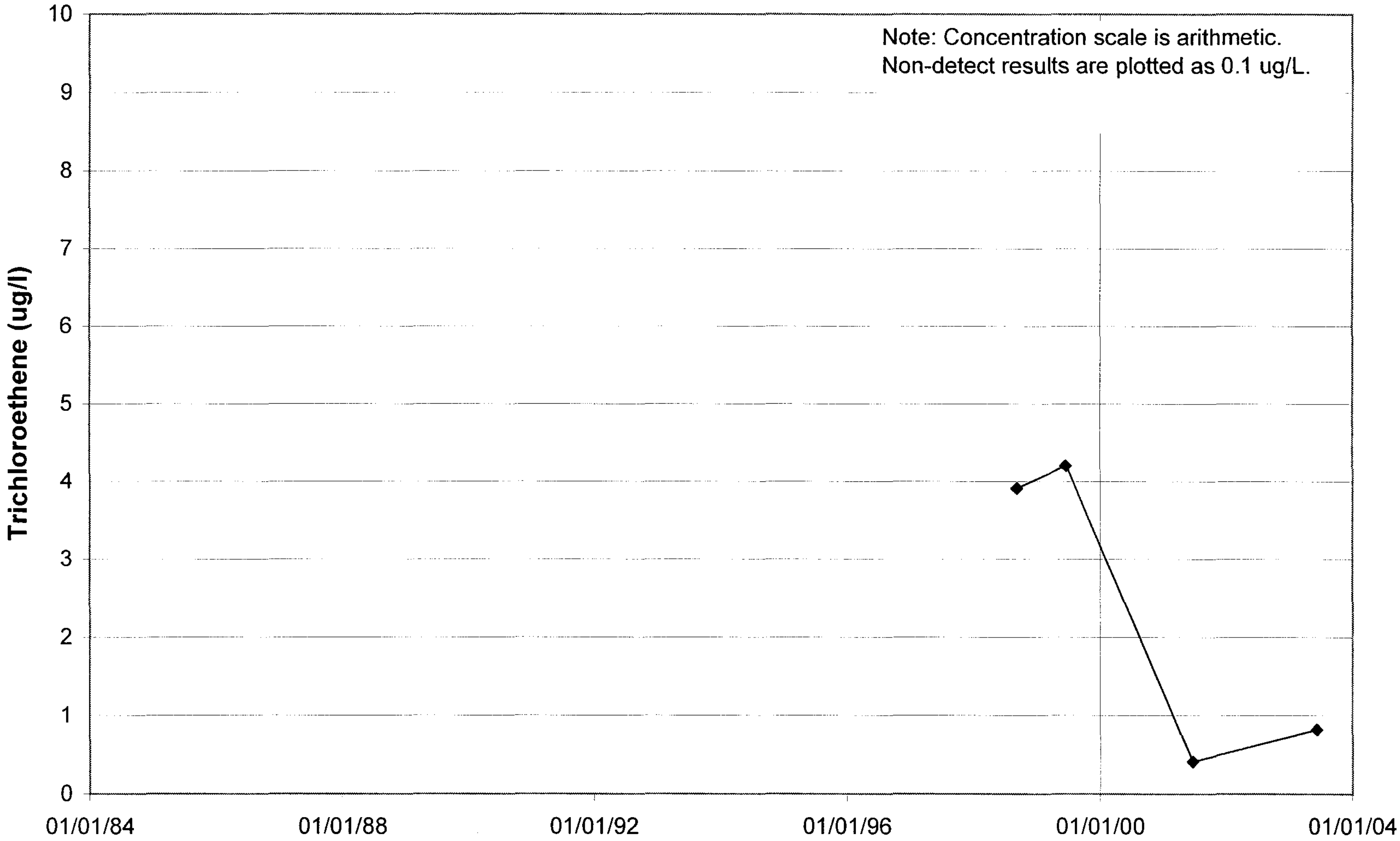

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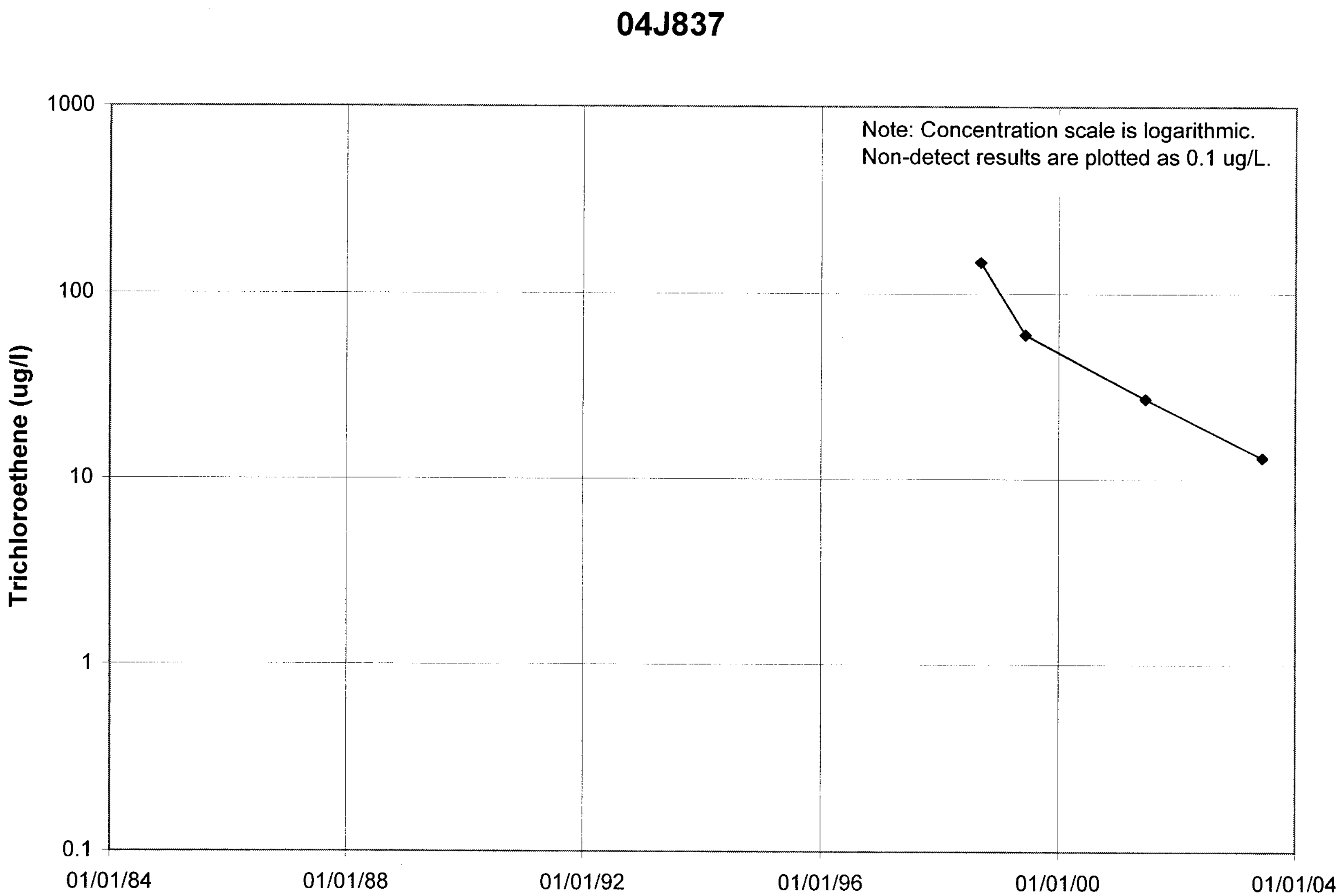

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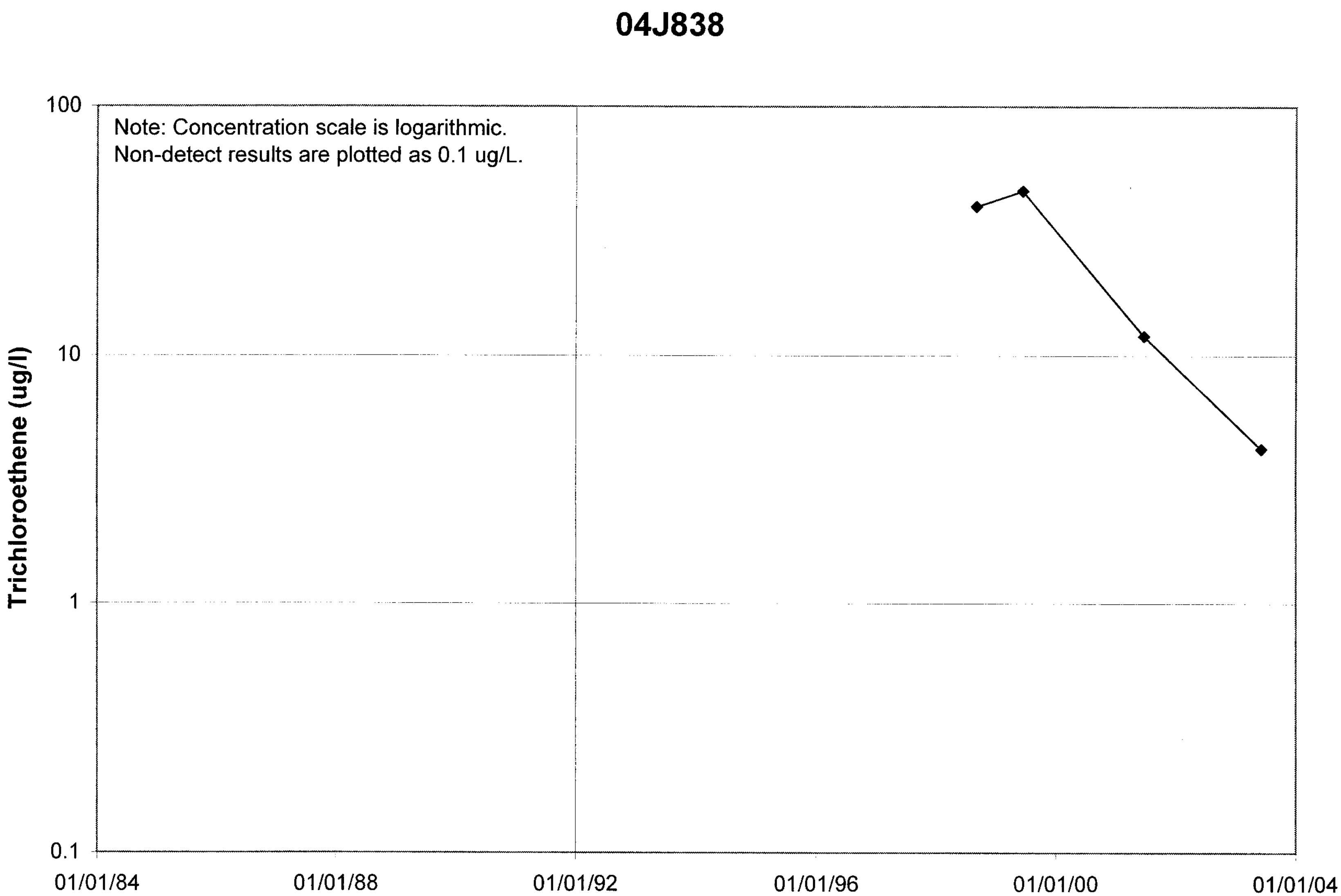

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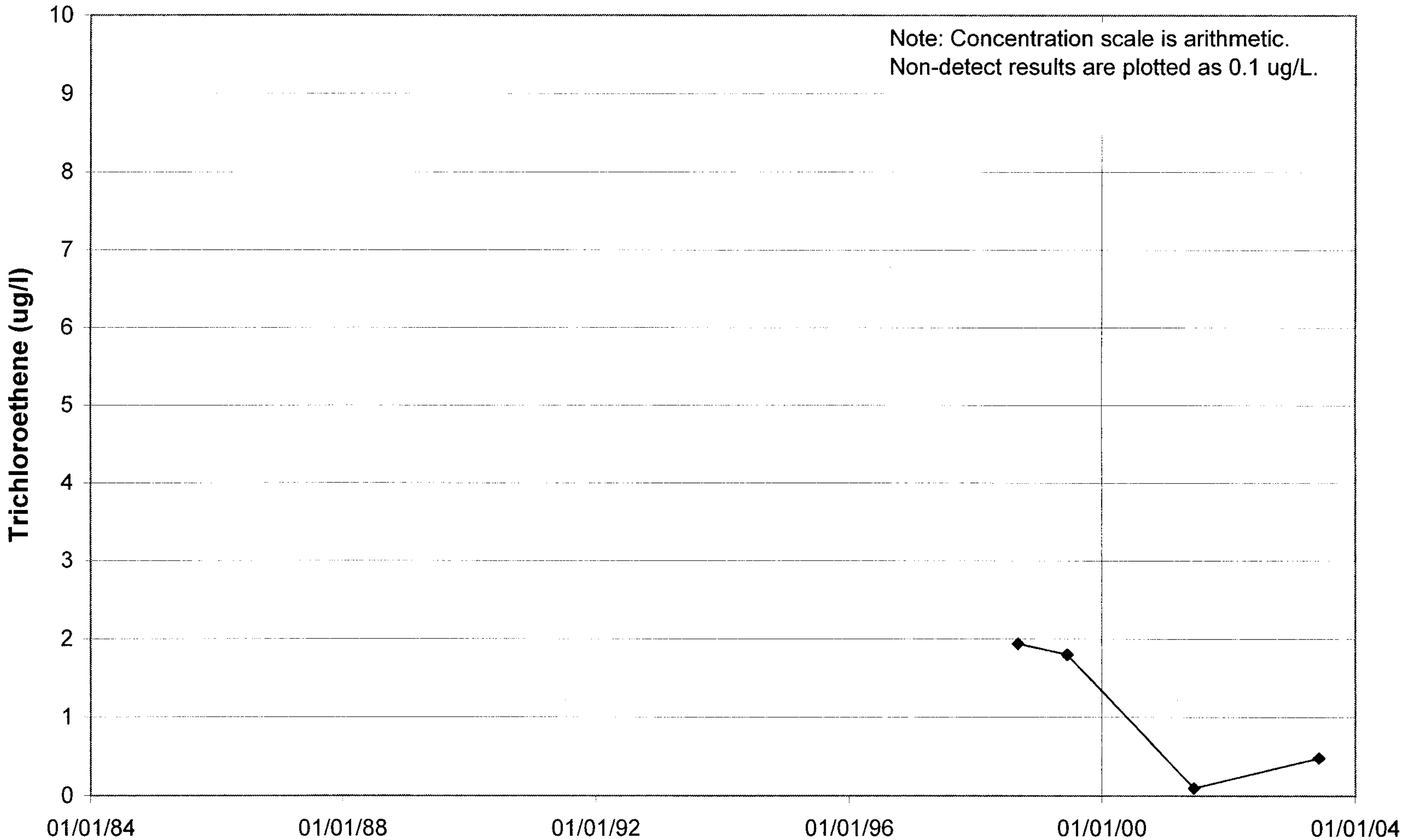

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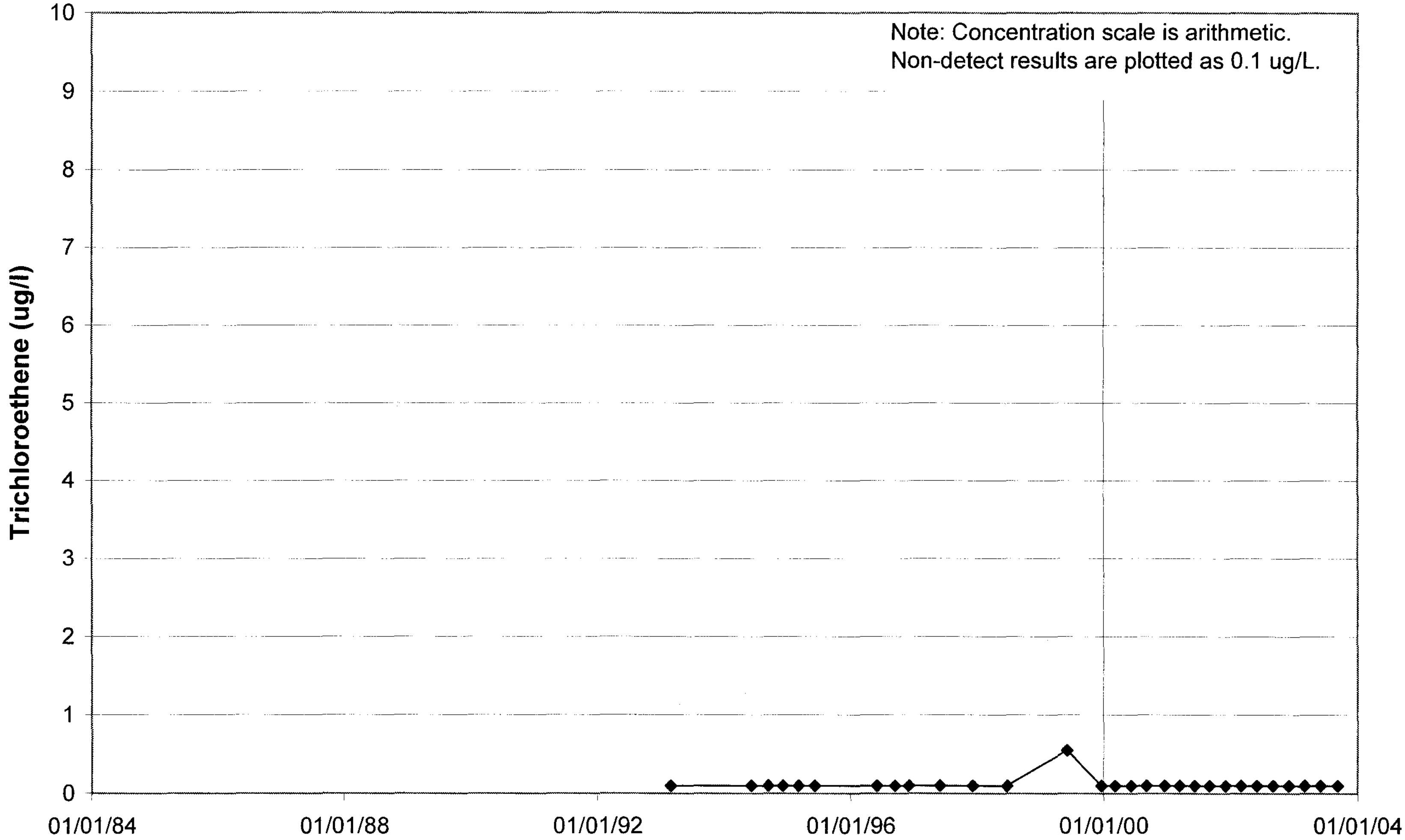

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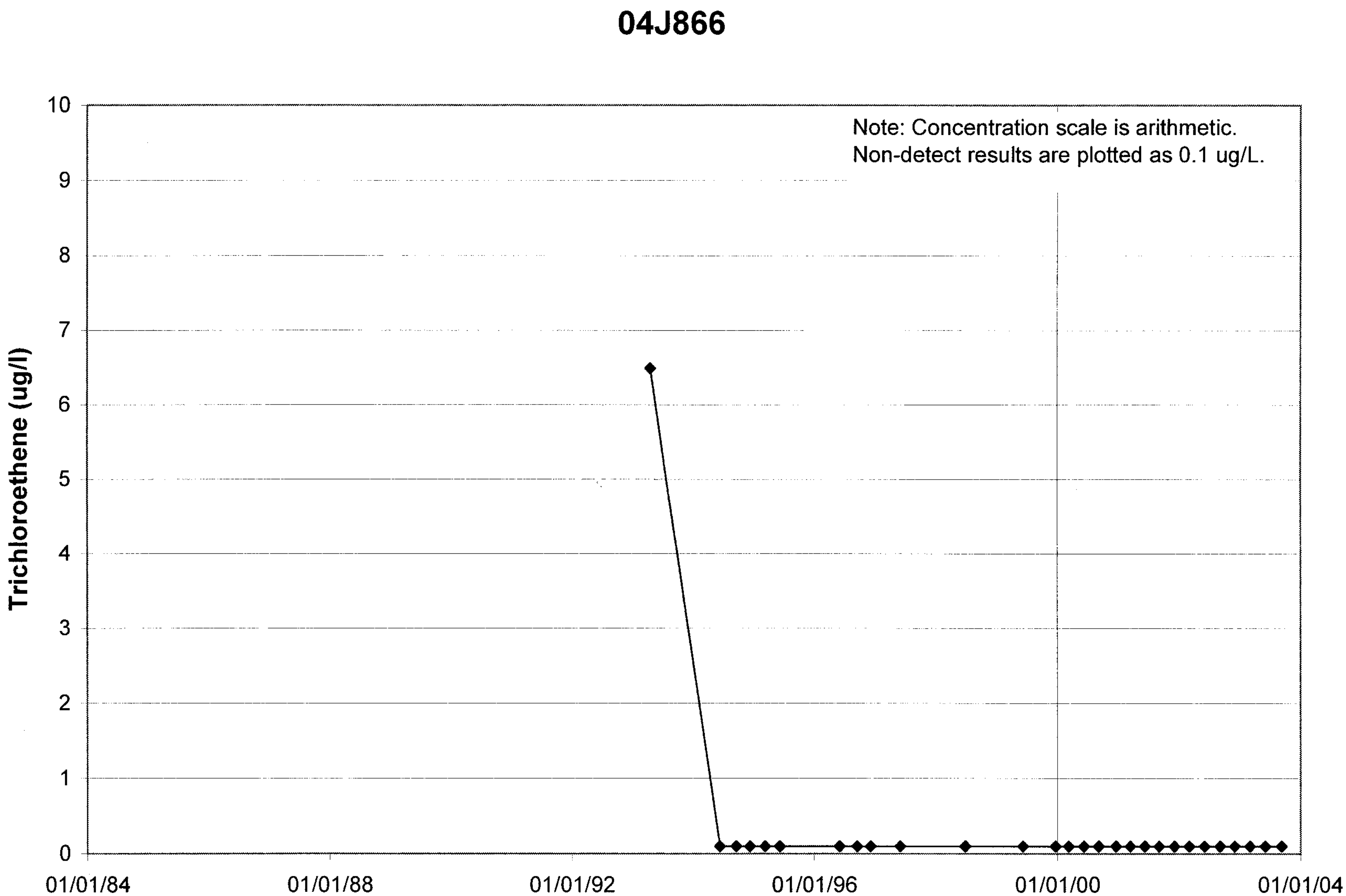

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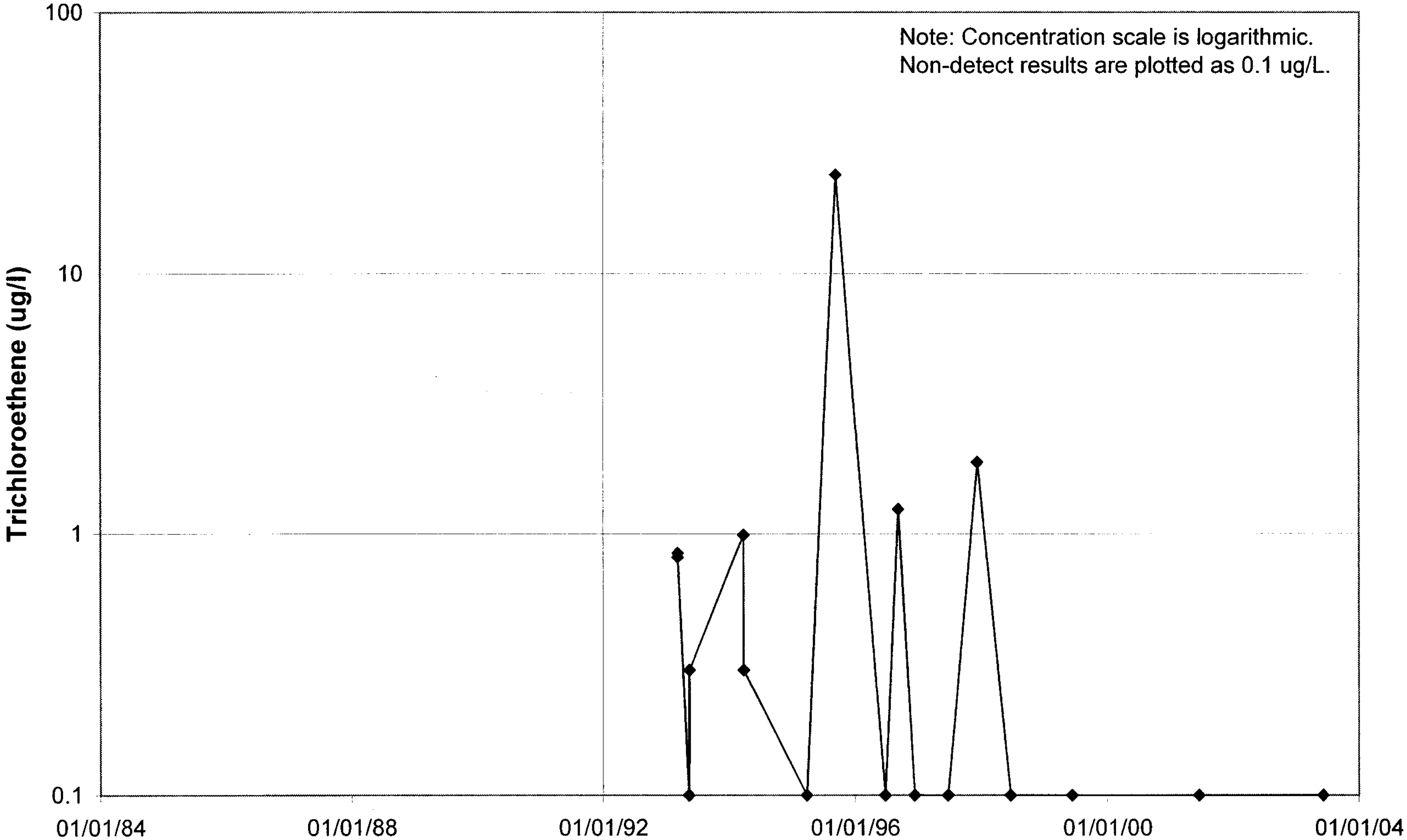

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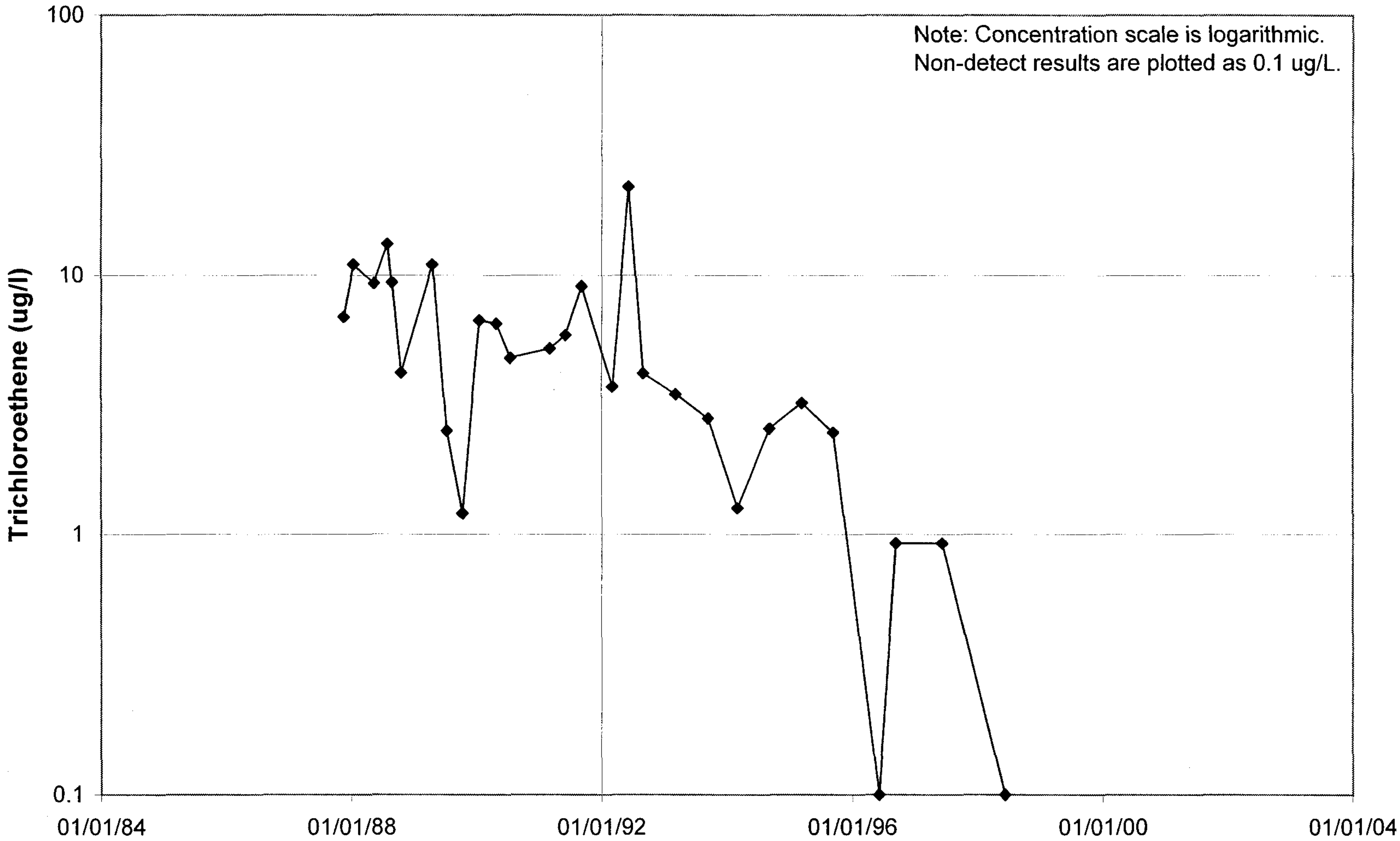

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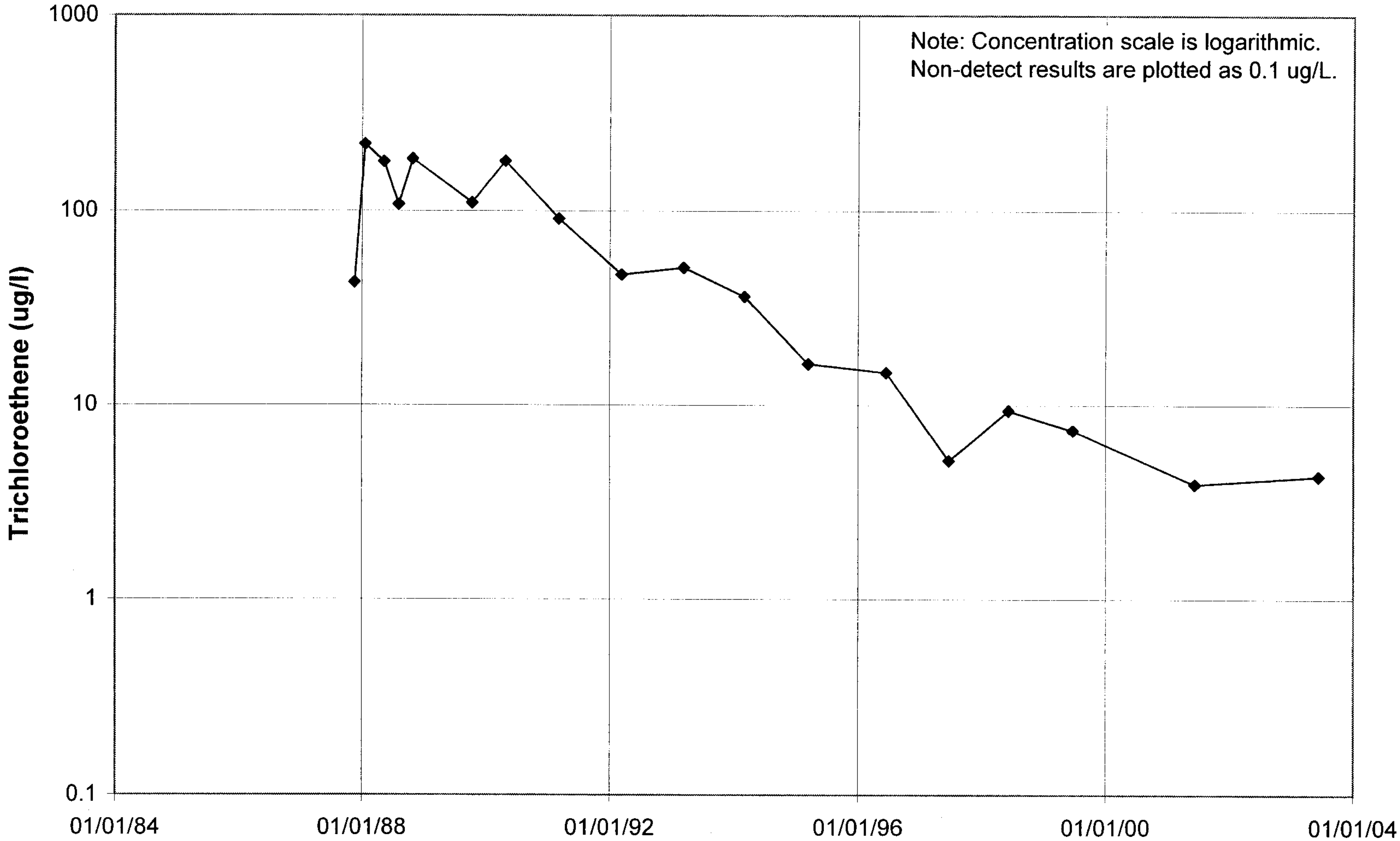
04U002



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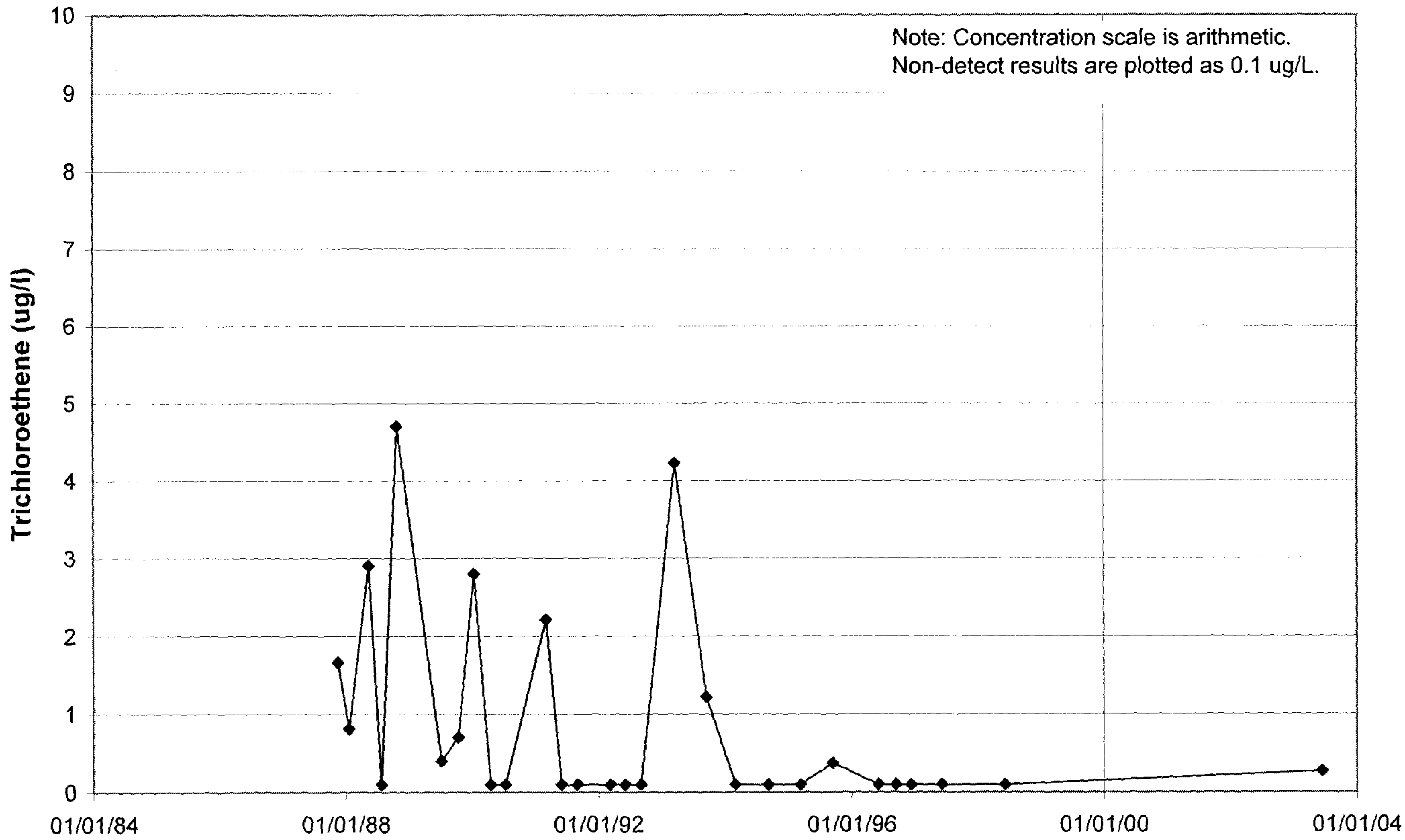
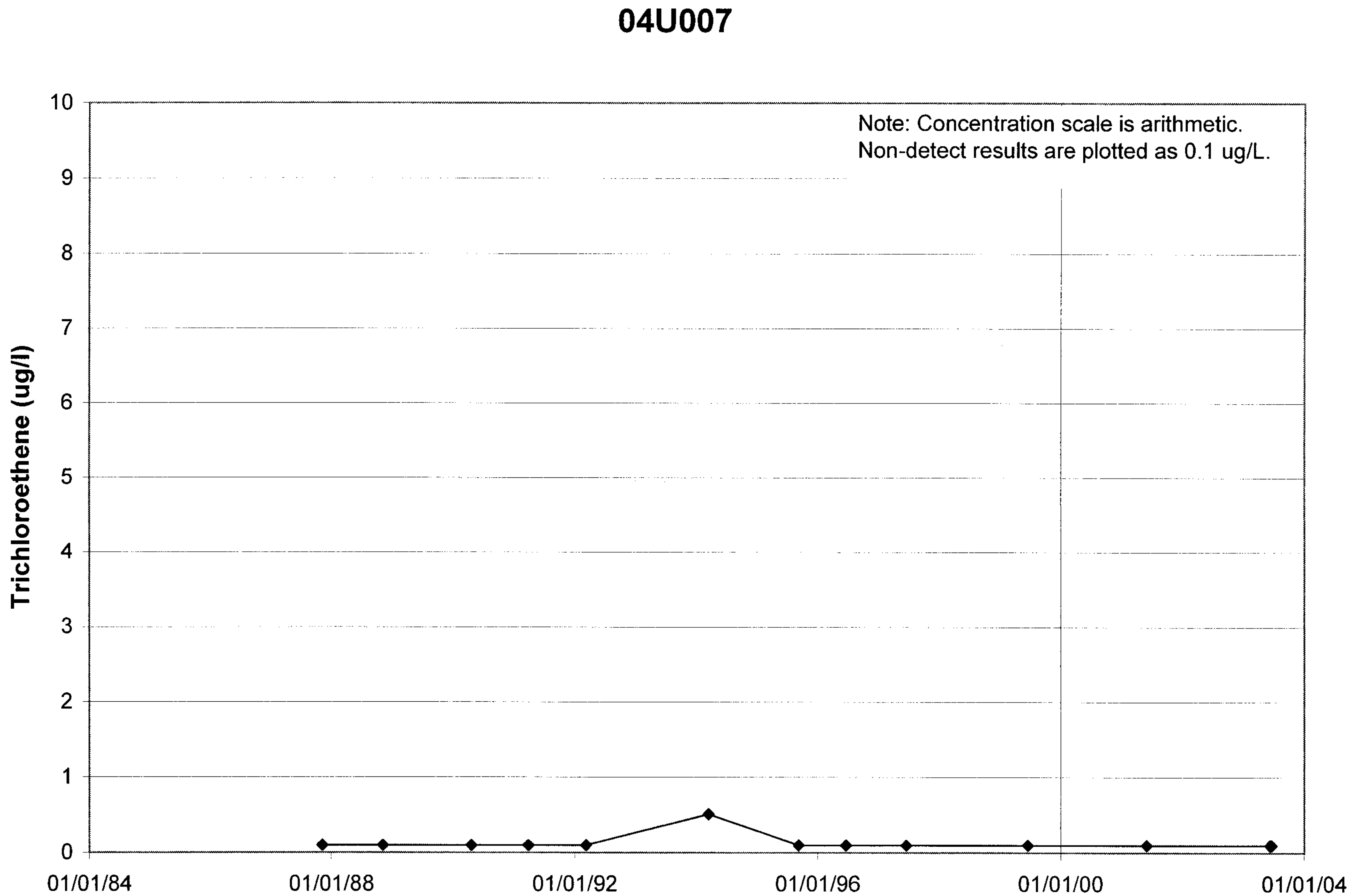


TO RETURN TO MAP: Click on "Go To Previous View" Button in the Tool Bar



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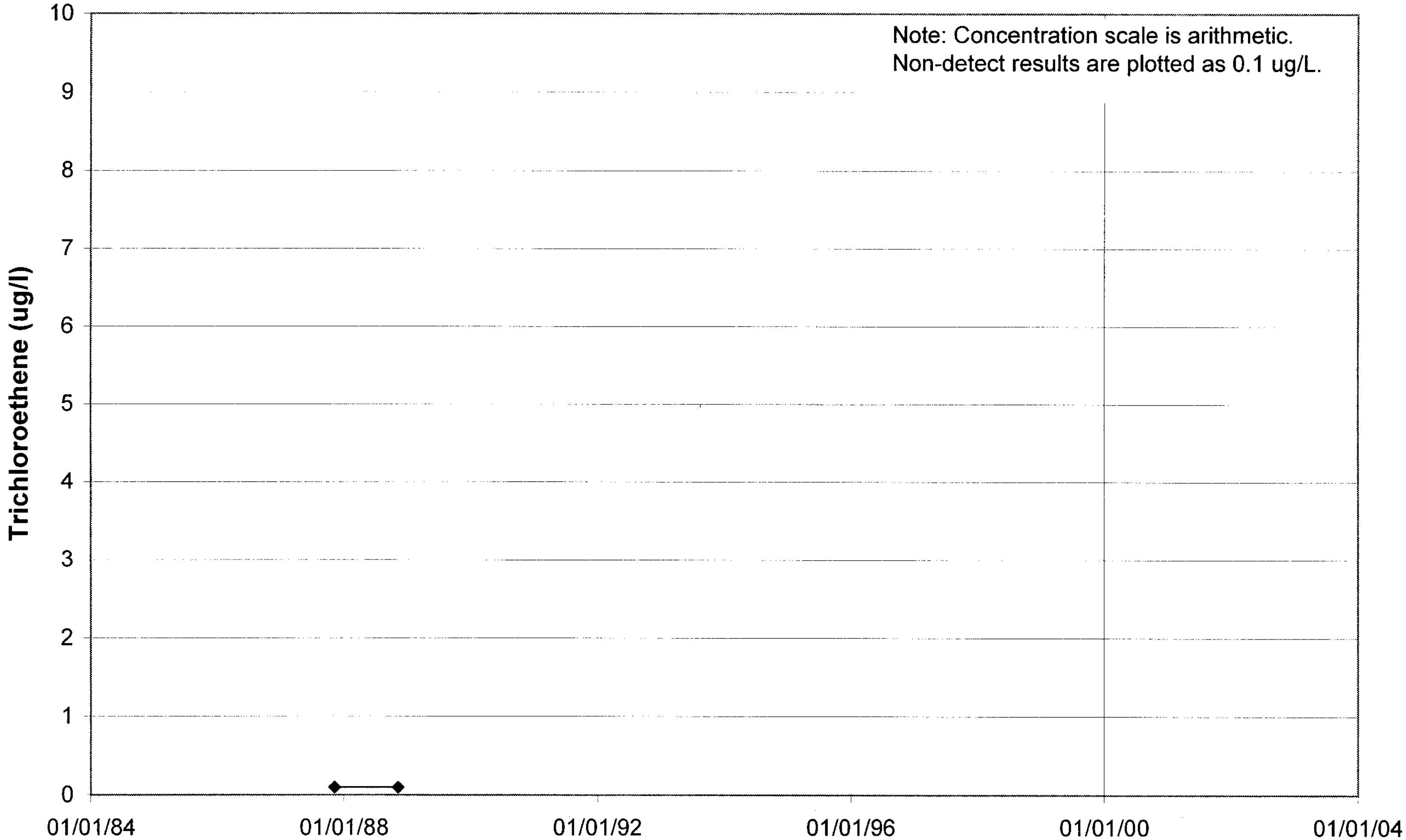

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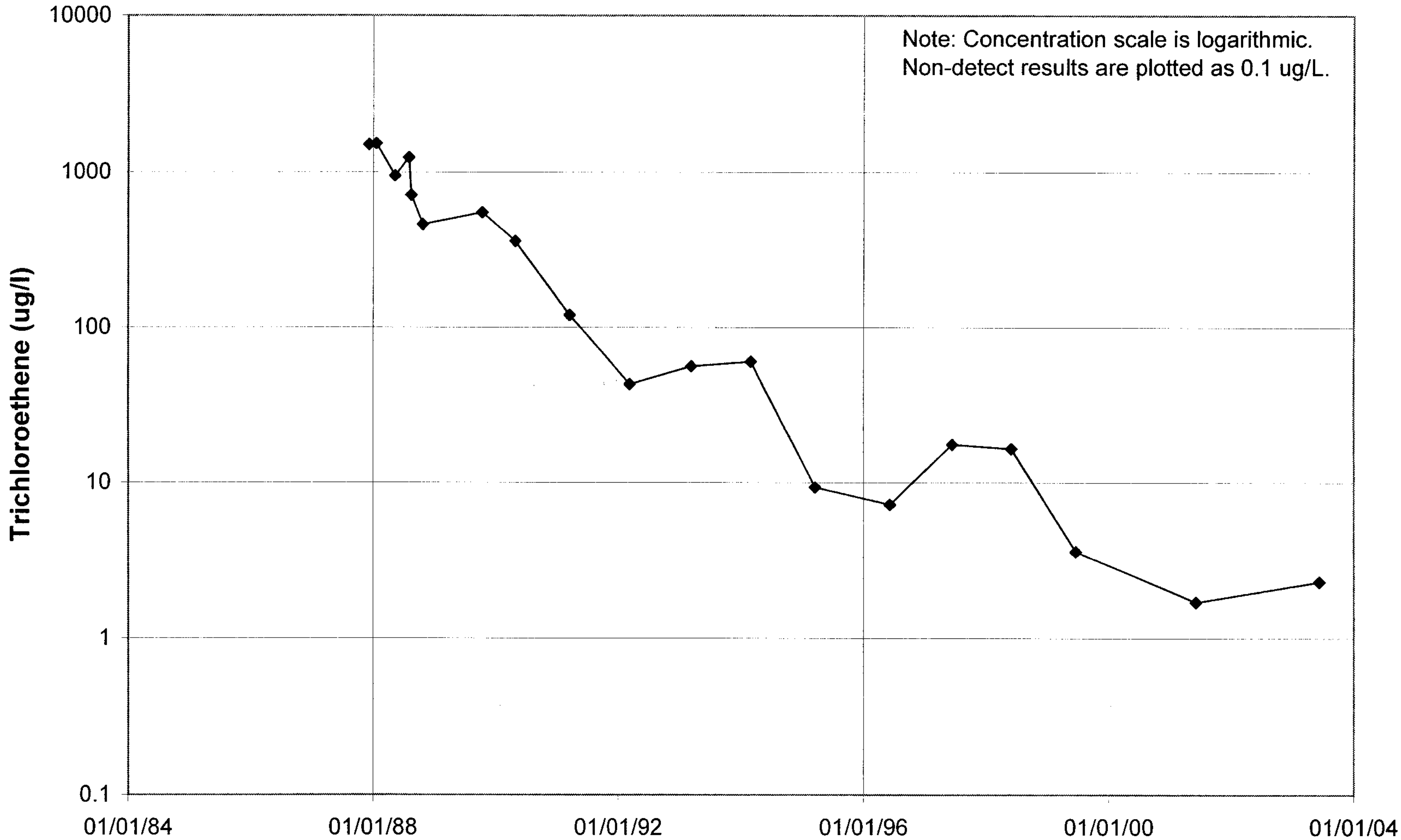

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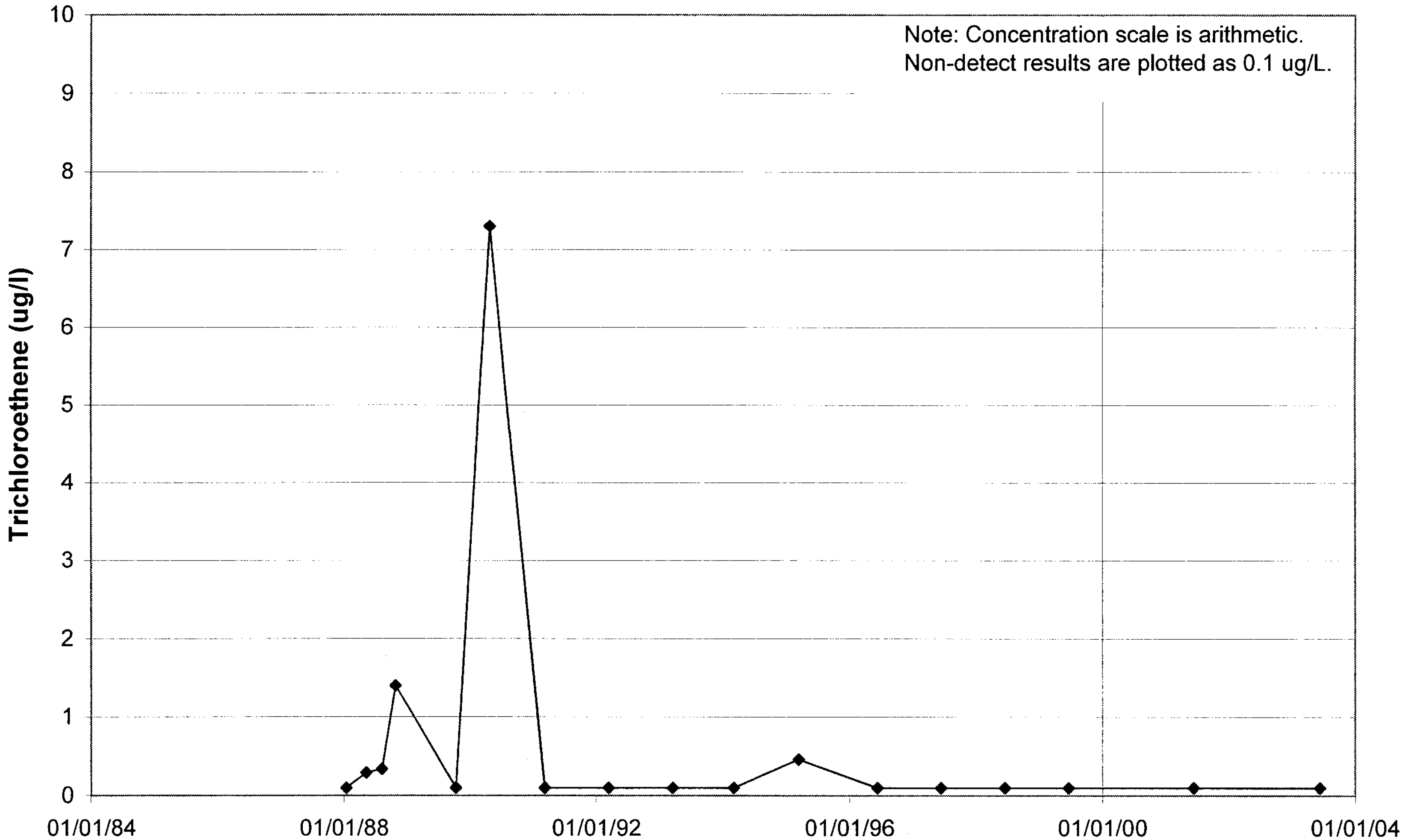

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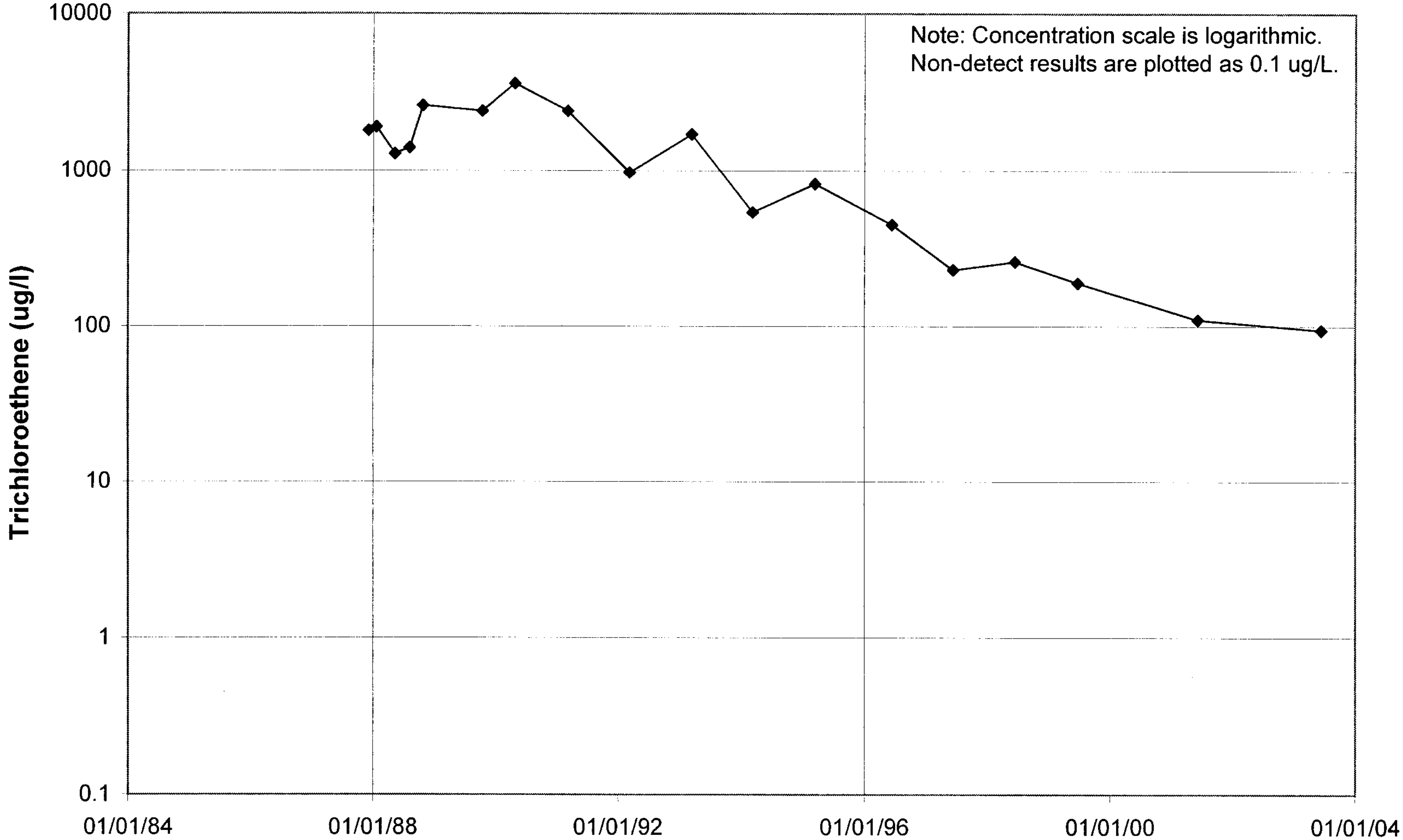

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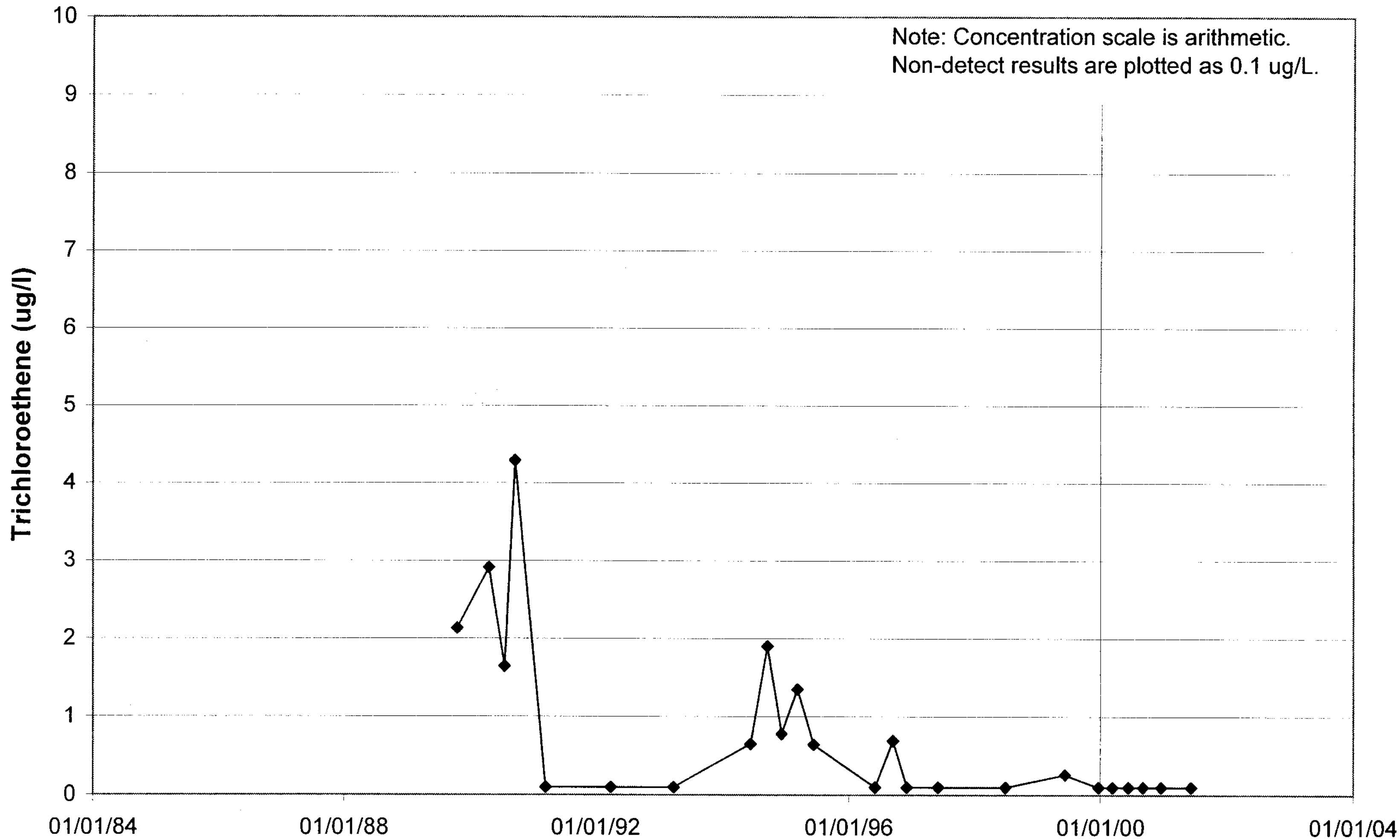
04U414 (414U4)



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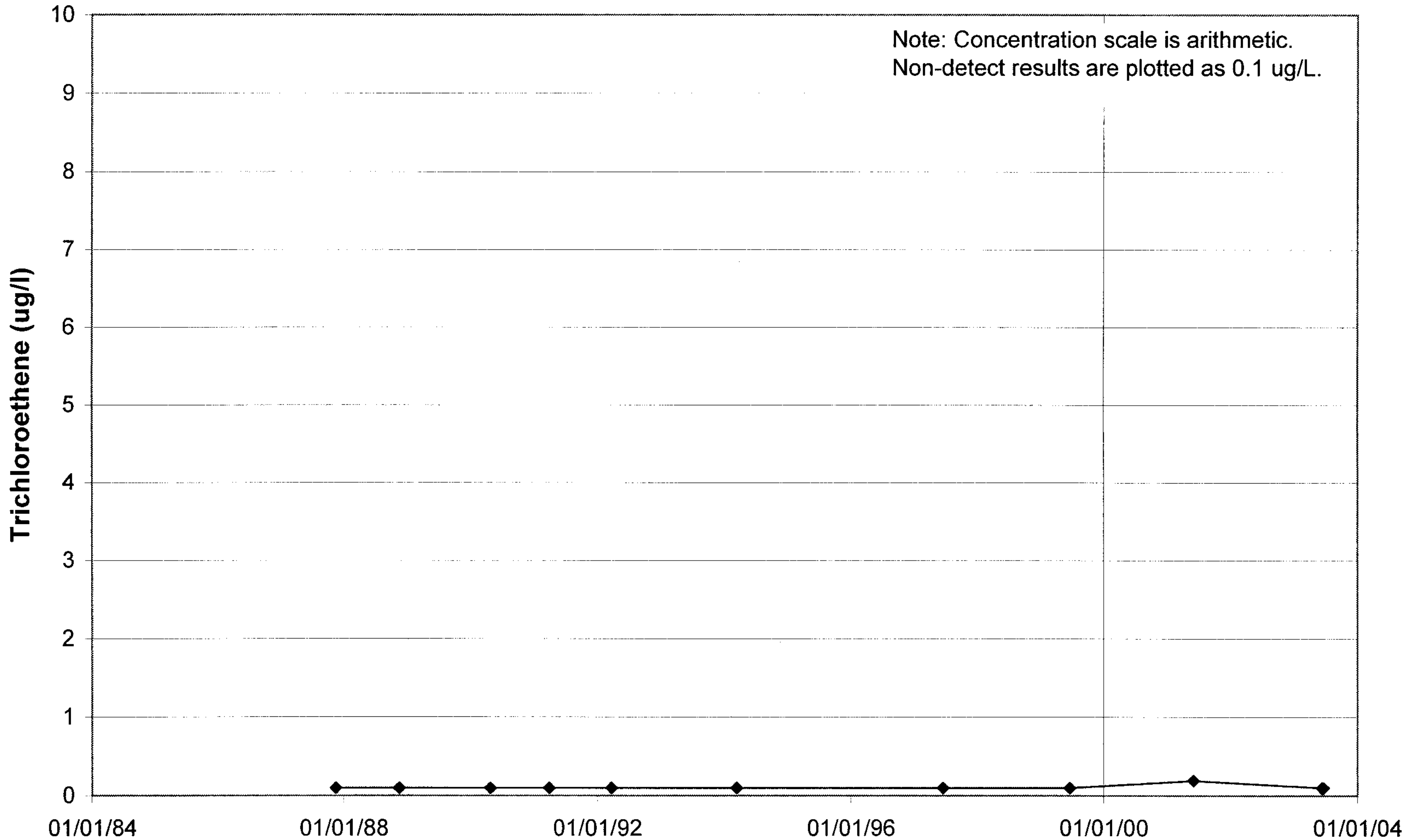

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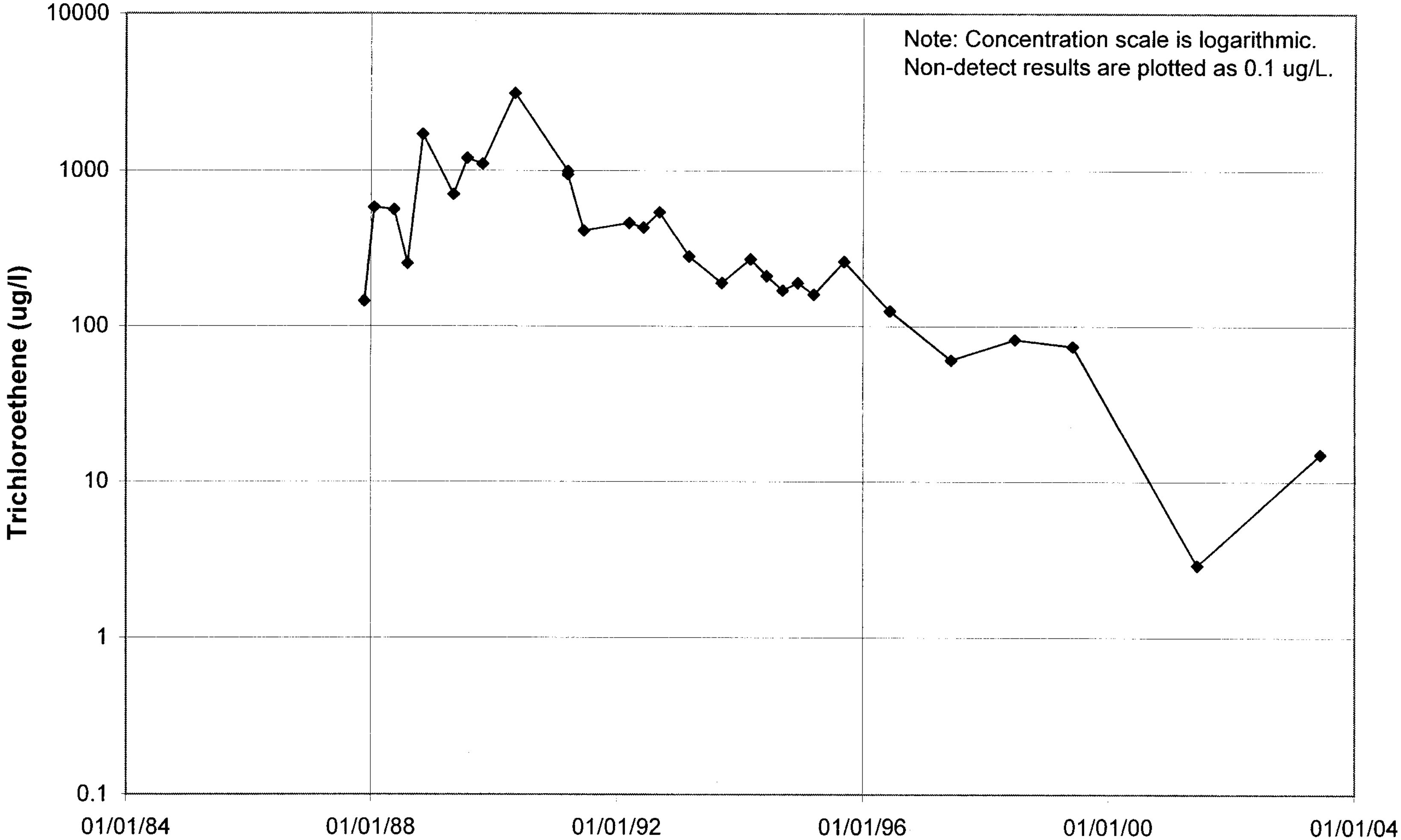

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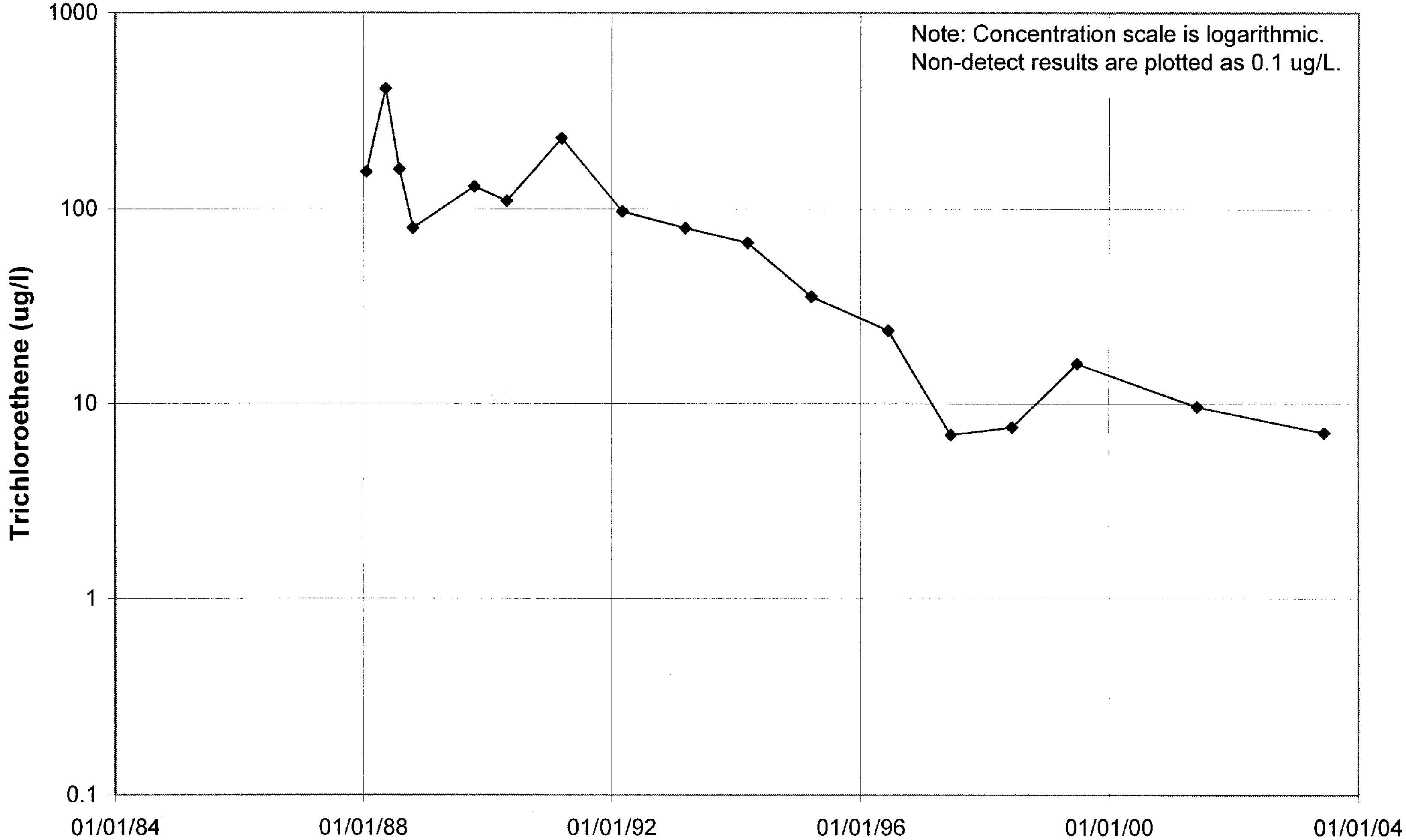

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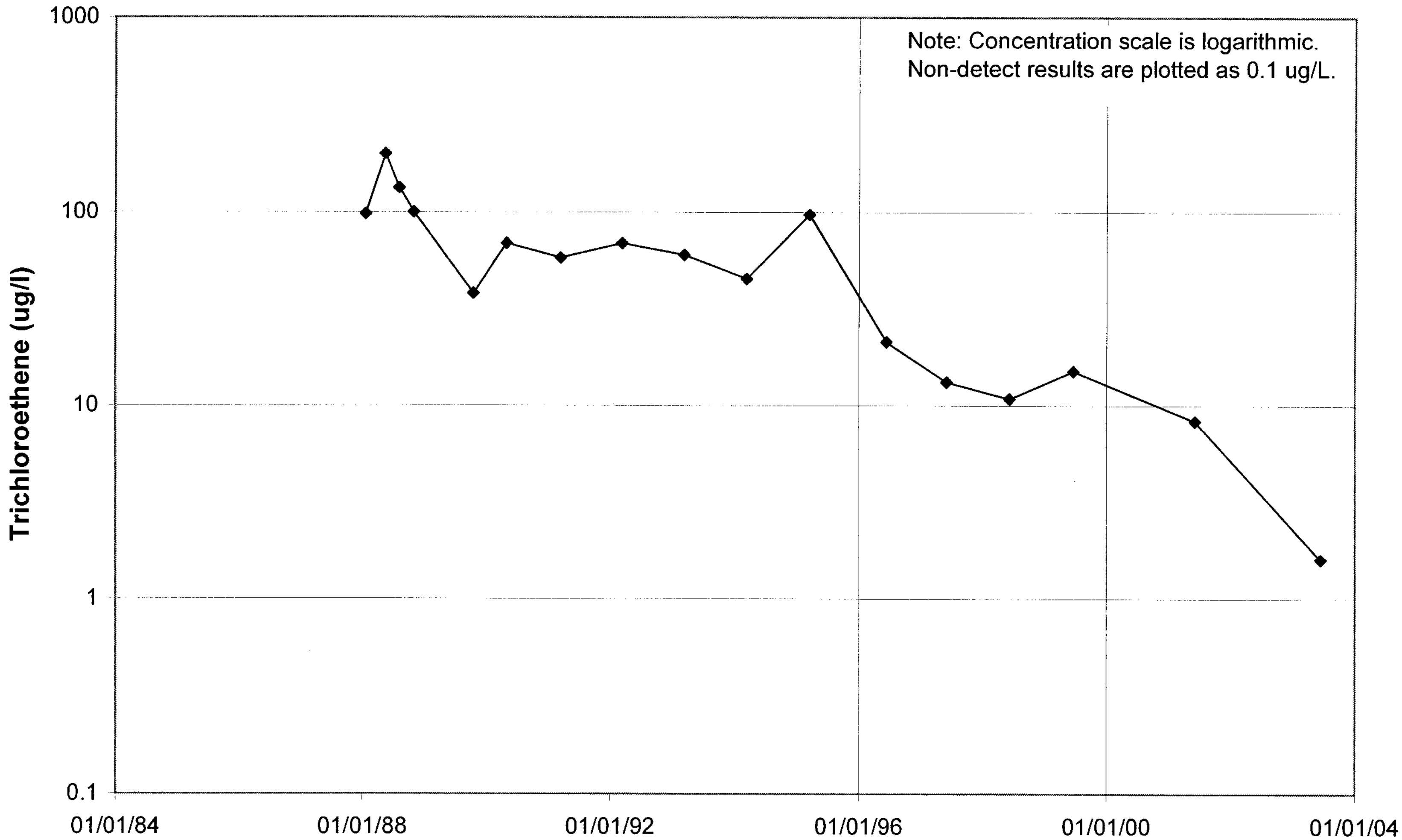

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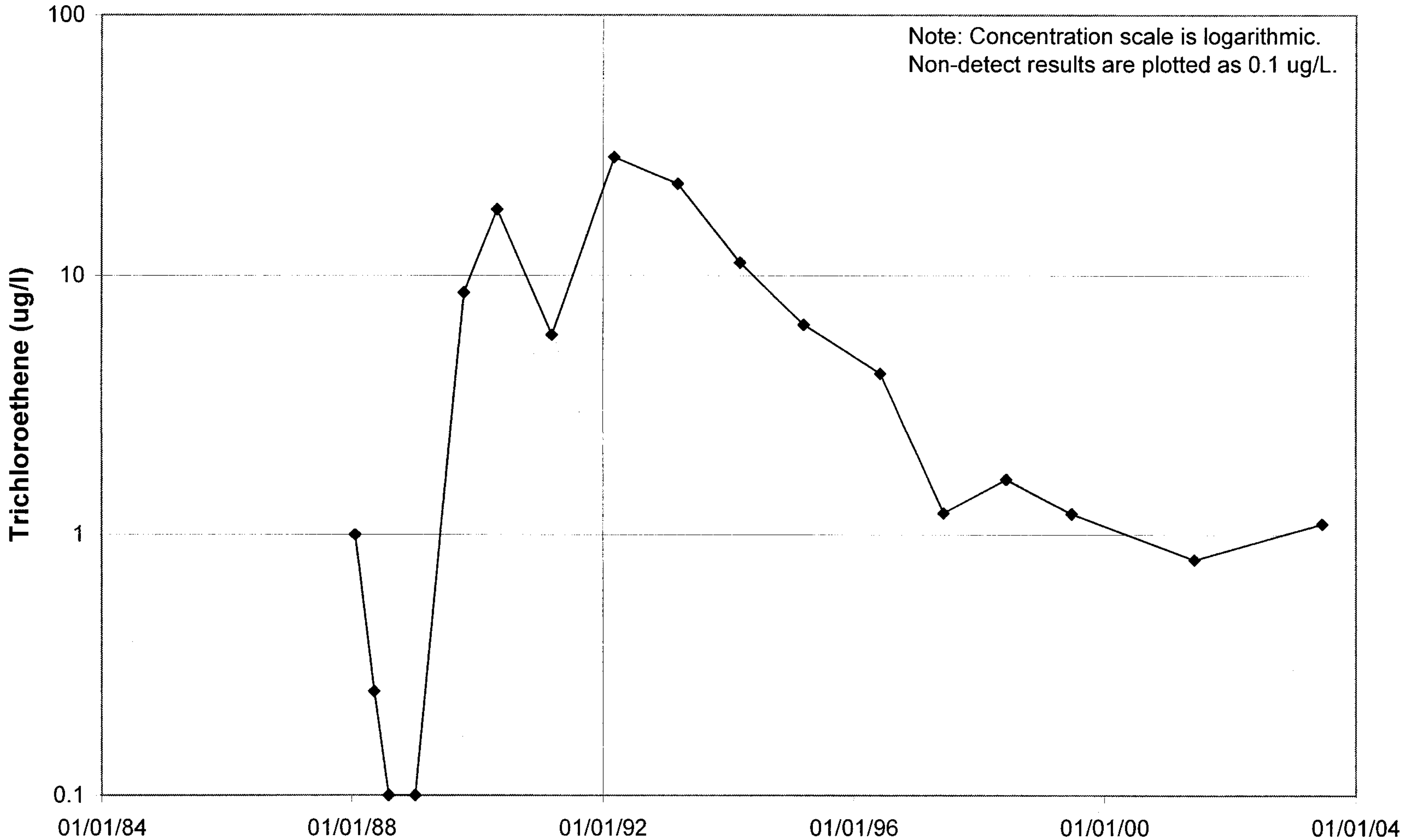

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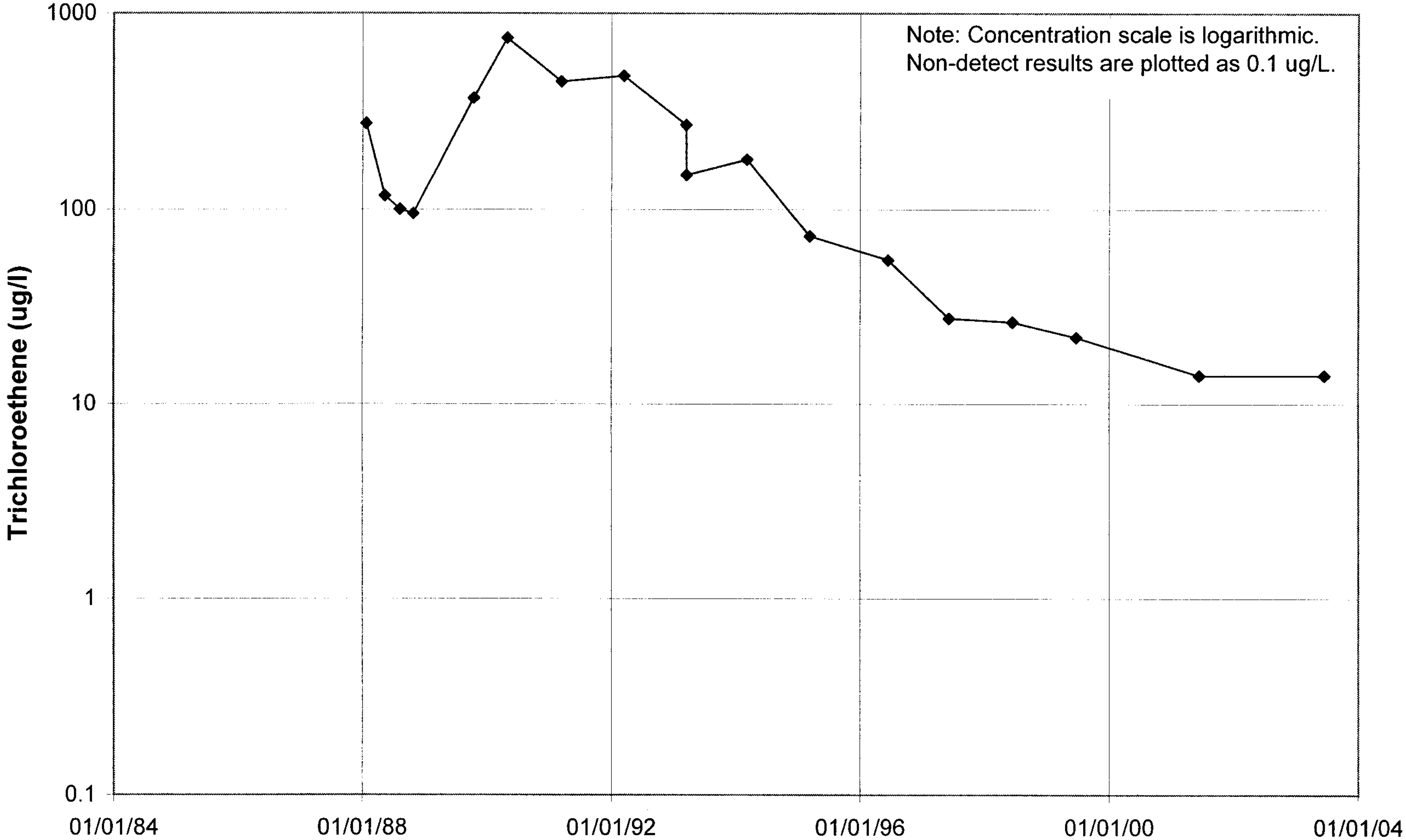

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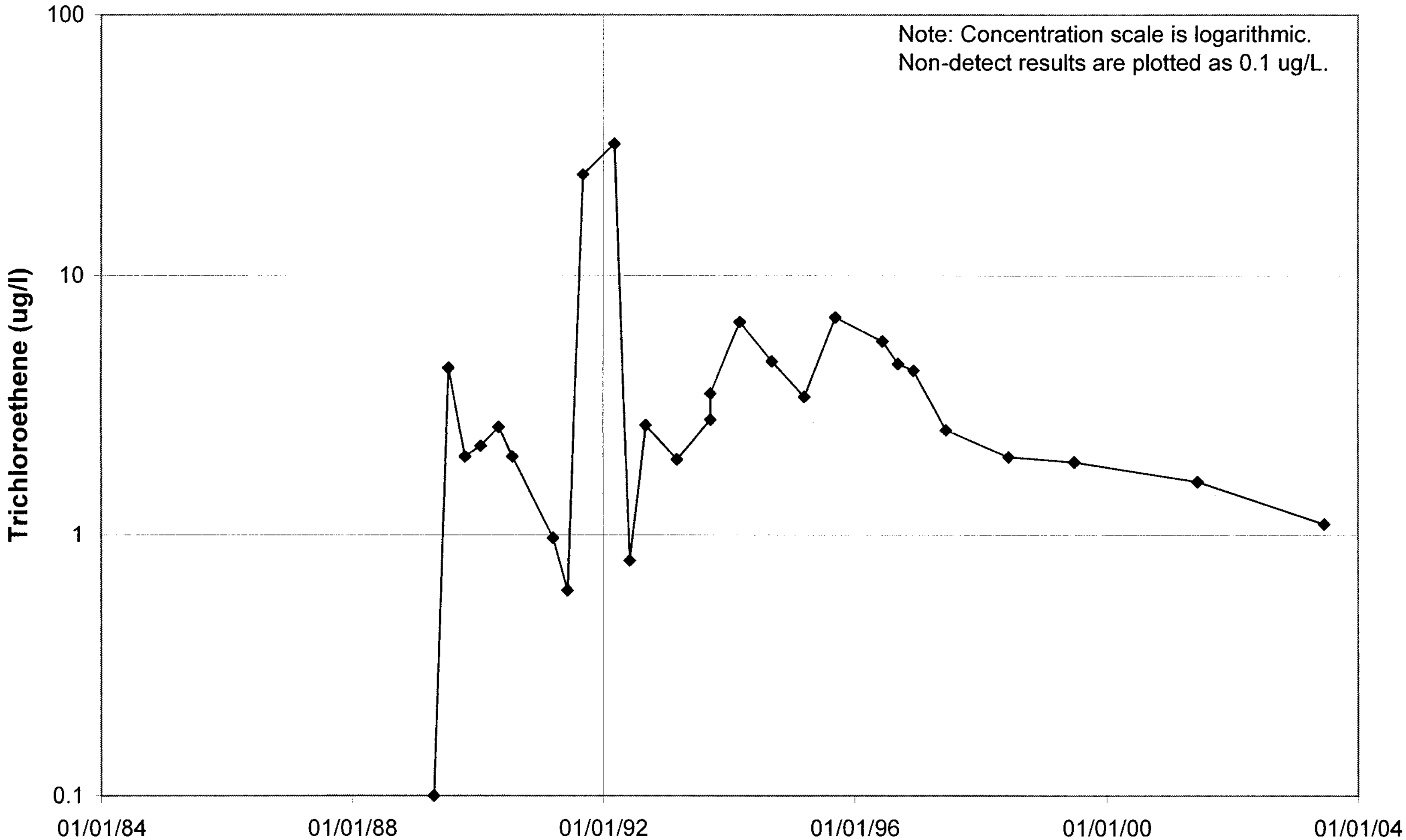

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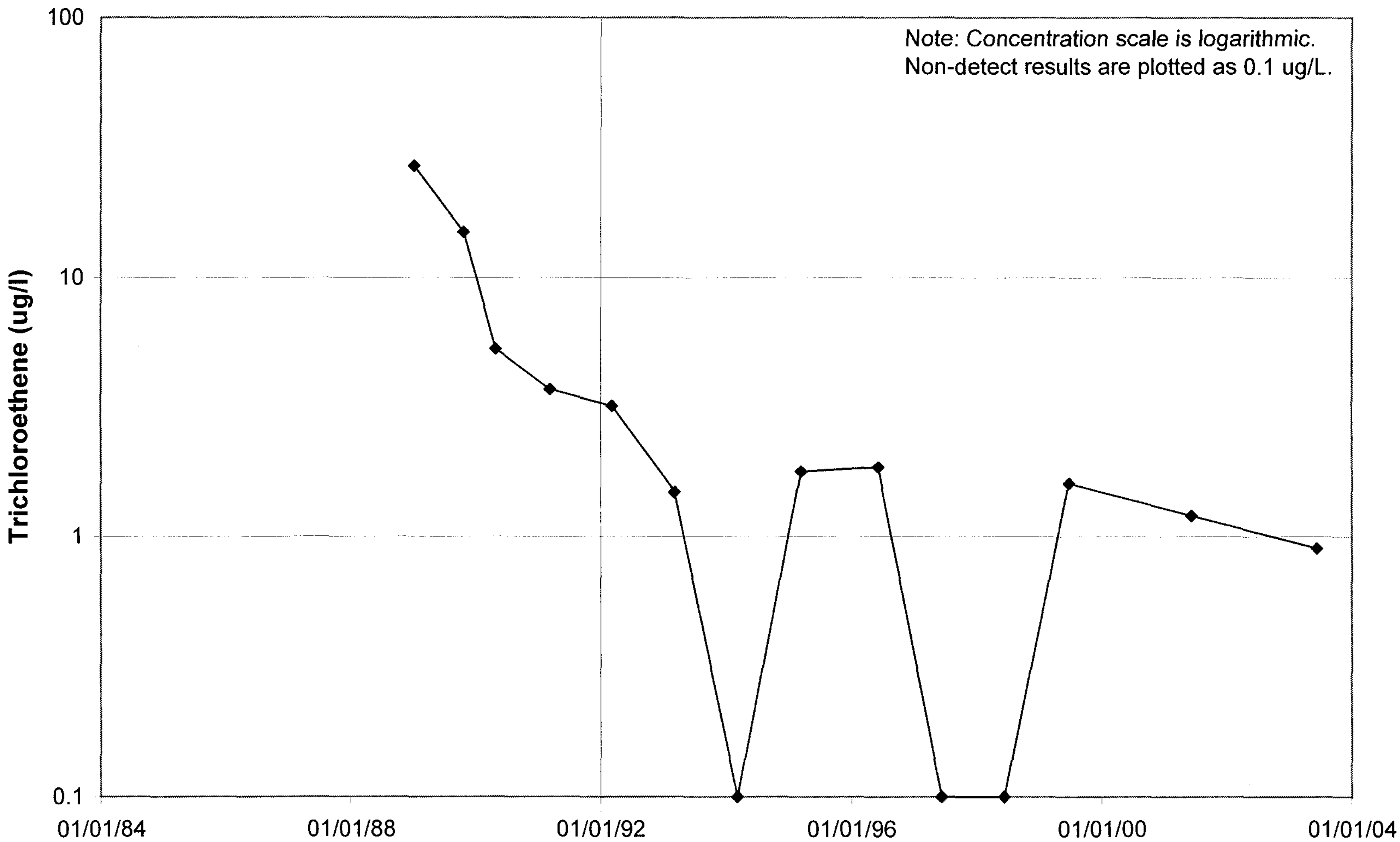

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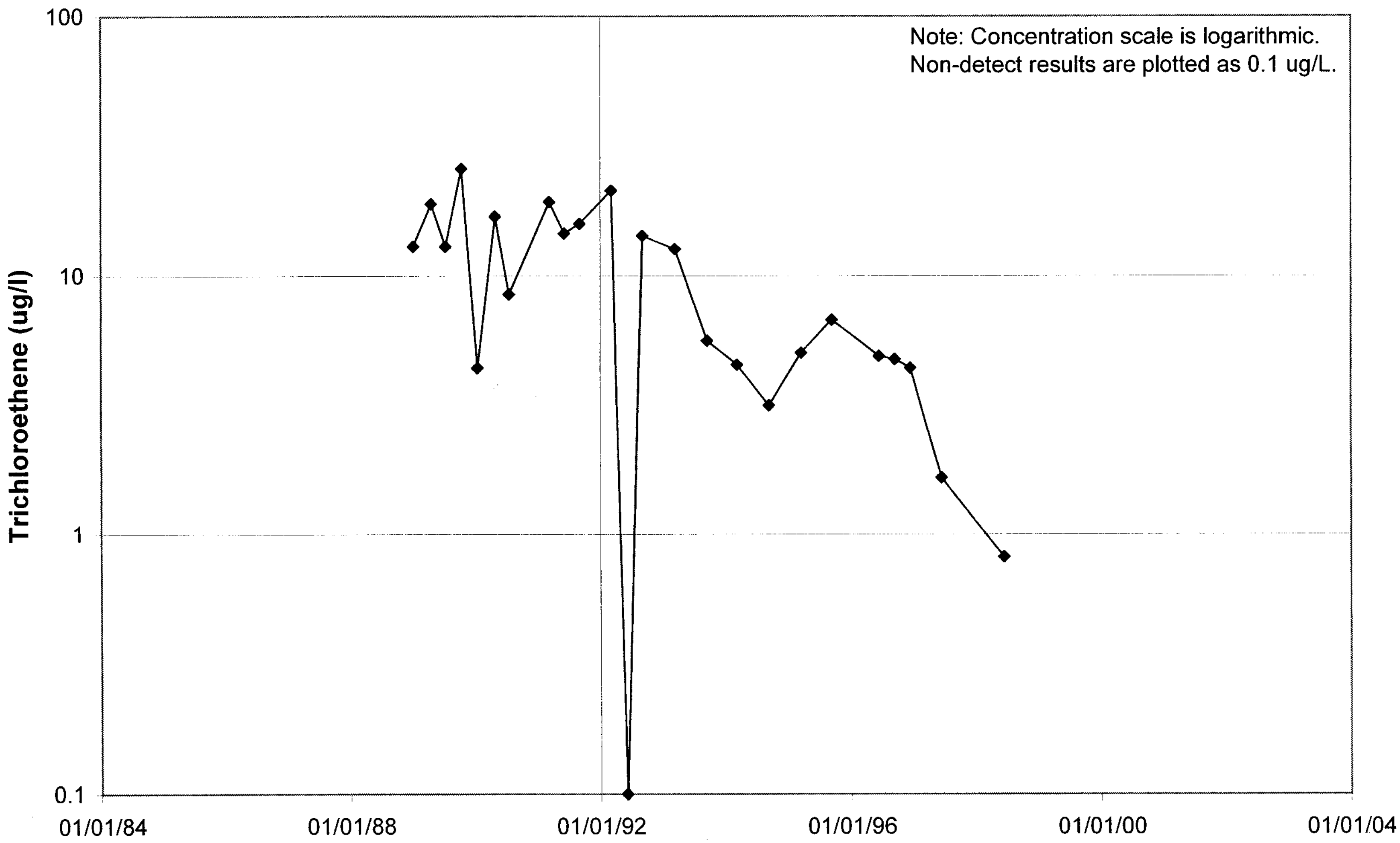

