INSTALLATION RESTORATION PROGRAM
TWIN CITIES ARMY AMMUNITION PLANT

FISCAL YEAR 2001 ANNUAL PERFORMANCE REPORT

Prepared for:

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

TECUMSEH/WENCK
INSTALLATION SUPPORT SERVICES

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

DECEMBER 2002
FINAL REPORT

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

November 14, 2002

REPLY TO THE ATTENTION OF: SRF-5J

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

Subject: Consistency Test for the Fiscal Year 2001 Annual Performance Report, Twin Cities Army Ammunition Plant, Arden Hills, Minnesota

Dear Mr. Fix:

Staff at the U.S. Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA) have completed review of the Fiscal Year 2001 Annual Performance Report (the Report). Our review included the draft version of the Report (February 2002), the U.S. Army's responses to EPA and MPCA comments on the Report, the minutes of the subsequent comments resolution meeting held on July 2, 2002, redline changes to the Report received by e-mail on July 29, 2002, and final redline changes received by e-mail on November 7, 2002. EPA and MPCA also reviewed and commented upon the Data Usability Reports (DURs) which support the FY2001 Annual Performance Report. Our comments and concerns regarding the DURs for the FY 2001 Annual Performance Report have also been resolved.

You are hereby advised that, in accordance with Chapter XIV of the Federal Facility Agreement, with the incorporation of the aforementioned redline page changes, the Twin Cities Army Ammunition Plant, Fiscal Year 2001 Annual Performance Report passes the Consistency Test.

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
Project Manager
Site Remediation Section
Metro District
Minnesota Pollution Control Agency

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APPENDICES

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
gpm	-	Gallons per Minute
HRC	-	Hydrogen Release Compound
IRA	-	Interim Remedial Action
MCES	-	Metropolitan Council Environmental Services
MCLs	-	Maximum Contaminant Levels
MCLGs	-	Maximum Contaminant Level Goals
MDH	-	Minnesota Department of Health
MDL	-	Method Detection Limit
MPCA	-	Minnesota Pollution Control Agency
NBM	-	New Brighton Municipal
NPL	-	National Priorities List
O&M	-	Operation and Maintenance
OU	-	Operable Unit
PCBs	-	Polychlorinated Biphenyls
PGAC	-	Permanent Granular Activated Carbon

List of Acronyms (Cont.)

PGRS	-	Plume Groundwater Recovery System
PLC	-	Programmable Logic Controller
PM	-	Preventative Maintenance
POTW	-	Publicly-Owned Treatment Works
ROD	-	Record of Decision
scfm	-	Standard Cubic Feet per Minute
SDWA	-	Safe Drinking Water Act
SECOR	-	SECOR International, Inc.
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	-	U.S. Army Environmental Center
USEPA	-	U.S. Environmental Protection Agency
VOCs	-	Volatile Organic Compounds
Wenck	-	Wenck Associates, Inc.

List of Chemical Abbreviations

Note: The abbreviations below are those required for data entry into the U.S. Army Environmental Center (USAEC) Installation Restoration Data Management Information System (IRDMIS).

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
CHBR3	-	Bromoform
CHCL3	-	Chloroform

List of Chemical Abbreviations (Cont.)

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 2001 (FY 2001) 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 2001 is defined as the period from October 1, 2000, through September 30, 2001.

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

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

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

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

Table 1-1, at the end of this section, summarizes the status of remedial actions at the end of FY 2001. Following are highlights of the accomplishments for each operable unit.

Operable Unit 1 (OU1): Deep Groundwater

OU1 consists of the "north" plume of VOC groundwater contamination off the TCAAP installation. The final remedy for OU1 consists of pumping three 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 2001:

- Private well monitoring that was recommended in the 1998/1999 Well Inventory Update was completed in FY 2001. Two of twenty wells sampled had contaminant concentrations exceeding cleanup levels (#234352 owned by Nutter and #235566 owned by Big Ten Supper Club). Confirmation sampling will be performed at the Nutter well in FY 2002 to assess eligibility for alternate water supply and/or well abandonment. The Big Ten Supper Club was previously offered, and refused, an Army offer for alternate water supply and well abandonment, so no further action is required.
- 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, water level contours, and water quality trends all support the interpretation that the extraction system is effectively containing contamination in the Prairie du Chien aquifer.
- The Army, USEPA, and MPCA continued discussions regarding performance of the OU1 remedy. A technical memorandum is currently under review, which discusses the possibility of modifying the OU1 ROD to remove the requirement for containment and replace it with a requirement to demonstrate that the plume is not spreading and that aquifer restoration is occurring.

- The PGAC treated nearly 1.3 billion gallons of water and removed 990 pounds of VOCs during FY 2001.
- The effluent of the PGAC was in compliance with the applicable Safe Drinking Water Act criteria.
- The treated groundwater was beneficially used in the New Brighton municipal water supply system.
- The overall monitoring data indicates 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 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 2001 are:

- Shallow Soil Sites
  - Completion of soil remediation at Site E, with treatment and off-site disposal of an additional 1,186 tons of soil (resulting in a project total of 27,980 tons including the quantities from 1999 and 2000).
  - Completion of soil remediation at Site H, with treatment and off-site disposal of an additional 20 tons of soil (resulting in a project total of 11,599 tons including the quantity from 1999 and 2000).
  - Completion of soil remediation at Site 129-3, with treatment and off-site disposal of an additional 3,197 tons of soil (resulting in a project total of 4,669 tons including the quantity from 2000).

- Continuation of soil remediation at Site C, with treatment and off-site disposal of an additional 4,422 tons of soil (resulting in a project total-to-date of 15,762 tons including the quantity from 2000).
- The closeout report for Site B received consistency. Closeout reports for Sites A, E, H, 129-3, 129-5 and 129-15 were in progress.
- In January 2001, continuous operation of an air sparging/soil vapor extraction (AS/SVE) system began to remediate VOC-contaminated soils and source area groundwater at Site A (see additional discussion under Site A below).

- Deep Soil Sites
  - The FY 2000 soil investigation for VOCs in shallow and deep soils at Sites D and G showed that deep soils had met cleanup goals at both sites and that the deep SVE systems were not needed at either site. The results also showed that the shallow soils at Site D met cleanup goals. With regulatory approval, the SVE system at Site D was dismantled in FY 2001. The shallow SVE system at Site G may or may not need to be operated with modifications, depending on final revisions to the Site G cleanup levels. The report is currently under review.
  - A work plan for characterization of non-VOC contaminants in Site D shallow soils was under regulatory review at the end of FY 2001.
- Site A Shallow Groundwater
  - The eight extraction wells operated until July 11, 2000, when the downgradient line of four extraction wells was shut off because concentrations declined below cleanup levels beyond the "first line" of extraction wells. The four extraction wells in the "first line" continued to operate throughout FY 2001 and continued to provide containment and mass removal.
  - The system pumped at an average rate of 16.2 gallons per minute (gpm), exceeding the 15 gpm target rate.
  - During FY 2001, the system removed approximately 1.9 pounds of VOCs, with a cumulative mass removal of 35 pounds since May 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. Two primary areas remaining to be remediated are: in the vicinity of extraction well 01U352 for cis-1,2-dichloroethene, and in the vicinity of monitoring well 01U108 (source area) for tetrachloroethene and trichloroethene.
- In January 2001, the AS/SVE system began continuous 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 being implemented voluntarily and was not a requirement of the OU2 ROD. Operation of the SVE system continued through the end of FY 2001.
- During FY 2001, the AS/SVE system removed approximately 413 pounds of VOCs.
- SVE VOC emissions were in compliance with discharge criteria.
- Due to declining VOC levels in the SVE discharge, a direct-push soil investigation was conducted in August 2001. Results showed that soil cleanup levels have not been reached. Results were submitted for regulatory review in early FY 2002, and included recommendations regarding potential SVE system modifications.

• Site I Shallow Groundwater
  - Sampling at Site I indicated no significant changes in VOC concentrations in Unit 1 monitoring wells in FY 2001. Two of the seven wells scheduled for sampling were dry.
  - A pilot test for evaluating the feasibility of dual phase extraction was completed and a report was submitted to the Agencies. The report concluded that dual phase extraction is not feasible. It also concluded that groundwater extraction from the existing extraction well is not feasible due to low aquifer permeability.

- Site K Shallow Groundwater
  - At Site K, the groundwater extraction trench and treatment system continued to operate as designed. The system captured and treated 6,703,138 gallons of water and maintained a continuous zone of capture downgradient of Building 103. A total of 14 pounds of VOCs were removed in FY 2001.
  - The extracted water was discharged to Rice Creek in compliance with all discharge criteria.
  - Additional characterization of the unsaturated Unit 1 soil was completed. A report was completed and submitted to the Agencies, which defined the extent of VOCs in the unsaturated soils beneath the building.
  - The University of Minnesota continued its research into hydrogen injection, via gas permeable membranes, to help degrade chlorinated organics in groundwater.
- Deep Groundwater
  - The TGRS operated in accordance with the OU2 ROD.
  - The TGRS operated at a rate sufficient to support the conclusion (based on comparison with the extensive performance evaluations presented in the 1989 Annual Monitoring Report) that the 5-µg/l trichloroethene contour is hydraulically contained.
  - In FY 2001, the TGRS extracted and treated 1,113,164,000 gallons of water. The mass of VOCs removed was 3,418 pounds. The total VOC mass removed by the TGRS through FY 2001 is 180,084 pounds.
  - Beginning 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 chemical data collected shows the shrinking of the 5-µg/l trichloroethene contour to the extent that Extraction Well B7 no longer captures any significant portion of the plume. In addition, Extraction Well SC3 no longer provides any significant VOC mass removal, as should be expected from a source control well. The Army is currently evaluating (with the assistance of

the regulatory agencies) alternative groundwater extraction scenarios as part of a proposed TGRS Reconfiguration Plan.

Operable Unit 3 (OU3): Deep Groundwater

- Under an agreement with the Agencies, the PGRS pumping rate was reduced to zero in response to declining VOC concentrations (to below ROD requirements) at the leading edge of the plume. The basis for this change is documented in a report titled "Plume History Evaluation, Operable Unit 3," dated October 10, 2000, by CRA. The influent to the PGRS treatment system had been below the ROD requirements since 1997.
- In FY 2001, through August 2001, a total of 204,523,000 gallons of water were treated by the PGRS.
- PGRS influent and effluent VOC concentrations were below all applicable drinking water criteria in FY 2001. The influent samples were non-detect for all VOCs in FY 2001. Thus, the PGRS removed a negligible mass of VOCs. The extraction well will be maintained in a standby status for the foreseeable future.
- The treated groundwater was beneficially used in the New Brighton municipal water supply system. New Brighton is conducting an evaluation of its municipal needs to determine the future use of the PGRS extraction well and treatment system.

Table 1-1

Status of Remedial Actions: FY 2001

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose 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	Metals-contaminated soil excavation was completed in early FY 2000. Closeout Report was in progress. AS/SVE system began continuous operation in early FY 2001.
Site C	Yes	Partially	No	Site was partially excavated in FY 2000/2001. Will be completed in FY 2002, if funding is available.
Site E	Yes	Yes	Partially	Site was partially excavated in FY 1999/2000, and was completed in FY 2001. Dump cover was installed in 2001. Closeout Report was in progress.

Table 1-1 (continued)

Status of Remedial Actions: FY 2001

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose 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	Site was partially excavated in FY 1999/2000, and was completed in FY 2001. Closeout Report was in progress.
Site 129-3	Yes	Yes	Partially	Site was partially excavated in FY 2000, and was completed in 2001. Closeout Report was in progress.
Site 129-5	Yes	Yes	Partially	Soil excavation completed in early FY 2000. Closeout Report was in progress.
#8: Groundwater Monitoring	No	No	No	Starts after #1-7 are completed.
#9: Characterization of Dumps:				
Site B	Yes	Yes	Yes	
Site 129-15	Yes	Yes	No	Site 129-15 was characterized in FY 1999. CERCLA soil cover was completed in 2001.
Overall Remedy	Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2001

Remedy Component		Is the component being implemented?	Is the component doing what it is suppose 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	Investigation for VOCs in shallow and deep soils was conducted in FY 2000. Deep SVE systems will not be required at Sites D or G. The Site D SVE system was dismantled in FY2001. The Site G SVE system may or may not be operated with enhancements, depending on the final revisions to Site G cleanup levels.
#4:	Enhancements to SVE Systems	Yes	Yes	Partially	The Site D SVE system was dismantled in FY2001. The Site G SVE system may not be operated with enhancements (see #3 above).
#5:	Maintain Existing Site Caps (Site G)	Yes	Yes	No	
#6:	Maintain Surface Drainage Controls (Site G)	Yes	Yes	No	
#7:	Characterize Shallow Soils and Dump	Yes	Partially	No	Investigation of "tar-like" substances at Site G was completed in FY 1999, with no further action required. A work plan for characterizing non-VOC contaminants at Site D was under regulatory review at the end of FY 2001.
Overall Remedy		Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2001

Remedy Component		Is the component being implemented?	Is the component doing what it is suppose 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	The AS/SVE system began continuous operation in early FY 2001 to address VOC-contaminated soils. AS was discontinued in June 2001 (SVE operation continued). The AS system was voluntarily implemented and is not required for this remedy component.
Overall Remedy		Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2001

Remedy Component	Is the component being implemented?	Is the component doing what it is suppose 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.
#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	No	
#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	No	Pilot study completed in FY 2000.
Overall Remedy	Yes	Yes	No	

Table 1-1 (continued)

Status of Remedial Actions: FY 2001

Remedy Component		Is the component being implemented?	Is the component doing what it is suppose to?	Has the component undergone final closeout?	Comments
Operable Unit 2: Deep Groundwater					
#1:	Hydraulic Containment and Contaminant Mass Removal	Yes	Yes	No	TGRS reconfiguration analysis was under regulatory review in FY 2001.
#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	No	Yes	No	PGRS flowrate was reduced to 0 gpm in FY 2001.
#2:	Groundwater Treatment	No	Yes	No	
#3:	Use of Water for Municipal Supply	No	Yes	No	
#4:	Groundwater Monitoring	Yes	Yes	No	
Overall Remedy		Yes	Yes	No	

2.0 Introduction

2.1 PURPOSE

This Fiscal Year 2001 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 2001 (FY 2001) extended from October 1, 2000, through September 30, 2001.

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

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

- Operable Unit 1
  - Deep Groundwater

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

- Operable Unit 3
  - Deep Groundwater

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

- October 12, 1990
- February 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.

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

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

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

In addition to the performance evaluation, another objective of making the report focused is to make the monitoring program focused and efficient. With specific questions identified, it is easier to develop the monitoring needs. In addition to reporting on FY 2001, this document presents proposed monitoring for future years (Appendix A). The monitoring plan shows FY 2001 through FY 2005. The FY 2001 monitoring plan indicates the work for which results are included in this report. The FY 2002 monitoring plan is in progress. The intent is that the monitoring plan will always be a revolving 5-year timespan--in other words, next year FY 2001 will drop off and FY 2006 will be added.

This report represents the collaboration of work performed by the U.S. Army (Army) and Alliant Techsystems Inc. (Alliant). On behalf of the Army, Tecumseh/Wenck Installation Support Services (TWISS) prepared Sections 2.0 through 6.0, and 11.0 of this report. On behalf of Alliant Techsystems Inc., 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 Arden Hills, Minnesota, in the northern portion of the Minneapolis-St. Paul metropolitan area (Figure 2-1). The facility occupies approximately a four-square mile area immediately east of U.S. Interstate Highway 35W and north of Ramsey County Highway 96. Alliant Techsystems Inc. is the prime tenant on the installation. TWISS is the contracted operator.

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

During periods of activity, solvents were utilized as part of the manufacturing process. Disposal of solvents and other wastes at the TCAAP site resulted in soil contamination and also groundwater contamination, which has migrated beyond the site boundary. Groundwater contamination was first discovered in July 1981, and the site was placed on the National Priorities List (NPL) in 1983.

A number of known and potential contaminant source areas have been identified on the TCAAP property: Sites A, B, C, D, E, F, G, H, I, J, K, 129-3, 129-5 and 129-15 (see Figure 2-2 for locations). Sites F and J have previously been remediated. The remaining sites are addressed in 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; therefore, they are not specifically addressed in this report.

2.3 HYDROGEOLOGIC UNITS AND WELL NOMENCLATURE

On- and off-post wells have been installed in four hydrogeologic units beneath the site: Unit 1 through Unit 4. Descriptions of these four units are presented in Appendix 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, the TCAAP designation, Minnesota unique number, and any other name(s) the wells may have. Figure B-2 (off-TCAAP) and Figure B-3 (on-TCAAP) in Appendix B show the locations of wells that are included in the TCAAP monitoring plan. With a known well name, the location of that well can be determined using the "Find" function, which will highlight the desired well name on the figure.

2.4 DATA COLLECTION, MANAGEMENT, AND PRESENTATION

Performance monitoring data was collected in accordance with the:

- FY 2001 Monitoring Plan for Groundwater Monitoring Wells
- FY 2001 Monitoring Plan for Remedial Treatment Systems

- FY 2001 Monitoring Plan for Surface Water
- New Brighton Water System Sampling and Analysis Plan

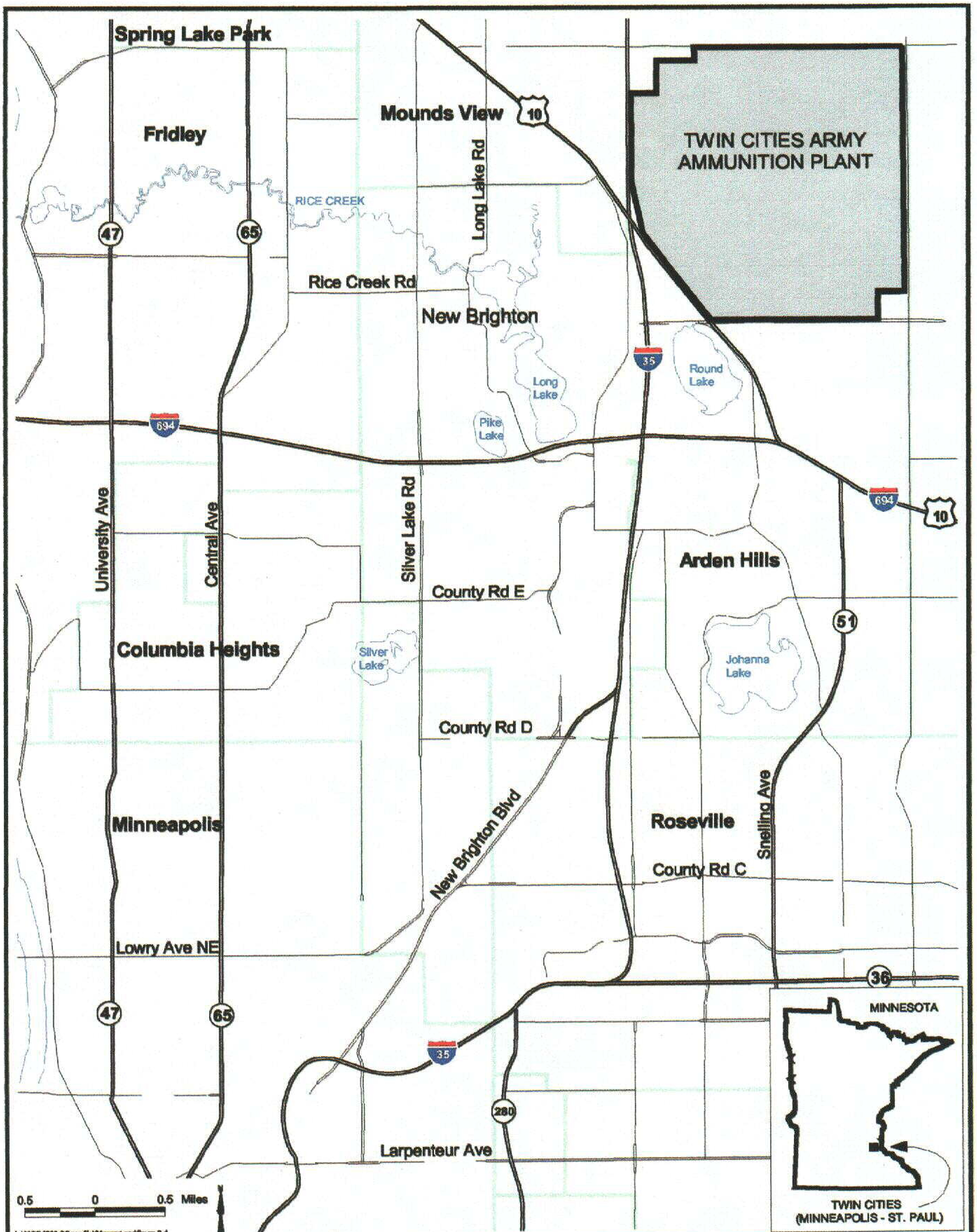
Data was collected principally by four parties: TWISS on behalf of the Army, SECOR and CRA on behalf of Alliant Techsystems, and Barr Engineering on behalf of the City of New Brighton. Appendix C presents a discussion of data collection, management, and presentation. The comprehensive groundwater level and groundwater quality databases from 1987 to present are contained in Appendix D. Groundwater quality trend graphs for the primary contaminant of concern (trichloroethene) can be viewed by selecting the well of interest on Figure B-2 (off-TCAAP) and B-3 (on-TCAAP) in Appendix B (click on the well name with the mouse). Tables showing FY 2001 data are presented following the text at the end of each section in which it is referenced.

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 2001 Monitoring Plan and the "Remedial Design/Remedial Action, Quality Assurance Project Plan" (Montgomery Watson, 1996). The databases (Appendix D) and data tables in the various report sections show the data qualifiers and flagging codes that were assigned to the data as a result of data assessment/validation. The qualifiers and flagging codes are explained in Appendix C. 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 November 28 and 29, 2001 (TWISS), December 18 and 19, 2001 (SECOR) and January 30, 2002 (CRA). MPCA and USEPA approval letters for these submittals are included in Appendix C.6.

With regard to completeness, Appendix C.2 summarizes a few minor deviations from the FY 2001 Monitoring Plan. Field completeness for FY 2001 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 16%, 10% and 6%, 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 81%, also meeting the QAPP-specified frequency. Data validation was performed on 12% 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 2001 is deemed to be representative based on: 1) adherence to QAPP-specified sampling and laboratory analytical procedures; 2) the results of data assessments and data validation; and 3) the comparability to historical results (substantial deviations from historical/anticipated results were very limited and are discussed within the site-specific sections of this report).



TWIN CITIES ARMY AMMUNITION PLANT

Site Location Map

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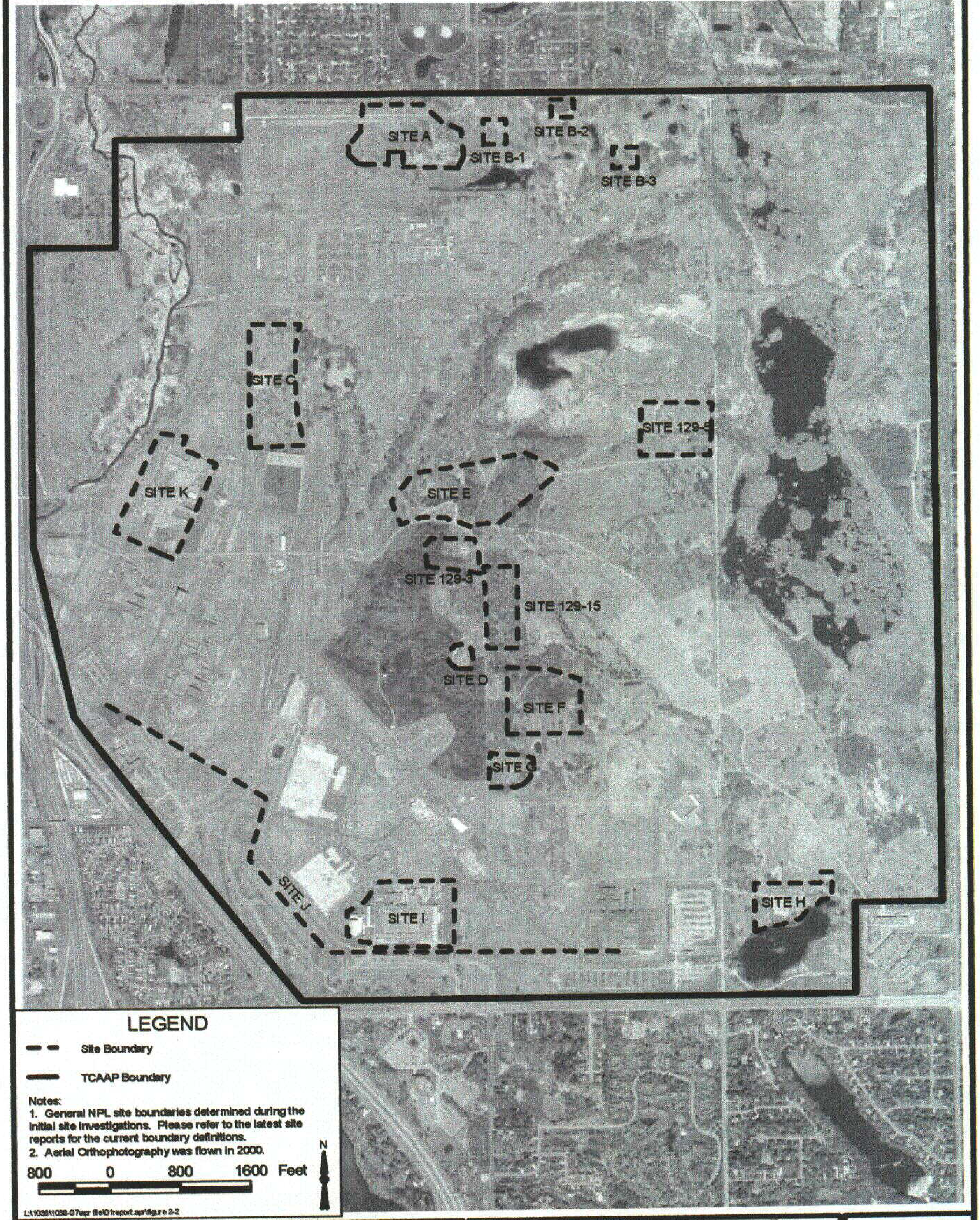
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2001

Figure 2-1



TWIN CITIES ARMY AMMUNITION PLANT

TCAAP Site Boundaries

Wenck

Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2001

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 <u>all</u> well owners 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 Figure E-1; 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 <u>all</u> 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 is implemented and will be 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, with an added buffer margin. The well inventory is intended to include all wells within the study area. The wells are grouped into categories based on factors such as level of contamination, type of use, active or sealed, etc. Wells in categories with the potential to be impacted are periodically sampled to see if any qualify for alternate water supply and/or abandonment.

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

1. Check if the study area 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,
3. Sample wells on a prescribed schedule,
4. Take the appropriate course of action depending on the results,
5. Update the well inventory database (e.g., new water quality results, any new owner information, any new construction information, any re-categorizing of wells)
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 well inventory study area change during FY 2001, as defined by the 1 μg/l contour line?

No. Figure 3-1 shows that the 1 μg/l contour line remained essentially the same between FY 1999 and FY 2001.

Were any additional water supply wells discovered within the North Plume during FY 2001? Yes. Two new wells were identified in FY2001 at the Midland Hills Country Club, but were determined to be Category 3 wells (i.e., they are located in the study area but are not screened in an aquifer of concern). The two new wells were mentioned to TWISS sampling personnel by Midland Hills staff when they were contacted to arrange sampling of the two wells already identified in the well inventory database.

Were any water supply wells within the North Plume sampled during FY 2001 (outside of those included in the OU1 performance monitoring plan)? If yes, what were the findings? Yes. Twenty wells were sampled. The 1998/1999 Well Inventory Update recommended that 87 wells be targeted for sampling (Table 3.1 of Appendix G of the FY 1999 Annual Performance Report). CRA performed an initial sampling effort in FY 2000. In October 2000, due to a change of responsibility for maintaining the well inventory from Alliant Techsystems to TWISS, CRA ceased their sampling effort. TWISS resumed the sampling effort in FY 2001. A summary of this sampling effort is presented in Table E-2 of Appendix E. The 67 wells that were not sampled were either found to be abandoned, were 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 2000/2001 sampling efforts are summarized in Table E-3. The well locations are illustrated on Figure E-5 (Appendix E), where the 2000/2001 results can be viewed by clicking on each well. Eight wells did not have any detections of the OU1 chemicals of concern, and twelve wells had one or more detections. Two wells had detections of at least one TCAAP contaminant above the OU1 cleanup level.

Well #234352, owned by Nutter, had a detection of 1,1-dichloroethene at 7.3 μg/l, above the OU1 cleanup level of 6 μg/l. This well is used for outside irrigation, and is not used for drinking water since the residence is connected to the municipal water supply.

Well #235566, owned by the Big Ten Supper Club, had a detection of trichloroethene at 28 μg/l, above the OU1 cleanup level of 5 μg/l, and a detection of 1,1-dichloroethene at 6.8 μg/l. The Big Ten Supper Club was previously offered, and refused, an Army offer for alternate water supply and well abandonment, so no further action is required by the Army.

Were any well owners offered an alternate water supply and/or well abandonment during FY 2001? No.

Within the North Plume, are there any well owners which meet the criteria, but have not yet been provided an alternate water supply? No.

Within the North Plume, are there any wells which meet the criteria, but have not yet been abandoned?
Maybe. According to the well abandonment program, results must be confirmed as part of determining eligibility. Well #234352 (Nutter) appears to be a possible candidate.

Is any sampling of water supply wells (excluding those included in the OU1 performance monitoring plan) proposed prior to the next report?
Yes. Well #234352 (Nutter) will be re-sampled in FY 2002. The next "major" sampling event will be in FY 2005.

Are there any changes or additional actions required for this remedy component?
Appendix E lays out a framework for specific actions and schedules for maintaining the well inventory. Previously, this level of detail was missing, so this Annual Performance Report will serve as the vehicle for review and approval of these clarifications.

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 new area 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 are 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 2001, 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?
Yes; however, two issues remained under discussion between the Army, USEPA, MPCA, and RAB:

1. The degree of containment provided in the Prairie du Chien, and
2. Whether or not containment is required in the Jordan.

Wenck prepared a technical memorandum addressing hydraulic analysis of containment within the Prairie du Chien in December 1999. Since that time, there have been a number of meetings, comment and response letters, and revisions to the technical memorandum. At the risk of over simplification, the main points are:

1. The Army believes the extraction system is providing complete containment in the Prairie du Chien,
2. The USEPA, MPCA, and RAB, while believing there is substantial containment, are not convinced of complete containment, and

3. All parties are evaluating the conditions in the Jordan, for which an extraction system was not specifically addressed through the ROD or subsequent remedial design stages.

At a meeting between the parties in July 2001, the idea surfaced to revisit the ROD with the intent of reevaluating the requirement for containment, and potentially replacing it with a requirement to demonstrate that the plume is not spreading and that aquifer restoration is occurring. The idea is to focus on the desired outcome, rather than the specific means to achieve it. The idea was spurred on by the general consensus that conditions in both the Prairie du Chien and Jordan appear to be improving. It was agreed that the Army would prepare a technical memorandum evaluating the feasibility of such a change, including its impact on protection of human health and the environment. The technical memorandum was completed late in calendar year 2001 and is currently under review. Subsequent meetings have also been held with the cities of New Brighton, St. Anthony, and Fridley, since they could potentially be affected by such a change.

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 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). Figure 3-2 shows variability in monthly pumping targets, in some cases due to the variable number of days in each month and in some cases, due to one well going off-line causing the target pumping rates to increase at other wells.

Figure 3-2 indicates that pumping at NBM #4 followed the target very closely in FY 2001. NBM #4 was off in March for routine inspections and maintenance. During this month, NBM #3 was operated, and NBM #14 and #15 were pumped harder to make up the difference. Pumping at NBM #15 was consistently above the target. Pumping at NBM #14 was below the target for the first four months, but then was at or above the target for the remaining months. The deficiencies at NBM #14 in December and January were compensated for by the overpumping at NBM #15. 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 water level measurements and Figure 3-3 shows water level contours, the estimated line of capture, and trichloroethene concentration contours. 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 total VOCs in NBM #3, #4, #14 and #15 are shown on Figure 3-4 and the data is presented in Table 3-1. At NBM #3, total VOCs decreased dramatically between 1994 and 1998, and since 1998, have been relatively stable. The range in FY 2001 was 18 μg/l to 52 μg/l, with an average of 37 μg/l. NBM #4 also exhibits a similar decrease between 1994 and 1998, and since 1998, has shown a relatively slight decreasing trend to its current level. The range in FY 2001 was 32 μg/l to 76 μg/l, with an average of 51 μg/l. NBM #14 has shown a decreasing trend since its startup in December 1996. The range in FY 2001 was 86 μg/l to 170 μg/l, with an average of 108 μg/l. NBM #15 has fluctuated since its startup in March 1998 and has not shown any clear trend to date. The range in FY 2001 was 92 μg/l to 170 μg/l, with an average of 124 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. The graphs can be viewed by clicking on the well of interest. Following are some comments regarding key wells near the extraction system. (The individual graphs can be viewed by clicking on the well name below. When done viewing the graph, to return to the text, click on the "back arrow," not the "Return to Map" button.)

04U839: Located west of the extraction wells near the west edge of the plume. The concentrations have decreased to 1 μg/l, suggesting that the extraction system is effectively containing the west edge of the plume.

04U875: Located downgradient of the extraction system, south of 04U839. The concentration has decreased from 23 μg/l in 1993 to 9.5 μg/l, supporting the interpretation that the west edge of the plume is being contained.

04U877: Located near the capture line south of NBM #14 and #15. The concentrations have decreased to 5.6 μg/l (essentially at the cleanup level) suggesting effective containment for 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 has declined from approximately 225 μg/l in 1996 to 25 μg/l in FY 2001, indicating that containment is occurring.

04U872: Located further downgradient of 04U871, this well shows a similar decline with the concentrations decreasing from approximately 170 µg/l in 1996 to 16 µg/l.

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).

Are any changes or additional actions required for this remedy component?
Potential changes and/or additional actions will be addressed through review and approval of the technical memorandum previously referenced.

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.

During FY 2001, 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 2001.

Each of the 8 pairs of GAC Contractors (labeled A and B) are normally run in series (i.e., water passes through A than 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 2001, one in November 2000 and one in June/July 2001. 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. The only detection reported after the lag vessel in FY 2001 was for Contactor (Vessel) #2A, where trichloroethene was 1.6 μg/l on June 29, 2001. Contactor #2 was running in parallel between June 25 (just after the June 21 carbon change-out in the B vessel) and July 14, 2001, due to high water demand. The July, August, and September results all had non-detectable concentrations of trichloroethene for Contactor #2, suggesting that the trichloroethene result on June 29, 2001, was a false positive. Even if it was an accurate result, at 1.6 μg/l, it was below the trichloroethene MCL of 5 μg/l. Furthermore, it would have been diluted prior to leaving the PGAC water treatment facility by the water from the other GAC vessels, which was clean.

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 four exceptions. Wells 191942 and 409596 could not be located on Midwest Asphalt property, the pump in the Cloverpond well (206688) was not operable, and Saint Anthony #3 (200804) was out of service for maintenance purposes.

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. Two wells will be sampled in FY 2002. 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. Further effort is needed to resolve the issues with the missed wells described above.

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 2001 water quality data for OU1. The trichloroethene concentrations are shown in plan view on Figures 3-5 through 3-7, and in cross-section view on Figure 3-8. As previously introduced, Figure 3-1 illustrates how the 1 µg/l contour has changed with time for Upper Unit 4. Similarly, Figure 3-9 shows how the 100 µg/l contour has changed.

Collectively, these figures indicate that the extent of contamination has remained generally the same, with the following comments regarding the comparison of FY 2001 versus FY 1999:

1. For Upper Unit 3 (Figure 3-5), the contours remained unchanged.
2. For Lower Unit 3 (Figure 3-6), the contours remained unchanged.
3. For Upper Unit 4 (Figure 3-7), the concentration at 04U839, located west of the extraction wells, decreased to 1 µg/l, causing the 1 µg/l contour to shrink in.
4. South of 04U839, the concentrations at 04U875, 04U882, and 234546 decreased causing the 10 µg/l contour to move in.
5. In the vicinity of extraction wells NBM #14 and NBM #15, changes were observed causing the 10 µg/l contour to shrink in. Decreases were observed at 04U838 (11 µg/l to 1.4 µg/l), 04U837 (16 µg/l to 2.6 µg/l), and 04U877 (13 µg/l to 5.6 µg/l).
6. Also for Upper Unit 4, the concentration at 04U844 increased from 22 µg/l to 400 µg/l causing the 100 µg/l contour to expand. However, review of the trend graph shows that the concentration at this well was typically around 500 µg/l prior to FY 1999, which makes that value seem anomalous. It is not likely that the 100 µg/l actually contracted, then expanded again.

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 decreasing concentrations relative to FY 1999. The decreases 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.

The Upper Unit 3 wells within the plume showed decreasing trichloroethene concentrations, while the wells marking the edges remained non-detect. Likewise, for the Lower Unit 3 wells. The same overall trend was observed for Unit 4 wells, with the following exceptions:

1. 04U841 and 04U843, located approximately ½ -mile off TCAAP, showed increases from 19 µg/l to 25 µg/l, and from 22 µg/l to 38 µg/l, respectively. The cause for these increases is not clear.

2. Further south of 04U843, the concentrations increased from 4.4 µg/l to 7.9 µg/l at 409549, which could be within the range of laboratory variability.

3. South of 04U841, the concentration at 04U844 increased from 22 µg/l to 400 µg/l. Review of the trend graph shows that prior to FY 1999, the concentration was typically around 500 µg/l, so it appears that the FY 1999 value was anomalous.

4. Just upgradient of the OU1 extraction system, the concentration at 04U850 increased from 32 µg/l to 61 µg/l. This increase is likely the result of shifting the center of the plume laterally due to pumping.

Overall, the monitoring data indicates that aquifer restoration is occurring in the Prairie du Chien. Both the extent and magnitude of the contamination 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 (11 μg/l) versus the Jordan (0.41 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.

With respect to the Jordan, near the TCAAP boundary at PJ #806, the trichloroethene concentration decreased from 300 μg/l to 180 μg/l, 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
04J839	1.74 μg/l	1.80 μg/l	<1.0 μg/l
04J836	3.91 μg/l	4.20 μg/l	0.41 μg/l
04J837	147 μg/l	60 μg/l	27 μg/l
04J838	39.8 μg/l	46 μg/l	12 μg/l

Downgradient of the extraction system at NBM #5 and #6 (both completed in the Jordan only), the concentrations decreased from 150 μg/l to 130 μg/l and 90 μg/l to 85 μg/l, respectively.

Further south at St. Anthony Municipal #5 and #4 (both completed in the Jordan only), the concentrations changed from 24 µg/l to 16 µg/l and from 21 µg/l to 23 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 3-3 shows that the PGAC removed 990 pounds of VOCs during FY 2001. The relative contribution from each extraction well was 16% from NBM #4, 34% from NBM #14, and 45% from NBM #15 (with a combined 5% from other extraction wells).

Besides the changes already discussed, are any other changes or additional actions required for OU1?

Potential changes and/or additional actions will be addressed through review and approval of the technical memorandum previously referenced.

Table 3-1

OU1 Pumping/VOC Mass Removal Data

Fiscal Year 2001

MTH/YR	ITEMS	WELL # 3	WELL # 4	WELL # 5	WELL # 6	WELL # 14	WELL # 15	TOTAL PGAC WELLS
Oct-00	Pumpage (Thousands of gals.)	90	37,762	108	104	25,948	34,774	98,786
	VOC Level (ppb)	29	53	190	120	160	150	
	Total VOCs (lbs)	0	17	0	0	35	44	95
Nov-00	Pumpage (Thousands of gals.)	1,116	14,628	204	196	10,596	16,343	43,083
	VOC Level (ppb)	32	32	160	110	100	130	
	Total VOCs (lbs)	0	4	0	0	9	18	31
Dec-00	Pumpage (Thousands of gals.)	7,639	32,175	329	109	22,089	43,460	105,801
	VOC Level (ppb)	42	55	150	110	54	120	
	Total VOCs (lbs)	3	15	0	0	10	44	71
Jan-01	Pumpage (Thousands of gals.)	11,323	37,443	172	141	33,236	40,532	122,847
	VOC Level (ppb)	48	64	160	120	55	120	
	Total VOCs (lbs)	5	20	0	0	15	41	81
Feb-01	Pumpage (Thousands of gals.)	5,850	34,319	117	99	29,820	30,328	100,533
	VOC Level (ppb)	51	76	210	91	95	170	
	Total VOCs (lbs)	2	22	0	0	24	43	91
Mar-01	Pumpage (Thousands of gals.)	25,665	0	203	179	42,999	41,661	110,707
	VOC Level (ppb)	47	NS	170	110	101	120	
	Total VOCs (lbs)	10	0	0	0	36	42	89
Apr-01	Pumpage (Thousands of gals.)	1,629	34,532	196	150	40,685	35,526	112,718
	VOC Level (ppb)	52	70	190	140	120	140	
	Total VOCs (lbs)	1	20	0	0	41	42	104
May-01	Pumpage (Thousands of gals.)	0	35,888	1,177	242	43,101	38,491	118,899
	VOC Level (ppb)	NS	49	160	120	110	120	
	Total VOCs (lbs)	0	15	2	0	40	39	95
Jun-01	Pumpage (Thousands of gals.)	0	27,908	159	154	29,521	35,013	92,755
	VOC Level (ppb)	NS	42	160	110	150	110	
	Total VOCs (lbs)	0	10	0	0	37	32	79
Jul-01	Pumpage (Thousands of gals.)	434	37,670	7,217	1,437	32,495	43,939	123,192
	VOC Level (ppb)	NS	41	160	110	170	100	
	Total VOCs (lbs)	0	13	10	1	46	37	107
Aug-01	Pumpage (Thousands of gals.)	17,706	37,938	131	118	30,608	42,074	128,575
	VOC Level (ppb)	18	41	140	96	100	92	
	Total VOCs (lbs)	3	13	0	0	26	32	74
Sep-01	Pumpage (Thousands of gals.)	6,695	36,544	138	125	30,972	37,747	112,221
	VOC Level (ppb)	18	40	180	120	86	120	
	Total VOCs (lbs)	1	12	0	0	22	38	74
Fiscal Year 2001 Totals								
	Pumpage (Thousands of gals.)	78,147	366,807	10,151	3,054	372,070	439,888	1,270,117
	Total VOCs (lbs)	24	160	14	3	340	449	990

Note:
NS - Not Sampled

Table 3-2

OU1 Groundwater Level Data

Fiscal Year 2001

Well	TOS [1] (ft)	Date	Groundwater Elevation (ft)	Well	TOS [1] (ft)	Date	Groundwater Elevation (ft)
03L811	908.43	31-May-01	842.05	04U846	888.39	31-May-01	827.51
03L822	876.60	31-May-01	833.52	04U847	916.84	31-May-01	845.08
03L841	911.27	31-May-01	841.01	04U850	916.80	31-May-01	827.15
03L846	887.61	31-May-01	828.70	04U855	896.10	31-May-01	831.69
03L853	888.80	31-May-01	834.30	04U871	957.10	31-May-01	819.40
03M843	885.70	31-May-01	834.38	04U872	952.20	31-May-01	817.73
03U811	908.19	31-May-01	842.93	04U875	1013.60	01-Jun-01	818.96
03U822	876.70	31-May-01	833.52	04U877	920.86	31-May-01	825.88
03U831	888.60	31-May-01	833.46	04U879	945.60	31-May-01	827.30
04J834	946.11	31-May-01	808.07	04U880	972.00	01-Jun-01	816.08
04J836	1000.88	01-Jun-01	823.45	04U881	976.50	01-Jun-01	814.70
04J837	928.62	01-Jun-01	823.78	04U882	917.70	31-May-01	811.31
04J838	879.80	01-Jun-01	825.99	04U883	948.60	31-May-01	809.85
04J839	987.43	01-Jun-01	824.16	409547	896.00	31-May-01	836.02
04J882	884.80	31-May-01	806.78	409548	867.00	31-May-01	828.91
04U834	945.70	31-May-01	812.19	409549	921.30	31-May-01	827.49
04U836	1000.15	01-Jun-01	821.94	409550	912.00	31-May-01	843.25
04U837	928.38	01-Jun-01	825.61	409555	923.00	31-May-01	821.04
04U838	879.97	01-Jun-01	827.47	409556	960.00	31-May-01	827.16
04U839	987.15	01-Jun-01	826.63	409557	896.00	31-May-01	833.48
04U841	911.49	31-May-01	841.94	409597	880.30	04-Jun-01	833.32
04U843	886.10	31-May-01	833.61	512761	891.20	01-Jun-01	808.12
04U844	884.49	31-May-01	832.13	PJ#318	983.00	01-Jun-01	813.06

Notes:

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

Table 3-3

PGAC Effluent Water Quality

Fiscal Year 2001

		QUARTERLY INFLUENT WELL MONITORING						MONTHLY OPERATIONAL PERFORMANCE MONITORING															
SAMPLING								Contactor #1		Contactor #2		Contactor #3		Contactor #4		Contactor #5		Contactor #6		Contactor #7		Contactor #8	
DATE	COMPOUND (ppb)	Well #3	Well #4	Well #5	Well #6	Well #14	Well #15	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10/12/00	Total VOCs	29	53	190	120	160	150	13	0	9.2	0	12	0	NS	0	13	0	7.3	0	5.6	0	0	0
11/08/00	Total VOCs	32	32	160	110	100	130	NS	NS	NS	NS	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0
								GAC Replaced in contactors 1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A between November 13-21, 2000. "B" Vessels become the Lead Vessels.															
12/21/00	Total VOCs	42	55	150	110	54	120	NS	1.2	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS	NS
01/25/01	Total VOCs	48	64	160	120	55	120	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/08/01	Total VOCs	51	76	210	91	95	170	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03/07/01	Total VOCs	47	NS	170	110	101	120	NS	NS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04/03/01	Total VOCs	52	70	190	140	120	140	0	1.4	0	3.1	0	0	0	3.4	0	2.9	0	1.2	0	1.3	0	1.8
05/23/01	Total VOCs	NS	49	160	120	110	120	0	0	0	5.2	0	0	0	5.3	0	5	0	2.9	0	3.4	0	3.2
								GAC Replaced in contactors 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B between June 19-July 10, 2000. "A" Vessels become the Lead Vessels.															
06/29/01	Total VOCs	NS	42	160	110	150	110	0	NS	1.6	NS	0	NS	0	NS	0	NS	0	NS	0	NS	0	NS
07/24/01	Total VOCs	NS	41	160	110	170	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08/09/01	Total VOCs	18	41	140	96	100	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09/13/01	Total VOCs	18	40	180	120	86	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: 1) The highlighted results indicate those results which are representative of effluent water quality for the given pair of contactor vessels (usually only the A or B vessel result is highlighted for vessels operating in series). If both results on a given date are highlighted, this indicates that the two vessels were operating in parallel at the time of sampling, rather than the normal series operation.

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 2001

			Trichloroethene	1,1-Dichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane
OU1 Cleanup Level [(1)]			5	6	70	200	3	70
03L811		*14-Jun-01*	*<1.0*	*1.0*	*J 0.18*	*J 0.14*	*<1.0*	*4.1*
03L822		25-Jun-01	**625**	**30**	JP 5.0	35	**<25**	JP 20
03L841		*18-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
03L846		*19-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*J 0.92*
03L853		23-Jun-01	**54**	2	JP 0.38	4.2	<1.0	1.7
03L853	D	23-Jun-01	**52**	2	JP 0.37	4.3	<1.0	1.7
03M843		*15-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
03U811		*14-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
03U822		*25-Jun-01*	***240***	***17***	*J 3.3*	*J 7.8*	***<10***	*22*
03U822	*D*	*25-Jun-01*	***250***	***17***	*J 3.3*	*J 8.2*	***<10***	*23*
03U831		*15-Jun-01*	*<1.0*	*<1.0*	*J 0.62*	*<1.0*	*<1.0*	*J 0.21*
04J834		*15-Jun-01*	*J 0.31*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04J836		*20-Jun-01*	*J 0.41*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*J 0.32*
04J837		23-Jun-01	**27**	1.8	JP 0.23	2.5	<1.0	1.6
04J837	D	23-Jun-01	**24**	1.6	JP 0.25	2.2	<1.0	1.4
04J838		23-Jun-01	**12**	1.2	JP 0.51	JP 0.59	<1.0	1.9
04J839		*18-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04J882		*15-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U834		23-Jun-01	**24**	1.4	JP 0.24	<1.0	<1.0	1.2
04U836		*20-Jun-01*	***11***	*J 0.84*	*<1.0*	*1.3*	*<1.0*	*J 0.70*
04U837		*21-Jun-01*	*2.6*	*J 0.20*	*J 0.12*	*<1.0*	*<1.0*	*J 0.65*
04U838		*20-Jun-01*	*1.4*	*J 0.12*	*J 0.19*	*J 0.11*	*<1.0*	*1.1*
04U839		*18-Jun-01*	*1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U841		*21-Jun-01*	***24***	*3.1*	*J 0.56*	*8.8*	*<1.0*	*2.0*
04U841	D	21-Jun-01	**25**	3.2	JP 0.59	9	<1.0	2.1
04U843		21-Jun-01	**38**	**6.2**	JP 0.49	9	<1.0	4.6

Table 3-5

OU1 Groundwater Quality Data

Fiscal Year 2001

			Trichloroethene	1,1-Dichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane
OU1 Cleanup Level [1]			5	6	70	200	3	70
04U844		23-Jun-01	**400**	**22**	2.5	54	JP 0.42	14
04U846		*15-Jun-01*	*J 0.81*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*J 0.30*
04U846	*D*	*15-Jun-01*	*J 0.83*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*J 0.28*
04U847		25-Jun-01	**1100**	**89**	12	110	**<10**	**72**
04U850		22-Jun-01	**61**	**6.5**	1.1	5.8	<1.0	5.3
04U855		*15-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U871		25-Jun-01	**25**	1.3	JP 0.36	JP 1.0	<1.0	1.7
04U872		*21-Jun-01*	***16***	*J 0.67*	*J 0.18*	*J 0.26*	*<1.0*	*J 0.66*
04U875		*19-Jun-01*	***9.5***	*J 0.61*	*<1.0*	*1.3*	*<1.0*	*J 0.51*
04U877		*20-Jun-01*	***5.6***	*J 0.33*	*J 0.21*	*<1.0*	*<1.0*	*J 0.61*
04U879		*18-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U880		*14-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U881		*18-Jun-01*	*J .35*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
04U882		*21-Jun-01*	*4.5*	*J 0.22*	*<1.0*	*J 0.15*	*<1.0*	*J 0.27*
04U883		*15-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
200154		25-Jun-01	JP 0.17	<1.0	<1.0	<1.0	<1.0	<1.0
200524		*14-Jun-01*	***16***	*J 0.82*	*J 0.12*	*J 0.84*	*<1.0*	*J 0.70*
200524	*D*	*14-Jun-01*	***16***	*J 0.70*	*<1.0*	*J 0.71*	*<1.0*	*J 0.61*
200803		*14-Jun-01*	***23***	*J 0.95*	*J 0.18*	*J 0.77*	*<1.0*	*J 0.73*
234546		*15-Jun-01*	*1.1*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
234549		25-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
409547		*14-Jun-01*	*<1.0*	*J 0.41*	*J 0.86*	*J 0.75*	*<1.0*	*J 0.79*
409548		*19-Jun-01*	*1.6*	*J 0.31*	*<1.0*	*<1.0*	*<1.0*	*J 0.59*
409549		*19-Jun-01*	***7.9***	*J 0.39*	*<1.0*	*J 0.99*	*<1.0*	*J 0.32*
409549	*D*	*19-Jun-01*	***7.3***	*J 0.39*	*<1.0*	*1.0*	*<1.0*	*J 0.32*
409550		25-Jun-01	**200**	**JP 8.2**	JP 1.6	29	**<10**	JP 4.5
409555		*14-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*

Table 3-5

OU1 Groundwater Quality Data

Fiscal Year 2001

		Trichloroethene	1,1-Dichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane
OU1 Cleanup Level (1)		5	6	70	200	3	70
409556	*14-Jun-01*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
409557	*20-Jun-01*	***13***	***7.4***	*1.5*	*7.2*	*<1.0*	*7.0*
409597	23-Jun-01	**110**	**13**	1.7	14	JP 0.26	12
512761	25-Jun-01	**36**	1.9	JP 0.29	2.9	<1.0	1.4
PJ#318	*19-Jun-01*	*3.1*	*J 0.14*	*<1.0*	*J 0.14*	*<1.0*	*J 0.15*

Notes: (1) Cleanup levels for OU1 deep groundwater are from page 18 of the OU1 ROD. Bolding indicates exceedance of the cleanup level or reporting limits higher than the cleanup level.
JP The value is below the reporting limit, but above the method detection limit.
J The value is below the reporting limit, but above the method detection limit.
D Duplicate sample.
Italics indicate data not from IRDMIS/ERIS

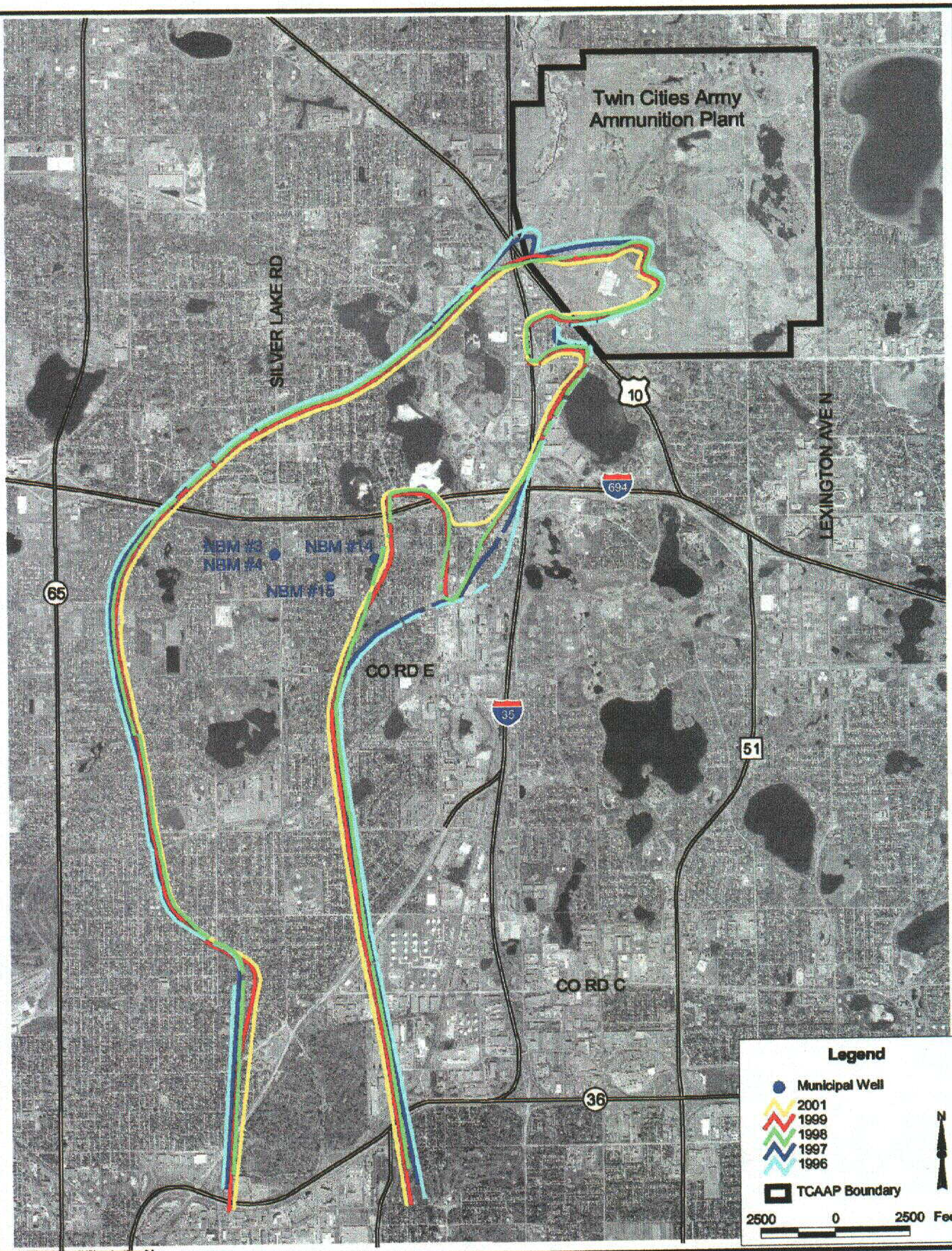
Table 3-6

OU1 Vertical Hydraulic Gradients

Groundwater Elevation (ft)

	Mid-Screen (or hole) Elevation (ft)	12/3/96	5/29/97	12/2/97	6/1/98	9/1/98	6/1/99	5/31/01
03U811	803	842.5	842.1	842.3	843.0	No Data	842.8	842.9
03L811	689	841.8	841.2	841.5	842.1		842.0	842.1
Difference	114	0.7	0.9	0.8	0.9		0.8	0.9
Vertical Gradient		.006	.008	.007	.008		.007	.008
03U822	786	No Data	No Data	833.0	833.7	No Data	833.3	833.52
03L822	761	833.9	830.6	833.0	833.7		833.2	833.52
Difference	25	-	-	0.0	0		0.1	0
Vertical Gradient		-	-	.000	.000		.004	.000
04U834	570	811.0	809.0	811.4	808.8	No Data	809.2	812.19
04J834	496	807.8	804.7	808.1	804.9		805.4	808.07
Difference	74	3.2	4.3	3.3	3.9		3.8	4.12
Vertical Gradient		.043	.058	.045	.053		.051	.056
03L841	760	840.3	840.4	840.3	841.2	No Data	841.0	841.01
04U841	682	841.2	841.1	841.9	842.7		842.5	841.94
Difference	78	-0.9	-0.7	-1.60	-1.5		-1.5	-0.93
Vertical Gradient		-.012	-.009	-.021	-.019		-.019	-.012
03L846	760	829.5	828.4	828.5	829.3	No Data	828.5	828.7
04U846	674	828.5	827.6	827.3	828.1		827.1	827.51
Difference	86	1.0	0.8	1.200	1.2		1.4	1.19
Vertical Gradient		.012	.009	.014	.014		.016	.014
04U882	600	810.2	808.0	810.4	807.4	No Data	807.9	811.31
04J882	455	772.8	769.3	806.9	803.2		803.1	806.78
Difference	145	37.4	38.7	3.5	4.2		4.8	4.53
Vertical Gradient		.258	.267	.024	.029		.033	.031
04U836(MW1)	663					824.0	822.7	821.9
04J836(MW2)	554					824.2	823.7	823.45
Difference	109					-0.2	-1.0	-1.5
Vertical Gradient						-.002	-.009	-.014
04U837(MW3)	653					826.5	826.2	825.61
04J837(MW4)	555					824.6	824.2	823.78
Difference	98					1.9	2	1.83
Vertical Gradient						.019	.020	.019
04U838(MW5)	659					827.5	827.3	827.47
04J838(MW6)	556					826.1	825.7	825.99
Difference	103					1.4	1.6	1.48
Vertical Gradient						.014	.016	.014
04U839(MW7)	626					827.3	827.1	826.63
04J839(MW8)	556					824.1	824.3	824.16
Difference	70					3.2	2.8	2.47
Vertical Gradient						.046	.040	.035

Note: Negative sign denotes upward vertical gradient.



TWIN CITIES ARMY AMMUNITION PLANT

Upper Unit 4,
1 ug/l Trichloroethene Isoconcentration Map

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Maple Plain, MN 55359-0429

FY 2001

Figure 3-1

OU1 WELL PUMPING RATES VS. TARGETS
TWIN CITIES ARMY AMMUNITION PLANT

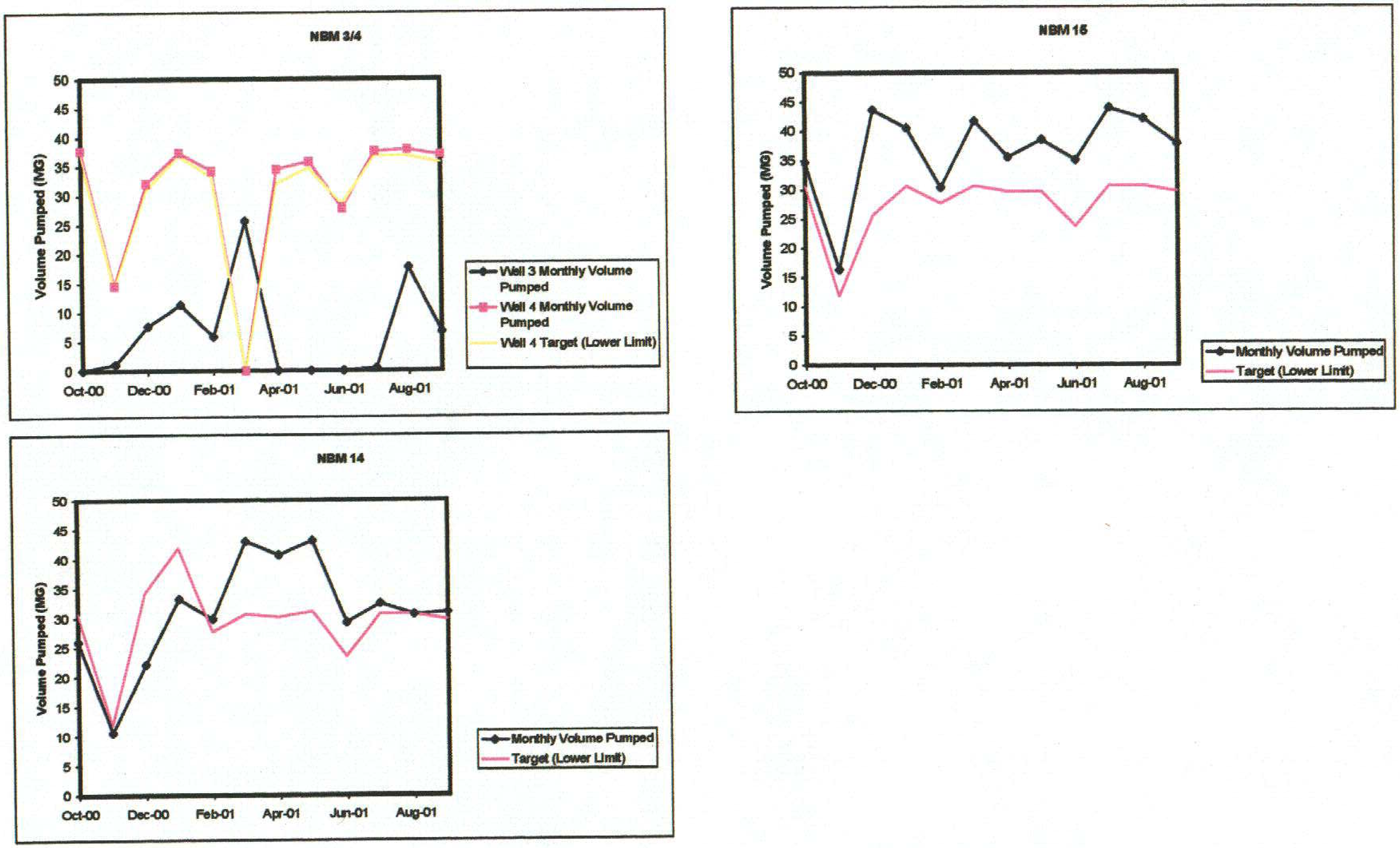

Figure 3-2
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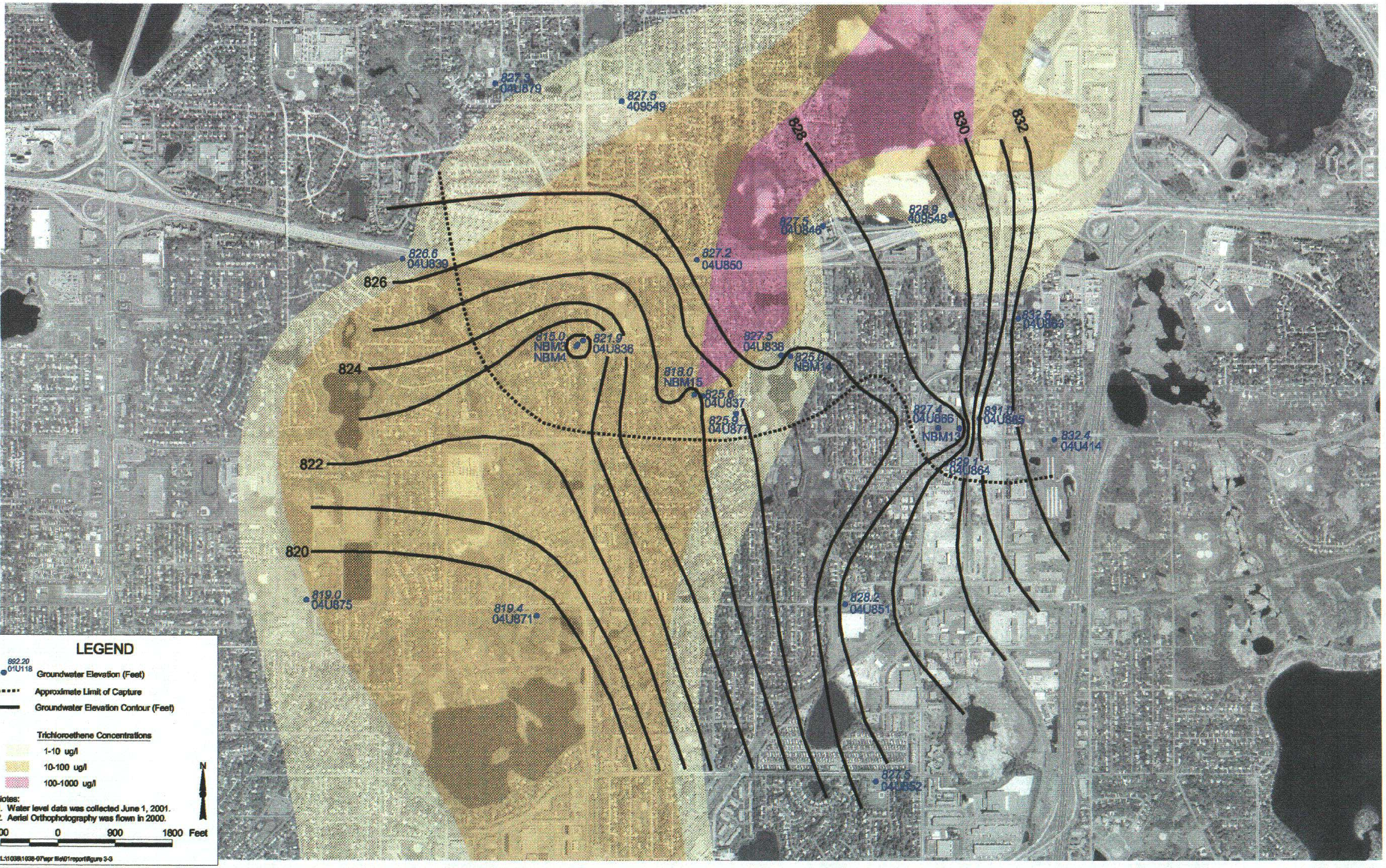

TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2001
OU1 Water Level Map - June 1, 2001	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 3-3

NEW BRIGHTON MUNICIPAL WELLS: TOTAL VOC WATER QUALITY TRENDS
TWIN CITIES ARMY AMMUNITION PLANT

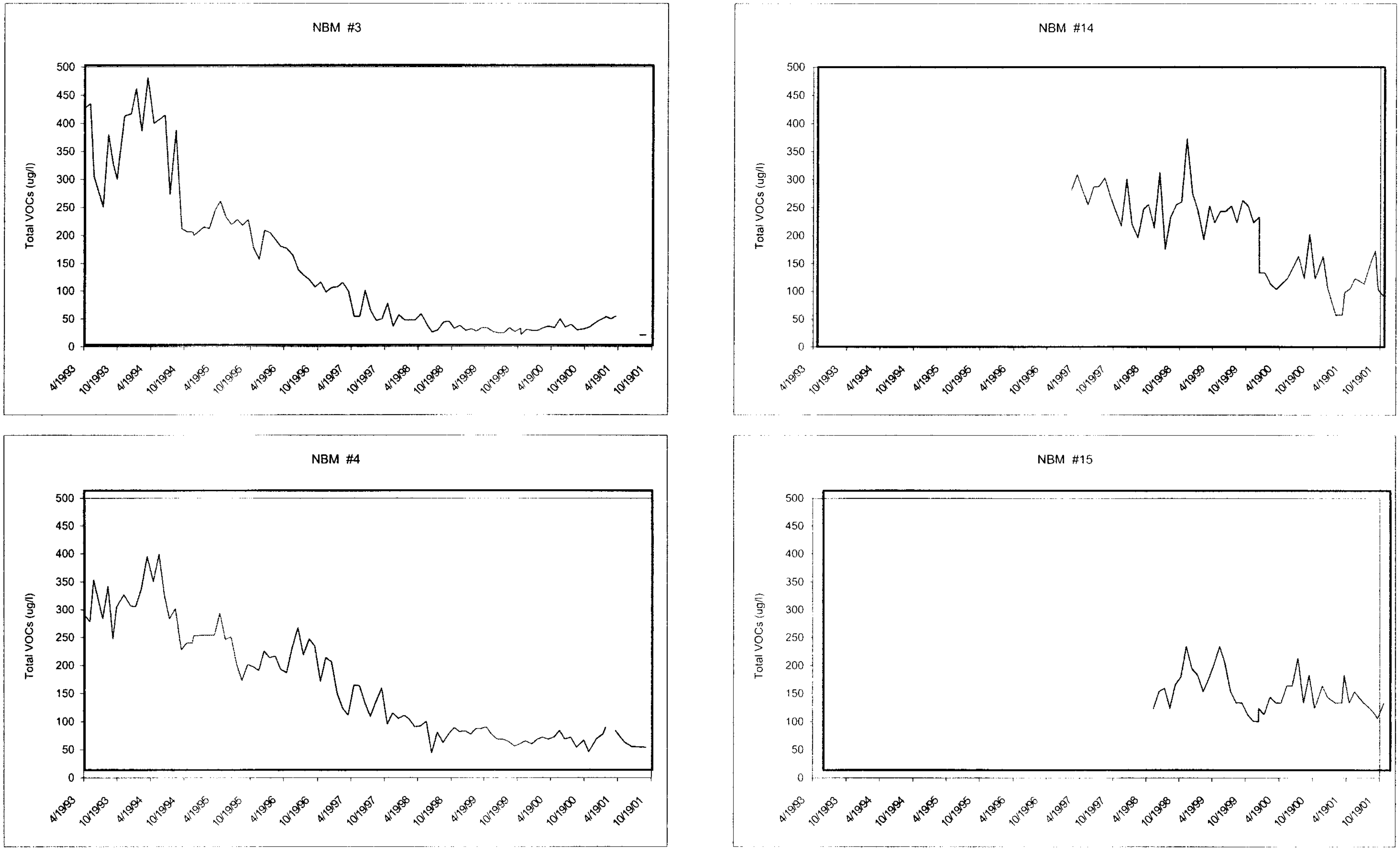

Figure 3-4
Wenck Associates, Inc.

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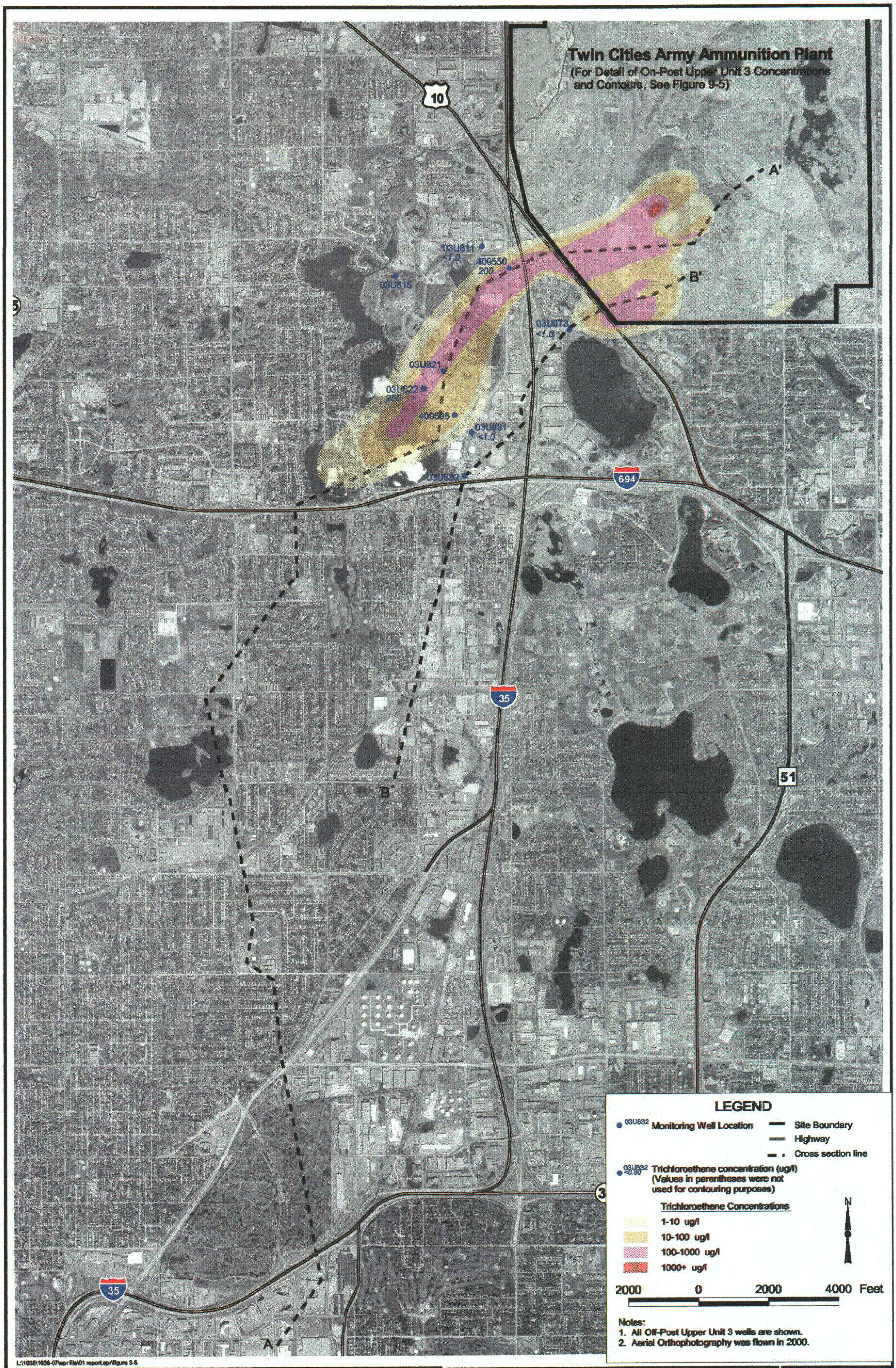

TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 3, Trichloroethene Isoconcentration Map
Summer 2001

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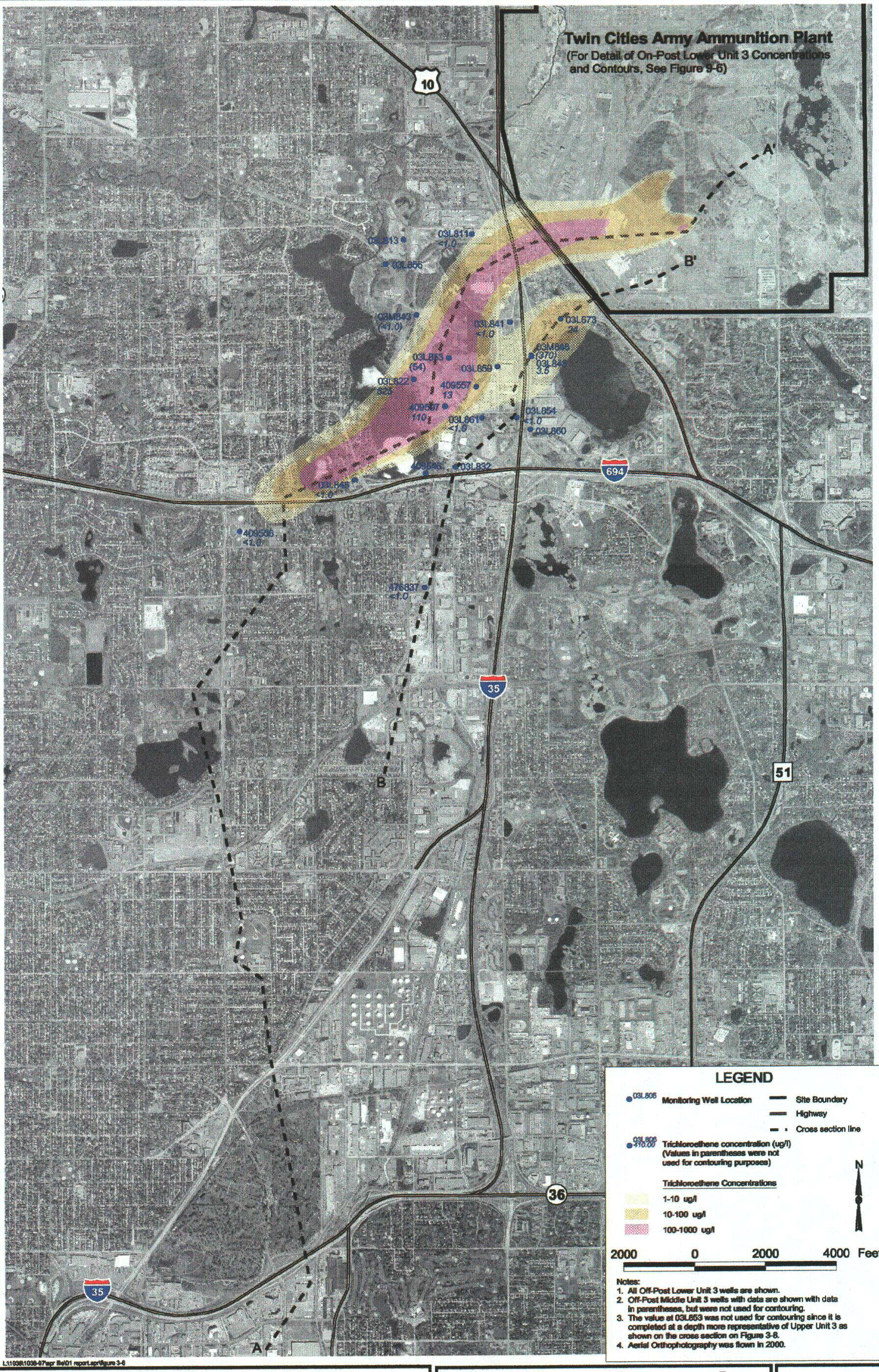
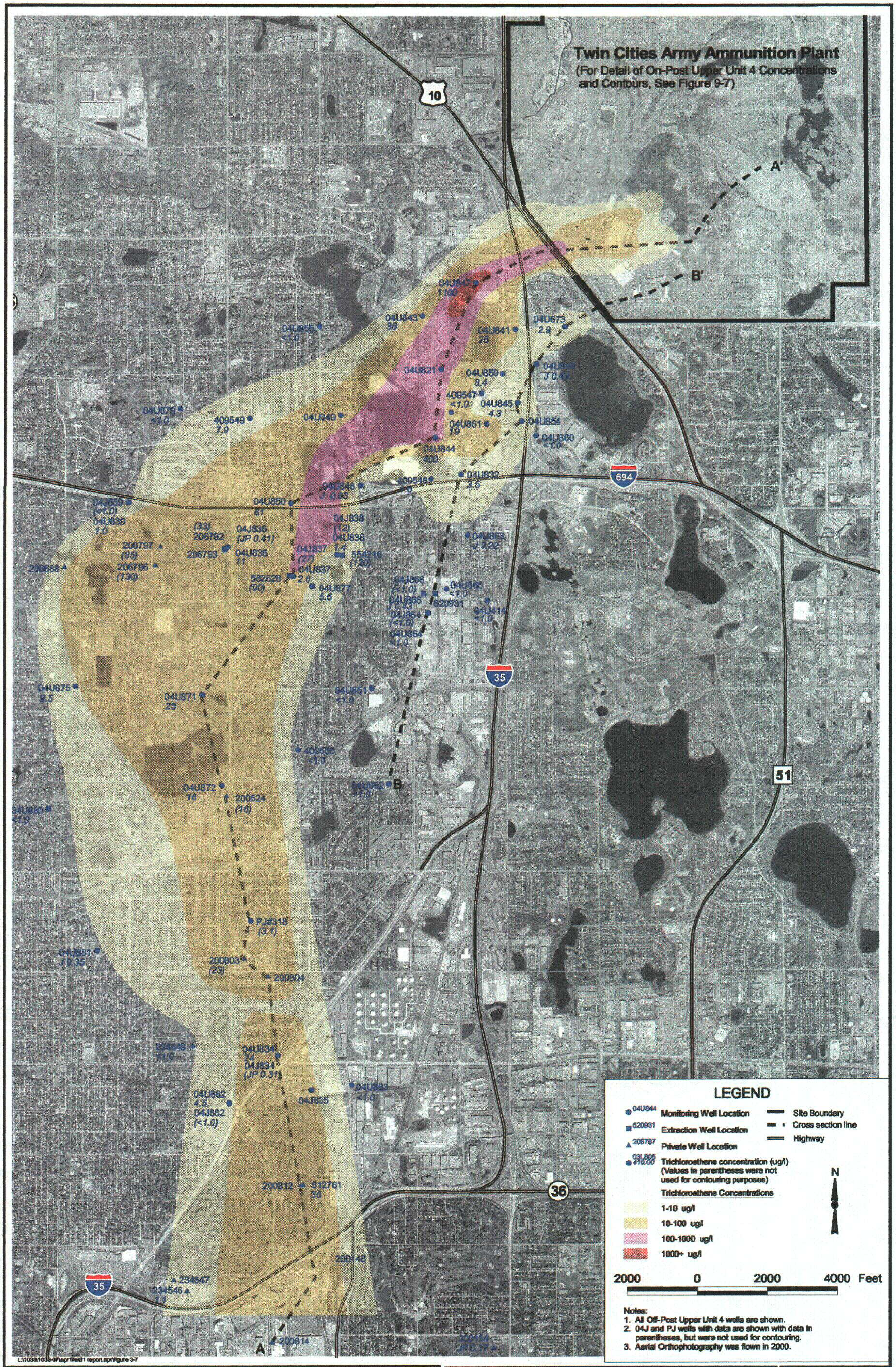
FY 2001

Figure 3-5



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2001
OU1 & OU3, Lower Unit 3, Trichloroethene Isoconcentration Map Summer 2001	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 3-6



TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3, Upper Unit 4, Trichloroethene Isoconcentration Map
Summer 2001

Wenck

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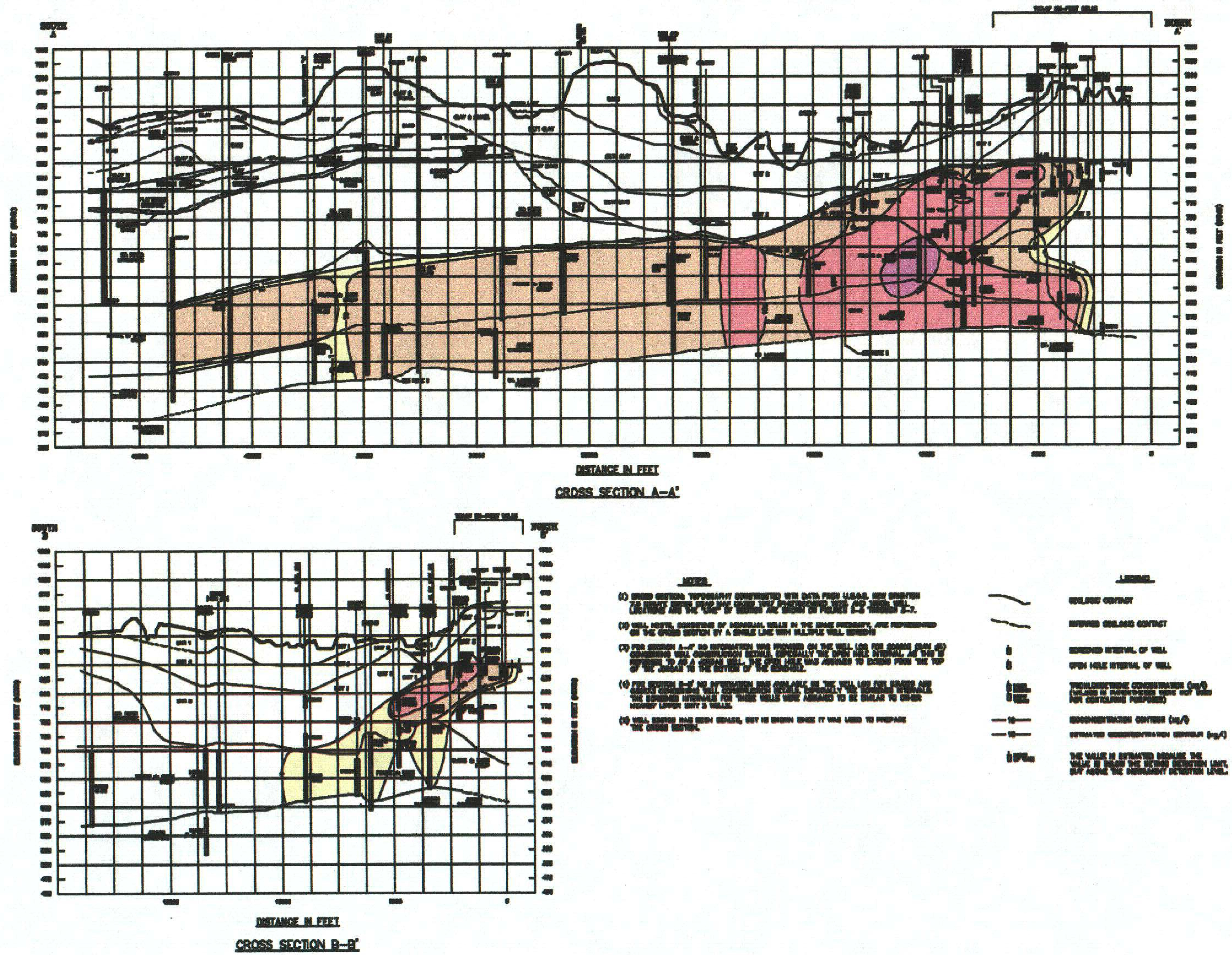
Maple Plain, MN 55359-0249

FY 2001

Figure 3-7



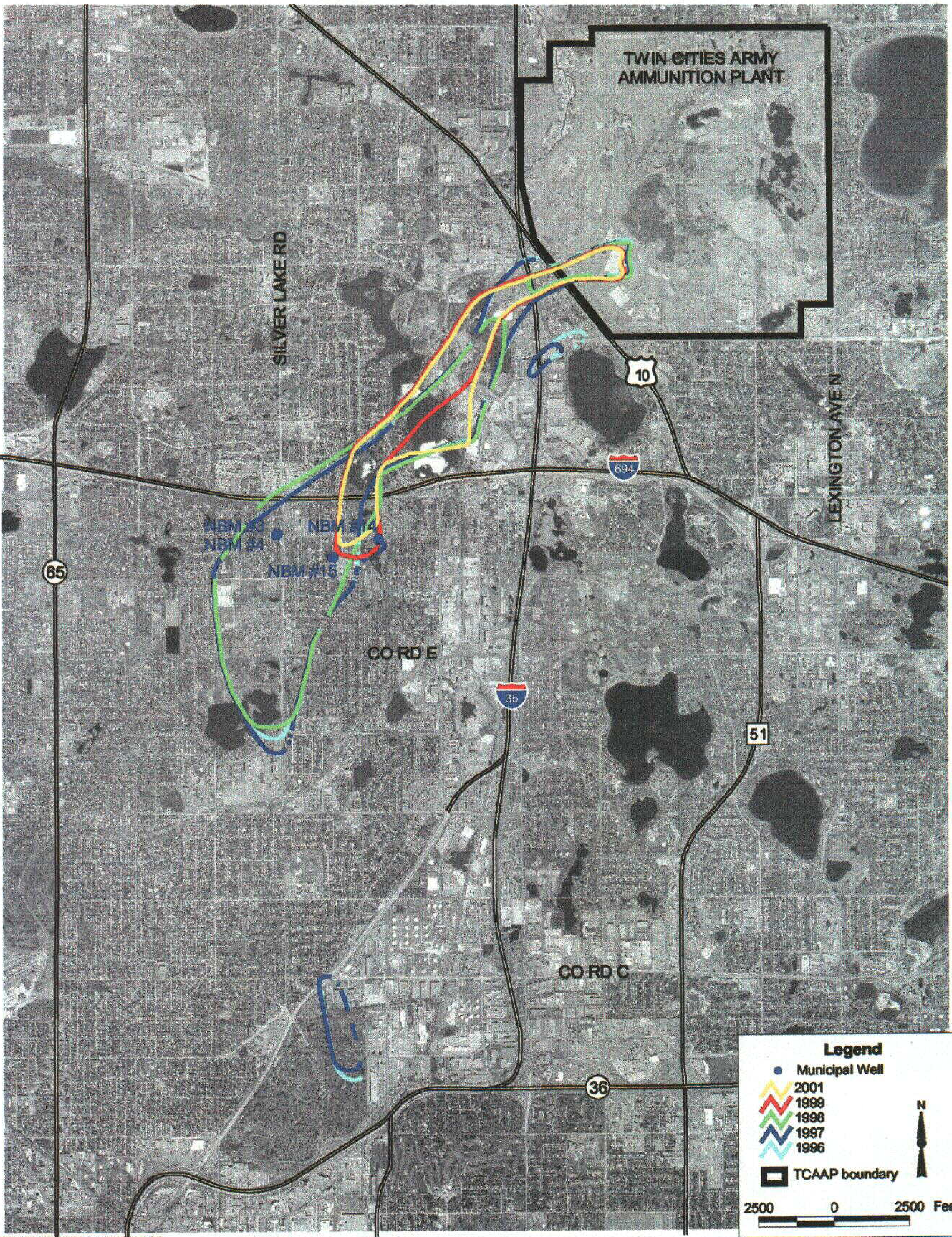
TWIN CITIES ARMY AMMUNITION PLANT

OU1 & OU3 Trichloroethene Cross Sections A-A' and B-B', Summer 2001

Wenck

FY 2001

Figure 3-8



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0429	FY 2001
Upper Unit 4, 100 ug/l Trichloroethene Isoconcentration Map		Figure 3-9

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. Activities during FY 2001 were:

- Site A metals-contaminated soil remediation field work was initiated in FY 1998 and completed in FY 2000. The Site A Closeout Report (prepared by Stone & Webster) was still under regulatory review at the end of FY 2001.
- Likewise, Site 129-5 remediation field work was completed in FY 2000. The Site 129-5 Closeout Report (prepared by Stone & Webster) was also under regulatory review at the end of FY 2001.
- Completed Site E soil excavation, treatment, and disposal.
  - In FY 2001, 1,186 tons of soil were stabilized and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. The final Site E soil quantity, including the totals from 1999 and 2000, was 27,980 tons.
  - A cap was placed over the Site E dump area.
  - The Site E Closeout Report (prepared by Stone & Webster) was under Army review at the end of FY 2001.
- Completed Site H soil excavation, treatment, and disposal.
  - In FY 2001, 20 tons of soil were stabilized and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. The final Site H soil quantity, including the totals from 1999 and 2000, was 11,599 tons.
  - The Site H Closeout Report was (prepared by Stone & Webster) was under regulatory review at the end of FY 2001.

- Completed Site 129-3 soil excavation, treatment, and disposal.
  - In calendar year 2001, 3,197 tons of soil were excavated, stabilized, and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. The final 129-3 soil quantity, including the total from 2000, was 4,669 tons.
  - The Site 129-3 Closeout Report was being prepared by Stone & Webster at the end of FY 2001.
- Continued Site C soil excavation, treatment, and disposal.
  - In calendar year 2001, 4,422 tons of soil were stabilized and transported off-site as non-hazardous waste for disposal at permitted disposal facilities. The project-to-date Site C soil quantity, including the total from 2000, is 15,762 tons.
  - Work was suspended for the winter and will resume in Spring 2002, if funding is available.
- A work plan for removal of the on-TCAAP Corrective Action Management Unit (CAMU) was under regulatory review at the end of FY 2001. The discovery of asbestos at shallow soil sites in FY 1999 rendered further use of the CAMU impractical.
- Initiated continuous operation of the air sparging/soil vapor extraction (AS/SVE) system on January 8, 2001, to remediate Site A VOC-contaminated soils and source area groundwater. Operation of the AS system was later ceased as explained in Section 6.5.

4.2 REMEDY COMPONENT #8: GROUNDWATER MONITORING

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

Performance Standard (how do you know when you're done):
When five years have elapsed with groundwater monitoring results below the groundwater cleanup levels.

Is this remedy component being implemented?
No. The intent of this remedy component is to verify that soil characterization and/or remediation activities do not somehow cause impacts to groundwater. As such, the five-year monitoring period is intended to start after completion of remedy components #1 through 7 described in the previous section. Thus, specifically for this remedy component, there was no monitoring performed in FY 2001. A monitoring plan will need to be developed for this remedy component prior to implementing it. The plan will address the following items for each of the shallow soil sites:

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

With respect to bullets 3 and 4, the OU2 ROD does specify some of the shallow groundwater contaminant cleanup levels for Site A (Table 1), but none are specified for the other shallow soil sites.

4.3 REMEDY COMPONENT #9: CHARACTERIZATION OF DUMPS

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

Performance Standard (how do you know when you're done):
When characterization has been sufficient to determine if the contents are toxic, hazardous, or contaminated.

Is this remedy component being implemented?
Yes. 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 revealed that construction of a soil cover was necessary. The design for the Site 129-15 dump cover was finalized in FY 2001, and the cover construction was completed at the end of calendar year 2001. A Site 129-15 Closeout Report will be prepared by Stone & Webster in FY 2002.

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 may exist at Site D, and Site G also contains a dump. The OU2 ROD (pages 2–3) describes seven remedy components for these two sites. The final remedy 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 2001 Monitoring Plan.

What impact are the SVE systems having 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' (Figure 3-8) 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 wells 03U018 (Figure 5-1), 03U093 (Figure 5-2), 03U096 (Figure 5-3), and 03L018 (Figure 5-4) the concentrations over the past five years show an overall decline. Well 03U018 had appeared to have an increasing trend in the previous three events; however, the June 2001 result was the lowest in the five-year period and suggests that the previous three events were the result of normal fluctuations in the data, rather than a "rebound effect" resulting from shutting off the SVE system.

Downgradient of Site G, at well 03U014 (Figure 5-5), the concentrations have remained below the cleanup level for the past five years. At Well 03U094 (Figure 5-6), the concentrations have remained relatively stable the last five years, between 400 and 500 µg/l. At well 03L014, the concentration declined from 810 ug/l in FY 1999 to 750 ug/l in FY 2001 (Figure 5-7). Given that data circa 1988 was non-detect, and that this well has only been sampled twice since then, additional monitoring is required to establish a trend.

Table 5-1 presents the FY 2001 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. Wells 03U094 and 03L014 also exceed the cleanup levels for other chemicals of concern.

During the years of SVE operation (1986 – 1998), trichloroethene concentrations in groundwater decreased from 10,000's to less than 800 µg/l. The most dramatic improvement has been at well 03U093 (Figure 5-2). Overall, these results indicate that the 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 150 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 2002 for VOC analysis.

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

5.2 REMEDY COMPONENT #2: RESTRICT SITE ACCESS

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

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

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

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).
- The intent of this remedy component was to add additional deep vents at both sites, as needed, to address presumably contaminated soils below the existing SVE systems. Also, the existing systems were to be modified, as needed, to improve VOC mass removal.

Performance Standard (how do you know when you're done):
When the soil concentrations are below the cleanup levels specified in Table 8 of the OU2 ROD.

Is this remedy component being implemented?
Yes. Activities during FY 2001 included:

- A soil investigation was conducted in FY 2000 to determine VOC concentrations in shallow and deep soils at both Sites D and G. The report documenting the soil investigation was under regulatory review during FY 2001 ("Sites D and G Shallow and Deep Soil VOC Investigation Report," prepared by Stone & Webster).
- The above report documented that Site D soils were below VOC cleanup levels and that no further remediation for VOCs was required. With MPCA and USEPA

concurrence, the Site D SVE system was dismantled between May and August 2001. Dismantlement included removal of aboveground piping, sealing of SVE vents by a licensed well driller, removal of SVE blowers and electrical panels from Building 570, and removal of the electrical transformer by Xcel Energy. This work was documented in "Site D Soil Vapor Extraction (SVE) Dismantlement Report," October 2001. This document was submitted for informational purposes, and will ultimately be included as an appendix to the Site D Closeout Report. The previously combined Sites D and G investigation report (first bullet above) will now be split into two reports, becoming site investigation and closeout reports for each site.

- The Investigation Report documented two locations in shallow soils at Site G which are above current cleanup levels. Potential revision of the Site G cleanup levels was still being evaluated by the Army, MPCA, and USEPA at the end of FY 2001.

Have the deep SVE systems been installed?
No. Deep systems will not be required at either site, as discussed above.

Have the shallow SVE systems been modified?
No. For Site D, the shallow SVE system has already been removed, as discussed above. The Site G shallow SVE system may still be modified, depending on final resolution of the Site G cleanup levels.

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

5.4 REMEDY COMPONENT #4: ENHANCEMENTS TO THE SVE SYSTEMS

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

Performance Standard (how do you know when you're done):
When an adequate evaluation has been completed.

Is this remedy component being implemented?
Yes. See discussion in Section 5.3.

Are any evaluations proposed prior to the next report?
As explained previously, no enhancements to the Site D SVE system will be necessary since this system was dismantled in FY 2001. Enhancement to the Site G SVE system, if any, will be determined when the cleanup levels for Site G are finalized.

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)

- This component originally applied to the site caps at both Sites D and G. Since VOC remediation has been completed at Site D, this component now only applies to Site G.

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. TWISS inspected the Site G cap during monthly operation and maintenance inspections.

Are there any problems with the Site G cap?
No problems were observed in FY 2001.

Were any maintenance activities performed for the Site G cap in FY 2001? No.

Are any maintenance activities planned prior to the next report?
No, except for cutting of any trees or bushes, as necessary.

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

5.6 REMEDY COMPONENT #6: MAINTAIN SURFACE DRAINAGE CONTROLS

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

- This component originally applied to both Sites D and G. Since VOC remediation has been completed at Site D, this component now only applies to Site G.

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. TWISS inspected the Site G drainage conditions during routine operation and maintenance inspections.
Are there any problems with the Site G surface drainage controls? No.

Were any maintenance activities performed for the Site G surface drainage controls in FY 2001? No.

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

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

5.7 REMEDY COMPONENT #7: CHARACTERIZE SHALLOW SOILS AND DUMP

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

Performance Standard (how do you know when you're done):
When the characterizations have provided answers necessary to determine if additional remediation is required, and if remediation is required, when it has been completed.

Is this remedy component being implemented?
Yes. Investigation of the "tar-like substances" at Site G was conducted in early FY 1999 with results documented in "Final Field Investigation Report, Site G Tar-Like Material," prepared by Stone & Webster. This report, which received consistency in late FY 1999, recommended no further action on the Site G tar-like material and stated that the tar-like material would be further evaluated when site characterization activities are conducted for the closure of the Site G dump. A work plan for characterization of non-VOC contaminants in Site D shallow soils was under regulatory review at the end of FY 2001.

Is any characterization work proposed prior to the next report?
Yes. When the work plan for characterization of Site D shallow soils receives regulatory approval, this work will be conducted by Stone & Webster.

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)?
SVE remediation is complete at Site D. At Site G, SVE remediation may or may not be complete, depending on final resolution of the Site G cleanup levels.

Has it been determined that remediation of shallow soils at Site D and/or the dump at Site G is not required, or if required, has the remediation been completed?
No, the determination has not been made.

Table 5-1

Deep Groundwater Data Near Sites D and G

Fiscal Year 2001

		Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	cis-1,2-Dichloroethene (ug/l)	1,1-Dichloroethane (ug/l)	1,1,1-Trichloroethane (ug/l)	1,2-Dichloroethane (ug/l)
OU2 Cleanup Level(1)		5	5	6	70	70	200	4
Site D								
03U018	11-Jun-01	<1.0	**70**	1.6	11	1.1	14	<1.0
03U093	18-Jun-01	<1.0	**87**	1.5	JP 0.55	JP 0.65	19	<1.0
03U096	18-Jun-01	<1.0	**14**	1.1	<1.0	2.1	2.7	<1.0
03U096 D	18-Jun-01	<1.0	**13**	1.1	<1.0	2.2	2.5	<1.0
03L018	11-Jun-01	<1.0	1.7	<1.0	<1.0	<1.0	JP 0.21	<1.0
Site G								
03U014	04-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
03U094	14-Jun-01	**<10**	**400**	JP **7.5**	JP 1.3	JP 2.0	**220**	**<10**
03L014	04-Jun-01	**<10**	**750**	**17**	JP 4.2	JP 6.9	**580**	**<10**

Notes: (1) Cleanup levels for Deep Groundwater are from Table 1 of the OU2 ROD. Bolding indicates exceedance of the cleanup level, or reporting limits that are higher than the cleanup level.
JP = The value is below the reporting limit, but above the method detection limit.

SITE D, WELL 03U018, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITITES ARMY AMMUNITION PLANT

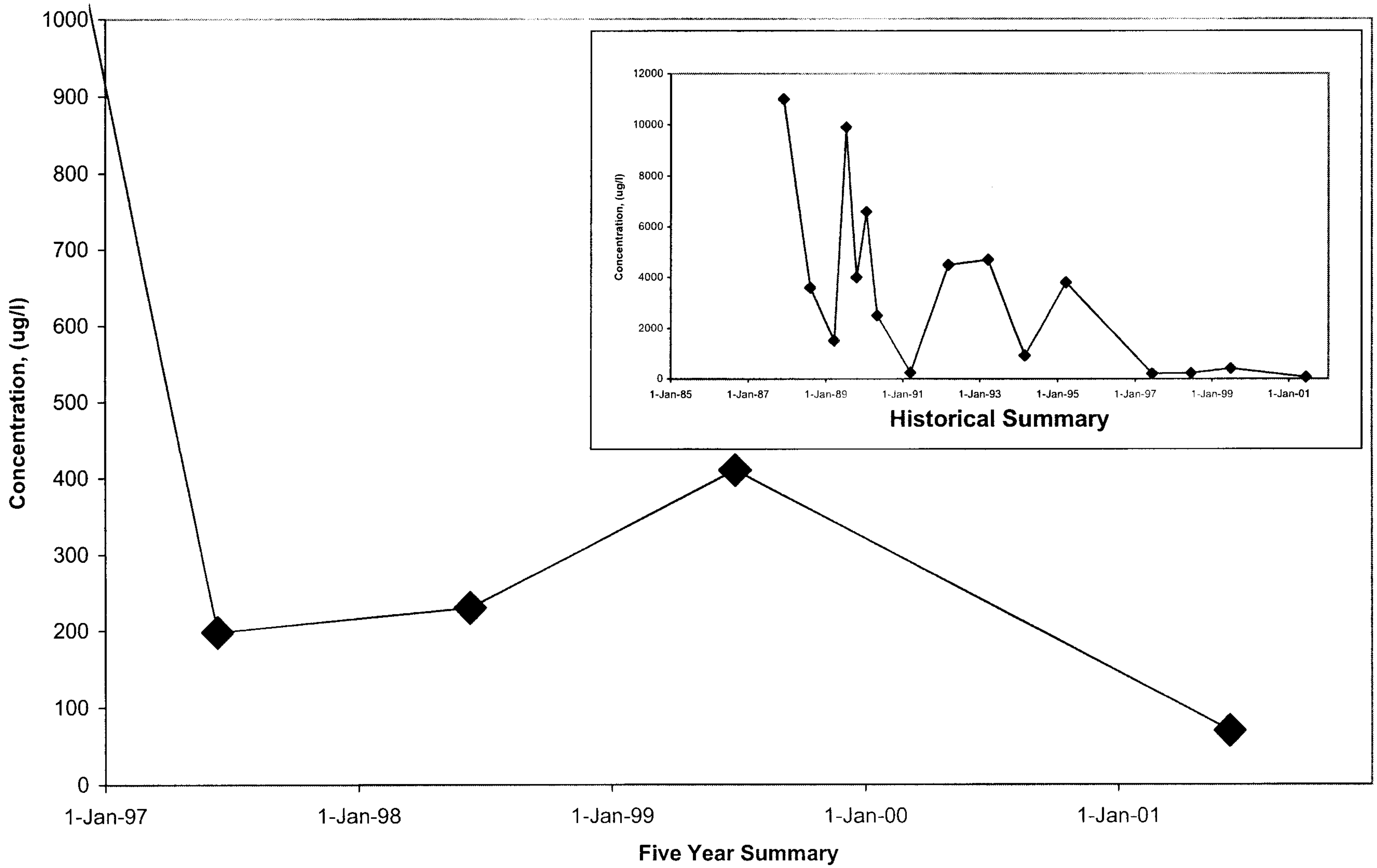


Figure 5-1
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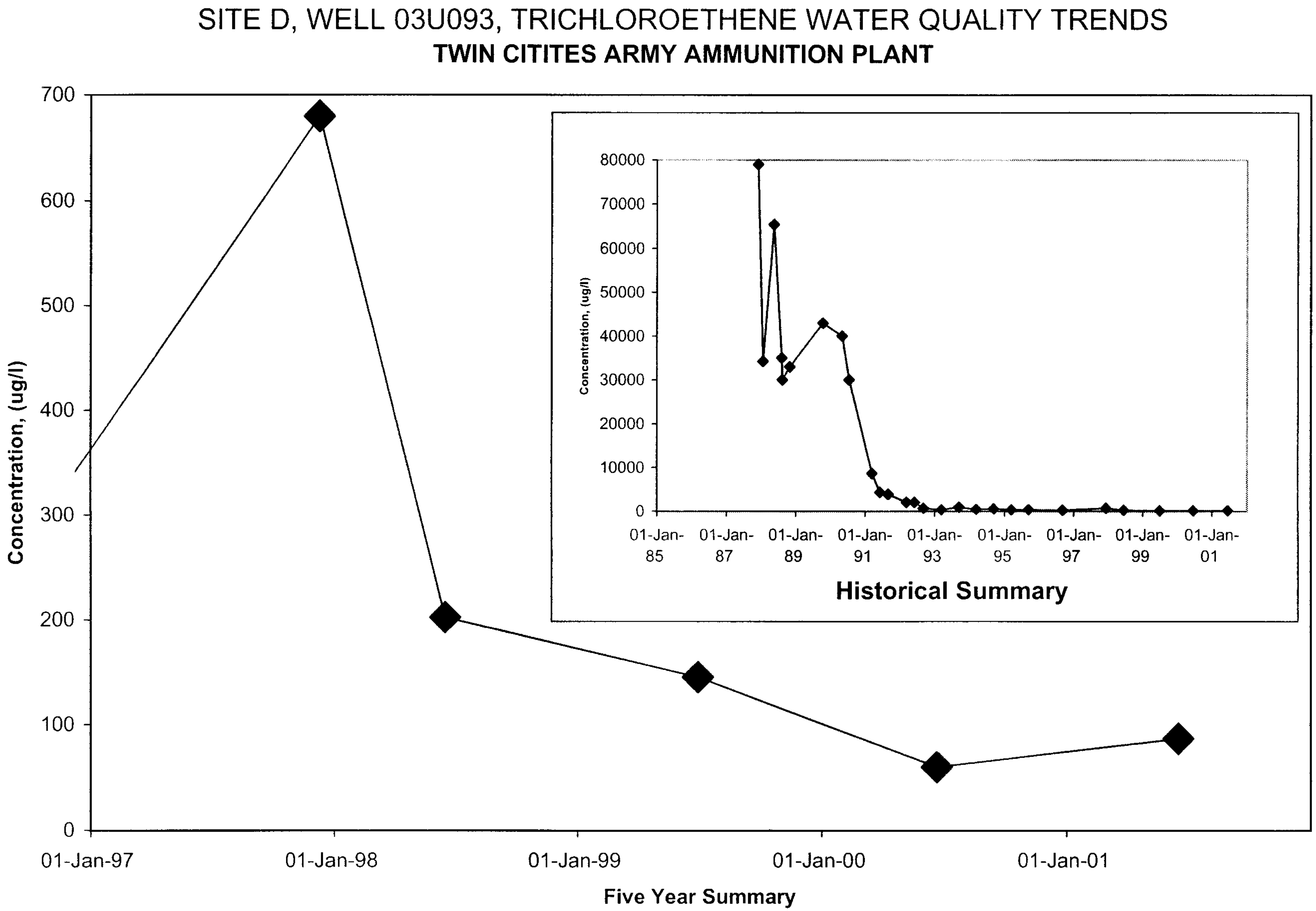

Figure 5-2
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SITE D, WELL 03U096, TRICHLOROETHENE WATER QUALITY TRENDS
TWIN CITITES ARMY AMMUNITION PLANT

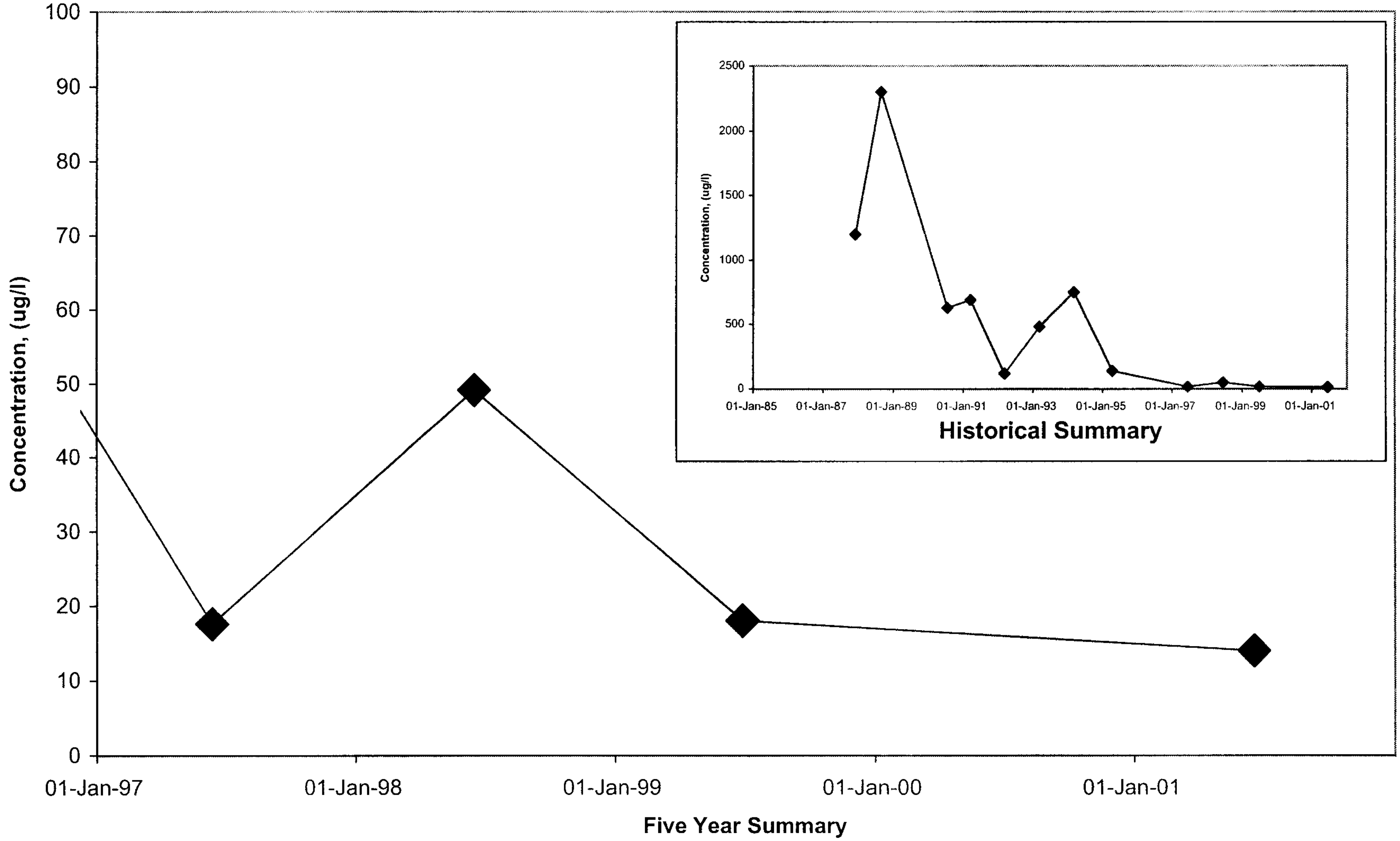

Figure 5-3
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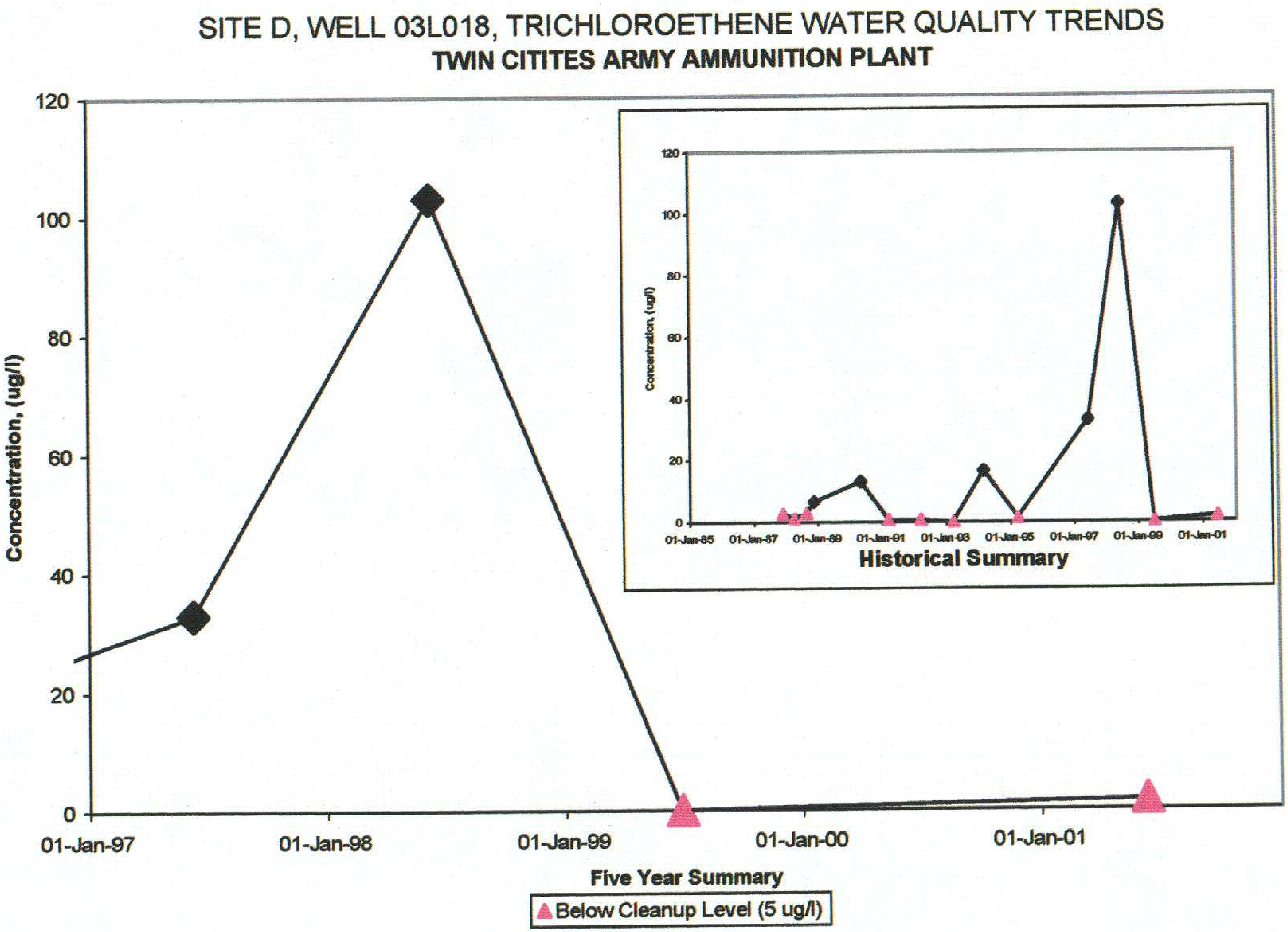

Figure 5-4
Wenck Associates, Inc.

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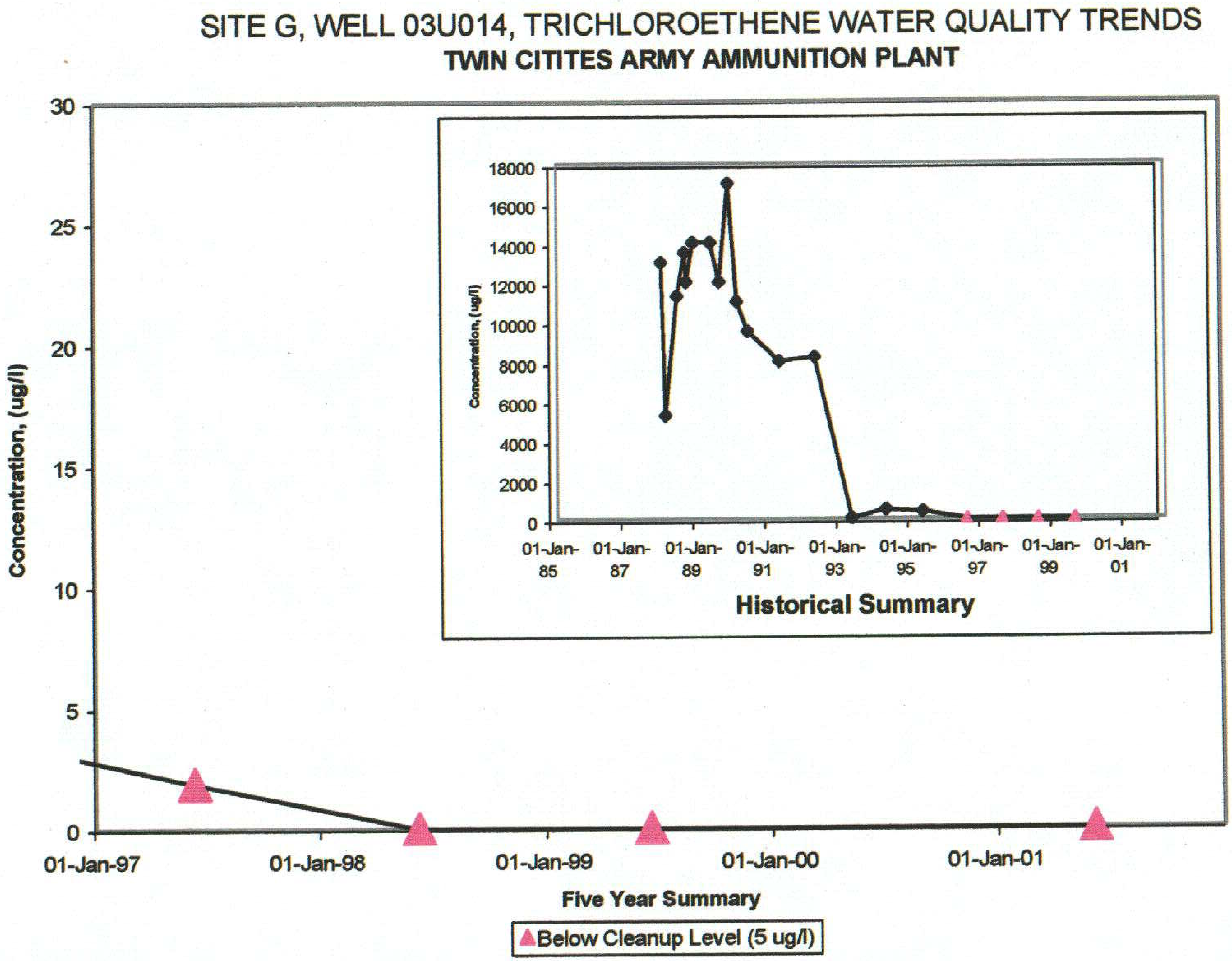

Figure 5-5
Wenck Associates, Inc.