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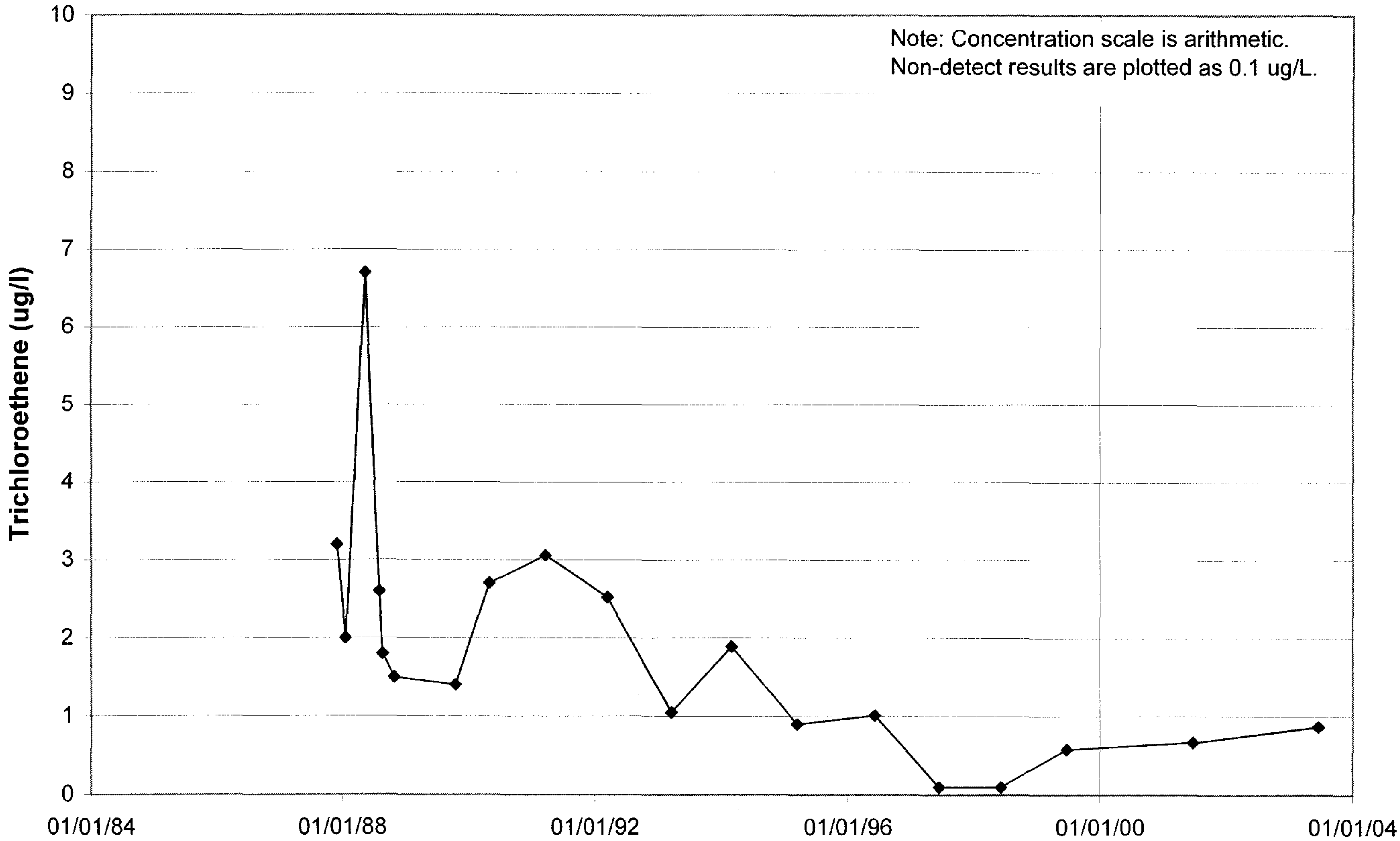

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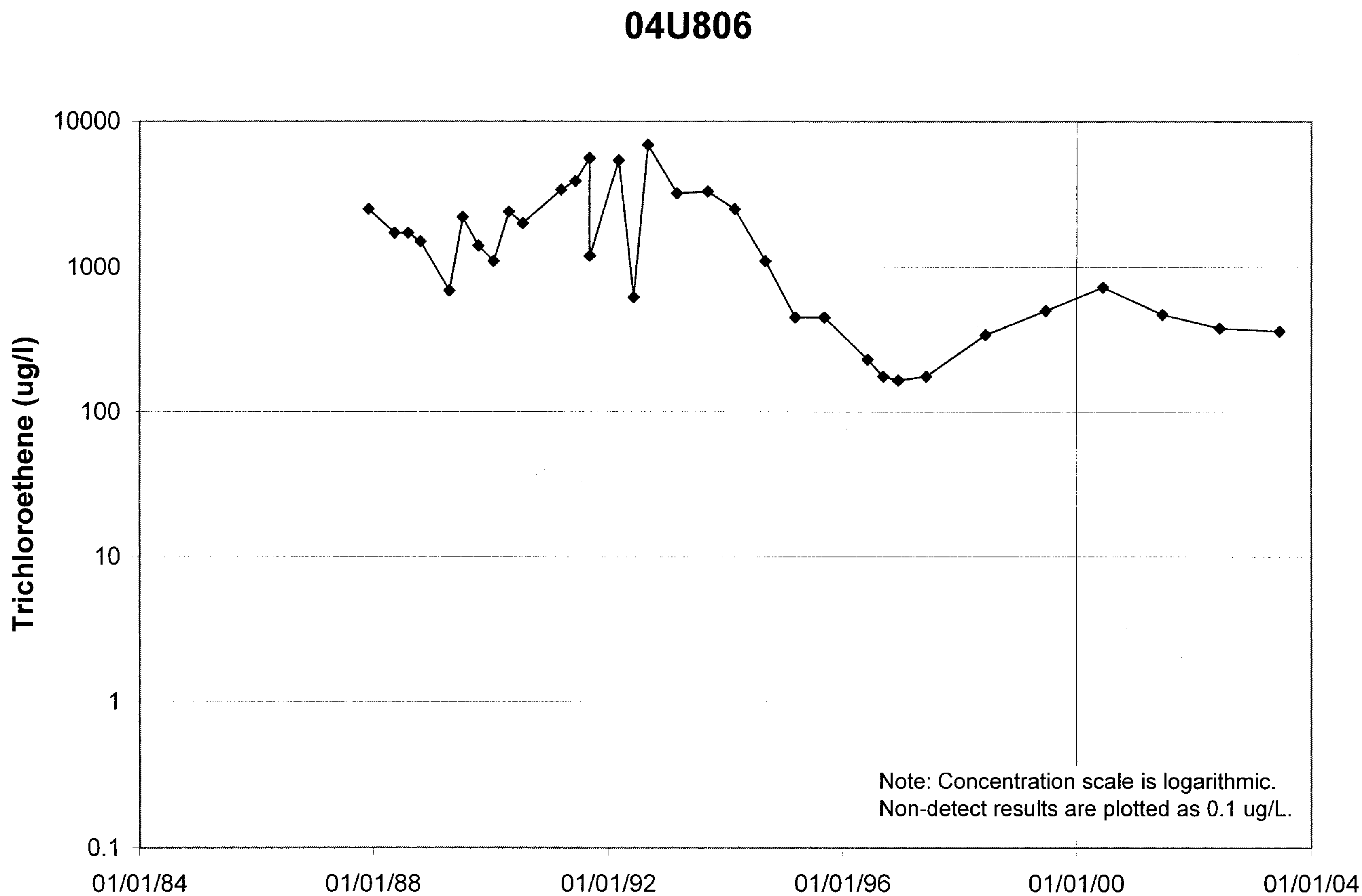

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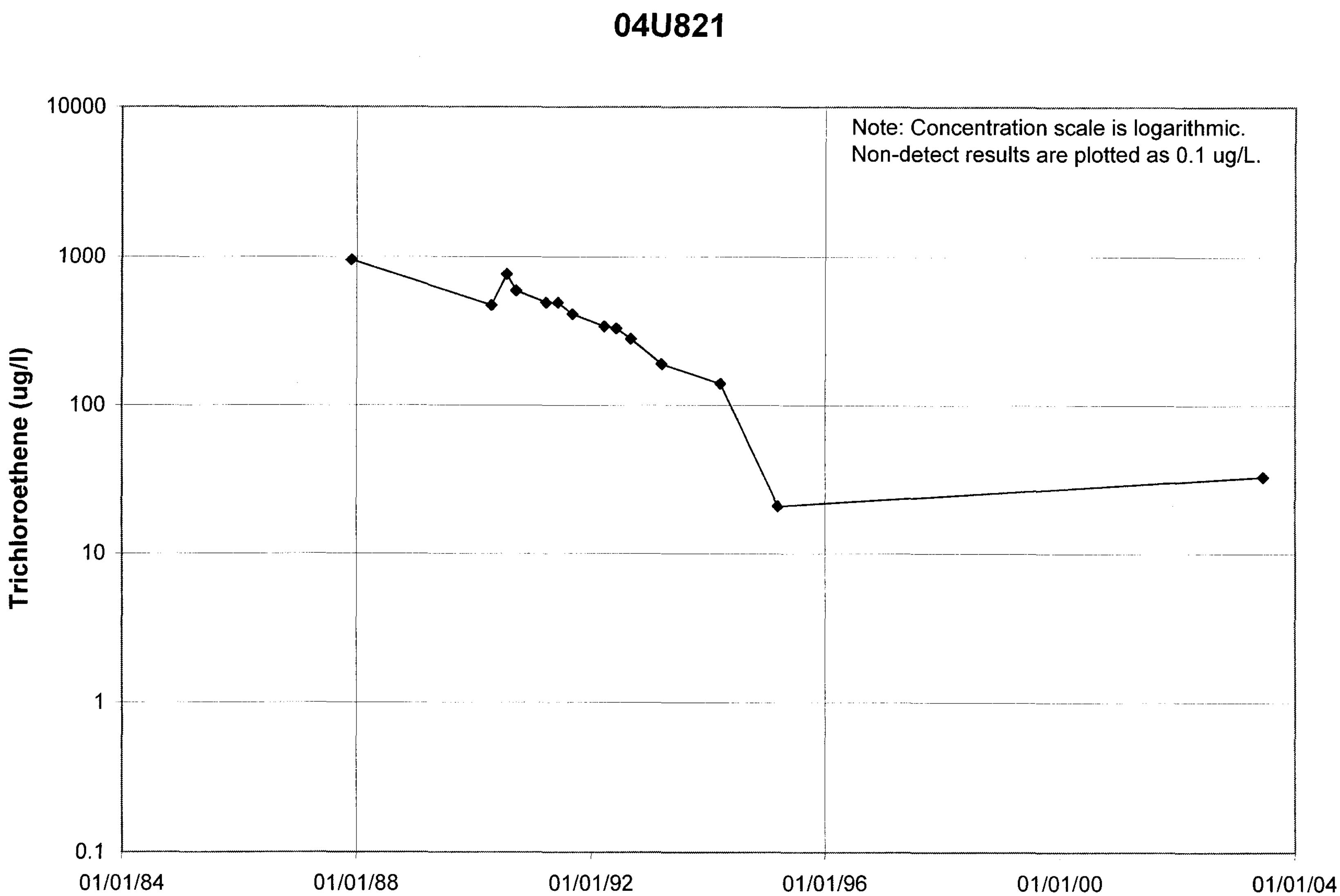

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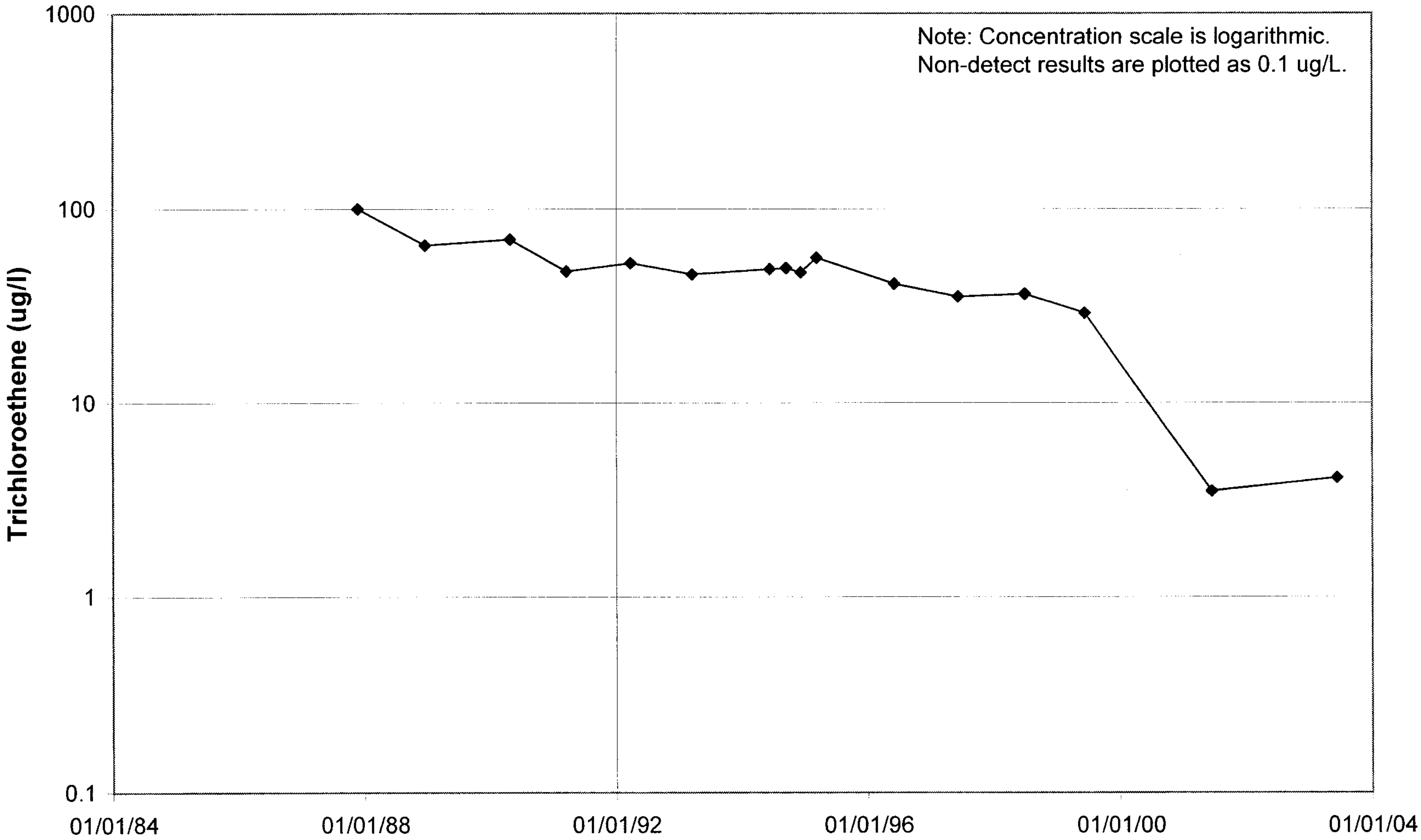

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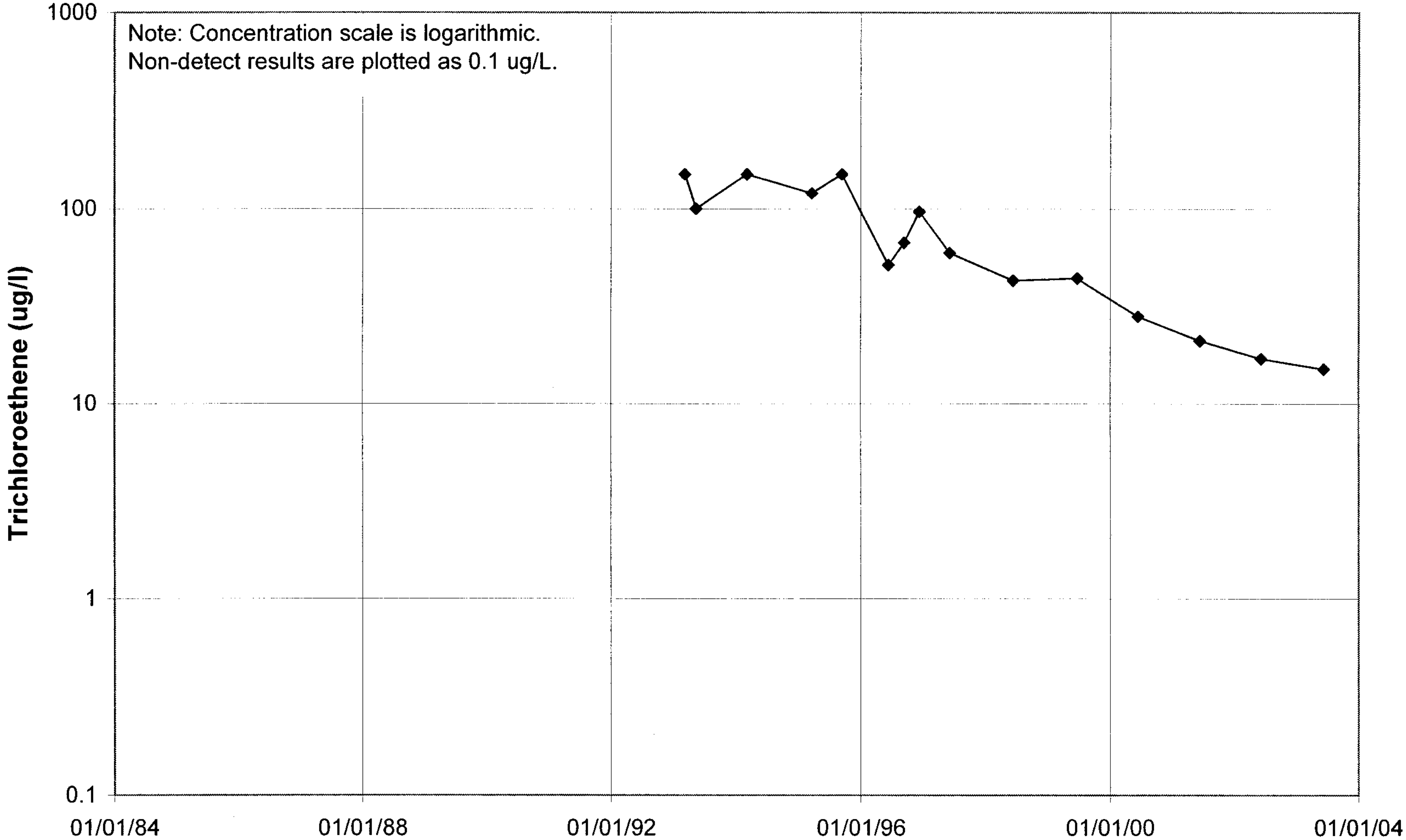

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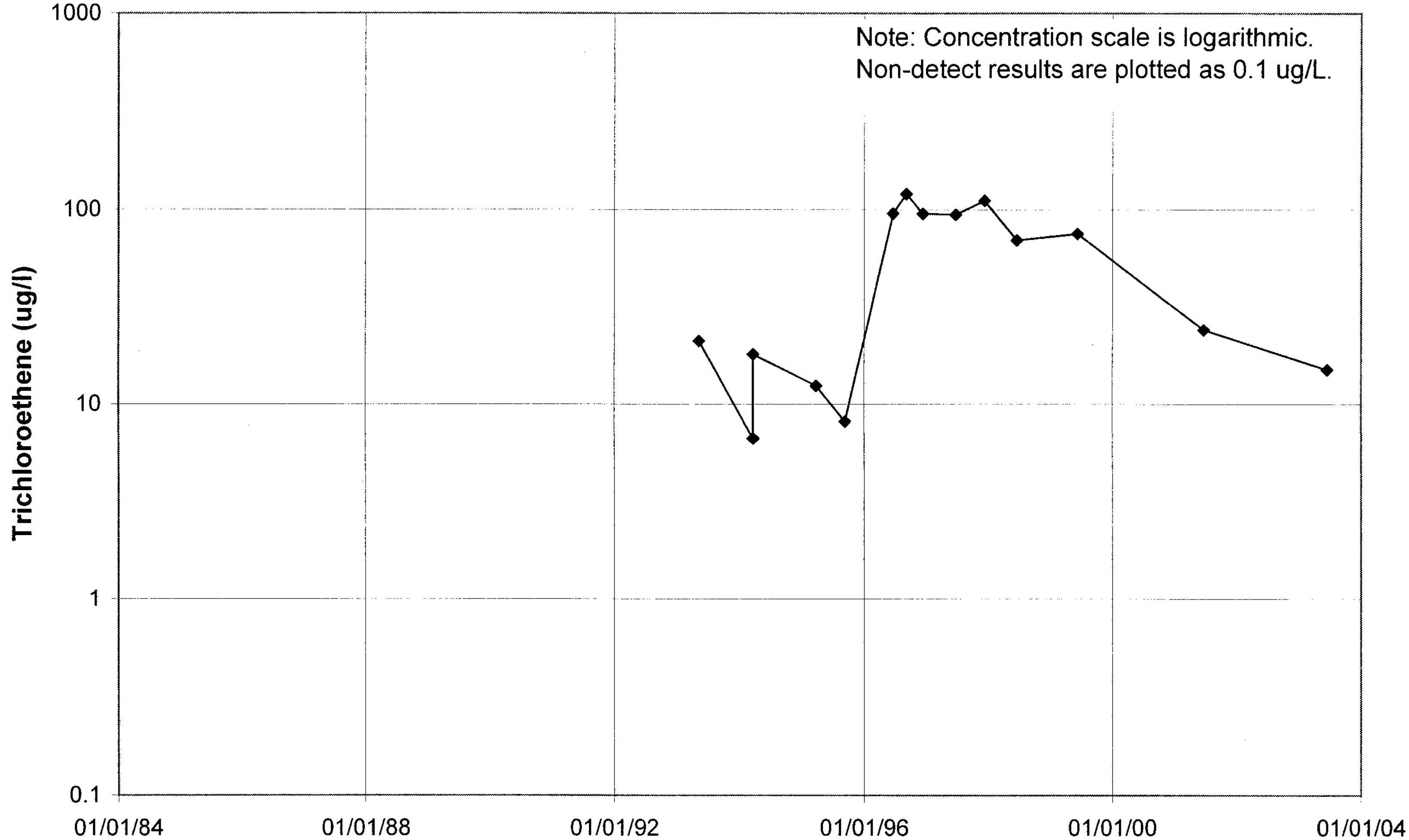

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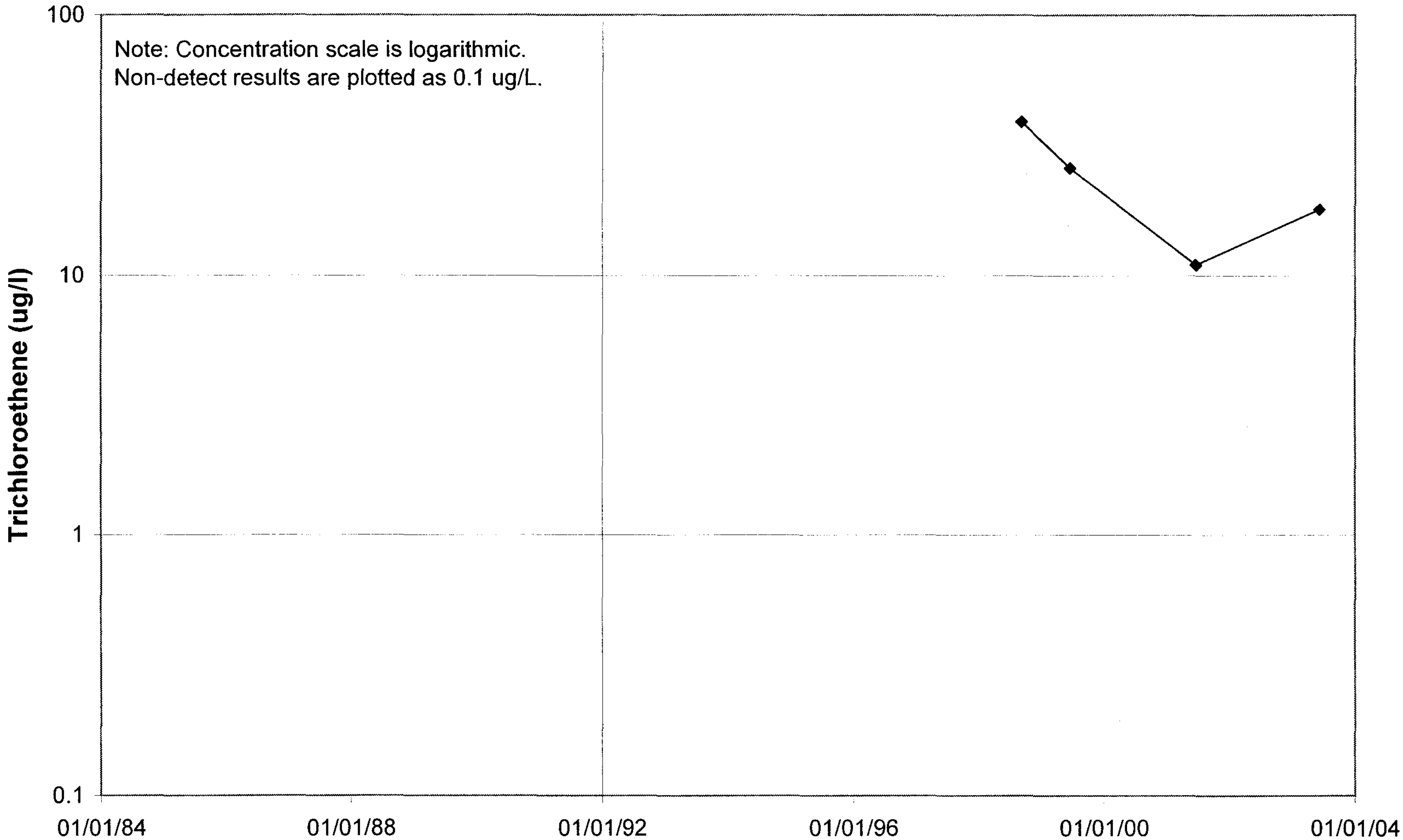

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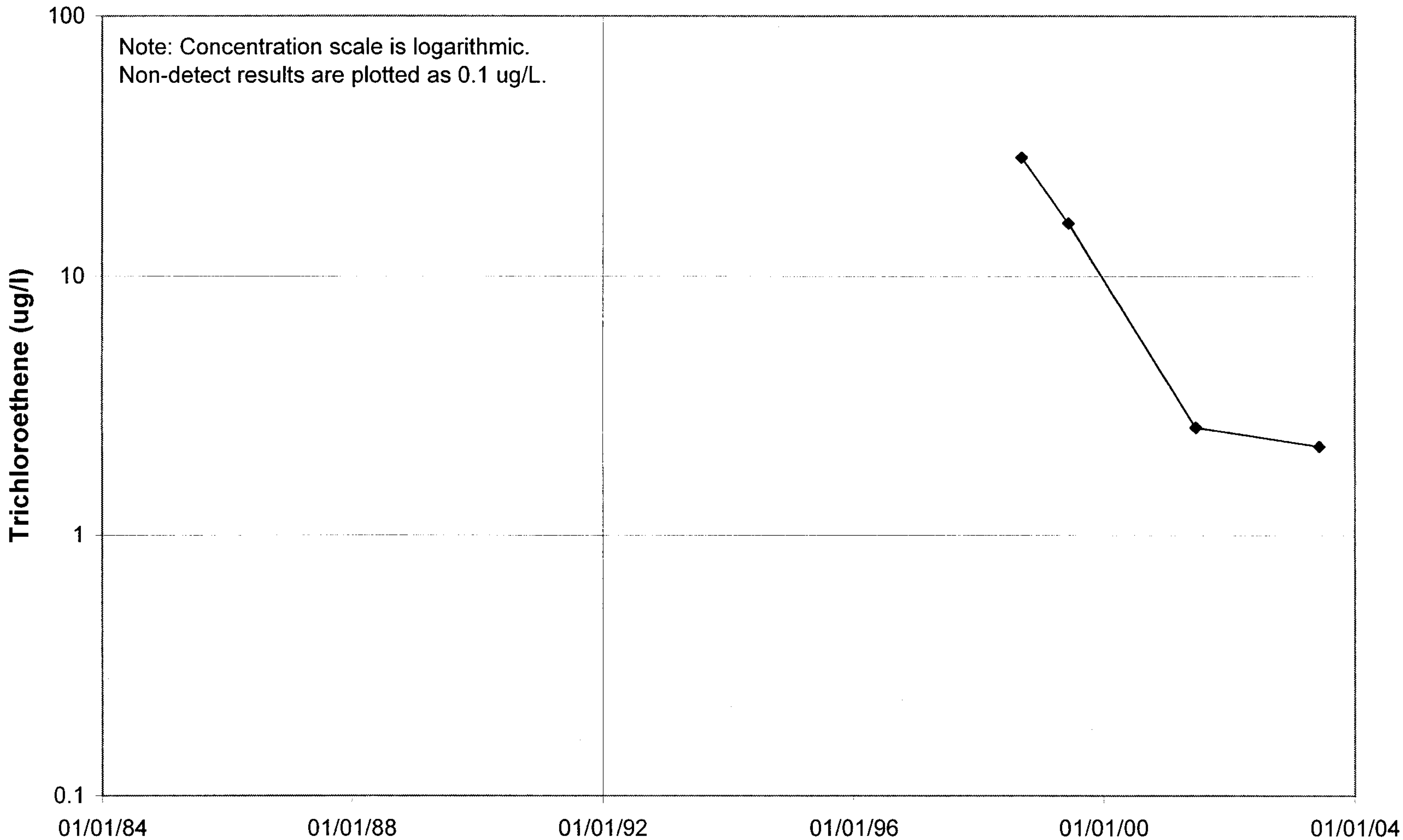

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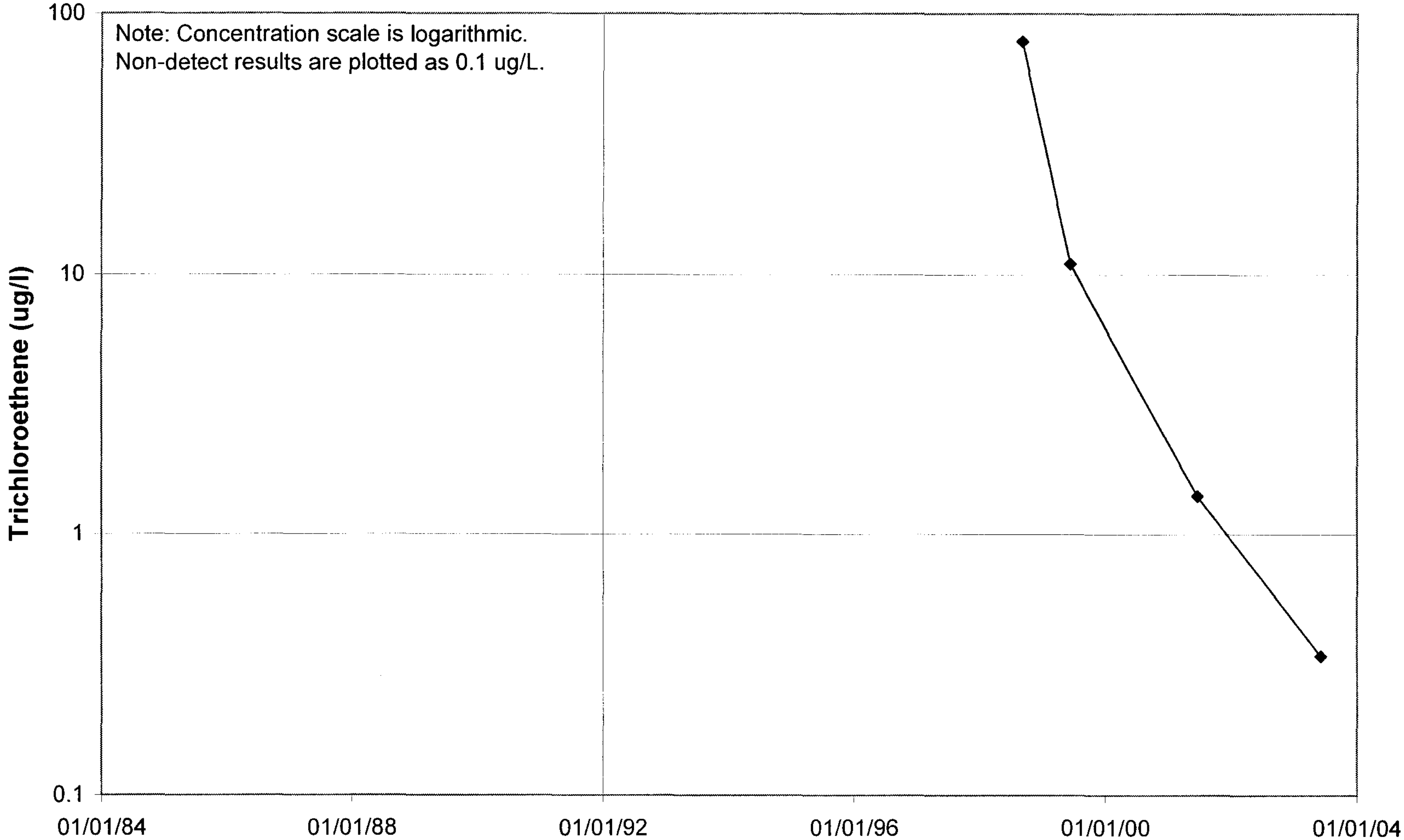

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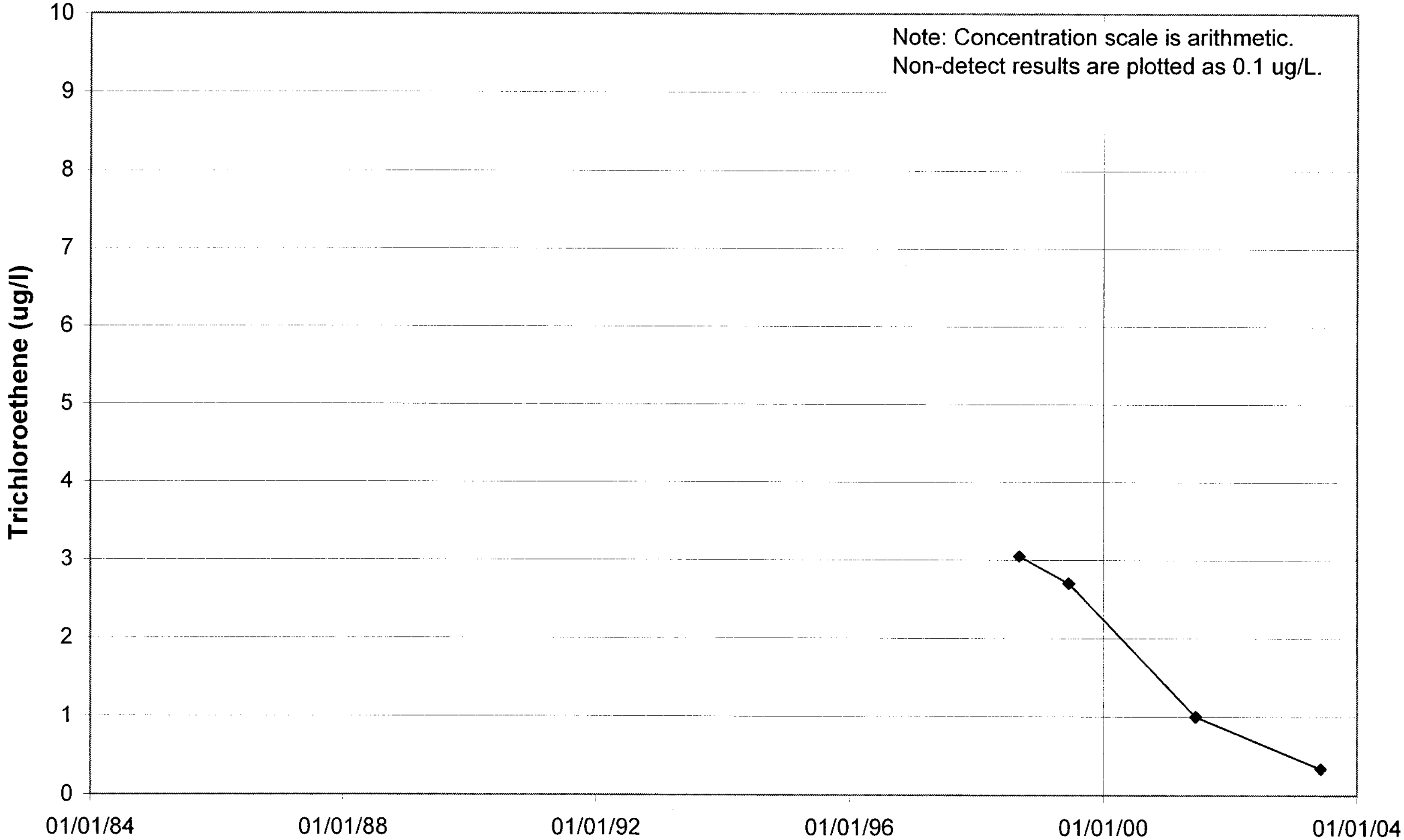

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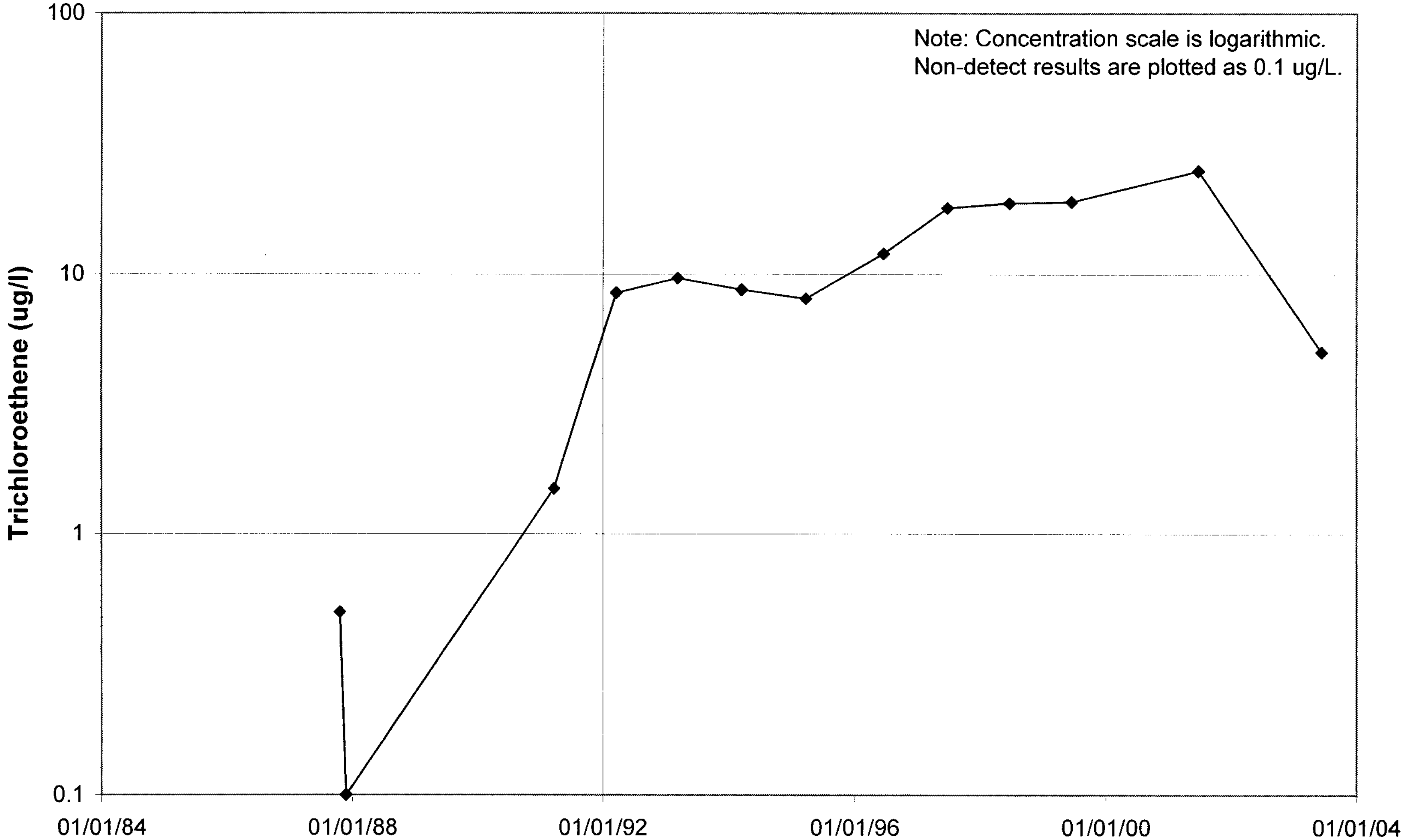

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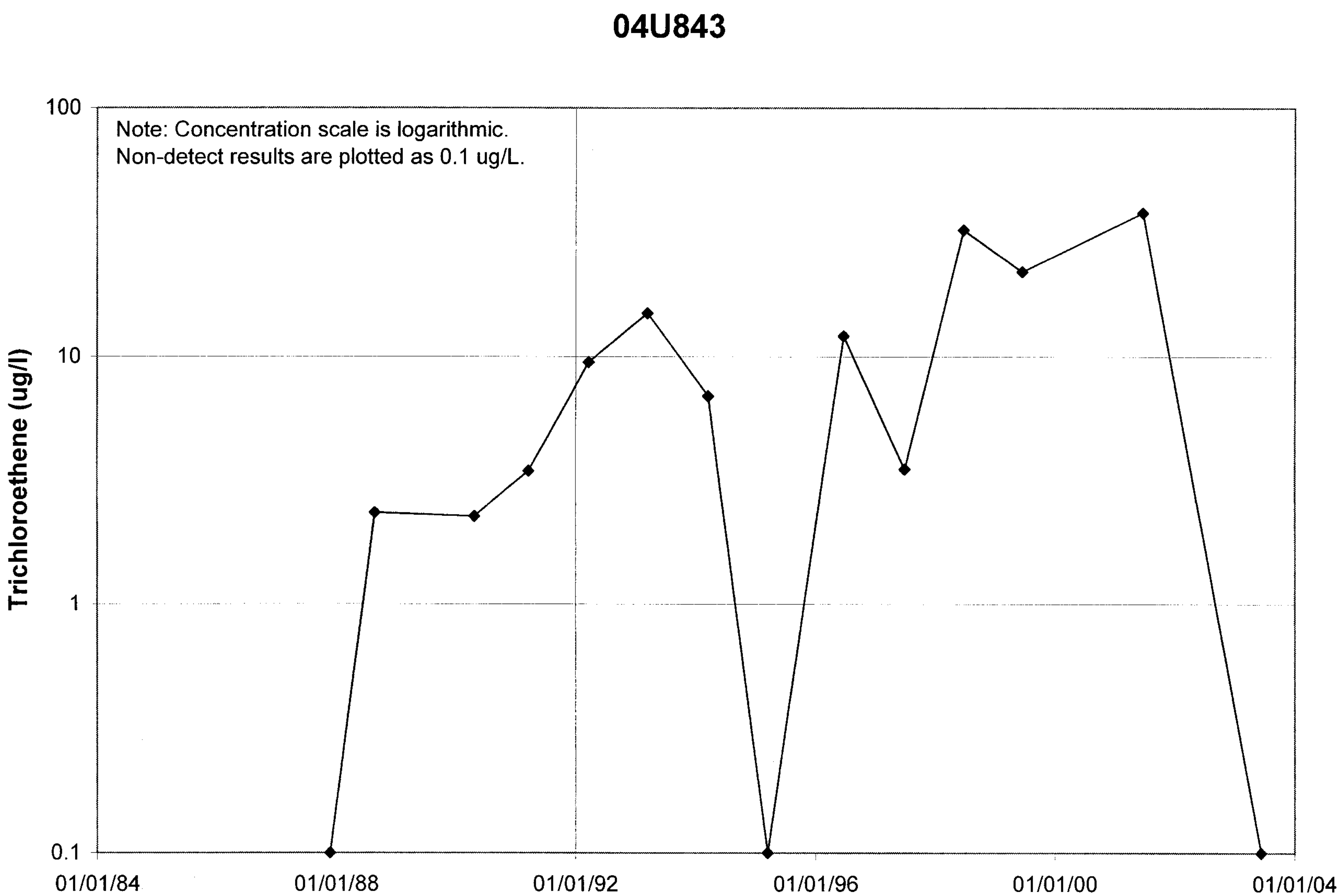

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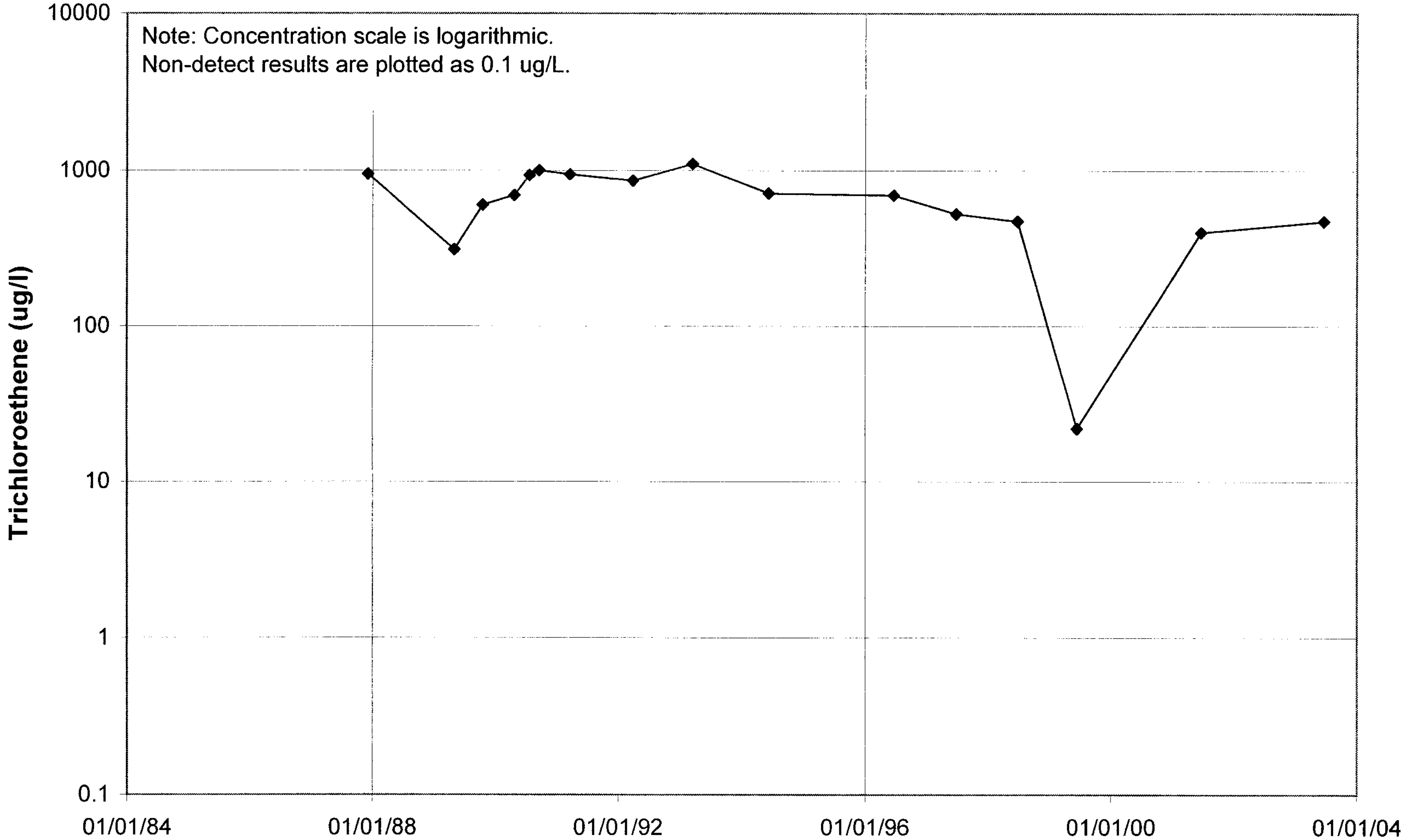

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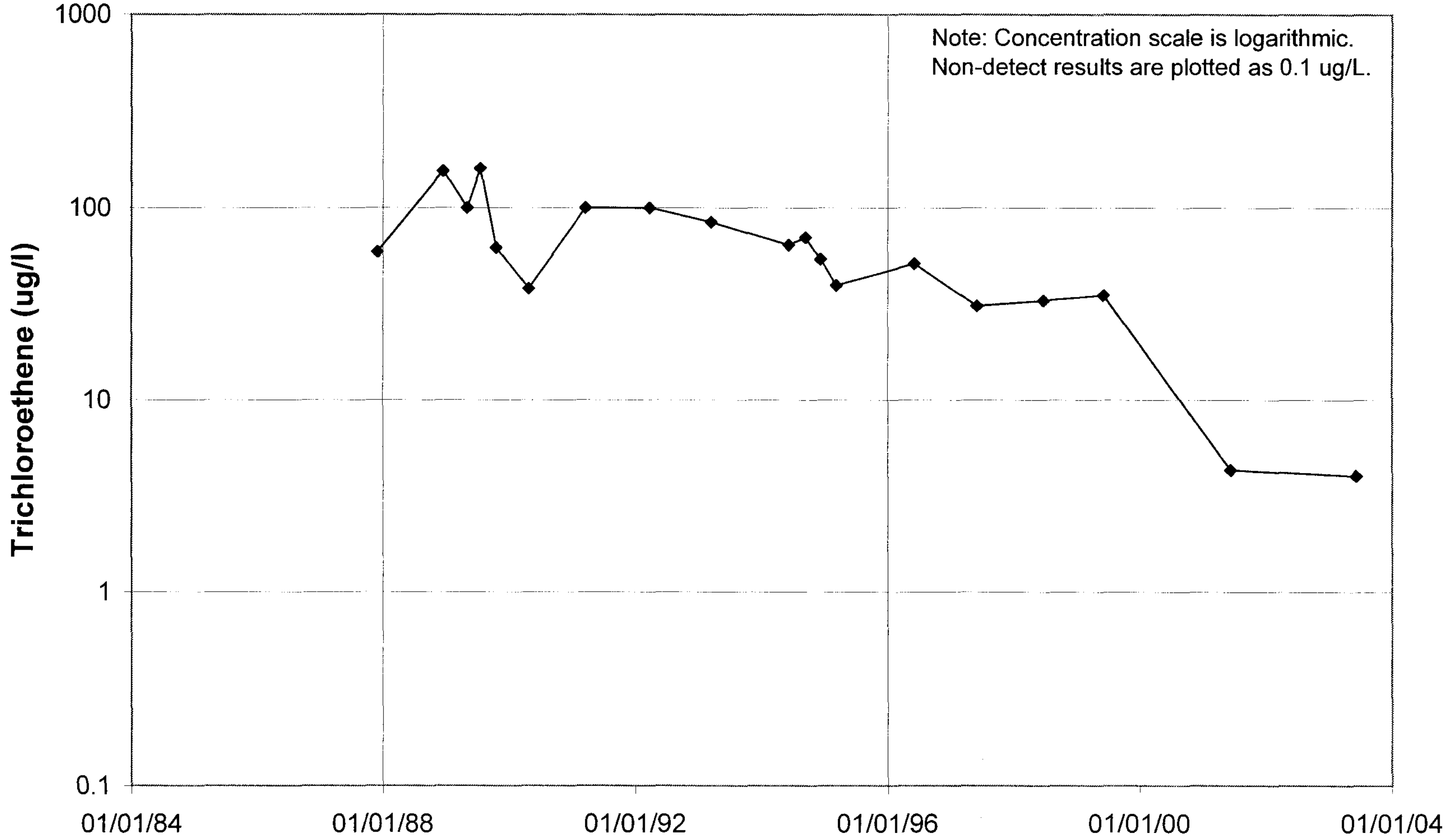

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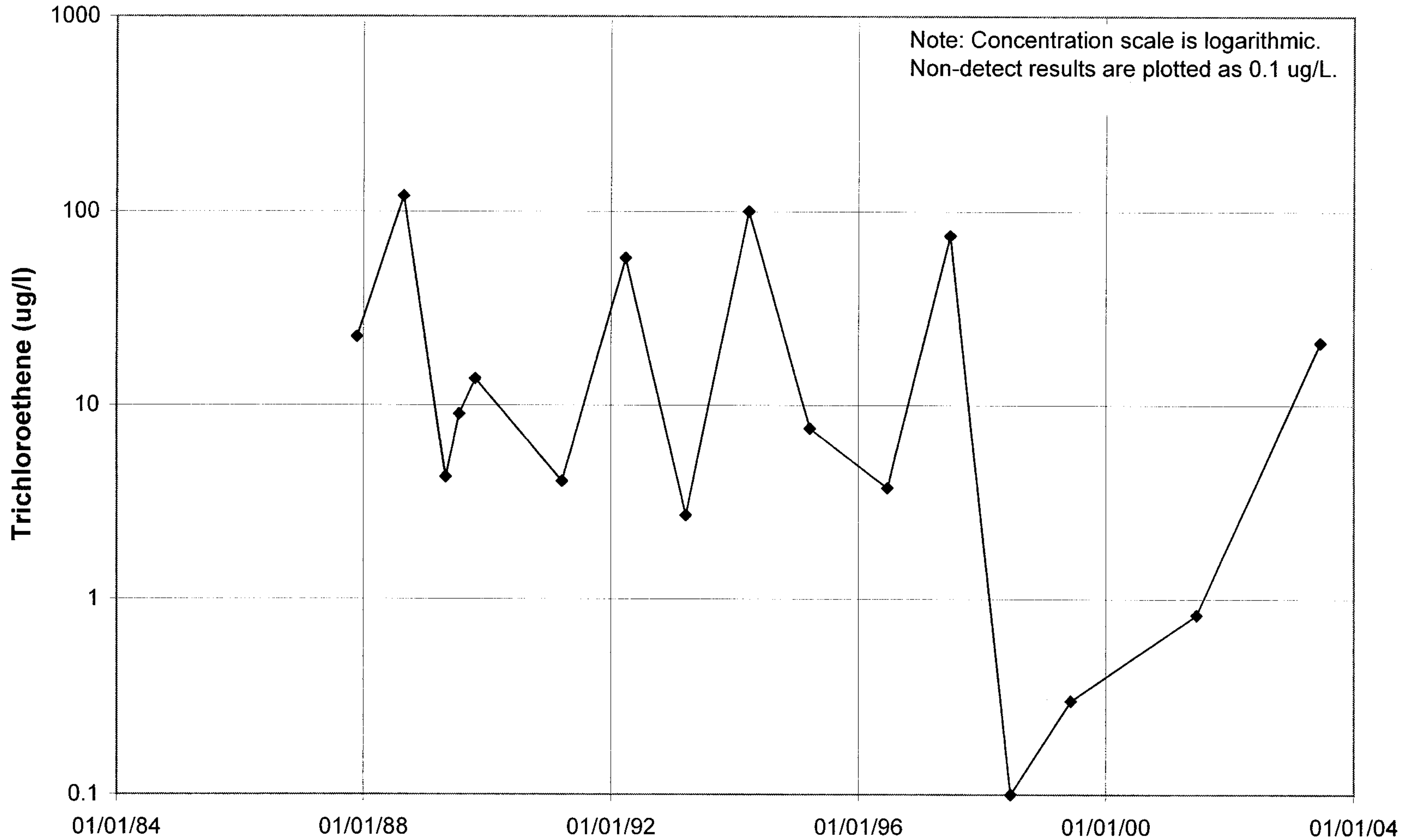

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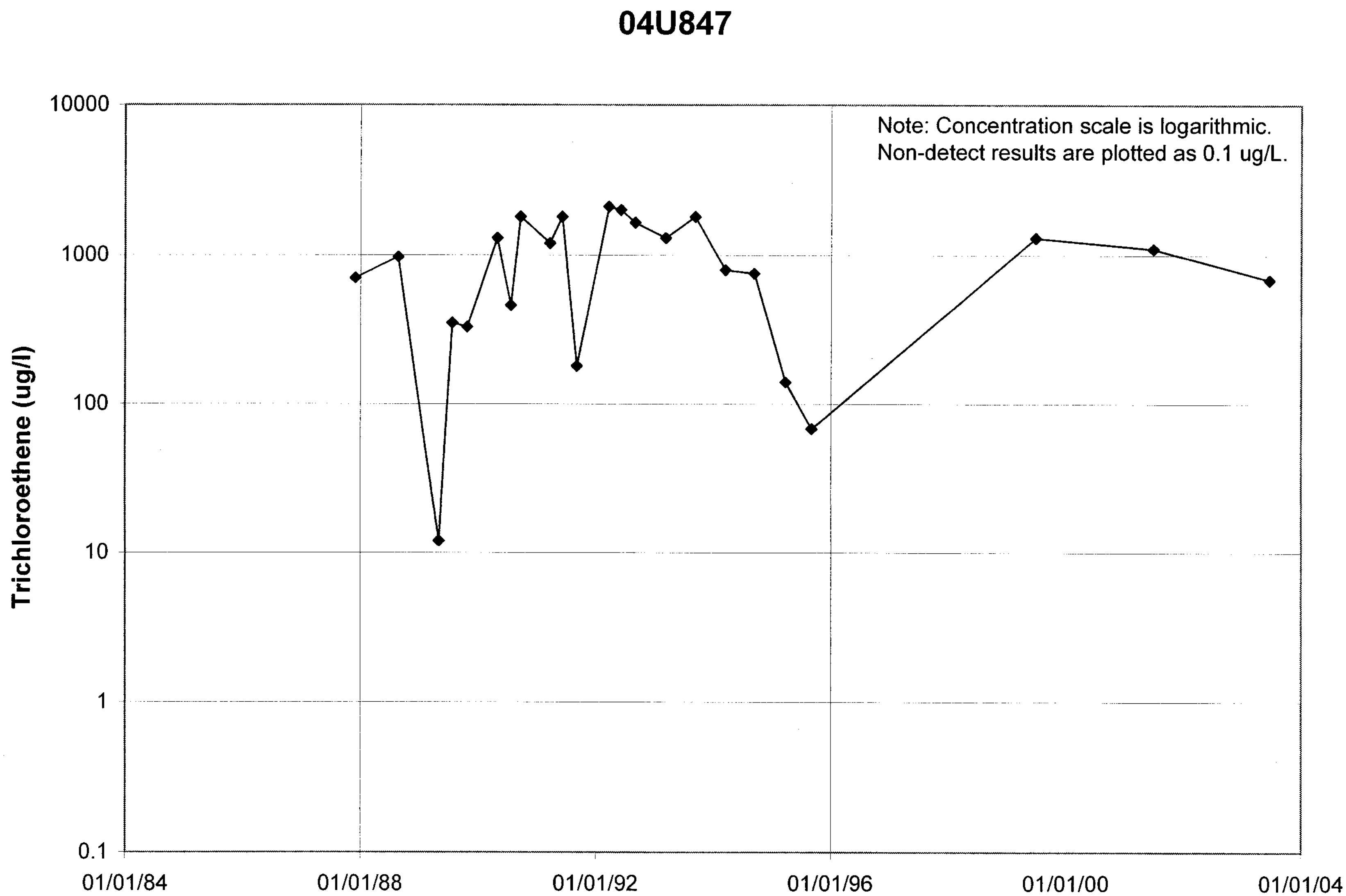

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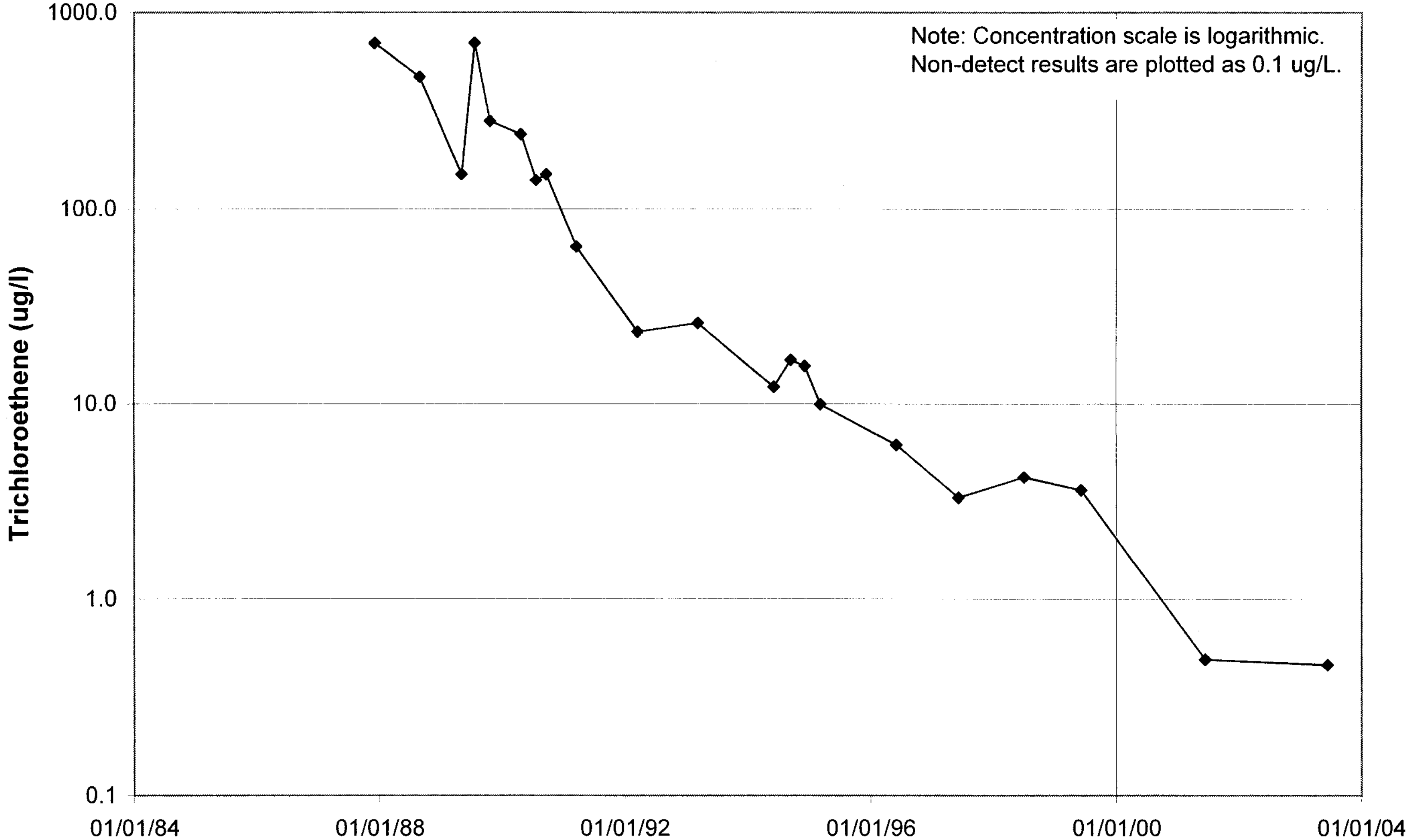

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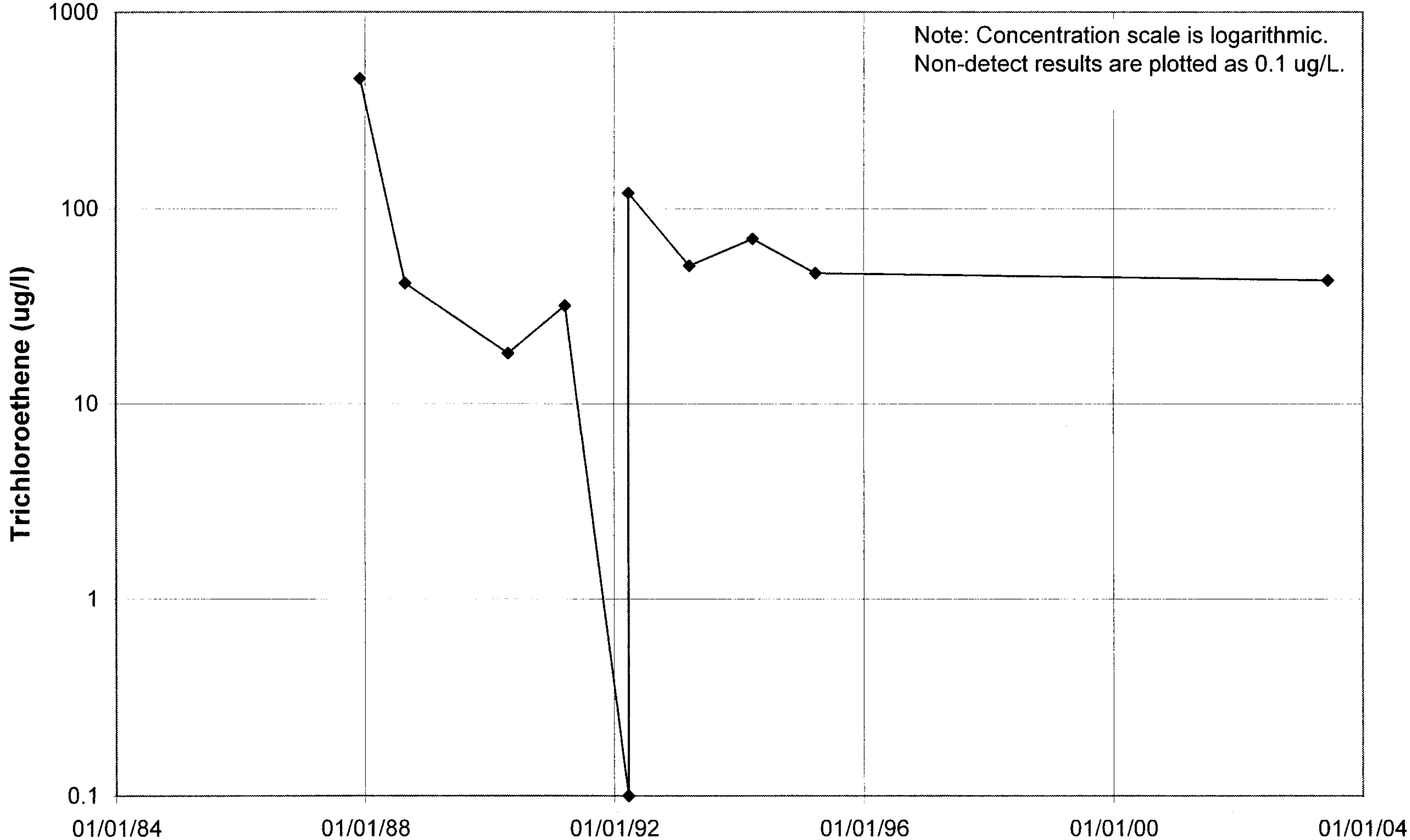

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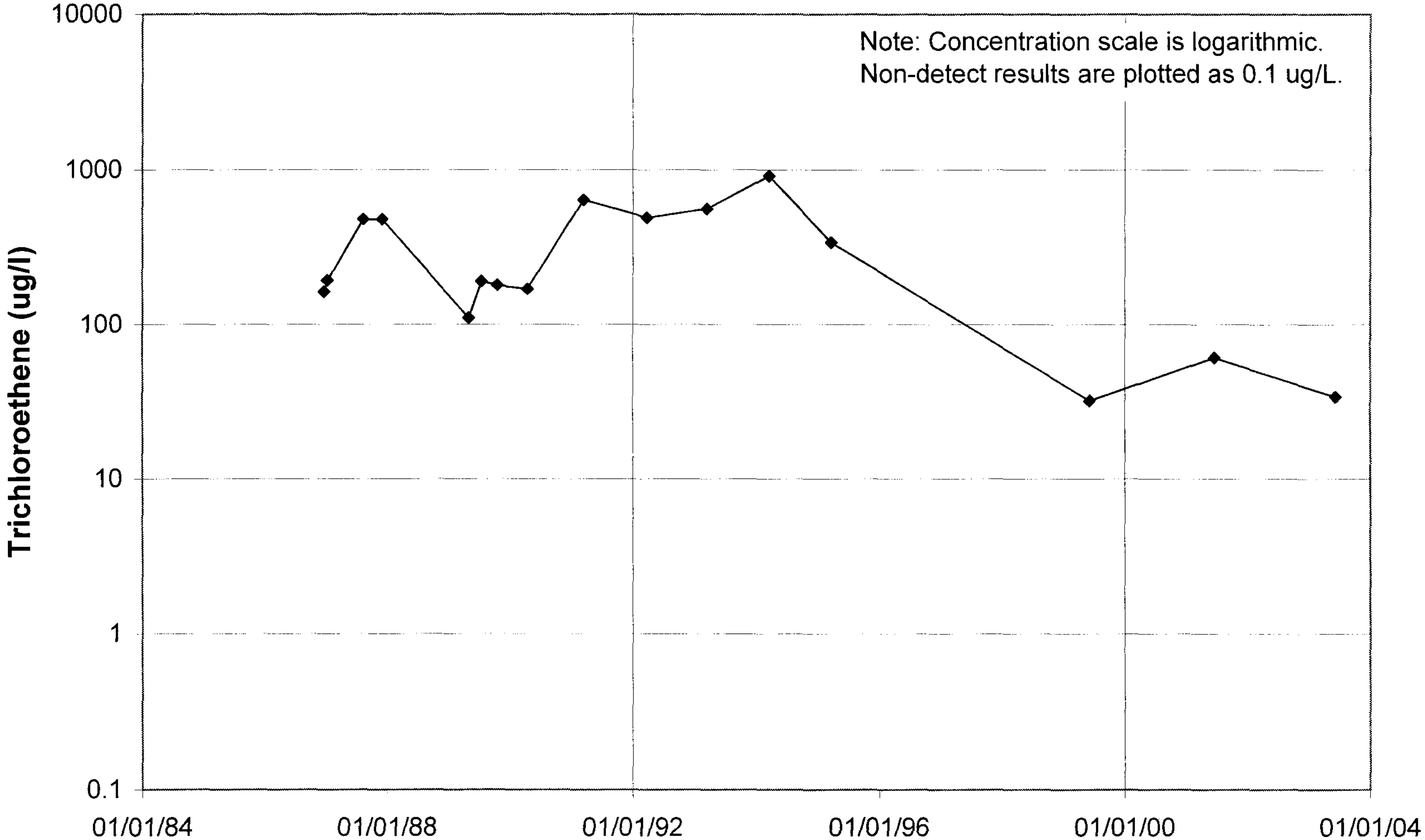

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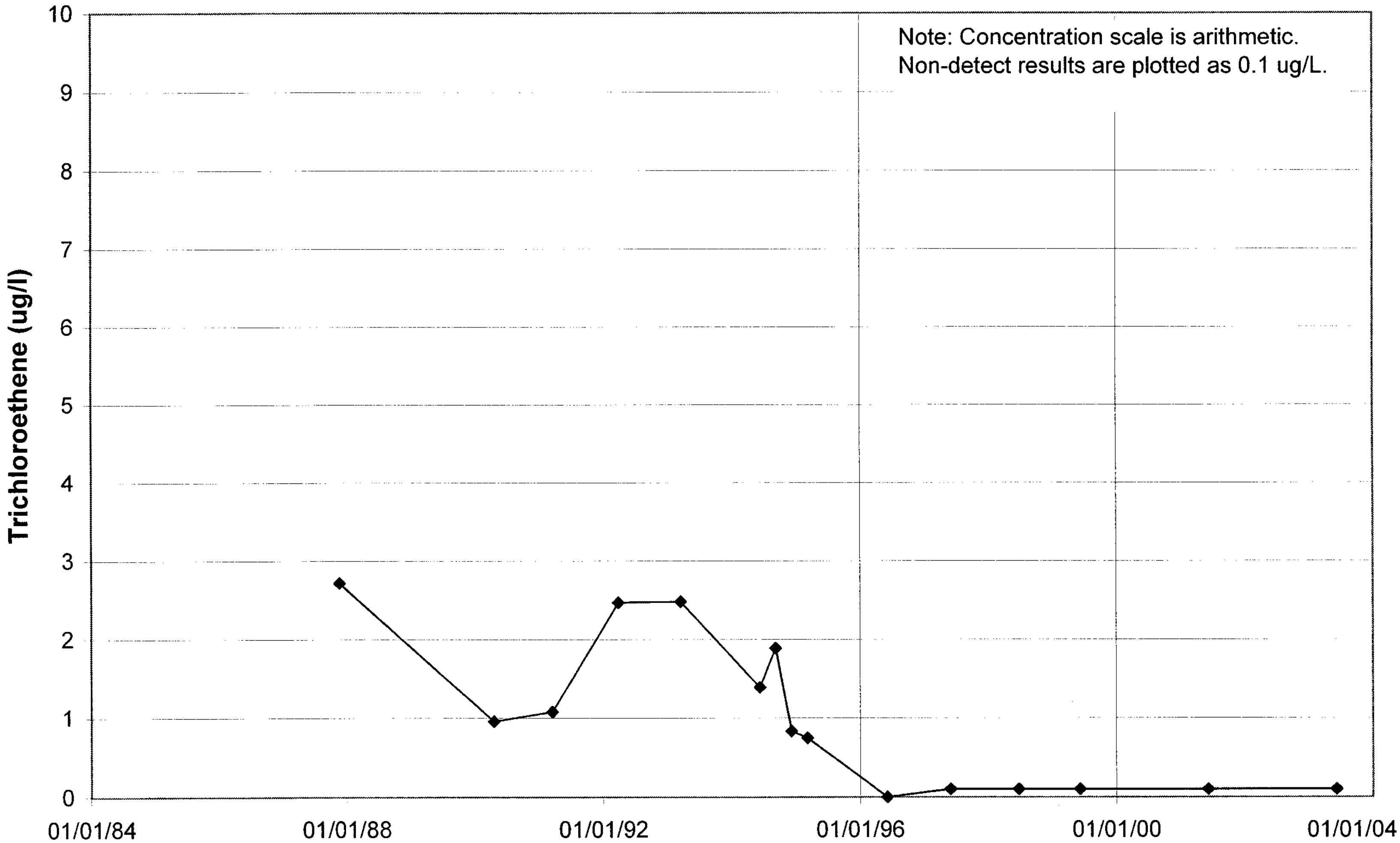

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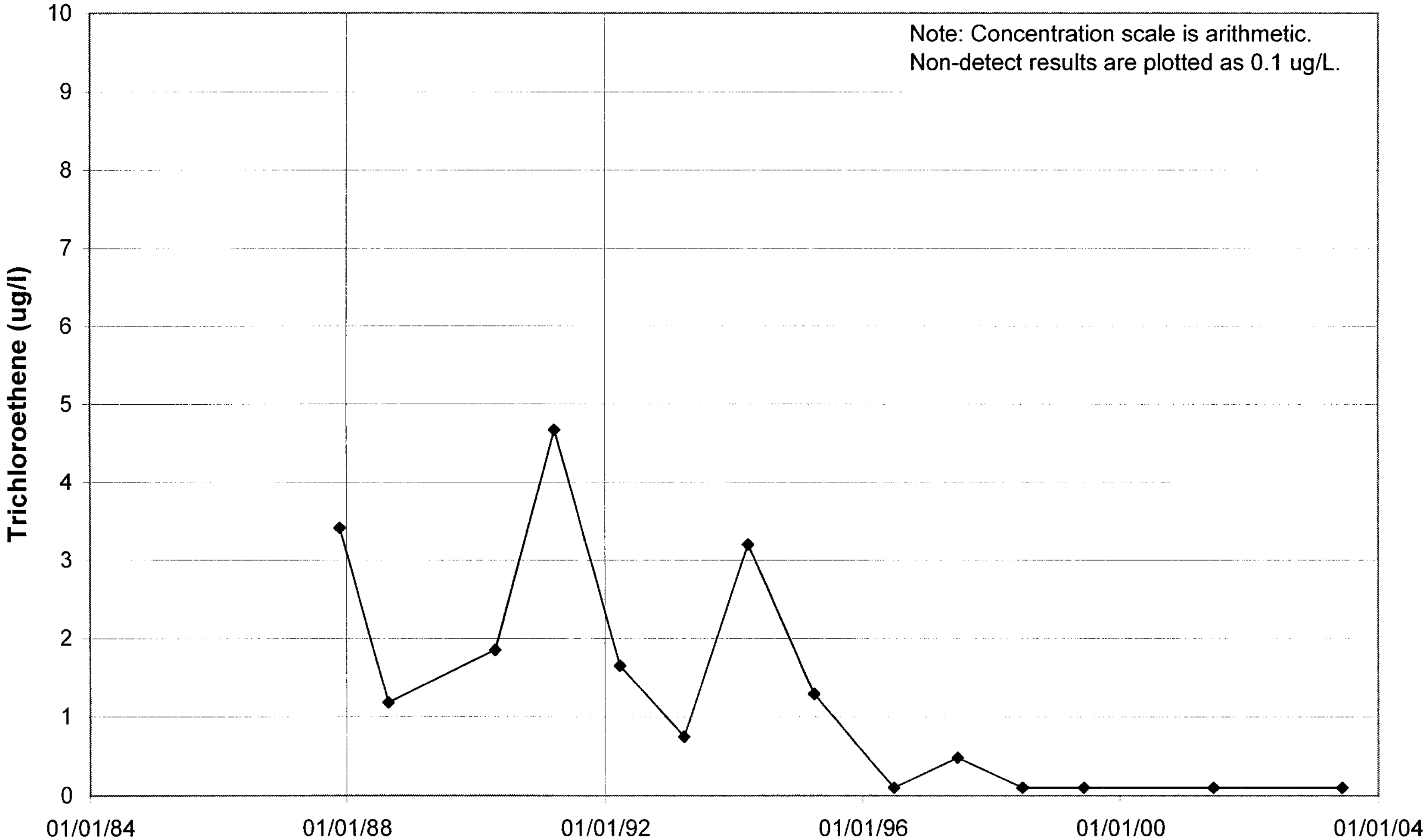

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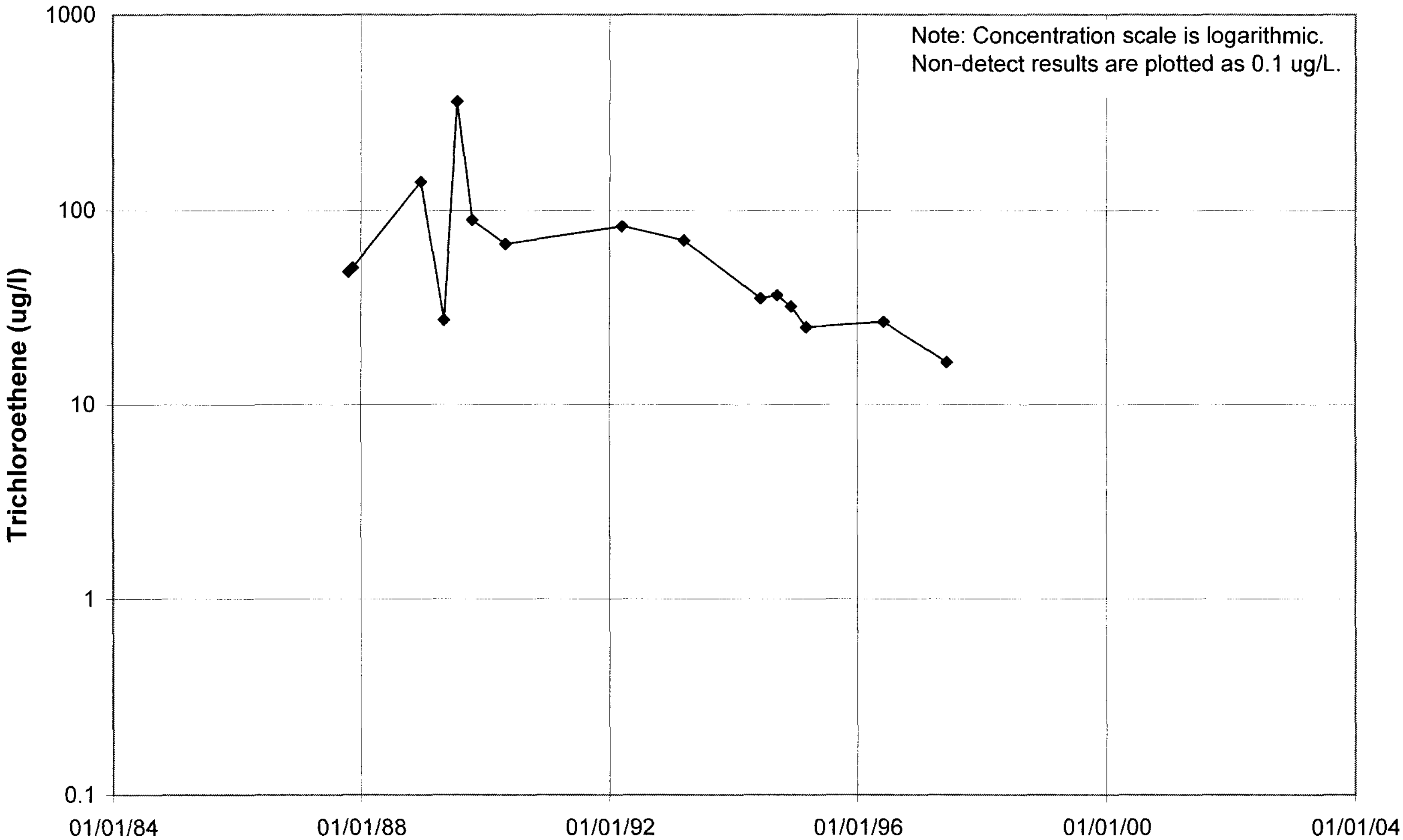

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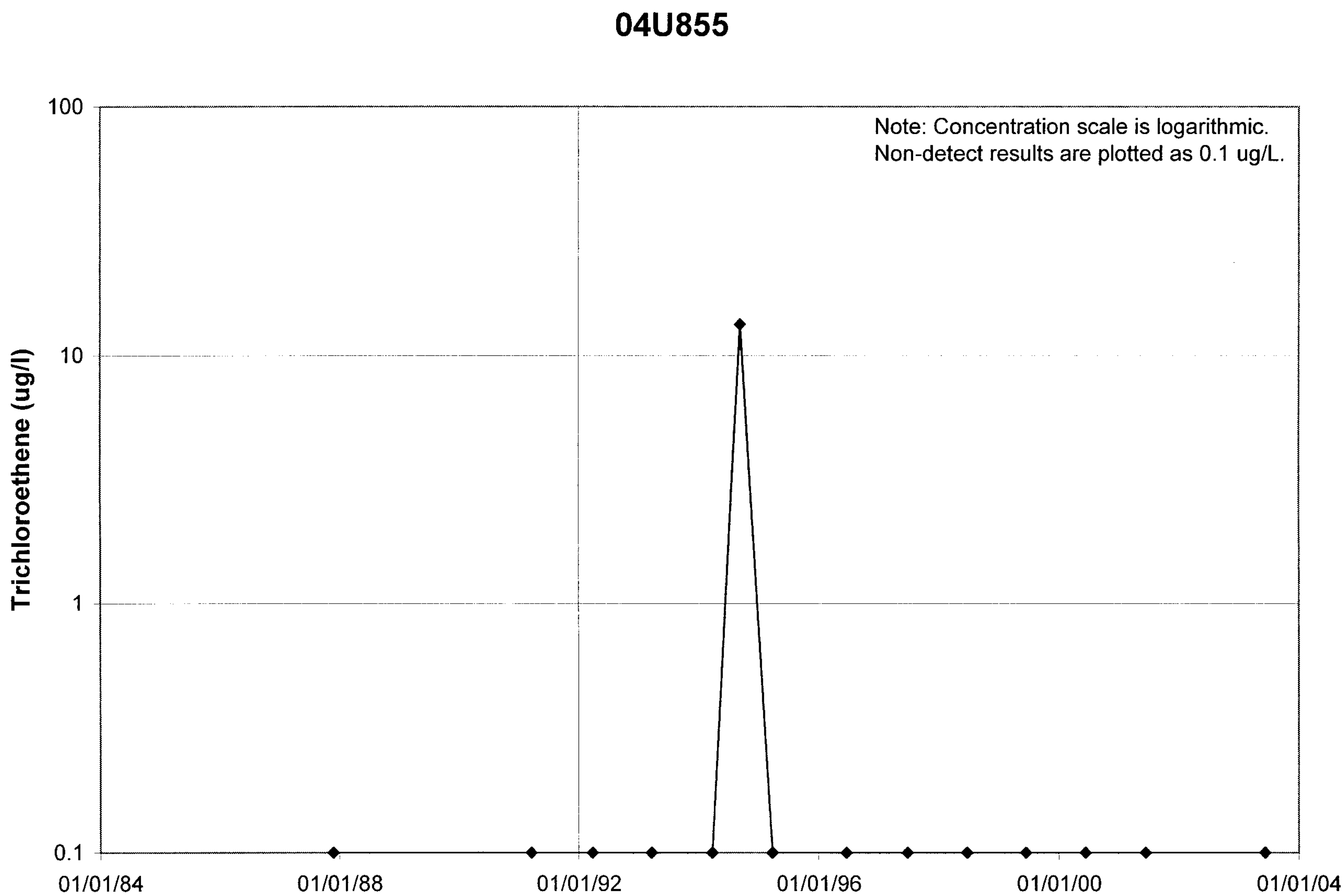

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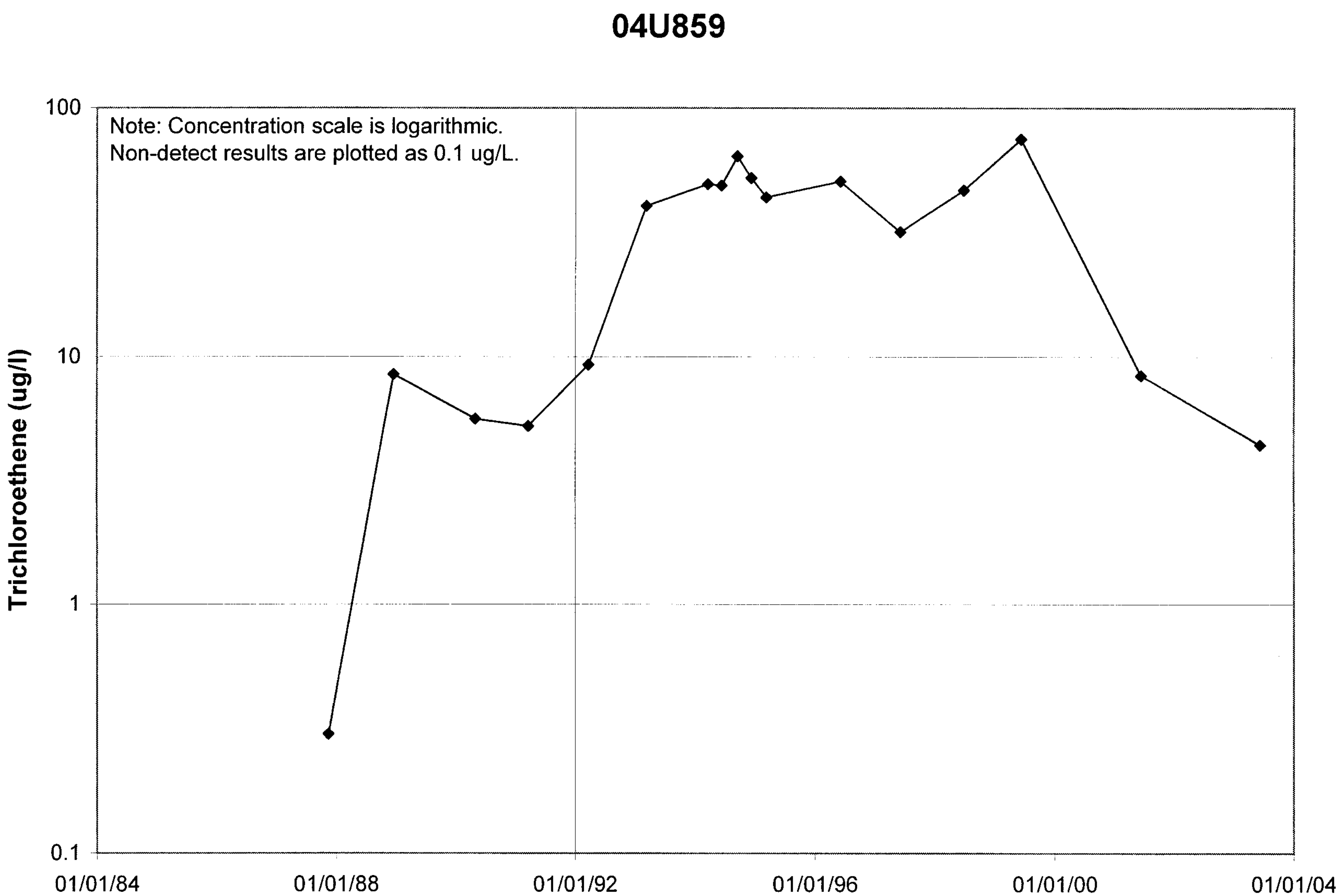

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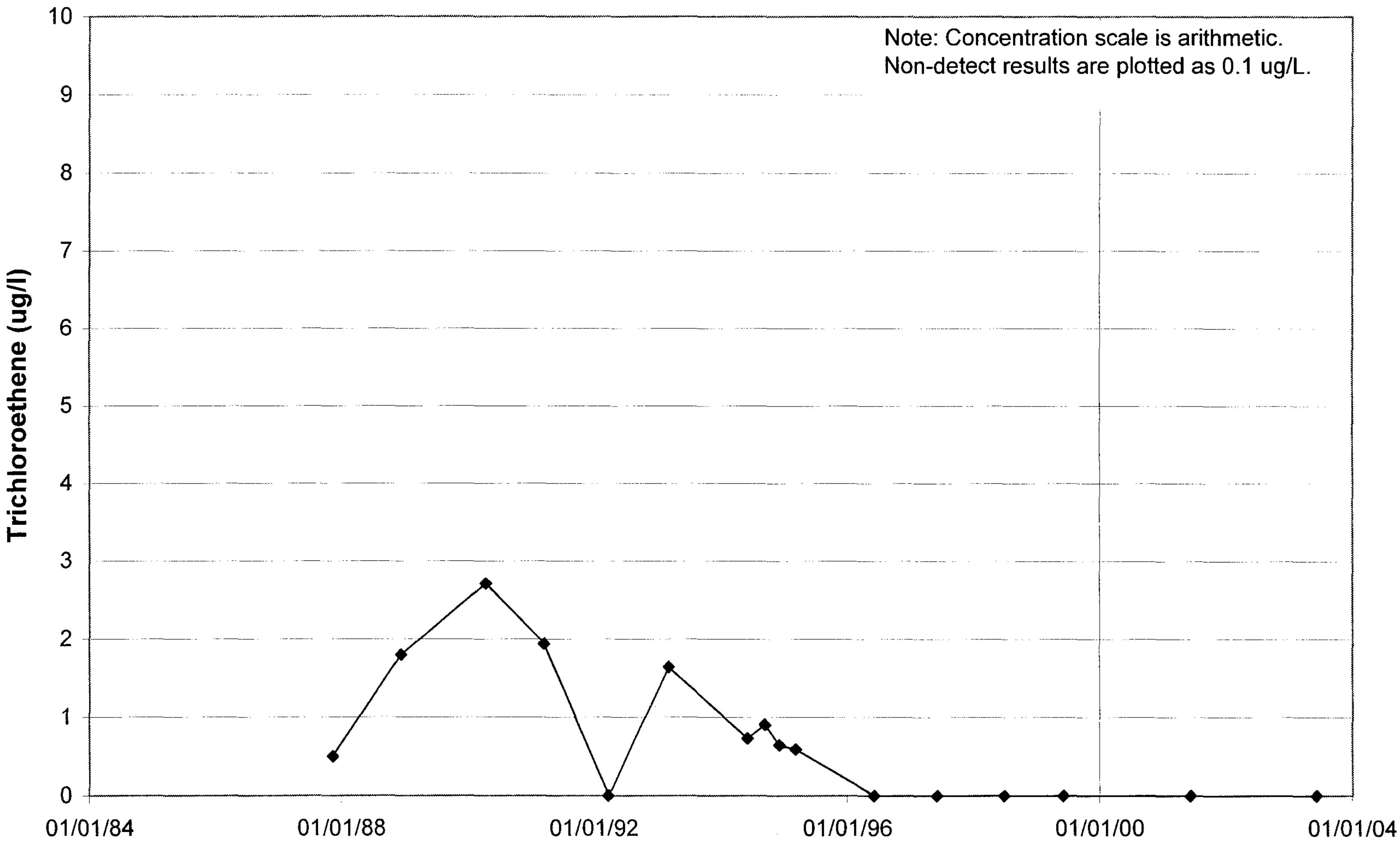

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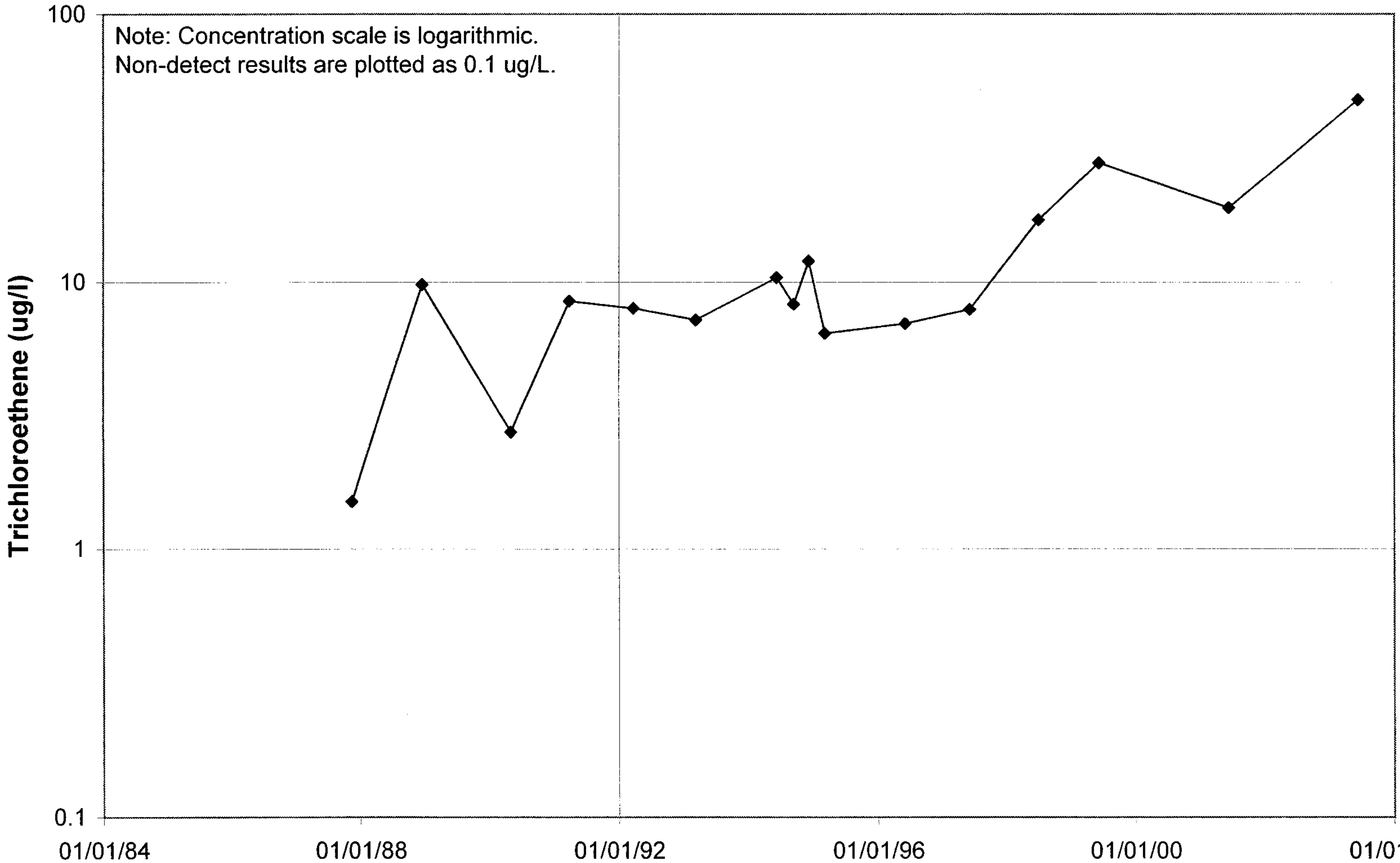

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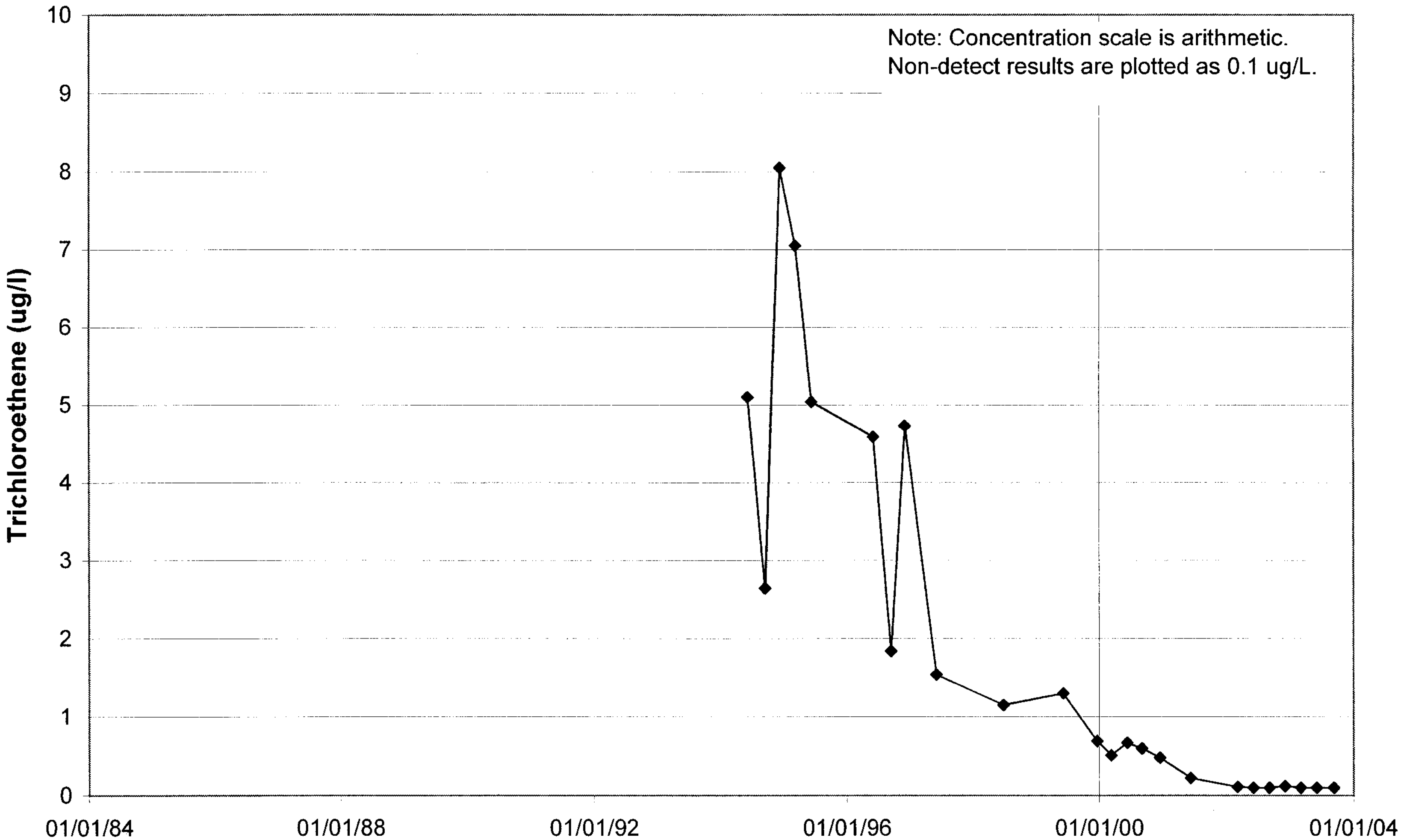

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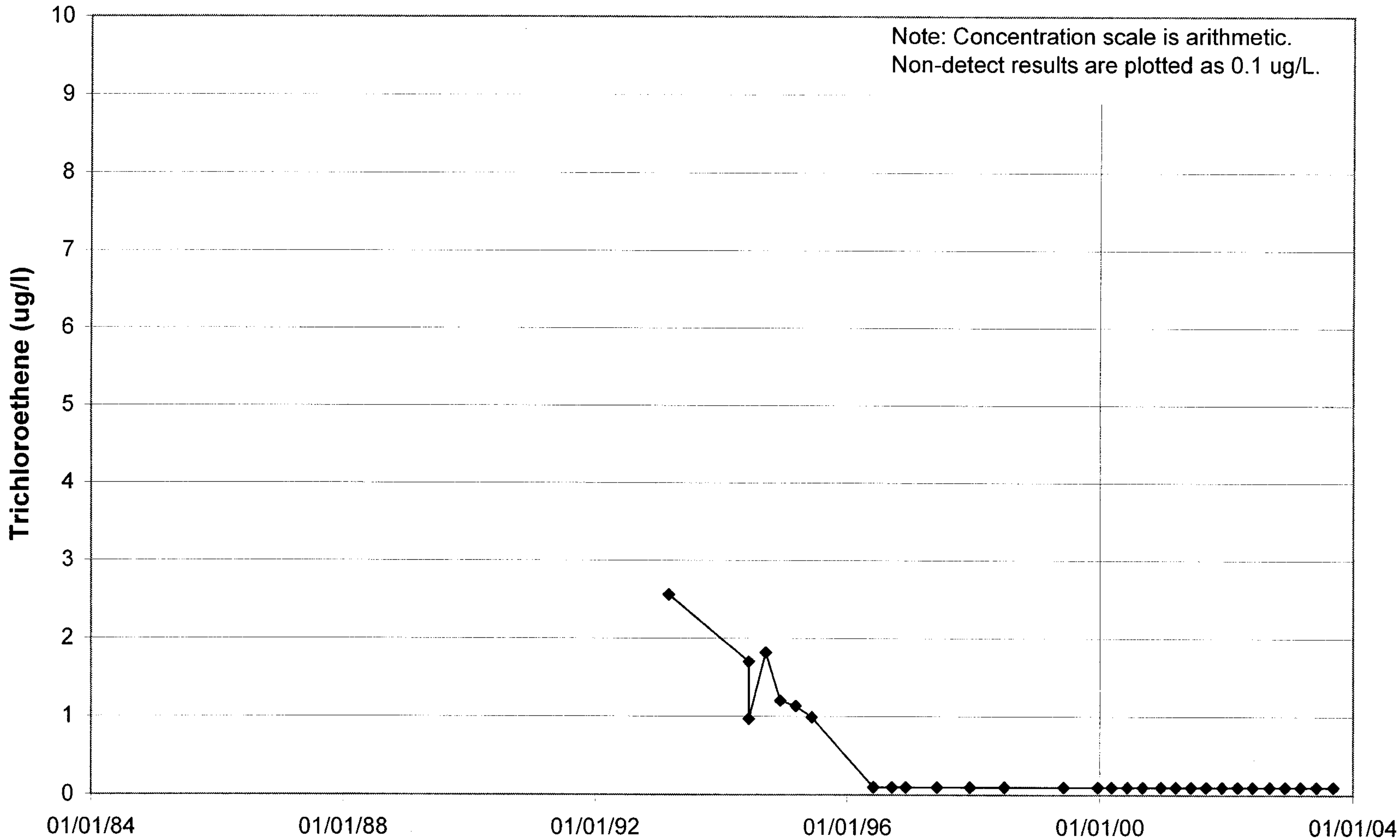

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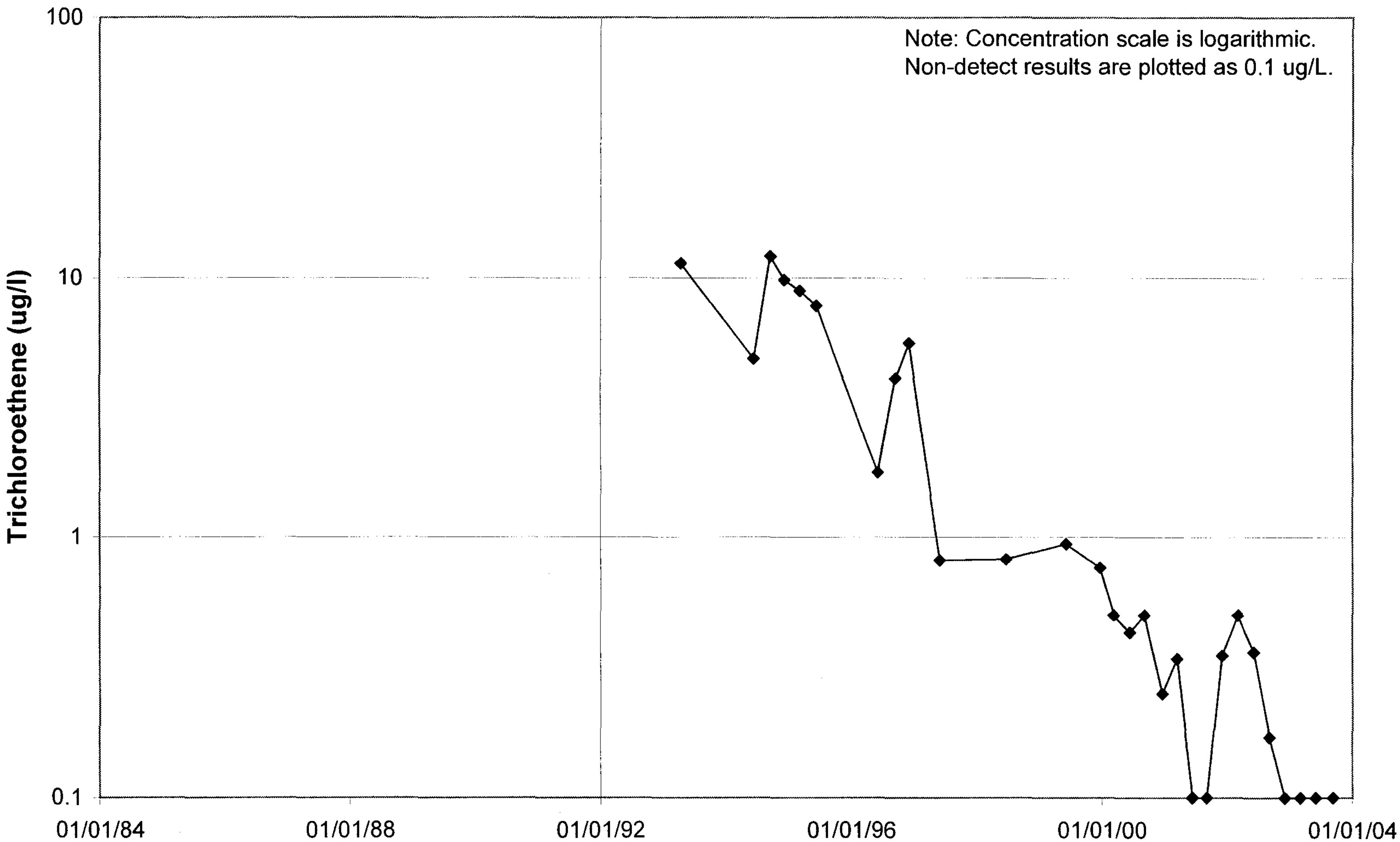

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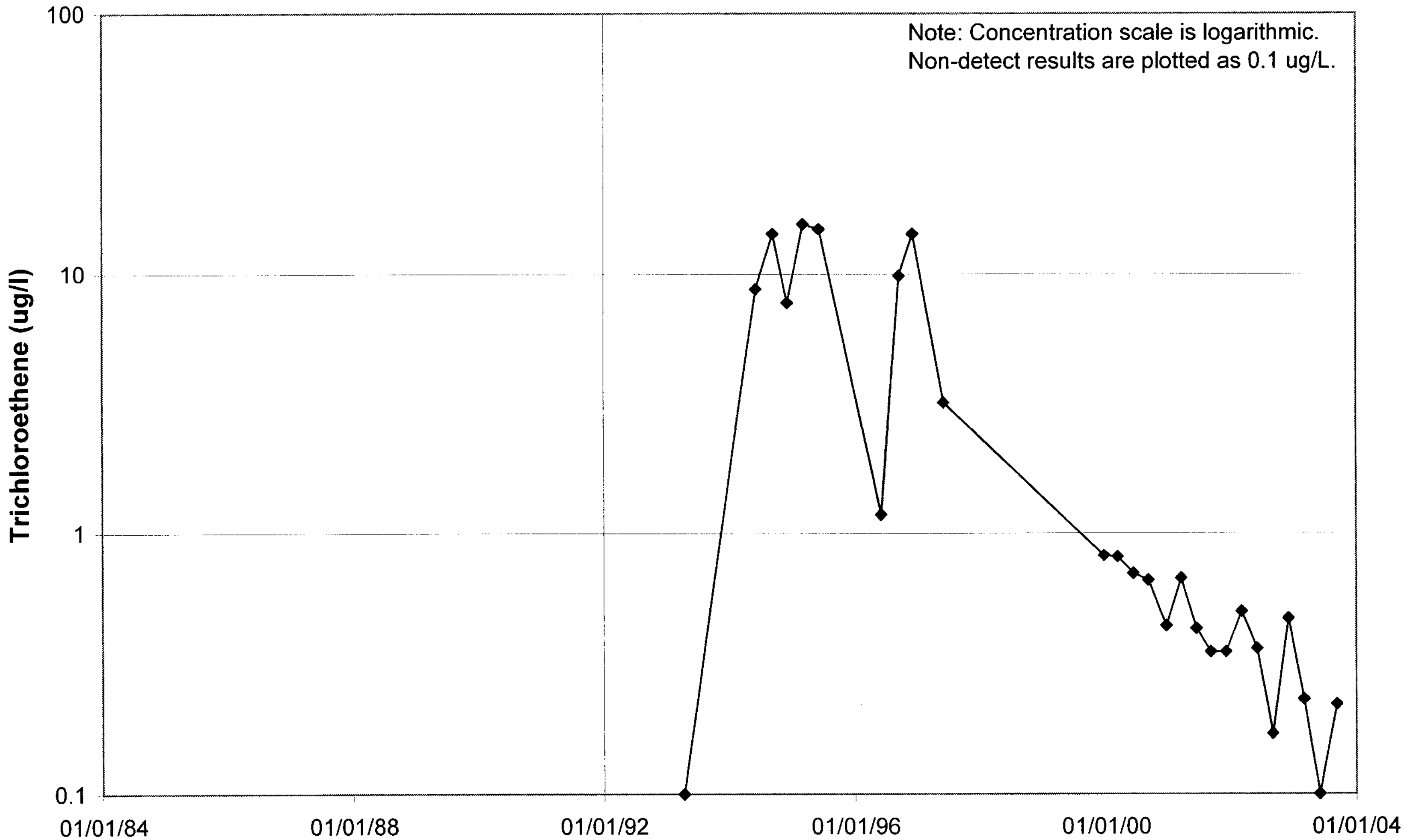

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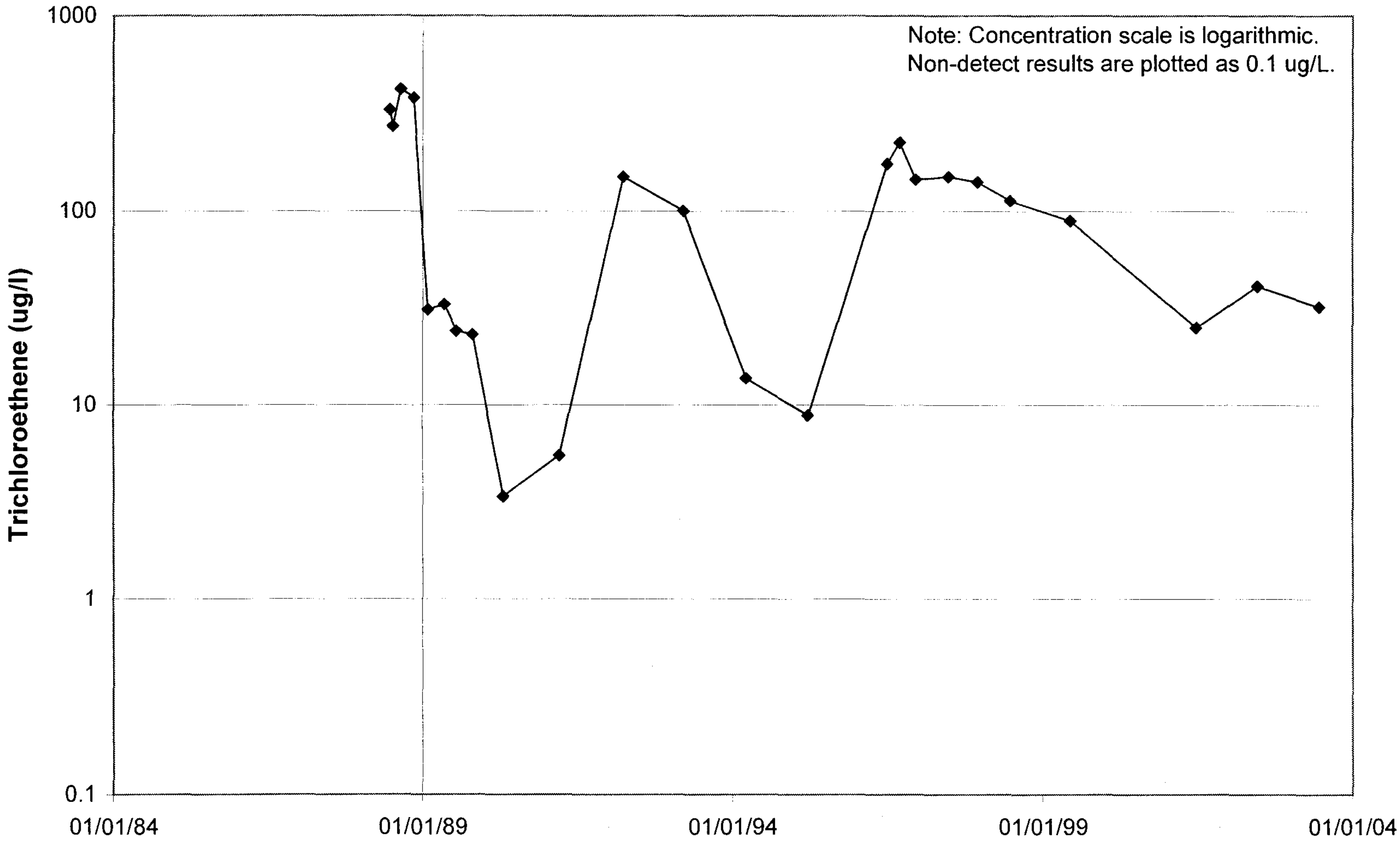

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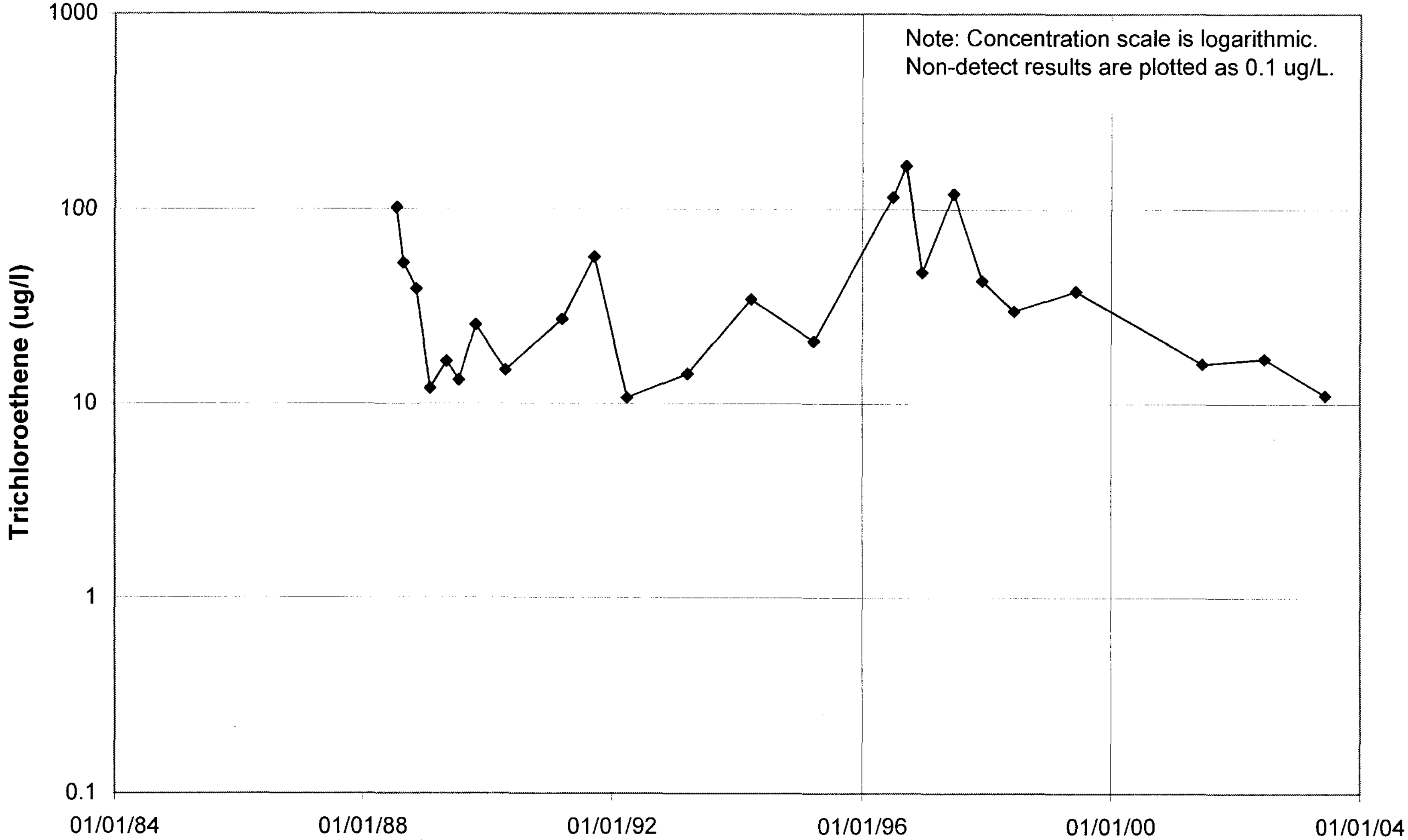

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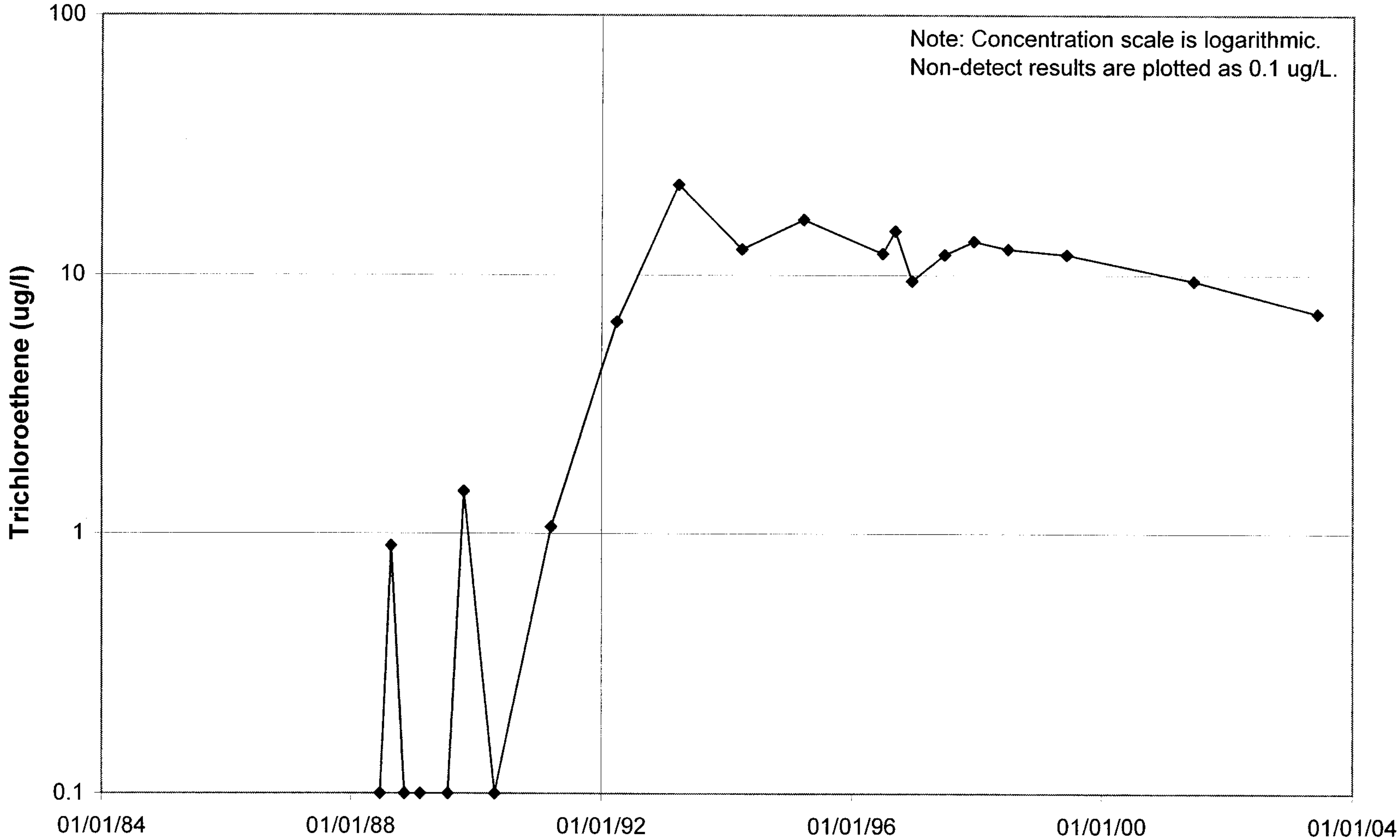

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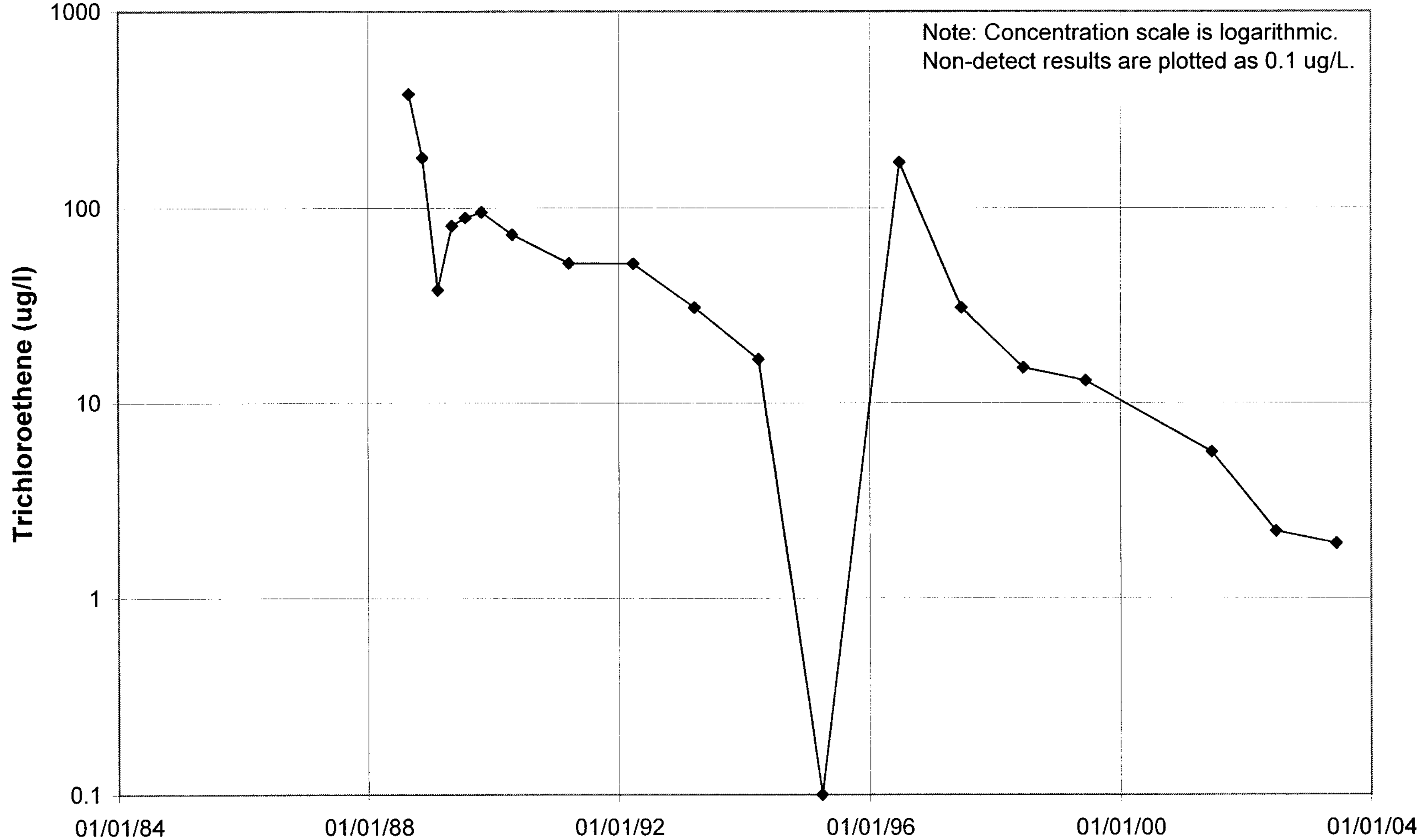

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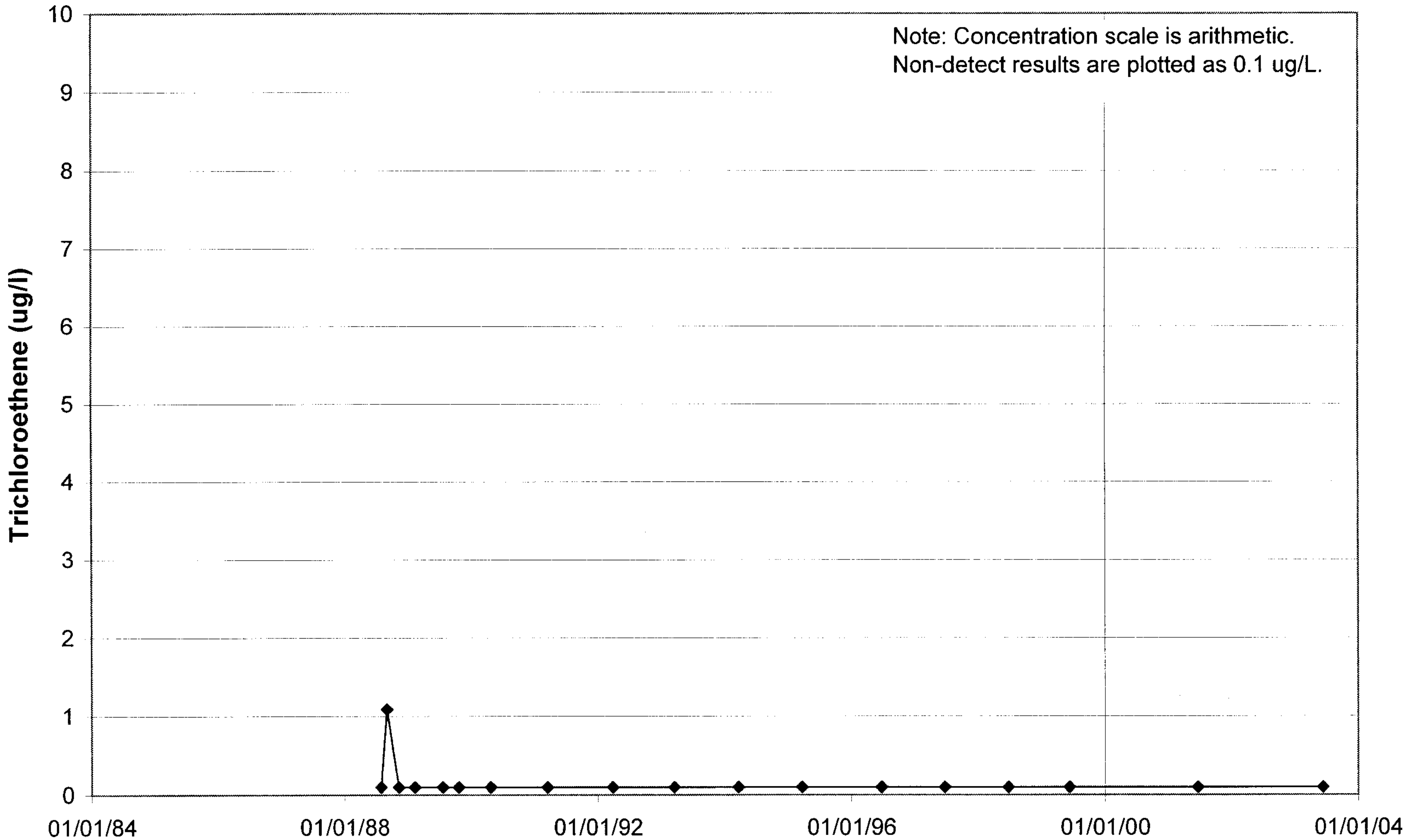

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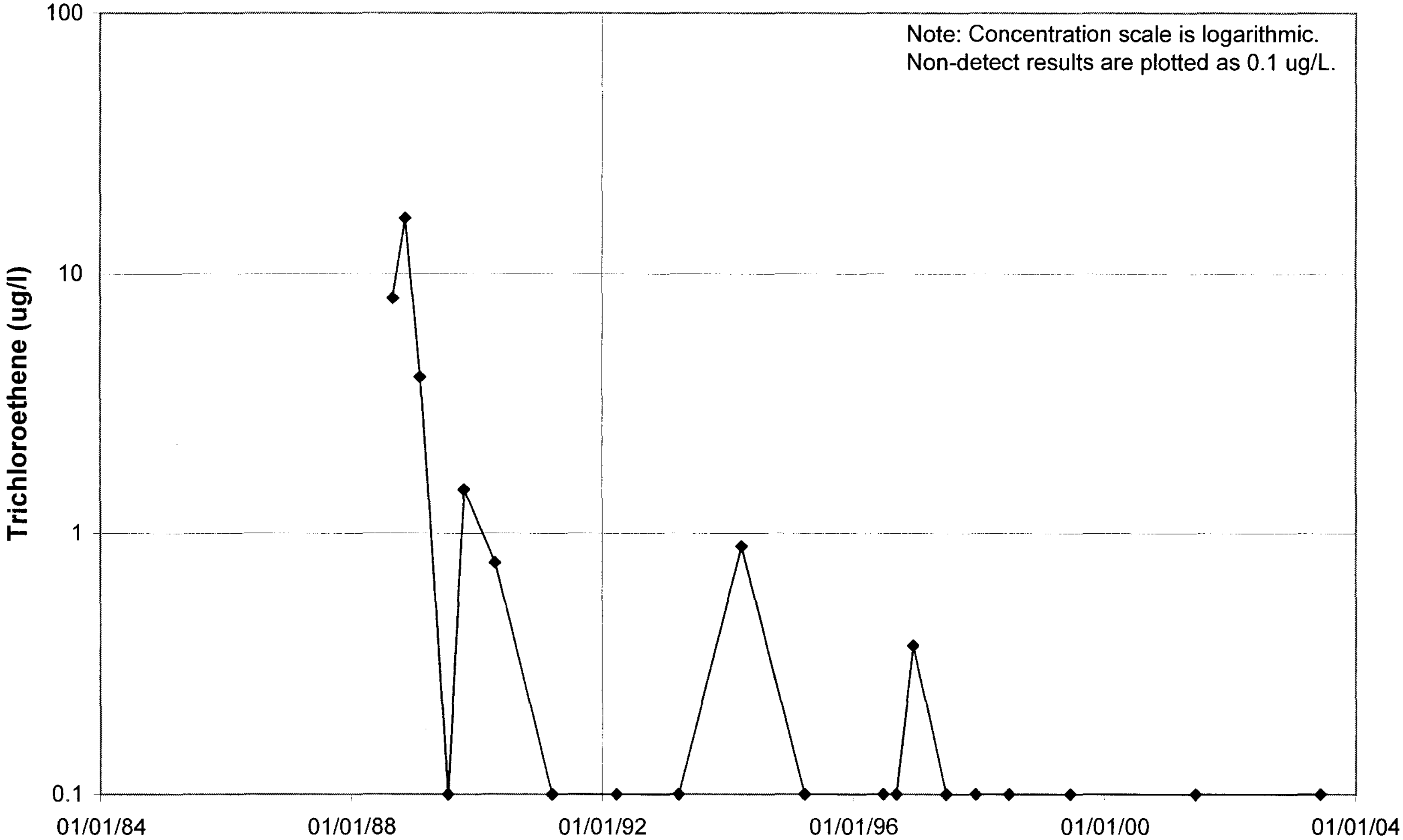

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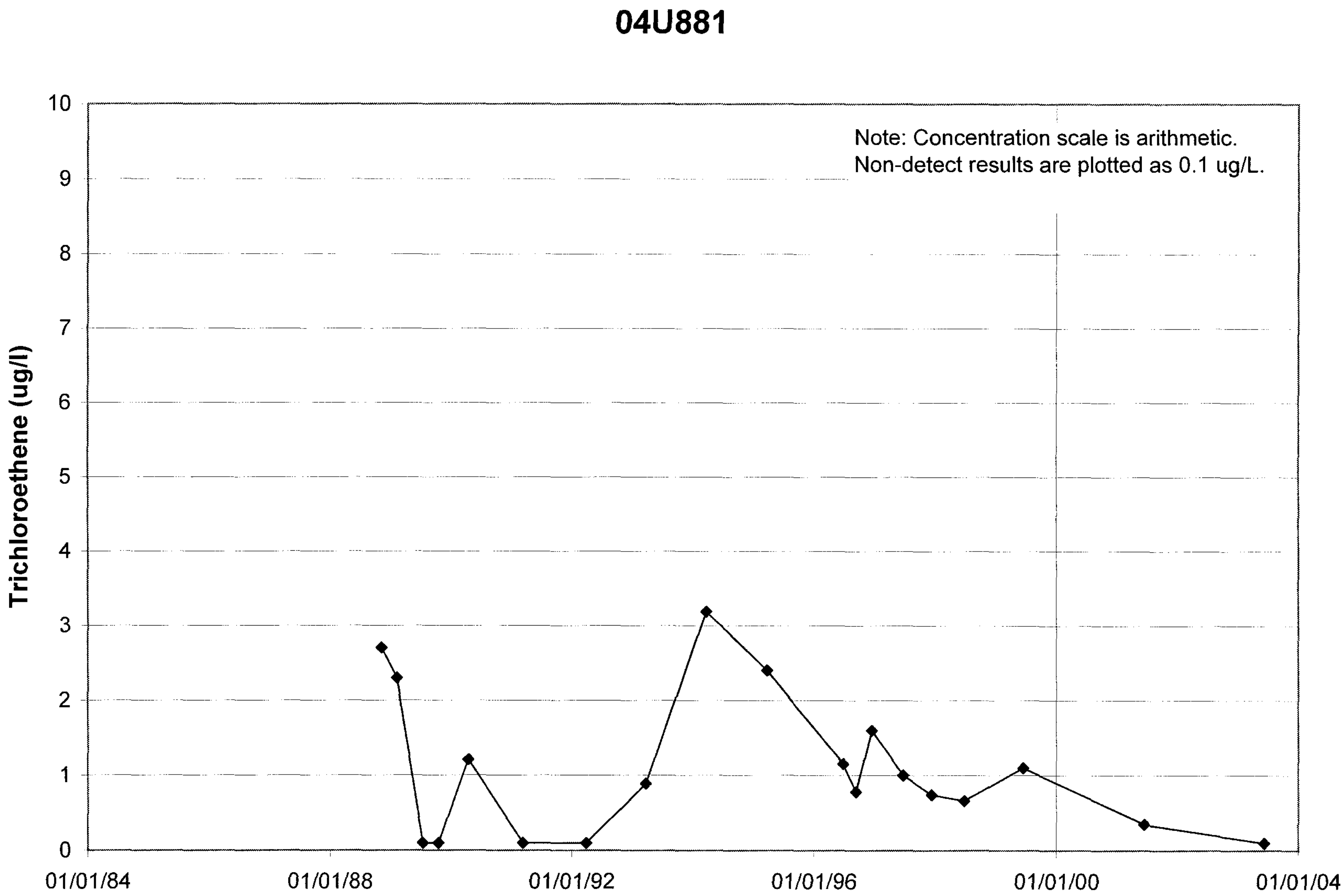

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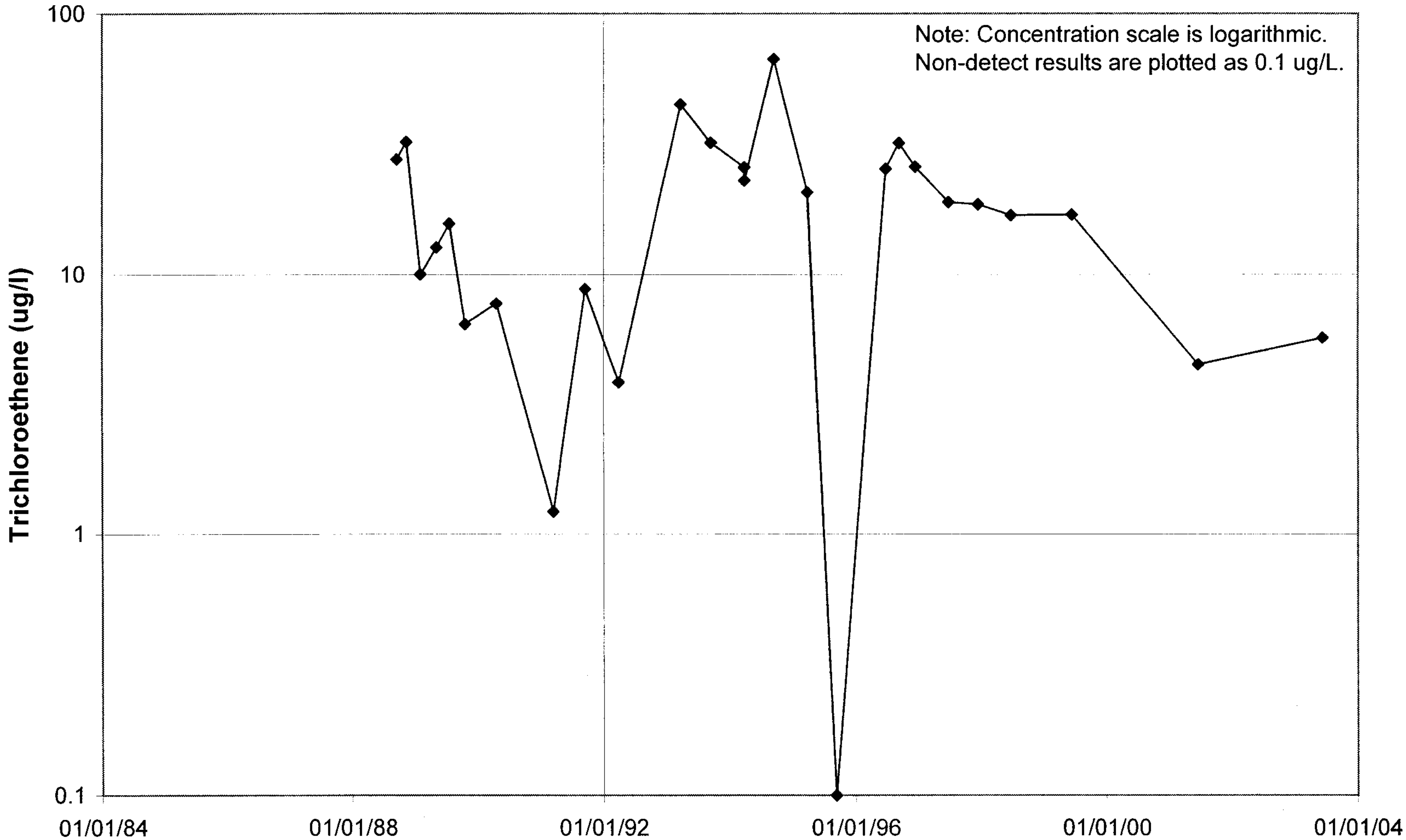

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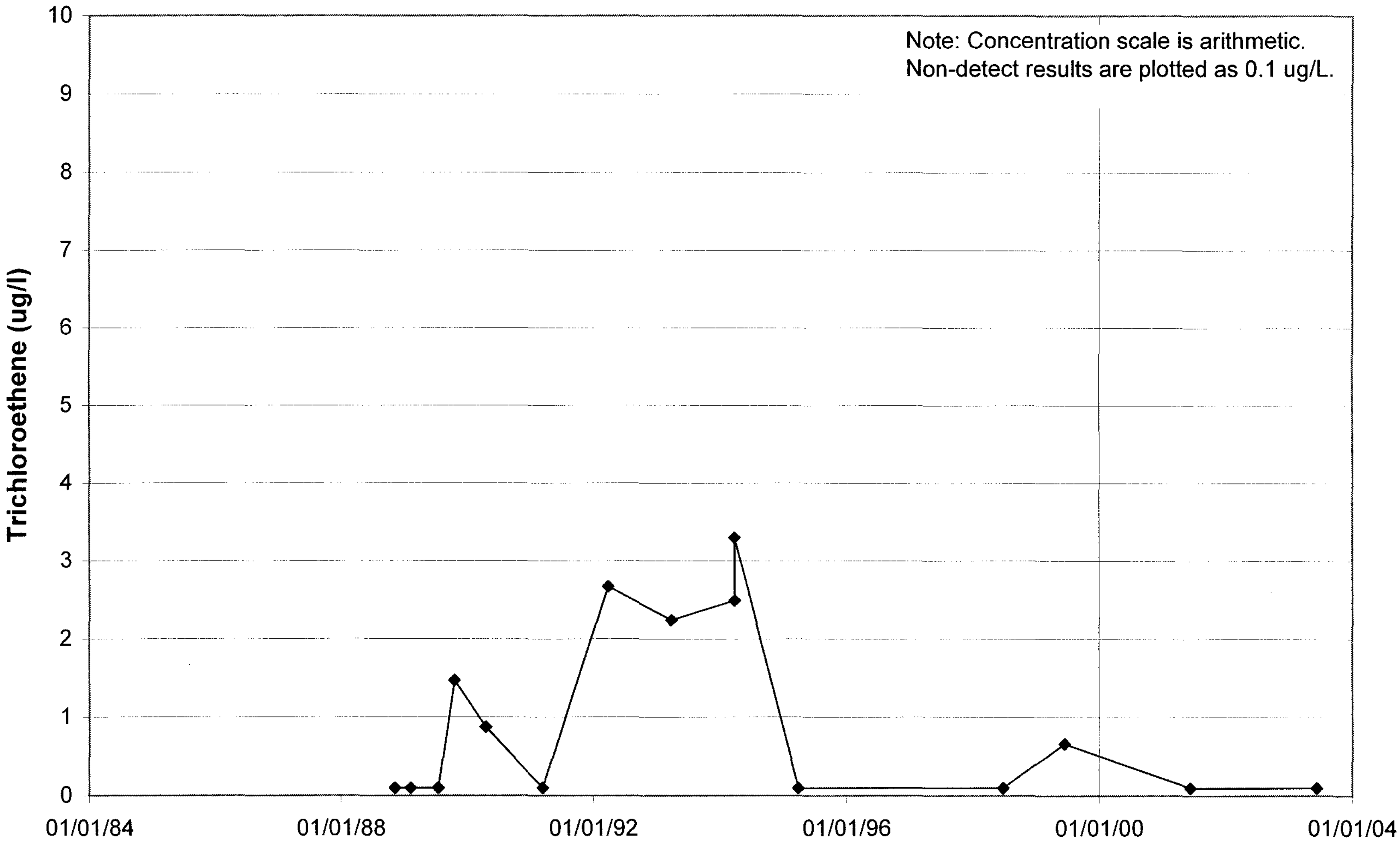

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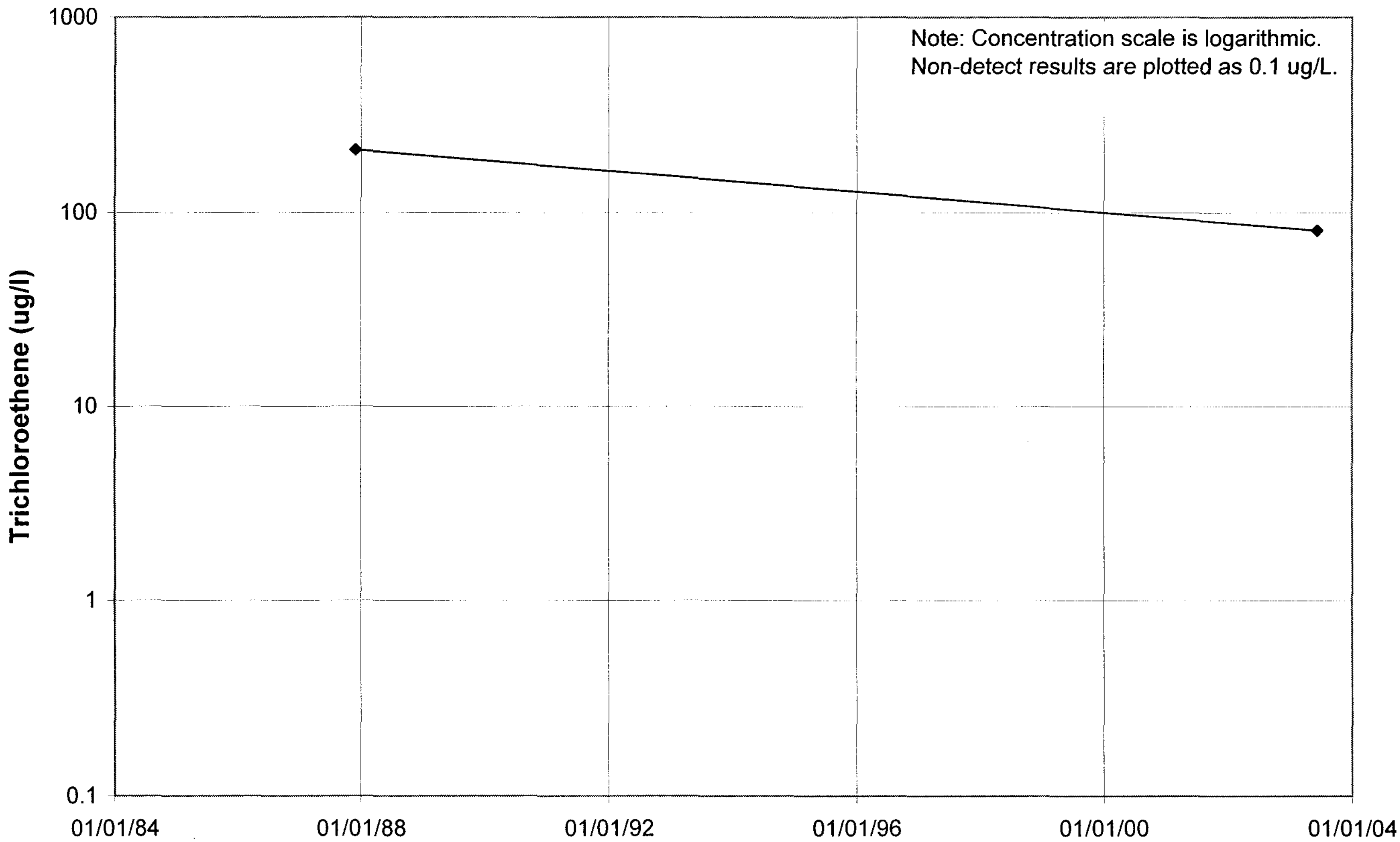

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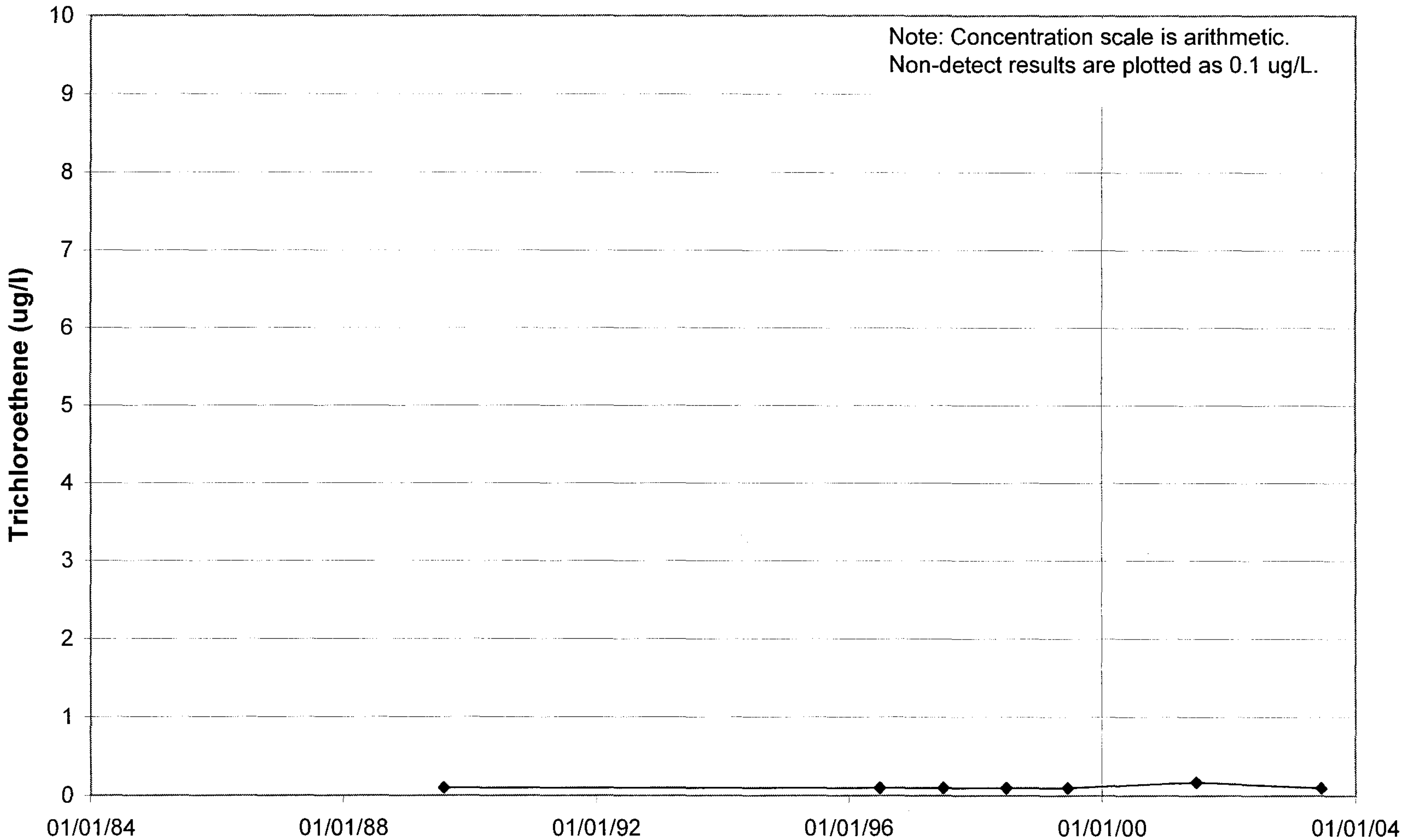

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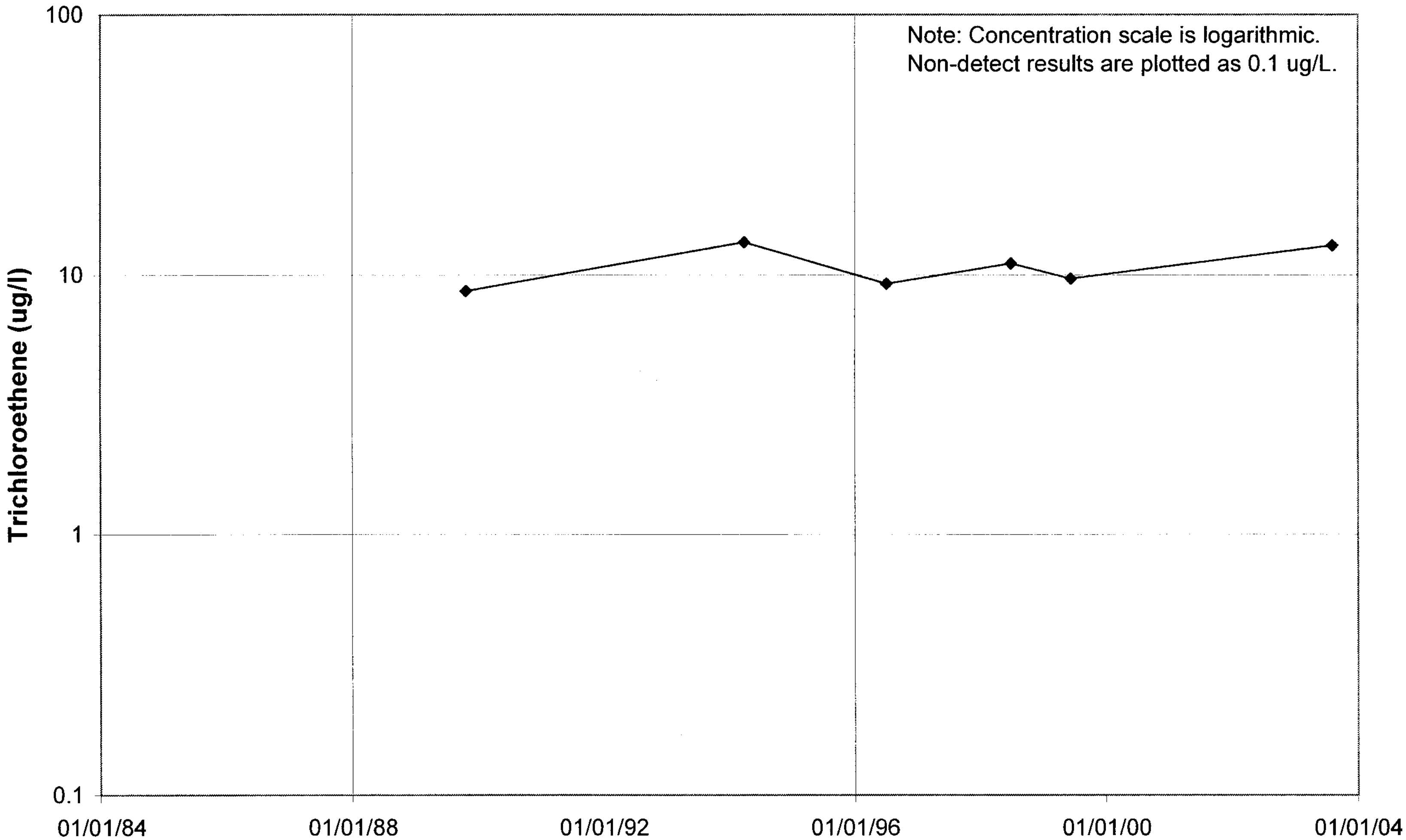

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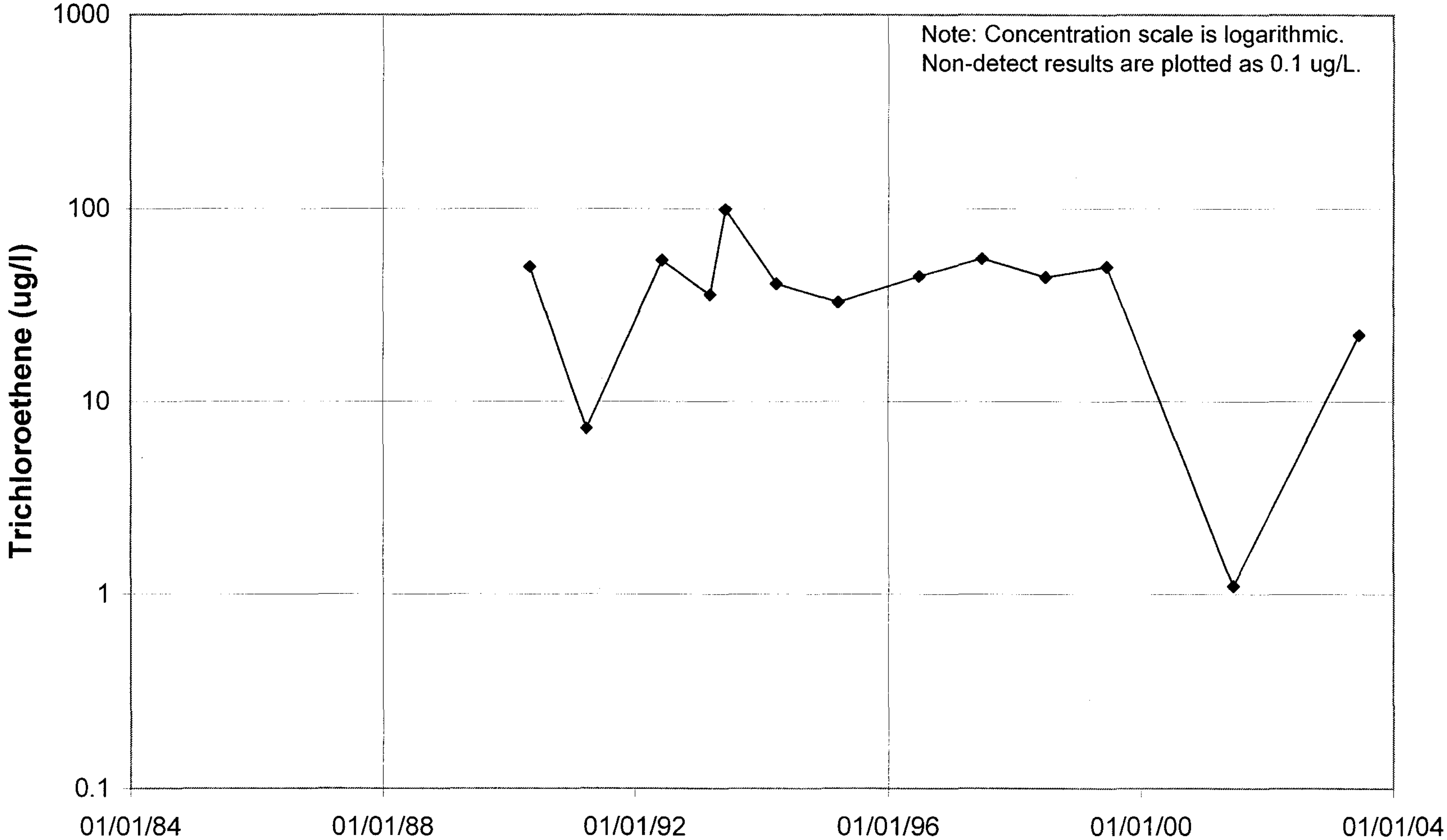

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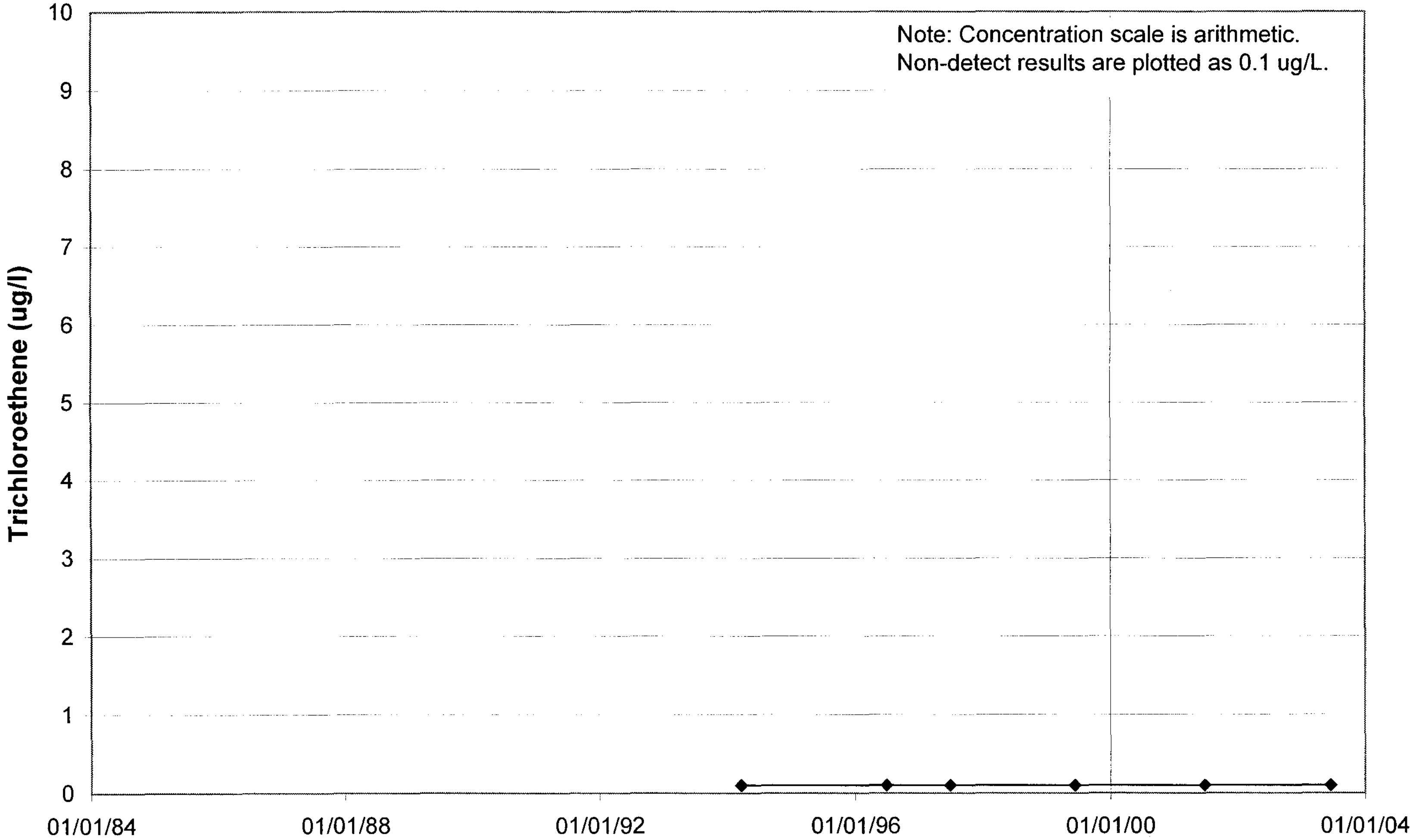

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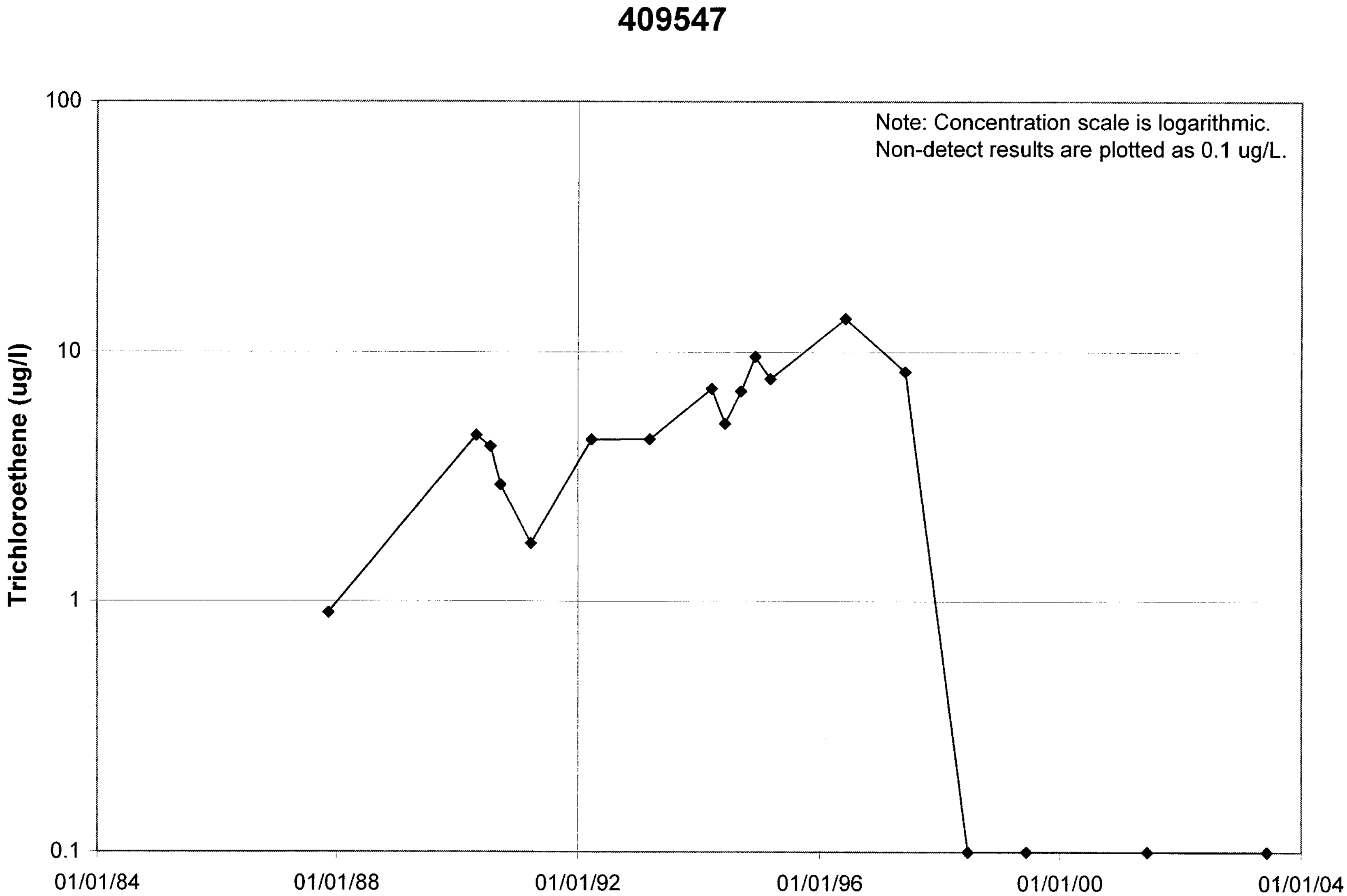

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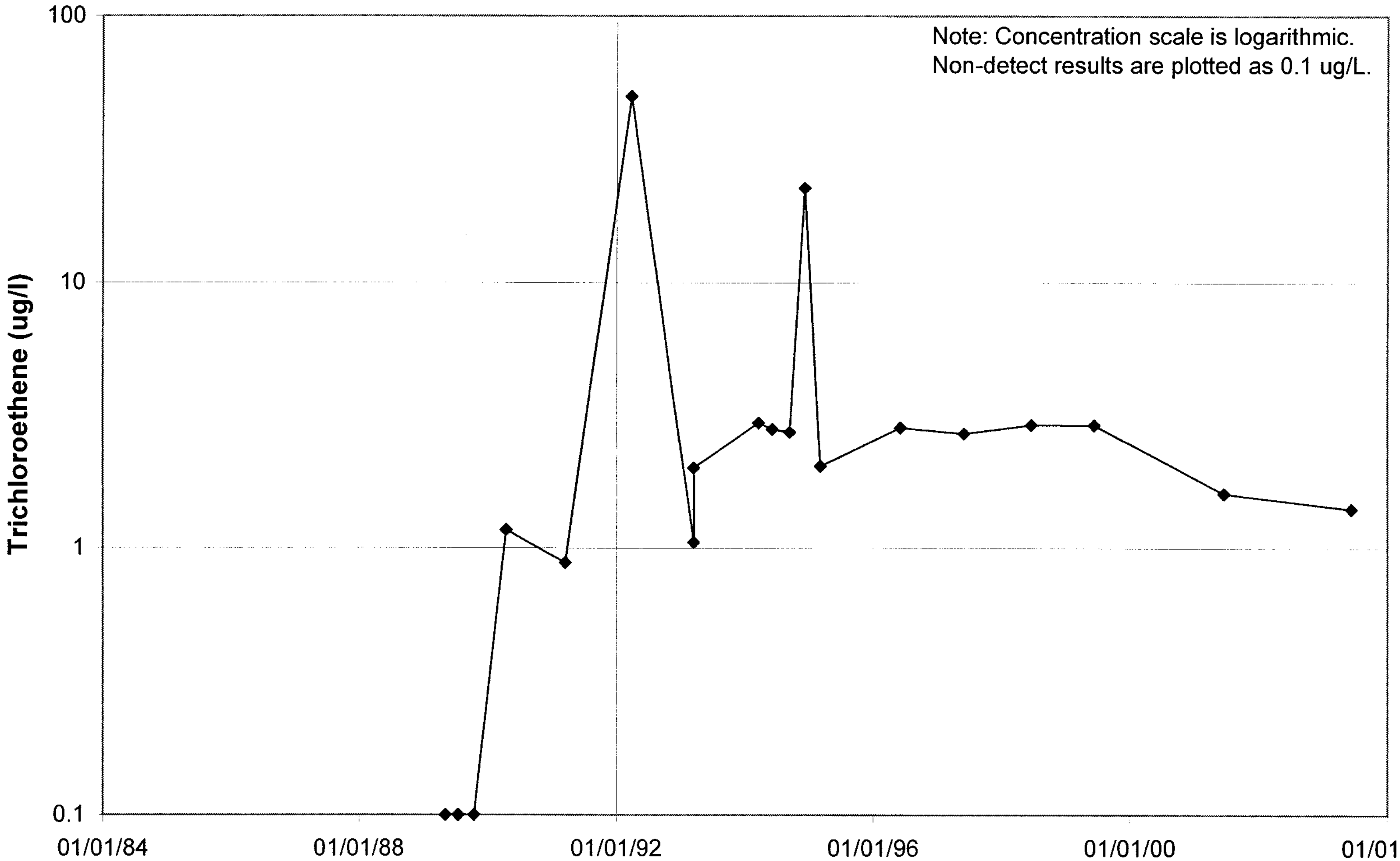

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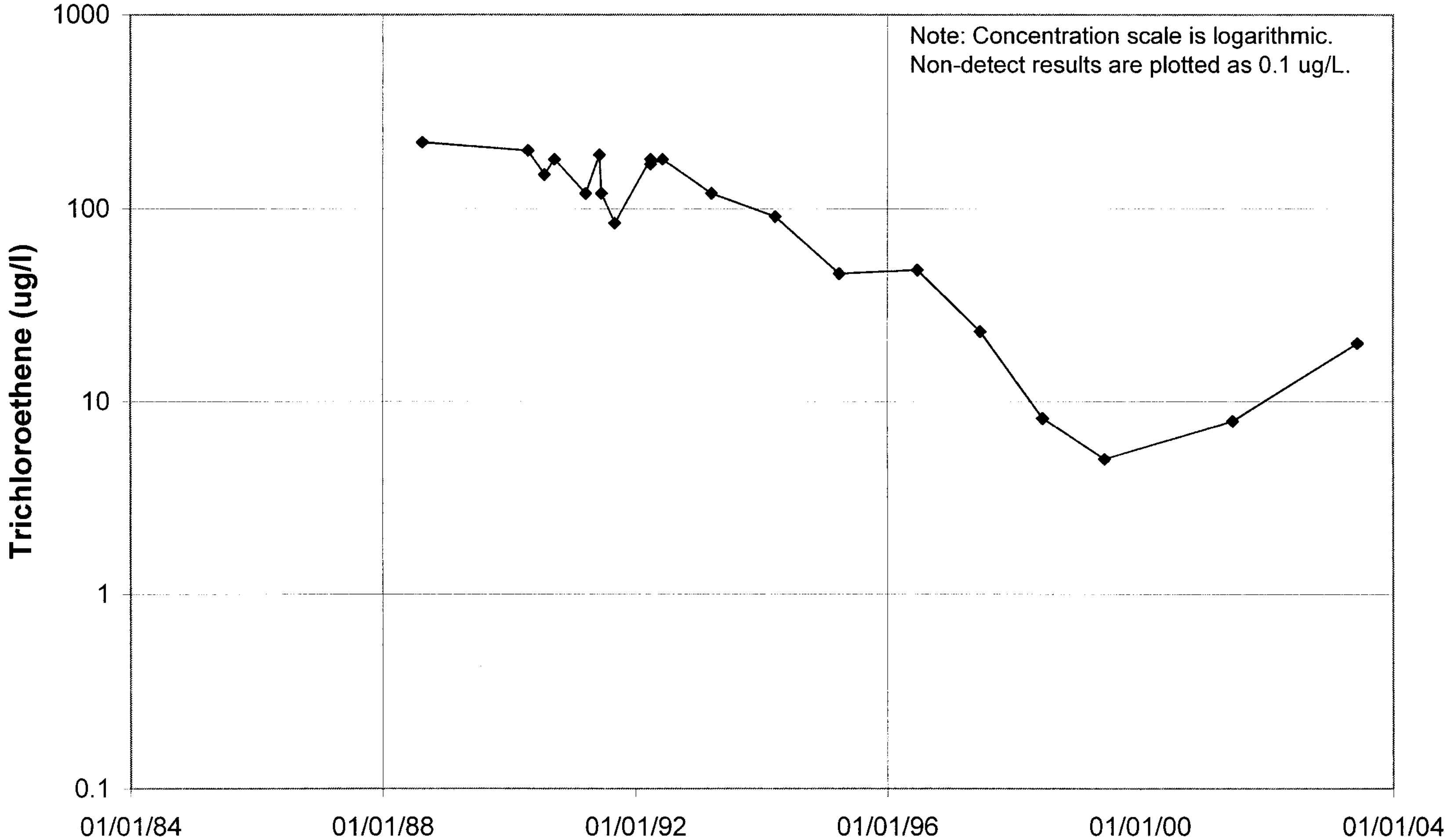

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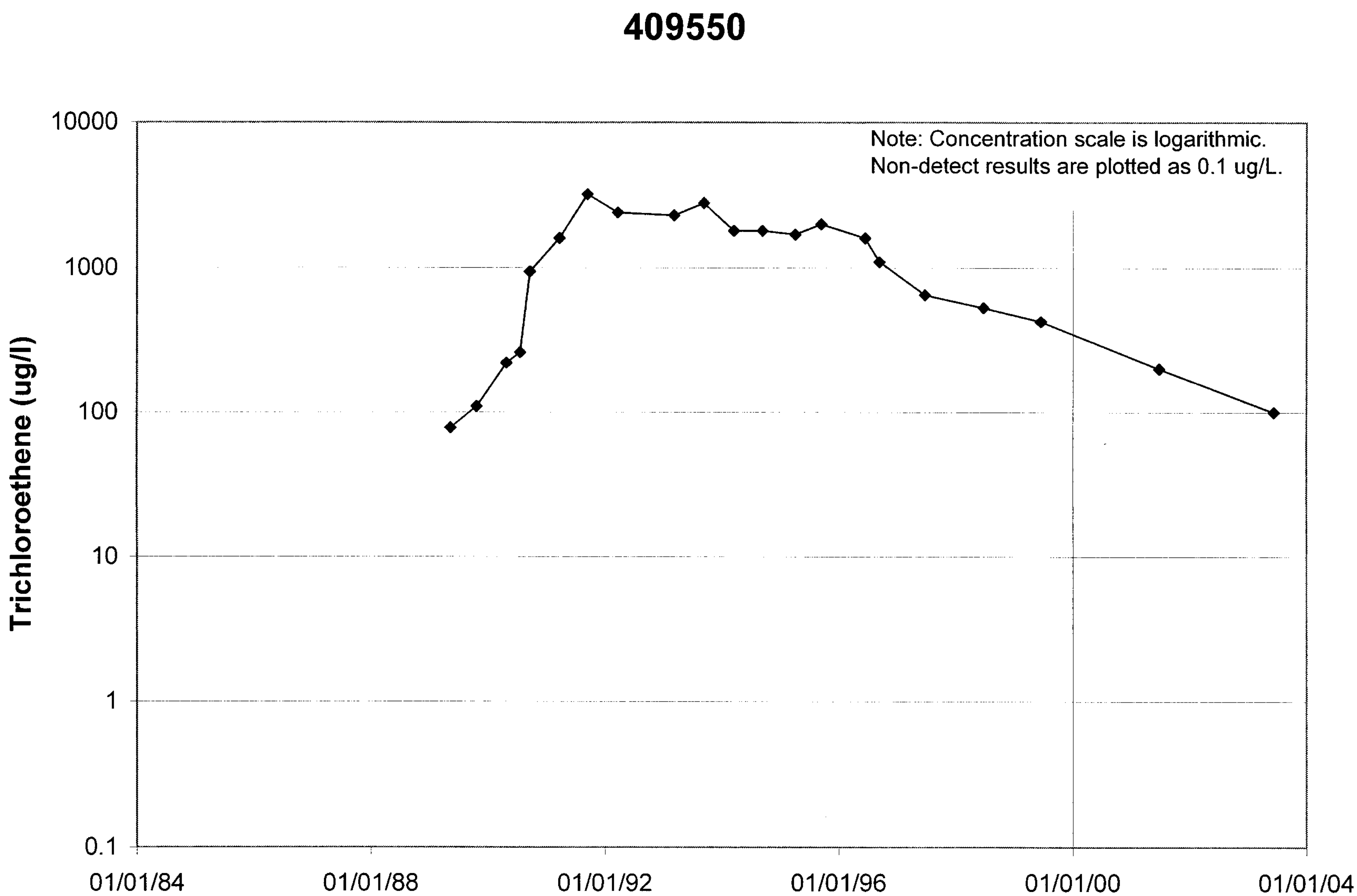

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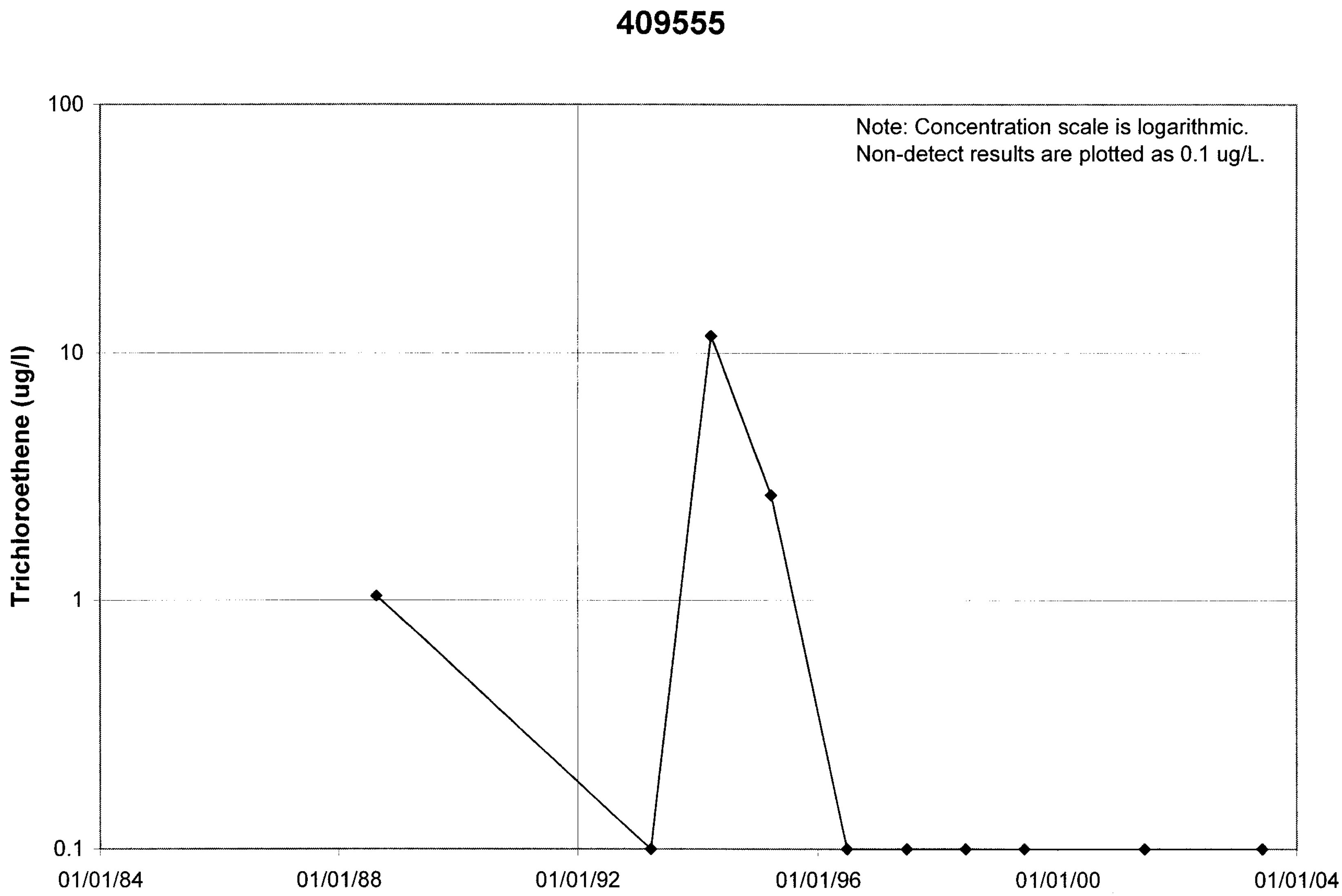

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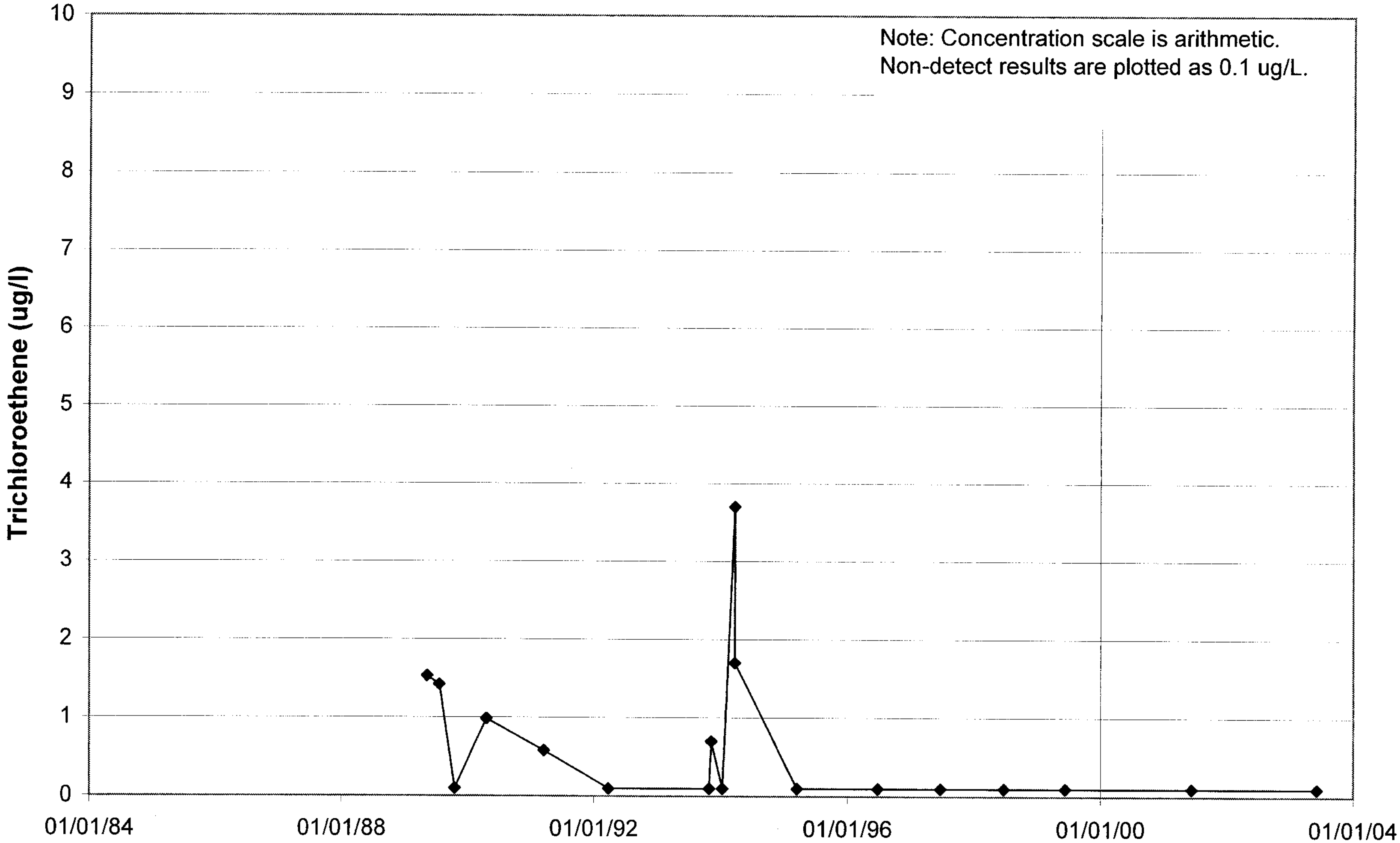

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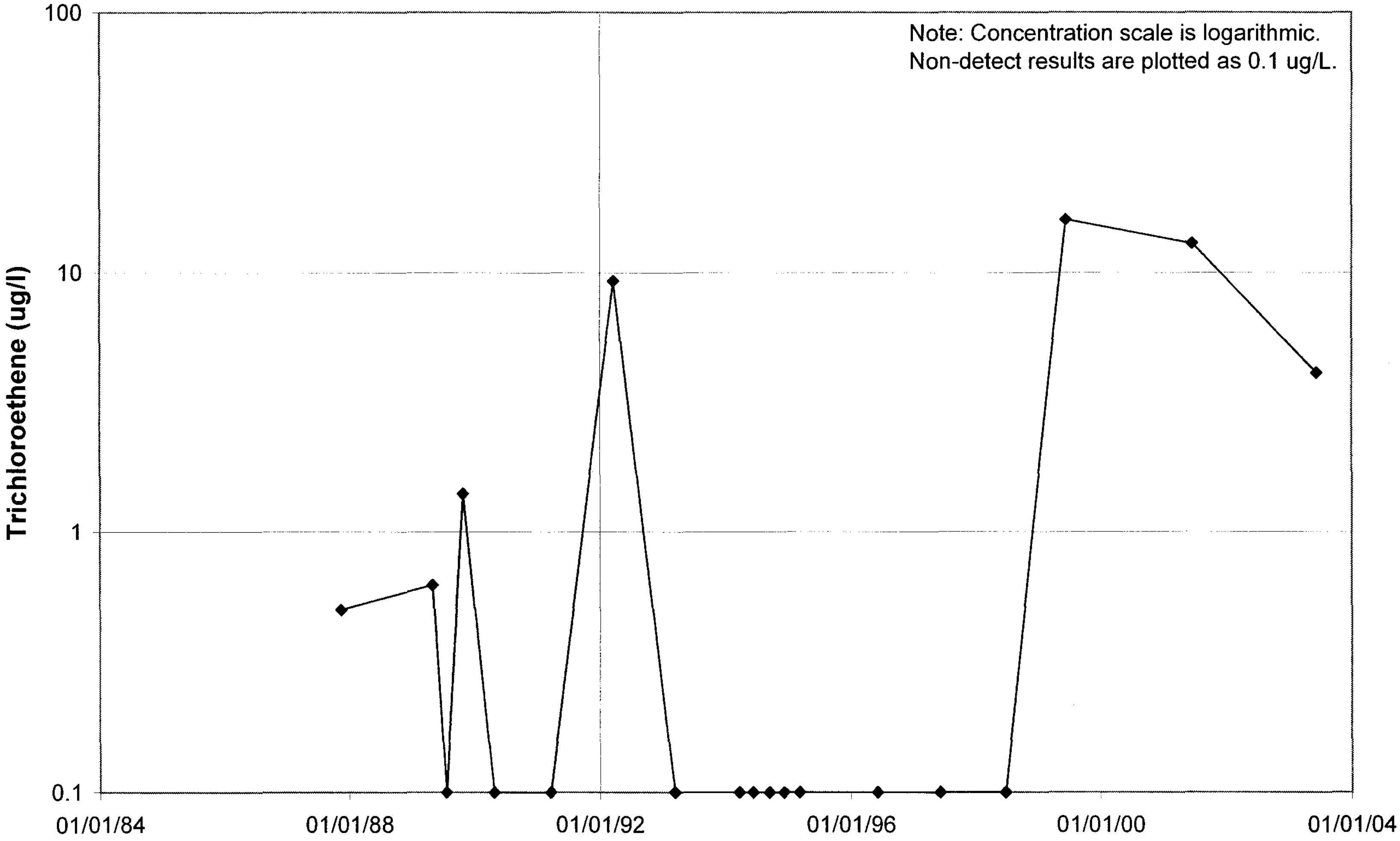