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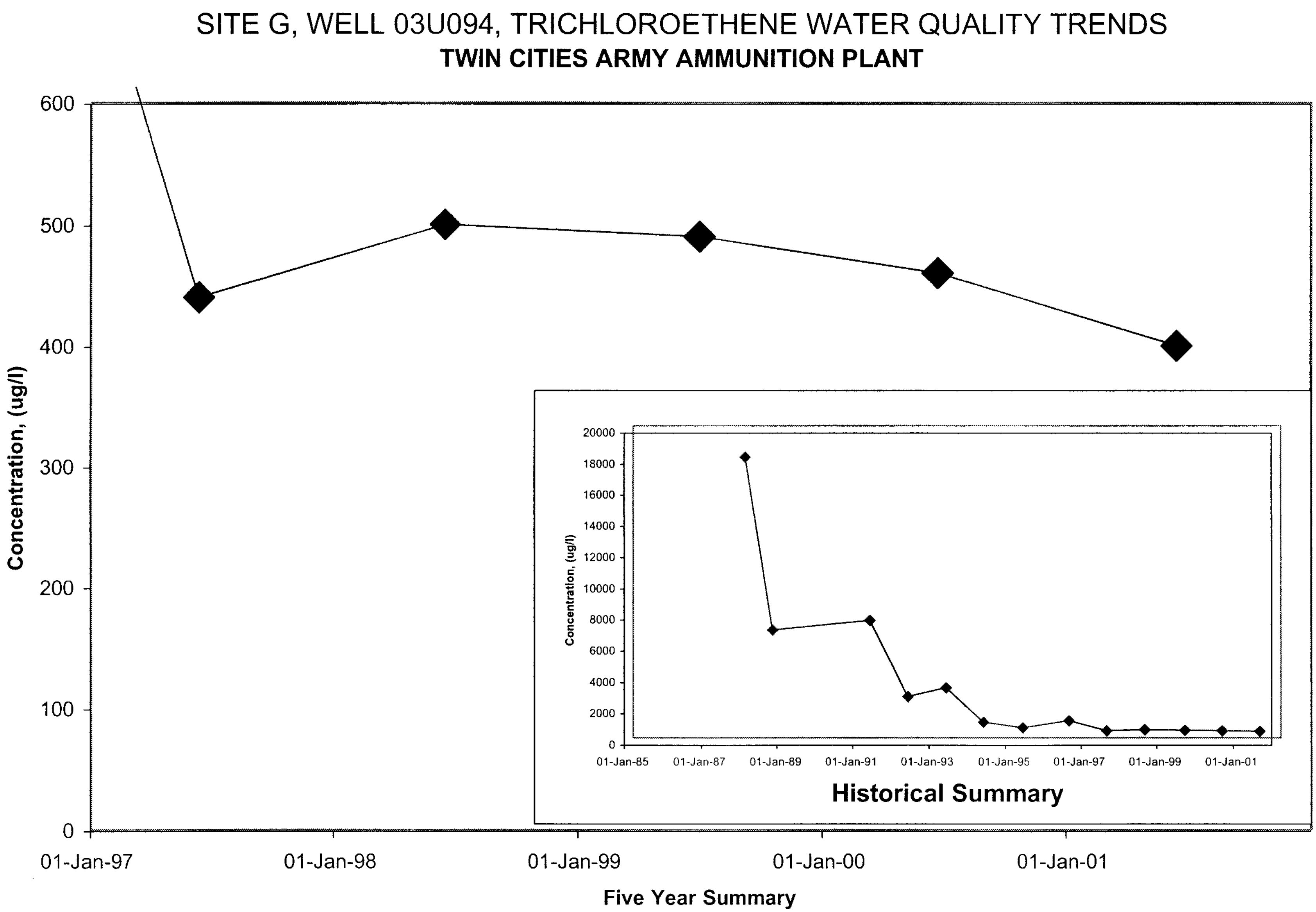

Figure 5-6
Wenck Associates, Inc.

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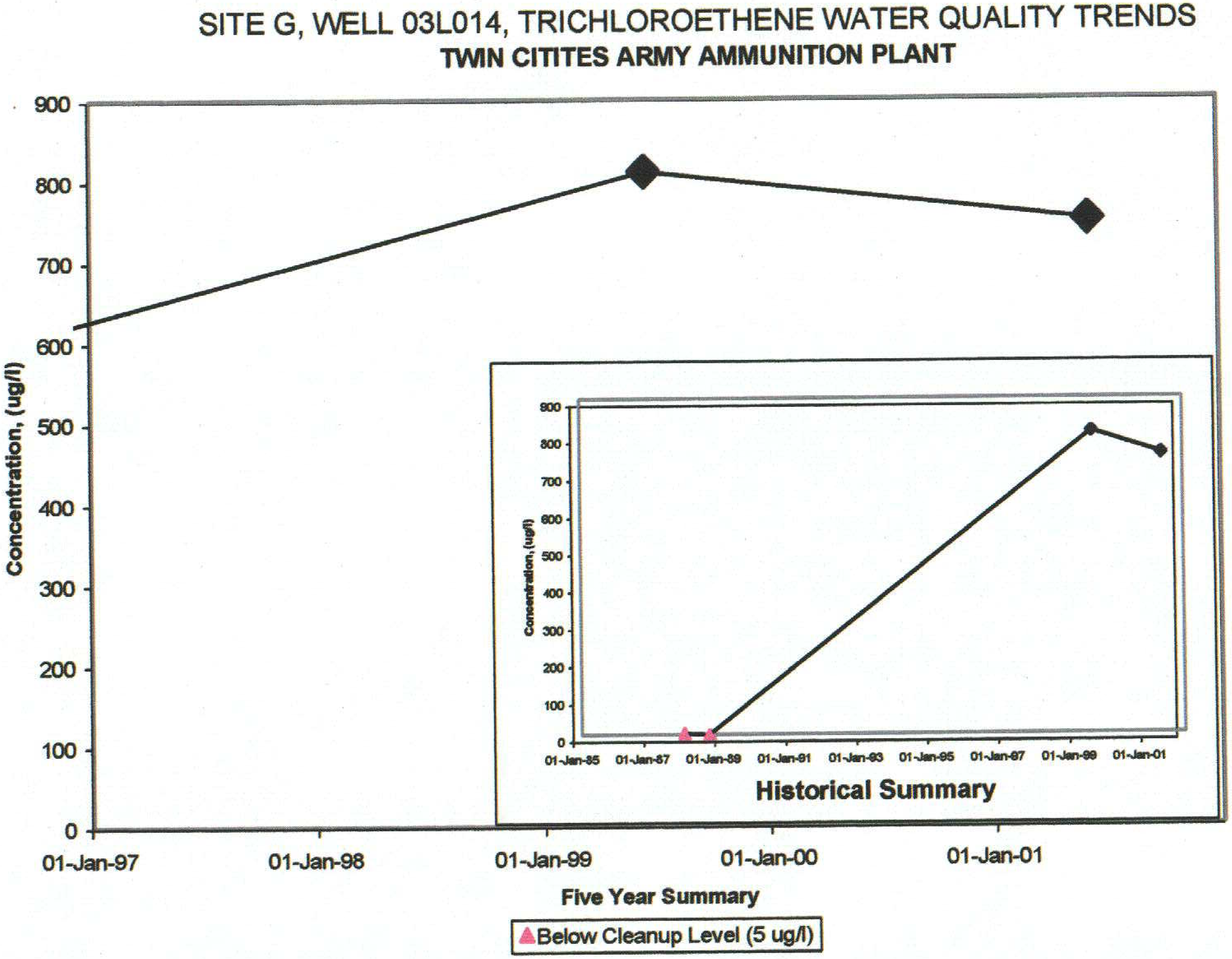

Figure 5-7
Wenck Associates, Inc.

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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 which are described and evaluated in the following sections.

6.1 REMEDY COMPONENT #1: GROUNDWATER MONITORING

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

Performance Standard (how do you know when you're done):
When a performance groundwater monitoring program has been established and 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, implementing parties, and the documents which contain the monitoring plans. The FY 2001 Monitoring Plan is included in Appendix A. Figure 6-1

illustrates the wells and piezometers associated with Site A and highlights those sampled in FY 2001.

Were the groundwater monitoring requirements for this remedy met?
Yes, with one exception:

- 1,2-Dichloroethane was inadvertently excluded from the list of analytes in the December 2000 Site A monitoring event. This compound was included in the analyte list in all other FY 2001 events, including the annual event. Deviations from the monitoring plan are summarized in Appendix C.2.

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

- Groundwater sampling of water supply wells related to alternate water supply and well abandonment will be in accordance with recommendations in Appendix E. No wells are recommended for FY 2002. 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.

As a point of clarification, since extraction wells 01U355-358 are no longer operating (and since extraction wells O1U355-357 are not longer required to be monitored quarterly, as previously approved by the USEPA and MPCA), the second line of extraction wells (01U355-358) will not be routinely monitored. Monitoring wells that were being sampled quarterly due to shut down of the second line of extraction wells will revert to annual monitoring as previously approved by the USEPA and MPCA.

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) 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, was completed in silt to sandy clay units which were resistant to drilling and determined to be the top of Unit 2 by the field geologist. The well log does not note the presence of silt (Fuller, 1994). The partially penetrating well is illustrated on cross-section B-B' on Figure 6-2.
- Wells 01U355 through 01U358, the line of extraction wells downgradient of the "first line" of extraction wells, were shut off (with regulatory approval) on July 7, 2000, and remained off through FY 2001. This had been recommended in the FY 1999 Annual Performance Report due to: 1) the downgradient extraction wells 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. One year of quarterly monitoring was started in September 2000 and ended in September 2001 (September quarter sampling was conducted on October 5, 2001). The MPCA and USEPA approved the request to discontinue quarterly monitoring after September 2001. The elimination of the quarterly monitoring requirement is included in Appendix A.1.

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 along with the target pumping rates for containment. The original target pumping rate for wells 01U351 through 01U355 was 15 gpm. Even with 01U355 off, the system has been operated to maintain a target pumping rate of 15 gpm. Table 6-3 shows that the average pumping rate for FY 2001 (16.2 gpm) exceeded the target.

Table 6-4 presents water level data collected during FY 2001 at Site A. Figure 6-3 presents a water level contour map using the data from June 1, 2001. Figure 6-3 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 shows that the locations where groundwater exceeds cleanup levels continue to be at and upgradient of the first line of recovery wells. Decreasing concentrations of cis-1,2-dichloroethene in 01U902 (downgradient of the extraction system) are also evidence of the extraction system's capture zone (Figure 6-9). The cis-1,2-dichloroethene concentration has dropped from a historical high around 100 µg/l to 9.6 µg/l in FY 2001.

Were there any significant operation and maintenance problems in FY 2001 (greater than 24 hour shutdown)?

Yes. Table 6-5 summarizes O&M notes for FY 2001.

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

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

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

Performance Standard (how do you know when you're done):
When the MDH has issued a Special Well Construction Area Advisory and when well owners who qualify have been offered and provided with alternate water supply and/or have had their wells abandoned (or the offers have been rejected).

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

Has the MDH issued a Special Well Construction Area Advisory for the area impacted by Site A?
Yes, it was issued in June 1996 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 2001, 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 changes from last year.

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

Were any water supply wells within the Site A plume sampled during FY 2001? If yes, what were the findings? No.

Were any well owners offered an alternate supply and/or well abandonment in FY 2001? No.

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

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

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 Special Discharge Permit as shown in Table 6-6.

During FY 2001, 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 every month in FY 2001.

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

Yes. In accordance with the permit requirements, the discharge will be sampled monthly for 1,2-dichloroethene; trichloroethene; 1,1,1-trichloroethane; and total 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. Stone and Webster performed investigation work in 1997 and the final "Site A Investigation Report" was issued December 12, 1997. That report delineated the extent of both VOC-contaminated and metal-contaminated soils requiring remediation.

Remediation work has been implemented, but is not complete. Stone and Webster 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 in FY 2000. Startup of the SVE system was initiated by Stone & Webster on August 23, 2000 and startup of the AS system was initiated on September 5, 2000. Startup procedures and minor construction modifications were ongoing until January 8, 2001, when continuous operation began. An AS/SVE Startup Report was finalized in late FY 2001.

Other than minor periods of down time, the SVE system operated continuously from January 8, 2001, through the end of FY 2001. The AS System operated from January to March; however, the two AS points were thought to be nearly dry during this period and both were confirmed to be above the water table on March 15, 2001. Two factors caused this situation: 1) Groundwater levels were at the lowest levels in five years according to water level history at nearby monitoring wells; and 2) the bottom of the AS points were set higher than specified in the design.

Two deeper AS points were installed on March 30, 2001, and connected to the AS system instead of the original AS points. The AS system was restarted and AS start-up monitoring was repeated in late April and May 2001. The start-up monitoring revealed that sparged air was traveling considerable distances horizontally, as evidenced by air bubbling into a monitoring well approximately 50 feet away. VOC monitoring in the SVE discharge during air sparging did not show a significant increase over VOC levels observed with only the SVE operating. Due to the concern regarding significant horizontal travel of sparged air (and potential VOC plume spreading) and the lack of increase in SVE VOC levels, the AS system was shut off in June 2001 (with MPCA approval) and remained off for the rest of FY 2001. Since source area *groundwater* remediation was not required by this component of the ROD, and the AS system was being implemented voluntarily by the Army, the decision to turn off the AS system does not affect the implementation of the source remediation component of the ROD.

Were there any significant AS/SVE system operation and maintenance problems in FY 2001 (greater than 24-hour shutdown)? Yes. Table 6-7 summarizes O&M notes for FY 2001.

Were SVE vents operating in accordance with design flowrates? No. Table 6-8 shows monthly average flow rates and also shows the design flowrate. Vent A was below the design flowrate throughout FY 2001 operation. Vents B and C were above or approximately equal to design flow rates from January through April, but were below design flowrates from May through September. Between June and September (warmer weather), the SVE blower had numerous automatic shutdowns related to exceedance of an exhaust air temperature limit (Table 6-7). To keep the SVE system running, the volume of bleed-in air had to be increased which limited the ability to maintain design flowrates. SVE blower operation is also limited by a maximum operating vacuum that limits the maximum extraction flowrates. The above limitations will be evaluated concurrently with potential SVE system modifications, as described below.

Did SVE emissions exceed any discharge criteria? No. SVE emissions were below the screening criteria for emissions treatment at the time of initial system start-up sampling (October 2000) and have declined considerably since that time (Table 6-9).

Have contaminant concentrations in soil declined to below the cleanup levels specified in Table 1 of the OU2 ROD? No. Due to the considerable decline in VOC concentrations in SVE emissions, direct push soil sampling was conducted on August 30, 2001, as a check on cleanup progress. The results indicated that some of the soil in the source area still exceeds cleanup levels for one or both contaminants of concern (tetrachloroethene and trichloroethene). These results were submitted for regulatory review in early FY 2002. Recommended system modifications are included with the submittal.

Is any characterization work or remediation work proposed prior to the next report? Yes. SVE system operation will continue in FY 2002.

Are any changes or additional actions required for this remedy component? Yes. Potential modifications to SVE system configuration or operation will be discussed with the MPCA and USEPA during FY 2002 and will be implemented as necessary. Potential modifications will include consideration of modifications to avoid exhaust air temperature system shutdowns. Also, since SVE emissions are well below discharge criteria, the frequency of air sampling for laboratory analysis (Method TO-14) should be reduced from once every two months to annually.

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 2001. Figure 6-5 shows that the area with tetrachloroethene exceedances (greater than 7 µg/l) extends from the source area (near 01U108 and 01U350) downgradient to near 01U126. The tetrachloroethene exceedances do not extend to the first line of extraction wells. Table 6-2 shows that trichloroethene exceedances are also limited to near the source area (01U108 and 01U350). Figure 6-4 suggests that the cis-1,2-dichloroethene exceedances (greater than 70 µg/l) are limited to extraction well 01U352 and an area immediately upgradient, but not extending back to the source area. Table 6-2 also shows that antimony was above the cleanup level at 01U103.

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. Plume contours in Figures 6-2, 6-4 and 6-5 did not change significantly from FY 2000 plume contours. Wells at, and downgradient, of the first line of extraction wells generally showed stable or slightly decreasing concentrations. All wells downgradient of the first line of extraction wells (01U351–354), including extraction wells 01U355–357, had water quality results that remained below the cleanup levels. Wells in, and just downgradient, of the source area generally showed comparable or slightly decreasing concentrations (01U117, 01U126 and 01U108). Figures 6-6 through 6-9 present trend graphs of cis-1,2-dichloroethene; trichloroethene; and tetrachloroethene for representative wells to illustrate these points:

- 01U108 – Near the source area
- Extraction Wells 01U351 – 01U354: the first line of extraction wells (cis-1,2-dichloroethene only)
- Extraction Wells 01U355 – 01U358: the second line of extraction wells (cis-1,2-dichloroethene only)
- 01U902 – Downgradient of the extraction system

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 the AS/SVE System having on contaminant concentrations?

No definitive impacts were evident in the plume maps or water quality trend graphs, though it is perhaps too early to expect to see definitive changes in water quality. At 01U108 and 01U350, the closest monitoring wells downgradient of the source area, variable results were observed in the three quarters of sampling, with the newest results (September 18, 2001) being comparable to the pre-AS/SVE results (Figure 6-6). Wells 01U103, 01U108 and 01U350 will continue to be monitored quarterly during FY 2002 to evaluate groundwater quality trends resulting from SVE system operation.

How much VOC mass has been removed?

Based on the calculated VOC mass removal rates for the total effluent, Table 6-10 shows that the groundwater extraction system removed approximately 1.9 pounds of VOCs in FY 2001, with a cumulative VOC mass removal of nearly 35 pounds since system startup on May 31, 1994.

Based on monitoring of the discharge air, the SVE system removed approximately 413 pounds of VOCs in FY 2001 (Table 6-11).

Has 10 years elapsed since signing of the OU2 ROD? No. The FY 2001 June sampling event marked four years of extraction system operation since the signing of the OU2 ROD. The ROD states that "should aquifer restoration not be attained within the anticipated ten year lifespan of the remedy, additional remedial measures will be addressed". Based on the water quality trends at 01U350, it appears that cleanup levels may not be reached throughout the areal extent of the plume by the tenth year. However, given the declining trends in contaminant concentrations at other wells, 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 system emissions	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 2001

		Tetrachloroethene (ug/l)	Trichloroethene (ug/l)	1,1-Dichloroethene (ug/l)	1,2-Dichloroethane (ug/l)	cis-1,2-Dichloroethene (ug/l)	Chloroform (ug/l)	Benzene (ug/l)	Antimony (ug/l)
Site A Cleanup Level [1]		7.0	30.0	6.0	4.0	70.0	60.0	10.0	6.0
01U039	06-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U102	06-Jun-01	5.3	1.6	<1.0	<1.0	18	<1.0	<1.0	
01U103	14-Mar-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U103	06-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	13.3
01U103	*18-Sep-01*	*J 0.11 UB0.15*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	
01U108	14-Mar-01	**76**	21	<1.0	<1.0	7.5	<1.0	<1.0	
01U108	06-Jun-01	**13**	2.7	<1.0	<1.0	1.1	<1.0	<1.0	
01U108	*18-Sep-01*	***130***	***31***	*<1.0*	*<1.0*	*22*	*<1.0*	*<1.0*	
01U115	06-Jun-01	<1.0	<1.0	<1.0	<1.0	JP 0.33	<1.0	<1.0	
01U116	06-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U117	06-Jun-01	3.3	2.1	<1.0	<1.0	8.5	<1.0	<1.0	
01U126	06-Jun-01	**12**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U126 D	06-Jun-01	**15**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
01U138	06-Jun-01	<1.0	<1.0	<1.0	<1.0	JP 0.48	<1.0	<1.0	
01U139	*19-Dec-00*	*<1.0*	*<1.0*	*<1.0*	*NS*	*J 0.33*	*<1.0*	*<1.0*	
01U139	14-Mar-01	<1.0	<1.0	<1.0	<1.0	JP 0.20	<1.0	<1.0	
01U139	06-Jun-01	<1.0	JP 0.40	<1.0	<1.0	9.0	<1.0	JP 0.45	
01U139	*04-Oct-01*	*<1.0*	*J 0.60*	*<1.0*	*<1.0*	*10*	*<1.0*	*J 0.68*	
01U140	*15-Dec-00*	*<1.0*	*J 0.23*	*<1.0*	*NS*	*3.8*	*<1.0*	*1.4*	
01U140	13-Mar-01	<1.0	JP 0.22	<1.0	<1.0	3.5	<1.0	JP 0.91	
01U140	06-Jun-01	<1.0	JP 0.20	<1.0	<1.0	4.0	<1.0	1.2	
01U140	*04-Oct-01*	*<1.0*	*J 0.23*	*<1.0*	*<1.0*	*4.1*	*<1.0*	*1.2*	
01U157	12-Jun-01	<1.0	JP 0.52	<1.0	<1.0	1.9	<1.0	<1.0	
01U158	12-Jun-01	<1.0	JP 0.19	<1.0	<1.0	1.4	<1.0	<1.0	
01U350	*14-Mar-01*	***200***	***88***	*<1.0*	*<1.0*	*70*	*J 0.31*	*<1.0*	
01U350	12-Jun-01	**130**	29	<1.0	<1.0	24	JP 0.17	<1.0	
01U350	*18-Sep-01*	***230***	***70***	*<1.0*	*<1.0*	*49*	*J 0.35*	*J 0.085*	
01U351	13-Jul-01	JP 0.47	JP 0.88	<1.0	<1.0	1.4	<1.0	JP 0.15	
01U352	13-Jul-01	JP 1.0	2.2	<1.0	<1.0	**77**	<1.0	6.1	
01U353	13-Jul-01	JP 0.26	JP 0.92	JP 0.081	<1.0	37	<1.0	JP 0.52	
01U354	13-Jul-01	<1.0	JP 0.27	<1.0	<1.0	JP 0.82	<1.0	JP 0.078	
01U355	*15-Dec-00*	*<1.0*	*J 0.16*	*<1.0*	*NS*	*3.7*	*<1.0*	*<1.0*	
01U355 D	*15-Dec-00*	*<1.0*	*J 0.15*	*<1.0*	*NS*	*3.4*	*<1.0*	*<1.0*	
01U355	13-Mar-01	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	<1.0	
01U355	12-Jun-01	<1.0	<1.0	<1.0	<1.0	3.8	<1.0	JP 0.18	
01U355	*05-Oct-01*	*<1.0*	*J 0.14*	*<1.0*	*<1.0*	*2.7*	*<1.0*	*J 0.13*	
01U356	*15-Dec-00*	*<1.0*	*J 0.25*	*<1.0*	*NS*	*4.1*	*<1.0*	*J 0.30*	
01U356	13-Mar-01	<1.0	JP 0.24	<1.0	<1.0	2.6	<1.0	JP 0.22	
01U356	12-Jun-01	<1.0	JP 0.24	<1.0	<1.0	3.1	<1.0	JP 0.26	
01U356	*05-Oct-01*	*<1.0*	*J 0.20*	*<1.0*	*<1.0*	*1.9*	*<1.0*	*J 0.17*	
01U357	*15-Dec-00*	*<1.0*	*J 0.20*	*<1.0*	*NS*	*7.4*	*<1.0*	*1.7*	
01U357	14-Mar-01	<1.0	JP 0.17	<1.0	<1.0	6.8	<1.0	1.8	
01U357	12-Jun-01	<1.0	<1.0	<1.0	<1.0	5.4	<1.0	1.2	
01U357	*03-Oct-01*	*<1.0*	*J 0.19*	*<1.0*	*<1.0*	*6.7*	*<1.0*	*1.8*	
01U901	12-Jun-01	<1.0	<1.0	<1.0	<1.0	JP 0.50	<1.0	<1.0	
01U902	*19-Dec-00*	*<1.0*	*J 0.30*	*<1.0*	*NS*	*11*	*<1.0*	*<1.0*	
01U902	14-Mar-01	<1.0	JP 0.36	<1.0	<1.0	9.7	<1.0	<1.0	
01U902	12-Jun-01	<1.0	JP 0.29	<1.0	<1.0	9.6	<1.0	<1.0	1.66
01U902 D	12-Jun-01	<1.0	JP 0.33	<1.0	<1.0	8.4	<1.0	<1.0	1.41
01U902	*09-Oct-01*	*<1.0*	*J 0.27*	*<1.0*	*<1.0*	*10*	*<1.0*	*J 0.13*	
01U903	12-Jun-01	<1.0	JP 0.17	<1.0	<1.0	JP 0.19	<1.0	<1.0	
01U904	*19-Dec-00*	*<1.0*	*<1.0*	*<1.0*	*NS*	*1.2*	*<1.0*	*<1.0*	
01U904	14-Mar-01	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	
01U904 D	14-Mar-01	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	
01U904	12-Jun-01	<1.0	<1.0	<1.0	<1.0	3.2	<1.0	JP 0.17	1.61
01U904	*09-Oct-01*	*<1.0*	*J 0.11*	*<1.0*	*<1.0*	*3.3*	*<1.0*	*J 0.18*	

Notes: (1) Cleanup levels for Site A Shallow Groundwater are from Table 1 of the OU2 ROD. Bolding indicates exceedance of the cleanup level or reporting limits that are higher than the cleanup level.
JP or J The value is below the reporting level, but above the method detection limit.
D Duplicate sample.
NS Parameter was not included in lab analysis.
UB0.15 Tetrachloroethene was detected in an equipment rinse blank at 0.15 ug/l.
Italics indicates data not downloaded from IRDMIS/ERIS

Table 6-3

Site A Removal Action Pumping Data

Fiscal Year 2001

Month	01U351	01U352	01U353	01U354	01U355	01U356	01U357	01U358	01U351-354 Subtotal
						Target Flowrate (gpm):			**15.0**
	Average Flowrate (gpm)								
Oct-00	4.02	3.85	3.71	3.87	0	0	0	0	15.5
Nov-00	4.49	3.99	4.14	3.53	0	0	0	0	16.2
Dec-00	3.87	3.85	3.75	3.74	0.01	0.01	0.01	0	15.2
Jan-01	4.34	4.18	4.11	4.34	0	0	0	0	17.0
Feb-01	4.08	4.16	3.98	4.17	0	0	0	0	16.4
Mar-01	4.17	4.16	3.89	3.98	0	0	0	0	16.2
Apr-01	4.39	4.52	4.29	4.36	0	0	0	0	17.6
May-01	3.90	4.19	3.19	4.32	0	0	0	0	15.6
Jun-01	4.85	3.67	4.09	4.13	0	0	0	0	16.7
Jul-01	4.25	3.78	4.21	4.63	0	0	0	0	16.9
Aug-01	4.09	2.29	3.84	4.38	0	0	0	0	14.6
Sep-01	4.97	2.63	3.90	4.92	0	0	0	0	16.4
FY01 Average	**4.3**	**3.8**	**3.9**	**4.2**	**0.0**	**0.0**	**0.0**	**0.0**	**16.2**

Notes:

Recovery Wells 01U355 through 01U358 were shut off on July 11, 2000, as approved by the MPCA and USEPA.
Recovery Wells 01U355 through 01U357 were turned on briefly on December 15, 2000 to facilitate the December Quarterly Sampling Event.

Table 6-4

Site A Groundwater Level Data

Fiscal Year 2001

Well	TOS [1] (ft)	Date	Groundwater Elev.(ft)
01U038	900.3	01-Jun-01	893.83
01U039	897.5	01-Jun-01	883.55
01U040	892.5	01-Jun-01	885.62
01U041	898.3	01-Jun-01	894.76
01U063	892.6	01-Jun-01	885.51
01U067	897.4	01-Jun-01	895.18
01U102	905.2	01-Jun-01	889.52
01U103	904.1	14-Mar-01	885.52
01U103	904.1	01-Jun-01	891.37
01U103	904.1	18-Sep-01	889.65
01U104	899.1	01-Jun-01	894.45
01U105	901.4	01-Jun-01	895.90
01U106	896.8	01-Jun-01	891.49
01U107	899.2	01-Jun-01	893.59
01U108	904.3	14-Mar-01	884.79
01U108	904.3	01-Jun-01	890.94
01U108	904.3	18-Sep-01	888.65
01U110	897.2	01-Jun-01	895.88
01U115	900.3	01-Jun-01	885.58
01U116	902.7	01-Jun-01	885.81
01U117	902.7	01-Jun-01	887.02
01U118	901.8	01-Jun-01	890.02
01U119	898.1	01-Jun-01	893.88
01U120	902.2	01-Jun-01	890.18
01U126	903.3	01-Jun-01	888.67
01U127	902.9	01-Jun-01	890.63
01U133	900.7	01-Jun-01	893.09
01U135	899.9	01-Jun-01	883.18
01U136	898.8	01-Jun-01	883.37
01U137	972.5	01-Jun-01	888.25
01U138	965.6	01-Jun-01	885.45
01U139	901.2	18-Dec-00	883.43
01U139	901.2	13-Mar-01	882.45
01U139	901.2	01-Jun-01	885.35
01U139	901.2	04-Oct-01	885.21
01U140	898.8	15-Dec-00	880.93
01U140	898.8	13-Mar-01	880.79
01U140	898.8	01-Jun-01	884.54
01U140	898.8	04-Oct-01	884.53
01U141	897.7	01-Jun-01	886.14
01U145	886.4	01-Jun-01	886.36
01U146	881.8	01-Jun-01	886.03
01U147	902.8	01-Jun-01	886.60
01U148	902.6	01-Jun-01	885.85
01U149	901.3	01-Jun-01	885.81
01U150	901.3	01-Jun-01	885.38
01U151	904.7	01-Jun-01	885.59
01U152	901.0	01-Jun-01	885.45
01U153	899.9	01-Jun-01	885.16
01U154	898.9	01-Jun-01	885.00
01U155	897.9	01-Jun-01	883.87
01U156	897.8	01-Jun-01	883.40
01U157	901.9	01-Jun-01	885.48
01U158	901.1	01-Jun-01	885.23
01U350	903.9	14-Mar-01	885.17
01U350	903.9	01-Jun-01	890.58
01U350	903.9	18-Sep-01	889.43
01U351	904.0	11-Oct-00	880.53 P
01U351	904.0	07-Nov-00	880.35 P
01U351	904.0	15-Dec-00	880.33 P
01U351	904.0	10-Jan-01	880.15 P
01U351	904.0	09-Feb-01	879.76 P
01U351	904.0	27-Feb-01	879.91 P
01U351	904.0	05-Apr-01	879.49 P
01U351	904.0	23-May-01	886.58
01U351	904.0	04-Jun-01	883.54 P
01U351	904.0	18-Jul-01	884.64 P
01U351	904.0	06-Aug-01	884.58 P
01U351	904.0	27-Sep-01	882.61 P
01U352	901.0	11-Oct-00	880.62 P
01U352	901.0	07-Nov-00	880.38 P
01U352	901.0	15-Dec-00	880.25 P
01U352	901.0	10-Jan-01	879.98 P
01U352	901.0	09-Feb-01	879.61 P

Table 6-4

Site A Groundwater Level Data

Fiscal Year 2001

Well	TOS [1] (ft)	Date	Groundwater Elev.(ft)
01U352	901.0	27-Feb-01	879.22 P
01U352	901.0	05-Apr-01	879.37 P
01U352	901.0	23-May-01	886.12
01U352	901.0	04-Jun-01	883.20 P
01U352	901.0	18-Jul-01	884.19 P
01U352	901.0	06-Aug-01	885.50 P
01U352	901.0	27-Sep-01	882.62 P
01U353	902.0	11-Oct-00	887.96 P
01U353	902.0	07-Nov-00	877.75 P
01U353	902.0	15-Dec-00	877.48 P
01U353	902.0	10-Jan-01	877.64 P
01U353	902.0	09-Feb-01	876.87 P
01U353	902.0	27-Feb-01	874.90 P
01U353	902.0	05-Apr-01	875.64 P
01U353	902.0	23-May-01	882.55
01U353	902.0	04-Jun-01	880.98 P
01U353	902.0	18-Jul-01	881.36 P
01U353	902.0	06-Aug-01	881.06 P
01U353	902.0	27-Sep-01	879.84 P
01U354	903.8	11-Oct-00	880.93 P
01U354	903.8	07-Nov-00	880.73 P
01U354	903.8	15-Dec-00	880.77 P
01U354	903.8	10-Jan-01	880.58 P
01U354	903.8	09-Feb-01	880.32 P
01U354	903.8	27-Feb-01	880.15 P
01U354	903.8	05-Apr-01	880.13 P
01U354	903.8	23-May-01	885.77
01U354	903.8	04-Jun-01	884.55 P
01U354	903.8	18-Jul-01	885.30 P
01U354	903.8	06-Aug-01	885.29 P
01U354	903.8	27-Sep-01	883.84 P

Well	TOS [1] (ft)	Date	Groundwater Elev.(ft)
01U355	899.9	15-Dec-00	881.81
01U355	899.9	13-Mar-01	881.43
01U355	899.9	01-Jun-01	885.32
01U355	899.9	05-Oct-01	885.20
01U356	899.5	15-Dec-00	881.51
01U356	899.5	13-Mar-01	881.09
01U356	899.5	01-Jun-01	884.88
01U356	899.5	05-Oct-01	884.86
01U357	899.1	15-Dec-00	881.08
01U357	899.1	14-Mar-01	881.00
01U357	899.1	01-Jun-01	884.24
01U357	899.1	03-Oct-01	884.30
01U901	901.5	01-Jun-01	882.49
01U902	901.3	18-Dec-00	880.66
01U902	901.3	14-Mar-01	881.21
01U902	901.3	01-Jun-01	884.76
01U902	901.3	05-Oct-01	884.86
01U903	903.7	01-Jun-01	886.31
01U904	899.4	19-Dec-00	880.66
01U904	899.4	14-Mar-01	880.29
01U904	899.4	01-Jun-01	883.48
01U904	899.4	05-Oct-01	883.55

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

(2) P = Pumping

Table 6-5

Site A Removal Action Monthly Operation and Maintenance Notes

Fiscal Year 2001

October

10/25 Effluent flow meter stopped working. Contacted City of Shoreview and MCES.
Both parties indicated that readings from this meter were not required, since a total discharge can be determined by adding the individual flowmeter readings together
Operation, maintenance, and recording of the effluent meter was discontinued

10/30 - 10/31 System stopped for scheduled cleaning. Down time: 29.8 hours

November

11/8 EW4 pump stopped running after a 30 minute shutdown to fix leaks.
11/10 EW-4 pump replaced approx. 3:00 P.M. Down time: 51 hours
11/13 During daily inspection of system, EW -1 was found to be at 8.5 gpm. Changed to 4.0 gpm
11/23 & 24 Meter readings not taken due to Thanksgiving holiday

December

12/15 Briefly ran EW5, EW-6, and EW-7 as part of the quarterly sampling event.
12/19 System shut down for scheduled cleaning. Total time shut down 54.33 hours
12/20 EW-1 pump went down during cleaning.
12/21 Pumps pulled from EW5, EW-6, EW-7, EW-8. Replaced old EW-1 pump with EW-5 pump.

January

No operational difficulties encountered.

February

2/5 System shut down for scheduled cleaning. Total time shut down 28.25 hours.

March

3/27 System shut down for scheduled cleaning. Total downtime 29 hours

April

4/23 EW-3 pump down upon daily site visit. Pump replaced same day

May

5/9 EW -3 pump down upon arrival at daily inspection. Down until 5/11. Down time approximately 44 hours
5/23 & 24 System shut down for scheduled cleaning. Down time 30 hours.

June

6/8 EW2 pump down upon arrival. Approximate down time 100 hrs

July

7/9 & 10 System shut down for scheduled cleaning. Approximate down time 26 hours
7/30 EW-2 and EW-3 shut down briefly to remove shrouds. Approximate down time 1/2 hour for each well

August

8/13 to 17 System shut down for scheduled cleaning. Down time 75 hours
8/15 EW-2 replaced, new pump not functioning properly.
8/15 Pitless leak in EW-1. Estimated down time 8 hours.
8/20 Replaced flow meter on EW-2, down time for EW-2 76 hours (some concurrent with cleaning down time

September

9/24 & 25 System shut down for scheduled cleaning. Down time 27 hours
9/26 to 28 EW2 tested, recleaned. Down time 26 hours.

Table 6-6

Site A Removal Action Effluent Water Quality

Fiscal Year 2001

		cis-1,2-Dichloroethene (ug/l)	trans-1,2-Dichloroethene (ug/l)	1,1,1-Trichloroethane (ug/l)	Trichloroethene (ug/l)	Mercury (ug/l)
Discharge Criteria:		3000	3000	3000	3000	2
Effluent - A	11-Oct-00	28	JP 0.85	<1.0	1.2	<0.10
Effluent - A	07-Nov-00	27	JP 0.83	<1.0	*1.3*	<0.10
Effluent - A	*15-Dec-00*	*30*	*J 0.94*	*<1.0*	*1.0*	*<0.10*
Effluent - A	10-Jan-01	28	JP 0.73	<1.0	1.1	*<0.10*
Effluent - A	08-Feb-01	23	JP 0.66	<1.0	1.2	<0.10
Effluent - A	13-Mar-01	21	JP 0.62	<1.0	1.1	<0.10
Effluent - A	05-Apr-01	20	JP 0.64	<1.0	1.1	<0.10
Effluent - A	24-May-01	23	JP 0.78	<1.0	1.1	<0.10
Effluent - A	25-Jun-01	26	JP 0.83	<1.0	1.2	<0.10
Effluent - A	18-Jul-01	28	JP 0.81	<1.0	1.0	<0.10
Effluent - A	07-Aug-01	18	JP 0.64	<1.0	JP 0.90	<0.10
Effluent - A	*18-Sep-01*	*25*	*J 0.75*	*<1.0*	*J 0.96*	*<0.10*

Note: JP = The value is below the reporting limit, but above the method detection limit.
J = The value is below the reporting limit, but above the method detection limit.
Italics indicate data not from IRDMIS/ERIS

Table 6-7

Site A SVE/AS System Monthly Operation and Maintenance Notes

Fiscal Year 2001

January (1)
No operational difficulties encountered.

February
2/9 System briefly shut down for water level measurements, down time 0.75 hour.
2/16 SVE-B Well head flow indicator was apparently plugged. Upon site visit 2/19 flow indicator was again functional. The meter may have been plugged with ice that later thawed.

March
3/2 OVM malfunctioned. PID readings not taken 3/2.

April
3/30 - 4/27 AS shut down.
4/16 - 4/27 System shut down for O&M and AS Startup.

May
No operational difficulties encountered.

June
6/8 AS system shut down due to continuous bubbling in monitoring well O1U350.
6/25 System down upon arrival (system temperature overheat). System restarted, estimated down time 48 hours.

July
7/18 System down upon arrival (system temperature overheat). System restarted, estimated down time 16 hours.
7/19 System down upon arrival (system temperature overheat). System restarted, estimated down time 21 hours.
7/23 System down upon arrival (system temperature overheat). System restarted, estimated down time 39 hours.
7/30 System down upon arrival (system temperature overheat). System restarted, estimated down time 2 hours.
7/31 System down upon arrival (system temperature overheat). System restarted, estimated down time 23 hours.

August
8/6 9:23 System down upon arrival (system temperature overheat). System restarted, estimated down time 16 hours
8/6 17:20 System down upon arrival (system temperature overheat). System restarted, estimated down time 4 hours.
8/7 System down upon arrival (system temperature overheat). System restarted, estimated down time 3 hours.
8/8 System down upon arrival (system temperature overheat). System restarted, estimated down time 17 hours.
8/9 System down upon arrival (system temperature overheat). System restarted, estimated down time 16 hours.
8/15 System down upon arrival (system temperature overheat). System restarted, estimated down time 17 hours.
8/24 System down upon arrival (system temperature overheat). System restarted, estimated down time 113 hours.
8/30 System down for confirmatory soil borings. Down time 7 hours.

September
9/4 System down upon arrival (system temperature overheat). System restarted, estimated down time 91 hours.
9/5 System down upon arrival (system temperature overheat). System restarted, estimated down time 1 hour.
9/14 System down upon arrival (system temperature overheat). System restarted, estimated down time 4 hours.

Notes:
(1) The system was placed into continuous operation January 8, 2001. Prior to this date the system was undergoing construction modifications and pre-startup testing.

Table 6-8

Site A SVE System Flowrates

Fiscal Year 2001

Monthly Average Flow Rate (cfm)

Month	SVE A	SVE B	SVE C	Total
Design Flow Rate	**75**	**75**	**75**	**225**
January [1]	66	79	87	232
February	61	79	82	222
March	72	81	84	237
April	62	71	80	213
May	60	61	63	184
June	58	60	70	188
July	54	54	62	170
August	48	48	55	151
September	48	51	55	154
FY 2001 Average	**59**	**65**	**71**	**195**

Notes:
(1) The system was placed into continuous operation January 8, 2001. Prior to this date the system was undergoing construction modifications and pre-startup testing.

Table 6-9
Site A SVE System Discharge Monitoring Results

Fiscal Year 2001

Date	Site A VOCs of Concern				Other Compounds Detected													Total VOCs
	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	Benzene	Ethylbenzene	Toluene	M&P-Xylene	O-Xylene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	4-Ethyl Toluene	Chloromethane	Dichlorodifluoromethane	Freon 11	Acetone	Methylene Chloride	Methyl Ethyl Ketone	
25-Oct-00	2300	680	<120	<110	140	<120	530	230	1100	470	NA	<120	<120	NA	NA	<120	NA	5450
26-Oct-00	3300	990	<120	<110	210	<120	720	290	960	430	NA	<120	<120	NA	NA	<120	NA	6900
27-Oct-00	2100	560	<110	<100	120	<110	490	210	900	390	NA	<110	<120	NA	NA	<120	NA	4770
08-Feb-01	360	59	7.1	0.38J	24	4.7	84	45	350	43	25	0.62J	0.63J	0.48J	1.8	<1.0	<1.0	1006
14-Mar-01	89	14	2.0	0.56J	6.1	2.3	28	15	80	35	17	0.90J	0.80J	0.58J	1.4	4.6	<1.0	297
05-Apr-01	26	3.9	0.45J	<1.0	2.4	1.0	11	3.8	13	6.5	2.5	<1.0	<1.0	<1.0	2.9	<1.0	0.42J	74
16-May-01	130	23	3.0	1.1	11	4.2	47	29	67	40	15	0.35J	0.63J	0.36J	2.7	0.93J	0.46J	376
02-Jul-01	130	23	2.3	1.0	5.3	1.5	22	13	27	19	6.9	<1.0	<1.0	<1.0	2.9	<1.0	<1.0	254
18-Sep-01	170	35	2.8	0.28J	5.9	1.2	31	27	50	42	17	<1.0	0.72J	0.38J	2.9B	2.7B	0.36J	384

Notes:
1) All results are reported as parts per billion by volume (ppbv).
2) J = The value is below the reporting limit, but above the method detection limit.
3) B = The compound was also detected in the method blank.
4) October 2000 results were from samples collected by Stone & Webster during initial system start-up. Later results were from sampling conducted by TWISS during continuous system operation that began January 8, 2001. The sampling frequency for continuous operation was reduced from monthly to every other month in May 2001 (as approved by the MPCA).

Table 6-10

Site A Removal Action Monthly VOC Removal

Fiscal Year 2001

MONTH	1,2-DICHLOROETHENE (CIS & TRANS) (ug/l)	TRICHLOROETHENE (ug/l)	TOTAL VOC CONCENTRATION (ug/l)	CONVERSION FACTOR (l*lb)/(ug*gal)	WATER PUMPED (gallons)	TOTAL VOC'S REMOVED BY EXTRACTION SYSTEM (lbs)
TOTAL GALLONS PUMPED AND VOC'S REMOVED THROUGH SEPTEMBER 30, 2000					104,278,335	32.62
OCTOBER	28.85	1.20	30.05	8.35E-09	689,670	0.17
NOVEMBER	27.83	1.30	29.13	8.35E-09	697,810	0.17
DECEMBER	30.94	1.00	31.94	8.35E-09	636,230	0.17
JANUARY	28.73	1.10	29.83	8.35E-09	805,980	0.20
FEBRUARY	23.66	1.20	24.86	8.35E-09	660,480	0.14
MARCH	21.62	1.10	22.72	8.35E-09	699,790	0.13
APRIL	20.64	1.10	21.74	8.35E-09	758,320	0.14
MAY	23.78	1.10	24.88	8.35E-09	696,580	0.14
JUNE	26.83	1.20	28.03	8.35E-09	722,930	0.17
JULY	28.81	1.00	29.81	8.35E-09	753,130	0.19
AUGUST	18.64	0.90	19.54	8.35E-09	651,560	0.11
SEPTEMBER	25.75	0.96	26.71	8.35E-09	662,020	0.15
TOTAL GALLONS PUMPED AND VOC'S REMOVED FOR FISCAL YEAR 2001					8,434,500	1.88
TOTAL GALLONS TREATED AND VOC'S REMOVED SINCE SYSTEM START UP					112,712,835	34.50

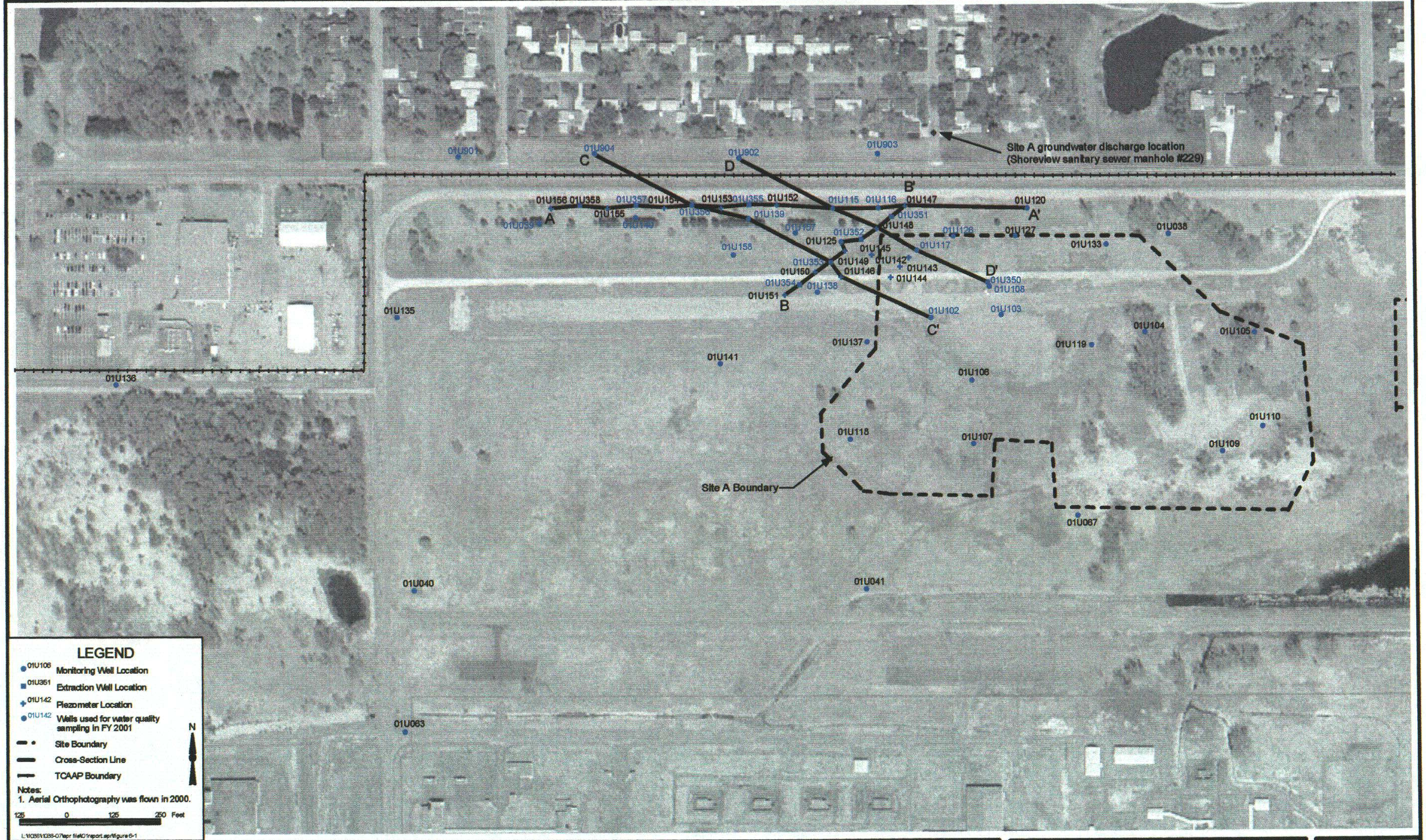
Table 6-11

Site A SVE/AS System Monthly VOC Removal

Fiscal Year 2001

Period	Average Effluent PID Reading (Parts per million)	Average Measured Effluent Flow Rate (SCFM) (2)	VOC Removal Rate (Lbs/day) (3)	VOCs Removed per Period (Lbs)	Down Time Per Period (Hours)	VOCs Removed per Month (Lbs) (4)
1/8 - 1/31	26.2	340	4.1	97.7	0	
January Total (1)						97.7
2/1 - 2/8	22.8	349	3.6	29.1	0	
2/8 - 2/16	19.8	346	3.1	25.0	0	
2/16 - 2/20	18.5	350	3.0	11.8	0	
2/20 - 2/28	18.9	348	3.0	24.0	0	
February Total						90.0
3/1 - 3/7	13.8	345	2.2	15.2	0	
3/7 - 3/14	12.6	345	2.0	13.8	0	
3/14 - 3/19	13.5	344	2.1	10.6	0	
3/19 - 3/31	13.0	341	2.0	24.3	0	
March Total						64.0
4/1 - 4/16	13.0	321	1.9	30.5	264	
April Total						30.5
4/28 - 5/16	9.6	355	1.6	29.6	0	
5/17 - 5/25	7.5	333	1.1	10.3	0	
5/25 - 5/29	9.6	323	1.4	7.1	0	
May Total						47.0
5/29 - 6/8	7.5	323	1.1	11.1	0	
6/8 - 6/22	5.3	333	0.8	11.3	0	
6/22 - 6/30	5.3	329	0.8	4.8	48	
June Total						27.2
7/1 - 7/19	4.3	317	0.6	10.8	37	
7/19 - 7/31	4.3	324	0.6	5.9	64	
July Total						16.6
8/1 - 8/15	7.5	321	1.1	13.1	73	
8/16 - 8/31	7.5	318	1.1	11.9	120	
August Total						25.0
9/1 - 9/12	5.3	322	0.8	6.4	92	
9/13 - 9/31	3.2	332	0.5	9.1	4	
September Total						15.5
FY 2001 Total VOCs Removed						**413.4**

Notes:
(1) The system was placed into continuous operation January 8, 2001. Prior to this date the system was undergoing construction modifications and pre-startup testing.
(2) Effluent flow rate includes dilution air.
(3) Average VOC molecular weight of 125 assumed for VOC removal rate calculation.
(4) VOCs removed per month are adjusted for down time.



TWIN CITIES ARMY AMMUNITION PLANT

Site A, Well Location Map

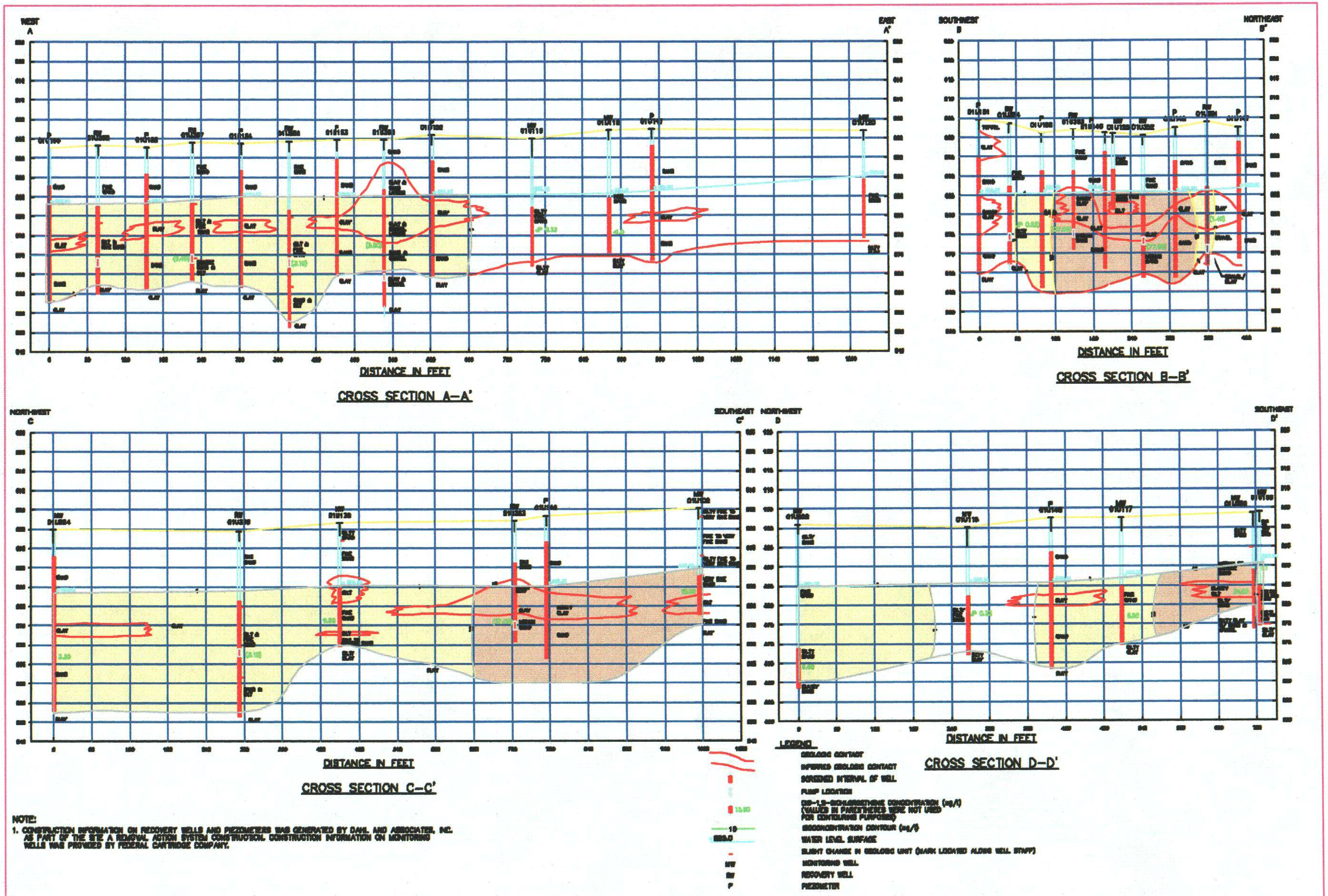
Wenck

Wenck Associates, Inc.
Environmental Engineers

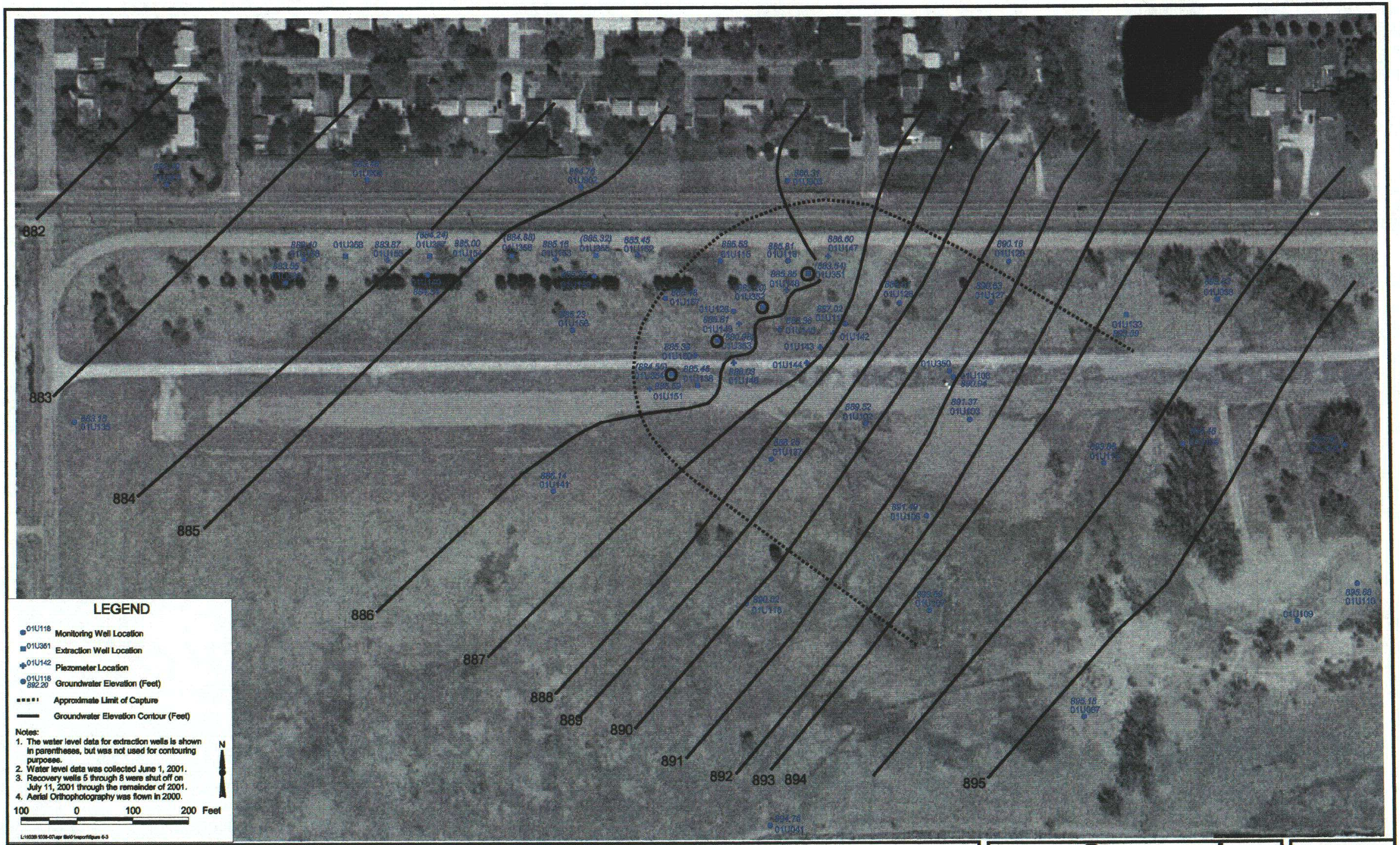
1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2001

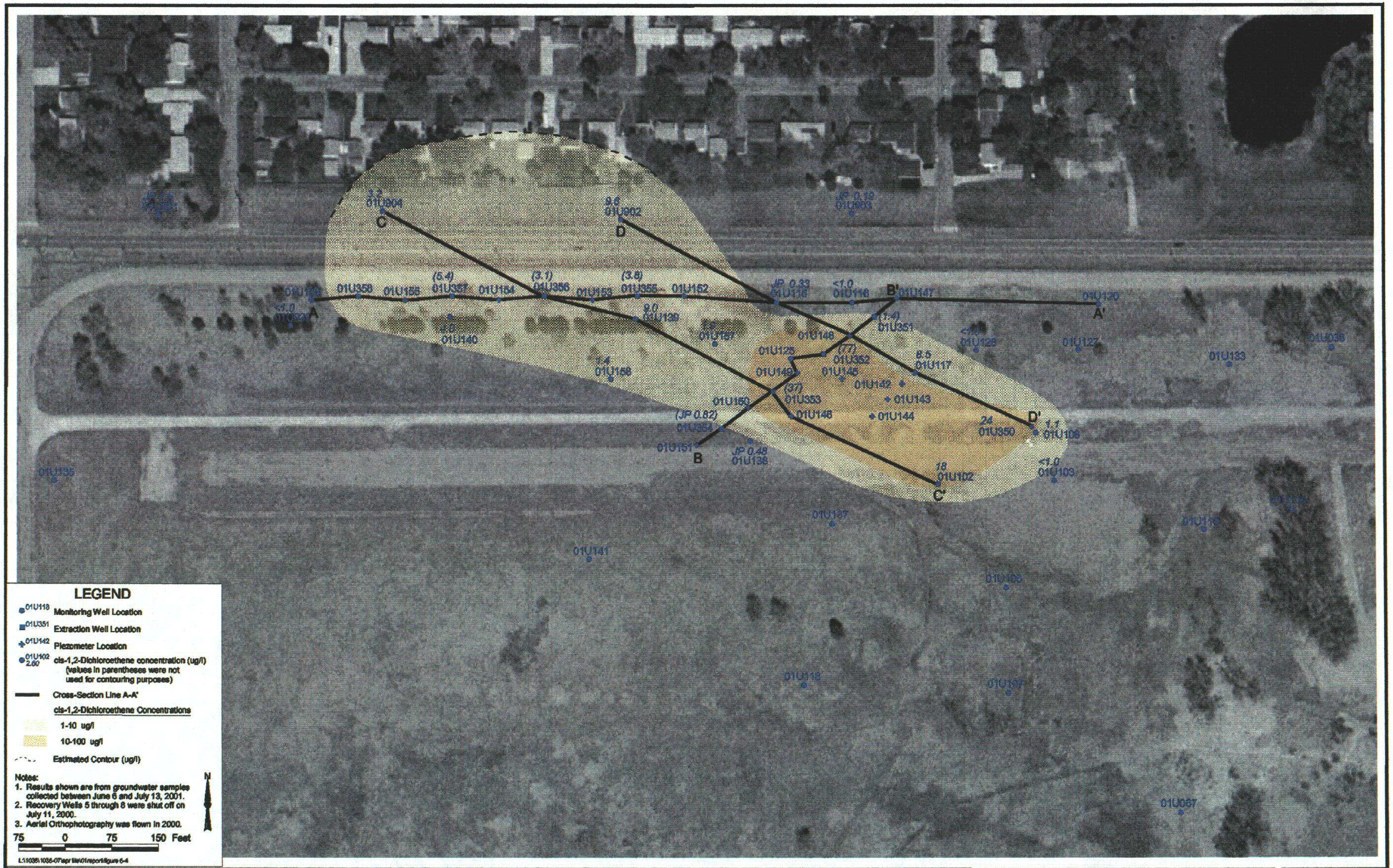
Figure 6-1



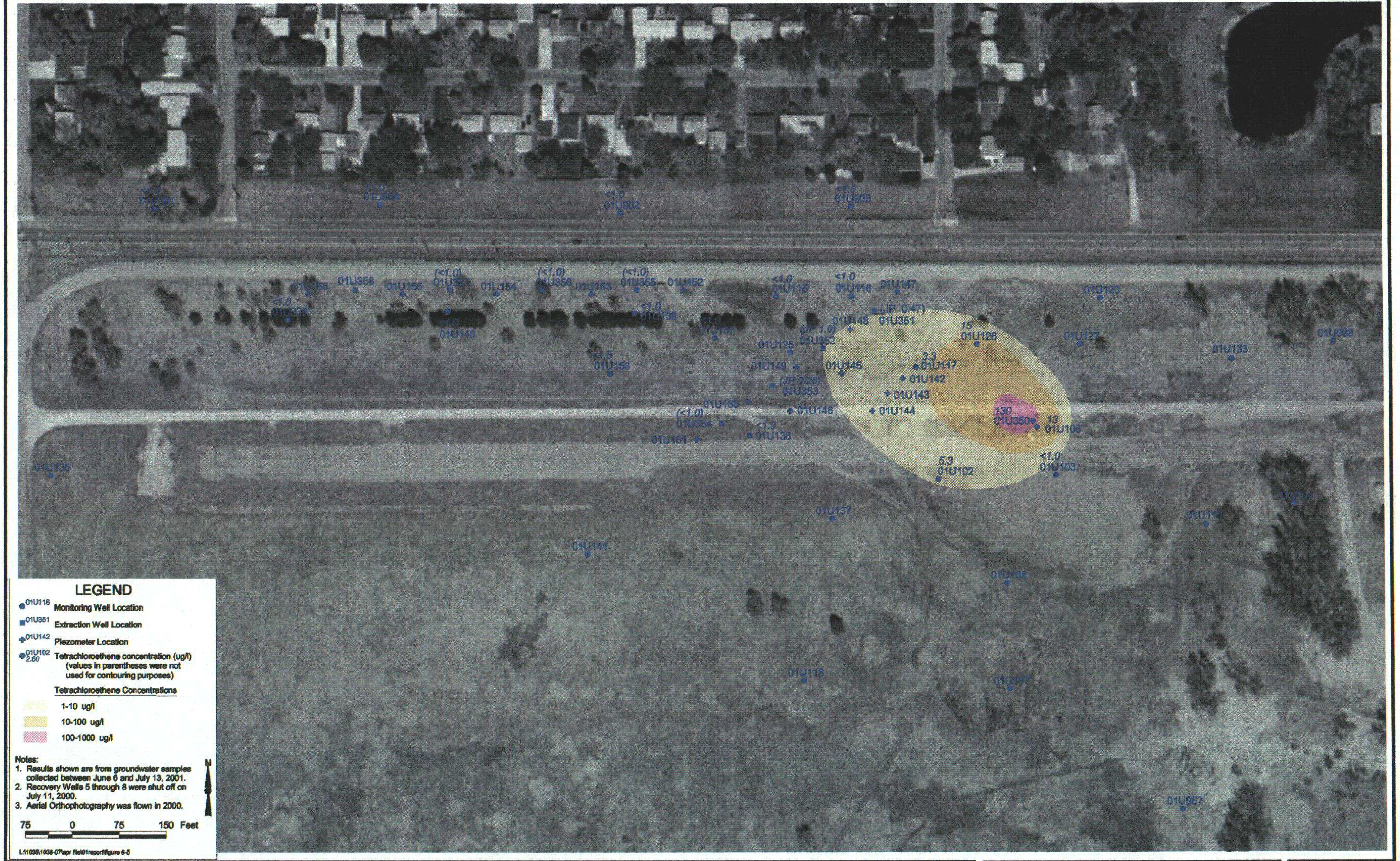
TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2001
Site A, cis-1,2-Dichloroethene Cross Sections A-A', B-B', C-C', D-D', Summer 2001		Figure 6-2



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2001
Site A, Unit 1, Potentiometric Map -- Summer 2001		Figure 6-3



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2001
Site A, Unit 1, cis-1,2-Dichloroethene Isoconcentration Map, Summer 2001		Figure 6-4



TWIN CITIES ARMY AMMUNITION PLANT

Site A, Unit 1 Tetrachloroethene Isoconcentration Map, Summer 2001

Wenck

Wenck Associates, Inc. Environmental Engineers

1800 Pioneer Creek Center Maple Plain, MN 55359-0429

FY 2001

Figure 6-5

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

TWIN CITIES ARMY AMMUNITION PLANT

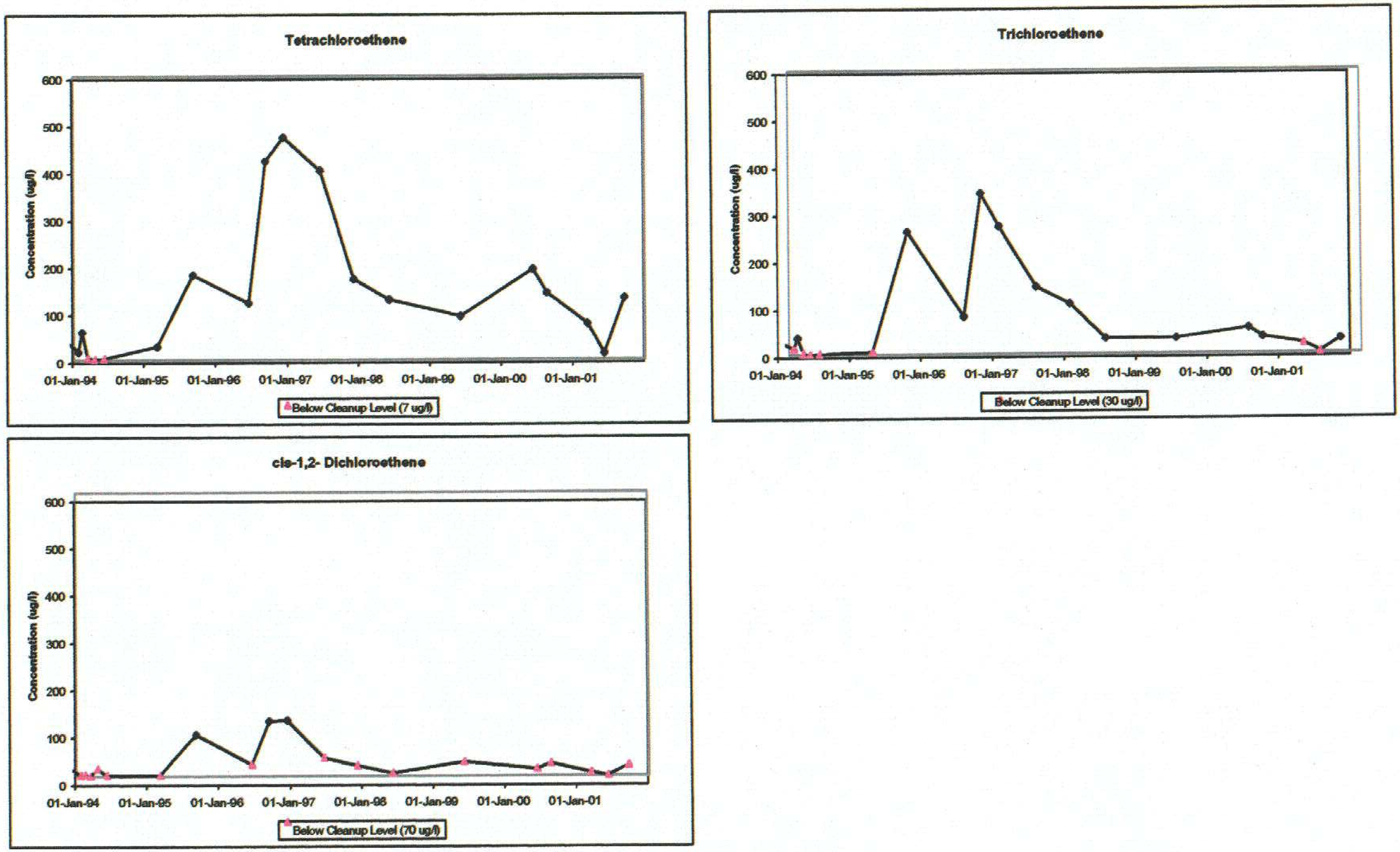


Figure 6-6
Wenck Associates, Inc.

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

TWIN CITIES ARMY AMMUNITION PLANT

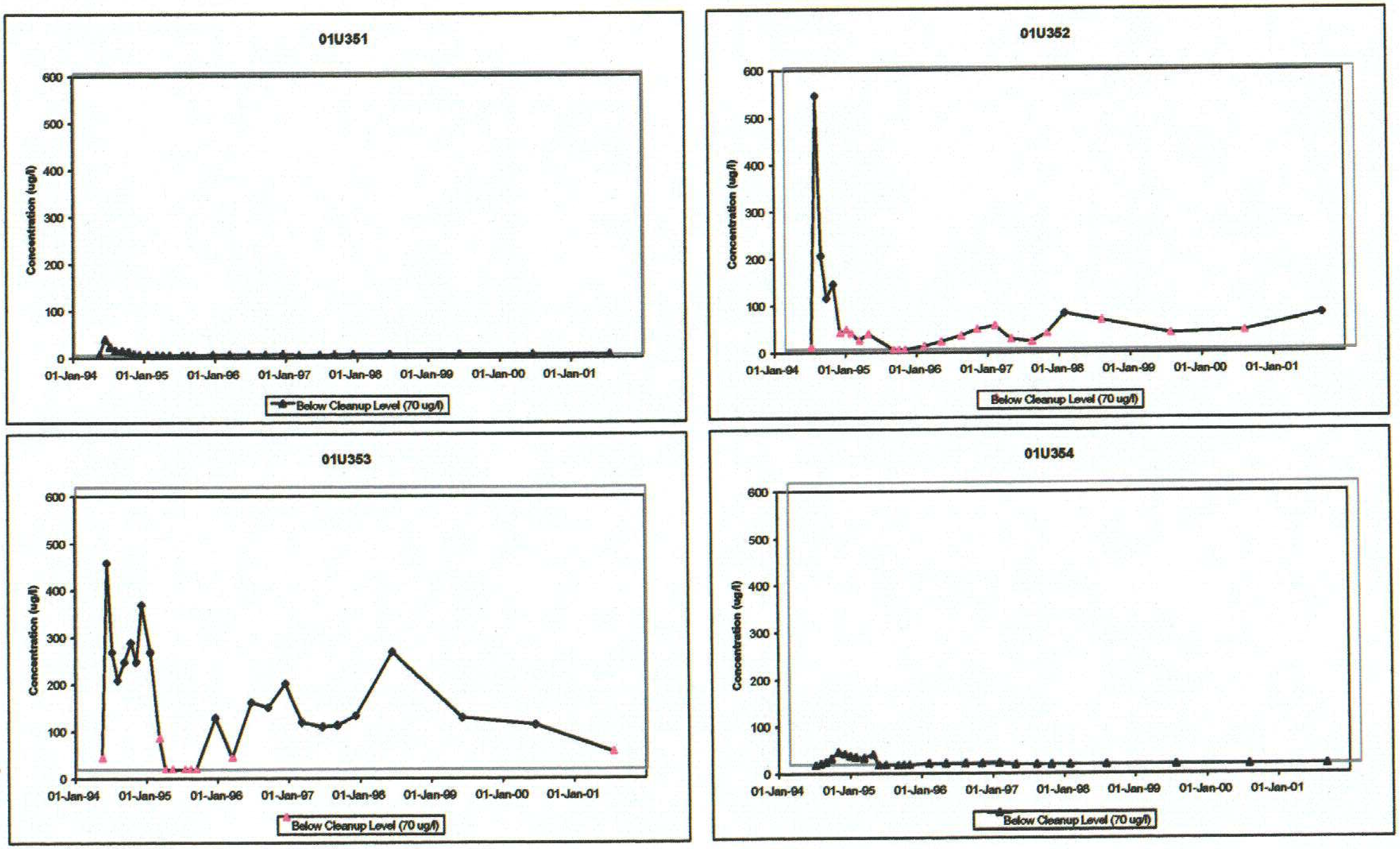


Figure 6-7
Wenck Associates, Inc.

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

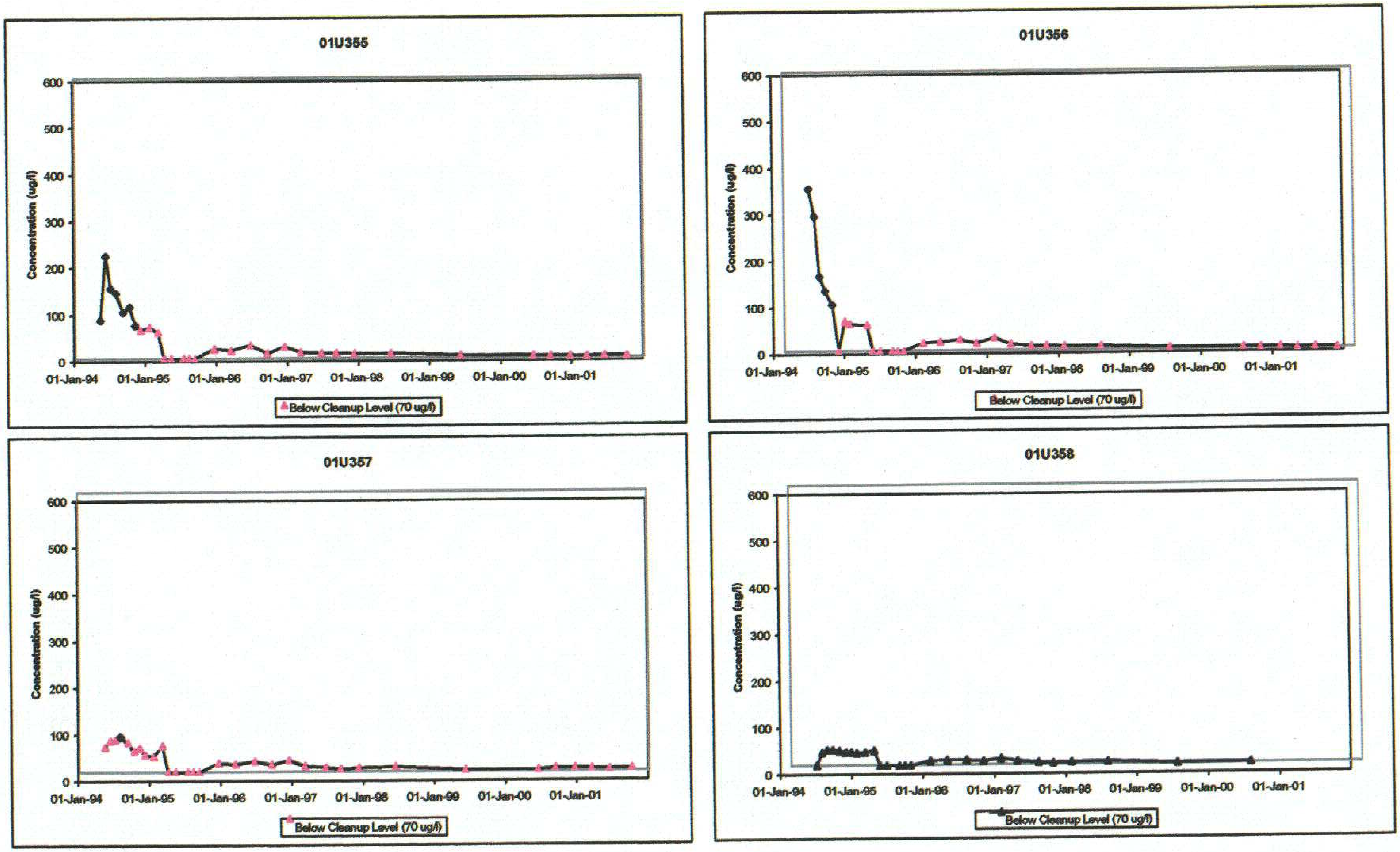


Figure 6-8
Wenck Associates, Inc.

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

TWIN CITIES ARMY AMMUNITION PLANT

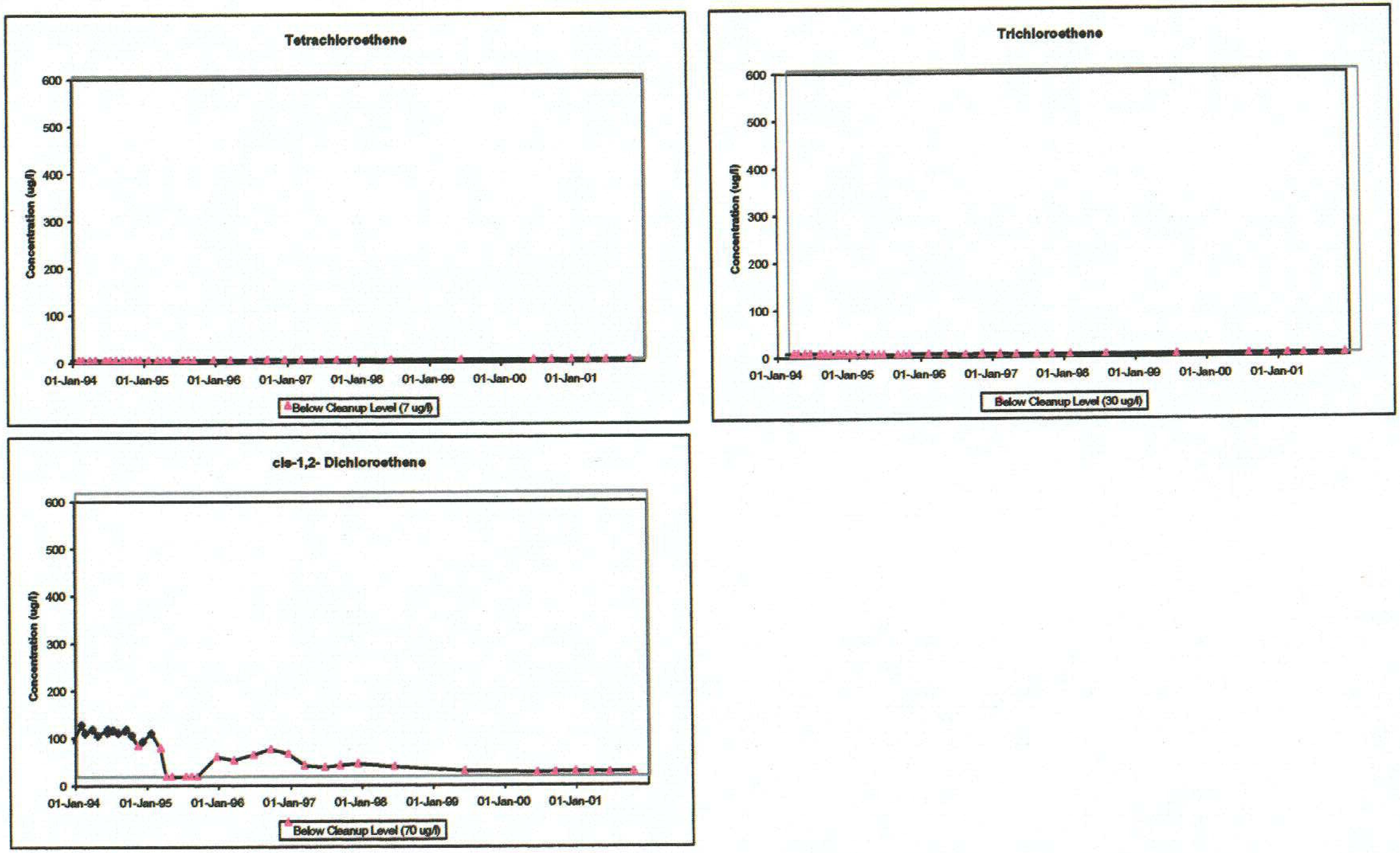


Figure 6-9
Wenck Associates, Inc.

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 2001 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, which incorporate the use of an existing well for groundwater extraction and additional investigation beneath the building slab. The additional investigation and Predesign Investigation Work Plan (Work Plan) are complete. 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 dual phase extraction is not feasible due to the low permeability of the Unit 1 aquifer beneath the building. An amendment to the OU2 ROD is currently being pursued to address the likely change to a 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 2001 was conducted according to the monitoring plan for FY 2001. Appendix A summarizes the FY 2001 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 FY2001. These wells are 01U064, 01U636, 01U639, 01U640, I01-MW, I02-MW and I05-MW. Figure 7-1 shows these well locations. Wells 01U639 and I02-MW were dry at the time of sampling (June, 2001). The dry wells yielded water when originally installed. Samples from the remaining wells were analyzed using EPA Method 8260 for VOCs.

What were the monitoring results for FY 2001?
Table 7-1 presents the results of the FY 2001 analyses. The VOCs present in the wells are consistent with past data, which identified VOCs in Unit 1 at 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 be 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 dual phase pilot test report, the remedy was modified further to include only 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 2001 was consistent with the FY 2001 monitoring plan. The following conclusions are made for FY 2001:

- 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 2002 – FY 2005 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.

TABLE 7-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2001
SITE I, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	111TCE	112TCE	11DCE	11DCLE	C12DCE	C2H3CL	CCL4	CH2CL2	CHCL3	T12DCE	TCLEE	TCLTFE	TRCLE	12DCLE
01U064	6/8/01	0.24JP	<1	0.18JP	0.80JP	26	1.2	<1	<1 1U	<1	1.8	<1	<1	1.2	<1
01U636	6/8/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
01U639	6/8/01	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
01U640	6/8/01	0.18JP	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	0.27JP	<1
I01MW	6/8/01	0.36JP	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
I02MW	6/8/01	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
I05MW	6/8/01	<1	<1	<1	<1	1.1	<1	<1	<1 1U	<1	<1	<1	<1	3.0	<1

Notes:

Concentrations in ug/L.

J - Value is estimated.

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

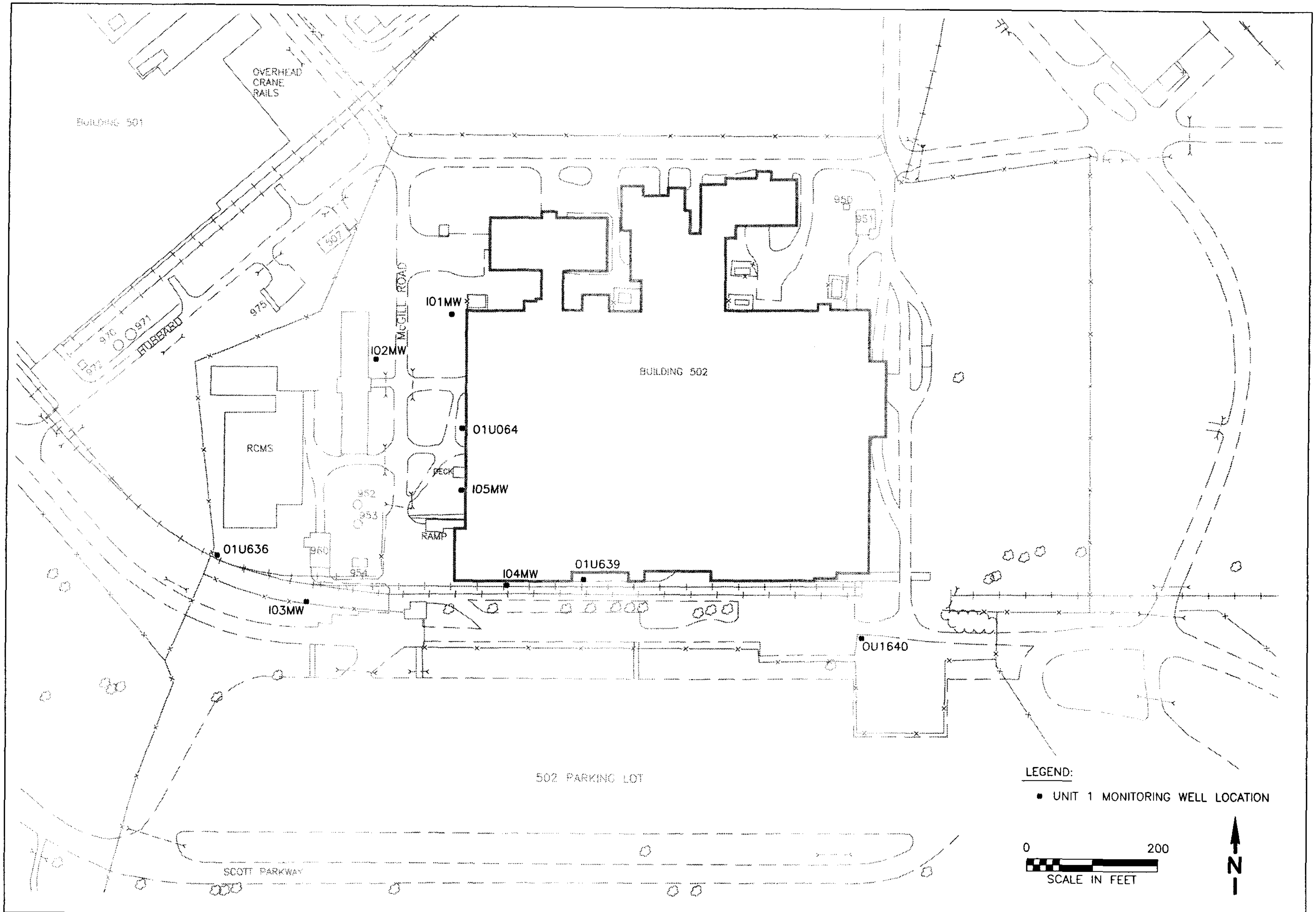
1UL Nondetect, trip blank yielded detections of compound.

TABLE 7-2

SUMMARY OF GROUNDWATER MONITORING REQUIREMENTS
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	Future monitoring plans 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	Future monitoring plans 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 106

WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITION PLANT

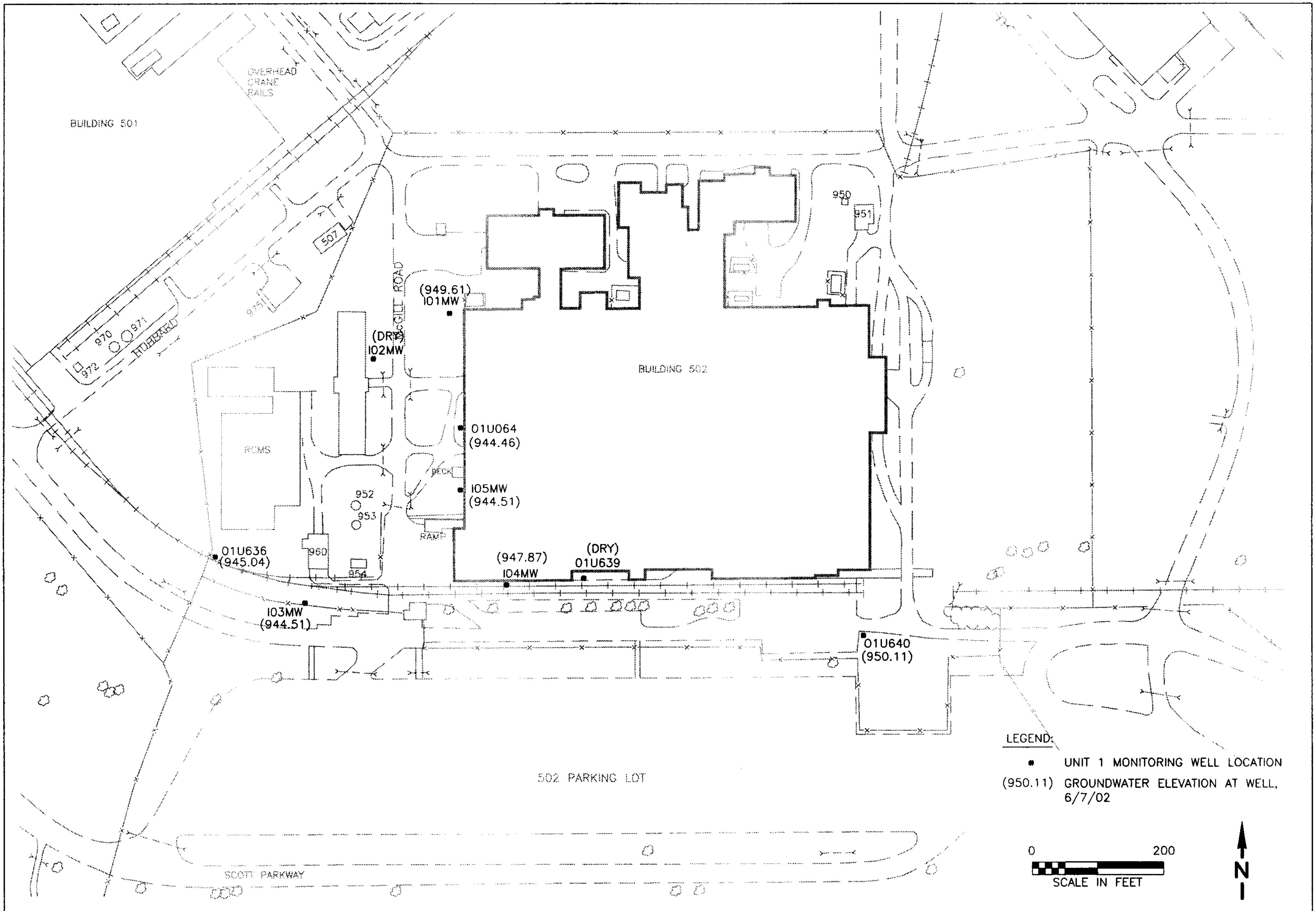
ARDEN HILLS, MINNESOTA

SITE I, UNIT 1

GROUNDWATER QUALITY MONITORING LOCATIONS

SECOR PROJECT #: 003.18508.362	FILENAME: SITE-02	DATE: 01/11/02

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, 6/7/01

SECOR PROJECT #: 003.18508.362	FILENAME: SITE-02	DATE: 07/11/02

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 2001 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 2001 monitoring was performed in accordance with the Monitoring Plan included as Appendix A. The comprehensive monitoring well sampling round was conducted in June 2001. Figures 8-1 and 8-2 present the sampling and water level monitoring locations. Figure 8-1 also shows the cross-section alignment.

8.2 REMEDY COMPONENT #2: SENTINEL WELLS

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

Performance Standard (how do you know when you're done):
When the wells have been installed according to a regulator approved work plan.

Is the remedy component being implemented?
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 Unit1/Unit2 interface. These four piezometers are screened at that interface.

Figure 8-2 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 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.

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. It was sampled in June 2001 as part of the annual round. The results of the samples collected during FY 2001 are presented in Table 8-1. VOCs were not detected in the Unit 3 sentinel well. In FY 2000, only chloroform was detected in the March sample at a concentration less than the reporting limit. The detection of chloroform was an anomalous event.

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 8-3 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 8-4. As seen in the figure, groundwater both upgradient and downgradient of the trench is captured and collected. The upward gradient beneath the trench indicates that groundwater does not migrate below the trench. The monitoring coverage provided by the bundle piezometer demonstrates complete vertical and horizontal hydraulic capture.

Figure 8-5 presents the trichloroethene concentrations from the June 2001 annual sampling event. Trichloroethene concentrations range from non-detect to 5900μg/l. Comparison of Figure 8-5 to the groundwater contour maps indicates that the VOC plume is hydraulically contained by the treatment system. Table 8-1 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 8-5 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 2000.

Trichloroethene and cis-1,2-dichloroethene were detected downgradient of the trench, at well 01U617, at concentrations of 0.34 μg/l and 0.2.9 μg/l, respectively. These are below the cleanup standard for these compounds and this well is within the hydraulic capture zone of the trench.

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 2001, the treatment system functioned properly. The new air stripper is less prone to fouling and requires less maintenance. The treatment system was operational 95% of the time in FY 2001. During FY 2001, 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 6,703,138 gallons of water and 13.9 pounds of VOCs were removed from the aquifer in FY 2001. The cumulative mass removal is 119.0 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 nickel data at one monitoring well. Nickel is no longer a groundwater concern.

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 2002 – 2005 Monitoring Plan. Table 8-6 presents the Site K monitoring requirements. The monitoring plan is subject to review based on the results of the additional investigation and final design of the remedial action.

8.9 OTHER ACTIVITY

Alliant Techsystems 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.

Alliant Techsystems is helping the University of Minnesota to continue its research into direct hydrogen injection by making the test plot available for its use. The University is continuing its research under a grant from the Department of Defense, Office of Naval Research.

TABLE 8-1

GROUNDWATER QUALITY DATA
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	111TCE	112TCE	11DCE	11DCLE	C12DCE	C2H3CL	CCL4	CH2CL2	CHCL3	T12DCE	TCLEE	TCLTFE	TRCLE	12DCLE
01U128	6/7/01	<1	<1	<1	<1	5.7	<1	<1	0.30JP	<1	0.72JP	<1	<1	<1	<1
OW103 (01U603)	6/7/01	<1	<1	<1	<1	<1	<1	<1	0.25JP	<1	<1	<1	<1	<1	<1
(01U604)	6/7/01	<1	<1	<1	<1	<1	<1	<1	0.19JP	<1	<1	<1	<1	<1	<1
OW111[1] (01U611)	6/7/01	<250	<250	<250	<250	350	<250	<250	<250	<250	70JP	<250	<250	5900	<1
OW115[2]	6/7/01	<100	<100	<100	<100	650	<100	<100	<100	<100	210	<100	<100	1800	<1
(01U615) D	6/7/01	<100	<100	<100	<100	650	<100	<100	<100	<100	210	<100	<100	1800	<1
OW117 (01U617)	6/7/01	<1	<1	<1	<1	2.9	<1	<1	0.22JP	<1	0.45JP	<1	<1	0.34JP	<1
OW118 (01U618)	6/7/01	<1	<1	<1	0.17JP	0.58JP	<1	<1	0.28JP	<1	<1	<1	1.5	1.4	<1
OW119 (01U619)	6/7/01	<1	<1	<1	<1	<1	<1	<1	0.31JP	<1	<1	<1	4.0	0.65JP	<1
OW121 (01U621)	6/7/01	<1	<1	<1	<1	5.3	<1	<1	0.32JP	<1	<1	<1	<1	<1	<1
03U621	1/11/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	6/29/01	<1	<1	<1	<1	<1	<1	<1	0.22JP	<1	<1	<1	<1	<1	<1
K04MW	6/6/00	<1	<1	<1	0.57JP	<1	<1	<1	0.16JP	<1	<1	<1	<1	0.65JP	<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.
[1] Sample dilution = 250.
[2] Sample dilution = 100.

TABLE 8-2

GROUNDWATER ELEVATIONS (FT. AMSL)
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Well ID	TOC Elevation	1/11/2001	6/6/2001
01U047	880.31		875.08
01U048	885.32		875.29
01U052	886.51		875.73
01U065	883.90		874.47
01U128	883.69		875.71
01U601	892.68		884.64
01U602	889.35		883.73
01U603	887.31		878.88
01U604	888.98		877.88
01U605	887.76		878.67
01U607	891.01		885.57
01U608	889.30		884.20
01U609	889.33		883.92
01U611	889.29		884.30
01U612	886.91		880.91
01U613	892.07		884.24
01U615	888.66		877.30
01U616	890.37		880.10
01U617	887.72		878.19
01U618	891.52		880.56
01U619	891.75		884.12
01U620	888.65		879.49
01U621	886.57		879.22
01U622	889.43		
01U623	889.44		
01U624A	889.88		879.04
01U624B	889.88		879.02
01U624C	889.91		879.03
01U624D	889.89		879.02
01U625A	886.92		878.15
01U625B	886.91		878.11
01U625C	886.91		878.11
01U625D	886.92		878.11
01U626A	886.87		878.06
01U626B	886.88		877.75
01U626C	886.88		877.70
01U626D	886.88		877.85
01U627A	886.46		879.04
01U627B	886.47		878.07
01U627C	886.47		877.98
01U627D	886.48		878.00
01U628A	887.82		878.96
01U628B	887.83		878.70
01U628C	887.82		878.34
01U628D	887.84		878.33
K01MW	891.24		886.95
K02MW	891.35		885.91
K04MW	887.66		881.18
03U621	887.01	849.41	850.19

TABLE 8-3

TREATMENT SYSTEM CONCENTRATIONS (ORGANICS)
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	11DCLE		11DCE		12DCLE		C12DCE		T12DCE		TRCLE	
Effluent	10/4/00	ND		ND		ND		ND		ND		ND	
Effluent	10/4/00	ND	D	ND	D	ND	D	ND	D	ND	D	ND	D
Effluent	11/7/00	ND		ND		ND		ND		ND		ND	
Effluent	11/7/00	ND	D	ND	D	ND	D	ND	D	ND	D	0.22	J
Effluent	12/5/01	ND		ND		ND		ND		ND		0.22	J
Effluent	12/5/01	ND	D	ND	D	ND	D	ND	D	ND	D	0.25	J
Effluent	3/6/01	ND		ND		ND		0.36	J	ND		1.0	
Effluent	3/6/01	ND	D	ND	D	ND	D	0.30	J	ND	D	1.0	D
Effluent	6/14/01	ND	V	ND	V	ND	V	0.33	J,V	ND	V	1.4	V
Effluent	6/14/01	ND	V	ND	V	ND	V	0.31	J,V	ND	V	1.3	V
Effluent	9/4/01	ND		ND		ND		0.13	J	ND		0.31	J
Effluent	9/4/01	ND		ND		ND		0.15	J	ND		0.41	J
Influent	12/5/00	ND		ND		ND		48.		7.2		160	
Influent	3/6/01	ND		ND		ND		72.		12.		310	
Influent	6/14/01	ND	V	ND	V	ND	V	34.	V	6.1	V	140	V
Influent	9/4/01	0.19	J	ND		ND		63.		10.		190	
MDL	12/00	0.0773		0.116		0.0778		0.0783		0.0761		0.0672	
MDL	3/01 to 9/01	0.0325		0.0500		0.0736		0.0649		0.0421		0.0313	
CRDL		1		1		1		1		1		1	
REQ.		7.0				3.8		70		100		10	

Notes:
Results are reported in µg/L unless otherwise noted.
D - Duplicate Sample
J - Estimated value
ND - Not Detected
V - Sample temp. at lab. Above 6, but less than 10 deg. C.
MDL - Method Detection Limit
CRDL - Contract Required Detection Limit
REQ - Substantive Requirements for discharge (effluent).

TABLE 8-4

TREATMENT SYSTEM CONCENTRATIONS (INORGANICS)
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	Phosphorus Total		Copper		Cyanide		Lead	Mercury		Silver		Zinc	
Effluent	12/05/00	313		ND		ND		ND	ND		ND		19.8	B
Effluent	03/06/01	226	J	ND		ND		ND	ND		ND	J	25.4	
Effluent	06/14/01	533		ND	U	ND		4.12	ND	U	0.782	B	23.20	
Effluent	09/04/01	285	J	15	B	ND	U	4.22	ND	U	ND	U	83	
MDL	12/00	15.8		5.58		7.80		0.630	0.0401		0.154		5.49	
MDL	3/01-9/01	11.4		8.18		3.32		0.862	0.0355		0.101		8.21	
CRDL		20		20		10		3.00	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.
B- The value is between the IDL (MDL) and PQL
U- Not detected at or above the MDL or IDL
J- Estimated value
REQ. - Substantive Requirements for discharge.

TABLE 8-5

SUMMARY OF MONTHLY VOC REMOVAL
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

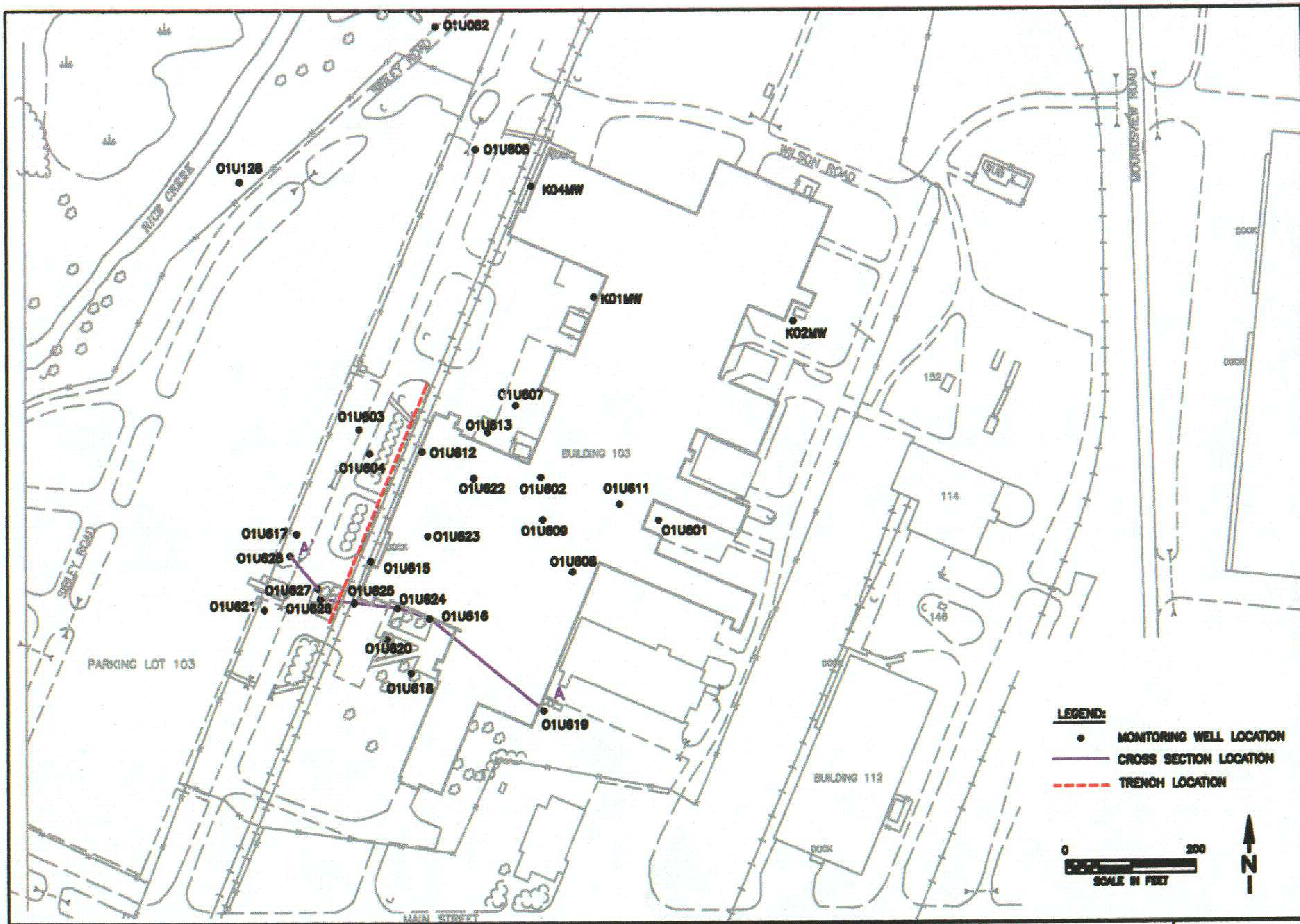
Month	Total Monthly Flow (million gallons)	Total VOC Influent Concentration	Total VOC Effluent Concentration	Total VOCs in Treatment Center Discharge (g)	Total VOC Mass Removed (g)	Total VOC Mass Removed (lb)
October[1]	0.45923	215.2	0	0.0	373.6	0.8
November[1]	0.48963	215.2	0	0.0	398.3	0.9
December	0.44350	215.2	0	0.0	360.8	0.8
January[1]	0.44346	395.1	1	1.7	660.6	1.5
February[1]	0.37394	395.1	1	1.4	557.1	1.2
March	0.47511	395.1	1	1.8	707.8	1.6
April[1]	0.76029	180.1	1.4	4.0	513.6	1.1
May[1]	0.81941	180.1	1.4	4.3	553.5	1.2
June	0.75929	180.1	1.4	4.0	512.9	1.1
July[1]	0.52652	264.9	0	0.0	527.2	1.2
August[1]	0.58218	264.9	0	0.0	582.9	1.3
September	0.57058	264.9	0	0.0	571.3	1.3
Totals	6.70314			17.3	6319.5	13.9

Notes:
[1] Influent and Effluent VOC concentrations from 12/5/00, 3/6/01, 6/14/01 and 9/4/01 quarterly samples, respectively.
VOC concetrations do not include estimated contractions for compounds detected below the reporting limits.

TABLE 8-6

SUMMARY OF MONITORING REQUIREMENTS
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 Report
#2	Sentinel Wells	a.	Water quality to monitor potential migration	Alliant	Site K Monitoring Plan in Annual Report
#3	Hydraulic Containment	a.	Water levels for use in drawing contour maps showing capture	Alliant	Site K Monitoring Plan in Annual Report
		b.	Pumping volumes and rates for reporting and mass removal calculation	Alliant	Site K Monitoring Plan in Annual Report
#4	Groundwater Treatment		None	Alliant	Site K Monitoring Plan in Annual Report
#5	Treated Water Discharge		None	Alliant	Site K Monitoring Plan in Annual Report
#6	Discharge Monitoring	a.	Treated effluent water quality for comparison to substantive requirements for discharge	Alliant	Site K Monitoring Plan in Annual Report
#7	Additional Investigation	a.	As per work plan (completed)	Alliant	Site K Monitoring Plan in Annual Report



SECOR

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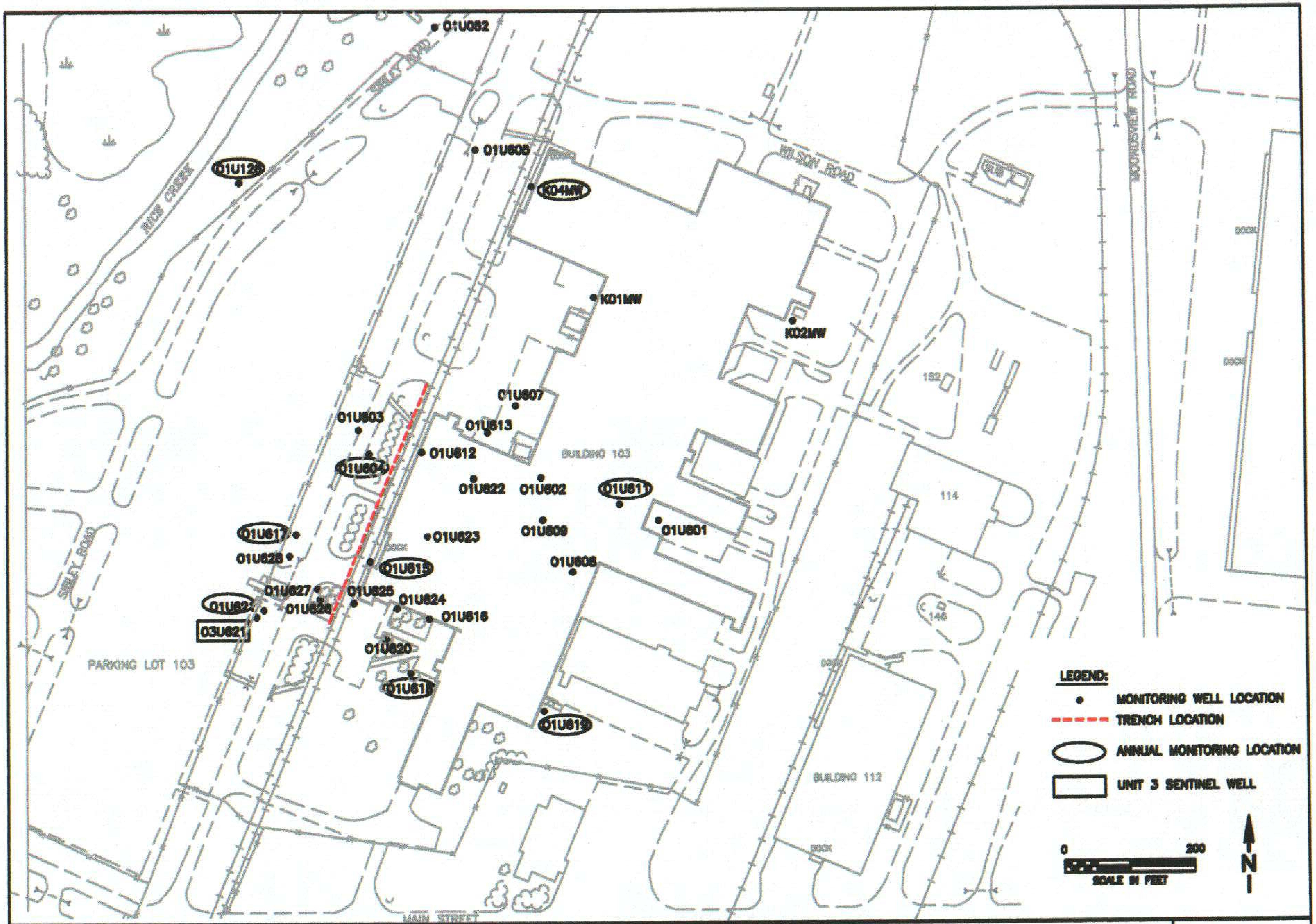
4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 55110

TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA

SITE K, UNIT 1
GROUNDWATER LEVEL MONITORING LOCATIONS

SECOR PROJECT #: 003.18508.462	FILENAME: SITE-02	DATE: 01/11/02

FIGURE
8-1



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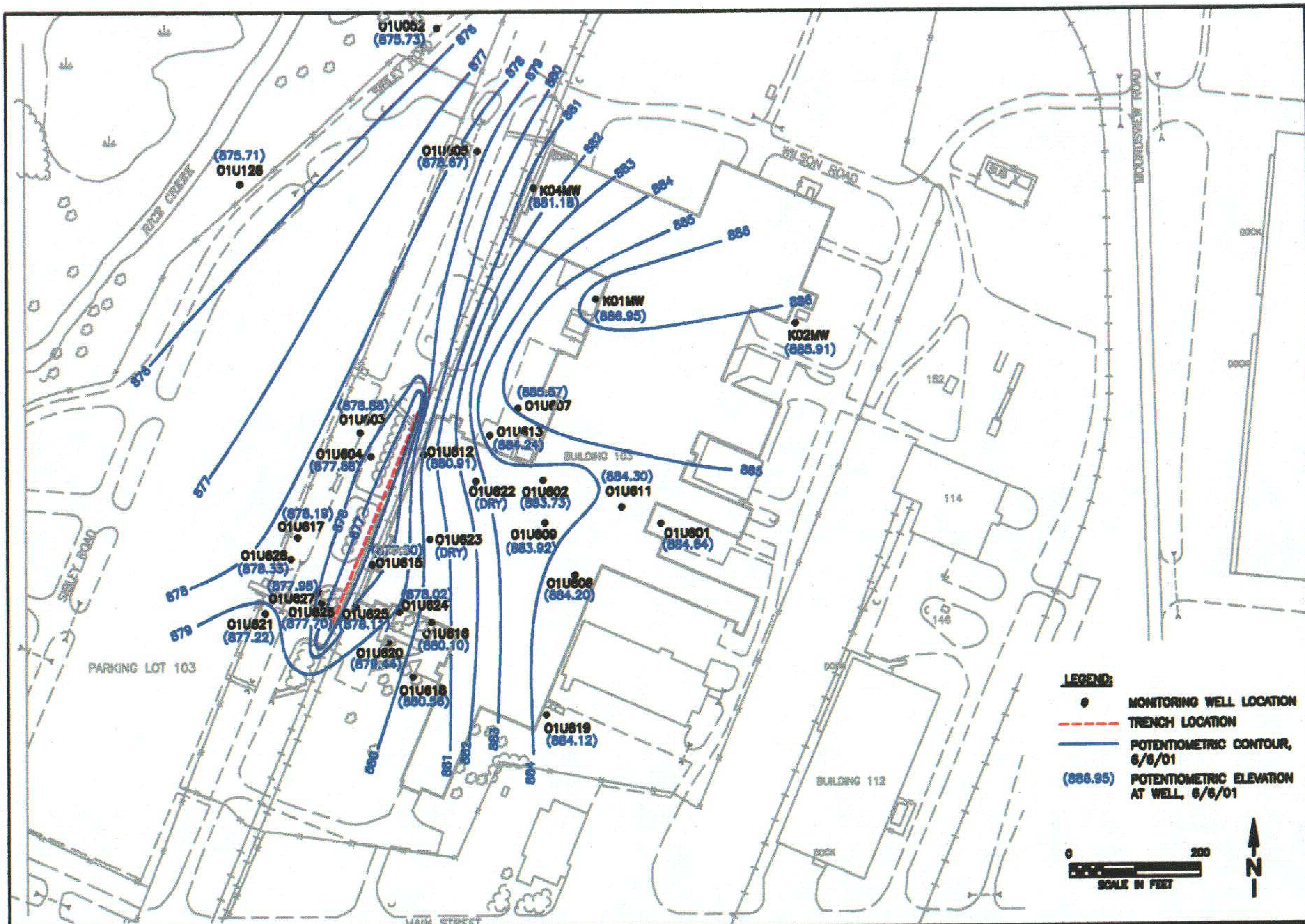
TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA
SITE K, UNIT 1 AND UNIT 3
GROUNDWATER QUALITY MONITORING LOCATIONS

SECOR PROJECT #: 003.18508.462	FILENAME: SITE-02	DATE: 01/11/02

FIGURE 8-2



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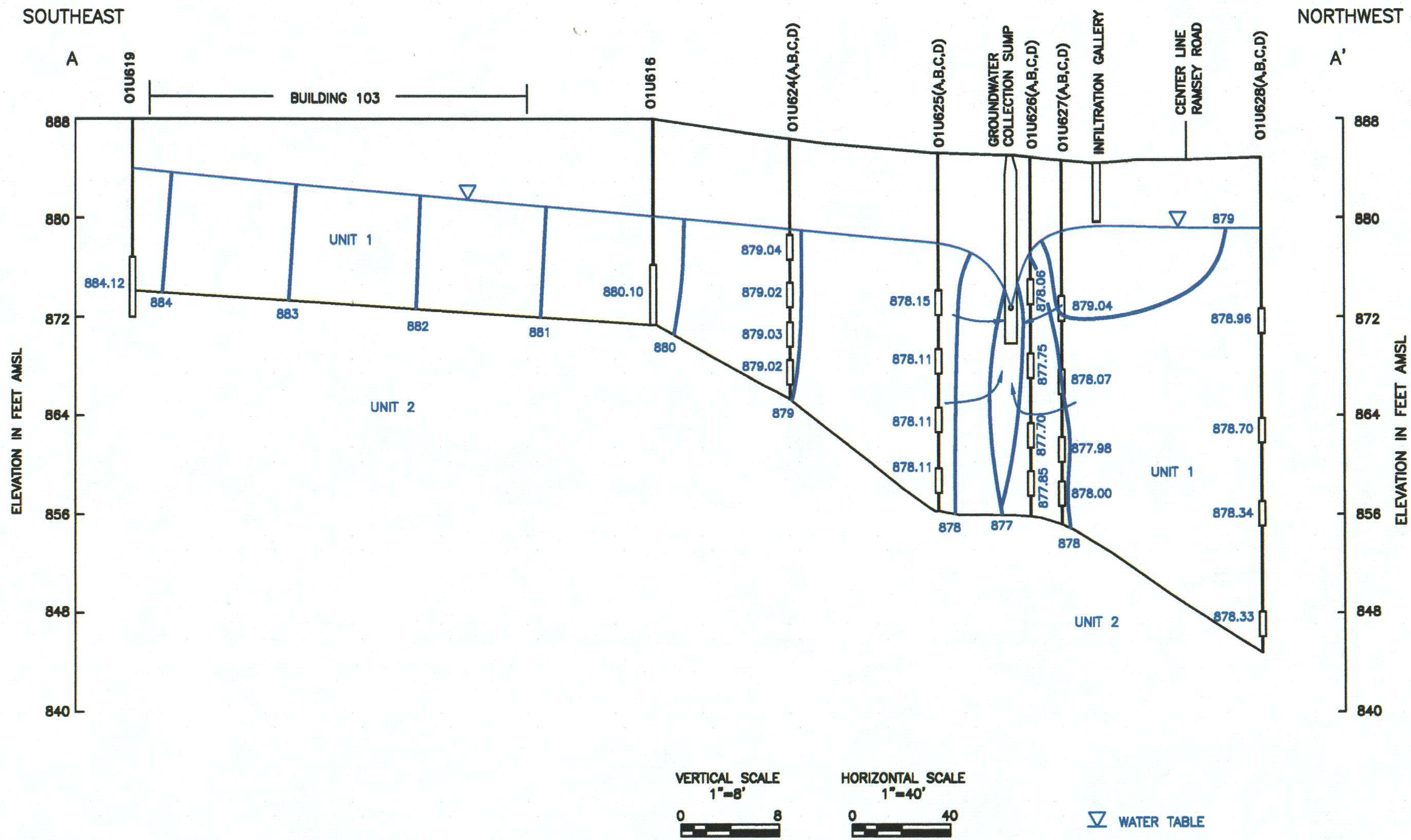
TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA

SITE K, UNIT 1
POTENTIOMETRIC MAP, 6/6/01 (Q71)

SECOR PROJECT #: 003.18508.462 | FILENAME: SITE-04 | DATE: 01/06/02

FIGURE
8-3



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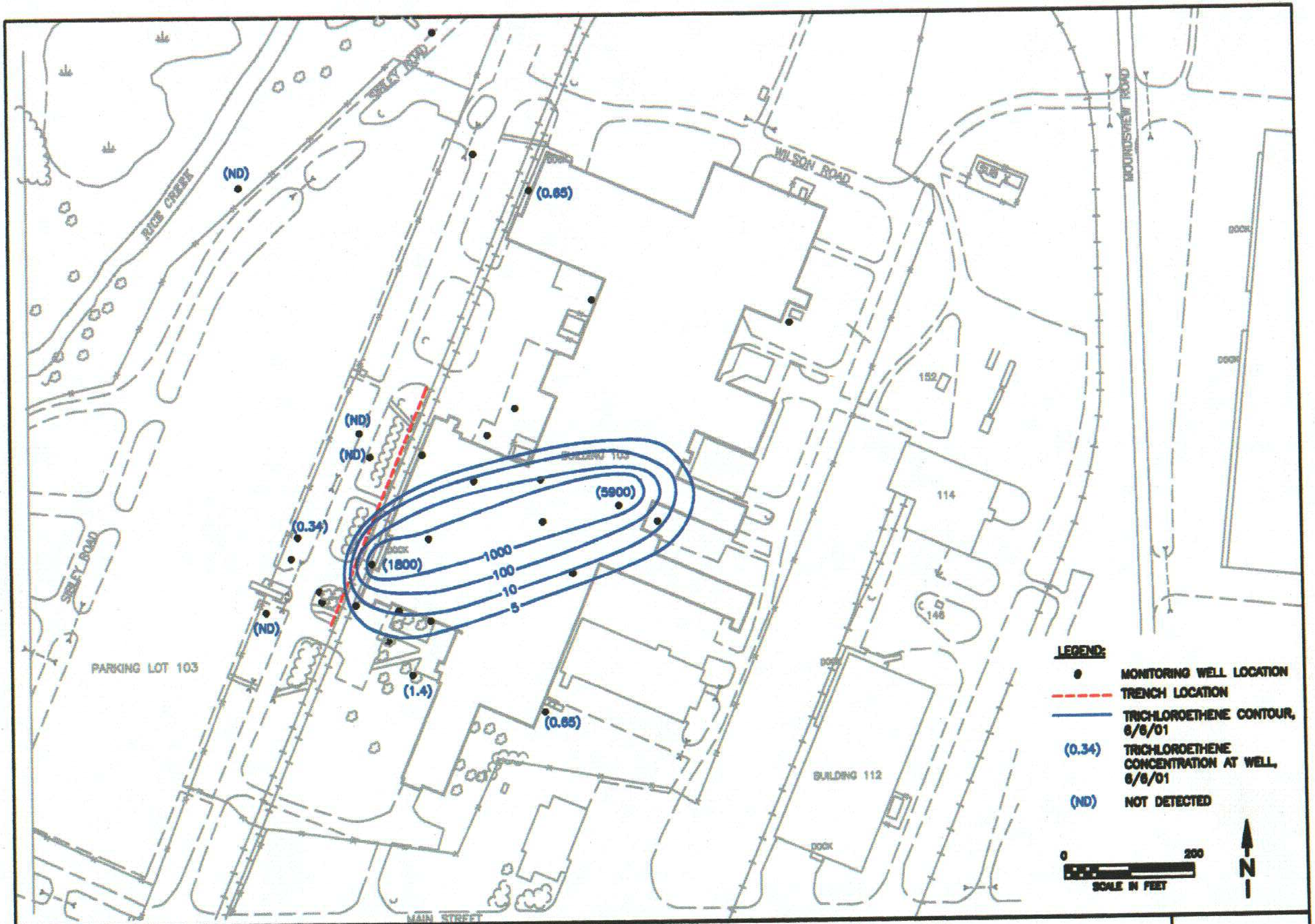
TWIN CITY ARMY AMMUNITION PLANT
ARDEN HILLS, MINNESOTA

SITE K
HYDROGEOLGIC CROSS SECTION A-A', 6/6/01 (Q71)

003.18508.462
CROSS-02
01/10/02

FIGURE
8-4



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TWIN CITY ARMY AMMUNITON PLANT
ARDEN HILLS, MINNESOTA
SITE K, UNIT 1
TRICHLOROETHENE CONCENTRATION MAP, 6/6/01 (Q71)

SECOR PROJECT #: 003.18508.462 | FILENAME: SITE-05 | DATE: 01/10/02

FIGURE 8-5

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 to hydraulically contain the source area and optimize the removal of contaminants. 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 2000 through September 2001.

Historical Design and Evaluation of TGRS Remedial Action

In September 1987, a Record of Decision (1987 ROD) was prepared 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), which were connected by forcemain to an air stripping treatment facility. The initial six BGRS extraction wells (B1 through B6) were installed and pumping tests were conducted prior to start up of the BGRS. These pumping tests were documented in the BGRS Extraction Well Pumping Test Report.

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

A pumping test on well B9 was conducted in August 1988 and formed the basis of the final design of the TGRS. This and the previous pumping tests were utilized to determine the pumping rate required to achieve the necessary zone of capture for the TGRS, 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. Hence, a minimum TGRS extraction rate of 2400 gpm was established to assure capture of the 5-µg/l trichloroethene contour. Since 1990, the system has continued to operate at an essentially steady state condition, so, no new comparisons to ambient conditions are necessary or possible.

TGRS Modifications

Since 1990 a number of modifications have been made to the TGRS operation in response to changes in plume configuration or operational issues. A brief summary of 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. Well B12 is the northern most extraction well and is screened across the Unit 4. The plume in the B12 area had dropped below cleanup standards for several years. Well B12 operated at an average extraction rate of 139 gpm in 1989 and 190 gpm prior to shut down.
3. Flowrates at individual wells have been modified from time to time due to plume configuration changes and operational issues.

The 1989 Annual Monitoring Report determined that the 5-μg/l trichloroethene plume was hydraulically contained at a minimum average flow rate of 2,400 gpm (actual rate in 1989 was 2,392 gpm but was rounded to 2,400). Removing the flow contribution from Wells SC4 and B12 reduced this baseline flow rate to 2,231 gpm.

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

Description: "Groundwater extraction to hydraulically contain the contaminated source area to the 5-μg/l trichloroethene (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 trichloroethene contour and removal of contaminants from the deep groundwater source area is optimized using the existing extraction system in addition to any new wells installed to improve the effectiveness of the system.

Is the remedy component being implemented?

Yes. The TGRS was operated in FY 2001 consistent with the requirements of the OU2 ROD. Table 9-1 presents the cleanup requirements for the TGRS from the OU2 ROD. Based on hydraulic and chemical data collected, it met the requirement for capture. The TGRS optimization study was initiated in FY 1999 and will continue into FY 2002. The TGRS Reconfiguration Plan is currently being developed with the assistance of the Agencies and RAB.

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

Summary of Operations

During FY 2001, groundwater was extracted from 11 wells along the southwest boundary of TCAAP (B1 through B11) and four wells downgradient of interior source areas on TCAAP (SC1 through SC3 and SC5). Submersible pumps in the extraction wells discharge into a common pressurized forcemain 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 60,000 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, 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 2001 Maintenance and Inspection Activity

Preventive Maintenance (PM): The extensive PM program allowed the operations staff to identify and repair or replace equipment to avoid a downtime failure. When required, further repair work was scheduled rather than waiting for the failure to occur. A broad range of system-specific information was collected during this year's PM. This information 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, 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 were critical in early identification of failing equipment. By early detection of flow rate changes, equipment repair was typically scheduled before a failure occurred.

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

Air Stripping Towers: Effluent concentrations from the treatment center gradually increased throughout FY 2001; although they remained below the cleanup levels. The cause of the increasing effluent concentrations was decreased air flow through the air stripping towers caused by plugging of the towers by iron and calcium precipitates. During the first quarter of FY 2002 a tower-cleaning program was initiated. Towers 1 and 2 were cleaned, causing the airflow to increase from approximately 1400 scfm to over 7000 scfm. As expected, the increase in airflow rate has resulted in decreasing effluent concentrations.

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

Yes, when FY2001 pumping rates are compared with 1989 rates. The TGRS successfully captured and treated 1,113,164,000 gallons of contaminated water from October 2000 through September 2001. The system pumped at an average rate of 2,118 gpm, of which the boundary wells contributed 1,891 gpm and the source control wells contributed 227 gpm. The above pumphouse volumes are corrected to reflect the total from treatment center meters #1 and #2, which are the most accurate for overall flow measurement. The TGRS as a whole was operational over 99 percent of the time.

The combined pumping rate (2118 gpm) is slightly below the baseline rate of 2231 gpm discussed in section 9.0, above. This was due primarily to the declining well capacity at extraction well B7 (152 gpm) that averaged 168 gpm less than that reported in 1989 (320 gpm) that formed the basis of the hydraulic capture determination. Well B2 also experienced a decline in pumping capacity (76 gpm in 2001 compared to 161 gpm in 1989) but to a lesser extent than at well B7. Also, as discussed later, the plume width has continued to shrink, as have the average VOC concentrations, indicating the TGRS is achieving its objectives. Hence, it is the opinion of the Army that well B7 is no longer needed to hydraulically capture the 5-µg/l trichloroethene plume. In September 2001 the Army discussed the flow rate reductions with the Agencies and it was agreed that there was no immediate need to either replace or rehabilitate wells B7 and B2 until the Reconfiguration Plan is reviewed.

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

The baseline extraction rate to confirm hydraulic capture of the 5-µg/l trichloroethene plume was determined in 1996 for the shutdown of wells SC4 and B12 by subtracting 1989 flow rates of the wells to be shut down from the 1989 total extraction rate. The Army believes that the same methodology can be applied to determine the baseline extraction rate for hydraulic capture of the plume without well B7 operating. As stated earlier, the total extraction rate for the TGRS in 1989 was 2392 gpm. Subtracting the 1989 pumping rates from wells B12 (139 gpm) , SC4 (29 gpm) and B7 (320 gpm) results in a baseline extraction rate of 1904 gpm.

During FY 2001, if the contribution of well B7 (152 gpm) is excluded from the total system flow rate of 2118 gpm, the TGRS extracted an average of 1965 gpm of groundwater. Comparing this extraction rate to the revised baseline hydraulic capture extraction rate (1904 gpm) indicates that hydraulic capture was obtained. To look at this another way, the combined extraction rate from wells B1, B2, B3, B4, B5, B6, B8, B9, B10, B11, SC1, SC2, SC3 and SC5 was approximately 60 gpm greater in 2001 than in 1989. Thus, the hydraulic capture generated by these wells was slightly greater than what these wells did in 1989 at a rate of 1904 gpm. The decrease at well B7 affected a portion of the aquifer that is no longer of concern since the plume has narrowed in the area within the capture of B7. To the extent the Army believes B7 is no longer needed, this analysis is valid under the current operating philosophy for the TGRS.

A draft TGRS Reconfiguration Plan (containing a groundwater flow model) dated September 28, 2001 was submitted to the regulatory agencies for review and comment. Based on subsequent discussions with the regulatory agencies, the Reconfiguration Plan is being revised to include the operational strategies for verifying hydraulic capture.

<u>Monthly Flow Reports</u>

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 2001 operational notes is presented in Appendix F-2. During FY 2001, treatment center flow meters #1 and #2 were used to measure total flow volumes used in monthly reports, and in this report, because they are the most accurate and representative of actual flow. Daily variation in readings at individual wells is primarily due to differences in the time of day when meter readings were taken.

How much down time occurred during the year?

The down time for each extraction well, over the last 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 2001 then they have been each of the previous four years.

Description of Down Time Categories

Pumphouse component failures accounted for an average of 1.1 days down time per pumphouse. Compared to FY 2000, down times due to pumphouse maintenance were minimal in FY 2001. The major pumphouse repairs causing down time were:

- Pumphouse B-2: the well, lift system, and pumphouse piping were cleaned by circulating acid. Also the electric check valve body was replaced.
- Pumphouse B-5: the electric control valve harness was replaced.
- Pumphouse B-7: the control panel I/O card was not functioning properly and was replaced.
- Pumphouse B-10: the control panel I/O card was not functioning properly and was replaced.

- Pumphouse SC-2: the well, lift system, and pumphouse piping were cleaned by circulating acid. The pump did not clean up properly and therefore 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. Treatment center component failures, repairs, and adjustments accounted for an average of 0.2 days of down time.

Electrical service system failures accounted for an average of 0.5 days down time per pumphouse. Electrical storm damage was the primary cause of down time.

Preventative maintenance procedures accounted for an average of 0.4 days of down time per pumphouse. Preventative maintenance procedures are described in the project Operation and Maintenance Manual.

There was no down time due to system modifications. During FY 2001, the autodialer answering service vendor was changed.

No system down time was attributed to the forcemain. Repairs were made to the Altitude Valve without shutting down the system.

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

Did the system achieve hydraulic capture?

Yes. The zone of hydraulic capture for the TGRS in FY 2001 was determined by contouring the June 2001 water level data. Contours were constructed manually. Past site experience and discussions with the MPCA and EPA determined that manually constructed contours are appropriate at TCAAP due to the complexities of the flow field and the resulting need for hydrogeological expertise in interpreting the flow field. Confidence in the groundwater contours was gained during the detailed analysis presented in the 1989 Annual Monitoring Report. The 1989 report included pumping test analysis, drawdown analysis, and vertical gradient analysis. The reader should consult the 1989 report for a complete analysis of hydraulic capture.

Appendix 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 2001. These figures present the potentiometric contours from three vertical portions of the aquifer.

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

Table 9-6 presents the groundwater quality data for the monitoring wells in FY 2001.
Figure 9-5, Figure 9-6, and Figure 9-7 present the trichloroethene contours for the Upper Unit 3, Lower Unit 3, and Upper Unit 4 Aquifers, respectively. Along the TCAAP boundary, the width of the source area above 5-µg/l trichloroethene has been shrinking since approximately 1993. Currently, there are no Unit 3 wells north of B7 above 5-µg/l trichloroethene and B7 has had a trichloroethene 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 extends beyond the 5-µg/l trichloroethene 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 1,113,164,000 gallons of water from October 2000 through September 2001. 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 3,418 pounds of VOCs from October 2000 through September 2001. The VOC mass removal is 24 percent lower than the FY 2000 VOC mass removal of 4,499 pounds. The VOC mass removal rate for the TGRS has been declining since FY 1991. This reflects the overall decrease in plume concentration. Table 9-7 summarizes the individual VOC mass contribution of each extraction well and the entire system. Overall, the TGRS has removed 180,084 pounds of VOCs from the aquifers since 1987.

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

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

VOC samples were collected semi-annually from the 17 extraction wells that comprise the TGRS. Wells B12 and SC4 are shut down, but were temporarily operated for sampling. Table 9-8 presents a summary of these sampling results. Variations in detection limits from round to round are the result of varying sample dilution 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 trichloroethene versus time graphs for each extraction well. Wells B1, B2, B6, B7, B8, B9, B10, B11, B12, SC2, SC3 and SC5 exhibit declining trichloroethene concentrations over time. As is typical, these wells exhibit asymptotic decreases over time. In the past, wells B3 and B4 exhibited rising trichloroethene concentrations with time, but now B3 appears to be leveling off and B4 is declining. Well B5 was increasing through 1992 and has been decreasing since then. Overall, the graphs indicate a long-term decrease in VOC concentrations.

Extraction well B6 exhibited a slight concentration increase in FY 1998 and was stable or slightly declining through FY 2001. 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 trichloroethene (5 µg/l), and all other VOCs from March 1995 through FY 2001.

These trends reflect the overall decline in OU2 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, six 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 97 percent of the VOC mass removed. Wells B7, B10 and B11, which pump on the south and north edges of the plume, removed only about 0.3 percent (10.2 pounds) of the total VOC mass.

The source control wells, SC1 through SC3 and SC5, together accounted for 54 percent of the VOC mass removed while accounting for only 11 percent of the water pumped by the system. SC5, in particular, removed 51 percent of the total VOC mass at a rate of only approximately

105 gpm (5 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 only 1.3 pounds of VOCs removed during the year. This well no longer provides useful mass removal and is no longer needed.

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

Appendix B presents the trichloroethene 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 TCE 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 discussions as presenting apparently anomalous patterns compared to the overall downward TCE concentration trends. Following is a summary of the TCE concentration trends identified in the FY2001 database that warrant further observation over time:

Well	Trend Observation
03U806, 03L806 and 04U806	Dropped from 1000's of ppb in mid 1990's recently stable in 100's of ppb.
03U711	Peaked near 1000 ppb in 1994, recently stable at 89 ppb.
03L809	Dropped from near 2000 ppb to 67 ppb through 1998, recently increased to 520 ppb.
04U861	Increased from below 10 ppb to mid 20's of ppb.
04U841	Increased from below 5 ppb to mid 20's of ppb.
04U843	Increased from below 5 ppb to mid 20's of ppb.
03L822	Increased from below 5 ppb to over 600 ppb since 1995. Approximately 1 mile from TGRS. Well historically showed 1,1,1 trichloroethane as major contaminant.

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 2001. The influent/effluent database for FY 2001 is contained in Appendix G-2. Figure 9-8 presents a graph of influent trichloroethene versus time. This graph is cumulative and includes data from before 1989, when the system consisted of only six extraction wells. Influent concentrations continued to decline in FY 2001.

The average FY 2001 influent trichloroethene concentration was 294 μg/l, down from 363 μg/l in FY 2000. Since the full-scale start-up of the TGRS, influent concentrations had not exhibited a clear trend until approximately 1993, when a decrease began. The decline corresponds with the decrease in VOC mass removal and shrinkage of the plume discussed earlier.

Figure 9-8 also presents a graph of the effluent trichloroethene concentration versus time. As indicated, the effluent was below 5-μg/l trichloroethene for all sampling events in FY 2001. A review of the FY 2001 database indicates that the effluent has also remained below the treatment requirements for all other VOC compounds specified in the OU2 ROD. Comparison of influent and effluent trichloroethene concentrations indicates 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 9.4 pounds/day based on the VOC mass removal rates. The total VOC emissions from October 2000 through September 2001 were 3,418 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 2001, 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 a government reservation, is fenced, and access is restricted to authorized personnel. TCAAP will remain under Army control into the foreseeable future.

9.5 REMEDY COMPONENT #5: REVIEW OF NEW TECHNOLOGIES

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

- The intent is to consider new technologies of merit, which is not on any set schedule. To have merit, a new technology must have promise in reducing cost and the time for cleanup. There may be years where no technologies are considered. It is envisioned that at any time, any interested party (Army, USEPA, MPCA) can suggest new technologies for consideration. At a minimum, the Technical Review Committee meetings can serve as a forum for discussion of possible technologies. If a technology is agreed to have merit by the Army, USEPA, and MPCA, then the 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 December 2000, the Army, Alliant Techsystems, MPCA, and USEPA attended the "Defense Environmental Restoration Program Workshop" in New Orleans, Louisiana.
- In June 2001, the Army, Alliant Techsystems, MPCA, and USEPA attended the "Sixth International Symposium on Insitu and On-Site Bioremediation" in San Diego, California. (note: the USEPA Remedial Project Manager for TCAAP did not attend).
- USEPA distributed information on groundwater remediation work performed by INEEL at a site similar to TCAAP where lactate injection was employed.
- MPCA suggested that the edible oil injection, which is in pilot stage demonstration by Navy in Fridley, Minnesota, be monitored for success and possible application for the deep groundwater system 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 2001.

Were any new technologies identified and considered to have merit during FY 2001?

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?

Alliant Techsystems conducted pilot scale tests of two new technologies in the shallow groundwater 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 reported in FY 2001. HRC, was found to be ineffective at Site K. HRC has shown promise at a number of Sites; however, to date its application is only feasible in shallow, granular aquifers, so, is not applicable to deep groundwater at TCAAP. The direct hydrogen injection test yielded promising results for shallow groundwater but more research is needed for full-scale operation and applicability to deep groundwater.

Alliant Techsystems is helping the University of Minnesota to continue its research into direct hydrogen injection by making the Site K test plot available for its use. The University is continuing its research under a grant from the Department of Defense, Office of Naval Research.

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 2002.

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 2001 was consistent with the OU2 ROD. Appendix A summarizes the FY 2001 monitoring plan and any deviations are explained in Appendix C-2. Monitoring was as follows:

Groundwater
Monitoring well groundwater samples were collected, and water levels measured in June 2001 in accordance with the FY 2001 monitoring plan. Samples were analyzed for VOCs.

Treatment System
The TGRS treatment system influent and effluent was sampled monthly during FY 2001 in accordance with the FY 2001 monitoring plan. Groundwater samples from the extraction wells were collected in December 2000 and June 2001 in accordance with the FY 2001 monitoring plan.

Is additional monitoring proposed prior to the next report?
Yes. Table 9-9 presents the monitoring requirements for Deep Groundwater. For FY 2001 through FY 2005, biennial monitoring well sampling and water level measurements will be

conducted. The reduction in groundwater monitoring frequency is based on the stability observed over the last nine years. The TGRS extraction wells will be monitored biennially and the TGRS treatment system influent and effluent will continue to be monitored monthly to permit detailed system tracking. Appendix A presents the FY 2001 to FY 2005 monitoring plan.

9.7 OVERALL REMEDY FOR DEEP GROUNDWATER

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

- Hydraulic capture in Unit 3 extends beyond the 5-µg/l trichloroethene contour. This meets the VOC capture criterion in the OU2 ROD. It is the opinion of the Army that Extraction well B7 is no longer needed to hydraulically contain the 5-µg/l trichloroethene plume.
- Hydraulic capture in Unit 4 extends beyond the 5-µg/l trichloroethene contour. This meets the VOC capture criterion in the OU2 ROD.
- The TGRS extracted and treated 1,113,164,000 gallons of water and removed 3,418 pounds of VOCs from October 2000 to September 2001.
- Based on the extracted water quality, the source area contamination continued to decrease in concentration. This demonstrates that the TGRS is effectively removing VOC mass from the aquifer as it also effectively contains the contamination.
- Effluent VOC concentrations were below contaminant-specific requirements for all sampling events.

Do any additional measures need to be addressed?

The TGRS reconfiguration plan is expected to be finalized in FY 2002. This plan will address the optimization of the TGRS as required by the OU2 ROD.

TABLE 9-1

GROUNDWATER CLEANUP LEVELS
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Substance	*Expected Level in Discharge (ppb)*	*Operable Unit 2 Rod Requirements (ppb)*
<u>*Volatile Organic Compounds (VOCs)*</u>		
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
1,1,2-Trichloroethene	<5	5
1,1-Dichloroethane	--	70
Tetrachloroethene	--	5

TABLE 9-2

EXTRACTION WELL WATER PUMPED
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

	Volume of Water Pumped (gallons)																	
	B1	*B2*	*B3*	*B4*	*B5*	*B6*	*B7*	*B8*	*B9*	*B10*	*B11*	*B12*	*SC1*	*SC2*	*SC3*	*SC4*	*SC5*	*TOTAL*
October 2000	10,469,500	3,411,500	10,044,000	7,582,300	8,447,600	9,584,900	9,439,700	6,112,300	6,914,500	10,575,200	4,533,700	0	1,293,300	2,242,300	2,088,000	0	4,769,600	97,508,400
November 2000	10,315,800	3,012,500	9,758,600	7,606,400	8,664,000	8,491,200	8,654,800	6,005,200	6,487,000	10,220,200	4,525,800	0	1,165,300	2,243,200	2,088,500	0	4,544,300	93,782,800
December 2000	10,489,700	2,871,000	10,215,400	7,989,500	9,018,000	8,488,800	8,069,200	6,166,100	6,509,800	10,504,100	4,777,300	0	1,171,500	1,165,400	2,167,300	0	4,908,700	94,511,800
January 2001	10,650,200	2,505,400	10,157,800	7,829,800	8,322,300	8,809,300	7,406,100	6,025,700	6,334,600	10,588,600	4,801,100	0	1,168,700	862,700	2,170,200	0	4,884,700	92,517,200
February 2001	9,476,300	3,157,400	8,939,400	6,997,400	7,923,100	7,930,900	6,220,200	6,047,400	6,128,300	9,584,700	4,156,100	0	1,101,600	2,026,600	1,998,400	0	4,410,100	86,097,900
March 2001	10,595,100	3,651,700	9,820,600	7,599,100	8,640,200	9,479,100	7,022,900	6,063,500	6,737,400	10,743,400	4,579,500	0	1,175,500	2,435,100	2,232,900	0	4,980,900	95,756,900
April 2001	10,088,200	3,373,000	9,540,400	7,075,000	8,473,400	8,930,000	6,731,500	5,762,800	6,439,500	10,405,700	4,422,400	0	1,127,400	2,330,400	2,111,800	0	4,785,200	91,596,700
May 2001	9,901,000	3,959,400	9,697,400	7,010,900	9,506,400	8,502,500	6,314,300	5,892,500	6,655,600	10,996,100	4,798,100	0	1,213,500	2,303,400	1,980,500	0	4,192,000	92,923,600
June 2001	9,689,100	3,791,100	9,474,800	6,691,100	9,043,560	9,639,700	5,184,700	5,933,300	6,223,700	10,681,800	4,405,600	58,400	1,059,300	2,316,400	1,885,200	5,200	4,105,400	90,188,360
July 2001	9,703,200	3,686,000	9,267,400	7,882,000	9,075,700	9,524,600	4,944,000	6,777,800	6,381,200	10,805,100	4,173,600	0	1,236,100	2,830,600	1,953,900	0	4,286,200	92,527,400
August 2001	8,951,000	3,199,300	8,999,500	9,940,200	9,029,000	9,614,500	5,090,600	6,517,000	6,346,800	11,267,800	4,386,600	0	1,199,000	3,383,600	1,750,400	0	4,546,400	94,221,700
September 2001	8,854,500	3,433,400	8,936,700	9,352,900	8,612,900	9,589,500	5,074,100	6,435,000	6,316,300	11,203,000	4,184,100	0	1,128,200	1,774,200	1,840,900	0	4,794,900	91,530,600
TOTAL FY 2001	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	14,039,400	25,913,900	24,268,000	5,200	55,208,400	1,113,163,360

FY89	67,563,900	69,364,850	72,257,490	75,237,700	76,328,500	100,611,510	138,278,100	42,329,200	60,613,300	54,516,600	93,534,437	60,210,340	13,867,660	20,078,880	36,660,309	12,593,300	39,307,600	1,033,353,676
gpm	156	161	167	174	177	233	320	98	140	126	217	139	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	27	49	46	0	105	2,118

TABLE 9-3

TREATMENT CENTER WATER METER TOTALS
FISCAL YEAR 2001
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 2000	97,508,400	58,142,000	38,418,000	96,560,000	28,370,000	60,138,000	88,508,000	0	0	0
November 2000	93,782,800	56,764,000	35,828,000	92,592,000	28,582,000	57,954,000	86,536,000	0	0	0
December 2000	94,511,800	58,119,000	35,703,000	93,822,000	28,768,000	60,025,000	88,793,000	0	0	0
January 2001	92,517,200	57,114,000	36,173,000	93,287,000	28,776,000	60,127,000	88,903,000	0	0	0
February 2001	86,097,900	53,169,000	33,656,000	86,825,000	27,413,000	54,949,000	82,362,000	0	0	0
March 2001	95,756,900	55,815,000	39,217,000	95,032,000	31,382,000	58,634,000	90,016,000	0	0	0
April 2001	91,596,700	55,682,000	35,327,000	91,009,000	28,413,000	57,513,000	85,926,000	0	0	0
May 2001	92,923,600	50,841,000	42,800,000	93,641,000	24,621,000	61,671,000	86,292,000	0	0	0
June 2001	90,188,360	55,330,000	35,471,000	90,801,000	23,058,000	60,379,000	83437000	0	0	0
July 2001	92,527,400	56,658,000	36,709,000	93,367,000	23,209,000	62,291,000	85,500,000	0	0	0
August 2001	94,221,700	56,707,000	36,993,000	93,700,000	23,076,000	63,102,000	86,178,000	0	0	0
September 2001	91,530,600	55,656,000	36,872,000	92,528,000	22,849,000	61,878,000	84,727,000	0	0	0
TOTAL 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

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

TABLE 9-4

PUMPHOUSE DOWN TIME (DAYS)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well Name	*FY01 Down Time (Days)*	*FY00 Down Time (Days)*	*FY99 Down Time (Days)*	*FY98 Down Time (Days)*	*FY97 Down Time (Days)*
B1	3.4	7.5	12.1	19.9	34.2
B2	3.9	18.7	39.7	18.4	29.9
B3	1.8	8.8	30.6	16.1	14.9
B4	1.7	5.7	17.8	16.9	4.1
B5	3.3	6.0	9.4	29.1	4.0
B6	1.6	32.3	10.3	12.6	4.0
B7	2.9	11.8	28.4	12.3	11.1
B8	1.3	9.0	21.2	14.9	9.3
B9	1.3	4.8	9.1	27.3	4.0
B10	2.4	8.0	29.0	15.8	11.6
B11	1.5	12.0	31.9	20.6	8.5
B12	--	--	--	--	5.0
SC1	2.9	18.7	47.8	16.1	11.5
SC2	3.0	6.8	7.5	23.9	5.0
SC3	1.5	7.2	8.2	12.3	7.7
SC4	--	--	--	--	5.2
SC5	2.0	12.1	14.7	13.9	5.0

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 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Category	*Down Time (Days)*
Pumphouse Component	1.1
Treatment Center Component	0.2
Electrical Service	0.5
Preventive Maintenance	0.4
System Modification	0.0
Forcemain	0.0
TGRS [1]	**2.1**

Anticipated Down Time for Fiscal Year 2001

Pumphouse Component	3
Treatment Center Component	15
Electrical Service	3
Preventive Maintenance	0.5
System Modification	0.1
Forcemain	0.1

Note:
(1) This value represents the adjusted down time for the entire system (i.e. all of the categories combined).

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane		1,1-Dichloroethene		1,1-Dichloroethane		1,2-Dichloroethane		cis-1,2-Dichloroethene		Tetrachloroethene		Trichloroeti
TGRS Cleanup Level [1]		200		6		70		4		70		5		5
03L002	6/6/01	3		1.7		1.1		< 1		0.38	JP	< 1		34
03L007	6/4/01	< 1		< 1		< 1		< 1		< 1		< 1		< 1
03L014	6/4/01	580		17		6.9	JP	< 10		4.2	JP	< 10		750
03L017	6/6/01	< 1		< 1		< 1		< 1		< 1		< 1		< 1
03L018	6/11/01	0.21	JP	< 1		< 1		< 1		< 1		< 1		1.7
03L020	6/5/01	0.85	JP	0.4	JP	0.51	JP	< 1		0.51	JP	< 1		22
03L077	6/8/01	8.2		2.2		0.66	JP	0.15	JP	0.49	JP	< 1		87
03L078	6/8/01	< 1		< 1		< 1		< 1		< 1		< 1		0.68
03L079	6/8/01	< 1		< 1		0.23	JP	< 1		< 1		< 1		0.36
03L084	6/11/01	< 1		< 1		< 1		< 1		< 1		< 1		0.21
03L802	6/19/01	< 1		< 1		< 1		< 1		< 1		< 1		4.4
03L806	6/15/01	30		40		49		< 10		7.3	JP	< 10		410
03L809	6/18/01	140		59		57		1.3		26		0.41	JP	520
03L833	6/13/01	0.21	JP	0.33	JP	0.43	JP	< 1		0.15	JP	< 1		12
03L833	6/13/01	0.2	JPD	0.31	JPD	0.42	JPD	< 1	D	< 1	D	< 1	D	13
03M020	6/6/01	1.9		0.63	JP	1.4		< 1		0.58	JP	< 1		38
03M802	6/19/01	0.27	JP	< 1		< 1		< 1		0.13	JP	< 1		13
03U003	6/6/01	19		4.1		3.5		0.17	JP	6.5		< 1		120

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethene*	*1,1-Dichloroethane*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroeti*
03U003	6/6/01	19 D	3.9 D	3.3 D	0.2 JPD	6.3 D	< 1 D	120
03U007	6/4/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U009	6/4/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U014	6/4/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1
03U017	6/6/01	0.77 JP	0.16 JP	< 1	< 1	< 1	< 1	2.9
03U018	6/11/01	14	1.6	1.1	< 1	11	< 1	70
03U020	6/6/01	340	60	8.4	0.19 JP	2	< 1	360
03U021	6/7/01	200	52.5	57.5	< 25	50	< 25	950
03U028	6/12/01	11	2.6	0.4 JP	< 1	8.7	0.38 JP	150
03U029	6/12/01	7.9	1.2	0.52 JP	< 1	9.5	< 1	79
03U030	6/12/01	0.2 JP	< 1	< 1	< 1	0.52 JP	< 1	13
03U032	6/15/01	< 1	< 1	< 1	< 1	< 1	< 1	0.14
03U075	6/15/01	< 1	< 1	< 1	< 1	< 1	< 1	0.47
03U077	6/8/01	11	2.4	1.3	0.26 JP	0.29 JP	1.7	65
03U078	6/8/01	5.1	1.5	0.49 JP	< 1	1.2	11	130
03U079	6/8/01	61	10 JP	10 JP	< 10	43	< 10	450
03U093	6/18/01	19	1.5	0.65 JP	< 1	0.55 JP	< 1	87
03U094	6/14/01	220	7.5 JP	2 JP	< 10	1.3 JP	< 10	400

TABLE 9-6

GROUNDWATER QUALITY DATA (μg/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethene*	*1,1-Dichloroethane*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroet*
03U096	6/18/01	2.7	1.1	2.1	< 1	< 1	< 1	14
03U096	6/18/01	2.5 D	1.1 D	2.2 D	< 1 D	< 1 D	< 1 D	13
03U099	6/12/01	3.2	0.3 JP	< 1	< 1	< 1	< 1	8.5
03U114	6/14/01	3.8	0.46 JP	< 1	< 1	< 1	< 1	21
03U659	6/12/01	4.8	0.81 JP	0.84 JP	< 1	11	< 1	76
03U671	6/12/01	10	2.8	1.7	< 1	0.38 JP	1.4	52
03U672	6/18/01	0.3 JP	0.12 JP	< 1	< 1	< 1	< 1	3.1
03U701	6/7/01	1.4	0.25 JP	0.2 JP	< 1	0.3 JP	0.23 JP	13
03U702	6/7/01	0.16 JP	< 1	< 1	< 1	< 1	< 1	1.7
03U703	6/8/01	1.7	0.33 JP	< 1	< 1	0.5 JP	4.9	11
03U708	6/7/01	84	21	10 JP	< 10	6.4 JP	3.2 JP	190
03U709	6/13/01	14	7	8.2	< 1	0.39 JP	< 1	71
03U710	6/19/01	63	7.9 JP	7.8 JP	< 10	19	< 10	370
03U711	6/12/01	30	8.5	8.8	0.15 JP	1.7	1.8	89
03U801	6/18/01	0.26 JP	0.12 JP	< 1	< 1	0.83 JP	< 1	66
03U803	6/15/01	< 1	< 1	< 1	< 1	< 1	< 1	3.7
03U804	6/13/01	< 1	< 1	< 1	< 1	< 1	< 1	0.28
03U805	6/15/01	1.5	0.56 JP	0.61 JP	< 1	0.35 JP	< 1	3

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Date	1,1,1-Trichloroethane			1,1-Dichloroethene			1,1-Dichloroethane			1,2-Dichloroethane			cis-1,2-Dichloroethene			Tetrachloroethene			Trichloroeth
03U806	6/15/01		1.4	JP		7.6	JP		9.2	JP	<	10			1.1	JP		1.2	JP		210
04J077	6/8/01		70			41			45		<	10			15		<	10			400
04J702	6/7/01		0.86	JP		0.31	JP	<	1		<	1		<	1		<	1			8.8
04J708	6/7/01		0.56	JP		0.34	JP		0.54	JP	<	1		<	1		<	1			3.8
04J713	6/12/01	<	1		<	1		<	1		<	1		<	1		<	1			0.26
04U002	6/6/01		0.6	JP		0.33	JP		0.4	JP	<	1		<	1		<	1			3.9
04U007	6/4/01	<	1		<	1		<	1		<	1		<	1		<	1		<	1
04U020	6/5/01	<	1		<	1			0.25	JP	<	1		<	1		<	1			1.7
04U027	6/11/01	<	1		<	1		<	1		<	1		<	1		<	1		<	1
04U027	6/11/01	<	1	D	<	1	D	<	1	D	<	1	D	<	1	D	<	1	D	<	1
04U077	6/8/01		12			3.7			1.1			0.21	JP		0.66	JP	<	1			110
04U077	6/8/01		12	D		3.5	D		1.1	D		0.19	JPD		0.65	JPD	<	1	D		110
04U510	6/4/01	<	1		<	1		<	1		<	1		<	1		<	1			0.19
04U510	6/4/01	<	1	D	<	1	D	<	1	D	<	1	D	<	1	D	<	1	D	<	1
04U701	6/7/01		0.83	JP		0.25	JP	<	1		<	1		<	1		<	1			9.6
04U702	6/7/01		0.75	JP		0.26	JP	<	1		<	1		<	1		<	1			8.3
04U708	6/7/01	<	1		<	1		<	1		<	1		<	1		<	1			0.8
04U709	6/13/01		0.98	JP		0.6	JP		0.65	JP	<	1			0.2	JP	<	1			14
04U711	6/12/01		0.15	JP		0.17	JP	<	1		<	1		<	1		<	1			1.6

TABLE 9-6

GROUNDWATER QUALITY DATA (µg/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Date*	*1,1,1-Trichloroethane*	*1,1-Dichloroethene*	*1,1-Dichloroethane*	*1,2-Dichloroethane*	*cis-1,2-Dichloroethene*	*Tetrachloroethene*	*Trichloroet*
04U713	6/12/01	0.15 JP	< 1	< 1	< 1	< 1	< 1	1.2
04U713	6/12/01	0.16 JPD	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	1.2
04U802	6/19/01	< 1	< 1	< 1	< 1	< 1	< 1	0.67
04U806	6/15/01	61	55	69	< 10	10 JP	< 10	470
04U833	6/13/01	0.33 JP	0.19 JP	0.26 JP	< 1	< 1	< 1	21
PJ#806	6/15/01	23	14	14	< 10	2.9 JP	< 10	180

Note:
[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 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Well	*% Contribution to VOC Mass Removal*	*FY 2001 Total Pounds VOC Mass Removed*
B1	6.3	216.7
B2	0.5	17.1
B3	0.5	16.1
B4	16.1	551.9
B5	12.3	420.5
B6	6.6	224.8
B7	0.0	0.8
B8	0.5	18.8
B9	2.6	88.7
B10	0.2	6.6
B11	0.1	2.8
B12	0.0	shut-down
SC1	2.5	85.9
SC2	0.8	28.6
SC3	0.0	1.3
SC4	0.0	shut-down
SC5	50.8	1737.7
Fiscal Year 2001 Total (lbs)		***3418***
Daily Average (lbs/day)		***9.4***

HISTORICAL TOTAL

Fiscal Year		*Pounds VOC Mass Removed*
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		***180,084***

TABLE 9-8

VOC CONCENTRATIONS IN TGRS EXTRACTION WELLS (ug/L)
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

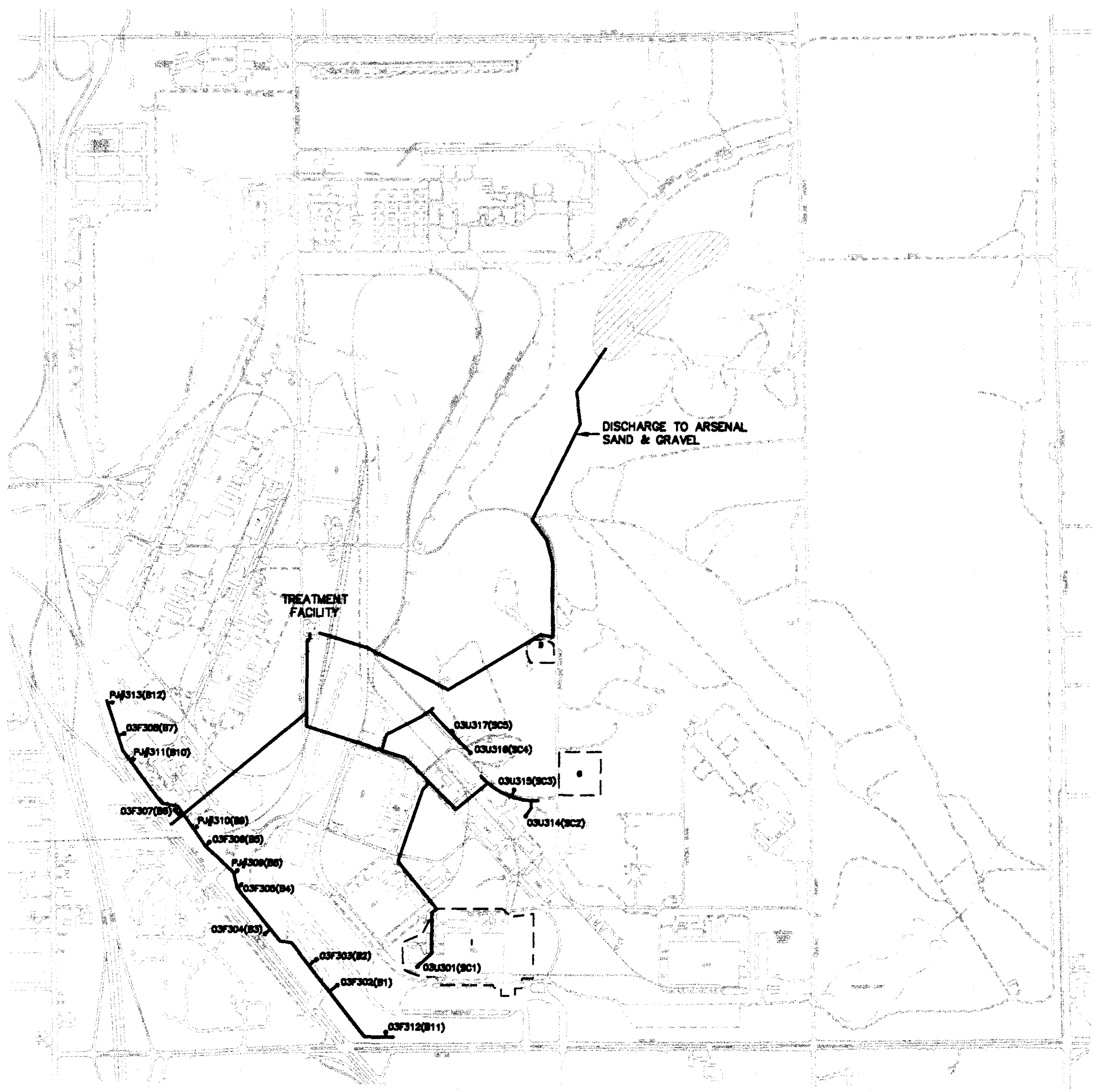
Location	Sample Date	111TCE	112TCE	11DCE	11DCLE	12DCLE	C12DCE	C2H3CL	CCL4	CH2CL2	CHCL3	T12DCE	TCLEE	TCLFE	TRCLE
03F302	12/13/00	11	< 10	3 JP	2.5 JP	< 10	12	< 10	< 10	< 10	< 10	< 10	1.7 JP	< 10	180
(B1)	12/13/00	12 D	< 10 D	3.2 JPD	2.8 JPD	< 10 D	12 D	< 10 D	< 10 D	< 10 D	< 10 D	< 10 D	< 10 D	< 10 D	180 D
	6/5/01	9.7	0.44 JP	2.5	2.7	0.19 JP	10	< 1	< 1	< 1 U	0.17 JP	< 1	1.4	< 1	180
03F303	12/14/00	1.7	1.4	2.3	1.2	0.16 JP	1.6	< 1	< 1	< 1 U	0.2 JP	< 1	2.5	< 1	40
(B2)	6/5/01	1.6	1.4	1.8	1.2	0.22 JP	1.5	< 1	< 1	< 1 U	0.21 JP	< 1	2.3	< 1	37
03F304	12/14/00	3.7	0.33 JP	2	1.3	< 1	0.43 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	7.8
(B3)	6/5/01	3.7	< 1	2	1.7	< 1	0.48 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	8.7
03F305	12/14/00	97	< 10	32	31	< 10	21	< 10	< 10	< 10	< 10	< 10	< 10	< 10	490
(B4)	6/5/01	95	< 5	32	36	< 5	20	< 5	< 5	< 5	< 5	< 5	< 5	< 5	500
03F306	12/13/00	26	< 10	17	17	< 10	2.5 JP	< 10	< 10	< 10 U	< 10	< 10	< 10	< 10	410
(B5)	6/5/01	19	< 10	12	16	< 10	2.7 JP	< 10	< 10	< 10	< 10	< 10	< 10	< 10	400
03F307	12/13/00	6.1	< 1	7.7	7.8	0.17 JP	1.4	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	230
(B6)	6/5/01	5.3	< 1	7.1	8.8	0.27 JP	1.4	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	200
03F308	12/14/00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	1.1
(B7)	6/5/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	1.2
PJ#309	12/13/00	4.8	< 1	2	1.5	< 1	0.76 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	21
(B8)	6/5/01	3.6	< 1	1.6	1.5	< 1	0.66 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	21
PJ#310	12/13/00	14	< 1	6.6	5.2	0.2 JP	2	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	110
(B9)	12/13/00	15 D	< 1 D	6.7 D	5.2 D	0.2 JPD	2 D	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	< 1 D	< 1 D	110 D
	6/5/01	13	< 1	5.9	5.7	0.25 JP	2	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	100
	6/5/01	12 D	< 1 D	5.6 D	5.4 D	0.26 JPD	1.9 D	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	< 1 D	< 1 D	96 D
PJ#311	12/13/00	0.64 JP	< 1	0.19 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5.1
(B10)	6/5/01	0.58 JP	< 1	0.22 JP	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	5.1
03F312	12/13/00	< 1	< 1	0.3 JP	0.42 JP	< 1	0.41 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	4.8
(B11)	6/5/01	< 1	< 1	0.28 JP	0.5 JP	< 1	0.41 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	4.7
(B12)	12/14/00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	< 1
PJ#313	6/5/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	0.18 JP
03U301	12/13/00	23	< 10	3.1 JP	< 10	< 10	64	< 10	< 10	< 10	< 10	< 10	< 10	< 10	580
(SC1)	6/5/01	21	< 10	1.8 JP	1.5 JP	< 10	61	< 10	< 10	< 10	< 10	< 10	< 10	< 10	650
03U314	12/13/00	36	< 1	3.8	2	< 1	0.92 JP	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	100
(SC2)	6/5/01	27	< 1	2.5	1.5	< 1	0.64 JP	< 1	< 1	0.23 JP	< 1	< 1	< 1	< 1	84
	6/5/01	27 D	< 1 D	2.5 D	1.6 D	< 1 D	0.59 JPD	< 1 D	< 1 D	0.21 JPD	< 1 D	< 1 D	< 1 D	< 1 D	82 D
03U315	12/13/00	0.87 JP	< 1	0.16 JP	< 1	< 1	< 1	< 1	< 1	< 1 U	0.29 JP	< 1	< 1	< 1	5.5
(SC3)	6/5/01	0.46 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.27 JP	< 1	< 1	< 1	< 1	4.6
03U316	12/13/00	1.4	< 1	0.19 JP	0.17 JP	< 1	< 1	< 1	< 1	< 1 U	0.34 JP	< 1	< 1	< 1	6.9
(SC4)	6/6/01	0.75 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.27 JP	0.21 JP	< 1	< 1	< 1	5
03U317	12/13/00	980	< 100	33 JP	19 JP	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	2800
(SC5)	6/5/01	830	< 100	30 JP	19 JP	< 100	< 100	< 100	< 100	19 JP	< 100	< 100	< 100	< 100	2500

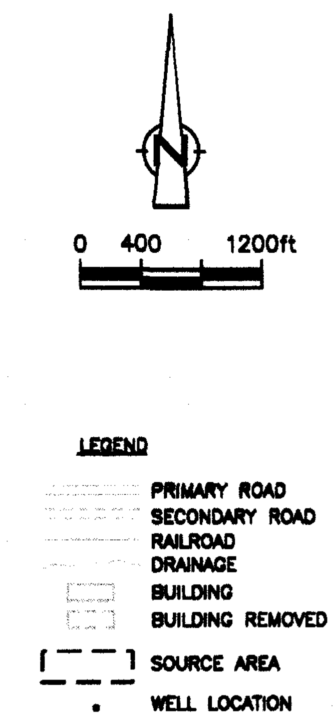
Notes:
D - Duplicate Analysis
J - Value is estimated
P - Results less than reporting level but greater than instrument detection limit.
U - The analyte is non-detect with the associated value being the quantitation limit.

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





EXTRACTION WELL NAME CROSS REFERENCE

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

figure 9–1

TGRS LAYOUT
Twin Cities Army Ammunition Plant

CRA

17520–43(002)GN–SP001 NOV 29/2001

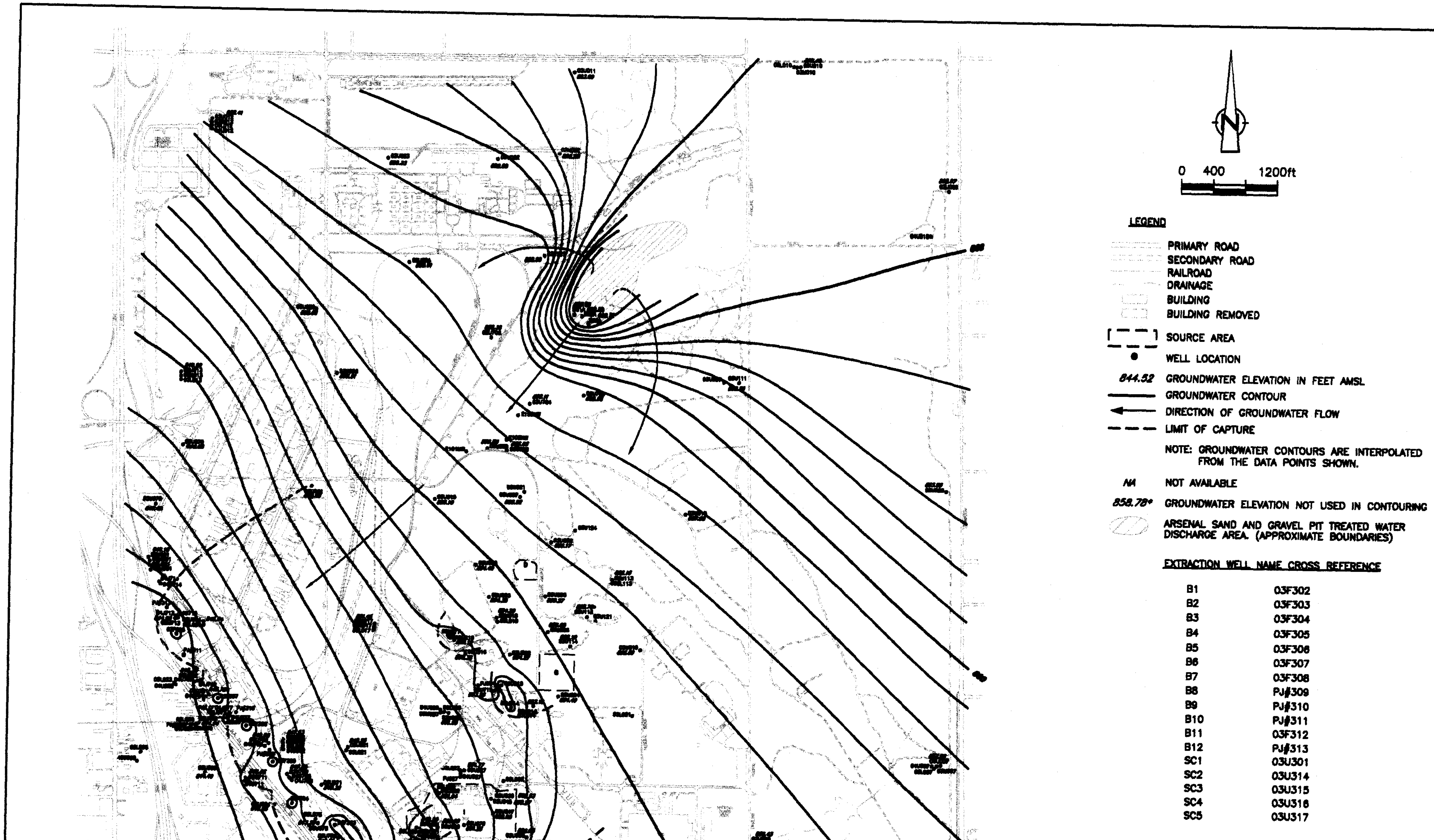


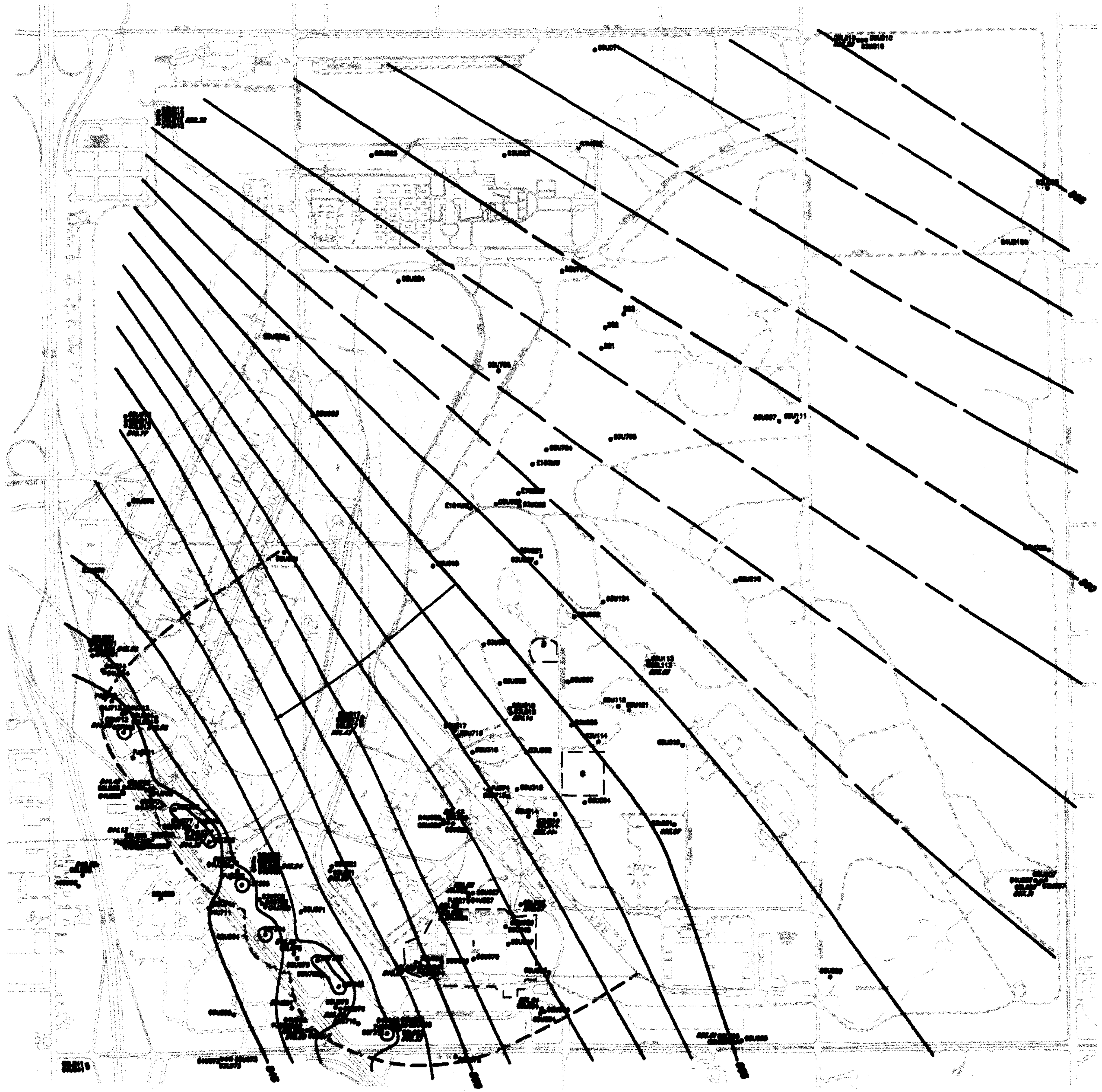
figure 9-2

OU2, UPPER UNIT 3, POTENTIOMETRIC MAP, 6/1/01 (Q71)

Twin Cities Army Ammunition Plant

CRA

17520-43(002)GN-SP002 DEC 03/2001



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
- 855.44* 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
SC1	03U301
SC2	03U314
SC3	03U315
SC4	03U316
SC5	03U317

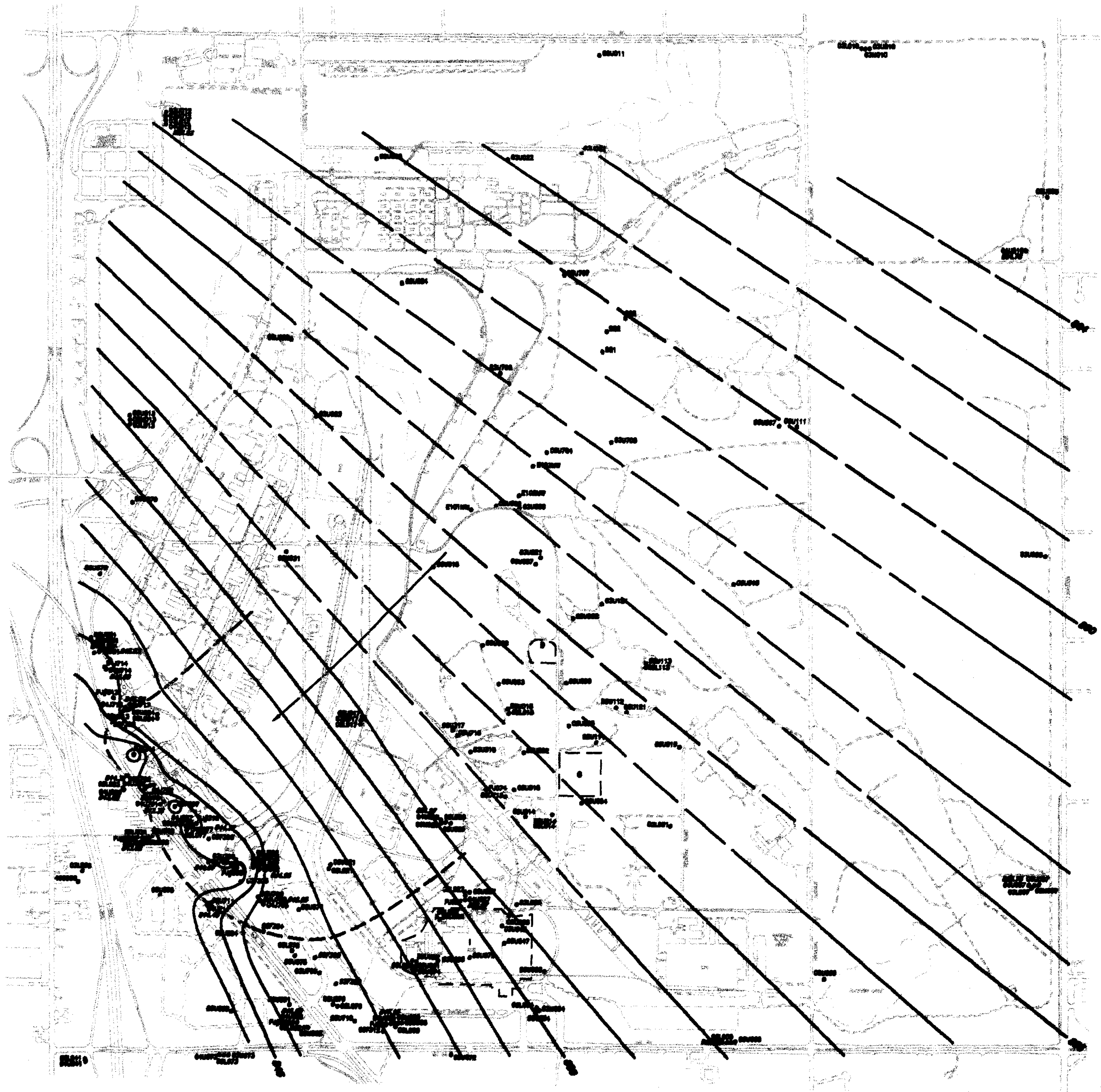
figure 9–3

OU2, LOWER UNIT 3, POTENTIOMETRIC MAP, 6/1/01 (Q71)

Twin Cities Army Ammunition Plant

CRA

17520-43(002)GN-SP003 DEC 03/2001



0 400 1200ft

LEGEND

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

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

- *NA* NOT AVAILABLE
- ARSENAL SAND AND GRAVEL PIT TREATED WATER DISCHARGE AREA. (APPROXIMATE BOUNDARIES)

EXTRACTION WELL NAME CROSS REFERENCE

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

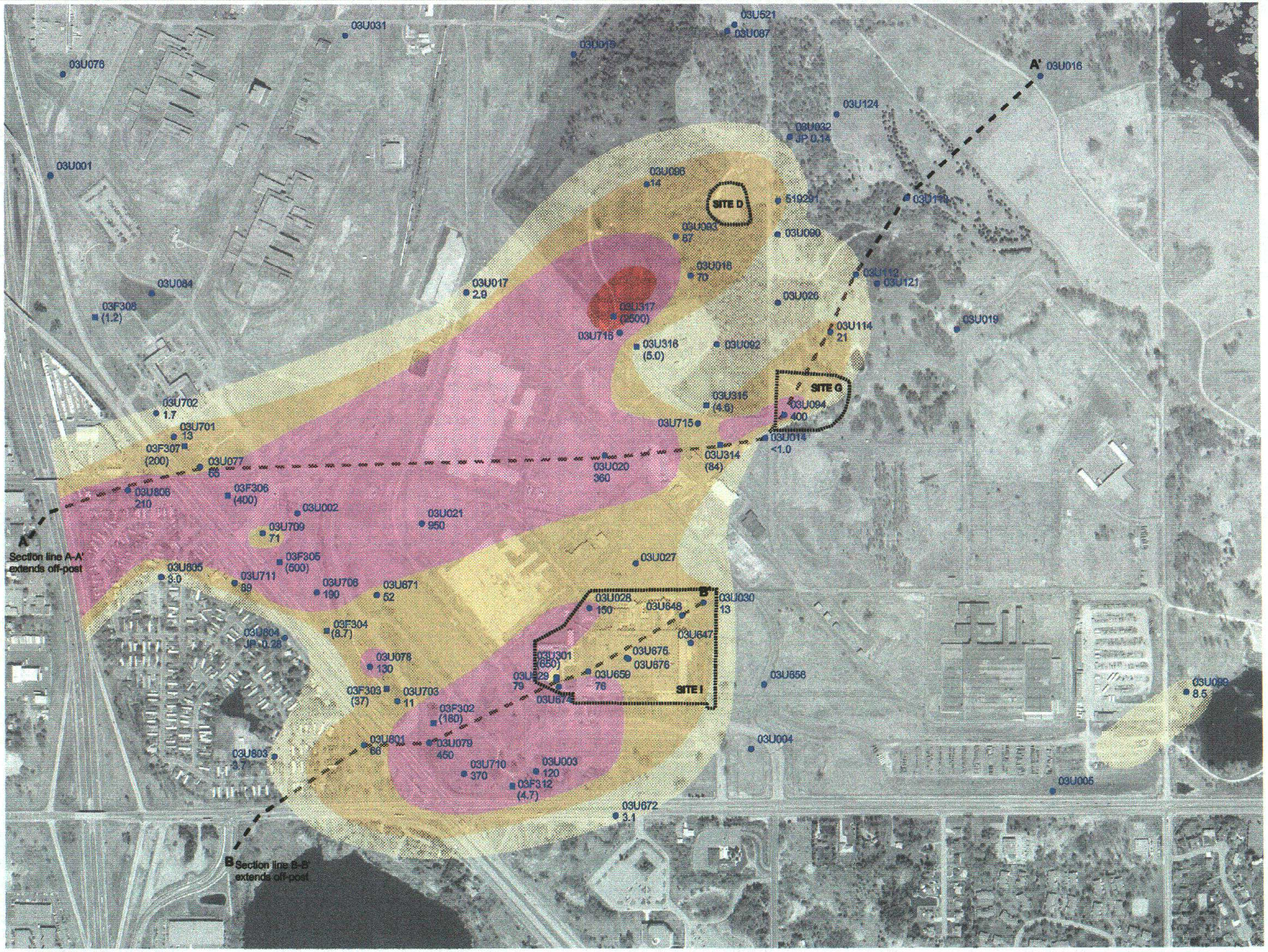
figure 9–4

OU2, UPPER UNIT 4, POTENTIOMETRIC MAP, 6/1/01 (Q71)

Twin Cities Army Ammunition Plant

CRA

17520–43(002)GN–SP004 DEC 03/2001



LEGEND

- 03U096 Monitoring Well Location
- 03U315 Extraction Well Location
- 03U096 180.00 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.
2. Aerial Orthophotography was flown in 2000.
3. Extraction well name conversions:

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

N

700 0 700 Feet

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TWIN CITIES ARMY AMMUNITION PLANT

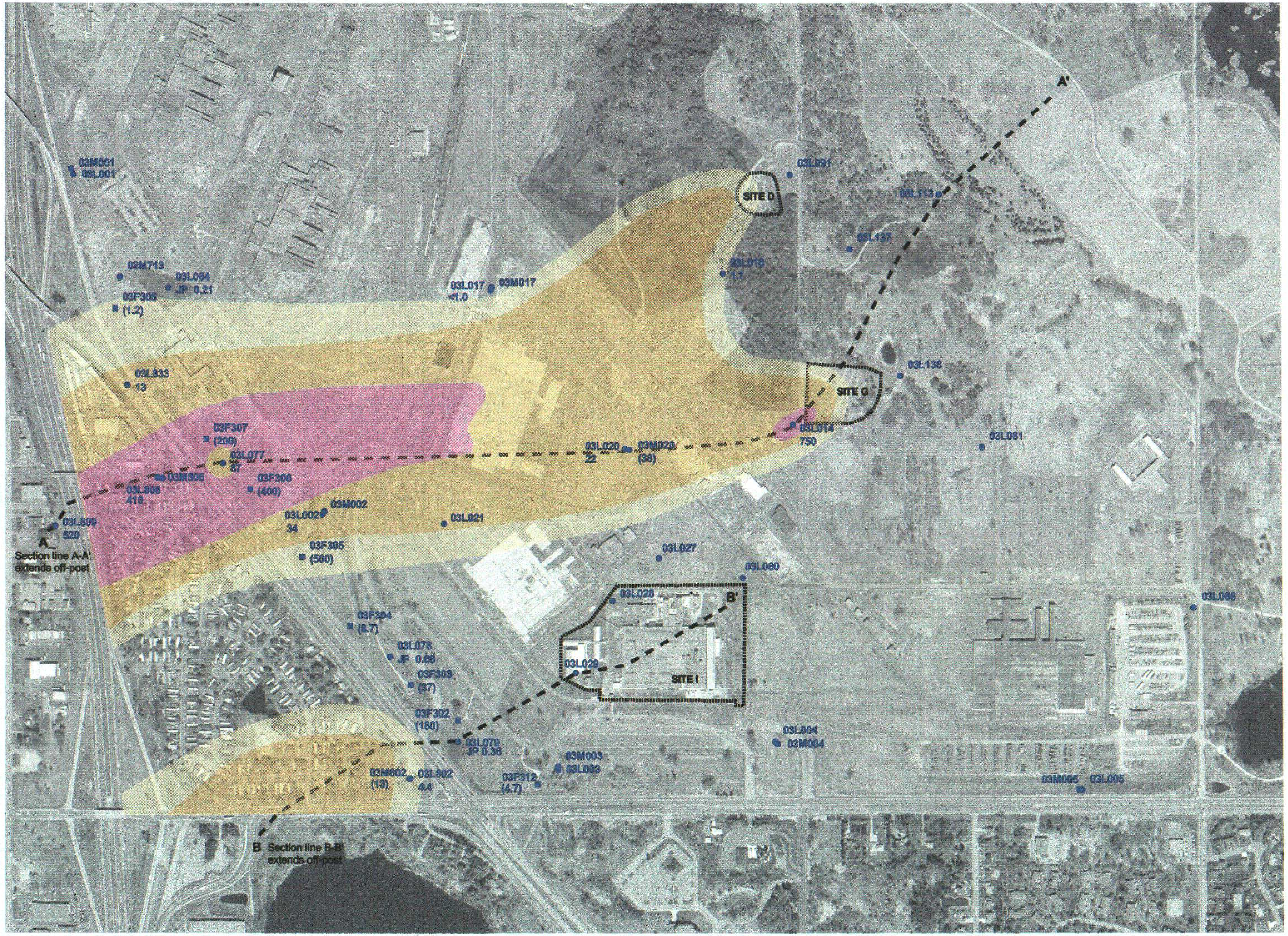
OU2, Upper Unit 3, Trichloroethene Isoconcentration Map, Summer 2001

Wenck

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

FY 2001

Figure 9-5



LEGEND

- 03U091 Monitoring Well Location
- 03U305 Extraction Well Location
- 03U091 180.00 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. Middle Unit 3 wells with data are shown with data in parentheses, but were not used for contouring.
2. 03F extraction wells are shown with data in parentheses, but were not used for contouring.
3. Aerial Orthophotography was flown in 2000.
4. Extraction well name conversions:

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

N

700 0 700 Feet

L:\1038\1038-07\apr file\01 report.apr\figure 9-6

TWIN CITIES ARMY AMMUNITION PLANT

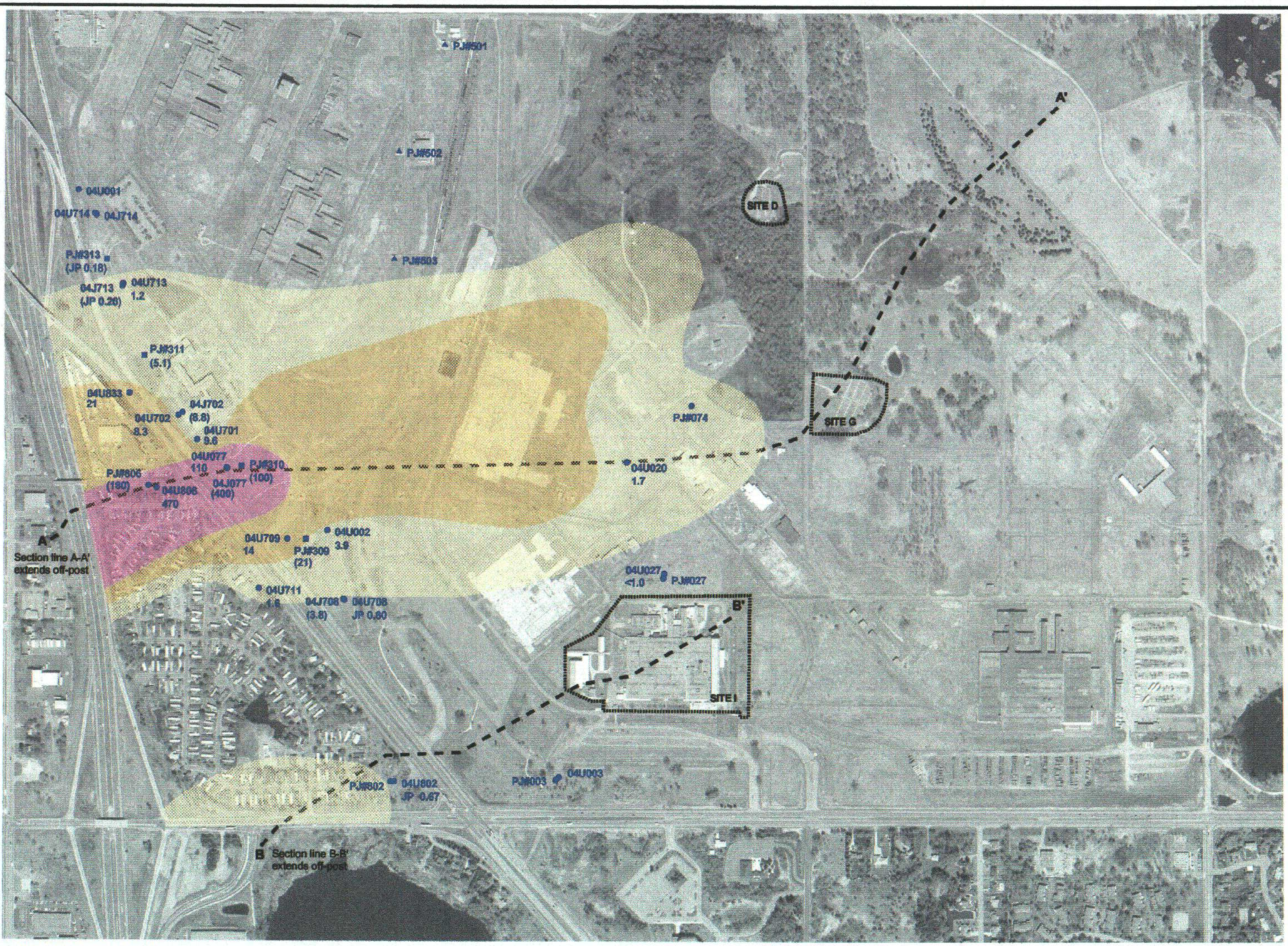
OU2, Lower Unit 3, Trichloroethene Isoconcentration Map, Summer 2001

Wenck

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

FY 2001

Figure 9-6



LEGEND

- 04U020 Monitoring Well Location
- PJ#309 Extraction Well Location
- PJ#503 Private Well Location
- 04U020 190.00 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 with data are shown with data in parentheses, but were not used for contouring.
4. Aerial Orthophotography was flown in 2000.
5. Extraction well name conversions:

PJ# 309	B-8
PJ# 310	B-9
PJ# 311	B-10
PJ# 313	B-12 (Shut Off)

N

700 0 700 Feet

L:\1038\1038-07\apr file\01 report.apr\figure 9-7

TWIN CITIES ARMY AMMUNITION PLANT

OU2, Upper Unit 4, Trichloroethene Isoconcentration Map, Summer 2001

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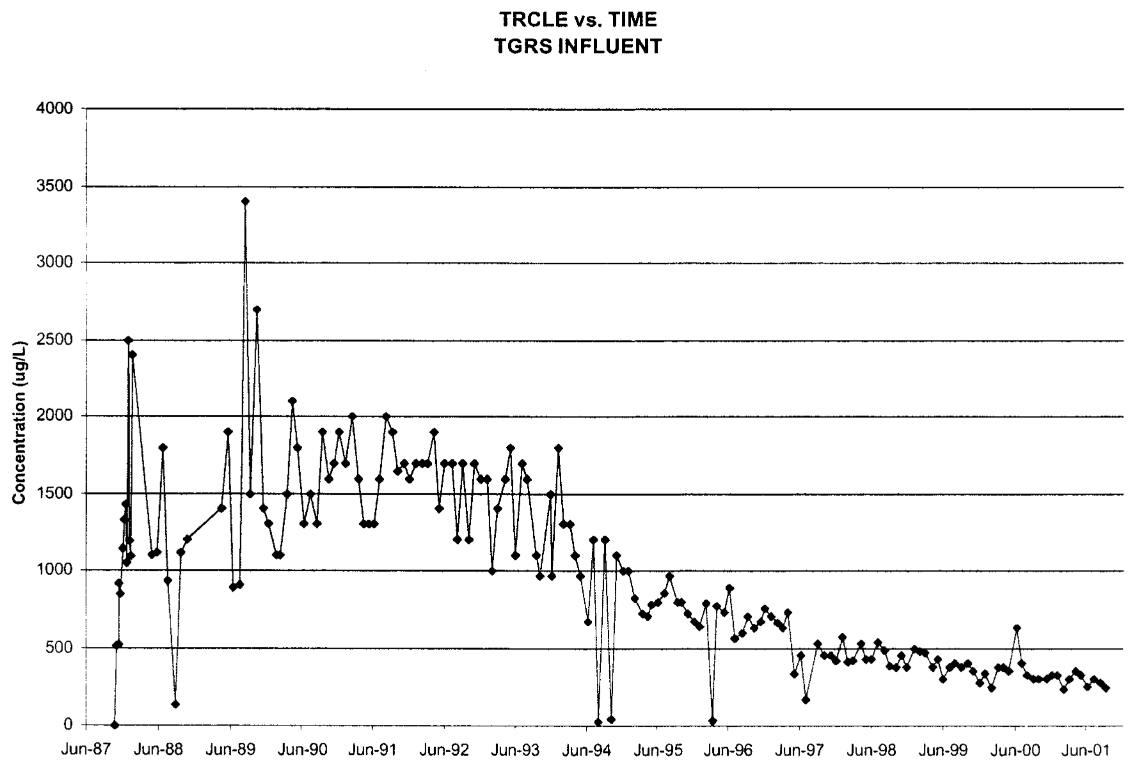
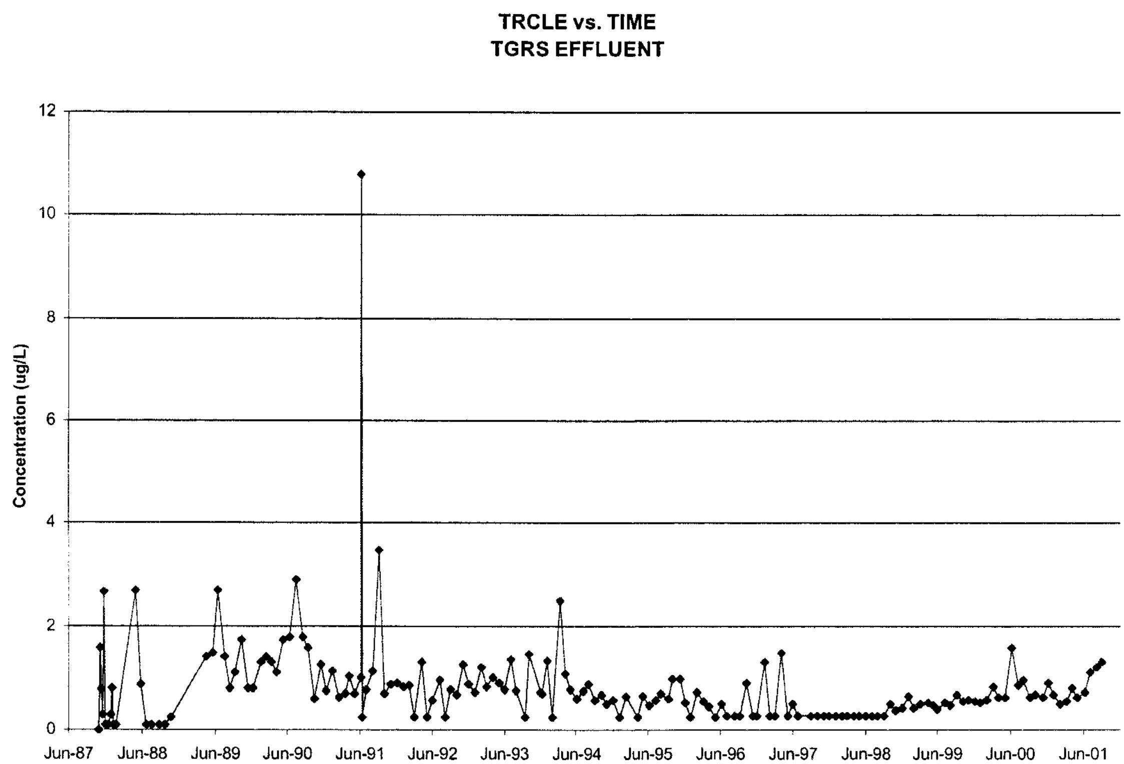
Wenck Associates, Inc. Environmental Engineers
1800 Pioneer Creek Center Maple Plain, MN 55359-0249

FY 2001

Figure 9-7





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 9–8

TGRS TREATMENT SYSTEM PERFORMANCE
Twin Cities Army Ammunition Plant

CRA

17520–43(002)GN–SP005 JAN 15/2002

10.0 Operable Unit 3: Deep Groundwater

The reference for the OU3 ROD is:

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

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

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

The PGRS began operations on May 3, 1994. This section of the report presents the monitoring results from the FY 2001 operation of the PGRS and documents treatment and groundwater capture performance.

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" 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. The City is conducting an evaluation of its municipal system to, in part, determine the future use of the PGRS extraction well and treatment system. The extraction well is being maintained in standby status while on going monitoring continues.

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 system is being maintained in a standby condition.

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 2001 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 04U863. Thus, the containment provided by the PGRS is of no consequence.

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. Until shut down in August 2001, the GAC system operated as required. As discussed above, the PGRS is no longer being operated, therefore this remedy component is no longer applicable.

Is treatment meeting the requirements of the OU3 ROD?

Yes. Influent and effluent water was sampled on a monthly basis through June 2001 and the results are provided in Table 10-1. PGRS influent is labeled NB13Inf and effluent is labeled NB13Eff. Table 10-2 presents a summary of monthly VOC removal for FY 2001 and Figure 10-2 shows the influent trichloroethene concentration versus time. The average FY 2001 influent trichloroethene concentration was <1.0 μg/l (below detection limits for all rounds).

Figure 10-2 also presents a summary of the effluent trichloroethene concentration versus time. As indicated, the effluent remained below the contaminant-specific requirements for all VOC compounds. The presence of chloroform in the effluent is most likely due to chlorination in the treatment train as part of the iron removal system, because it is not present in the influent.

As discussed above, the PGRS was not operated after August 2001, therefore, this remedy component is no longer applicable.

How much VOC mass did the system remove?

The PGRS extracted and treated 204,523,000 gallons of water from October 2000 through August 2001 (Appendix H.1), for an average of 423 gpm.

Since the monthly VOC concentrations from the NBM#13 influent for FY 2001 were non-detect throughout the year the PGRS removed a negligible mass of VOCs in FY 2001.A summary of the PGRS monthly pumping volumes and VOC mass removal is shown in Table 10-2. The total VOC mass removed from the PGRS from startup through FY 2001 is 132 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. The City of New Brighton established a municipal water supply interconnection with the City of Fridley in 1994. This has allowed them to accept the discharge from the PGRS on a full time basis since its start up in May 1994. The City of New Brighton operates the well and treatment system.

As discussed above, the PGRS was not operated after August 2001, therefore, this remedy component is no longer applicable.

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 2001 monitoring plan and any deviations are explained in Appendix C.2. Monitoring was as follows:

Groundwater

Groundwater samples and water level measurements were collected quarterly from five wells in the vicinity of the PGRS (south of Interstate 694). The purpose of this sampling was to monitor for potential VOC concentration "rebound" in the vicinity of the PGRS following the pumping rate reduction in December 1999. A larger list of wells was sampled in June 2001 as part of the OU1, OU2 and OU3 comprehensive sampling round. All samples were analyzed for VOCs using SW846 8260. Monitoring wells used for water levels and sampling for the PGRS are shown on Figure 10-1. The specific role of each well is provided in Appendix A. Appendix H.2 presents the water level database.

Treatment System

Samples were collected by the City of New Brighton from the treatment facility on a monthly basis, except for December 2000, through June 2001. Treatment system influent and effluent analytical data are provided in Appendix H.3. The extraction well flow measurements are 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 2002 through FY 2005, quarterly monitoring well sampling and water level measurements are planned. Appendix A presents the FY 2002 – FY 2005 monitoring plan.

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. There are no wells exhibiting VOC concentrations above the ROD requirements in the vicinity of the PGRS. FY 2001 total VOC concentrations at NBM #13 were non-detect. All detection limits were below the requirements of the ROD.

Chemical Performance

Table 10-4 presents the FY 2001 groundwater quality data. A total of 5 monitoring wells were sampled on four occasions in FY 2001. A larger network of wells was sampled during the comprehensive bi-annual round. The treatment system, presented in Table 10-1, was monitored monthly and the influent data represents groundwater from NBM #13, which is completed in the Prairie du Chien formation.

All the monitoring well data was below the ROD requirements. Trichloroethene was the only compound detected and was below 1 μg/l in all cases; the ROD requirement for trichloroethene is 5 μg/l.

The influent samples to the treatment system were non-detect for VOCs in all rounds of monthly sampling. Detection limits were below the ROD requirements for all compounds.

Are any changes or additional actions required for OU3?

No. Monitoring will continue, to confirm that the plume remains below ROD standards.

TABLE 10-1

TREATMENT SYSTEM ANALYTICAL SUMMARY
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 10/12/00	NB13INF. 11/8/00	NB13INF. 1/29/01	NB13INF. 2/8/01	NB13INF. 3/7/01	NB13INF. 4/3/01	NB13INF. 5/23/01	NB13INF. 6/29/01
1,1-Dichloroethane	11DCLE	<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
1,2-Dichloroethylene	12DCE	<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
1,1,2-Trichloroethane	112TCE	<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
Benzene	C6H6	<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
Bromoform	CHBR3	<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
Carbon tetrachloride	CL4	<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
Chloroethane	C2H5CL	<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 *
Chloroform	CHCL3	<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
Chlorodibromomethane	DBRCLM	<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
1,2-Dichlorobenzene	12DCLB	<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
1,4-Dichlorobenzene	14DCLB	<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
1,3-Dichloro-1-propene, cis	C13DCP	<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
Ethyl benzene	ETC6H5	<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
1,1,2,2-Tetrachloroethane	TCLEA	<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
Toluene	MEC6H5	<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
Vinyl chloride	C2H3CL	<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

TABLE 10-1

TREATMENT SYSTEM ANALYTICAL SUMMARY
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 10/12/00	NB13EFF. 11/8/00	NB13EFF. 11/8/00 DUP	NB13EFF. 1/29/01	NB13EFF. 2/8/01	NB13EFF. 2/8/01 DUP	NB13EFF. 3/7/01
1,1-Dichloroethane	11DCLE	<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
1,2-Dichloroethylene	12DCE	<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
1,1,2-Trichloroethane	112TCE	<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
Benzene	C6H6	<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
Bromoform	CHBR3	<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
Carbon tetrachloride	CL4	<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
Chloroethane	C2H5CL	<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 *
Chloroform	CHCL3	**2.1**	**2.2**	**2.3**	**4.3**	**4.2**	**3.8**	**3.6**
Chloromethane	CH3CL	<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
1,2-Dichloroethane	12DCLE	<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
1,3-Dichlorobenzene	13DCLB	<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
1,2-Dichloropropane	12DCLP	<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
1,3-Dichloro-1-propene trans	T13DCP	<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
Methylene chloride	CH2CL2	<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
Tetrachloroethylene	TCLEE	<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
Trichlorofluoromethane	CCL3F	<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
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

TABLE 10-1

TREATMENT SYSTEM ANALYTICAL SUMMARY
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 4/3/01	NB13EFF. 4/3/01 DUP	NB13EFF. 5/23/01	NB13EFF. 5/23/01 DUP	NB13EFF. 6/29/01
1,1-Dichloroethane	11DCLE	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	11DCE	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene	12DCE	<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
1,1,2-Trichloroethane	112TCE	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	**1.1**	<1.0	<1.0	<1.0	<1.0
Bromoform	CHBR3	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	CH3BR	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	CL4	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	CLC6H5	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**3.1**	**2.9**	**2.3**	**2.3**	**1.4**
Chloromethane	CH3CL	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorodibromomethane	DBRCLM	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	12DCLE	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	12DCLB	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	13DCLB	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	14DCLB	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	12DCLP	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene, cis	C13DCP	<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
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	CH2CL2	<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
Tetrachloroethylene	TCLEE	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	CCL3F	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	C2H3CL	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0

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.

Last sampling date 6-29-01. System shut down per agreement with Agencies.

TABLE 10-2

SUMMARY OF MONTHLY VOC REMOVAL
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Month	Total Monthly Flow (million gallons)	Total VOC Influent Concentration	Total VOC Effluent Concentration	Total Vocs in Treatment Center (Discharge (g)	Total VOC Mass Removed (g)	Total VOC Mass Removed (lb)
October	22.224	0	0	0.000	0.00	0.00
November	20.417	0	0	0.000	0.00	0.00
December	6.740	(1)	0	0.000	0.00	0.00
January	3.480	0	0	0.000	0.00	0.00
February	20.114	0	0	0.000	0.00	0.00
March	22.242	0	0	0.000	0.00	0.00
April	21.075	0	0	0.000	0.00	0.00
May	22.225	0	0	0.000	0.00	0.00
June	26.677	0	0	0.000	0.00	0.00
July	39.154	(2)	0	0.000	0.00	0.00
August	0.175	(2)	0	0.000	0.00	0.00
September	0.000	(2)	0	0.000	0.00	0.00
Totals	204.523			0.000	0.00	0.00

Notes:
(1) No analytical information was reported for the month of December.
(2) Last sampling collection performed on 6/29/01. System shut down per agreement with Agencies.
Samples were collected and analyzed by Barr Enginering for City of New Brighton.
Calculations based on detected compounds only.
Concentrations in ug/L.

TABLE 10-3

SUMMARY OF OU3 MONITORING REQUIREMENTS
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

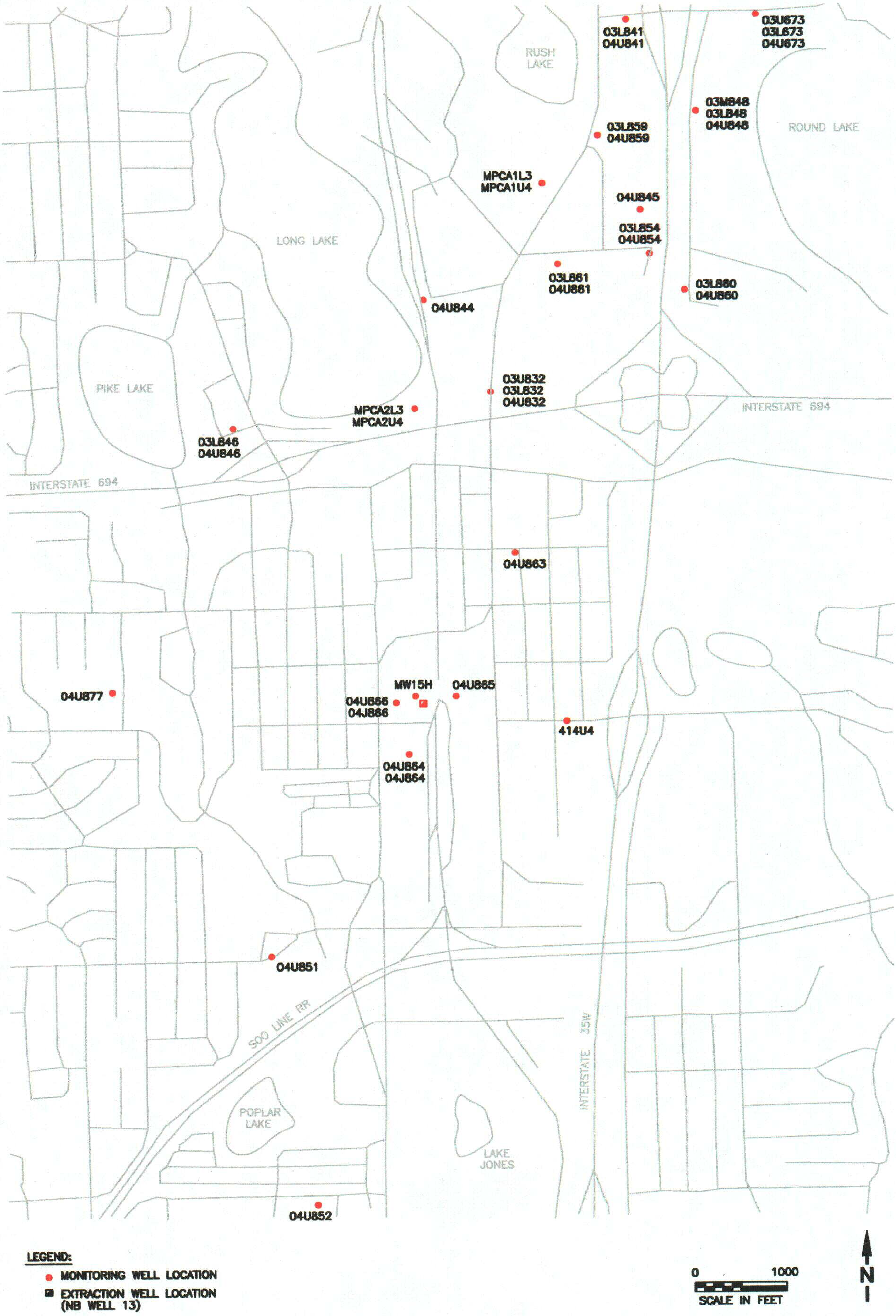
TABLE 10-4
GROUNDWATER QUALITY DATA
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Sample Date*	*111TCE*	*112TCE*	*11DCE*	*11DCLE*	*C12DCE*	*C2H3CL*	*CCL4*	*CH2CL2*	*CHCL3*	*T12DCE*	*TCLEE*	*TRCLE*	TCLTFE	12DCLE
PGRS Cleanup Level (1)		*200*	*3*	*6*	*70*	*70*	--	--	--	--	--	--	*5*	--	--
Quarterly Locations															
04J864	12/19/00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04J864	3/15/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04J864 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.23 JP	<1	<1	<1	<1	<1	<1
04J864 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.22 JP	<1	<1	<1	<1	<1	<1
04J864	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04J866	12/18/00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04J866	3/14/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04J866 D	3/14/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04J866 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.20 JP	<1	<1	<1	<1	<1	<1
04J866	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04J866 D	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U864	12/19/00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04U864	3/15/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04U864 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.19 JP	<1	<1	<1	<1	<1	<1
04U864	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U865	12/19/00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.25 JP	<1	<1
04U865	3/15/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.34 JP	<1	<1
04U865 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U865	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U866	12/19/00	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.44 JP	<1	<1
04U866	3/14/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.67 JP	<1	<1
04U866 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.22 JP	<1	<1	<1	0.43 JP	<1	<1
04U866	9/4/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	0.35JP	<1	<1

TABLE 10-4
GROUNDWATER QUALITY DATA
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	*Sample Date*	*111TCE*	*112TCE*	*11DCE*	*11DCLE*	*C12DCE*	*C2H3CL*	*CCL4*	*CH2CL2*	*CHCL3*	*T12DCE*	*TCLEE*	*TRCLE*	TCLTFE	12DCLE
PGRS Cleanup Level (1)		*200*	*3*	*6*	*70*	*70*	--	--	--	--	--	--	*5*	--	--
Annual Locations															
03L673 V	6/12/01	<1	<1	<1	0.19 JP	1.3	<1	<1	<1 1U	<1	<1	<1	24	<1	<1
03L848 V	6/12/01	<1	<1	<1	<1	0.31 JP	<1	<1	<1 1U	<1	<1	<1	3.5	<1	<1
03L854 V	6/14/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
03L861 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.20 JP	<1	<1	<1	<1	<1	<1
03M848 V	6/11/01	<10	<10	2.5 JP	2.0 JP	20	<10	<10	<10	<10	<10	<10	370	<10	<10
03U673 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U673 V	6/12/01	<1	<1	<1	<1	0.33 JP	<1	<1	<1 1U	<1	<1	<1	2.9	<1	<1
04U832 V	6/14/01	<1	<1	0.24 JP	0.41 JP	0.32 JP	<1	<1	<1 1U	<1	<1	<1	3.5	<1	<1
04U845 V	6/13/01	<1	<1	<1	<1	0.94 JP	<1	<1	<1 1U	<1	<1	<1	4.3	<1	<1
04U848 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	0.49 JP	<1	<1
04U851 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U851 DV	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U852 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	<1	<1	<1
04U859 V	6/13/01	0.53 JP	<1	1.5	2.1	1.1	<1	<1	<1 1U	<1	<1	<1	8.4	<1	<1
04U860 V	6/12/01	<1	<1	<1	<1	<1	<1	<1	0.23 JP	<1	<1	<1	<1	<1	<1
04U861 V	6/11/01	0.34JP	<1	0.85JP	1.3	6.6	<1	<1	0.31 JP	<1	<1	<1	19	<1	<1
04U863 (2)	12/18/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	0.47 JP	<1	<1
04U863 D	12/18/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	0.48 JP	<1	<1
04U863 V	6/14/01	<1	<1	<1	<1	<1	<1	<1	<1 1U	<1	<1	<1	0.22 JP	<1	<1
04U414 (2)	12/19/01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
04U414 V	6/11/01	<1	<1	<1	<1	<1	<1	<1	0.20 JP	<1	<1	<1	<1	<1	<1
MW15H	6/29/01	<1	<1	<1	<1	<1	<1	<1	0.21 JP	<1	<1	<1	<1	<1	<1

Notes:
D - Duplicate analysis
J - Value Estimated
P - Results less than reporting level but greater than instrument detection limit
V - Sample arrived at laboratory with cooler temp. between 6° C and 9° C
(1) Clean up from OU3 ROD
(2) Wells also sampled in December 2001
1U - Non-detect, trip blank yielded concentrations of compound



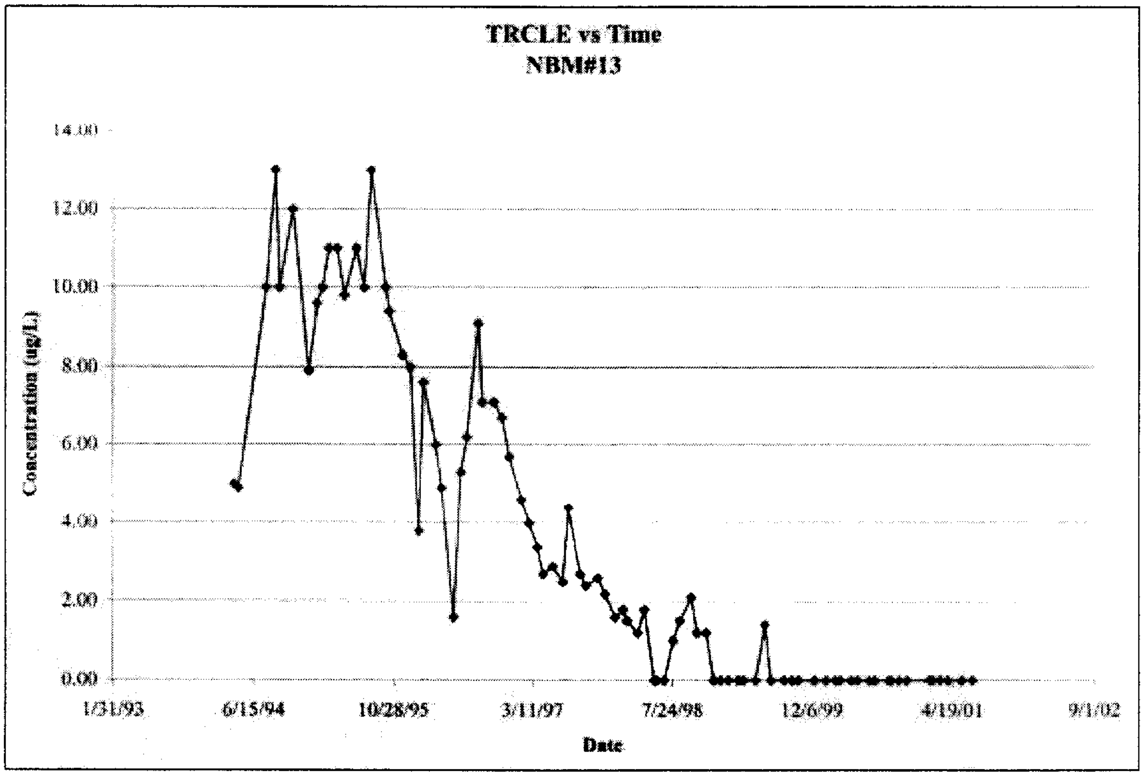
SECOR
INTERNATIONAL INCORPORATED
4463 WHITE BEAR PARKWAY, SUITE 106
WHITE BEAR LAKE, MINNESOTA 55110

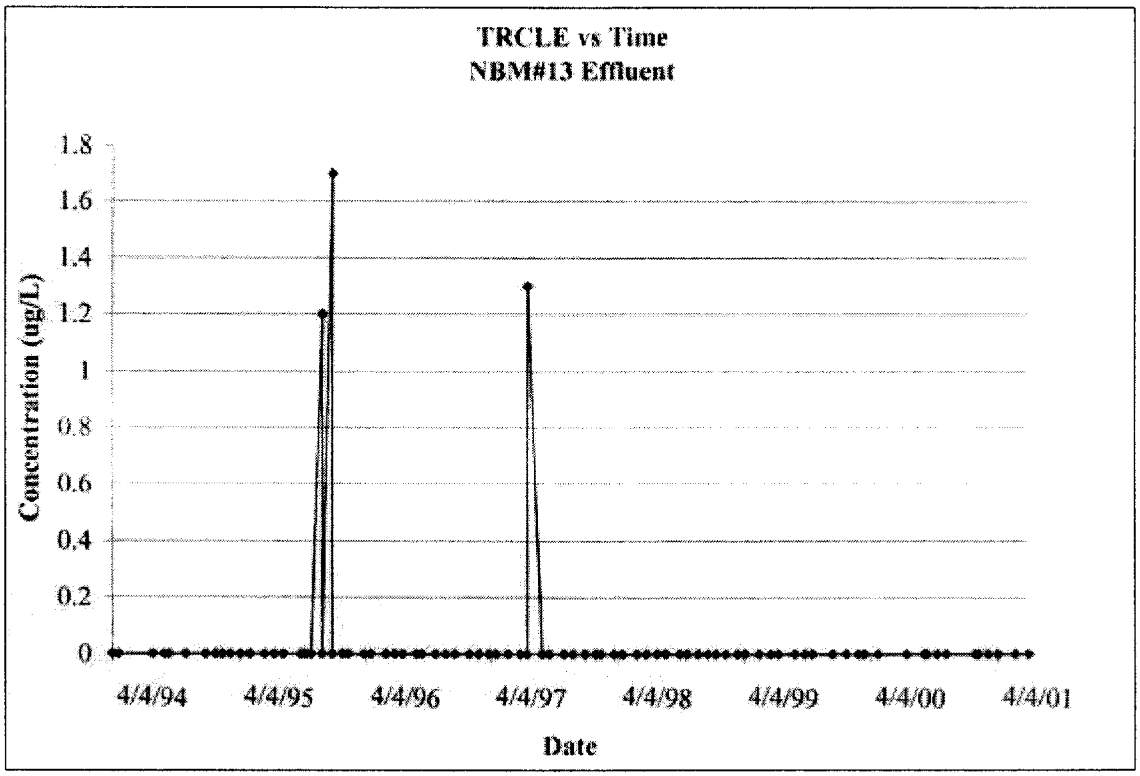
TWIN CITY ARMY AMMUNITION PLANT
ARDEN HILLS, MINNESOTA

OU3 (PGRS) SITE PLAN

SECOR PROJECT #: 003.18508.262 | FILENAME: SITE-03 | DATE: 01/08/02

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

FIGURE 10-2

SECOR PROJECT #: 003.18508.262	FILENAME: SITE-06	DATE: 01/11/02

11.0 Other Installation Restoration Activities During FY 2001

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

12.0 References

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

A.1 FY 2001 – FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Unit Designations

01U - Upper Fridley Formation	03L - Lower Hillside Formation	SL - St. Lawrence
01L - Lower Fridley Formation	SP - St. Peter	UNK - Unknown
03U - Upper Hillside Formation	PC - Prairie du Chien	
03M - Middle Hillside Formation	J - Jordan	

Notes:

(A) Indicates that the monitoring is the responsibility of Alliant Techsystems Inc., the tenant.

(B) Indicates that the monitoring is the responsibility of the U.S. Army.

(1) "L (A or B)" denotes a water level measurement by the appropriate party.

(2) "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 quarterly from September 2000 through June 2001 (Sept., Dec., March, June), due to shutting off "second line" of Site A extraction wells. MPCA approved elimination of the quarterly sampling requirement after the September 2001 sampling event.

(6) Sample quarterly during operation of Site A AS/SVE system.

(7) Quarterly water levels and water quality of the Site K Upper Unit 3 Sentinel Well for one year following the February 2000 installation date.

(8) Quarterly water levels and water quality for FY 2000 through FY 2003 only (Dec., March, June, and Sept.).

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
Operable Unit 1											
01U	01U807			---	---	---	---	---	---	---	
01U	01U813			---	---	---	---	---	---	---	
01L	01L813			---	---	---	---	---	---	---	
01L	01L816			---	---	---	---	---	---	---	
01L	01L821			---	---	---	---	---	---	---	
01L	01L822			---	---	---	---	---	---	---	
01L	01L823			---	---	---	---	---	---	---	
03U	03U811			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	3.b	
03U	03U815			---	---	---	---	---	---	---	
03U	03U821			---	---	---	---	---	---	---	
03U	03U822			Q,L(B)		Q,L(B)	---	Q,L(B)	1.a, OR	None	
03U	03U824			---	---	---	---	---	---	---	Sealed 2000
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	03L813			---	---	---	---	---	---	---	
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)	---	Q,L(B)	---	Q,L(B)	OR	None	
03L	03L856			---	---	---	---	---	---	---	
03L	03L858			---	---	---	---	---	---	---	Sealed 2001
03L	409546	PCA2L3		---	---	---	---	---	---	---	
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			---	---	---	---	---	---	---	
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			---	---	---	---	---	---	---	
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	
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)	---	---	---	---	One-time event (missed '01)
PC	200154	UM Golf Course		Q (B)	---	Q (B)	---	Q (B)	1.a, OR	---	
PC	206688	Cloverpond		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	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
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	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	04J882			Q,L(B)	---	Q,L(B)	---	Q,L(B)	OR	None	
J	200524	St. Anthony #5	(4)	Q	---	Q(B)	---	Q(B)	OR	---	Army gets St. Anthony Data
J	200803	St. Anthony #4	(4)	Q	---	Q(B)	---	Q(B)	OR	---	Army gets St. Anthony Data
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	---	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	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	
PC/J/SL	233221	R & D Systems		---	-	---	---	---	---	---	No longer in operation
UNK	234546	Hnywell Ridgway		Q(B)	---	Q(B)	---	Q(B)	OR	---	

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
Operable Unit 2											
Site A Removal Action											
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		(6)	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		(6)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U109			---	---	---	---	---	---	---	Sealed 1999
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			L(B)	L(B)	L(B)	L(B)	L(B)	---	2.b	
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			L(B)	L(B)	L(B)	L(B)	L(B)	---	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	
01U	01U138			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U139		(5)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U140		(5)	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	01U142	Piezometer		---	---	---	---	---	---	---	
01U	01U143	Piezometer		---	---	---	---	---	---	---	
01U	01U144	Piezometer		---	---	---	---	---	---	---	
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		(6)	Q,L(B)	Q,L(B)	---	---	---	OR	2.b	
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

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
01U	01U355	EW-5	(5)								See Appendix A.2
01U	01U356	EW-6	(5)								See Appendix A.2
01U	01U357	EW-7	(5)								See Appendix A.2
01U	01U358	EW-8									See Appendix A.2
01U	01U901			Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	
01U	01U902		(5)	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		(5)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	Q,L(B)	OR	2.b	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
Site I Remedial Action											
01U	01U004			---	---	---	---	---	---	---	
01U	01U054			---	---	---	---	---	---	---	
01U	01U064			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U132			---	---	---	---	---	---	---	
01U	01U631			---	---	---	---	---	---	---	
01U	01U632			---	---	---	---	---	---	---	
01U	01U634			---	---	---	---	---	---	---	
01U	01U635			---	---	---	---	---	---	---	
01U	01U636			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	01U638			---	---	---		---	---	---	
01U	01U639			Q,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	01U642			---	---	---	---	---	---	---	
01U	01U652			---	---	---	---	---	---	---	
01U	01U666			---	---	---	---	---	---	---	
01U	01U667			---	---	---	---	---	---	---	
01U	01U668			---	---	---	---	---	---	---	
01U	01U675			---	---	---		---	---	---	
01U	482086	101MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482087	105MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482088	102MW		Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	1a, OR	1a, OR	
01U	482089	104MW		L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	
01U	482090	103MW		L(A)	L(A)	L(A)	L(A)	L(A)	---	1a, OR	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	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			L(A)	L(A)	L(A)	L(A)	L(A)	-	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			L(A)	L(A)	L(A)	L(A)	L(A)		3.a	
01U	01U621			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	
01U	01U622			---		---	---	---	---	---	
01U	01U623			---	-	---	---	---	---	---	
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	
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		(7)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	3.a	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
TCAAP Groundwater Recovery System											
03F	03F302	B1									See Appendix A.2
03F	03F303	B2									See Appendix A.2
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									See Appendix A.2
03F	03F312	B11									See Appendix A.2
03U	03U001			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U002			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U003			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U004			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U005			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U006			---	---	---	---	---	---	---	Sealed 2000
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	
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)	---	L(A)	---	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			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U088			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U089			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U090			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U092			L(A)	---	L(A)	---	L(A)	---	1.a	
03U	03U093			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	
03U	03U094			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	1.a	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
03U	03U096			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03U	03U097			---	---	---	---	---	---	---	
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	
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	03U124			---	---	---	---	---	---	---	
03U	03U129			---	---	---	---	---	---	---	
03U	03U301	SC1									See Appendix A.2
03U	03U314	SC2									See Appendix A.2
03U	03U315	SC3									See Appendix A.2
03U	03U316	SC4									See Appendix A.2
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)	OR	1.a	
03U	03U715			L(A)	---	L(A)	---	L(A)	---	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		---	---	---	---	---	---	---	
03U	519289	E102-MW		---	---	---	---	---	---	---	
03U	519290	E103-MW		---	---	---	---	---	---	---	
03U	519291	1291501-MW		---	---	---	---	---	---	---	
03M	03M001			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M002			L(A)	---	L(A)	---	L(A)	---	1.a	
03M	03M003			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	

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
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)	OR	1.a	
03M	03M806			L(A)	---	L(A)	---	L(A)	---	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			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	
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			L(A)	---	L(A)		L(A)	---	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	03L086			---	---	---	---	---	---	---	
03L	03L091			---	---	---	---	---	---	---	
03L	03L113			L(A)	---	L(A)		L(A)	---	1.a	
03L	03L137			---	---	---	---	---	---	---	
03L	03L138			---	---	---	---	---	---	---	
03L	03L802			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	1.a	
03L	03L806			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			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	
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)	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)	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	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
J	04J077			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	La	
J	04J702			Q,L(A)	-	Q,L(A)	---	Q,L(A)	OR	La	
J	04J708			Q,L(A)		Q,L(A)	---	Q,L(A)	OR	La	
J	04J713			Q,L(A)		Q,L(A)	---	Q,L(A)	OR	La	
J	04J714			L(A)		L(A)	---	L(A)	---	La	
PC/J	PJ#003			L(A)	--	L(A)	---	L(A)		La	
PC/J	PJ#027			L(A)		L(A)	---	L(A)		La	
PC/J	PJ#074			---	--	---	---	---		--	
PC/J	PJ#309	B8									See Appendix A.2
PC/J	PJ#310	B9									See Appendix A.2
PC/J	PJ#311	B10									See Appendix A.2
PC/J	PJ#313	B12									See Appendix A.2
PC/J	PJ#501	TCAAP #1		---	---	---	---	---		---	
PC/J	PJ#502	TCAAP #2		---	---	---	---	---			
PC/J	PJ#503	TCAAP #3		---	--	---	---	---	--	--	
PC/J	PJ#802			L(A)		L(A)	---	L(A)		La	
PC/J	PJ#806			Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	La	
SG	Staff Gauges			L(A)	--	L(A)	---	L(A)		--	

Well Information				Combined Water Level/ Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments

Unit 1 Wells

Unit	Well I.D.	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
01U	01U003			---	---	---	---	---	---	---	
01U	01U011			---	---	---	---	---	---	---	
01U	01U012			---	---	---	---	---	---	---	
01U	01U022			---	---	---	---	---	---	---	
01U	01U033			---	---	---	---	---	---	---	
01U	01U034			---	---	---	---	---	---	---	
01U	01U035			---	---	---	---	---	---	---	
01U	01U036			---	---	---	---	---	---	---	
01U	01U037			---	---	---	---	---	---	---	
01U	01U043			---	---	---	---	---	---	---	
01U	01U044			---	---	---	---	---	---	---	
01U	01U045			---	---	---	---	---	---	---	
01U	01U046			---	---	---	---	---	---	---	
01U	01U050			---	---	---	---	---	---	---	
01U	01U051			---	---	---	---	---	---	---	
01U	01U053			---	---	---	---	---	---	---	
01U	01U054			---	---	---	---	---	---	---	
01U	01U060			---	---	---	---	---	---	---	
01U	01U062			---	---	---	---	---	---	---	
01U	01U072			---	---	---	---	---	---	---	
01U	01U085			---	---	---	---	---	---	---	
01U	01U098			---	---	---	---	---	---	---	
01U	01U100			---	---	---	---	---	---	---	
01U	01U101			---	---	---	---	---	---	---	
01U	01U122			---	---	---	---	---	---	---	
01U	01U130			---	---	---	---	---	---	---	
01U	01U131			---	---	---	---	---	---	---	
01U	01U524			---	---	---	---	---	---	---	
01U	01U525			---	---	---	---	---	---	---	
01U	01U526			---	---	---	---	---	---	---	
01U	01U527			---	---	---	---	---	---	---	
01U	01U803			---	---	---	---	---	---	---	
01U	01U805			---	---	---	---	---	---	---	
01U	01U806			---	---	---	---	---	---	---	
01L	01L811			---	---	---	---	---	---	---	

Appendix A.1

FY 2001 - FY 2005 Monitoring Plan for Groundwater Monitoring Wells

Well Information				Combined Water Level/Water Quality Plan (1,2)					Purpose For Monitoring (3)		
Unit	Well I.D	Common Name	Notes	Jun 01	Jun 02	Jun 03	Jun 04	Jun 05	Water Quality	Water Level	Comments
Operable Unit 3											
03U	03U673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03U	03U832			---	---	--	---	---	---	---	
03M	03M848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03L	03L673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03L	03L832			---	---	--	---	---	---	---	
03L	03L848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03L	03L854			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03L	03L859			L(A)	---	L(A)	---	L(A)	---	La	
03L	03L860			L(A)	---	L(A)	---	L(A)	---	La	
03L	03L861			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
03L	476837	MW15H		Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U414	414U4		Q,L(A)	---	--	---	---	---	---	
PC	04U673			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U832			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U845			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U848			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U851			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U852			Q,L(A)	--	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U854			L(A)	---	L(A)	---	L(A)	---	La	
PC	04U859			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U860			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U861			Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U863	323U4		Q,L(A)	---	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U864	324U4	(8)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	La	
PC	04U865	325U4	(8)	Q,L(A)	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	La	
PC	04U866	326U4	(8)	Q,L(A)	Q,L(A)	Q,L(A)	---	L(A)	OR	La	
PC	520931	NBM #13									See Appendix A.2
J	04J864	324J	(8)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	Q,L(A)	OR	La	
J	04J866	326J	(8)	Q,L(A)	Q,L(A)	Q,L(A)	---	Q,L(A)	OR	La	

Appendix A.2
FY 2001 - FY 2005 Monitoring Plan for Remedial Treatment Systems

OU1: DEEP GROUNDWATER(1)

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

OU2: SITES D & G SOIL VAPOR EXTRACTION (SVE) SYSTEMS [Only if Operating!]

Location	Sampling Frequency	Parameters
• Site D	- N/A (dismantled)	
• Site G	- Monthly	- Flowrate, C12DCE, TRCLE, 111TCE

OU2: SITE A SHALLOW GROUNDWATER

Location	Sampling Frequency	Parameters
• Extraction Wells 01U351-01U354 (4)	- Monthly	- Pumping Volumes
	- Monthly	- Water Levels
	- Annual	- Water Quality (2)
• Extraction/Discharge System Effluent	- Monthly	- C12DCE, T12DCE, TRCLE, 111TCE, HG (3)

OU2: SITE A AIR SPARGING/SVE SYSTEM [Only if Operating!]

Location	Sampling Frequency	Parameters
• SVE Emissions	- Twice per Month	- Flowrate and Organic Vapor (PID)
	- Annually	- USEPA Method TO14 List

OU2: SITE K REMEDIAL ACTION

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

OU2: TCAAP GROUNDWATER RECOVERY SYSTEM (TGRS)

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

OPERABLE UNIT 3 PLUME GROUNDWATER RECOVERY SYSTEM (PGRS) [Not Operating]

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

NOTE:
(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).
(4) 01U355 - 01U358 are not operating and are not being sampled or monitored for water levels.

Appendix A.3

FY 2001 - FY 2005 Monitoring Plan for Surface Water

Analysis	Analytical Method	Units	Outfall 010 Site K Effluent	20700 Rice Crk In	20800 Rice Crk Out
Flow Rate	- -	M gal/day	Continuous	- -	- -
Total Flow	- -	M gal	M	- -	- -
pH	(field)		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	7761	ug/l	Q	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-Dichloroether	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 = Analysis 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 01U103, 01U902 and 01U904 on an annual basis.

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:
Volatile Organic Compounds: SW-846 Method 8260B
Antimony: SW-846 Method 6020

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. Well designations consist of six characters, such as 03U093. The first two characters represent the hydrogeologic unit in which the well is completed, as follows:

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

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

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

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

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

Off-TCAAP wells installed by parties other than USAEC, TCAAP, or Alliant Techsystems Inc. are designated by their Minnesota unique number. A well-designation cross-reference guide is included as Tables B-1 and B-2, which lists all wells of concern, the USAEC designation or Minnesota unique number, and any other name(s) the wells may have. 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

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 "find" function, which will highlight the desired 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 with the mouse.