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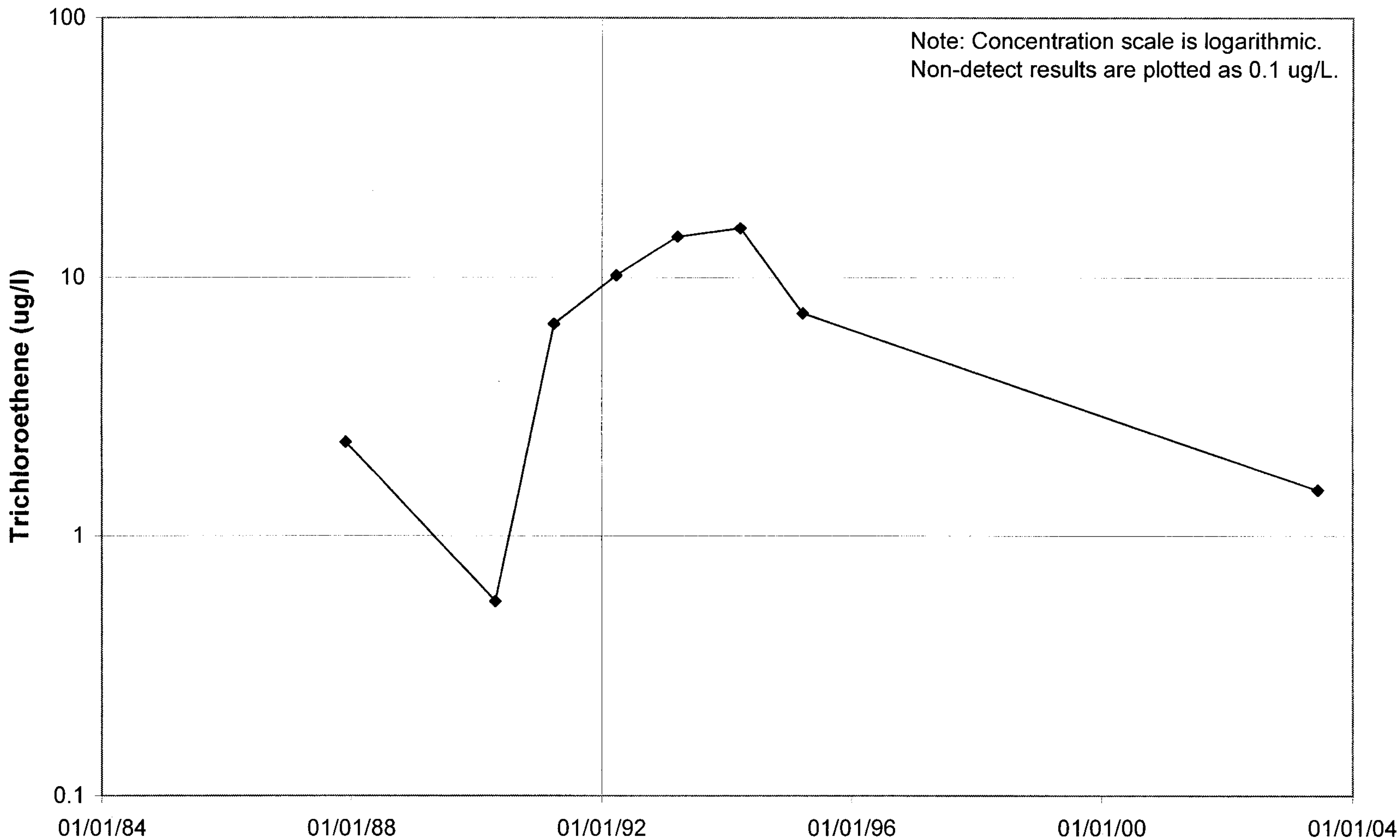

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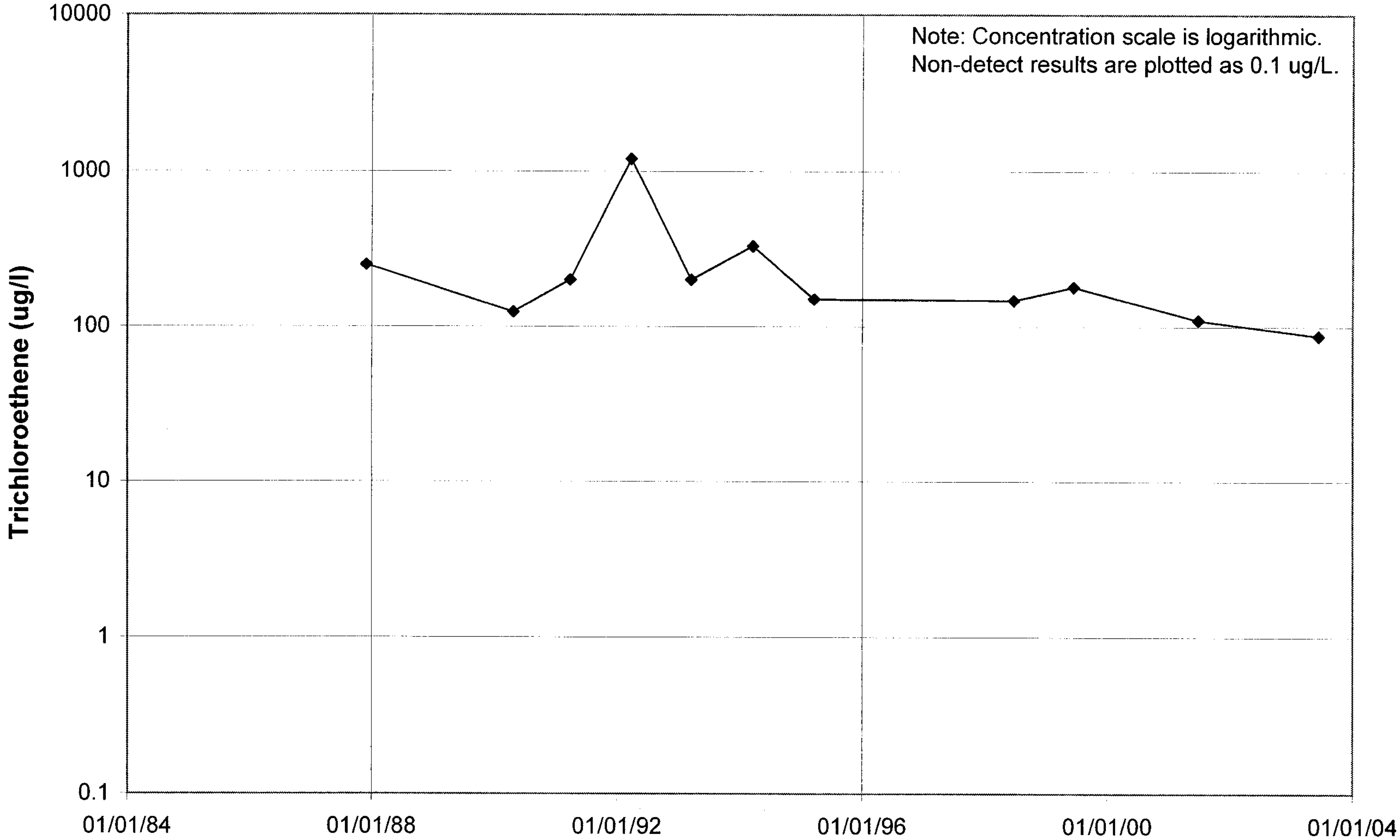

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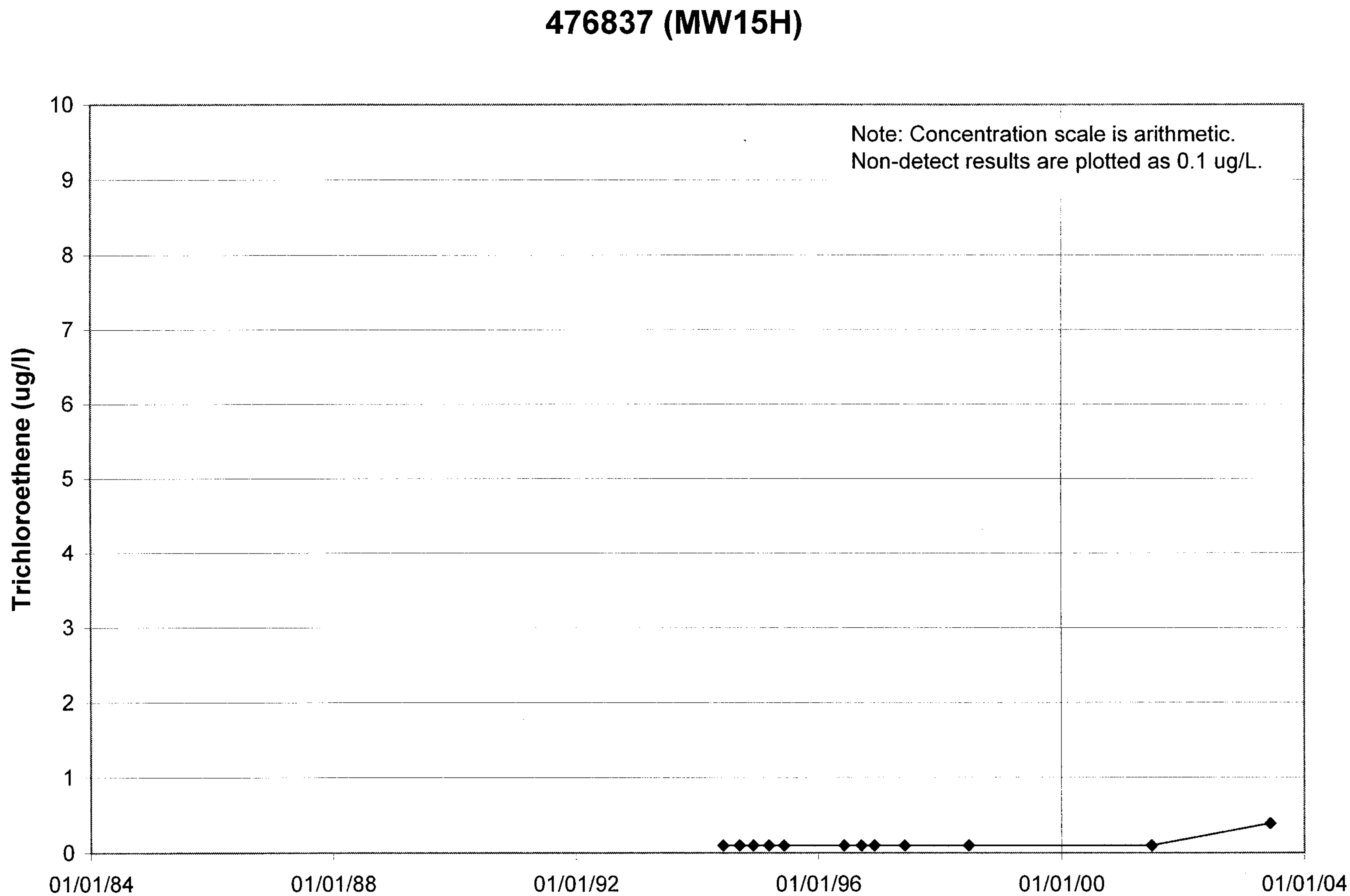

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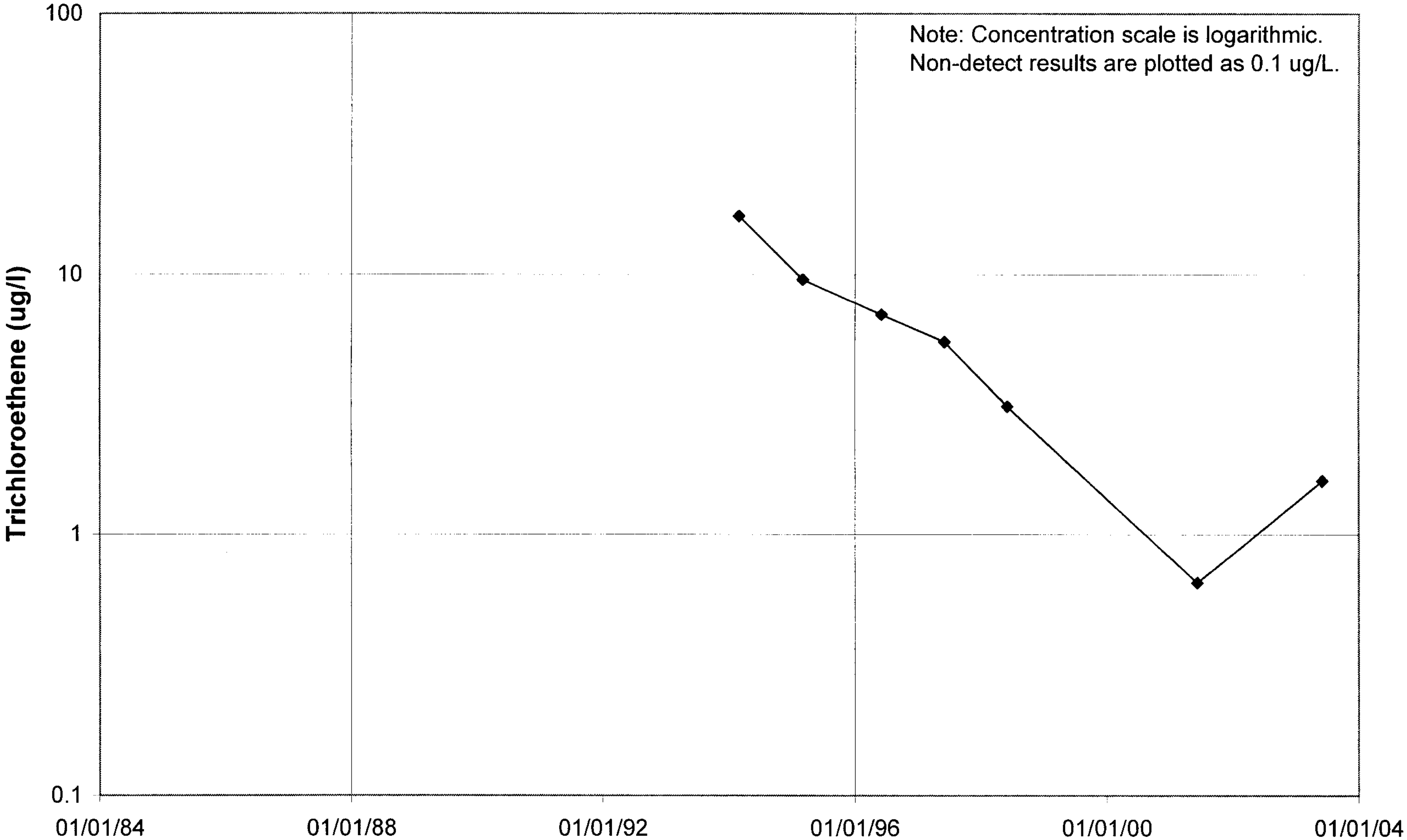

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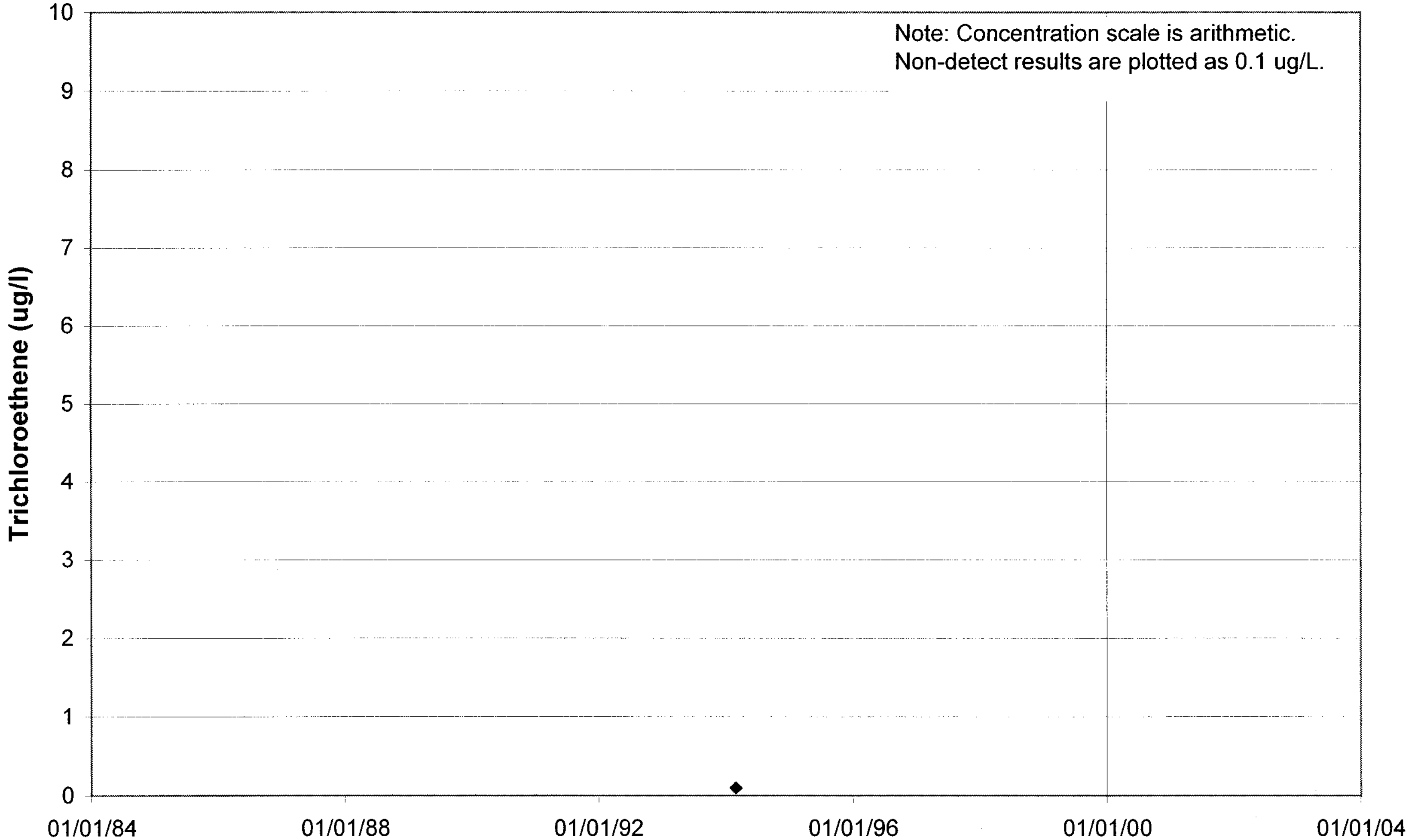

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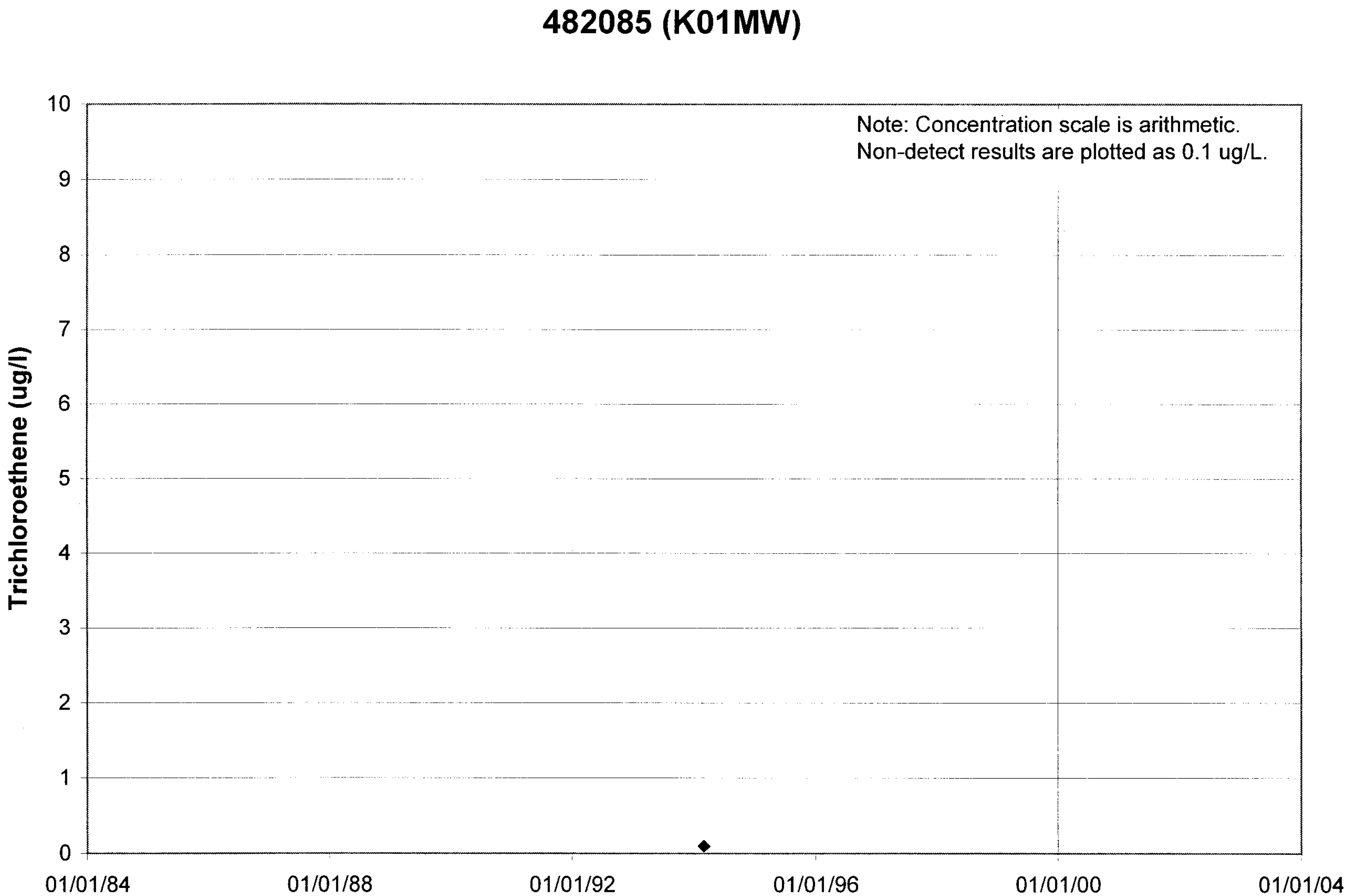

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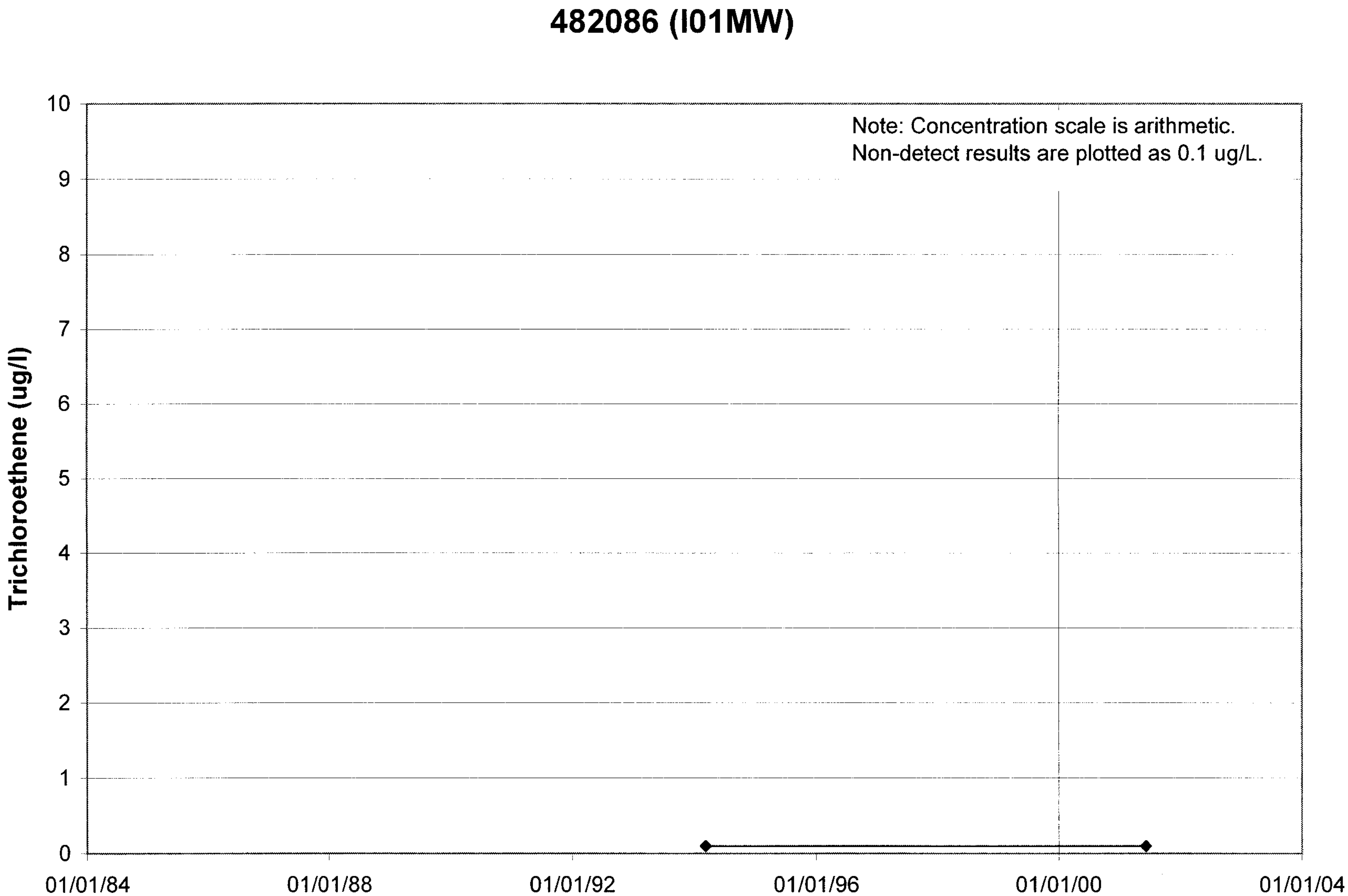

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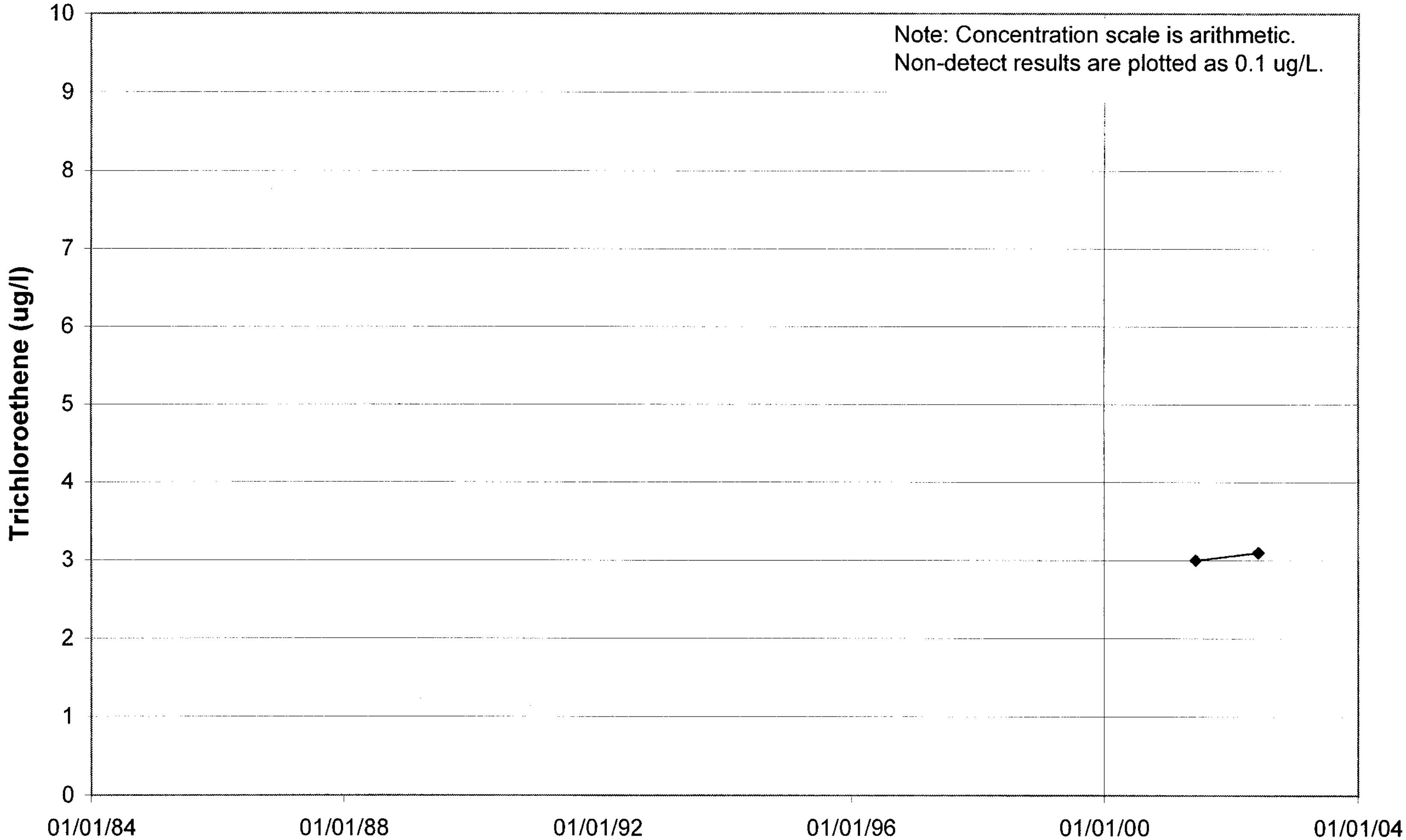

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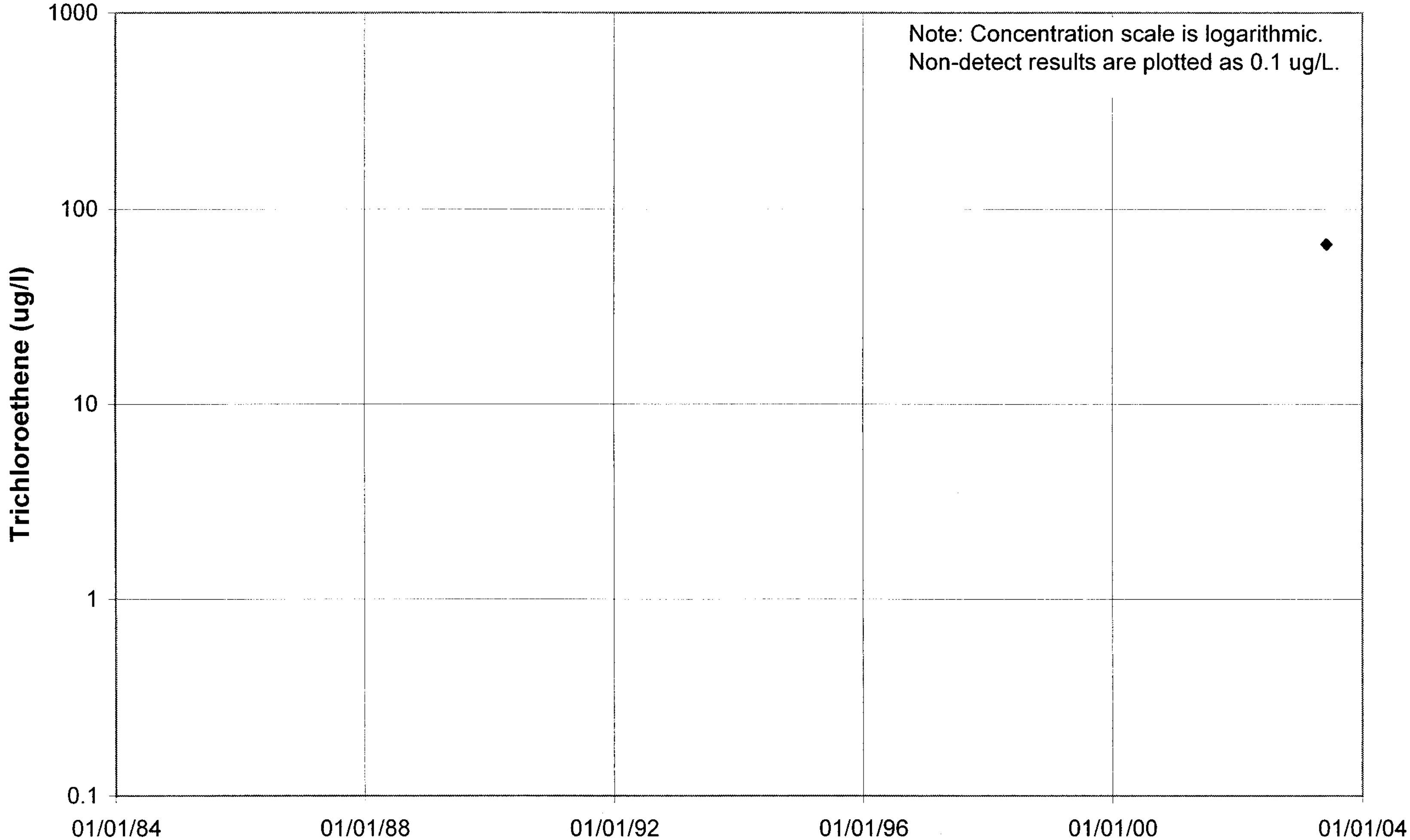

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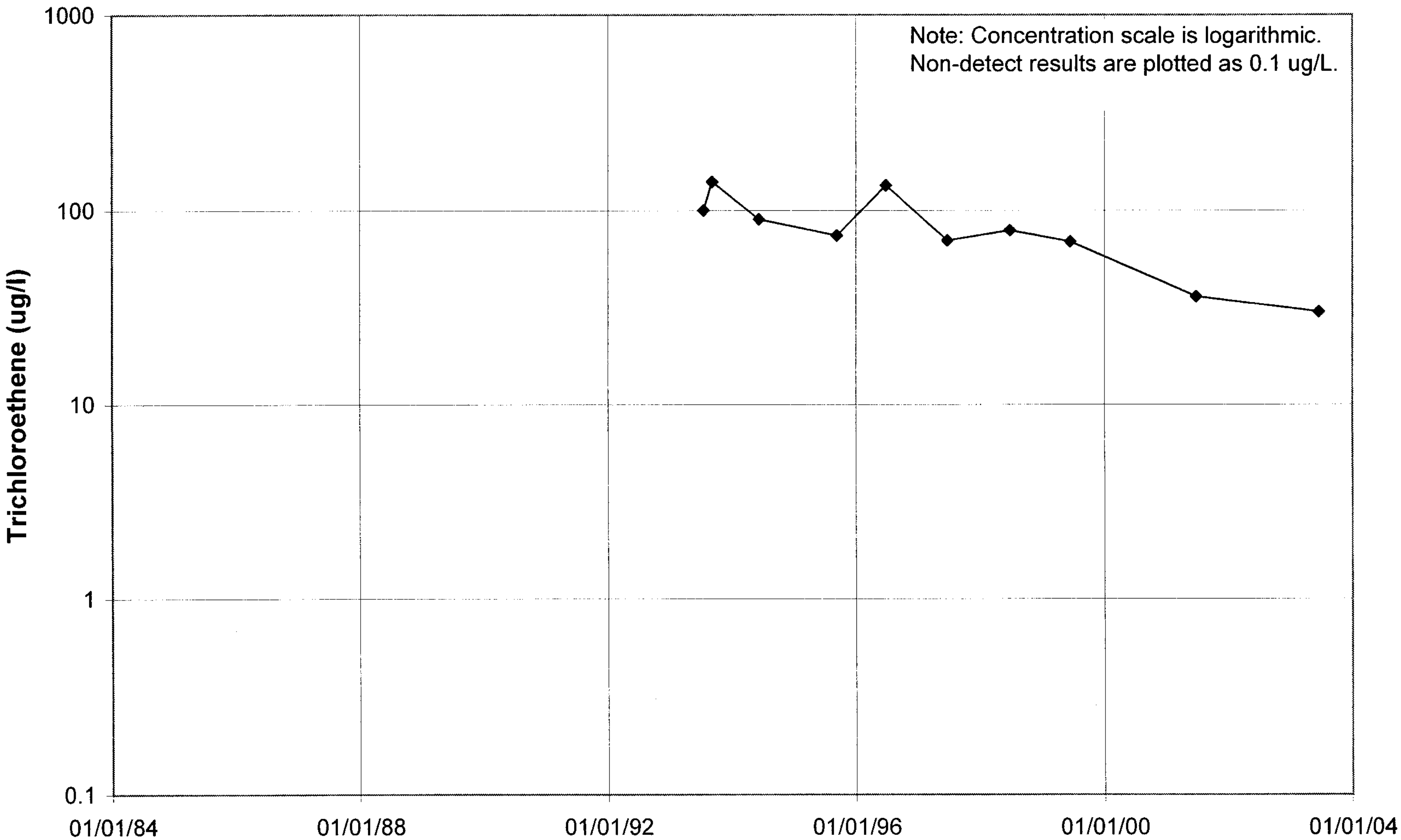

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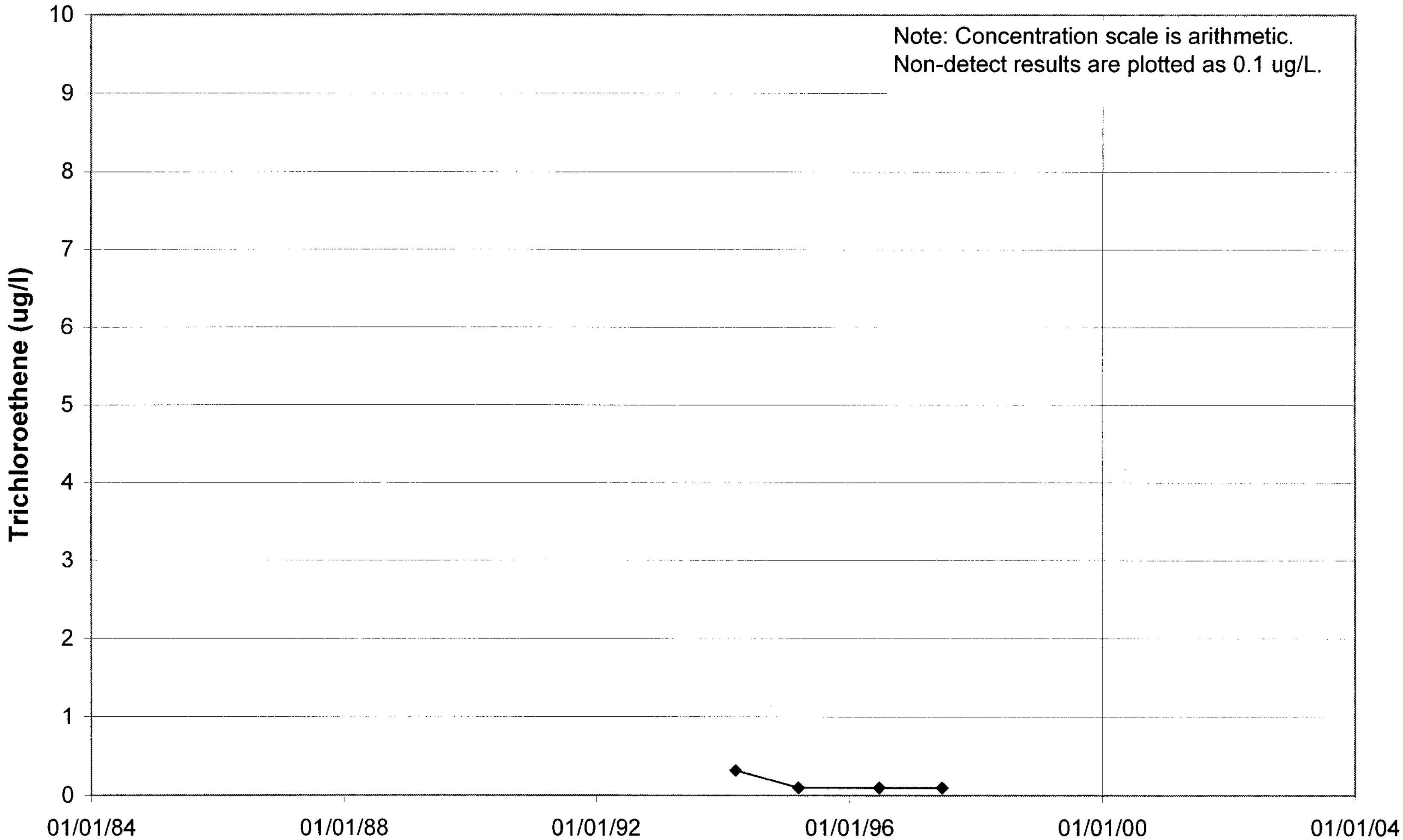

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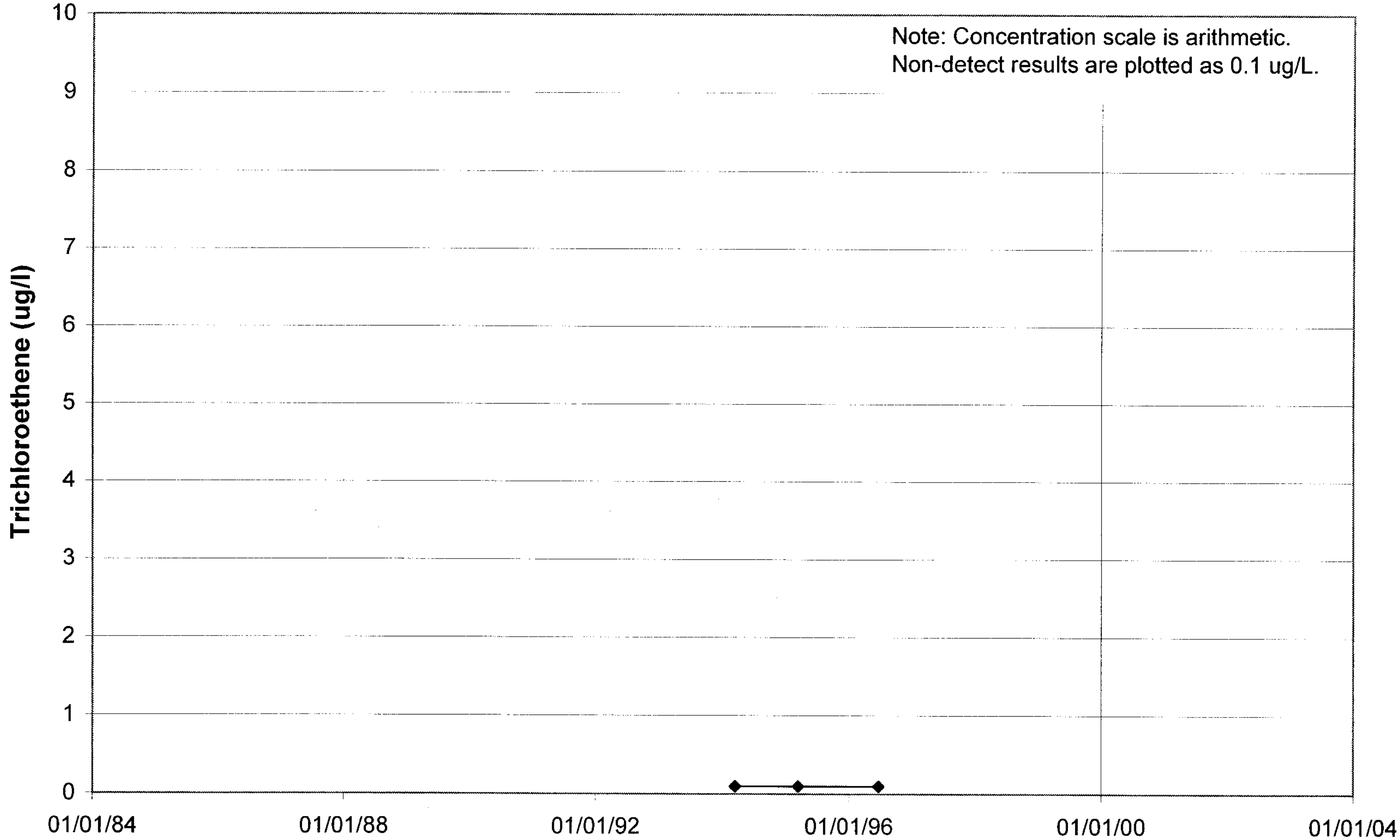

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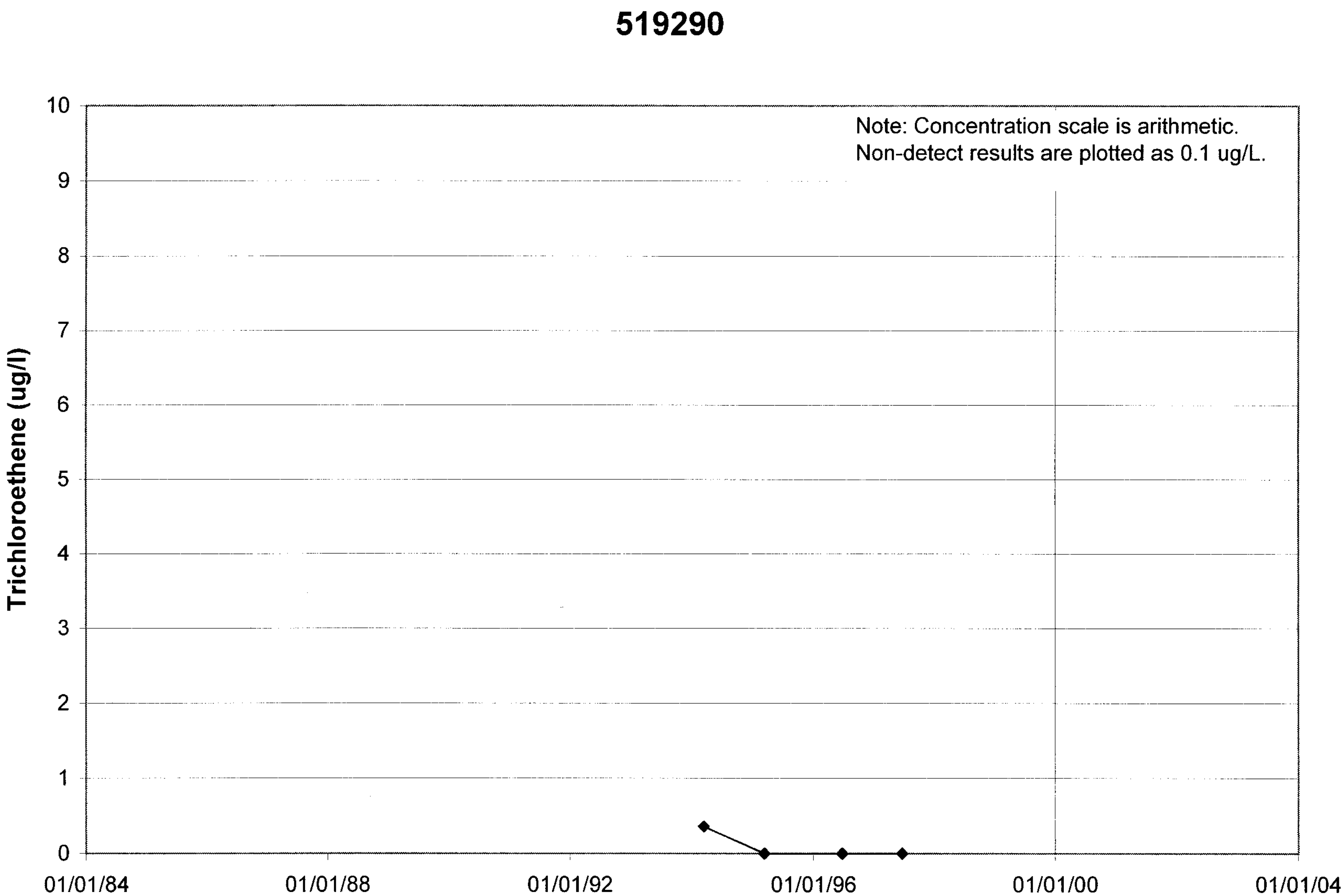

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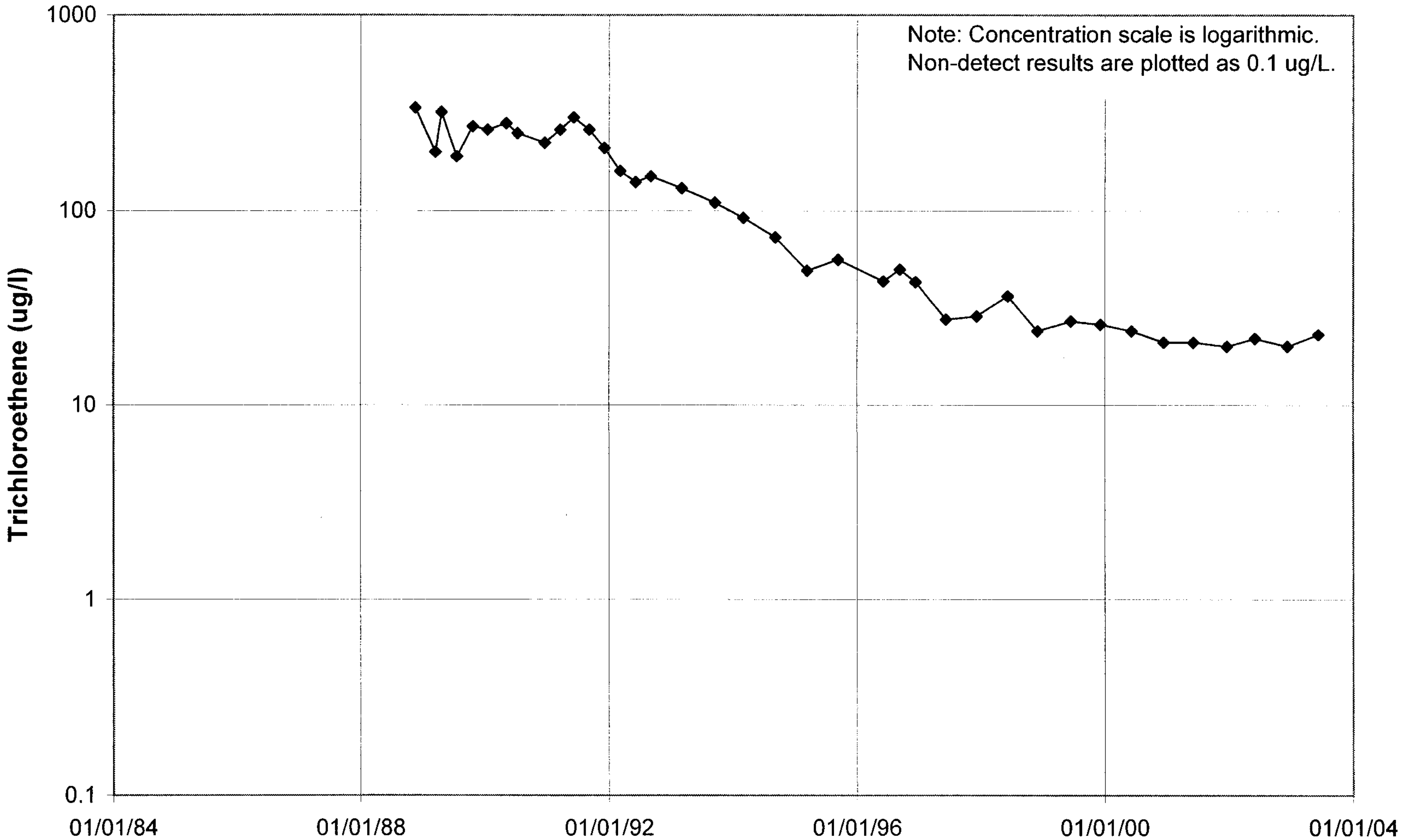

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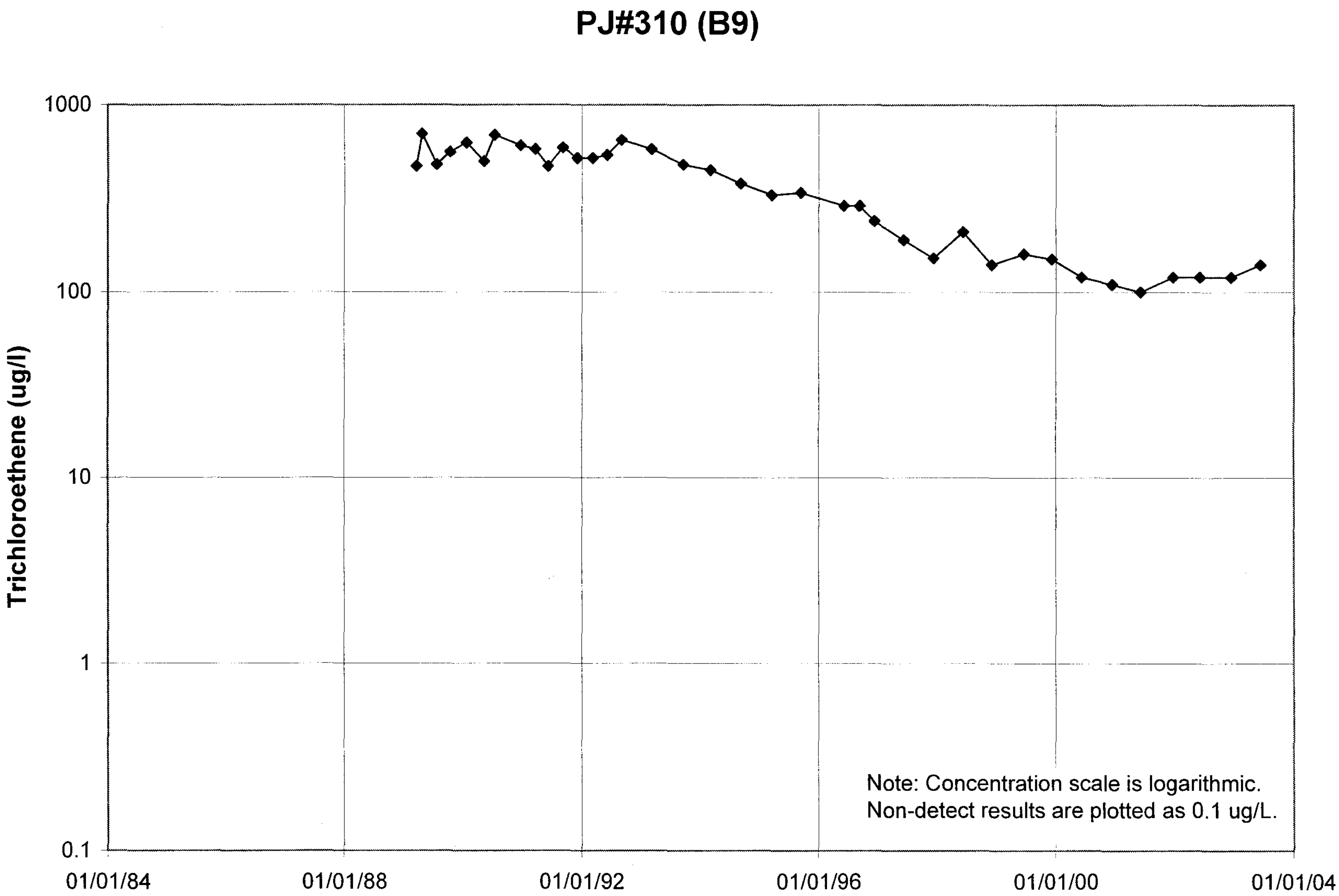

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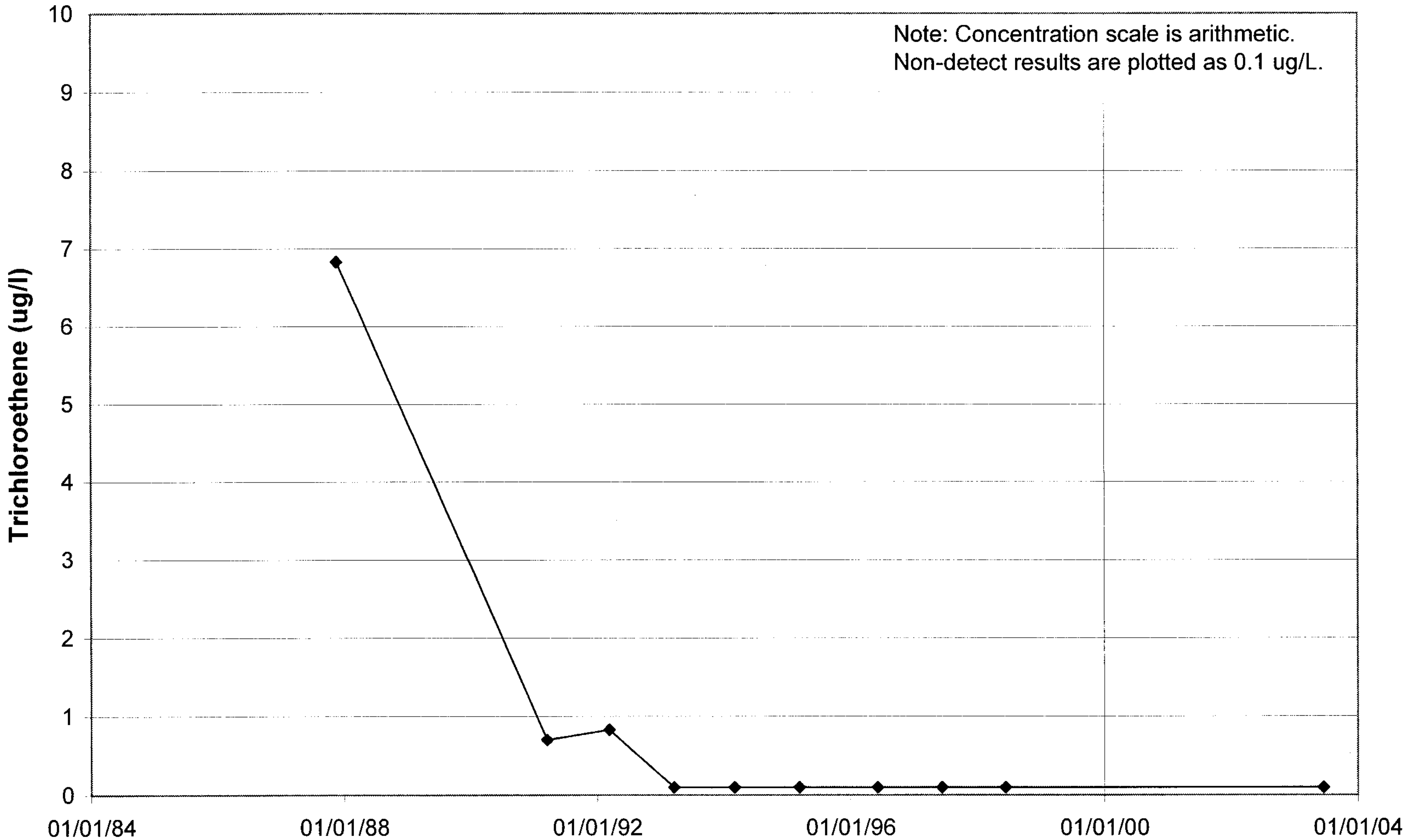
PJ#003



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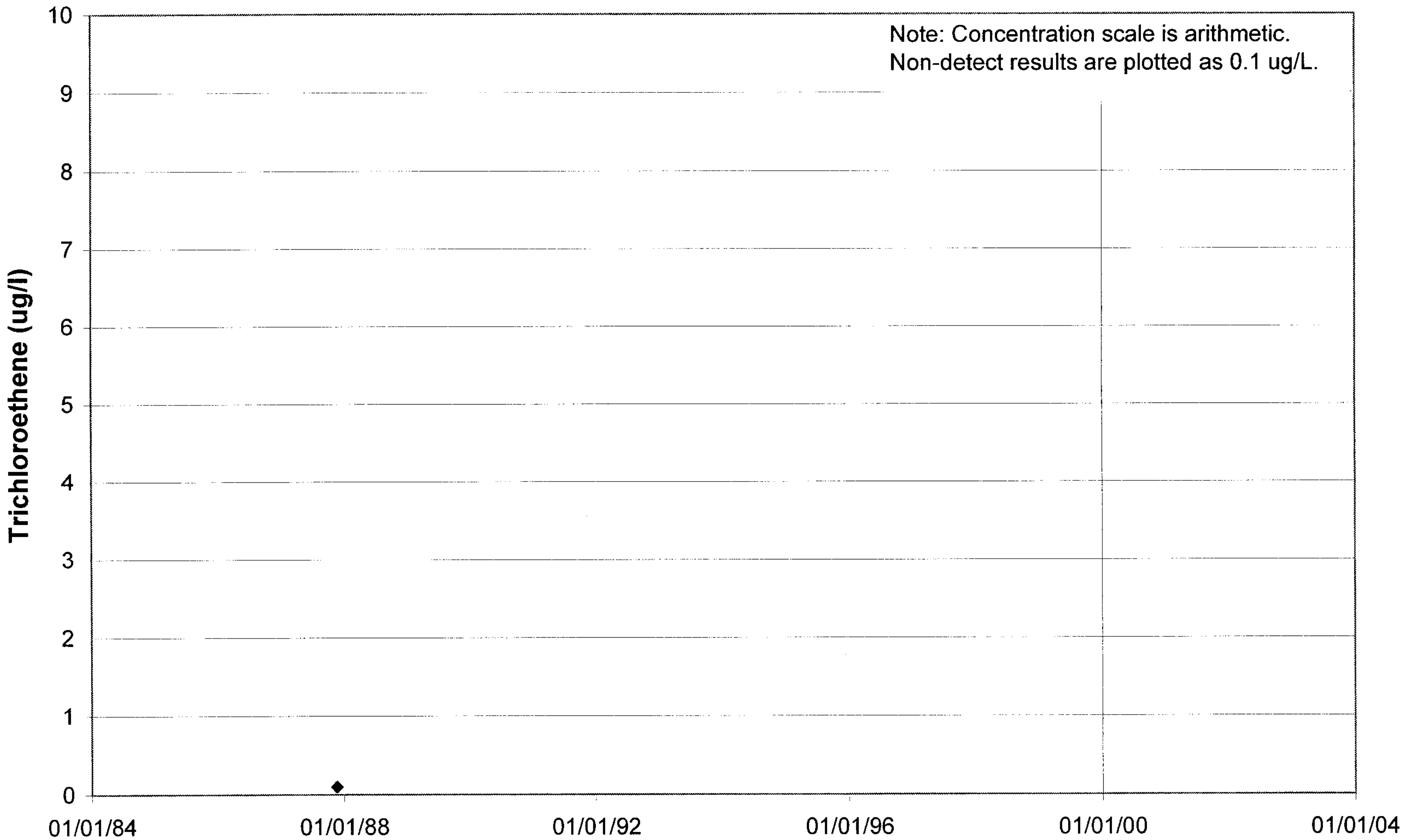

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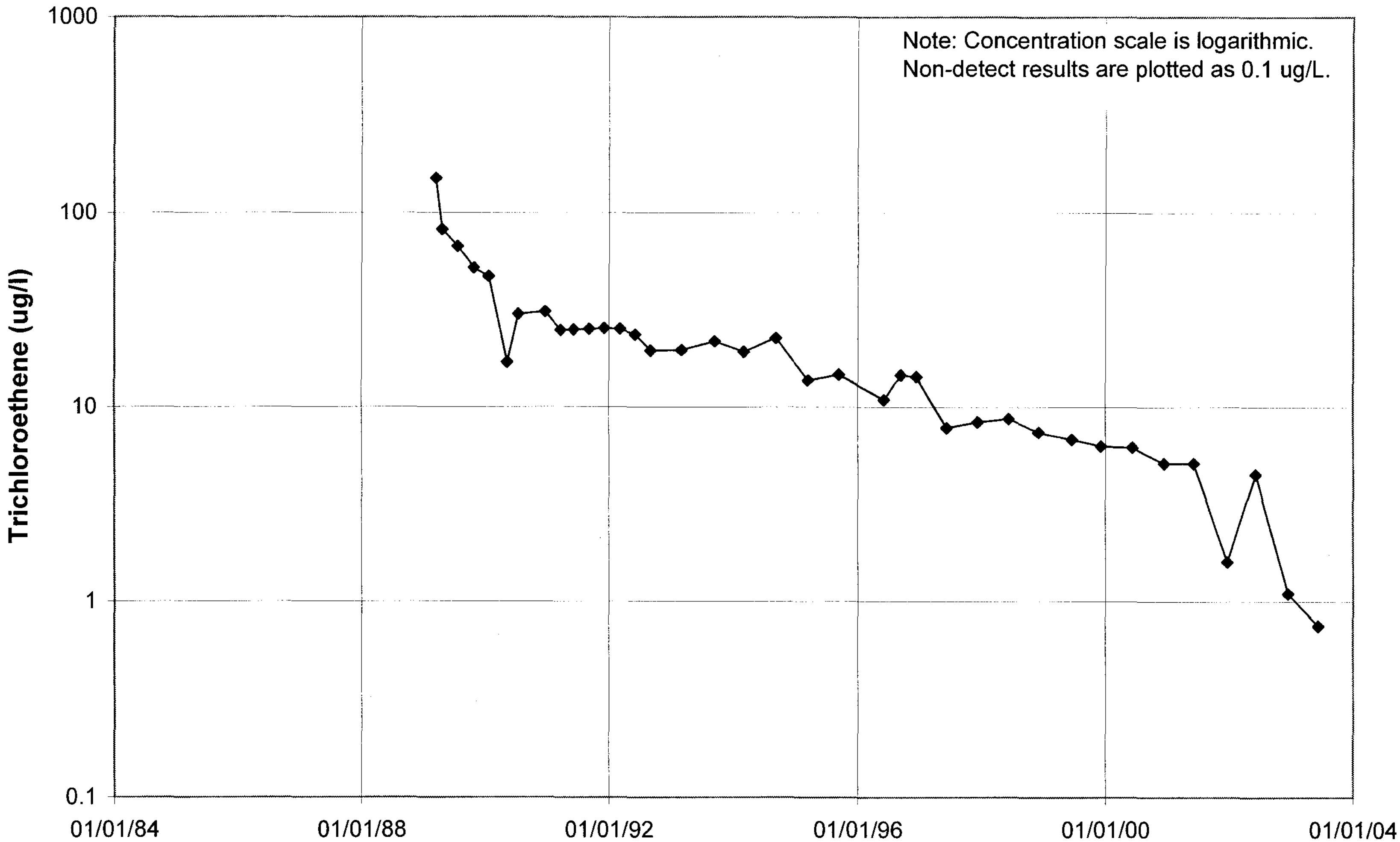

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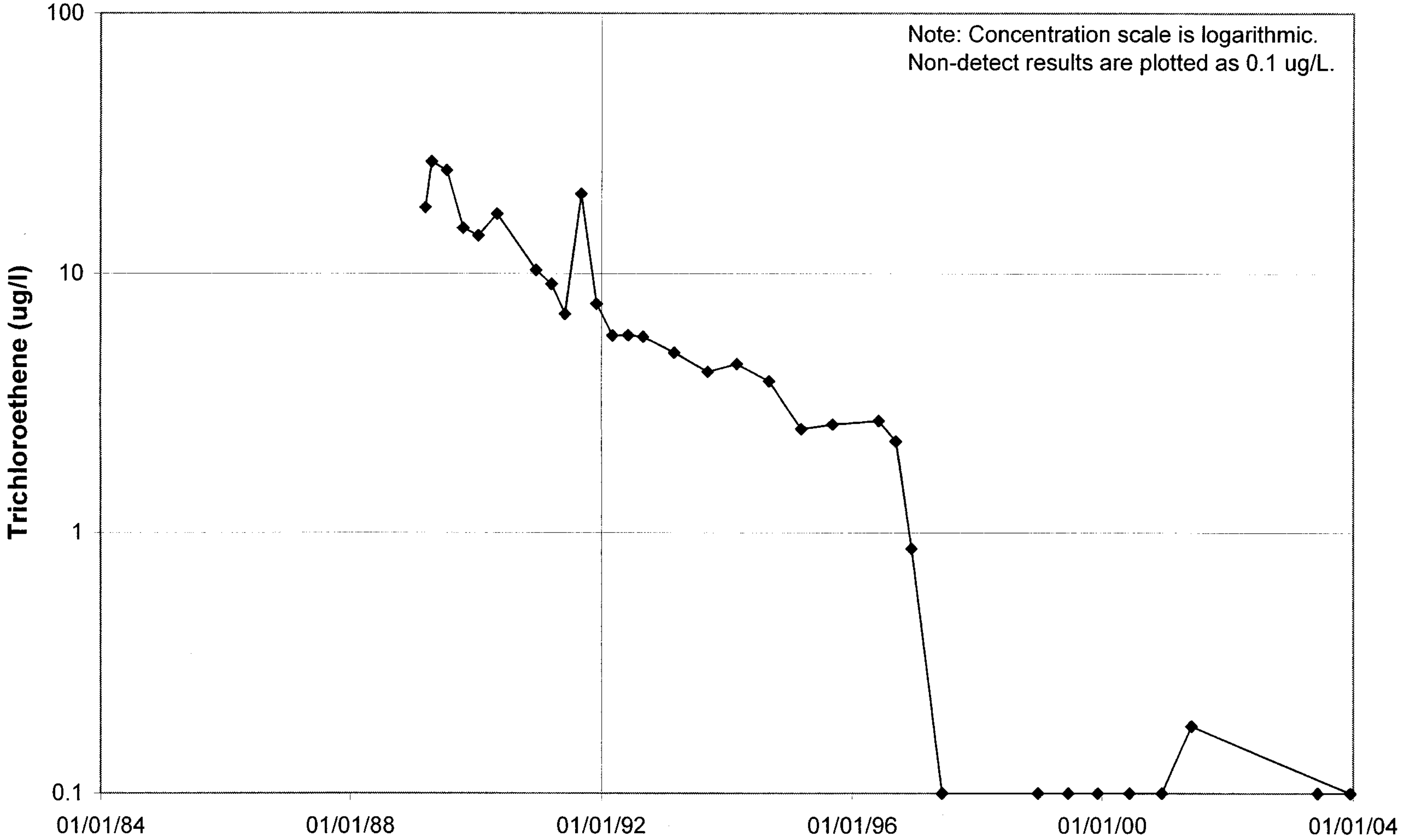

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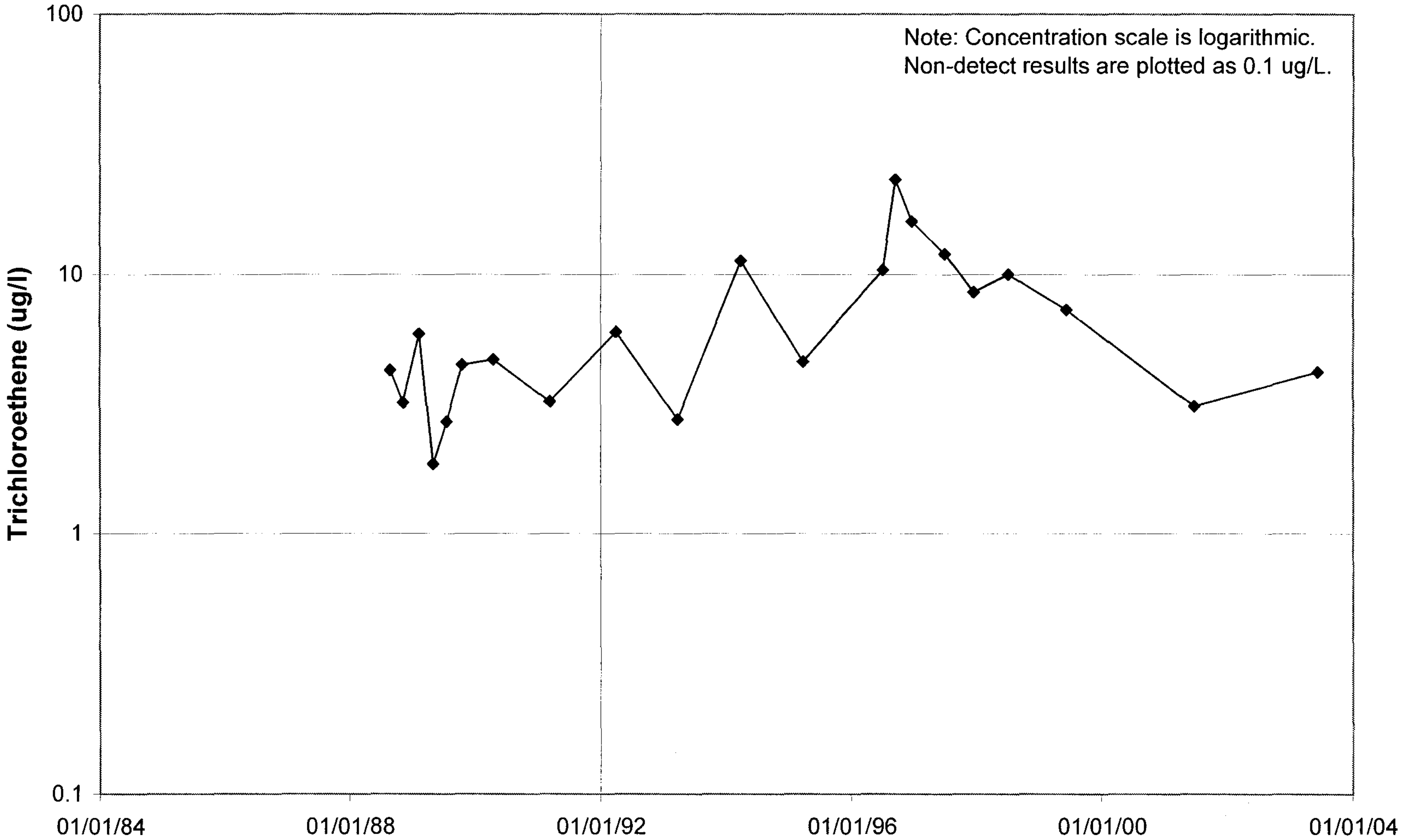

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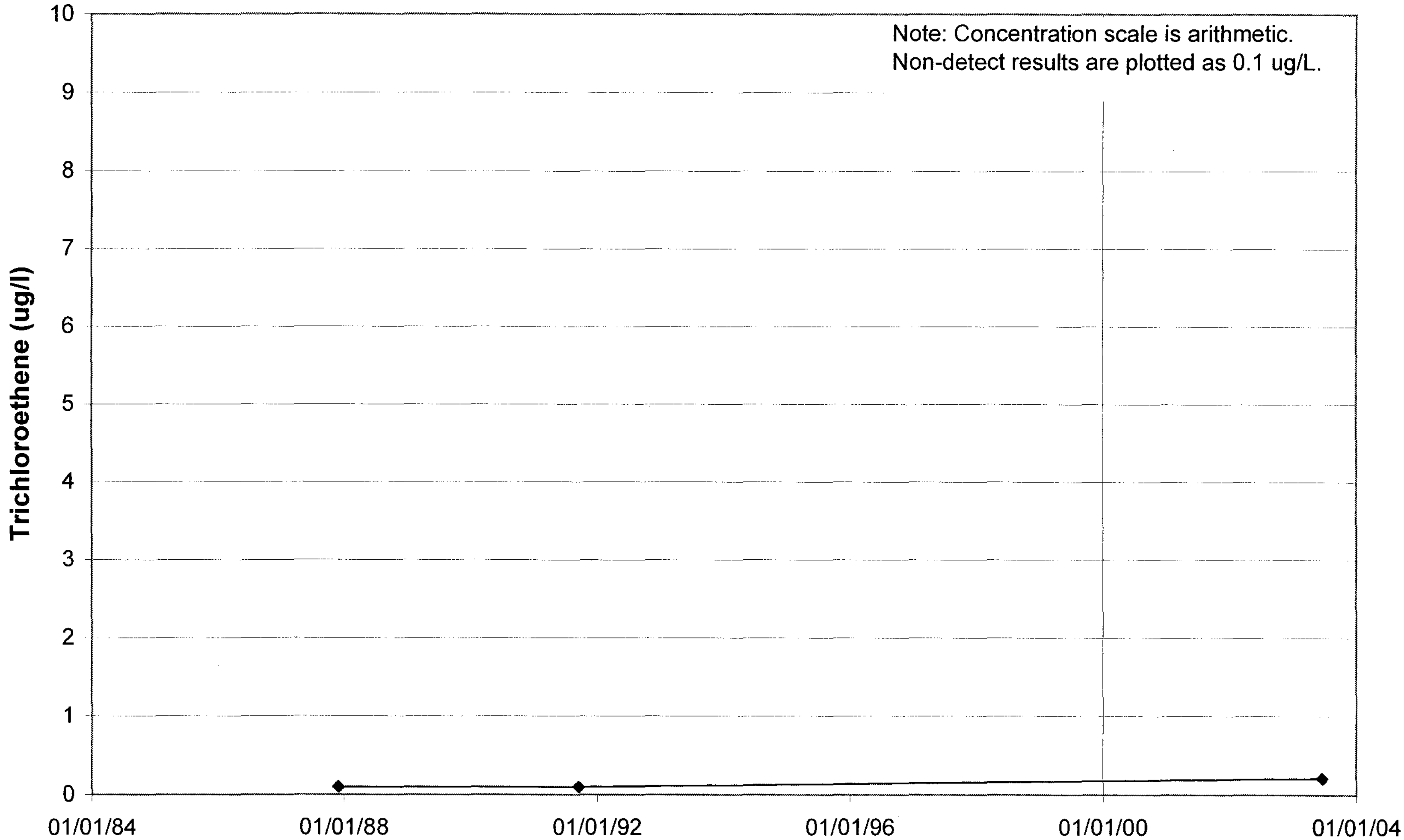

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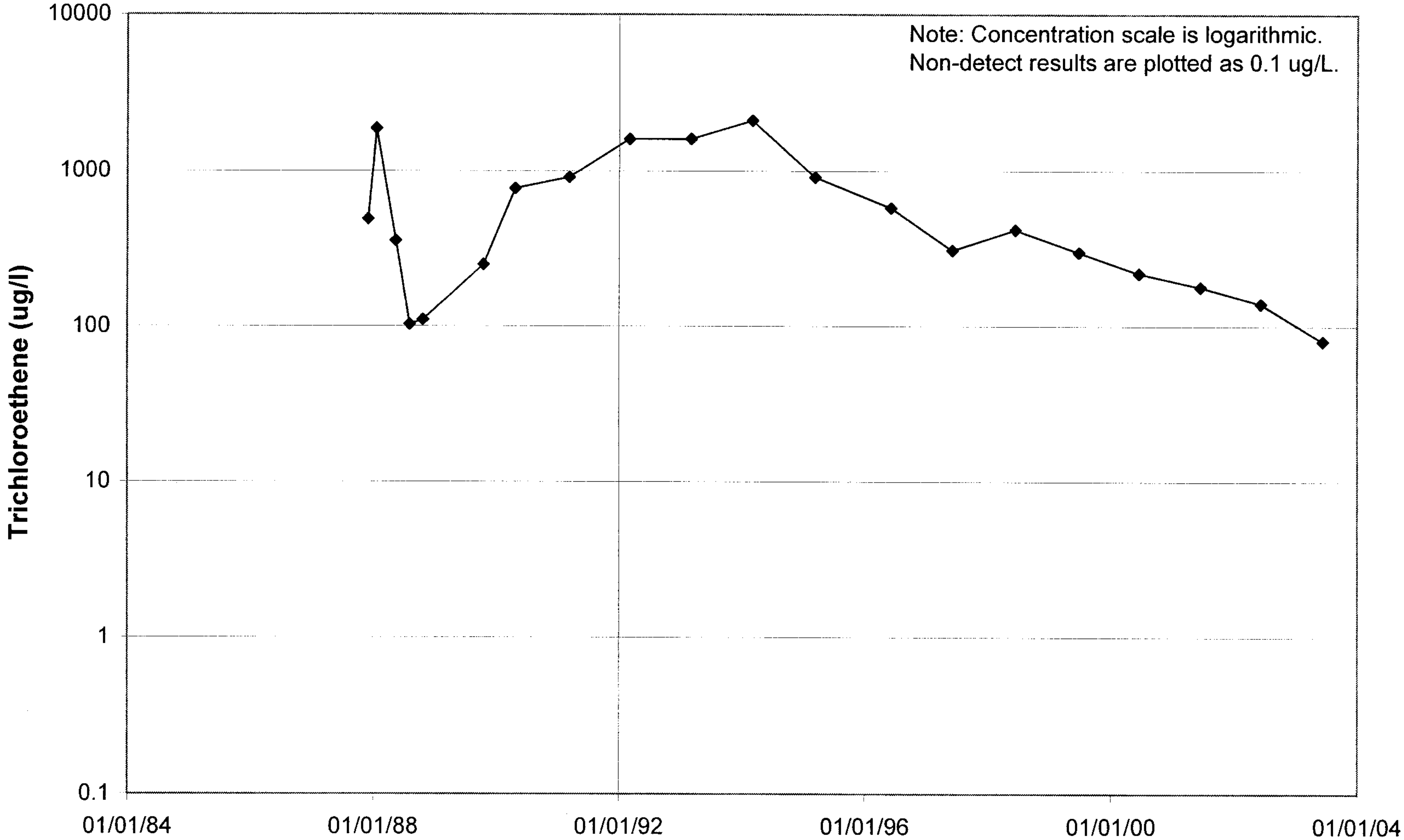

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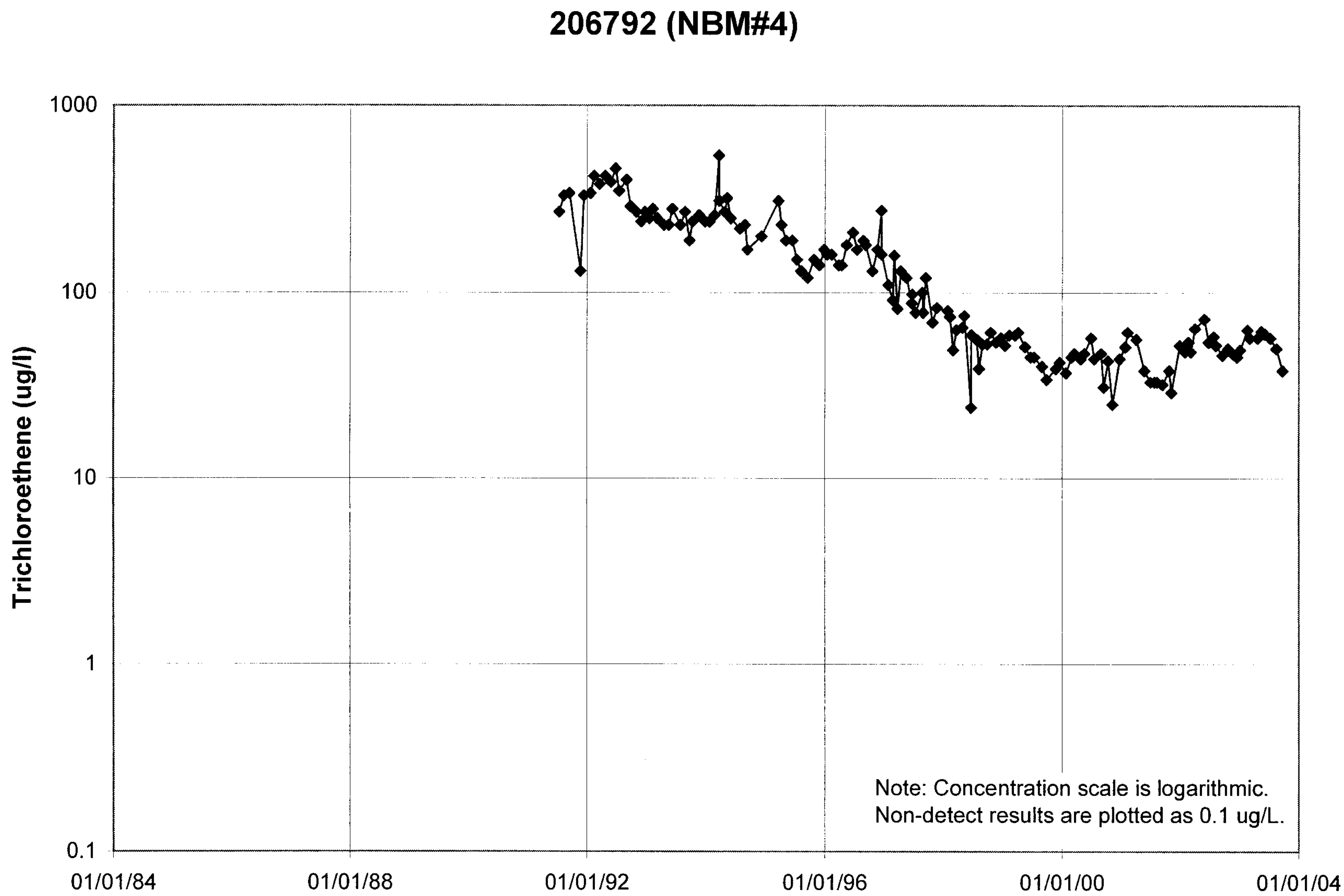

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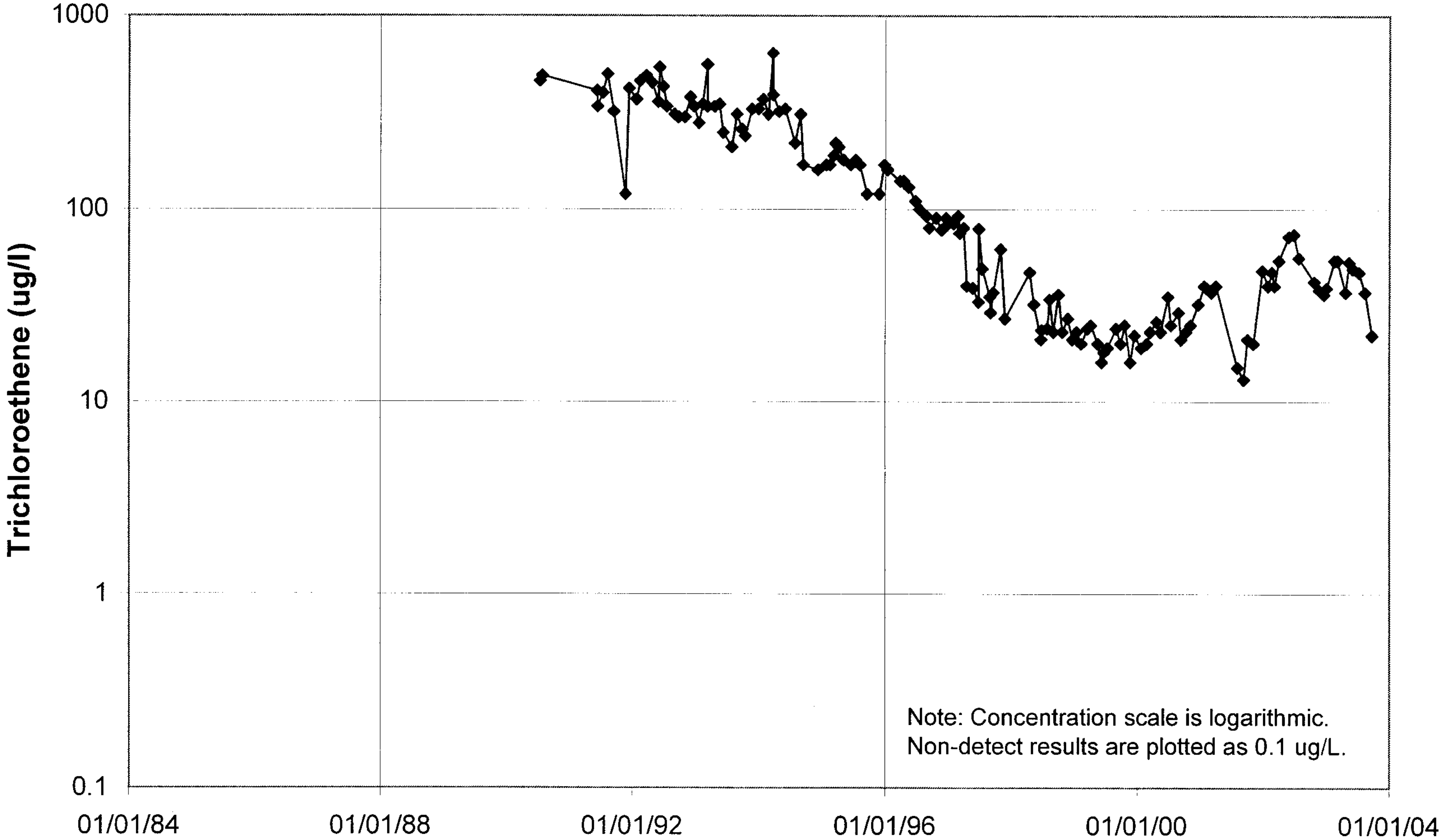

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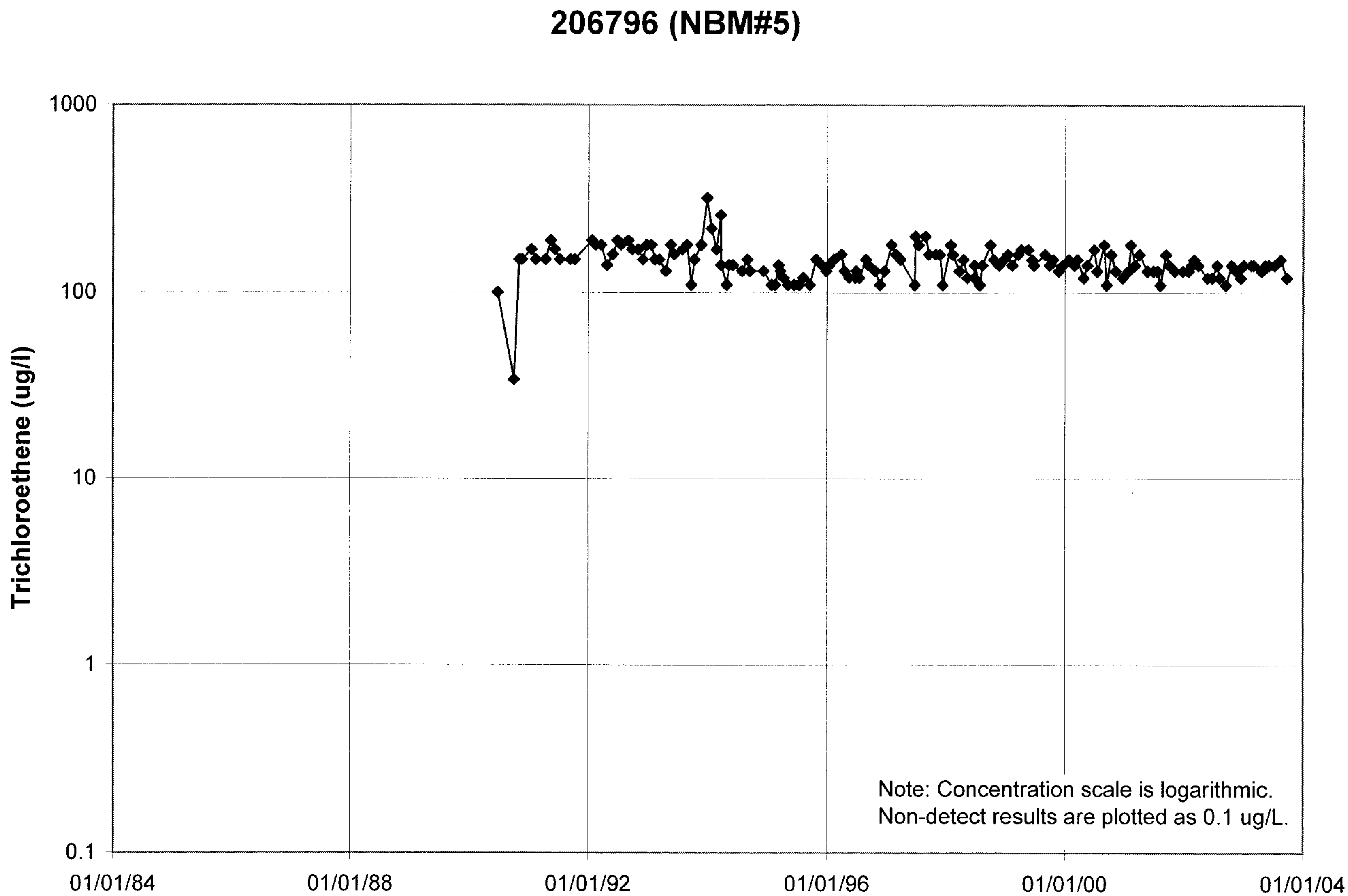

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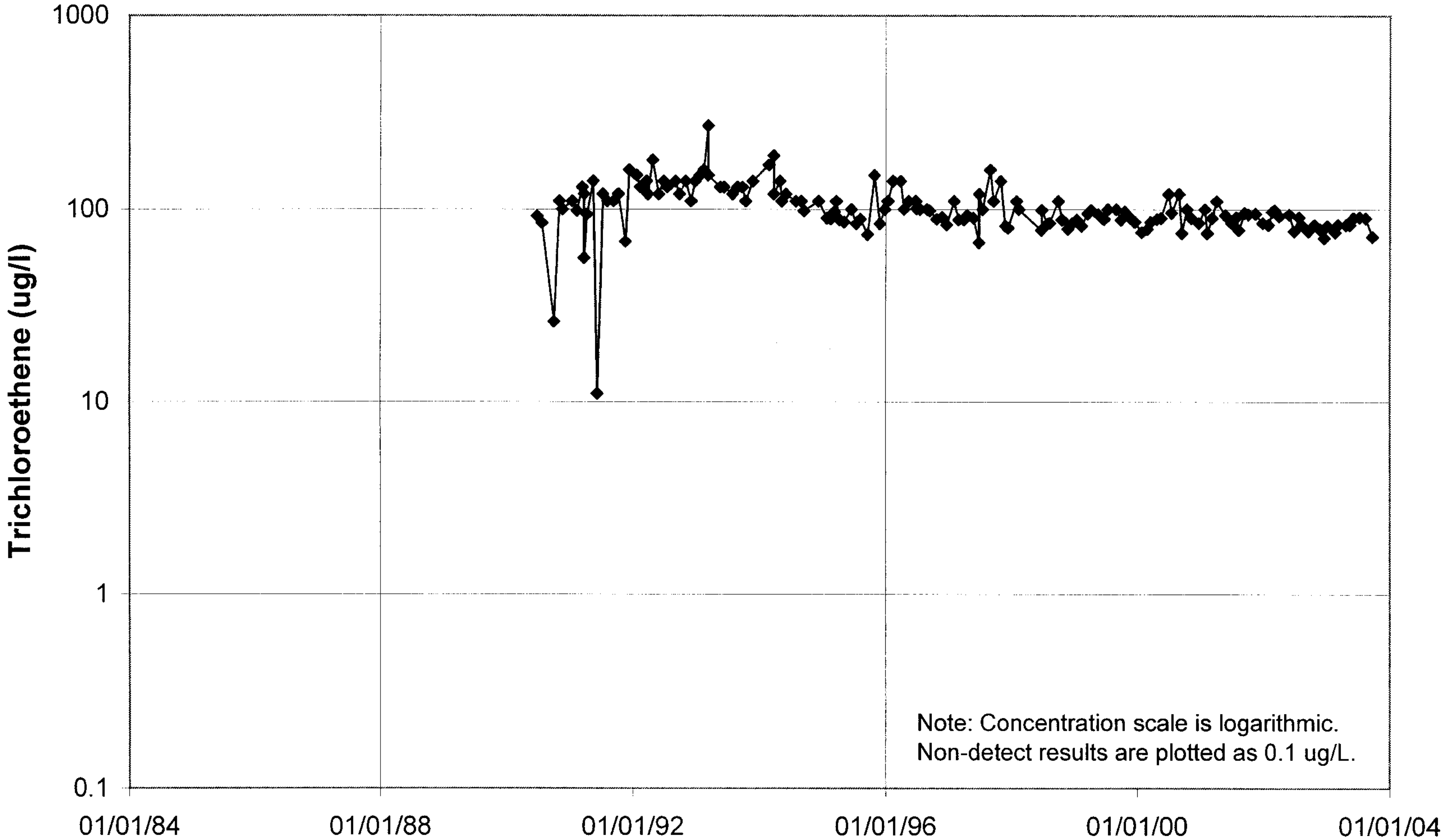