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 HOM	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 & STORA	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	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		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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	MON		
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 W	OFF	IND		
223992		BOOM ISLAND	OFF	IND		
225886		FRANKLIN STEEL SQUARE	OFF	P.S.		
225905		ST PAUL TERM. WAREHOUSE	OFF	IND		
225906		ST PAUL TERM. WAREHOUSE	OFF	IND		
231741		LABELLE	OFF	UN		
231742	04U510	GRENADE PLANT PROOF RAN	ON	IND		
231845		MNDOT CIVIL DEFENSE TRAI	ON/OFF	P.S.		
231854	03L522	ARSENAL GRAVEL PIT	ON	ABAND :	✓	
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		

TABLE B-1
TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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 ARCHITECTURA	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		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
242207		SUNSET MEMORIAL CEMETA	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	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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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		
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		

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SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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		

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Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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.		
538044	01U150		ON	PIEZ.		
538045	01U151		ON	PIEZ.		
538046	01U152		ON	PIEZ.		
538047	01U153		ON	PIEZ.		
538048	01U154		ON	PIEZ.		
538049	01U155		ON	PIEZ.		
538050	01U156		ON	PIEZ.		
538051	01U351		ON	REM		
538052	01U352		ON	REM		
538053	01U353		ON	REM		
538054	01U354		ON	REM		
538055	01U355		ON	REM		
538056	01U356		ON	REM		
538057	01U357		ON	REM		
538058	01U358		ON	REM		
538059	01U904		OFF	MON		
538060	01U903		OFF	MON		
538062	01U157		ON	MON		
538063	01U158		ON	MON		
	PJ#006		ON	MON		
	01U131					

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TCAAP WELL INDEX
SORTED BY UNIQUE NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
	01U132					
	01U142					
	01U143					
	01U144					
	03U301	SC-1	ON	REM		
	03L306		ON	MON		
	03U315	SC-3		REM		
	01U653			MON		
554216		NEW BRIGHTON #14	OFF	MUNI		
	03U674	OW541U3	ON	MON		
	01U675					
	03U675					
	03U676	OW543U3	ON	MON		
	04U842			MON		
	03L843	303L3	OFF	MON		
		MW15D	OFF	MON		
		MW15S	OFF	MON		
		Staff Gauge 1				
		Staff Gauge 2				
		Staff Gauge 3				
582628		NEW BRIGHTON #15	OFF	MUNI		
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		

TABLE B-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
424055	01L811	H1L1	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		
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		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		ON	REM		
538052	01U352		ON	REM		
538053	01U353		ON	REM		
538054	01U354		ON	REM		
538055	01U355		ON	REM		
538056	01U356		ON	REM		
538057	01U357		ON	REM		
538058	01U358		ON	REM		
236194	01U524	FA4U1	ON	PIEZ.		
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		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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
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		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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	MON		
453831	03M713		ON	MON		
426818	03M802	T2M3	OFF	TEST		
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		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
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 RAN	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		
426854	04U844	304U4	OFF	TEST		

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TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
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		
127537		MIDWEST ASPHALT	OFF	DOM		
134318		LORENZ W SEUTTER	OFF	DOM		
139035		WATERGATE MARINA	OFF	P.S.		
151568		ARDEN MANOR MOBILE HON	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	✓	

TABLE B-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

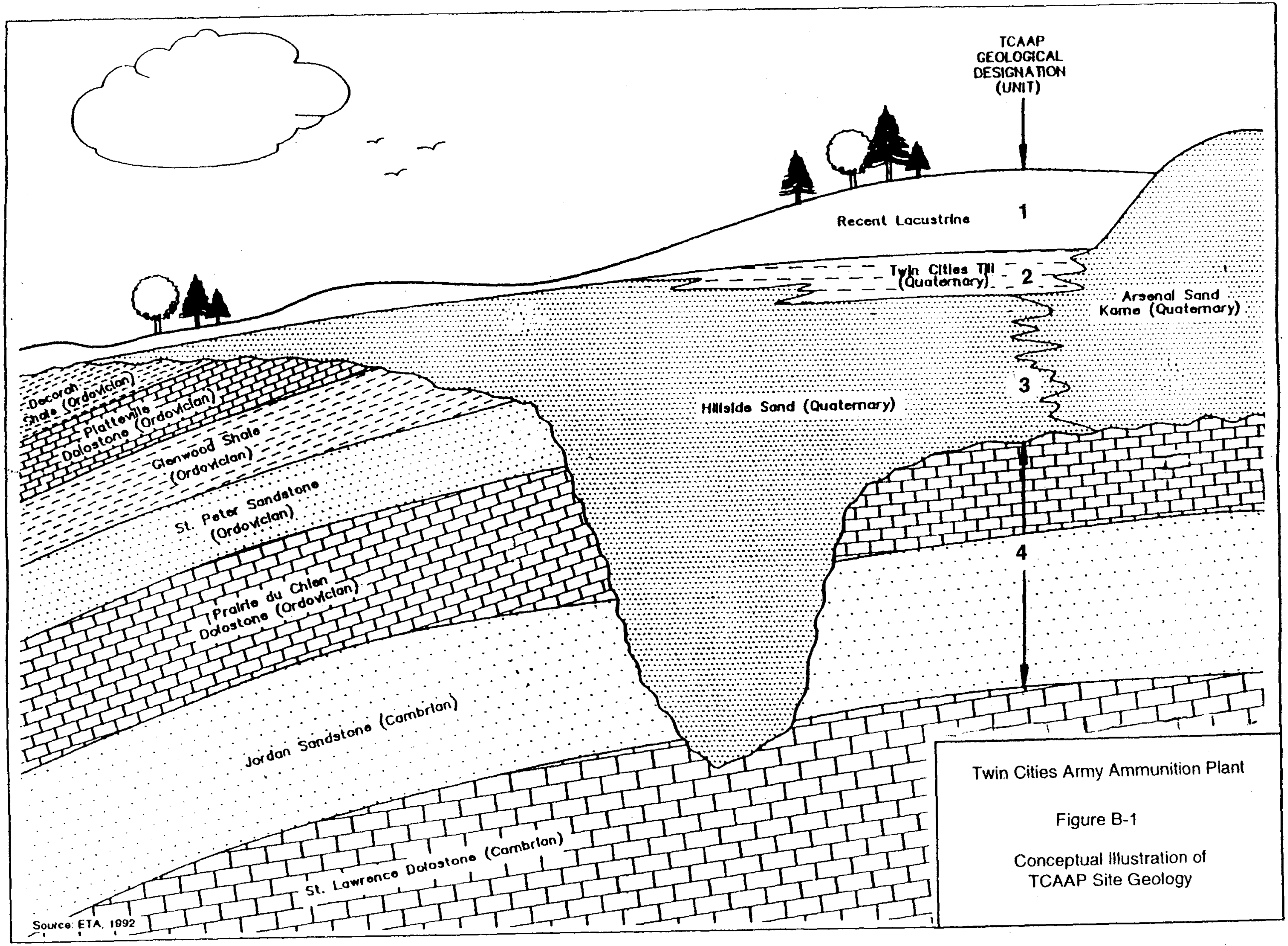
Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
200072		WITTE TRANSPORTATION	OFF	IND	✓	
200073		WILSON TRANSFER & STORA	OFF	IND		
200074		ASBESTOS PROD	OFF	IND	✓	
200075		PHILLIPS PETROLEUM	OFF	IND	✓	
200076		OLD DUTCH FOODS INC	OFF	IND		
200077		JOHN CONLIN	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	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.		
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 W	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-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
231845		MNDOT CIVIL DEFENSE TRAI	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		
234547		HONEYWELL RIDGEWAY	OFF	UN		
234549		REINER	OFF	IRR		
235539		OLD HOTEL	OFF	UN		
235557		HIDDEN FALLS PARK W.WEL	OFF	P.S.		
235619		SHRINERS HOSPITAL	OFF	P.S.		
235735		FLOUR CITY ARCHITECTURA	OFF	COM		
236122		NWR	OFF	ABAND		
242162		301PB	OFF	UN		
242207		SUNSET MEMORIAL CEMETA	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		

TABLE B-2
TCAAP WELL INDEX
SORTED BY IRDMIS NUMBER

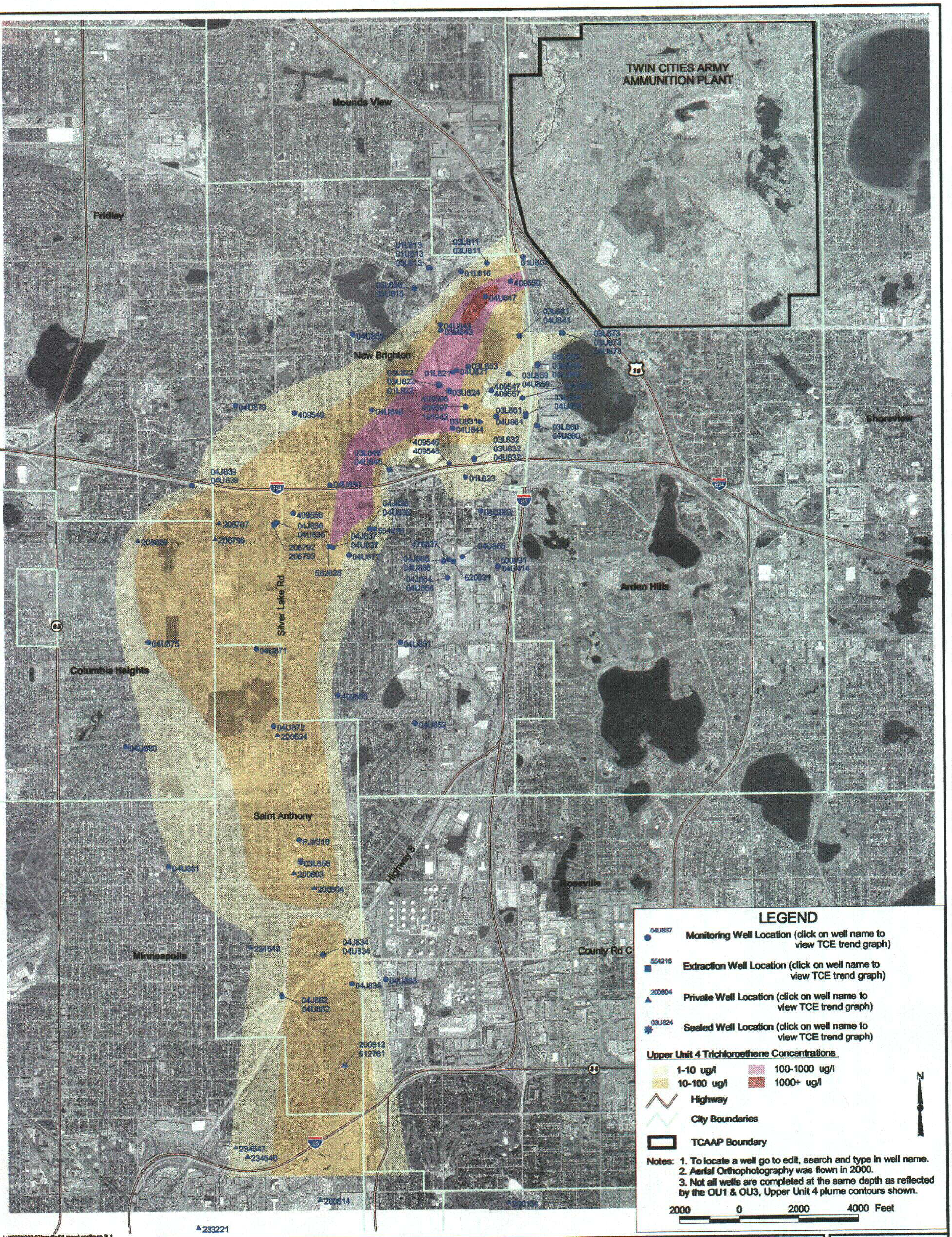
Minnesota Unique #	IRDMIS #	Common Name	Well Location	Well Type	Well Sealed	Second Unique #
409596		B118U3	OFF	MON		
409597		B118L3	OFF	IND		
409598		B117U3	OFF	ABAND		
416143			OFF	ABAND		
416198		311U4	OFF	MON		
420713		HERBST LANDFILL	OFF	MON		
476387		MW15H	OFF	MON		
482083		K04-MW	ON	MON		
482084		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		
		MW15D	OFF	MON		
		MW15S	OFF	MON		
		Staff Gauge 1				
		Staff Gauge 2				
		Staff Gauge 3				



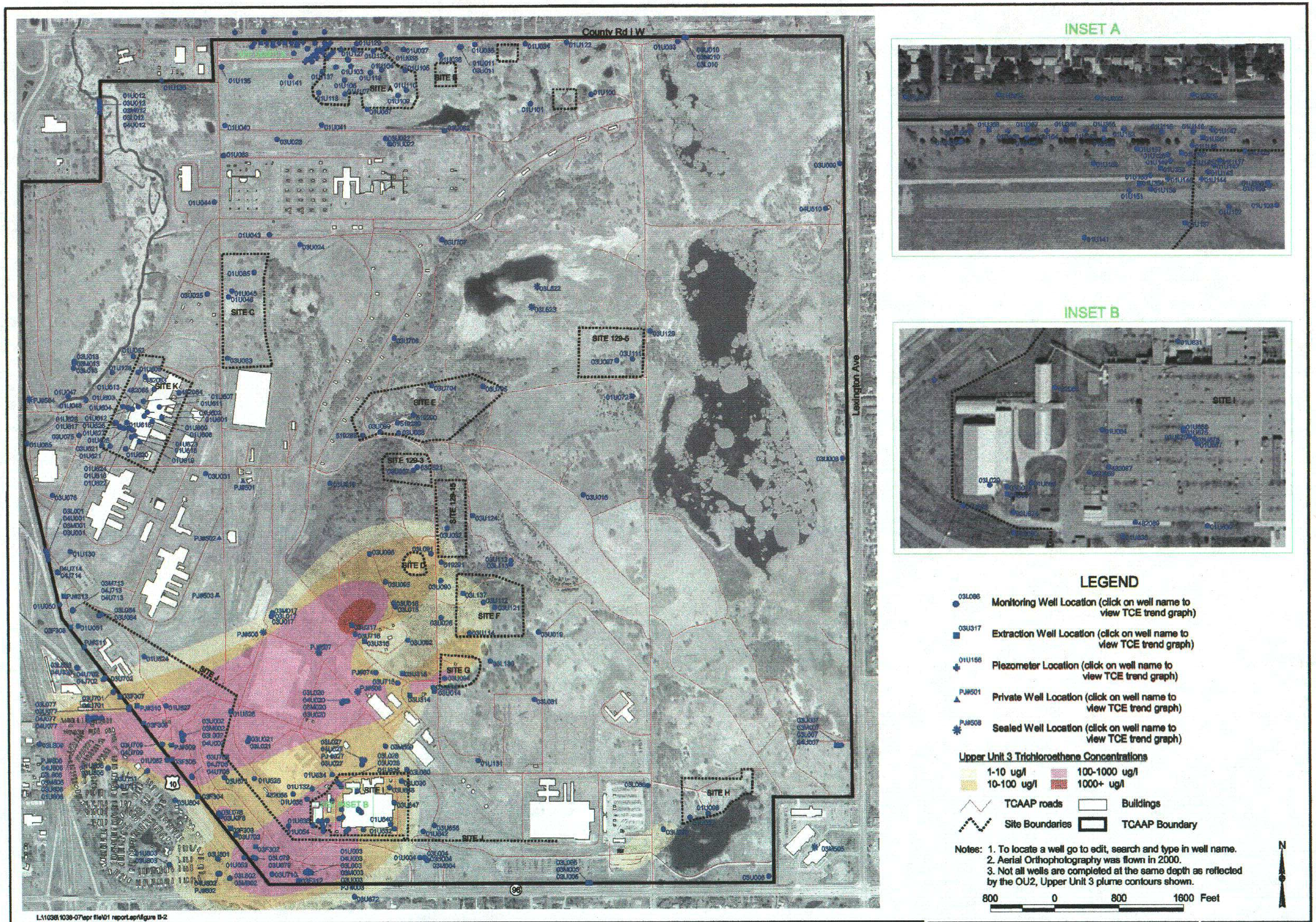
Twin Cities Army Ammunition Plant

Figure B-1

Conceptual Illustration of
TCAAP Site Geology



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2001
OU1 & OU3, Well Location and TCE History Map	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure B-2



L:\1038\1038-07\apr file\01 report.apr\figure B-2

TWIN CITIES ARMY AMMUNITION PLANT

OU2 Well Location and TCE History Map

Wenck

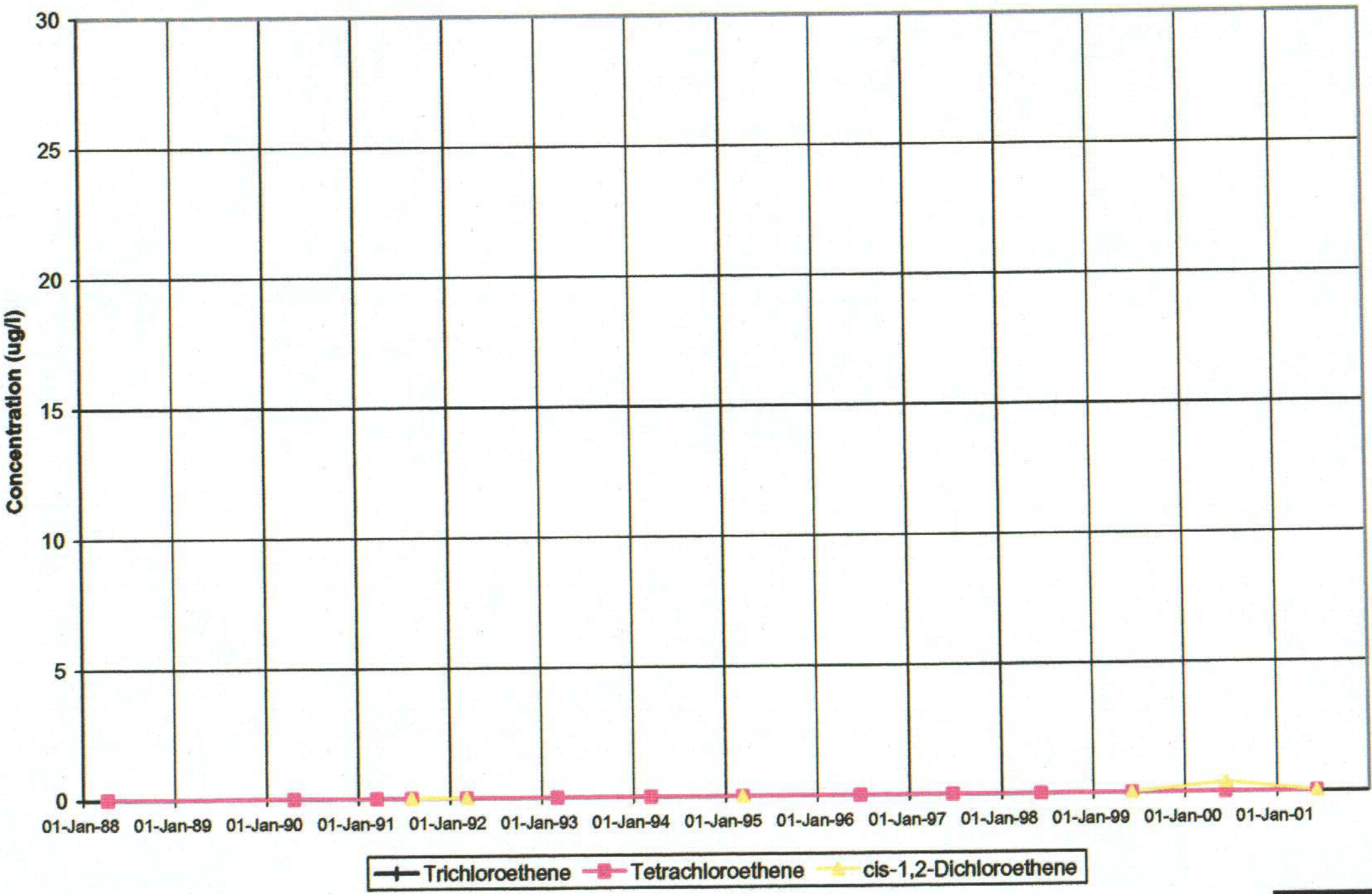
Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2001

Figure B-3

01U039



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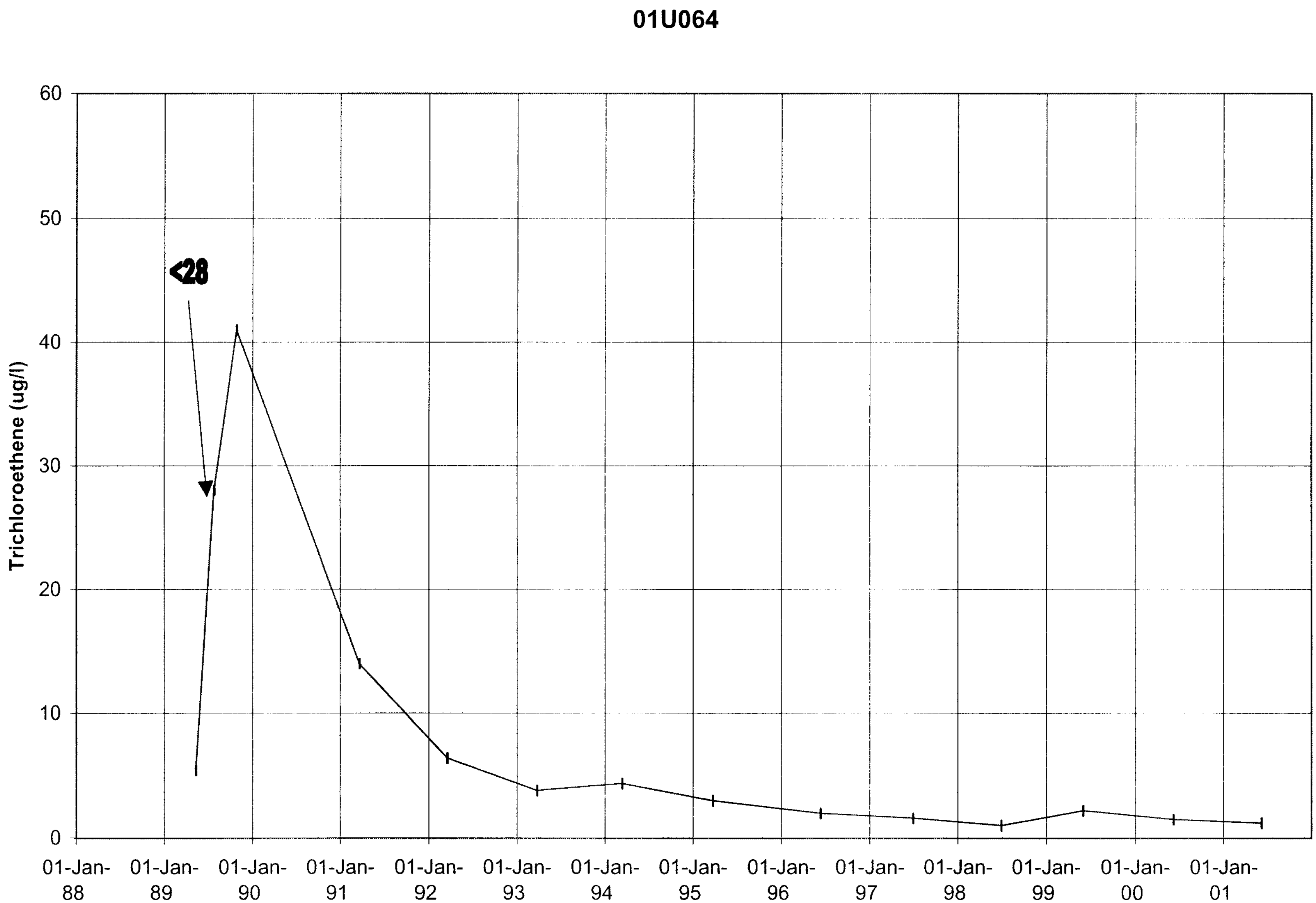
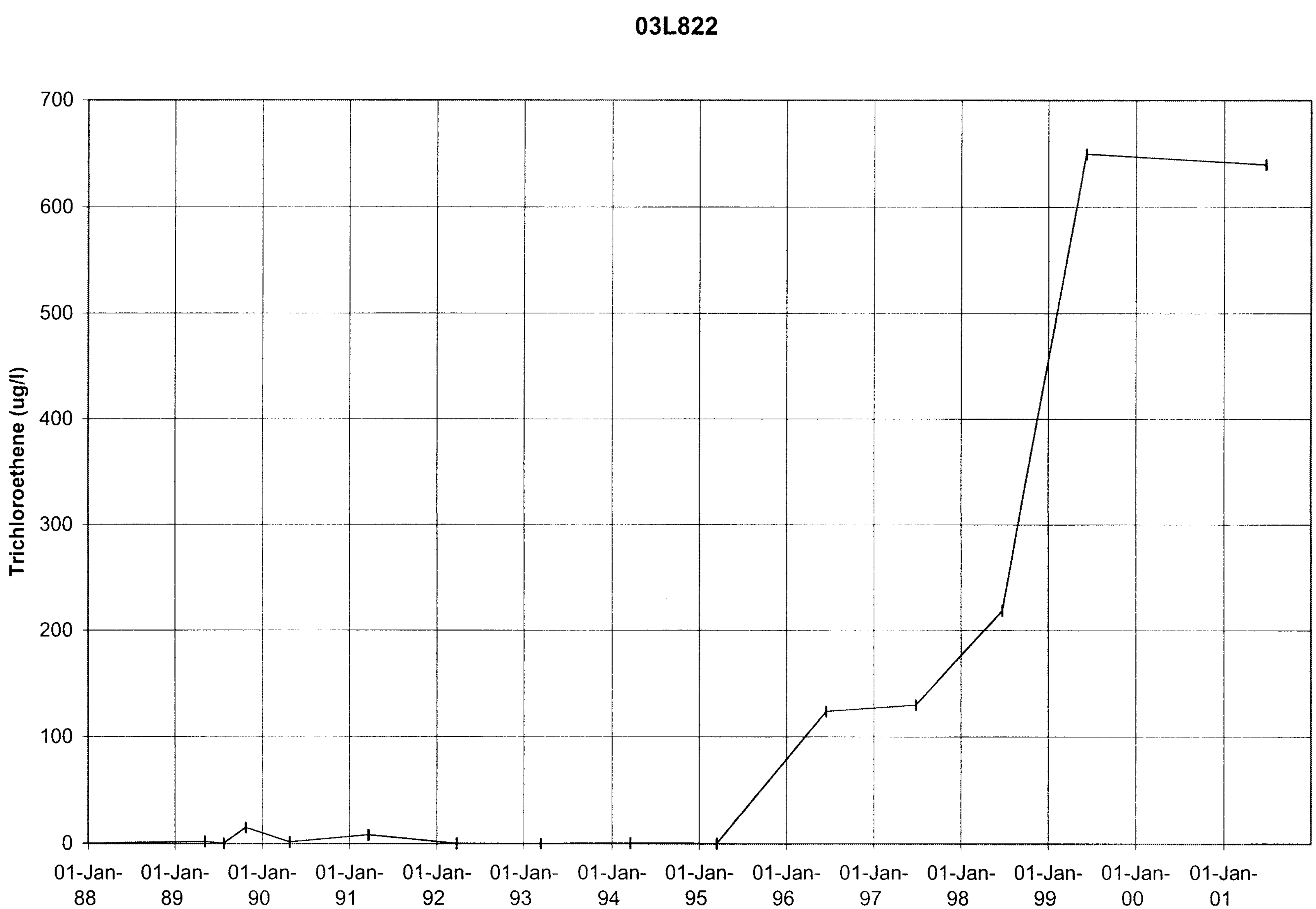


01U064
Trichloroethene (ug/l)
60
50
40
30
20
10
0
<28
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map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Trichloroethene (ug/l)
700
600
500
400
300
200
100
0
01-Jan-88
01-Jan-89
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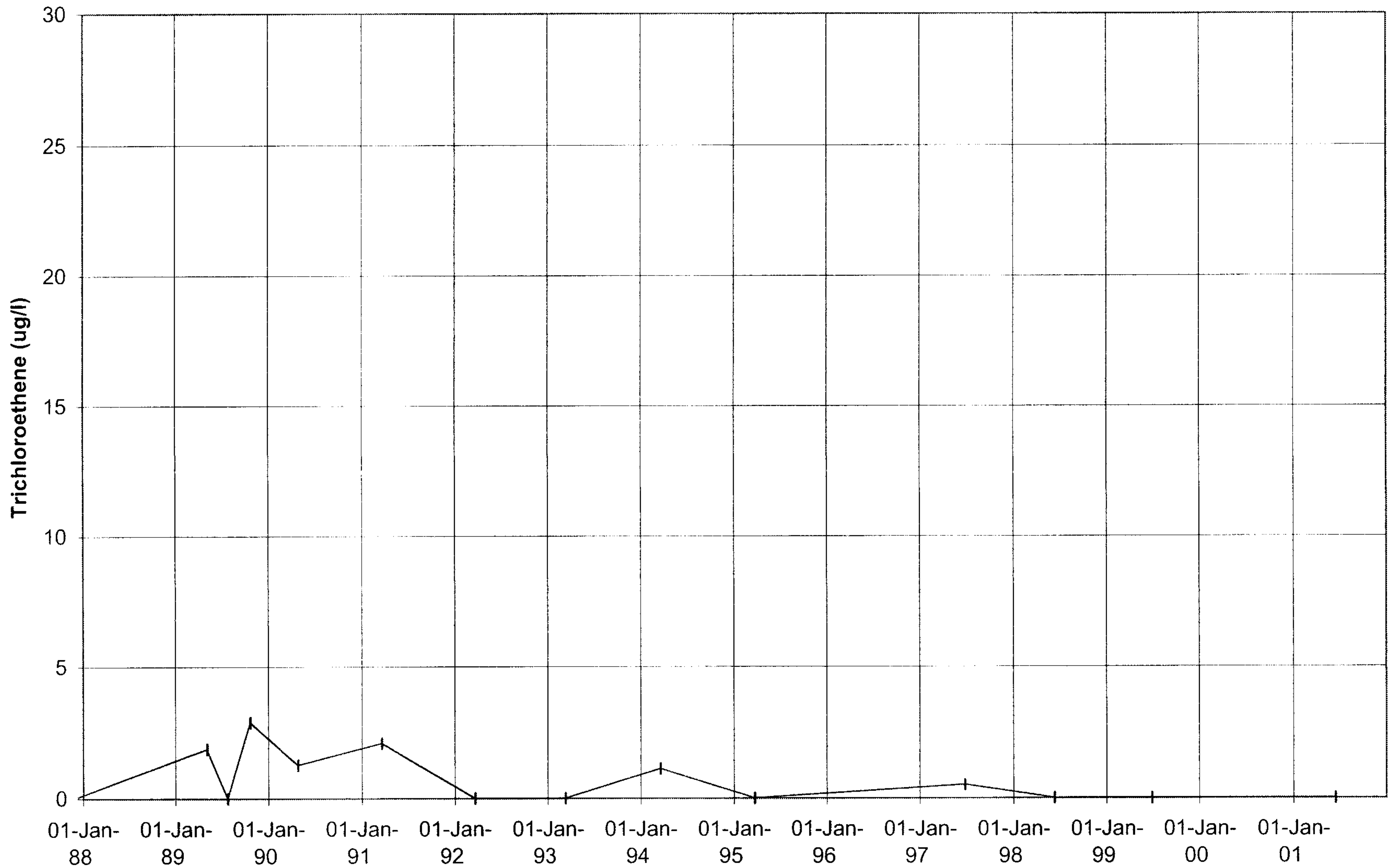
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03L811



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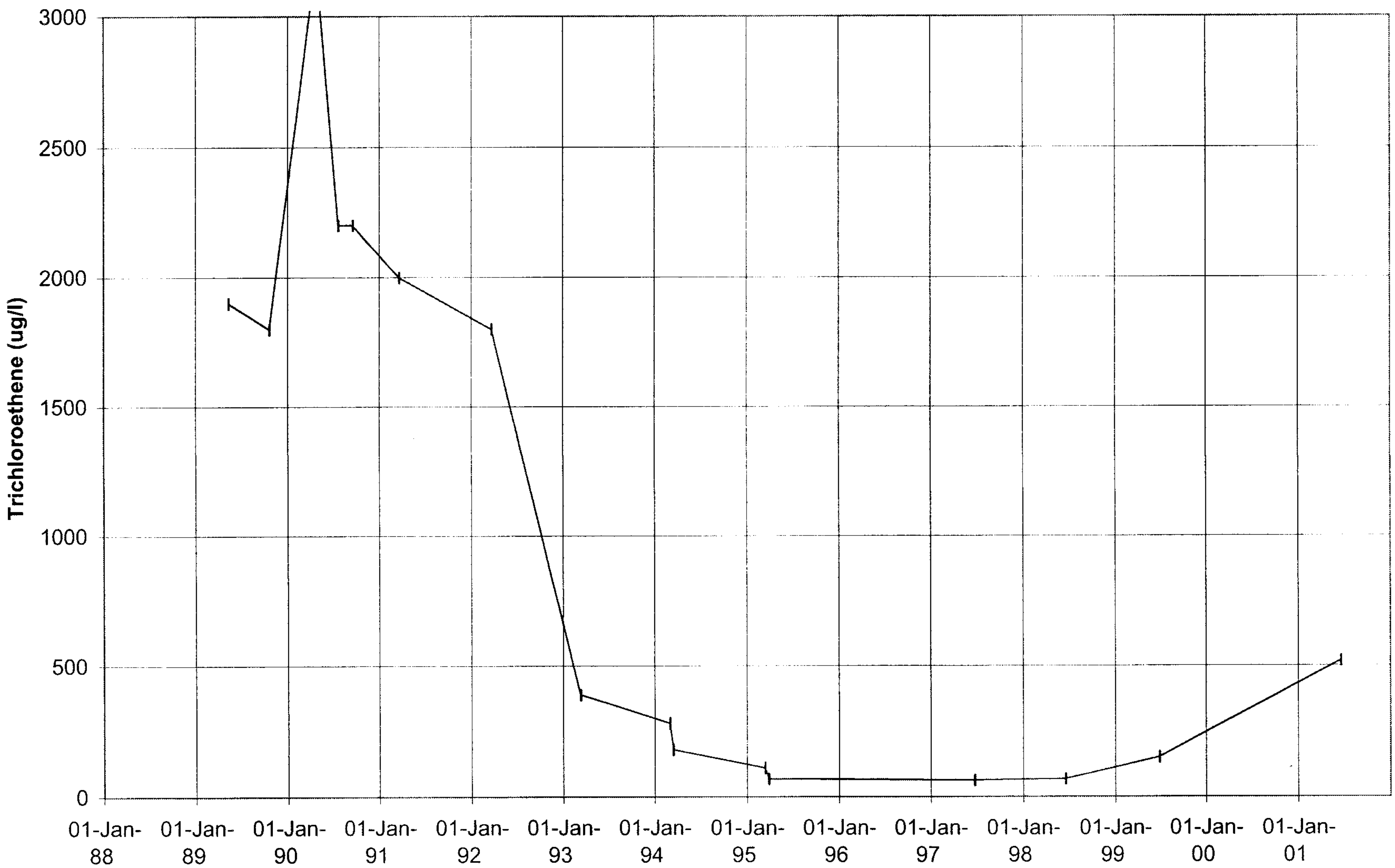

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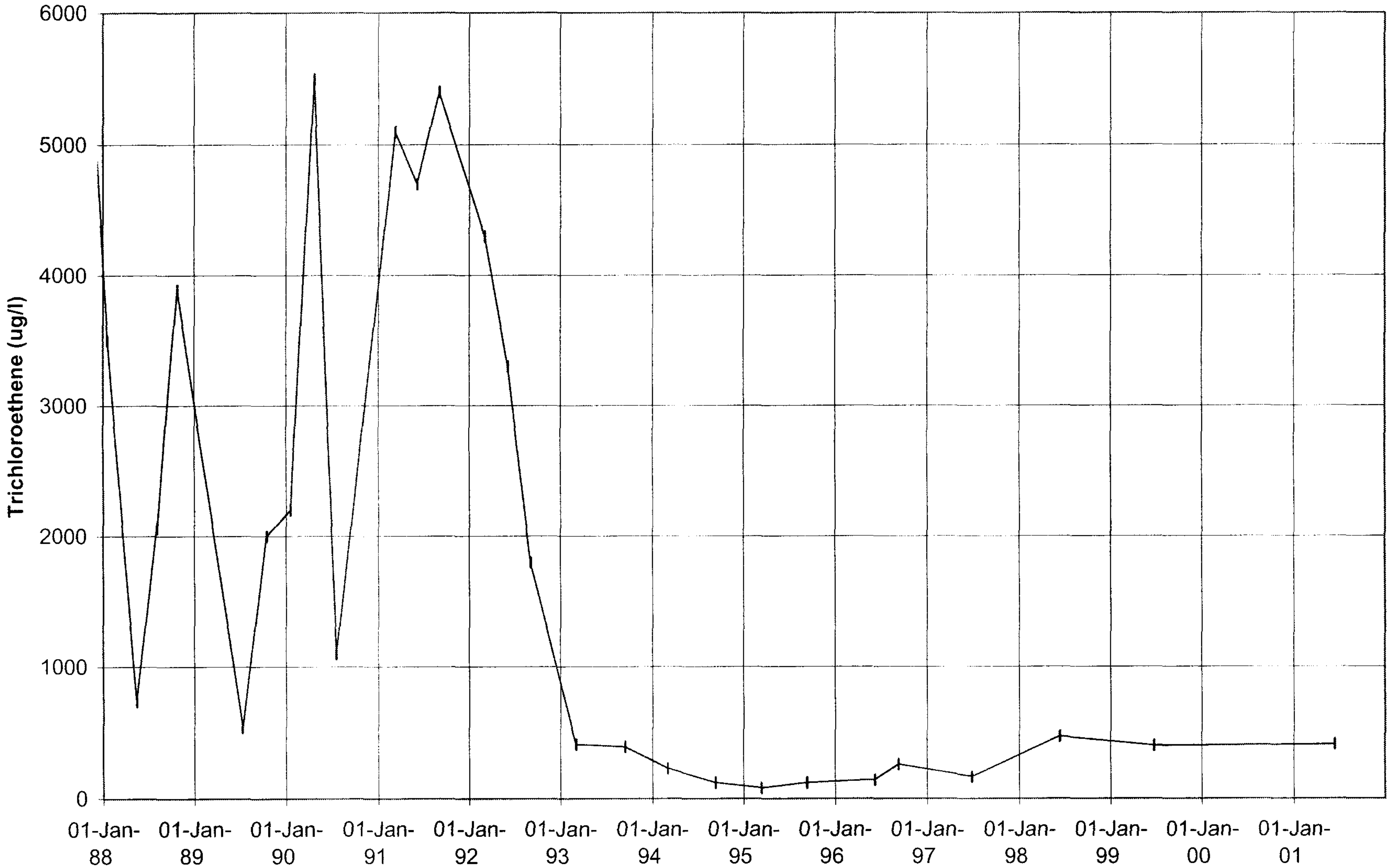
03L806



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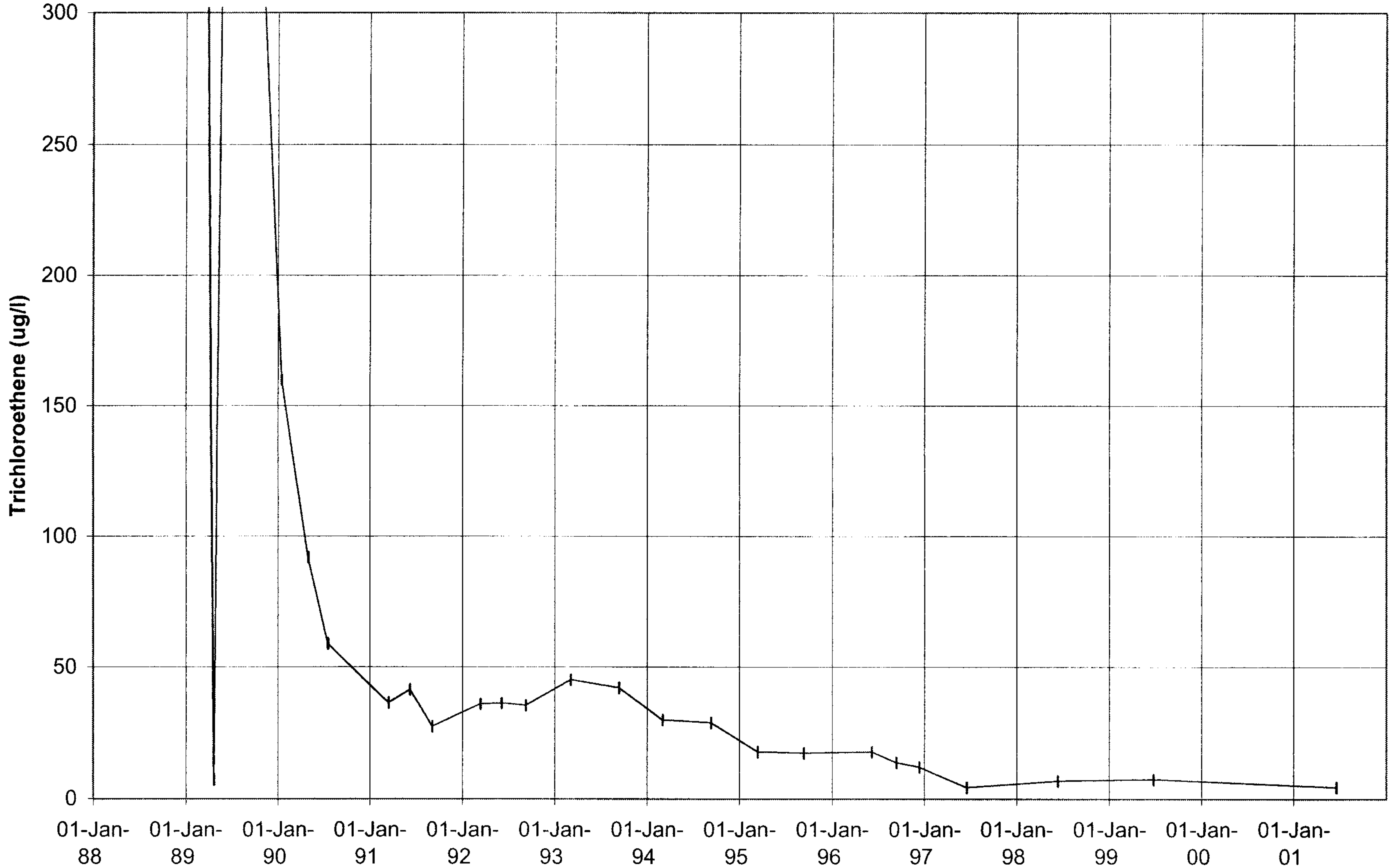

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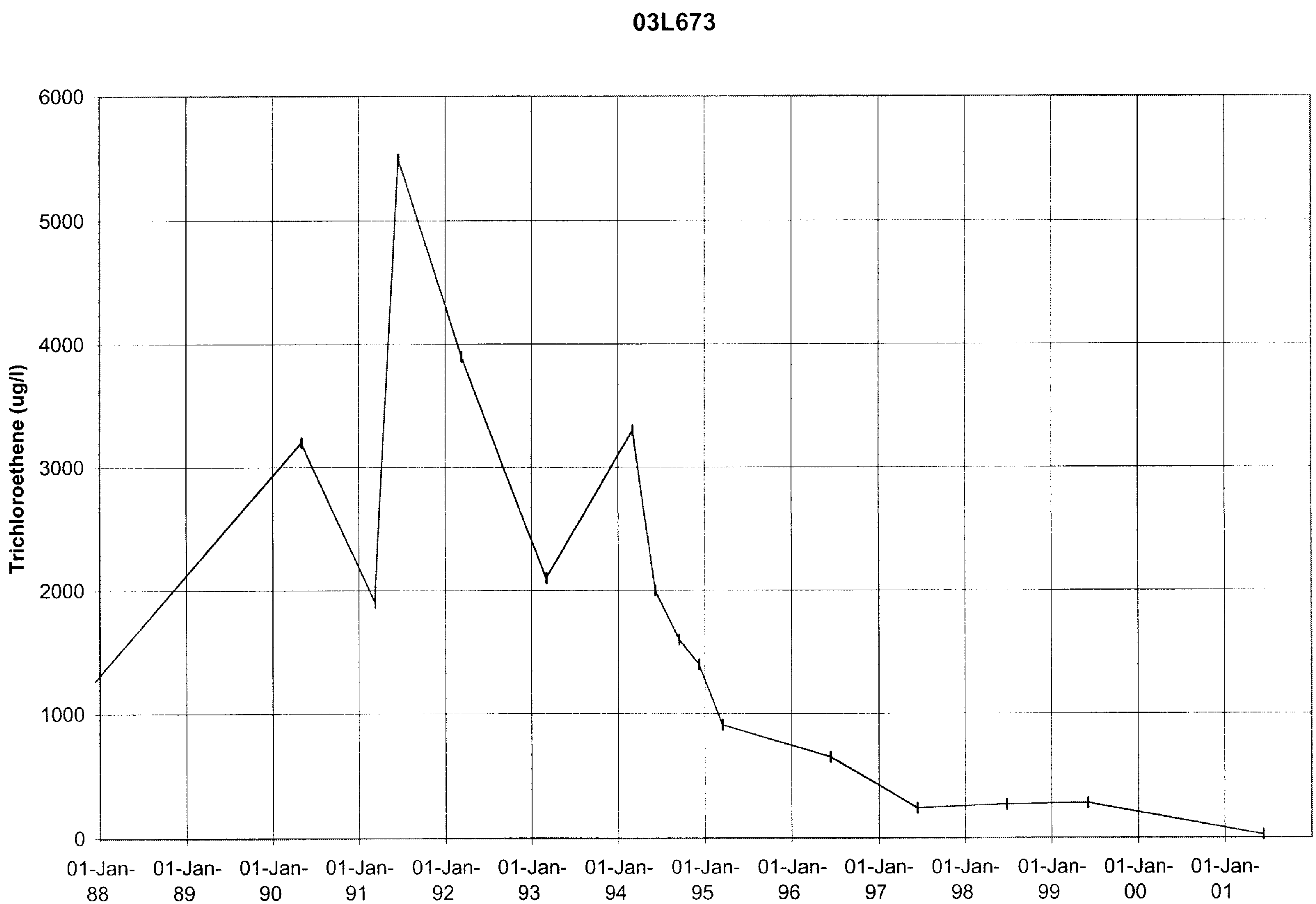
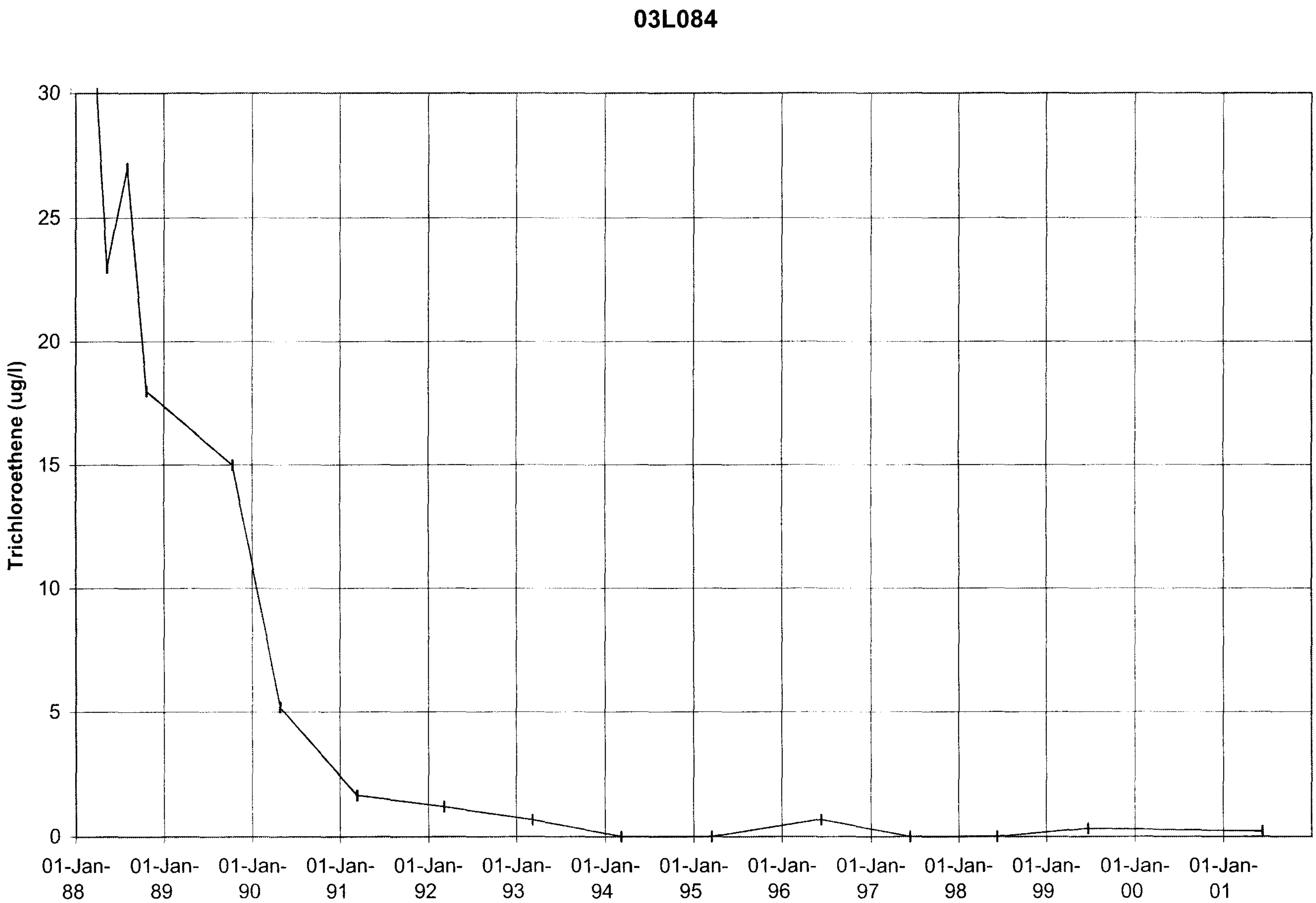
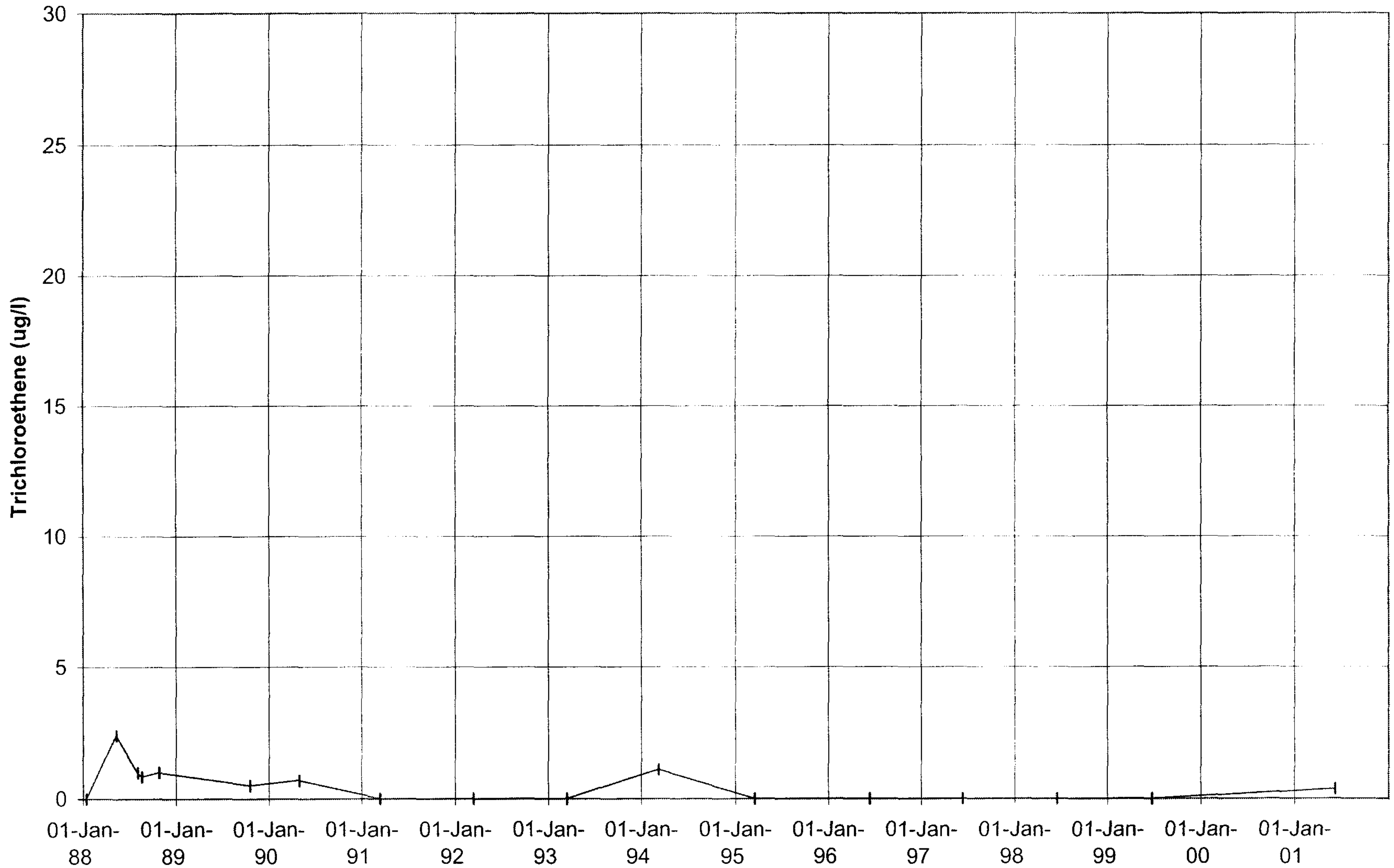

03L673
Trichloroethene (ug/l)
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


03L084
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03L079



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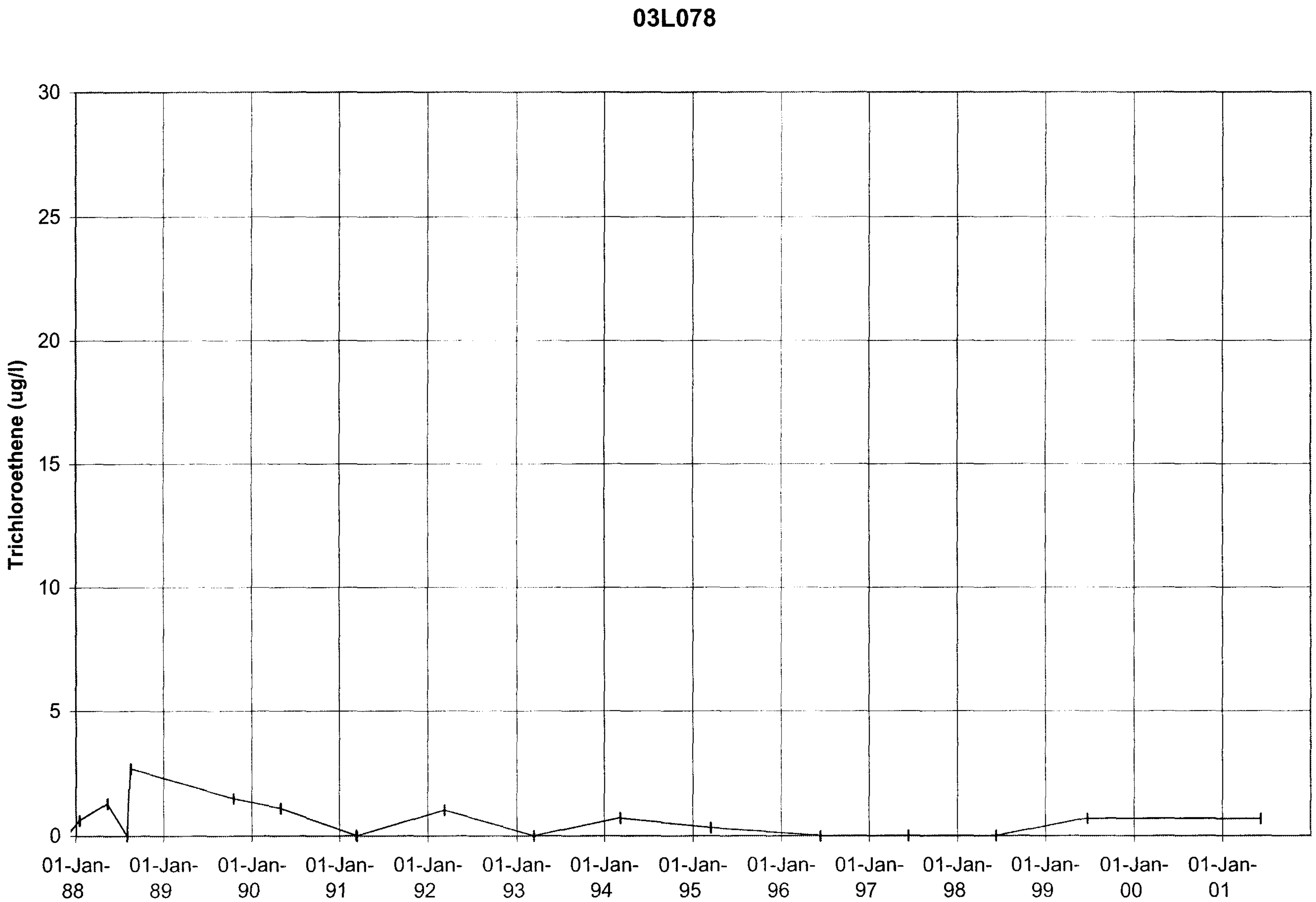

03L078
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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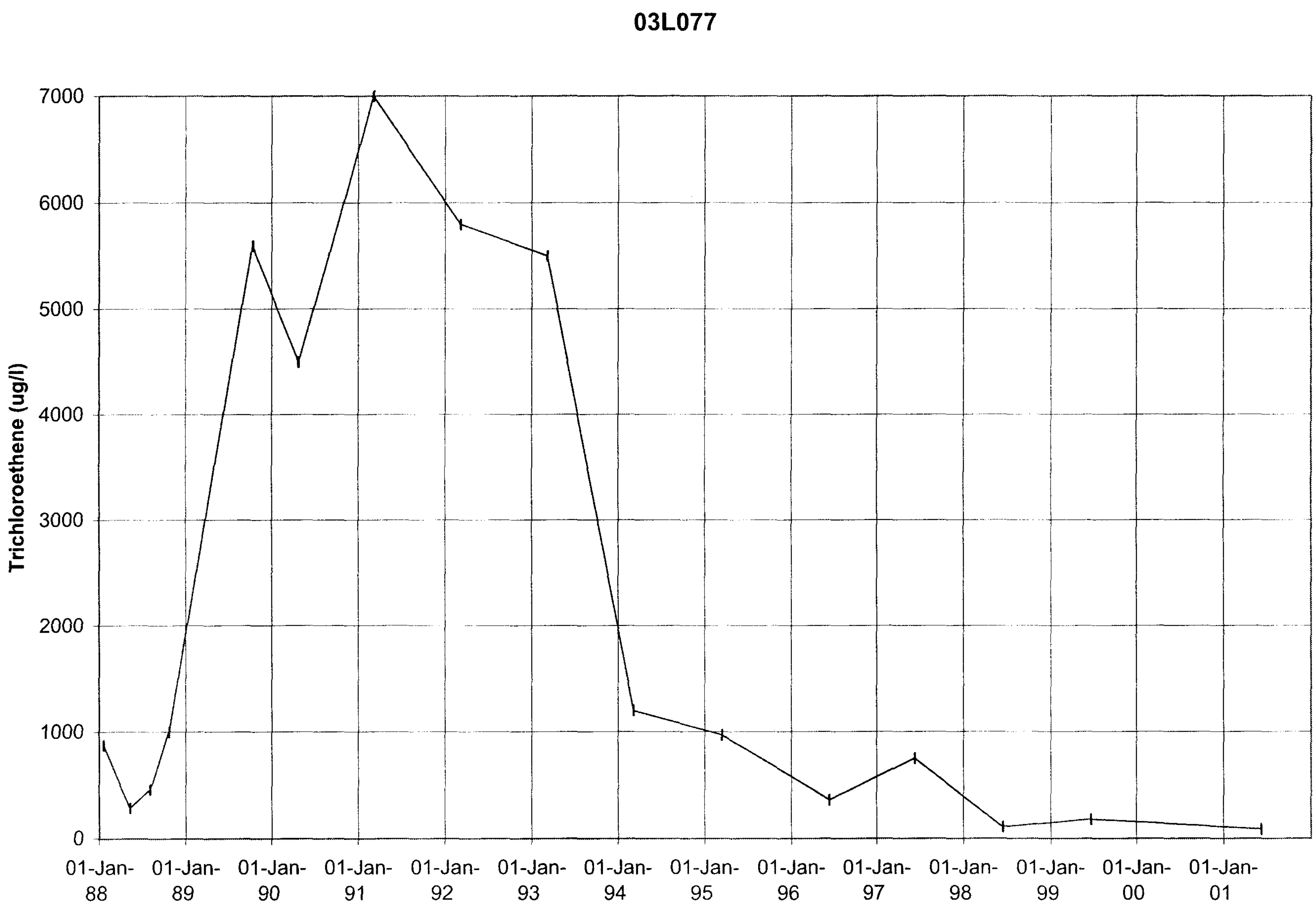
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map



03L077
Trichloroethene (ug/l)
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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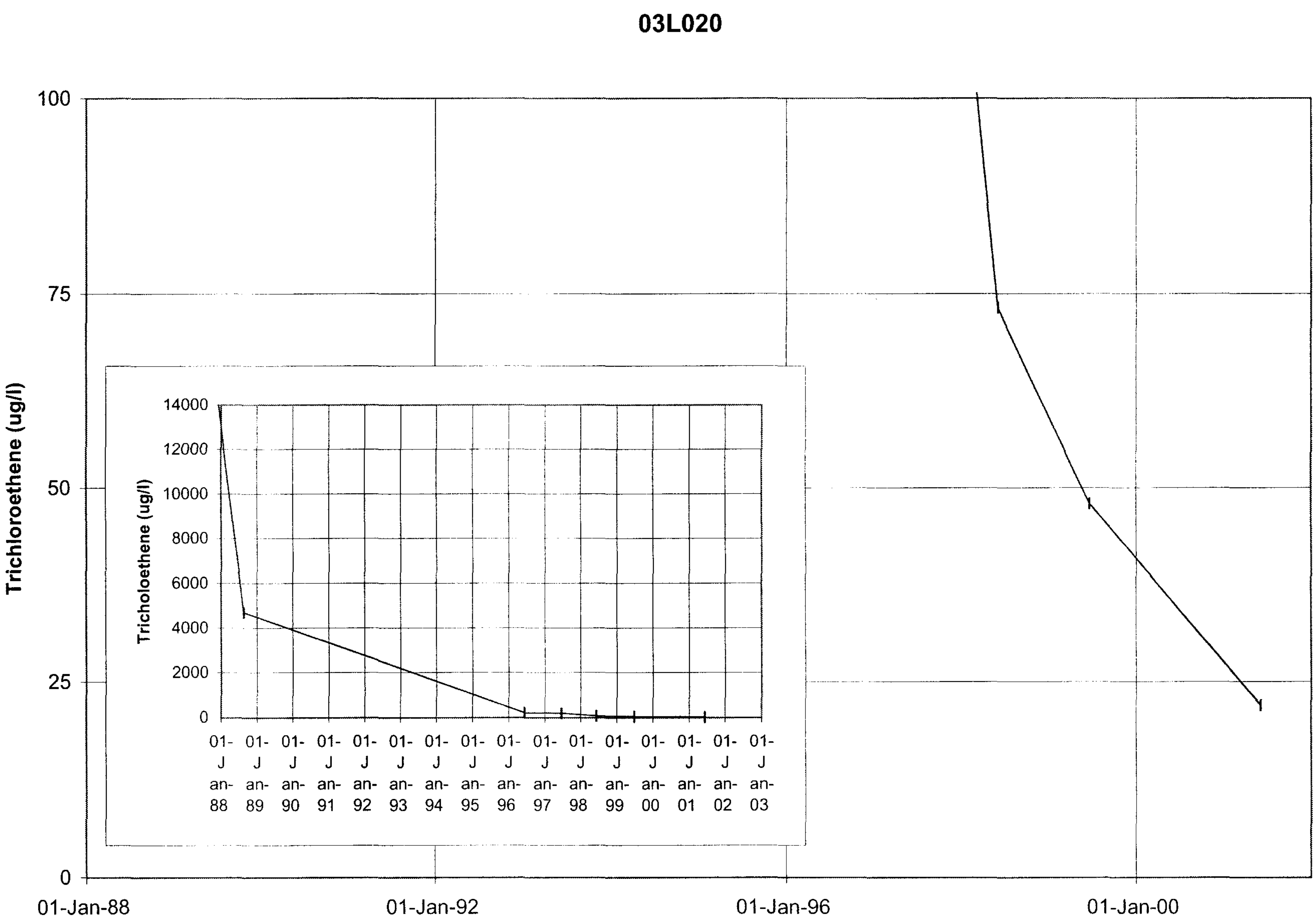
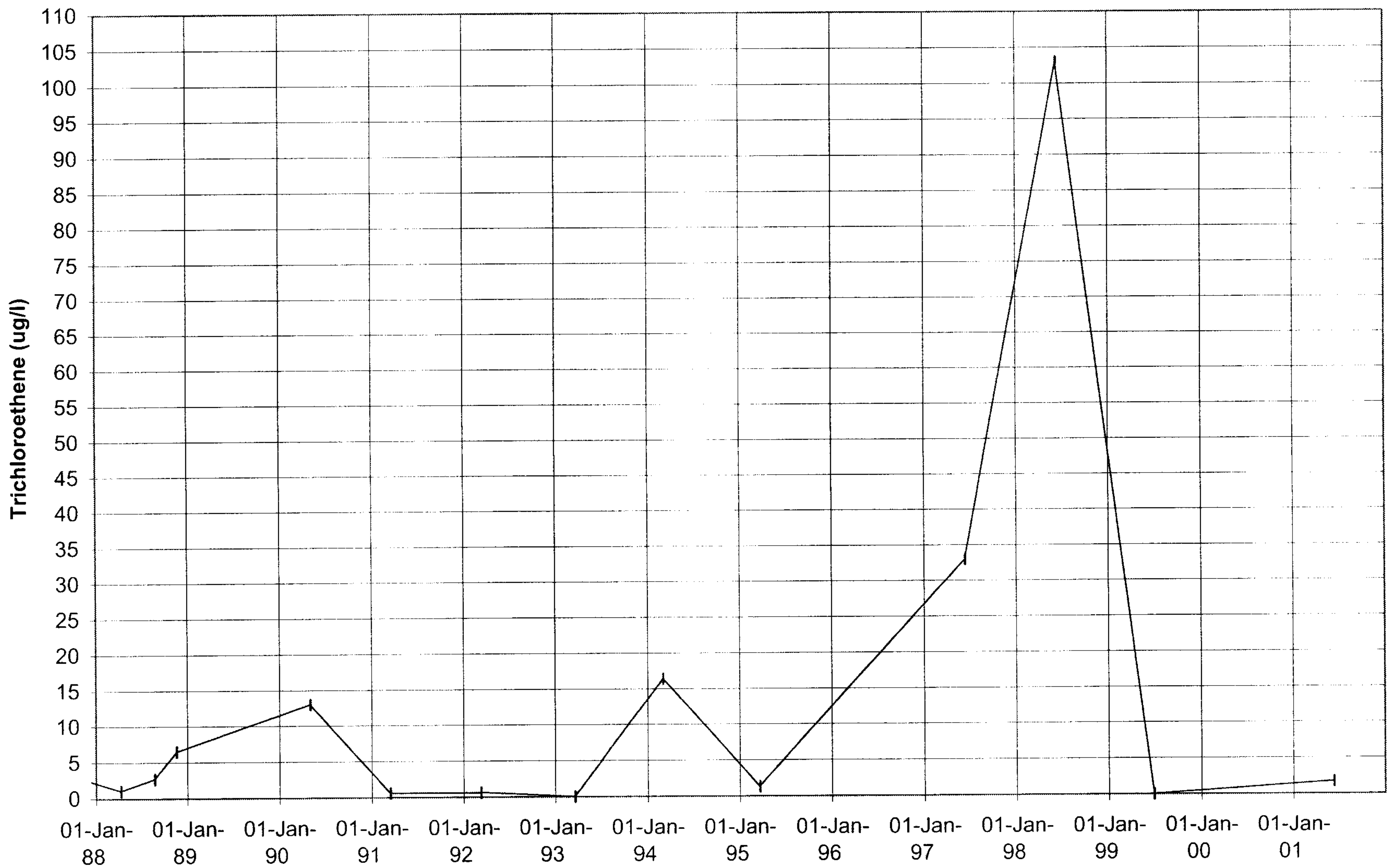
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


03L020
Trichloroethene (ug/l)
100
75
50
25
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
Tricholoethene (ug/l)
14000
12000
10000
8000
6000
4000
2000
0
01-Jan-88 01-Jan-89 01-Jan-90 01-Jan-91 01-Jan-92 01-Jan-93 01-Jan-94 01-Jan-95 01-Jan-96 01-Jan-97 01-Jan-98 01-Jan-99 01-Jan-00 01-Jan-01 01-Jan-02 01-Jan-03

Back to Map

03L018



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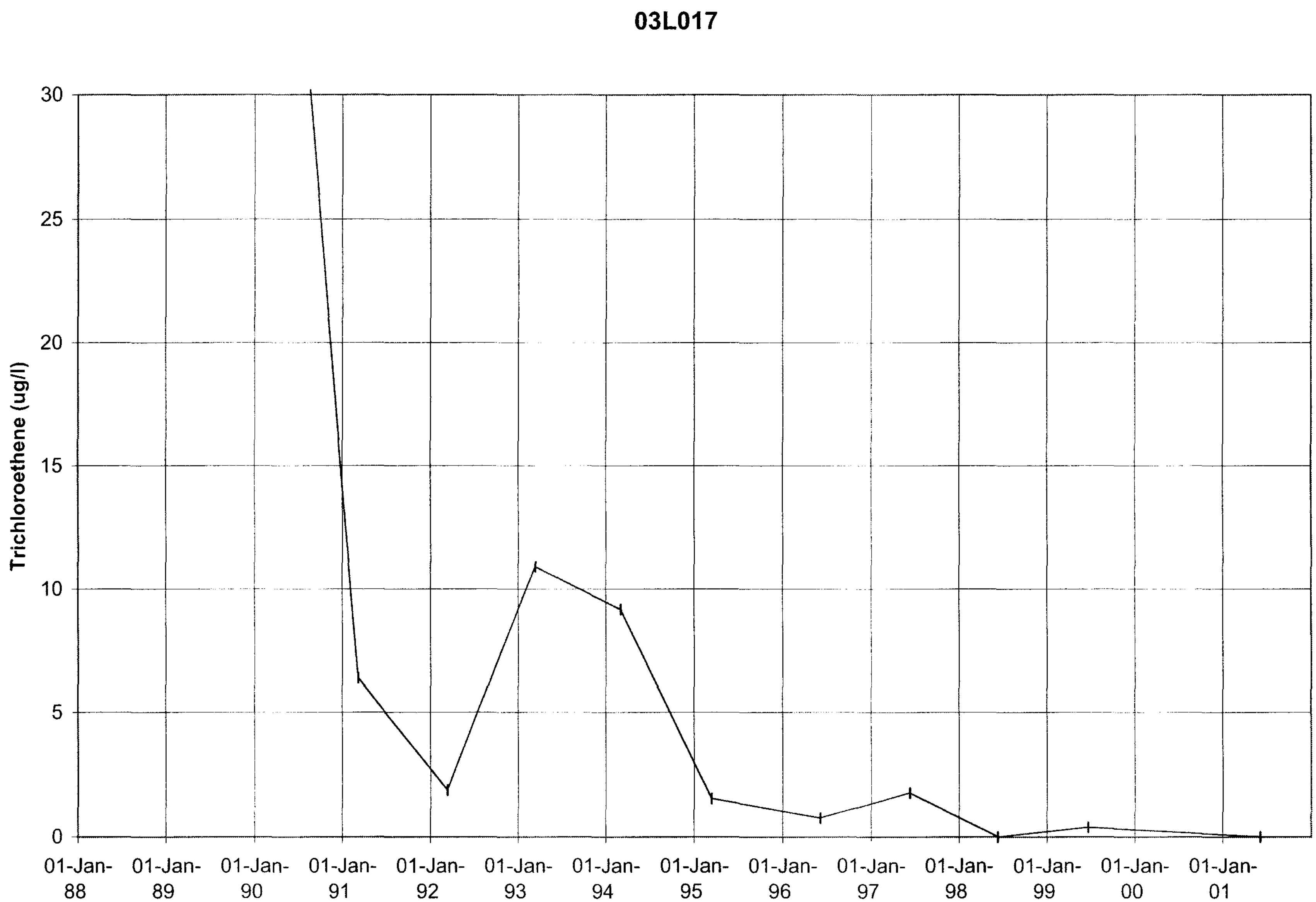
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25
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15
10
5
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01-Jan-92
01-Jan-93
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01-Jan-01

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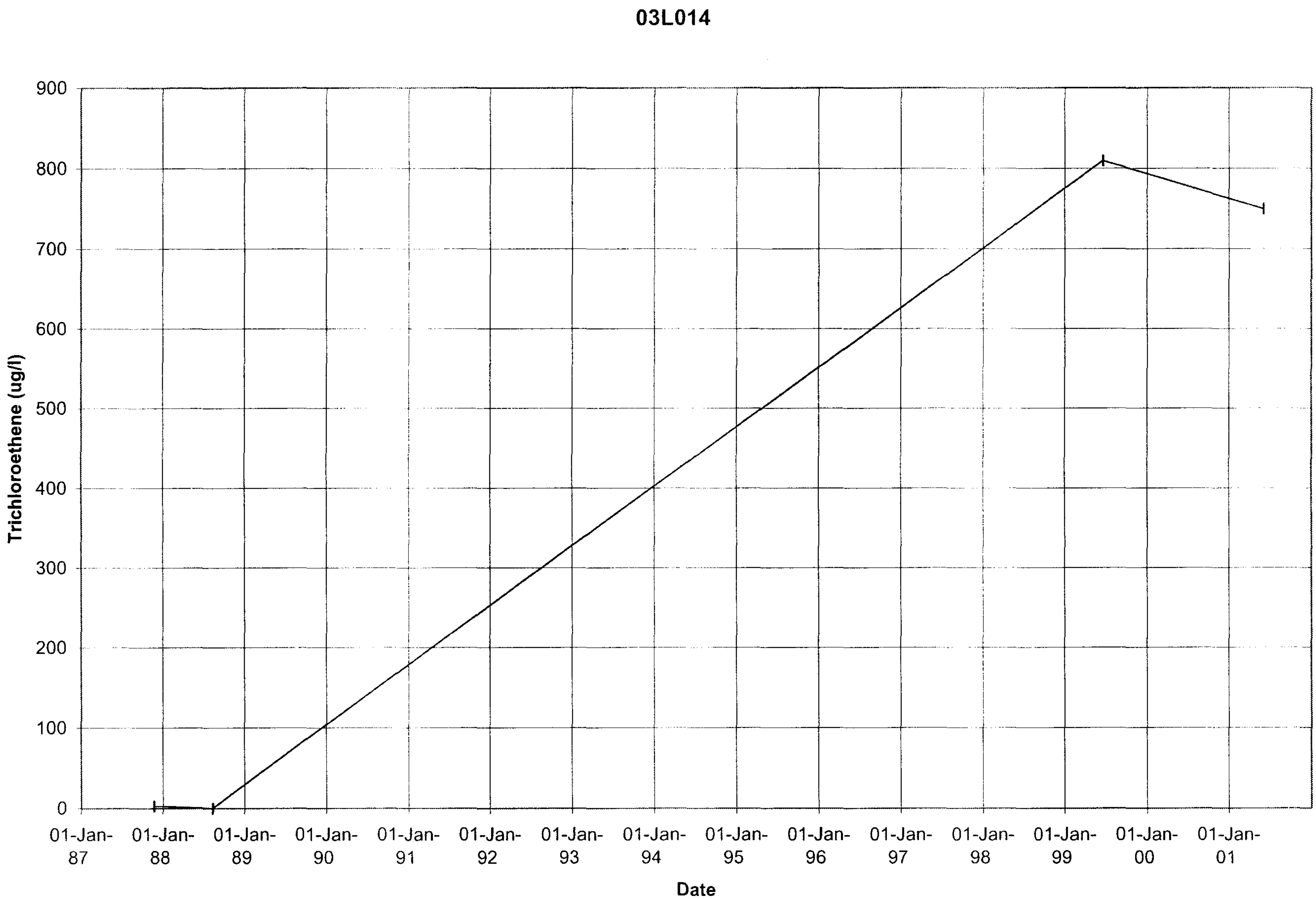

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Trichloroethene (ug/l)
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800
700
600
500
400
300
200
100
0
01-Jan-87
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01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-00
01-Jan-01
Date

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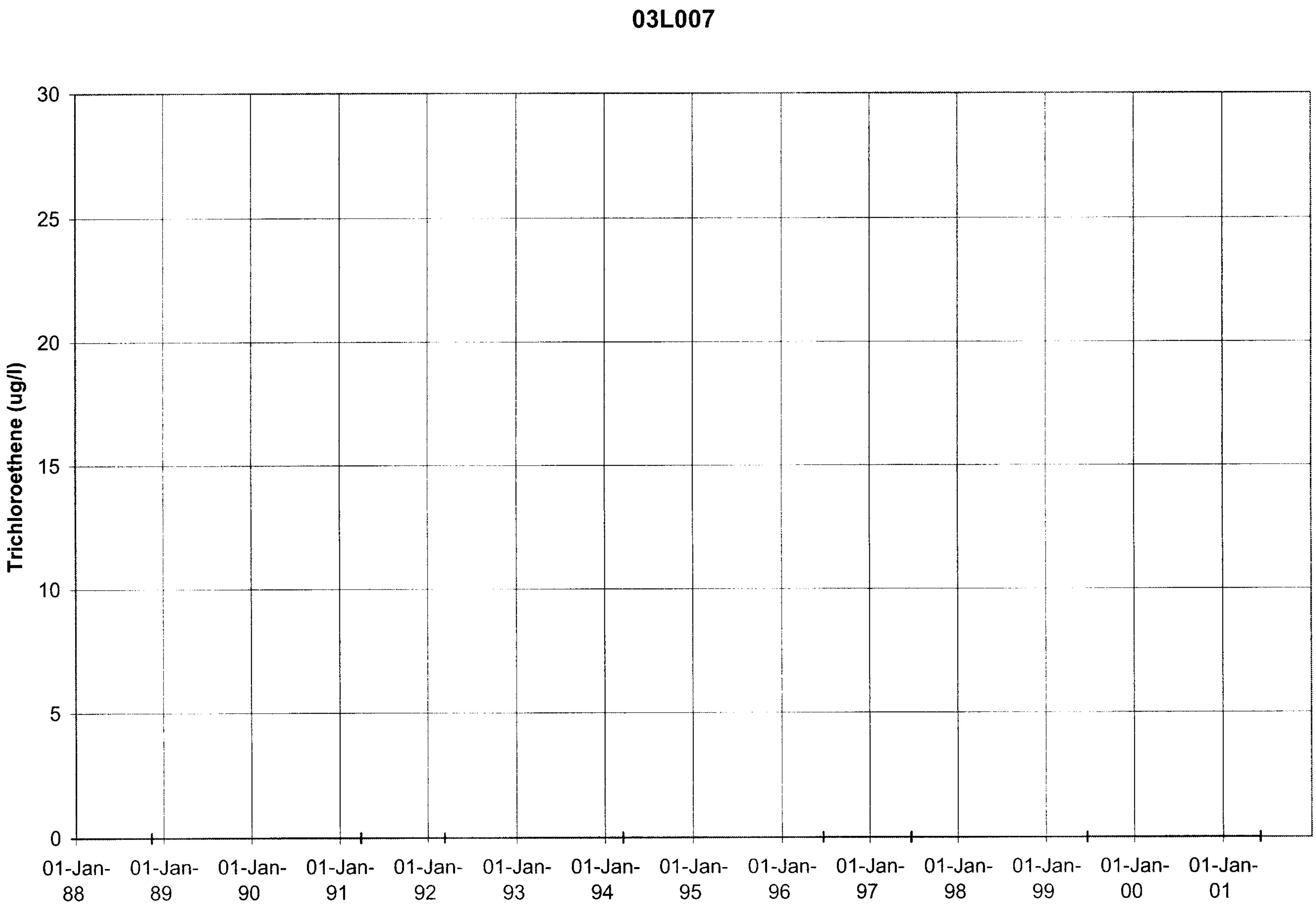
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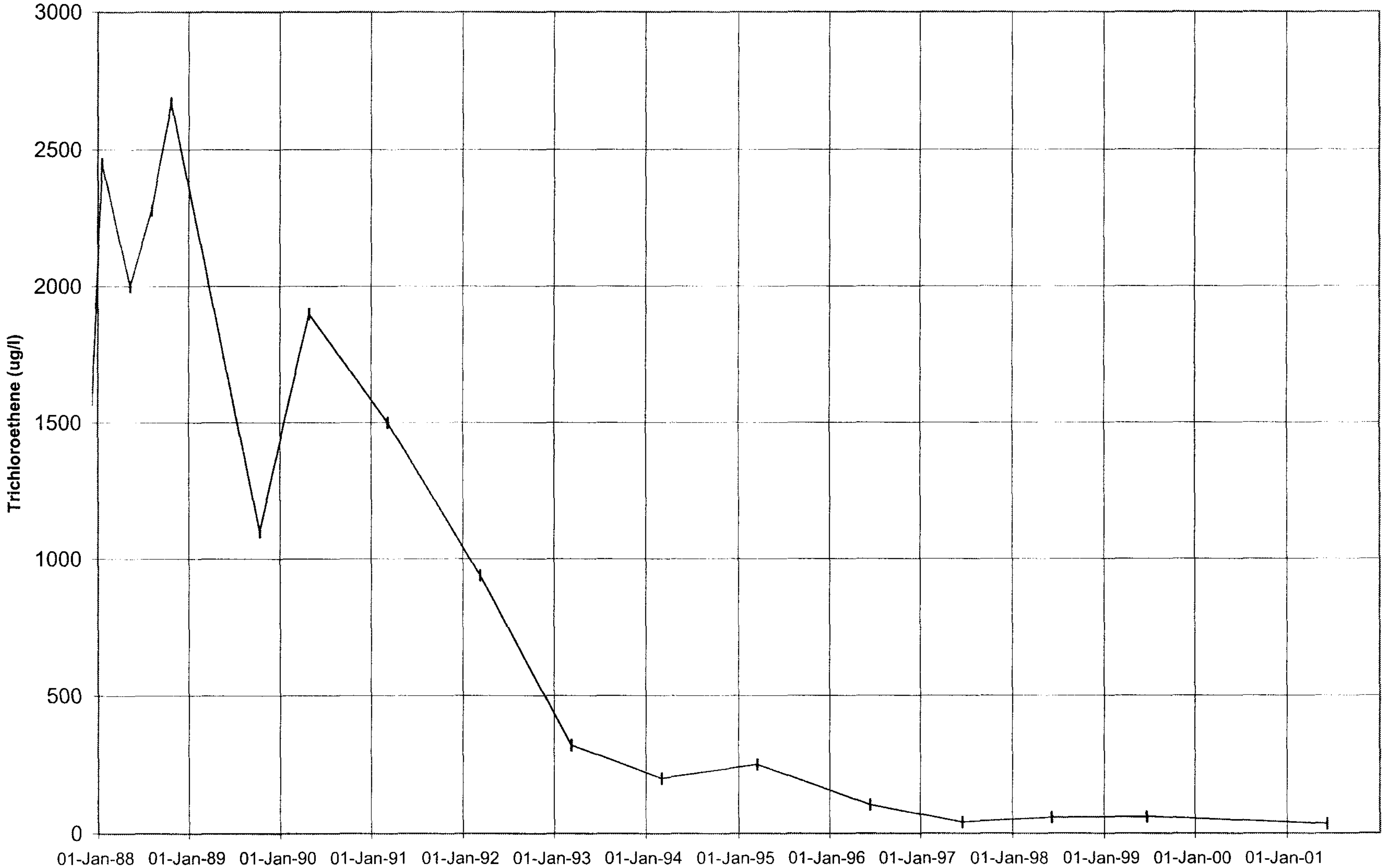

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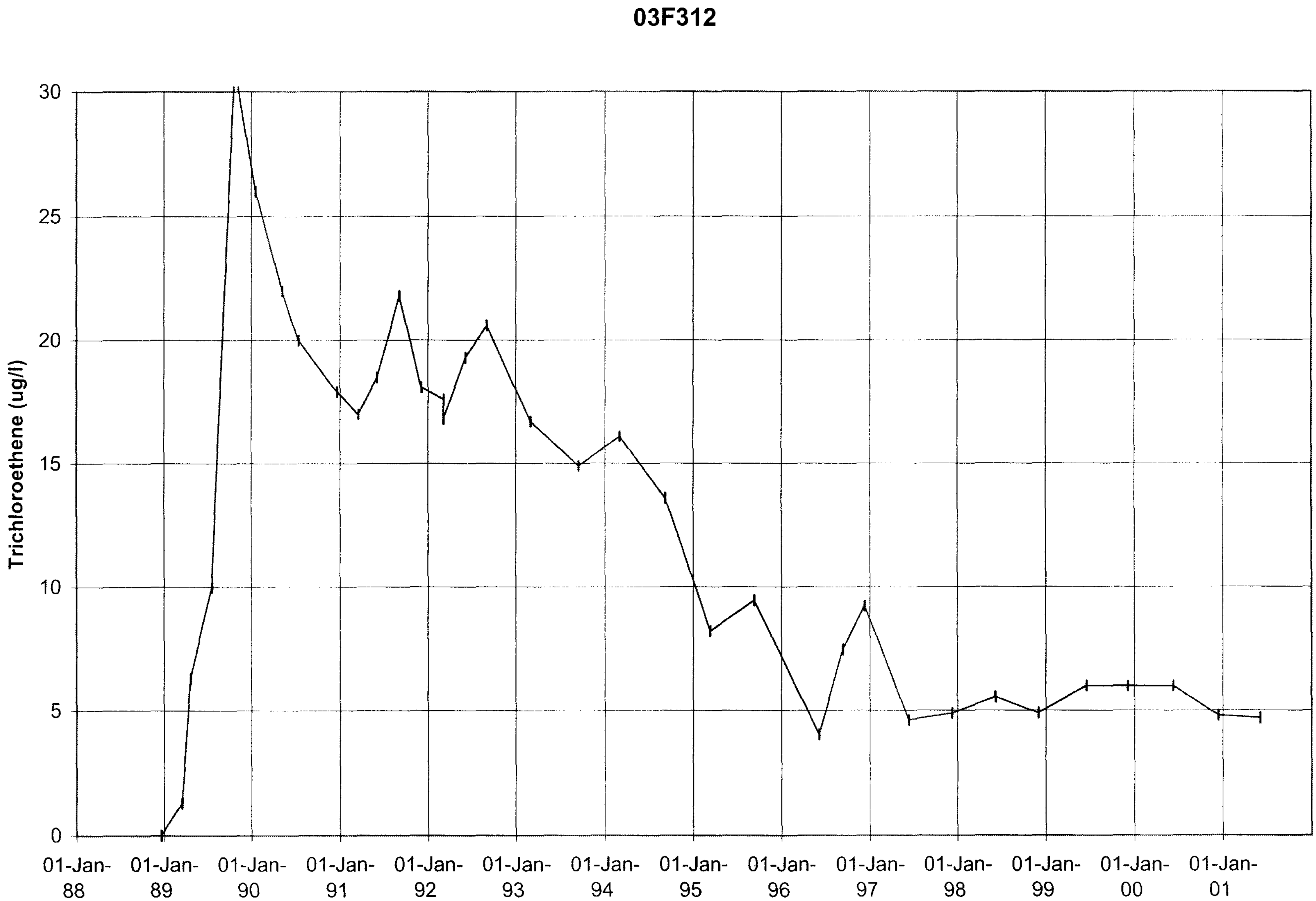
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20
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10
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01-Jan-92
01-Jan-93
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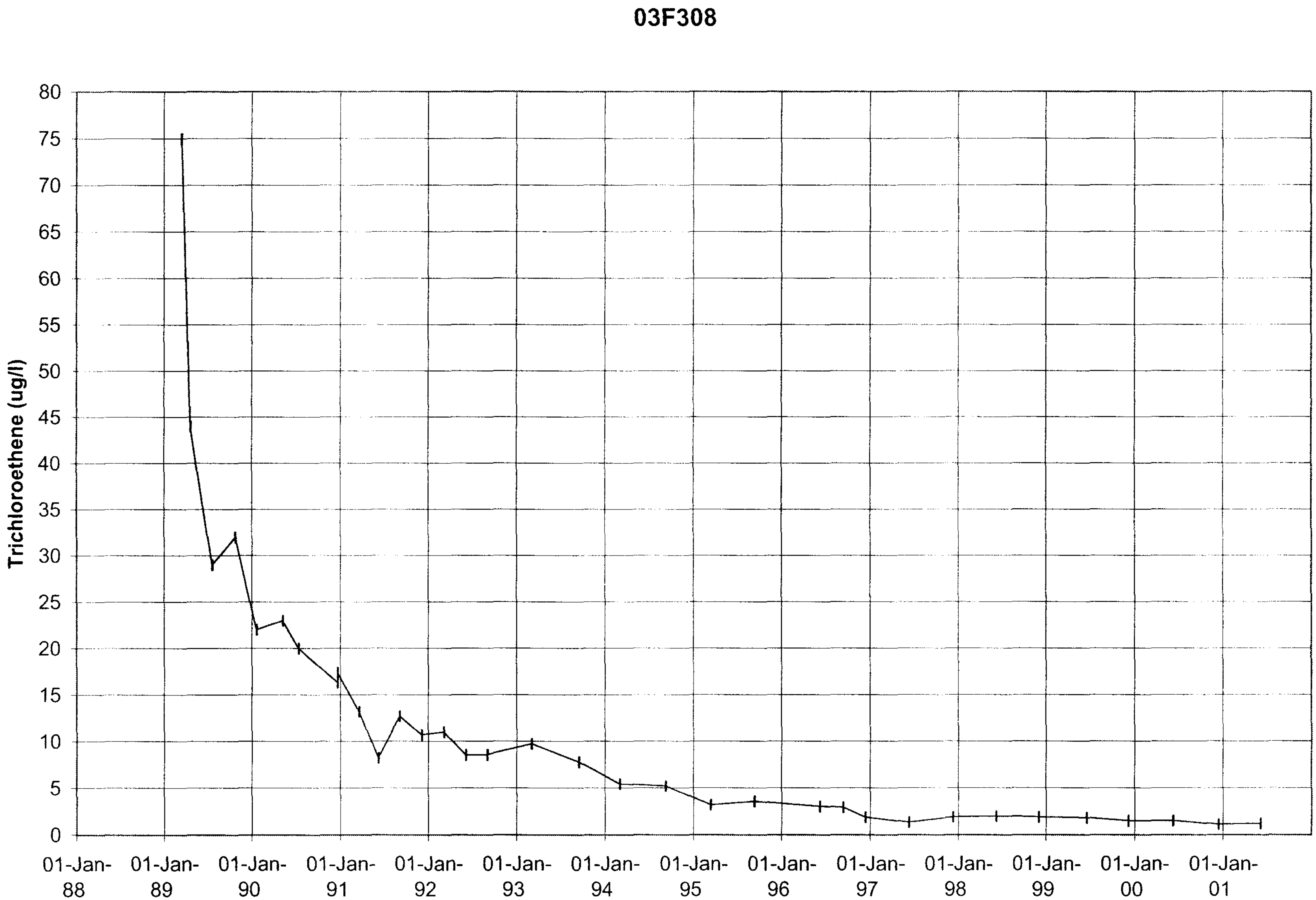

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Trichloroethene (ug/l)
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55
50
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35
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25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
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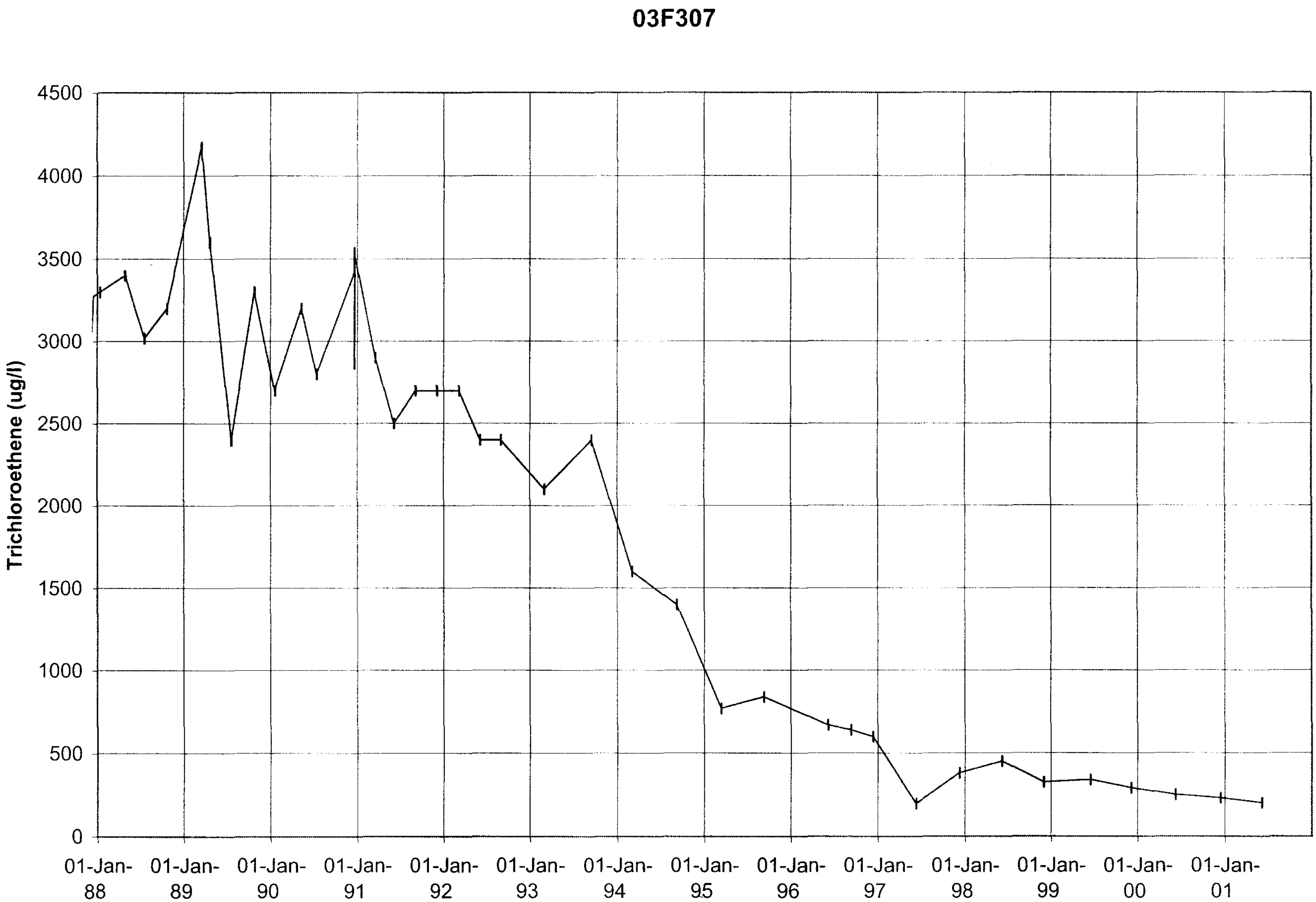
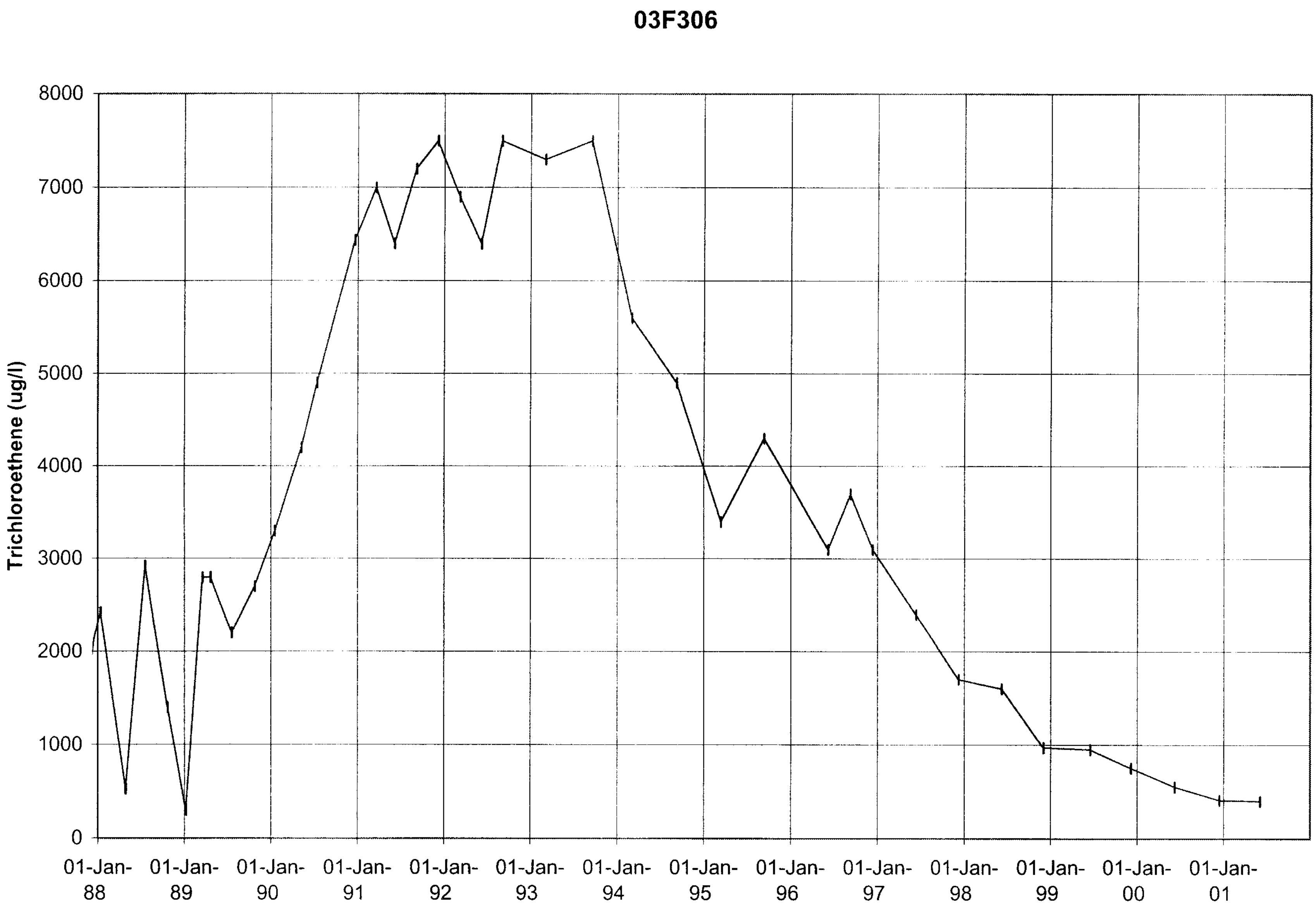
Back to Map

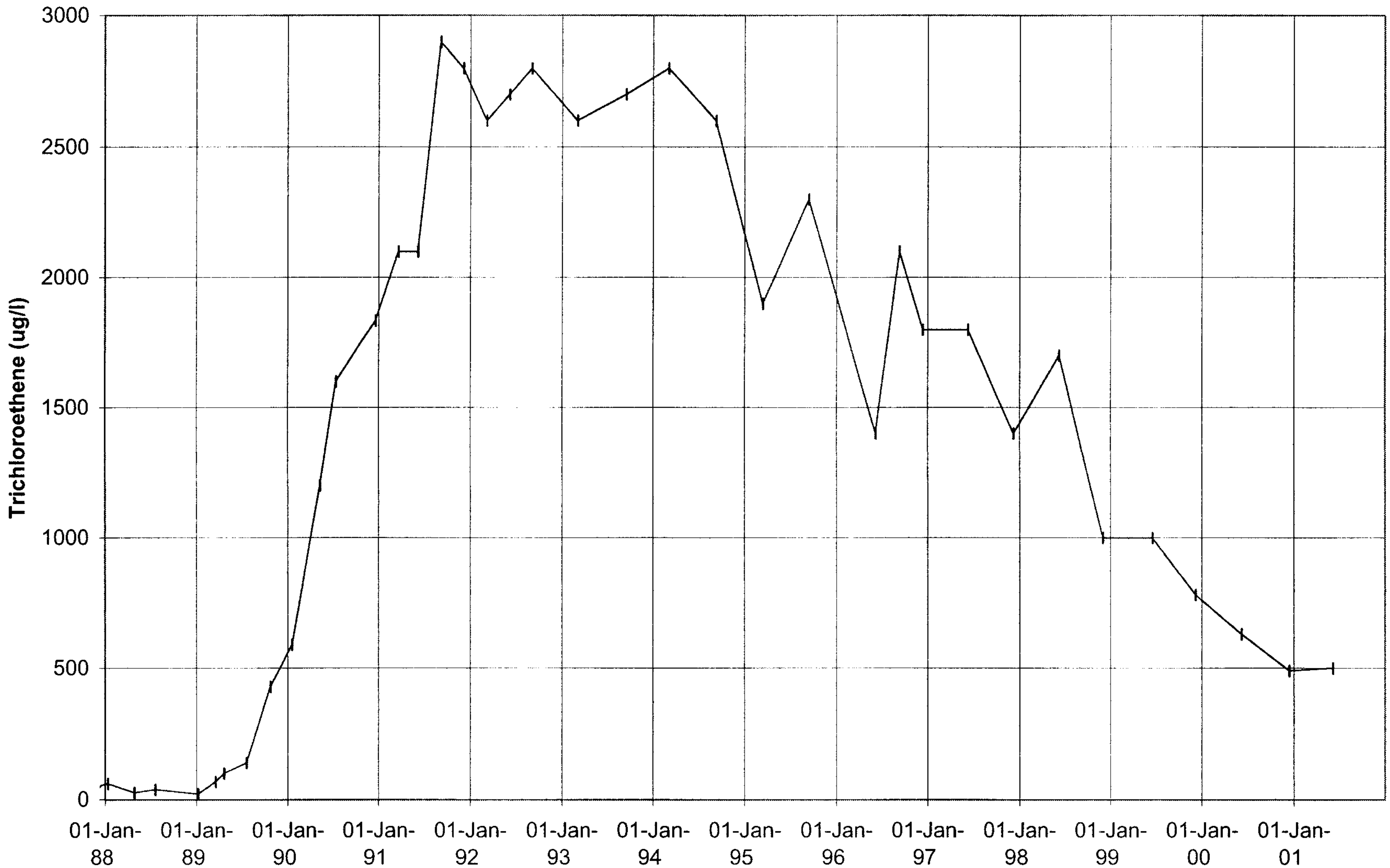

03F307
Trichloroethene (ug/l)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

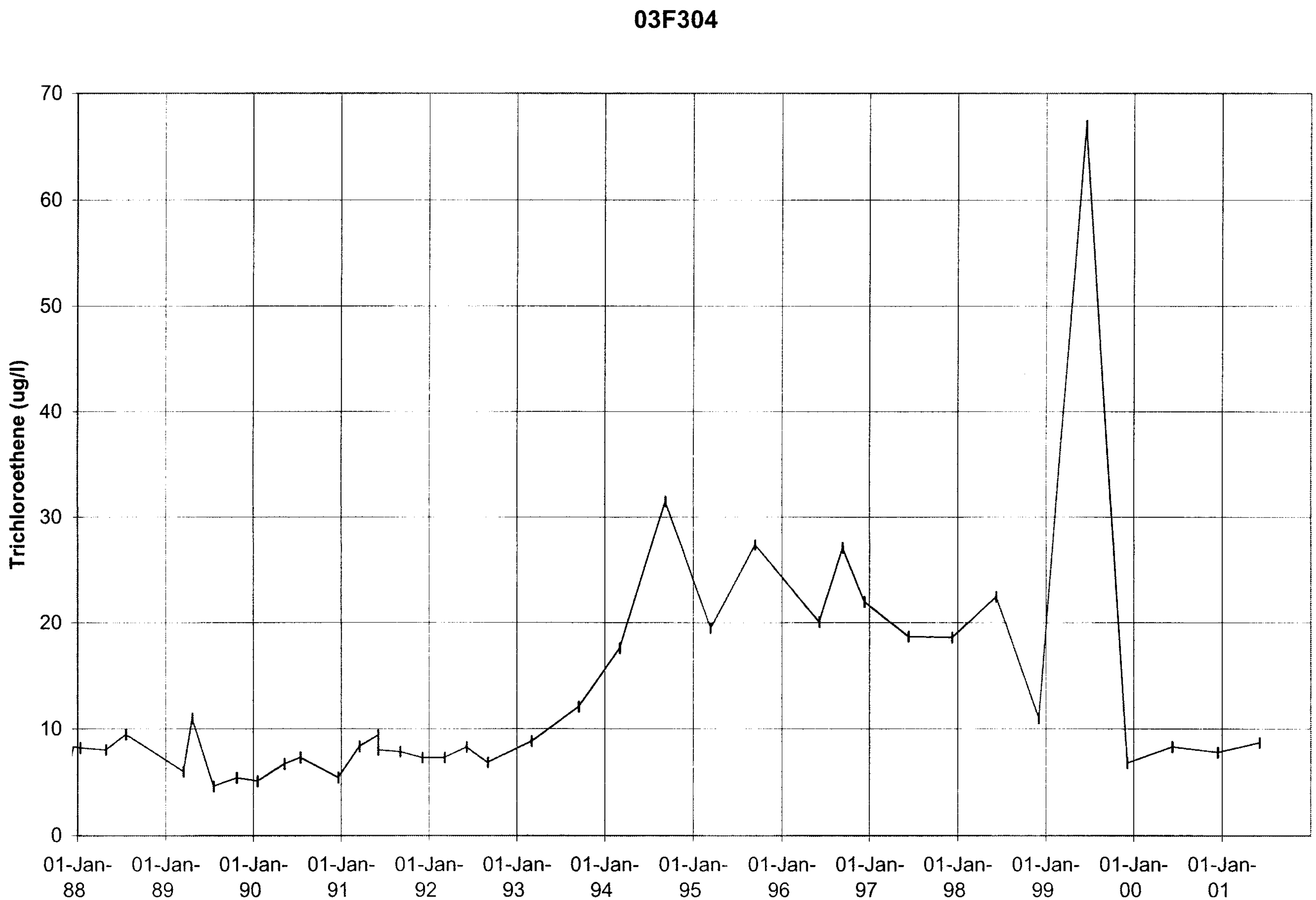

03F306
Trichloroethene (ug/l)
8000
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

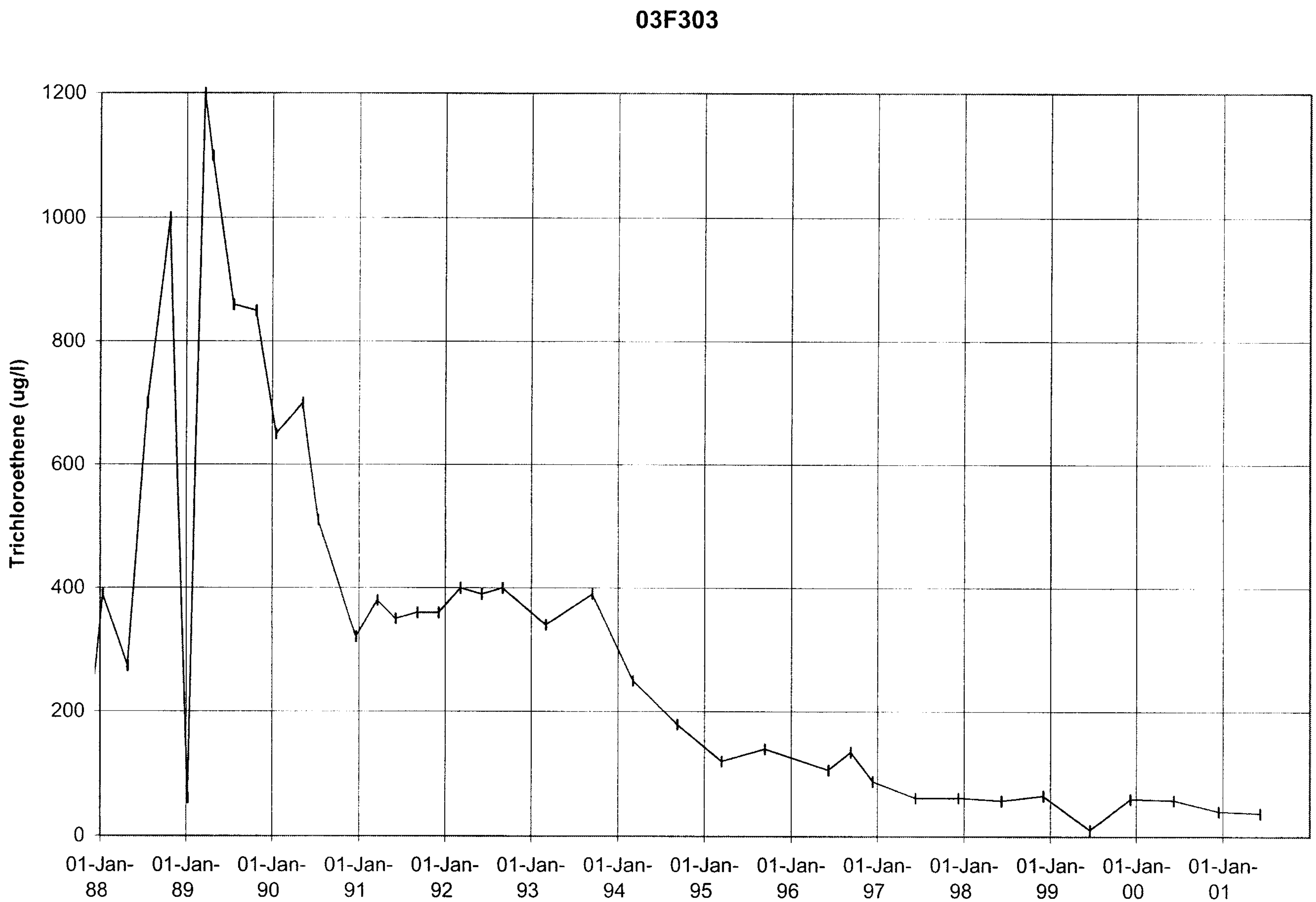
03F305



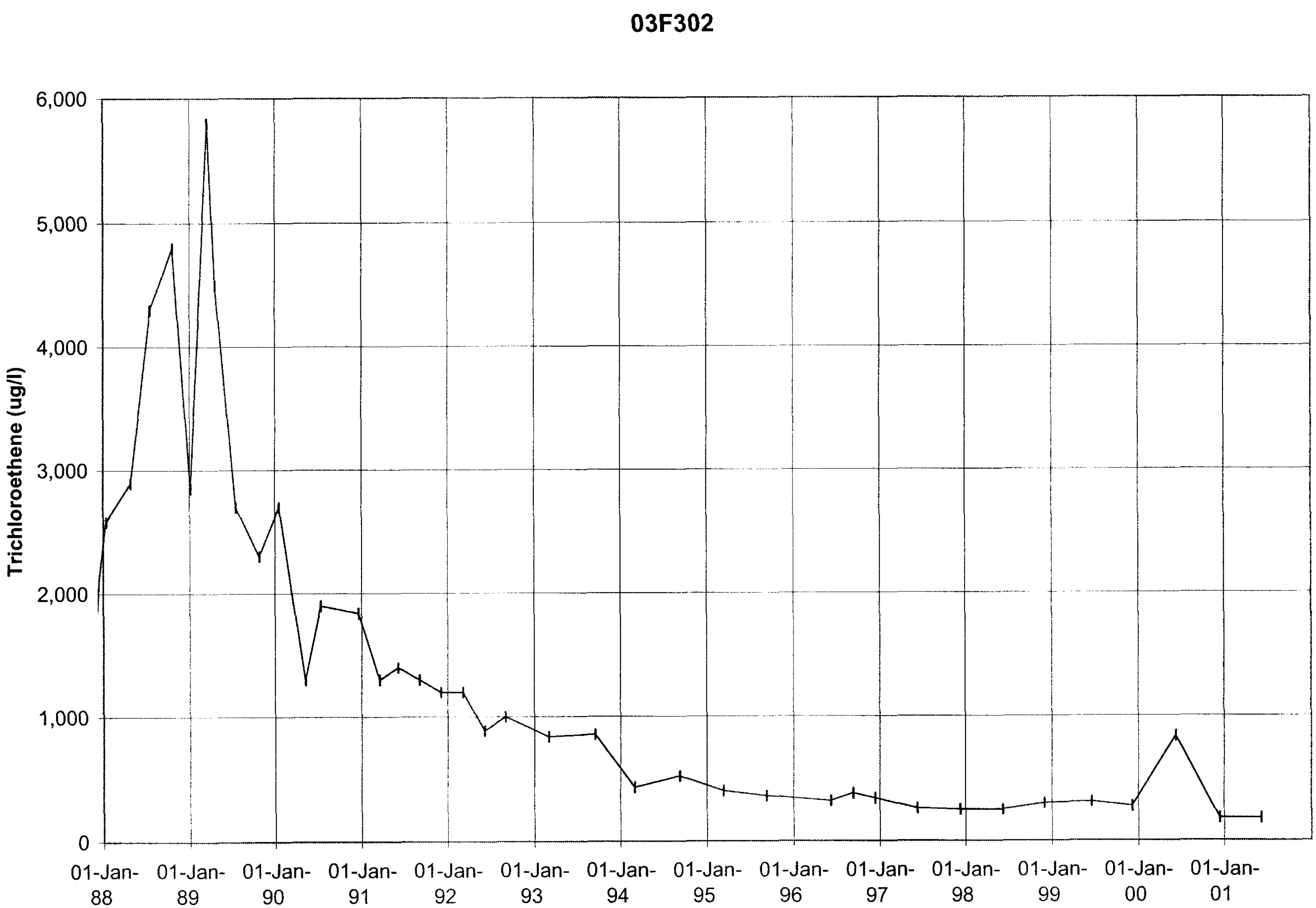
Back to Map


03F304
Trichloroethene (ug/l)
70
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


03F303
Trichloroethene (ug/l)
1200
1000
800
600
400
200
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map



03F302
Trichloroethene (ug/l)
6,000
5,000
4,000
3,000
2,000
1,000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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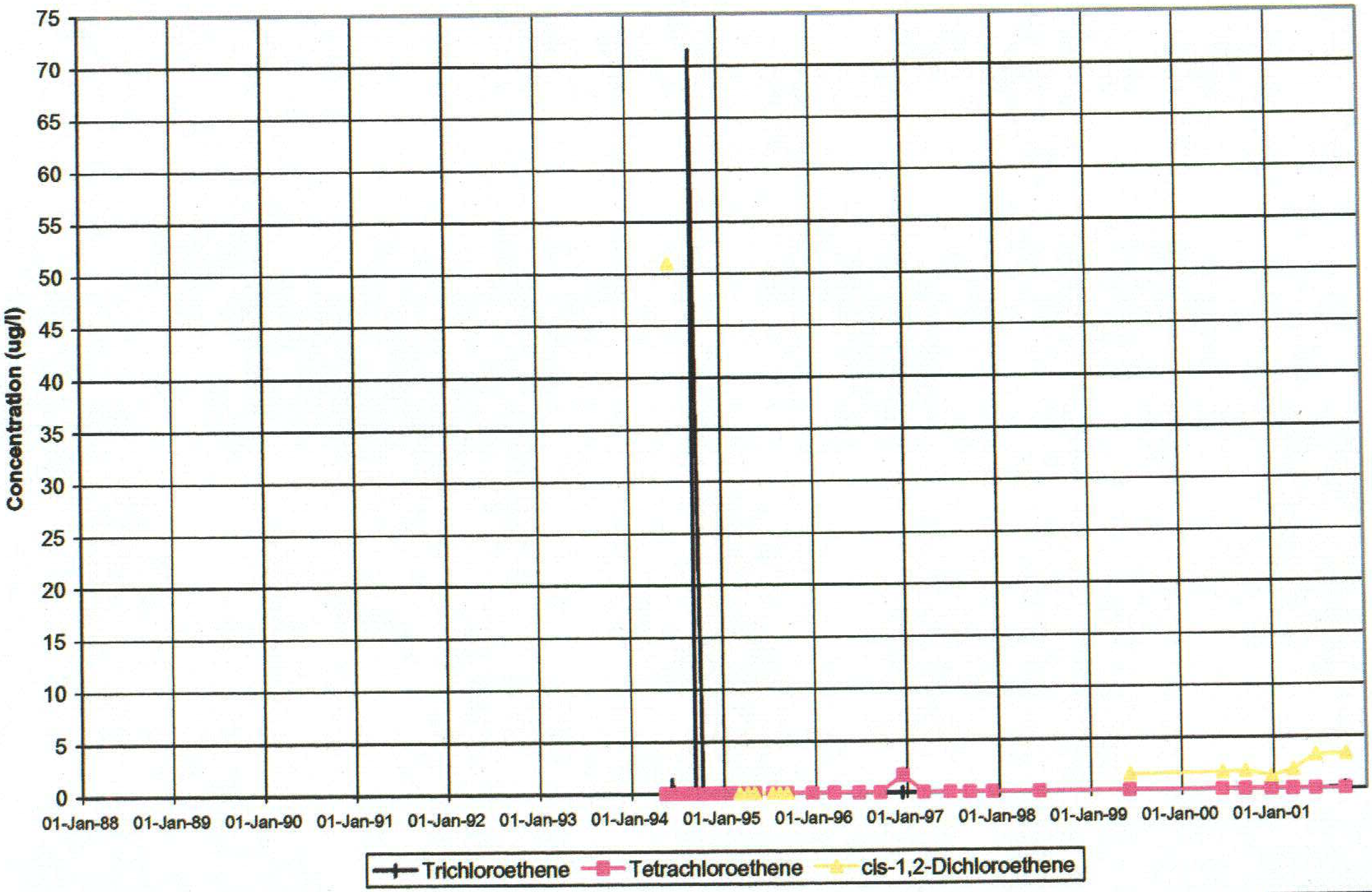
01U904



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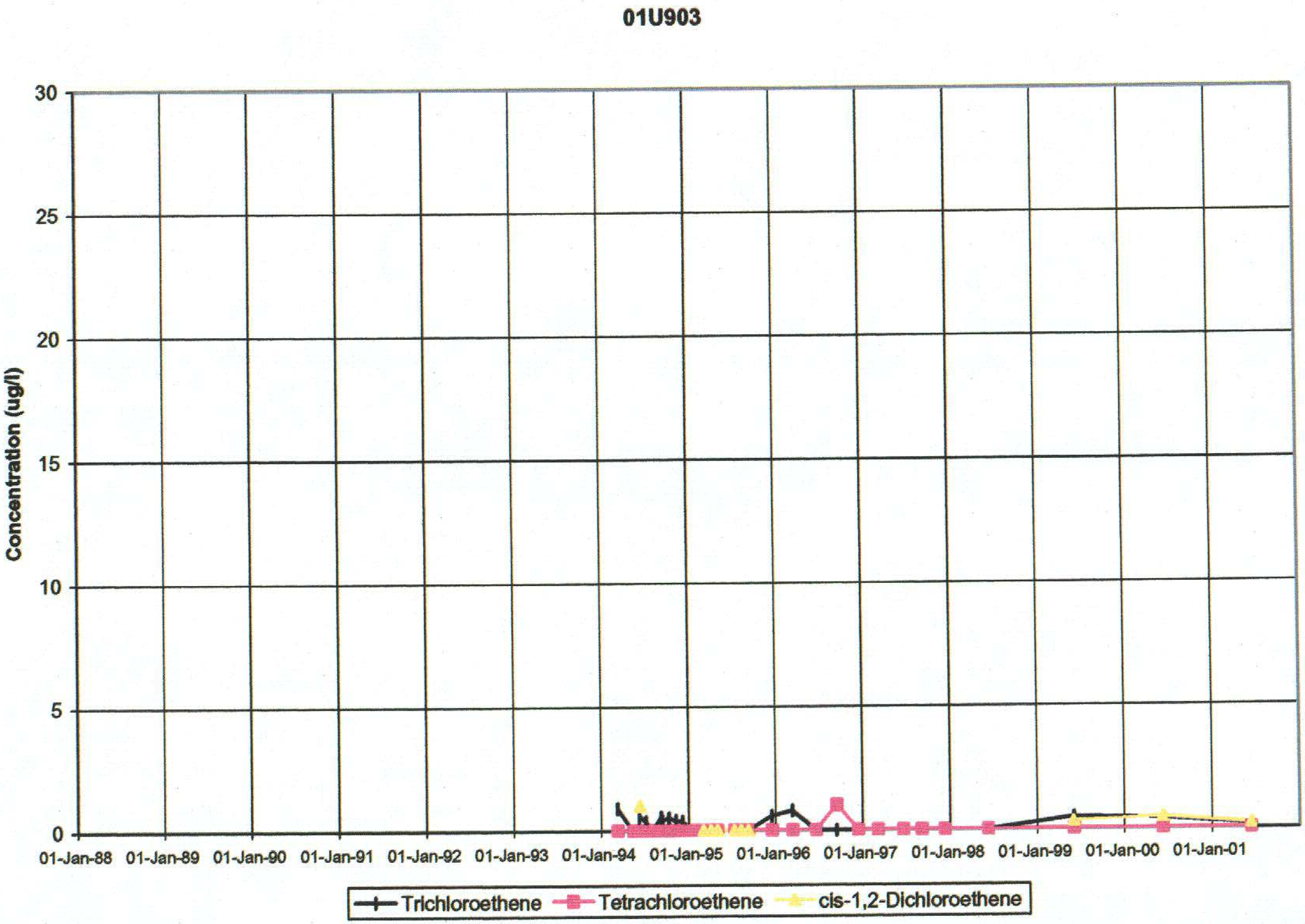
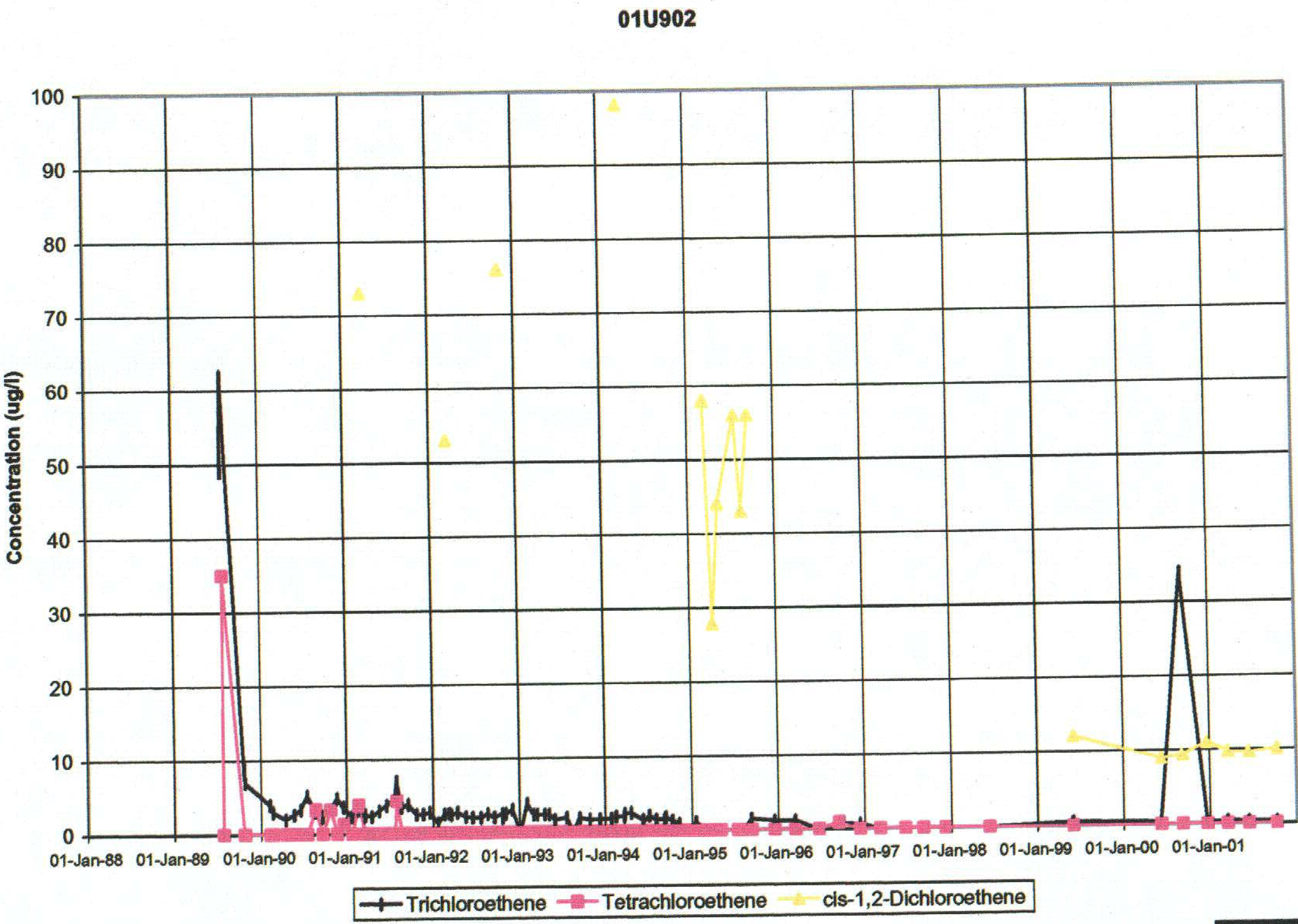


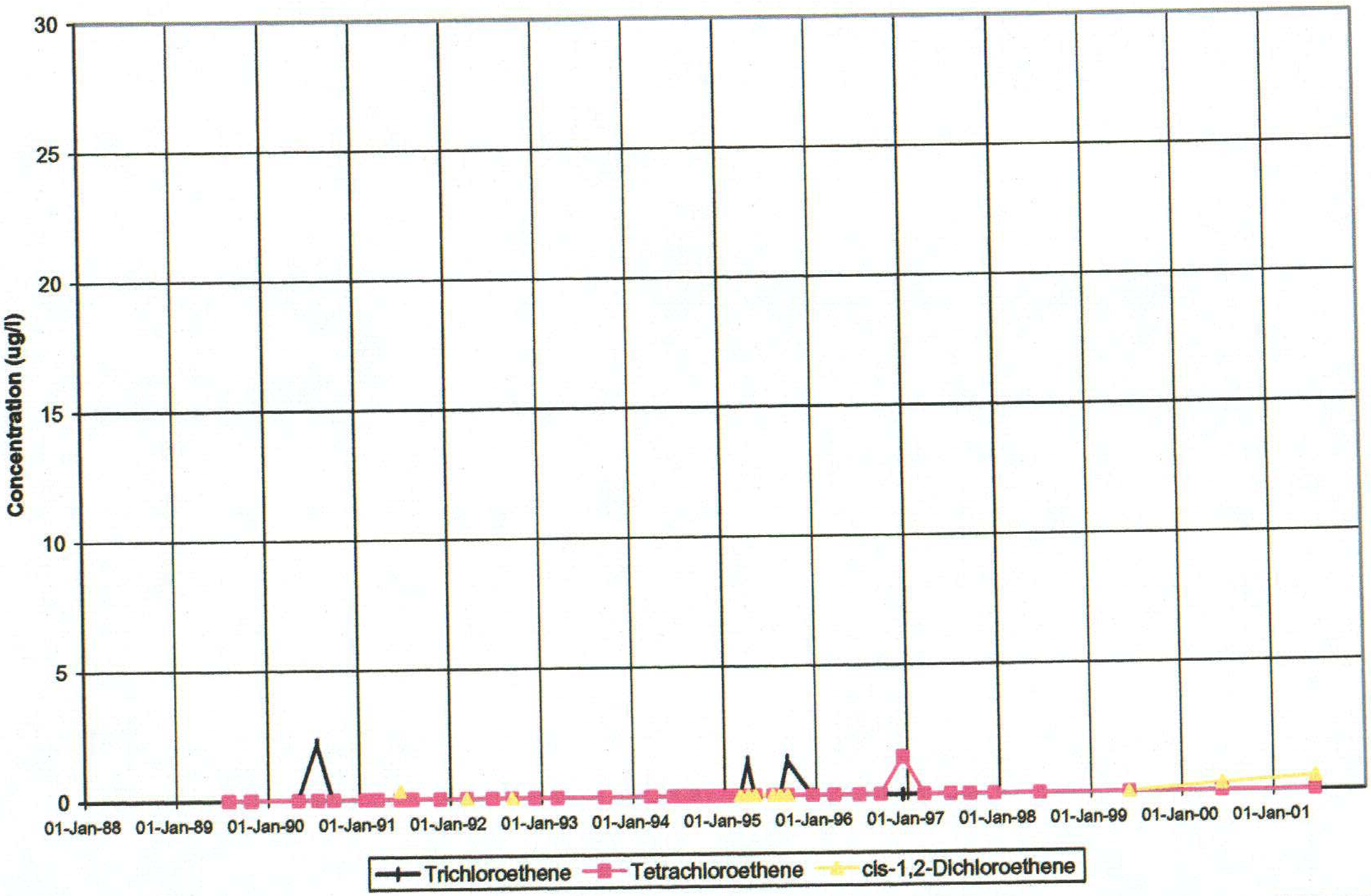
01U903
Concentration (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map

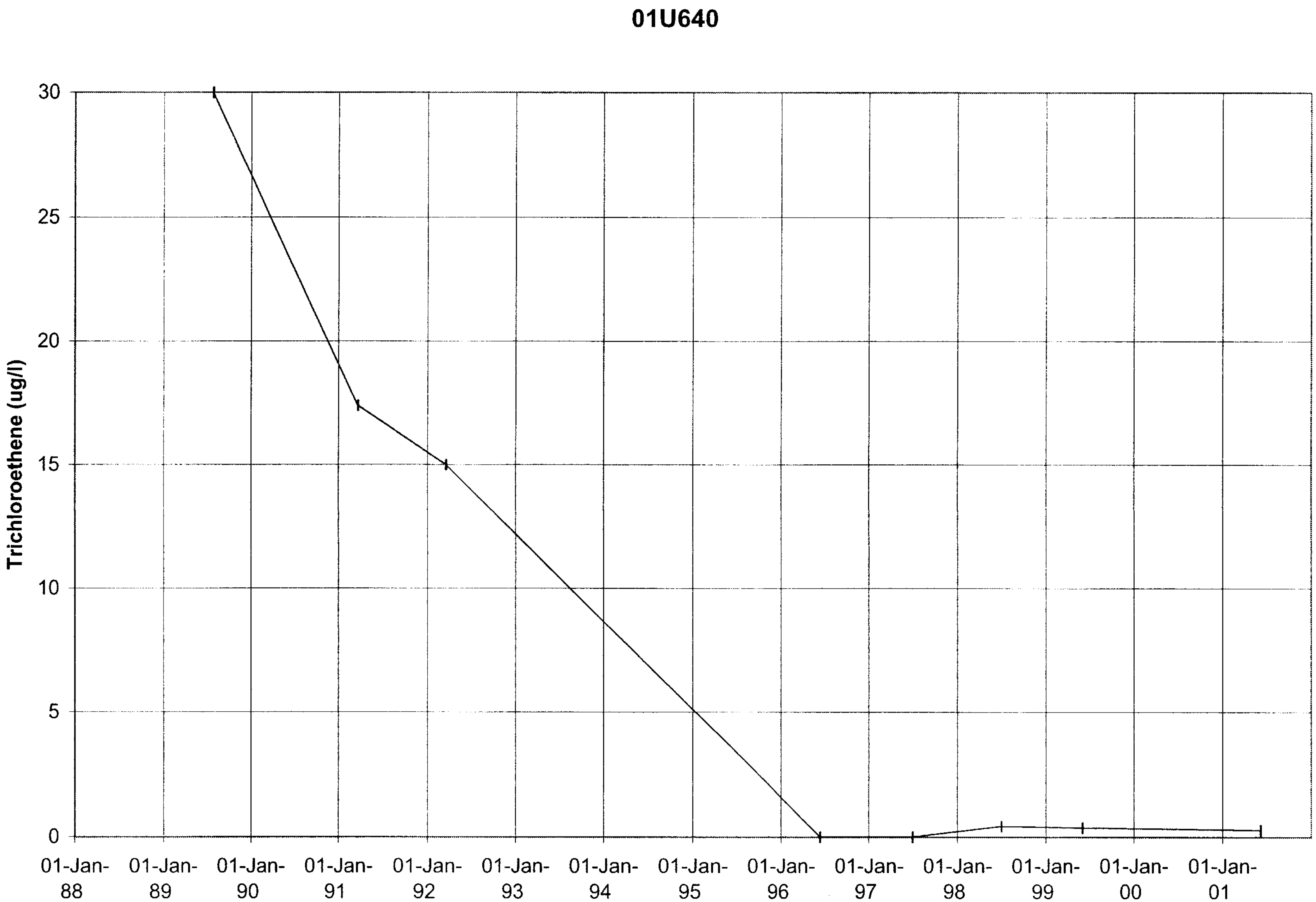

01U902
Concentration (ug/l)
100
90
80
70
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map

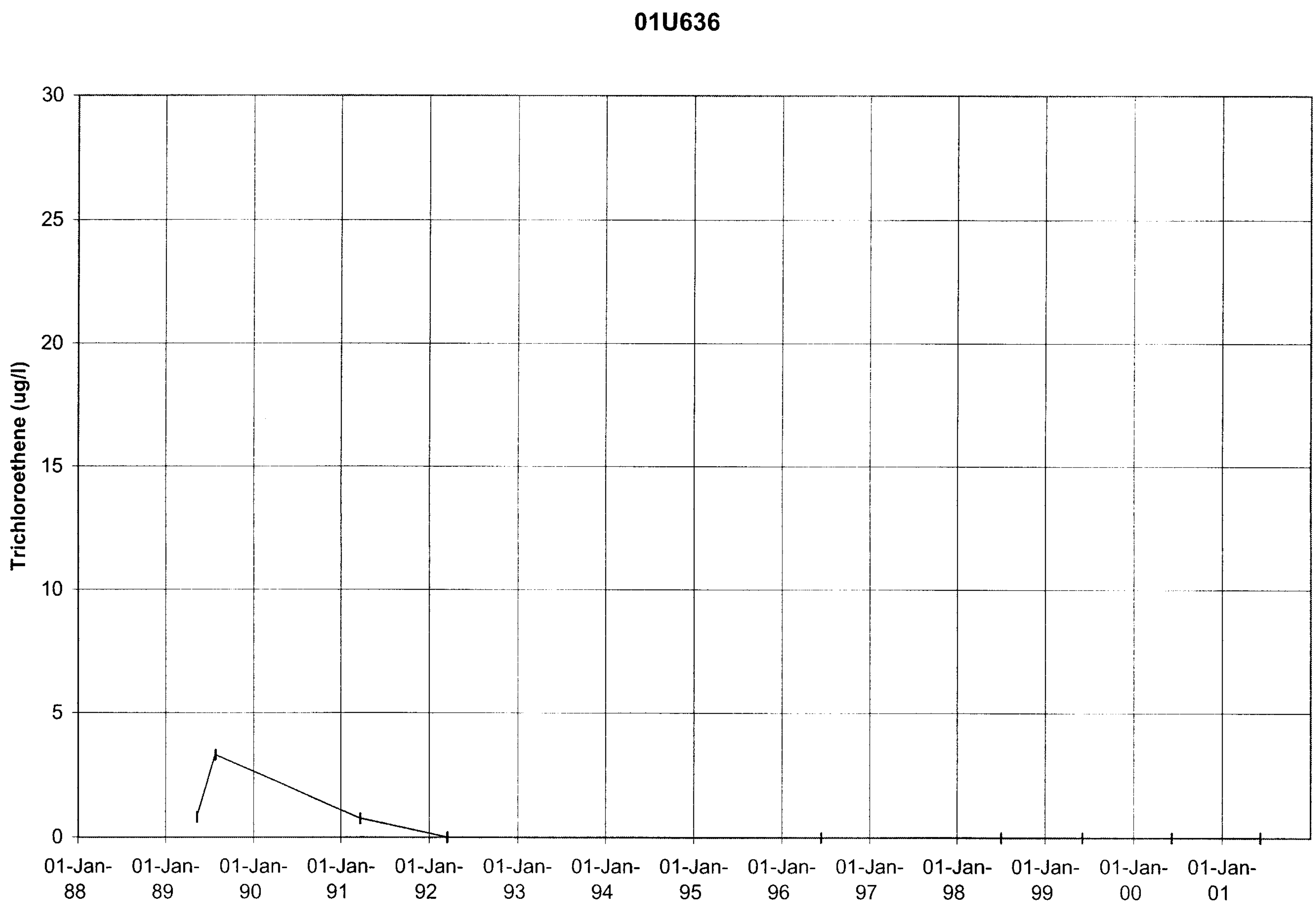
01U901



Back to Map


01U640
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

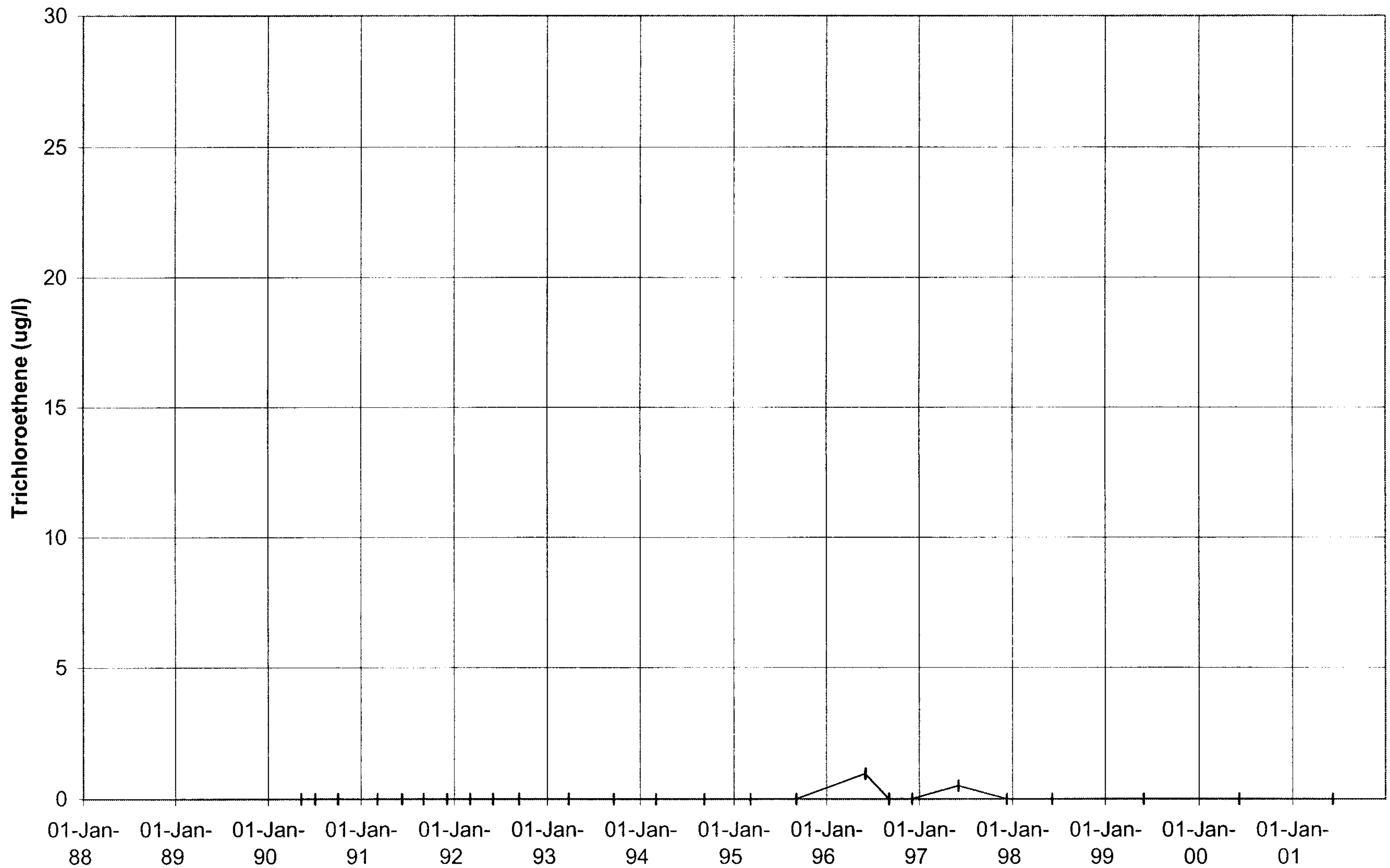
Back to Map



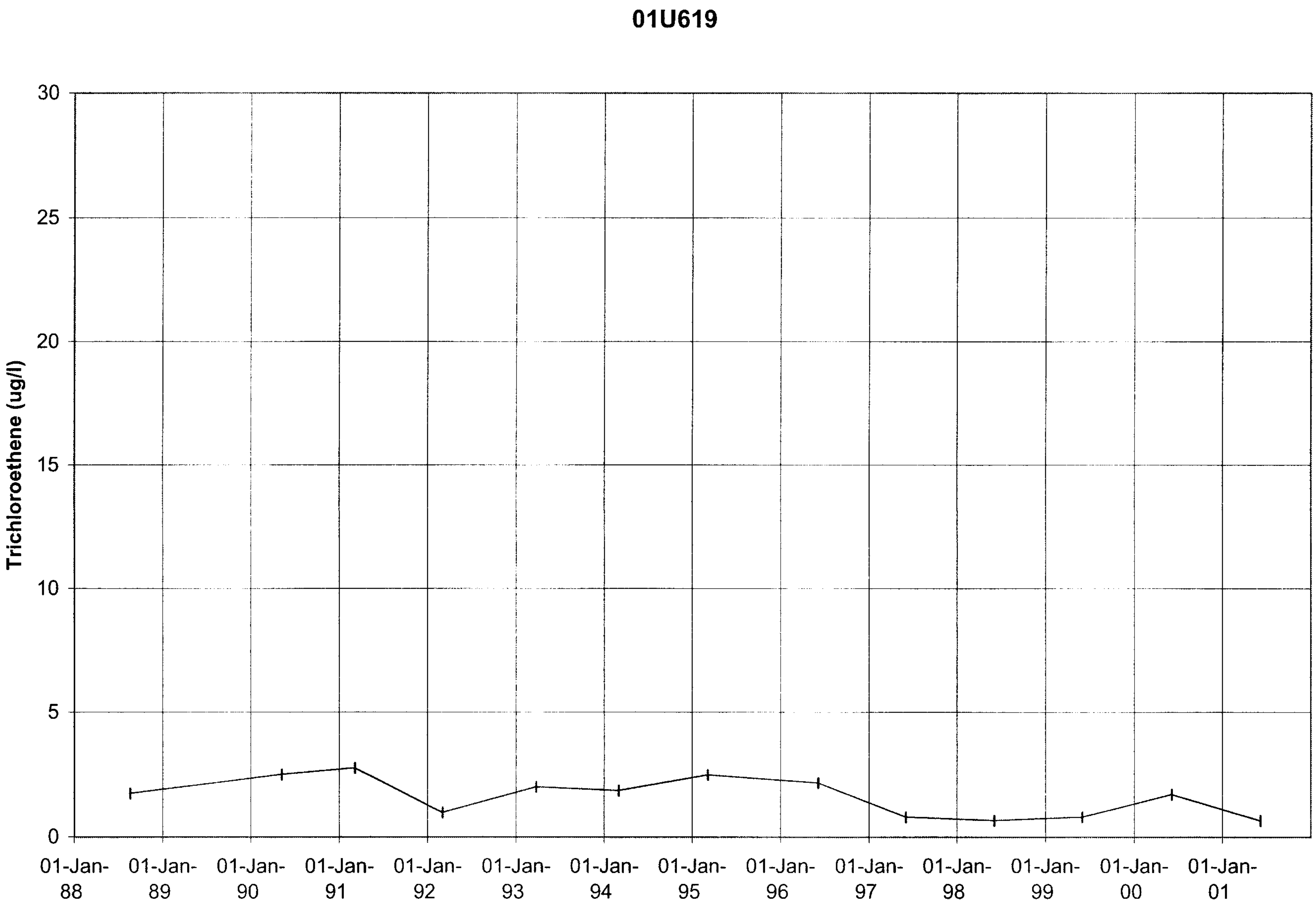
01U636
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

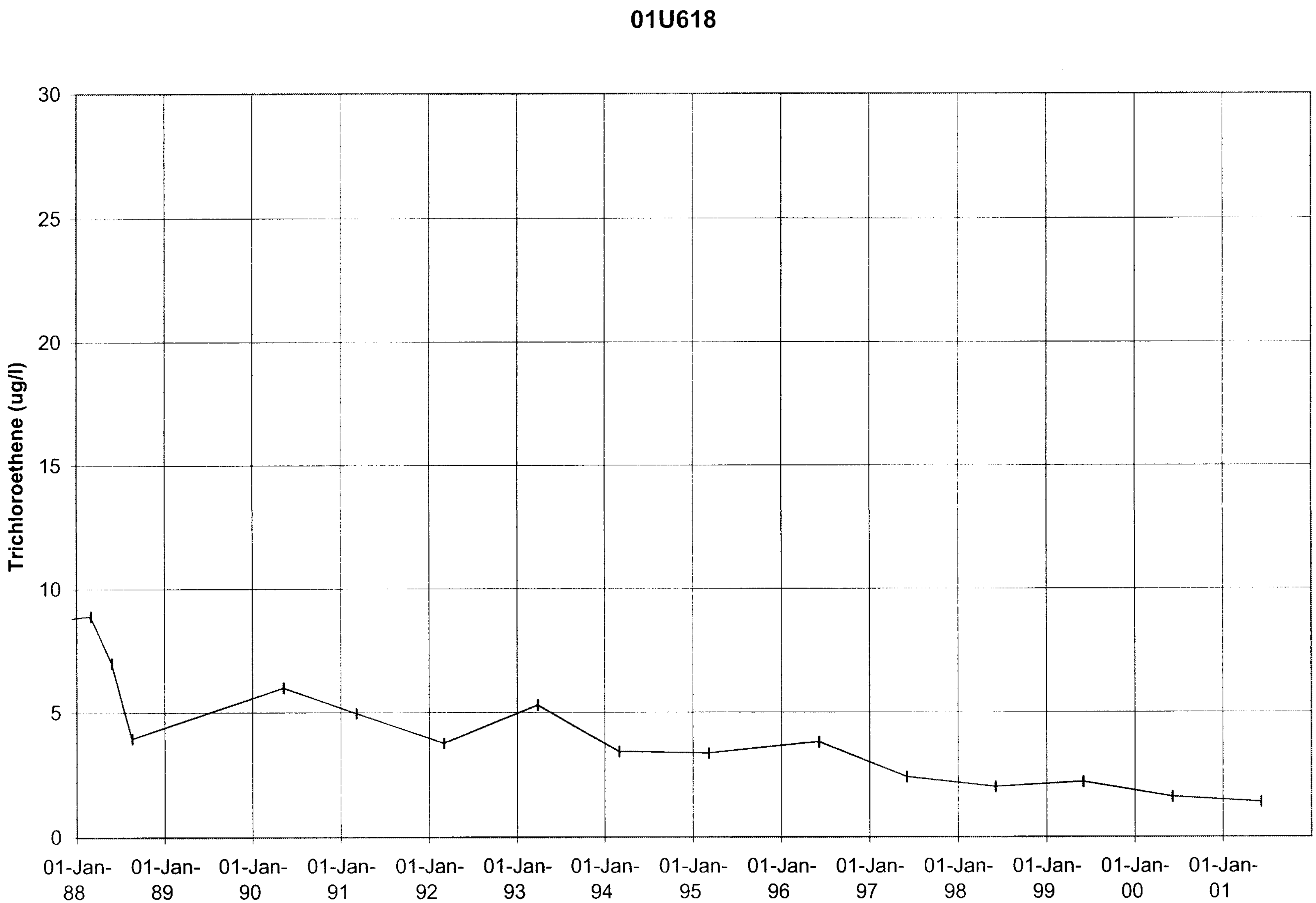
01U621



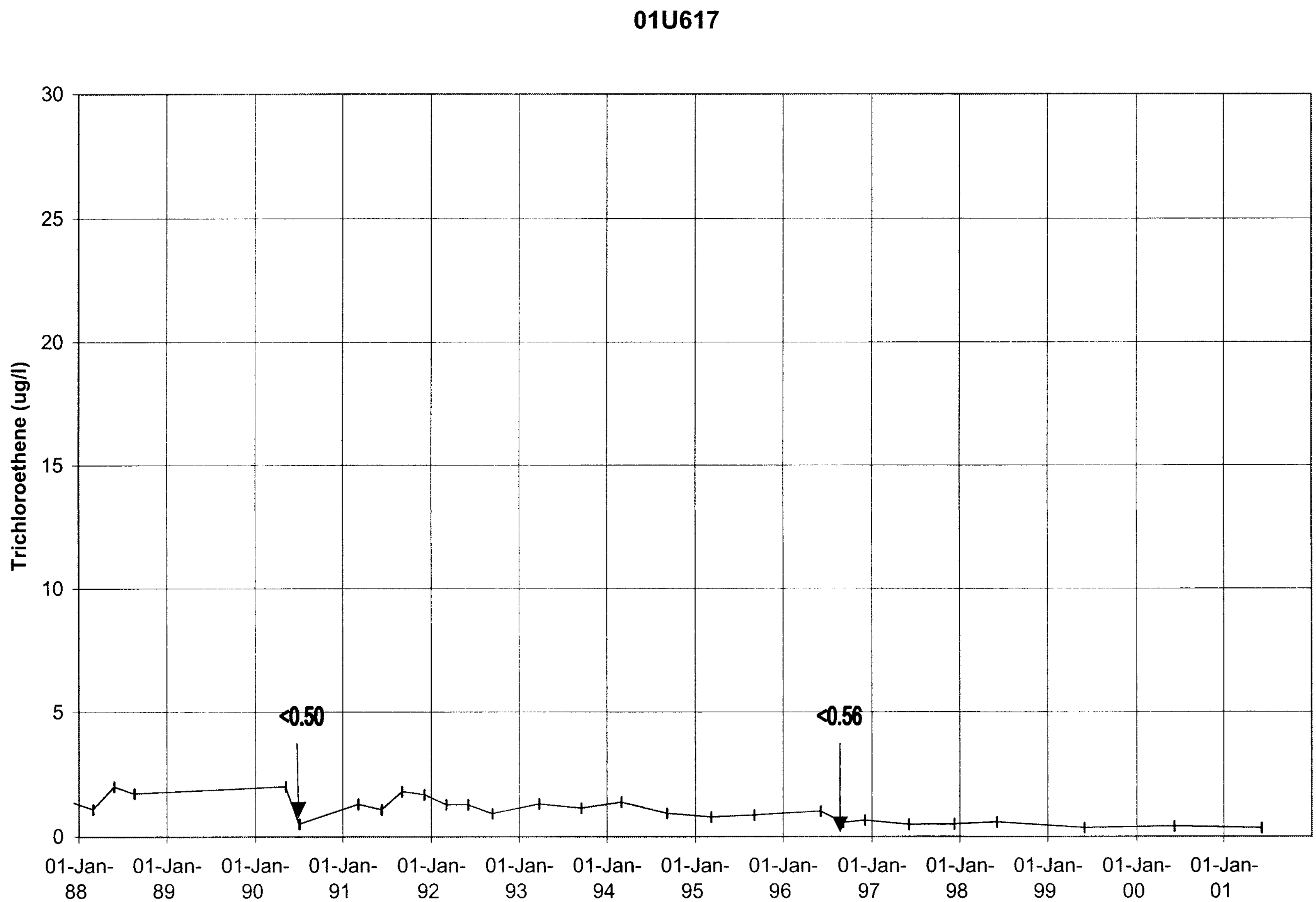
Back to Map


01U619
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

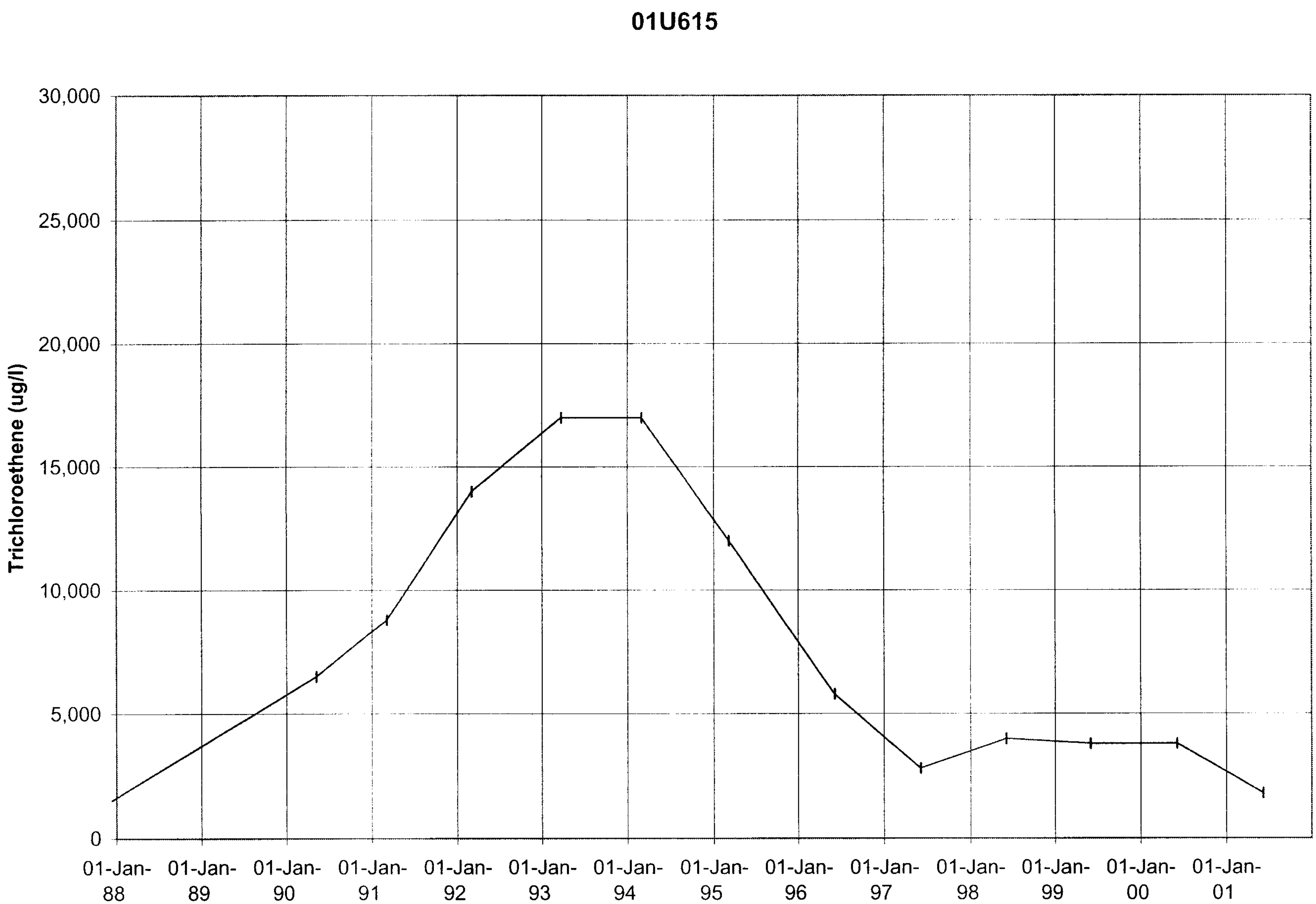
Back to Map


01U618
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

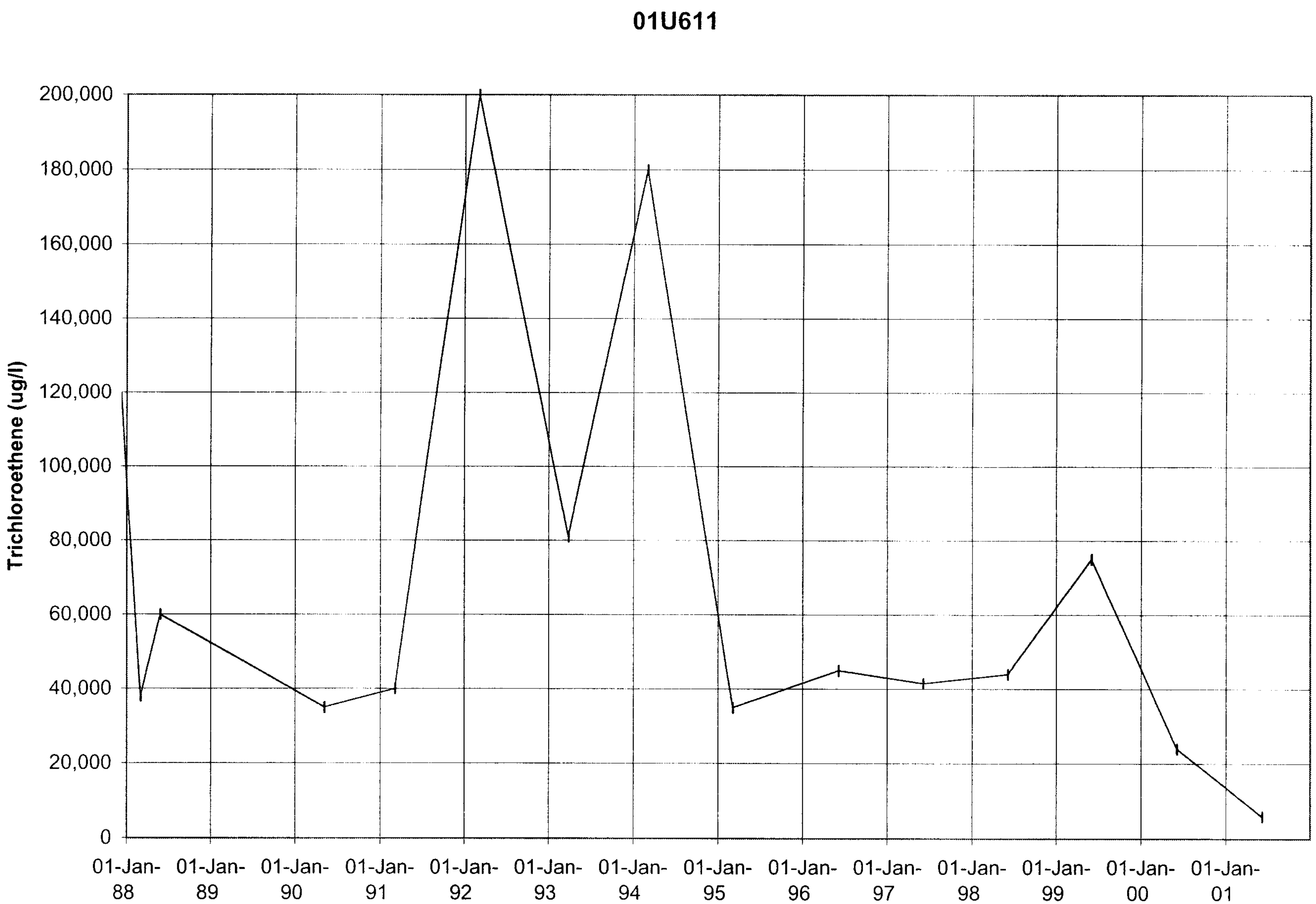

01U617
Trichloroethene (ug/l)
30
25
20
15
10
5
0
<0.50
<0.56
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

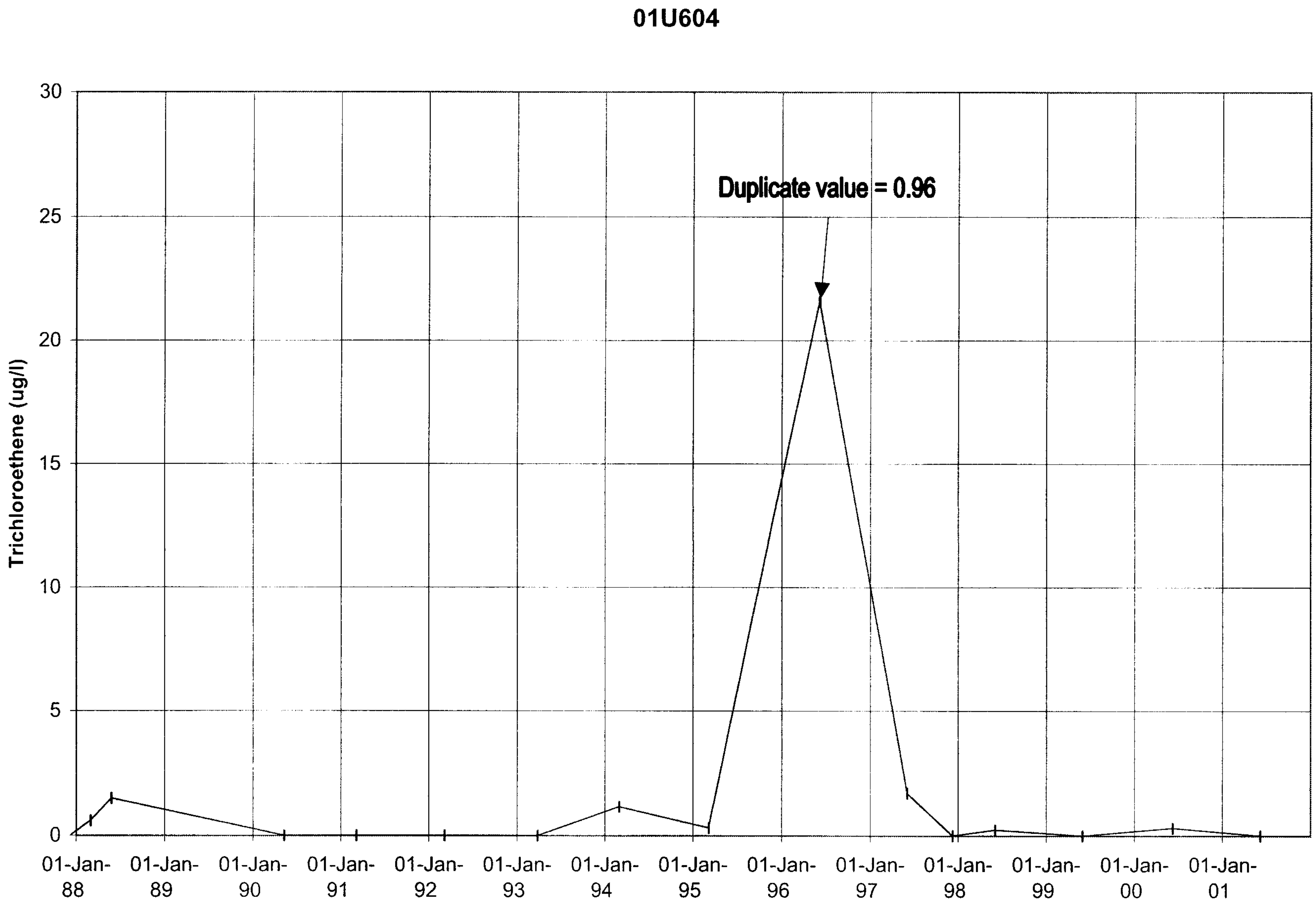


01U615
Trichloroethene (ug/l)
30,000
25,000
20,000
15,000
10,000
5,000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

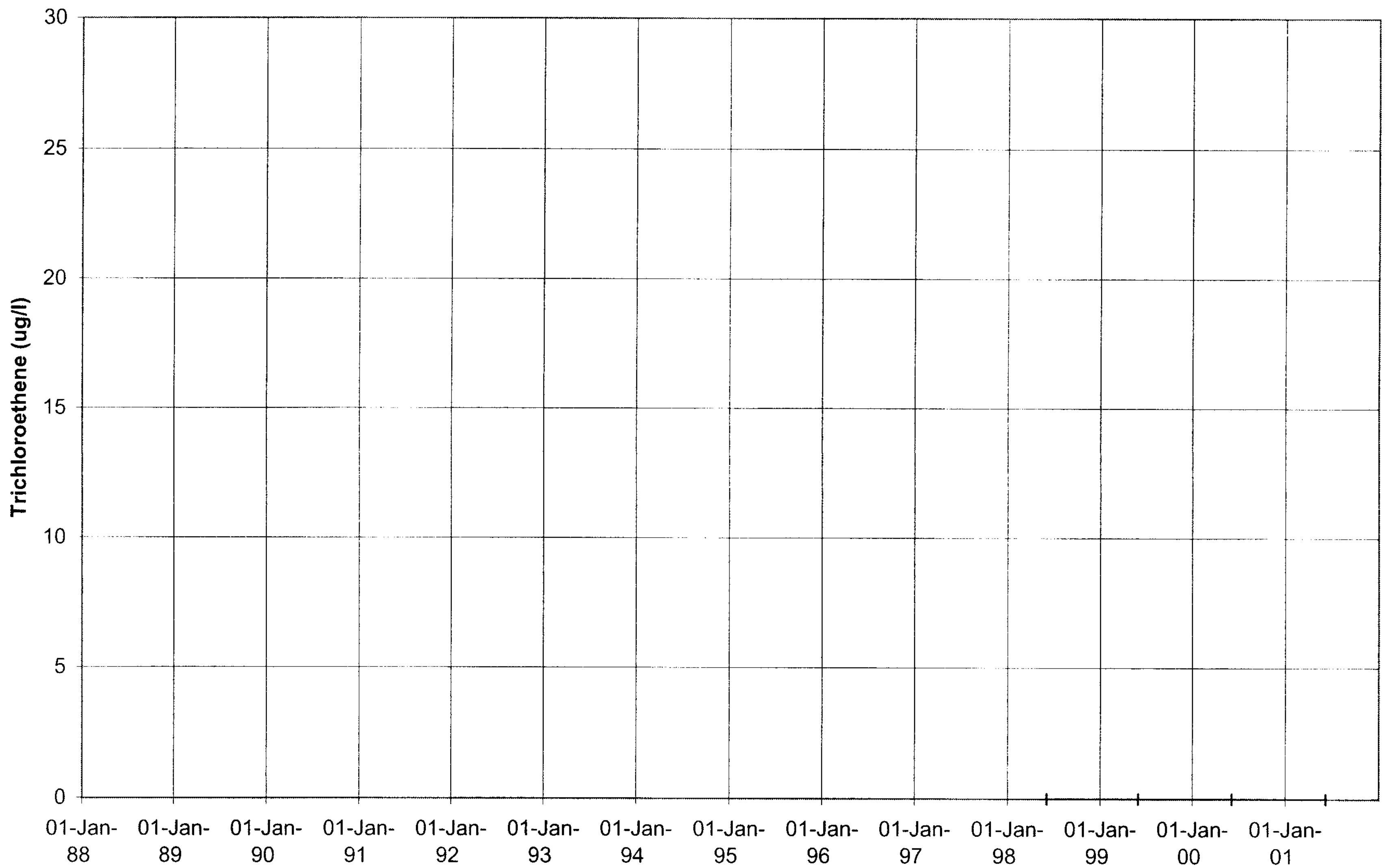

01U611
Trichloroethene (ug/l)
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


01U604
Duplicate value = 0.96
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

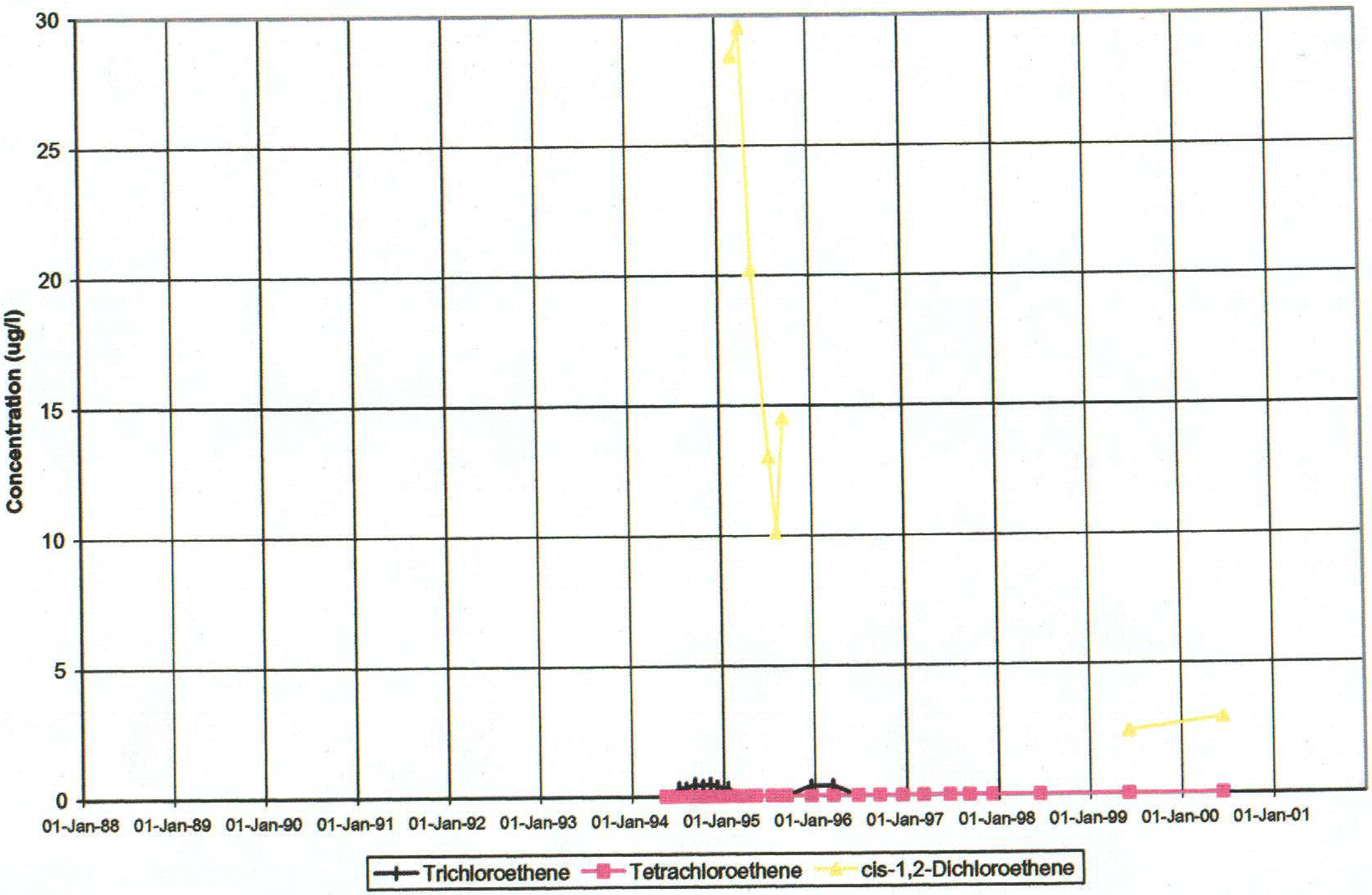
Back to Map

01U603

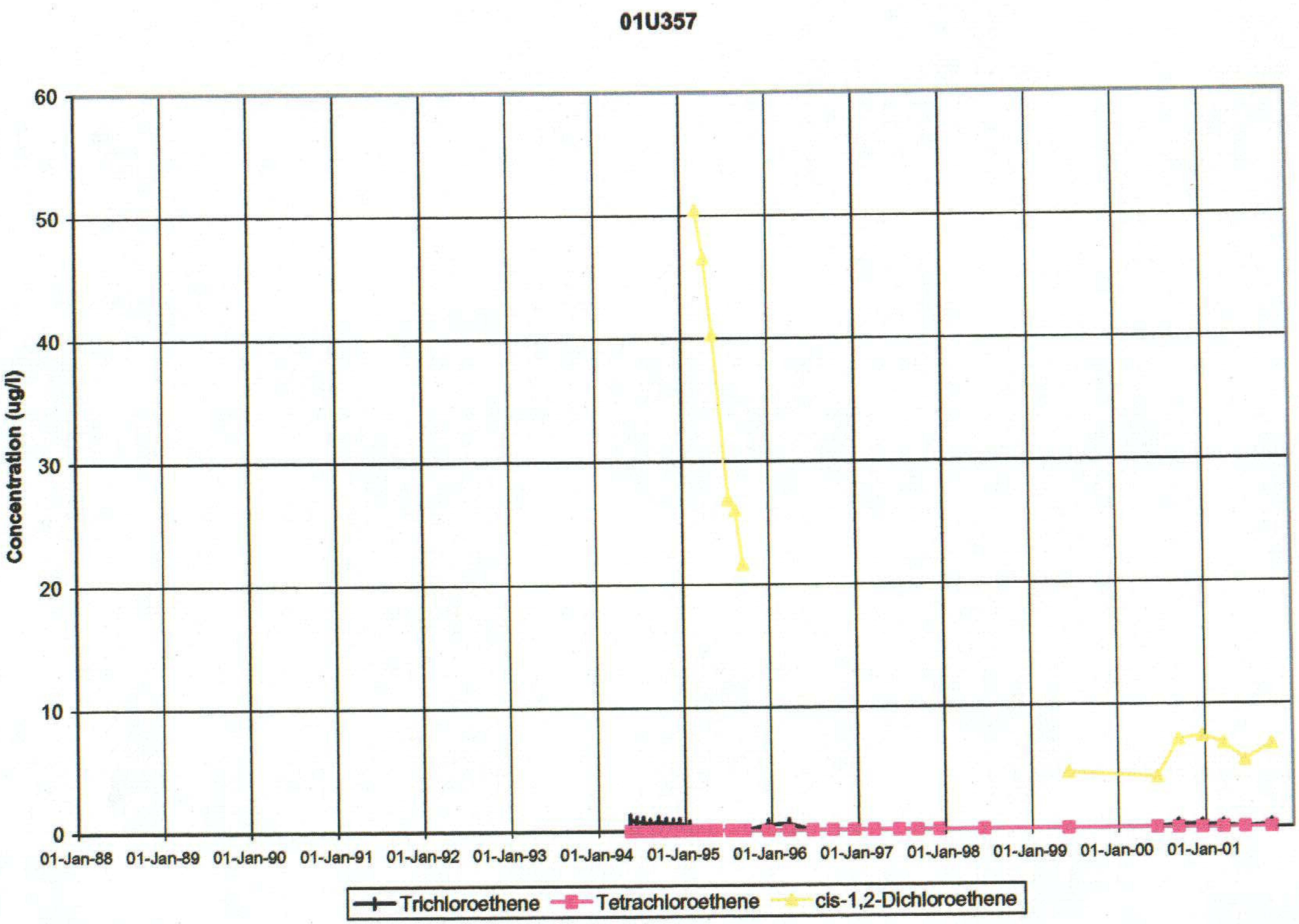


Back to Map

01U358

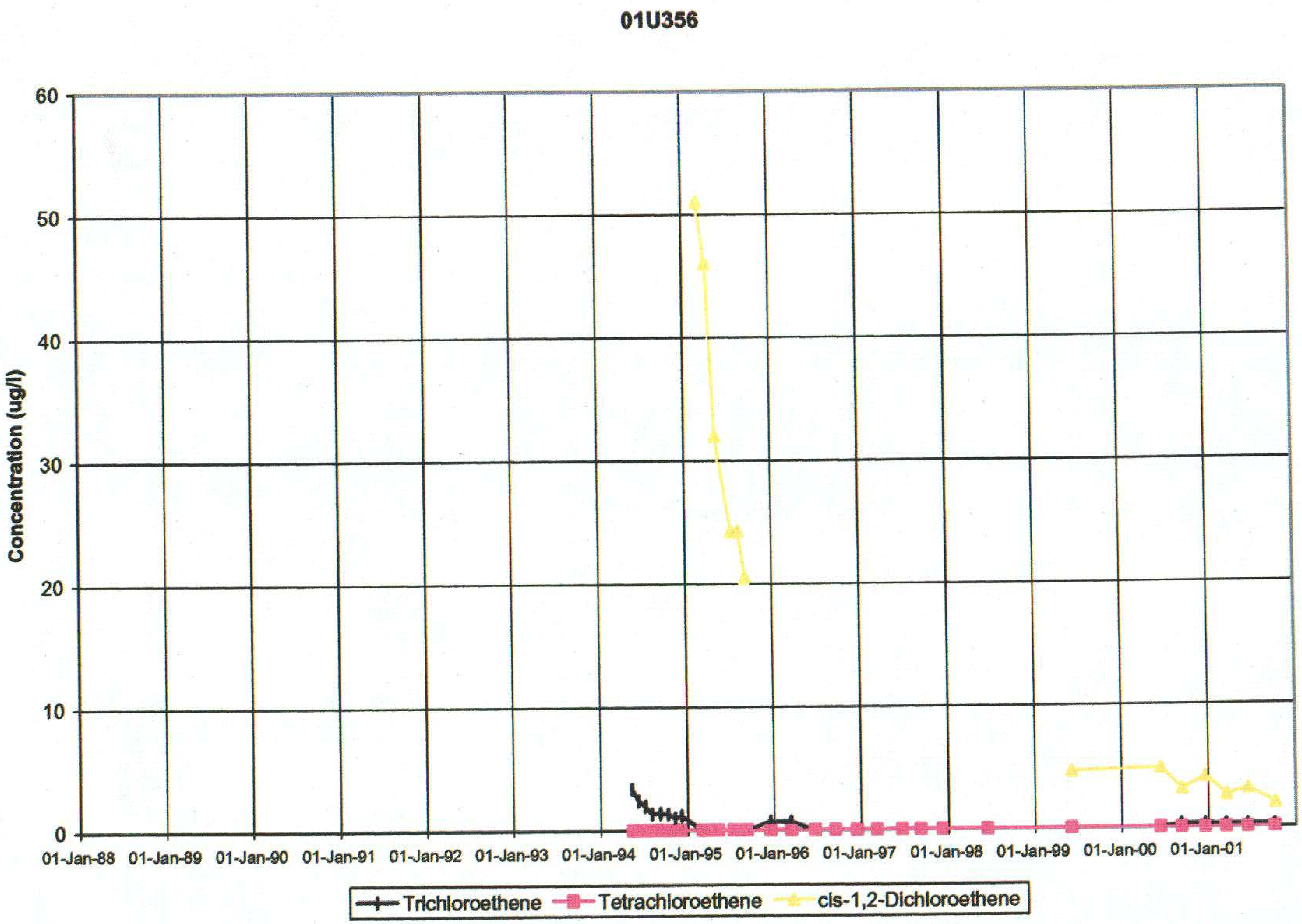


Back to Map



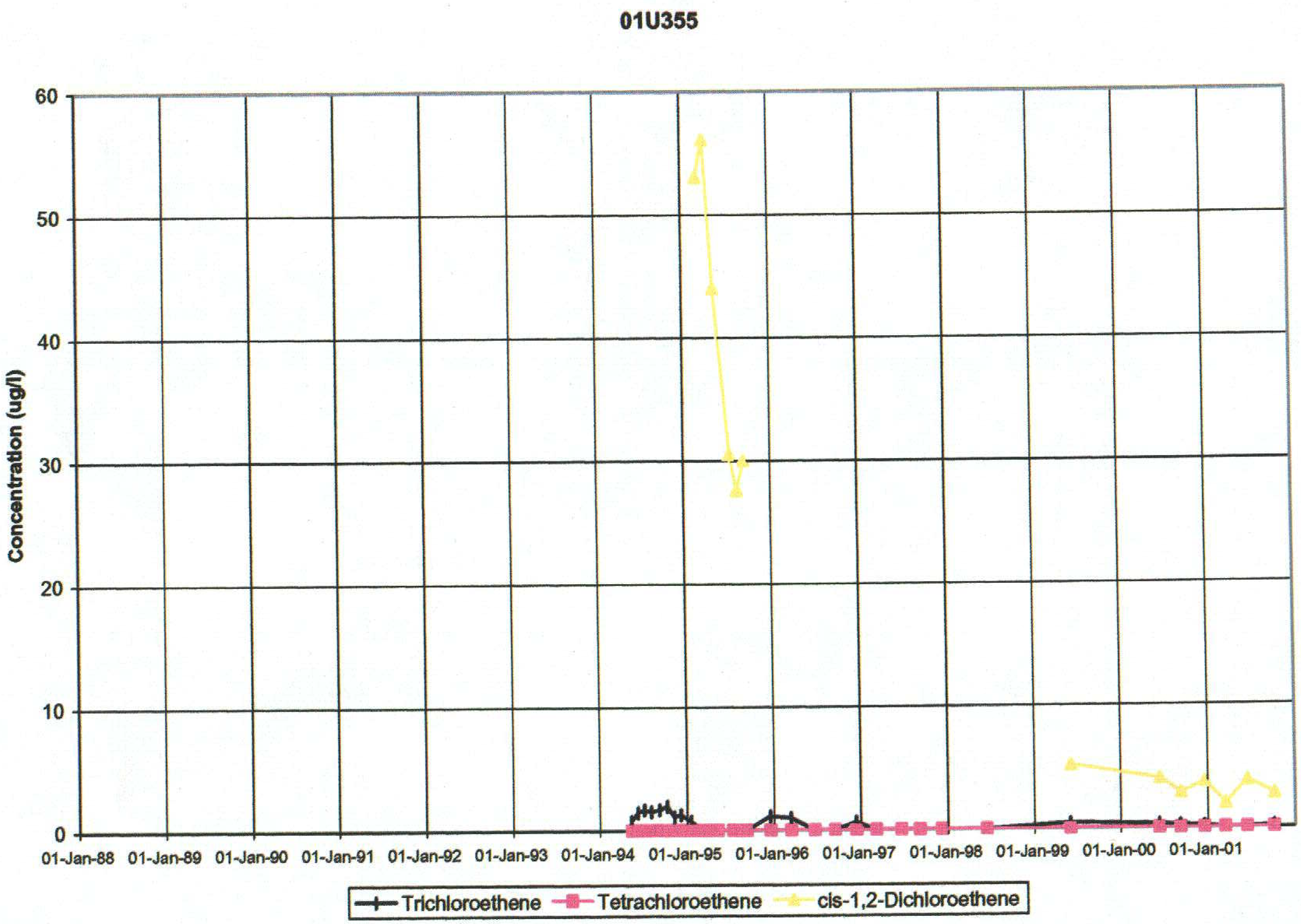
01U357
Concentration (ug/l)
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map



01U356
Concentration (ug/l)
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map



01U355
60
50
40
30
20
10
0
Concentration (ug/l)
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

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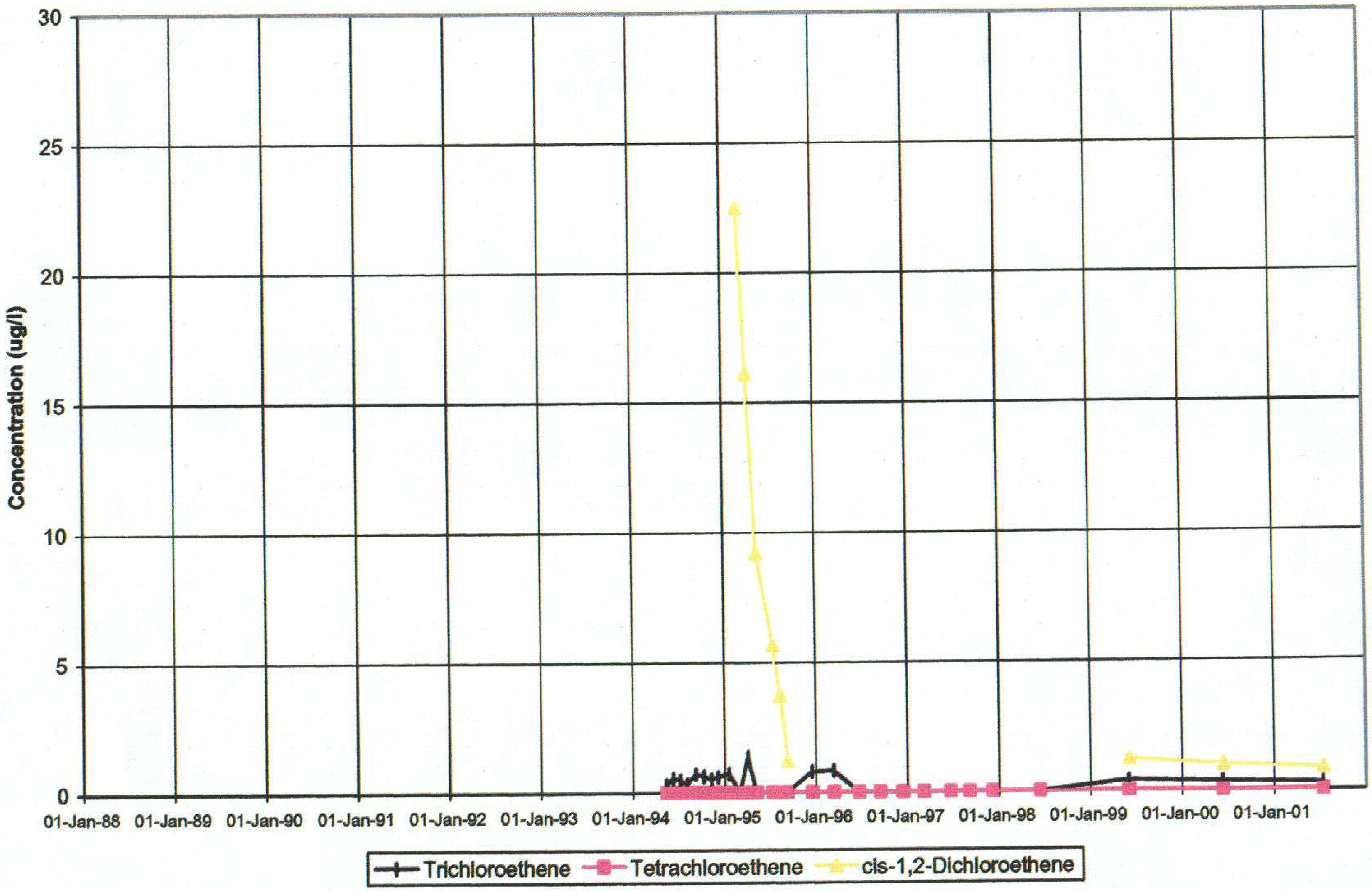
01U354



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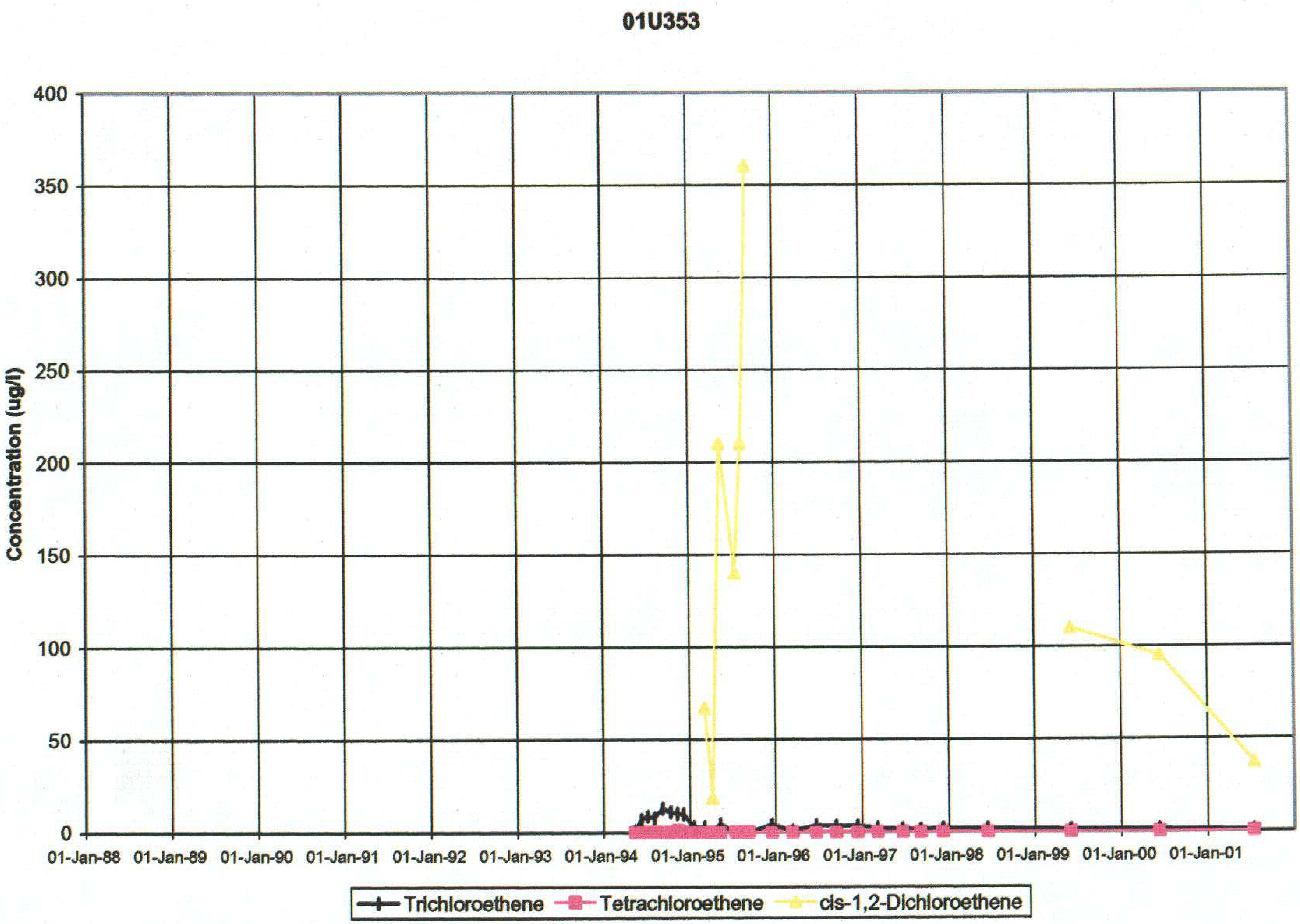
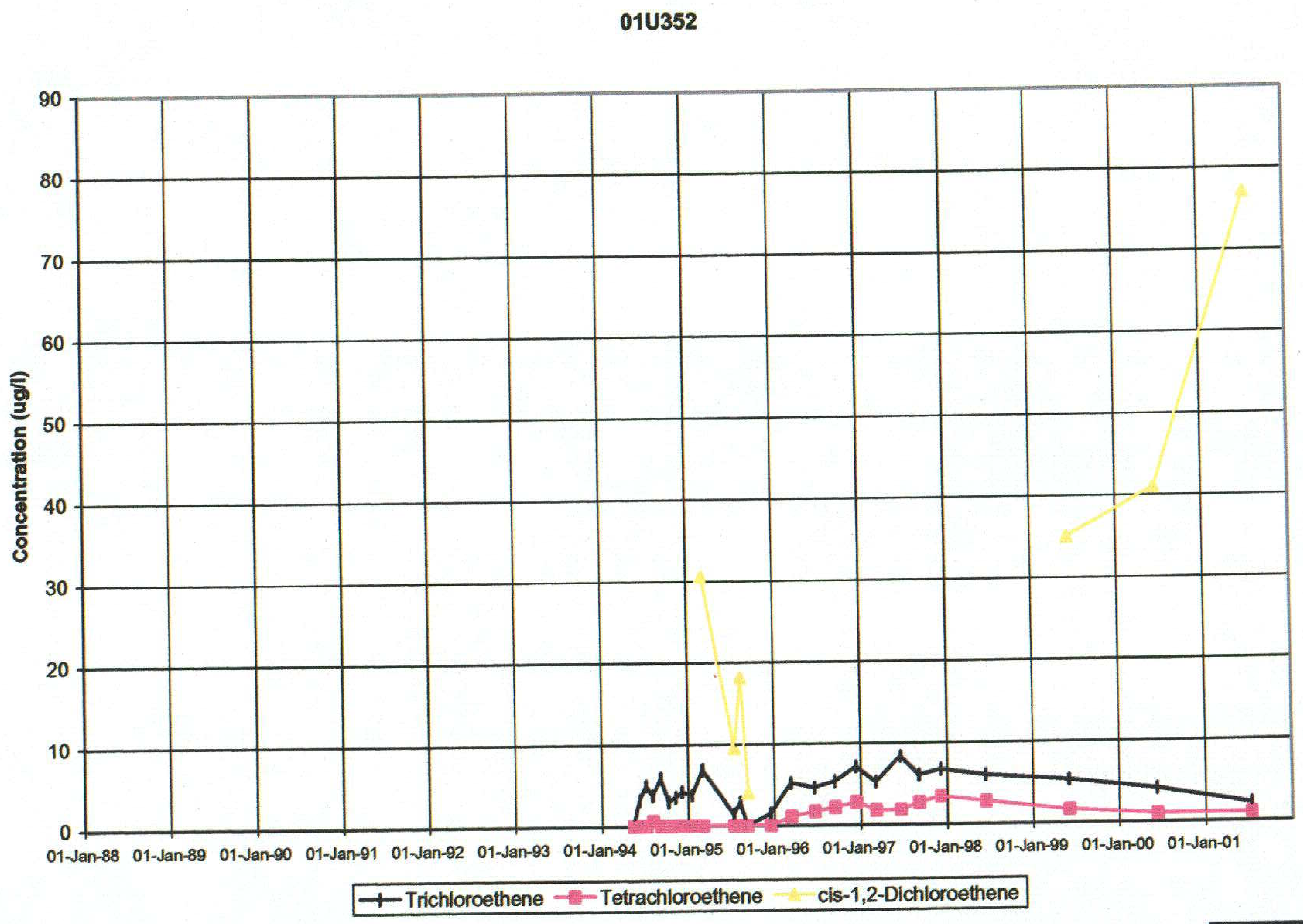


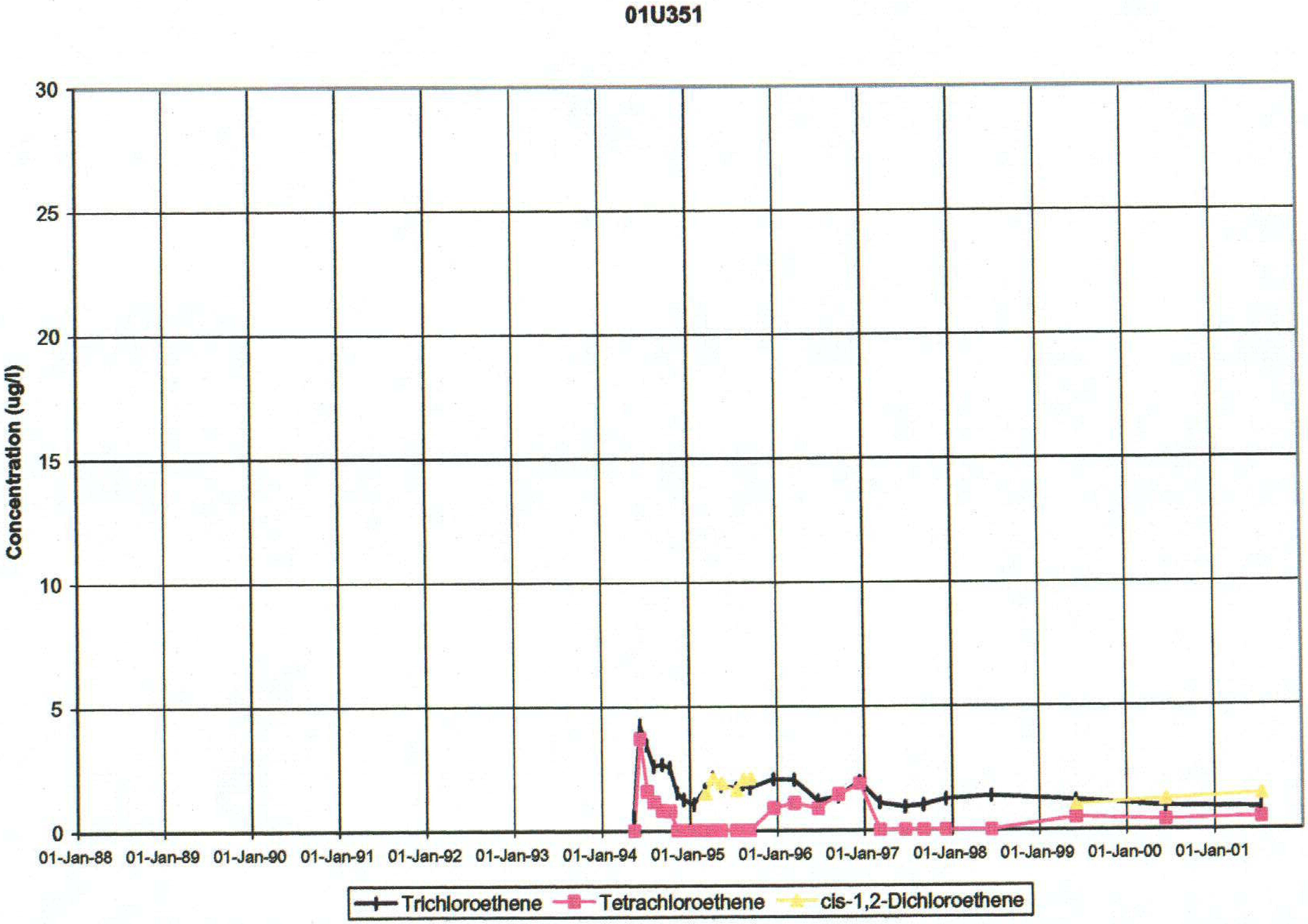
01U353
Concentration (ug/l)
400
350
300
250
200
150
100
50
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map



01U352
90
80
70
60
50
40
30
20
10
0
Concentration (ug/l)
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

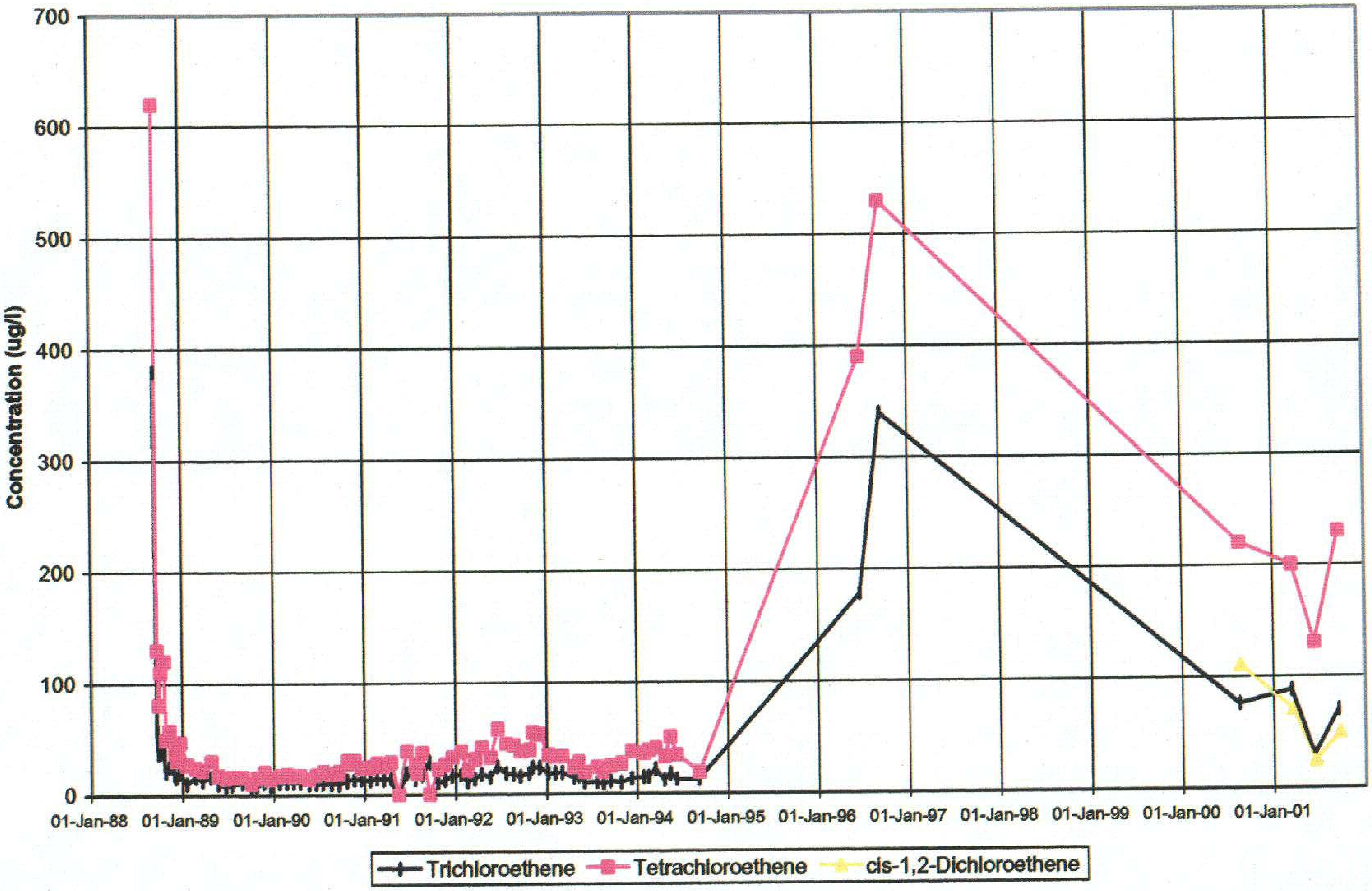
Back to Map



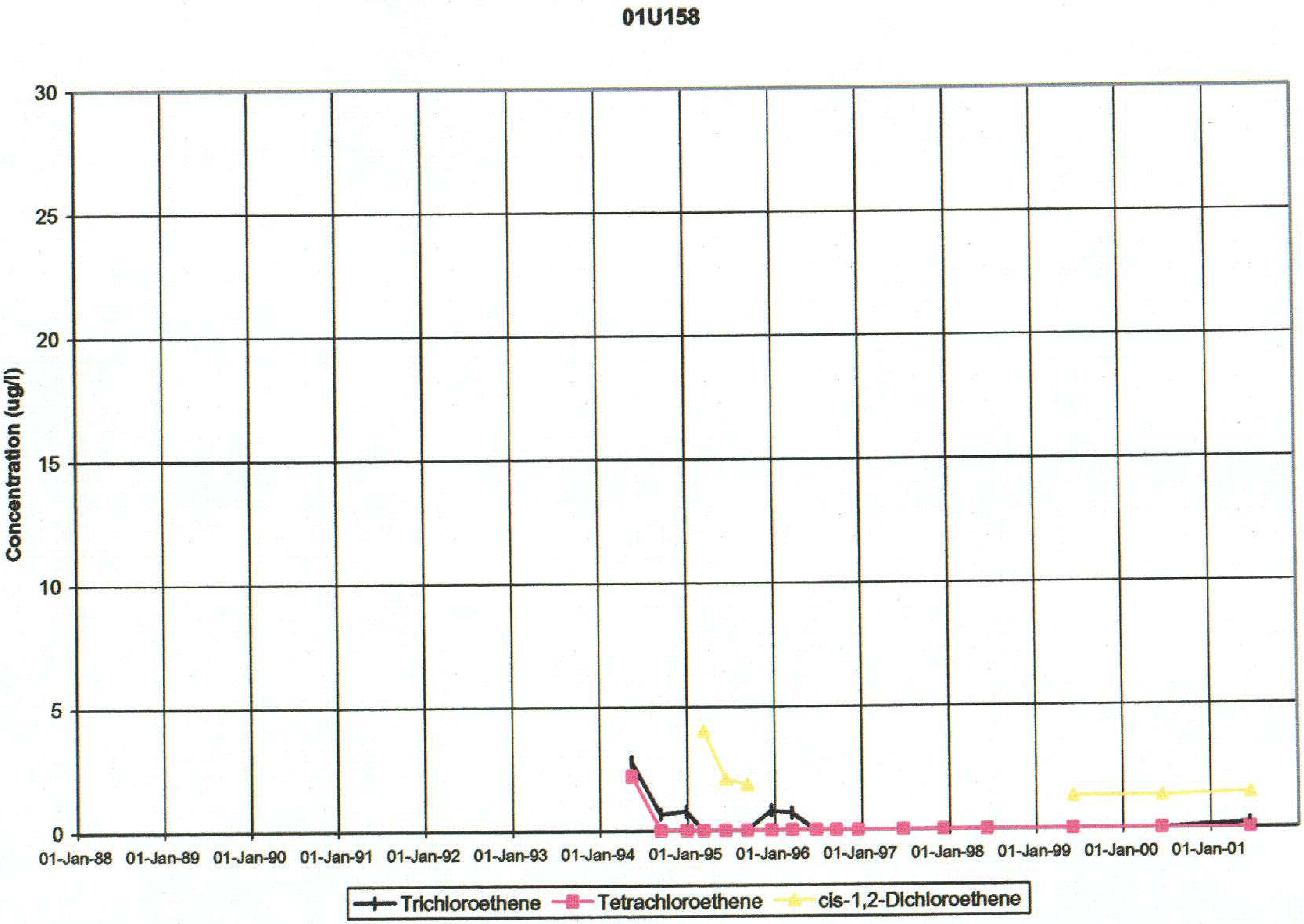
01U351
Concentration (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map

01U350

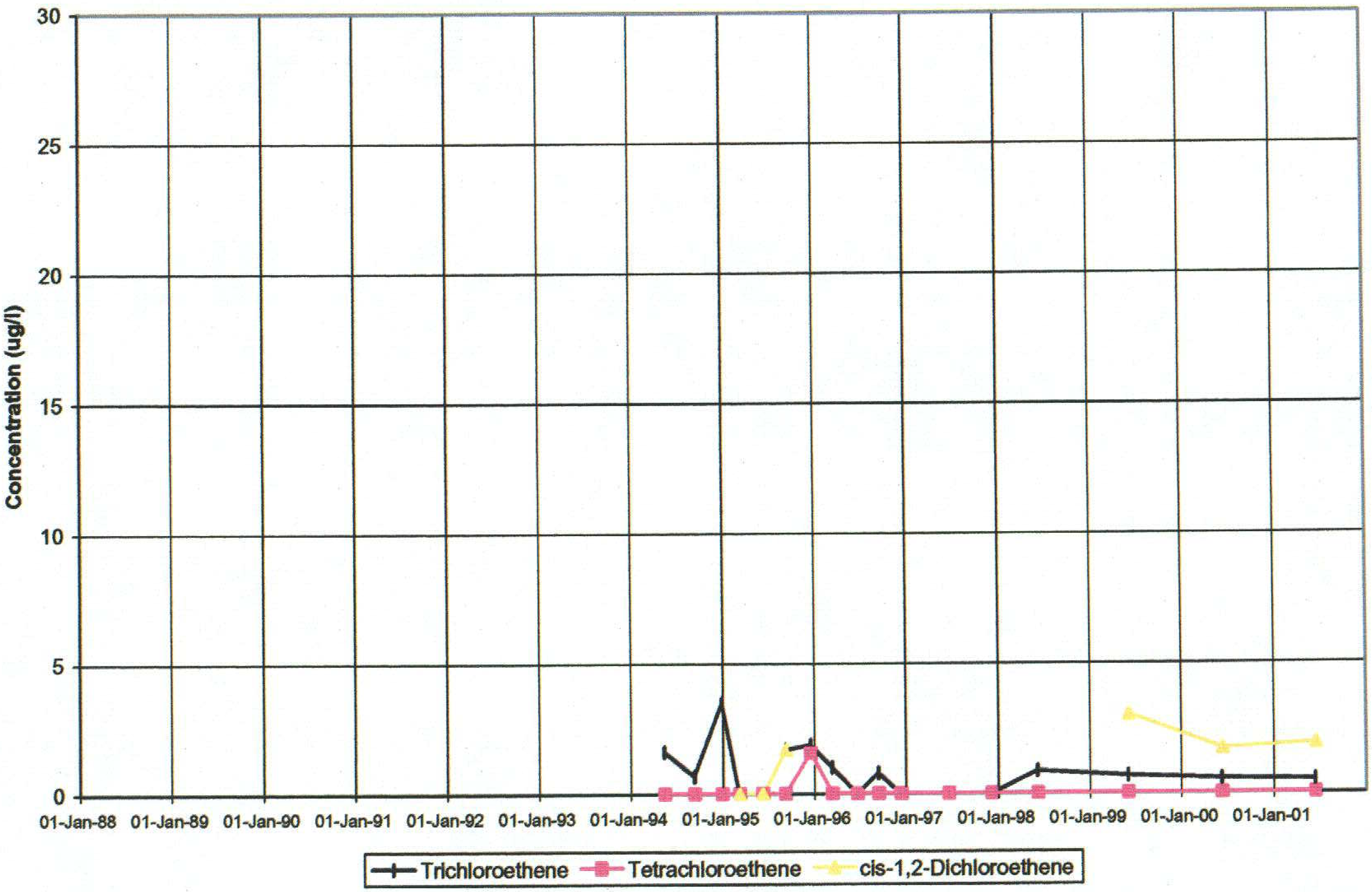


Back to Map

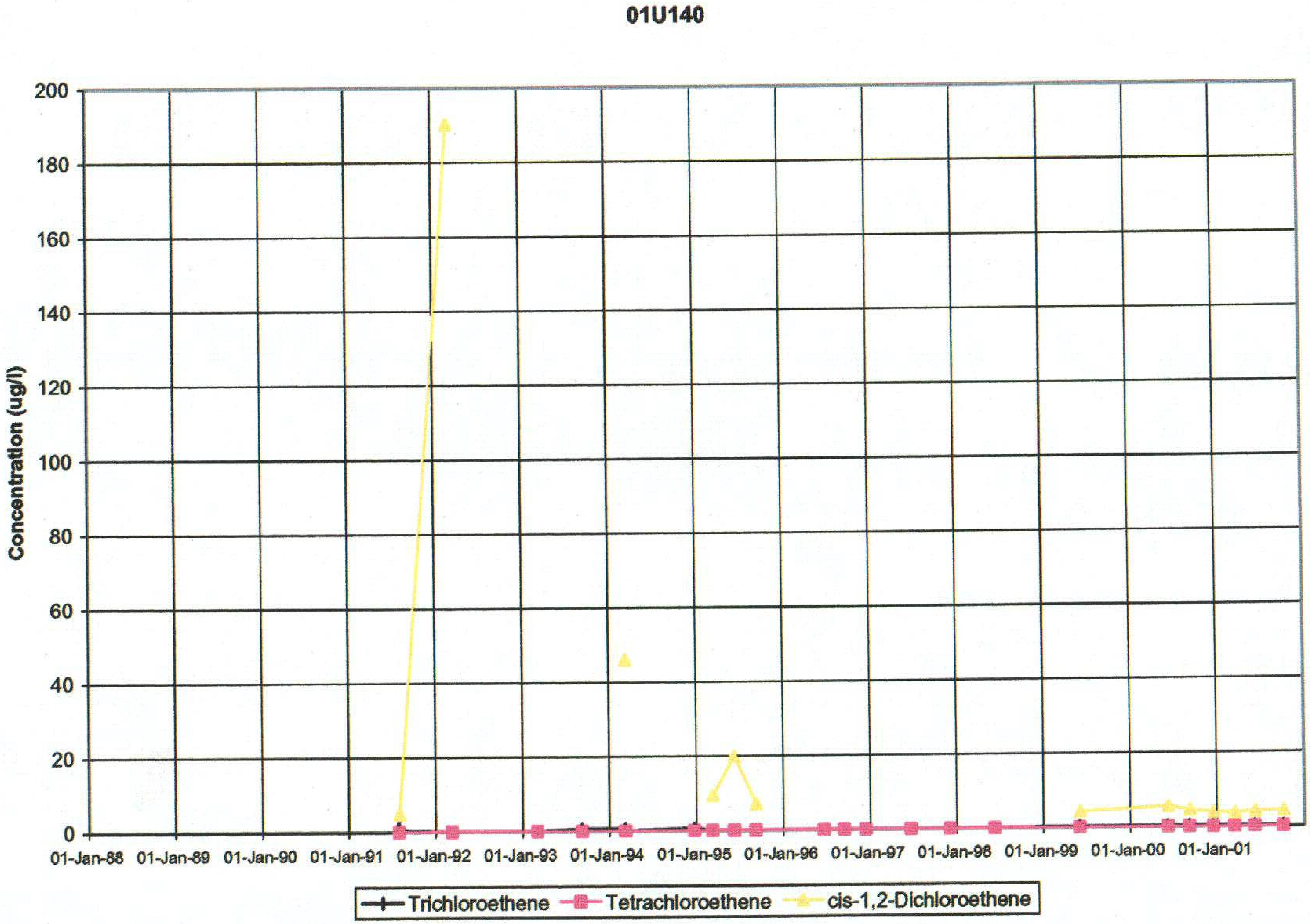

01U158
30
25
20
15
10
5
0
Concentration (ug/l)
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map

01U157



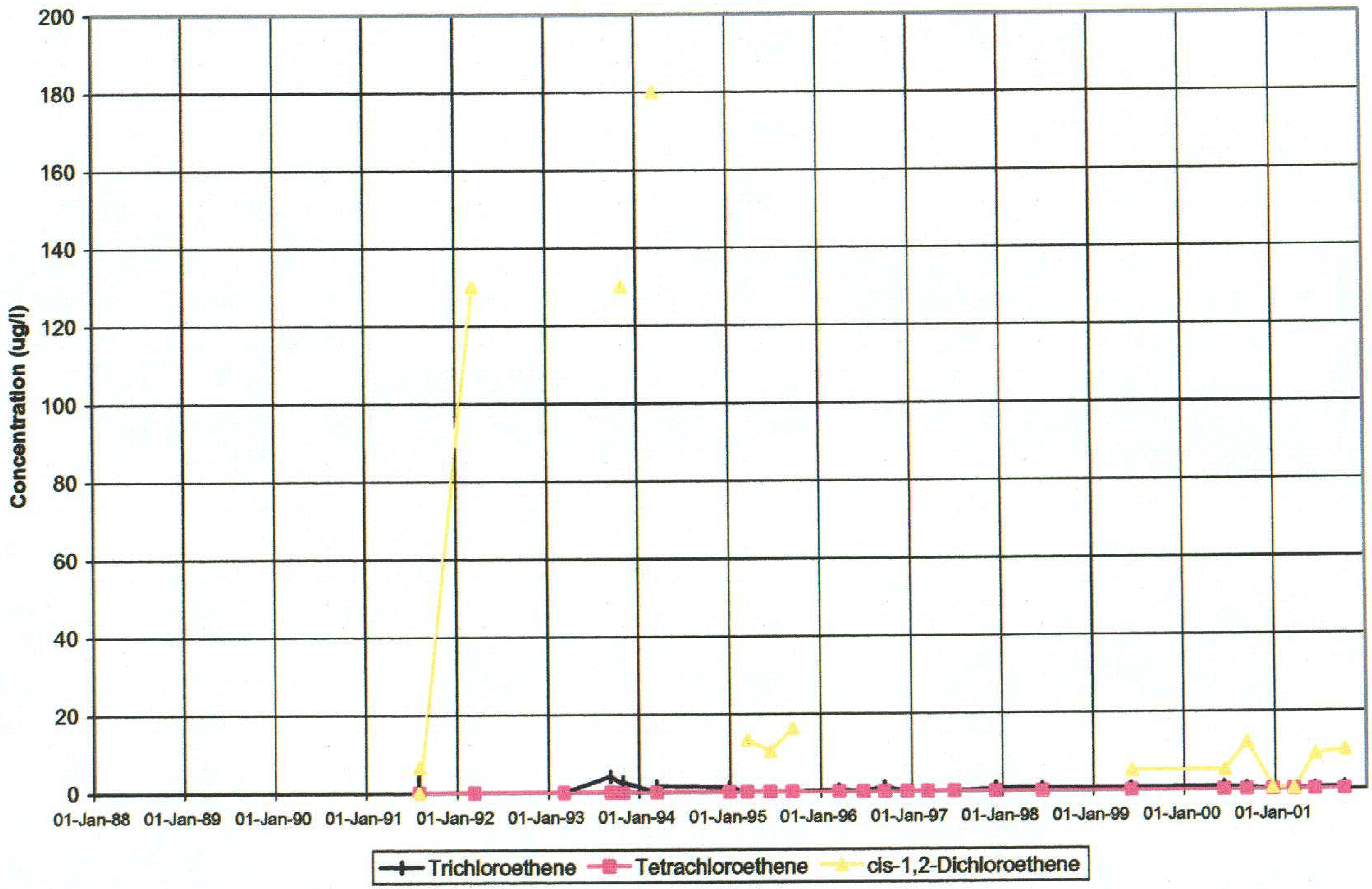
Back to Map



01U140
Concentration (ug/l)
200
180
160
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

Back to Map

01U139



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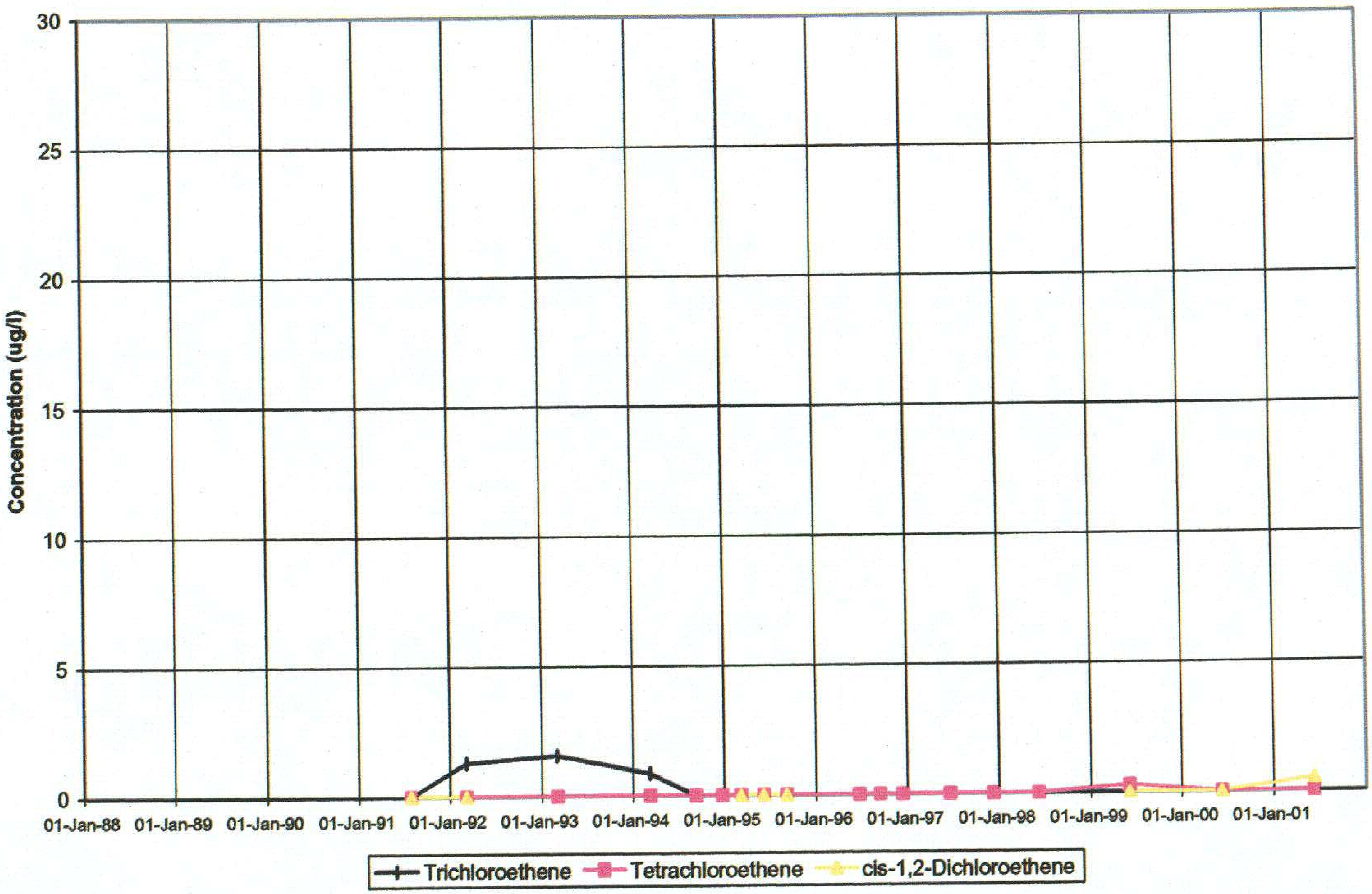
01U138



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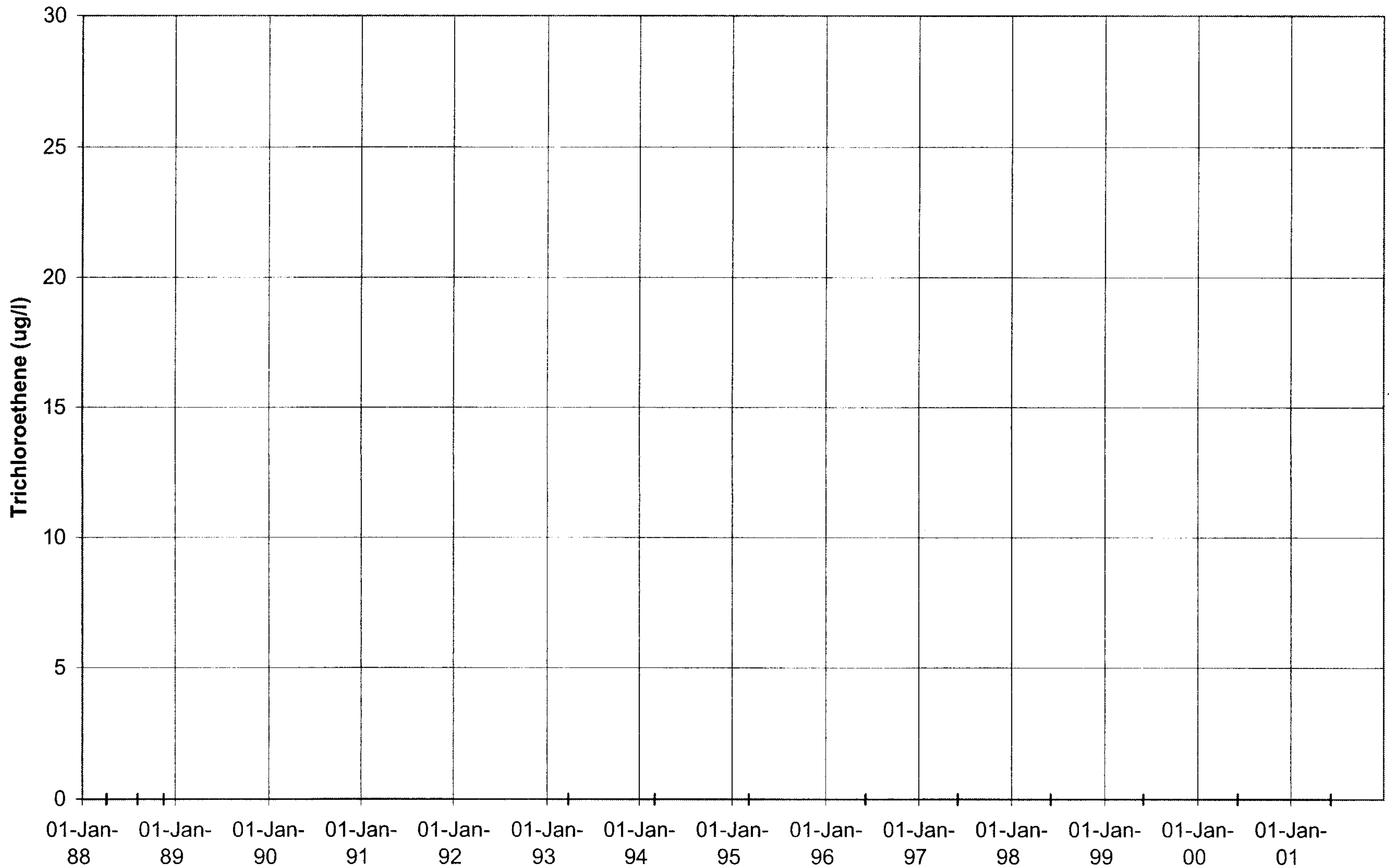
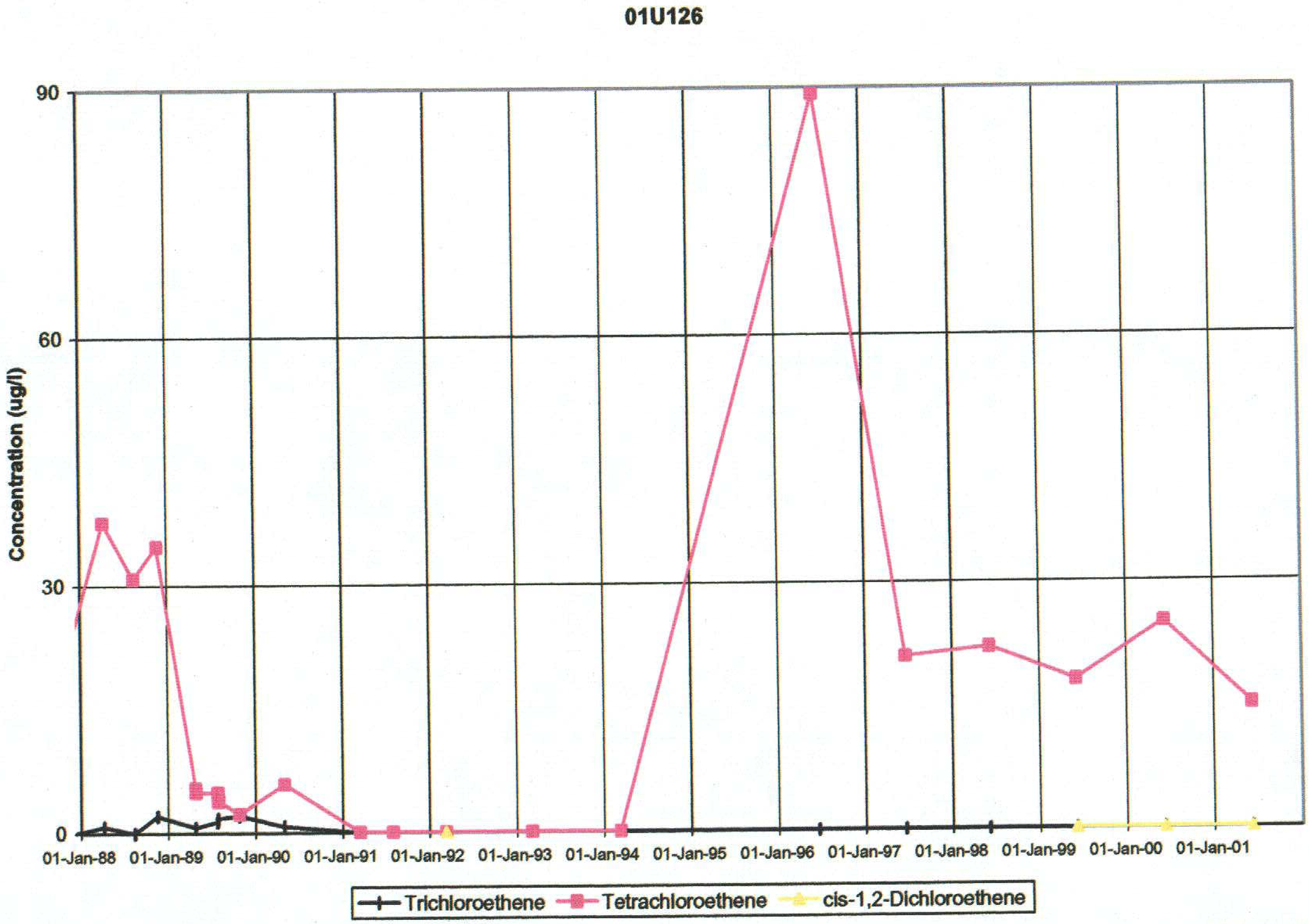
01U128

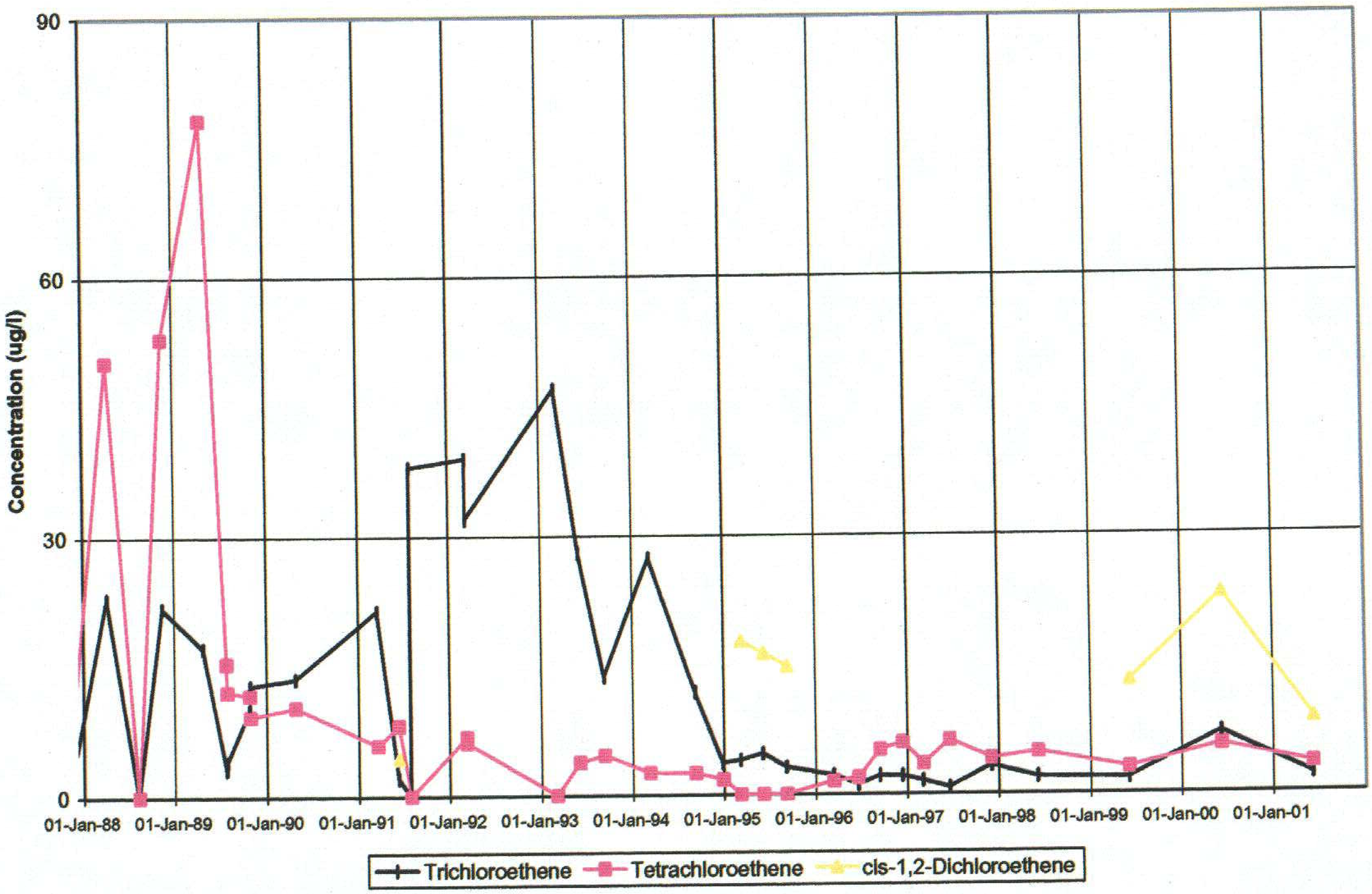


Back to Map


01U126
Concentration (ug/l)
90
60
30
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