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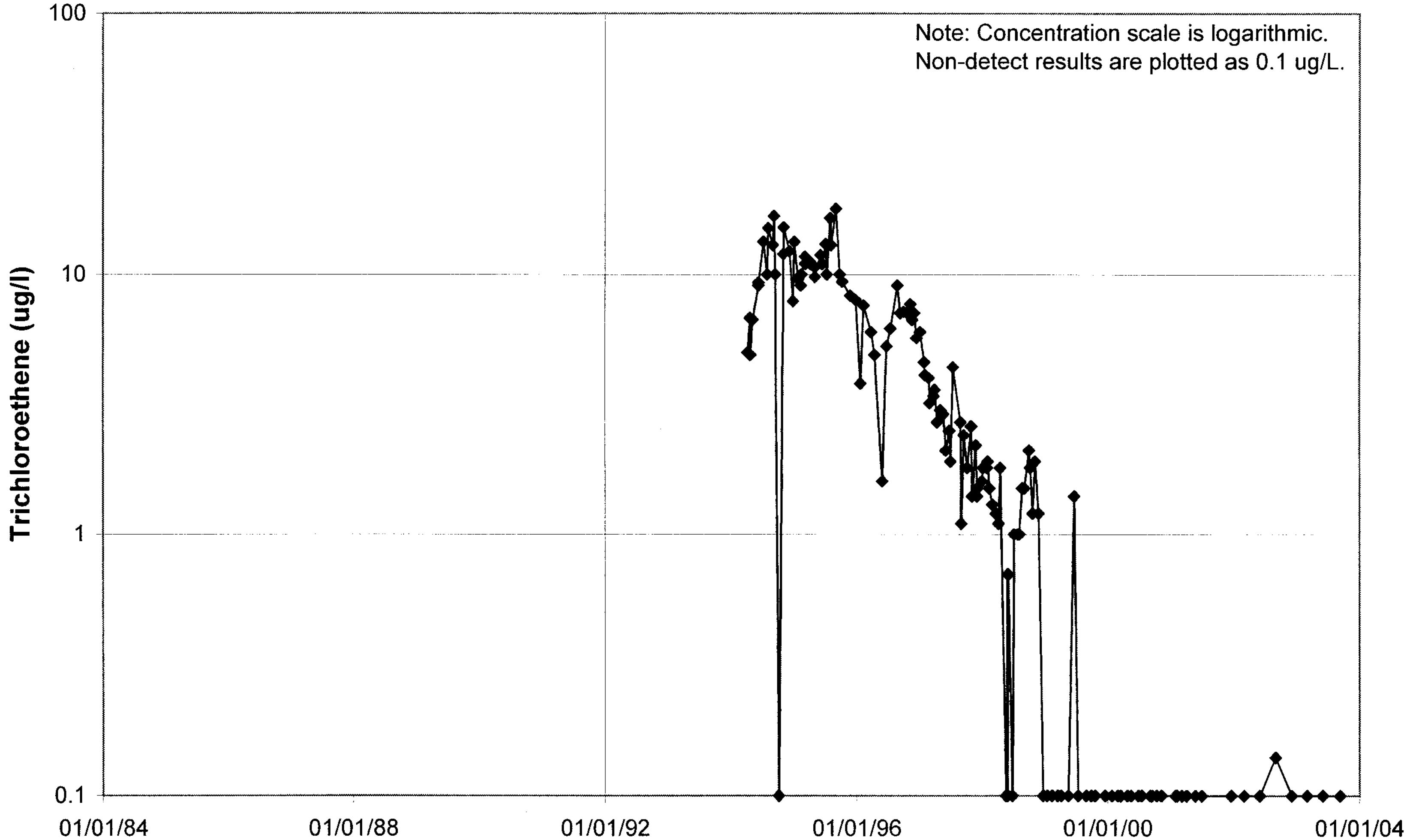

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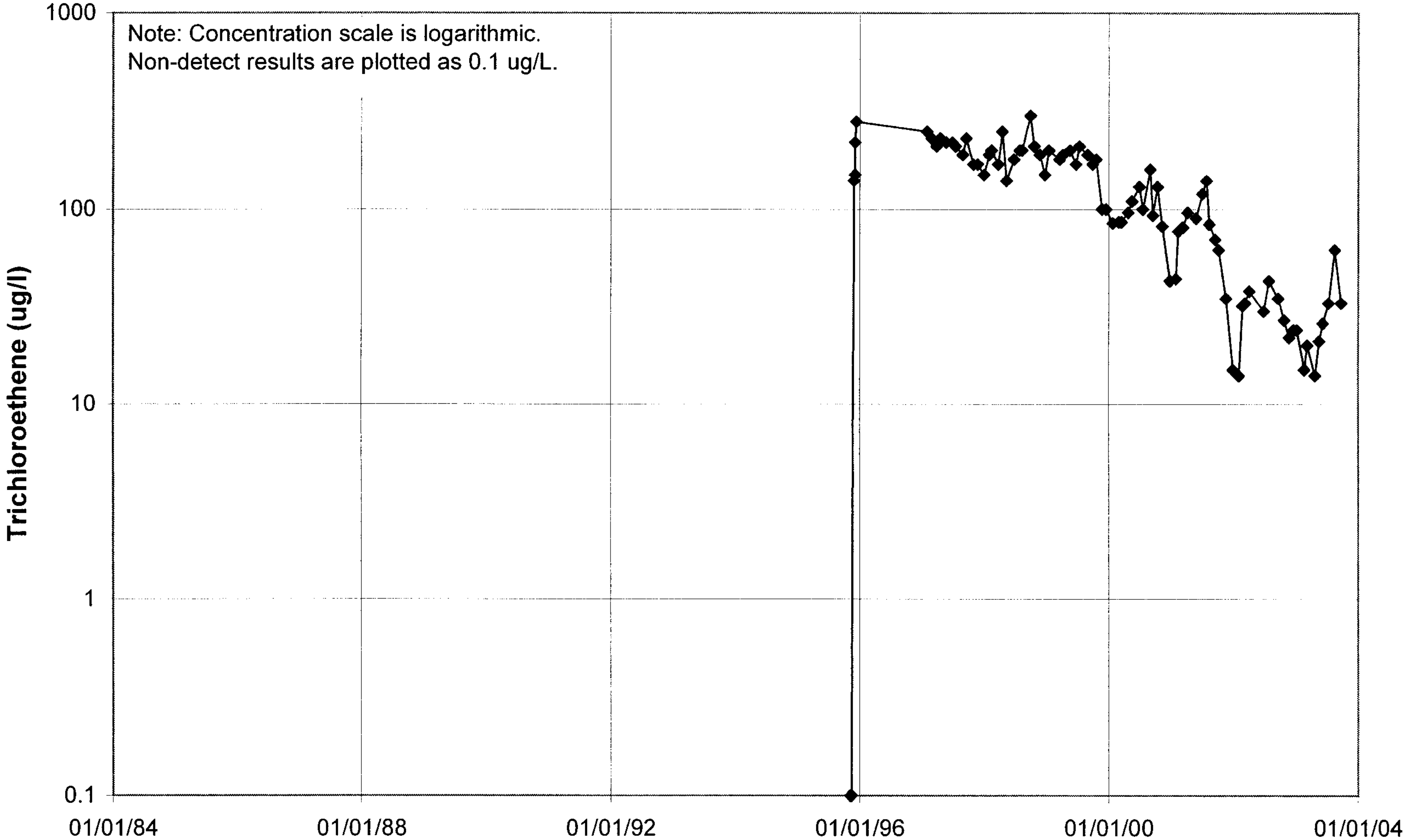
554216 (NBM#14)



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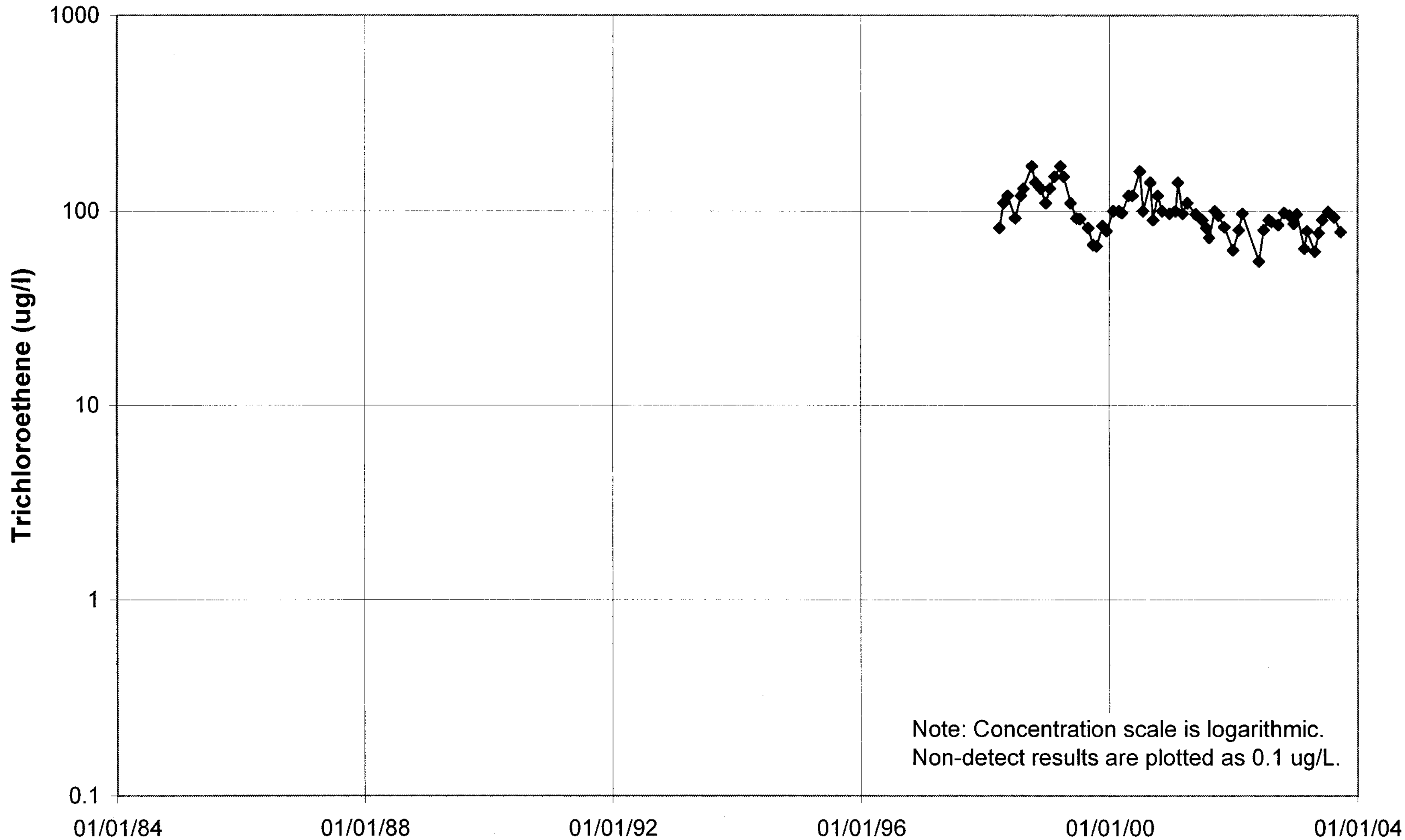
582628 (NBM#15)



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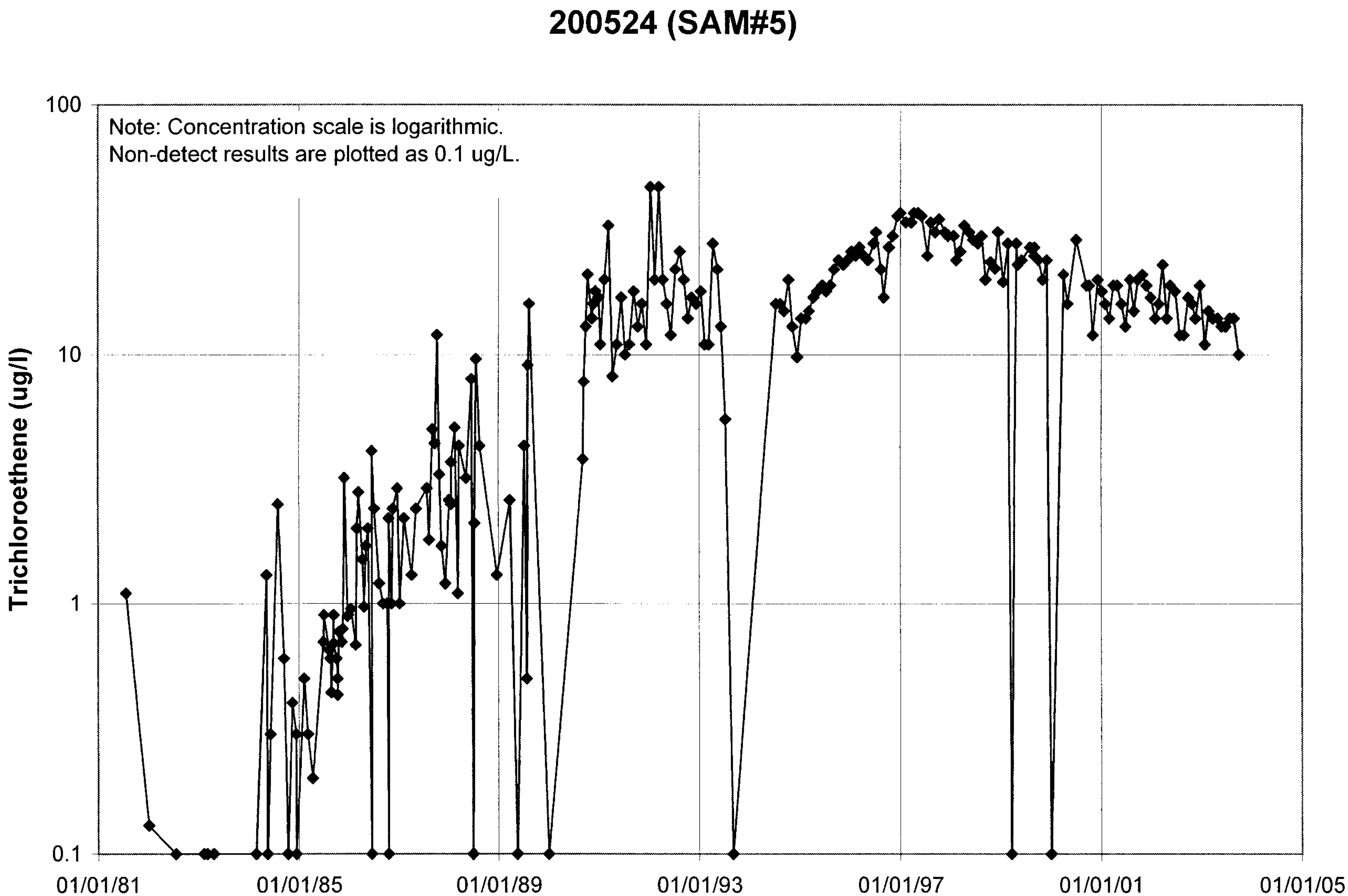

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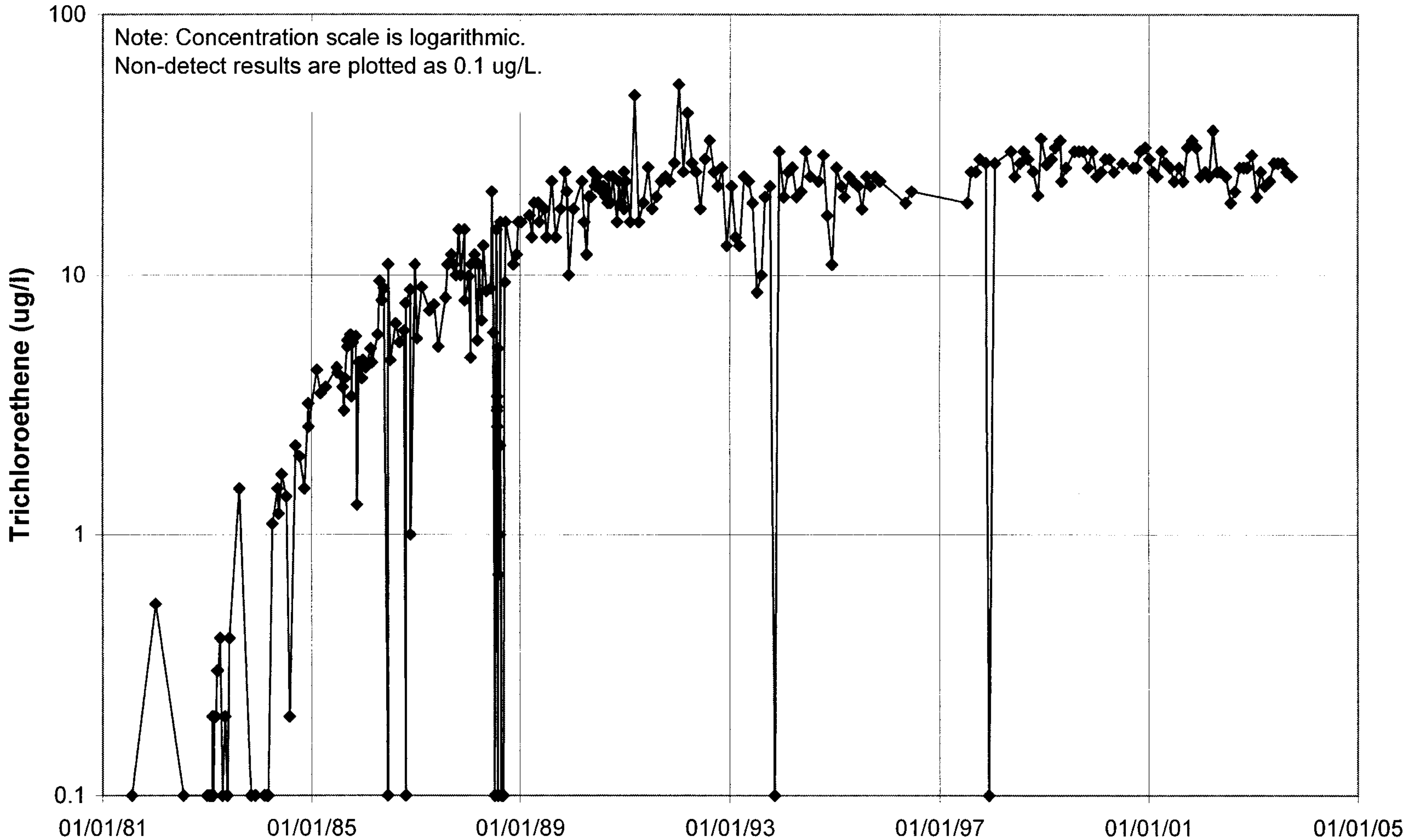

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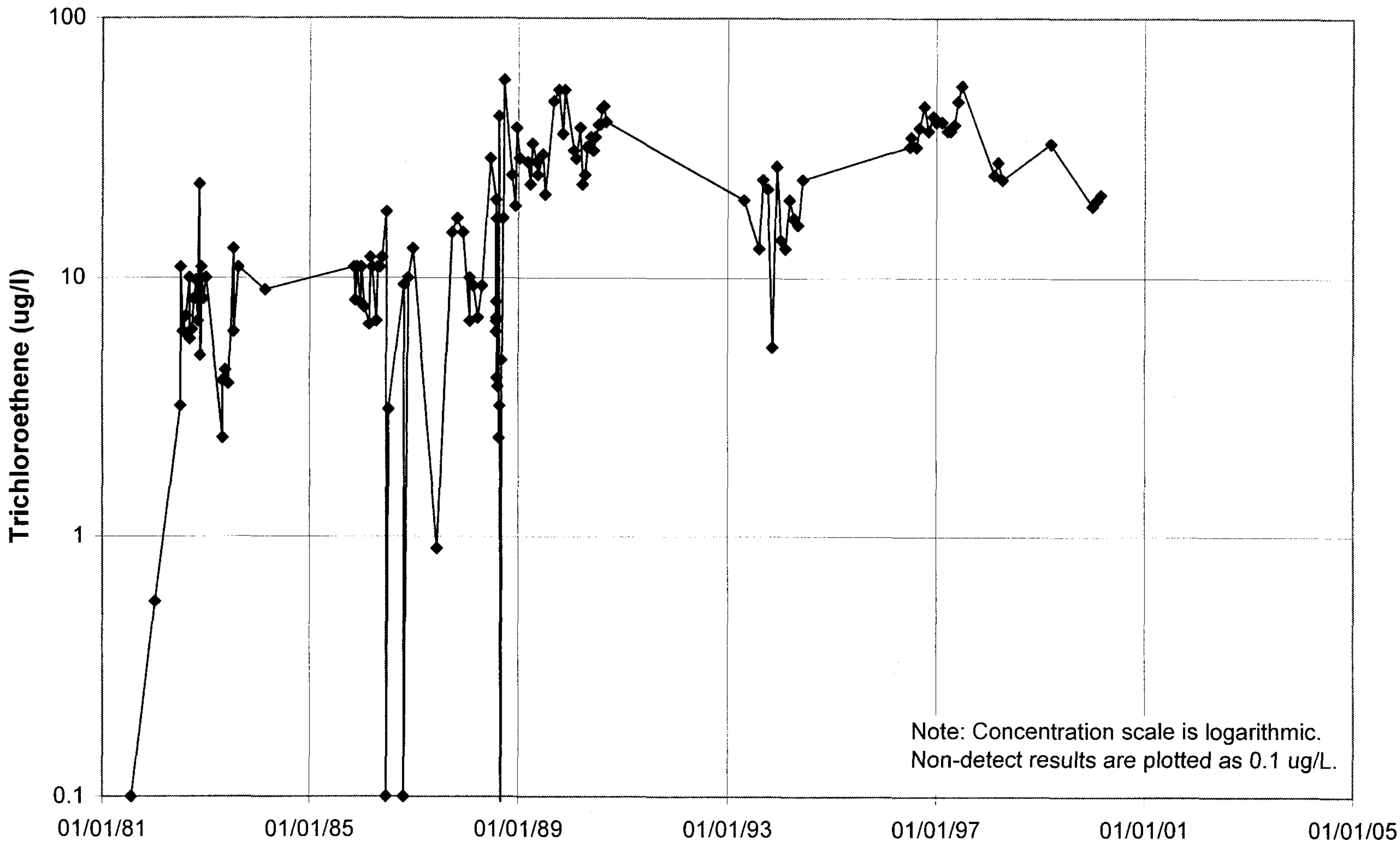

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APPENDIX C.1

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 2003 was comprised of Quarter 77 (October through December), Quarter 78 (January through March), Quarter 79 (April through June), and Quarter 80 (July through September). Water sampling, water level measurements, and laboratory analysis were conducted in accordance with the TCAAP "Remedial Design/Remedial Action, Quality Assurance Project Plan" (Montgomery Watson, 1996).

Prior to November 1, 2001, data collected at TCAAP was stored in the U.S. Army Environmental Center (USAEC) Installation Restoration Data Management Information System (IRDMIS). The IRDMIS was managed by Potomac Research, Inc. (PRI) on behalf of the USAEC. USAEC replaced the IRDMIS System on November 1, 2001, with a new system, the Environmental Restoration Information System (ERIS), which incorporated all of the data that had previously been entered into ERIS.

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 2003 Annual Monitoring Plan (Appendix A), which established the monitoring responsibilities for both the Army and Alliant. Water level monitoring and water sampling were conducted by TWISS for the Army and by SECOR and CRA for Alliant. For all samples, laboratory analysis was performed by DataChem Laboratories, Salt Lake City, Utah.

Appendix A.4 contains lists of required analytes, as referenced by the monitoring plans in Appendix A. The lists are site-specific, based on the chemicals of concern. Halogenated volatile organic compounds were the parameters of primary interest, while select wells were sampled for aromatic volatile organic compounds, metals, and explosives. Appendix C.2 presents clarifications and deviations from the FY 2003 Annual Monitoring Plan.

Data assessment and validation was conducted in accordance with procedures and requirements outlined in the TCAAP QAPP. Flagging codes and data qualifiers assigned to data through data assessment/validation appear in the data tables included within the individual sections of this report (see table footnotes for definitions) and also in the historical databases (Appendix D). Data assessment and validation information was submitted to the MCPA and USEPA for review. Regulatory approvals for these submittals are included in Appendix C.3.

For water level measurements, the depth to water from the surveyed top of the well casing was measured. Groundwater elevations were calculated and data tables are included within the individual sections of this report and also in the historical database (Appendix D).

2.2 Groundwater Elevation Contour Maps

The most extensive water level monitoring event performed during FY 2003 was in June (Quarter 79). This data was used to prepare groundwater elevation contour maps for OU1/OU3 deep groundwater (off-TCAAP), OU2 deep groundwater (on-TCAAP), and Sites A and K shallow groundwater. These maps are included within the individual sections of this report.

2.3 Groundwater Quality Contour Maps and Cross-Sections

The most extensive sampling event performed during FY 2003 was in June (Quarter 79). This data was used to prepare groundwater quality isoconcentration contour maps and/or cross-sections for OU1/OU3 deep groundwater, OU2 deep groundwater, and Sites A and K shallow groundwater. Contour maps were generated by hand, based on the observed contaminant concentrations and the extent of past site contamination. These maps are included within the individual sections of this report.

For OU1/OU3 deep groundwater and OU2 deep groundwater, isoconcentration maps and cross-sections are provided for trichloroethene, as this is the principal contaminant on a concentration basis. Isoconcentration maps were prepared for OU1/OU3 deep groundwater (combined) and OU2 deep groundwater, with individual maps for Upper Unit 3, Lower Unit 3, and Upper Unit 4. To complement the isoconcentration 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-TCAAP through well 582628 (NBM#15) of the New Brighton Contaminated Groundwater Recovery System (NBCGRS). A second section line passes through the source area at Site I and traces the south plume (OU3) off-TCAAP through the Plume Groundwater Recovery System (PGRS).

Contaminant concentrations for Middle Unit 3 wells and wells that fully penetrate Unit 3 (03F) (including any recovery wells that fully penetrate Unit 3 and that are being sampled as a monitoring well) are shown in parentheses on the Lower Unit 3 isoconcentration 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 isoconcentration maps, but were not used for contouring purposes.

For Site A, isoconcentration maps were developed for cis-1,2-dichloroethene, since this is the most widespread contaminant at Site A, and also for tetrachloroethene, which illustrates the source area. Site A cross-sections were also prepared which illustrate cis-1,2-dichloroethene. The isoconcentration maps for Site A were prepared only for Unit 1, since this is the only contaminated aquifer.

For Site K, an isoconcentration map was developed for trichloroethene (the primary contaminant). The map for Site K was prepared only for Unit 1, since this is the only contaminated aquifer.

Contaminant concentrations for recovery wells that are actively pumping are shown in parentheses on the isoconcentration 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.

APPENDIX C.2
DEVIATIONS FROM MONITORING PROGRAM

Fiscal Year 2003

<u>OU1 Deep Groundwater</u>

June 2003:
City of St. Anthony Municipal Well #3 was not sampled because it was not in service at the time of the June sampling event. However, the sampling plan requires sampling of this well only if it is in service at the time of the June event.

<u>OU2 Site I</u>

June 2003:
Well I02MW was dry and no water level measurements were recorded or a groundwater sample collected.

Well 01U639 was dry and no water level measurements were recorded or a groundwater sample collected.

Well I05MW had only 2 inches of water in the well and no sample was collected.

Well I01MW had only 4 inches of water in well and no sample was collected.

As approved, the following analytes were no longer included in analytical reports: carbon tetrachloride, methylene chloride, and 1,1,2-trichlorotrifluoroethane.

<u>OU2 Site K</u>

March 2003:
The March 6, 2003 treatment system effluent sample submitted for cyanide analysis was improperly preserved. An additional sample was collected on March 12, 2003 and submitted for analysis.

June 2003:
Well 01U603 bailed dry after 1.5 well volumes were removed from the well.
Well 01U604 bailed dry after 2 gallons were removed from the well.
Well 01U611 pumped dry after 1 gallon was removed from the well.
Well 01U615 bailed dry after 5 gallons were removed from the well.
Well 01U617 bailed dry after 8 gallons were removed from the well.
Well 01U618 bailed dry after 1.5 well volumes were removed from the well.
Well 01U620 bailed dry after 2 well volumes were removed from the well.
Well 03U621 pumped dry after 7 gallons were removed from the well.

OU2 Site K (cont'd)

June 2003 (cont'd):

As approved, the following analytes were no longer included in analytical reports, carbon tetrachloride, methylene chloride, and 1,1,2-trichlorotrifluoroethane.

September 2003:
The September 10, 2003 treatment system effluent sample submitted for cyanide analysis was improperly preserved. An additional sample was collected on September 15, 2003 and submitted for analysis.

OU2 Deep Groundwater

December 2002 through June 2003:
Well 03F319 (B13) was sampled for VOCs, alkalinity, hardness, calcium, iron, manganese, magnesium, and zinc in December 2002. VOC sampling of this well continued on a monthly basis from February 2003 to June 2003.

OU3 Deep Groundwater

June 2003:
Well 03U673 pumped dry at approximately 90 gallons (with pump set 10-20 feet below water table).

Well 04U832 water level measurement is incorrect due to human and/or equipment error.

As approved, the following analytes were no longer included in analytical reports: carbon tetrachloride, methylene chloride, and 1,1,2-trichlorotrifluoroethane.

APPENDIX C.3
REGULATORY APPROVALS FOR DATA ASSESSMENTS AND VALIDATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

May 24, 2004

REPLY TO THE ATTENTION OF: SR-6J

Mr. Michael R. Fix
Commander's Representative
Twin Cities Army Ammunition Plant
4700 Highway 10 - Suite A
Arden Hills MN 55112-3928

Subject: **Approval of <u>Data Usability Report Numbers 28, 29, 30 and 32</u>**

Ref.: **Data Usability Report Number 28, TCAAP FY 2003 Performance Monitoring Program 1st Quarter Monitoring (October - December 2002), Twin Cities Army Ammunition Plant, March 4, 2003;**

EPA comments on Data Usability Report Number 28, dated March 28, 2003;

(MPCA deferred to EPA for comment on this DUR)

U.S. Army Responses to EPA comments on DUR 28, dated October 13, 2003 and November 13, 2003;

TCAAP Data Usability Report (DUR) #28, Final Report, dated April 2, 2004;

Data Usability Report Number 29, TCAAP FY 2003 Performance Monitoring Program 2nd Quarter Monitoring (January - March 2003), Twin Cities Army Ammunition Plant, June 3, 2003;

EPA comments on Data Usability Report Number 29, dated July 15, 2003;

(MPCA deferred to EPA for comment on this DUR)

U.S. Army Responses to EPA comments on DUR 29, dated October 13, 2003;

Data Usability Report Number 30, TCAAP FY 2003 Performance Monitoring Program 3rd Quarter Monitoring (April - June 2003), Twin Cities Army Ammunition Plant, October 9, 2003;

MPCA Comments on Data Usability Report Number 30, dated October 28, 2003;

EPA comments on Data Usability Report Number 30, dated November 26, 2003;

U.S. Army Responses to EPA and MPCA comments on DUR 30, dated January 22, 2004;

Additional EPA comments on DUR 30 dated February 23, 2004;

U.S. Army Responses to Additional EPA comments on DUR 30, dated March 9, 2004;

Data Usability Report Number 32, TCAAP FY 2003 Performance Monitoring Program 3rd Quarter Monitoring (July - September 2003), Twin Cities Army Ammunition Plant, December 1, 2003;

EPA comments on Data Usability Report Number 32, dated December 23, 2003;

MPCA Comments on Data Usability Report Number 32, dated December 26, 2003;

U.S. Army Responses to EPA and MPCA comments on DUR 32, dated March 23, 2004;

U.S. Army Responses to Additional EPA comments on DUR 32, dated May 18, 2004.

Dear Mr. Fix:

This letter documents that the U.S. Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA) completed their review of the subject Data Usability Reports (DURs) 28, 29, 30 and 32. Based upon our review of the information provided by the U.S. Army (Army) in referenced documents, and upon the technical conversations held among EPA, MPCA and Army contractor staff to resolve the regulators' comments on the DURs, the U.S. EPA and the MPCA agree that the subject DURs are acceptable.

You are hereby advised that the EPA and the MPCA approve Data Usability Report Numbers 28, 29, 30 and 32.

If you have any questions, please contact Tom Barounis of the EPA at (312) 353-5577 or Dagmar Romano of the MPCA at (651) 296-7776.

Sincerely,

Tom Barounis

Tom Barounis
Remedial Project Manager
U.S. Environmental Protection Agency
Region 5

Tom Barounis

for Dagmar Romano
Superfund Unit 2
Superfund Section
Majors and Remediation Division
Minnesota Pollution Control Agency

MAY 27 10:34

APPENDIX D
COMPREHENSIVE GROUNDWATER QUALITY AND GROUNDWATER LEVEL DATABASES

The historical groundwater tables are located on this CD-ROM in a directory named Appendix D. This directory contains three Microsoft Excel files:

File	Contents
Compelev.xls	Groundwater elevations
Comporwq.xls	Groundwater quality: organic data
Compinwq.xls	Groundwater quality: inorganic data

APPENDIX E
TCAAP WELL INVENTORY UPDATE

FISCAL YEAR 2003

Purpose

The purpose of well inventory is to identify wells that have been impacted by contaminants from TCAAP or that could potentially be impacted by TCAAP contaminants.

Background

Developing and maintaining the well inventory is a process that was initiated in 1991, with the work efforts documented in several update reports since that time. Beginning in FY 1999, the update reporting was incorporated into the Annual Performance Reports.

The well inventory "study area," as defined by the Minnesota Pollution Control Agency, is shown on Figure E-1, and coincides with the Minnesota Department of Health (MDH) Special Well Construction Area.

The aquifers of concern are defined by the 1 μg/l trichloroethene contour for the Unit 3 and Unit 4 aquifers, and the 1 μg/l cis-1,2-dichloroethene contour for the Unit 1 aquifer north of TCAAP.

The "area of concern" for the Unit 3 and Unit 4 aquifers is created by adding a quarter mile buffer area outside the 1 μg/l trichloroethene contour. The area of concern for the Unit 3 and Unit 4 aquifers is shown on Figure E-2.

The area of concern for the Unit 1 aquifer north of TCAAP is delineated by city streets. The area of concern for the Unit 1 aquifer is shown on Figure E-3.

Wells within the study area are categorized based on location, depth/aquifer, and use. Well categories for the well inventory are described in Table E-1.

Program Requirements

The well inventory program requirements have evolved over time, with changes documented through the update reports. A flowchart that describes the annual requirements for maintaining the TCAAP well inventory database is shown on Figure E-4. Requirements are summarized below.

At the beginning of each federal fiscal year, an updated version of the MDH database of wells in the study area is acquired. The MDH database consists of three lists:

1. Wells constructed since 1990 (generated through drillers submitting Water Well Records);
2. Sealed wells (generated through drillers submitting Well Sealing Records); and
3. Wells disclosed through property transfer.

Since the MDH database is comprehensive for all time, the database is screened to extract the new information that was added since the previous update.

With the new MDH information, the TCAAP well inventory database is updated by recategorizing wells, as necessary, and by adding any new wells that are within the study area. Any new wells found in Categories 1a, 1b, 1c, 2a, 2b, 2c, or 4a are targeted for sampling in that fiscal year; however, an attempt to reclassify any new category 4a wells will be made prior to sampling. Wells that are not sampled due to non-responsive well owners are targeted for sampling in the next major sampling event.

Category 4 wells are those with an unknown depth or unknown location, or both. Ideally, there should be no wells in Category 4. Each year, an attempt is made to reclassify Category 4 wells into one of the other categories. This is accomplished through phone calls, letters, and/or site visits in an attempt to obtain additional information. Any wells which are re-classified as Category 1a, 1b, 1c, 2a, 2b, or 2c are targeted for sampling in that fiscal year.

"Major" well inventory sampling events occur every four years and are shown in Appendix A.1. The major sampling events are scheduled to coincide with the biennial sampling events for performance purposes as delineated in the APR (FY 2005 will be the next major well inventory sampling event). For each major event, all wells in Categories 1a, 1b, 1c, 2a, 2b, 2c, and 4a are targeted for sampling. After every sampling event, each well owner is mailed a copy of their testing results. Wells that are not sampled due to non-responsive well owners are targeted for sampling in the next major sampling event.

For each sampling event, if any well has a detection which exceeds the applicable TCAAP groundwater cleanup level for that contaminant (or an additivity of 1.0, similar to the MDH Hazard Index calculation), the well is evaluated using the flow chart presented in Figure E-4 to determine the timing of additional sampling. Wells that are used for drinking water are sampled again within one month of data validation. Wells that are not used for drinking water, but have possible contact exposure risks, are sampled the next fiscal year. If a cleanup level exceedance is confirmed (two consecutive events), and the contaminant concentrations in the well are proportional to contaminant concentrations of the TCAAP OU1 plume, the Army offers to abandon the well and/or provide an alternate water supply.

The annual reporting requirements for the TCAAP well inventory will include:

- A list of any wells found or reclassified.
- Analytical results and a summary of sampling efforts from that fiscal year.
- Recommendations for participation in the Well Abandonment/Alternate Water Supply Program.
- An updated well inventory database that lists wells by well category.
- An updated database listing water quality of wells.

FY 2003 Update

The updated MDH database was provided to TWISS on April 3, 2003. This comprehensive database was screened to extract the lists of wells that were constructed, disclosed, or sealed since the previous well inventory update. Further investigative efforts were primarily focused on determining each well's location (inside or outside the study area and/or area of concern), status (active, inactive, or sealed), and water use (supply/non-supply).

Newly constructed wells that were determined to be located within the study area are presented in Table E-3. With the exception of five wells, all newly constructed wells were monitoring and recovery wells and were classified into Category 6. Five wells listed as either being for supply or of an unknown use were further investigated, with the following results:

- Well 689609 was classified into Category 3, since it is not screened in an aquifer of concern.
- The well at 2420 County Road C West in Roseville was classified into Category 4a and efforts to contact the well owner yielded no response (to be further investigated in FY 2004).
- Wells 688419, 688420, and 688421 were classified into Category 4b, since the wells could not be found during a site visit (to be further investigated in FY 2004).

Disclosed wells that were identified as being in use, inactive, or of unknown status (but not sealed) and that were determined to be located within the study area are identified in Table E-4. Most of these wells were Category 3 wells that required no further investigation (though one was inadvertently sampled, as discussed later). Twenty-six of these wells were further investigated, with the following results:

- Wells 107405 and 249007 were sampled in FY 2003 (see later discussion regarding sampling results). Both wells were disclosed through the MDH database update as being in-use. Although the wells were already listed in the TCAAP well inventory database as Category 3 (outside of the area of concern), a review of their locations suggested that the wells should be re-classified as 2a (drinking water well located inside the buffer lines but outside the 1 ug/L contour, and screened in an aquifer of concern).
- Well 127537 was sampled in FY 2003 (see later discussion regarding sampling results). This well was identified in the MDH disclosed well list as being in use; however, a unique well number was not associated with that data entry. Site contacts identified the well in question as a well used for equipment cleaning. A site visit was conducted and

the well in question was found to be unmarked. A well depth measurement that might have helped confirm the suspected well identification was unobtainable due to pump control wires and pipe obstructing the inner casing, and therefore a sample was collected. Subsequent discussions with site personnel revealed that the well in question was Well 127537, already classified as Category 2c (non-drinking, non-contact water use). Based on the well use, Well 127537 should be re-categorized from 2c to 2b (non-drinking but possible contact water use).

- Well 234474 had previously been identified by the MDH as a sealed well; however, conversation with the well owner revealed that it had not been sealed and that it is being used for irrigation. The well driller was contacted and the depth of the well was determined to be 214 feet; however, the aquifer for this well could not be verified. The depth suggests that it could potentially be an upper Prairie du Chien well, or could be completed above the Prairie du Chien. Given the uncertainty regarding the aquifer, this well was recategorized as 4a (unknown aquifer). Well 234474 was initially scheduled for sampling in FY 2003. When the attempt to sample was made, the address could not be located in the field and a subsequent miscommunication resulted in the well not being sampled. The error was not discovered before the end of FY 2003. The owner will be contacted and, if responsive, the well will be sampled in early FY 2004.
- The remaining wells were Category 4 wells that could not be sampled (i.e., because they were inactive, because of lack of response from the owner, or because of inadequate well location information); Category 5 wells (i.e., wells that were field checked and not located); or Category 6 (one monitoring well).

Sealed wells were found by reviewing the MDH sealed well list, by screening the MDH disclosed and new construction lists (which also contain sealed wells), and in a few cases, by talking with the well owners. Wells identified as sealed are shown in Table E-5. Disclosed wells that were located within the area of concern and that the MDH identified as having a change in status from active or inactive to sealed were further investigated for confirmation of their sealed status. Any wells that were already in the TCAAP well inventory database that the MDH identified as having a change in status from active or inactive to sealed are shown in Table E-5 with strikeouts through the old well category entry. Wells identified as sealed in the MDH database updates were assigned to Category 7a (documented as sealed/abandoned). Wells that were determined to be sealed through conversations with well owners were assigned to Category 7b (undocumented as sealed, or improperly abandoned).

As required each fiscal year, an attempt was made to reclassify Category 4 wells that were in the existing TCAAP well inventory database into one of the other categories. This was accomplished through telephone calls, letters, and/or site visits in an attempt to obtain additional information. Specifically, information on a well is initially investigated by searching the County Well Index for any contact information or geologic/well depth information. If any phone numbers are located for the well owner (or other potentially knowledgeable parties), a telephone call is made to request information about the well. If no phone number can be found, or if attempted telephone calls go unanswered, a site visit is conducted (when a well address is available). If the well address is found in the field, but the well owner is not present, a letter is left at the property to explain the program and requesting that the well owner contact TWISS (on behalf of the Army). If the well owner does not respond to telephone calls or the letter, or if no information regarding a well address or telephone contact is found, the well remains in Category 4 until the next fiscal year's well inventory update, when an attempt will again be made to contact the well owner and/or find additional information. Alternatively, if a well address is known and a site visit reveals that a well is not located on the property, the well may be reassigned to Category 5. Thirty-three Category 4 wells were field studied during FY 2003 and an investigative summary is included in Table E-6. Contact information was updated, four wells were re-categorized, and Well 401201 was deleted from the database as it was found to be located outside of the study area.

Information contained in Tables E-3 through E-6 was updated in the well inventory database.

Through the FY 2003 well inventory update effort, five wells were sampled. The wells of concern that were not sampled were either found to be abandoned, not found to exist from site visits, or the well owners were not responsive to requests for access to sample. The analytical data from the FY 2003 sampling efforts are summarized in Table E-2. The locations of wells sampled in FY 2003 are shown on Figure E-5. All five of the wells had no detections of TCAAP contaminants, nor any other reported VOCs. Two of the wells that were sampled did not need to be sampled. Well 249632, a Category 1b well, should not have been sampled until the next major sampling event in FY 2005 (as listed in Appendix A.1). Also, the well located at 1910 County Road E was sampled before it was determined to be a Category 3 well (located within the study area but outside of the area of concern).

Recommendations

- At this time no wells are recommended for the Army to offer alternate water supply or well abandonment.
- Wells to be sampled in FY 2004 are:
    - Well 234474, located at 2601 Silver Lane NE in St. Anthony.
    - Any previously undiscovered wells determined to be in Categories 1a, 1b, 1c, 2a, 2b, 2c, or 4a based on the FY 2004 review of the MDH database.
    - Any Category 4 wells that are determined, from further investigation, to be in Category 1a, 1b, 1c, 2a, 2b, or 2c.
- The next "major" sampling event will be in FY 2005.

TABLE E-1
WELL INVENTORY CATEGORY DESCRIPTIONS

Category	Subcategory	Explanation
1		Water supply wells screened in an aquifer of concern, inside the 1 ug/l contour. Wells are divided into the following subcategories:
	1a	• Drinking water well
	1b	• Nondrinking but possible contact water
	1c	• Nondrinking, noncontact water
	1d	• Well is inoperable or has not been used for several years
	1e	• Well for which the owner has refused (or has been unresponsive to) an Army offer for abandonment, or for which the water use has been deemed acceptable
2		Water supply wells in an area of concern, inside the buffer lines, but outside the 1 ug/L contour, screened in an aquifer of concern. Wells are divided into the following subcategories:
	2a	• Drinking water well
	2b	• Nondrinking but possible contact water
	2c	• Nondrinking, noncontact water
	2d	• Well is inoperable or has not been used for several years
3		Water supply wells within the Study Area that are either outside the area of concern, or are within the area of concern but are not screened in an aquifer of concern.
4		Water supply wells with missing information, divided into the following subcategories:
	4a	• Unknown depth or aquifer, but located in the area of concern.
	4b	• Unknown location, but potentially located within the Study Area. Wells with both an unknown depth and an unknown location are included in 4b.
5		Wells that are in the study area, but that have been field checked and not located. No further action is recommended for these wells.
6		Nonsupply wells (primarily monitoring wells).
7		Sealed or abandoned wells. Wells are divided into the following subcategories:
	7a	• Documented as sealed/abandoned
	7b	• Undocumented as sealed, or improperly abandoned

TABLE E-2
WELL INVENTORY SAMPLING RESULTS

Fiscal Year 2003

Unique Number:	249632	127537	(None)	(None)	107405	249007		
Address:	2301 N. Upland Crest	1400 Old Hwy 8	1910 Cty Rd E	1910 Cty Rd E (Duplicate)	4355 Hwy 10	4453 Hwy 10	OU1 Cleanup Level(1)	MDH HRL(2)
VOCs (ug/L)	05-Aug-03	30-Sep-03	25-Sep-03	25-Sep-03	24-Sep-03	29-Sep-03		
OU1 Chemicals of Concern:								
Trichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	
1,1-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6	
cis-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70	
1,1,1-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200	
1,1,2-Trichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3	
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70	
Other Analytes:								
1,1,2,2-Tetrachloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		2
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		4
1,2-Dichloropropane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		5
2-Butanone	<5.0	<10	<10	<10	<10	<10		4000
2-Hexanone	<5.0	<10	<10	<10	<10	<10		(Note 3)
4-Methyl-2-Pentanone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		300
Acetone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0		700
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		10
Bromodichloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		6
Bromoform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		40
Bromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		10
Carbon Disulfide	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		700
Carbon Tetrachloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		3
Chlorobenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		100
Chloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		280
Chloroform	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		60
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		80
cis-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		2
Dibromochloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		80
Ethylbenzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		700
m&p-Xylene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		10,000
Methylene Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		50
o-Xylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		10,000
Styrene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		(Note 3)
Tetrachloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		7
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		1000
trans-1,2-Dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		100
trans-1,3-Dichloropropene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		2
Vinyl Chloride	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		0.2

Notes:
(1) Cleanup levels for OU1 deep groundwater are from page 18 of the OU1 ROD.
(2) Minnesota Department of Health's Health Risk Limits (HRLs), for reference.
(3) No HRL has been established for this analyte.

TABLE E-3
CONSTRUCTED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Depth*	*Date Drilled*
689609	3	U OF M ; Gordon Girtz	500 PILLSBURY DR SE	MINNEAPOLIS	Dewatering	68	
00LUBETE	4a	LUBE-TECH	2420 COUNTY ROAD C WEST	ROSEVILLE			
688419	4b	SANMINA-SCI	2516 WABASH AV	ST. PAUL			
688420	4b	SANMINA-SCI	2516 WABASH AV	ST. PAUL			
688421	4b	SANMINA-SCI	2516 WABASH AV	ST. PAUL			
436331	6	EXXON MOBIL CORPORATION	606 VANDALIA ST	ST. PAUL	Monitoring	43	9/2002
439233	6	ANOKA COUNTY FARM SERVICE COOP	1427 OLD HIGHWAY 8	NEW BRIGHTON	Monitoring	20	
439234	6	ANOKA COUNTY FARM SERVICE COOP	1427 OLD HIGHWAY 8	NEW BRIGHTON	Monitoring	20	
478232	6	US EPA	0 County Road E2 & FIFTH AVENUE	NEW BRIGHTON	Monitoring	40	9/2000
478234	6	US EPA	0 County Road E2 & FIFTH AVENUE	NEW BRIGHTON	Monitoring	101	9/2000
542514	6	ALLIANT TECHSYSTEMS PROVING GROUNDS	0 77 & 14TH STREET CR	NEW BRIGHTON	Monitoring	4	1/2000
542515	6	ALLIANT TECHSYSTEMS PROVING GROUNDS	0 77 & 14TH STREET CR	NEW BRIGHTON	Monitoring	4	1/2000
594641	6	CANADIAN PACIFIC RAILWAY	2823 CENTRAL AV NE	MINNEAPOLIS	Monitoring	47	4/2000
594642	6	CANADIAN PACIFIC RAILWAY	2803 POLK ST NE	MINNEAPOLIS	Monitoring	52	5/2000
616524	6	US EPA	0 4TH AVE NW & 8TH ST NW	NEW BRIGHTON	Recovery	50	9/1999
616525	6	US EPA	0 4TH AVE NW & 8TH ST NW	NEW BRIGHTON	Recovery	50	8/1999
619704	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	51	7/1999
619705	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	39	7/1999
619709	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	38	7/1999
619710	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	40	8/1999
619711	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	39	7/1999
619712	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	40	8/1999
619713	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	39	7/1999
619714	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	40	8/1999
619715	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	44	7/1999
619716	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	45	8/1999
619718	6	US EPA	310 THIRD AV NW	NEW BRIGHTON	Monitoring	40	9/1999
619719	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Monitoring	41	9/1999
619725	6	US EPA	0 WEST FIFTH ST NW (1200 BLOCK)	NEW BRIGHTON	Monitoring	51	1/2001
619726	6	US EPA	0 WEST FOURTH ST NW (1100 BLOCK)	NEW BRIGHTON	Monitoring	42	1/2001
619727	6	US EPA	0 W FOURTH (1200 BLOCK) ST NW	NEW BRIGHTON	Monitoring	60	1/2001
619728	6	US EPA	0 W 12TH AVE NW (300 BLOCK)	NEW BRIGHTON	Monitoring	43	1/2001
619729	6	US EPA	301 W FIFTH ST NW	NEW BRIGHTON	Monitoring	59	1/2001
619730	6	US EPA	517 SECOND AV NW	NEW BRIGHTON	Monitoring	45	1/2001
623331	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Recovery	30	9/1999
624046	6	DRESSER/RAND COMPANY	347 HARRISON ST	MINNEAPOLIS	Monitoring	34	1/2000
624048	6	DRESSER/RAND COMPANY	347 HARRISON ST	MINNEAPOLIS	Monitoring	34	1/2000
628901	6	US EPA	0 EIGHTH AV S	NEW BRIGHTON	Recovery	40	8/1999
628906	6	US EPA	0 11TH AV	NEW BRIGHTON	Recovery	45	9/1999
628907	6	US EPA	0 FOURTH ST.NW & 10TH ST.	NEW BRIGHTON	Recovery	45	8/1999
628908	6	US EPA	0 FOURTH ST.NW & 10TH ST.	NEW BRIGHTON	Recovery	40	8/1999

TABLE E-3
CONSTRUCTED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Depth*	*Date Drilled*
628909	6	US EPA	0 FOURTH ST.NW & 10TH ST.	NEW BRIGHTON	Recovery	40	8/1999
628910	6	US EPA	0 FOURTH ST.NW & 10TH ST.	NEW BRIGHTON	Recovery	40	8/1999
628911	6	US EPA	0 11TH AV NW	NEW BRIGHTON	Recovery	50	7/1999
628912	6	US EPA	0 11TH AV NW	NEW BRIGHTON	Recovery	40	7/1999
628913	6	US EPA	0 11TH AV NW	NEW BRIGHTON	Recovery	40	8/1999
628914	6	US EPA	0 11TH AV NW	NEW BRIGHTON	Recovery	40	9/1999
628999	6	US EPA	0 EIGHTH AV S	NEW BRIGHTON	Recovery	45	7/1999
629000	6	US EPA	0 EIGHTH AV S	NEW BRIGHTON	Recovery	40	8/1999
632110	6	GEPNER	359 HOOVER ST	MINNEAPOLIS	Monitoring	30	8/1999
632111	6	GEPNER	359 HOOVER ST	MINNEAPOLIS	Monitoring	30	8/1999
632112	6	GEPNER	359 HOOVER ST	MINNEAPOLIS	Monitoring	29	8/1999
632113	6	GEPNER	359 HOOVER ST	MINNEAPOLIS	Monitoring	30	8/1999
632277	6	MIXON, INC.	2286 CAPP RD	ST. PAUL	Monitoring	35	7/2000
632278	6	MIXON, INC.	2286 CAPP RD	ST. PAUL	Monitoring	32	7/2000
632279	6	MIXON, INC.	2286 CAPP RD	ST. PAUL	Monitoring	30	7/2000
632280	6	MIXON, INC.	2286 CAPP RD	ST. PAUL	Monitoring	30	7/2000
632281	6	MIXON, INC.	2286 CAPP RD	ST. PAUL	Monitoring	47	7/2000
632295	6	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Monitoring	26	10/2000
632296	6	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Monitoring	25	10/2000
632297	6	ONAN CORPORATION	7033 CENTRAL AV NE	FRIDLEY	Monitoring	27	10/2000
632298	6	ONAN CORPORATION	7033 CENTRAL AV NE	FRIDLEY	Monitoring	26	10/2000
632299	6	ONAN CORPORATION	7033 CENTRAL AV NE	FRIDLEY	Monitoring	27	10/2000
635423	6	STROM	2492 DOSWELL AV	ST. PAUL	Monitoring	42	11/1999
638965	6	BOISE CASCADE CORPORATION	1400 73TH AV NE	FRIDLEY	Monitoring	20	11/1999
642161	6	ALLIANT TECHSYSTEMS, INC.	4700 HWY 10	ARDEN HILLS	Monitoring	118	2/2000
643880	6	U.S. ARMY/TCAAP - SITE C			Monitoring	18	12/2000
643881	6	U.S. ARMY/TCAAP - SITE C			Monitoring	29	12/2000
643882	6	U.S. ARMY/TCAAP - SITE C			Monitoring	18	12/2000
643883	6	U.S. ARMY/TCAAP - SITE C			Monitoring	21	12/2000
643884	6	U.S. ARMY/TCAAP - SITE C			Monitoring	16	12/2000
643885	6	U.S. ARMY/TCAAP - SITE C			Monitoring	20	12/2000
643887	6	U.S. ARMY/TCAAP - SITE C			Monitoring	20	12/2000
646102	6	BP AMOCO	1000 UNIVERSITY AVE SE	MINNEAPOLIS	Monitoring	30	5/2000
646103	6	BP AMOCO	1000 UNIVERSITY AVE SE	MINNEAPOLIS	Monitoring	30	5/2000
646104	6	BP AMOCO	1000 UNIVERSITY AVE SE	MINNEAPOLIS	Monitoring	30	5/2000
646105	6	BP AMOCO	1000 UNIVERSITY AVE SE	MINNEAPOLIS	Monitoring	30	5/2000
646863	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	15	6/2000
646864	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	18	6/2000
646865	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	20	6/2000
646866	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	15	6/2000
646867	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	18	6/2000

TABLE E-3
CONSTRUCTED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Depth*	*Date Drilled*
646873	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	67	6/2000
646874	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	57	6/2000
646875	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	60	6/2000
646876	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	59	6/2000
646877	6	BRENNTAG GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	59	6/2000
649985	6	MURPHY OIL USA, INC.	3110 CLEVELAND AV N	ROSEVILLE	Monitoring		7/2000
650819	6	U.S. ARMY/TCAAP - SITE C			Monitoring	15	4/2001
650820	6	U.S. ARMY/TCAAP - SITE C			Monitoring	13	4/2001
650832	6	U.S. ARMY/TCAAP	4700 HWY 10	ARDEN HILLS	Recovery	21	6/2001
650833	6	U.S. ARMY/TCAAP	4700 HWY 10	ARDEN HILLS	Recovery	20	6/2001
650834	6	U.S. ARMY/TCAAP	4700 HWY 10	ARDEN HILLS	Recovery	22	6/2001
651549	6	WISWELL	1851 CENTRAL AV NE	MINNEAPOLIS	Monitoring	13	10/2000
652675	6	ROSEVILLE, CITY OF	2785 FAIRVIEW AV	ROSEVILLE	Monitoring	14	8/2000
653903	6	U.S. ARMY/TCAAP - GRENADE RANGE			Monitoring	14	9/2000
653904	6	U.S. ARMY/TCAAP - GRENADE RANGE			Monitoring	14	9/2000
653905	6	U.S. ARMY/TCAAP - GRENADE RANGE			Monitoring	14	9/2000
656976	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	23	3/2001
656977	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	55	3/2001
656978	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	33	3/2001
656979	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	70	3/2001
656980	6	U OF M			Monitoring	28	4/2001
657324	6	INTERPLASTIC CORPORATION	2015 NE BROADWAY ST	MINNEAPOLIS	Recovery	33	12/2000
658163	6	UNION PACIFIC RAILROAD CO	2000 ELM ST SE	MINNEAPOLIS	Monitoring	23	1/2001
658164	6	UNION PACIFIC RAILROAD CO.	2000 ELM ST SE	MINNEAPOLIS	Monitoring	23	1/2001
658165	6	UNION PACIFIC RAILROAD, INC.	2000 ELM ST SE	MINNEAPOLIS	Monitoring	26	1/2001
658166	6	UNION PACIFIC RAILROAD CO.	2000 ELM ST SE	MINNEAPOLIS	Monitoring	26	1/2001
658167	6	UNION PACIFIC RAILROAD CO.	2000 ELM ST SE	MINNEAPOLIS	Monitoring	26	1/2001
658172	6	MN PCA/METRO DISTR.SITE REMEDIATION SECT	500 CLEVELAND AV	NEW BRIGHTON	Monitoring	85	1/2001
658173	6	MN PCA/METRO DISTR.SITE REMEDIATION SECT	500 SECOND AV NW	NEW BRIGHTON	Monitoring	84	1/2001
658191	6	BP AMOCO	1000 UNIVERSITY AVE SE	MINNEAPOLIS	Monitoring	36	2/2001
658192	6	WISWELL	1851 CENTRAL AV NE	MINNEAPOLIS	Monitoring	16	2/2001
658193	6	WISWELL	1851 CENTRAL AV NE	MINNEAPOLIS	Monitoring	16	2/2001
658728	6	U.S. ARMY/TCAAP - SITE C			Monitoring	15	3/2001
658729	6	U.S. ARMY/TCAAP - SITE C			Monitoring	14	3/2001
658730	6	U.S. ARMY/TCAAP - SITE C			Monitoring	14	3/2001
658733	6	U.S. ARMY/TCAAP - SITE C			Monitoring	13	3/2001
658734	6	U.S. ARMY/TCAAP - SITE C			Monitoring	13	3/2001
658735	6	U.S. ARMY/TCAAP - SITE C			Monitoring	15	3/2001
658737	6	U.S. ARMY/TCAAP - SITE A			Monitoring	29	4/2001
658738	6	U.S. ARMY/TCAAP - SITE A			Monitoring	29	4/2001
658861	6	BRENNTAG GREAT LAKES, LLC	0 EVERETT ST	ST. PAUL	Monitoring	21	5/2001

TABLE E-3
CONSTRUCTED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Depth*	*Date Drilled*
658862	6	BRENNTAG GREAT LAKES, LLC	0 EVERETT ST	ST. PAUL	Monitoring	47	5/2001
658863	6	BRENNTAG GREAT LAKES, LLC	0 CAPP RD	ST. PAUL	Monitoring	13	5/2001
658864	6	BRENNTAG GREAT LAKES, LLC		ST. PAUL	Monitoring	53	5/2001
658865	6	BRENNTAG GREAT LAKES, LLC	0 CAPP ROAD & HERSEY ST	ST. PAUL	Monitoring	20	5/2001
658866	6	BRENNTAG GREAT LAKES, LLC	0 CAPP ROAD & HERSEY ST	ST. PAUL	Monitoring	67	5/2001
658867	6	BRENNTAG GREAT LAKES, LLC	0 CAPP ROAD & HERSEY ST	ST. PAUL	Monitoring	16	5/2001
658868	6	BRENNTAG GREAT LAKES, LLC	0 CAPP ROAD & HERSEY ST	ST. PAUL	Monitoring	65	5/2001
659857	6	UNION PACIFIC RAILROAD COMPANY	2200 EIGHTH ST SE	MINNEAPOLIS	Monitoring	20	5/2001
659858	6	UNION PACIFIC RAILROAD COMPANY	2200 EIGHTH ST SE	MINNEAPOLIS	Monitoring	20	5/2001
659859	6	UNION PACIFIC RAILROAD COMPANY	2200 EIGHTH ST SE	MINNEAPOLIS	Monitoring	20	5/2001
659894	6	MURPHY OIL USA, INC.	3110 CLEVELAND AV N	ROSEVILLE	Monitoring	70	6/2001
661518	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	22	7/2001
661545	6	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Monitoring	27	10/2001
661546	6	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Monitoring	27	10/2001
661569	6	PARTNERSHIP 4	2118 MYRTLE AV	ST. PAUL	Monitoring	20	7/2001
661570	6	PARTNERSHIP 4	2118 MYRTLE AV	ST. PAUL	Monitoring	20	7/2001
661571	6	PARTNERSHIP 4	2118 MYRTLE AV	ST. PAUL	Monitoring	20	7/2001
661598	6	HENNEPIN COUNTY	942 LOWRY AV NE	MINNEAPOLIS	Monitoring	49	8/2001
662094	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	40	10/2001
662095	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	21	10/2001
662096	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	20	10/2001
666478	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	65	5/2002
666479	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	20	5/2002
666480	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	20	5/2002
666481	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	20	5/2002
666482	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	55	4/2002
666483	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	35	5/2002
666484	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	55	5/2002
666485	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	30	5/2002
666486	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	55	5/2002
666487	6	BRENNTAG - GREAT LAKES, LLC	2130 ENERGY PARK DR	ST. PAUL	Monitoring	30	5/2002
667706	6	GLIDDEN PAINT	1901 E HENNEPIN AV	MINNEAPOLIS	Monitoring	26	8/2001
667707	6	GLIDDEN PAINT	1901 HENNEPIN AV	MINNEAPOLIS	Monitoring	26	8/2001
668811	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	28	2/2002
668812	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	32	2/2002
668813	6	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Monitoring	27	2/2002
668846	6	U OF M	231 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	41	8/2002
668847	6	U OF M	231 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	42	8/2002
668848	6	U OF M	231 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	48	8/2002
668849	6	U OF M	231 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	65	8/2002
671114	6	MURPHY OIL USA, INC.	3110 CLEVELAND AV N	ROSEVILLE	Monitoring	66	11/2001

TABLE E-3
CONSTRUCTED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Depth*	*Date Drilled*
671157	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	30	4/2002
671158	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	25	4/2002
671171	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	30	4/2002
674094	6	TESORO REFINING AND MARKETING	2288 COUNTY ROAD C WEST	ROSEVILLE	Monitoring	79	7/2002
674778	6	U OF M	0 FIFTH ST SE AND OAK ST	MINNEAPOLIS	Monitoring	18	8/2002
674779	6	U O M	0 FIFTH ST SE AND OAK ST	MINNEAPOLIS	Monitoring	17	8/2002
674780	6	U OF M	0 FIFTH ST SE AND OAK ST	MINNEAPOLIS	Monitoring	18	8/2002
674781	6	U OF M	2005 FOURTH ST SE	MINNEAPOLIS	Monitoring	20	8/2002
674782	6	U OF M	2005 FOURTH ST SE	MINNEAPOLIS	Monitoring	20	8/2002
674783	6	U OF M	2005 FOURTH ST SE	MINNEAPOLIS	Monitoring	20	8/2002
675976	6	US ARMY TWIN CITY AMMUNITION PLANT	4700 HWY 10	ARDEN HILLS	Monitoring	17	4/2002
677194	6	U OF M	500 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	129	7/2002
677195	6	U OF M	500 PILLSBURY DR SE	MINNEAPOLIS	Monitoring	170	7/2002
678201	6	INGERSOLL RAND COMPANY	347 HARRISON ST NE	MINNEAPOLIS	Monitoring	35	5/2002
678202	6	INGERSOLL RAND COMPANY	347 HARRISON ST NE	MINNEAPOLIS	Monitoring	35	5/2002
678203	6	INGERSOLL RAND COMPANY	347 HARRISON ST NE	MINNEAPOLIS	Monitoring	35	5/2002
678226	6	TPI PETROLEUM, INC.	3673 N LEXINGTON AV	ARDEN HILLS	Recovery	23	7/2002
678227	6	TPI PETROLEUM, INC.	3673 N LEXINGTON AV	ARDEN HILLS	Recovery	23	7/2002
680613	6	ROSEVILLE PROPERTIES	2118 MYRTLE AV	ST. PAUL	Monitoring	38	10/2002
680614	6	ROSEVILLE PROPERTIES	2118 MYRTLE AV	ST. PAUL	Monitoring	20	10/2002
680615	6	ROSEVILLE PROPERTIES	2108 UNIVERSITY AV	ST. PAUL	Monitoring	16	10/2002
683303	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Recovery	45	8/2002
683305	6	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Recovery	35	9/2002
684901	6	US EPA	324 MEHIGAN NW	NEW BRIGHTON	Monitoring	40	8/2002
686672	6	CANADIAN PACIFIC RAILWAY	2851 CENTRAL AV NE	MINNEAPOLIS	Monitoring	185	10/2002
686673	6	CANADIAN PACIFIC RAILWAY	2851 CENTRAL AV NE	MINNEAPOLS	Monitoring	110	10/2002
686675	6	CANADIAN PACIFIC RAILWAY	2851 CENTRAL AV NE	MINNEAPOLIS	Monitoring	49	8/2002
687112	6	TWIN CITIES AMMUNITION PLANT/US ARMY	4700 HWY 10	ARDEN HILLS	Recovery	154	11/2002
687134	6	VIACOM, INC.	2303 KENNEDY ST	MINNEAPOLIS	Monitoring	22	1/2003

TABLE E-4
WELLS DISCLOSED THROUGH PROPERTY TRANSFER

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Use*	*Status*	*Depth*	*Aquifer*	*Date Drilled*	*Comments*
107405	~~3~~ 2a	~~Roebke~~, ANDERSON	4355 Hwy 10	Arden Hills	Domestic	Active	181	OPDC	1976	Sampled in FY 2003
249007	~~3~~ 2a	~~Tran,~~ Walton	4453 Hwy 10	Arden Hills	Domestic	Active	200	OPCJ	1988	Sampled in FY 2003
127537	~~2c~~ 2b	Midwest Asphalt	1400 Old Hwy 8	New Brighton	Commercial	Active	117	QBAA	1984	Sampled in FY 2003
130890	3	~~Conboy~~, PARLIN	1657 Hillview Rd	Shoreview	Irrigation	Active	142	OPDC	1977	
134319	3	~~Campbell~~, LANGENFELD	1615 Cty Rd I	Shoreview	Domestic	Active	138	OSTP	1977	
134333	3	~~Morris~~, LEEBENS	5790 Fairview Ave N	Shoreview	Domestic	Active	118/108	QBAA	1978	
153241	3	~~Livingston~~, CARLSON	5581 Fairview Ave	Shoreview	Irrigation	Active	133/130?	QBAA	1978	
156076	3	~~Ripienski,~~ FRANTZ	1724 Oakwood Dr	Shoreview	Domestic	Active	108	QBAA	1980/1979	
200094	3	~~Lundgren~~, SALMANPOUR	1862 Gluek Ln	Roseville	Domestic	Active	75	QUUU		
233748	3	PEPER	1835 Gluek Ln	Roseville	Domestic	Active	103	ODCR		
234467	3	~~Szurek~~ MISKOWIEC	2809 Silver Ln NE	Minneapolis	Irrigation	Active	120	QBAA	1936	
234516	3	~~Risty~~, SCHLOTTACH	2001 Eldridge Ave W	Roseville	Domestic	Active				
249134	3	~~Nardecchia,~~ LAVANDOWSKA	1699 Pinewood Dr	Shoreview	Irrigation	Active	125			
249159	3	~~Lindorff~~, LARSON	1615 Lois Dr	Shoreview	Domestic	Active	125/399?	Unknown		
249162	3	~~Chapin~~, RACINE	3947 Rolling Hills Rd	Arden Hills	Irrigation	Active	150		1959	
249636	3	~~Bellis~~, CHRISTENSEN	2977 Cty Rd H	New Brighton	Domestic	Active	120	HILLSIDE		
527408	3	HARK'S CO.	5695 HACKMANN AV NE NE	FRIDLEY		Active				
623342	3	DALSTAR FIFTH AVENUE, LLC	300 FIFTH AV NW	NEW BRIGHTON		Active				
S00221	3	~~Crichton,~~ HINES	1700 Valentine Ave	Arden Hills	Unknown	~~Unk~~ Active				
S00272	3	~~Bacon~~, HIESTAND	1336 Hillcrest Dr NE	Fridley	Domestic	Active	195	HIQBAA	1953	
S00330	3	~~Fortmeyer~~, LUEDTKE	1905 Ryan Ave W	Roseville	Domestic	Active				
S00334	3	~~Rice & Daley~~, CHAIL	1957 Roselawn Ave W	Roseville	Domestic	Active				
S00342	3	~~Wilson~~, TOSTENGARD	2079 W Skillman Ave	St Paul	Dom./Public	Active	160	HILLSIDE	1961	
S00383	3	~~Pearson~~, GROTH	1768 Oakwood Dr	Shoreview	Domestic	Active	135/120?	QBAA	1963	
S00540	3	~~Porter,~~ HOGENSON	6870 Channel Rd	Fridley	Domestic	Active	100	QUUU	1940s	
	3	MOGHUL	1345 GARDENA AV NE	FRIDLEY		Active				
	3	SHAMROCK INVESTMENT III, LLC	1400 73RD AV NE	FRIDLEY		Active				
	3	HILLCREST DEVELOPMENT	1515 CENTRAL AV NE	MINNEAPOLIS		Active				
	3	WALKNER	1538 GARDENA AV NE	FRIDLEY		Inactive				
	3	OLSON	1568 FERNDALE AV	FRIDLEY		Active				
	3	~~Thingelstad~~, BERNT	1593 Lois Dr	Shoreview		Active	25		1955	
	3	~~Weston~~, BARNES	1649 Lois Dr	Shoreview		Active				
	3	~~Imes~~, WHITE	1687 Hillview	Shoreview	Domestic	Active	40			
	3	~~Anderson~~, SKOTTE	1709 Hillview	Shoreview	Domestic	Active				
	3	LUDWIG	1729 CRYSTAL AV	ARDEN HILLS		Active				
	3	GRAF	1742 GRAMSIE RD	ARDEN HILLS		Active				
	3	STRAIT	1763 FAIRVIEW N	FALCON HEIGHTS		Inactive				
	3	ROO	1775 OAKWOOD DR	SHOREVIEW		Inactive				
	3	TATE	1779 CEDAR DR	NEW BRIGHTON		Inactive				
	3	~~Lavoie~~, BRANT	1779 Lois Dr	Shoreview		Inactive	120		1976	
	3	BELL	1798 VENUS AV	ARDEN HILLS		Active				
	3	SKOK	1873 SHRYER	ST. PAUL		Active				
	3	STRECKER	1910 E CR	ARDEN HILLS	Irrigation	Active				Sampled in FY 2003
	3	SPRINGER	1967 GLEN PAUL AV	ARDEN HILLS		Inactive				
	3	NEW BRIGHTON, CITY OF	1975 SILVER LAKE RD	NEW BRIGHTON		Active				
	3	WILCVIC	1988 ELDRIDGE AV W	ROSEVILLE		Active				
	3	HIAWATHA MARKETING, INC.	201 FIFTH ST NW	NEW BRIGHTON		Active				
	3	POULADIAN	2030 ELDRIDGE AV W	ROSEVILLE						
	3	SAGER	2042 ELDRIDGE AV W	ROSEVILLE		Active				

TABLE E-4
WELLS DISCLOSED THROUGH PROPERTY TRANSFER

Unique Number	Category	Last Name or Business Name	Street	City	Use	Status	Depth	Aquifer	Date Drilled	Comments
	3	ROSEVILLE, CITY OF	2136 36 HY W	ROSEVILLE		Active				
	3	FYKSEN	2136 CEDAR DR	NEW BRIGHTON		Active				
	3	TOWLE FINANCIAL SERVICES, INC.	2165 UNIVERSITY DR	ST. PAUL		Active				
	3	BOSARD	2229 H 2 CR	MOUNDS VIEW		Inactive				
	3	MOHR	2234 LAMBERT AV	MOUNDS VIEW		Active				
	3	ROSEVILLE, CITY OF	2237 36 HY W	ROSEVILLE		Active				
	3	ZUNIGA	2276 LEONA DR	NEW BRIGHTON		Inactive				
	3	PAUL	2302 RAINBOW AV	NEW BRIGHTON		Active				
	3	MICHAEL INVESTMENTS	2310 10 HY N	MOUNDS VIEW		Active				
	3	MCKENZIE	2463 RIDGE LA	MOUNDS VIEW		Active				
	3	RACHAC	2542 14TH AV NW	NEW BRIGHTON		Inactive				
	3	MATTSON	2578 SUNBOW LA	NEW BRIGHTON		Active				
	3	LOBEJKO	2605 EASTMAN DR	NEW BRIGHTON		Active				
	3	LARRY BEACH CONSTRUCTION, INC.	30 12TH AV NW	NEW BRIGHTON		Inactive				
	3	PRESBYTERIAN HOMES OF ARDEN HILLS	3151 LAKE JOHANNA BL	ARDEN HILLS		Inactive				
	3	WESTLUND	3355 LAKE JOHANNA BL	ARDEN HILLS		Inactive				
	3	REIGSTAD	3417 LAKE JOHANNA BL	ARDEN HILLS		Inactive				
	3	LAUDON	376 SECOND AV SE	NEW BRIGHTON		Active				
	3	JORDAN	4093 VALENTINE CREST RD	ARDEN HILLS		Active				
	3	LA/CDBC, INC.	4201 LEXINGTON N	ARDEN HILLS		Active				
	3	ATLANTIC FINANCIAL GROUP, LTD.	4201 LEXINGTON N	ARDEN HILLS		Active				
	3	SPENCE, III	5046 EASTWOOD RD	MOUNDS VIEW		Inactive				
	3	POLSON	5066 BRIGHTON LA	MOUNDS VIEW		Active				
	3	WALD	5225 SKIBA DR	MOUNDS VIEW		Active				
	3	BECK	5260 LONG LAKE RD	MOUNDS VIEW		Inactive				
	3	WOODWARD	5331 JACKSON DR	MOUNDS VIEW		Inactive				
	3	NEDEGAARD CONSTRUCTION CO., INC.	5353 FILLMORE ST	FRIDLEY		Active				
	3	~~Johnson~~, HERZOG	5595 Schutta Rd	Shoreview		Active	170		1974	
	3	HOLIDAY STATIONSTORES, INC.	5695 HACKMANN AV	FRIDLEY		Active				
	3	LYNDALE TERMINAL CO.	5695 HACKMANN AV NE	FRIDLEY						
	3	FRIDLEY, CITY OF	6028 CENTRAL AV NE	FRIDLEY		Active				
	3	VANG	6516 PIERCE ST NE	FRIDLEY		Active				
	3	CLARK	6860 SIVERTS LA	FRIDLEY		Active				
	3	SPIERING	6951 KNOLLWOOD DR	MOUNDS VIEW		Active				
	3	KING	7408 SILVER LAKE RD	MOUNDS VIEW		Active				
	3	BRICKNER BUILDERS, INC.	7440 BACON DR NE	FRIDLEY		Inactive				
	3	FERGUSON	7588 GROVELAND RD	MOUNDS VIEW		Active				
	3	RUPERT	7594 GROVELAND RD	MOUNDS VIEW		Active				
234474	~~7b~~ 4a	~~Mikkelson,~~ HODSON	2601 SILVER LA NE	ST. ANTHONY	Irrigation	~~Sealed~~Active	~~160~~ 214		1955	Sample in FY 2004
	4a	BEACH	1615 SILVER LAKE RD	NEW BRIGHTON		Active				Could Not Locate
	4a	NEW BRIGHTON, CITY OF	19 14TH ST NW	NEW BRIGHTON		Active				Could Not Locate
	4a	BURTON	2073 TENTH ST NW	NEW BRIGHTON	Residential	Inactive				Inactive Well
	4a	TABAIKA	2512 27TH AV NE	ST. ANTHONY		Inactive				Inactive Well
	4a	WILLIG	2600 PAHL AV	ST. ANTHONY	Irrigation	Active				No Response
	4a	WEISENBERGER	2816 SILVER LAKE RD	ST. ANTHONY	Residential	Inactive				Inactive Well
	4a	HINTON, E and T Hermes	2935 OLD HWY 8	ROSEVILLE		Active				No Response
	4b	NOTTESTAD	1001 E CR W	NEW BRIGHTON		Active				No Response
	4b	BRIGHTON LAND DEVELOPMENT, LLC	1001 E CR W	NEW BRIGHTON		Active				No Response
	4b	HOGAN	1700 F CR W	ARDEN HILLS		Active				No Response

TABLE E-4
WELLS DISCLOSED THROUGH PROPERTY TRANSFER

Unique Number	Category	Last Name or Business Name	Street	City	Use	Status	Depth	Aquifer	Date Drilled	Comments
	4b	MERIDIAN PROPERTIES REAL ESTATE DEV.,LLC	3700 SILVER LAKE RD	ST. ANTHONY		Active				Could Not Locate
	4b	DONATELLE ASSOCIATES, LLC		NEW BRIGHTON		Active				No Response
	4b	NEW BRIGHTON ALANO SOCIETY, INC.		MOUNDS VIEW		Active				No Response
	5	SPEEDWAY SUPERAMERICA, LLC	1816 37TH AV	MINNEAPOLIS		Unknown				Site Visit: Not Located
	5	SANDER	2520 BROADWAY DR	LAUDERDALE		Unknown				Site Visit: Not Located
	5	Great Northern Baking Co.	443 HOOVER ST	MINNEAPOLIS		Active				Site Visit: Not Located
	5	Stork TC Testing Group	662 CROMWELL AV	ST. PAUL	Monitoring	Active				Site Visit: Not Located
	6	HARTMAN	887 19TH AV SE	MINNEAPOLIS	Monitoring	Unknown				

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
236512	~~1d~~ 7a	Gordon Rendering Co	Butcher Allotment #1 Blk-1, Lot-1.		~~Inactive~~ Sealed	12/28/2000
206769	~~3~~ 7a	Carlson	4137 James Circle	Arden Hills	~~Active~~ Sealed	8/3/1999
233851	~~3~~ 7a	Bredemus	2705 St Anthony	Minneapolis	~~Inactive~~ Sealed	7/19/2002
506348	~~3~~ 7a	Reed, H.B. Fuller Co.	520 Malcom	Minneapolis	~~Permit~~ Sealed	
519125	~~3~~ 7a	Estate Of Fredrick W Thoine	3224 Old Hwy 8	Roseville	Sealed	
519126	~~3~~ 7a	Estate Of Fredrick W Thoine	3224 Old Hwy 8	Roseville	Sealed	
519127	~~3~~ 7a	Estate Of Fredrick W Thoine	3224 Old Hwy 8	Roseville	Sealed	
552567	~~3~~ 7a	Menard Inc	5351 Central Ave NE	Fridley	~~Active~~ Sealed	
558111	~~3~~ 7a	SUPER AMERICA	2010 Silver Lake	New Brighton	Sealed	
558113	~~3~~ 7a	SUPER AMERICA	2010 Silver Lake	New Brighton	Sealed	
558114	~~3~~ 7a	SUPER AMERICA	2010 Silver Lake	New Brighton	Sealed	
563998	~~3~~ 7a	Midwest Motor Express Company	2778 Cleveland Ave N	Roseville	~~Active~~ Sealed	
563999	~~3~~ 7a	Midwest Motor Express Company	2778 Cleveland Ave N	Roseville	~~Active~~ Sealed	
191912	~~6~~ 7a	Medtronics	69th Ave NE & Central Ave			
234199	~~6~~ 7a	O1U011; ST-11-U1			~~Active~~ Sealed	1/5/2002
234200	~~6~~ 7a	ST-12-U1			~~Active~~ Sealed	1/7/2002
234201	~~6~~ 7a	O1U022; ST-22-U1			~~Active~~ Sealed	1/4/2002
234202	~~6~~ 7a	O1U033; ST-33-U1			~~Active~~ Sealed	1/4/2002
234204	~~6~~ 7a	O1U034; ST-34-U1			~~Active~~ Sealed	1/4/2002
234206	~~6~~ 7a	O1U036; ST-36-U1			~~Active~~ Sealed	1/3/2002
234207	~~6~~ 7a	O1U037; ST-37-U1			~~Active~~ Sealed	1/3/2002
234221	~~6~~ 7a	PSB-50A			~~Active~~ Sealed	1/7/2002
234222	~~6~~ 7a	PSB-51			~~Active~~ Sealed	1/7/2002
234225	~~6~~ 7a	PSB-53A			~~Active~~ Sealed	1/7/2002
234237	~~6~~ 7a	PSB-62			~~Active~~ Sealed	1/7/2002
235397	~~6~~ 7a	Medtronics B-10	7000 CENTRAL AV NE		~~Active~~ Sealed	
235502	~~6~~ 7a	Medtronics FM-17	7000 Central Ave NE		~~Active~~ Sealed	9/27/2001
235565	~~6~~ 7a	PSB-74			~~Active~~ Sealed	12/16/2002
236457	~~6~~ 7a	T-5-U1			~~Active~~ Sealed	1/8/2002
236460	~~6~~ 7a	T-601			~~Active~~ Sealed	1/8/2002
409546	~~6~~ 7a	MPCA No 2			~~Active~~ Sealed	12/11/2002
409556	~~6~~ 7a	MPCA No 4			~~Active~~ Sealed	- -
424053	~~6~~ 7a	01U803; T-3-U1			~~Active~~ Sealed	1/8/2002
424057	~~6~~ 7a	01U808; T-8-U1			~~Active~~ Sealed	1/9/2002
424059	~~6~~ 7a	01U807; T-7-U1			~~Active~~ Sealed	- -
424061	~~6~~ 7a	O1L823 NW3L1			~~Active~~ Sealed	- -
426816	~~6~~ 7a	03L813 H3-L3			~~Active~~ Sealed	12/12/2002
426861	~~6~~ 7a	03L856 316-L3			~~Active~~ Sealed	12/12/2002
426862	~~6~~ 7a	03U815 H5-U3			~~Active~~ Sealed	12/12/2002
426864	~~6~~ 7a	03U832 M2-U3			~~Active~~ Sealed	12/11/2002
452878	~~6~~ 7a	Mobil Lube Plant	Myrtle & Wabash	St Paul	~~Active~~ Sealed	9/27/2002
452879	~~6~~ 7a	Mobil Lube Plant	Myrtle & Wabash	St Paul	~~Active~~ Sealed	9/27/2002
452880	~~6~~ 7a	Mobil Lube Plant	Myrtle & Wabash	St Paul	~~Active~~ Sealed	9/27/2002

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
463045	~~6~~ 7a	Gopher Oil Braun			~~Active~~ Sealed	10/15/2002
463724	~~6~~ 7a	Gopher Oil Braun			~~Active~~ Sealed	10/21/2002
468561	~~6~~ 7a	Bob Ring Amoco MW2			~~Active~~ Sealed	11/22/2002
468562	~~6~~ 7a	Bob Ring Amoco MW3			~~Active~~ Sealed	11/22/2002
476403	~~6~~ 7a	Hyman Freightways, Inc			~~Active~~ Sealed	3/9/2000
476806	~~6~~ 7a	Chicago & Northwestern Transportation			~~Active~~ Sealed	- -
476807	~~6~~ 7a	Chicago & Northwestern Transportation			~~Active~~ Sealed	- -
479060	~~6~~ 7a	Fina Serve Inc	7298 Hwy 65 NE	Fridley	Sealed	9/11/2002
479061	~~6~~ 7a	Fina Serve Inc	7298 Hwy 65 NE	Fridley	Sealed	9/11/2002
479062	~~6~~ 7a	Fina Serve Inc	7298 Hwy 65 NE	Fridley	Sealed	9/11/2002
483817	~~6~~ 7a	Barry	2015 NE Broadway		~~Active~~ Sealed	9/11/2002
483834	~~6~~ 7a	Drayna	403 8th NW	New Brighton	Sealed	- -
487711	~~6~~ 7a	City of New Brighton	845 5th Ave	New Brighton	~~Permit~~ Sealed	
487712	~~6~~ 7a	City of New Brighton	845 5th Ave	New Brighton	~~Permit~~ Sealed	
487713	~~6~~ 7a	City of New Brighton	845 5th Ave	New Brighton	~~Permit~~ Sealed	
487714	~~6~~ 7a	City of New Brighton	845 5th Ave	New Brighton	~~Permit~~ Sealed	
491931	~~6~~ 7a	Gopher Oil			~~Active~~ Sealed	10/21/2002
491934	~~6~~ 7a	Gopher Oil Co			~~Active~~ Sealed	10/21/2002
491935	~~6~~ 7a	Gopher Oil Co			~~Active~~ Sealed	10/15/2002
496257	~~6~~ 7a	MW-2	305 2nd St NW, MW-2		~~Active~~ Sealed	7/27/2001
500694	~~6~~ 7a	03L137 03-137 137-L			~~Active~~ Sealed	12/10/2002
505618	~~6~~ 7a	03L138 03L-138 138-L			~~Active~~ Sealed	12/9/2002
505688	~~6~~ 7a	SB096			~~Active~~ Sealed	6/25/2001
509632	~~6~~ 7a	MW-1			~~Active~~ Sealed	5/10/2002
509633	~~6~~ 7a	MW-2			~~Active~~ Sealed	5/10/2002
509634	~~6~~ 7a	MW-3			~~Active~~ Sealed	5/10/2002
509928	~~6~~ 7a	Gopher Oil Co			~~Active~~ Sealed	10/21/2002
510592	~~6~~ 7a	Steinle	7680 Hwy 65 NE		~~Active~~ Sealed	11/22/2002
514116	~~6~~ 7a	Fina Serve Inc	7298 Hwy 65 NE	Fridley	Sealed	9/11/2002
517549	~~6~~ 7a	MW-2			~~Active~~ Sealed	5/28/2001
519291	~~6~~ 7a	TC Ordnance Plant	Hwy 10 & Hwy 96	Arden Hills	Sealed	12/9/2002
522732	~~6~~ 7a	USEPA	305 6th NW	New Brighton	Sealed	
522738	~~6~~ 7a	USEPA	251 NW 5th St	New Brighton	Sealed	
522935	~~6~~ 7a	Crown Coco Inc	574 8th NW	New Brighton	Sealed	
522936	~~6~~ 7a	Crown Coco Inc	574 8th NW	New Brighton	Sealed	
522958	~~6~~ 7a	MW-5			~~Active~~ Sealed	9/11/2002
525806	~~6~~ 7a	MW-3			~~Active~~ Sealed	6/28/2001
525807	~~6~~ 7a	MW-4			~~Active~~ Sealed	6/28/2001
555987	~~6~~ 7a	Sears Roebuck & Company	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
555989	~~6~~ 7a	Sears Roebuck & Company	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
555990	~~6~~ 7a	Sears Roebuck & Company	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
558136	~~6~~ 7a	Sears Roebuck & Company	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
558445	~~6~~ 7a	Amoco Oil Company, SS #5070	2102 Como Ave	St Paul	~~Active~~ Sealed	6/22/2000