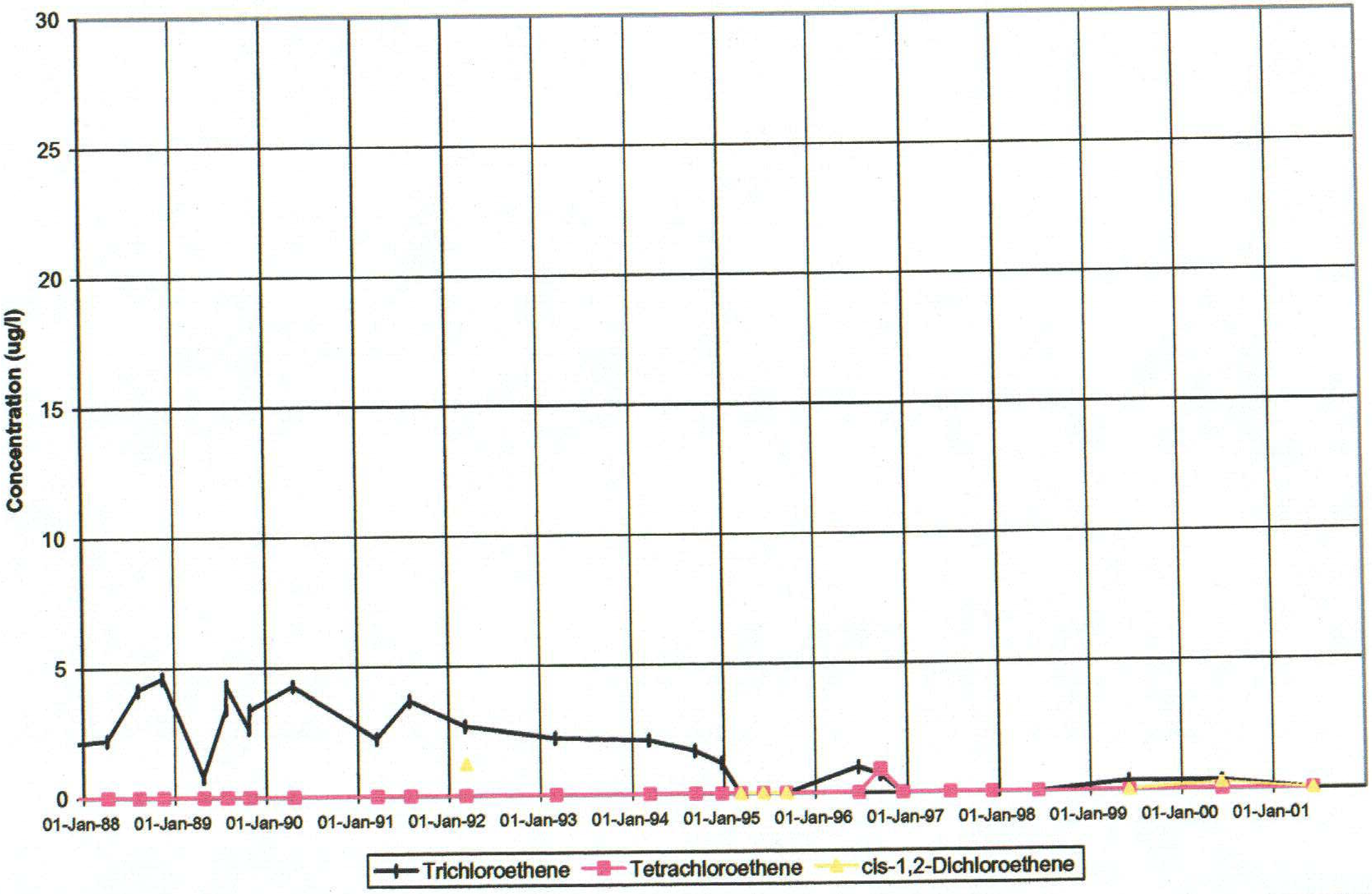
Back to Map

01U117



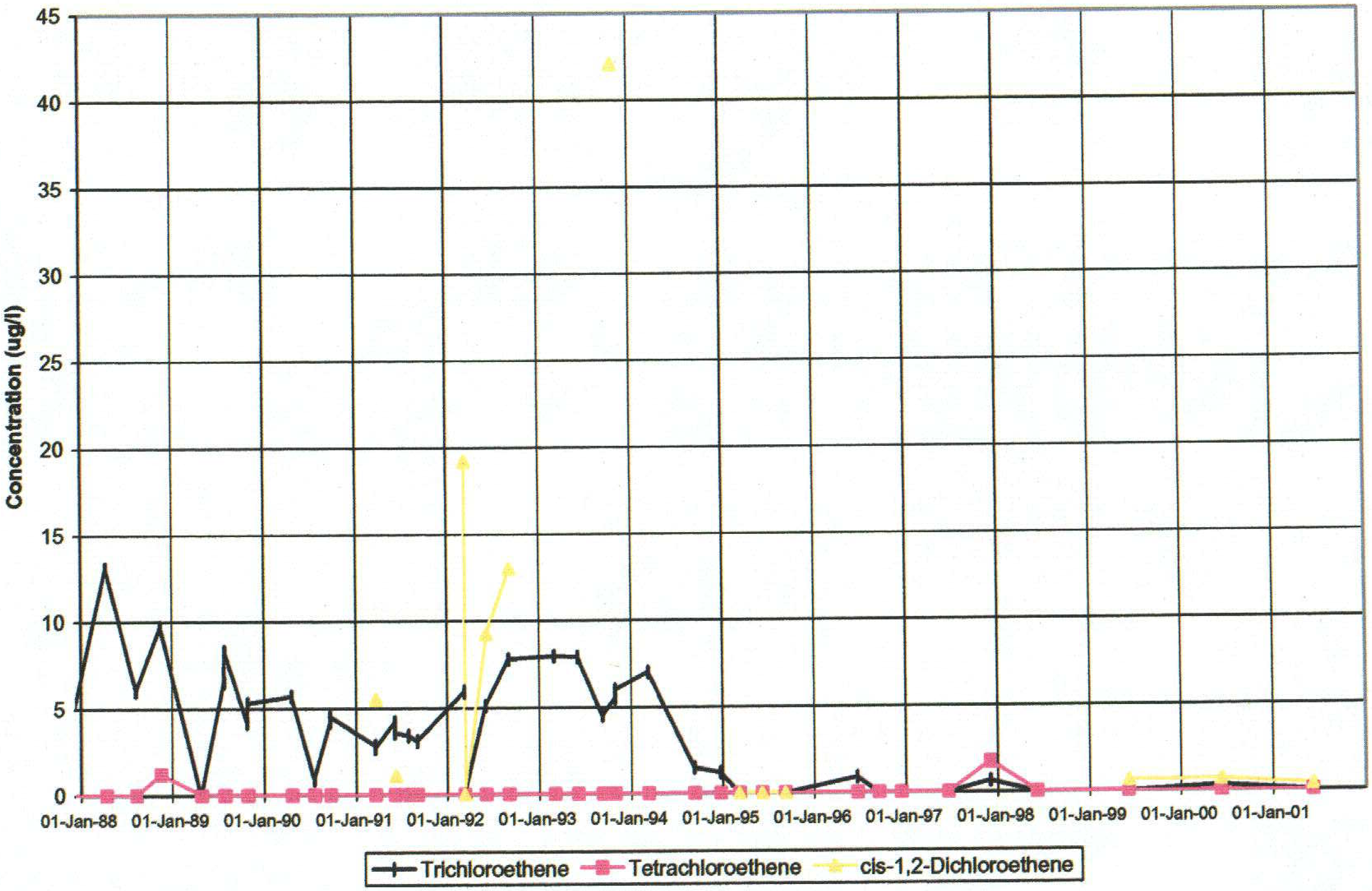
Back to Map

01U116

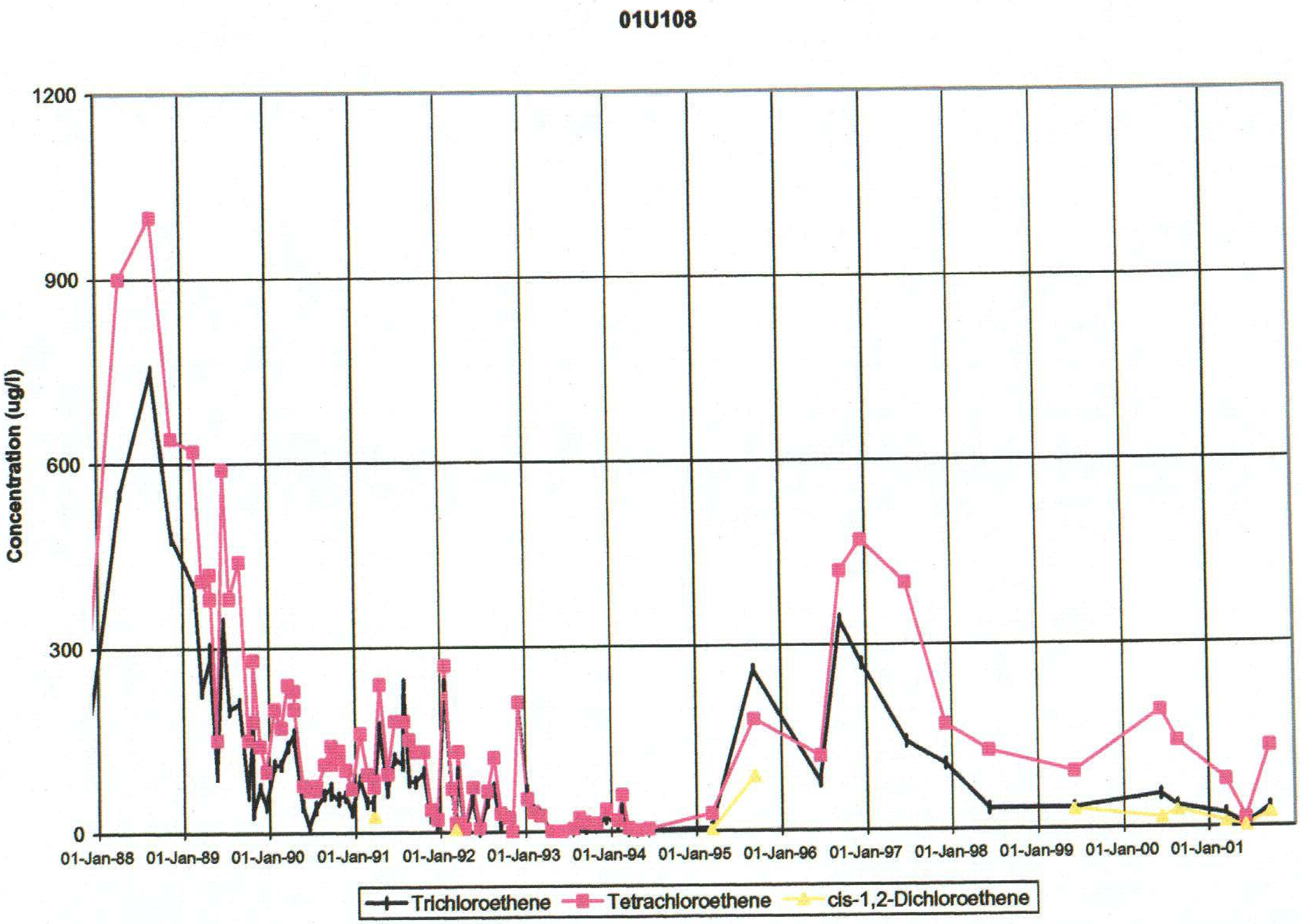


Back to Map

01U115



Back to Map



01U108
Concentration (ug/l)
1200
900
600
300
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

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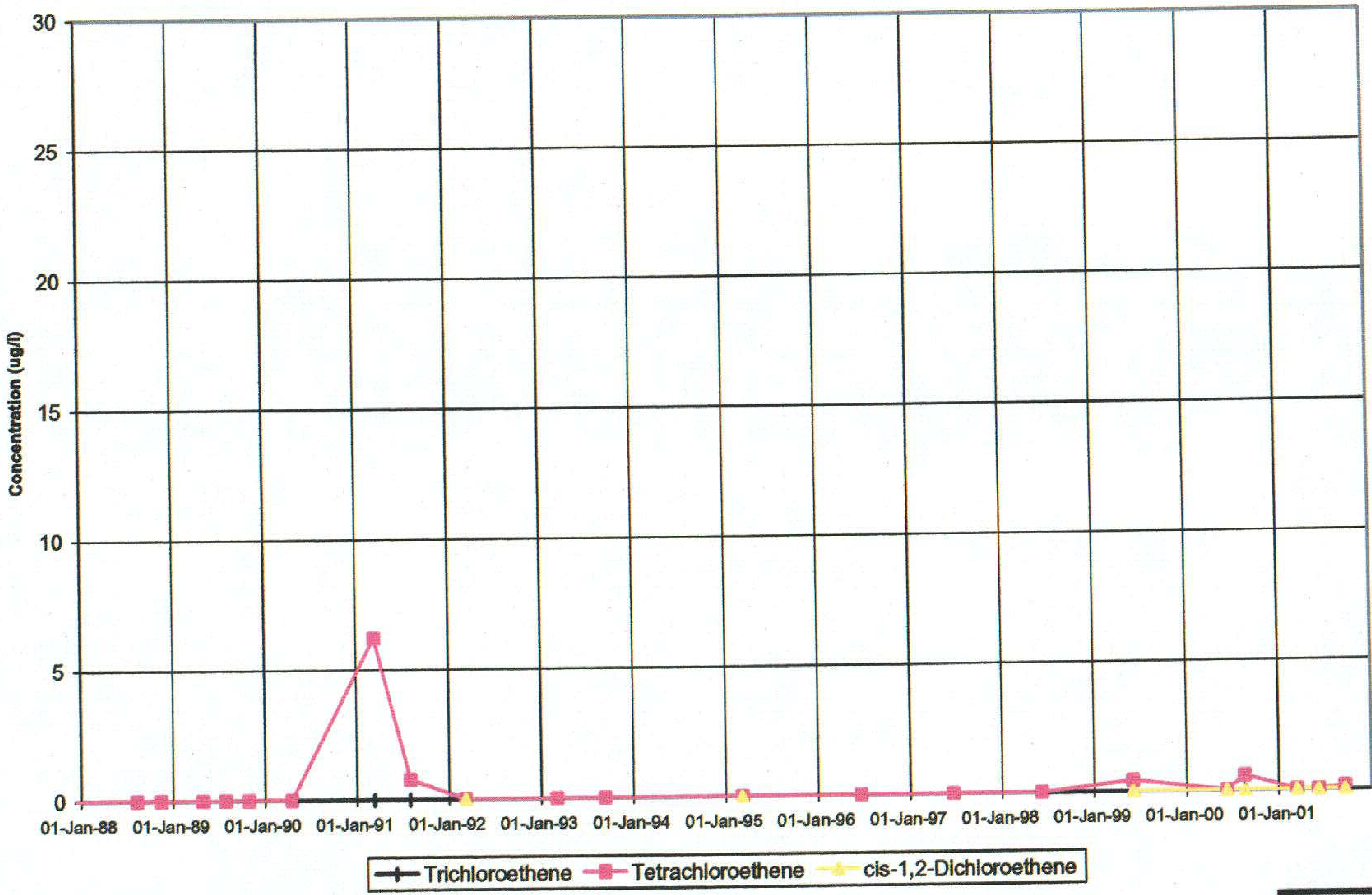
01U103



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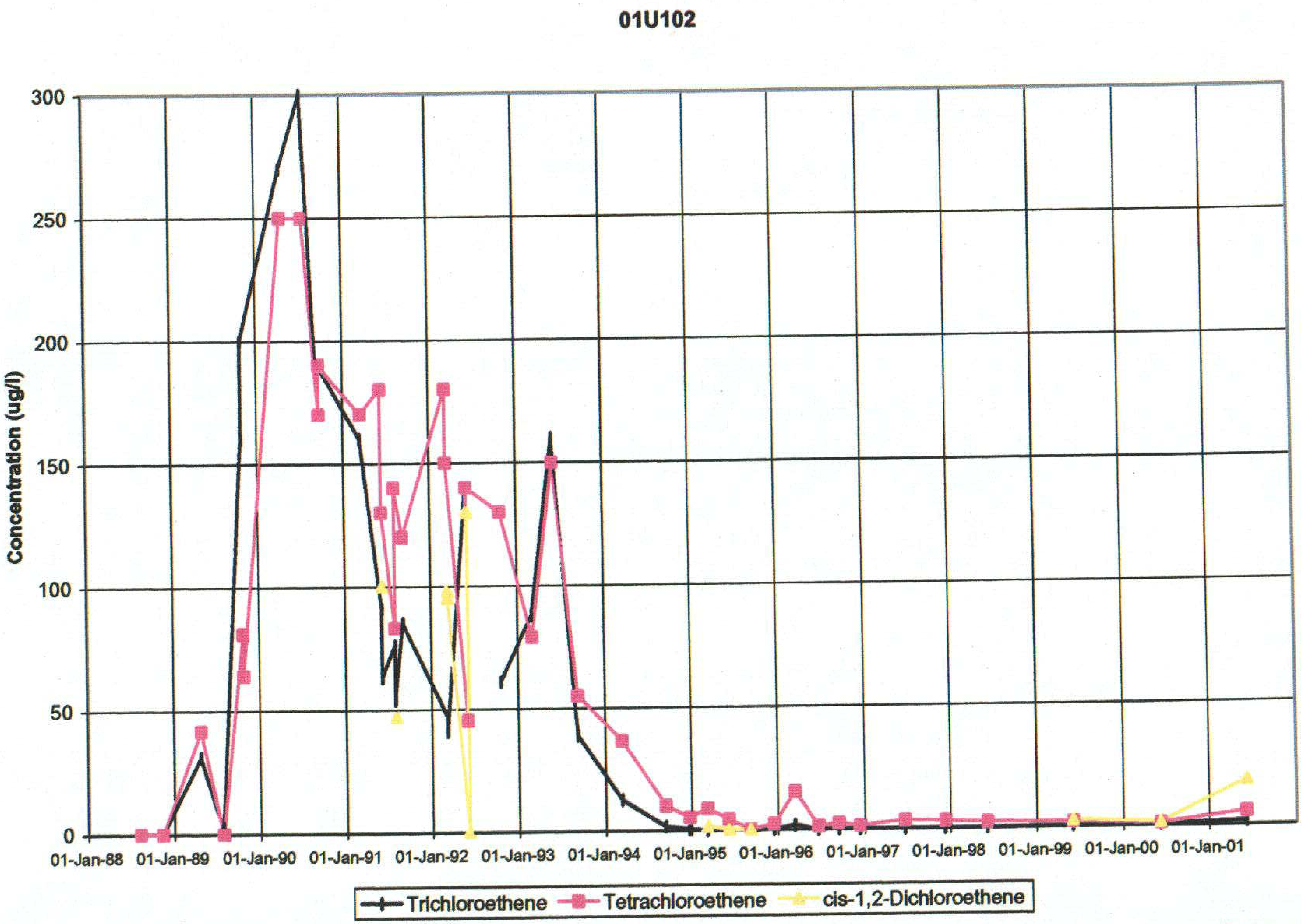

01U102
Concentration (ug/l)
300
250
200
150
100
50
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Trichloroethene
Tetrachloroethene
cis-1,2-Dichloroethene

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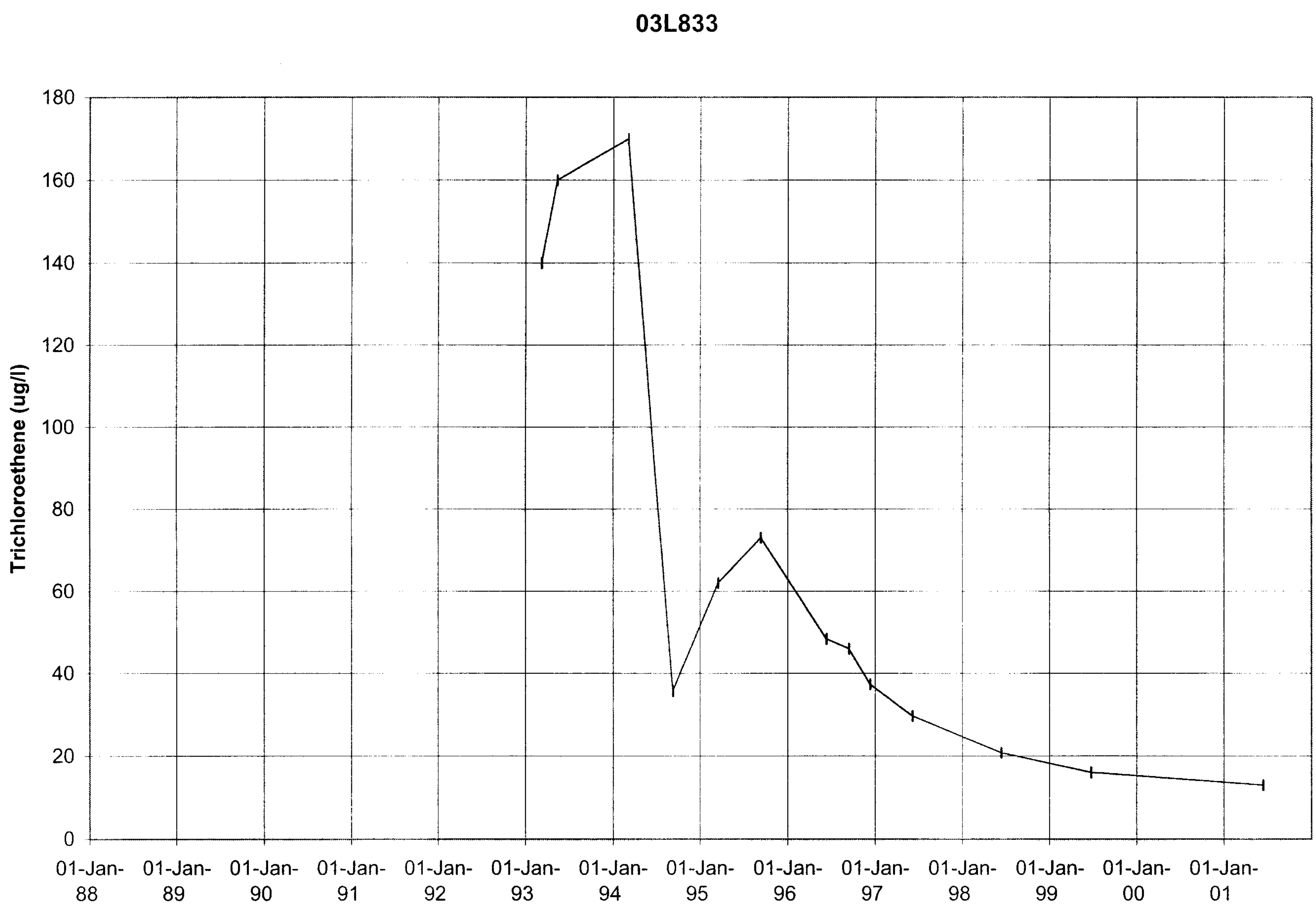
03L833
Trichloroethene (ug/l)
180
160
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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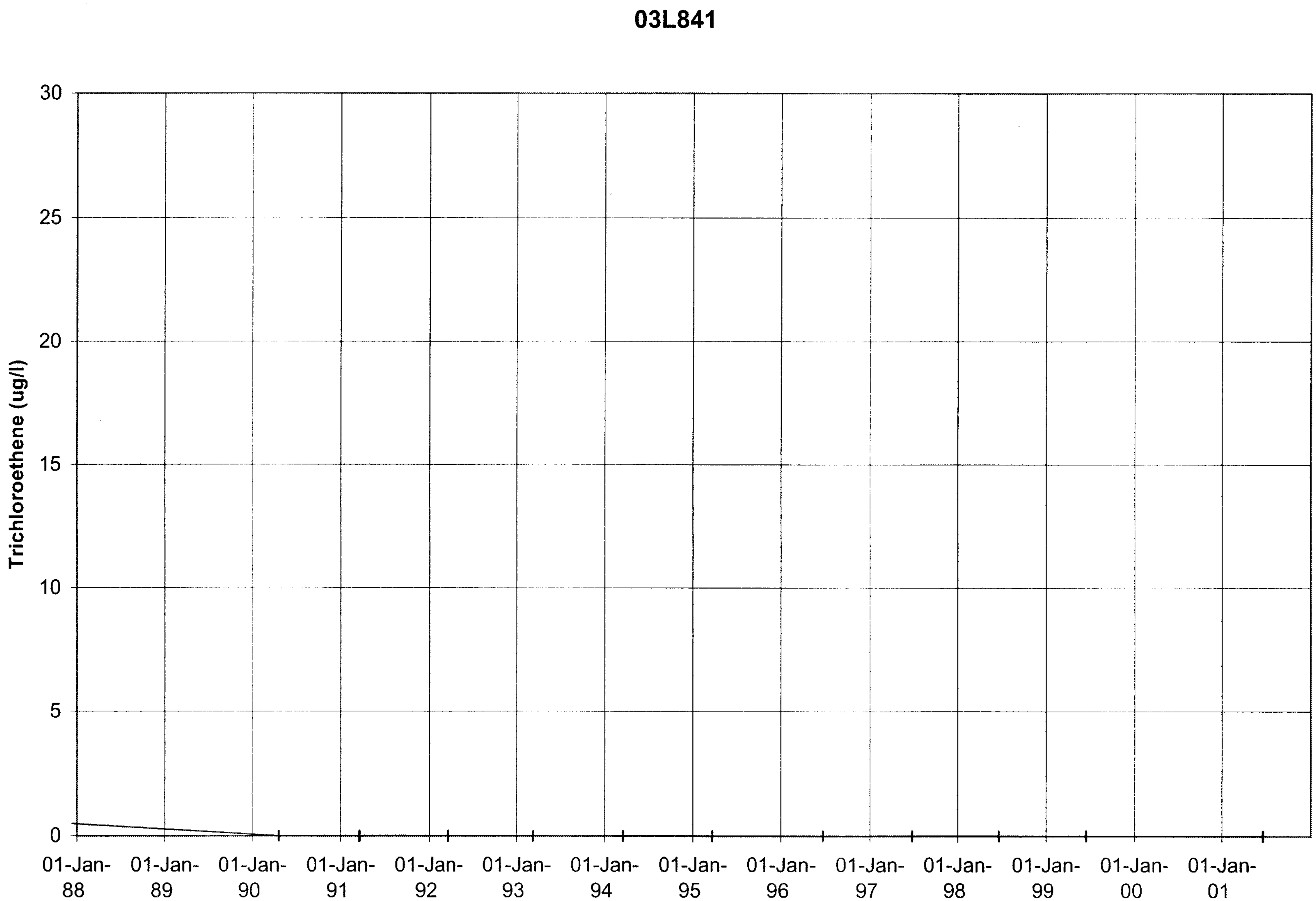
03L841
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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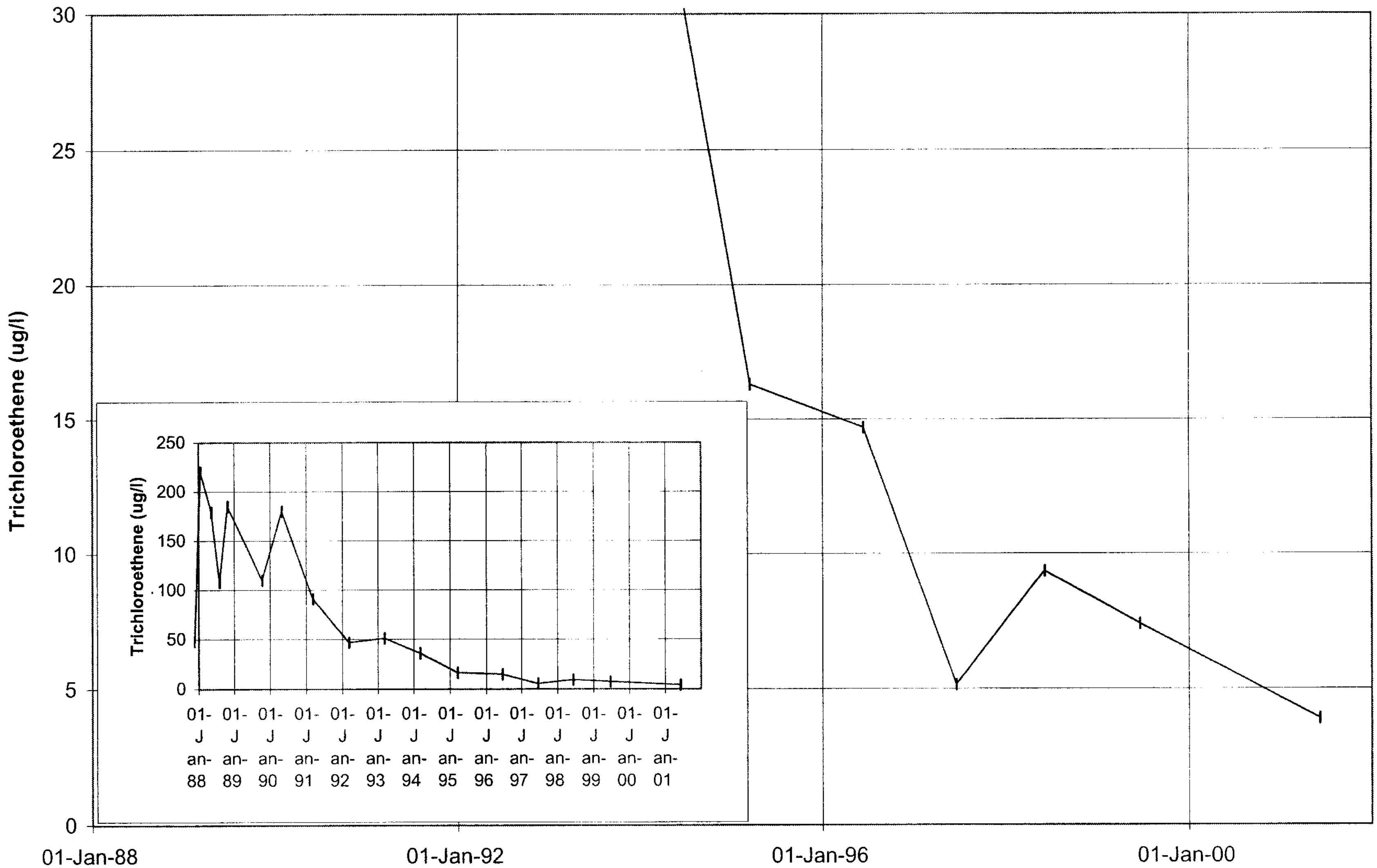
04U002



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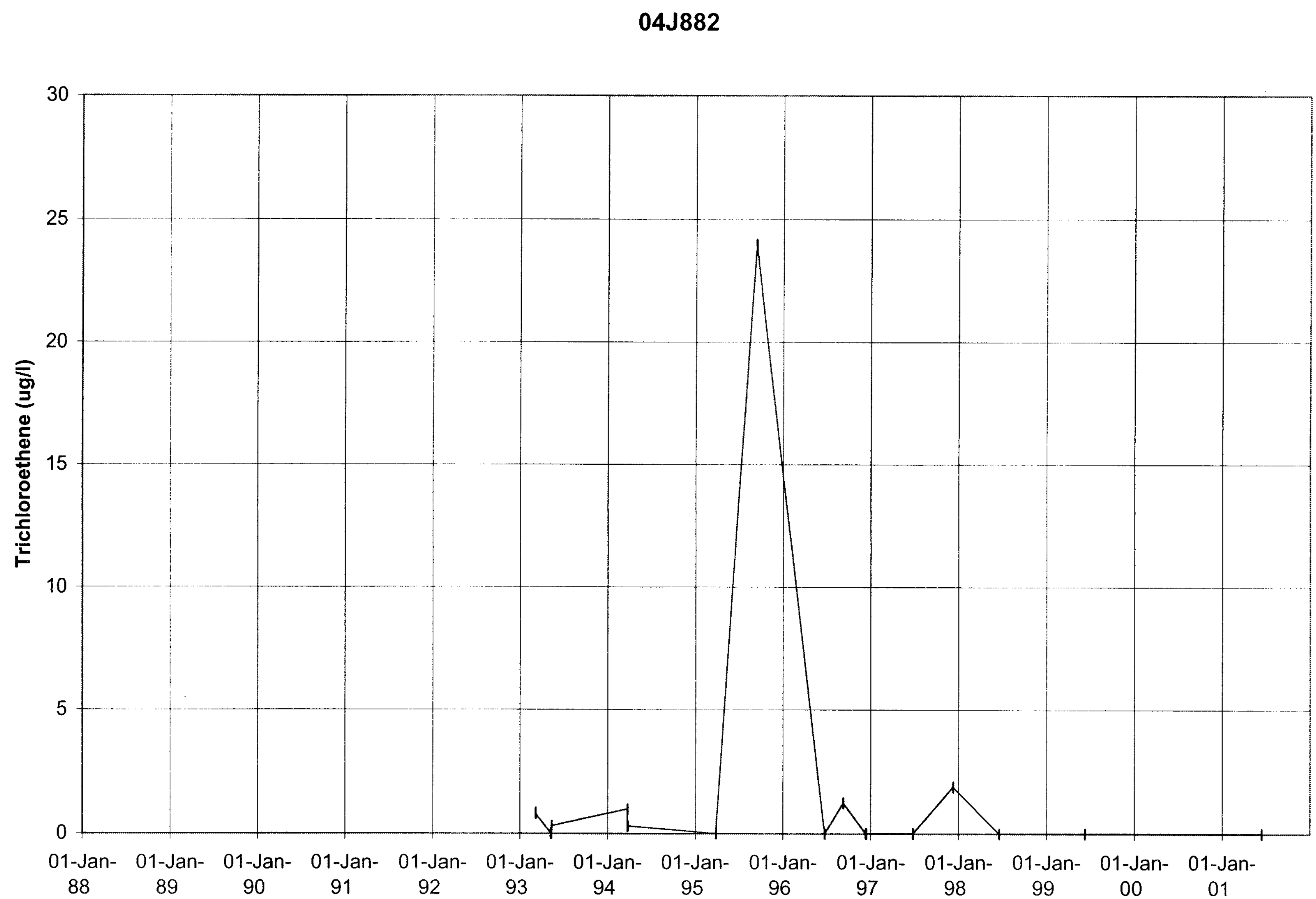
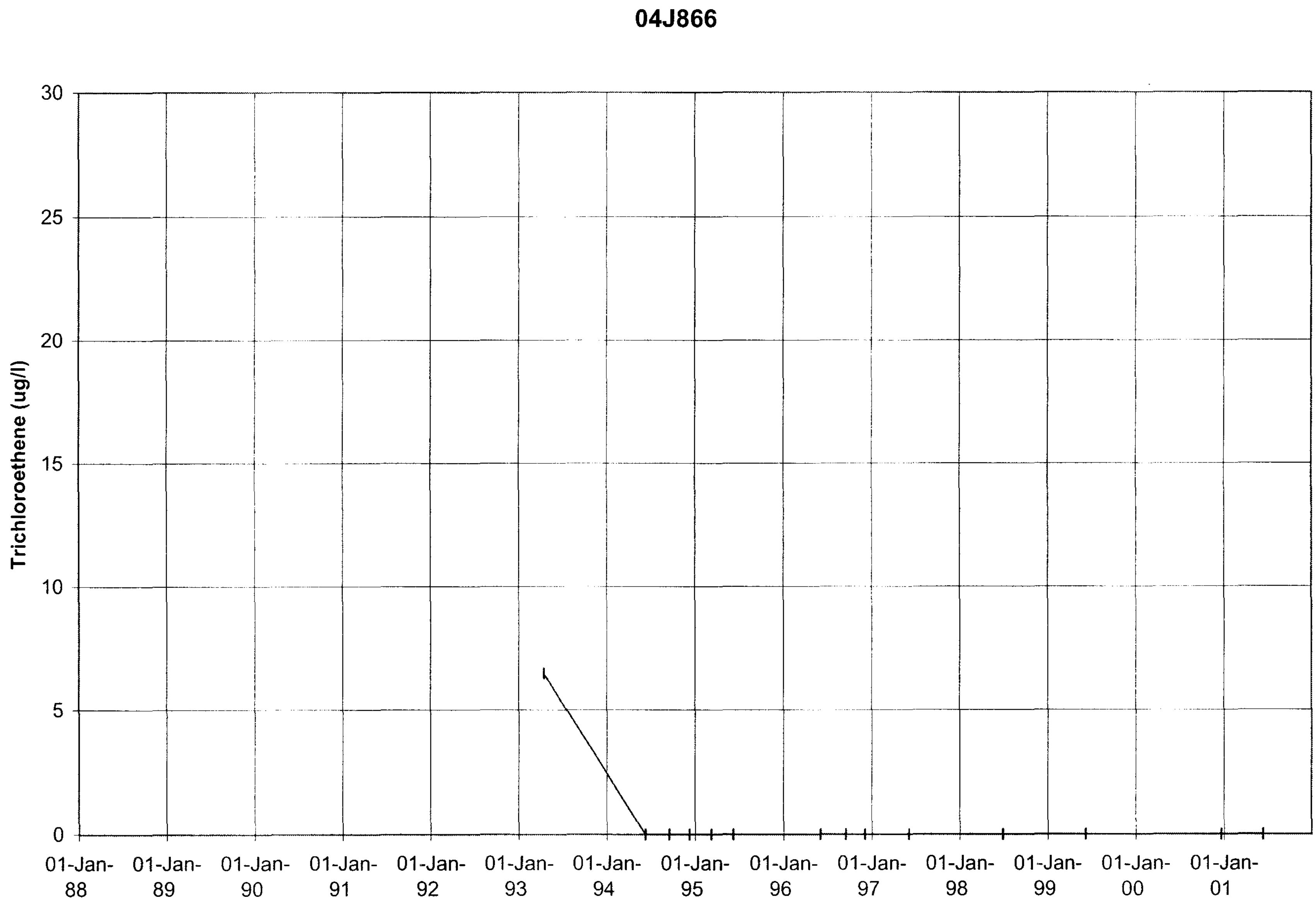

04J882
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

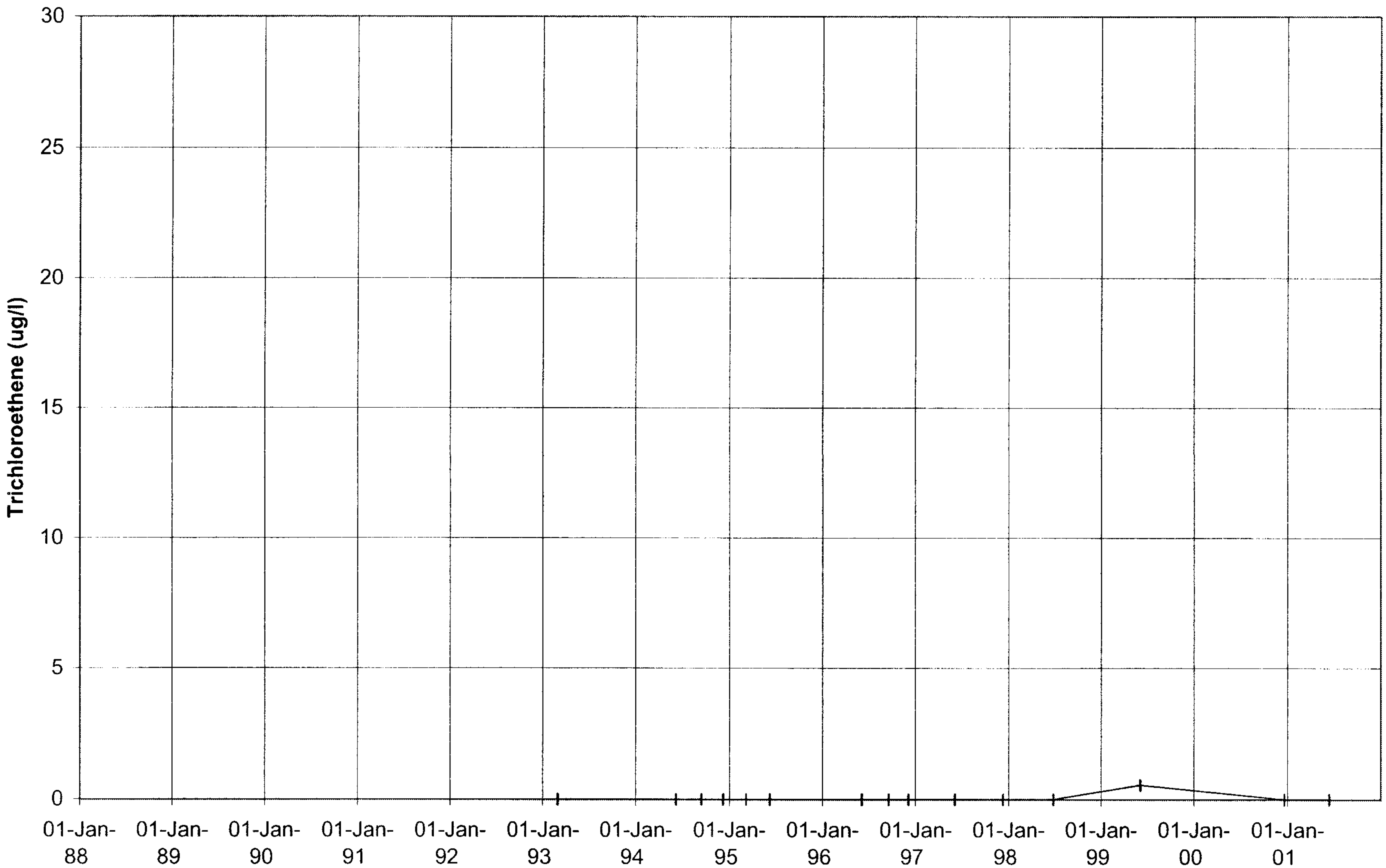
Back to Map



04J866
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04J864



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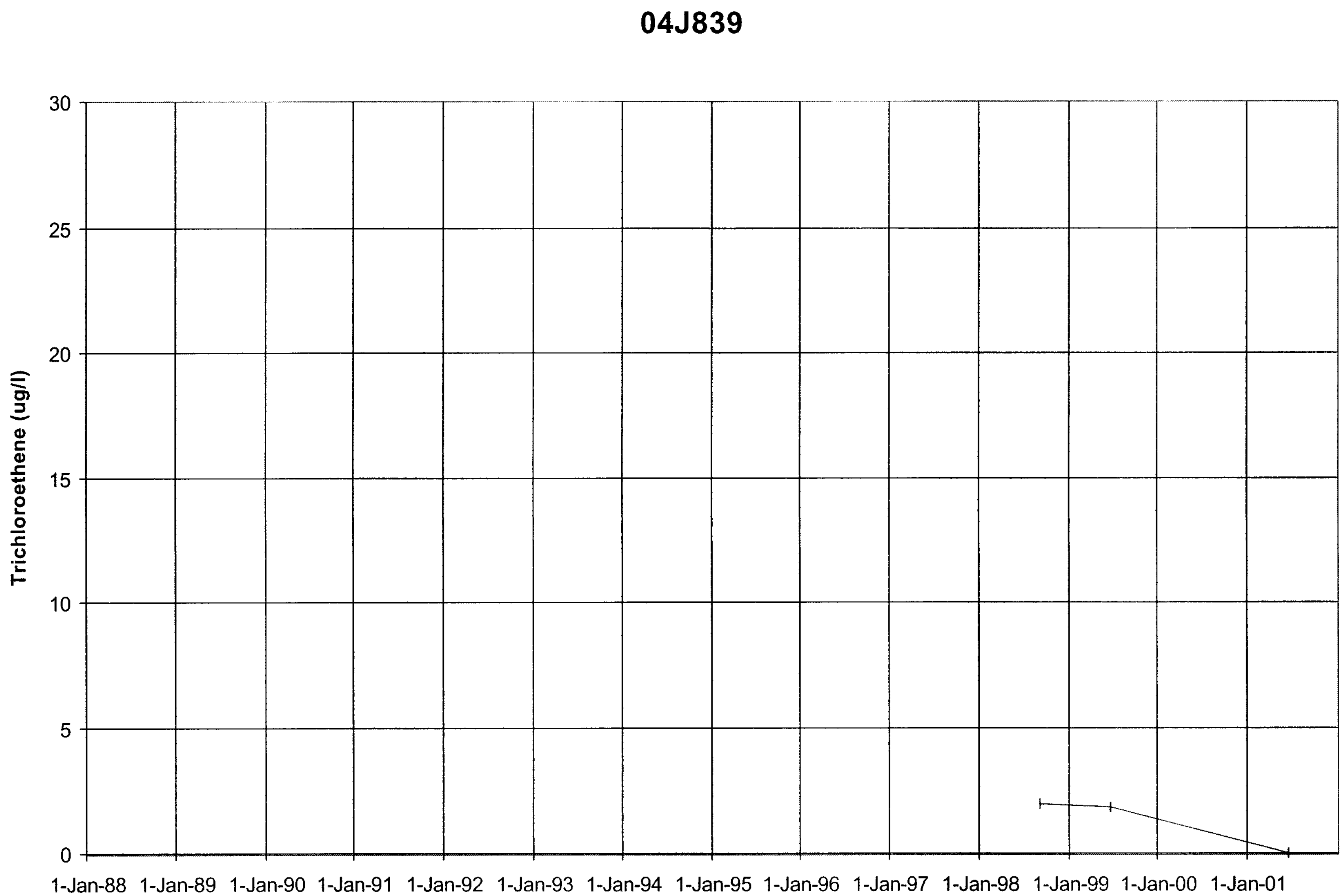

04J839
Trichloroethene (ug/l)
30
25
20
15
10
5
0
1-Jan-88
1-Jan-89
1-Jan-90
1-Jan-91
1-Jan-92
1-Jan-93
1-Jan-94
1-Jan-95
1-Jan-96
1-Jan-97
1-Jan-98
1-Jan-99
1-Jan-00
1-Jan-01

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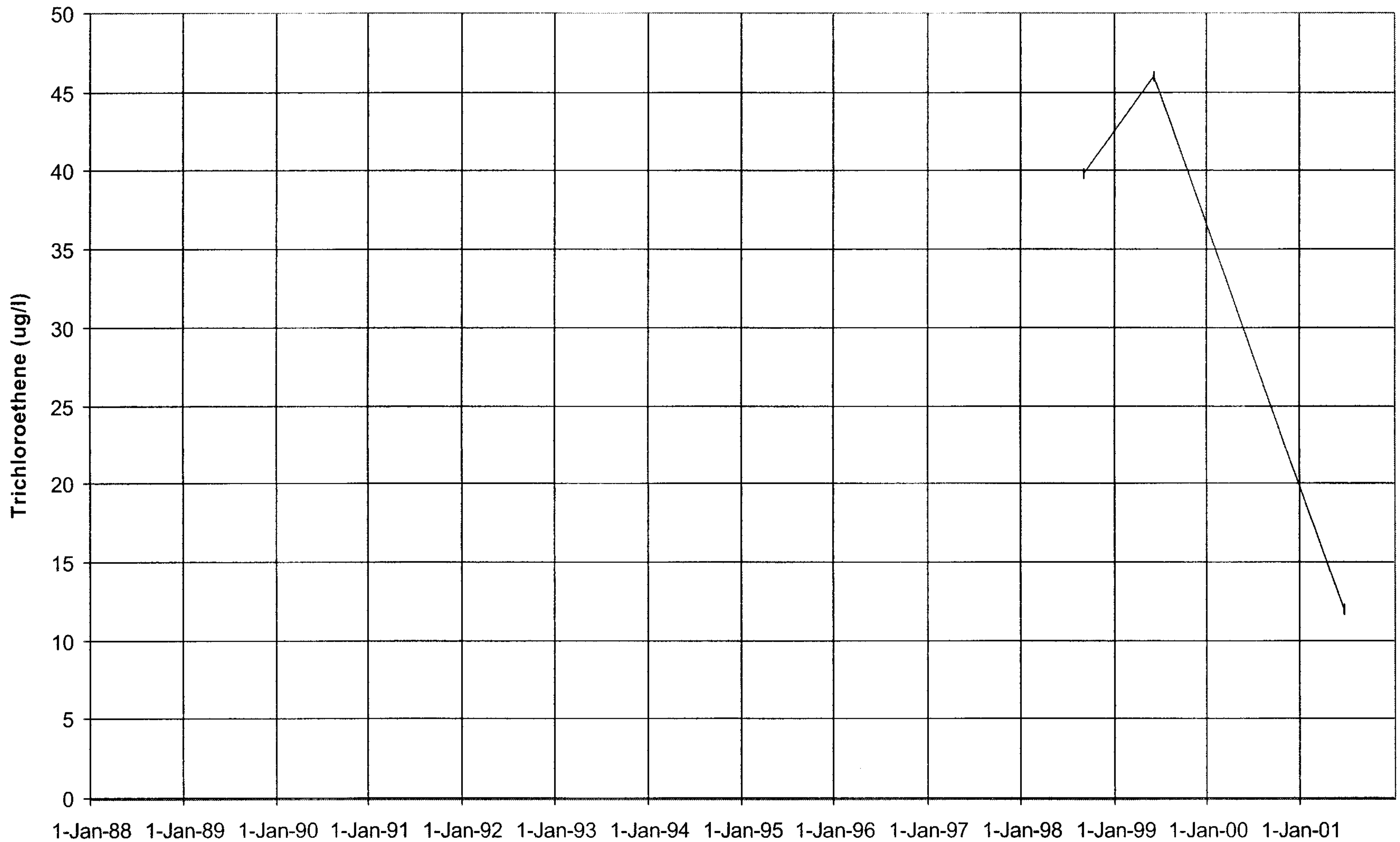
04J838



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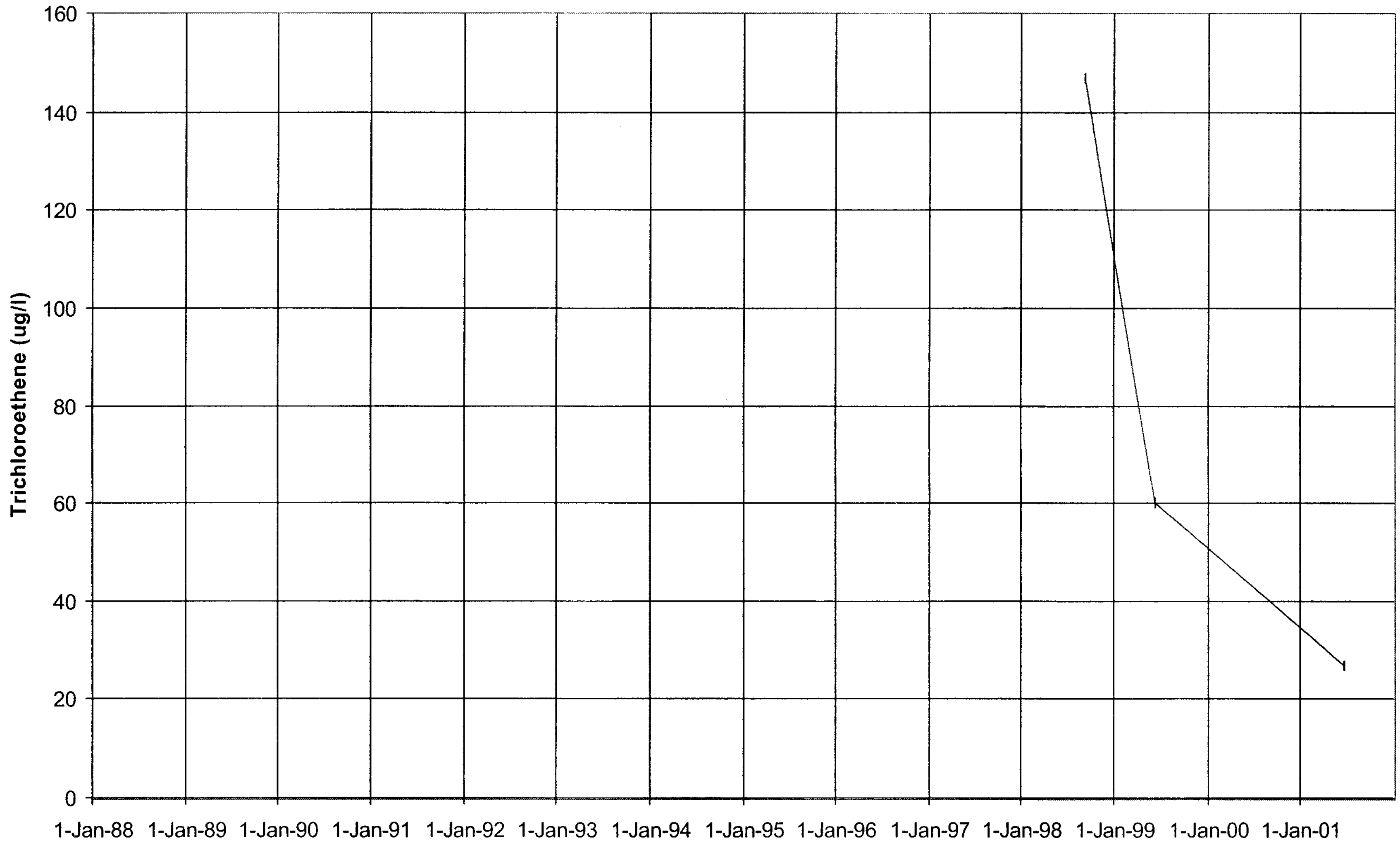
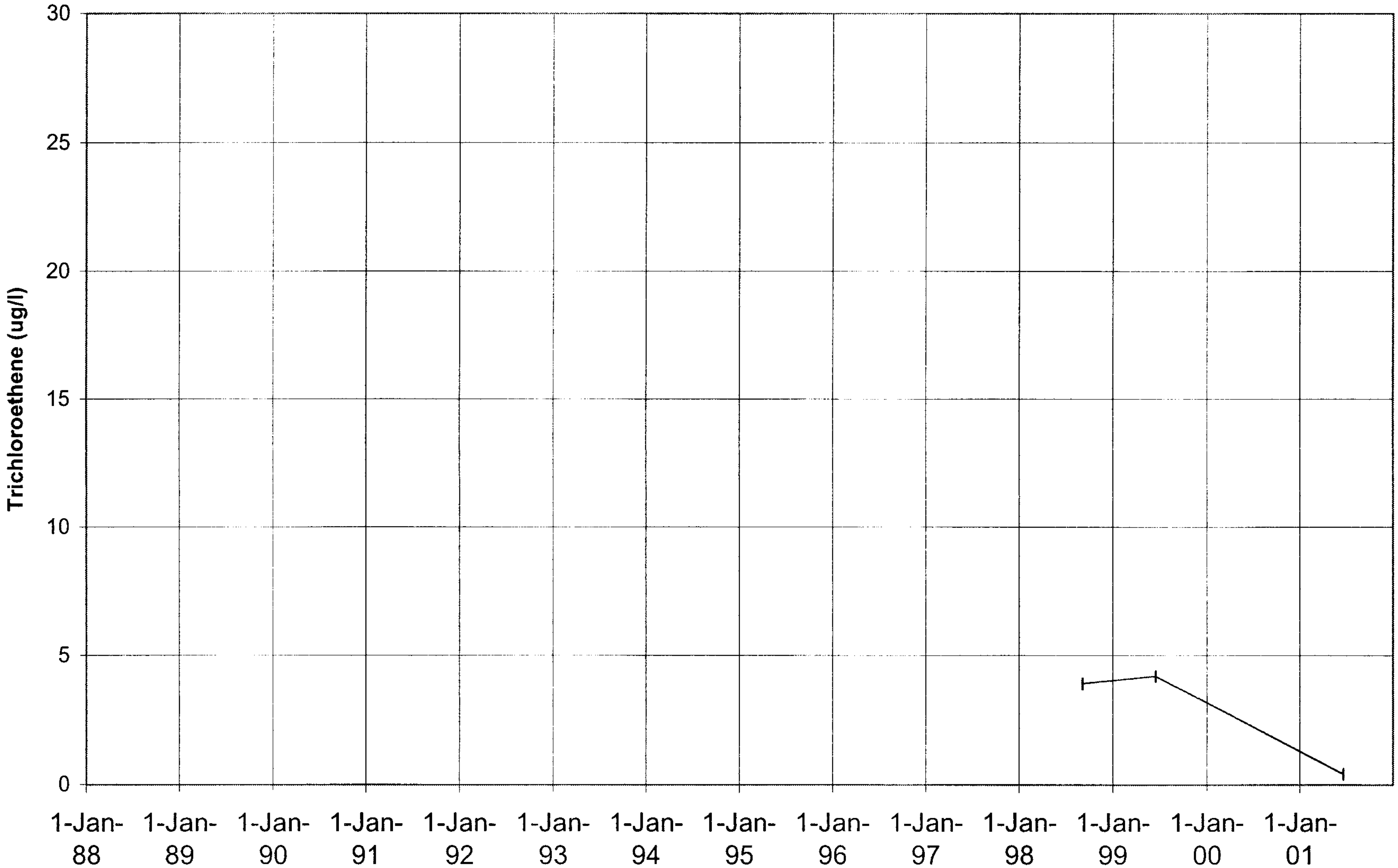
04J837



Back to Map

04J836



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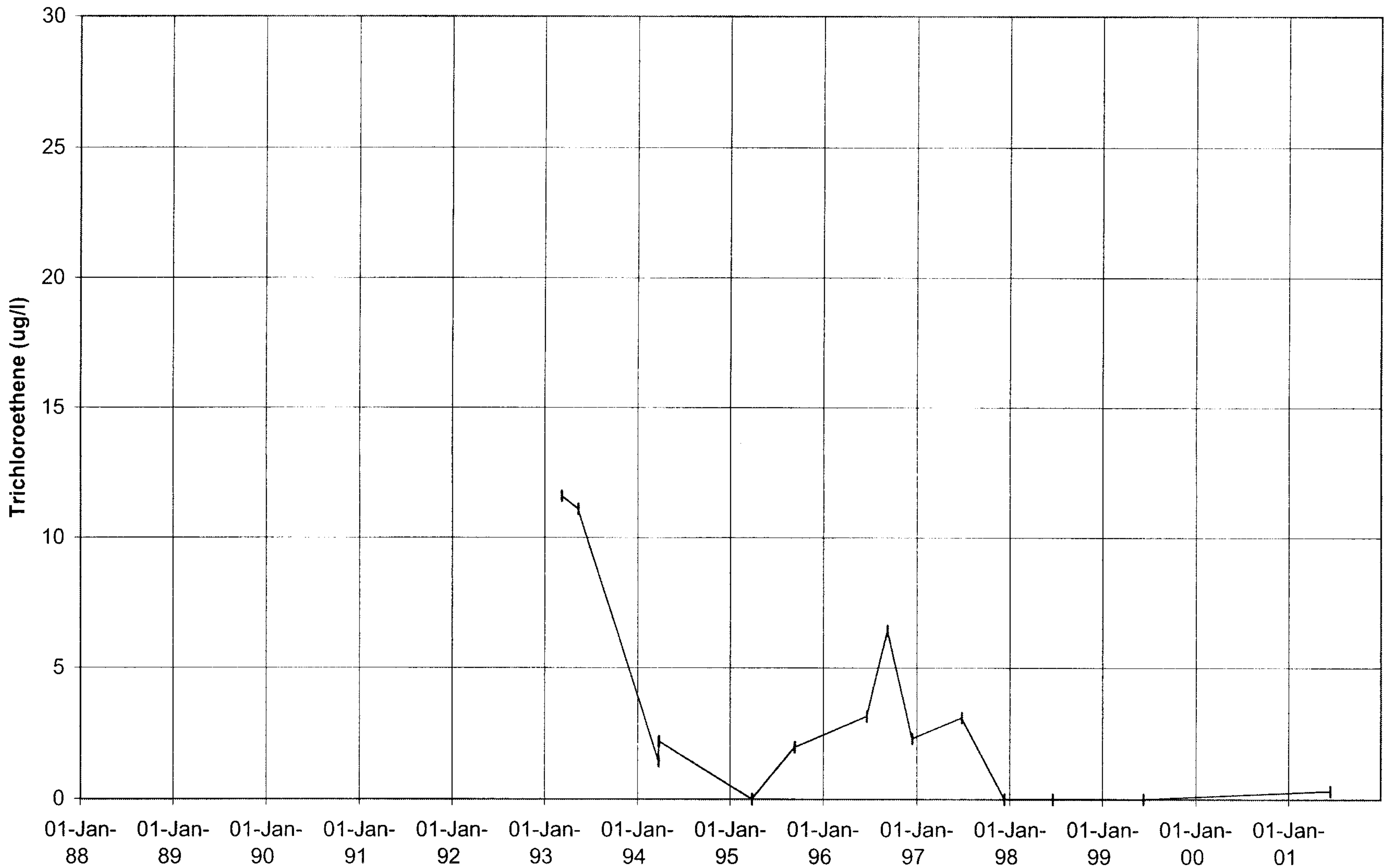
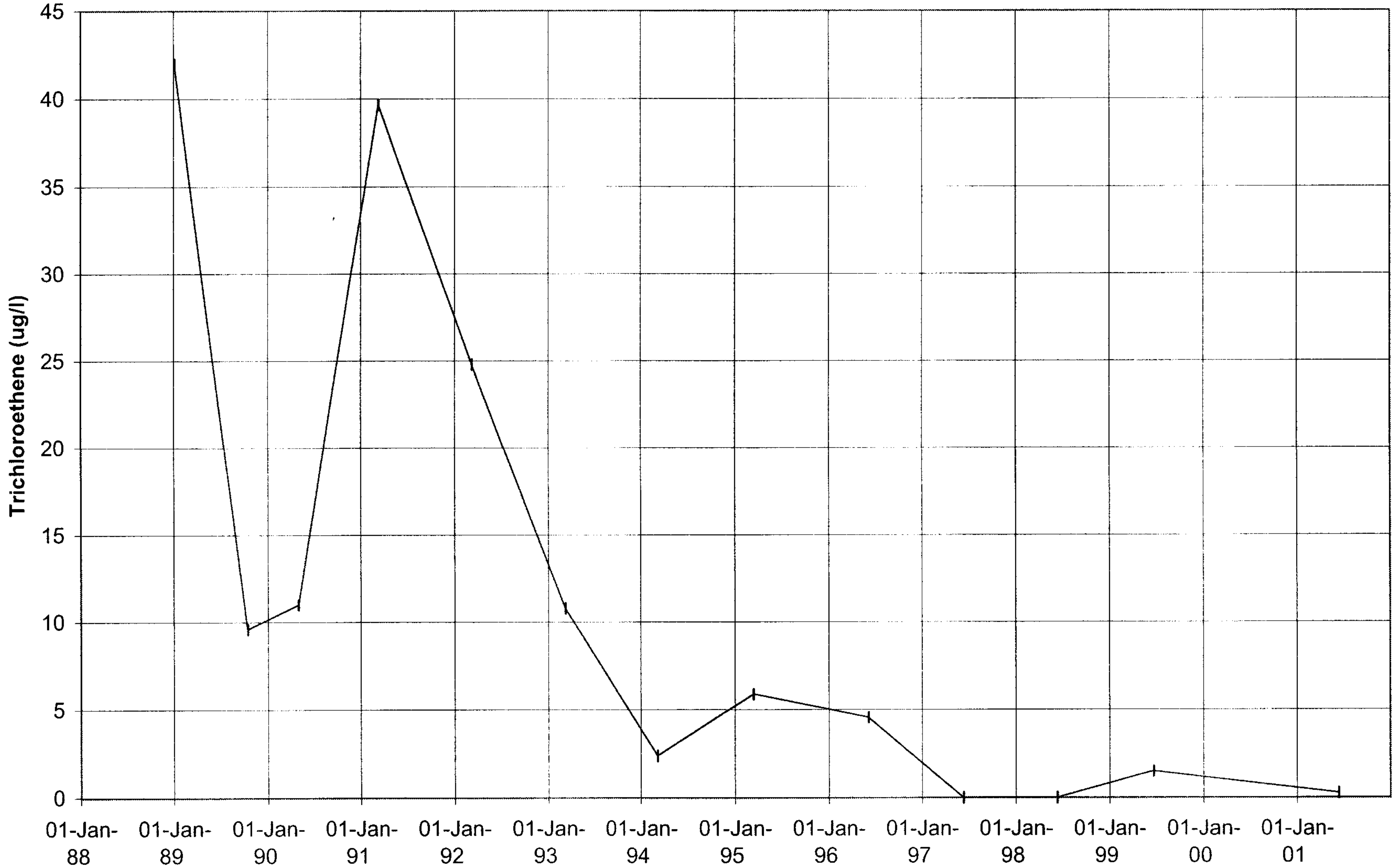
04J834



Back to Map

04J713



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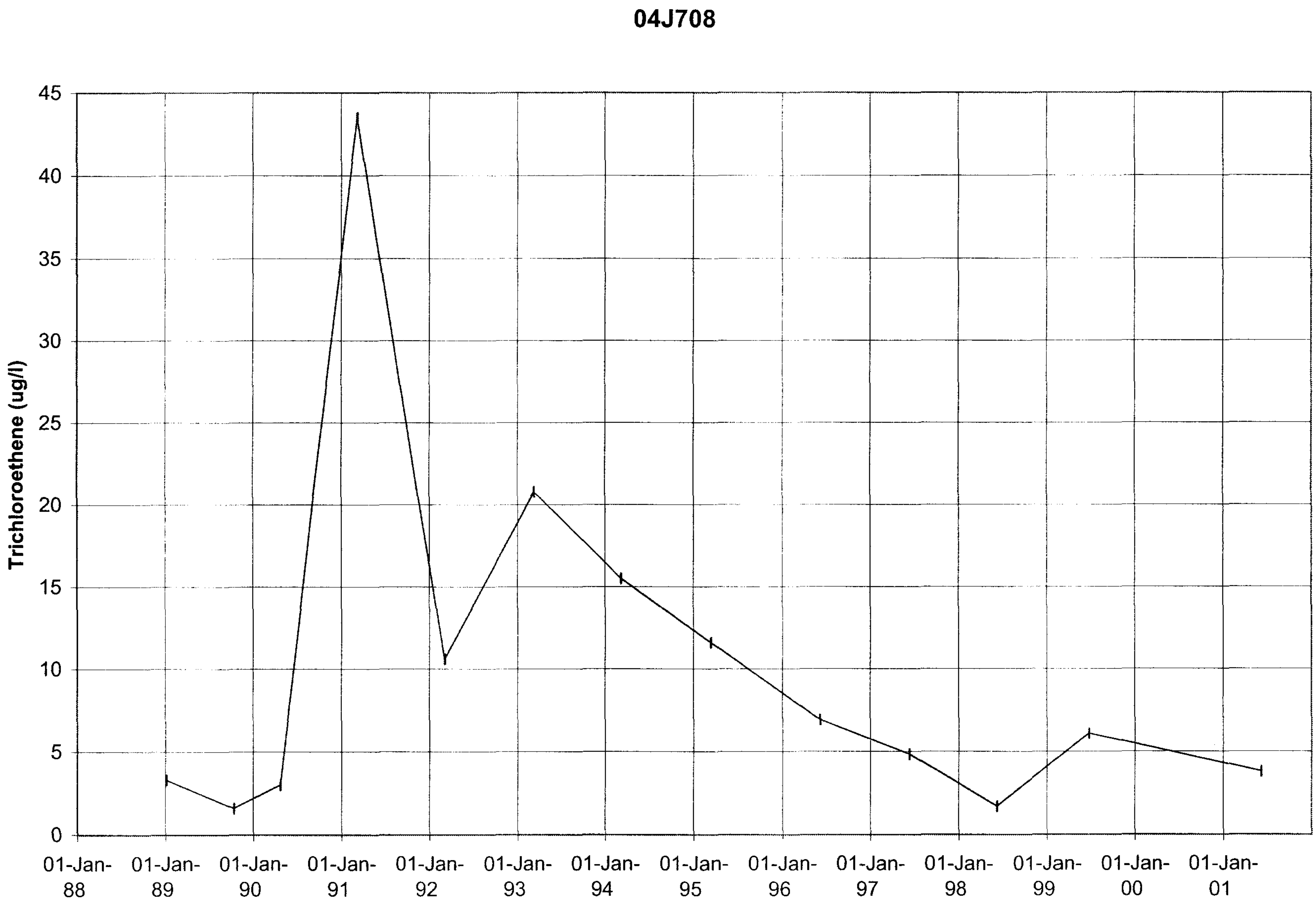
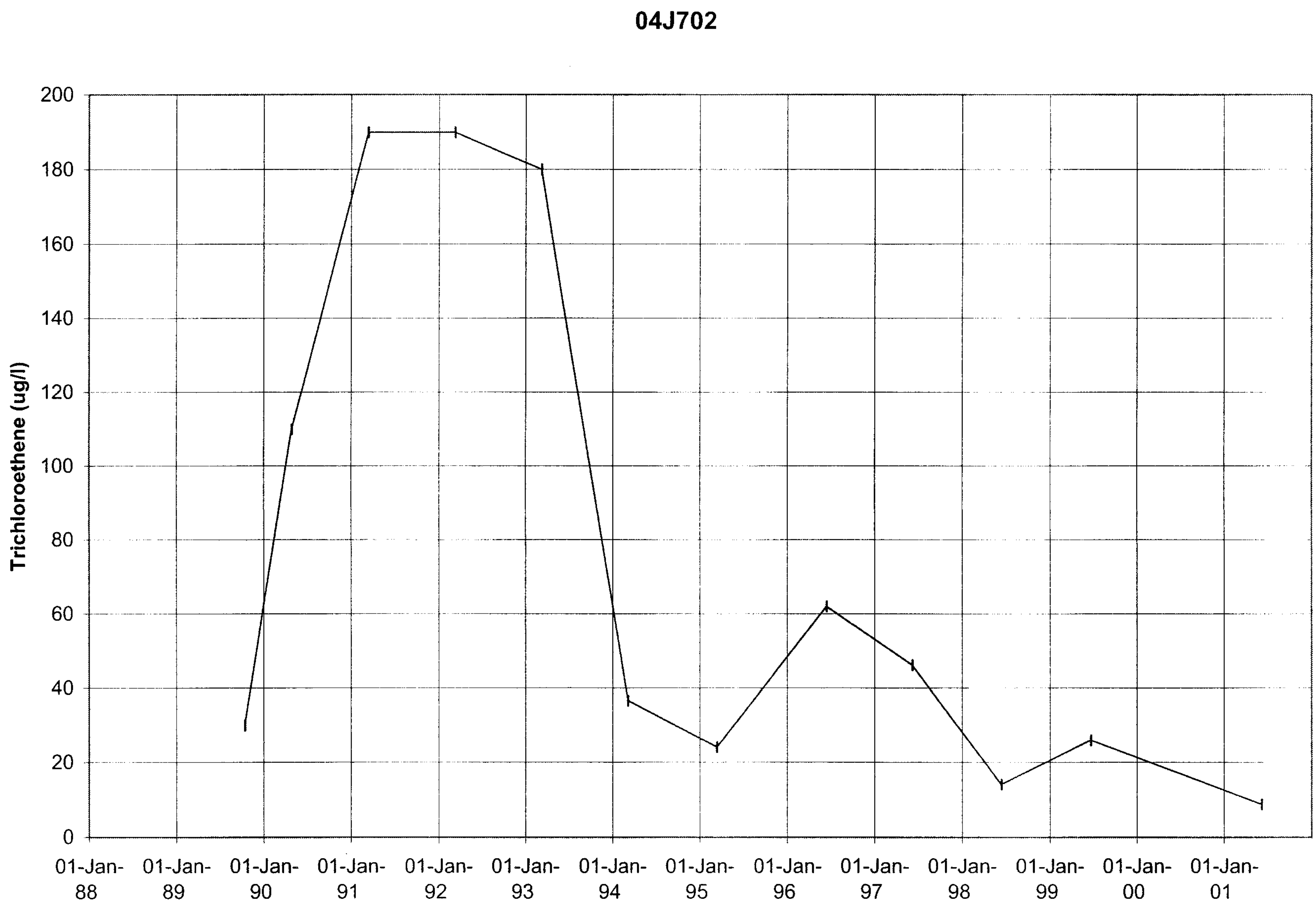
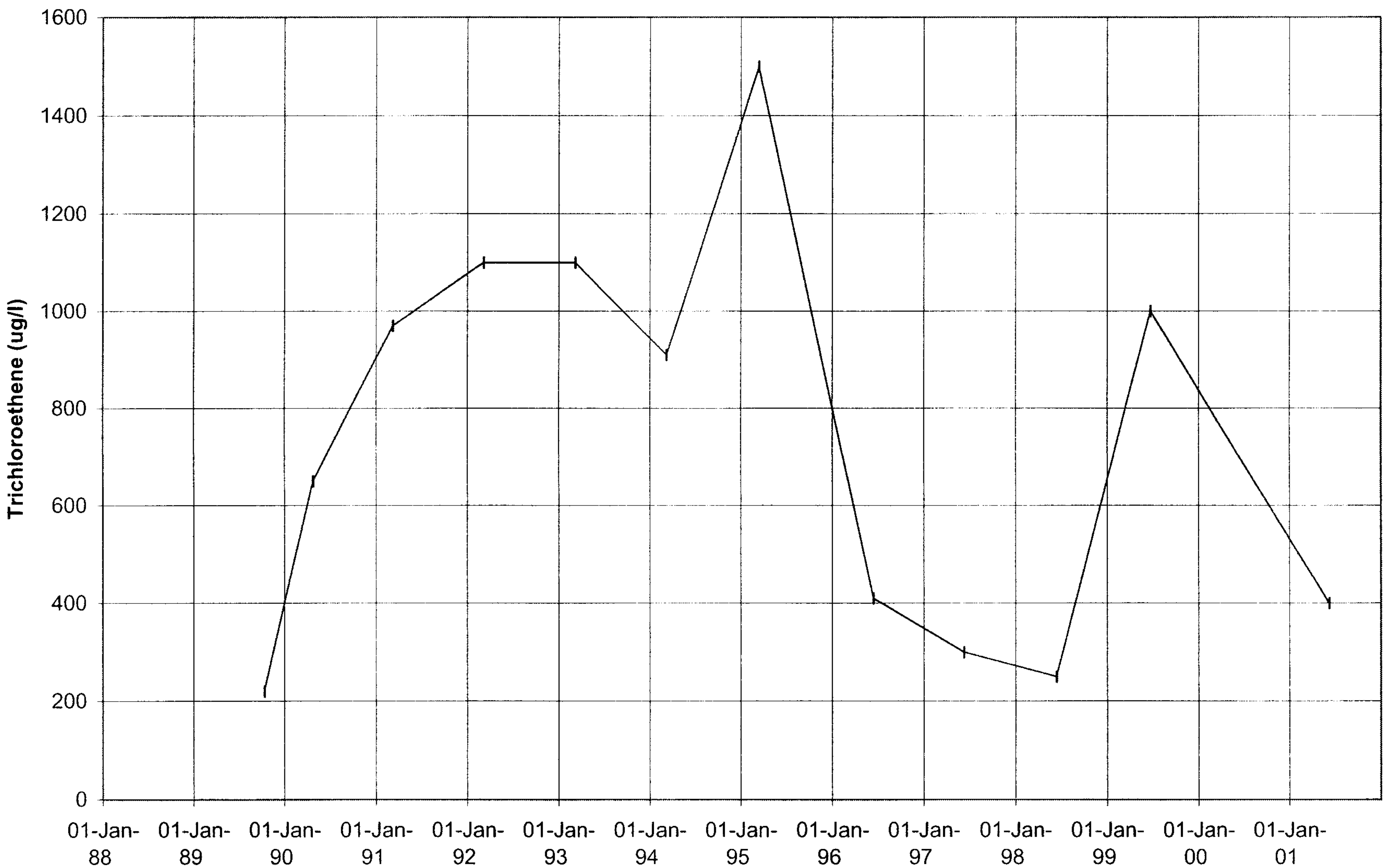

04J708
Trichloroethene (ug/l)
0
5
10
15
20
25
30
35
40
45
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


04J702
Trichloroethene (ug/l)
200
180
160
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

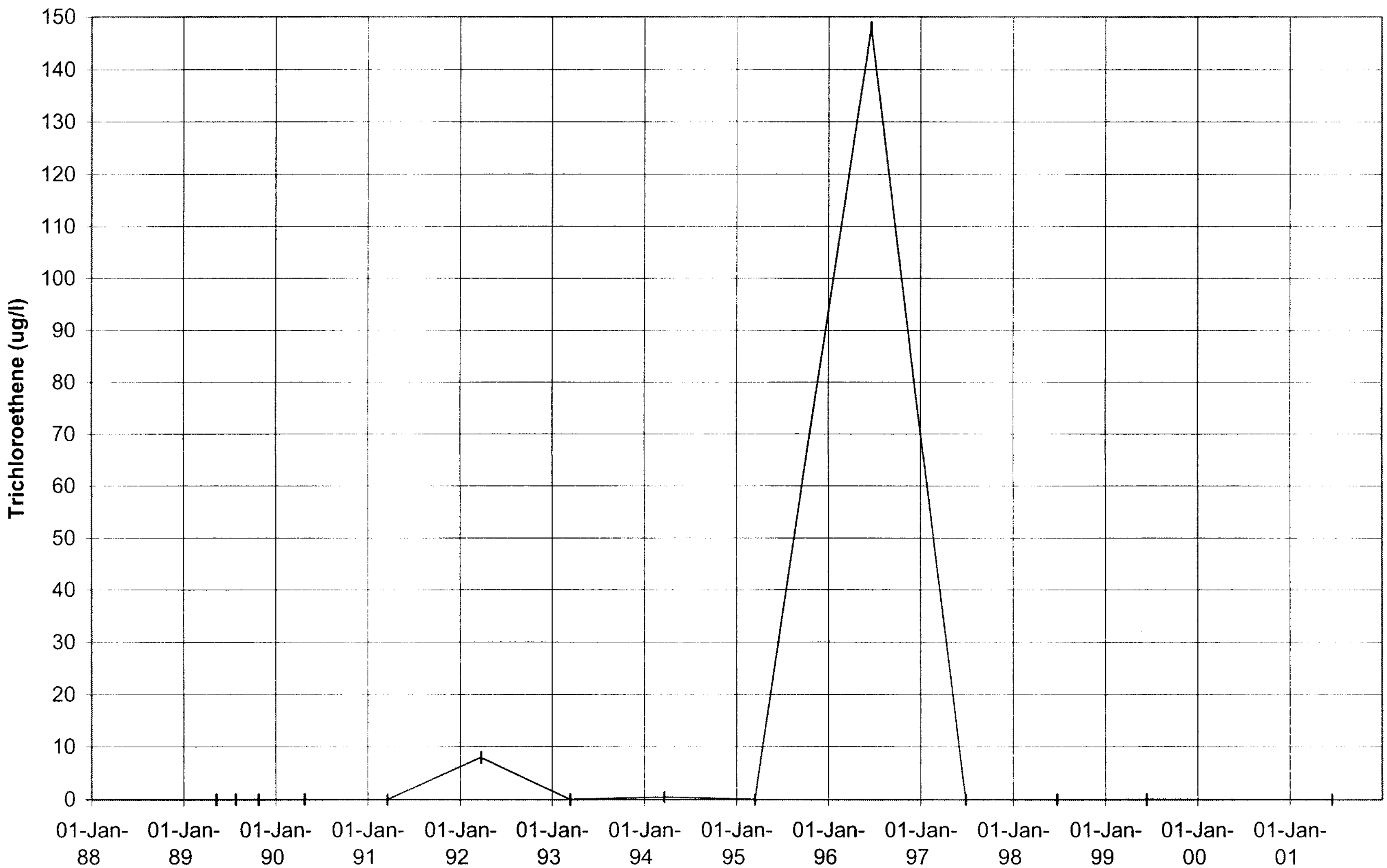
Back to Map

04J077



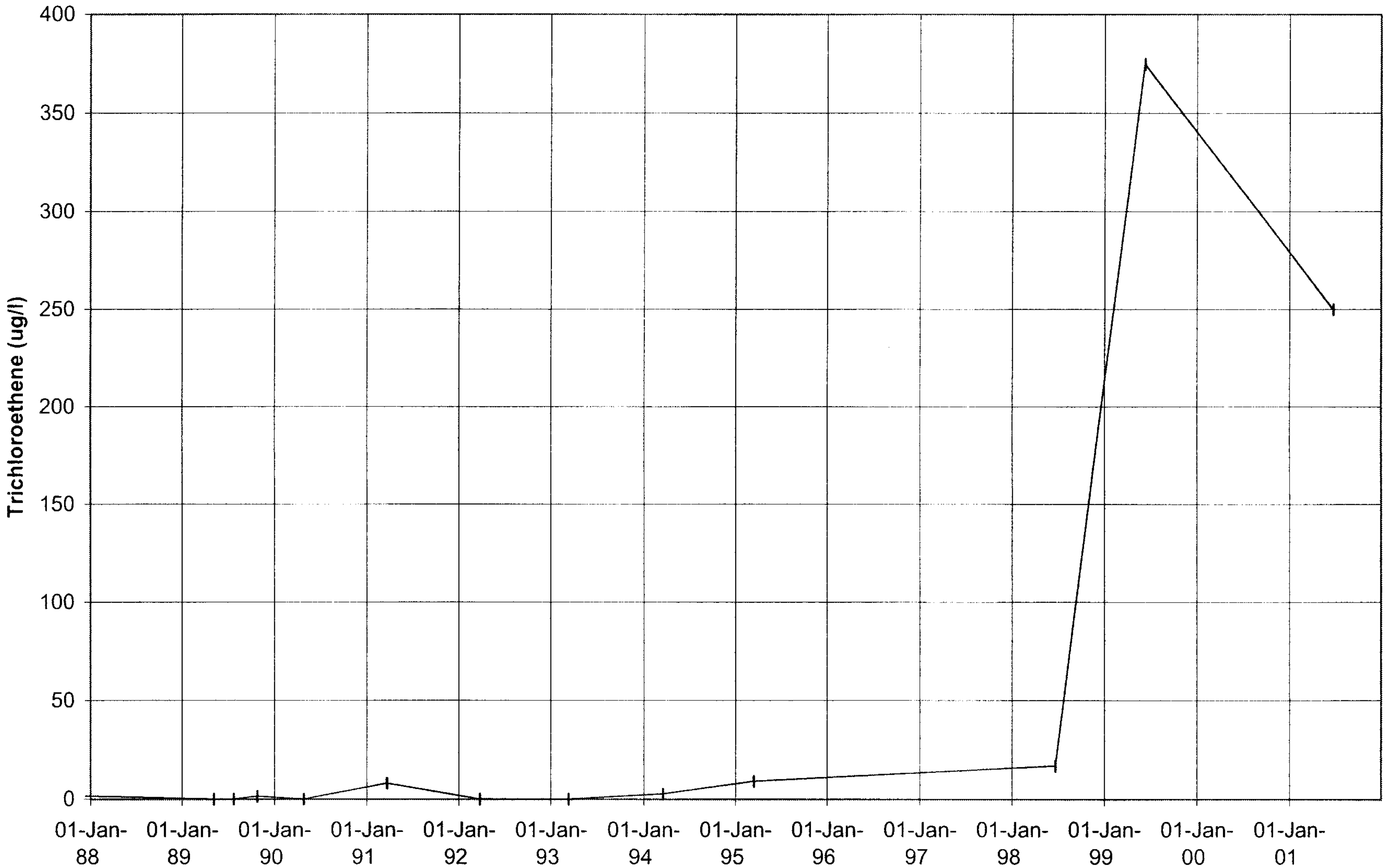
Back to Map

03U831



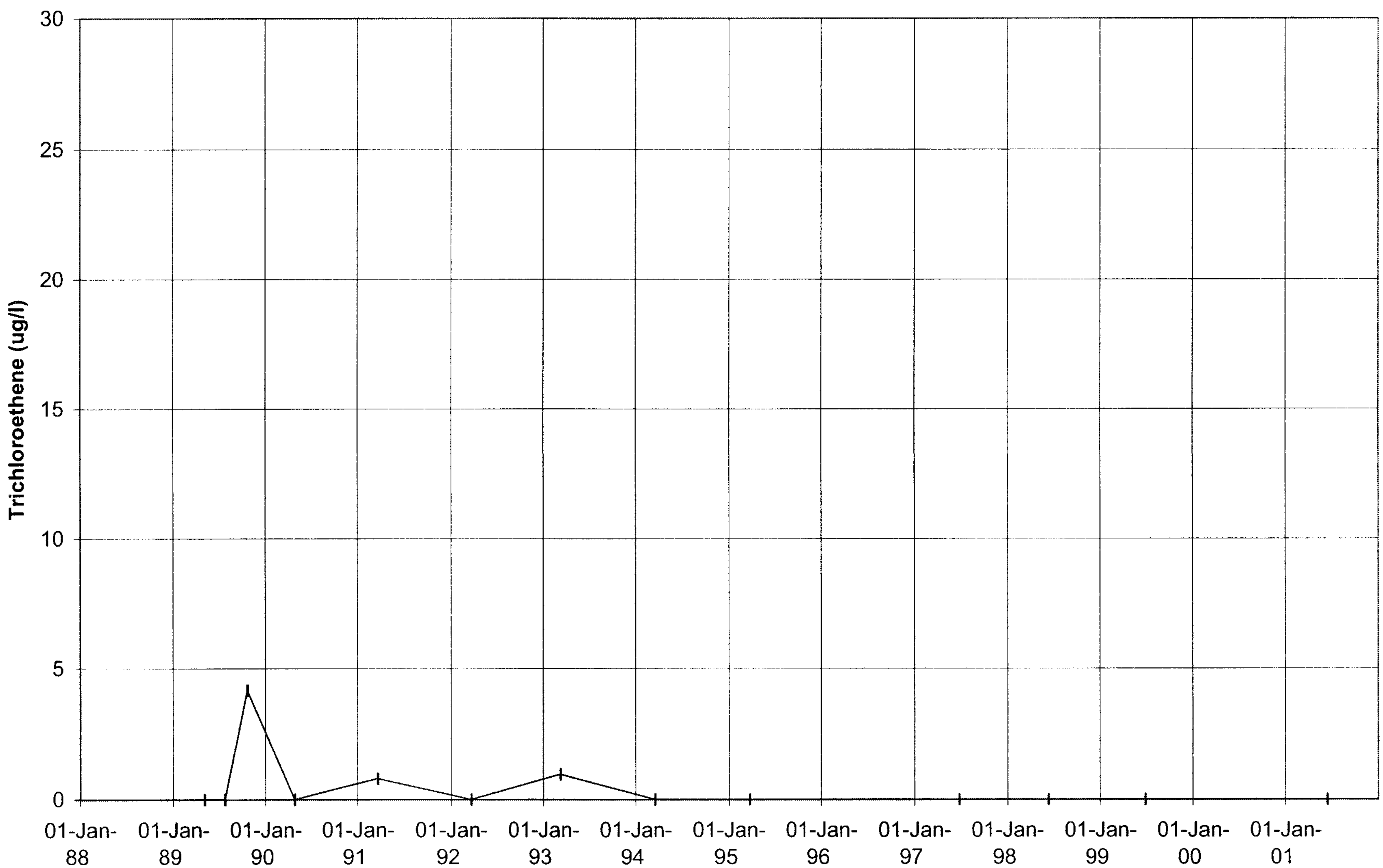
Back to Map

03U822



Back to Map

03U811



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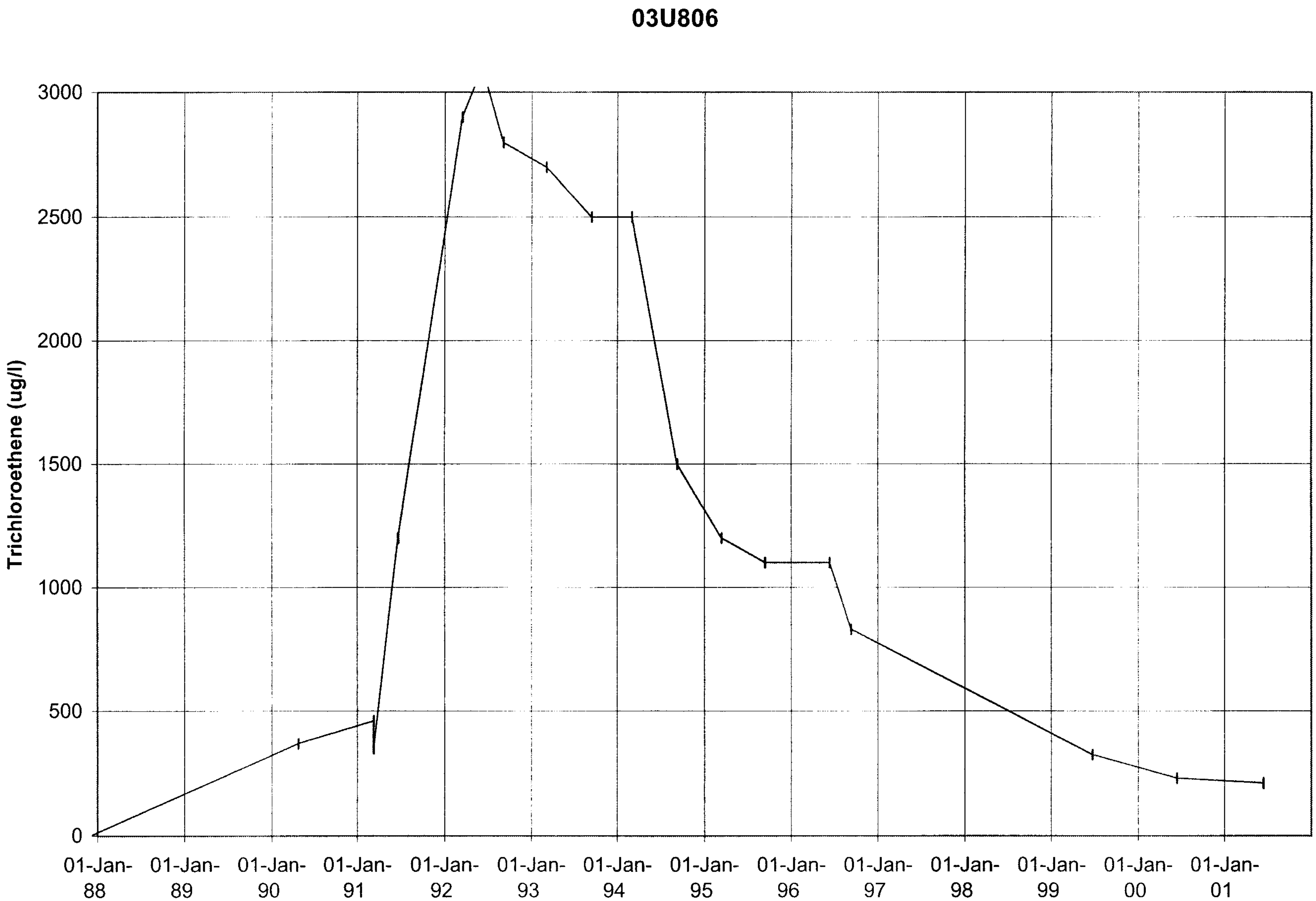
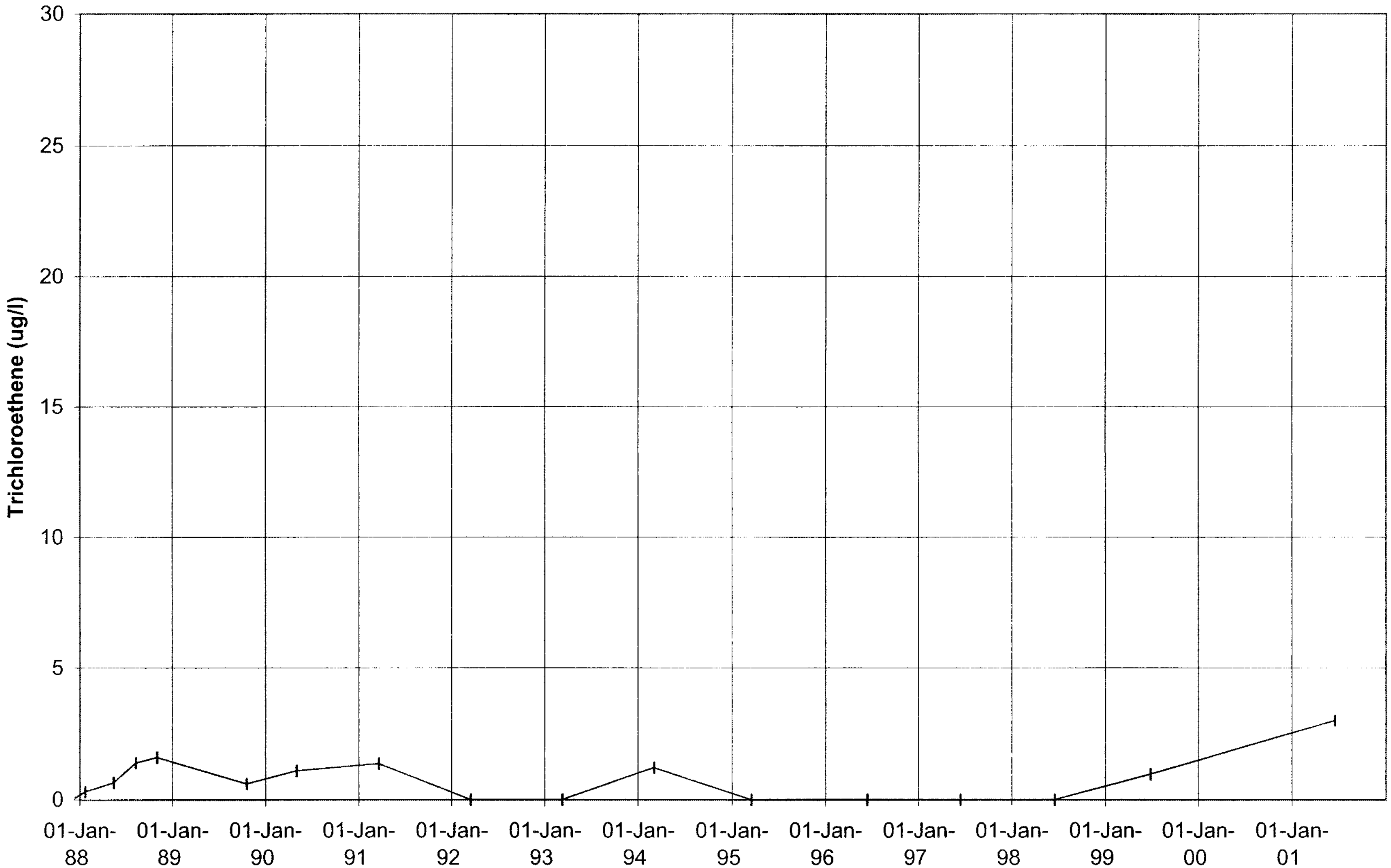

03U806
Trichloroethene (ug/l)
3000
2500
2000
1500
1000
500
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U805



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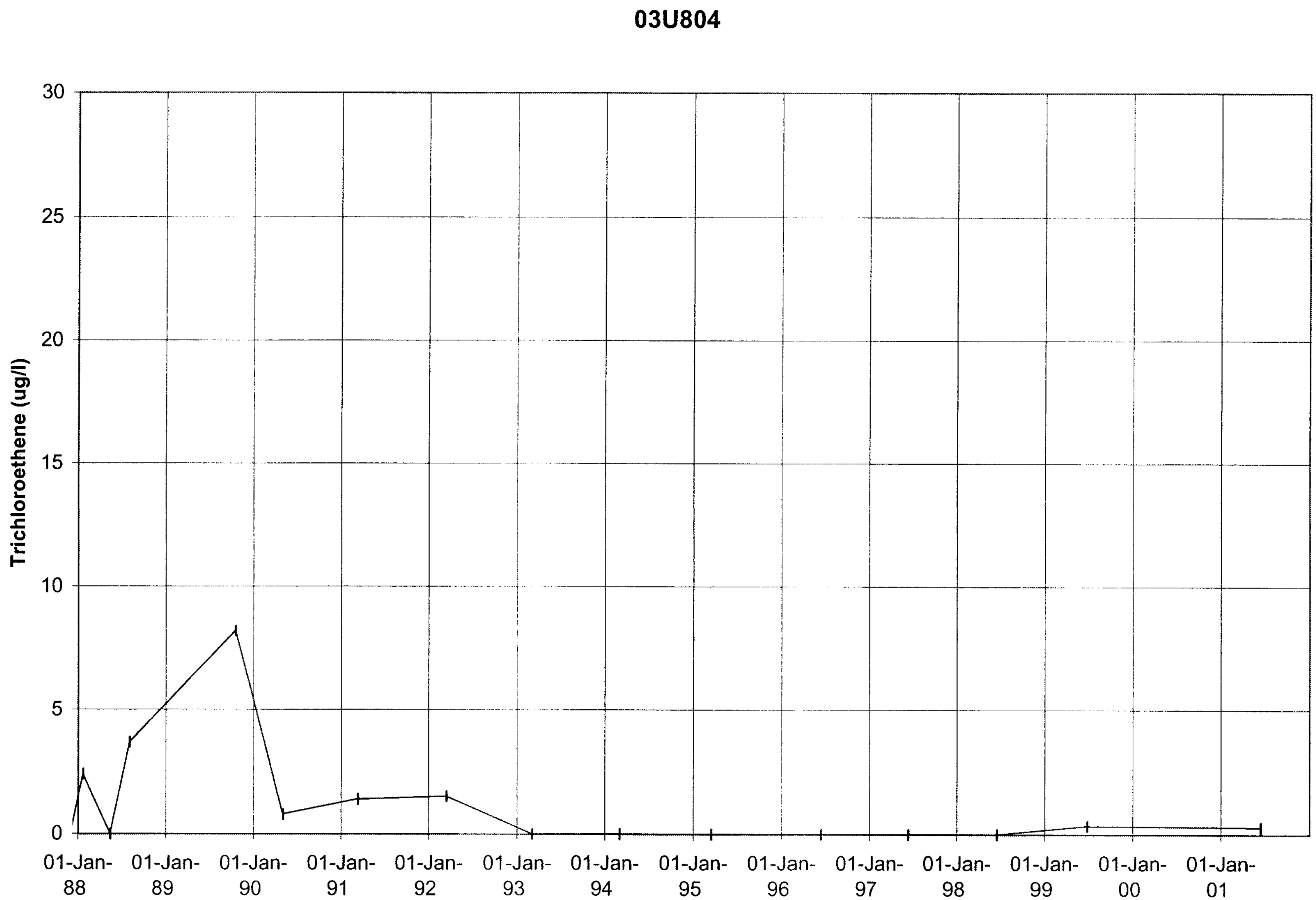
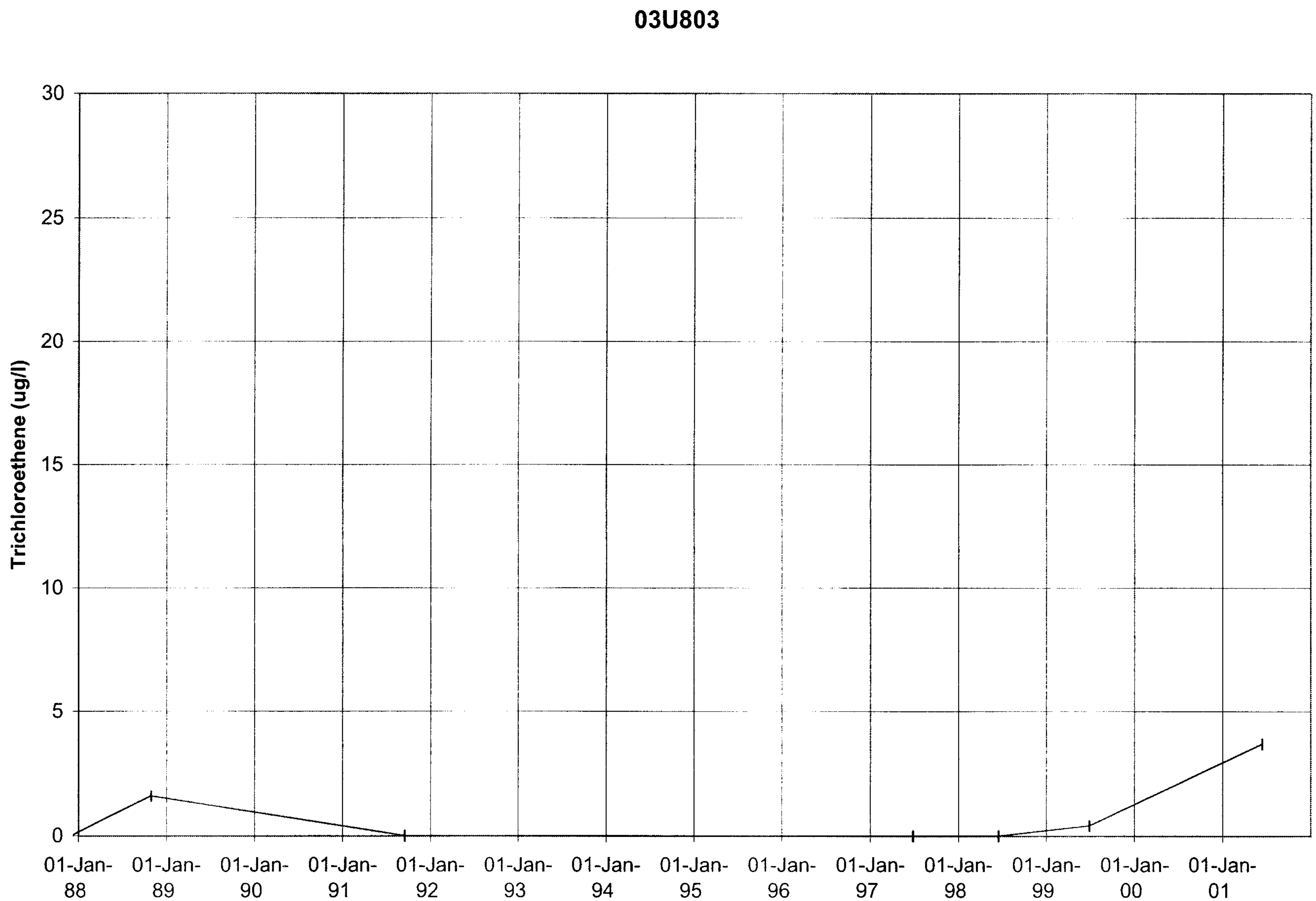
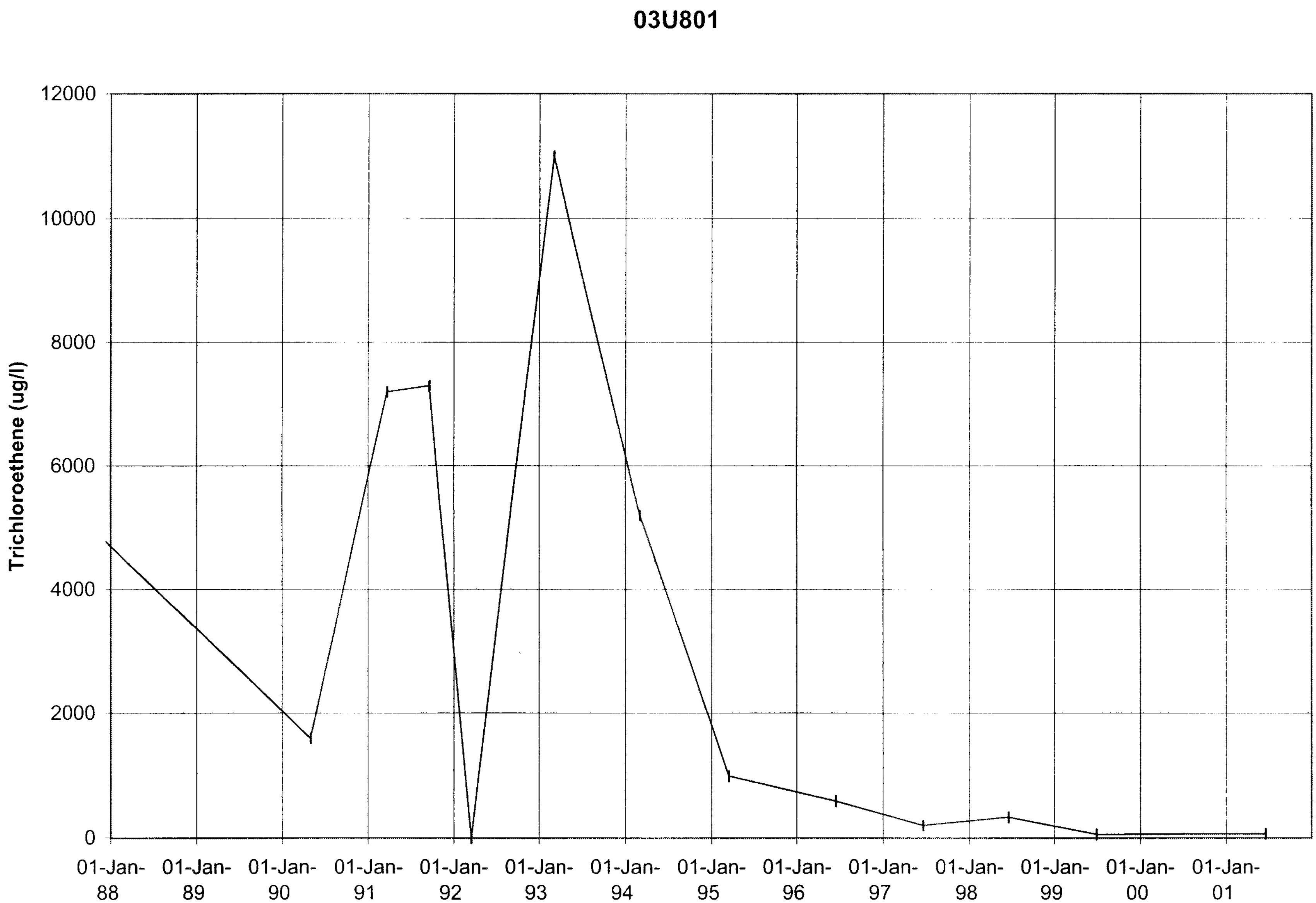

03U804
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

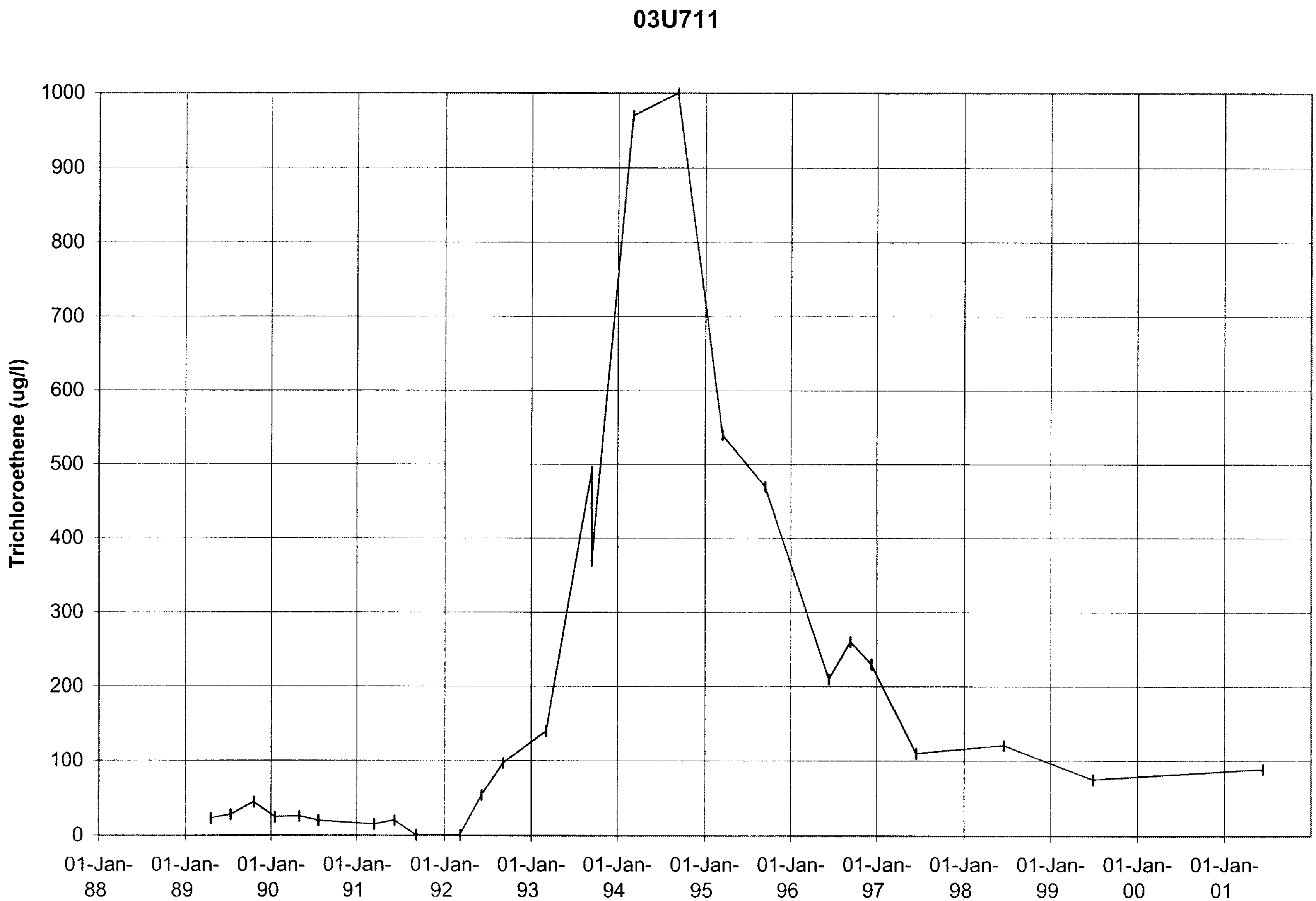
Back to Map


03U803
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

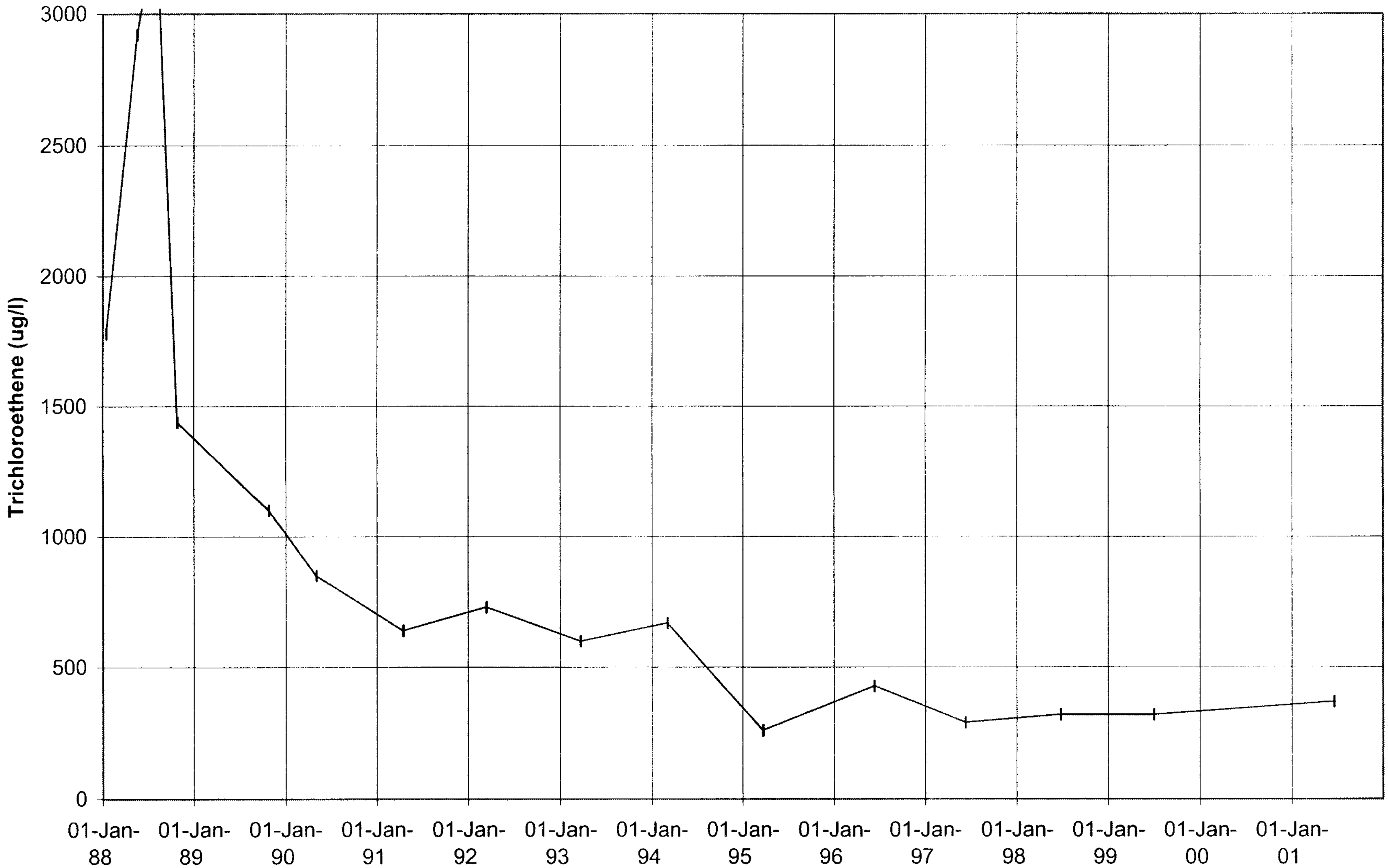

03U801
Trichloroethene (ug/l)
12000
10000
8000
6000
4000
2000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


03U711
Trichloroethene (ug/l)
1000
900
800
700
600
500
400
300
200
100
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U710



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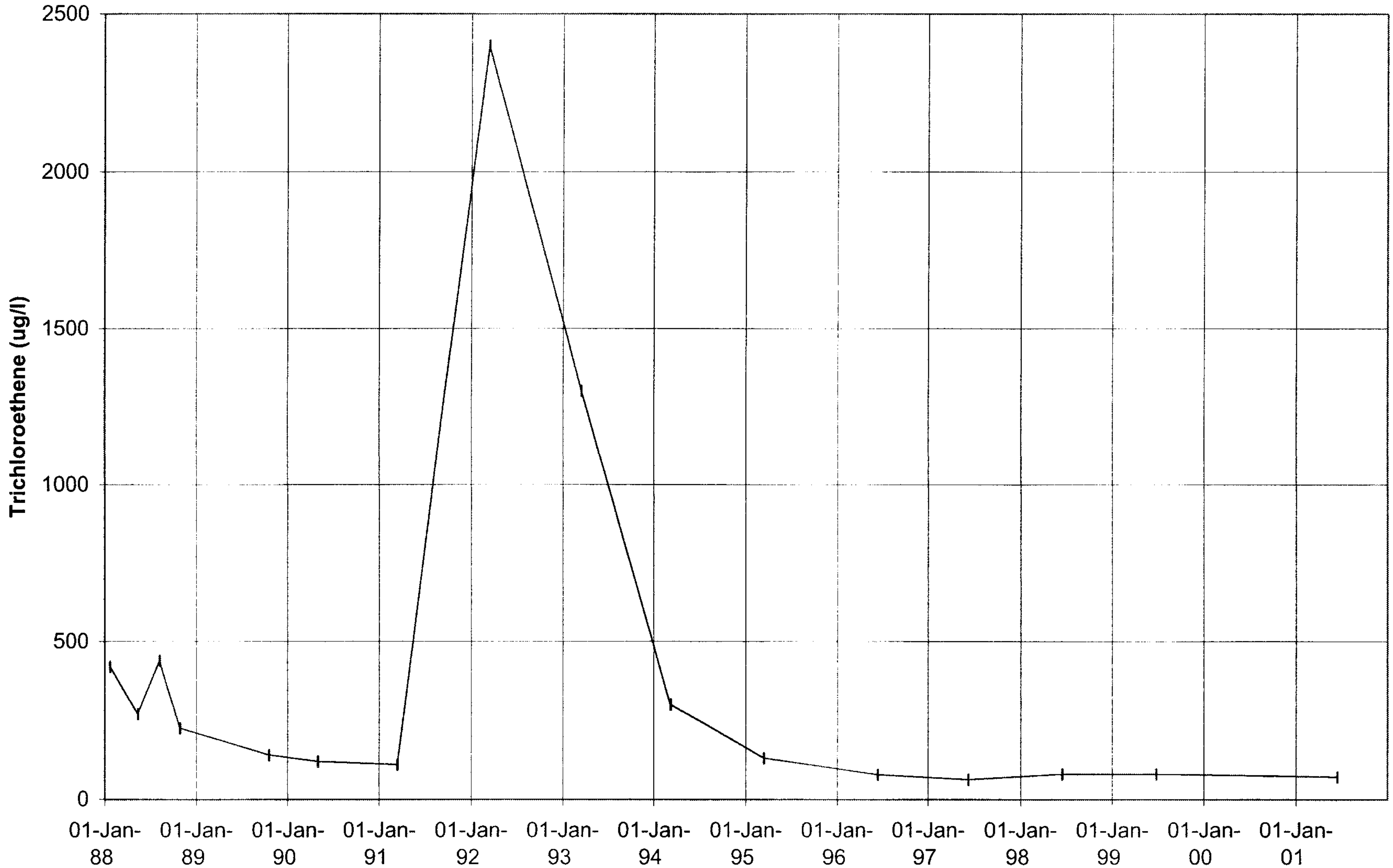
03U709



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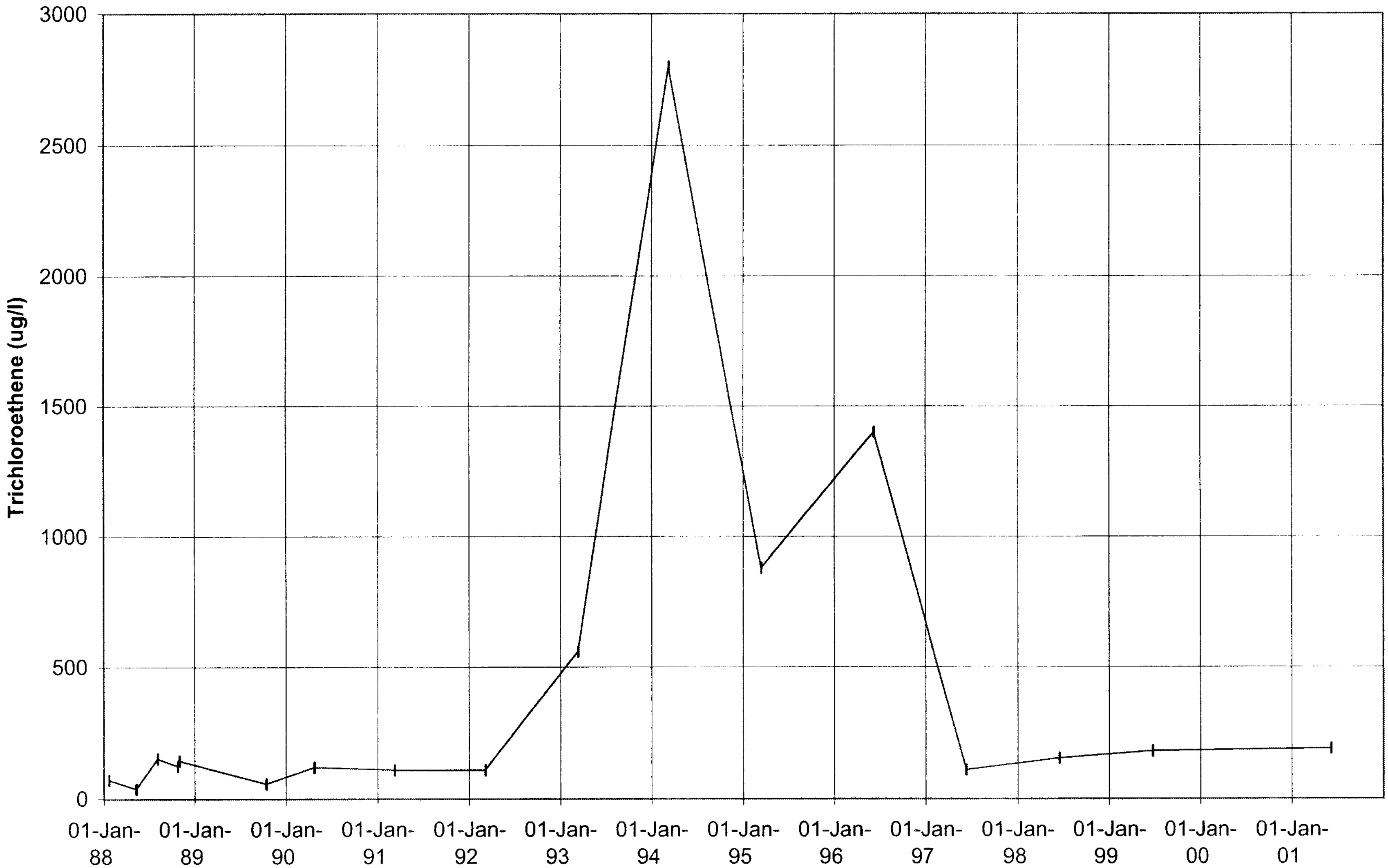
03U708



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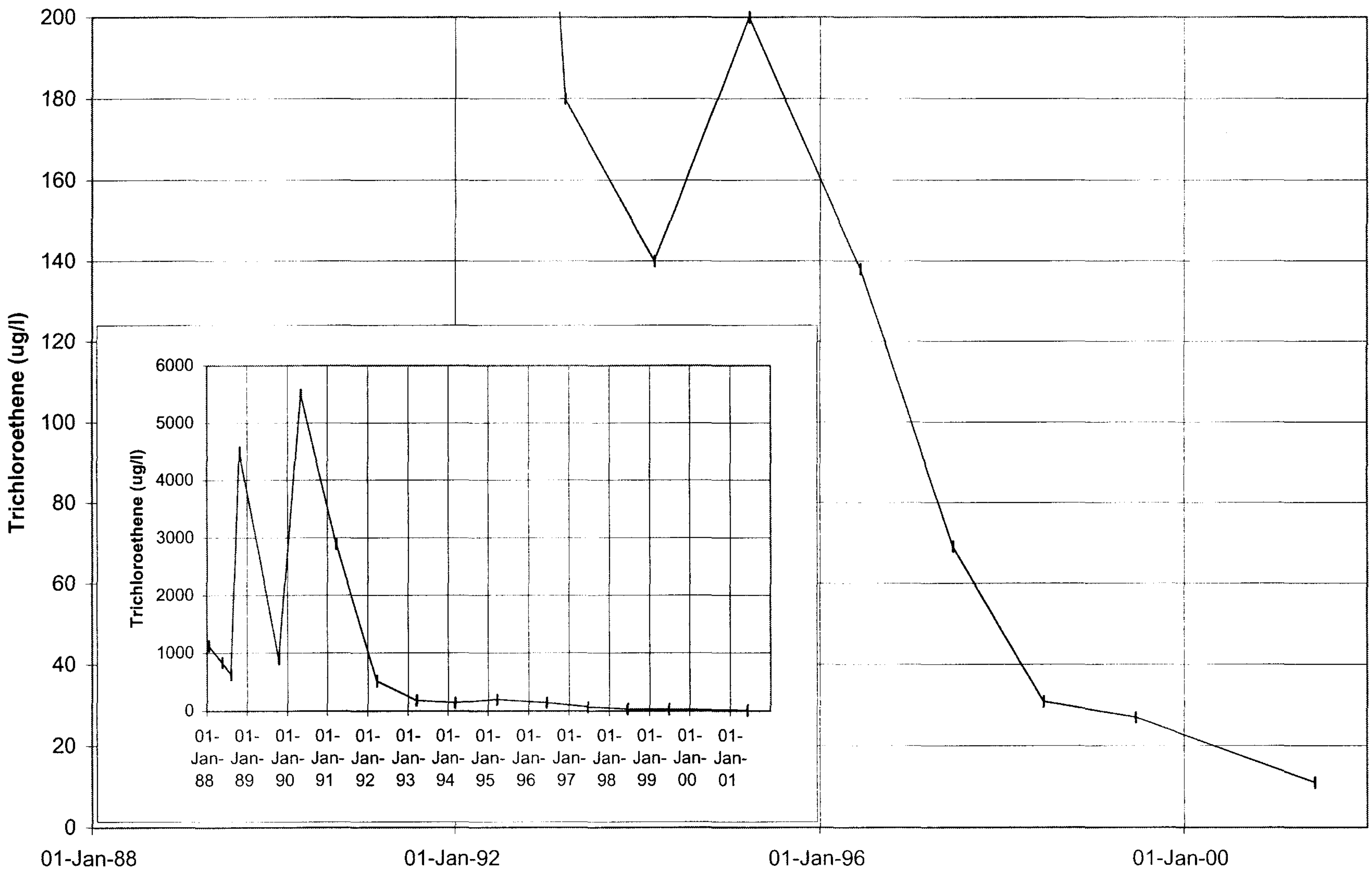
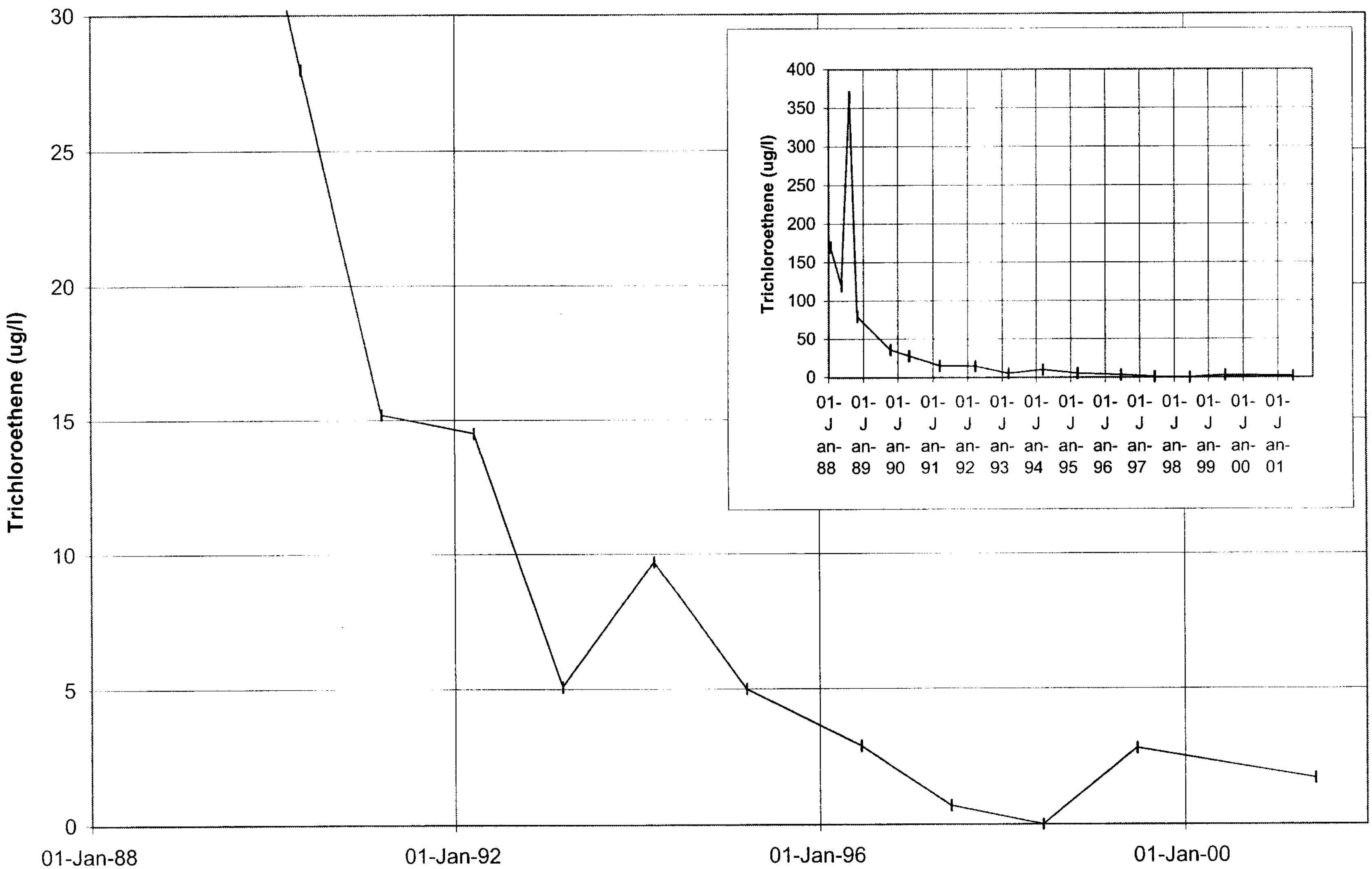
03U703



Back to Map

03U702



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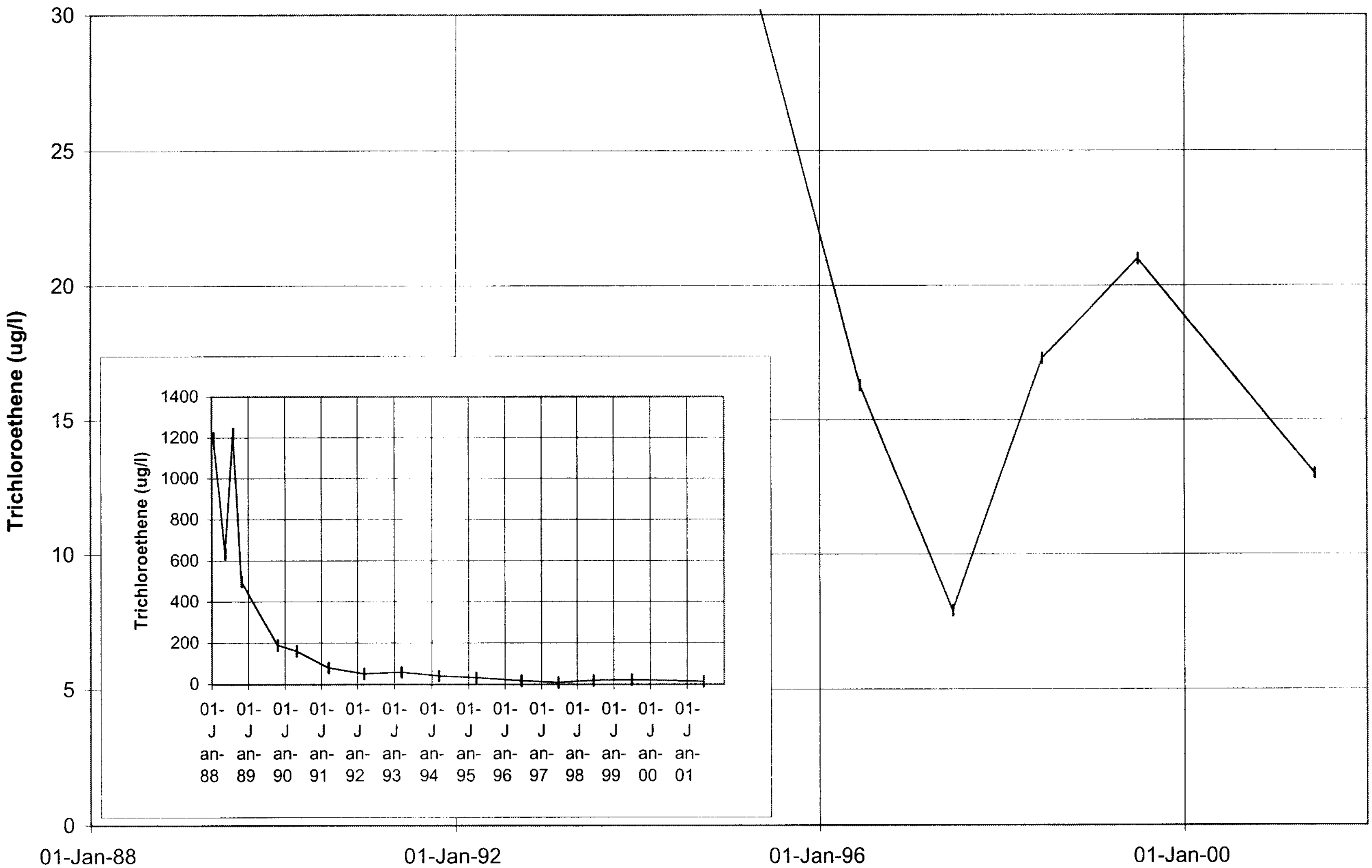
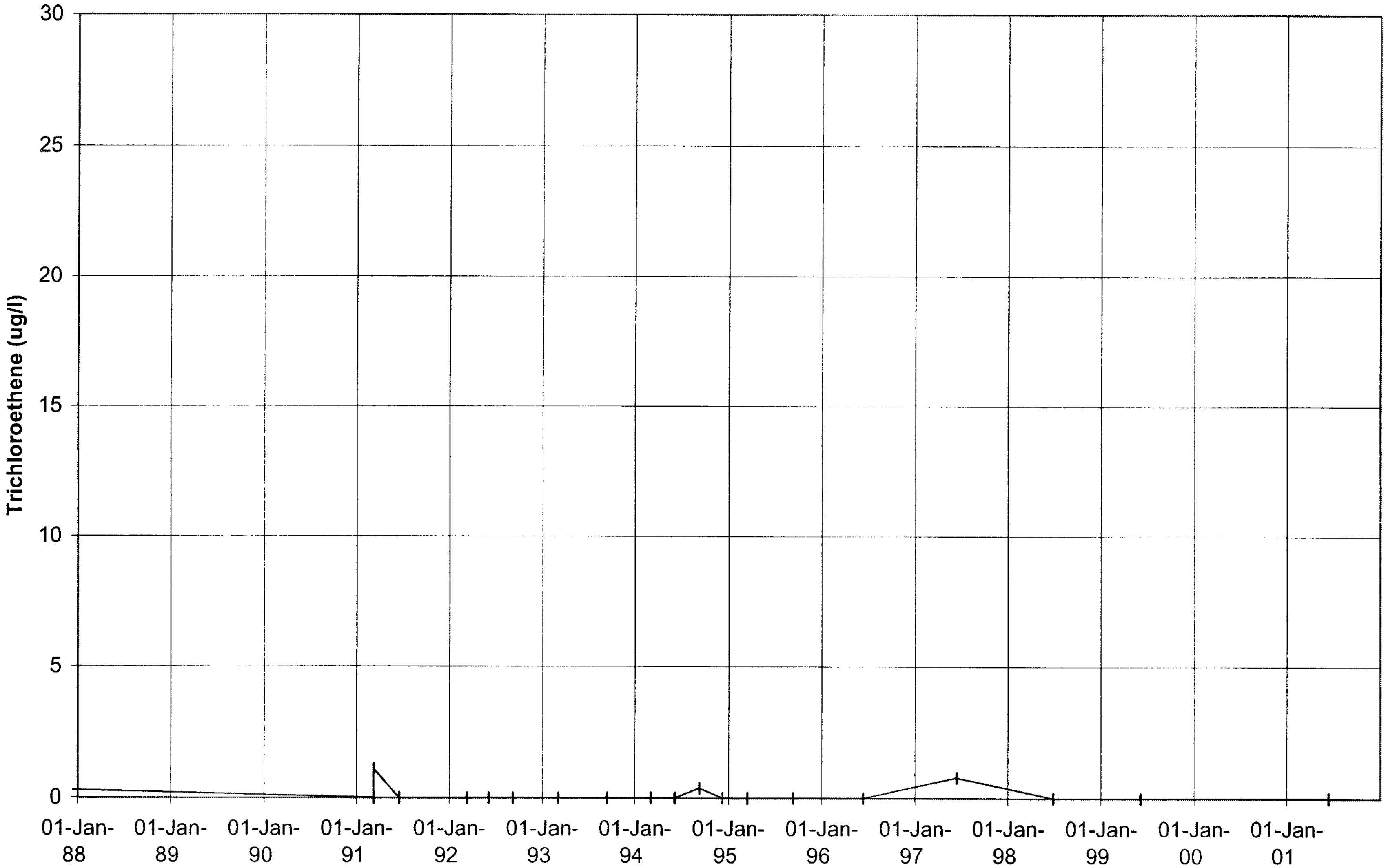
03U701



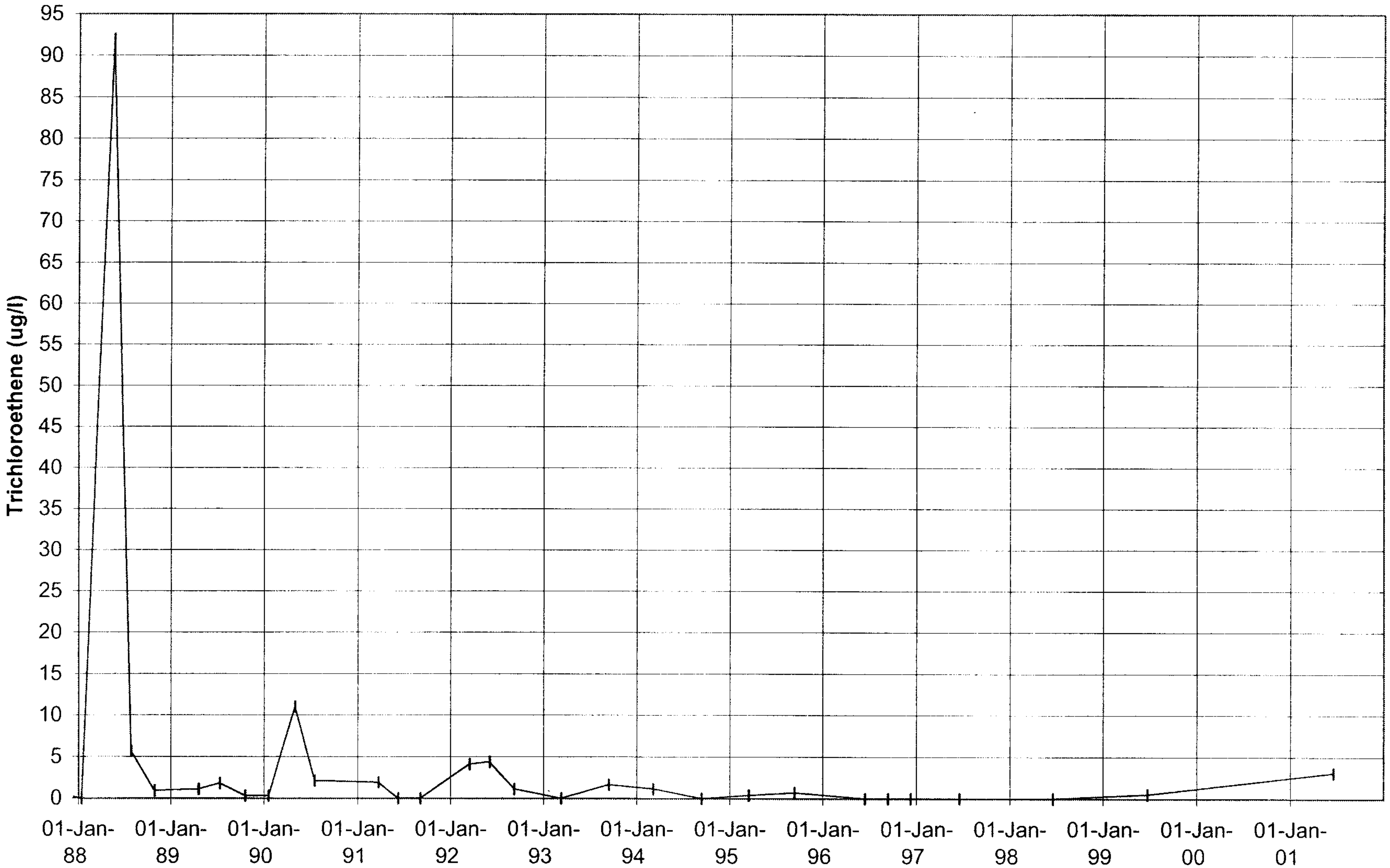
Back to Map

03U673

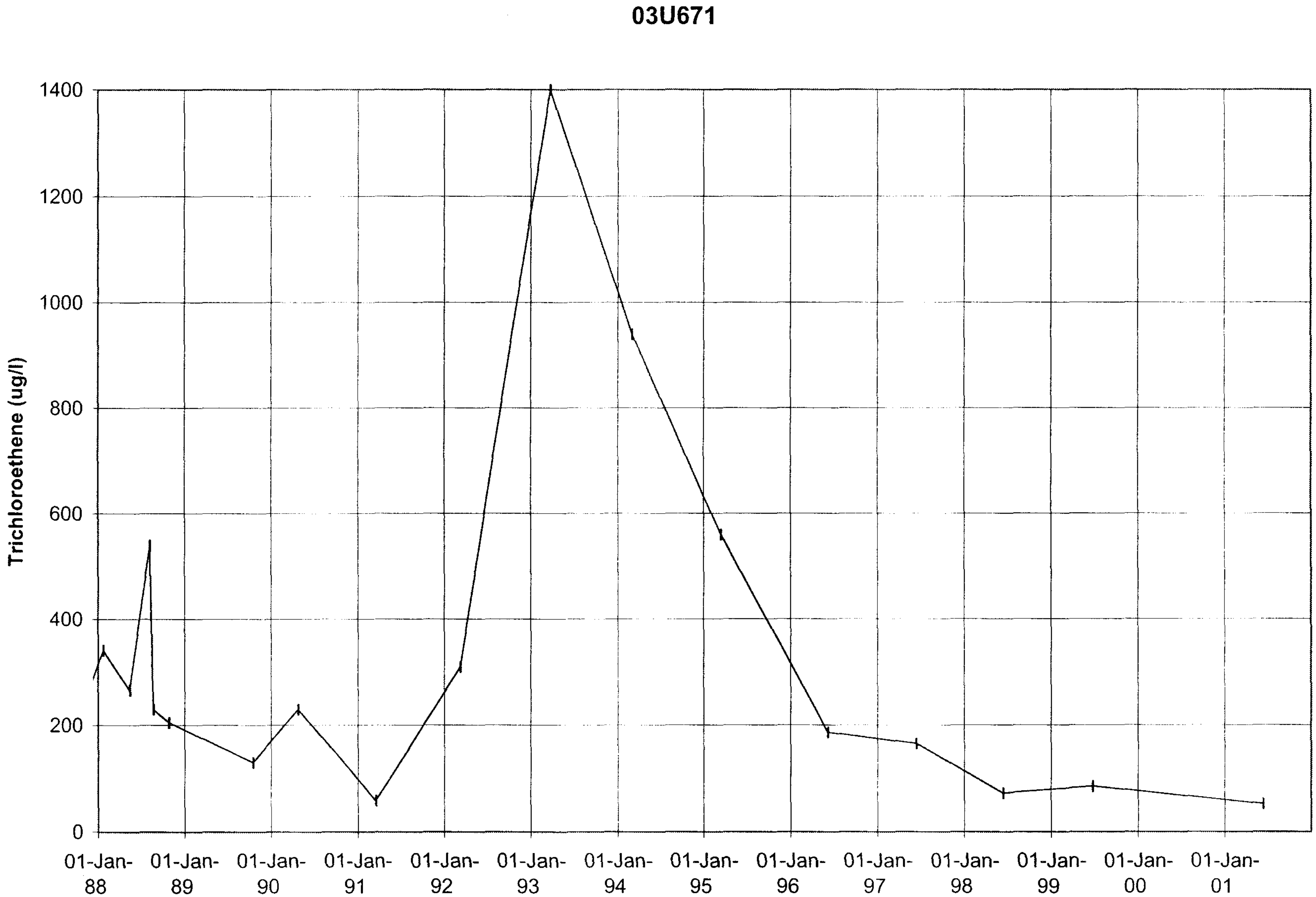


Back to Map

03U672



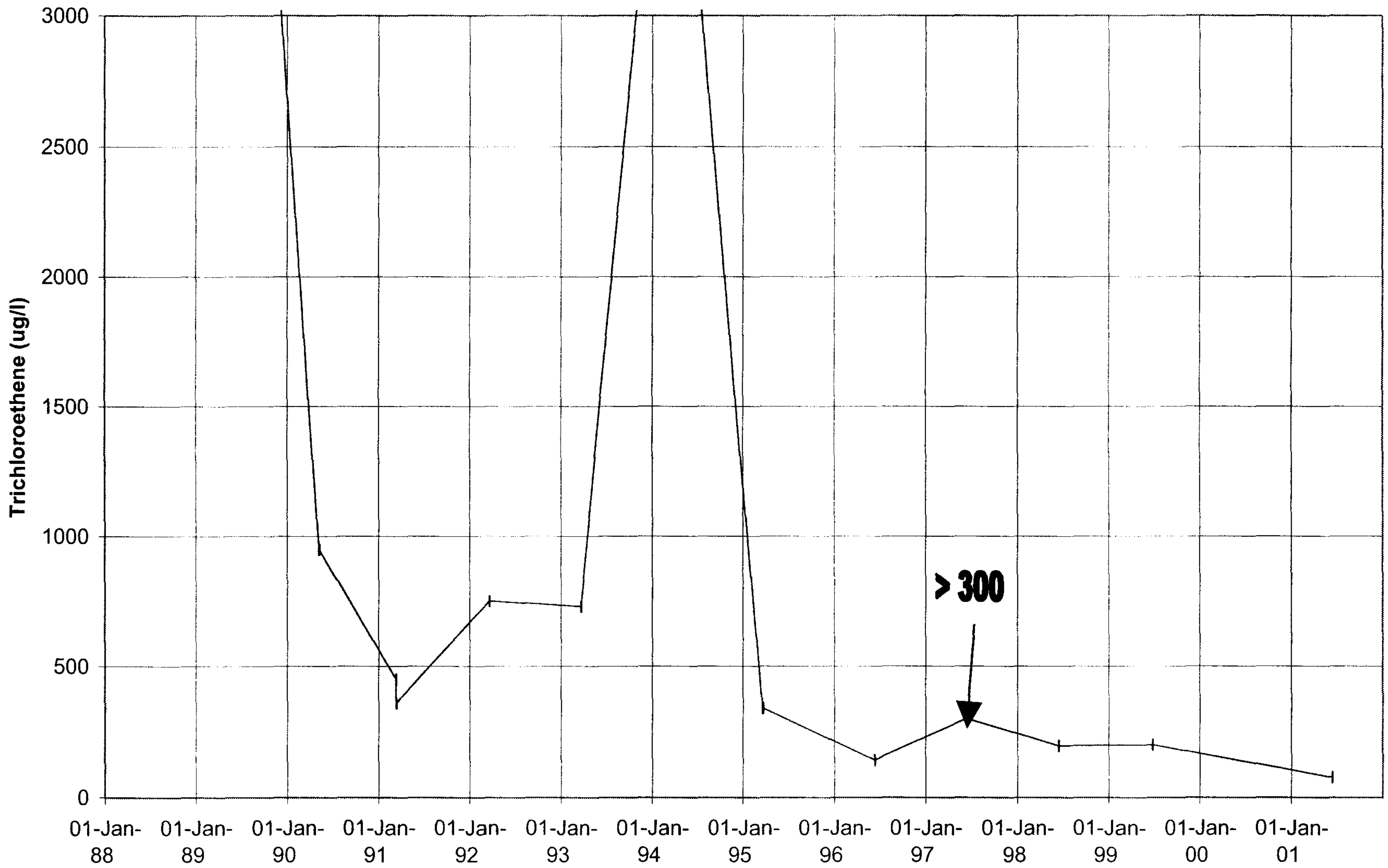
Back to Map



03U671
Trichloroethene (ug/l)
1400
1200
1000
800
600
400
200
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U659



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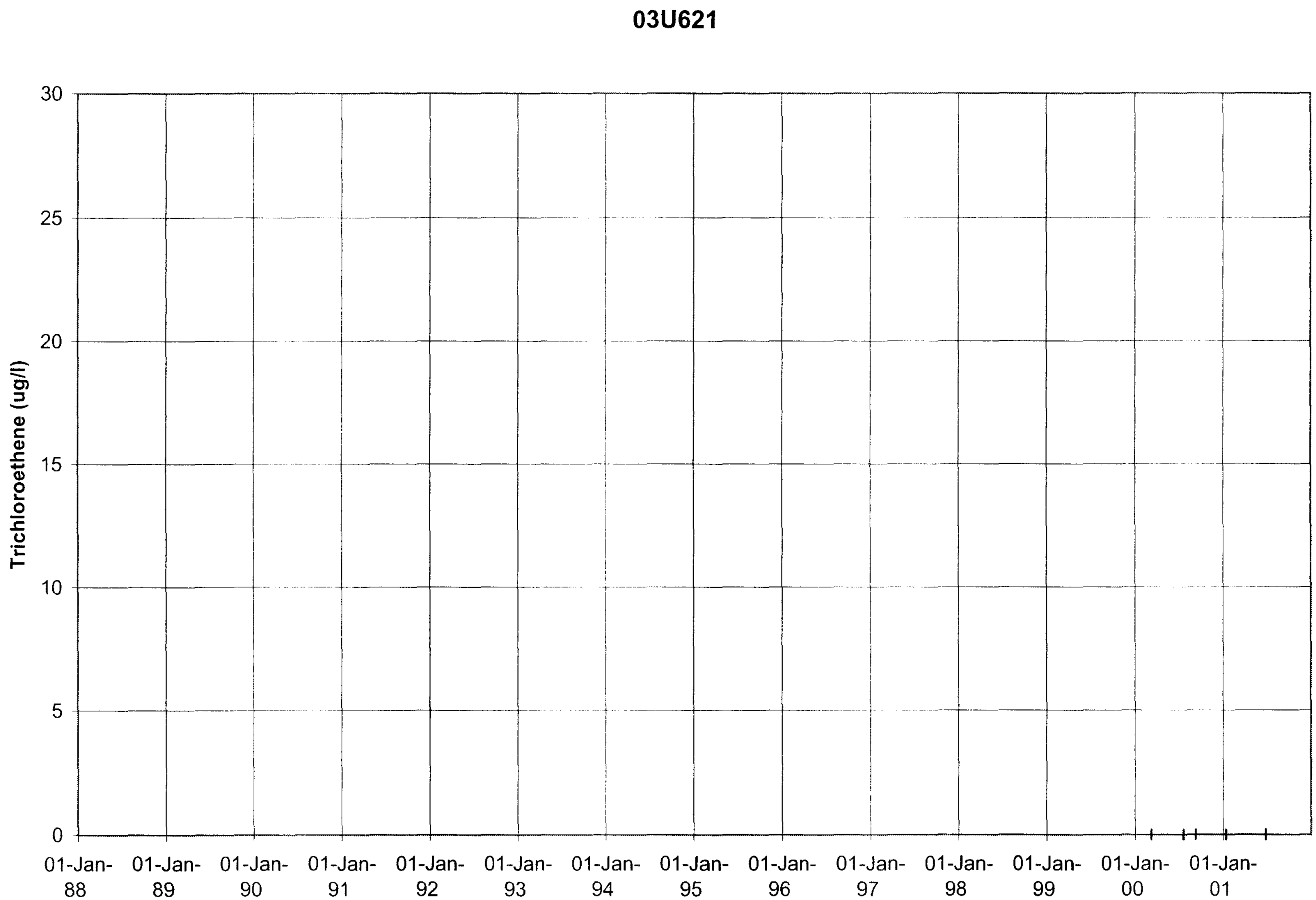
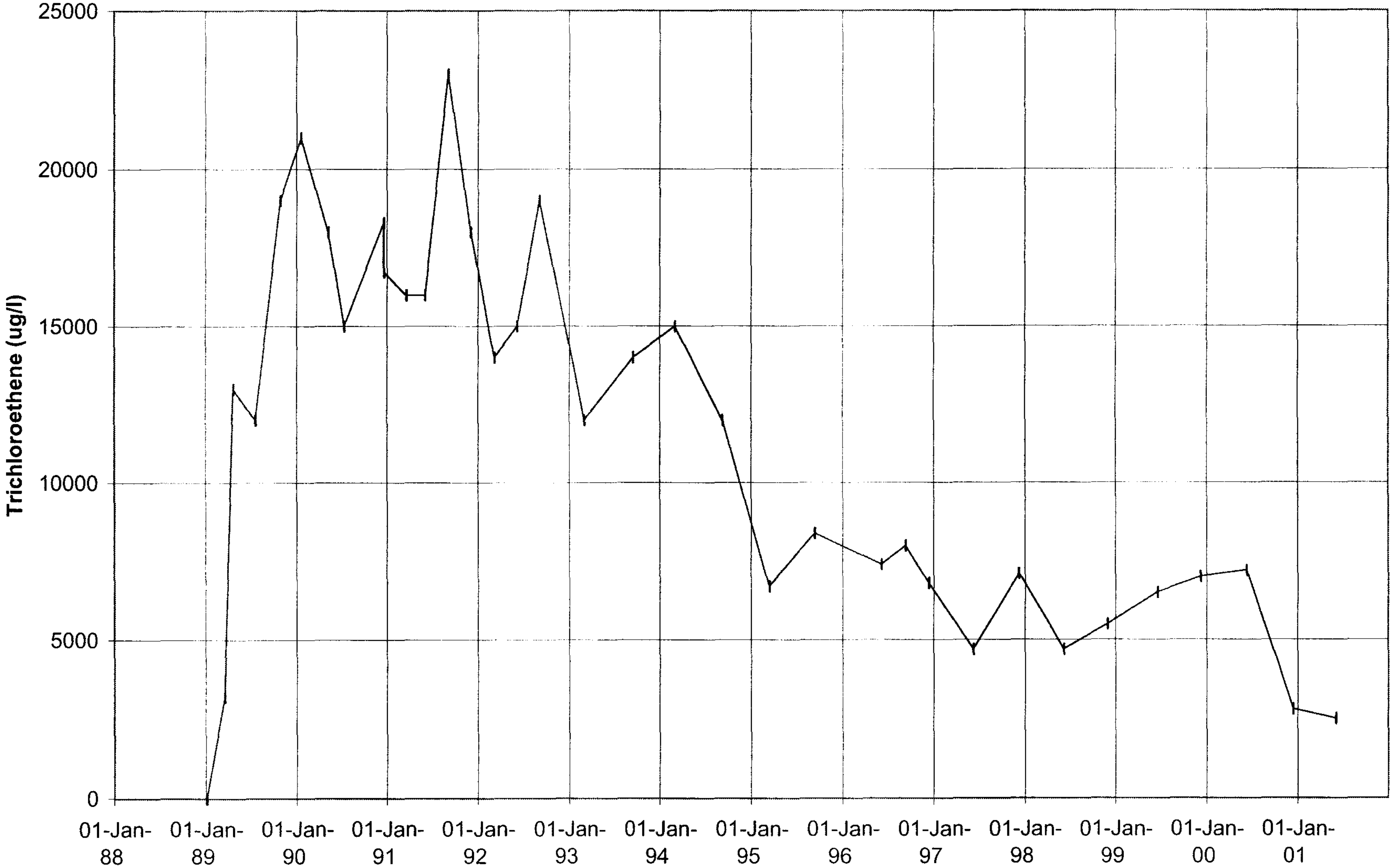

03U621
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U317



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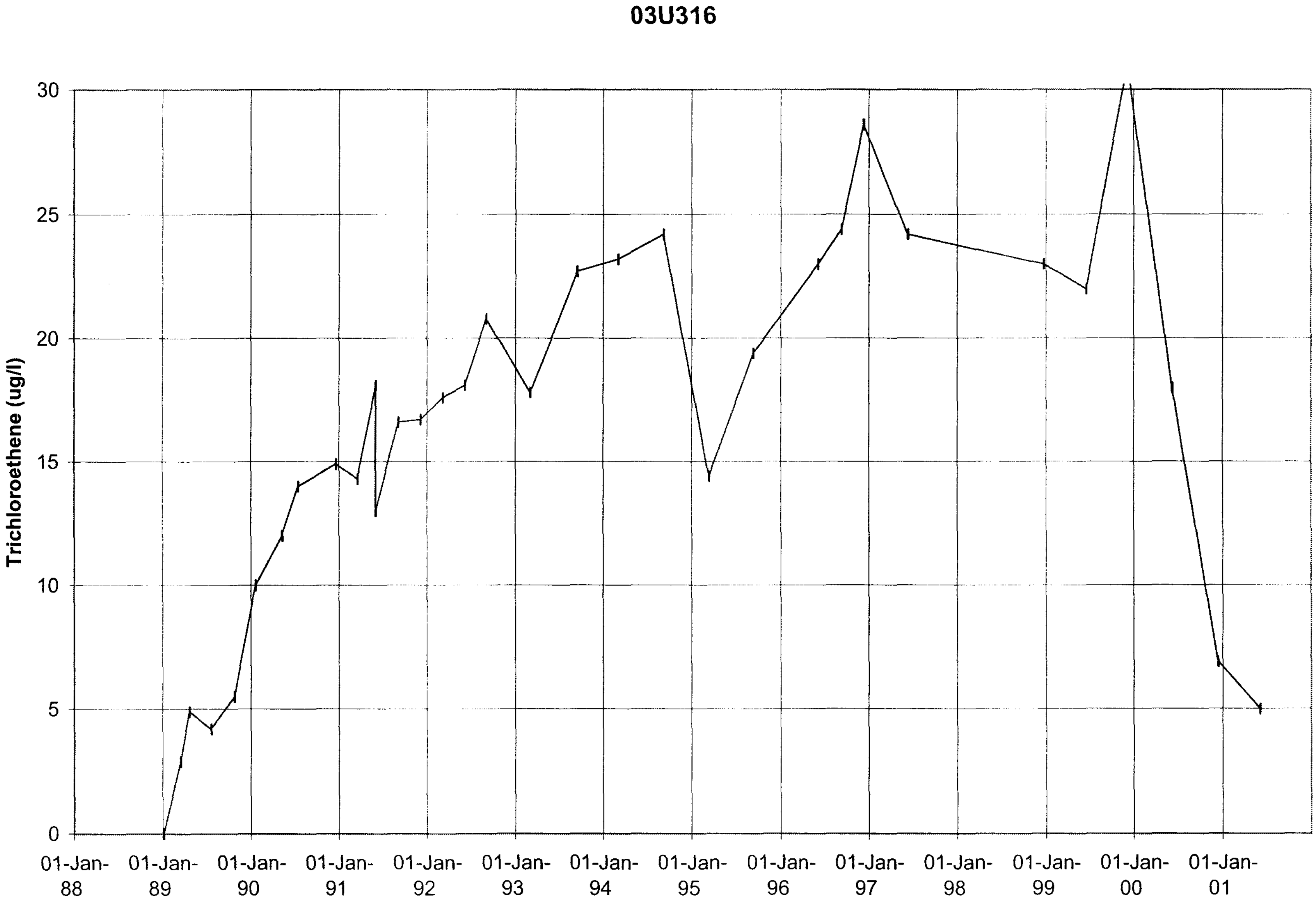
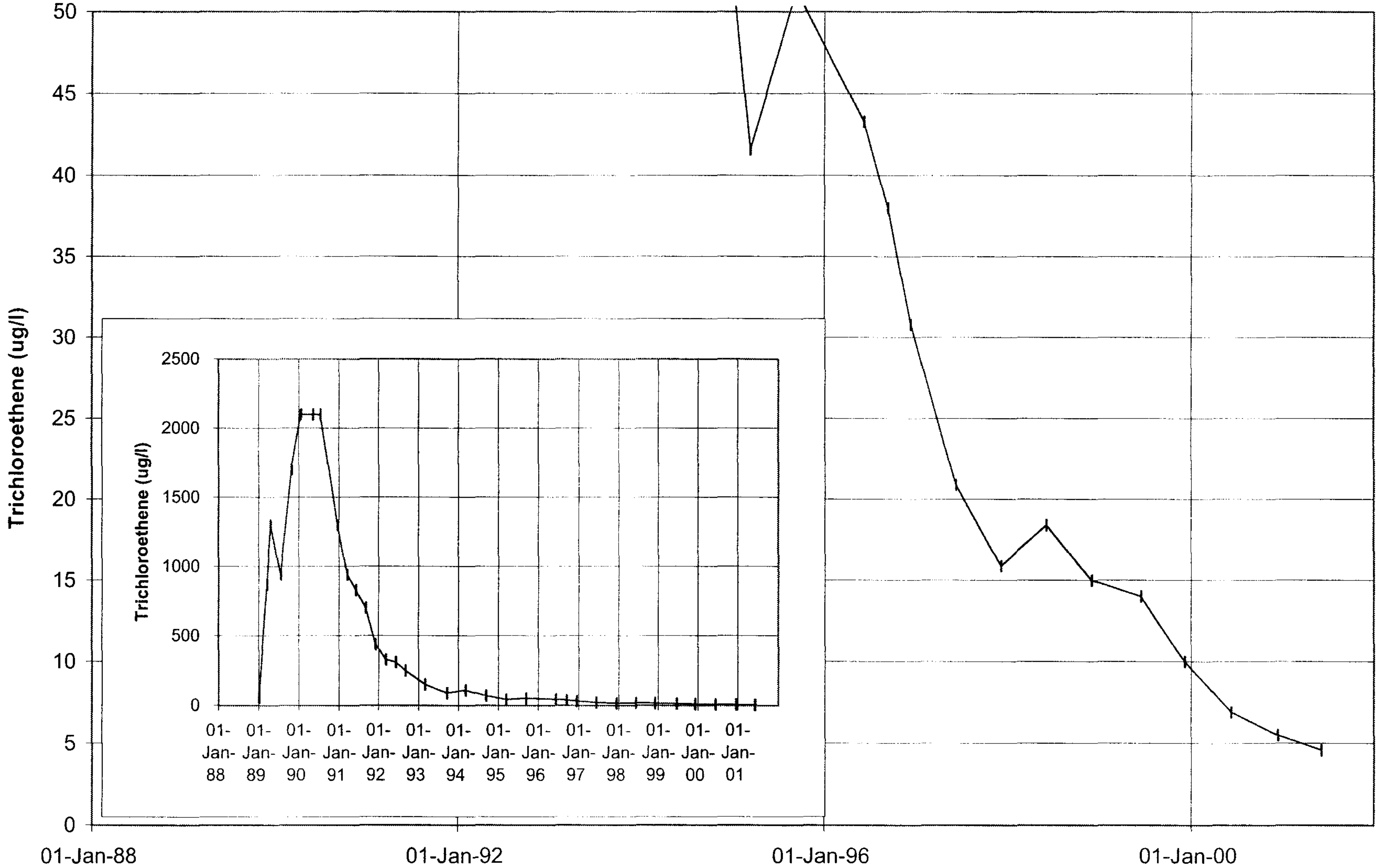


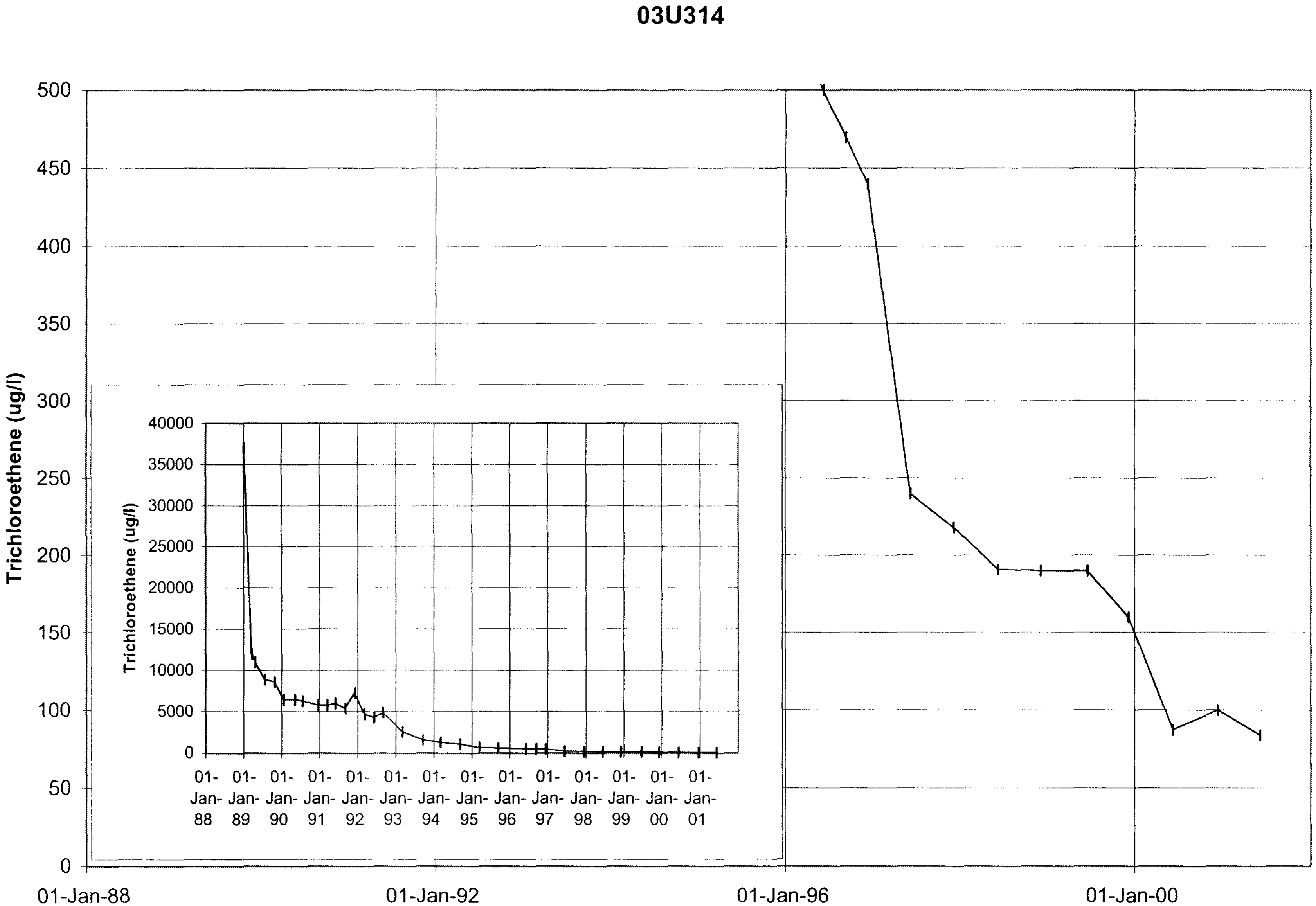
03U316
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U315

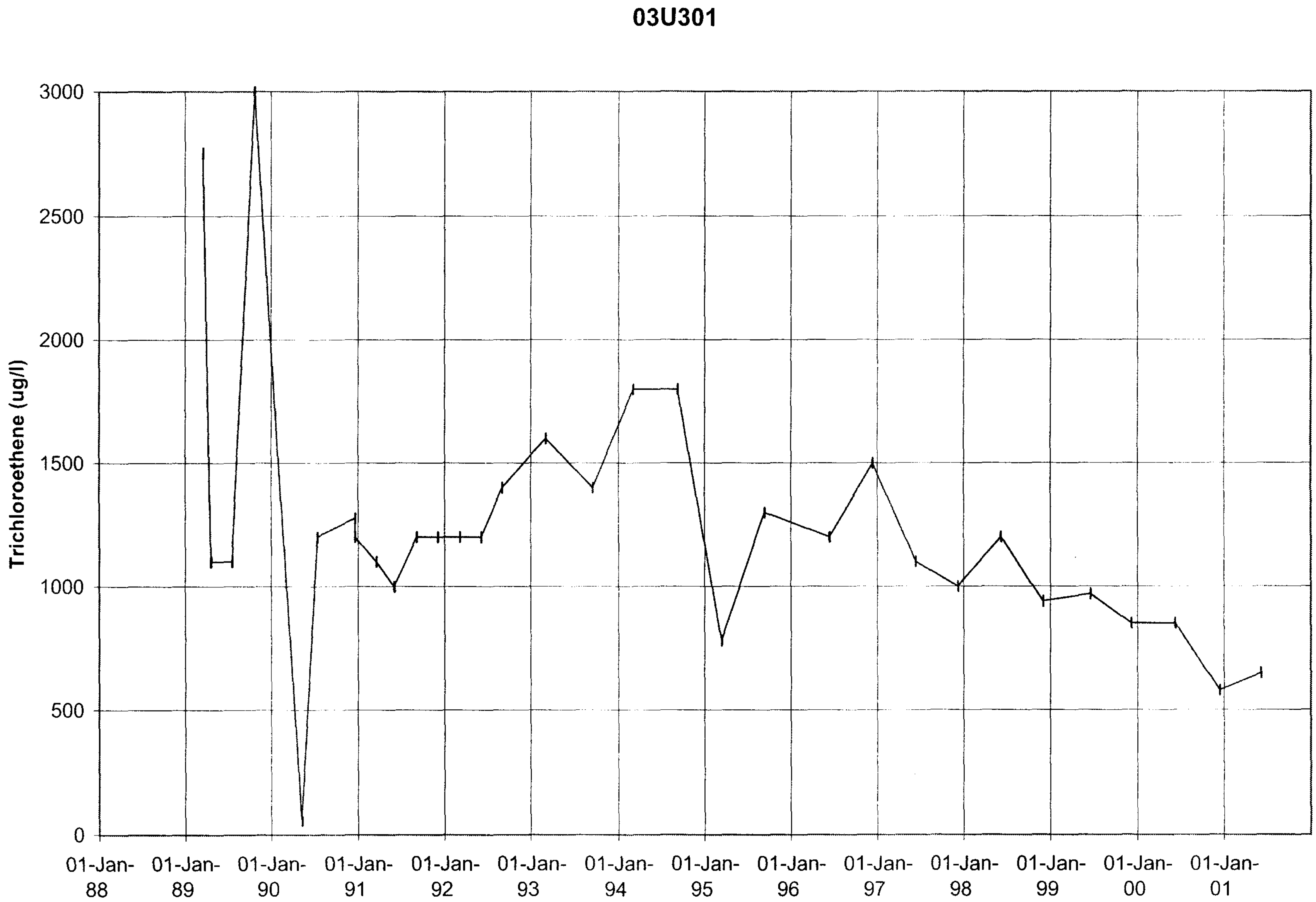


Back to Map



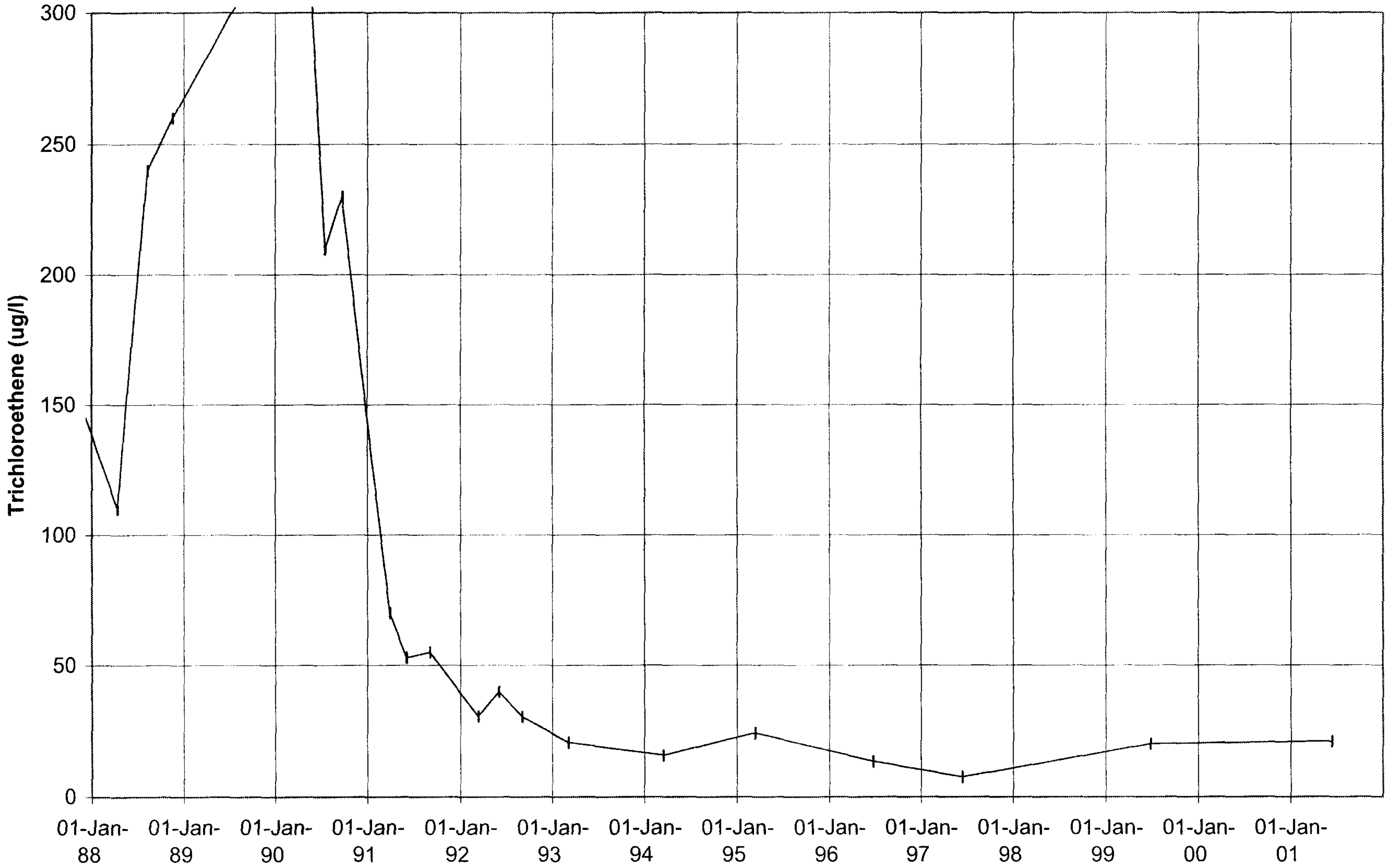
03U314
Trichloroethene (ug/l)
500
450
400
350
300
250
200
150
100
50
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
40000
35000
30000
25000
20000
15000
10000
5000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


03U301
Trichloroethene (ug/l)
3000
2500
2000
1500
1000
500
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U114



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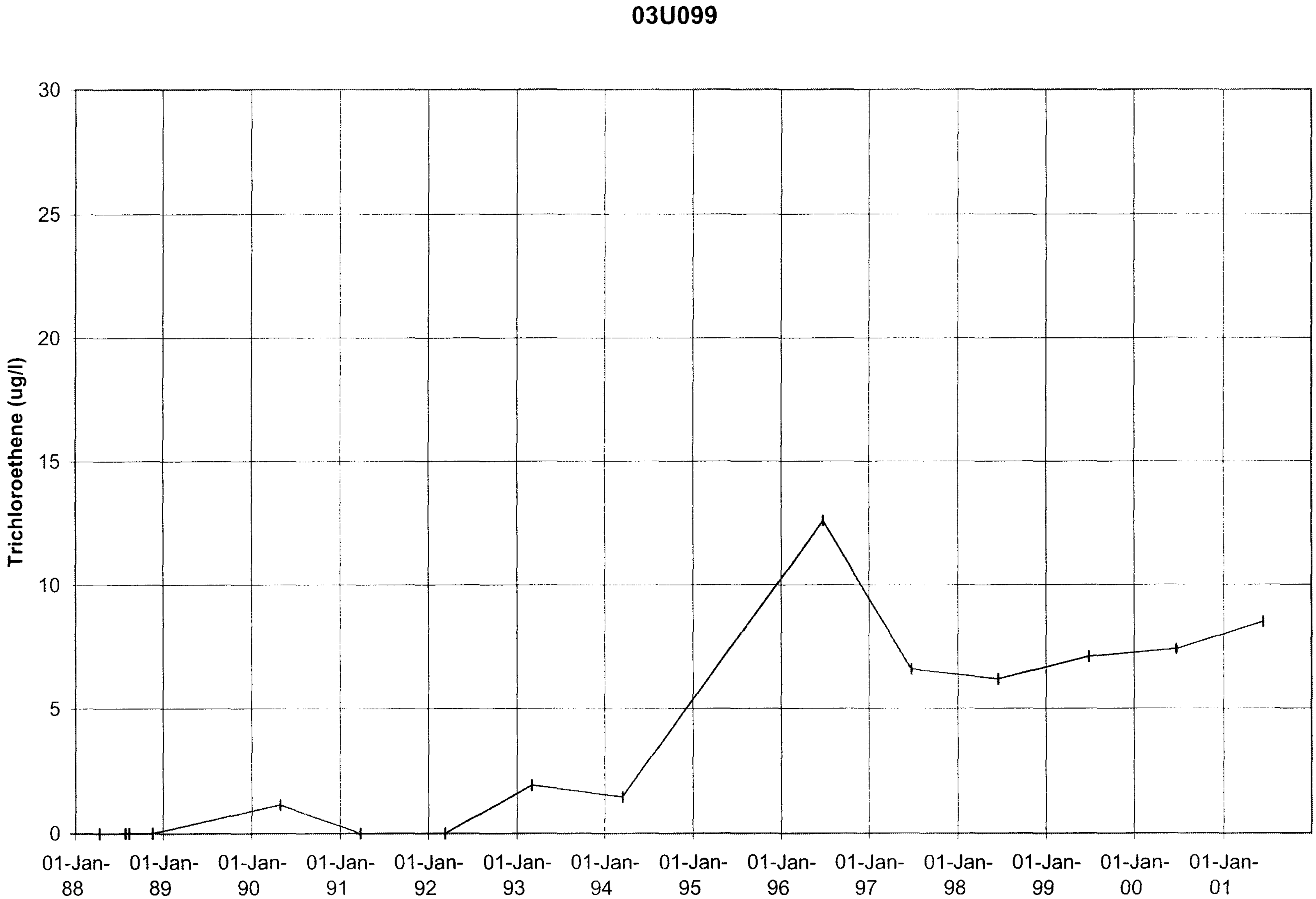
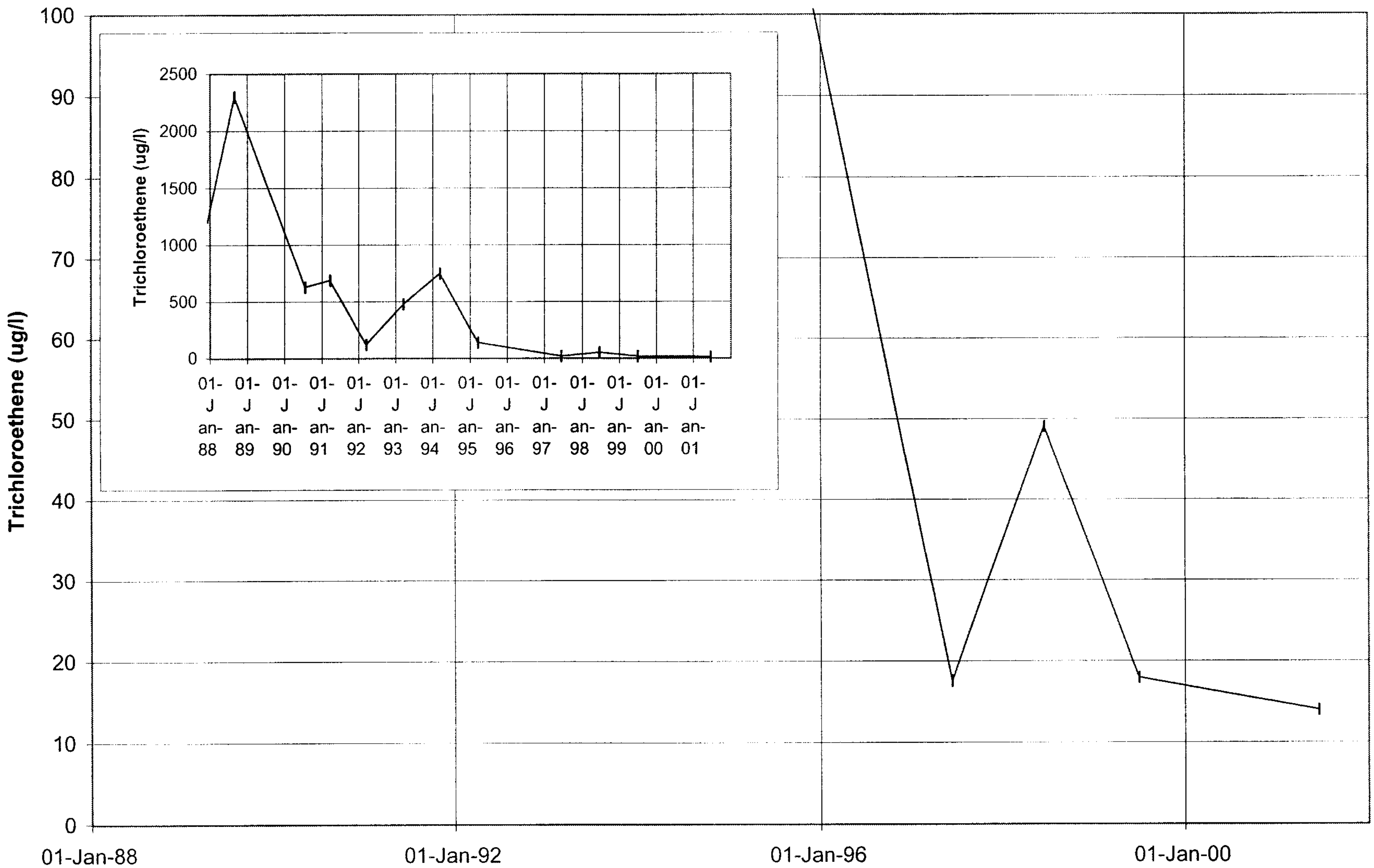

03U099
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

03U096



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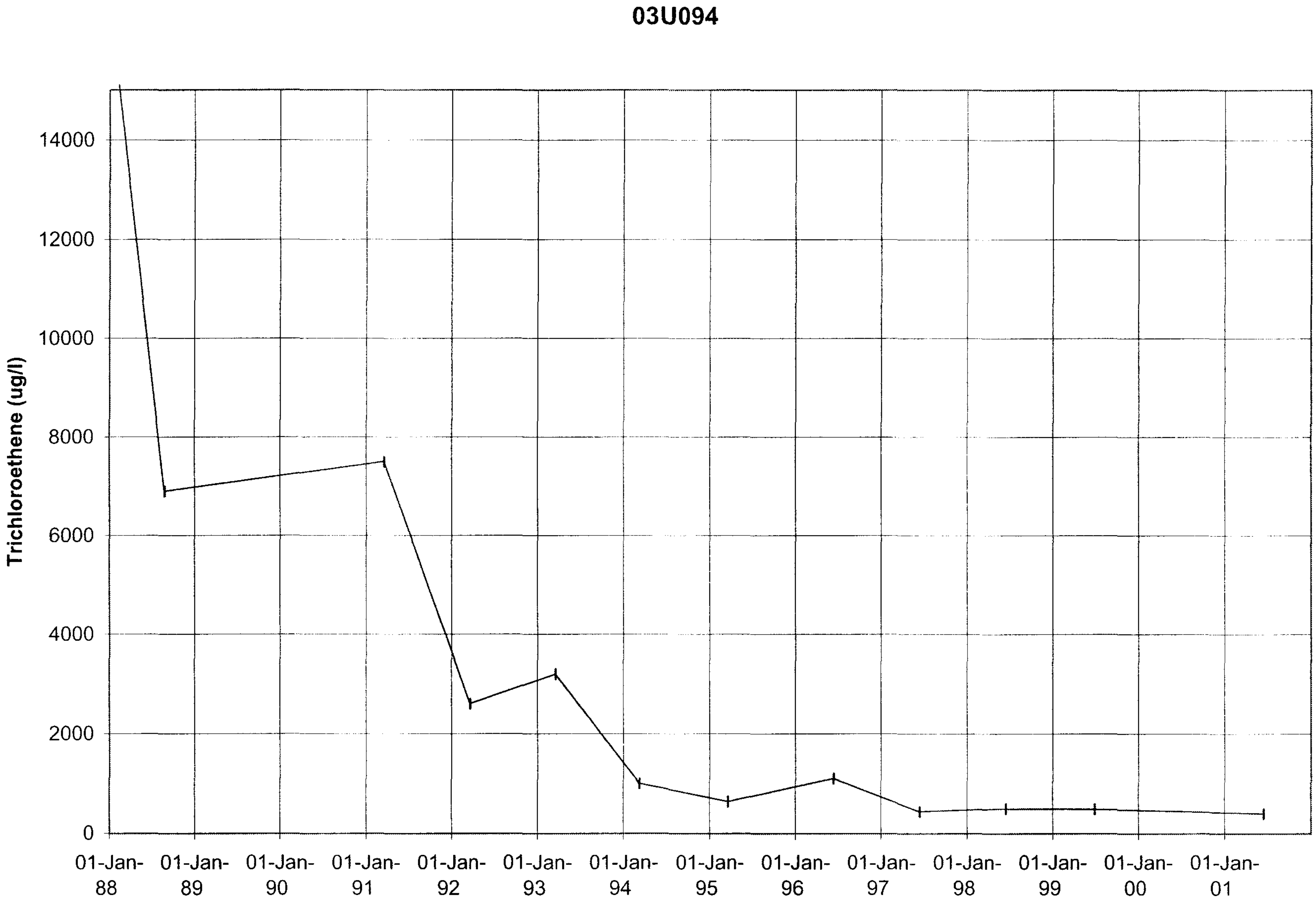
03U094
Trichloroethene (ug/l)
14000
12000
10000
8000
6000
4000
2000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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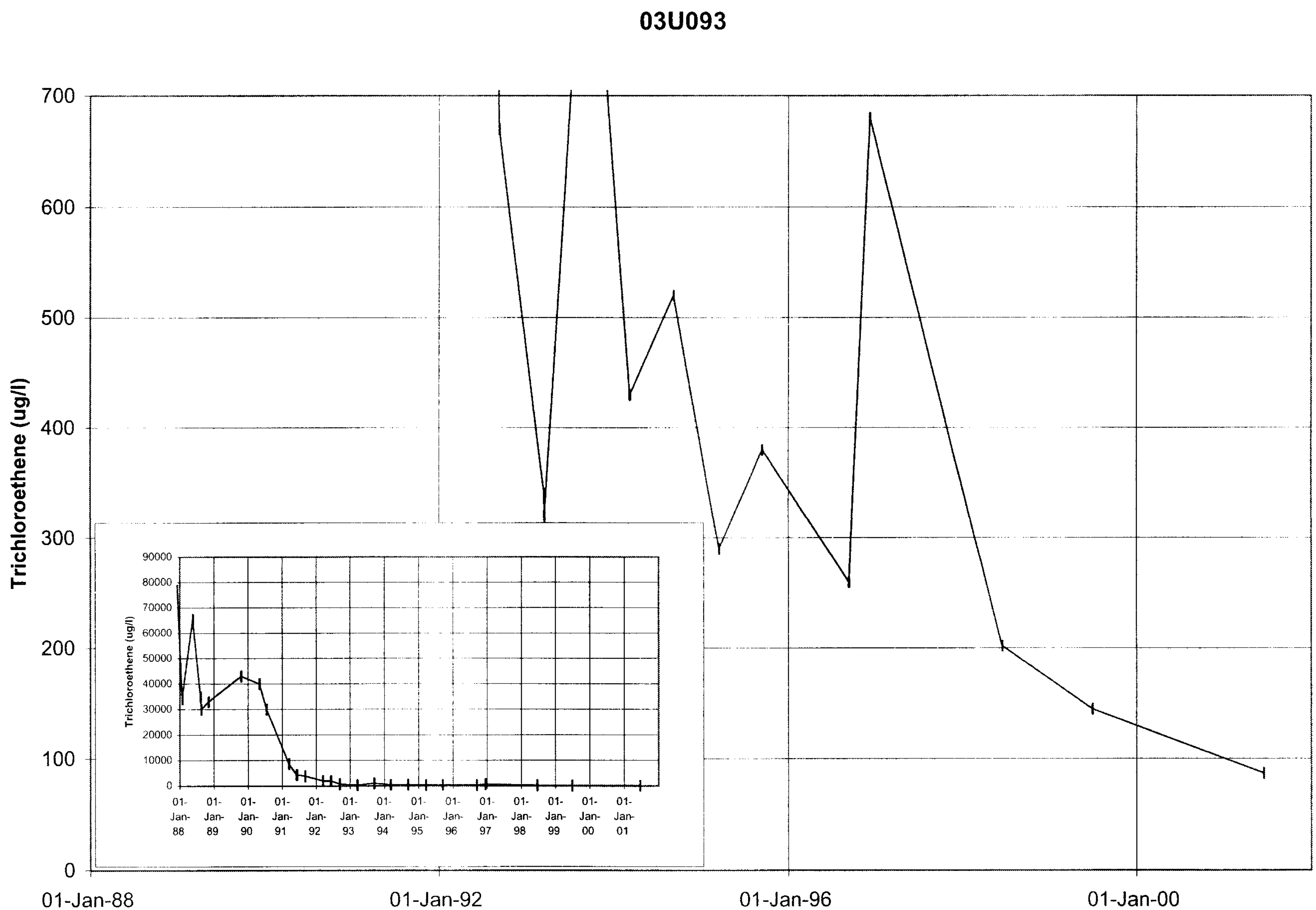
03U093



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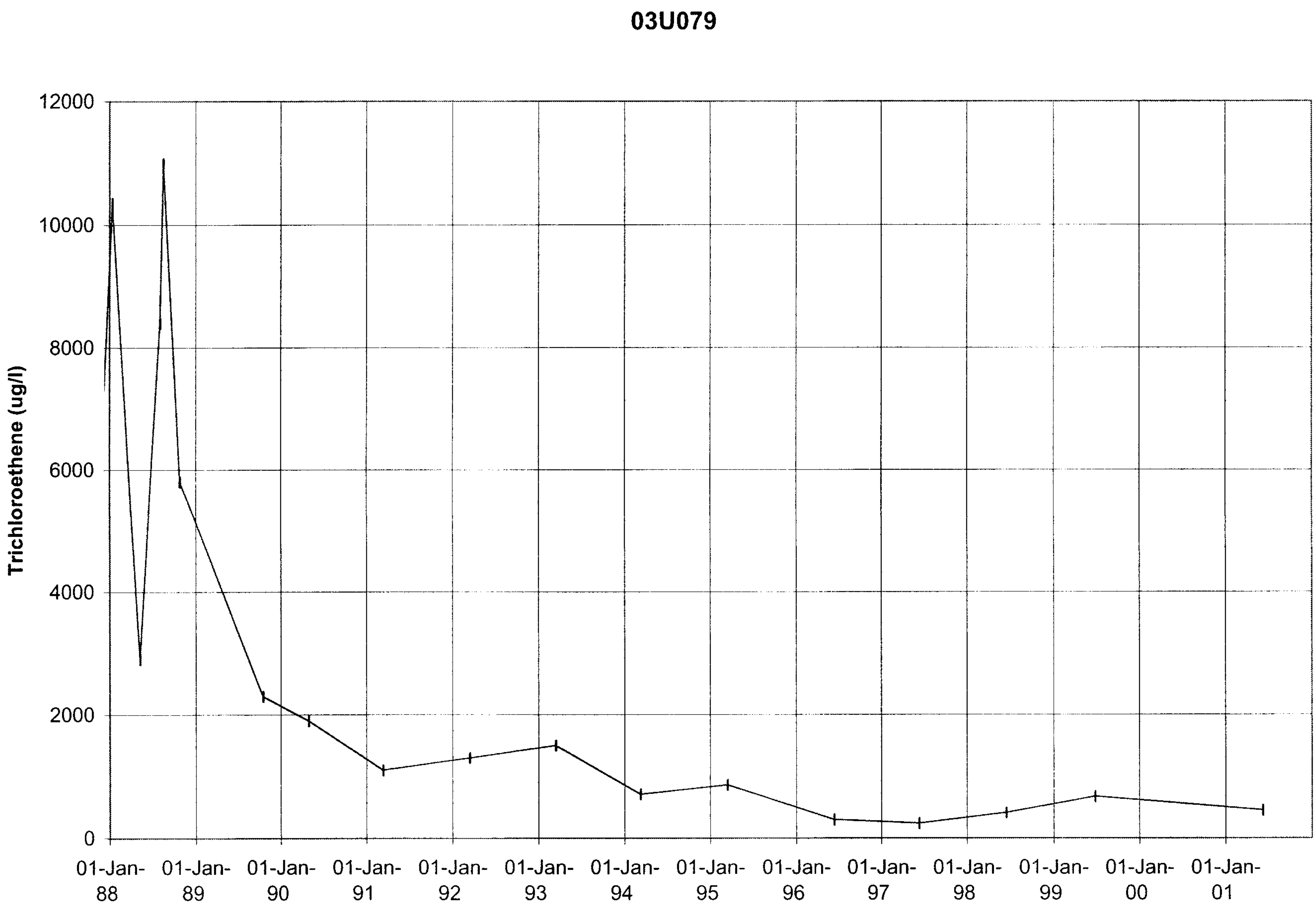

03U079
Trichloroethene (ug/l)
12000
10000
8000
6000
4000
2000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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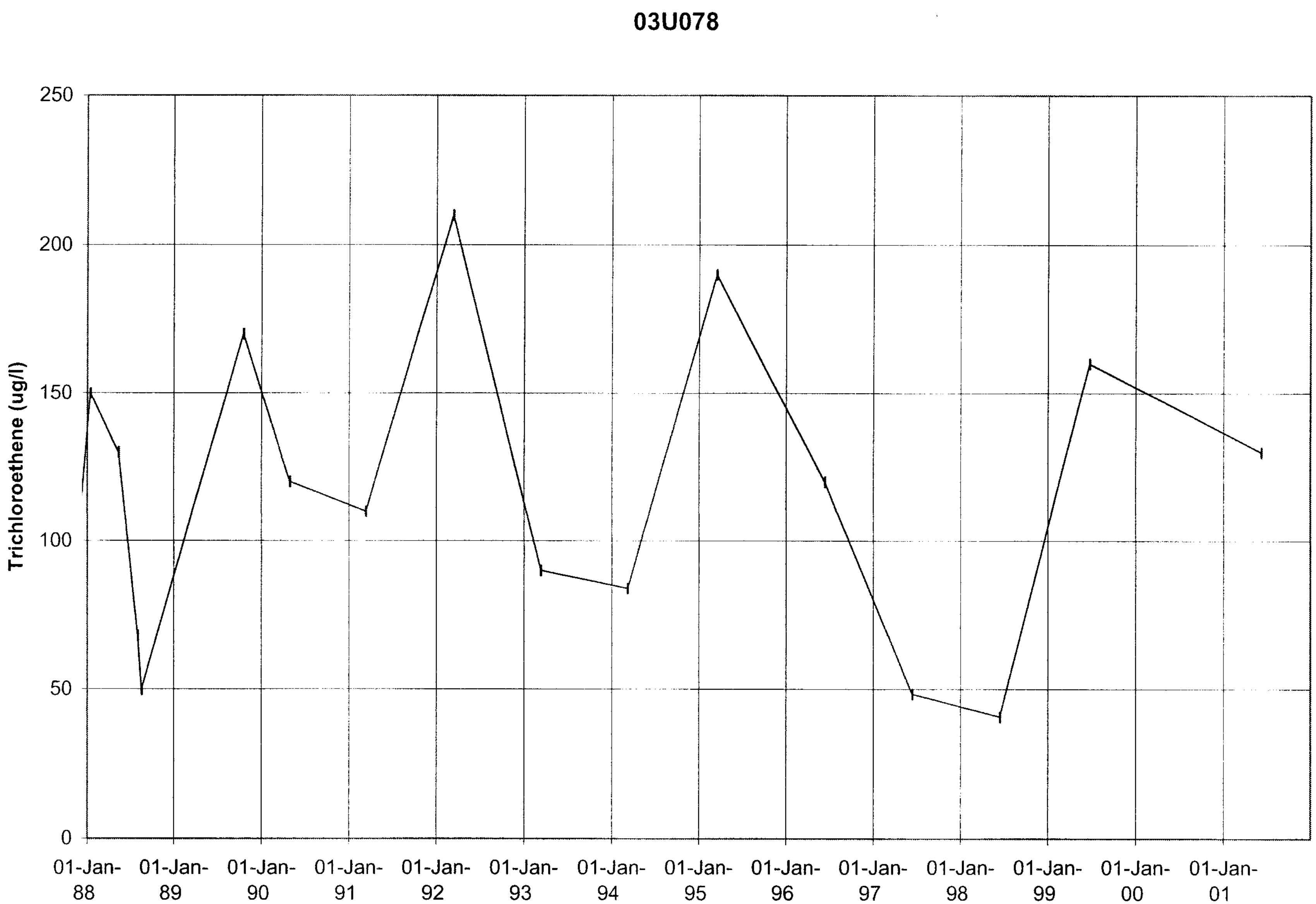

03U078
Trichloroethene (ug/l)
250
200
150
100
50
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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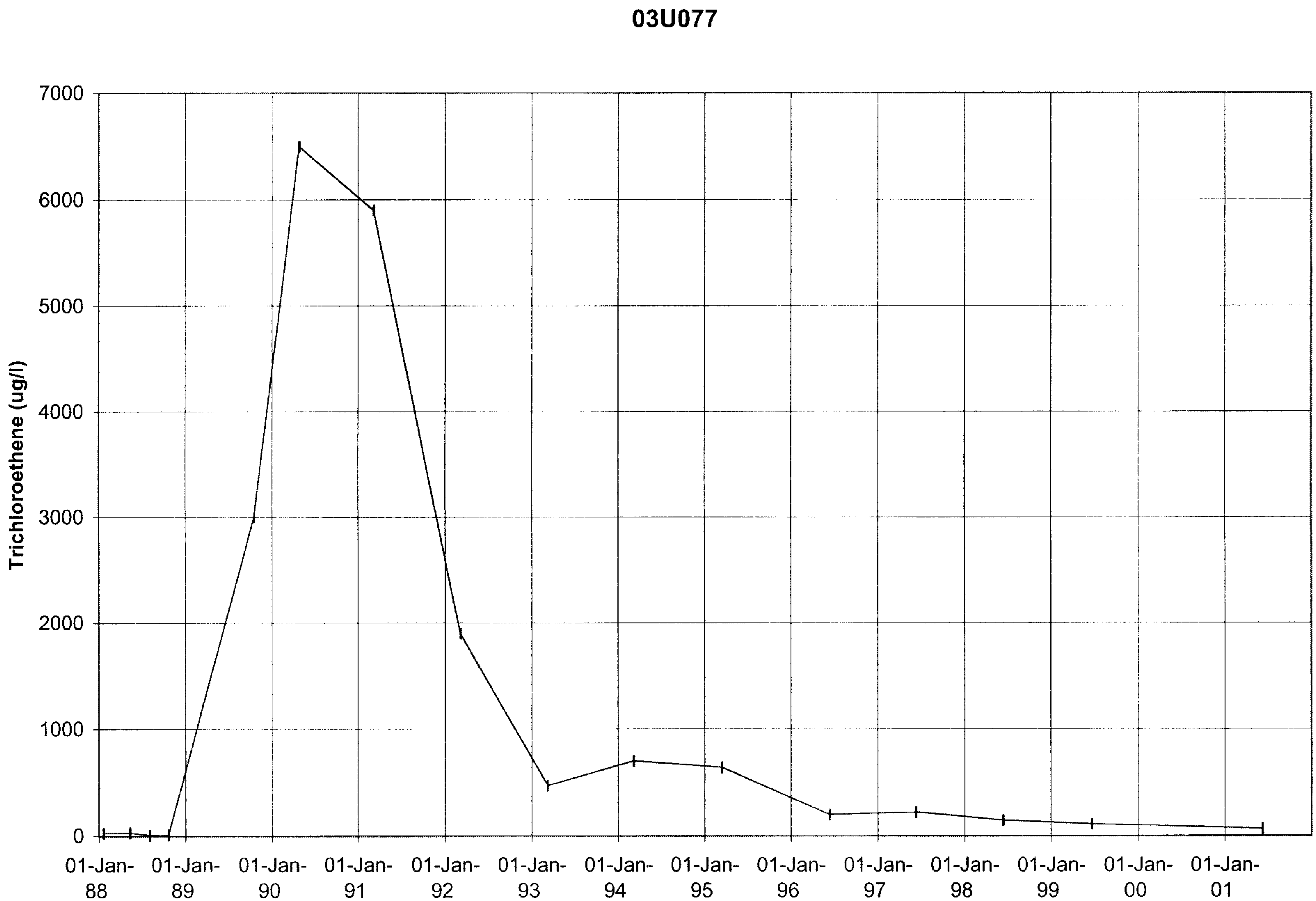
03U077
Trichloroethene (ug/l)
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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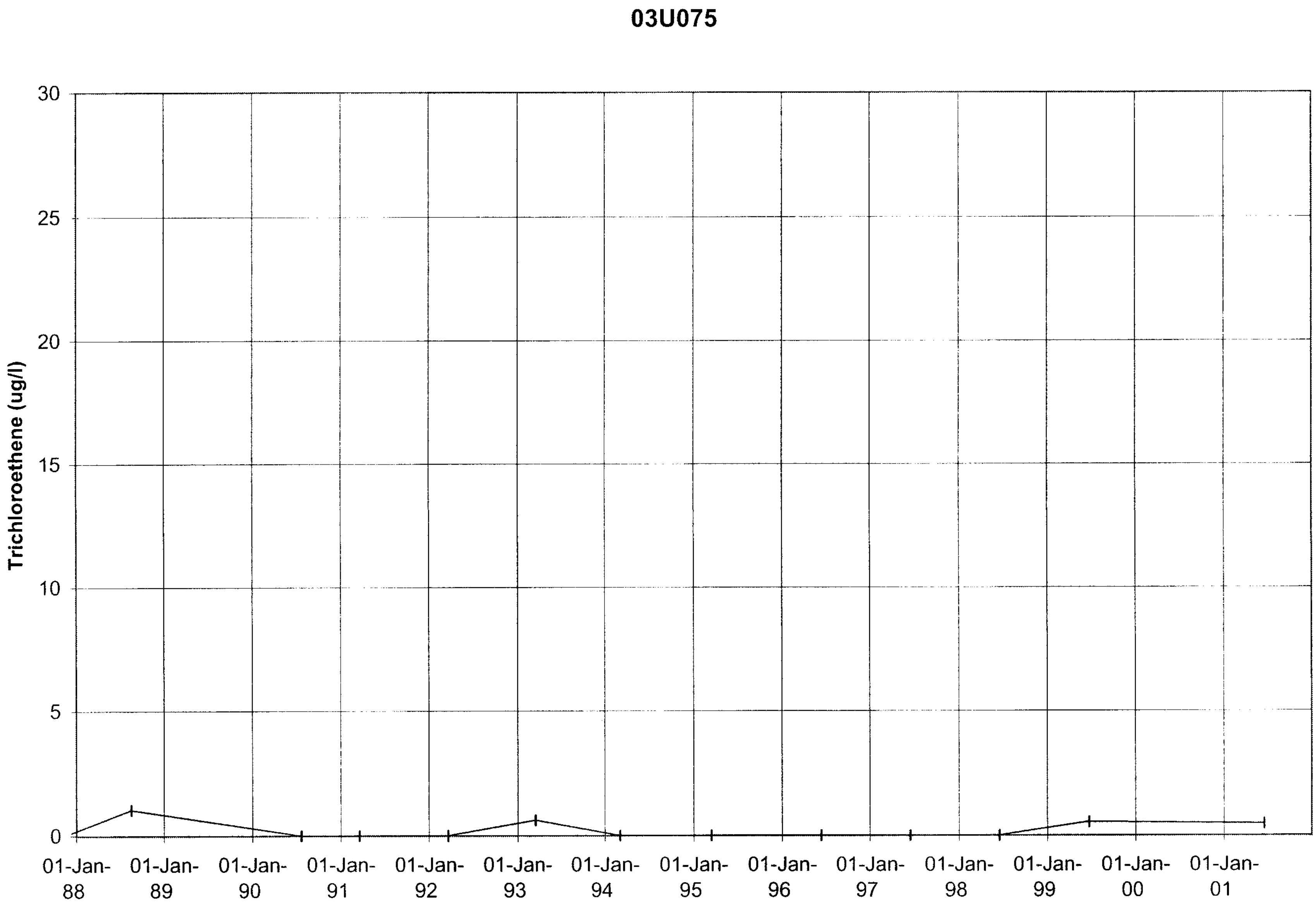
03U075
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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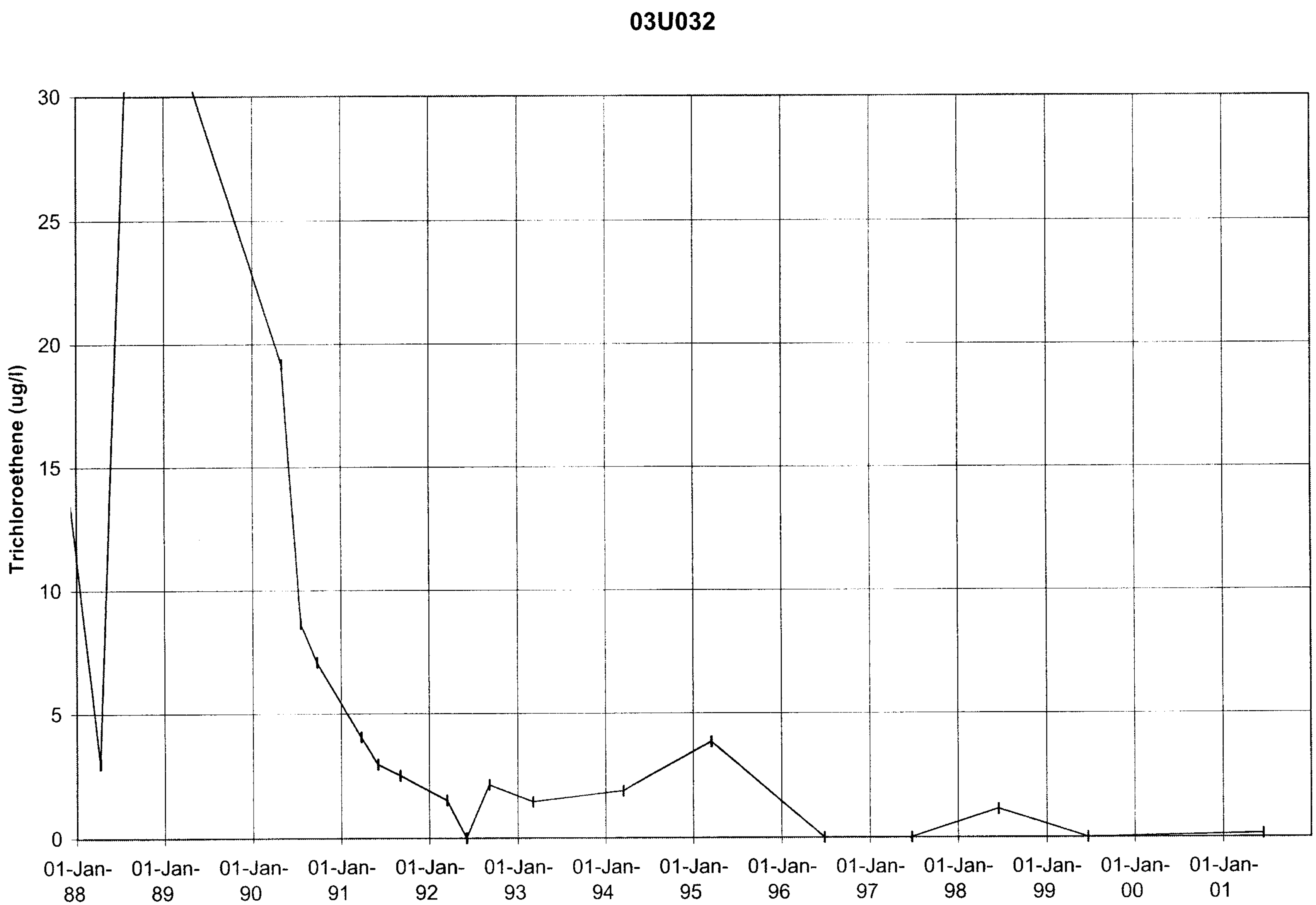
03U032
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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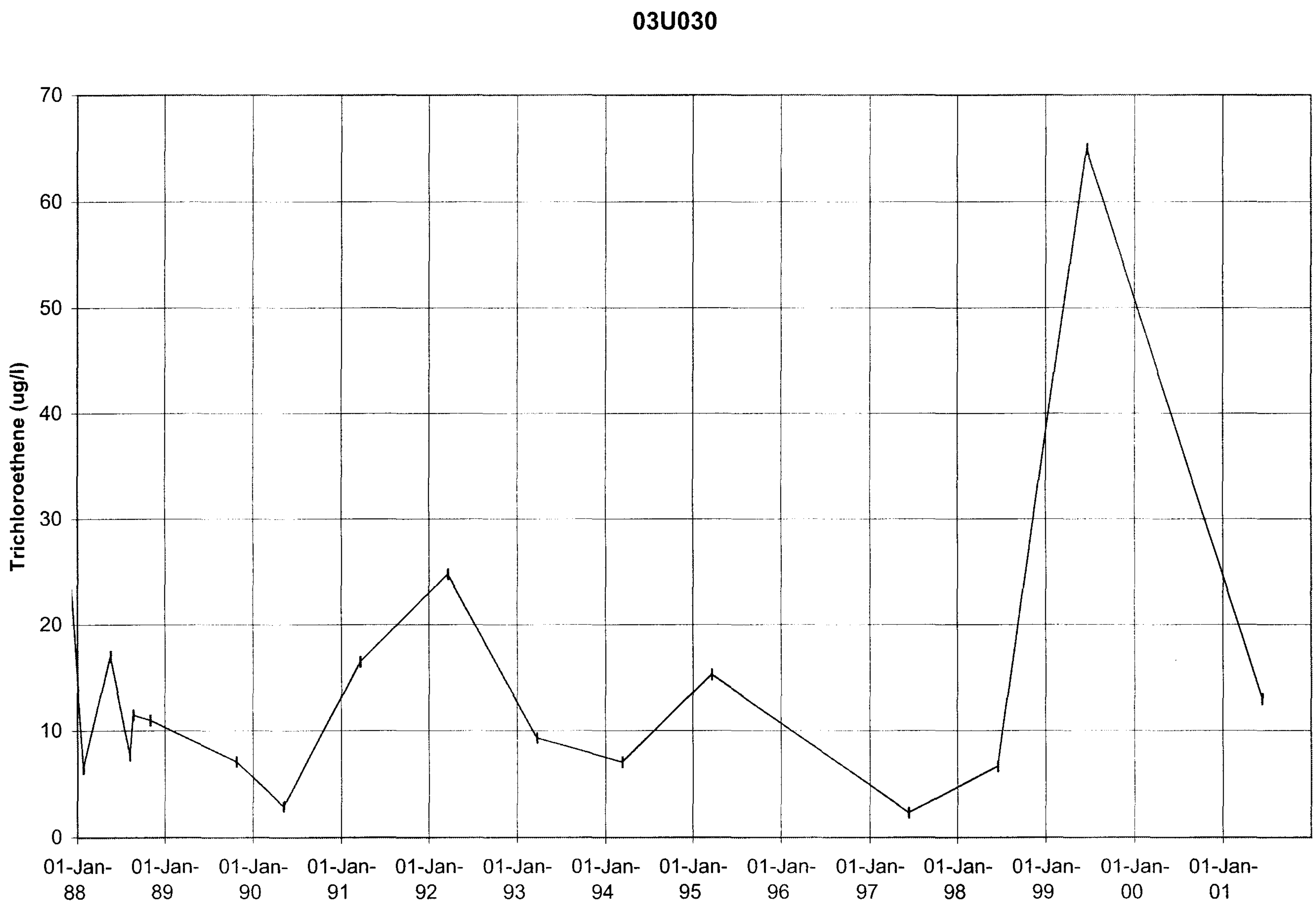
03U030
Trichloroethene (ug/l)
70
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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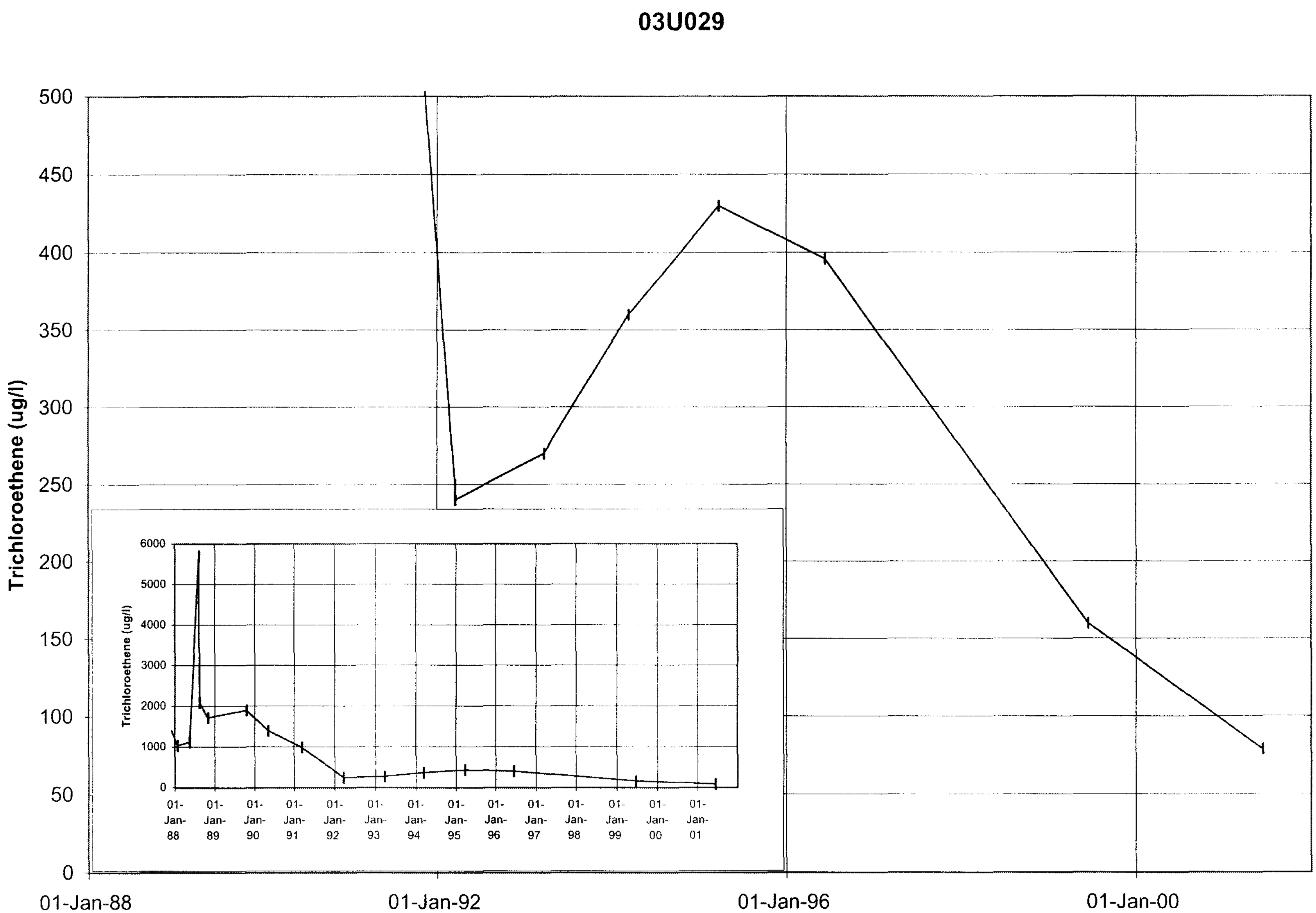

03U029
Trichloroethene (ug/l)
500
450
400
350
300
250
200
150
100
50
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
Trichloroethene (ug/l)
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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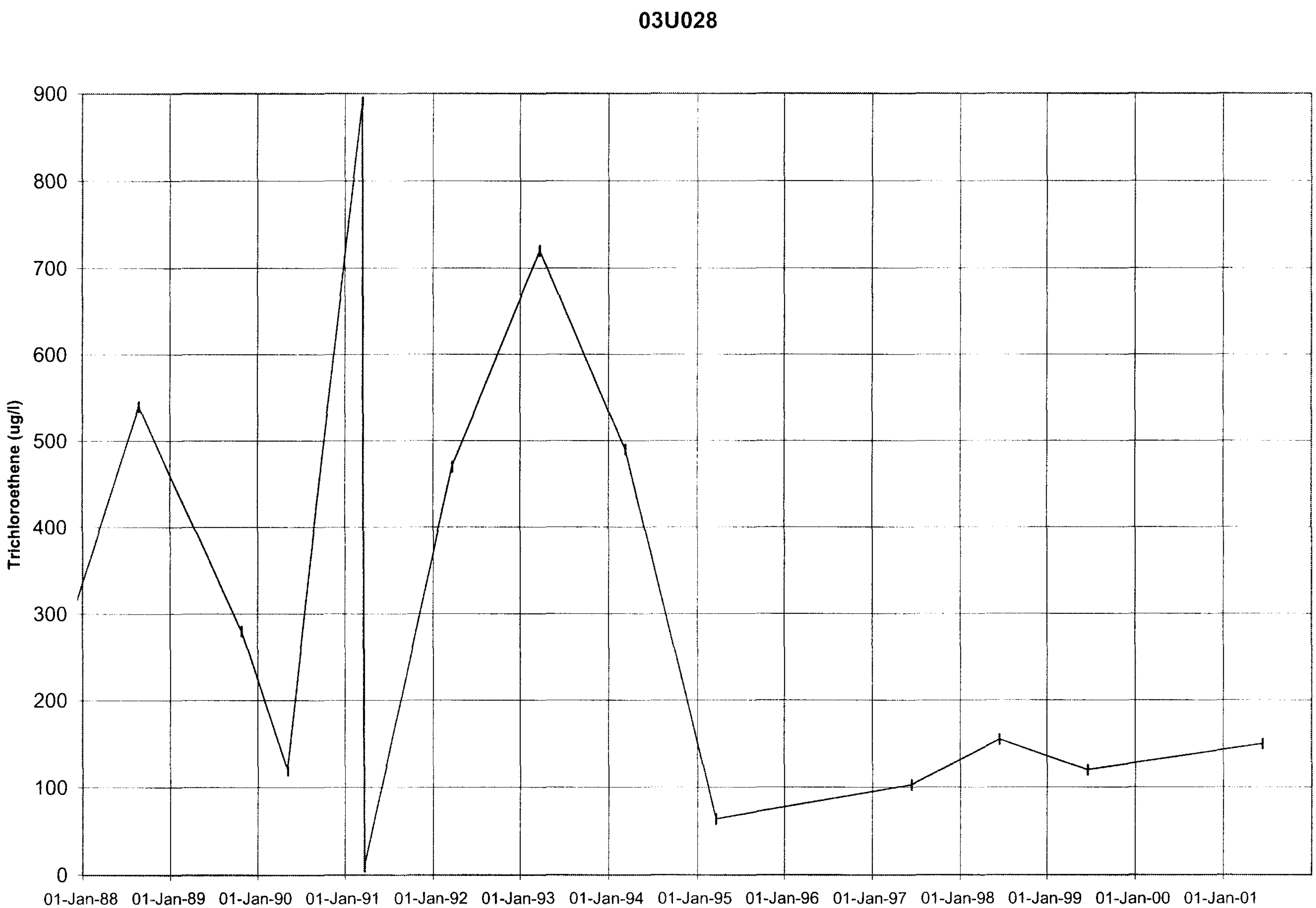

03U028
Trichloroethene (ug/l)
900
800
700
600
500
400
300
200
100
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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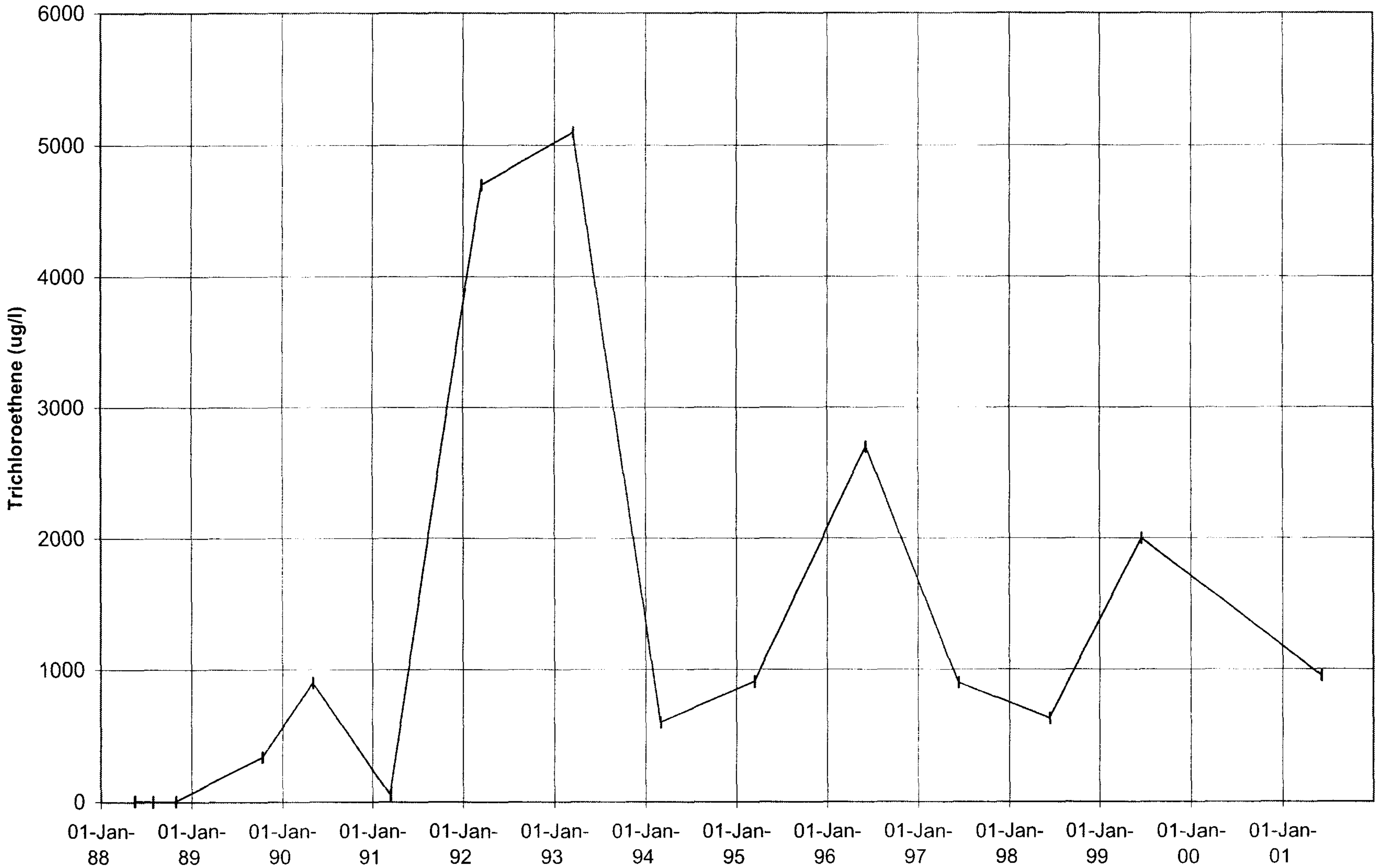
03U021



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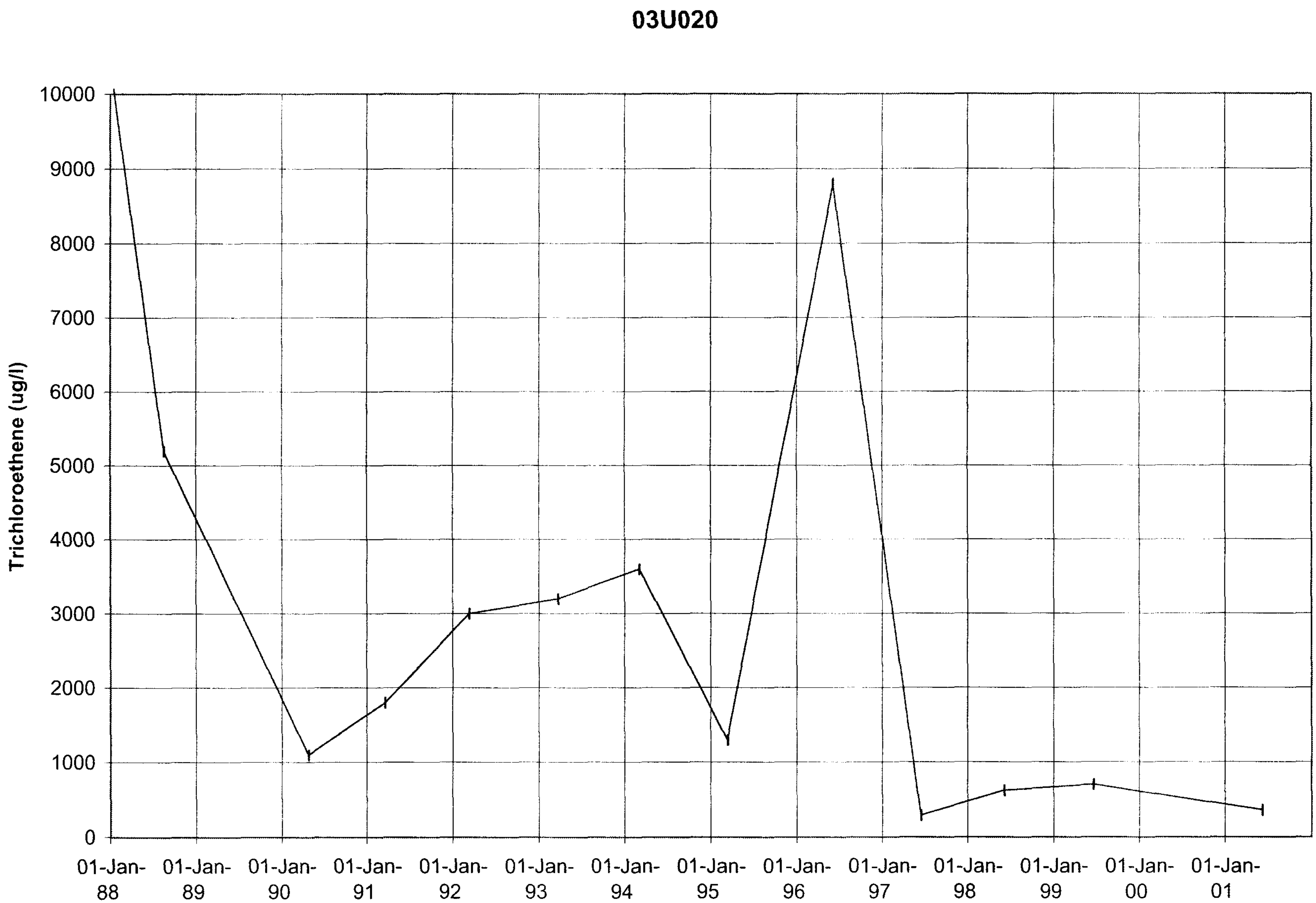
03U020
Trichloroethene (ug/l)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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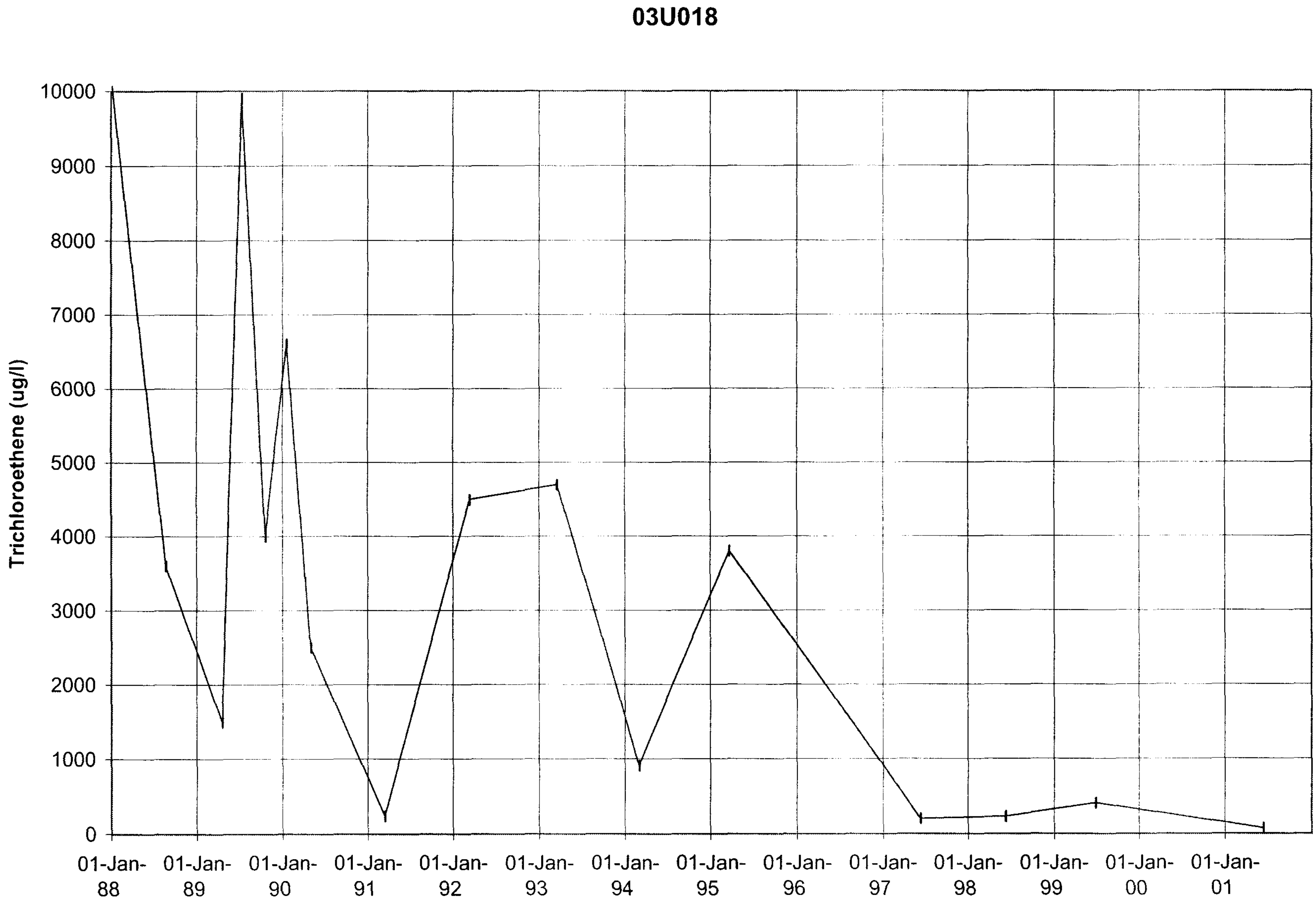
03U018
Trichloroethene (ug/l)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
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01-Jan-00
01-Jan-01

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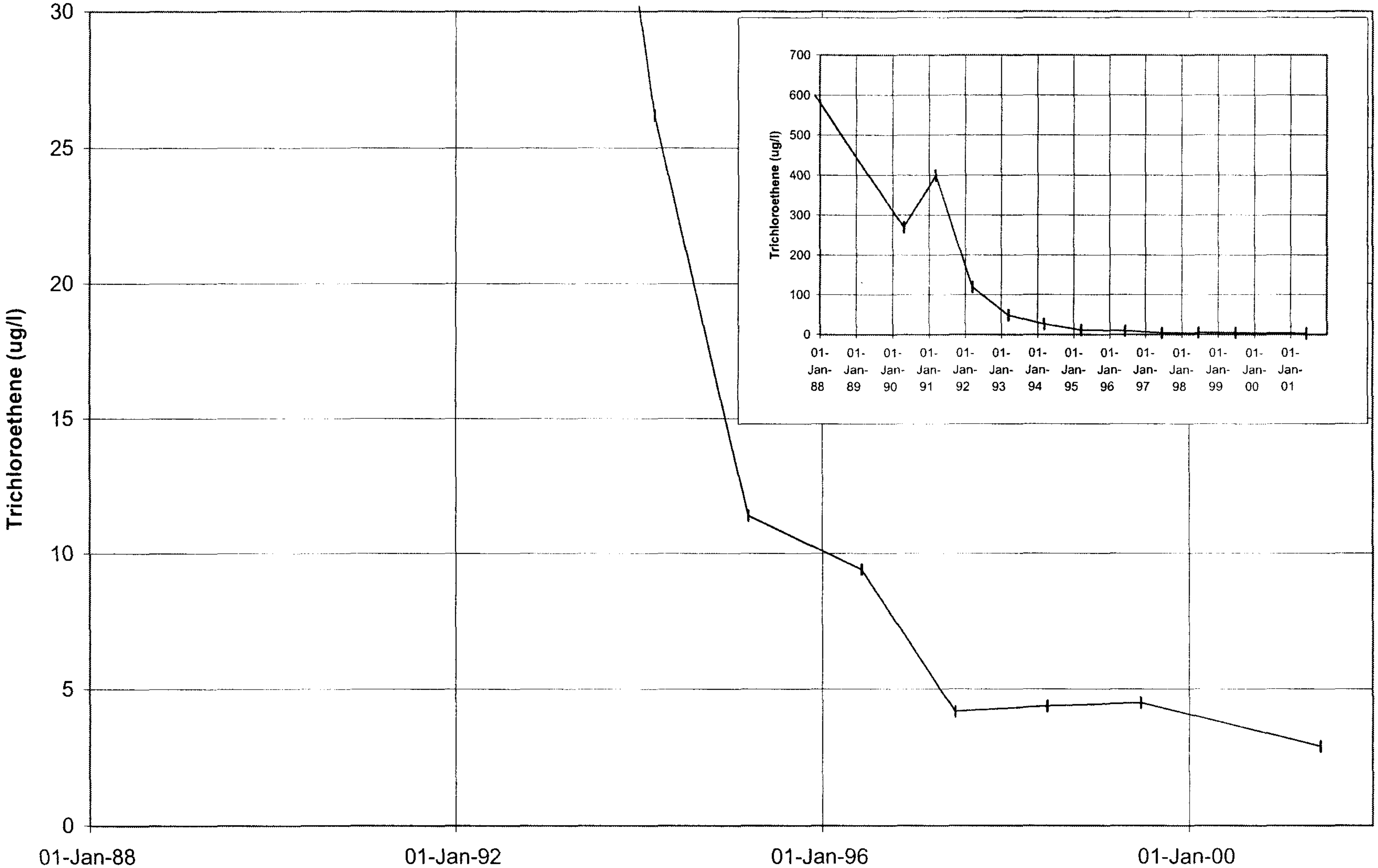
03U017



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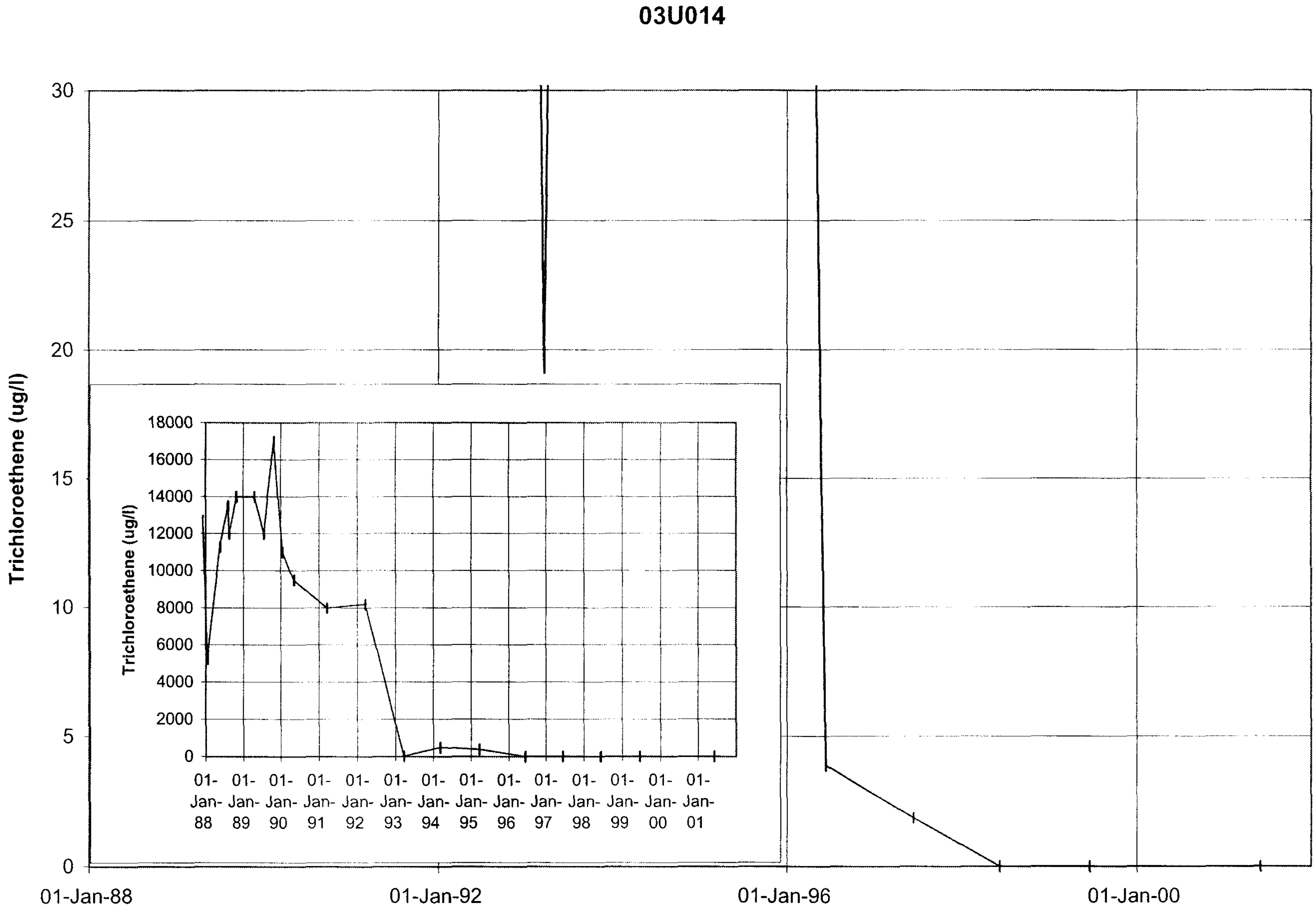
03U014
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
Trichloroethene (ug/l)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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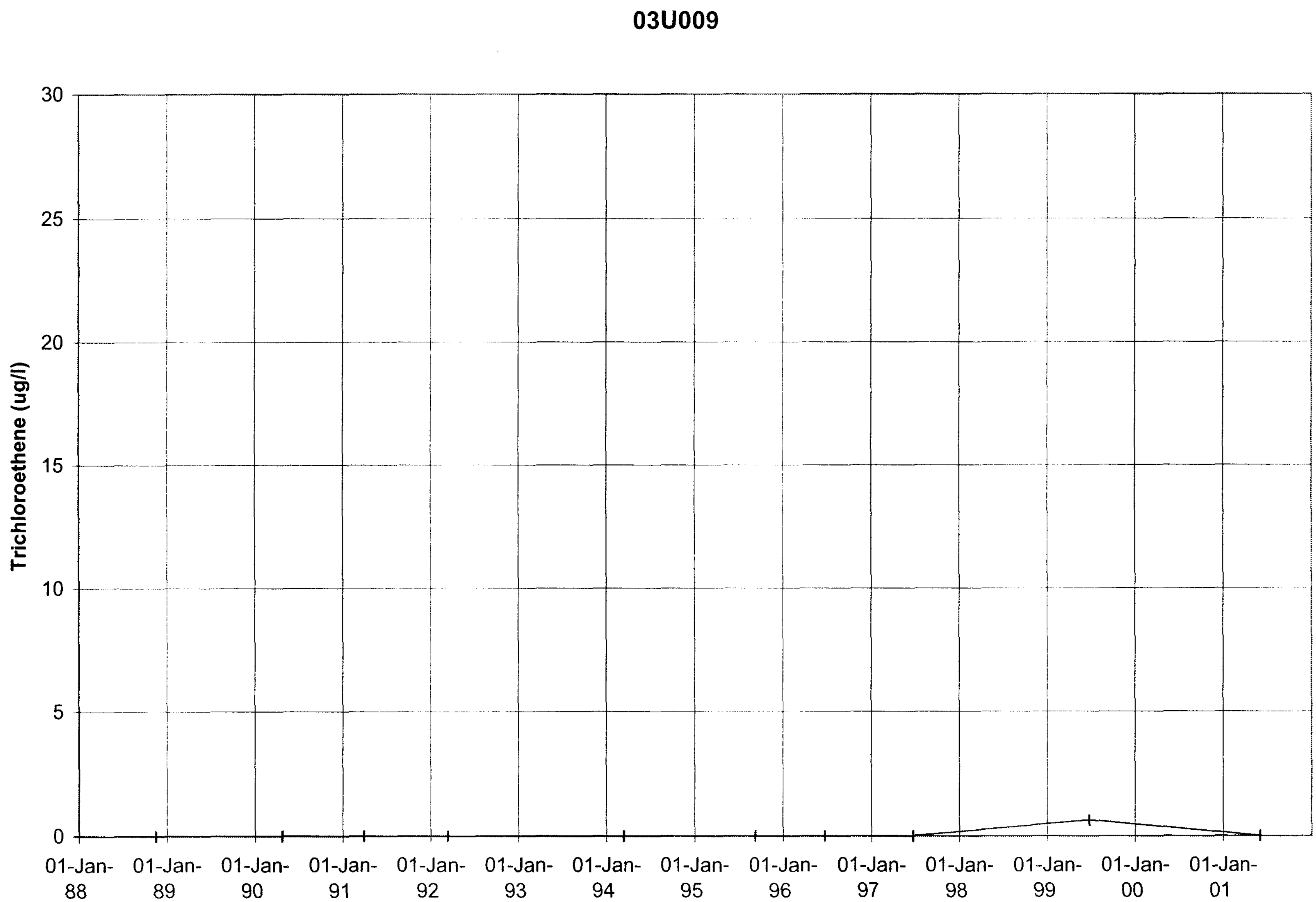