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
558446	~~6~~ 7a	Amoco Oil Company, SS #5070	2102 Como Ave	St Paul	~~Active~~ Sealed	6/22/2000
558447	~~6~~ 7a	Amoco Oil Company, SS #5070	2102 Como Ave	St Paul	~~Active~~ Sealed	6/22/2000
558448	~~6~~ 7a	Amoco Oil Company, SS #5070	2102 Como Ave	St Paul	~~Active~~ Sealed	6/22/2000
561689	~~6~~ 7a	Maxim Technologies, Inc	649 Pelham Blvd	St Paul	~~Active~~ Sealed	4/6/2001
561690	~~6~~ 7a	Maxim Technologies, Inc	649 Pelham Blvd	St Paul	~~Active~~ Sealed	4/6/2001
561691	~~6~~ 7a	Maxim Technologies, Inc	649 Pelham Blvd	St Paul	~~Active~~ Sealed	4/6/2001
561692	~~6~~ 7a	Maxim Technologies, Inc	649 Pelham Blvd	St Paul	~~Active~~ Sealed	4/6/2001
564031	~~6~~ 7a	Glidden Company	1901 Hennepin Ave E	Minneapolis	~~Active~~ Sealed	7/24/2001
564035	~~6~~ 7a	Unocal Corp	5695 Hackmann Ave	Fridley	~~Active~~ Sealed	12/3/1999
564036	~~6~~ 7a	Unocal Corp	5695 Hackmann Ave	Fridley	~~Active~~ Sealed	12/3/1999
568207	~~6~~ 7a	SLS Inc	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
568208	~~6~~ 7a	SLS Inc	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
568209	~~6~~ 7a	SLS Inc	2700 Winter St NE	Minneapolis	~~Active~~ Sealed	10/3/2000
570280	~~6~~ 7a	Unocal Inc	825 Thornton St	Minneapolis	~~Active~~ Sealed	10/25/2002
570281	~~6~~ 7a	Unocal Inc	825 Thornton St	Minneapolis	~~Active~~ Sealed	10/25/2002
570282	~~6~~ 7a	Unocal Inc	825 Thornton St	Minneapolis	~~Active~~ Sealed	10/15/2002
576943	~~6~~ 7a	CSM Investors, Inc	2500 Elm St	Minneapolis	~~Active~~ Sealed	5/17/2000
234353	~~7b~~ 7a	Lee	52 Mounds Ave	New Brighton	Sealed	- -
480649	~~7b~~ 7a	US Postal Service	1255 Old Hwy 8	New Brighton	Sealed	
480650	~~7b~~ 7a	US Postal Service	1255 Old Hwy 8	New Brighton	Sealed	
480651	~~7b~~ 7a	US Postal Service	1255 Old Hwy 8	New Brighton	Sealed	
545978	7a	WISPARK, CORP.		SHOREVIEW	Sealed	
	7a	OPUS NORTHWEST, LLC		ROSEVILLE	Sealed	
	7a	OPUS NORTHWEST, LLC		ROSEVILLE	Sealed	
	7a	ST. CROIX PARTNERS, LLC			Sealed	
	7a	TARGET, CORP.		MINNEAPOLIS	Sealed	
	7a	PRE NEW BRIGHTON REAL ESTATE INVESTMENT	FIRST ST SW	NEW BRIGHTON	Sealed	
	7a	WATERCOTT	1200 45TH AV NE	COLUMBIA HEIGHTS	Sealed	
	7a	SCHREINER	1331 HILLCREST DR	FRIDLEY	Sealed	
	7a	MATHEWS REDDEN	1365 EIDE CI	ARDEN HILLS	Sealed	
	7a	COGLE	1376 66TH AV NE	FRIDLEY	Sealed	
	7a	NELSON	1391 FLORAL DR W	ARDEN HILLS	Sealed	
	7a	MITCHELL	1466 17TH ST NW	NEW BRIGHTON	Sealed	
	7a	VU	1470 SILVER LAKE RD	NEW BRIGHTON	Sealed	
	7a	HALL	1491 RICE CREEK RD NE	FRIDLEY	Sealed	
	7a	KOCOUREK	1491 RICE CREEK RD NE	FRIDLEY	Sealed	
	7a	BOCKENHAUER	1500 16TH ST NW	NEW BRIGHTON	Sealed	
	7a	JOHNSON	1512 16TH ST NW	NEW BRIGHTON	Sealed	
	7a	NORLING	1530 16TH ST NW	NEW BRIGHTON	Sealed	
	7a	DEEN	1530 LONG LAKE RD	NEW BRIGHTON	Sealed	
	7a	THEISSEN	1556 OAK AV	ARDEN HILLS	Sealed	
	7a	LIU	1645 GLENVIEW CT	ARDEN HILLS	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
	7a	LANGLIE	1653 GLENVIEW CT	ARDEN HILLS	Sealed	
	7a	JAROSZ	1663 LONG LAKE RD	NEW BRIGHTON	Sealed	
	7a	JANSSEN	1721 CRYSTAL AV	ARDEN HILLS	Sealed	
	7a	JAMISON	1745 CEDAR DR	NEW BRIGHTON	Sealed	
	7a	ROSEVILLE, CITY OF	1750 COUNTY ROAD C WEST	ROSEVILLE	Sealed	
	7a	BREZINKA	1761 FAIRVIEW AV N	FALCON HEIGHTS	Sealed	
	7a	DONDLINGER	1761 GRAMSIE RD	ARDEN HILLS	Sealed	
	7a	FOX, III	1761 SEVENTH ST NW	NEW BRIGHTON	Sealed	
	7a	WISTRCILL	1779 SUNNYSIDE TE	NEW BRIGHTON	Sealed	
	7a	LOE	1780 GLENVIEW AV	ARDEN HILLS	Sealed	
	7a	ADVANCED TRAINING SYSTEMS, INC.	1801 OLD HWY 8	NEW BRIGHTON	Sealed	
	7a	WUNSCHMANN	1811 TATUM ST	FALCON HEIGHTS	Sealed	
	7a	BECKER	1825 LAKE LA	ARDEN HILLS	Sealed	
	7a	GLEASON	1828 CARL ST	LAUDERDALE	Sealed	
	7a	DURAND	1828 LAKE LA	ARDEN HILLS	Sealed	
	7a	BRANDT	1837 RYAN AV W	ROSEVILLE	Sealed	
	7a	HADY	1843 FULHAM ST	LAUDERDALE	Sealed	
	7a	BONDY	1849 DRAPER DR	ROSEVILLE	Sealed	
	7a	CUMMING	1850 BECKMAN AV	ARDEN HILLS	Sealed	
	7a	MURPHY	1851 RYAN AV W	ROSEVILLE	Sealed	
	7a	BLUM	1854 GLEN PAUL AV	ARDEN HILLS	Sealed	
	7a	GISSELQUIST	1881 SHRYER AV W	ROSEVILLE	Sealed	
	7a	MOSVICK	1883 RYAN AV W	ROSEVILLE	Sealed	
	7a	MCNEAL	1887 SHRYER AV W	ROSEVILLE	Sealed	
	7a	BERGMAN	1889 GLEN PAUL AV	ARDEN HILLS	Sealed	
	7a	RICHARDSON	1893 BECKMAN AV	ARDEN HILLS	Sealed	
	7a	MOLINE	1894 SHRYER AV W	ROSEVILLE	Sealed	
	7a	WERNER	1898 NOBLE RD	ARDEN HILLS	Sealed	
	7a	VOYTOVICH	1906 LONGVIEW DR	NEW BRIGHTON	Sealed	
	7a	FULLMER, JR.	1906 TATUM ST	FALCON HEIGHTS	Sealed	
	7a	GALE	1913 EDGEWATER AV	ARDEN HILLS	Sealed	
	7a	ARDEN HILLS, CITY OF	1920 HWY 96 WEST	ARDEN HILLS	Sealed	
	7a	O'BRIEN	1954 JERROLD AV	ARDEN HILLS	Sealed	
	7a	PIKE	1958 ROSELAWN AV W	FALCON HEIGHTS	Sealed	
	7a	HARTWICK	1964 AUTUMN ST	FALCON HEIGHTS	Sealed	
	7a	KAUFFMAN	1974 TATUM ST	ROSEVILLE	Sealed	
	7a	CHRISTENSEN	1975 PRIOR AV N	ROSEVILLE	Sealed	
	7a	COURNEYA	1978 THOM DR	ARDEN HILLS	Sealed	
	7a	ROYCE	1993 COUNTY ROAD D WEST	ARDEN HILLS	Sealed	
	7a	CADDY	2004 ELDRIDGE AV W	ROSEVILLE	Sealed	
	7a	WINDHAM	2007 SHARONDALE AV	ROSEVILLE	Sealed	
	7a	ELLWEIN	2026 STOWE AV	ARDEN HILLS	Sealed	
	7a	KREJCHIK	2039 THOM DR	ARDEN HILLS	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
	7a	BLOOMQUIST	2055 CEDAR DR	NEW BRIGHTON	Sealed	
	7a	KIRBERGER	2069 LONGVIEW DR	NEW BRIGHTON	Sealed	
	7a	PELLEGRIN	2113 29TH AV NW	NEW BRIGHTON	Sealed	
	7a	MARKS	2123 FAIRWAYS LA	ROSEVILLE	Sealed	
	7a	CHAPIN	2159 ROSEWOOD LA S	ROSEVILLE	Sealed	
	7a	ROSEVILLE, CITY OF	2175 HWY 36 WEST	ROSEVILLE	Sealed	
	7a	RYGH	2176 CEDAR DR	NEW BRIGHTON	Sealed	
	7a	YUNIS	2191 ROSEWOOD LA S	ROSEVILLE	Sealed	
	7a	CARTLAND	2207 COUNTY ROAD B WEST	ROSEVILLE	Sealed	
	7a	SEABLOOM	2216 DRAPER AV	ROSEVILLE	Sealed	
	7a	CHEN	2232 ROSEWOOD LA S	ROSEVILLE	Sealed	
	7a	ABEL	2233 ROSEWOOD LA S	ROSEVILLE	Sealed	
	7a	OLSBY	2234 EUSTIS ST	ROSEVILLE	Sealed	
	7a	KALMES	2315 17TH AV NW	NEW BRIGHTON	Sealed	
	7a	COOK	2412 27TH AV NE	ST. ANTHONY	Sealed	
	7a	POWELL	2416 BRENNER CT	ROSEVILLE	Sealed	
	7a	KAPAUN	2418 17TH AV NW	NEW BRIGHTON	Sealed	
	7a	FORTIN	2464 RIDGE LA	MOUNDS VIEW	Sealed	
	7a	AP MOUNDS VIEW LIMITED PARTNERSHIP	2468 COUNTY ROAD 22 WEST	MOUNDS VIEW	Sealed	
	7a	AP MOUNDS VIEW LIMITED PARTNERSHIP	2474 COUNTY ROAD H	MOUNDS VIEW	Sealed	
	7a	HOLTZKAMP	2477 GREGORY DR	NEW BRIGHTON	Sealed	
	7a	MILLER	2501 27TH AV NE	MINNEAPOLIS	Sealed	
	7a	SCHAFFHAUSEN	2504 MURRAY AV	MINNEAPOLIS	Sealed	
	7a	SCHNEIDER	2505 ST. ANTHONY BL	ST. ANTHONY	Sealed	
	7a	HORNBLAD	2509 27TH AV NE	MINNEAPOLIS	Sealed	
	7a	ZUMBERGE	2510 KNOLLWOOD DR	NEW BRIGHTON	Sealed	
	7a	ROBSON	2512 PAHL AV NE	MINNEAPOLIS	Sealed	
	7a	ZABROCKI	2513 ST. ANTHONY BL	MINNEAPOLIS	Sealed	
	7a		2517 PAHL AV	MINNEAPOLIS	Sealed	
	7a	OTTE	2521 PAHL AV NE	MINNEAPOLIS	Sealed	
	7a	SANDER	2531 SUMMER ST	LAUDERDALE	Sealed	
	7a	GREENBERGER	2539 ORIOLE LA	NEW BRIGHTON	Sealed	
	7a	HOUSEWRIGHT	2542 LONGVIEW DR	NEW BRIGHTON	Sealed	
	7a	PENTTILA	2554 EASTMAN DR	NEW BRIGHTON	Sealed	
	7a	OBERG	2554 ORIOLE LA	NEW BRIGHTON	Sealed	
	7a	MIHALOW	2595 WOODCREST DR	MOUNDS VIEW	Sealed	
	7a	GREEN	2616 29TH AV NE	MINNEAPOLIS	Sealed	
	7a	WOODBURY	2658 VALLEYVIEW LA	NEW BRIGHTON	Sealed	
	7a	JOHNSON	266 SECOND AV SE	NEW BRIGHTON	Sealed	
	7a	MN INDUSTRIAL PROPERTIES, LLP	2778 CLEVELAND AV	ROSEVILLE	Sealed	
	7a	BUIE	2804 PAHL AV	MINNEAPOLIS	Sealed	
	7a	BEAMAN	2808 ST. ANTHONY BL NE	ST. ANTHONY	Sealed	
	7a	GERLACH	2816 ROOSEVELT ST	MINNEAPOLIS	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
	7a	FRITCHIE, JR.	2820 ROOSEVELT ST	MINNEAPOLIS	Sealed	
	7a	MAILE	2820 SILVR LAKE RD	ST. ANTHONY	Sealed	
	7a	JONES	2828 ROOSEVELT ST NE	MINNEAPOLIS	Sealed	
	7a	HATCH	2832 COOLIDGE ST NE	MINNEAPOLIS	Sealed	
	7a	DYRDAHL	2908 30TH AV NE	ST. ANTHONY	Sealed	
	7a	NORDELL .	2909 COUNTY ROAD H	MOUNDS VIEW	Sealed	
	7a	MABRY	2909 SPRINGVIEW LA	MOUNDS VIEW	Sealed	
	7a	FORD	2909 WOODALE DR	MOUNDS VIEW	Sealed	
	7a	THORNE	2925 COUNTY ROAD H	MOUNDS VIEW	Sealed	
	7a	SUBURBAN HENNEPIN REGIONAL PARK DISTRICT	2950 COUNTY ROAD E WEST	ST. ANTHONY	Sealed	
	7a	HAMM	3000 SILVER LA NE	ST. ANTHONY	Sealed	
	7a	LEVCHAK	3001 COUNTY ROAD H	MOUNDS VIEW	Sealed	
	7a	PRESCOTT	3021 FAIRVIEW AV N	ROSEVILLE	Sealed	
	7a	BRAUCH	309 11TH AV NW	NEW BRIGHTON	Sealed	
	7a	SCHULTZ	3243 LAKE JOHANNA BL	ARDEN HILLS	Sealed	
	7a	ADAIR	3332 NEW BRIGHTON RD	ARDEN HILLS	Sealed	
	7a	STEVENS	3924 MACALASTER DR	ST. ANTHONY	Sealed	
	7a	GRUNDITZ	4105 SNELLING AV N	ARDEN HILLS	Sealed	
	7a	HAMILTON	4440 HAMLINE AV N	ARDEN HILLS	Sealed	
	7a	ROSA NOTT CO.	4480 ROUND LAKE RD W	ARDEN HILLS	Sealed	
	7a	BARTELS	4500 HAMLINE AV N	ARDEN HILLS	Sealed	
	7a	ERICKSON	4627 HWY 10	ARDEN HILLS	Sealed	
	7a	MENTH	4750 OLD HWY 8	NEW BRIGHTON	Sealed	
	7a	SWANSON	5054 LONG LAKE RD	MOUNDS VIEW	Sealed	
	7a	PASK	5059 LONGVIEW DR	MOUNDS VIEW	Sealed	
	7a	SREY	5066 RAINBOW LA	NEW BRIGHTON	Sealed	
	7a	BARNHOLTZ	5069 IRONDALE RD	MOUNDS VIEW	Sealed	
	7a	HEIDGER	5071 RAINBOW LA	MOUNDS VIEW	Sealed	
	7a	MURPHY	5080 SUNNYSIDE RD	MOUNDS VIEW	Sealed	
	7a	WELCH	5092 SILVER LAKE RD	MOUNDS VIEW	Sealed	
	7a	DOKU	5309 GREENFIELD AV	MOUNDS VIEW	Sealed	
	7a	NELSON	536 NINTH AV NW	NEW BRIGHTON	Sealed	
	7a	PIERRE	5439 QUINCY ST	MOUNDS VIEW	Sealed	
	7a	RYMAN	5446 ERICKSON RD	MOUNDS VIEW	Sealed	
	7a	MAURER	5463 ERICKSON RD	MOUNDS VIEW	Sealed	
	7a	SEAMANS	5479 ADAMS ST	MOUNDS VIEW	Sealed	
	7a	ANDERSON	560 OLD HWY 8 SW	NEW BRIGHTON	Sealed	
	7a	GYALTSEN	5921 BENJAMIN ST	FRIDLEY	Sealed	
	7a	VILLEGAS	6061 CENTRAL AV	FRIDLEY	Sealed	
	7a	NELSON	6083 WOODY LA NE	FRIDLEY	Sealed	
	7a	WIND	6545 ARTHUR ST NE	FRIDLEY	Sealed	
	7a	OBRIEN	6610 MCKINLEY ST NE	FRIDLEY	Sealed	
	7a	WOLFE	663 13TH AV NW	NEW BRIGHTON	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
	7a	LUNDEEN	739 TENTH ST NW	NEW BRIGHTON	Sealed	
	7a	CH VANDALIA, LLC	739 VANDALIA ST	ST. PAUL	Sealed	
	7a	SMITH	7485 KNOLLWOOD DR	MOUNDS VIEW	Sealed	
	7a	GREIG	7644 GREENFIELD AV	MOUNDS VIEW	Sealed	
	7a	KUNZ	7665 KNOLLWOOD DR	MOUNDS VIEW	Sealed	
	7a	LEWIS	921 23RD AV NW	NEW BRIGHTON	Sealed	
058107	7a	MN DOT	0		Sealed	5/24/2000
058109	7a	MN DOT	0		Sealed	5/23/2000
058110	7a	MN DOT	0		Sealed	5/31/2000
058111	7a	MN DOT	0		Sealed	5/25/2000
234406	7a	~~Klapperich~~, HANNA	758 9th Ave NW	New Brighton	Sealed	5/13/93
236067	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	12/10/2002
236068	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	12/16/2002
236176	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/7/2002
236194	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
236195	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
236196	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
236197	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/7/2002
236497	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
236498	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
236506	7a	US ARMY	0	ARDEN HILLS	Sealed	8/23/1999
242153	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/10/2002
424052	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/8/2002
424054	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/9/2002
424062	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/10/2002
436903	7a	GLIDDEN PAINT COMPANY	1901 E HENNEPIN AV	MINNEAPOLIS	Sealed	7/24/2001
436904	7a	GLIDDEN PAINT COMPANY	1901 E HENNEPIN AV	MINNEAPOLIS	Sealed	7/24/2001
436905	7a	GLIDDEN PAINT COMPANY	1901 E HENNEPIN AV	MINNEAPOLIS	Sealed	7/24/2001
440888	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/4/2002
440895	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/7/2002
440896	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	12/13/2002
454265	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
454266	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
454267	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
454268	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
454269	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
462310	7a	TESORO REFINING AND MARKETING	2288 County Road C West	ROSEVILLE	Sealed	
462317	7a	TESORO REFINING AND MARKETING	2288 County Road C West	ROSEVILLE	Sealed	
462346	7a	BP PRODUCTS NORTH AMERICA, INC.	7680 Hwy 65 NE	FRIDLEY	Sealed	11/22/2002
462347	7a	BP PRODUCTS NORTH AMERICA, INC.	7680 Hwy 65 NE	FRIDLEY	Sealed	11/22/2002
462348	7a	BP PRODUCTS NORTH AMERICA, INC.	7680 Hwy 65 NE	FRIDLEY	Sealed	11/22/2002
467180	7a	CHICAGO & NORTHWESTERN TRANSPORTATION CO	2000 ELM ST	MINNEAPOLIS	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
472963	7a	PENNZOIL	7000 Hwy 65 NE	FRIDLEY	Sealed	
472972	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	5/3/2000
476405	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
477182	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV W	ROSEVILLE	Sealed	8/3/2000
477183	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
477184	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
477185	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
477186	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
477249	7a	REICHHOLD CHEMICALS, INC.	525 25TH AV SE	MINNEAPOLIS	Sealed	
477250	7a	REICHHOLD CHEMICALS, INC.	525 25TH AV SE	MINNEAPOLIS	Sealed	
477865	7a	U.S. WEST COMMUNICATIONS	100 NINTH AV SW	NEW BRIGHTON	Sealed	
477866	7a	U.S. WEST COMMUNICATIONS	100 NINTH AV SW	NEW BRIGHTON	Sealed	
477867	7a	U.S. WEST COMMUNICATIONS	100 NINTH AV SW	NEW BRIGHTON	Sealed	
477892	7a	OVERNITE TRANSPORATION COMPANY	400 FIRST ST SW	NEW BRIGHTON	Sealed	
477893	7a	OVERNITE TRANSPORATION COMPANY	400 FIRST ST SW	NEW BRIGHTON	Sealed	
477894	7a	OVERNITE TRANSPORATION COMPANY	400 FIRST ST SW	NEW BRIGHTON	Sealed	
478237	7a	US EPA	400 FIFTH AV NW	NEW BRIGHTON	Sealed	
478238	7a	U.S. EPA	400 FIFTH AV NW	NEW BRIGHTON	Sealed	
478241	7a	U.S. EPA	400 FIFTH AV NW	NEW BRIGHTON	Sealed	
478983	7a	RETAIL FOODS OF MINNESOTA	2390 Hwy 10	MOUNDS VIEW	Sealed	
491918	7a	PAPER CALMENSON AND COMPANY	0 HWY 280 AND County Road B	ROSEVILLE	Sealed	
491919	7a	PAPER CALMENSON AND COMPANY	0 HWY 280 AND County Road B	ROSEVILLE	Sealed	
491920	7a	PAPER CALMENSON AND COMPANY	0 HWY 280 AND County Road B	ROSEVILLE	Sealed	
491921	7a	PAPER CALMENSON AND COMPANY	0 HWY 280 AND County Road B	ROSEVILLE	Sealed	
491922	7a	PAPER CALMENSON AND COMPANY	0 HWY 280 AND County Road B	ROSEVILLE	Sealed	
491937	7a	UNOCAL CORPORATION	0 FRANKLIN & THORNTON ST NE	MINNEAPOLIS	Sealed	
491938	7a	UNOCAL CORPORATION	0 FRANKLIN & THORNTON ST NE	MINNEAPOLIS	Sealed	
492770	7a	AMOCO OIL COMPANY - TANK FARM	2288 County Road C West	ROSEVILLE	Sealed	
492771	7a	AMOCO OIL COMPANY - TANK FARM	2288 County Road C West	ROSEVILLE	Sealed	
494681	7a	AMOCO OIL COMPANY	0 J.C. PENNEY ROSEDALE MAL	ROSEVILLE	Sealed	7/2/2001
494682	7a	AMOCO OIL COMPANY	0 J.C.PENNEY ROSEDALE MALL	ROSEVILLE	Sealed	7/2/2001
494683	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
494684	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
494685	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
494686	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
494687	7a	AMOCO OIL COMPANY	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	7/2/2001
496250	7a	JRS ASSOCIATES	1015 ESSEX ST SE	MINNEAPOLIS	Sealed	
498079	7a	LINDIG	1875 County Road C West	ROSEVILLE	Sealed	
498080	7a	LINDIG	1875 County Road C West	ROSEVILLE	Sealed	
498083	7a	LINDIG	1875 County Road C West	ROSEVILLE	Sealed	
499855	7a	AMOCO OIL COMPANY, SS #5070	2102 COMO AV	ST. PAUL	Sealed	
505604	7a	JONES LANG LASALLE MGMT	0 H2 (& PROGRAM AV) CR	MOUNDSVIEW	Sealed	2/28/2000
505607	7a	JONES LANG LASALLE MGMT	2100 Old Hwy 8	NEW BRIGHTON	Sealed	2/28/2000

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SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
505608	7a	JONES LANG LASALLE MGMT	2100 Old Hwy 8	NEW BRIGHTON	Sealed	2/25/2000
505609	7a	JONES LANG LASALLE MGMT	2100 Old Hwy 8	NEW BRIGHTON	Sealed	2/25/2000
510183	7a	MULTIPLE RESOURCE REAL ESTATE	0	ROSEVILLE	Sealed	1/21/2002
510184	7a	MULTIPLE RESOURCE REAL ESTATE	0	ROSEVILLE	Sealed	1/21/2002
510185	7a	MULTIPLE RESOURCE REAL ESTATE	0	ROSEVILLE	Sealed	1/21/2002
511151	7a	MULTIPLE RESOURCE REM ESTATE NORDQUIST	2884 Hwy 8	ROSEVILLE	Sealed	
511164	7a	MULTIPLE RESOURCE REM ESTATE NORDQUIST	2884 Hwy 8	ROSEVILLE	Sealed	
511165	7a	MULTIPLE RESOURCE REM ESTATE NORDQUIST	2884 Hwy 8	ROSEVILLE	Sealed	
518466	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
518467	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
518468	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
518473	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
522115	7a	EQUITABLE REAL ESTATE	0		Sealed	
522116	7a	EQUITABLE REAL ESTATE	0		Sealed	
529711	7a	SILVER LAKE CAMP	2950 County Road E West	ST. ANTHONY	Sealed	
533276	7a	NEW BRIGHTON, CITY OF	0	NEW BRIGHTON	Sealed	
536854	7a	BURLINGTON NORTHERN RAILROAD/DAVID SEEP	3171 FIFTH ST SE	ST. PAUL	Sealed	
537526	7a	BRIGHTON DEVELOPMENT CORPORATION	825 THORNTON AV	MINNEAPOLIS	Sealed	10/24/2002
537527	7a	BRIGHTON DEVELOPMENT CORPORATION	825 THORNTON AV	MINNEAPOLIS	Sealed	10/24/2002
537528	7a	BRIGHTON DEVELOPMENT CORPORATION	825 THORNTON AV	MINNEAPOLIS	Sealed	10/24/2002
537529	7a	BRIGHTON DEVELOPMENT CORPORATION	825 THORNTON AV	MINNEAPOLIS	Sealed	10/24/2002
538749	7a	BELL LUMBER & POLE COMPANY	778 FIRST ST NW	NEW BRIGHTON	Sealed	
538750	7a	BELL LUMBER & POLE COMPANY	778 FIRST ST NW	NEW BRIGHTON	Sealed	
538751	7a	BELL LUMBER & POLE COMPANY	778 FIRST ST NW	NEW BRIGHTON	Sealed	
538819	7a	NEW BRIGHTON, CITY OF	875 FIFTH AV NW	NEW BRIGHTON	Sealed	
539508	7a	ST. ANTHONY MINNEAPOLIS, INC.	2616 Hwy 88	MINNEAPOLIS	Sealed	
540710	7a	SUPERAMERICA GROUP/ASHLAND OIL	2010 SILVER LAKE RD	NEW BRIGHTON	Sealed	
540711	7a	SUPERAMERICA GROUP/ASHLAND OIL	2010 SILVER LAKE RD	NEW BRIGHTON	Sealed	
544135	7a	TETRA REX	2341 UNIVERSITY AV	ST. PAUL	Sealed	4/27/2001
544136	7a	TETRA REX	2341 UNIVERSITY AV	ST. PAUL	Sealed	4/27/2001
544137	7a	TETRA REX INC.	2285 UNIVERSITY AV	ST. PAUL	Sealed	
544138	7a	TETRA REX	2341 UNIVERSITY AV	ST. PAUL	Sealed	4/27/2001
544139	7a	TETRA REX	2341 UNIVERSITY AV	ST. PAUL	Sealed	4/27/2001
545994	7a	U OF M	0 SE CORNER 35W & County Road J We:	SHOREVIEW	Sealed	
547881	7a	RYDER TRUCK RENTAL	2580 LONG LAKE RD	ROSEVILLE	Sealed	
547882	7a	RYDER TRUCK RENTAL	2580 LONG LAKE RD	ROSEVILLE	Sealed	
547883	7a	RYDER TRUCK RENTAL	2580 LONG LAKE RD	ROSEVILLE	Sealed	
547884	7a	RYDER TRUCK RENTAL	2580 LONG LAKE RD	ROSEVILLE	Sealed	
547885	7a	RYDER TRUCK RENTAL	2580 LONG LAKE RD	ROSEVILLE	Sealed	
547985	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	
547986	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	
547987	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	
547988	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	

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Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
547989	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	
547990	7a	FINA OIL & CHEMICAL COMPANY	11 SILVER LAKE RD	NEW BRIGHTON	Sealed	
548008	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
548009	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
548010	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
548011	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/14/2000
548012	7a	MODINE MANUFACTURING (INDUSTRIAL AIR)	2475 DOSWELL AV	ST. PAUL	Sealed	3/15/2000
552032	7a	FINA OIL & CHEMICAL	2250 RICE ST	LITTLE CANADA	Sealed	8/9/2002
555988	7a	SEARS ROEBUCK & CO.	2700 WINTER ST NE	MINNEAPOLIS	Sealed	10/3/2000
555991	7a	SEARS ROEBUCK & CO.	2700 WINTER ST NE	MINNEAPOLIS	Sealed	10/3/2000
561172	7a	HOLIDAY COMPANIES	4259 CENTRAL AV NE	COLUMBIA HEIGHTS	Sealed	
561173	7a	HOLIDAY COMPANIES	4259 CENTRAL AV NE	COLUMBIA HEIGHTS	Sealed	
563381	7a	STEWART LUMBER	421 JOHNSON ST NE	MINNEAPOLIS	Sealed	10/2/2002
570313	7a	IDEAL SECURITY HARDWARE	2621 FAIRVIEW AV N	ROSEVILLE	Sealed	
570314	7a	IDEAL SECURITY HARDWARE	2621 FAIRVIEW AV N	ROSEVILLE	Sealed	
572629	7a	CHENAN CONSTRUCTION	2301 SEVENTH ST NW	NEW BRIGHTON	Sealed	
578368	7a	RIHM MOTOR COMPANY	567 CLEVELAND AV	ST. PAUL	Sealed	
578369	7a	RIHM MOTOR COMPANY	567 CLEVELAND AV	ST. PAUL	Sealed	
578370	7a	RIHM MOTOR COMPANY	567 CLEVELAND AV	ST. PAUL	Sealed	
583050	7a	HILLSIDE CEMETARY	2600 19TH AV NE	MINNEAPOLIS	Sealed	4/5/2002
583112	7a	BP PRODUCTS NORTH AMERICA, INC.	2441 FAIRVIEW AV N	ROSEVILLE	Sealed	
589203	7a	HILLSIDE CEMETARY	2600 19TH AV NE	MINNEAPOLIS	Sealed	4/5/2002
589301	7a	GOODMAN	2165 UNIVERSITY AV	ST. PAUL	Sealed	5/11/2000
589302	7a	GOODMAN	2165 UNIVERSITY AV	ST. PAUL	Sealed	5/11/2000
589303	7a	GOODMAN	2165 UNIVERSITY AV	ST. PAUL	Sealed	5/11/2000
590202	7a	HILLSIDE CEMETARY	2600 19TH AV NE	MINNEAPOLIS	Sealed	4/5/2002
591260	7a	PHILLIPS PETROLEUM COMPANY	2525 County Road 10	MOUNDSVIEW	Sealed	5/8/2002
594572	7a	KLEESPIE TANK	705 RAYMOND AV	ST. PAUL	Sealed	8/28/2000
594606	7a	CUTSHALL JR.	3255 SPRING ST NE	MINNEAPOLIS	Sealed	10/24/2001
594607	7a	CUTSHALL JR.	3255 SPRING ST NE	MINNEAPOLIS	Sealed	10/24/2001
594608	7a	CUTSHALL	3255 SPRING ST NE	MINNEAPOLIS	Sealed	10/24/2001
602255	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	11/17/2000
602256	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	
602257	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	
602258	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	
602277	7a	TOTAL PETROLEUM INC.	3673 LEXINGTON AV N	ARDEN HILLS	Sealed	9/13/2002
609658	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	11/17/2000
609659	7a	ST. PAUL METALCRAFT	3737 LEXINGTON AV N	ARDEN HILLS	Sealed	11/17/2000
616482	7a	US EPA	251 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
616603	7a	UNITED STATES FEDERAL GOVERNMENT	105 TWIN CITY ARMS PLANT	ARDEN HILLS	Sealed	
617479	7a	WETHERN	534 GLENDALE ST	ST. PAUL	Sealed	
619701	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
619717	7a	US EPA	324 MEHIGAN ST NW	NEW BRIGHTON	Sealed	8/22/2002

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SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
621358	7a	SHOREVIEW, CITY OF	0		Sealed	- -
622618	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622619	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622620	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622621	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622622	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622623	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622624	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
622625	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
623335	7a	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
623336	7a	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
623369	7a	SUNSET ACQUISITION CORPORATION	2250 ST. ANTHONY BL	MINNEAPOLIS	Sealed	
624019	7a	US FEDERAL GOVERNMENT/TCAAP	105 TWIN CITY ARMS PLANT	ARDEN HILLS	Sealed	
624020	7a	US FEDERAL GOVERNMENT/TCAAP	105 TWIN CITY ARMS PLANT	ARDEN HILLS	Sealed	
624074	7a	MCDA	1515 CENTRAL AV NE	MINNEAPOLIS	Sealed	10/18/2002
624076	7a	MCDA	1515 CENTRAL AV NE	MINNEAPOLIS	Sealed	10/18/2002
624077	7a	MCDA	1515 CENTRAL AV NE	MINNEAPOLIS	Sealed	10/18/2002
624078	7a	MCDA	1515 CENTRAL AV NE	MINNEAPOLIS	Sealed	10/18/2002
624432	7a	SUNSET ACQUISITION CORPORATION	2250 ST. ANTHONY BL	MINNEAPOLIS	Sealed	
624433	7a	SUNSET ACQUISITION CORPORATION	2250 ST. ANTHONY BL	MINNEAPOLIS	Sealed	
625071	7a	PETERSON	6301 Hwy 65	FRIDLEY	Sealed	12/28/2000
625072	7a	PETERSON	6301 Hwy 65	FRIDLEY	Sealed	12/28/2000
625073	7a	PETERSON	6301 Hwy 65	FRIDLEY	Sealed	12/28/2000
625074	7a	PETERSON	6319 Hwy 65	FRIDLEY	Sealed	12/29/2000
628903	7a	US EPA	0 11TH & 3RD TERRACE AV	NEW BRIGHTON	Sealed	8/22/2002
628904	7a	US EPA	0 11TH & 3RD TERRACE AV	NEW BRIGHTON	Sealed	8/22/2002
628905	7a	US EPA	0 11TH & 3RD TERRACE AV	NEW BRIGHTON	Sealed	8/22/2002
632145	7a	TETRA REX	2274 UNIVERSITY AV	ST. PAUL	Sealed	4/27/2001
632300	7a	INTERGROUP REALTY TRUST	2508 DELAWARE ST SE	MINNEAPOLIS	Sealed	7/26/2001
635495	7a	BP PRODUCTS NORTH AMERICA, INC.	7680 Hwy 65 NE	FRIDLEY	Sealed	11/22/2002
635496	7a	BP PRODUCTS NORTH AMERICA, INC.	7680 Hwy 65 NE	FRIDLEY	Sealed	11/22/2002
643379	7a	U.S. ARMY/TCAAP - SITE A PZ	0		Sealed	
643380	7a	U.S. ARMY/TCAAP - SITE A PZ	0		Sealed	
643381	7a	U.S. ARMY/TCAAP - SITE A PZ	0		Sealed	
643382	7a	U.S. ARMY/TCAAP - SITE A PZ	0		Sealed	
643886	7a	U.S. ARMY/TCAAP	4700 Hwy 10	ARDEN HILLS	Sealed	
650835	7a	CHILDREN'S HOME SOCIETY OF MINNESOTA	1605 EUSTIS ST	ST. PAUL	Sealed	8/24/2001
650836	7a	CHILDREN'S HOME SOCIETY OF MINNESOTA	1605 EUSTIS ST	ST. PAUL	Sealed	9/27/2001
650837	7a	CHILDREN'S HOME SOCIETY OF MINNESOTA	1605 EUSTIS ST	ST. PAUL	Sealed	9/27/2001
652670	7a	ROSEVILLE, CITY OF	2690 CLEVELAND AV N	ROSEVILLE	Sealed	
652671	7a	ROSEVILLE, CITY OF	1947 County Road C	ROSEVILLE	Sealed	
652672	7a	ROSEVILLE, CITY OF	1947 County Road C	ROSEVILLE	Sealed	
652673	7a	ROSEVILLE, CITY OF	2680 PRIOR AV N	ROSEVILLE	Sealed	

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Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
652674	7a	ROSEVILLE, CITY OF	0 FAIRVIEW AVE (WEST OF 2785)	ROSEVILLE	Sealed	
656951	7a	INTERGROUP REALITY TRUST	2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/26/2001
656952	7a	INTERGROUP REALITY TRUST	2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/26/2001
656974	7a	U OF M, DEPT. OF ENV. HEALTH AND SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	4/12/2001
656975	7a	U OF M, DEPT. OF ENV. HEALTH AND SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	4/12/2001
657312	7a	TAHO SPORTSWEAR	6304 Hwy 65 NE	FRIDLEY	Sealed	11/6/2002
657313	7a	TAHO SPORTSWEAR	6304 Hwy 65 NE	FRIDLEY	Sealed	11/6/2002
657314	7a	TAHO SPORTSWEAR	6304 Hwy 65 NE	FRIDLEY	Sealed	11/6/2002
657315	7a	TAHO SPORTSWEAR	6304 Hwy 65 NE	FRIDLEY	Sealed	11/6/2002
658181	7a	PHILLIPS PETROLEUM COMPANY	2525 Hwy 10 NE	MOUNDSVIEW	Sealed	5/8/2002
658182	7a	PHILLIPS PETROLEUM COMPANY	2525 Hwy 10 NE	MOUNDSVIEW	Sealed	5/8/2002
658183	7a	PHILLIPS PETROLEUM COMPANY	2525 Hwy 10 NE	MOUNDSVIEW	Sealed	5/8/2002
658731	7a	U.S. ARMY/TCAAP	4700 Hwy 10	ARDEN HILLS	Sealed	
658732	7a	U.S. ARMY/TCAAP	4700 Hwy 10	ARDEN HILLS	Sealed	
659895	7a	MURPHY OIL U.S.A. INC.	3110 CLEVELAND AV N	ROSEVILLE	Sealed	
660216	7a	U OF M DEPARTMENT OF HEALTH AND SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	12/27/2001
660217	7a	U OF M, DEPT. HEALTH & SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	4/1/2002
660218	7a	U OF M, DEPT. HEALTH & SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	4/1/2002
661540	7a	DOMINIUM DEVELOPMENT & ACQUISITION	FIFTH AVE & OLD HWY 8	NEW BRIGHTON	Sealed	10/5/2002
661541	7a	DOMINIUM DEVELOPMENT & ACQUISITION	FIFTH AVE & SIXTH ST	NEW BRIGHTON	Sealed	10/5/2002
661542	7a	DOMINIUM DEVELOPMENT & ACQUISITION	OLD HWY 8 & 5TH AVE	NEW BRIGHTON	Sealed	10/5/2002
661543	7a	AMERICAN FREIGHTWAYS	2323 TERMINAL RD	ROSEVILLE	Sealed	12/10/2002
661544	7a	AMERICAN FREIGHTWAYS, INC.	2323 TERMINAL RD	ROSEVILLE	Sealed	
665818	7a	PHILLIPS PETROLEUM COMPANY	2525 HWY 10 NE	MOUNDSVILEW	Sealed	5/8/2002
665819	7a	PHILLIPS PETROLEUM COMPANY	2525 County Road 10	MOUNDS VIEW	Sealed	
665820	7a	PHILLIPS PETROLEUM COMPANY	2525 HWY 10 NE	MOUNDSVIEW	Sealed	5/8/2002
683304	7a	US EPA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	
H0003833	7a	2356 UNIVERSITY AVENUE, LP	2356 UNIVERSITY AV W	ST. PAUL	Sealed	
H0004329	7a	DODGE	1751 LONGVIEW DR	NEW BRIGHTON	Sealed	
H0006806	7a	HALSTROM	2529 ST. ANTHONY BL	ST. ANTHONY	Sealed	
H0010036	7a	GERMANSON	2184 ROSEWOOD LA N	ROSEVILLE	Sealed	
H0010525	7a	VILLELLA	5572 ALDINE ST	SHOREVIEW	Sealed	
H0018146	7a	C.W. TERMINAL	2785 FAIRVIEW N	ROSEVILLE	Sealed	- -
H0019396	7a	STOVIE	1791 ROSE PL	ROSEVILLE	Sealed	- -
H0019487	7a	BURKE	2605 ALDINE ST	ROSEVILLE	Sealed	- -
H0025638	7a	BARR	2215 ORIOLE AV	NEW BRIGHTON	Sealed	
H0026851	7a	KERNER	1400 66TH AV NE	FRIDLEY	Sealed	- -
H0029825	7a	ROSEVILLE, CITY OF	1905 C CR W	ROSEVILLE	Sealed	- -
H0031473	7a	KELLY	1926 SHRYER	ROSEVILLE	Sealed	- -
H0034025	7a	US ARMY	0	ARDEN HILLS	Sealed	6/7/2000
H0034638	7a	TWIN CITY ARSENAL PLANT	0 ARSENAL	NEW BRIGHTON	Sealed	- -
H0034639	7a	TWIN CITY ARSENAL PLANT	0 ARSENAL	NEW BRIGHTON	Sealed	- -
H0034640	7a	TWIN CITY ARSENAL PLANT	0 ARSENAL	NEW BRIGHTON	Sealed	- -

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
H0035406	7a	NELSON	1684 LOIS DR	SHOREVIEW	Sealed	
H0038703	7a	EITER	621 SILVER LAKE RD	NEW BRIGHTON	Sealed	- -
H0046965	7a	TAMAISAR	1680 OAKCREST	ROSEVILLE	Sealed	- -
H0051686	7a	KNOX	1751 TATUM ST	FALCON HEIGHTS	Sealed	
H0054857	7a	HABECK	2761 15TH ST NW	NEW BRIGHTON	Sealed	
H0055615	7a	ST. PAUL, CITY OF	0	ST. PAUL	Sealed	11/15/1999
H0070502	7a	UTKE	2095 LONGVIEW DR	NEW BRIGHTON	Sealed	
H0070505	7a	KHANNA	2468 SILVER LAKE RD	NEW BRIGHTON	Sealed	
H0074503	7a	MARK YOUNGDAHL & ASSOCIATES	2938 Old Hwy 8	ST. ANTHONY	Sealed	- -
H0100693	7a	SHADE TREE CONSTRUCTION	5353 FILLMORE ST NE	FRIDLEY	Sealed	7/13/2001
H0100958	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	10/20/2000
H0105885	7a	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Sealed	10/4/1999
H0105886	7a	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Sealed	10/4/1999
H0105887	7a	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Sealed	10/4/1999
H0105888	7a	ONAN CORPORATION	1400 73RD AV NE	FRIDLEY	Sealed	10/1/1999
H0105889	7a	ONAN CORPORATION	1700 73RD AV NE	FRIDLEY	Sealed	10/1/1999
H0105890	7a	ONAN CORPORATION	1700 73RD AV NE	FRIDLEY	Sealed	10/1/1999
H0105891	7a	ONAN CORPORATION	1700 73RD AV NE	FRIDLEY	Sealed	10/14/1999
H0106179	7a	KUESTER	1887 MALVERN ST	LAUDERDALE	Sealed	
H0108551	7a	BEATTIE	1930 AUTUMN ST	FALCON HEIGHTS	Sealed	
H0108792	7a	KRUGER	169 OAKWOOD DR	NEW BRIGHTON	Sealed	- -
H0110282	7a	MN DOT	1900 County Road I West	SHOREVIEW	Sealed	9/10/1999
H0115604	7a	WILLIAMS PIPE LINE COMPANY	County Road C and Long Lake Rd.	ROSEVILLE	Sealed	- -
H0115605	7a	WILLIAMS PIPE LINE COMPANY	County Road C and Long Lake Rd.	ROSEVILLE	Sealed	- -
H0115606	7a	WILLIAMS PIPE LINE COMPANY	County Road C and Long Lake Rd.	ROSEVILLE	Sealed	- -
H0115607	7a	WILLIAMS PIPE LINE COMPANY	County Road C and Long Lake Rd.	ROSEVILLE	Sealed	- -
H0115608	7a	WILLIAMS PIPE LINE COMPANY	County Road C and Long Lake Rd.	ROSEVILLE	Sealed	- -
H0115768	7a	DAUGHERTY	4014 FAIRVIEW AV N	ARDEN HILLS	Sealed	
H0115890	7a	BERGEN TRANSFER & STORAGE	3015 37TH AV NE	ST. ANTHONY	Sealed	- -
H0116455	7a	JAGLOWSKI	2025 County Road B West	ROSEVILLE	Sealed	- -
H0118483	7a	PHILIPS HOLDING COMPANY	2520 BROADWAY DR	LAUDERDALE	Sealed	5/16/2002
H0118808	7a	BUSCH	5468 JACKSON DR	MOUNDS VIEW	Sealed	
H0118819	7a	HEMMINGSEN	2451 17TH AV	NEW BRIGHTON	Sealed	
H0118850	7a	BURSCH	3119 MILDRED DR	ROSEVILLE	Sealed	
H0120553	7a	ETTINGER	2360 County Road C West	ROSEVILLE	Sealed	- -
H0121193	7a	MIDLAND HILLS COUNTRY CLUB	2001 FULHAM	ROSEVILLE	Sealed	- -
H0121194	7a	MIDLAND HILLS COUNTRY CLUB	2001 FULHAM	ROSEVILLE	Sealed	- -
H0123177	7a	ROSEVILLE, CITY OF	2417 CLEVELAND AV N	ROSEVILLE	Sealed	- -
H0123232	7a	MACGILLIS GIBBS COMPANY	400 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
H0123233	7a	MACGILLIS GIBBS COMPANY	400 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
H0125316	7a	BUNDY	1856 RYAN AV W	ROSEVILLE	Sealed	- -
H0125403	7a	PAULSON	5059 EASTWOOD RD	MOUNDS VIEW	Sealed	
H0126202	7a	OLSON	5405 QUINCY ST	MOUNDS VIEW	Sealed	

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
H0126215	7a	MARCHIAFAVA	7500 KNOLLWOOD AV	MOUNDS VIEW	Sealed	
H0126238	7a	CRANE	1967 EDGEWATER AV	ARDEN HILLS	Sealed	
H0126264	7a	EWING	2111 LONG LAKE RD	NEW BRIGHTON	Sealed	
H0128653	7a	ASPROTH	3025 COUNTY ROAD H	MOUNDS VIEW	Sealed	
H0130085	7a	RAYMOND	3007 OLD HWY 8	NEW BRIGHTON	Sealed	- -
H0130983	7a	YANG	6420 ARTHUR ST NE	FRIDLEY	Sealed	
H0132317	7a	BROWNSON	7371 HAYES ST	FRIDLEY	Sealed	
H0137388	7a	LUMKE	1888 County Road E West	ARDEN HILLS	Sealed	- -
H0139227	7a	CAVANAUGH	2909 ST. ANTHONY BL	ST. ANTHONY	Sealed	- -
H0139827	7a	INDYKIEWICZ	1239 12TH ST NW	NEW BRIGHTON	Sealed	
H0140014	7a	LESSARD	1921 SHRYER AV W	ROSEVILLE	Sealed	
H0140033	7a	PALUMBO	1976 GLEN PAUL AV	ARDEN HILLS	Sealed	
H0140711	7a	CSM CORPORATION	3065 CENTRE POINTE DR	ROSEVILLE	Sealed	- -
H0141523	7a	COWGILL OAK STREET ARTS	309 OAK ST SE	MINNEAPOLIS	Sealed	
H0141964	7a	ST. MICHAEL'S LUTHERAN CHURCH	1660 County Road B West	ROSEVILLE	Sealed	8/30/1999
H0142383	7a	WILLIAMS COMMUNICATIONS	310 FIFTH AV NW	NEW BRIGHTON	Sealed	6/6/2000
H0142671	7a	BOLEMAN	5079 LONGVIEW DR	MOUNDS VIEW	Sealed	
H0143300	7a	ALLEN	2344 County Road B West	ROSEVILLE	Sealed	8/6/1999
H0144553	7a	MN PCA	0		Sealed	11/1/1999
H0147556	7a	US EPA REGION V	251 FIFTH ST	NEW BRIGHTON	Sealed	- -
H0147565	7a	US EPA	Old Hwy 8	NEW BRIGHTON	Sealed	11/30/2001
H0147566	7a	US EPA	Sixth Avenue & Eighth Avenue	NEW BRIGHTON	Sealed	12/3/2001
H0147567	7a	US EPA	103 WEDGEWOOD CT	NEW BRIGHTON	Sealed	12/3/2002
H0147568	7a	US EPA	151 HANSON CT	NEW BRIGHTON	Sealed	12/3/2001
H0147569	7a	US EPA	131 HANSON CT	NEW BRIGHTON	Sealed	11/30/2001
H0148140	7a	COLDWELL BANKERS	3083 WILDER	ROSEVILLE	Sealed	2/18/2000
H0148561	7a	MN DOT	0		Sealed	2/8/2000
H0148571	7a	DAYTONS/Marshall Fields	701 INDUSTRIAL BL	MINNEAPOLIS	Sealed	5/18/2000
H0150167	7a	SCHRACHTA	569 11TH AV NW	NEW BRIGHTON	Sealed	
H0150175	7a	SCOTT	2210 SEVENTH ST NW	NEW BRIGHTON	Sealed	
H0150202	7a	WALES	BENJAMIN ST NE	FRIDLEY	Sealed	
H0150215	7a	BAZANT	563 NINTH AV NE	NEW BRIGHTON	Sealed	
H0150799	7a	PIEKARCZYK	2508 PAHL AV	ST. ANTHONY	Sealed	8/10/1999
H0151728	7a	COLLINS	5101 BRIGHTON LA	MOUNDS VIEW	Sealed	10/29/1999
H0152135	7a	MORRIS	5790 FAIRVIEW AV N	SHOREVIEW	Sealed	8/24/2001
H0152450	7a	RASMUSSON	3965 DELLVIEW AV	ARDEN HILLS	Sealed	9/7/1999
H0152831	7a	MN PCA	750 PELHAM BL	ST.PAUL	Sealed	3/28/2000
H0152832	7a	MN PCA	2446 UNIVERSITY AV W	ST.PAUL	Sealed	3/28/2000
H0153062	7a	BOCHNAK	2600 ST. ANTHONY BL	ST. ANTHNOY	Sealed	- -
H0153073	7a	SIMONSON	2069 LONGVIEW DR	NEW BRIGHTON	Sealed	11/18/1999
H0153097	7a	RAMSEY COUNTY PARKS	1500 Old Hwy 8	NEW BRIGHTON	Sealed	7/21/2000
H0153193	7a	SPRINT	501 HURON BL	MINNEAPOLIS	Sealed	10/4/2000
H0154077	7a	WORUM CHEMICAL	0	ST. PAUL	Sealed	6/12/2000

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
H0154548	7a	MIXON INC.	2286 CAPP RD	ST. PAUL	Sealed	1/19/2000
H0155433	7a	NIELSON	1889 GLEN PAUL AV	ARDEN HILLS	Sealed	7/29/1999
H0155574	7a	KOCHLER	1828 CARL ST	LAUDERDALE	Sealed	9/1/1999
H0155942	7a	UECKER	6545 ARTHUR ST	FRIDLEY	Sealed	10/7/1999
H0156104	7a	JOHNSON	1717 STANBRIDGE AV	ROSEVILLE	Sealed	7/30/1999
H0156105	7a	JOHNSON	1717 STANBRIDGE AV	ROSEVILLE	Sealed	7/30/1999
H0156114	7a	BATES	2616 FAIRVIEW AV N	ROSEVILLE	Sealed	10/18/1999
H0156116	7a	GRINDAHL	1847 EUSTIS	LAUDERDALE	Sealed	10/30/1999
H0156119	7a	BURGESON	3759 NEW BRIGHTON RD	ARDEN HILLS	Sealed	11/11/1999
H0156134	7a	MCGOUGH CONST. CO. INC.	2711 FAIRVIEW AV	ROSEVILLE	Sealed	3/29/2000
H0156140	7a	EMAHISER	3098 MILDRED DR	ROSEVILLE	Sealed	3/28/2000
H0156150	7a	HUNTER	2104 S ROSEWOOD LA	ROSEVILLE	Sealed	6/22/2000
H0156757	7a	HIAWATHA MARKETING	201 FIFTH ST NE	NEW BRIGHTON	Sealed	10/20/1999
H0156777	7a	MIDLAND HILLS GOLF	2001 FULHAM	ROSEVILLE	Sealed	6/9/2000
H0156840	7a	GOODWILL INDUSTRIES	1627 County Road B	ROSEVILLE	Sealed	11/2/1999
H0157477	7a	SHOREVIEW, CITY OF	0		Sealed	10/27/1999
H0157479	7a	H & W MOTOR EXPRESS	2720 FAIRVIEW AV N	ROSEVILLE	Sealed	11/8/1999
H0157489	7a	SHOREVIEW, CITY OF	0	SHOREVIEW	Sealed	12/1/1999
H0157506	7a	MPLS COMMUNITY DEV AGENCY	3548 POLK ST NE		Sealed	4/11/2000
H0157535	7a	MOBIL OIL	0		Sealed	8/18/2000
H0157767	7a	YANG	1862 WALNUT ST	LAUDERDALE	Sealed	
H0158090	7a	MIXON, INC.	2286 CAPP RD	ST. PAUL	Sealed	9/2/1999
H0158146	7a	FRASER COMMUNITY CAPITAL	3319 UNIVERSITY AV	ST. PAUL	Sealed	6/19/2000
H0158802	7a	JOHNSON	2026 STOWE AV	ARDEN HILLS	Sealed	8/23/1999
H0158839	7a	MOEN	1906 TATUM ST	FALCON HEIGHTS	Sealed	9/23/1999
H0159082	7a	PIK TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	11/11/1999
H0159390	7a	ROBERTSON BEVER PRINTING INCORPORATED	315 27TH AV SE	MINNEAPOLIS	Sealed	10/1/1999
H0159393	7a	MURPHY OIL USA, INC.	3110 CLEVELAND	ROSEVILLE	Sealed	10/12/1999
H0159558	7a	KLETTENBERG	4541 LAKESHORE PL	ARDEN HILLS	Sealed	10/12/1999
H0159575	7a	MILEY	1938 LAKE ST	ROSEVILLE	Sealed	12/3/1999
H0159579	7a	GENNARO	1597 N RIDGEWOOD LA	ROSEVILLE	Sealed	- -
H0159581	7a	BELL BETTY BELL, ESTATE OF	3611 N HAMLINE AV	ARDEN HILLS	Sealed	1/28/2000
H0159598	7a	ROWLAND	2563 ROBIN LA	NEW BRIGHTON	Sealed	4/11/2000
H0159710	7a	WILLIAMS PIPE LINE COMPANY	2451 County Road C West	ROSEVILLE	Sealed	9/21/2000
H0159855	7a	WOLFE	663 13TH AV NW	NEW BRIGHTON	Sealed	
H0159869	7a	BONNEY	7523 GROVELAND RD	MOUNDS VIEW	Sealed	
H0159877	7a	CHRIST	2824 WOODALE DR	MOUNDS VIEW	Sealed	
H0159881	7a	MILEWSKI	2123 FULHAM ST	ROSEVILLE	Sealed	
H0159898	7a	COOPER SMART	1995 STOWE AV	NEW BRIGHTON	Sealed	
H0159899	7a	ERICKSON	2202 RAINBOW AV	NEW BRIGHTON	Sealed	
H0159966	7a	MAGGI	1988 STOWE AV	ARDEN HILLS	Sealed	9/24/1999
H0159970	7a	KEIL	3216 29TH AV NE	MINNEAPOLIS	Sealed	
H0159982	7a	HALEY	1843 ROSELAWN AV W	ROSEVILLE	Sealed	

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SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
H0159995	7a	CRUZ	4005 HAYES ST	COLUMBIA HEIGHTS	Sealed	- -
H0160588	7a	SABA RUTH SABA, ESTATE OF	1485 73RD AV NE	FRIDLEY	Sealed	11/4/1999
H0160695	7a	MURPHY OIL	3110 CLEVELAND AV N	ROSEVILLE	Sealed	2/14/2000
H0160802	7a	MN PCA	0	ST. PAUL	Sealed	11/4/1999
H0161713	7a	EVANGELICAL LUTHERAN	901 THORNTON ST SE	MINNEAPOLIS	Sealed	2/16/2000
H0161715	7a	KENNEDY BUILDING LIMITED PARTNER	2303 KENNEDY ST NE	MINNEAPOLIS	Sealed	4/7/2000
H0161716	7a	US ARMY	0	ARDEN HILLS	Sealed	4/11/2000
H0161723	7a	US ARMY	0	ARDEN HILLS	Sealed	5/17/2000
H0161750	7a	H.B. FULLER	2400 ENERGY PARK DR	ST. PAUL	Sealed	11/2/2000
H0161965	7a	GEBHARDT	5071 RAINBOW LA	MOUNDS VIEW	Sealed	11/16/1999
H0161980	7a	ST. HILAIRE	2800 ST. ANTHONY BL	ST. ANTHONY	Sealed	12/7/1999
H0162276	7a	BRANSON	1759 ROSE PL	ROSEVILLE	Sealed	3/29/2000
H0162346	7a	GRUDNOSKE	7234 KNOLLWOOD DR	MOUNDS VIEW	Sealed	
H0162840	7a	ADVANCED TRAINING SYSTEMS	0	NEW BRIGHTON	Sealed	12/9/1999
H0163071	7a	ACE SUPPLY	4749 OLD HWY 8	MOUNDS VIEW	Sealed	2/4/2000
H0163077	7a	MARTINEAU	2211 ST. CROIX ST	ROSEVILLE	Sealed	5/22/2000
H0163097	7a	KEMMER	1768 TATUM ST	FALCON HEIGHTS	Sealed	6/28/2000
H0163110	7a	LUHMAN	1611 66TH AV NE	FRIDLEY	Sealed	7/25/2000
H0163634	7a	WEIS BUILDERS	2552 N SNELLING	ROSEVILLE	Sealed	- -
H0163707	7a	BOCHNAK	2600 ST. ANTHONY BL	ST. ANTHONY	Sealed	5/18/2000
H0163733	7a	ALLIANT TECH SYSTEMS, INC.	1400 OLD HWY 8	NEW BRIGHTON	Sealed	1/17/2000
H0163749	7a	TWIN CITIES ARMY AMMUNITION PLANT	4700 HWY 10	ARDEN HILLS	Sealed	2/17/2000
H0163833	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
H0163834	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
H0163835	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
H0163836	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
H0163837	7a	P.I.K. TERMINAL	2690 PRIOR AV	ROSEVILLE	Sealed	3/9/2000
H0164853	7a	GEPHART	2100 FAIRWAYS LA	ROSEVILLE	Sealed	3/6/2000
H0164895	7a	DIEDRICH	1904 GLEN PAUL AV	ARDEN HILLS	Sealed	4/24/2000
H0164897	7a	SNYDER	1642 HILLVIEW RD	SHOREVIEW	Sealed	4/24/2000
H0165122	7a	BRYAN	2022 LONGVIEW DR	NEW BRIGHTON	Sealed	
H0165403	7a	ARMSTRONG CONSTRUCTION, INC.	717 FIRST ST SW	NEW BRIGHTON	Sealed	3/27/2000
H0165404	7a	ARMSTRONG CONSTRUCTION, INC.	717 FIRST ST SW	NEW BRIGHTON	Sealed	3/27/2000
H0165603	7a	VANREESE	2243 LAMBERT AV	MOUNDS VIEW	Sealed	3/10/2000
H0165675	7a	NIELSEN	4430 SNELLING AV N	ARDEN HILLS	Sealed	4/19/2000
H0166856	7a	ROSENBERGER	2504 MURRAY AV	ST. ANTHONY	Sealed	5/11/2000
H0166860	7a	PERLICK	3974 N FAIRVIEW	ARDEN HILLS	Sealed	5/24/2000
H0166861	7a	PERLICK	3974 N FAIRVIEW AV	ARDEN HILLS	Sealed	5/24/2000
H0166881	7a	NYBERG	2191 S ROSEWOOD LA	ROSEVILLE	Sealed	8/11/2000
H0166907	7a	HEIMBACH	1676 W LAURIE RD	ROSEVILLE	Sealed	3/28/2001
H0166911	7a	NEUBRAND	2559 CHARLOTTE ST	ROSEVILLE	Sealed	4/18/2001
H0166930	7a	AUGE	2551 N ALDINE ST	ROSEVILLE	Sealed	6/29/2001
H0166931	7a	DE ROSIER	2550 ALDINE ST	ROSEVILLE	Sealed	7/6/2001

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
H0166941	7a	BRUBAKER	1741 STANBRIDGE AV	ROSEVILLE	Sealed	10/9/2001
H0166942	7a	BRUBAKER	1741 STANBRIDGE AV	ROSEVILLE	Sealed	10/9/2001
H0167013	7a	PRESBYTERIAN HOMES	3199 LAKE JOHANNA BL	ARDEN HILLS	Sealed	7/24/2000
H0167018	7a	U OF M	826 BERRY ST	ST. PAUL	Sealed	5/30/2000
H0167177	7a	MIDLAND HILLS COUNTRY CLUB	2001 FULHAM ST	ROSEVILLE	Sealed	5/16/2000
H0167427	7a	MACKAY ENVELOPE CORP.	2100 ELM ST SE	MINNEAPOLIS	Sealed	8/22/2000
H0167465	7a	ARIAS	2039 THOM DR	ARDEN HILLS	Sealed	7/12/2000
H0167476	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167477	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167478	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167479	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167480	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167481	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167482	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167484	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167485	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167486	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167487	7a	MN PCA	310 FIFTH AV NW	NEW BRIGHTON	Sealed	8/9/2000
H0167500	7a	KALWAY CONSTRUCTION CO.	0	NEW BRIGHTON	Sealed	9/5/2000
H0167628	7a	SENTYRZ, JR.	2508 ST. ANTHONY BL	ST. ANTHONY	Sealed	6/23/2000
H0167747	7a	STROM PROPERTIES	2492 DOSWELL AV	ST. PAUL	Sealed	6/7/2000
H0168110	7a	BERUBE	1677 LOIS DR	ST. PAUL	Sealed	8/29/2000
H0168118	7a	MCMASTER	2571 CHARLOTTE ST	ROSEVILLE	Sealed	10/12/2000
H0168137	7a	HEIMBACH	1676 W LAURIE RD	ROSEVILLE	Sealed	- -
H0168140	7a	CHRUN	1795 TATUM ST	ST. PAUL	Sealed	5/8/2001
H0168144	7a	JOHNSON	1881 SHRYER AV W	ROSEVILLE	Sealed	5/21/2001
H0168146	7a	CHRUN	1795 TATUM ST	ST. PAUL	Sealed	5/8/2001
H0168150	7a	STRUCK	1805 TATUM ST	FALCON HEIGHTS	Sealed	9/18/2001
H0168893	7a	H. BROOKS AND COMPANY	2521 E HENNEPIN AV	MINNEAPOLIS	Sealed	11/6/2000
H0168895	7a	U OF M	101 27TH AV SE	MINNEAPOLIS	Sealed	11/8/2000
H0169421	7a	FARR	2828 ROOSEVELT ST NE	ST. ANTHONY	Sealed	7/26/2000
H0169437	7a	LARSON	2917 County Road H	MOUNDSVIEW	Sealed	6/21/2000
H0169454	7a	LITECKY	2825 COOLIDGE ST NE	ST. ANTHONY	Sealed	8/22/2000
H0169486	7a	CHILMAN	1004 45TH AV NE	COLUMBIA HEIGHTS	Sealed	8/21/2000
H0169642	7a	GIRARD	6900 PLEASANT VIEW DR	MOUNDSVIEW	Sealed	5/21/2001
H0169925	7a	H.B. FULLER	2400 ENERGY PARK DR	ST. PAUL	Sealed	9/7/2000
H0170224	7a	US EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/6/2000
H0170225	7a	US EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/6/2000
H0170226	7a	MN PCA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	- -
H0170227	7a	US EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/7/2000
H0170228	7a	US EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/7/2000
H0170229	7a	US EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/7/2000
H0170230	7a	MN PCA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	10/7/2000

TABLE E-5
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Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
H0170676	7a	KNOLL	7528 VAN BUREN ST	FRIDLEY	Sealed	10/11/2000
H0171663	7a	KACALCK	1812 GRAMSIE RD	ARDEN HILLS	Sealed	9/27/2000
H0172241	7a	PIKOP	2180 HADDINGTON AV	ROSEVILLE	Sealed	- -
H0172391	7a	WIRL AIRFLOW	1515 CENTRAL AV NE	MINNEAPOLIS	Sealed	8/17/2001
H0172803	7a	ST. ANTHONY, VILLAGE OF	2700 PAHL AV NE	ST. ANTHONY	Sealed	9/27/2000
H0172821	7a	SEARS ROEBUCK & CO.	2700 WINTER ST NE	MINNEAPOLIS	Sealed	10/3/2000
H0172829	7a	INTERGROUP REALTY TRUST	155 SIXTH (& DELAWARE 2508) AV SE	MINNEAPOLIS	Sealed	10/16/2000
H0172846	7a	STOP-N-GO	2651 JOHNSON ST NE	MINNEAPOLIS	Sealed	12/27/2000
H0173078	7a	OMEGA CONSTRUCTION	7665 KNOLLWOOD DR	MOUNDSVIEW	Sealed	11/8/2000
H0173124	7a	DAGGET	1648 HILLVIEW RD	SHOREVIEW	Sealed	9/22/2000
H0173440	7a	MOUNDS VISTA INC.	2200 HWY 10	MOUNDSVIEW	Sealed	8/30/2001
H0173755	7a	WINSNESS	1953 TATUM AV	ROSEVILLE	Sealed	11/14/2000
H0173974	7a	UNISOURCE	3080 LONG LAKE RD	ROSEVILLE	Sealed	- -
H0174303	7a	RAMSEY COUNTY PARKS	0 LAKE JOHANNA BL	ARDEN HILLS	Sealed	10/4/2000
H0174304	7a	RAMSEY COUNTY PARKS	0 LAKE JOHANNA BL	ARDEN HILLS	Sealed	4/12/2001
H0174702	7a	H.B. FULLER COMPANY	2400 ENERGY PARK DR	ST. PAUL	Sealed	11/1/2000
H0174719	7a	PANELCRAFT	3000 UNIVERSITY AV SE	MINNEAPOLIS	Sealed	11/13/2000
H0174720	7a	BP AMOCO	3700 SILVER LAKE RD	ST. ANTHONY	Sealed	11/20/2000
H0175528	7a	BRUHN	1698 HILLVIEW RD	SHOREVIEW	Sealed	11/27/2000
H0175530	7a	JOHNSON	2233 ROSEWOOD LA S	ROSEVILLE	Sealed	11/18/2000
H0175890	7a	U OF M	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	10/23/2000
H0176064	7a	FRIDLEY, CITY OF	0	FRIDLEY	Sealed	8/29/2000
H0176065	7a	FRIDLEY, CITY OF	0	FRIDLEY	Sealed	8/31/2000
H0176077	7a	MOUNDS VIEW, CITY OF	0 County Road H	MOUNDS VIEW	Sealed	2/7/2001
H0176661	7a	WORUM CHEMICAL	0 CAPP & VANDALIA ST	ST. PAUL	Sealed	12/18/2000
H0176665	7a	WORUM CHEMICAL	0 ENERGY PARK DR	ST. PAUL	Sealed	12/20/2000
H0176666	7a	WORUM CHEMICAL	0 ENERGY PARK DR	ST. PAUL	Sealed	12/20/2000
H0176765	7a	GNB CORPORATION	803 BERRY ST	ST. PAUL	Sealed	11/14/2000
H0176818	7a	ANDREWS	155 26TH AV SE	MINNEAPOLIS	Sealed	3/29/2001
H0176845	7a	H BROOKS AND COMPANY	2521 E HENNEPIN AV	MINNEAPOLIS	Sealed	12/11/2000
H0177258	7a	MURPHY OIL USA, INC.	3110 CLEVELAND AV N	ROSEVILLE	Sealed	1/18/2001
H0177268	7a	RAMSEY COUNTY ENGINEERING/OPERATIONS	0 TCAAP BLDG.576	ARDEN HILLS	Sealed	- -
H0177270	7a	ANNE GENDEIN TRUST	359 HOOVER ST	MINNEAPOLIS	Sealed	1/26/2001
H0177272	7a	FOREMAN	2524 ST. ANTHONY BL	ST. ANTHONY VILLAGE	Sealed	1/22/2001
H0177289	7a	BP AMOCO	1000 UNIVERSITY AV SE	MINNEAPOLIS	Sealed	2/8/2001
H0177294	7a	WISWELL	1851 CENTRAL AV NE	MINNEAPOLIS	Sealed	2/13/2001
H0177295	7a	MAI PROPERTIES	Old Hwy 8 & County Road C2	ROSEVILLE	Sealed	- -
H0177315	7a	FORUM	2524 ST. ANTHONY BL	ST. ANTHONY	Sealed	- -
H0177325	7a	VOGEL	309 11TH AV NW	NEW BRIGHTON	Sealed	1/26/2001
H0177342	7a	PARMELEE	2501 PAHL AV	ST. ANTHONY	Sealed	2/28/2001
H0177347	7a	TEFFT	2909 29TH AV NE	ST. ANTHONY	Sealed	3/26/2001
H0177396	7a	OLSON	2122 FAIRWAYS LA	ROSEVILLE	Sealed	5/13/2001
H0177534	7a	NABISCO INC.	749 STINSON BL	MINNEAPOLIS	Sealed	12/27/2000

TABLE E-5
SEALED WELLS

Unique Number	Category	Last Name or Business Name	Street	City	Status	Date Sealed
H0177824	7a	U OF M, DEPT. OF ENV. HEALTH AND SAFETY	2525 FOURTH ST SE	MINNEAPOLIS	Sealed	4/12/2001
H0177825	7a	U OF M	22525 FOURTH ST E	MINNEAPOLIS	Sealed	4/12/2001
H0177864	7a	SMITH	2815 WILSON ST	ST. ANTHONY	Sealed	4/6/2001
H0177903	7a	INTERGROUP REALTY TRUS	155 26TH AV SE	MINNEAPOLIS	Sealed	2/27/2001
H0177932	7a	US ARMY	4700 HWY 10	ARDEN HILLS	Sealed	- -
H0177933	7a	US ARMY	4700 HWY 10	ARDEN HILLS	Sealed	- -
H0178067	7a	TWIN CITIES ARMY AMMUNITION PLANT	4700 HWY 10	ARDEN HILLS	Sealed	- -
H0178357	7a	CONNRD PLASTICS	742 29TH AV SE	MINNEAPOLIS	Sealed	4/30/2001
H0178378	7a	WESTERN GOLF ASSOCIATION	929 FIFTH ST SE	MINNEAPOLIS	Sealed	3/9/2001
H0179114	7a	WISWELL	942 19TH AV NE	MINNEAPOLIS	Sealed	4/24/2001
H0179126	7a	STOP-N-GO	2651 JOHNSON ST NE	MINNEAPOLIS	Sealed	5/21/2001
H0179397	7a	SCHILLING	4500 HAMLINE AV	ARDEN HILLS	Sealed	6/28/2001
H0179398	7a	MCCLELLAN	5343 ST. STEPHEN ST	MOUNDSVIEW	Sealed	6/7/2001
H0180029	7a	GNB	0 ELLIS AVE & BERRY ST	ST. PAUL	Sealed	6/27/2001
H0180759	7a	MN PCA	2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/26/2001
H0180760	7a	MN PCA	2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/26/2001
H0180761	7a	MN PCA	2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/26/2001
H0180762	7a		2508 DELAWARE ST	MINNEAPOLIS	Sealed	7/30/2001
H0181003	7a	RYDBERG	1435 COUNTY ROAD E WEST	ARDEN HILLS	Sealed	
H0181325	7a	HEIDORN	1381 SKILLMAN AV	ROSEVILLE	Sealed	7/13/2001
H0182076	7a	OSTERGAARD	1811 TATUM ST	FALCON HEIGHTS	Sealed	6/5/2001
H0182087	7a	ANDERSON	2203 S ROSEWOOD LA	ROSEVILLE	Sealed	8/25/2001
H0182095	7a	PETERSON	1716 STANBRIDGE	ROSEVILLE	Sealed	10/3/2001
H0182135	7a	MEYER	3017 SHOREWOOD LA	ROSEVILLE	Sealed	8/22/2002
H0182419	7a	HAMBLIN	2430 LONG LAKE RD	NEW BRIGHTON	Sealed	
H0182646	7a	JLT GROUP INC.	606 VANDALIA ST	ST. PAUL	Sealed	10/3/2001
H0182647	7a	HUBBARD BROADCASTING, INC.	3415 UNIVERSITY AV	ST. PAUL	Sealed	10/19/2001
H0182756	7a	MN DOT	1905 County Road I	ARDEN HILLS	Sealed	4/16/2002
H0183374	7a	GILLITZER	4105 SNELLING AV	ARDEN HILLS	Sealed	8/10/2001
H0183483	7a	SWENSON	5796 FAIRVIEW AV	SHOREVIEW	Sealed	9/6/2001
H0184826	7a	JLT GOUP INC.	587 FIRST ST SW	NEW BRIGHTON	Sealed	8/15/2001
H0184827	7a	JLT GOUP INC.	587 FIRST ST SW	NEW BRIGHTON	Sealed	8/29/2001
H0184834	7a	UNISOURCE	550 KASOTA AV	MINNEAPOLIS	Sealed	8/24/2001
H0185014	7a	CHILDRENS HOME SOCIETY OF MN	1605 EUSTIS ST	ST. PAUL	Sealed	- -
H0185094	7a	SCHOPPE	666 CLEVELAND AV	NEW BRIGHTON	Sealed	10/4/2001
H0185112	7a	PENKIVECH	1200 45TH AV NE		Sealed	8/14/2001
H0185124	7a	OPSAHL	2137 FAIRWAYS LA	ROSEVILLE	Sealed	10/18/2001
H0185127	7a	T.C.A.A.P.	4740 SNELLING AV	NEW BRIGHTON	Sealed	6/25/2001
H0185129	7a	AFFELDT	2605 ST. ANTHONY BL	ST. ANTHONY	Sealed	9/28/2001
H0185144	7a	SMITH	2917 County Road I	MOUNDS VIEW	Sealed	9/27/2001
H0185145	7a	SMITH	2917 County Road I	MOUNDS VIEW	Sealed	9/27/2001
H0185146	7a	SMITH	2917 County Road I	MOUNDS VIEW	Sealed	9/27/2001
H0185173	7a	CHURCH	2590 County Road E	NEW BRIGHTON	Sealed	10/17/2001

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
H0192369	7a	BISSET	2577 County Road H	NEW BRIGHTON	Sealed	8/5/2002
H0192821	7a	JOHNSON	2010 THOM DR	ARDEN HILLS	Sealed	3/18/2002
H0192846	7a	HEDLUND	1865 FAIRVIEW AV N	FALCON HEIGHTS	Sealed	4/10/2002
H0193552	7a	U OF M	2035 UNIVERSITY AV SE	MINNEAPOLIS	Sealed	3/14/2002
H0193557	7a	GORSHE	800 14TH AV SE	MINNEAPOLIS	Sealed	3/20/2002
H0194166	7a	VEIT & COMPANY	101 27TH AV SE	MINNEAPOLIS	Sealed	4/19/2002
H0195266	7a	EMERALD PARK LLC	0 BERRY ST	ST. PAUL	Sealed	- -
H0195391	7a	EJ DOUGHERTY OIL & STONE COMPANY, LLC	2578 KASOTA AV	ST. PAUL	Sealed	5/22/2002
H0196326	7a	MINNEAPOLIS COMMERCIAL DEV. AGENCY	601 25TH AV SE	MINNEAPOLIS	Sealed	7/31/2002
H0196339	7a	ROSEDALE CHEVROLET	2845 N 35 Interstate Highway W	ROSEVILLE	Sealed	8/7/2002
H0196353	7a	JLT GROUP INC.	606 VANDALIA ST	ST. PAUL	Sealed	6/27/2002
H0196360	7a	HANK SPECIALTY	1451 FIRST AV NW	NEW BRIGHTON	Sealed	7/29/2002
H0196362	7a	ROSEVILLE PROPERTIES	1947 County Road C West	ROSEVILLE	Sealed	8/6/2002
H0196401	7a	RAMSEY COUNTY ENGINEERING/OPERATIONS	0	ROSEVILLE	Sealed	5/13/2002
H0196422	7a	WELLINGTON MANAGEMENT	841 BERRY ST SE	ST. PAUL	Sealed	6/26/2002
H0196423	7a	REGOR INC.	1947 County Road C	ROSEVILLE	Sealed	6/28/2002
H0196443	7a	PIK TERMINAL, INC.	2680 PRIOR (2680-2690) AV	ROSEVILLE	Sealed	8/15/2002
H0197666	7a	VEIT COMPANY	2570 ELLIS AV	ST. PAUL	Sealed	7/9/2002
H0197667	7a	VEIT & COMPANY	2570 ELLIS AV	ST. PAUL	Sealed	7/9/2002
H0197728	7a	ROHLADER	3101 SHOREWOOD LA	ROSEVILLE	Sealed	8/5/2002
H0198051	7a	DOYLE	1715 LOIS DR	SHOREVIEW	Sealed	8/14/2002
H0198062	7a	SCHLOEGEL	1018 W SHRYER AV	ROSEVILLE	Sealed	10/7/2002
H0198116	7a	STELLING	2417 ST. ANTHONY BL	ST. ANTHONY	Sealed	9/12/2002
H0198135	7a	NOREN	2515 MURRAY AV	ST. ANTHONY	Sealed	- -
H0198137	7a	TCAAP/US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	9/25/2002
H0198147	7a	STEWART LUMBER	421 JOHNSON ST NE	MINNEAPOLIS	Sealed	10/4/2002
H0198708	7a	MORCON CONSTRUCTION	2590 County Road E	NEW BRIGHTON	Sealed	8/9/2002
H0198712	7a	FULLER	3731 NEW BRIGHTON RD	ARDEN HILLS	Sealed	8/21/2002
H0198733	7a	SCOTT	2520 PAHL AV	ST. ANTHONY	Sealed	10/14/2002
H0198735	7a	NESS	2701 PAHL AV	ST. ANTHONY	Sealed	10/31/2002
H0198821	7a	KUNZ OIL COMPANY	4372 ADAMS ST	MOUNDS VIEW	Sealed	8/19/2002
H0198857	7a	ROSEVILLE PROPERTIES	2118 MYRTLE AV	ST. PAUL	Sealed	- -
H0199249	7a	WINDERF	5085 LONGVIEW DR	MOUNDS VIEW	Sealed	12/24/2002
H0199834	7a	NEW BRIGHTON, CITY OF	1155 OLD HIGHWAY 8	NEW BRIGHTON	Sealed	- -
H0202461	7a	MARION LIND, ESTATE OF	1670 LOIS DR	SHOREVIEW	Sealed	10/23/2002
H0202464	7a	WALKER	3812 HAYES ST NE	COLUMBIA HEIGHTS	Sealed	10/29/2002
H0202466	7a	WARD	2849 BRONSON DR	MOUNDS VIEW	Sealed	10/28/2002
H0202469	7a	VALENTE	1770 GLENVIEW AV	ARDEN HILLS	Sealed	11/11/2002
H0202495	7a	NOREN	2512 MURRAY AV	ST. ANTHONY	Sealed	12/20/2002
H0202515	7a	ROSEDALE CHEVROLET	2845 35W HY N	ROSEVILLE	Sealed	11/12/2002
H0202539	7a	Minnesota Diversified Ind.	670 PELHAM BL	ST. PAUL	Sealed	12/2/2002
H0202540	7a	MINNESOTA DIVERSIFIED IND.	0 PELHAM BLVD (ROW)	ST. PAUL	Sealed	12/2/2002
H0203268	7a	US ARMY	4651 Hwy 10	ARDEN HILLS	Sealed	12/26/2002

TABLE E-5
SEALED WELLS

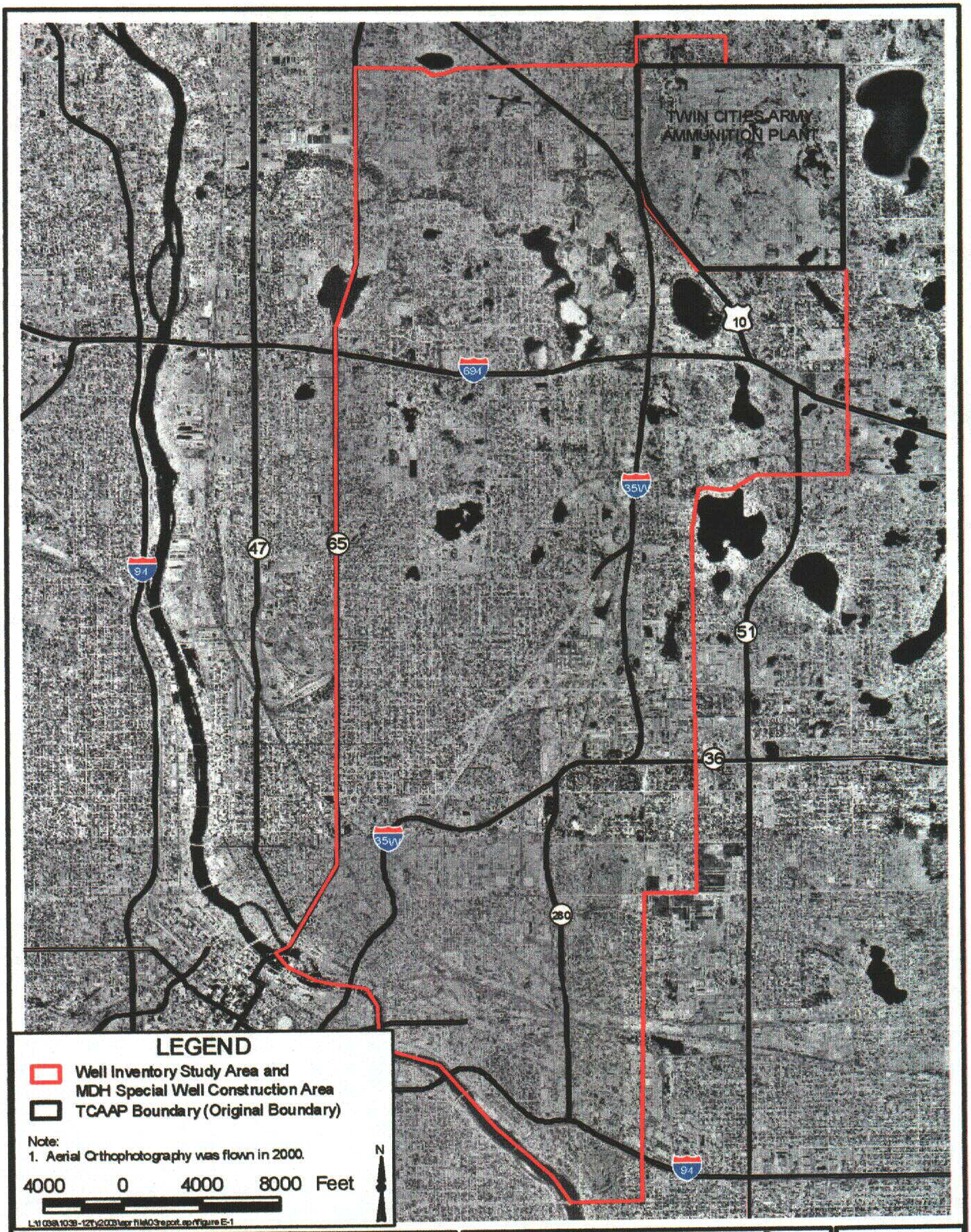
Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
H0203322	7a	NEILSON	5876 STINSON BL NE	FRIDLEY	Sealed	1/8/2003
H0203749	7a	SAMINA-SCI	2516 WABASH AV	ST. PAUL	Sealed	- -
H0204942	7a	TWIN CITIES ARMY AMO PLANT	0	ARDEN HILLS	Sealed	3/24/2003
H0204943	7a	TWIN CITIES ARMY AMO PLANT	0	ARDEN HILLS	Sealed	3/24/2003
H0205634	7a	VADNAIS HEIGHTS WATERSHED MANAGEMENT		VADNAIS HEIGHTS	Sealed	2/20/2003
H0206453	7a	BRADDOCK	2212 HADDINGTON	ROSEVILLE	Sealed	- -
	7a	DUELLMAN	1648 LOIS DR	SHOREVIEW	Sealed	
	7a	KASPER	1710 PINEWOOD DR	SHOREVIEW	Sealed	
	7a	FORD	1774 PINEWOOD DR	SHOREVIEW	Sealed	
	7a	BREKKE	5796 FAIRVIEW	SHOREVIEW	Sealed	
606837	7b	ST. PAUL, CITY OF	0 COMO & EUSTIS	ST. PAUL	Sealed	
	7b	MAYERS	2275 COMO AV	ST. PAUL	Sealed	
	7b	FORMAN	2524 ST. ANTHONY BL	MINNEAPOLIS	Sealed	
234475	~~1d,~~ 7b	Rissell	2805 Silver Ln NE	Minneapolis	Sealed	10/13/2003

TABLE E-5
SEALED WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street*	*City*	*Status*	*Date Sealed*
H0185185	7a	ERNT	2420 27TH AV NE	ST. ANTHONY	Sealed	1/4/2002
H0185194	7a	CHILDRENS HOME SOCIETY	1605 EUSTIS ST	LAUDERDALE	Sealed	11/6/2001
H0185347	7a	NICHOLS	2275 LEONA DR	NEW BRIGHTON	Sealed	3/15/2002
H0185376	7a	SCHRYER	204 THIRD AV SE	NEW BRIGHTON	Sealed	11/21/2001
H0185380	7a	IMPERIAL HOMES	1000 County Road I West	SHOREVIEW	Sealed	3/7/2002
H0186049	7a	ELSAFY	2585 FRY ST	ROSEVILLE	Sealed	11/8/2001
H0186400	7a	WELLINGTON MANAGEMENT, INC.	803 BERRY ST	ST. PAUL	Sealed	1/31/2002
H0187101	7a	MPCA-HANS NEVE	630 SE MALCOLM AV	MINNEAPOLIS	Sealed	6/6/2002
H0188498	7a	ENNEN	2500 PAHL AV NE	ST. ANTHONY	Sealed	11/14/2002
H0188524	7a	U OF MN	0	MINNEAPOLIS	Sealed	8/8/2002
H0188526	7a	U OF M	0	MINNEAPOLIS	Sealed	8/27/2002
H0189395	7a	METALUNION INC.	900 E HENNEPIN AV	MINNEAPOLIS	Sealed	4/18/2002
H0189986	7a	SULLIVAN	1802 OAKCREST AV	ROSEVILLE	Sealed	4/23/2002
H0190124	7a	LUBE TECH	2420 County Road 2 West	ROSEVILLE	Sealed	- -
H0190174	7a	MCDA	1575 CENTRAL AV NE	MINNEAPOLIS	Sealed	10/18/2002
H0190301	7a	MN DIVERSIFIED INDUSTRIES	670 PELHAM BL	ST. PAUL	Sealed	6/27/2002
H0190406	7a	PACKARD	3900 BETHEL DR	ARDEN HILLS	Sealed	11/30/2001
H0190474	7a	JORDEN	750 PELHAM BL	ST. PAUL	Sealed	12/12/2001
H0190485	7a	LARSON	2813 PAHL AV	ST. ANTHONY	Sealed	- -
H0190528	7a	BLOMGREN	1805 ROSELAWN AV W	ROSEVILLE	Sealed	5/21/2002
H0190542	7a	KASPER	1710 PINEWOOD DR	SHOREVIEW	Sealed	5/28/2002
H0190630	7a	BRINK	4097 SNELLING AV N	ARDEN HILLS	Sealed	2/7/2002
H0190646	7a	PETERSON	4086 VALENTINE CREST RD	ARDEN HILLS	Sealed	4/24/2002
H0190651	7a	BLANCHE MURMA, ESTATE OF	2236 County Road B West	ROSEVILLE	Sealed	5/8/2002
H0190660	7a	KING	1938 LAKE ST	ROSEVILLE	Sealed	6/12/2002
H0190676	7a	SEABURG	5119 RED OAK DR	MOUNDS VIEW	Sealed	8/14/2002
H0190690	7a	LI	5046 EASTWOOD AV	MOUNDS VIEW	Sealed	10/21/2002
H0191472	7a	SINCLAIR OIL CORPORATION	6290 Hwy 65	FRIDLEY	Sealed	5/8/2002
H0191492	7a	GOLDSMITH	1970 STOWE AV	ARDEN HILLS	Sealed	7/19/2002
H0191602	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/3/2002
H0191603	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/3/2002
H0191604	7a	US ARMY	4700 Hwy 10	ARDEN HILLS	Sealed	1/3/2002
H0191660	7a	F. GOULD NATIONAL BATTERY	2650 UNIVERSITY AV W	ST. PAUL	Sealed	4/11/2002
H0191911	7a	U.S. EPA	312 FIFTH AV NW	NEW BRIGHTON	Sealed	4/5/2002
H0191928	7a	U OF M	0 BLUE STEM LANE & PARKVIEW DR	SHOREVIEW	Sealed	9/13/2002
H0191929	7a	U OF M	0 BLUE STEM LANE & PARKVIEW DR	SHOREVIEW	Sealed	9/13/2002
H0191930	7a	U OF M	0 BLUE STEM LANE & PARKVIEW DR	SHOREVIEW	Sealed	9/13/2002
H0191931	7a	U OF M	0 BLUE STEM LANE & PARKVIEW DR	SHOREVIEW	Sealed	9/13/2002
H0191987	7a	US BANK	2402 UNIVERSITY AV	ST. PAUL	Sealed	- -
H0192168	7a	INTERNATIONAL PAPER	2242 UNIVERSITY AV	ST. PAUL	Sealed	5/10/2002
H0192169	7a	INTERNATIONAL PAPER	2242 UNIVERSITY AV	ST. PAUL	Sealed	5/10/2002
H0192306	7a	MORGAN	2265 MARION RD	ROSEVILLE	Sealed	2/14/2002
H0192355	7a	DURAND	7092 PLEASANT VIEW DR	MOUNDS VIEW	Sealed	6/20/2002

TABLE E-6
FY 2003 EFFORT TO RECLASSIFY CATEGORY 4 WELLS

Unique Number	*Category*	*Last Name or Business Name*	*Street Address*	*City*	*Use*	*Status*	*Depth*	*Comments*
249150	4a	~~Barres, Martha L.~~, Lisa Coldor	3511 Stinson Blvd NE	St Anthony	Unknown	Unknown		No Response
249185	4a	Novotny, Mark L.	1706 Malvern St	Lauderdale	Unknown	Unknown		No Response
249191	4a	Wells, Henry A, Jr	1651 Millwood Ave	Roseville	Irrigation	Active		No Response
S00294	4a	Western Remodelers, Rapit Printing owns Bldg	2520 W Larpenteur Ave	St Paul	Unknown	Unknown		No Response
S00295	4a	Alfson, Loren	2351 Summer St	Lauderdale	Unknown	Unknown		No Response
S00409	4a	Ohara, Rose L.	3553 Stinson Blvd NE	St Anthony	Unknown	Unknown		No Response
S00608	4a	Grundtner, James	136 Oakwood Dr	New Brighton	Unknown	Active		No Response
105242	4b	Weber, Nordeen Jr.	Nordeen Estates		Domestic	Active	214	Could Not Locate
105271	4b	Nelson, Roger			Domestic	Active	137	Could Not Locate
126463	4b	B & M Construction	Nordeen Estates		Domestic	Active	216	Could Not Locate
130000	4b	550 Associates		Arden Hills	Public Supply	Inactive		Could Not Locate
148132	4b	Vince Velie, H & H Construction			Domestic	Active	190	Could Not Locate
180922	4b				Unknown	Active		Could Not Locate
192091	4b			Elmwood	Unknown	Active		Could Not Locate
201192	4b				Unknown	Active		Could Not Locate
234434	4b	Marquart, Vina L.		Arden Hills	Domestic	Unknown		Could Not Locate
234532	4b				Unknown	Unknown		Could Not Locate
234537	4b				Unknown	Unknown		Could Not Locate
234545	4b				Unknown	Unknown		Could Not Locate
234568	4b	Daniel J. Thomsen?	4 88 NE		Unknown	Unknown	200	No Response
234658	4b				Unknown	Unknown		Could Not Locate
239465	4b	Lennox, Dan			Unknown	Active	256	Could Not Locate
239468	4b	Burlington Northern Railroad			Unknown	Active	253	Could Not Locate
239469	4b	Great Northern Railway			Unknown	Active	200	Could Not Locate
S00413	4b	Norquist Campground			Unknown	Unknown		Could Not Locate
S00471	4b	R Komarek/Nelson-Miller Cons			Unknown	Inactive		Could Not Locate
S00551	4b	Tamarack Care Temp			Unknown	Unknown		Could Not Locate
S00650	4b	CME		New Brighton	Unknown	Unknown		Could Not Locate
249118	~~4a~~ 5	Cameron, David	1003 7th St NW	New Brighton	Unknown	Inactive		Could Not Locate
	~~4a~~ 5	Polynesian Village	1417 NW 10th St	New Brighton				Could Not Locate
452938	~~4b~~ 6	John Hancock Properties, Boston, Mass.	Co Rd C	ROSEVILLE	Unknown	Unknown	19	Could Not Locate
452939	~~4b~~ 6	John Hancock Properties, Boston, Mass.	Co Rd C	ROSEVILLE	Unknown	Unknown	72	Could Not Locate
401201	~~4b~~ deleted	Rehbein Const	23455 Davenport St	Anoka	Domestic	Active	61	Deleted



TWIN CITIES ARMY AMMUNITION PLANT

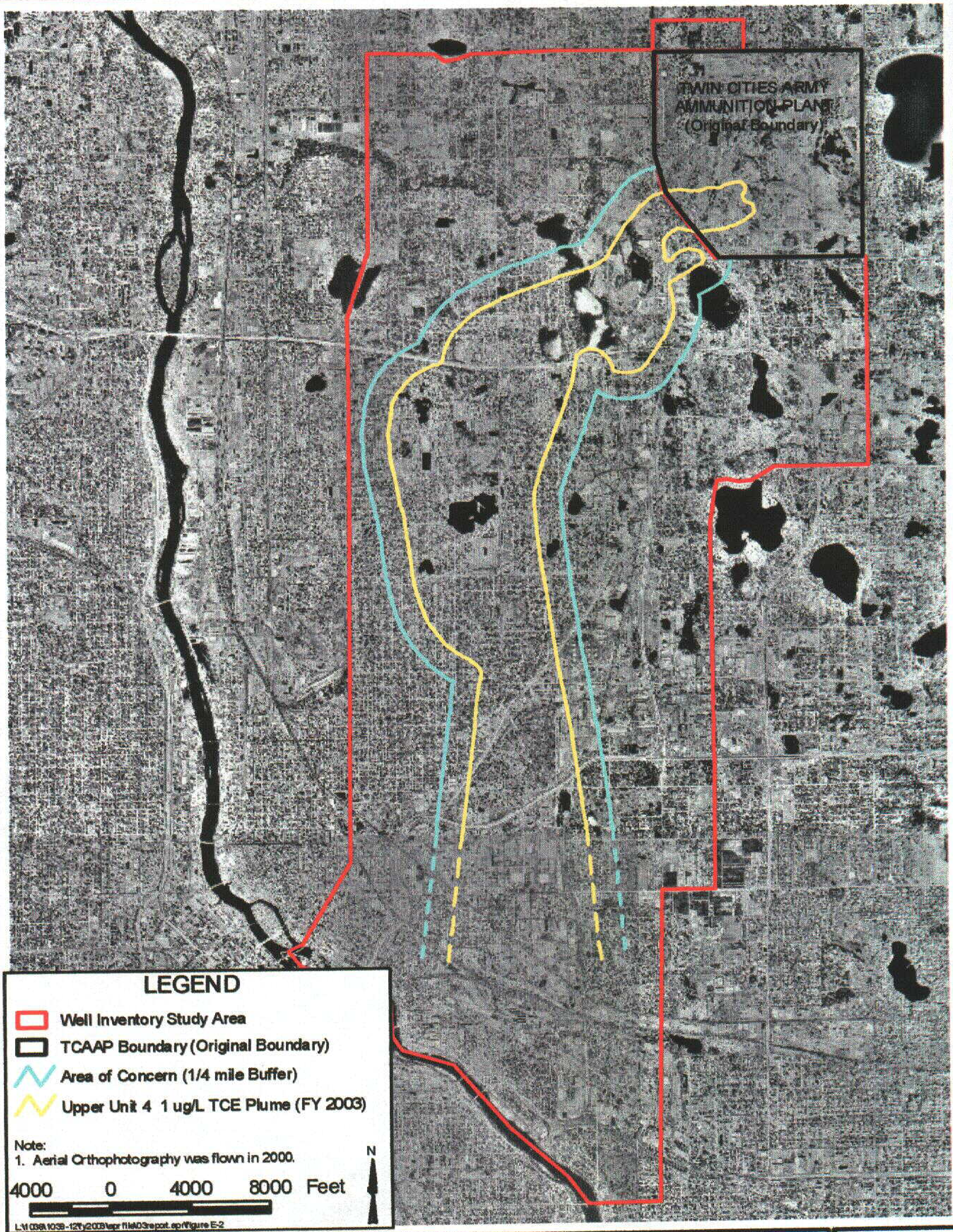
Well Inventory Study Area

Wenck

Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359-0249

FY 2003

Figure E-1



TWIN CITIES ARMY AMMUNITION PLANT

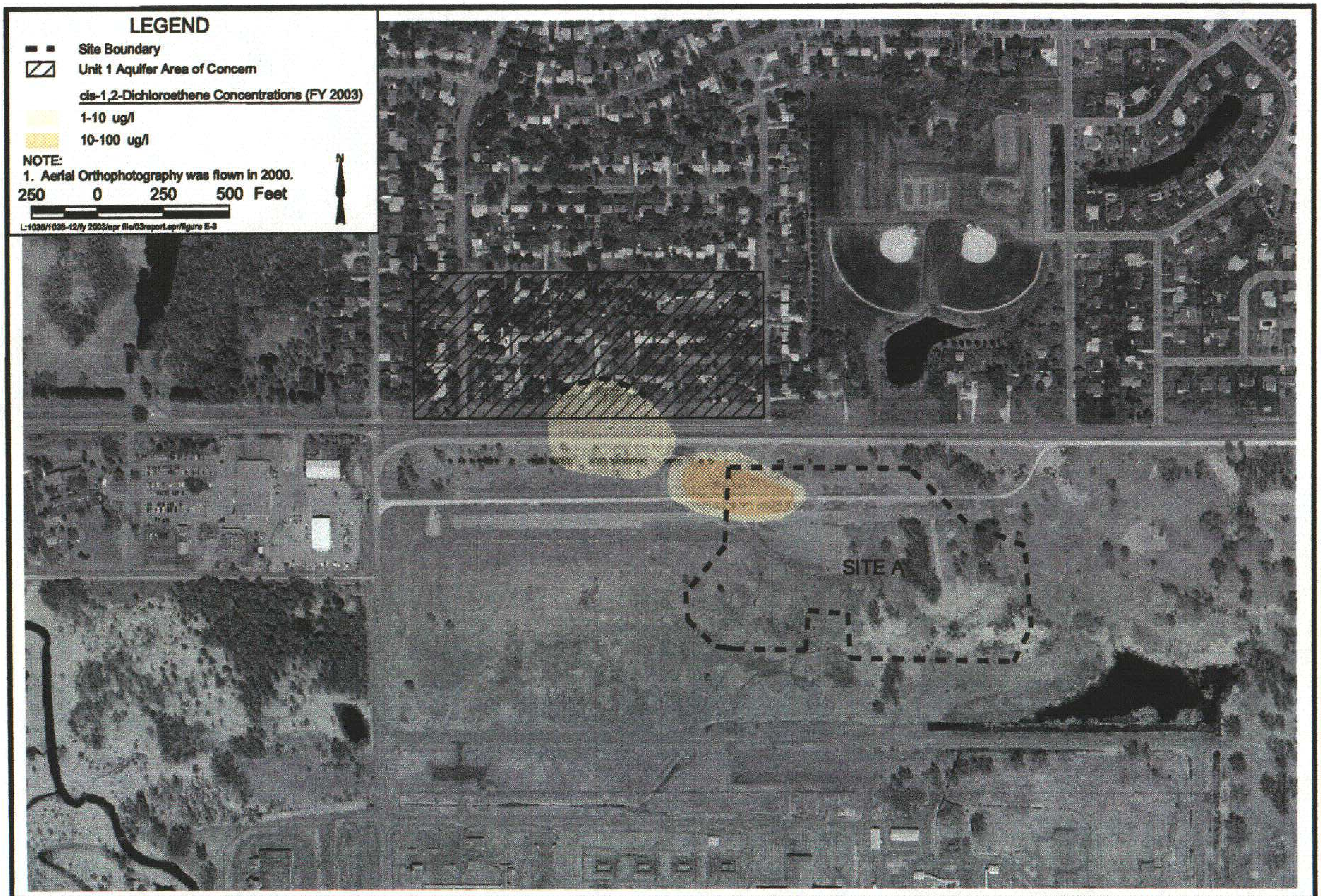
Areas of Concern (Unit 3 and Unit 4)

Wenck

Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359-0249

FY 2003

Figure E-2



TWIN CITIES ARMY AMMUNITION PLANT

Area of Concern (Unit 1)

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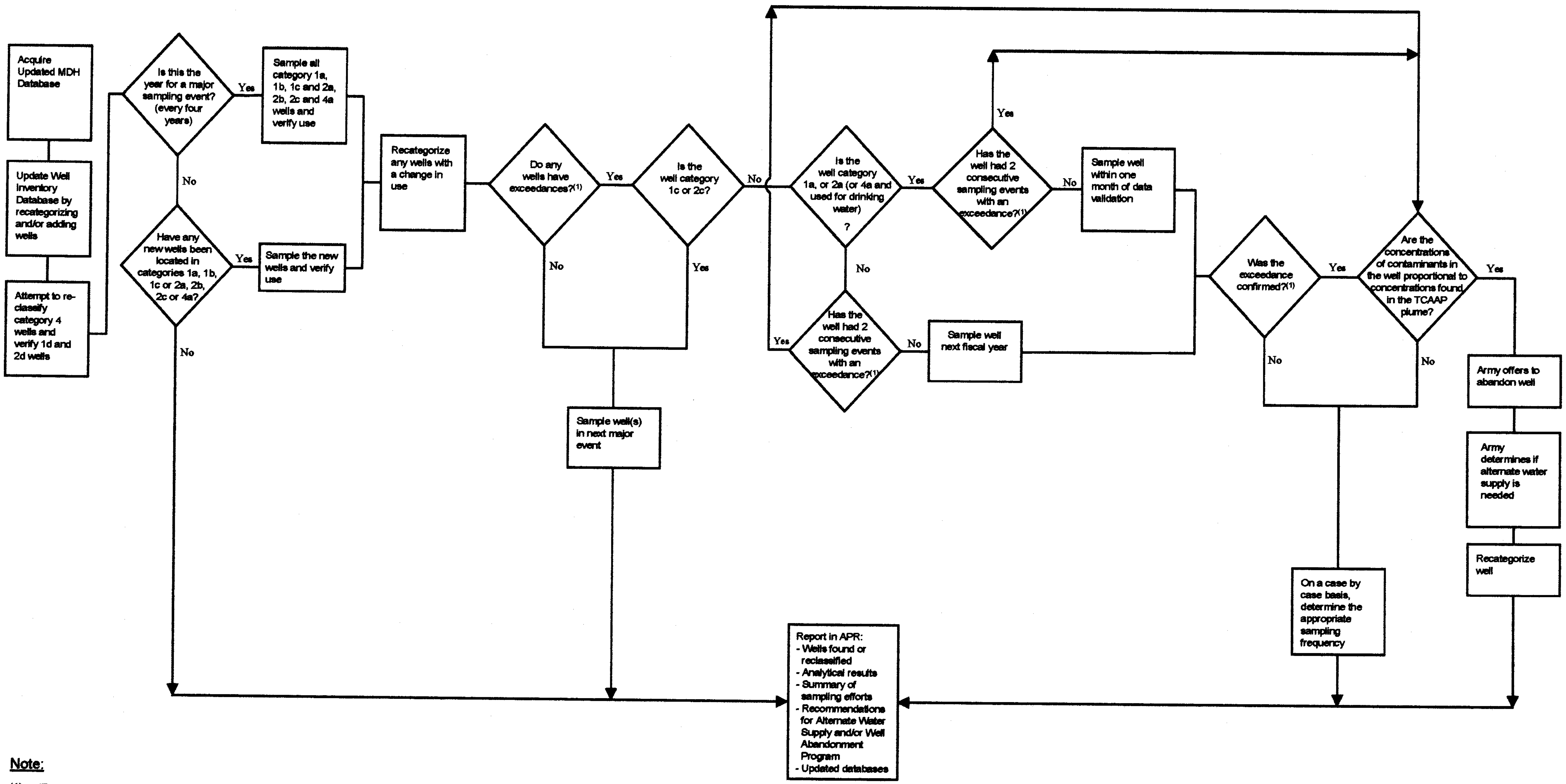
Environmental Engineers Maple Plain, MN 55359-0249

FY 2003

Figure E-3

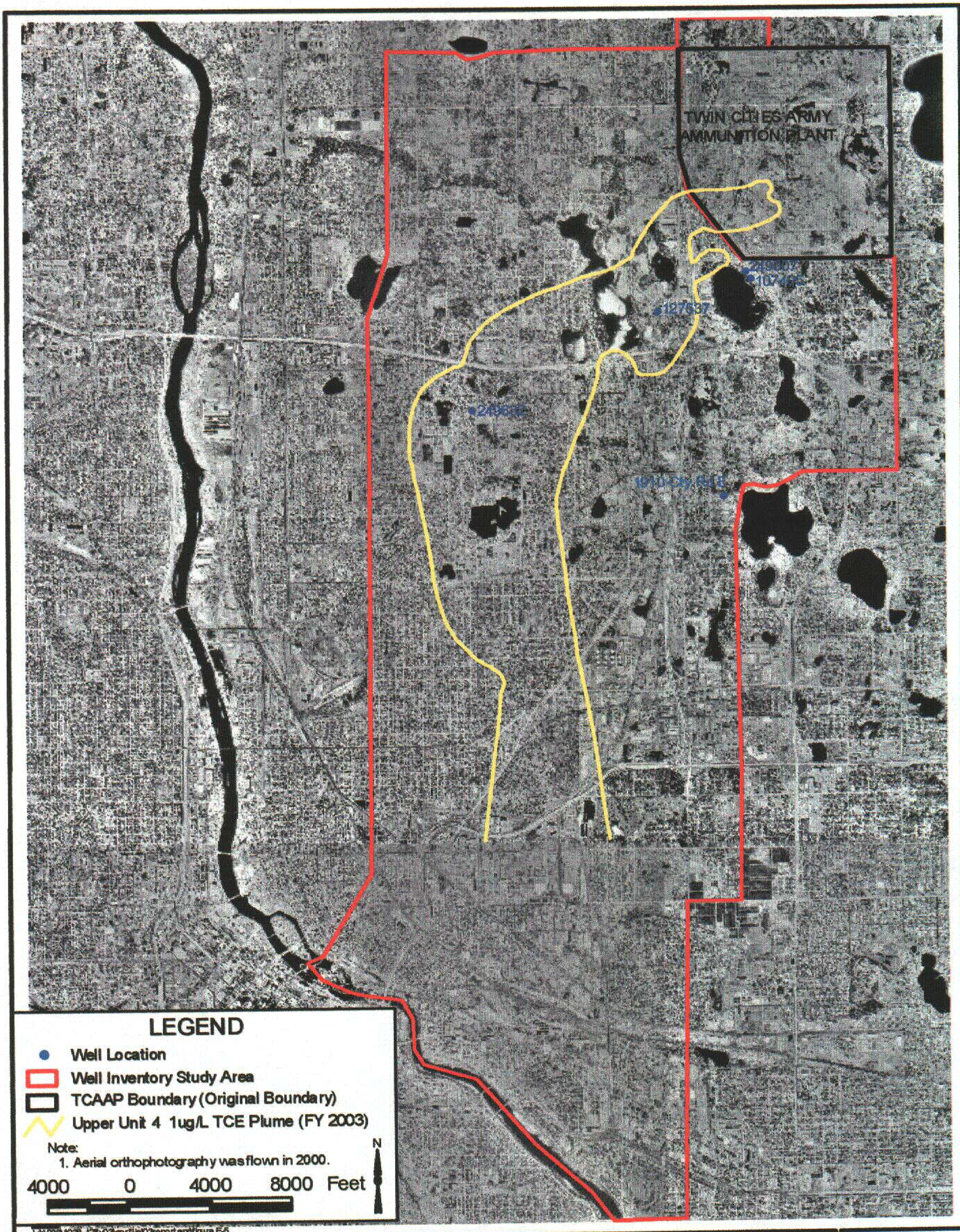
Figure E-4

Annual Requirements for Maintaining TCAAP Well Inventory Database



Note:

(1) = Exceedance of a TCAAP Groundwater Cleanup Level



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2003
FY2003 Well Inventory Sampling Locations	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure E-5

TCAAP WELL INVENTORY DATABASE

The TCAAP Well Inventory Database is located on
this CD-ROM in the following Microsoft Excel file:

App E_Well Inventory Database.xls

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

October 2002

10-1-02: Installed new flow meter. Meter did not function properly as it indicated 100 gpm. System down time: 2.0 hours.

10-2-02: Diversified Remediation & Controls and Controls & Meters technicians on-site to trouble shoot flow meter. Identified additional grounding problem and corrected. Meter appears to function properly, but flow is low. While on-site the building heater wouldn't function. Electrician contacted to trouble shoot and repair. System down time: 1.0 hour.

10-2-02: Removed tower demister section and examined spray nozzle. Nozzle was clogged with "woody" plant debris. The nozzle was cleaned and reinstalled and the system flow rate adjusted. System down time: None.

10-7-02: Electrician (LEC) is on-site to inspect electric heater. The thermostat had failed and will be replaced. System down time: None.

10-9-02: Electrician (LEC) replaces the thermostat and tests the heating system. Building heater & controls function properly. System down time: None.

10-10-02: Anti-siphon valve is leaking. System down time: None.

10-11-02: Cleaned and relocated anti-siphon valve. System down time: None.

10-16-02: System O.K., in suspense. System down time: None.

10-23-02: Cleaned nozzle in tower, adjusted flow rate to 18 gpm, and adjusted the air flow to a static pressure of 26-27 inches. System down time: 1.0 hour.

10-28-02: System O.K. in suspense. System down time: None.

November 2002

11-4-02: Flow rate is low, adjusting flow valve open does not result in higher gauge reading. System down time: None.

11-5-02: Obstruction found in nozzle; cleaned nozzle and adjusted flow rate. Building temperature was recorded while door remained open for approximately 45 minutes. System down time: 1 hour.

11-11-02: System O.K. in suspense. System down time: None.

11-14-02: System O.K. in suspense. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

11-18-02: System O.K. in suspense. System down time: None.

11-22-02: Performed monthly PM. System down time: None.

11-25-02: System O.K. in suspense. System down time: None.

11-26-02: Cleaned nozzle in tower, reset flow to 18 gpm. System down time: 1 hour.

11-27-02: System down on low air flow. Reset and restart system. Raise effluent hose to increase water column in sump. Inspect riser pipe. Found leak at bottom side of solvent weld coupling, near grating elevation. System down time: 15 hours.

11-28-02: System O.K. in suspense. System down time: None.

December 2002

12-2-02: System O.K., in suspense. System down time: None.

12-4-02: System down for repairs to leaking influent pipe. System down time: see 12-6-02 note.

12-5-02: Influent pipe leak repaired. System down time: see 12-6-02 note.

12-6-02: Restarted system and checked for leaks. Influent pipe leaking at new joint, shut down system. Leak repaired in late afternoon; system restarted on Saturday 12-7-02. System down time: 94 hrs

12-10-02: System O.K. in suspense. System down time: None.

12-16-02: Performed monthly PM. Identified very slow leak at discharge elbow. System down time: None.

12-17-02: System O.K., in suspense. System down time: None.

12-19-02: System O.K., in suspense. System down time: None.

12-24/25-02: No system monitoring- Holiday

12-31-02: System O.K., in suspense. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

January 2003

1-2-03: System O.K., in suspense. System down time: None.

1-6-03: System O.K., in suspense. System down time: None.

1-7-03: System O.K., in suspense. System down time: None.

1-8-03: System O.K., in suspense. System down time: None.

1-13-03: System O.K., in suspense. System down time: None.

1-14-03: System O.K., in suspense. System down time: None.

1-20-03: System O.K., in suspense. System down time: None.

1-21-03: System O.K., in suspense. System down time: None.

1-23-03: System O.K., in suspense. System down time: None.

1-24-03: System O.K., in suspense. System down time: None.

1-28-03: System O.K., in suspense. System down time: None.

1-29-03: System O.K,. in suspense. Performed monthly inspection. System down time: None.

1-30-03: System O.K., in suspense. System down time: None.

1-31-03: System O.K., in suspense. System down time: None.

February 2003

2-3-03: System O.K., in suspense. System down time: None.

2-4-03: System O.K., in suspense. System down time: None.

2-6-03: System O.K., in suspense. System down time: None.

2-10-03: System O.K., in suspense. System down time: None.

2-11-03: System O.K., in suspense. System down time: None.

2-12-03: System O.K., in suspense. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

2-14-03: System O.K., in suspense. Performed monthly inspection. System down time: None.

2-18-03: System O.K., in suspense. System down time: None.

2-19-03: System O.K., in suspense. System down time: None.

2-20-02: System O.K., in suspense. System down time: None.

2-21-03: System O.K., in suspense. System down time: None.

2-24-03: System O.K., in suspense. System down time: None.

2-27-03: System O.K., in suspense. System down time: None.

March 2003

3-3-03: System O.K., in suspense. System down time: None.

3-6-03: System O.K., in suspense. Sampled the treatment system and performed monthly preventative maintenance. System down time: None.

3-7-03: System O.K., in suspense. I observed System start-up while on-Site and operation was acceptable. System down time: None.

3-11-03: System O.K., in suspense. System down time: None.

3-13-03: System O.K., in suspense. System down time: None.

3-19-03: I observed system startup on arrival and system start-up acceptable. No water emanated from top of tower during start-up. System down time: None.

3-20-03: System O.K., in suspense. Precipitation is occurring. No water was observed on the floor. I pushed on the roof insulation with a broom and found no indication of water stored in the insulation. System down time: None.

3-24-03: System O.K., in suspense. System down time: None.

3-25-03: System O.K., in suspense. System down time: None.

3-26-03: Reduced the flow rate from ~18.0 gpm to 15.1-15.4 gpm. Flow turbulence in pipe likely causes fluctuating flow rate. System down time: None.

3-28-03: System O.K., in suspense. System down time: None.

3-31-03: System O.K., in suspense. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

April 2003

4-2-03: System O.K., in suspense. System down time: None.

4-7-03: System O.K., in suspense. System down time: None.

4-8-03: System O.K., in suspense. System down time: None.

4-10-03: System O.K., in suspense. System down time: None.

4-14-03: System O.K., in suspense. System down time: None.

4-15-03: Performed monthly preventive maintenance procedures. Swept out building and replaced leaking acid storage bucket. System down time: None.

4-16-03: System O.K. in suspense. System down time: None.

4-22-03: System O.K. in suspense. System down time: None.

4-23-03: System O.K. in suspense. System down time: None.

4-28-03: System O.K. in suspense. System down time: None.

4-29-03: System O.K. in suspense. System down time: None.

May 2003

5-1-03: System O.K. in suspense. System down time: None.

5-15-03: Performed monthly preventive maintenance procedures. System down time: None.

5-19-03: Switch breaker on for fresh air fan. System down time: None.

5-22-03: Increase flow rate from 14.1 to 18.8 gpm, reduce height of effluent hose. System down time: None.

5-23-03: System O.K. in suspense. System down time: None.

5-27-03: System cycled off during inspection. System down time: None.

5-28-03: System O.K. in suspense. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

5-29-03: Louver control arm/linkage failed - left open, adjust flow rate to 17.7 gpm to reduce cycling, adjust air flow rate to 24.5" H_2O static pressure. System down time: None.

June 2003

6-1-03: System O.K., in suspense. System down time: None.

6-3-03: System O.K., in suspense. System down time: None.

6-5-03: Reduce flow rate to 16.3 gpm to reduce cycling. System down time: None.

6-12-03: System O.K., in suspense. System down time: None.

6-19-03: System O.K., in suspense. System down time: None.

6-20-03: Performed monthly preventive maintenance procedures. System down time: None.

6-24-03: System O.K. in suspense. Clean accumulated debris from air inlet screen. System down time: None.

6-25 & 26-03: TCAAP power outage. System down time: 23 hours.

July 2003

7-8-03: Adjust flow rate up to 16.3 gpm. System is running continuously, not cycling. System down time: None.

7-9-03: System is shut down on high water level in tower sump. Restart system and reduce flow rate to 14.4 gpm. System down time: 15 hours.

7-11-03: Xcel electric utility on-site to perform repairs to TCAAP electrical service. System down time: 4 hours.

August 2003

8-5-03: System down on arrival. High water level in tower sump. Based on hours of pump operation, the system likely shut down on a high water alarm during the morning of 8-1-03. System down time: 65 hours.

8-5-03: System shut down for annual cleaning. System down time: 7 hours.

8-13-03: In suspense, system O.K. System down time: None.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

8-19-03: In suspense, system O.K. System down time: None.

8-22-03: In suspense, system O.K. System down time: None.

8-25-03: Reduced flow rate by 1 gpm to reduce cycling frequency. System down time: None.

8-26-03: Reduced flow rate by 1 gpm to reduce cycling frequency. System down time: None.

September 2003

9-2-03: System in suspense. System down time: None.

9-3-03: System in suspense. System down time: None.

9-4-03: System in suspense. System down time: None.

9-8-03: System in suspense. Perform monthly preventive maintenance. System down time: None.

9-10-03: System in suspense. System down time: None.

9-15-03: System in suspense. System down time: None.

9-19-03: System in suspense. System down time: None.

9-24-03: System in suspense. System down time: None.

9-25-03: System in suspense. System down time: None.

9-29-03: System in suspense. System down time: None.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

October 2002

10/4/2002	Pumphouse SC3; The pumphouse was shut off as authorized by the Agencies.
10/7/2002 and	Pumphouse B1; Pumphouse down intermittently to replace pump disconnect switch. Down time: 72 hours.
10/9/2002	Visual inspection of Building 116 performed. Meter readings were not recorded, therefore, the daily meter readings were estimated.
10/9/2002 - 10/10/2002	Treatment System and Well Field; TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours each at B1, B2, B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2, and SC5.

November 2002

11/17/2002 - 11/30/2002	Pumphouse B1; Submersible pump failed. All Enviro pulled lift system and Bergerson Caswell video taped the well. Check valve failed and jetted a hole in the well screen at 109 ft btoc. Sand wore down pump impellars. Down time: 288 hours.
11/18/2002	Pumphouse B2; Pumphouse shutdown. Deemed no longer necessary as part of the remedy. Extraction well B13 piped into pumphouse B2. Down time: 0 hours.
11/27/2002	Treatment system and well field; Laughlin performed electrical maintenance at main PLC. Down time: 3 hours each at B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2 and SC5.
11/28/2002	Daily inspection not performed due to Thanksgiving Holiday. Meter readings estimated.

December 2002

12/1/2002 - 12/6/2002	Pumphouse B1; Install a temporary used 40 hp pump and motor to troubleshoot hole in screen. Down time: 119 hours.
12/10/2002 - 12/11/2002	Pumphouse B9; Install new (higher capacity) pump and motor. Upgrade electrical controls to accommodate larger pump and motor. Down time: 28 hours.
12/11/2002	Pumphouse B10; The pumphouse was turned off as authorized by the Agencies.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

12/14/2002 - 12/19/2002	Pumphouse B1; Install new pump and motor. Down time: 137 hours.
12/25/2002	Daily inspection was not performed due to the Christmas Day holiday. Meter readings estimated.
12/30/2002	Treatment Center; PDU #2 failure. Starter short circuited. Replaced with new. Down time: 4 hours.

January 2003

01/1/2003	Treatment Center; PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours each at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2.
01/2/2003	Treatment Center; PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours each at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2.
01/3/2003	Treatment Center; Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/4/2003	Pumphouse B5; Submersible pump and motor fail. Replaced with new. Down time: 158 hours.
01/6/2003	Treatment Center; Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/8/2003	Treatment Center; Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/17/2003	Water Tower; Call from Dave Fuller, water tower filling slowly, altitude valve open. Snelling Avenue valve at 18 psi. Rinsed screen, flushed piping, adjusted psi to 28. Down time: None.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

01/20/2003	Pumphouses B1, B3, B11, B13 and SC1; Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours each at B1, B3, B11, B13 and SC1.
01/24/2003	Treatment Center; ECV #4 would not close on command. Installed new filter and observed normal operation. Down time: None.
01/24/2003	Pumphouse SC 2; ARV leaking, low back pressure, closed valve. Down time: None.
01/24/2003	Treatment Center; Replaced WW2 pump start float, moved float up six inches and closed sluice gate. Restarted treatment system and well field and observed normal operation. Down time: 3 hours for Treatment system and well field (except B1, B3, B11, B13 and SC1 which are already off for B13 pumping test).
01/25/2003	Treatment Center; PDU #2 closed without command. Opened sluice gate. Reset PDU #2 and PLC and observed normal operation. Down time: None.
01/25/2003	Treatment Center; PDU #4 closed without command. Reset PDU #4 and PLC and observed normal operation. Down time: none.
01/25/2003	Pumphouse SC1; Flow meter ruptured and failed. Turned off downstream valve and ordered new flow meter. Down time: None (already down for B13 pumping test).
01/27/2003	Treatment Center; PDU #4 valve would not open on start up. Reset PDU #4 and changed control valve filter. Down time: None.
01/27/2003	Pumphouse SC1; Remove and Replace SC 1 flow meter and downstream 2" diameter, PVC forcemain piping. Down time: None (already down for B13 pumping test).

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

01/28/2003	Pumphouse SC1; PVC forcemain piping installed on 1/27/03 failed. Replaced with galvanized piping. Down time: None (already down for B13 pumping test).
01/26/2003	Pumphouse B9; Flow meter failed; swapped out with new from inventory. Meter reading adjusted to account for incorrect meter reading. Down time: none
01/28/2003	Pumphouses B8 and SC2; Pumphouses cycling. Reset at PLC. Down time: 24 hours each.
01/29/2003	Treatment Center; ECV #4 pilot failed. Replaced with new. Down time: None.
01/31/2003	Discharge Forcemain; Water observed in ditch approximately 150 feet east of Building 116. Possible leak in discharge forcemain. Treatment system and well field turned off to inspect and troubleshoot. Further troubleshooting necessary. Down time: 2 hours.

February 2003

02/3/2003 - 02/4/2003	Treatment Center and Well Field; Air release valve (ARV) chamber near B2 flooded. Pumped out chamber and ARV failed. Removed ARV and ordered replacement. Down time: 6 hours for treatment system and well field.
02/4/2003	Pumphouse B13; B13 light flashing on PLC. Reset PLC and B13 restarted properly. Down time: 13 hours.
02/4/2003	Pumphouse B4; Pumphouse not inspected on 2/4-5/2003 because snow was not plowed from the road. Meter readings estimated. Down time: None.
02/8/2003	Pumphouse B13; B13 light flashing on PLC. Reset PLC and B13 restarted properly. Down time: 4 hours.
02/12/2003	Treatment System; Replaced ECV #3 pilot with new from inventory. Changed inline filters to ECV #3 and #4 . Down time: None.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

02/12/2003 Treatment system; Call from auto dialer at 11:15 PM, TGRS fail. Well field cycling. Inspected all ECVs, changed filter at ECV 1, reset PLC and observed normal operation.
Down time: None.

02/14/2003 Treatment Center; call from auto dialer, ECV#2 not closing. Adjusted control valves but auto dialer continued to call out. Reset PLC and calls ceased.
Down time: None.

02/21/2003 Discharge Forcemain; Inspected area of suspected discharge forcemain leak approximately 250 feet east of Building 116. Area showed an increase in the amount of ponded water and ice build up.
Down time: None.

March 2003

03/1/2003 Pumphouse B1; B1 light not lit on PLC in Building 116, cycled PLC and B1 lit normally.
Down time: 19 hours.

03/5/2003 Treatment System; Stopped leaking water from motor packing glands at wet well pumps #2 and #4.
Down time: None.

03/5/2003 Treatment System; Replaced leaking section of potable water line to ECV 1 ball valve with copper parts from inventory.
Down time: None.

3/13/2003 - 03/15/2003 Pumphouse B5; Forcemain pressure at B5 climbing, reducing flow rate. Valve adjustments performed.
Down time: 30 hours.

03/20/2003 Treatment System; Changed 3 way solenoid at ECV 4 and filters at ECVs 3 and 4 on 3/17 and 3/20.
Down time: None.

03/24/2003 Treatment System; At 9:30 am, trending indicates a fault at B6 and a minor fault at PDU 3. ECV 1 and 4 valves would not close, replaced filters and adjusted open and close speed valves.
Down time: None.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

03/24/2003	Forcemain and pumphouses SC1 and SC2; Forcemain failure on raw water loop approximately 500 feet SW of pumphouse SC4. Area excavated and forcemain repaired. Down time: 174 hours each.
03/25/2003 - 03/31/2003	Treatment System; Pumphouse B9 not lit on PLC but pump is working properly. Anik contacted, inspection shows low power supply to pumphouse B10 is causing communication problem at paired pumphouse B9. Xcel contacted and installed a new transformer at power pole near B7. Down time: None.
03/27/2003	Treatment System; Call from autodialer at 1450, PDU 4 would not close on command, reset PDU and adjusted open speed valve. Down time: None.
03/30/2003	Pumphouses B1, B3, B4, B5, B8, B11 and SC5; ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 3 hours each at B1, B4, B11 and SC5; 4 hours at B8; 6 hours at B5 and 9 hours at B3.

April 2003

04/5/2003 - 04/11/2003	Pumphouse B3; Meter not functioning properly; installed new from inventory; flow rates estimated from 4/5-11/03. Down time: None.
04/7/2003	Treatment System; Wet well pump 1 wiring to pump stop float cracked and shorting out to wet well pump 1 valve. Rewired and replaced pump stop float. Down time: 3 hours.
04/7/2003	Treatment System; Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: B1, B4, B5, B6, B9, B13, SC1, SC2, and SC5 for 3 hours each and 7 hours each at B8 and B11.
04/10/2003	Treatment System; B6 flashing on PLC; Reset PLC and B6 relit normally. Down time: 8 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

04/10/2003	Pumphouses B7, B10 and B12; Xcel energy and Laughlin on-Site to energize newly installed power bank on power pole near B7 and check direction of current to pump in B7; Upon energizing new power bank, an electrical short occurred in B12; Laughlin to order new electrical parts, schedule a meet with Xcel to shut down power to B12 and install new electrical parts. Xcel will then re-energize power bank and Laughlin will check current direction. Down time: None.
04/11/2003	Pumphouse B3; Flow meter failed, impeller shaft damaged. Installed new meter from inventory. Down time: 1 hour.
04/11/2003	Treatment System; ECV # 2 not closing, pilot failed. Replaced pilot and operating solenoid valve. Down time: None.
04/12/2003 - 04/17/2003	Pumphouse SC5; Flow meter not functioning properly; switched SC5 meter with SC3 meter. Meter readings estimated from 4/12-17/03. Down time: None.
04/16/2003	Treatment System and well field; Replaced failed micro switch on ECV 3 with new. Down time: 3 hours
04/28/2003	Pumphouse B8; decreased the pressure on the valve and increased the flow rate to 140 gpm. Down time: None.
04/28/2003	Pumphouses B3 and B4; attempted to adjust the flow rates via valve adjustment; valves are wide open and flow rate is at maximum. Pumps are likely failing. Down time: None.
04/30/2003	Treatment System; B6 flashing on PLC; Reset PLC and B6 relit normally. Down time: 15 hours.

May 2003

05/2/2003 - 05/5/2003	Pumphouse B3; Flow rate has been steadily declining; Troubleshooting indicates pump and motor failing; All Enviro contracted to replace pump and motor with 30 hp pump and motor. Laughlin Electric also contracted to upgrade starter from size 2 to size 3. Down time: 78 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

05/5/2003	Potable system alarm, GSR low, now at 9.4, tower at 26'. Channels 20, 05, 06 disarmed. Pipe behind softening tank B 5 dripping faster, informed Rick Boyer. Down time: None.
05/5/2003	Pumphouse B2; Erosion by pumphouse getting worse, almost to the access road around the pumphouse. Down time: None.
05/6/2003	Pumphouse B12; Laughlin Electric installed new surge arrestor. Down time: None.
05/7/2003	Pumphouse B5; B5 light flashing at PLC. Reset PLC and B5 operational. Reduced PSI from 112 to 104. Pump and motor running properly. Possible micro switch tripped via valve stem disk. Down time: 18 hours.
05/13/2003	Treatment System and Pumphouses; Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours
05/14/2003	Treatment System and Pumphouses; Daily inspection not performed due to miscommunication between technicians. Meter readings estimated. Down time: None.
05/15/2003	Treatment System and Pumphouses; Turned off treatment system and extraction wells to perform annual maintenance and electrical inspection. Down time: 8 hours
05/23/2003	Treatment System; Laughlin Electric installed new lighting. Down time: None.
05/23/2003	Treatment System and Pumphouses; The motor for wet well pump 3 failed; All Enviro removed and replaced the old motor with a rebuilt motor from inventory. Down time: 3.5 hours.
05/26/2003	Treatment System and Pumphouses; Daily inspection not performed due to Memorial Day holiday. Meter readings estimated. Down time: None.

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05/27/2003	Pumphouse B11; Laughlin electric performed electrical servicing. Down time: 1.5 hours
05/29/2003	Pumphouse SC4; Flow meter body cracked. Replaced with new from inventory. Down time: None.
05/29/2003	Pumphouse B3; Pilot failed; removed pilot from pumphouse B3 and with pilot from pumphouse B12. Down time: None.
05/29/2003	Pumphouse B4; Pump and motor failed. All Enviro scheduled to remove and replace failed components and upgrade 3" diameter drop pipe to 4" diameter pipe on 6/4/2003. Down time: 74 hours

June 2003

06/4/2003	Pumphouse B6; Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 13 hours.
06/4/2003	Pumphouses B2 (B13), B3, B4, B5, B6, B8, B9, B11, SC1, SC2 and SC5; Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours at each pumphouse.
06/1/2003 - 06/4/2003	Pumphouse B4; Pump and motor failed; All Enviro replaced with new. Down time: 90 hours.
09/8/2003	Pumphouse B6; Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 9 hours.
06/9/2003	Pumphouse B1; Laughlin Electric installed surge arrestor fuse box. Down time: 0.5 hours.
06/11/2003	Pumphouses B4, B5, B6, B8 and B9; Power outage; Xcel responded and repaired. Down time: 10 hours at each pumphouse.
06/17/2003	Treatment System and Well Field; An electrical fire at a substation shut down power to the treatment system. Power restored and the treatment system and well field were reset. Down time: Treatment system and well field for 6 hours.

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06/17/2003	Pumphouse B3; pitless adapter leaking. All- Enviro replaced failed O-Ring. Down time: None.
06/21/2003	Pumphouse B6; Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 8 hours.
06/25/2003	Treatment System and Well Field; A storm shut down power to the treatment system at 1:30 AM. Power restored and the treatment system and well field were reset. Down time: 33 hours at each pumphouse.
06/28/2003	Treatment System; PDU #1 failed due to insufficient pump pressure at start up. Reset starter at power panel and observed normal operation at PDU #1. Down time: None.
06/26/2003 - 06/30/2003	Pumphouse SC5; SC5 light flashing at PLC. Reset PLC and SC5 relit normally. Adjusted microswitch valve nut on valve stem and pump operated normally. Control valve problems ensued. Flushed control valve piping and adjusted speed control valves and pilot until valve operated normally. Down time: 65 hours.

July 2003

07/1/2003	Pumphouse SC5; Control valve not maintaining constant pressure as before; Reflush control piping and reset speed control valves and pilot. Valve operates normally. Down Time: 24 hours.
07/1/2003	Altitude Valve; Altitude valve would not close on command; water overflowing out top of water tower; flush control piping, adjust valve and observe normal operation. Down time: 0.5 hours at each pumphouse.
07/2/2003 - 07/3/2003	Pumphouse B9; B9 light flashing on PLC; reset PLC and B9 light went out; Replace failed communication card in B10 control panel and B9 restarted normally. Down time: 11 hours.
07/11/2003	Treatment System and well Field; Xcel Energy shut down power to the TGRS to perform work on electrical grid. Down time: 2 hours at each pumphouse.

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07/13/2003	Treatment Center; Upon performing daily inspection, the Treatment system and extraction wells were off. No power at PDU 2; Auto dialer did not call out; Replaced blown fuse in mother board. Down time: 17.5 hours at B1 and B9; 34 hours at B3, B4, B5, B6 and SC2; 40 hours at B8, B11, B13, SC1 and SC5.
07/14/2003	Treatment System and Well Field; well field cycling on arrival, Major fault at PDU #3; No alarms; Autodialer normal but did not call out. Reset well field panel and PDUs. Down time: 7 hours at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2; 15 hours at SC5.
07/14/2003	Pumphouse SC5; Valve not maintaining constant pressure; flushed piping, adjusted speed control valves and pilot and observed normal operation. Down time: None.
07/15/2003	Altitude Valve; Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours at each pumphouse.
07/15/2003	Treatment System; Wet well pump 4 shaft leaking; All Enviro repacks shaft. Down time: None (system already down for altitude valve troubleshooting work).
07/18/2003	Pumphouse B1; Loud spraying noise from inside well casing; All Enviro pulls lift system and replaces failed check valve with new. Down time: 5 hours.
07/20/2003	Treatment System; Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel and PDU #3 and adjusted control piping. Down time: None.
07/21/2003	Treatment System; Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours at B3, B4, B5, B6, B8, B11, B13, SC2 and SC5.
07/21/2003	Altitude Valve; Water level in tower at 21.5 ft; Manually opened altitude valve until water level reached 34.6 ft and manually closed valve. Down time: None.
07/23/2003	Pumphouse SC5; Light flashing on PLC; Reset PLC and light came on normally. Down time: 20 hours.

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August 2003

08/1/2003	Treatment System; Water Tower level at 14.5'; Manually opened altitude valve and filled tower to 36.5 ft. B10 control power was off. Replaced 3-way solenoid valve on ECV 3. Down time: None.
08/2/2003	Pumphouse B6; B6 light flashing on PLC; Reset the well field and the B6 light relit normally. Down time: 4 hours.
08/8/2003	Altitude valve, Treatment System and Well Field; All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 10 hours at B1 and B9; 8 hours at B3, B4, B5, B6, B8, B11, SC1, SC2 and SC5 and 4 hours at B13.
08/11/2003 - 08/12/2003	Treatment System; ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours at B1, B4, B5, B6, B9 and SC5; 10 hours at B3, B8, B11, SC1 and SC2; 3 hours at B13.
08/18/2003 - 08/19/2003	Elevated tank; The tank level is low; Manually fill tank to level between 34 - 36 ft. Down time: None.
08/20/2003 - 08/21/2003	Pumphouse SC5; SC5 light flashing on PLC; Reset the well field and the light for SC5 relit normally; SC5's ECV is not opening; flushed control piping and observed normal operation. Down time: 20 hours.
08/22/2003	Altitude Valve; All Enviro on Site by his own volition to clean and adjust the old solenoid valve in an attempt to get it to work while waiting for arrival of new solenoid valve. Down time: None.
08/27/2003 - 08/31/2003	Treatment System; Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours at B1, B13, B4, and SC5; 78 hours at B3, B5, B6, B8, B11, SC1 and SC2 and 60 hours at B9.

September 2003

08/30/2003 - 09/2/2003	Treatment System and Well Field; TGRS down to repair ECV's 1, 2 and 4. Restarted treatment system and well field at 06:20 on 9/2/2003. Down time: 46 hours.

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09/3/2003	Treatment System; Installed a new 3-way solenoid on ECV 4. Adjusted pilot, changed filter and installed vent tube from pilot to make PDU 4 close when activated by the switch. Down time: 1 hour.
09/3/2003	Treatment System; ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 1.5 hours at B1; 5 hours at B13, B4 and SC5 and 8.5 hours at B3, B5, B6, B8, B11, SC1 and SC2.
09/7/2003	Pumphouse B5; Flow meter inoperable. Removed and replaced with new meter and totalizer from inventory. Down time: None.
09/6/2003 - 09/18/2003	Pumphouse B13; B13 producing low flow rates. Cleaned meter and compared accuracy with B3's meter. Meters compared closely. Well producing heavy Iron and Manganese. Treated well with 150 pounds of Dry Acid Special. Compared flow meter with flow meter from B5 and B5 meter read 90 gpm. Left B5 meter in place and retired old B13 flow meter. Down time: None, due to false meter readings, manually adjusted flow rates to 90 gpm each day.
09/15/2003 - 09/19/2003	Pumphouse SC2; All Enviro contracted to circulate acid through well and piping. Pump and motor failed when attempting to circulate acid due to too much sludge. Pulled and replaced pump and motor. Down time: 92 hours.
09/18/2003	Pumphouses B1, B13, B3, B4, B5, B6, B8, B9, and B11; Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours each.
09/19/2003 - 09/20/2003	Pumphouse B5; Pump motor failed; Gate valve not opened after switching of flow meter with B13 and motor burned out. All Enviro/Sampson Brothers pulls pump and installs new motor. Down time: 49 hours.
09/22/2003	Pumphouse B6; B6 light flashing at PLC. Reset PLC and B6 fully operational. Down time: 16 hours.

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09/23/2003 - 09/27/2003	Pumphouse SC5; Grinding noise coming from inside well; Water level measurement performed. No water encountered, probe contacts top of shroud at 128 feet btoc; Pumping water level is at inlet of pump. Increased pressure to 80 psi to decrease flow rate and increase pumping water level. Grinding noise ceased. Down time: None.
09/23/2003	Pumphouse SC2; Water level measures 148.8 feet btoc. Down time: None.
09/23/2003 - 09/29/2003	Pumphouse B13; Grinding noise coming from inside well; Water level measurement performed. No water encountered, probe contacts top of shroud at 116 feet btoc; Pumping water level is at inlet of pump. Adjusted pressure to 105 psi to decrease flow rate and increase pumping water level. Down time: None.
09/25/2003	Altitude Valve; All Enviro on Site from 8:30 to 10:30 to troubleshoot altitude valve; observed altitude valve open and close in hand position several times but slowly, 8 minutes per cycle. Down time: None
09/30/2003	Altitude Valve, Treatment System and Well Field; All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: B1, B13, B3, B4, B5, B6, B8, B9, B11, SC1, SC2 and SC5 were down for 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Pumphouses B1, B13, B3, B4, B5, B6, B8, B9, B11, SC1, SC2 and SC5; Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

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MAINTENANCE ACTIVITIES BY LOCATION
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Pumphouse B1

10/8/2002	Pumphouse down intermittently to replace pump disconnect switch. Down time: 72 hours.
10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/17/2002	Submersible pump failed. All Enviro pulled lift system and Bergerson Caswell video taped the well. Check valve failed and jetted a hole in the well screen at 109 ft btoc. Sand wore down pump impellars. Down time: 288 hours.
12/1/2002 - 12/6/2002	Install a temporary used 40 hp pump and motor to troubleshoot hole in screen. Down time: 119 hours.
12/14/2002 - 12/19/2002	Install new pump and motor. Down time: 137 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/20/2003	Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours.
03/1/2003	B1 light not lit on PLC in Building 116, cycled PLC and B1 lit normally. Down time: 19 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 3 hours.

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04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
06/9/2003	Laughlin Electric installed surge arrestor fuse box. Down time: 0.5 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/18/2003	Loud spraying noise from inside well casing; All Enviro pulls lift system and replaces failed check valve with new. Down time: 5 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 10 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 1.5 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.

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09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B2

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/18/2002	Pumphouse shutdown. Deemed no longer necessary as part of the remedy. Extraction well B13 piped into pumphouse B2. Down time: 0 hours.
05/5/2003	Erosion by pumphouse getting worse, almost to the access road around the pumphouse. Down time: None.

Pumphouse B3

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.

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01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/20/2003	Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 9 hours.
04/5/2003 - 04/11/2003	Meter not functioning properly; installed new from inventory; flow rates estimated from 4/5/03 - 4/11/03. Down time: None.
04/11/2003	Flow meter failed, impeller shaft damaged. Installed new meter from inventory. Down time: 1 hour.
04/28/2003	Attempted to adjust the flow rates via valve adjustment; valves are wide open and flow rate is at maximum. Pumps are likely failing. Down time: None.
05/2/2003 - 05/5/2003	Flow rate has been steadily declining; Troubleshooting indicates pump and motor failing; All Enviro contracted to replace pump and motor with 30 hp pump and motor. Laughlin Electric also contracted to upgrade starter from size 2 to size 3. Down time: 78 hours.
05/13/2003	Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours
05/29/2003	Pilot failed; removed pilot from pumphouse B3 and with pilot from pumphouse B12. Down time: None.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.

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06/17/2003	Pitless adapter leaking. All- Enviro replaced failed O-Ring. Down time: None.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 10 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.

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09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B4

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
02/4/2003	Pumphouse not inspected on 2/4-5/2003 because snow was not plowed from the road. Meter readings estimated. Down time: None.

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03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 3 hours.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
04/28/2003	Attempted to adjust the flow rates via valve adjustment; valves are wide open and flow rate is at maximum. Pumps are likely failing. Down time: None.
05/13/2003	Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours
05/29/2003	Pump and motor failed. All Enviro scheduled to remove and replace failed components and upgrade 3" diameter drop pipe to 4" diameter pipe on 6/4/2003. Down time: 74 hours
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
06/1/2003 - 06/4/2003	Pump and motor failed; All Enviro replaced with new. Down time: 90 hours.
06/11/2003	Power outage; Xcel responded and repaired. Down time: 10 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.

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08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 5 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th; however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B5

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.

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11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/4/2003	Submersible pump and motor fail. Replaced with new. Down time: 158 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
3/13/2003 - 03/15/2003	Forcemain pressure at B5 climbing, reducing flow rate. Valve adjustments performed. Down time: 30 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 6 hours at B5.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
05/7/2003	B5 light flashing at PLC. Reset PLC and B5 operational. Reduced PSI from 112 to 104. Pump and motor running properly. Possible micro switch tripped via valve stem disk. Down time: 18 hours.

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06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
06/11/2003	Power outage; Xcel responded and repaired. Down time: 10 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/7/2003	Flow meter inoperable. Removed and replaced with new meter and totalizer from inventory. Down time: None.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.

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09/19/2003 - 09/20/2003	Pump motor failed; Gate valve not opened after switching of flow meter with B13 and motor burned out. All Enviro/Sampson Brothers pulls pump and installs new motor. Down time: 49 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th; however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B6

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.

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04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
04/30/2003	B6 flashing on PLC; Reset PLC and B6 relit normally. Down time: 15 hours.
06/4/2003	Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 13 hours.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
09/8/2003	Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 9 hours.
06/11/2003	Power outage; Xcel responded and repaired. Down time: 10 hours.
06/21/2003	Light flashing at PLC. Reset PLC at the beginning of the inspection and pumphouse operated normally. Down time: 8 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/2/2003	B6 light flashing on PLC; Reset the well field and the B6 light relit normally. Down time: 4 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.

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08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.
09/22/2003	B6 light flashing at PLC. Reset PLC and B6 fully operational. Down time: 16 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B8

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours each.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.

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01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/28/2003	Pumphouses cycling. Reset at PLC. Down time: 24 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 4 hours.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 7 hours.
04/28/2003	Decreased the pressure on the valve and increased the flow rate to 140 gpm. Down time: None.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
06/11/2003	Power outage; Xcel responded and repaired. Down time: 10 hours.

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07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 10 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

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Pumphouse B9

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
12/10/2002 and 12/11/2002	Install new (higher capacity) pump and motor. Upgrade electrical controls to accommodate larger pump and motor. Down time: 28 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/26/2003	Flow meter failed; swapped out with new from inventory. Meter reading adjusted to account for incorrect meter reading. Down time: none
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
06/11/2003	Pumphouses Power outage; Xcel responded and repaired. Down time: 10 hours.

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07/2/2003 - 07/3/2003	B9 light flashing on PLC; reset PLC and B9 light went out; Replace failed communication card in B10 control panel and B9 restarted normally. Down time: 11 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 10 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 60 hours.
09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B10

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.

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11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours each at B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2 and SC5.
12/11/2002	The pumphouse was turned off as authorized by the Agencies.

Pumphouse B11

10/9-10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/20/2003	Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 3 hours.

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04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 7 hours.
05/13/2003	Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours
05/27/2003	Laughlin electric performed electrical servicing. Down time: 1.5 hours
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 10 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.

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09/18/2003	Power outage to boundary pumphouses due to wind blowing power lines into trees between B1 and B11. Xcel Energy on Site. They replaced 2 blown fuses at power pole near Gate 4 and cut down trees. Wells were restarted at 12:30. Down time: 17 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse B12

04/10/2003	Xcel energy and Laughlin on-Site to energize newly installed power bank on power pole near B7 and check direction of current to pump in B7; Upon energizing new power bank, an electrical short occurred in B12; Laughlin to order new electrical parts, schedule a meet with Xcel to shut down power to B12 and install new electrical parts. Xcel will then re-energize power bank and Laughlin will check current direction. Down time: None.
05/6/2003	Laughlin Electric installed new surge arrestor. Down time: None.
05/13/2003	Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours

Pumphouse B13

01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.

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01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/20/2003	Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours.
02/4/2003	B13 light flashing on PLC. Reset PLC and B13 restarted properly. Down time: 13 hours.
02/8/2003	B13 light flashing on PLC. Reset PLC and B13 restarted properly. Down time: 4 hours.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 4 hours.

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08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 3 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 5 hours.
09/6/2003 - 09/18/2003	B13 producing low flow rates. Cleaned meter and compared accuracy with B3's meter. Meters compared closely. Well producing heavy Iron and Manganese. Treated well with 150 pounds of Dry Acid Special. Compared flow meter with flow meter from B5 and B5 meter read 90 gpm. Left B5 meter in place and retired old B13 flow meter. Down time: None, due to false meter readings, manually adjusted flow rates to 90 gpm each day.
09/23/2003 - 09/29/2003	Grinding noise coming from inside well; Water level measurement performed. No water encountered, probe contacts top of shroud at 116 feet btoc; Pumping water level is at inlet of pump. Adjusted pressure to 105 psi to decrease flow rate and increase pumping water level. Down time: None.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse SC1

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.

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01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/20/2003	Turned off at 3:00 PM to prepare aquifer for upcoming pumping test. Down time: 163 hours.
01/25/2003	Flow meter ruptured and failed. Turned off downstream valve and ordered new flow meter. Down time: None (already down for B13 pumping test).
01/27/2003	Remove and Replace SC 1 flow meter and downstream 2" diameter, PVC forcemain piping. Down time: None (already down for B13 pumping test).
01/28/2003	PVC forcemain piping installed on 1/27/03 failed. Replaced with galvanized piping. Down time: None (already down for B13 pumping test).
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.

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07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 10 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse SC2

10/9/2002 - 10/10/2002	Treatment System and Well Field; TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours.
01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
01/24/2003	ARV leaking, low back pressure, closed valve. Down time: None.
01/28/2003	Pumphouses cycling. Reset at PLC. Down time: 24 hours.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 10 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 78 hours.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 8.5 hours.
09/15/2003 - 09/19/2003	All Enviro contracted to circulate acid through well and piping. Pump and motor failed when attempting to circulate acid due to too much sludge. Pulled and replaced pump and motor. Down time: 92 hours.
09/23/2003	Water level measures 148.8 feet btoc. Down time: None.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

Pumphouse SC3

10/4/2002	Pumphouse SC3; The pumphouse was shut off as authorized by the Agencies.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Pumphouse SC4

05/29/2003	Flow meter body cracked. Replaced with new from inventory. Down time: None.

Pumphouse SC5

10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours.
03/30/2003	ECVs 3 and 4 not opening/closing on command, air in forcemain. Adjusted open and close speed valves and observed normal operation. Down time: 3 hours.
04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: 3 hours.
04/12/2003 - 04/17/2003	Flow meter not functioning properly; switched SC5 meter with SC3 meter. Meter readings estimated from 4/12-17/03. Down time: None.
06/4/2003	Laughlin Electric installed fuse boxes for surge arrestors. Down time: 0.5 hours.

APPENDIX F-3

**MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA**

06/26/2003 - 06/30/2003	SC5 light flashing at PLC. Reset PLC and SC5 relit normally. Adjusted microswitch valve nut on valve stem and pump operated normally. Control valve problems ensued. Flushed control valve piping and adjusted speed control valves and pilot until valve operated normally. Down time: 65 hours.
07/1/2003	Control valve not maintaining constant pressure as before; Reflush control piping and reset speed control valves and pilot. Valve operates normally. Down Time: 24 hours.
07/15/2003	Altitude valve not functioning properly; After flushing and cleaning control piping, valve continues to fail. All Enviro performing troubleshooting tasks. Down time: 3.5 hours at each pumphouse.
07/21/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel, reset PDU 3 and adjusted speed control valves. Down time: 3 hours.
07/23/2003	Light flashing on PLC; Reset PLC and light came on normally. Down time: 20 hours.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 8 hours.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours.
08/20/2003 - 08/21/2003	SC5 light flashing on PLC; Reset the well field and the light for SC5 relit normally; SC5's ECV is not opening; flushed control piping and observed normal operation. Down time: 20 hours.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 5 hours.
09/23/2003 - 09/27/2003	Grinding noise coming from inside well; Water level measurement performed. No water encountered, probe contacts top of shroud at 128 feet btoc; Pumping water level is at inlet of pump. Increased pressure to 80 psi to decrease flow rate and increase pumping water level. Grinding noise ceased. Down time: None.
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.
09/30/2003	Laughlin Electric schedules Xcel Energy to be on site to shut off power to pumphouses. Laughlin installs fuses for electrical surge protection in each of the operating pumphouses. Xcel reenergizes power at 3 PM. Down time: None, treatment system and well field already off for altitude valve rebuild.

TREATMENT CENTER

10/9/2002	Visual inspection of Building 116 performed. Meter readings were not recorded, therefore, the daily meter readings were estimated.
10/9/2002 - 10/10/2002	TGRS cycling due to a valve malfunction on the discharge line at Snelling Avenue. Down time: 33 hours each at B1, B2, B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2, and SC5.
11/27/2002	Laughlin performed electrical maintenance at main PLC. Down time: 3 hours each at B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2 and SC5.
12/30/2002	PDU #2 failure. Starter short circuited. Replaced with new. Down time: 4 hours.
01/1/2003	PDU #3 failure. Well field cycling. Reset PLC and inspected float sensor in wet well 3 for normal operation. Down Time: 7.5 hours each at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

01/2/2003	PDU #3 failure. Well field cycling. Reset PLC. Contact Anik. Anik on-Site and determines faulty floats in WW3. Down Time: 7.5 hours each at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2.
01/3/2003	Turn off treatment system and well field to inspect floats in wet wells. WWP #3 pump stop float and WWP #4 pump start float have failed. Replacement scheduled. Down time: 2.5 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/6/2003	Replace WWP #3 pump stop float and WWP #4 pump start float. Normal operation observed. Down time: 2.5 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/8/2003	Treatment system cycling. Snelling Avenue valve at 80 psi. Adjusted valve to 38 psi. Down time: 27 hours each at B1, B3, B4, B5, B6, B8, B9, B11, B13, SC1, SC2 and SC5.
01/24/2003	ECV #4 would not close on command. Installed new filter and observed normal operation. Down time: None.
01/24/2003	Replaced WW2 pump start float, moved float up six inches and closed sluice gate. Restarted treatment system and well field and observed normal operation. Down time: 3 hours for Treatment system and well field (except B1, B3, B11, B13 and SC1 which are already off for B13 pumping test).
01/25/2003	PDU #2 closed without command. Opened sluice gate. Reset PDU #2 and PLC and observed normal operation. Down time: None.
01/25/2003	PDU #4 closed without command. Reset PDU #4 and PLC and observed normal operation. Down time: none.
01/27/2003	PDU #4 valve would not open on start up. Reset PDU #4 and changed control valve filter. Down time: None.
01/29/2003	ECV #4 pilot failed. Replaced with new. Down time: None.
02/3/2003 - 02/4/2003	Air release valve (ARV) chamber near B2 flooded. Pumped out chamber and ARV failed. Removed ARV and ordered replacement. Down time: 6 hours for treatment system and well field.
02/12/2003	Replaced ECV #3 pilot with new from inventory. Changed inline filters to ECV #3 and #4 . Down time: None.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

02/12/2003	Call from auto dialer at 11:15 PM, TGRS fail. Well field cycling. Inspected all ECVs, changed filter at ECV 1, reset PLC and observed normal operation. Down time: None.
02/14/2003	Call from auto dialer, ECV#2 not closing. Adjusted control valves but auto dialer continued to call out. Reset PLC and calls ceased. Down time: None.
03/5/2003	Stopped leaking water from motor packing glands at wet well pumps #2 and #4. Down time: None.
03/5/2003	Replaced leaking section of potable water line to ECV 1 ball valve with copper parts from inventory. Down time: None.
03/20/2003	Changed 3 way solenoid at ECV 4 and filters at ECVs 3 and 4 on 3/17 and 3/20. Down time: None.
03/24/2003	At 9:30 am, trending indicates a fault at B6 and a minor fault at PDU 3. ECV 1 and 4 valves would not close, replaced filters and adjusted open and close speed valves. Down time: None.
03/25/2003 - 03/31/2003	Pumphouse B9 not lit on PLC but pump is working properly. Anik contacted, inspection shows low power supply to pumphouse B10 is causing communication problem at paired pumphouse B9. Xcel contacted and installed a new transformer at power pole near B7. Down time: None.
03/27/2003	Call from autodialer at 1450, PDU 4 would not close on command, reset PDU and adjusted open speed valve. Down time: None.
04/7/2003	Wet well pump 1 wiring to pump stop float cracked and shorting out to wet well pump 1 valve. Rewired and replaced pump stop float. Down time: 3 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

04/7/2003	Discharge forcemain pressure at 92 psi (normally 50-75 psi) and Snelling Avenue pressure at 48 psi (normally 32 to 35 psi). One-quarter inch valve and copper piping on top of Snelling Avenue valve plugged. Cleaned piping and valve with a wire and muratic acid. Snelling Avenue discharge pressure back at 35 psi. Down time: B1, B4, B5, B6, B9, B13, SC1, SC2, and SC5 for 3 hours each and 7 hours each at B8 and B11.
04/10/2003	B6 flashing on PLC; Reset PLC and B6 relit normally. Down time: 8 hours.
04/11/2003	ECV # 2 not closing, pilot failed. Replaced pilot and operating solenoid valve. Down time: None.
04/16/2003	Replaced failed micro switch on ECV 3 with new. Down time: 3 hours
04/30/2003	B6 flashing on PLC; Reset PLC and B6 relit normally. Down time: 15 hours.
05/13/2003	Turned off treatment system and extraction wells to perform annual maintenance inspection. Down time: 2 hours
05/14/2003	Daily inspection not performed due to miscommunication between technicians. Meter readings estimated. Down time: None.
05/15/2003	Turned off treatment system and extraction wells to perform annual maintenance and electrical inspection. Down time: 8 hours
05/23/2003	Laughlin Electric installed new lighting. Down time: None.
05/23/2003	The motor for wet well pump 3 failed; All Enviro removed and replaced the old motor with a rebuilt motor from inventory. Down time: 3.5 hours.
05/26/2003	Daily inspection not performed due to Memorial Day holiday. Meter readings estimated. Down time: None.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

06/17/2003	An electrical fire at a substation shut down power to the treatment system. Power restored and the treatment system and well field were reset. Down time: Treatment system and well field for 6 hours.
06/25/2003	A storm shut down power to the treatment system at 1:30 AM. Power restored and the treatment system and well field were reset. Down time: 33 hours at each pumphouse.
06/28/2003	PDU #1 failed due to insufficient pump pressure at start up. Reset starter at power panel and observed normal operation at PDU #1. Down time: None.
07/1/2003	Altitude valve would not close on command; water overflowing out top of water tower; flush control piping, adjust valve and observe normal operation. Down time: 0.5 hours at each pumphouse.
07/11/2003	Xcel Energy shut down power to the TGRS to perform work on electrical grid. Down time: 2 hours at each pumphouse.
07/13/2003	Upon performing daily inspection, the Treatment system and extraction wells were off. No power at PDU 2; Auto dialer did not call out; Replaced blown fuse in mother board. Down time: 17.5 hours at B1 and B9; 34 hours at B3, B4, B5, B6 and SC2; 40 hours at B8, B11, B13, SC1 and SC5.
07/14/2003	Well field cycling on arrival, Major fault at PDU #3; No alarms; Autodialer normal but did not call out. Reset well field panel and PDUs. Down time: 7 hours at B3, B4, B5, B6, B8, B11, B13, SC1 and SC2; 15 hours at SC5.
07/15/2003	Wet well pump 4 shaft leaking; All Enviro repacks shaft. Down time: None (system already down for altitude valve troubleshooting work).
07/20/2003	Auto dialer calls out; Major fault at PDU 3; No fault light on. Reset well field panel and PDU #3 and adjusted control piping. Down time: None.
07/21/2003	Water level in tower at 21.5 ft; Manually opened altitude valve until water level reached 34.6 ft and manually closed valve. Down time: None.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

08/1/2003	Water Tower level at 14.5'; Manually opened altitude valve and filled tower to 36.5 ft. B10 control power was off. Replaced 3-way solenoid valve on ECV 3. Down time: None.
08/8/2003	All Enviro on site rebuilding altitude valve; shutdown the treatment system and well field to relieve pressure on altitude valve. Down time: 10 hours at B1 and B9; 8 hours at B3, B4, B5, B6, B8, B11, SC1, SC2 and SC5 and 4 hours at B13.
08/11/2003 - 08/12/2003	ECV 4 not opening on command; Replaced failed coil on solenoid, adjusted speed control valve, flushed control piping and changed filter and observed normal operation. Down time: 6 hours at B1, B4, B5, B6, B9 and SC5; 10 hours at B3, B8, B11, SC1 and SC2; 3 hours at B13.
08/22/2003	All Enviro on Site by his own volition to clean and adjust the old solenoid valve in an attempt to get it to work while waiting for arrival of new solenoid valve. Down time: None.
08/27/2003 - 08/31/2003	Electric check valves 1 and 2 will not shut off when commanded by PDUs 1 and 2. Also, ECV 4 not opening on command; Switch PDU 4 from "AUTO" to "OFF" to cycle well field. Anik Systems, LLC on site to troubleshoot; Adjusted speed controls and pilot, flushed control piping and changed filters. Down time: 33 hours at B1, B13, B4, and SC5; 78 hours at B3, B5, B6, B8, B11, SC1 and SC2 and 60 hours at B9.
08/30/2003 - 09/2/2003	TGRS down to repair ECV's 1, 2 and 4. Restarted treatment system and well field at 06:20 on 9/2/2003. Down time: 46 hours.
09/3/2003	Installed a new 3-way solenoid on ECV 4. Adjusted pilot, changed filter and installed vent tube from pilot to make PDU 4 close when activated by the switch. Down time: 1 hour.
09/3/2003	ECV 4 did not open on start up and upon inspection, ECV 2 and 4 were closed. Well field cycled within a 14 hour period. Flushed control piping, exercised valve and observed normal operation. Down time: 1.5 hours at B1; 5 hours at B13, B4 and SC5 and 8.5 hours at B3, B5, B6, B8, B11, SC1 and SC2.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

09/25/2003	All Enviro on Site from 8:30 to 10:30 to troubleshoot altitude valve; observed altitude valve open and close in hand position several times but slowly, 8 minutes per cycle. Down time: None
09/30/2003	All Enviro on site at 7:30 AM to drain remainder of water tower and take apart and rebuild altitude valve. Down time: B1, B13, B3, B4, B5, B6, B8, B9, B11, SC1, SC2 and SC5 were down for 16 hours on September 30th, however, due to our method of calculating downtime, the downtime for the 30th will be reported in the October 2003 flow report.

ELEVATED TANK

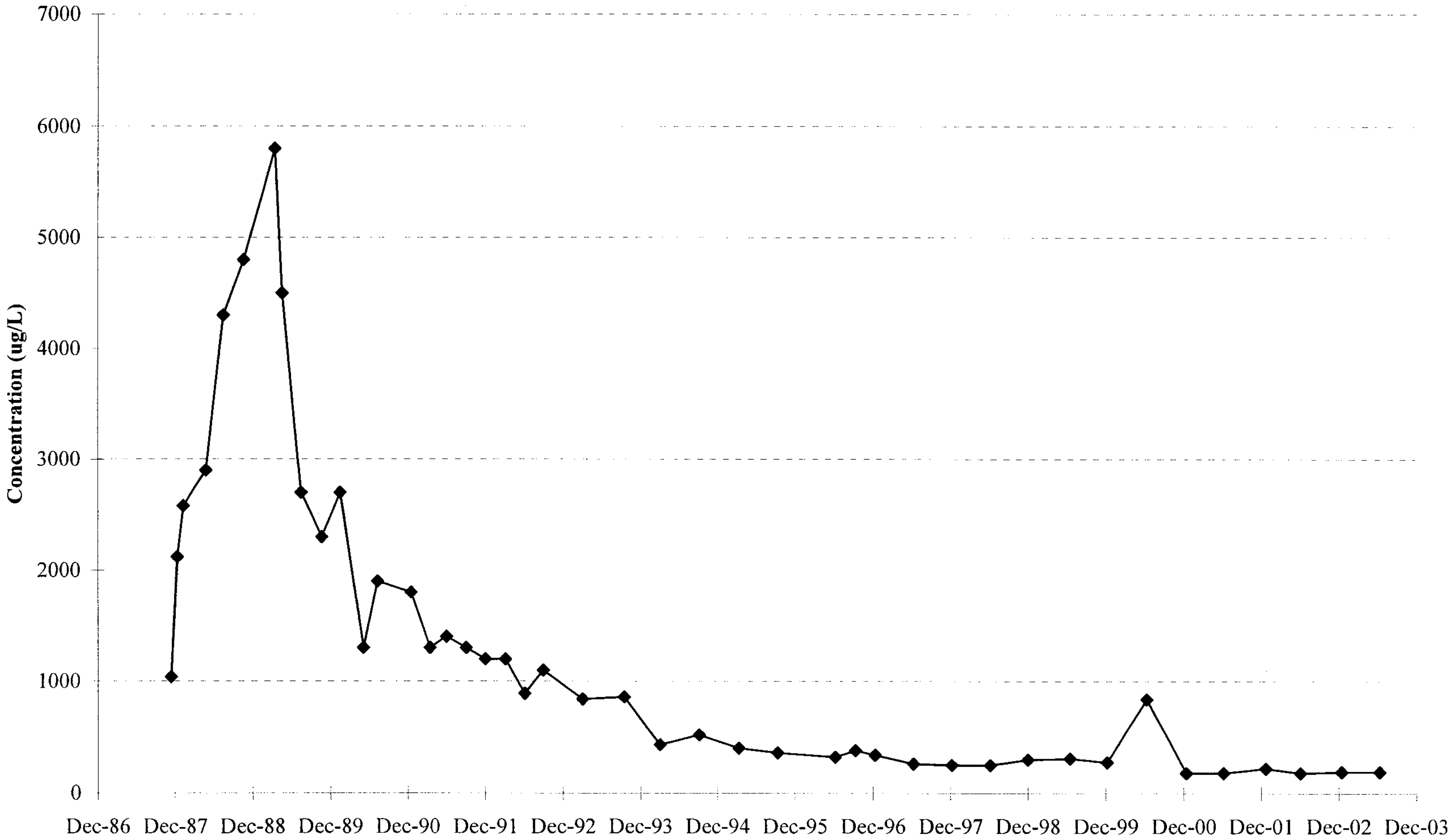
01/17/2003	Call from Dave Fuller, water tower filling slowly, altitude valve open. Snelling Avenue valve at 18 psi. Rinsed screen, flushed piping, adjusted psi to 28. Down time: None.
08/18/2003 - 08/19/2003	The tank level is low; Manually fill tank to level between 34 - 36 ft. Down time: None.

FORCEMAIN

01/31/2003	Water observed in ditch approximately 150 feet east of Building 116. Possible leak in discharge forcemain. Treatment system and well field turned off to inspect and troubleshoot. Further troubleshooting necessary. Down time: 2 hours.
02/21/2003	Inspected area of suspected discharge forcemain leak approximately 250 feet east of Building 116. Area showed an increase in the amount of ponded water and ice build up. Down time: None.
03/24/2003	Forcemain failure on raw water loop approximately 500 feet SW of pumphouse SC4. Area excavated and forcemain repaired. Down time: 174 hours each.

APPENDIX G-1

EXTRACTION WELL B1 - TRCLE VS.TIME

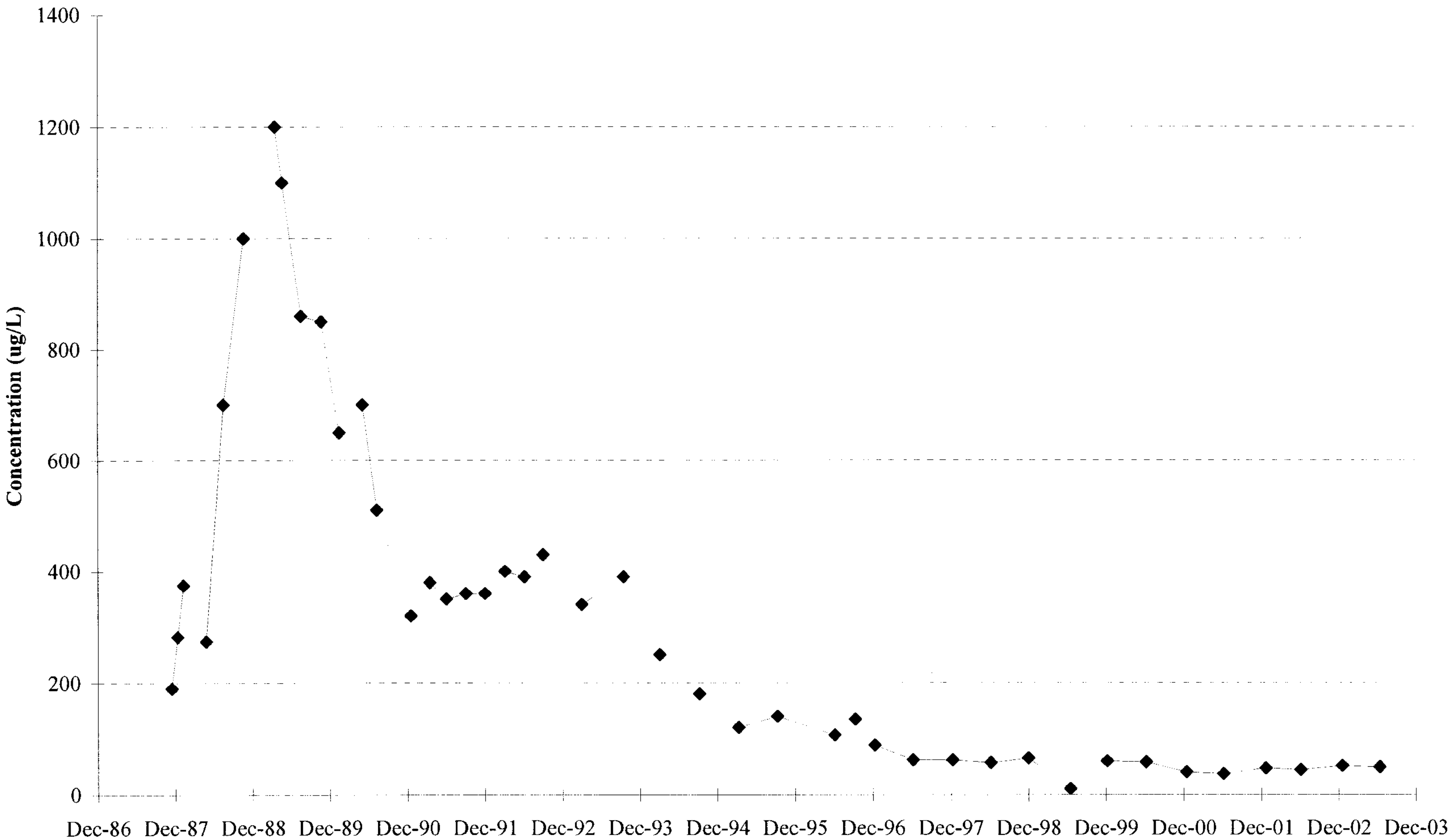


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B2 - TRCLE VS. TIME

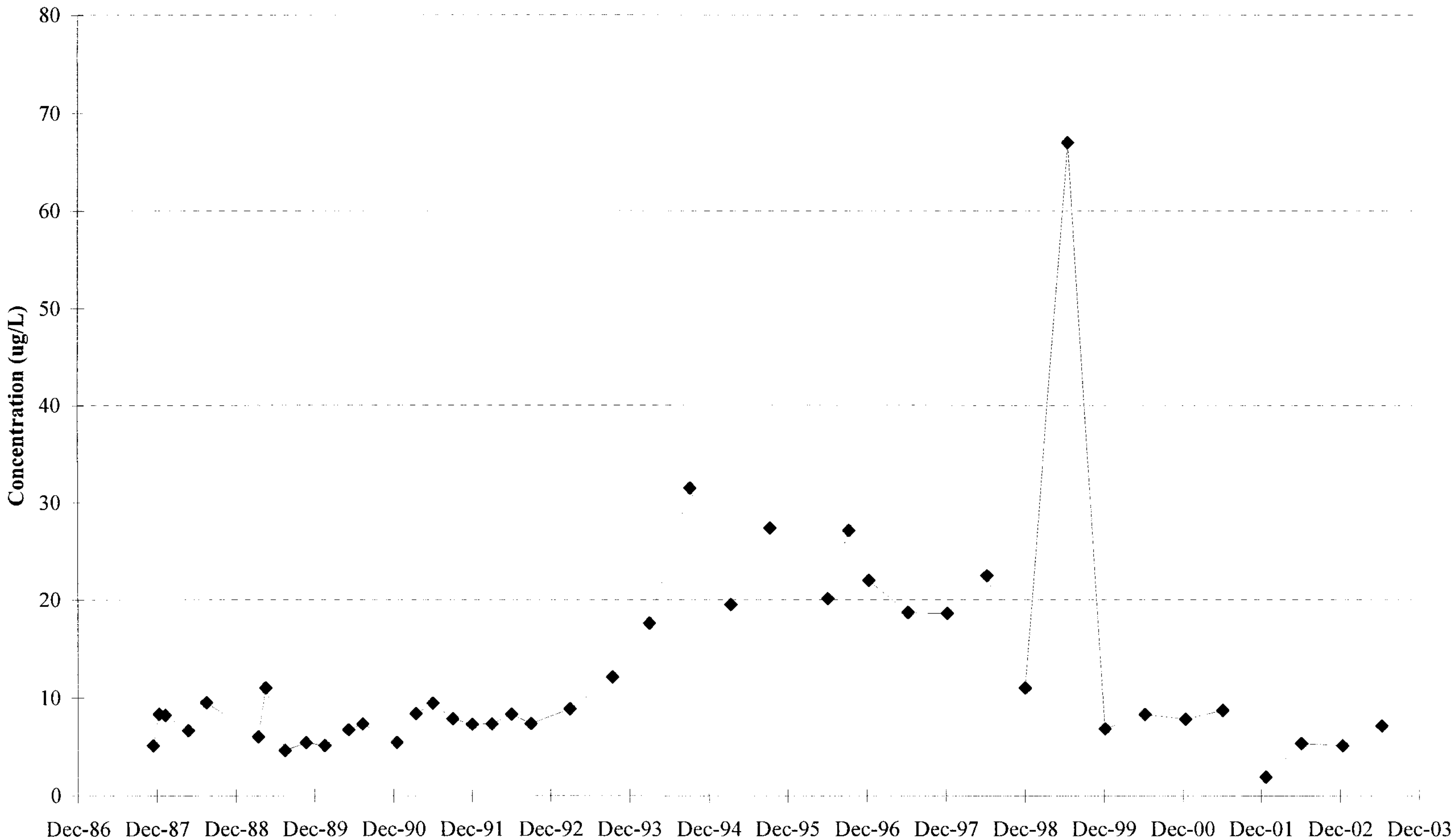


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B3 - TRCLE VS. TIME

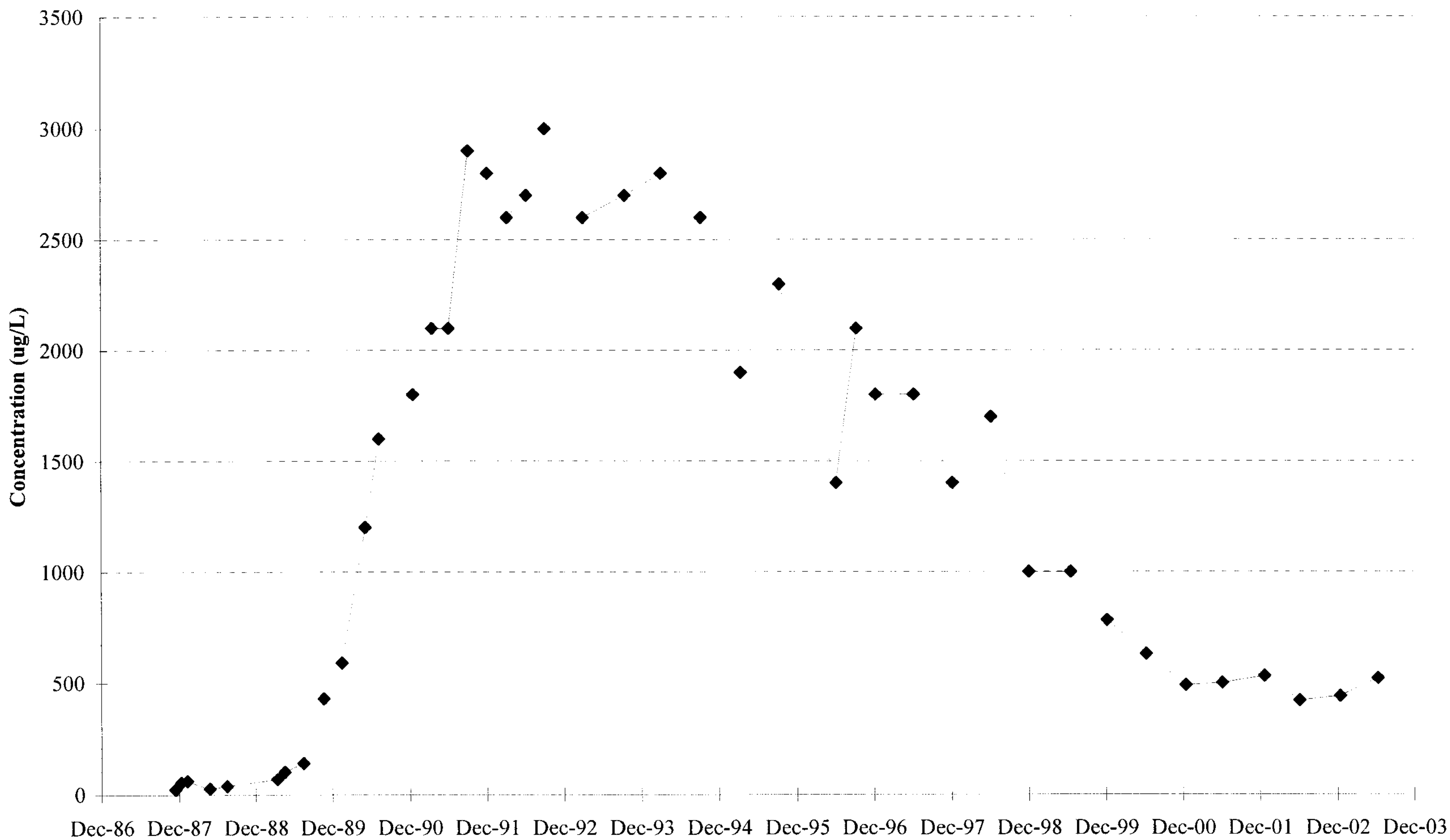


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B4 - TRCLE VS. TIME

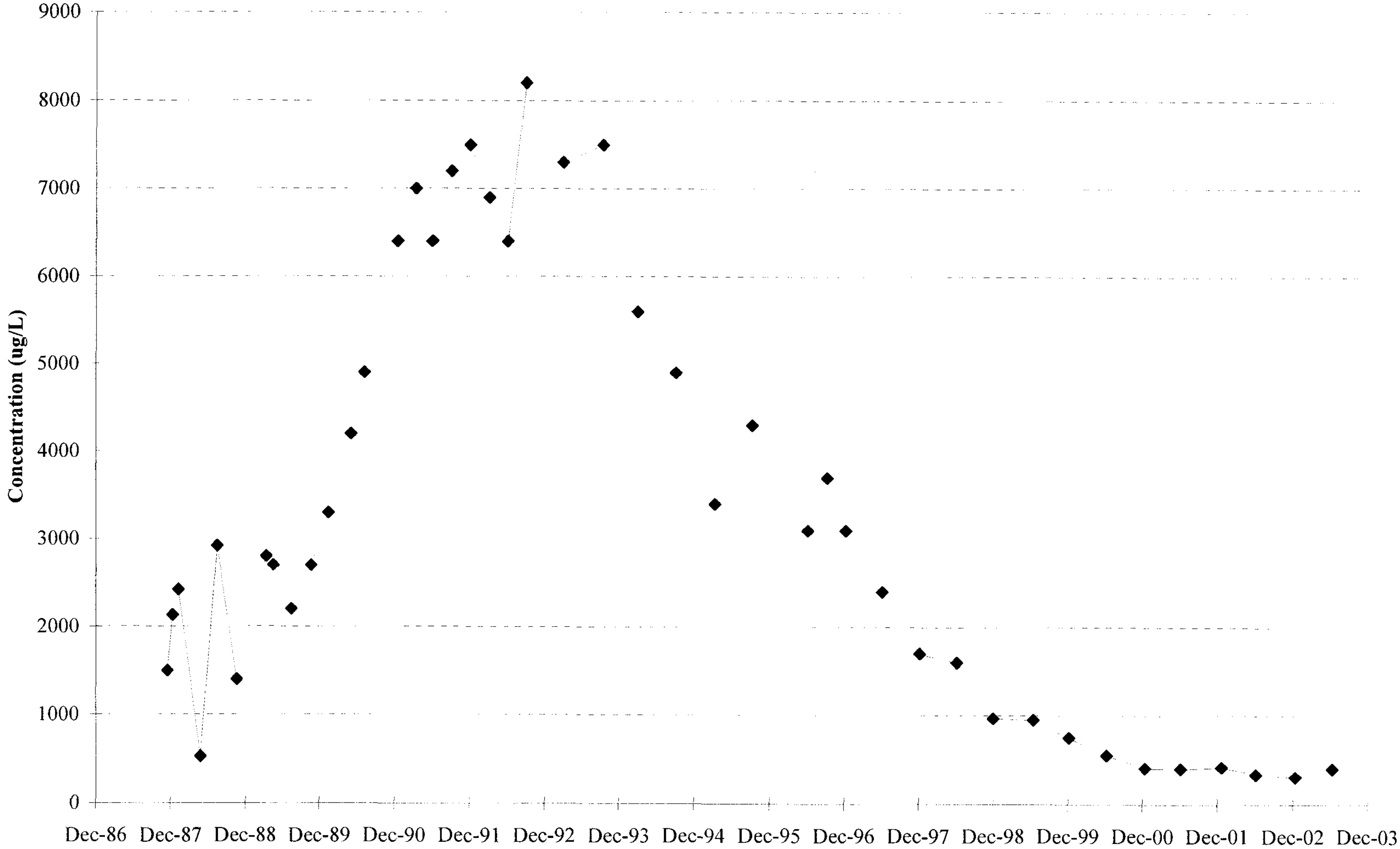


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B5 - TRCLE VS. TIME

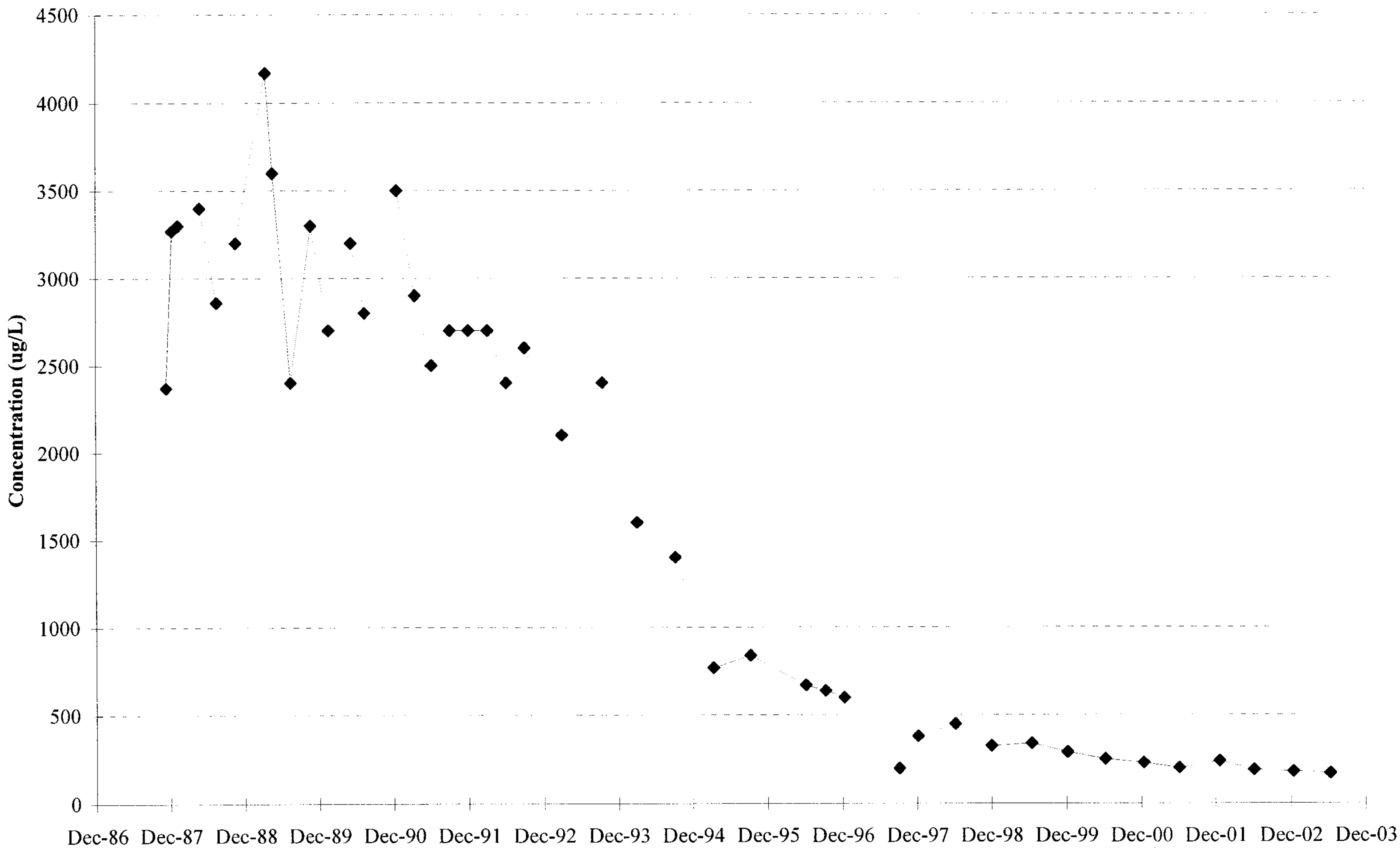


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B6 - TRCLE VS. TIME

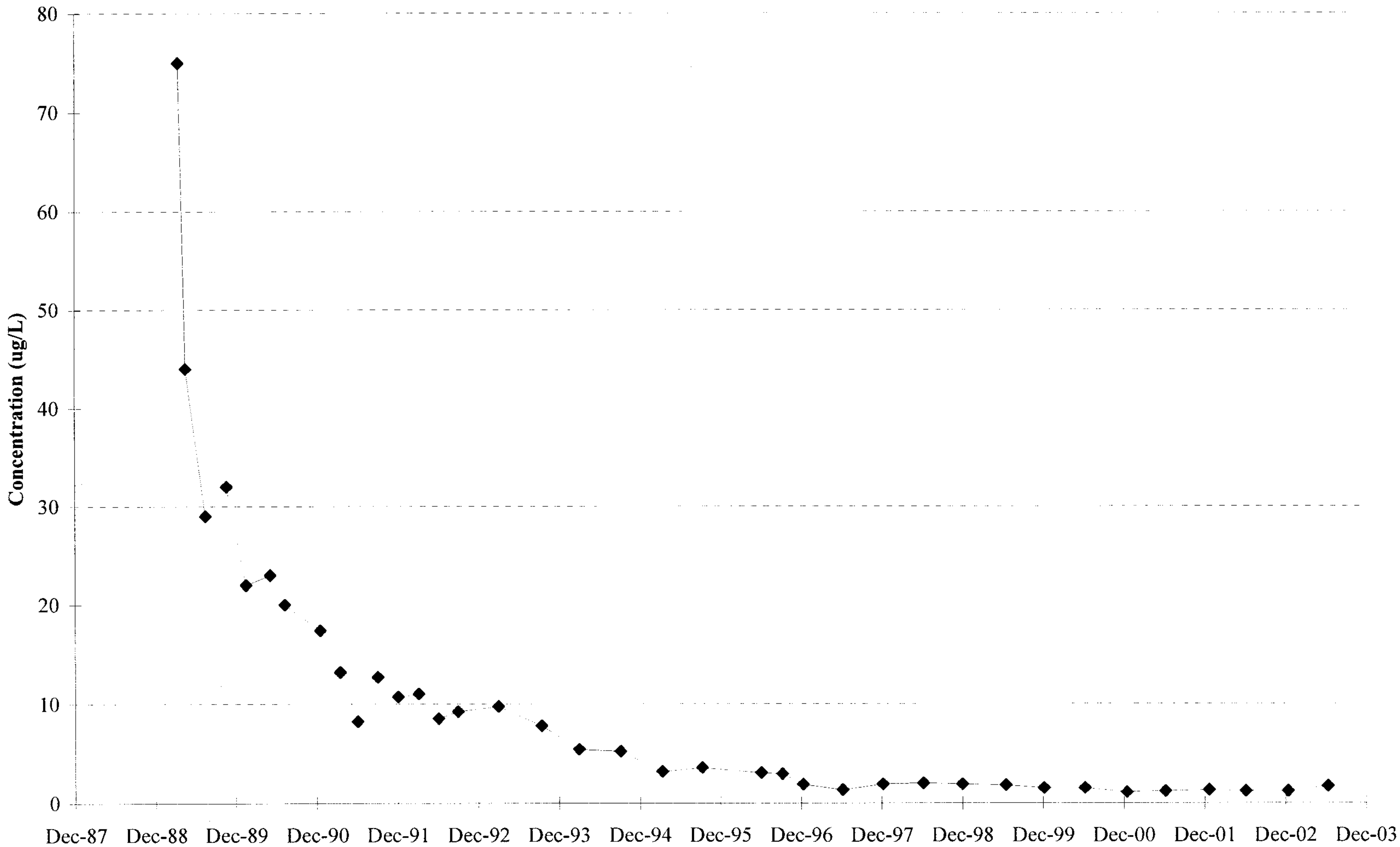


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B7 - TRCLE VS. TIME

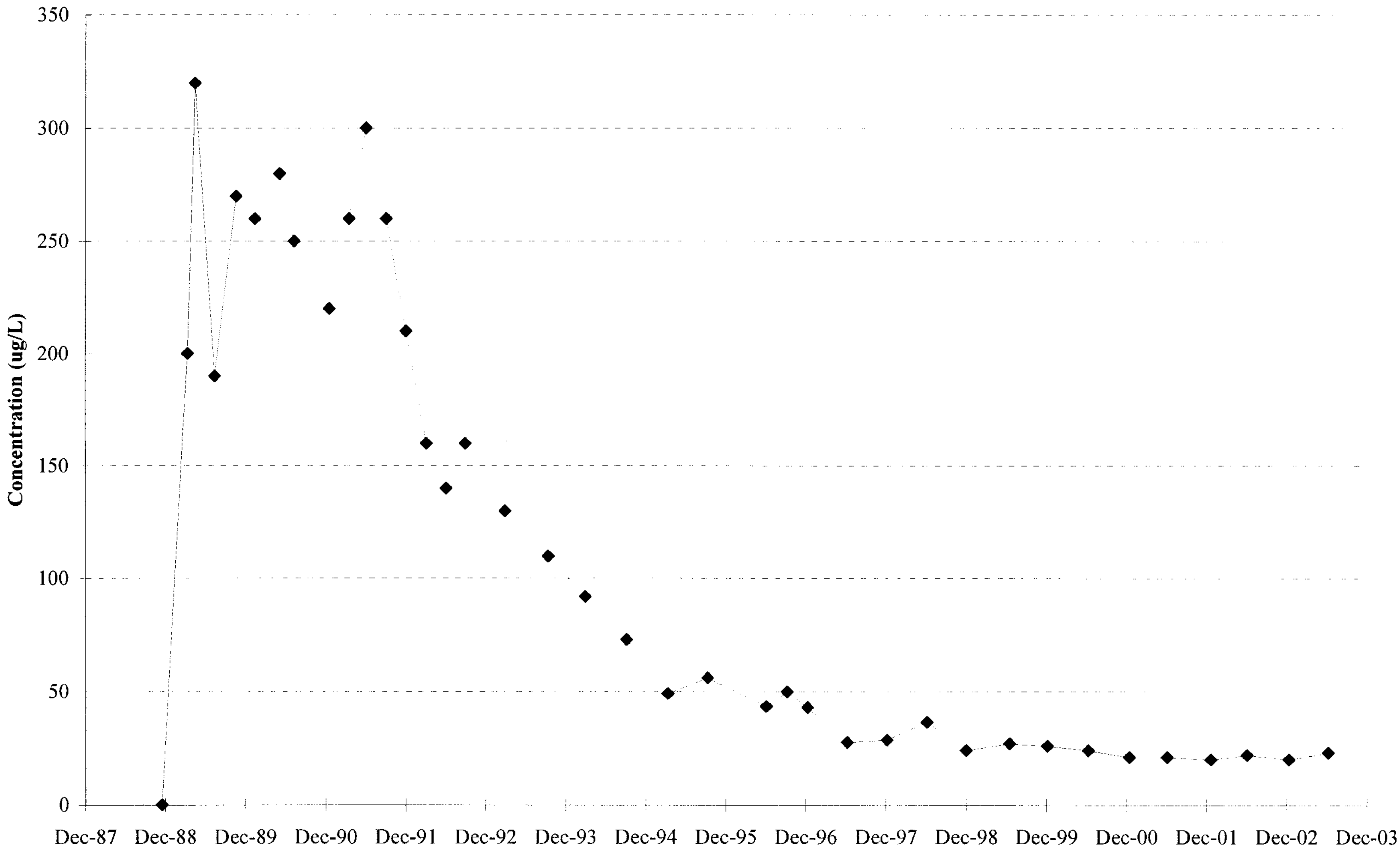


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B8 - TRCLE VS. TIME

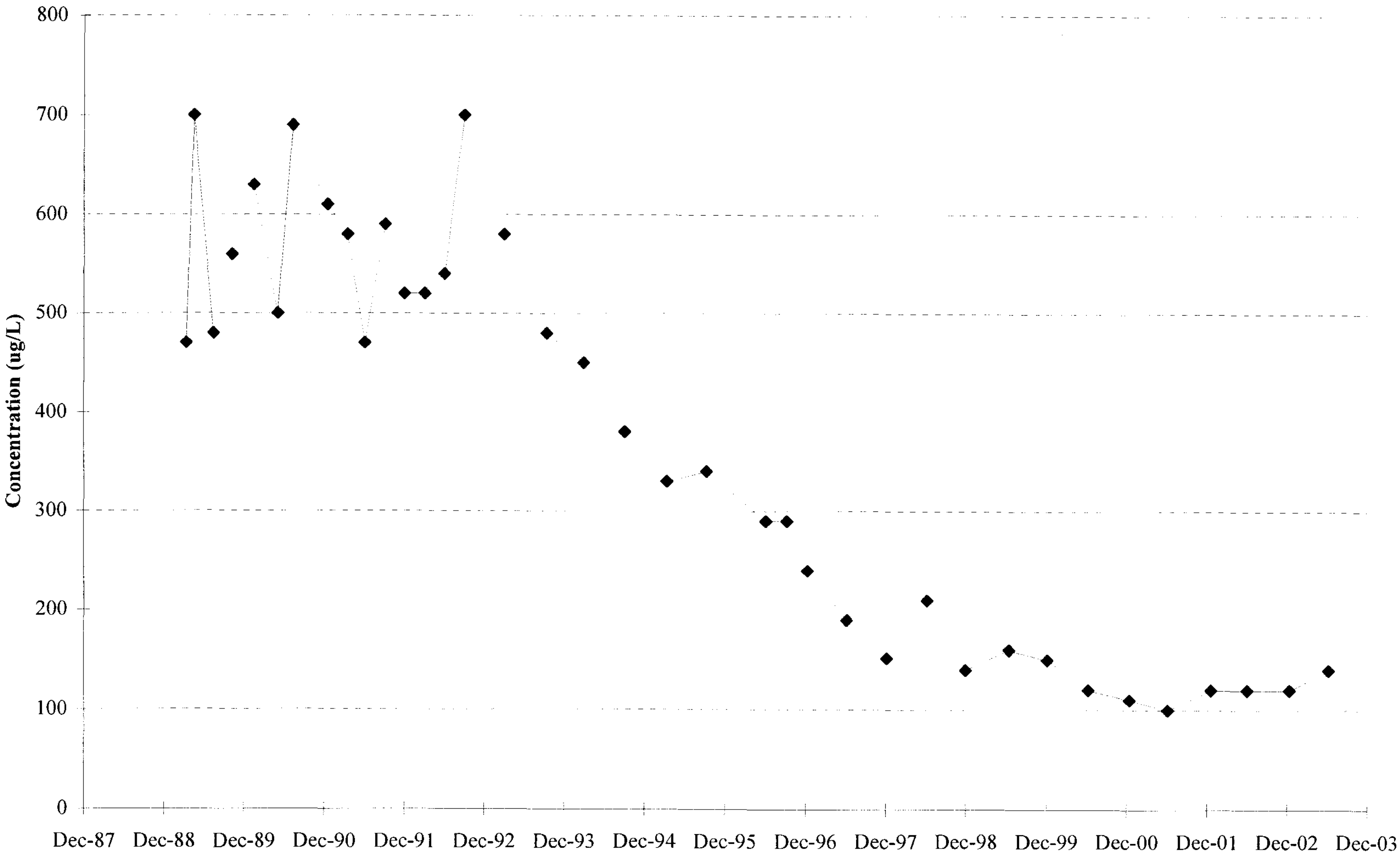


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

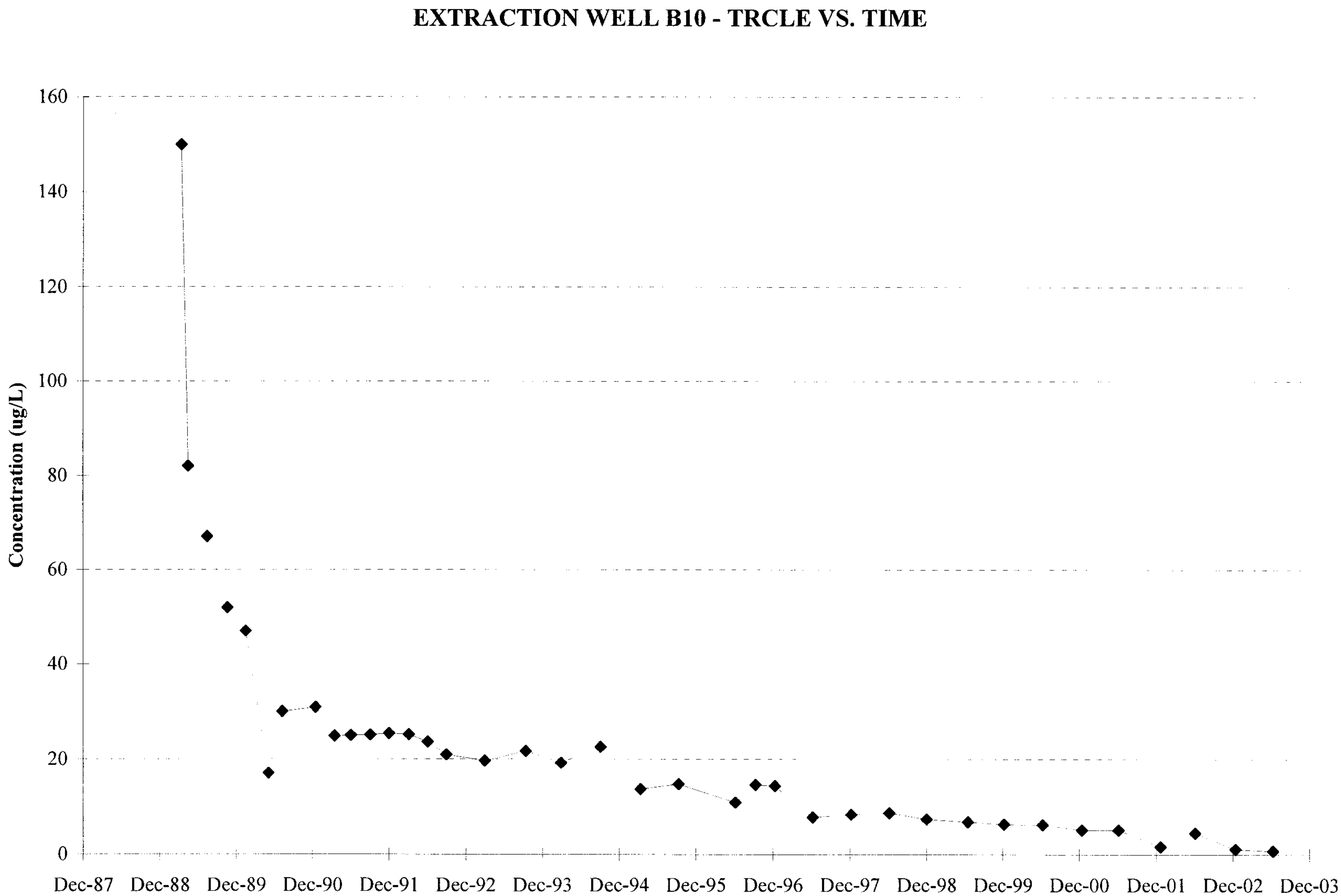
EXTRACTION WELL B9 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

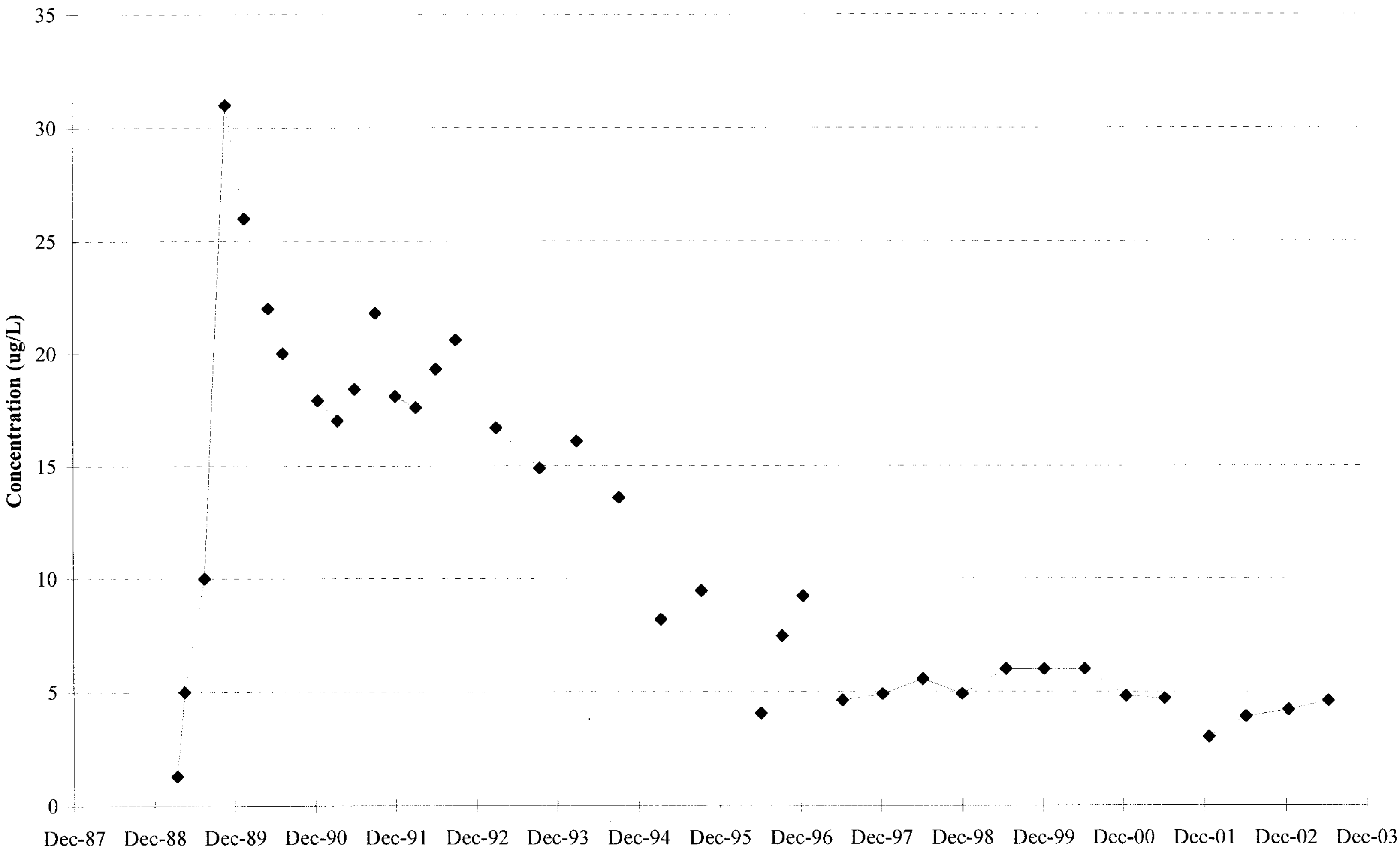


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B11 - TRCLE VS. TIME

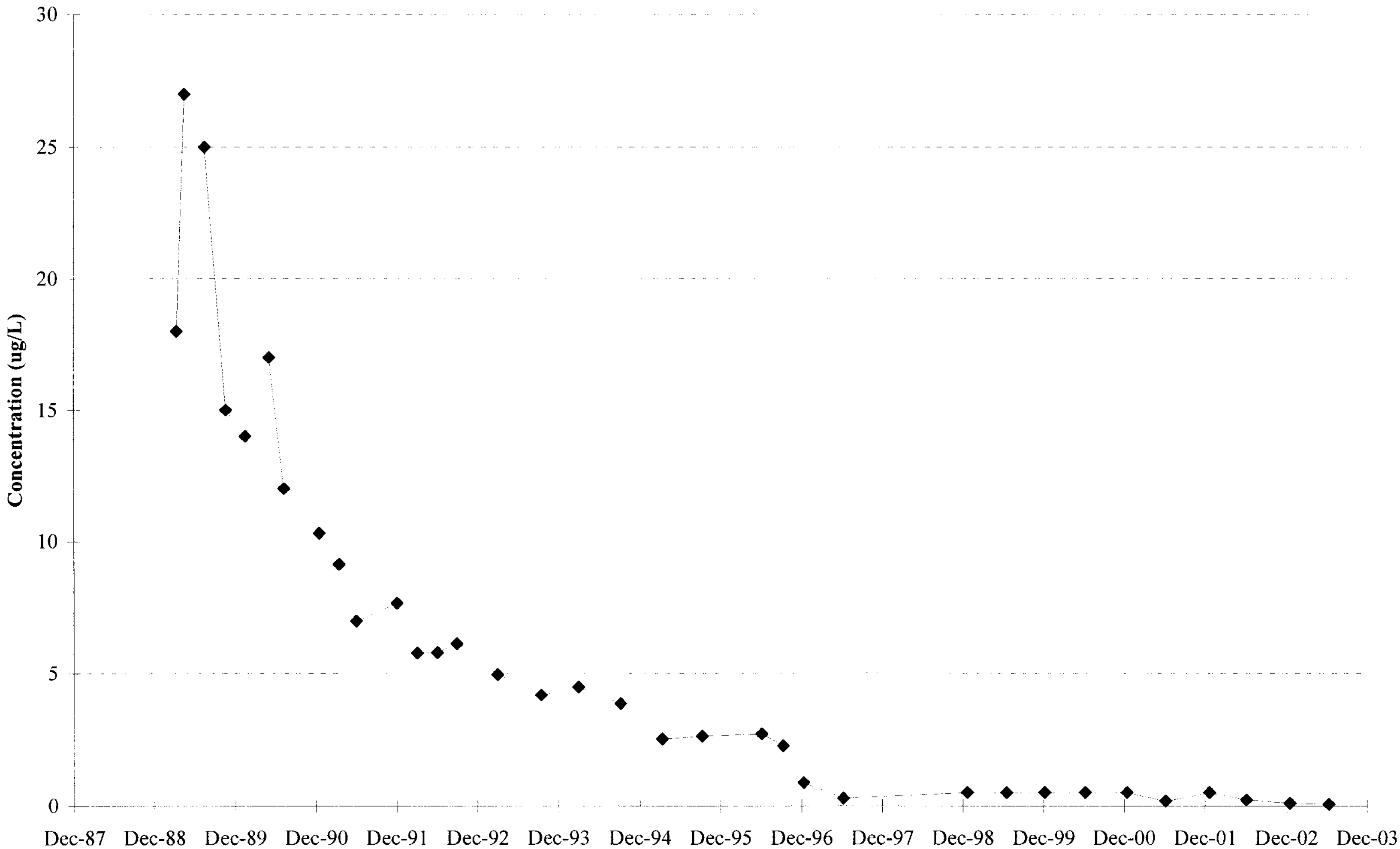


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B12 - TRCLE VS. TIME

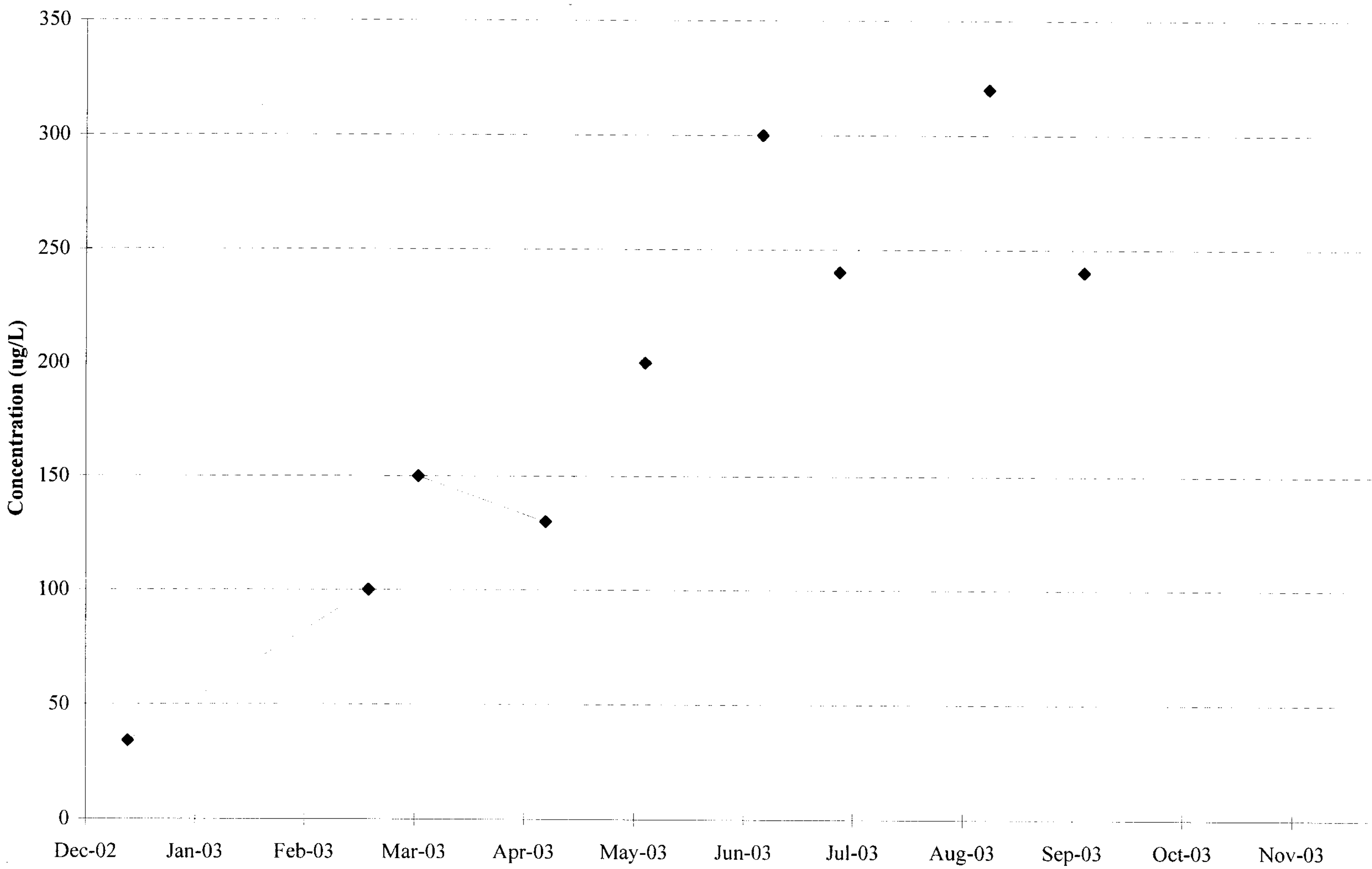


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL B13 - TRCLE VS. TIME

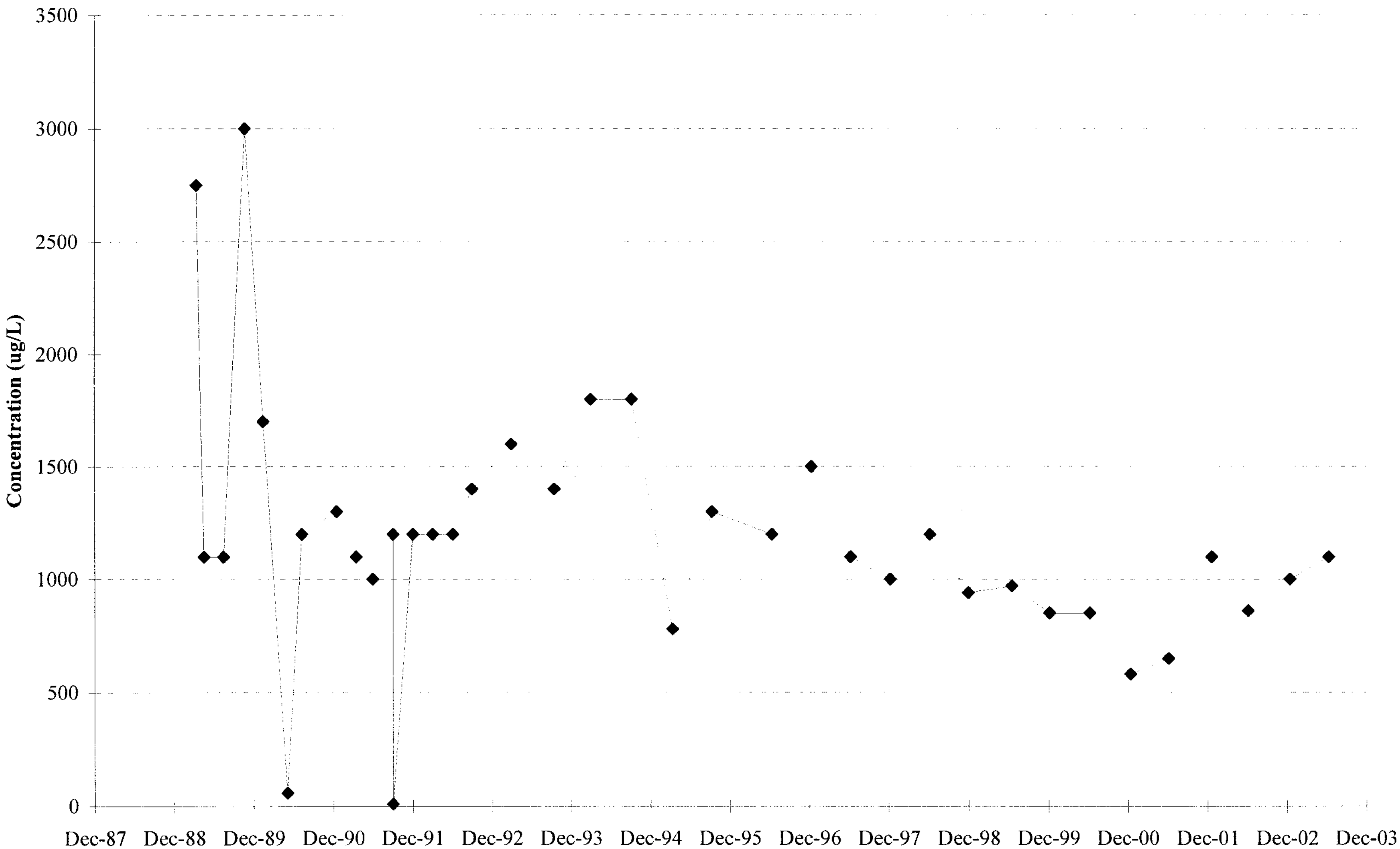


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL SC1 - TRCLE VS. TIME

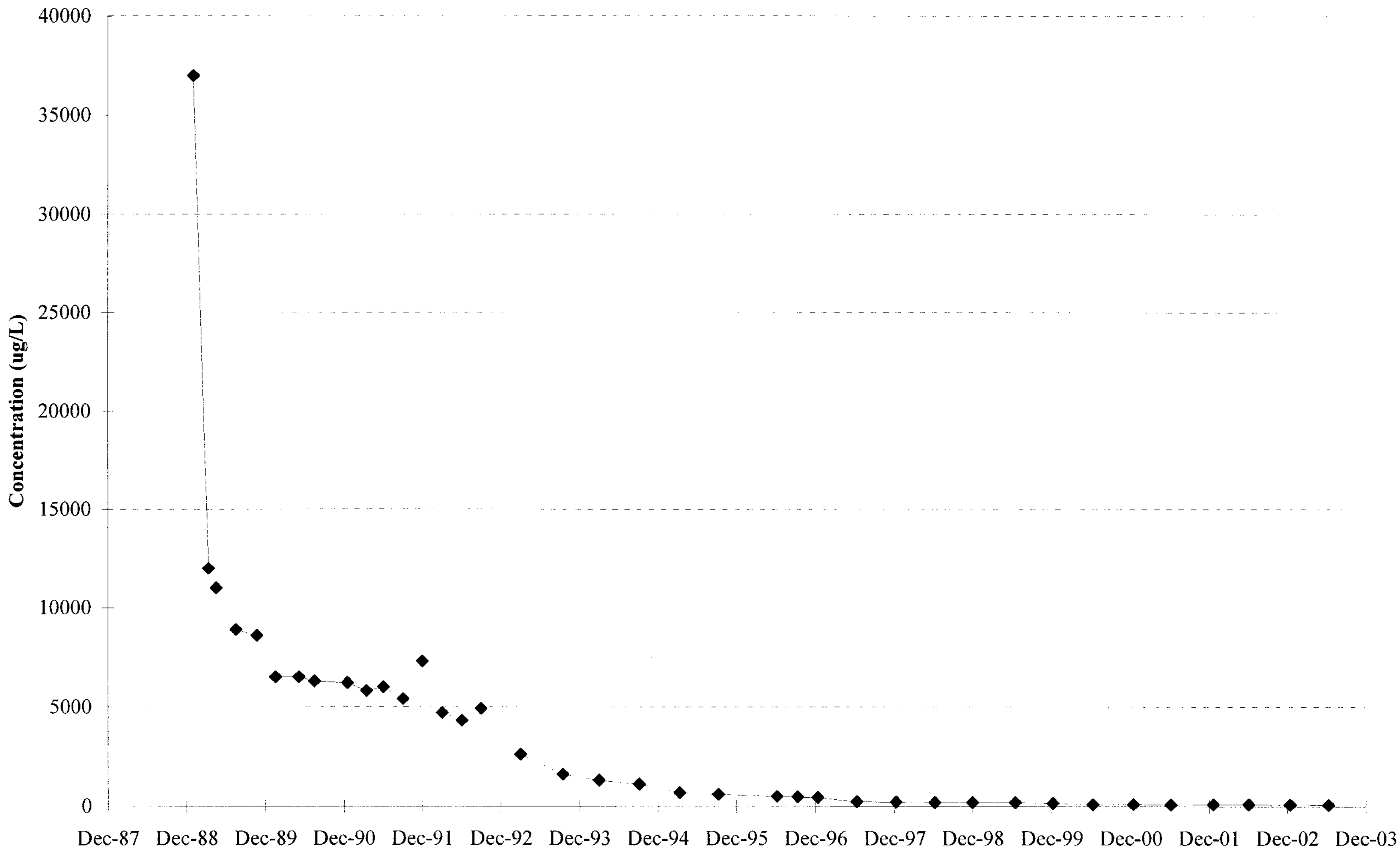


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL SC2 - TRCLE VS. TIME

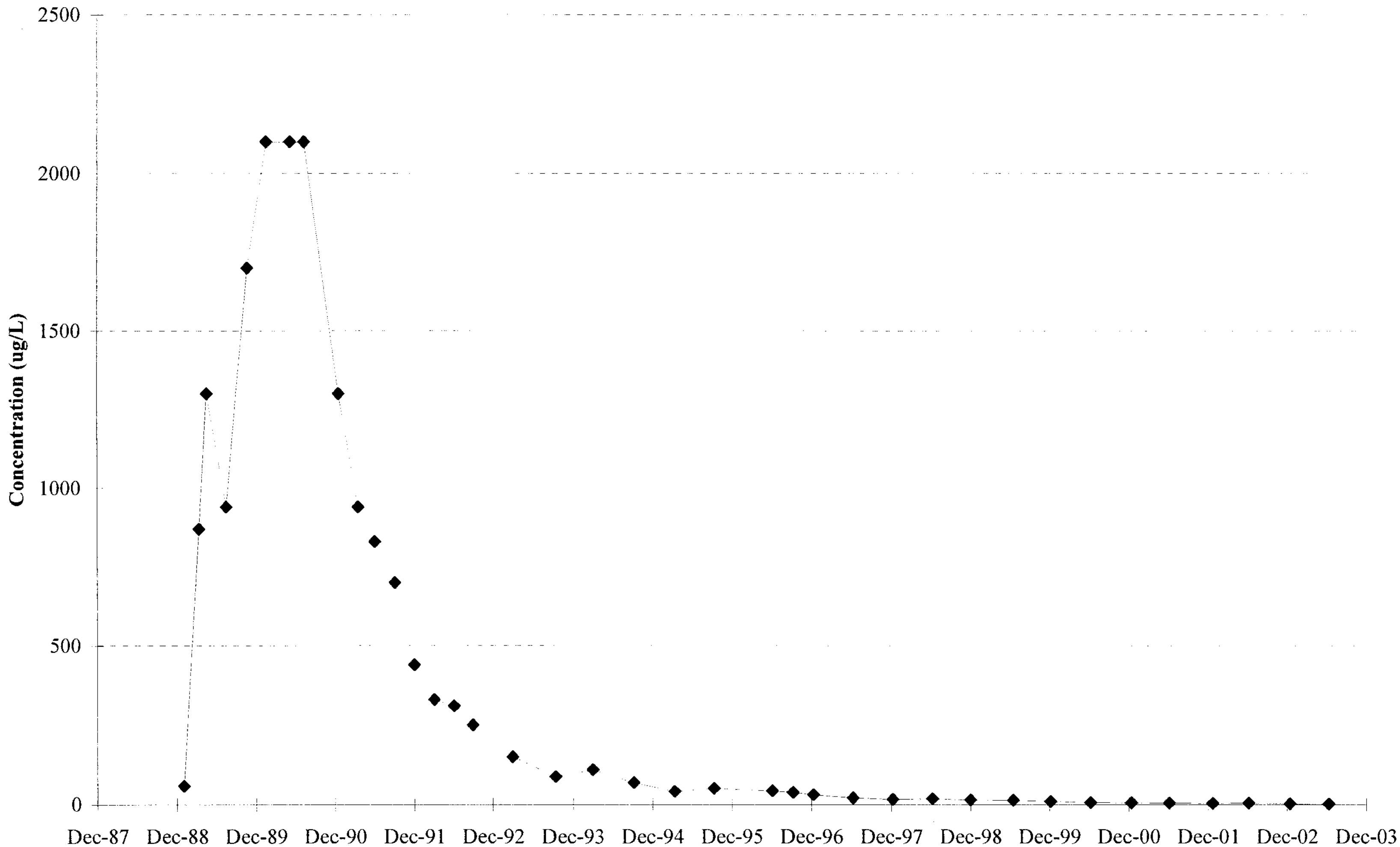


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL SC3 - TRCLE VS. TIME

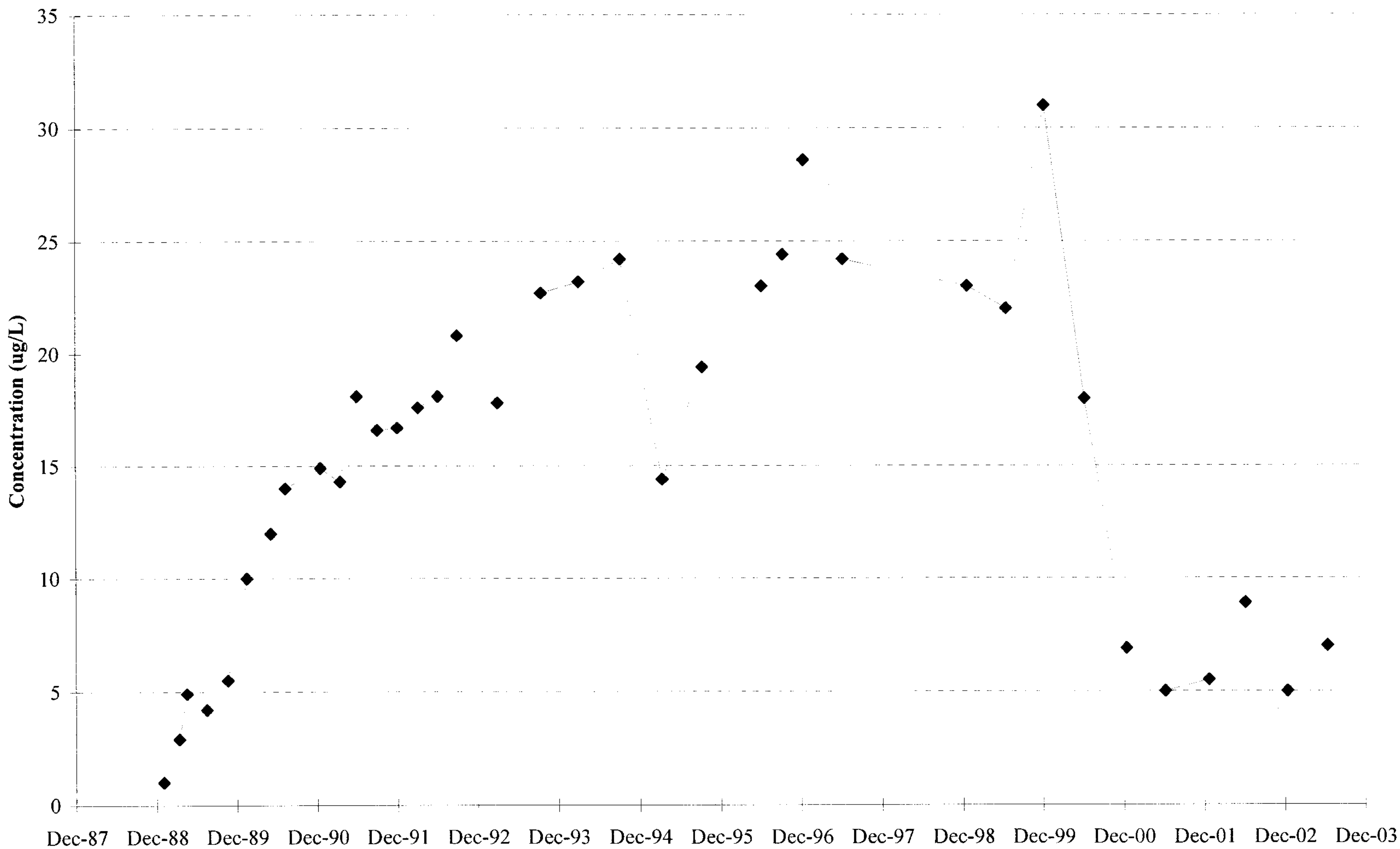


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL SC4 - TRCLE VS. TIME

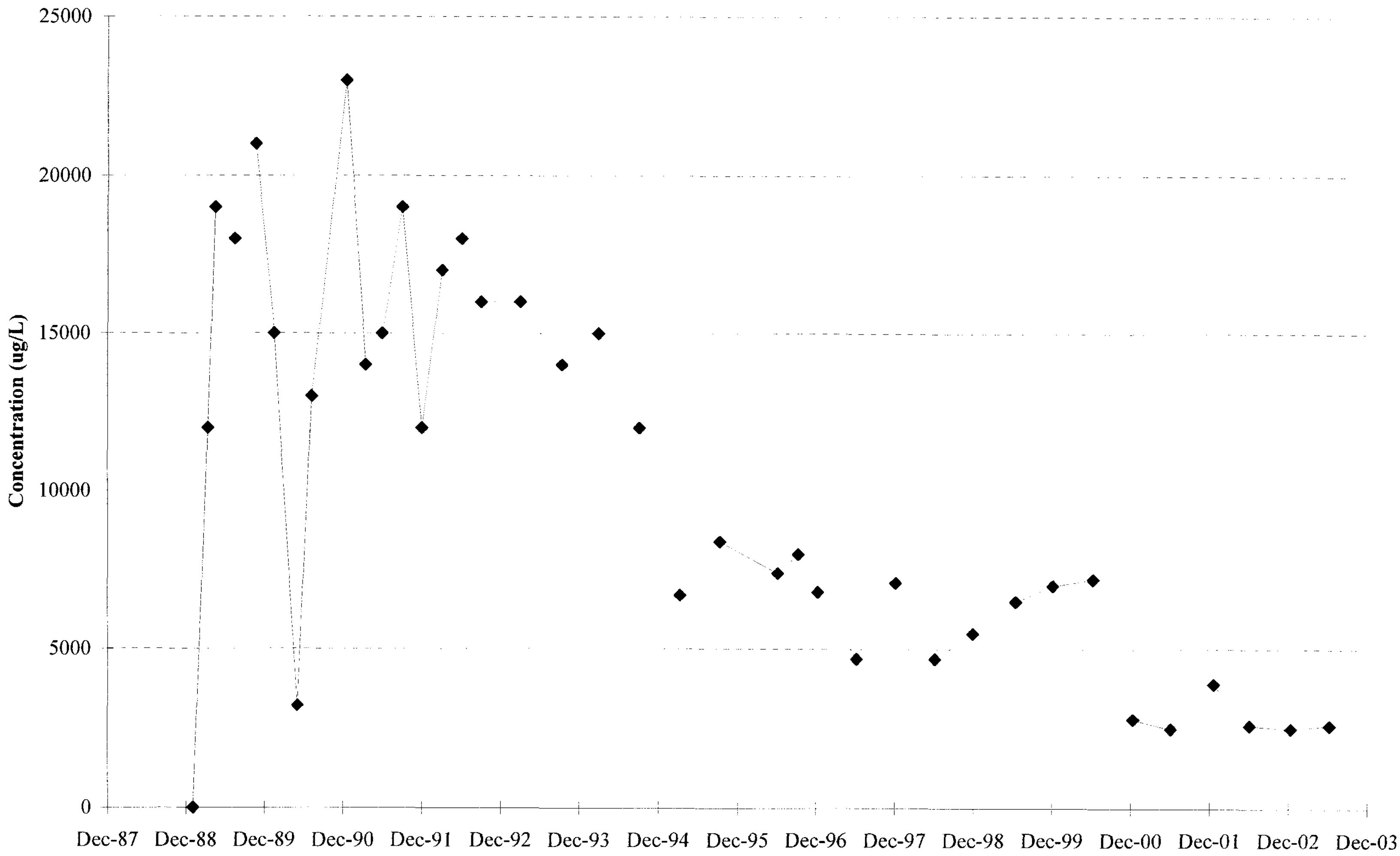


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

APPENDIX G-1

EXTRACTION WELL SC5 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 31783 (4)

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane µg/L	1,1,2-Trichloroethane µg/L	1,1-Dichloroethane µg/L	1,1-Dichloroethene µg/L	1,2-Dichloroethane µg/L	Carbon Tetrachloride µg/L	Chloroform µg/L
Effluent	10/4/02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	10/4/02	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	11/5/02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	11/5/02	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	12/16/02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	12/16/02	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	1/7/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	1/7/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	2/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	2/19/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	3/5/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	3/5/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	4/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	4/10/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	5/8/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	5/8/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	6/11/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	7/2/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	7/2/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	8/13/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	8/13/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	9/9/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	9/9/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D

APPENDIX G-2

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane µg/L	1,1,2-Trichloroethane µg/L	1,1-Dichloroethane µg/L	1,1-Dichloroethene µg/L	1,2-Dichloroethane µg/L	Carbon Tetrachloride µg/L	Chloroform µg/L
Influent	10/4/02	68	< 1	6.5	6.3	0.23 JP	< 1	0.14 JP
Influent	11/5/02	72	< 1	9.2	9.4	< 1	< 1	0.15 JP
Influent	12/16/02	69	< 1	8	7.4	0.36 JP	< 1	0.13 JP
Influent	1/7/03	69	< 1	7.5	7.5	0.5 JP	< 1	< 1
Influent	2/19/03	54	< 1	6.8	7.2	0.38 JP	< 1	0.17 JP
Influent	3/5/03	60	< 1	7.6	7.9	0.44 JP	< 1	0.12 JP
Influent	4/10/03	68	0.5 JP	8.1	7.4	0.56 JP	< 1	< 1
Influent	5/8/03	64	0.38 JP	7.3	6.9	< 1	< 1	< 1
Influent	6/11/03	57	< 1	7.2	6.8	< 1	< 1	0.11 JP
Influent	7/2/03	57	0.43 JP	7.3	6.3	0.43 JP	< 1	0.15 JP
Influent	8/13/03	69	< 1	8.6	9.4	< 1	< 1	< 1
Influent	9/9/03	58	0.43 JP	7.2	7.3	< 1	< 1	0.13 JP

APPENDIX G-2

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	cis-1,2-Dichloroethene µg/L	Freon 113 µg/L	Methylene Chloride µg/L	Tetrachloroethene µg/L	trans-1,2-Dichloroethene µg/L	Trichloroethene µg/L	Vinyl Chloride µg/L
Effluent	10/4/02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	10/4/02	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	11/5/02	< 1	< 1	< 1	< 1	< 1	0.11 JP	< 1
Effluent	11/5/02	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.1 JPD	< 1 D
Effluent	12/16/02	< 1	< 1	< 1 U	< 1	< 1	0.1 JP	< 1
Effluent	12/16/02	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	0.17 JPD	< 1 D
Effluent	1/7/03	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1
Effluent	1/7/03	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	2/19/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	2/19/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	3/5/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	3/5/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	4/10/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	4/10/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	5/8/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	5/8/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	6/11/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	6/11/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	7/2/03	< 1	< 1 UJ	< 1	< 1	< 1	< 1	< 1
Effluent	7/2/03	< 1 D	< 1 UJD	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	8/13/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	8/13/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D
Effluent	9/9/03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Effluent	9/9/03	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D

APPENDIX G-2

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	cis-1,2-Dichloroethene µg/L	Freon 113 µg/L	Methylene Chloride µg/L	Tetrachloroethene µg/L	trans-1,2-Dichloroethene µg/L	Trichloroethene µg/L	Vinyl Chloride µg/L
Influent	10/4/02	4.3	< 1	0.11 JP	0.79 JP	0.08 JP	310	< 1
Influent	11/5/02	5.2	1.3	0.09 JP	1	0.1 JP	360	< 1
Influent	12/16/02	3.7	< 1	< 1 U	0.56 JP	< 1	370	< 1
Influent	1/7/03	5.2	1	< 1 U	0.77 JP	0.16 JP	330	< 1
Influent	2/19/03	5.2	< 1	< 1	0.87 JP	< 1	320	< 1
Influent	3/5/03	5.1	< 1	< 1	0.83 JP	< 1	340	< 1
Influent	4/10/03	5.5	0.81 JP	< 1	0.97 JP	< 1	310	< 1
Influent	5/8/03	4.9	0.73 JP	< 1	0.85 JP	< 1	310	< 1
Influent	6/11/03	5.3	0.64 JP	< 1	0.83 JP	< 1	300	< 1
Influent	7/2/03	4.6	0.81 JP	< 1	0.86 JP	< 1	310	< 1
Influent	8/13/03	6.6	1	< 1	< 1	< 1	410	< 1
Influent	9/9/03	5.1	0.78 JP	< 1	0.84 JP	< 1	290	< 1

Notes:
D - Duplicate analysis
J - Value is estimated
P - Results less than reporting level but greater than instrument detection limit.
U - The analyte is non-detect with the associated value being the quantitation limit.

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 4/5/1994	NB13INF. 4/21/1994	NB13INF. 7/28/1994	NB13INF. 8/30/1994	NB13INF. 9/13/1994	NB13INF. 10/31/1994	NB13INF. 12/27/1994	NB13INF. 1/25/1995	NB13INF. 2/14/1995	NB13INF. 3/9/1995	NB13INF. 4/7/1995
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	**5.0**	**4.9**	**10**	**13**	**10**	**12**	**7.9**	**9.6**	**10**	**11**	**11**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.1 b**	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	**7.8**	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 5/4/1995	NB13INF. 6/15/1995	NB13INF. 7/13/1995	NB13INF. 8/7/1995	NB13INF. 9/28/1995	NB13INF. 10/11/1995	NB13INF. 11/28/1995	NB13INF. 12/27/1995	NB13INF. 1/26/1996	NB13INF. 2/12/1996	NB13INF. 3/28/1996
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	**9.8**	**11**	**10**	**13**	**10**	**9.4**	**8.3**	**8.0**	**3.8**	**7.6**	**6.0**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 4/17/1996	NB13INF. 5/31/1996	NB13INF. 6/25/1996	NB13INF. 7/18/1996	NB13INF. 8/27/1996	NB13INF. 9/12/1996	NB13INF. 10/22/1996	NB13INF. 11/21/1996	NB13INF. 12/17/1996	NB13INF. 1/30/1997	NB13INF. 2/26/1997
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	**4.9**	**1.6**	**5.3**	**6.2**	**9.1**	**7.1**	**7.1**	**6.7**	**5.7**	**4.6**	**4.0**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	**4.3 b**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 3/27/1997	NB13INF. 4/17/1997	NB13INF. 5/22/1997	NB13INF. 6/26/1997	NB13INF. 7/16/1997	NB13INF. 8/28/1997	NB13INF. 9/17/1997	NB13INF. 10/30/1997 RMS	NB13INF. 11/24/1997 RMS	NB13INF. 12/30/1997 RMS	NB13INF. 1/29/1998 RMS
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	**3.4**	**2.7**	**2.9**	**2.5**	**4.4**	**2.7**	**2.4**	**2.6**	**2.2**	**1.6**	**1.8**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.	NB13INF.
Sample Date	Abbreviation	2/12/1998	3/23/1998	4/16/1998	5/20/1998	5/29/1998	6/25/1998	7/27/1998	8/20/1998	9/30/1998	10/21/1998	11/23/1998
Dup		RMS	RMS	RMS	RMS	RMS	RMS					
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	**1.5**	**1.2**	**1.8**	<1.0	<1.0	<1.0	**1.0**	**1.5**	**2.1**	**1.2**	**1.2**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	**2.2 b**	<1.0	<5.0	<5.0	<5.0	<5.0	<5.0	**12 b**	**8.6 b**	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 12/21/1998	NB13INF. 1/14/1999	NB13INF. 2/11/1999	NB13INF. 3/17/1999	NB13INF. 4/6/1999	NB13INF. 5/18/1999	NB13INF. 6/21/1999	NB13INF. 7/13/1999	NB13INF. 8/30/1999	NB13INF. 9/27/1999	NB13INF. 10/19/1999
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 12/16/1999	NB13INF. 1/25/2000	NB13INF. 2/28/2000	NB13INF. 3/16/2000	NB13INF. 4/24/2000	NB13INF. 5/16/2000	NB13INF. 6/28/2000	NB13INF. 7/17/2000	NB13INF. 9/5/2000	NB13INF. 9/14/2000	NB13INF. 10/12/2000
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 11/8/2000	NB13INF. 1/29/2001	NB13INF. 2/8/2001	NB13INF. 3/7/2001	NB13INF. 4/3/2001	NB13INF. 5/23/2001	NB13INF. 6/29/2001	NB13INF. 5/22/2003	NB13INF. 6/5/2003	NB13INF. 7/9/2003	NB13INF. 8/14/2003
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10*	<10*	<10*	<10*
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 9/23/2003	NB13INF. 10/6/2003
1,1-Dichloroethane	11DCLE	<1	<1.0
1,1-Dichloroethylene	11DCE	<1	<1.0
1,2-Dichloroethylene	12DCE	<2	<2.0
1,1,1-Trichloroethane	111TCE	<1	<1.0
1,1,2-Trichloroethane	112TCE	<1	<1.0
Trichloroethylene	TRCLE	<1	<1.0
Benzene	C6H6	<1	<1.0
Bromodichloromethane	BRDCLM	<1	<1.0
Bromoform	CHBR3	<1	<1.0
Bromomethane	CH3BR	<1	<1.0
Carbon tetrachloride	CL4	<1	<1.0
Chlorobenzene	CLC6H5	<1	<1.0
Chloroethane	C2H5CL	<1	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *
Chloroform	CHCL3	<1	<1.0
Chloromethane	CH3CL	<1	<1.0
Chlorodibromomethane	DBRCLM	<1	<1.0
1,2-Dichloroethane	12DCLE	<1	<1.0
1,2-Dichlorobenzene	12DCLB	<1	<1.0
1,3-Dichlorobenzene	13DCLB	<1	<1.0
1,4-Dichlorobenzene	14DCLB	<1	<1.0
1,2-Dichloropropane	12DCLP	<1	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1	<1.0
Ethyl benzene	ETC6H5	<1	<1.0
Methylene chloride	CH2CL2	<5	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1	<1.0
Tetrachloroethylene	TCLEE	<1	<1.0
Toluene	MEC6H5	<1	<1.0
Trichlorofluoromethane	CCL3F	<1	<1.0
Vinyl chloride	C2H3CL	<1	<1.0
Xylenes total	XYLEN	<3	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 4/4/1994	NB13EFF. 4/21/1994	NB13EFF. 7/28/1994	NB13EFF. 8/30/1994	NB13EFF. 9/13/1994	NB13EFF. 9/13/1994	NB13EFF. 10/31/1994	NB13EFF. 12/27/1994	NB13EFF. 12/27/1994	NB13EFF. 1/25/1995	NB13EFF. 1/25/1995	NB13EFF. 2/14/1995	NB13EFF. 3/9/1995	NB13EFF. 4/7/1995
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	4/7/1995	5/4/1995	6/15/1995	6/15/1995	7/13/1995	7/13/1995	8/7/1995	9/28/1995	10/11/1995	10/11/1995	11/28/1995	12/27/1995	10/22/1996	11/21/1996
Dup															
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.7**	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.2**	**1.3**	**1.3**	**1.3**	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 12/17/1996	NB13EFF. 1/30/1997	NB13EFF. 2/26/1997	NB13EFF. 3/27/1997	NB13EFF. 4/17/1997	NB13EFF. 5/22/1997	NB13EFF. 6/26/1997	NB13EFF. 7/16/1997	NB13EFF. 8/28/1997	NB13EFF. 8/28/1997	NB13EFF. 9/17/1997	NB13EFF. 10/30/1997 RMS	NB13EFF. 11/24/1997 RMS	NB13EFF. 11/24/1997 DUP
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.1**	**1.0**	**1.2**	**1.2**	**1.8**	**2.4**	**2.2**	**1.2**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	12/30/1997	1/29/1998	2/12/1998	2/12/1998	3/23/1998	4/16/1998	4/16/1998	5/29/1998	6/25/1998	7/27/1998	8/20/1998	8/20/1998	9/30/1998	10/21/1998
Dup		RMS	RMS	RMS	RMS	RMS	RMS	DUP	RMS	RMS					
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **	*<10 **
Chloroform	CHCL3	**3.0**	**2.8**	**2.8**	**2.9**	**3.8**	**2.6**	**2.9**	**2.5**	**2.7**	**2.2**	**2.6**	**2.8**	**1.9**	**1.8**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<5.0	**12 b**	**8.7 b**
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	11/23/1998	11/23/1998	12/21/1998	1/14/1999	2/11/1999	3/17/1999	4/6/1999	5/18/1999	5/18/1999	6/21/1999	7/13/1999	8/30/1999	8/30/1999	9/27/1999
Dup										*DUP*				*DUP*	
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.4**	**1.5**	**1.5**	**1.3**	<1.0	<1.0	**1.2**	**1.2**	**1.2**	**1.1**	**1.2**	<1.0	<1.0	**1.1**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	10/19/1999	4/4/1994	10/27/1995	11/28/1995	12/27/1995	1/26/1996	1/26/1996	2/12/1996	3/28/1996	4/17/1996	4/17/1996	5/31/1996	6/25/1996	7/18/1996
Dup															
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.0 b**	**1.4**	**1.7**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	**1.4**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	**7.5**	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	7/18/1996	8/27/1996	9/12/1996	10/22/1996	10/22/1996	11/21/1996	12/17/1996	1/30/1997	1/30/1997	2/26/1997	3/27/1997	4/17/1997	4/17/1997	5/22/1997
Dup															
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.7**	**2.0**	**2.1**	**1.6**	**1.6**	**3.1**	**1.6**	**1.5**	**1.6**	**1.4**	**1.4**	**1.9**	**1.9**	**2.5**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	6/26/1997	7/16/1997	8/28/1997	9/17/1997	10/30/1997	11/24/1997	12/30/1997	1/29/1998	2/12/1998	3/23/1998	4/16/1998	5/29/1998	6/25/1998	7/27/1998
Dup						RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.6**	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 8/20/1998	NB13EFF. 9/30/1998	NB13EFF. 10/21/1998	NB13EFF. 11/23/1998	NB13EFF. 12/21/1998	NB13EFF. 1/14/1999	NB13EFF. 2/11/1999	NB13EFF. 3/17/1999	NB13EFF. 4/6/1999	NB13EFF. 5/18/1999	NB13EFF. 6/21/1999	NB13EFF. 7/13/1999	NB13EFF. 8/30/1999	NB13EFF. 9/27/1999
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	**1.1**	**1.5**	**1.3**	<1.0	**1.3**	**1.4**	**1.6**	**1.4**	**1.5**	**1.3**	**1.6**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	**12 b**	**8.8 b**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	10/19/1999	12/16/1999	12/16/1999	1/25/2000	1/25/2000	2/28/2000	3/16/2000	3/16/2000	4/24/2000	7/17/2000	7/17/2000	9/5/2000	9/14/2000	9/14/2000
Dup				DUP		DUP			DUP			DUP			DUP
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.5**	**1.5**	<1.0	**3.2**	**2.8**	**2.8**	**3.0**	**2.9**	**2.8**	**2.8**	**2.3**	**2.5**	**2.3**	**2.2**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	10/12/2000	11/8/2000	11/8/2000	1/29/2001	2/8/2001	2/8/2001	3/7/2001	4/3/2001	4/3/2001	5/23/2001	5/23/2001	6/29/2001	6/5/2003	7/9/2003
Dup				DUP			DUP			DUP		DUP			
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1.0	<1.0	**1.1**	**1.2**	**1.0**	<1.0	**1.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**2.1**	**2.2**	**2.3**	**4.3**	**4.2**	**3.8**	**3.6**	**3.1**	**2.9**	**2.3**	**2.3**	**1.4**	<1.0	<1.0
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 8/14/2003	NB13EFF. 9/23/2003	NB13EFF. 10/6/2003
1,1-Dichloroethane	11DCLE	<1.0	<1	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1	<1.0
1,2-Dichloroethylene	12DCE	<2.0	<2	<2.0
1,1,1-Trichloroethane	111TCE	<1.0	<1	<1.0
1,1,2-Trichloroethane	112TCE	<1.0	<1	<1.0
Trichloroethylene	TRCLE	<1.0	<1	<1.0
Benzene	C6H6	<1.0	<1	<1.0
Bromodichloromethane	BRDCLM	<1.0	<1	<1.0
Bromoform	CHBR3	<1.0	<1	<1.0
Bromomethane	CH3BR	<1.0	<1	<1.0
Carbon tetrachloride	CL4	<1.0	<1	<1.0
Chlorobenzene	CLC6H5	<1.0	<1	<1.0
Chloroethane	C2H5CL	<1.0	<1	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1	<1.0
Chloromethane	CH3CL	<1.0	<1	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<1.0	<1	<1.0
1,3-Dichloro-1-propene trans	T13DCP	<1.0	<1	<1.0
Ethyl benzene	ETC6H5	<1.0	<1	<1.0
Methylene chloride	CH2CL2	<5.0	<5	<5.0
1,1,2,2-Tetrachloroethane	TCLEA	<1.0	<1	<1.0
Tetrachloroethylene	TCLEE	<1.0	<1	<1.0
Toluene	MEC6H5	<1.0	<1	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1	<1.0
Vinyl chloride	C2H3CL	<1.0	<1	<1.0
Xylenes total	XYLEN	<3.0	<3	<3.0

APPENDIX H - 1

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2003
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Notes:

--	Not analyzed.
b	Potential false positive based on blank data validation procedure.
*	Estimated value, QA/QC criteria not met.
ND	None detected.
Dup	Duplicate sample.
RMS	Routine monitoring sample.

Concentrations in ug/L

Samples were collected and analyzed by Barr Engineering for City of New Brighton.

System shut down per agreement with Agencies during period June '01 through April 2003. System operated as needed through October 2003 and then shut down.

NB13EFF location is OPER1B.

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	3/30/1994	3/31/1994	4/10/1994	4/17/1994	4/18/1994 (AM)	4/18/1994 (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

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	4/18/1994 (PM)	4/19/1994	4/20/1994	4/21/1994	4/22/1994	4/25/1994
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	- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	4/26/1994	4/28/1994	4/29/1994	5/2/1994	5/9/1994	5/16/1994
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

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	5/23/1994	6/20/1994	7/19/1994	10/10/1994	1/27/1995
03U673	897.84	844.35	844.01	845.00	843.06	843.42
03L673	898.44	843.20	842.81	844.33	842.23	842.24
04U673	898.34	843.34	842.95	843.93	842.43	842.39
03U832	886.82	834.31	833.55	833.48	832.65	833.36
03L832	886.85	834.14	833.33	833.25	832.49	833.20
04U832	885.31	833.99	833.19	833.09	832.39	833.07
03L841	911.91	842.50	842.10	843.37	841.48	841.55
04U841	912.47	842.60	842.20	843.55	841.71	841.65
04U844	886.74	833.90	833.18	833.20	832.29	833.09
04U845	894.91	835.83	835.16	835.29	834.23	834.94
03L846	888.54	831.96	831.16	830.78	830.16	830.74
04U846	889.46	830.91	830.06	829.74	829.44	830.11
03M848	904.12	841.31	840.84	841.46	839.75	840.21
03L848	903.91	841.69	841.18	841.95	840.28	840.62
04U848	903.92	842.36	841.94	843.02	841.27	841.40
04U851	914.51	830.23	829.20	829.01	828.85	829.72
04U852	905.66	827.90	plugged	826.62	826.83	827.91
03L854	892.41	838.81	838.26	838.30	836.93	837.56
04U854	891.95	834.44	833.63	833.60	832.83	833.52
03L859	903.55	839.30	838.79	839.07	837.48	838.14
04U859	903.73	841.92	841.51	842.57	840.83	840.96
03L860	896.79	839.09	838.51	838.54	837.22	837.86
04U860	896.61	834.31	833.57	833.41	832.75	833.38
03L861	891.35	837.17	836.55	836.54	835.25	835.99
04U861	890.91	834.53	833.78	833.76	832.97	833.63
04U863	895.33	833.82	832.92	832.79	832.18	832.85
04U864	908.67	830.76	829.72	829.55	829.07	829.71
04J864	908.79	826.49	825.46	825.93	825.04	826.81
04U865	915.60	831.14	830.22	830.04	829.54	830.14
04U866	910.60	829.96	828.90	828.72	828.28	828.97
04J866	910.69	827.25	826.26	826.71	825.71	827.46
04U877	923.08	830.30	829.34	828.98	828.84	829.50
MPCA1L3	898.25	837.70	837.13	837.27	835.82	836.58
MPCA1U4	898.60	835.64	835.03	835.22	834.05	834.74
MPCA2L3	872.05	832.75	831.94	831.81	831.12	831.89
MPCA2U4	872.19	831.78	830.93	830.71	830.14	830.91
414U4	893.95	833.44	832.55	832.43	831.91	832.59
MW15H	911.52	834.12	833.30	833.12	832.36	833.11
NB WELL 13	914.66	- -	820.58	820.26	819.41	819.66

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	3/6/1995	6/21/1995 8:00 A.M.	9/5/1995	12/14/1995	3/5/1996
03U673	897.84	843.31	843.59	842.55	843.33	843.28
03L673	898.44	842.12	842.76	841.34	842.14	842.23
04U673	898.34	842.24	842.96	841.49	842.29	842.38
03U832	886.82	833.24	833.02	832.57	833.26	833.55
03L832	886.85	833.48	832.82	832.40	833.11	833.40
04U832	885.31	833.14	832.63	832.27	832.97	833.27
03L841	911.91	841.42	842.03	840.53	841.48	841.47
04U841	912.47	841.53	842.23	840.69	841.59	841.63
04U844	886.74	833.16	832.59	832.22	833.00	833.26
04U845	894.91	834.94	834.64	834.06	834.87	835.07
03L846	888.54	830.92	830.62	830.20	830.51	830.94
04U846	889.46	830.23	829.35	829.25	829.69	830.08
03M848	904.12	840.14	840.39	839.38	840.18	frozen
03L848	903.91	frozen	840.91	840.48	840.61	frozen
04U848	903.92	841.27	841.82	840.49	841.33	frozen
04U851	914.51	829.87	828.58	828.55	829.49	829.91
04U852	905.66	828.13	826.08	826.04	827.66	828.16
03L854	892.41	837.59	837.56	836.87	837.63	837.65
04U854	891.95	833.54	833.00	832.68	833.46	833.71
03L859	903.55	838.15	838.12	837.33	838.14	838.13
04U859	903.73	840.88	841.42	840.09	840.95	841.00
03L860	896.79	837.84	837.83	837.11	837.90	837.92
04U860	896.61	833.43	832.98	832.57	833.40	833.59
03L861	891.35	836.03	835.86	835.23	836.03	836.09
04U861	890.91	833.66	833.20	832.80	833.59	833.75
04U863	895.33	832.95	832.42	832.09	832.76	833.14
04U864	908.67	829.88	829.10	829.01	829.50	829.97
04J864	908.79	826.92	824.22	824.77	827.23	827.49
04U865	915.60	830.24	829.50	829.33	829.67	830.41
04U866	910.60	829.22	828.24	828.14	828.40	829.06
04J866	910.69	827.57	825.13	825.55	827.80	828.07
04U877	923.08	829.76	828.63	828.71	829.14	829.53
MPCA1L3	898.25	836.59	836.45	835.79	836.58	836.63
MPCA1U4	898.60	834.80	834.49	833.89	834.68	834.85
MPCA2L3	872.05	831.93	831.43	831.08	831.63	832.03
MPCA2U4	872.19	830.99	830.31	830.07	830.62	830.99
414U4	893.95	832.67	832.03	830.77	832.48	832.90
MW15H	911.52	833.19	832.85	832.41	833.02	833.34
NB WELL 13	914.66	819.66	819.66	819.66	816.10	820.01

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	5/28/1996	9/16/1996	12/3/1996	5/30/1997	9/2/1997
03U673	897.84	843.84	842.44	842.16	842.39	- -
03L673	898.44	842.84	840.97	840.99	841.06	- -
04U673	898.34	843.00	841.08	841.13	841.21	- -
03U832	886.82	834.26	831.27	832.31	831.36	- -
03L832	886.85	834.55	831.09	832.16	831.22	- -
04U832	885.31	833.89	830.93	832.04	831.11	- -
03L841	911.91	842.13	840.18	840.31	840.34	- -
04U841	912.47	842.30	840.27	840.48	840.42	- -
04U844	886.74	833.75	830.99	832.02	831.23	- -
04U845	894.91	835.70	832.94	833.93	833.23	- -
03L846	888.54	831.51	828.83	829.46	828.41	- -
04U846	889.46	830.17	827.71	828.49	827.60	- -
03M848	904.12	840.85	838.97	839.01	838.99	- -
03L848	903.91	841.28	839.39	frozen	839.40	- -
04U848	903.92	841.99	840.08	840.22	840.18	- -
04U851	914.51	829.86	827.25	828.46	827.97	- -
04U852	905.66	827.76	obstructed	obstructed	- -	- -
03L854	892.41	838.41	836.06	836.38	836.20	- -
04U854	891.95	834.36	831.41	832.56	831.68	- -
03L859	903.55	838.95	836.53	836.68	836.77	- -
04U859	903.73	841.63	839.47	839.84	839.82	- -
03L860	896.79	838.66	836.58	836.68	836.49	- -
04U860	896.61	834.30	831.38	832.53	831.41	- -
03L861	891.35	836.89	834.22	834.79	834.41	- -
04U861	890.91	834.45	831.56	832.65	831.79	- -
04U863	895.33	833.75	830.86	831.88	830.92	- -
04U864	908.67	830.23	827.63	828.59	828.68	- -
04J864	908.79	826.50	823.55	825.99	825.07	- -
04U865	915.60	830.63	827.84	829.01	829.05	- -
04U866	910.60	829.14	826.74	827.43	826.23	- -
04J866	910.69	827.17	824.83	826.54	825.76	- -
04U877	923.08	829.48	827.06	827.85	827.45	- -
MPCA1L3	898.25	837.35	834.80	835.34	835.04	- -
MPCA1U4	898.60	835.45	832.73	833.66	832.99	- -
MPCA2L3	872.05	832.55	829.74	830.62	829.66	- -
MPCA2U4	872.19	831.36	828.69	829.54	828.58	- -
414U4	893.95	833.36	830.57	831.64	830.72	830.40
MW15H	911.52	834.10	831.10	832.11	831.08	- -
NB WELL 13	914.66	819.66	819.66	818.33	827.94	- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	12/6/1997	6/1/1998	5/27/99	12/20/99	3/9/2000
03U673	897.84	842.03	843.33	843.14	- -	- -
03L673	898.44	840.99	842.11	841.91	- -	- -
04U673	898.34	841.19	842.30	842.06	- -	- -
03U832	886.82	- -	- -	- -	- -	- -
03L832	886.85	- -	- -	832.03	- -	- -
04U832	885.31	831.76	832.38	832.02	- -	- -
03L841	911.91	- -	- -	- -	- -	- -
04U841	912.47	- -	- -	- -	- -	- -
04U844	886.74	- -	- -	- -	- -	- -
04U845	894.91	833.74	834.46	834.19	- -	- -
03L846	888.54	- -	- -	- -	- -	- -
04U846	889.46	- -	- -	- -	- -	- -
03M848	904.12	838.80	839.95	839.71	- -	- -
03L848	903.91	839.27	840.41	840.20	- -	- -
04U848	903.92	840.17	841.20	841.02	- -	- -
04U851	914.51	827.93	828.61	828.12	- -	- -
04U852	905.66	826.57	826.74	826.63	- -	- -
03L854	892.41	836.10	837.29	836.92	- -	- -
04U854	891.95	832.44	832.98	832.77	- -	- -
03L859	903.55	836.62	837.81	837.40	- -	- -
04U859	903.73	839.83	840.97	840.61	- -	- -
03L860	896.79	836.39	837.46	837.24	- -	- -
04U860	896.61	832.33	832.81	832.72	- -	- -
03L861	891.35	834.47	835.53	835.14	- -	- -
04U861	890.91	832.43	833.09	832.76	- -	- -
04U863	895.33	831.80	832.33	832.11	832.36	832.80
04U864	908.67	828.02	828.87	827.92	829.19	829.50
04J864	908.79	826.32	826.40	825.77	826.99	827.49
04U865	915.60	828.57	829.30	828.63	830.11	830.30
04U866	910.60	826.30	827.42	825.89	827.53	827.82
04J866	910.69	826.80	827.02	826.31	827.50	827.98
04U877	923.08	- -	- -	- -	- -	- -
MPCA1L3	898.25	- -	- -	- -	- -	- -
MPCA1U4	898.60	- -	- -	- -	- -	- -
MPCA2L3	872.05	- -	- -	- -	- -	- -
MPCA2U4	872.19	- -	- -	- -	- -	- -
414U4	893.95	831.64	832.12	831.86	832.10	832.77
MW15H	911.52	831.66	832.36	832.02	- -	- -
NB WELL 13	914.66	816.59	816.21	815.46	- -	- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	6/5/2000	9/5/2000	12/18/2000	3/13/2001	6/1/2001
03U673	897.84	- -	- -			842.22
03L673	898.44	- -	- -			841.11
04U673	898.34	- -	- -			841.25
03U832	886.82	- -	- -			832.62
03L832	886.85	- -	- -			832.46
04U832	885.31	- -	- -			832.40
03L841	911.91	- -	- -			- -
04U841	912.47	- -	- -			- -
04U844	886.74	- -	- -			- -
04U845	894.91	- -	- -			834.54
03L846	888.54	- -	- -			- -
04U846	889.46	- -	- -			- -
03M848	904.12	- -	- -			839.86
03L848	903.91	- -	- -			840.35
04U848	903.92	- -	- -			841.14
04U851	914.51	- -	- -			828.23
04U852	905.66	- -	- -			827.45
03L854	892.41	- -	- -			837.19
04U854	891.95	- -	- -			833.06
03L859	903.55	- -	- -			837.68
04U859	903.73	- -	- -			837.86
03L860	896.79	- -	- -			837.49
04U860	896.61	- -	- -			831.33
03L861	891.35	- -	- -			835.53
04U861	890.91	- -	- -			833.13
04U863	895.33	817.42	831.59	831.98		832.46
04U864	908.67	827.35	828.22	829.45	828.93	829.13
04J864	908.79	827.95	825.62	826.49	826.84	826.75
04U865	915.60	833.09	829.19	830.29	829.77	831.02
04U866	910.60	848.44	826.59	827.90	827.23	827.39
04J866	910.69	826.34	826.24	827.21	827.35	827.30
04U877	923.08	- -	- -			- -
MPCA1L3	898.25	- -	- -			- -
MPCA1U4	898.60	- -	- -			- -
MPCA2L3	872.05	- -	- -			- -
MPCA2U4	872.19	- -	- -			- -
414U4	893.95	833.05	831.31	831.88		832.43
MW15H	911.52	- -	- -			832.47
NB WELL 13	914.66	- -	- -			- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	9/4/2001	12/4/2001	3/6/2002	6/5/2002	9/5/2002
03U673	897.84	- -				
03L673	898.44	- -				
04U673	898.34	- -				
03U832	886.82	- -				
03L832	886.85	- -				
04U832	885.31	- -				
03L841	911.91	- -				
04U841	912.47	- -				
04U844	886.74	- -				
04U845	894.91	- -				
03L846	888.54	- -				
04U846	889.46	- -				
03M848	904.12	- -				
03L848	903.91	- -				
04U848	903.92	- -				
04U851	914.51	- -				
04U852	905.66	- -				
03L854	892.41	- -				
04U854	891.95	- -				
03L859	903.55	- -				
04U859	903.73	- -				
03L860	896.79	- -				
04U860	896.61	- -				
03L861	891.35	- -				
04U861	890.91	- -				
04U863	895.33	- -		833.67	834.40	833.92
04U864	908.67	828.04	832.37	831.14	831.92	831.25
04J864	908.79	824.91	829.20	828.04	827.59	827.23
04U865	915.60	830.44	834.41	833.52	834.26	833.62
04U866	910.60	826.70	831.44	829.78	830.89	829.87
04J866	910.69	825.59	828.89	828.81	828.50	827.93
04U877	923.08	- -				
MPCA1L3	898.25	- -				
MPCA1U4	898.60	- -				
MPCA2L3	872.05	- -				
MPCA2U4	872.19	- -				
414U4	893.95	- -				
MW15H	911.52	- -				
NB WELL 13	914.66	- -				

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	12/4/2002	3/6/2003	6/4/2003	9/10/2003
03U673	897.84			846.23	
03L673	898.44			845.09	
04U673	898.34			845.21	
03U832	886.82				
03L832	886.85			836.04	
04U832	885.31			818.01 (1)	
03L841	911.91				
04U841	912.47				
04U844	886.74				
04U845	894.91			838.26	
03L846	888.54				
04U846	889.46				
03M848	904.12			843.75	
03L848	903.91			844.25	
04U848	903.92			845.12	
04U851	914.51			831.81	
04U852	905.66			830.87	
03L854	892.41			840.89	
04U854	891.95			836.69	
03L859	903.55			841.44	
04U859	903.73			844.77	
03L860	896.79			841.2	
04U860	896.61			834.98	
03L861	891.35			839.14	
04U861	890.91			836.75	
04U863	893.08	834.86	836.32	835.92	834.11
04U864	908.67	832.54	833.52	833.61	831.36
04J864	908.79	829.52	830.33	829.85	827.44
04U865	915.60	834.73	836.56	835.72	834.15
04U866	910.60	830.96	831.95	831.86	830.07
04J866	910.69	829.92	831.09	830.55	828.57
04U877	923.08				
MPCA1L3	898.25				
MPCA1U4	898.60				
MPCA2L3	872.05				
MPCA2U4	872.19				
414U4	893.95			836.01	
MW15H	911.52			836.06	
NB WELL 13	914.66				

Notes:

New TOC elevation for 04U863 as of 8-13-03 is 893.08

(1) Elevation incorrect.

APPENDIX I
OTHER INSTALLATION RESTORATION ACTIVITIES
DURING FY 2003

This appendix is intended to give the reader a brief overview of other activities at TCAAP that are related to the Installation Restoration Program, but are not required by the RODs for OU1 through OU3.

A. BACKGROUND MONITORING

1. Deep Groundwater

In order to 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). Locations of these wells are shown on Figure B-3 in Appendix B. The FY 2003 results are:

Well	Trichloroethene
03U007	<1.0
03U009	<1.0
03L007	<1.0
04U007	<1.0
04U510	<1.0

The above data indicate that groundwater flowing onto TCAAP does not contain trichloroethene. These locations will be sampled again in FY 2005 as shown in Appendix A.1 (the wells are listed under TCAAP Groundwater Recovery System in the appendix).

2. Surface Water

The FY 2003 – FY 2007 Surface Water Monitoring Plan is presented in Appendix A.3. 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 comply with the Final Modified Substantive Requirements Document (MN U000579), dated November 19, 1997. The data for Outfall 010 is presented in Tables 8-3 and 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, as shown on Figure I-1). This voluntary monitoring (not a regulatory requirement) is conducted to establish baseline characteristics for Rice Creek. Monitoring has been conducted annually beginning with FY 2001 (previous years had been quarterly). The FY 2003 data is presented in Table I-1. VOCs, mercury, silver, and cyanide were all non-detectable in the water entering and leaving TCAAP. There were low detections reported for copper, lead, and zinc, both entering and leaving TCAAP (at comparable levels for each analyte). Phosphorus was also detected, both entering and leaving TCAAP, at comparable levels.

B. AQUATIC STUDIES

The Tier II Ecological Risk Assessment Report for aquatic sites, prepared by the U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM), was undergoing resolution of regulatory agency comments during FY 2003. Based on the findings of the final report, the risk managers will determine for each aquatic site if No Further Action is appropriate, or whether to consider a remedy through a feasibility study.

C. GRENADE RANGE

The removal action to address contaminated soils was completed in early FY 2000. The Grenade Range Closeout Report (prepared by Alliant) received partial regulatory approval in FY 2002, with land use control issues still needing resolution. The Groundwater Investigation Report (prepared by Alliant) also received regulatory approval in FY 2002. The remedy included additional verification groundwater monitoring.

The four monitoring wells at this site were sampled by TWISS in FY 2003. Locations of the wells are shown on Figure I-2. Sampling results are shown in Table I-2. Results are summarized as follows:

- Bis (2-ethylhexyl) phthalate was not detected in any of the wells.
- PCB-1016 was detected in GR2-1 (and the duplicate sample) at concentrations just slightly above the reporting limit of 0.1 ug/l. No PCBs (including PCB-1016) were detected in any of the Grenade Range wells in the FY 2002 sampling event (with identical reporting limits), nor were any PCBs detected in any of the wells in the FY 2001 sampling event. The FY 2004 sampling event will provide confirmation regarding whether this year's detection of PCB-1016 at GR2-1 is real, or possibly anomalous.
- For metals, most of the analytes were either non detectable or were detected at low levels, below the background level. Exceptions were as follows:
    - Arsenic was detected in GR1-2 at 10 ug/l, above the background level of 4 ug/l (the other wells were below 4 ug/l). Arsenic was not detected in GR1-2 in the FY 2002 sampling event (with a reporting limit of 300 ug/l), or in the FY 2001 sampling event (with a reporting limit of 3.4 ug/l). It is possible that the detection at 10 ug/l is representative of the variability surrounding the background level. The FY 2004 sampling event will provide confirmation.
    - Cobalt was detected in GR1-2 at 1.3 ug/l and in GR2-1 at 1.1 ug/l, just slightly above the background level of 1 ug/l (the other wells were below 1 ug/l). Cobalt was not detected in either of these wells in the FY 2002 sampling event (with a reporting limit of 50 ug/l). In the FY 2001 sampling event, cobalt was detected in GR1-2 at 0.54 ug/l and was not detected in GR2-1 (with a reporting limit of 0.5 ug/l). It is likely that the detections at 1.3 and 1.1 ug/l are representative of the variability surrounding the background level. The FY 2004 sampling event will provide confirmation.

  - Nickel was detected in all four wells at concentrations ranging from 5 to 19 ug/l, above the background level of 4 ug/l. Nickel was not detected in any of the wells in the FY 2002 sampling event (with a reporting limit of 40 ug/l). In the FY 2001 sampling event, nickel was detected in GR1-1 and GR1-2 at 3.7 and 4.0 ug/l, respectively, and was not detected in GR2-1 (with a reporting limit of 1 ug/l). GR-DF1 had not yet been installed at the time of the FY 2001 event.
- Radionuclides were not detected in any of the monitoring wells, with the exception of gross beta. Gross beta detections were reported at GR1-2 and GR2-1; however, both of these detections were qualified as non detect due to detection of gross beta in an associated blank.

One more sampling event is scheduled for these four monitoring wells in FY 2004 (June event), as shown in Appendix A.1. Then a decision will be made to continue or discontinue monitoring.

D. OUTDOOR FIRING RANGE

The removal action to address metals-contaminated soils was completed in early FY 2000 and the Outdoor Firing Range Closeout Report (prepared by Alliant) received partial regulatory approval in FY 2002, with land use control issues still needing resolution. Alliant prepared a work plan for construction of a soil cover over a portion of the 1900-yard range that is contaminated with polynuclear aromatic hydrocarbons (PAHs). The work plan received regulatory approval near the end of FY 2003, with construction of the soil cover planned for early FY 2004. Construction of the soil cover will be documented in an addendum to the Outdoor Firing Range Closeout Report.

E. 135 AND 535 PRIMER/TRACER AREAS

Preliminary assessment reports for both of these sites were prepared by Alliant and both received regulatory approval in FY 2002. Alliant also prepared site investigation work plans for both of these sites in FY 2002. The 135 Primer/Tracer Area work plan received regulatory approval in FY 2002 and site investigation fieldwork was completed in FY 2002. The 535 Primer/Tracer

Area work plan received regulatory approval in FY 2003 and the site investigation fieldwork was also completed in FY 2003. Alliant prepared a site investigation report for each of these sites, both of which were under Army review at the end of FY 2003.

F. MONITORING WELL ABANDONMENT

In FY 2001, MPCA and USEPA approved the Final Sitewide Groundwater Monitoring Well Abandonment Work Plan for monitoring wells that no longer serve a purpose. Phase I of the well sealing was completed in FY 2002. A total of 31 wells were sealed, as documented in "Phase I Sitewide Groundwater Monitoring Well Abandonment Completion Report, TCAAP", prepared by Stone & Webster. Three wells that were scheduled to be sealed could not be located in the field and were presumed to have been previously sealed, though the MDH did not have any sealing records for those three wells.

Phase II of the well sealing was completed in FY 2003. Sealing was completed for 12 monitoring wells, 2 residential water supply wells, and 11 locations near the Site A 1945 trench (soil vents, air sparge points, and piezometers that had been installed as part of soil remediation work). The Phase II sealing work is documented in "Phase II Sitewide Groundwater Monitoring Well Abandonment Completion Report, TCAAP", prepared by Stone & Webster.

G. PROPERTY TRANSFER-RELATED ENVIRONMENTAL ACTIVITIES

While not Installation Restoration Program activities (i.e., not funded by the Defense Environmental Restoration Account), other potentially relevant environmental activities during FY 2003 included the following:

1. Investigation and Cleanup Associated with Property Transfer to Ramsey County
   Ramsey County funded and executed investigation and cleanup work for contaminants related to former Building 576 and associated infrastructure on approximately 13 acres of property being transferred from Federal control. The County performed the work in coordination with the MPCA Voluntary Investigation and Cleanup Program.

2. <u>Phase I & II Environmental Site Assessment for 774 –Acre Excess Parcel</u>

   The remaining 774 acres that is still under the control of TCAAP was declared excess to the needs of the Department of Defense in 2002. The Army Base Realignment and Closure Office funded environmental site assessment work to collect reliable information regarding the environmental condition of the property in order to facilitate property transfer. The work included document reviews and field sampling of various media. The findings were published in "Environmental Site Assessment for 774-Acre Excess Parcel, Phase I and Phase II Report, Twin Cities Army Ammunition Plant" (Plexus Scientific Corporation, July 28, 2003, draft report). At the end of FY 2003, the document was under regulatory review.

TABLE I-1
WATER QUALITY DATA FOR SURFACE WATER

Fiscal Year 2003

	20700 (Entering TCAAP)	20800 (Leaving TCAAP)
	24-Jun-03	24-Jun-03
VOCs (ug/l)		
1,1-Dichloroethane	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0
Trichloroethene	<1.0	<1.0
Vinyl Chloride	<1.0	<1.0
Metals (ug/l)		
Copper	B 1.9	B 1.8
Lead	B 1.3	B 1.3
Mercury	<0.100	<0.100
Silver	<1.0	<1.0
Zinc	B 2.9	B 2.9
Inorganics (ug/l)		
Cyanide	<10	<10
Total Phosphorus	175	182

Notes:

B = The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

TABLE I-2
GRENADE RANGE GROUNDWATER QUALITY DATA

Fiscal Year 2003

	GR1-1	GR1-2	GR2-1	GR2-1D	GR-DF1	Background [1]
	19-Jun-03	19-Jun-03	19-Jun-03	19-Jun-03	19-Jun-03	
SVOCs (ug/l)						
Bis (2-ethylhexyl) phthalate	<5.0	<5.0	<5.0	<4.9	<4.8	
PCBs (ug/L)						
PCB-1016	<0.1	<0.1	**0.106**	**0.114**	<0.1	
PCB-1221	<0.2	<0.2	<0.2	<0.2	<0.2	
PCB-1232	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1242	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1248	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1254	<0.1	<0.1	<0.1	<0.1	<0.1	
PCB-1260	<0.1	<0.1	<0.1	<0.1	<0.1	
Metals (ug/l)						
Aluminum	B 6.8 (UB18)	B 8.4 (UB18)	<30.0	B 6.4 (UB18)	B 20. (UB18)	500
Arsenic	<3.00	**10**	**B 1.6**	**B 1.7**	<3.00	4
Barium	**57**	**170**	**96**	**96**	**27**	372
Beryllium	<2.00	<2.00	<2.00	<2.00	<2.00	1
Cadmium	<2.00	<2.00	<2.00	<2.00	B 0.11 (UB0.3)	4
Chromium	**B 0.49**	**B 0.47**	**B 0.53**	<5.00	**B 0.55**	5
Cobalt	**B 0.60**	**B 1.3**	**B 1.1**	**B 0.84**	B 0.17 (UB0.07)	1
Lead	B 0.16 (UB0.5)	B 0.17 (UB0.5)	B 0.14 (UB0.5)	B 0.15 (UB0.5)	B 0.094 (UB0.5)	7
Nickel	**9.5**	**19**	**15**	**10**	**5**	4
Silver	<5.00	<5.00	<5.00	<5.00	<5.00	4
Thallium	<2.00	<2.00	B 0.096 (UB0.05)	<2.00	B 0.043 (UB0.05)	2
Vanadium	**B 1.3**	<5.00	**B 0.51**	<5.00	**B 0.81**	17
Zinc	19 (UB13)	B 2.7 (UB13)	<5.00	<5.00	B 3.8 (UB13)	19
Radionuclides (pCi/L)						
Gross alpha	<4.0	<4.0	<4.0	<4.0	<4.0	20
Gross beta	<6.0	7.3 (UB2.4)	5.1 (UB2.4)	<6.0	<6.0	29.5
Radium 226	<0.6	<0.6	<0.6	<0.6	<0.6	(Not Listed)
Radium 228	<3.1	<3.1	<3.1	<3.3	<3.2	(Not Listed)

Notes:

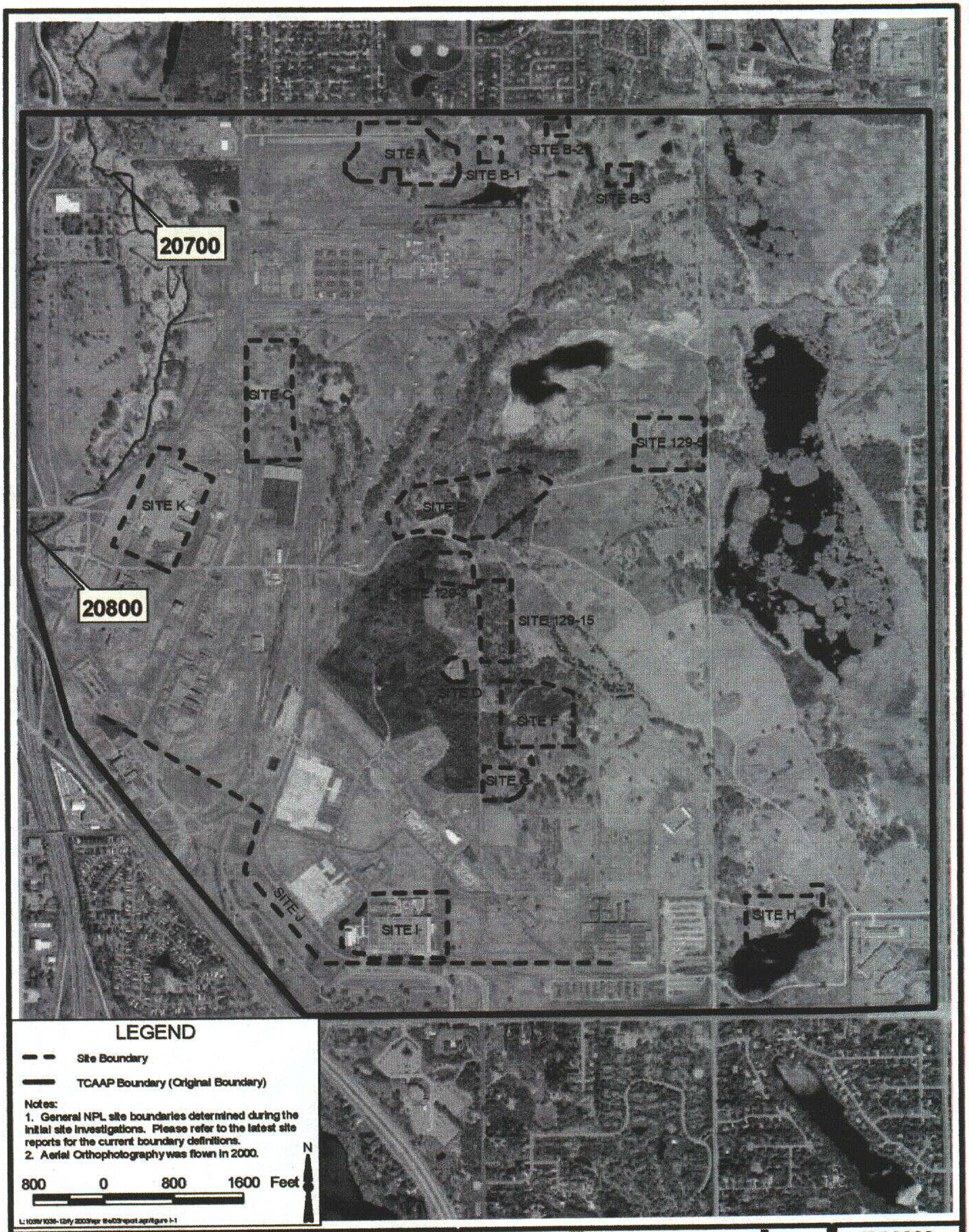
[1] The background values were cited in Table 3 of the Grenade Range Engineering Evaluation / Cost Analysis Report.

Bolding (in red color) indicates detection of the analyte (note that data qualified "UB" is considered non detect).

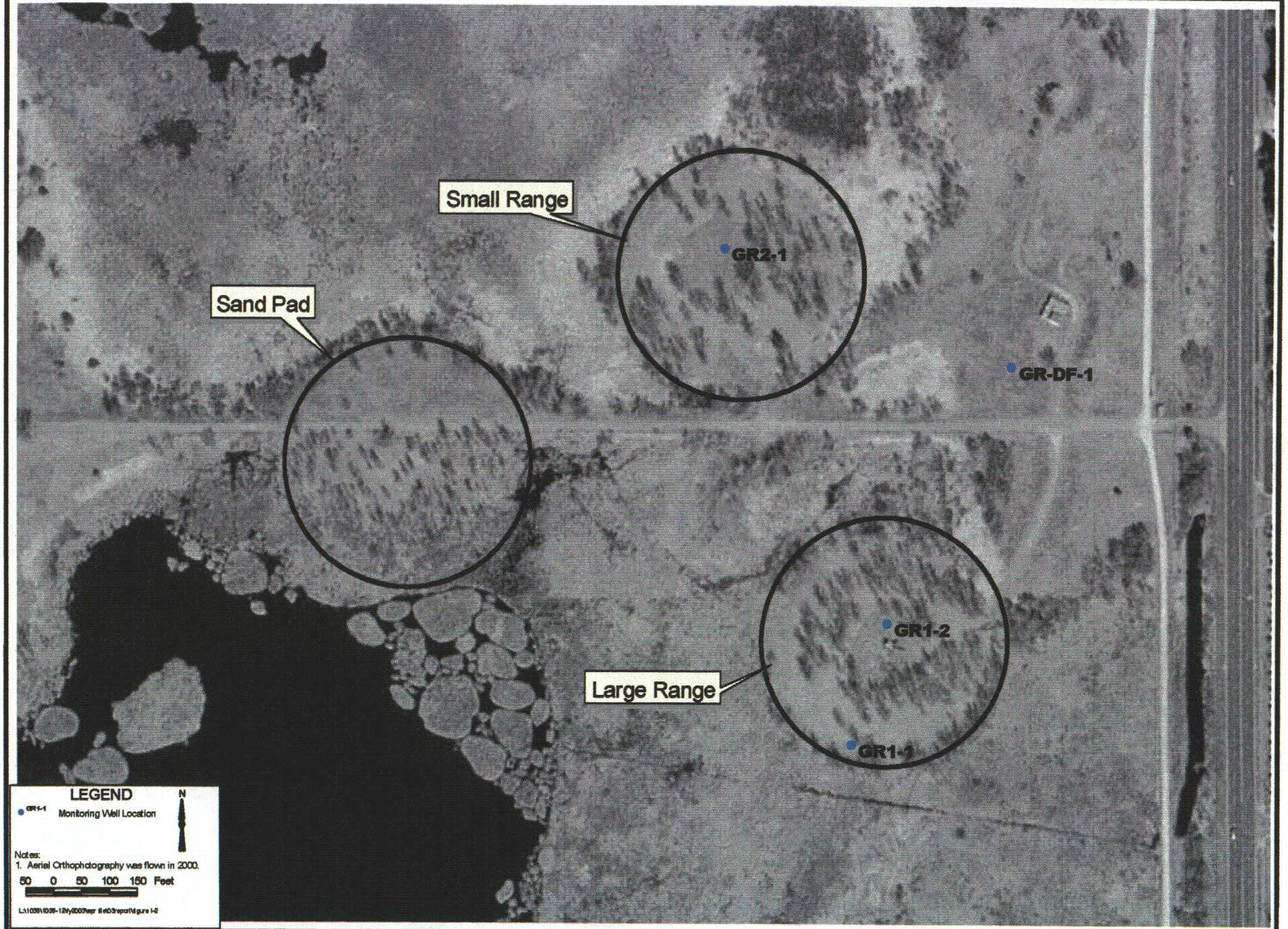
D = Duplicate sample.

B = The value is below the reporting level, but above the method detection limit. Results should be considered estimated.

UB = The sample result was less than 5 times the level detected in a blank (the result for the blank is listed after "UB"). The sample result can be considered non detect at an elevated detection limit.



TWIN CITIES ARMY AMMUNITION PLANT	COPYRIGHT Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0429	FY 2003
Surface Water Monitoring Locations		Figure I-1



TWIN CITIES ARMY AMMUNITION PLANT

Grenade Range Monitoring Well Locations

Wenck

Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0429

FY 2003

Figure I-2

APPENDIX J
ANNUAL SITE INSPECTION CHECKLIST FOR LAND USE CONTROLS

ANNUAL SITE INSPECTION CHECKLIST FOR LAND USE CONTROLS

Twin Cities Army Ammunition Plant

Date: July 30, 2003 Inspected By: Dave Fuller (AMC/TCAAP), Dave Hamernick (National Guard)
Keith Barker (Tecumseh/Wenck Installation Support Services)

Sites:	A	C	D	E	G	H	I	K
Site is located on property held by:	N.G.	AMC	N.G.	N.G.	N.G.	N.G.	AMC	AMC
Is the fence surrounding federally-controlled property intact?	Yes (1)	→	→	→	→	→	→	→
Is access to the federally-controlled property still controlled by the AMC, ATK, & the National Guard?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the current land use consistent with the land use scenario upon which the cleanup levels were based?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Has there been any excavation or other man-made soil disturbance at the site?	No	No (2)	No	No	No	No	Yes (5)	No
If excavation or soil disturbance has occurred, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
If excavation or soil disturbance was authorized, was the work done in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Have any new structures or facilities (including new wells) been constructed on the site?	No	No	No	No	No	No	No	No
If new facilities or structures were constructed, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If new facilities or structures were authorized, was constuction in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Has there been any damage to or removal/modification of groundwater remediation systems?	No	N/A	N/A	N/A	N/A	N/A	N/A	No
If such systems were removed or modified, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If system removal/modification was authorized, was removal/modification in accordance with approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, is adequate vegetation present throughout the soil cover area?	N/A	N/A	Yes	Yes	Yes	Yes	N/A	N/A
If a protective soil cover is present, is there any woody vegetation > 2" diameter present on the soil cover area?	N/A	N/A	N/A	N/A	Yes (4)	N/A	N/A	N/A
If a protective soil cover is present, are run-on/runoff controls in good condition (swales, berms, riprap, etc.)?	N/A	N/A	Yes	Yes	Yes	Yes	N/A	N/A
If a protective soil cover is present, are signs marking the edge of the soil cover present and in good condition?	N/A	N/A	No (3)	No (3)	No (3)	No (3)	N/A	N/A

Comments (Attach additional pages as necessary):

(1) In accordance with the facility operating contract, Tecumseh/Wenck performed an annual inspection of the perimeter fence in April 2003, as documented in a letter to Mike Fix dated April 17, 2003. The inspection included the perimeter fence around the property controlled by the National Guard.

(2) Site C remediation has not been completed, but there was no evidence of any disturbance since work was suspended.

(3) Signs will be installed in the Fall 2003.

(4) Woody vegetation will be removed during construction of cover improvements in the Fall 2003

(5) Soil disturbance and regrading was recently completed as part of demolition for a wing of Building 502.

C:\Files\Lisa\Land Use Control\LUCIP\Appendix B

ANNUAL SITE INSPECTION CHECKLIST FOR LAND USE CONTROLS

Twin Cities Army Ammunition Plant

Date: July 30, 2003 Inspected By: Dave Fuller, Dave Hamernick, Keith Barker

Sites:	129-3	129-5	129-15	Grenade Range	Outdoor Firing Range	Bldg 135 P/T Area	Bldg 535 P/T Area	Phyto Demo Area	Unchar. Land
Site is located on property held by:	N.G.	N.G.	N.G.	N.G.	N.G.	AMC	N.G.	AMC	AMC/N.G.
Is the fence surrounding federally-controlled property intact?	Yes (1)								
Is access to the federally-controlled property still controlled by the AMC, ATK, & the National Guard?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the current land use consistent with the land use scenario upon which the cleanup levels were based?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Has there been any excavation or other man-made soil disturbance at the site?	No	No	No	No	No	Yes (7)	Yes (7)	No (2)	N/A
If excavation or soil disturbance has occurred, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A
If excavation or soil disturbance was authorized, was the work done in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A
Have any new structures or facilities (including new wells) been constructed on the site?	No	No	No	No	No	No	Yes (8)	No	N/A
If new facilities or structures were constructed, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A
If new facilities or structures were authorized, was constuction in accordance with the approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A
Has there been any damage to or removal/modification of groundwater remediation/monitoring systems?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A
If such systems were removed or modified, was prior approval given by the AMC or National Guard?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If system removal/modification was authorized, was removal/modification in accordance with approved plan?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, is adequate vegetation present throughout the soil cover area?	N/A	N/A	Yes	N/A	(6)	N/A	N/A	N/A	N/A
If a protective soil cover is present, is there any woody vegetation > 2" diameter present on the soil cover area?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If a protective soil cover is present, are run-on/runoff controls in good condition (swales, berms, riprap, etc.)?	N/A	N/A	Yes	N/A	(6)	N/A	N/A	N/A	N/A
If a protective soil cover is present, are signs marking the edge of the soil cover present and in good condition?	N/A	N/A	No (3)	N/A	No (3)	N/A	N/A	N/A	N/A

Comments (Attach additional pages as necessary):

(6) The soil cover for an area at the 1900 Yard Range is expected to be constructed in the Fall 2003.

(7) Intrusive soil investigation work was performed during the past year.

(8) Improvements were made to the parking lot adjacent to Building 535.