03U009
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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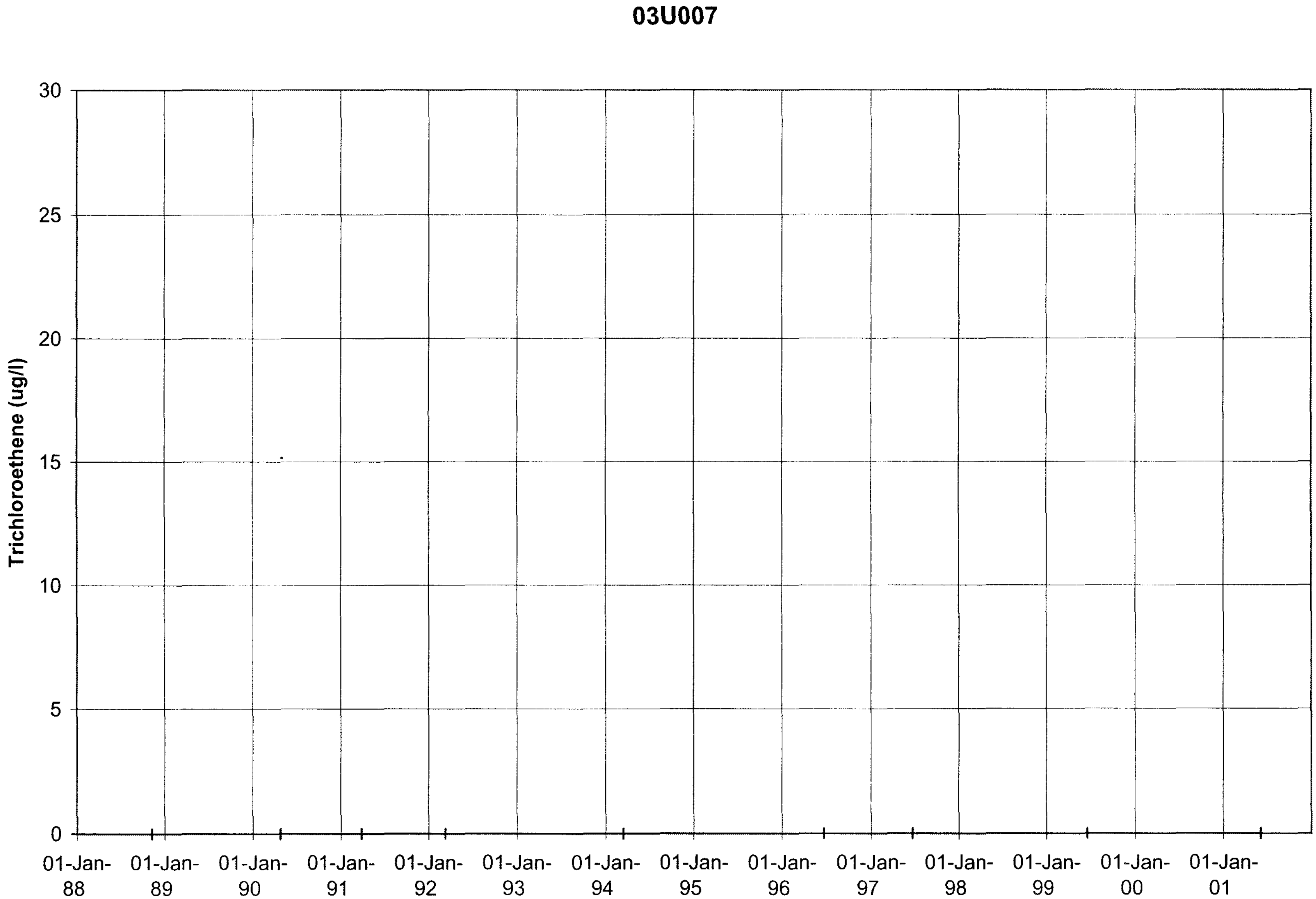

03U007
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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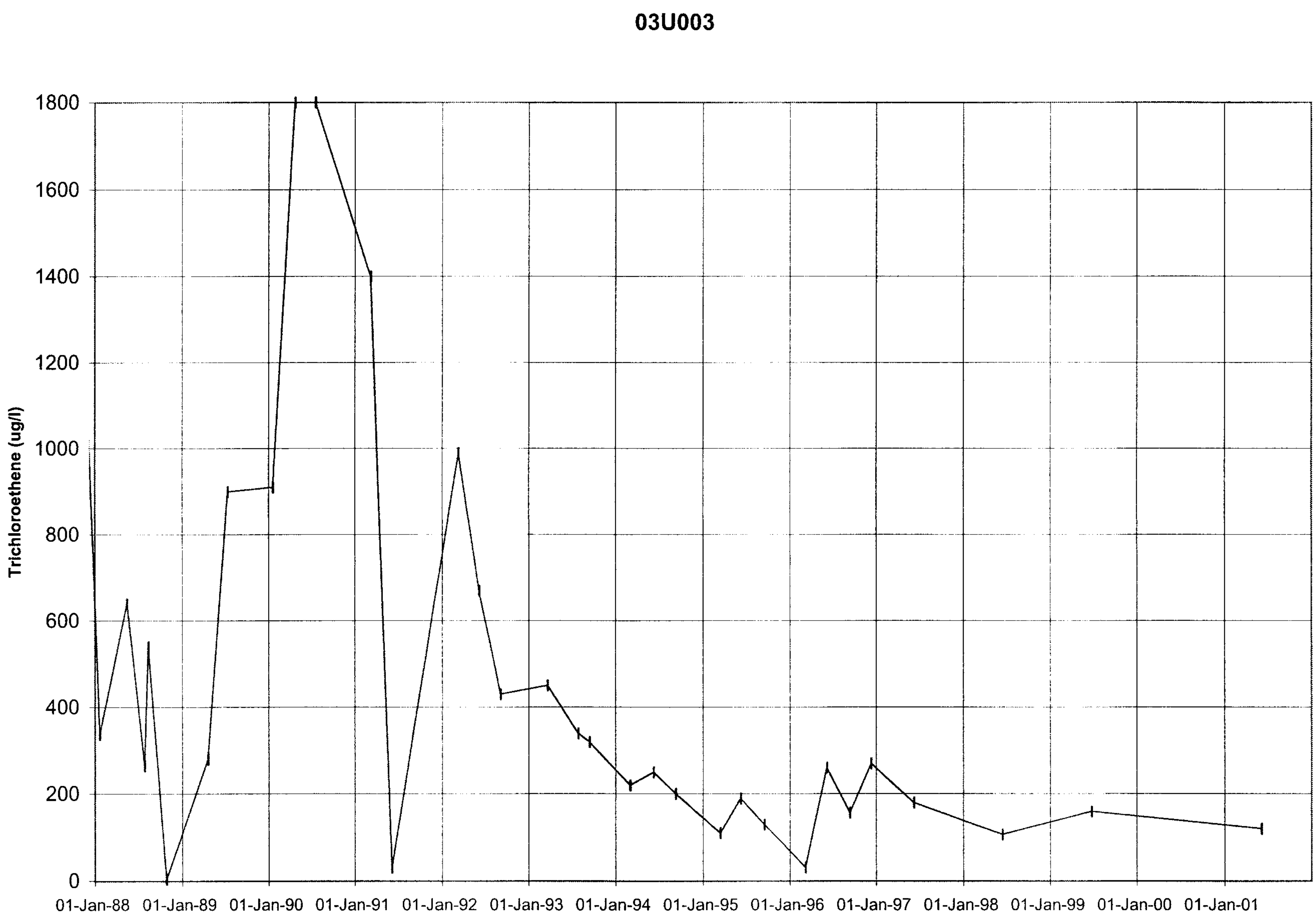
03U003
Trichloroethene (ug/l)
1800
1600
1400
1200
1000
800
600
400
200
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
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01-Jan-99
01-Jan-00
01-Jan-01

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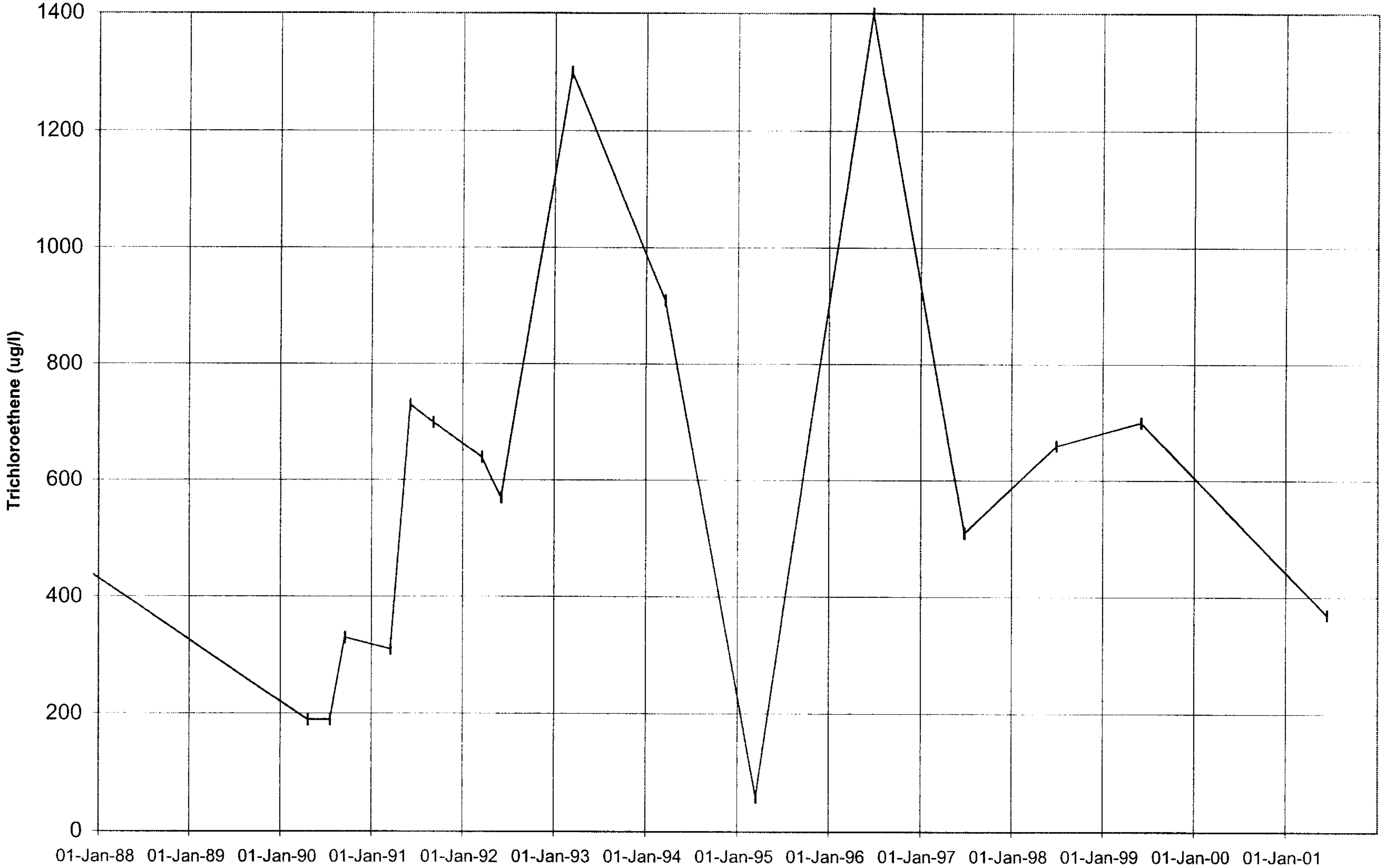
03M848



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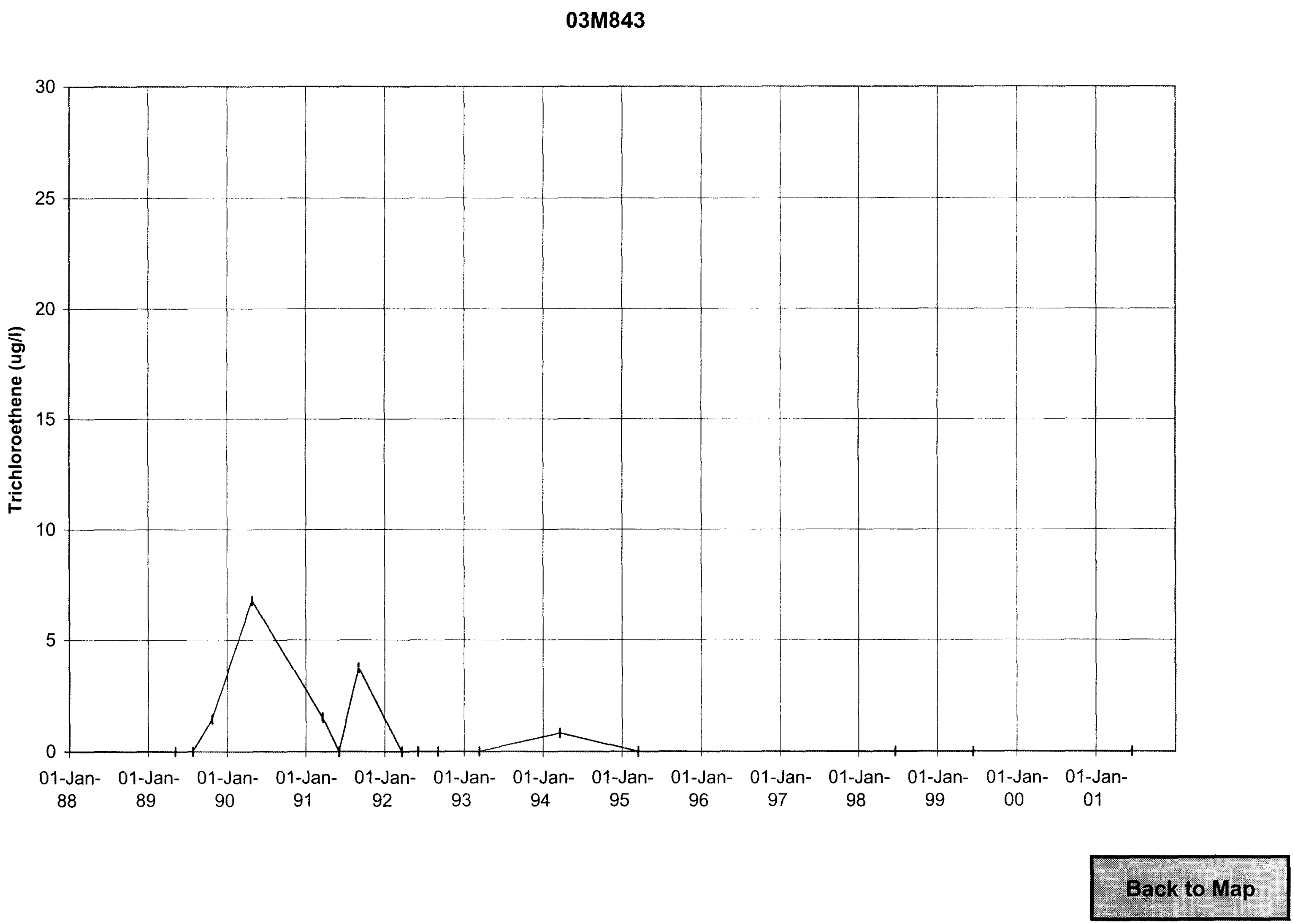

03M843
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
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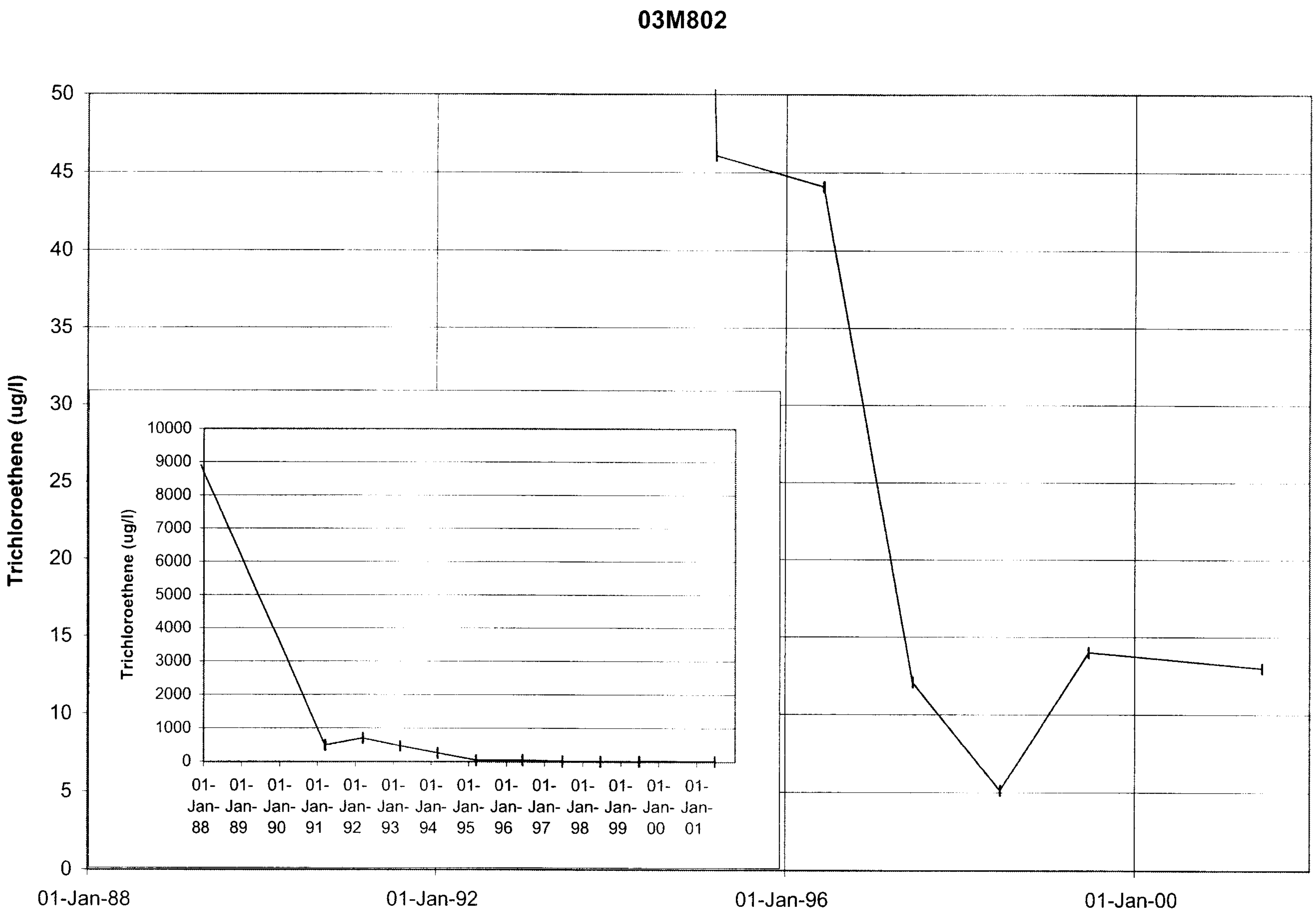
03M802
Trichloroethene (ug/l)
50
45
40
35
30
25
20
15
10
5
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
Trichloroethene (ug/l)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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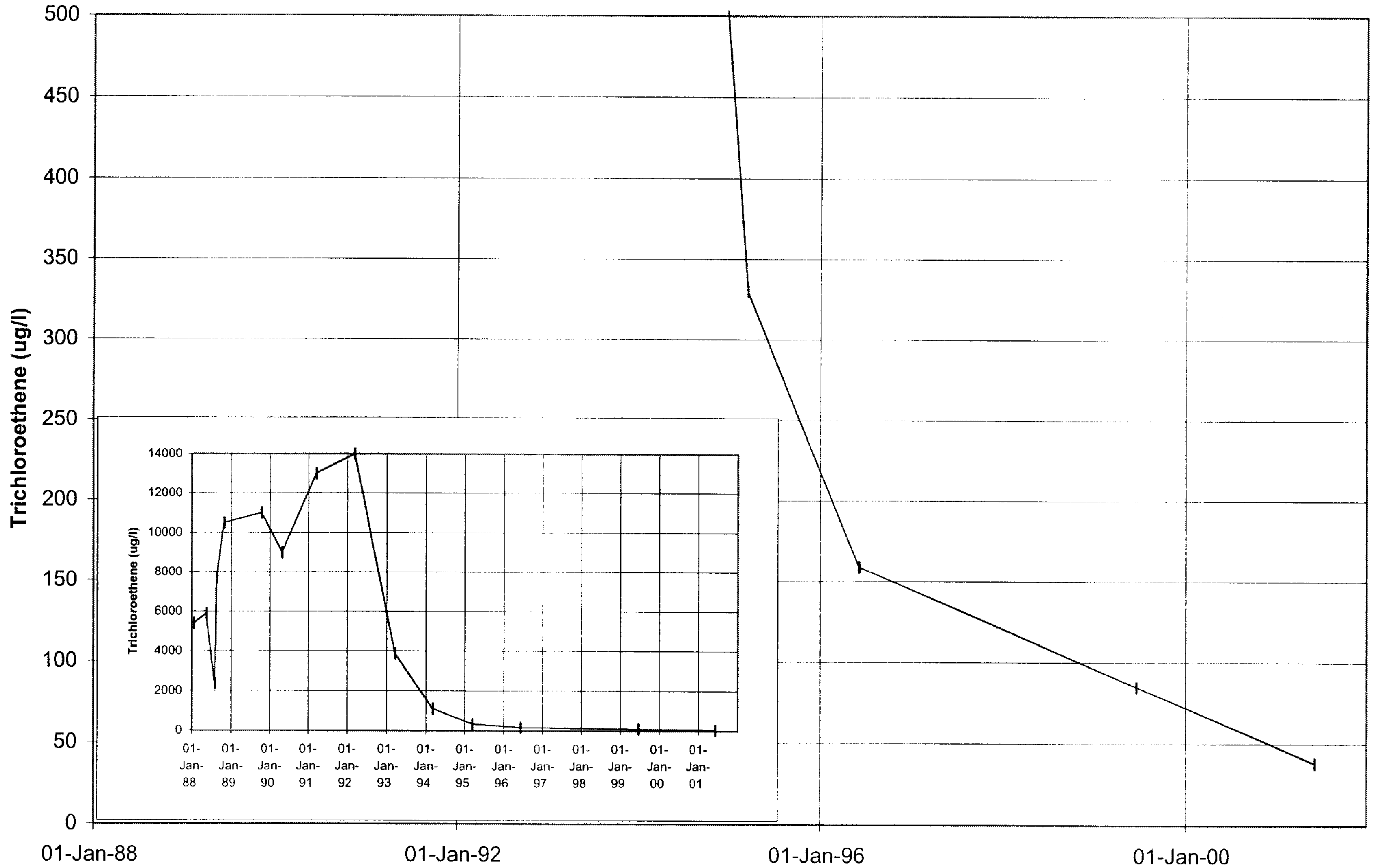
03M020



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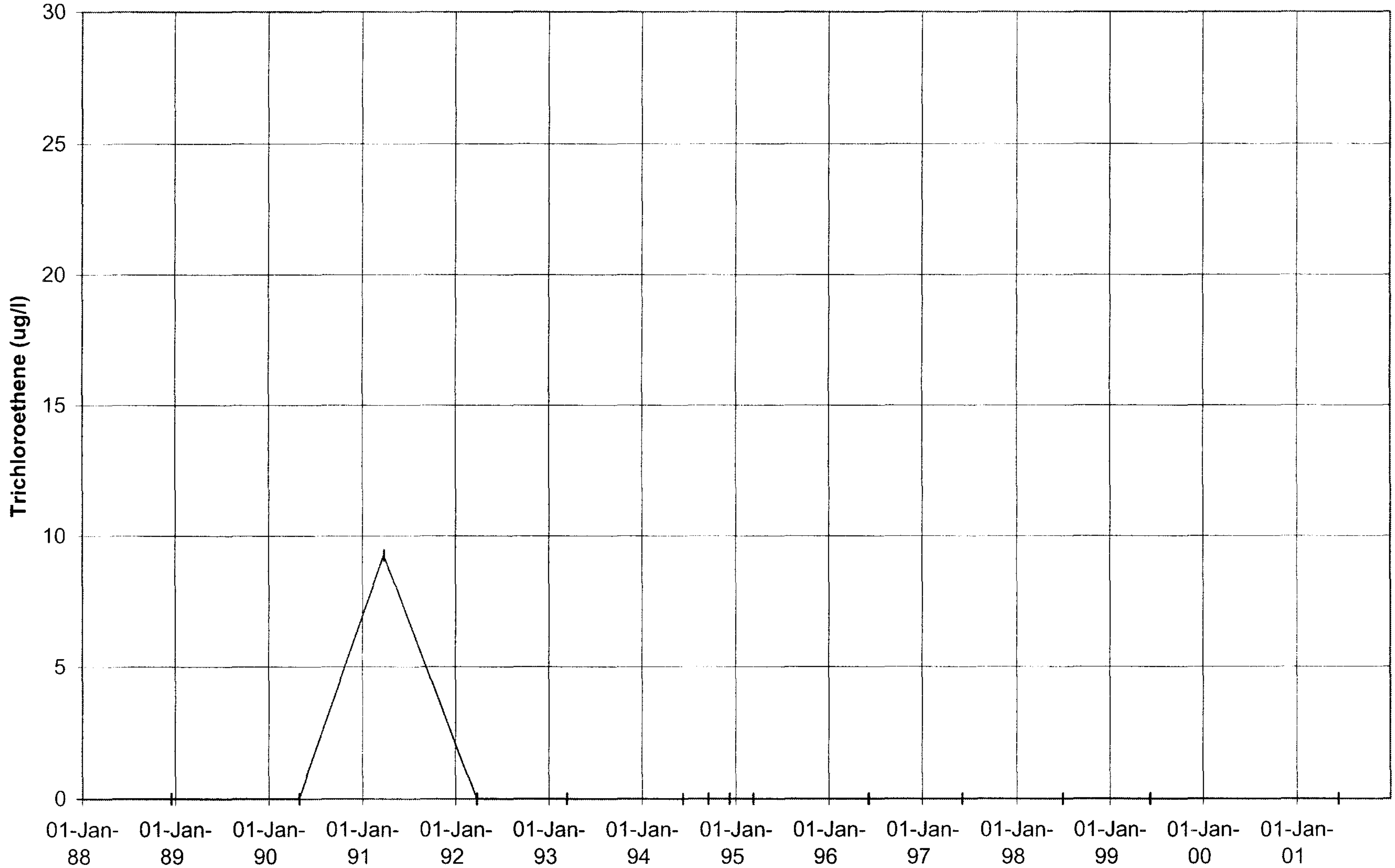
03L861



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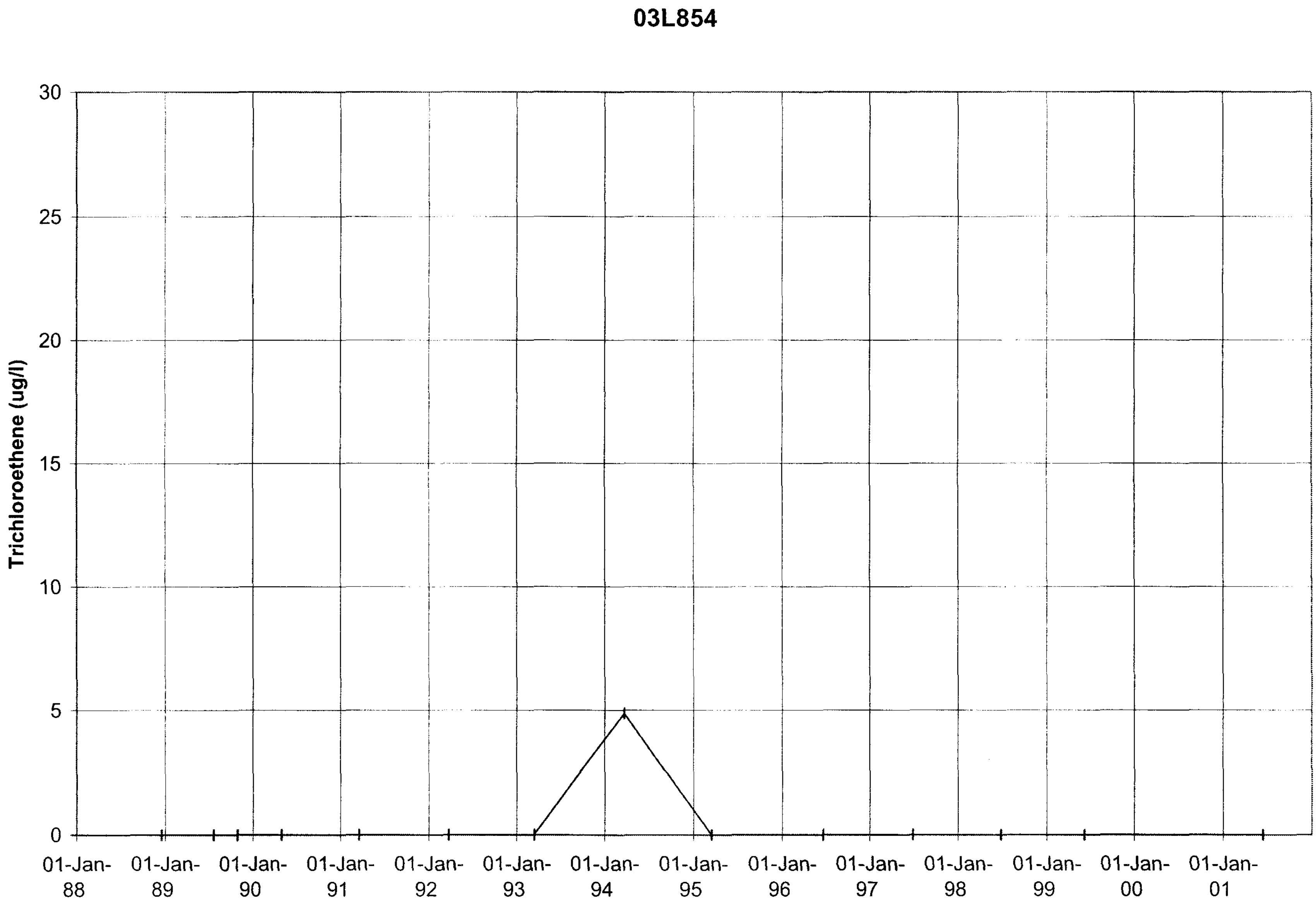
03L854
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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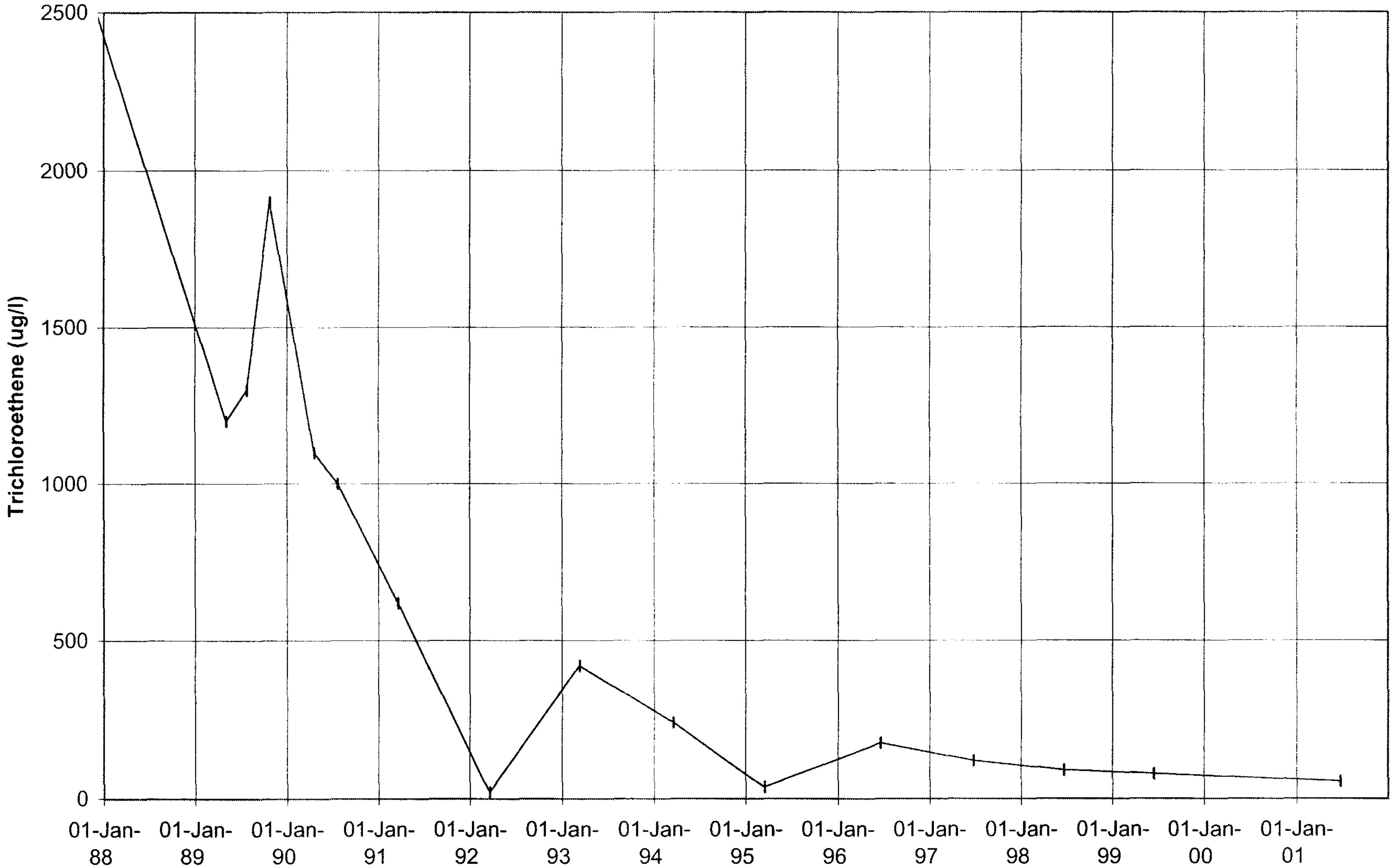
03L853



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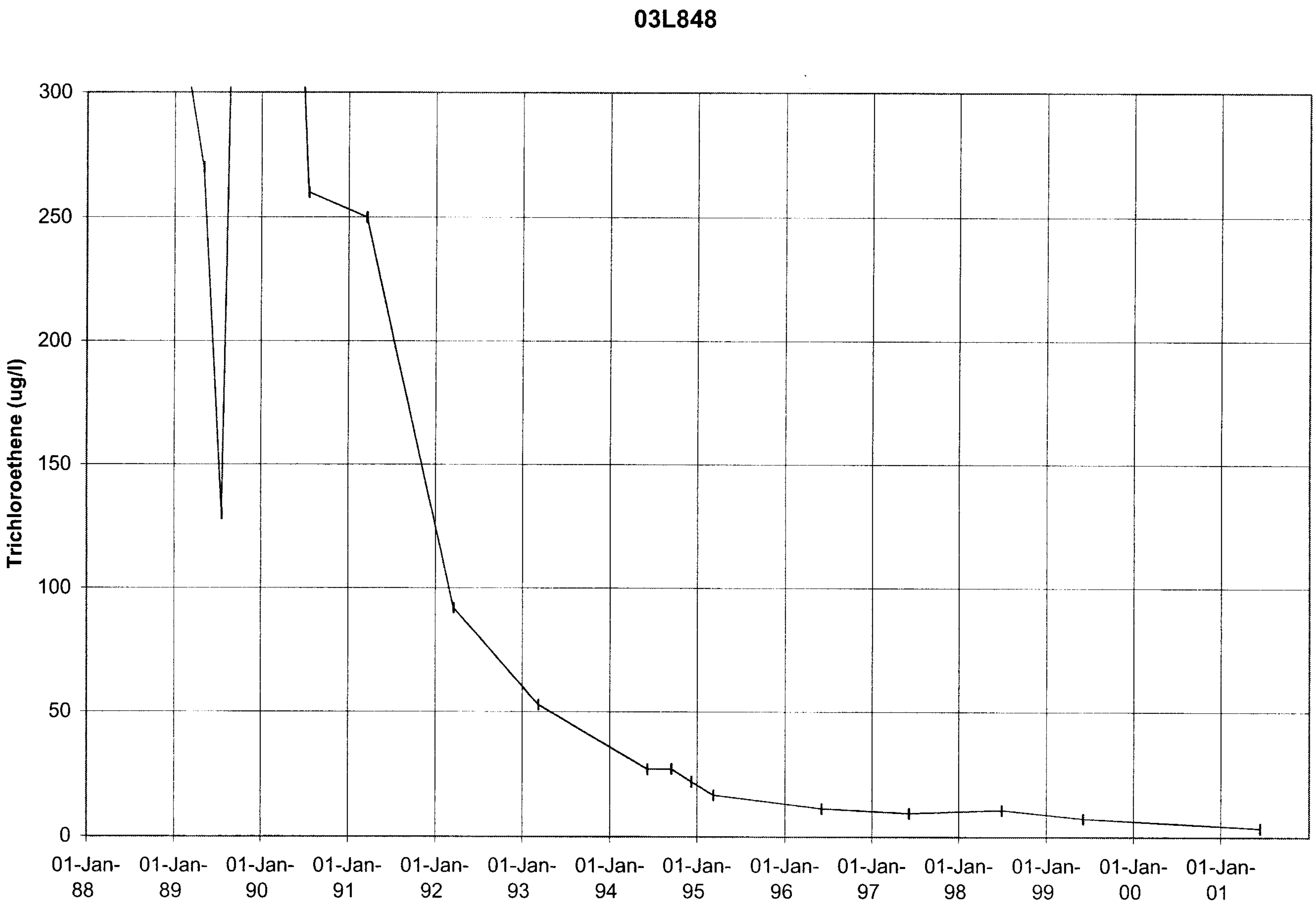
03L848
Trichloroethene (ug/l)
300
250
200
150
100
50
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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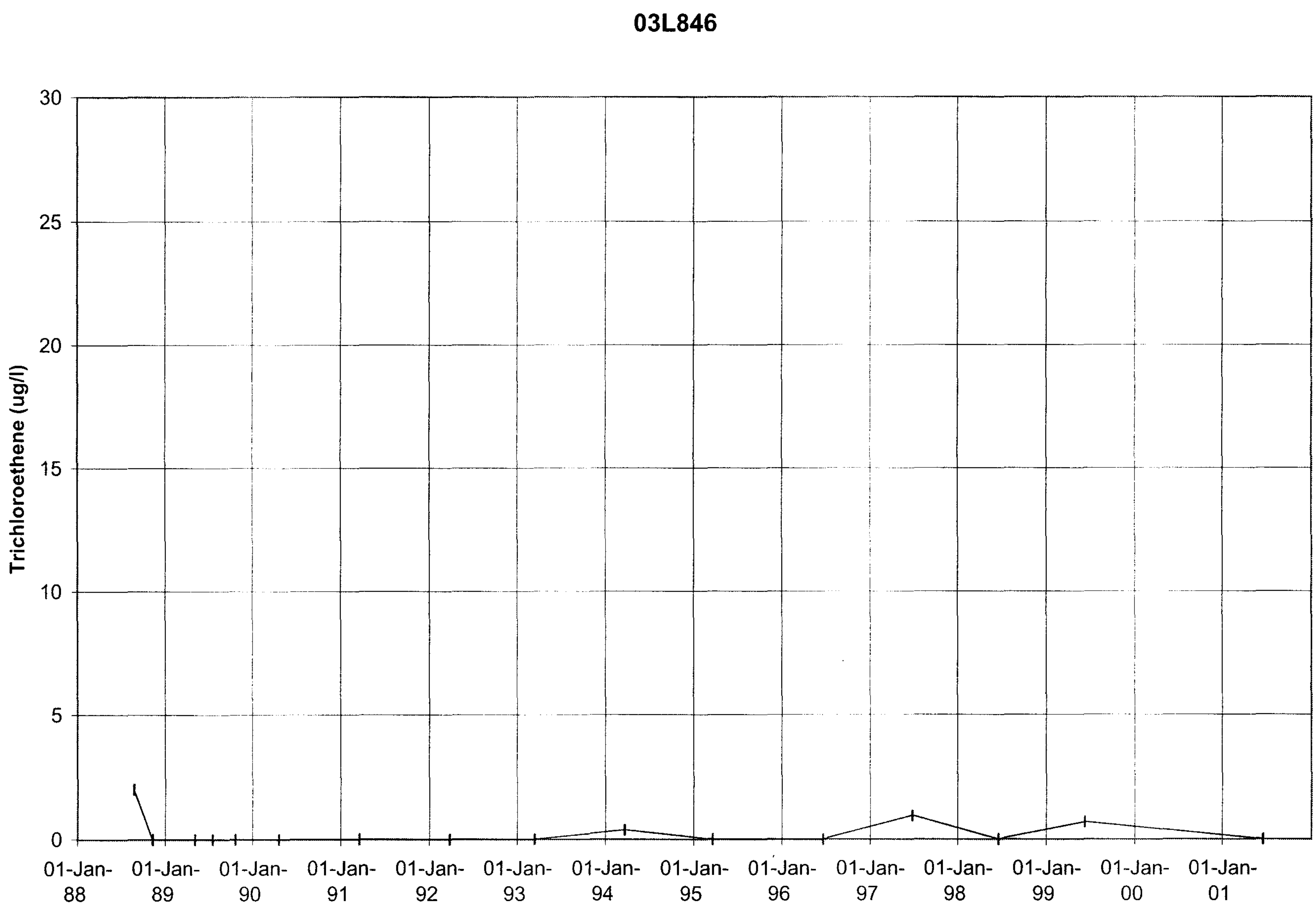
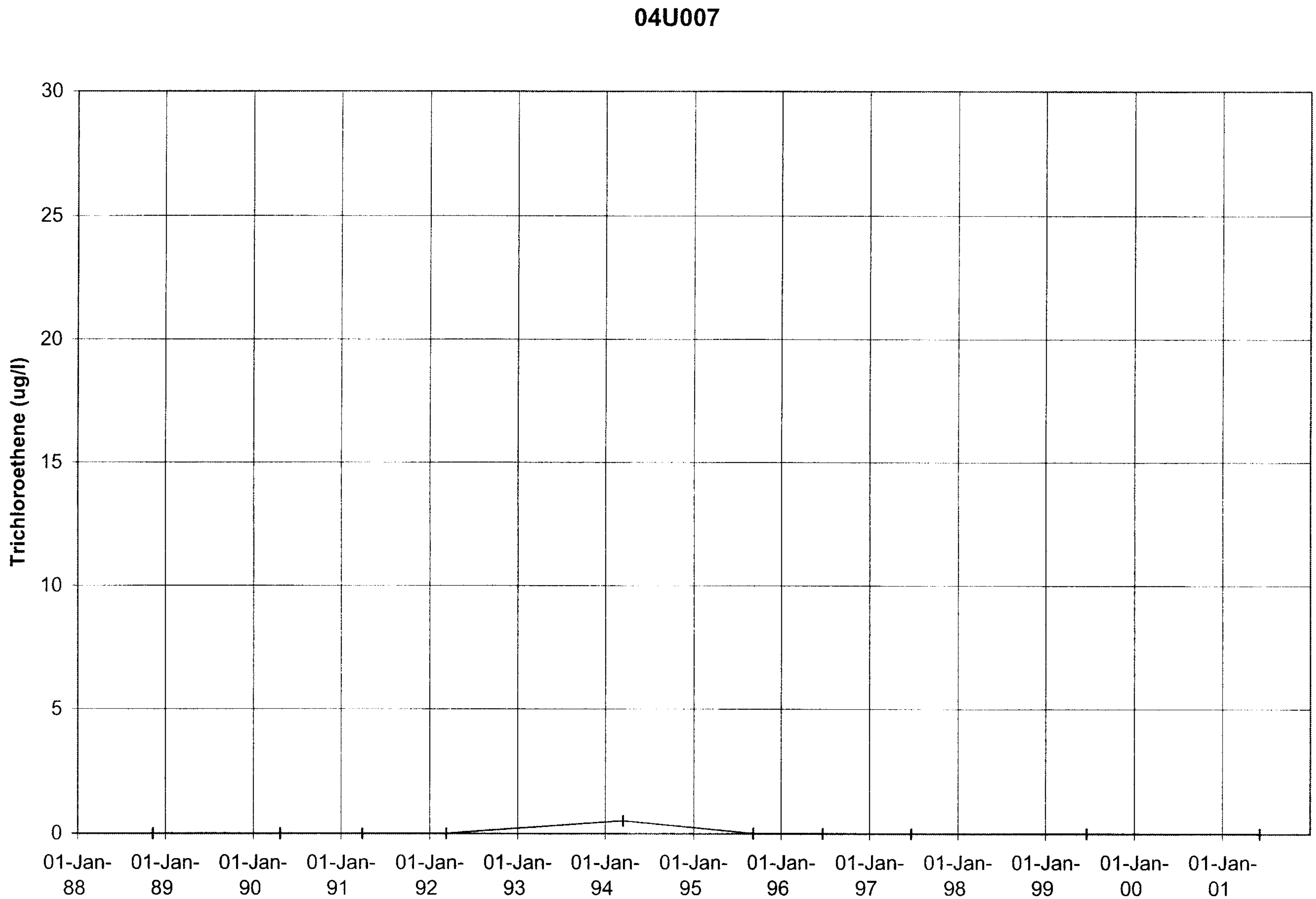
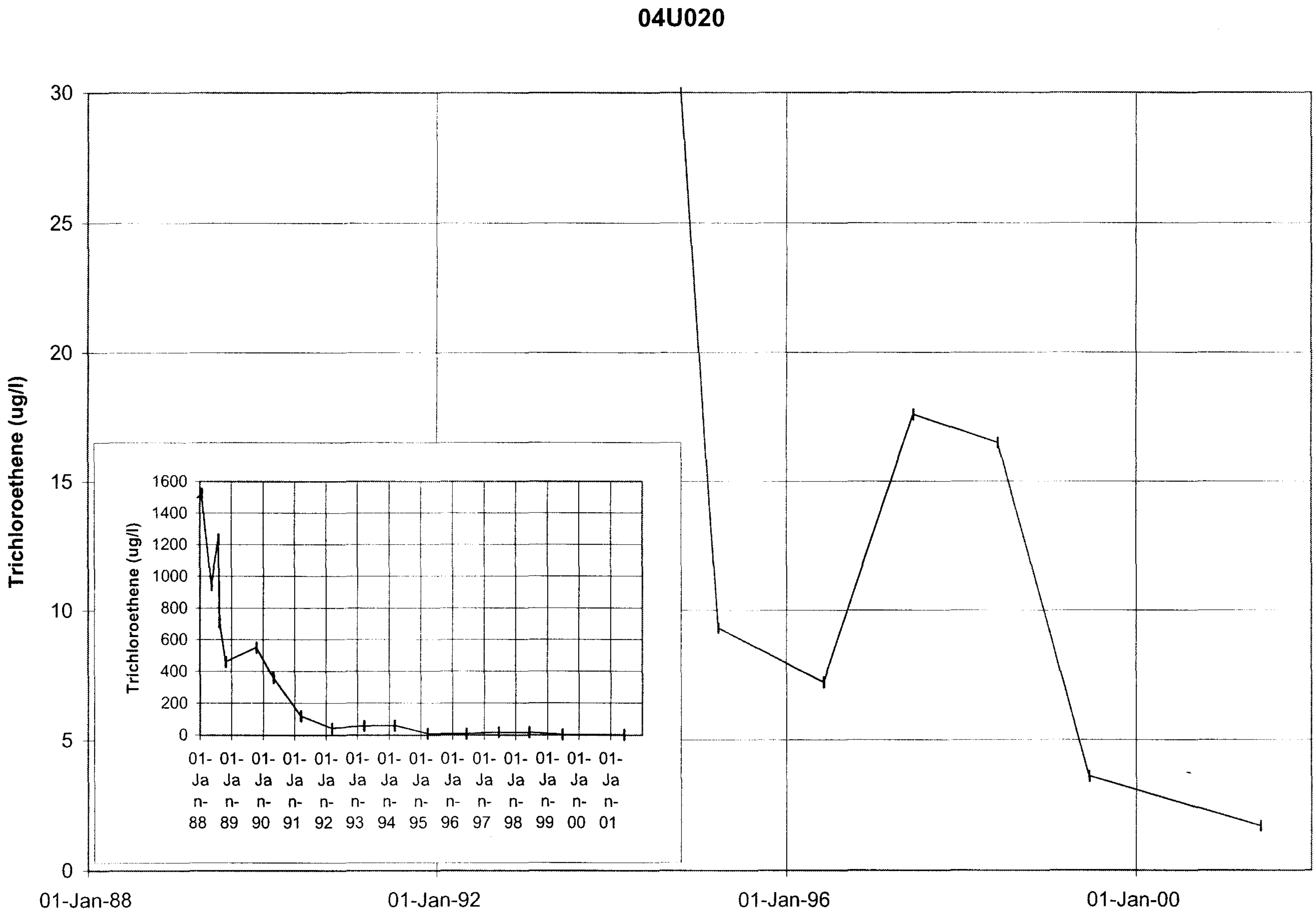

03L846
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Back to Map


04U007
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


04U020
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-92
01-Jan-96
01-Jan-00
1600
1400
1200
1000
800
600
400
200
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
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01-Jan-99
01-Jan-00
01-Jan-01

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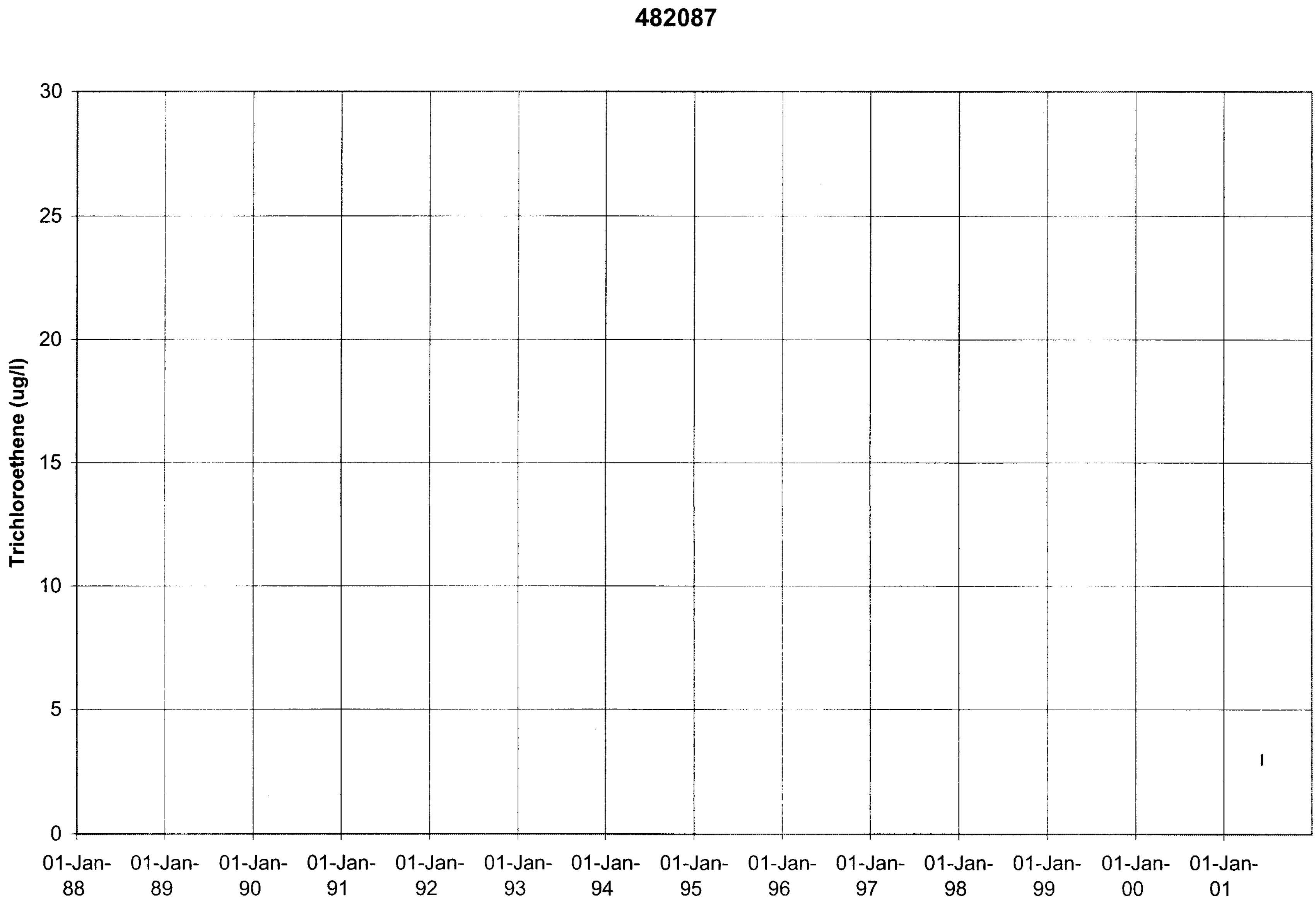

482087
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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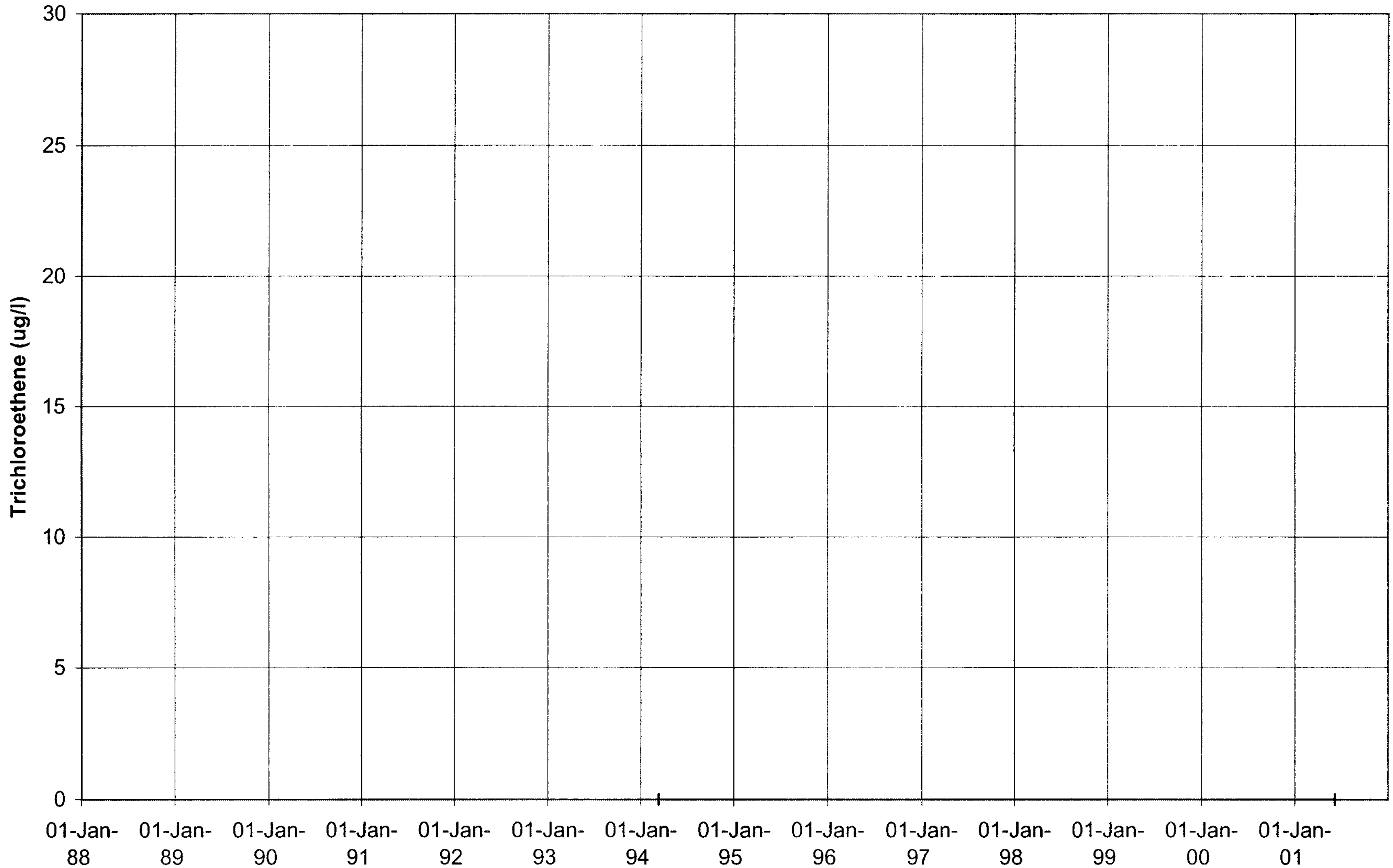
482086



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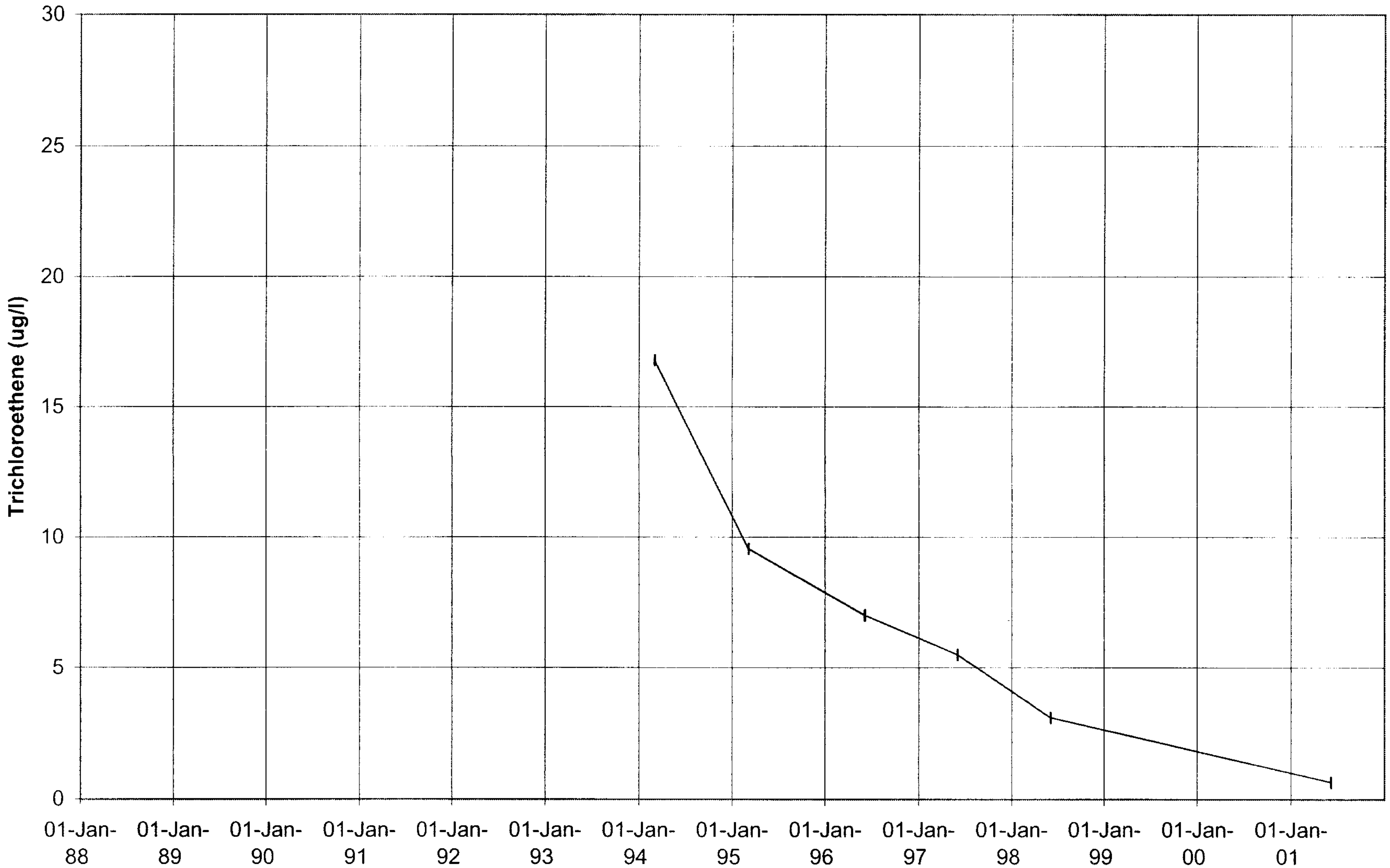
482083



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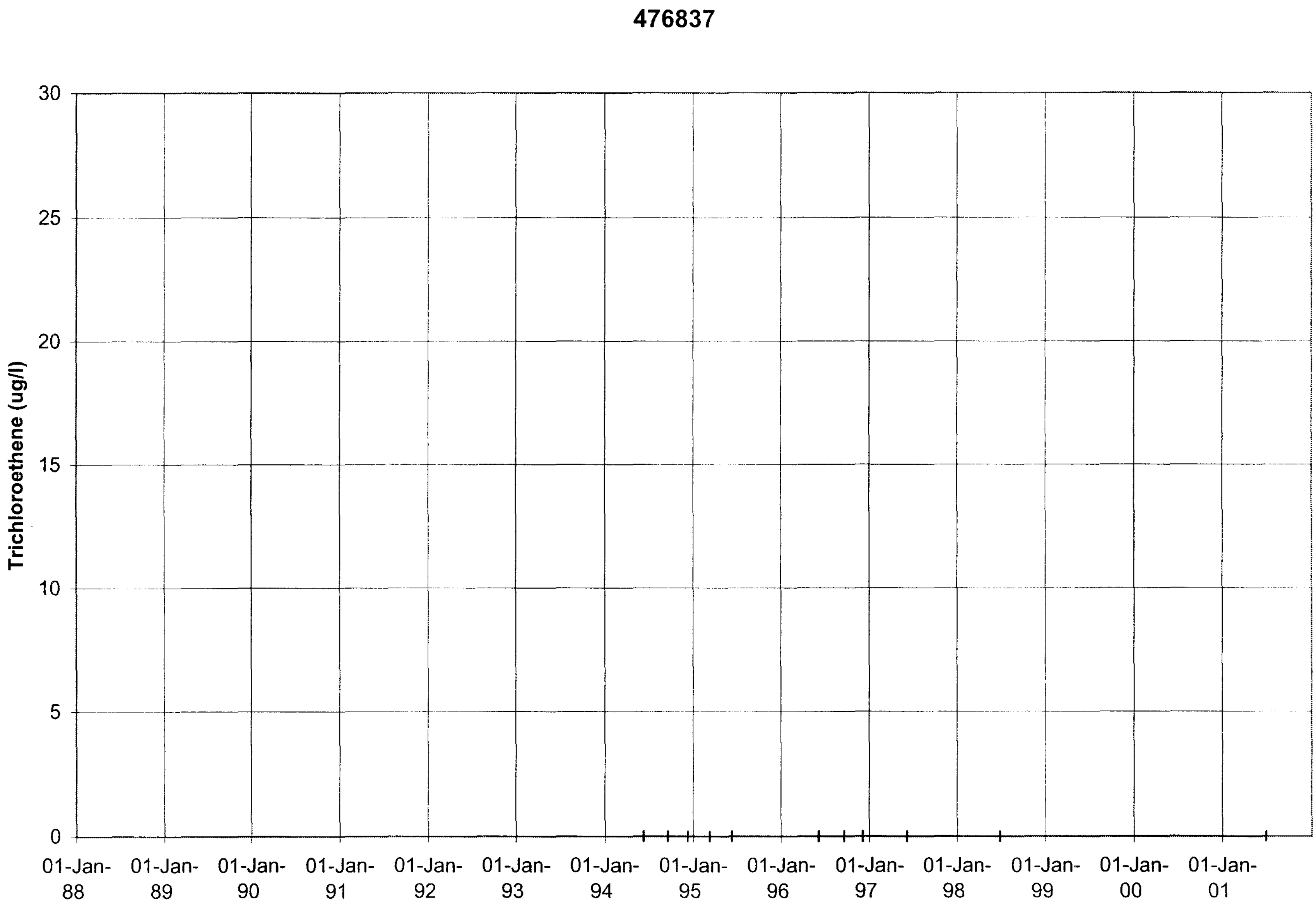
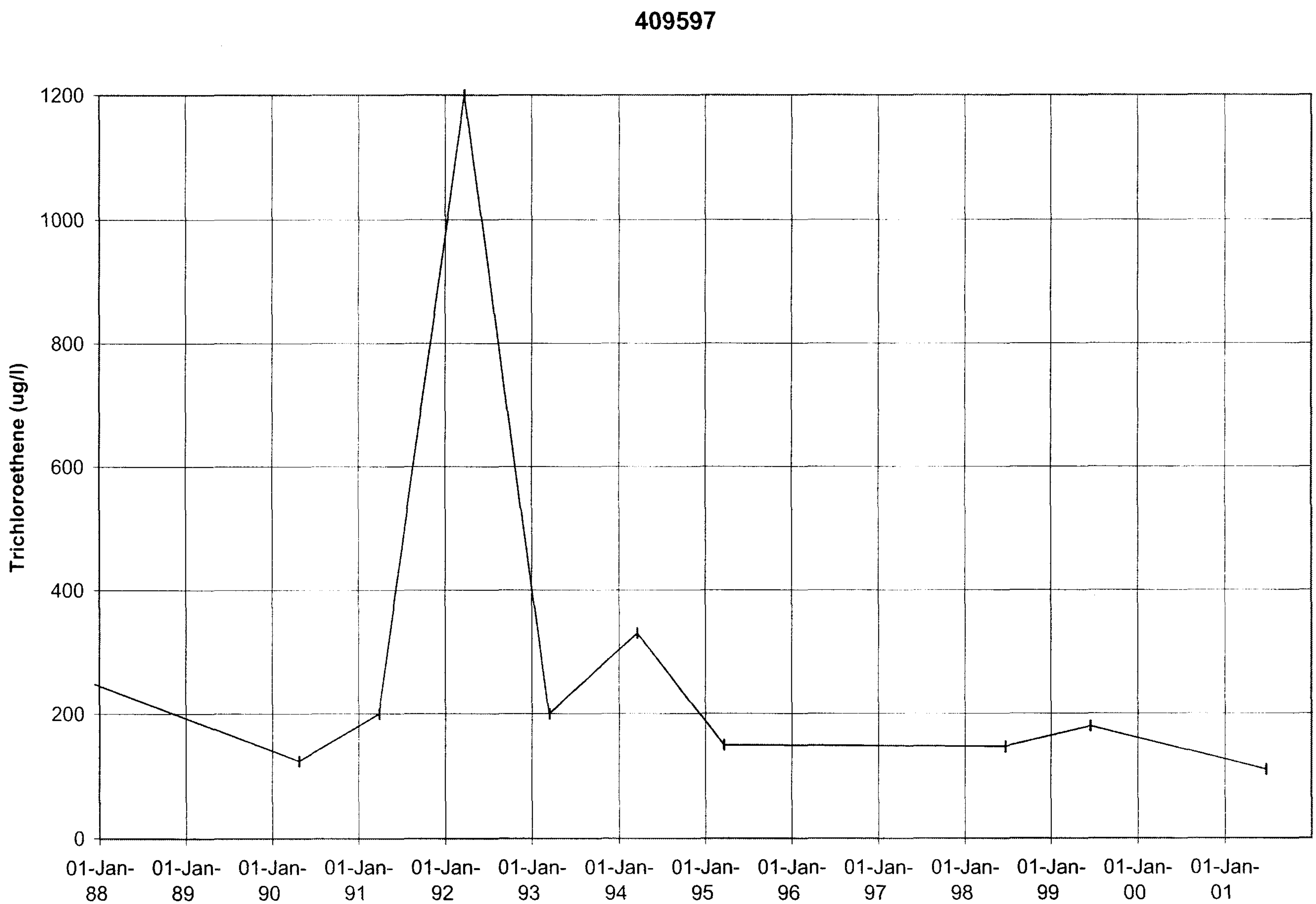

476837
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


409597
Trichloroethene (ug/l)
1200
1000
800
600
400
200
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
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01-Jan-99
01-Jan-00
01-Jan-01

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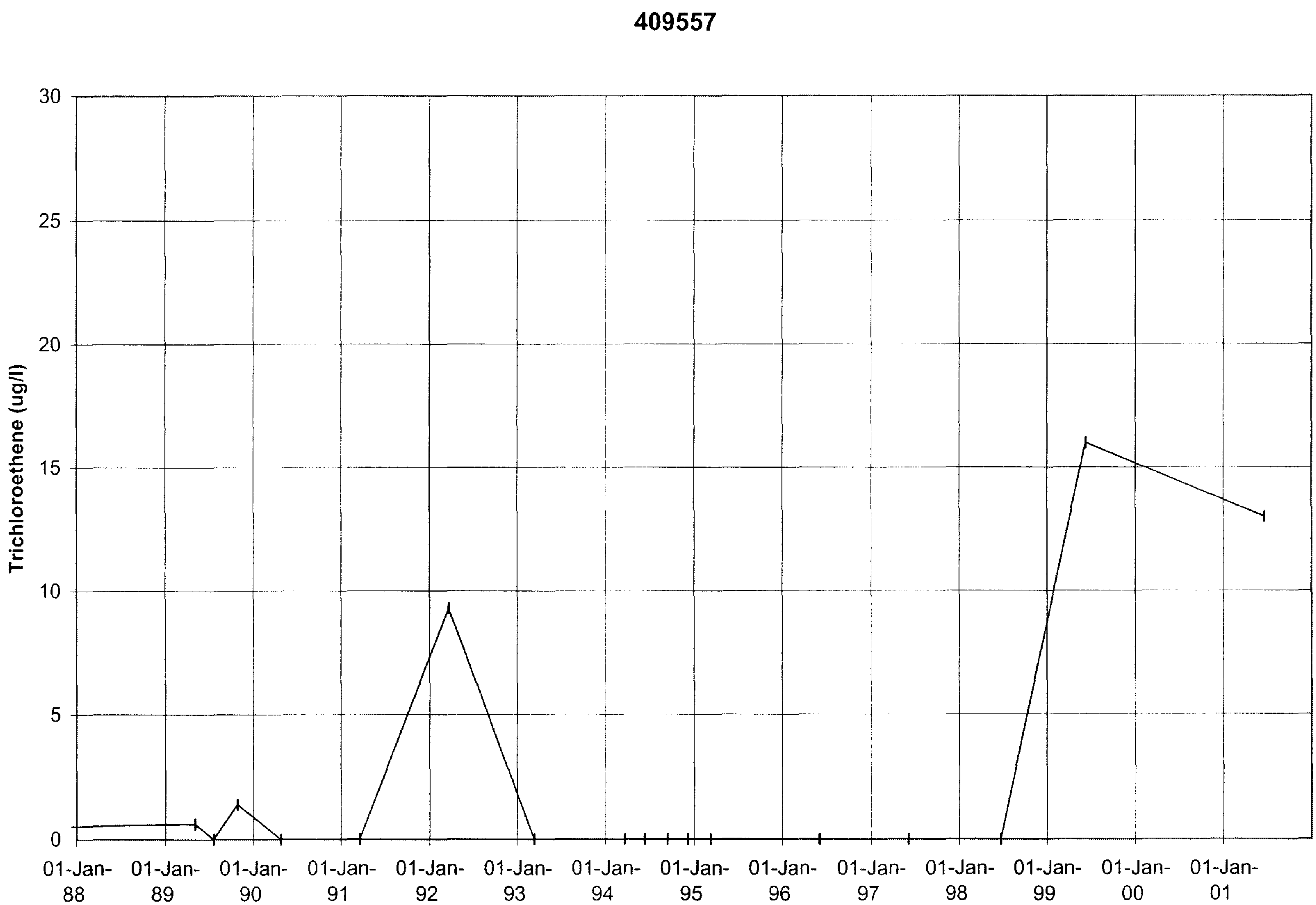
409557
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-00
01-Jan-01

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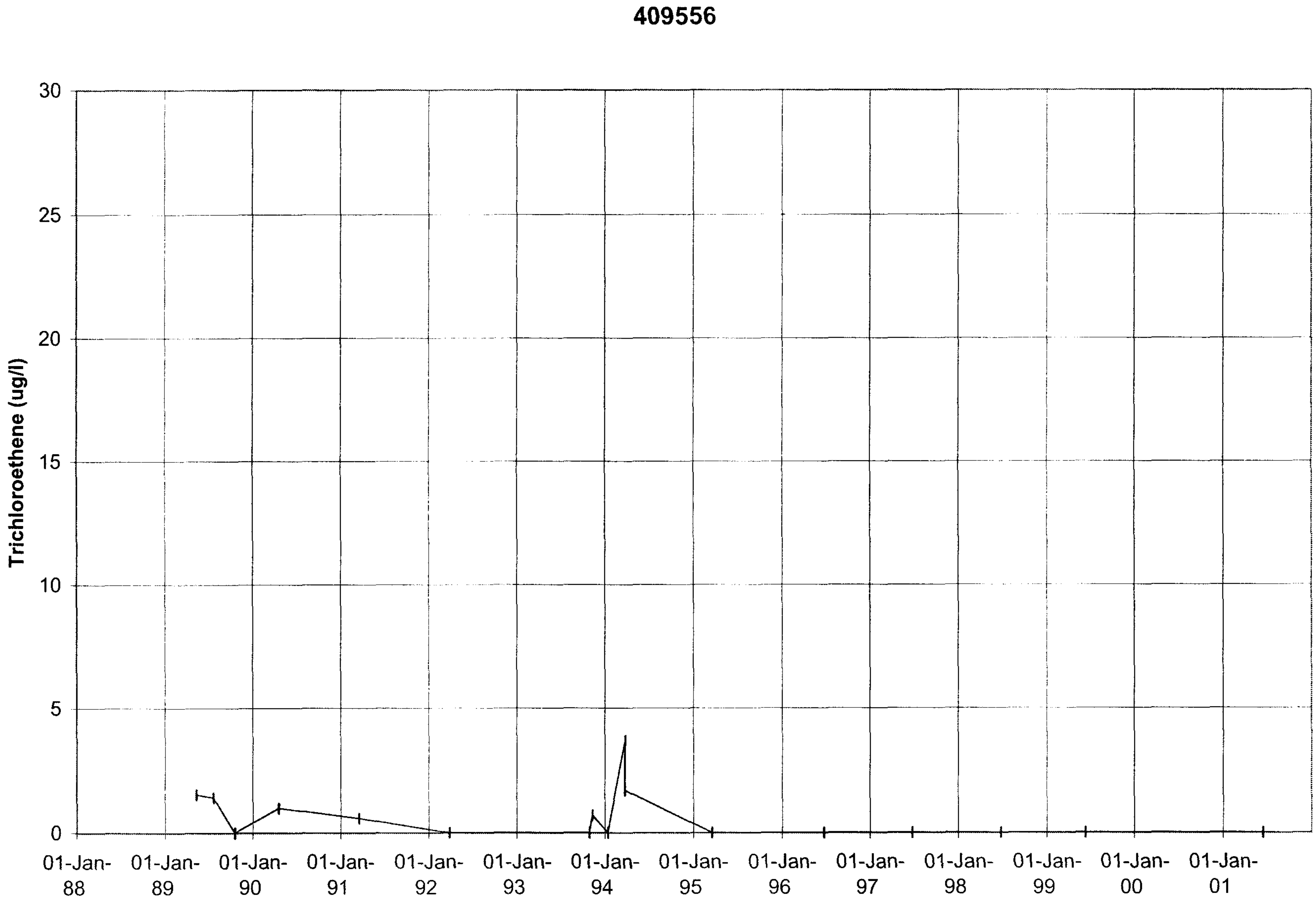

409556
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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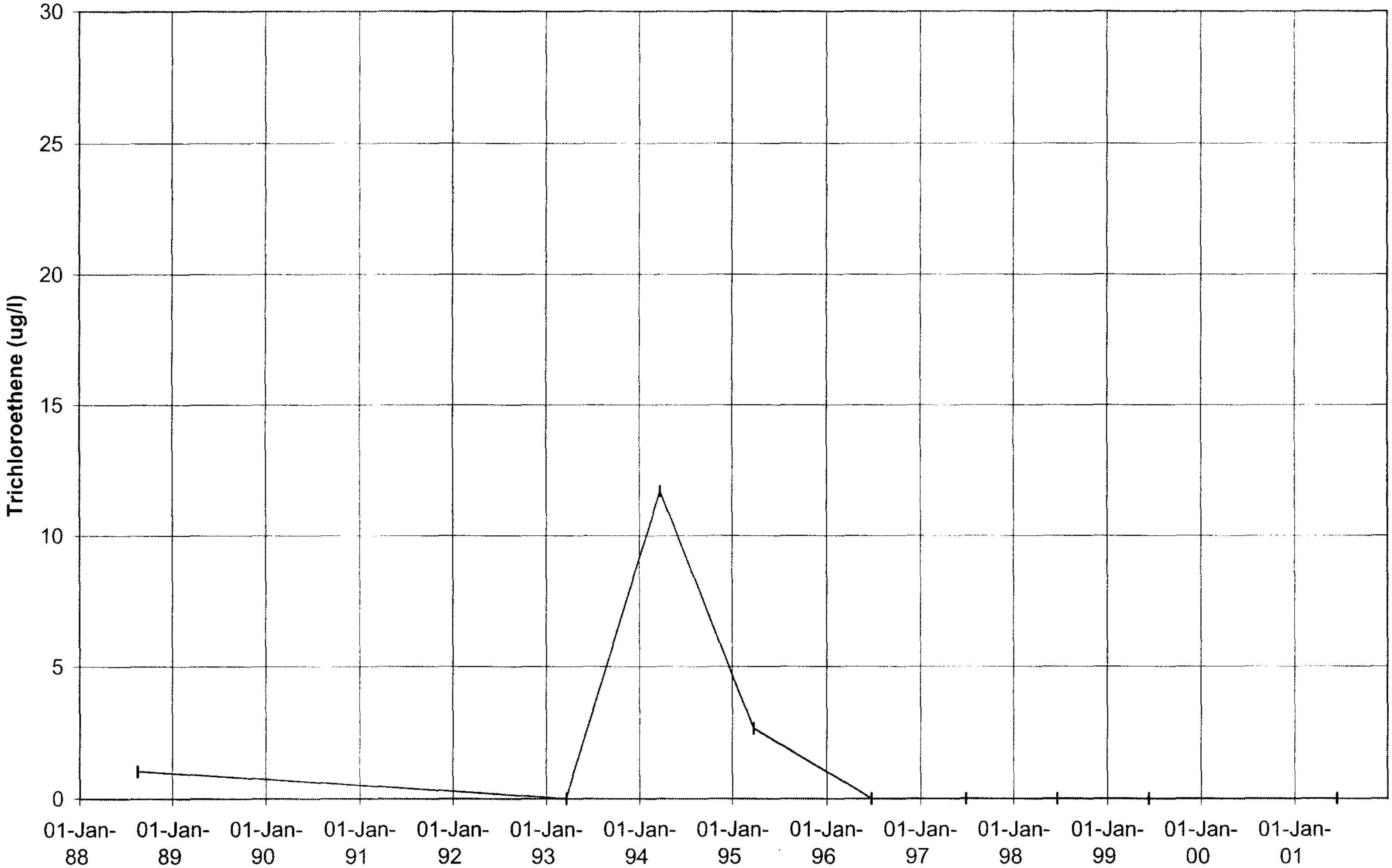
409555



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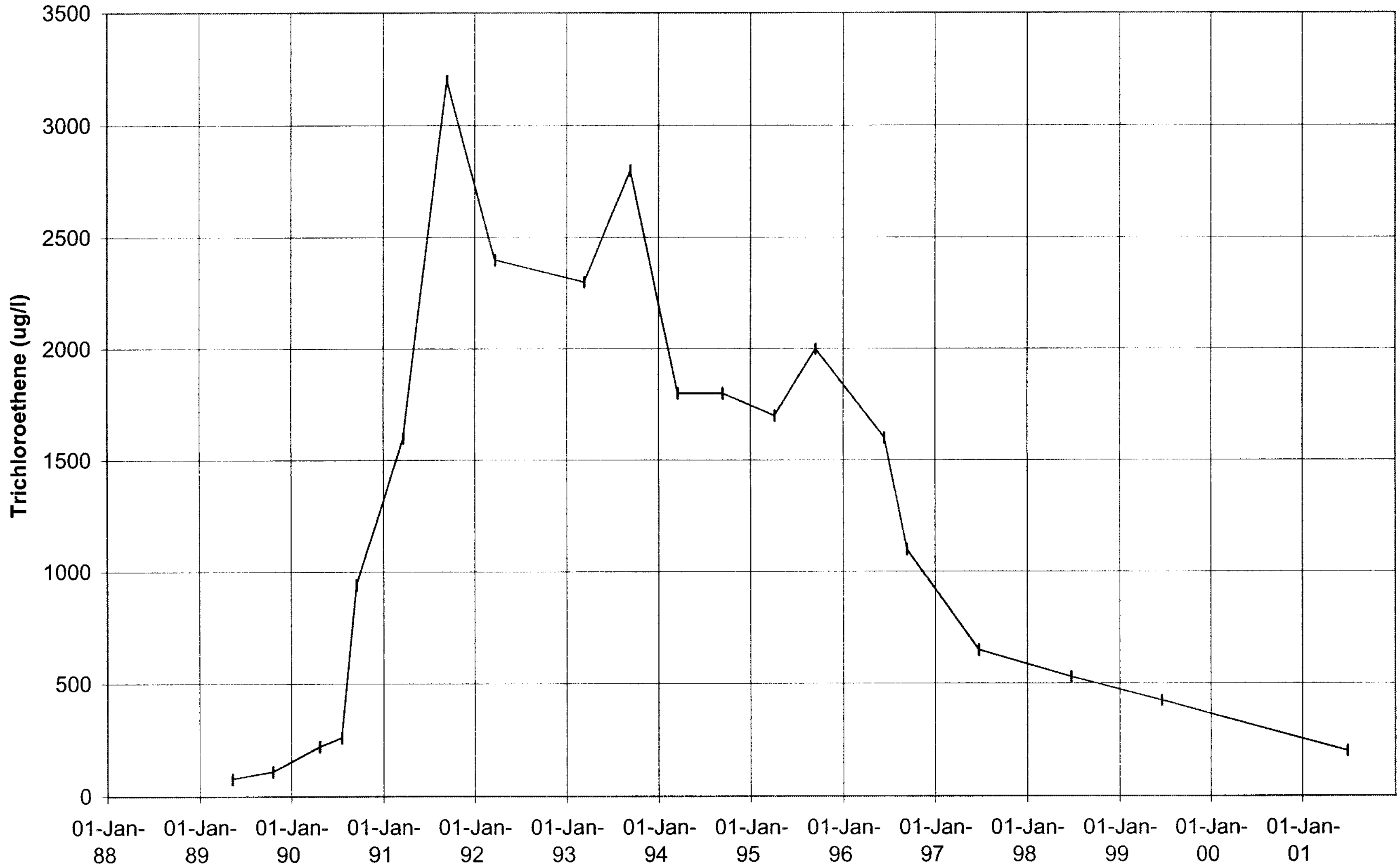
409550



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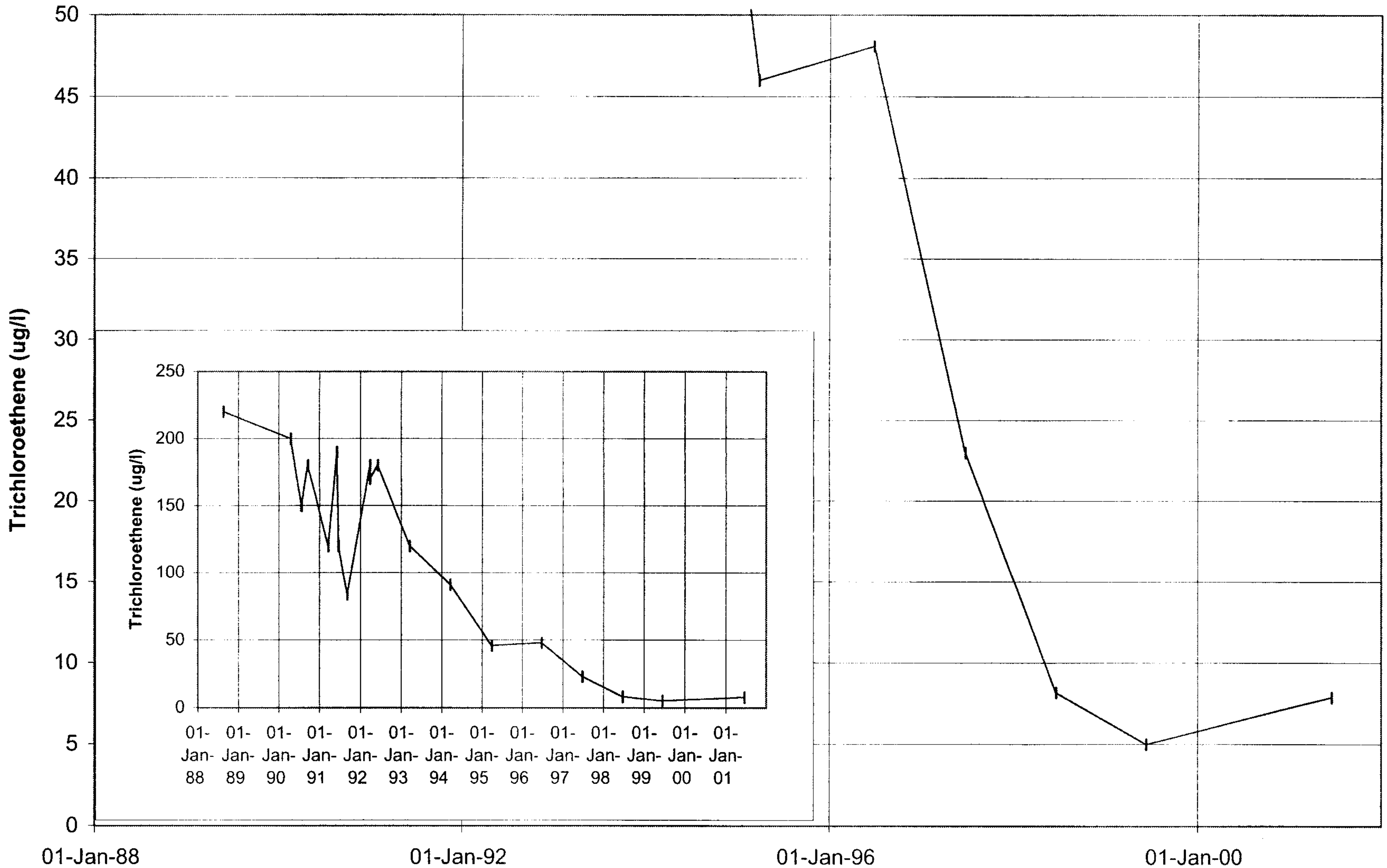
409549



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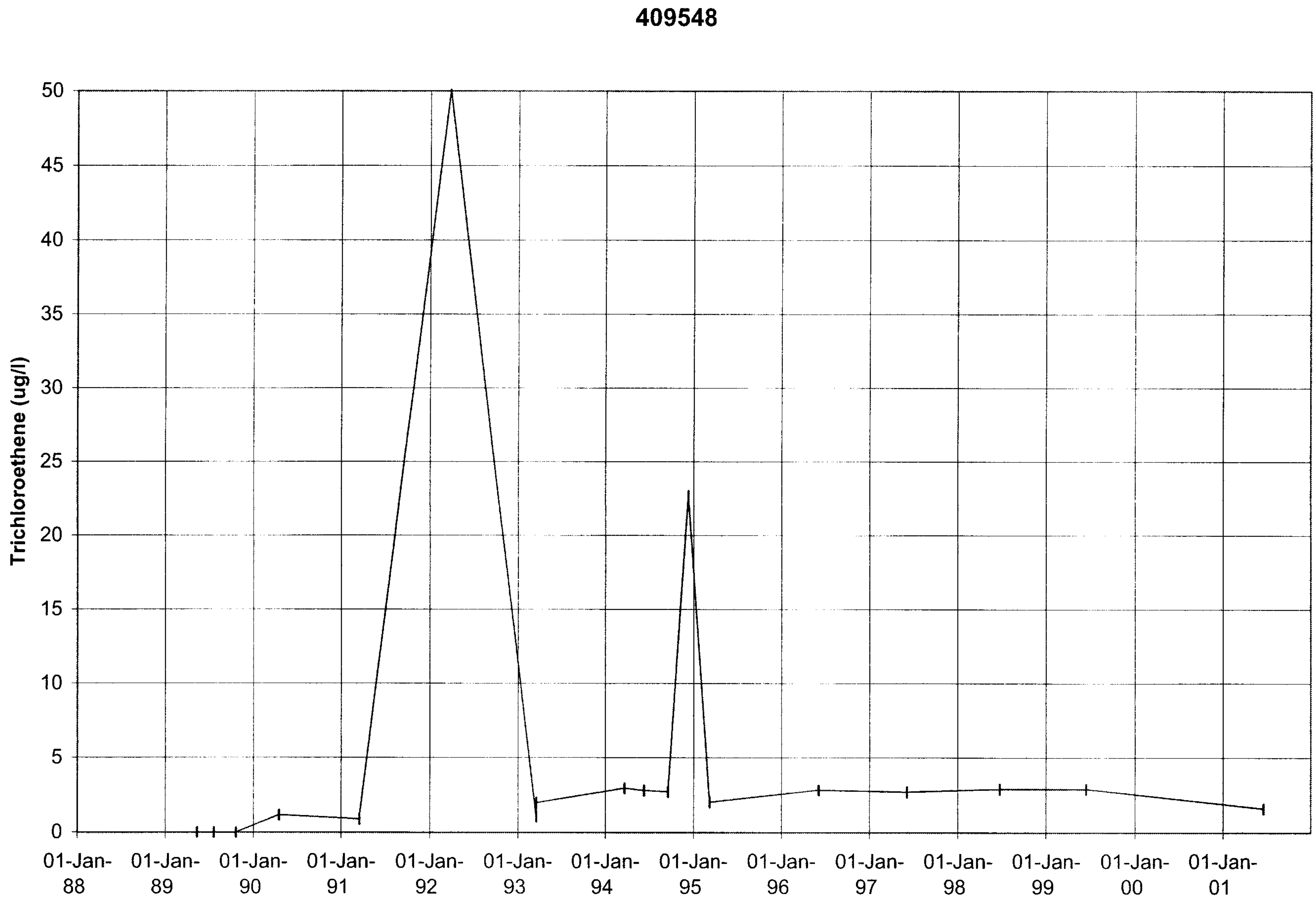
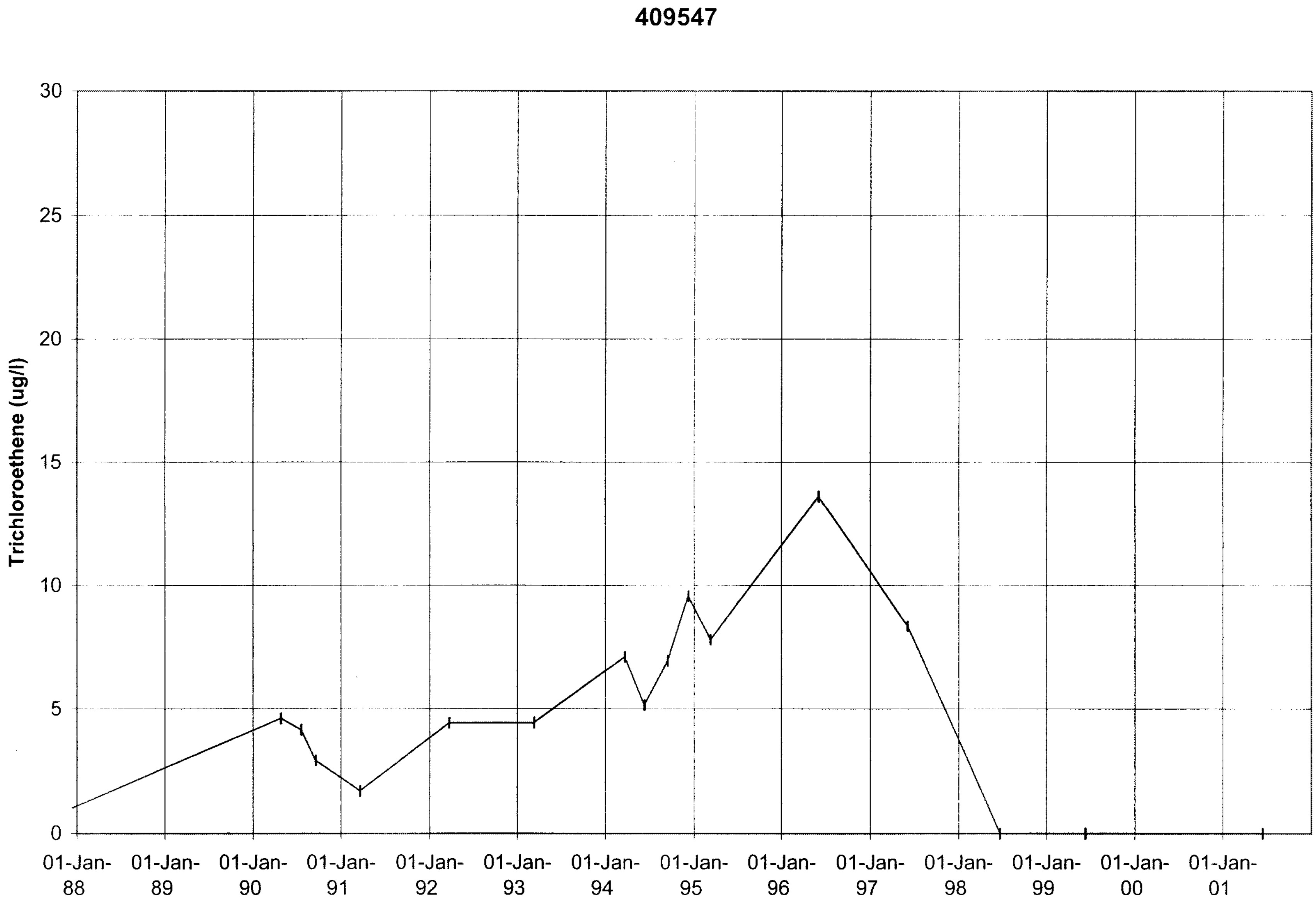
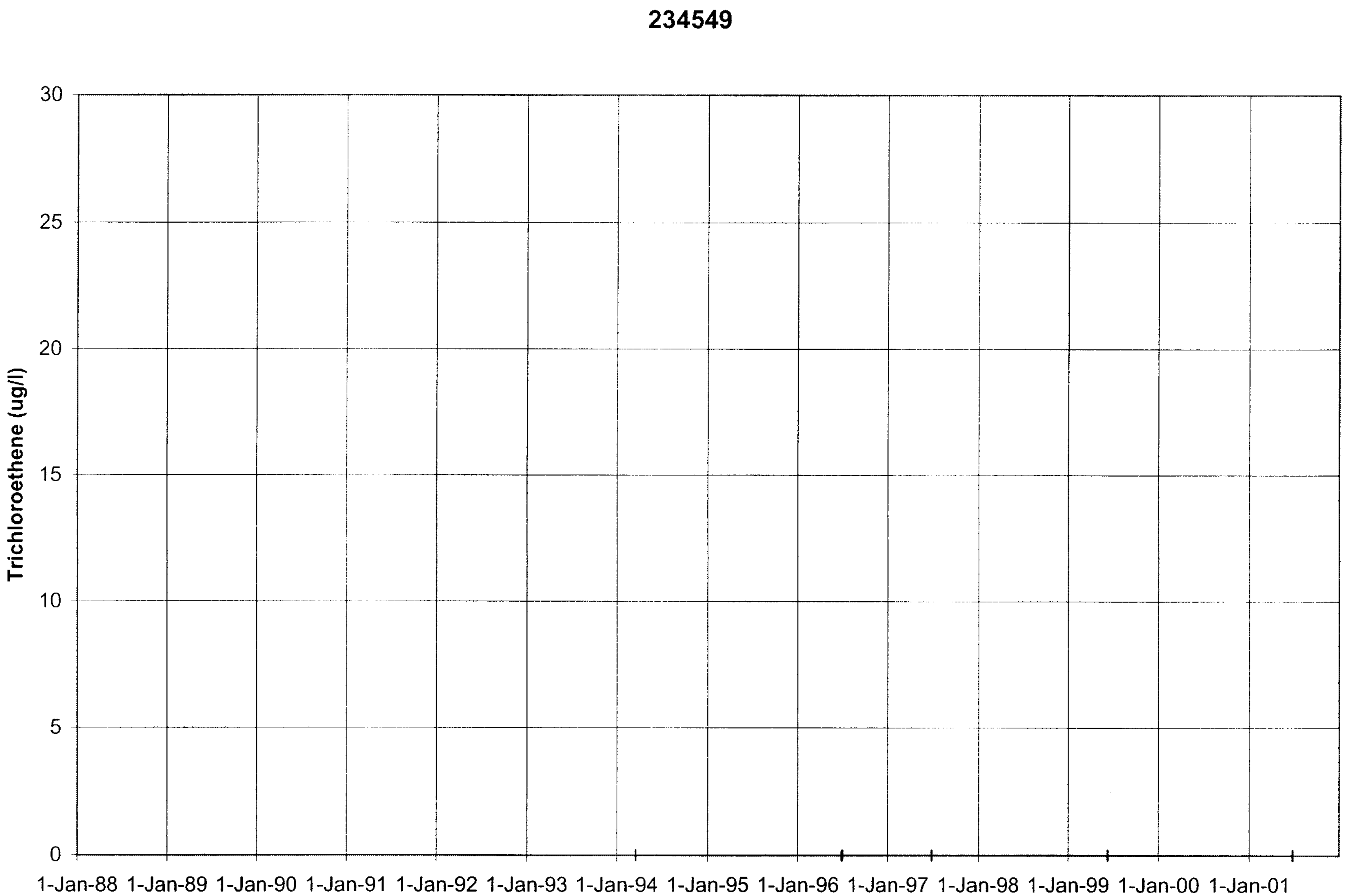

409548
Trichloroethene (ug/l)
0
5
10
15
20
25
30
35
40
45
50
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map



409547
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


234549
Trichloroethene (ug/l)
30
25
20
15
10
5
0
1-Jan-88
1-Jan-89
1-Jan-90
1-Jan-91
1-Jan-92
1-Jan-93
1-Jan-94
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1-Jan-99
1-Jan-00
1-Jan-01

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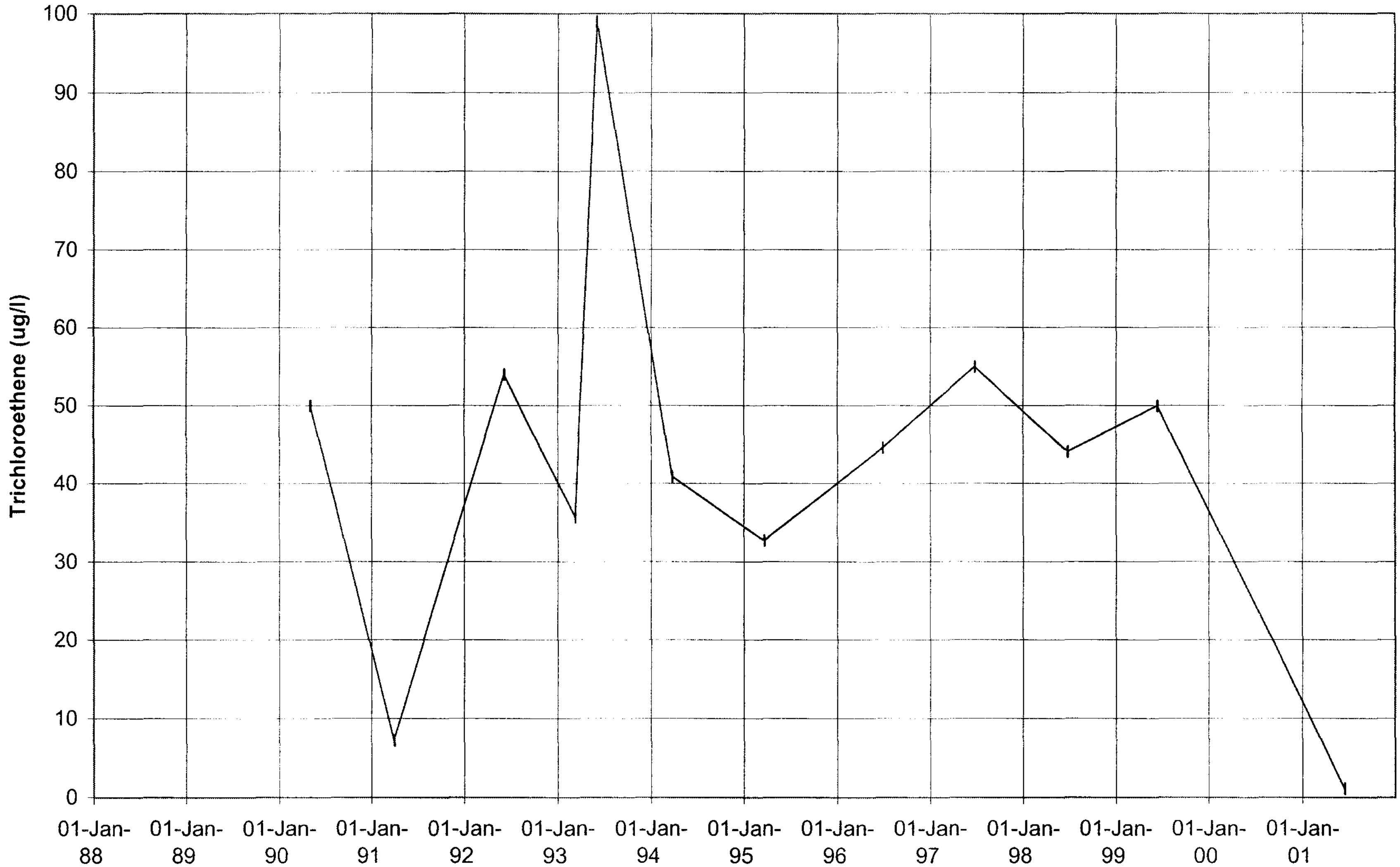
234546



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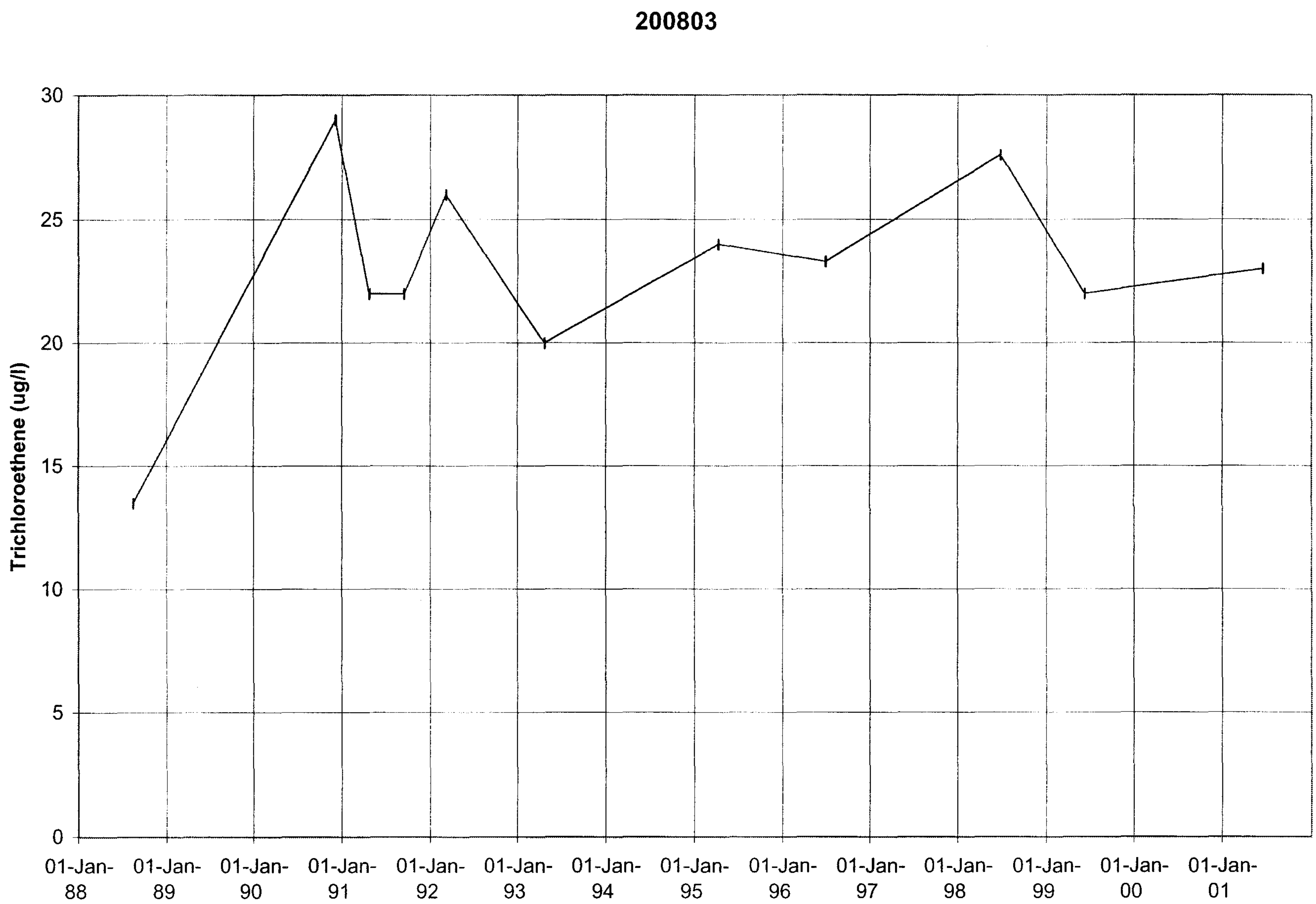
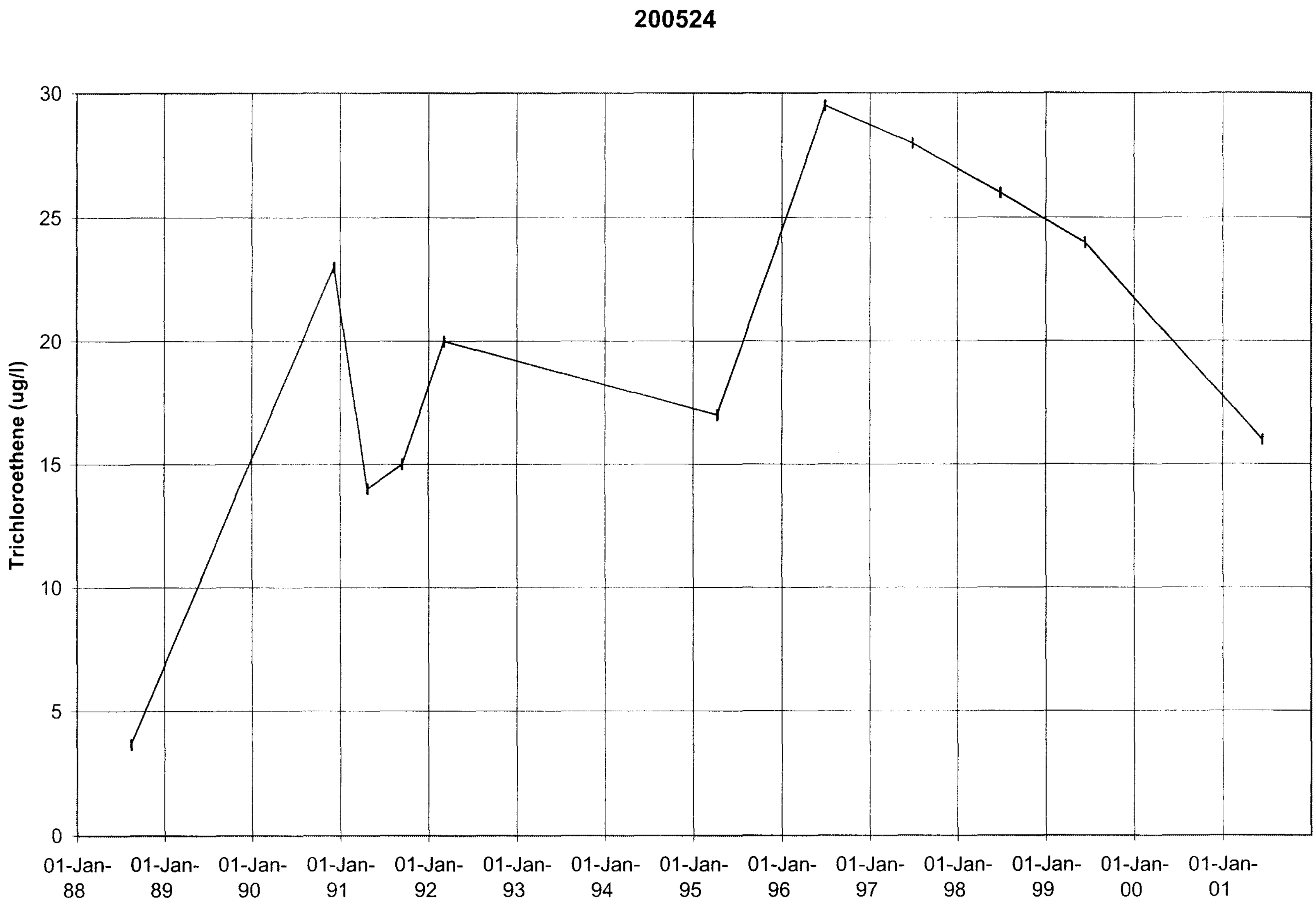

200803
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map



200524
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

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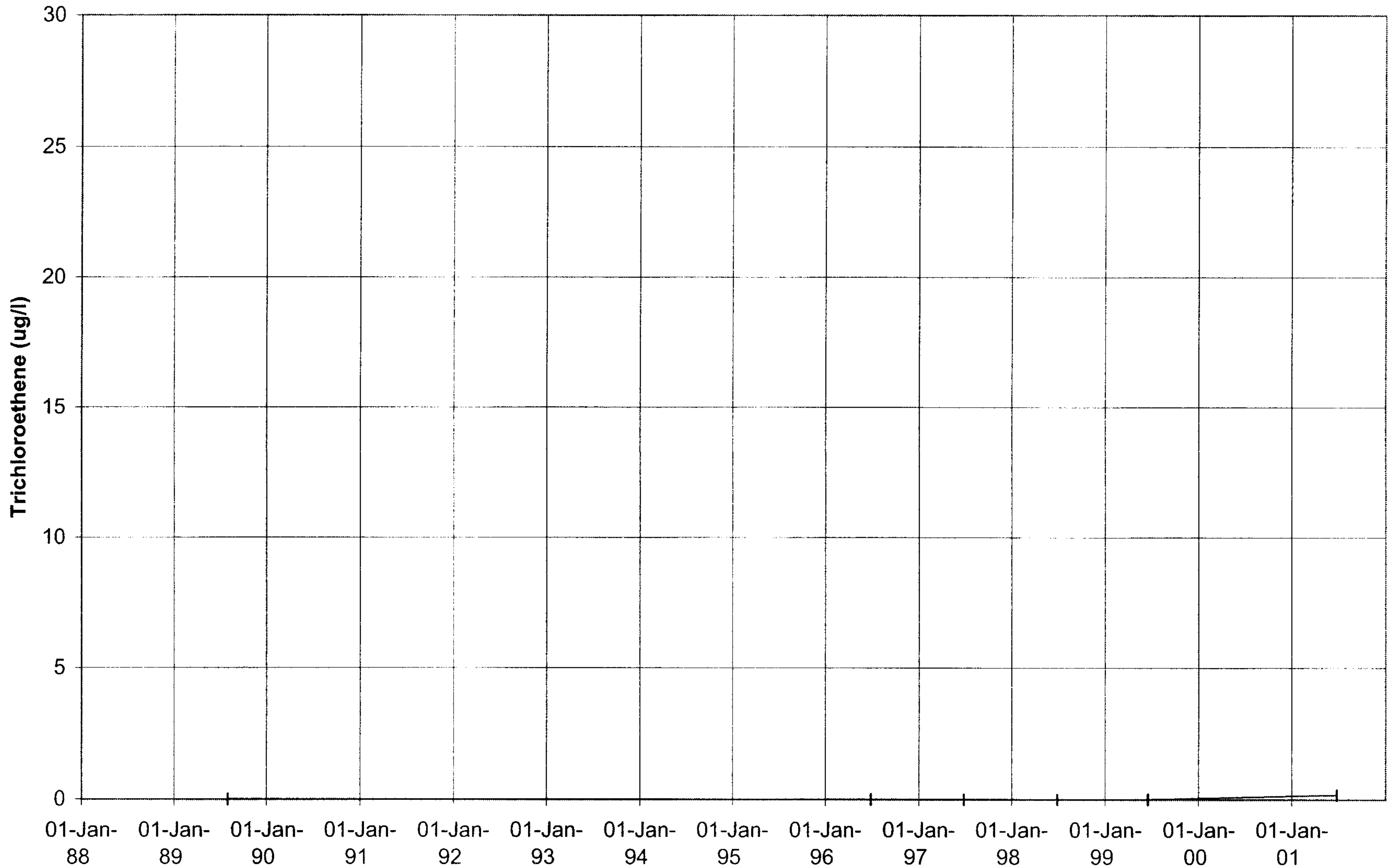
200154



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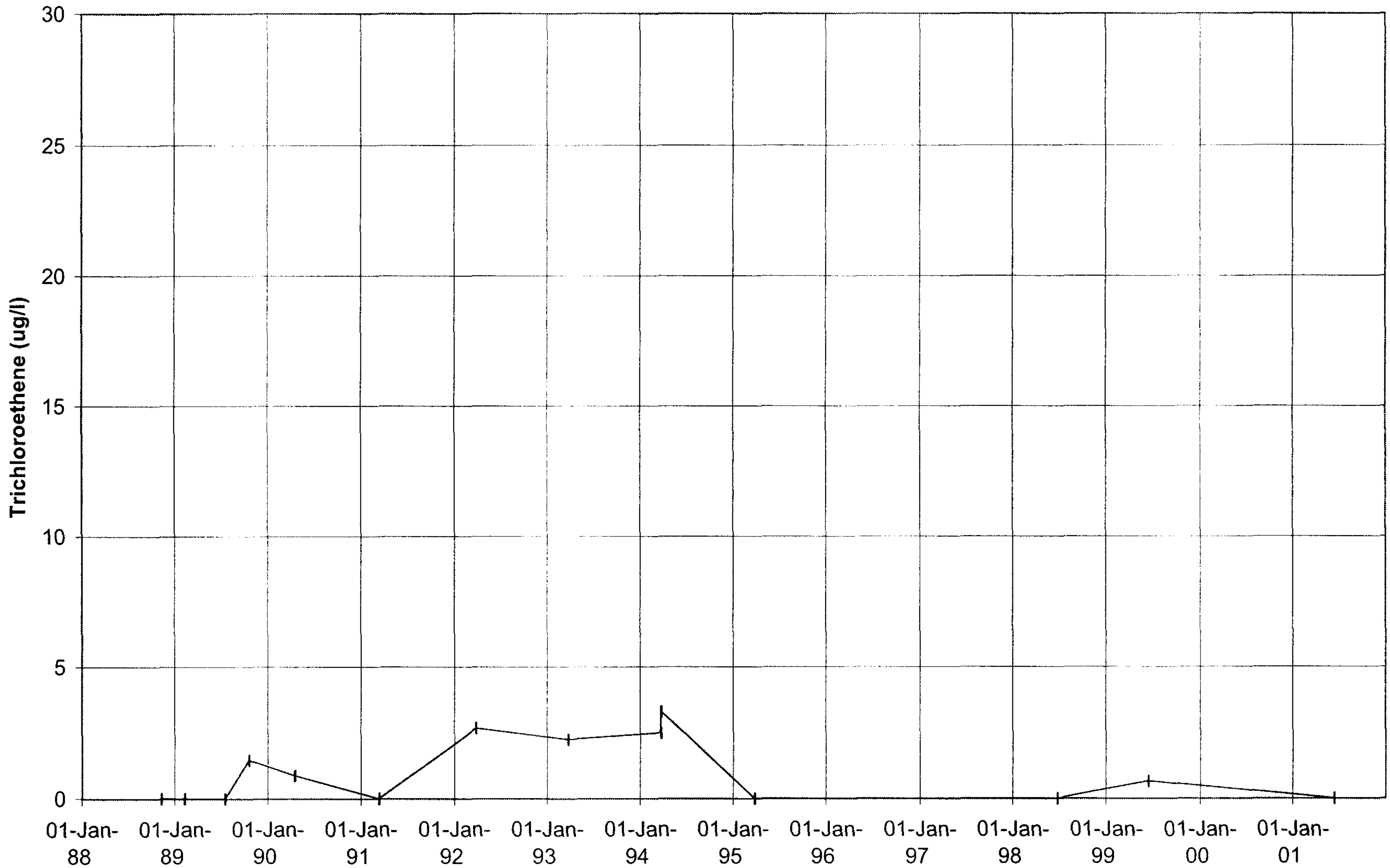
04U883



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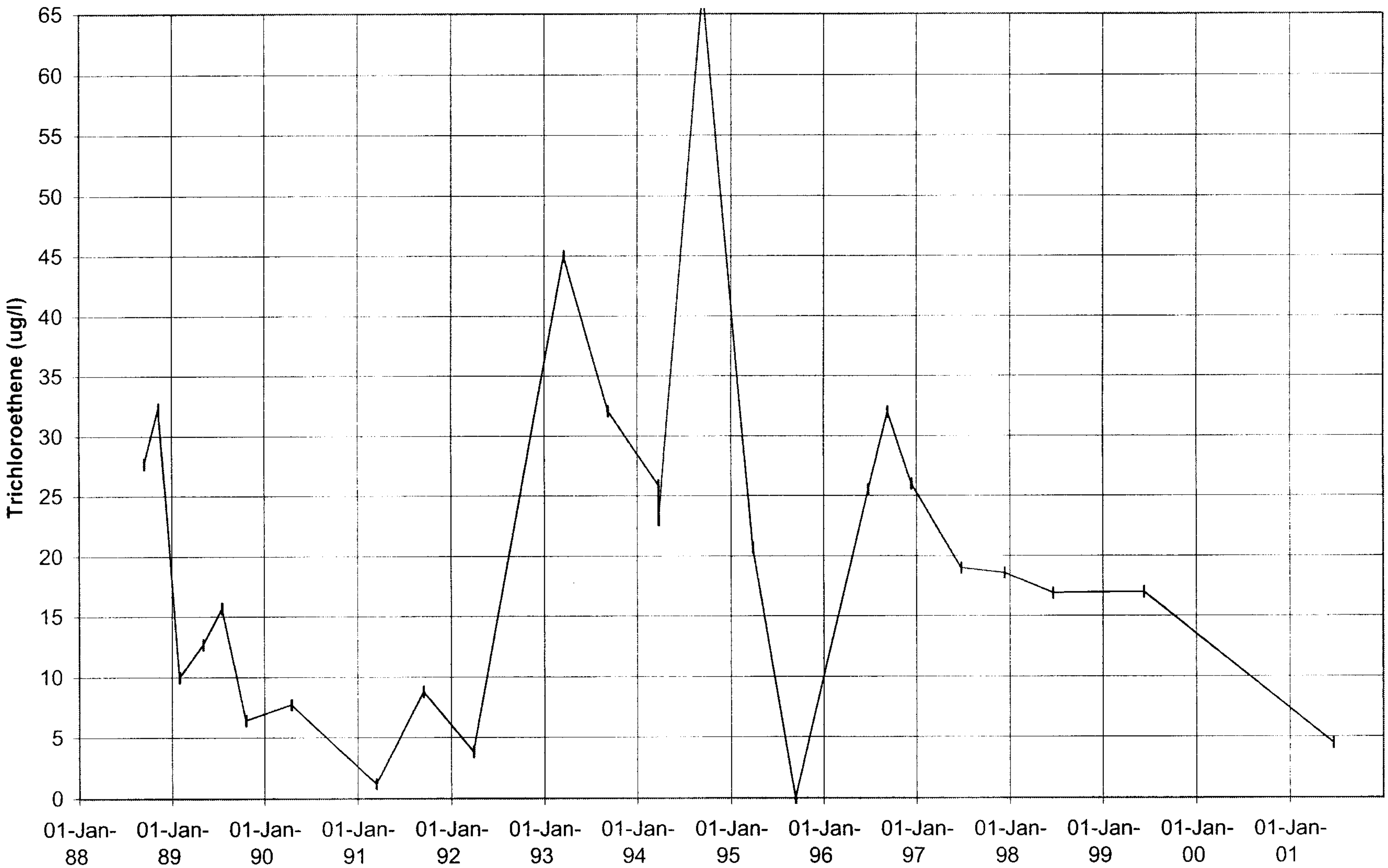
04U882



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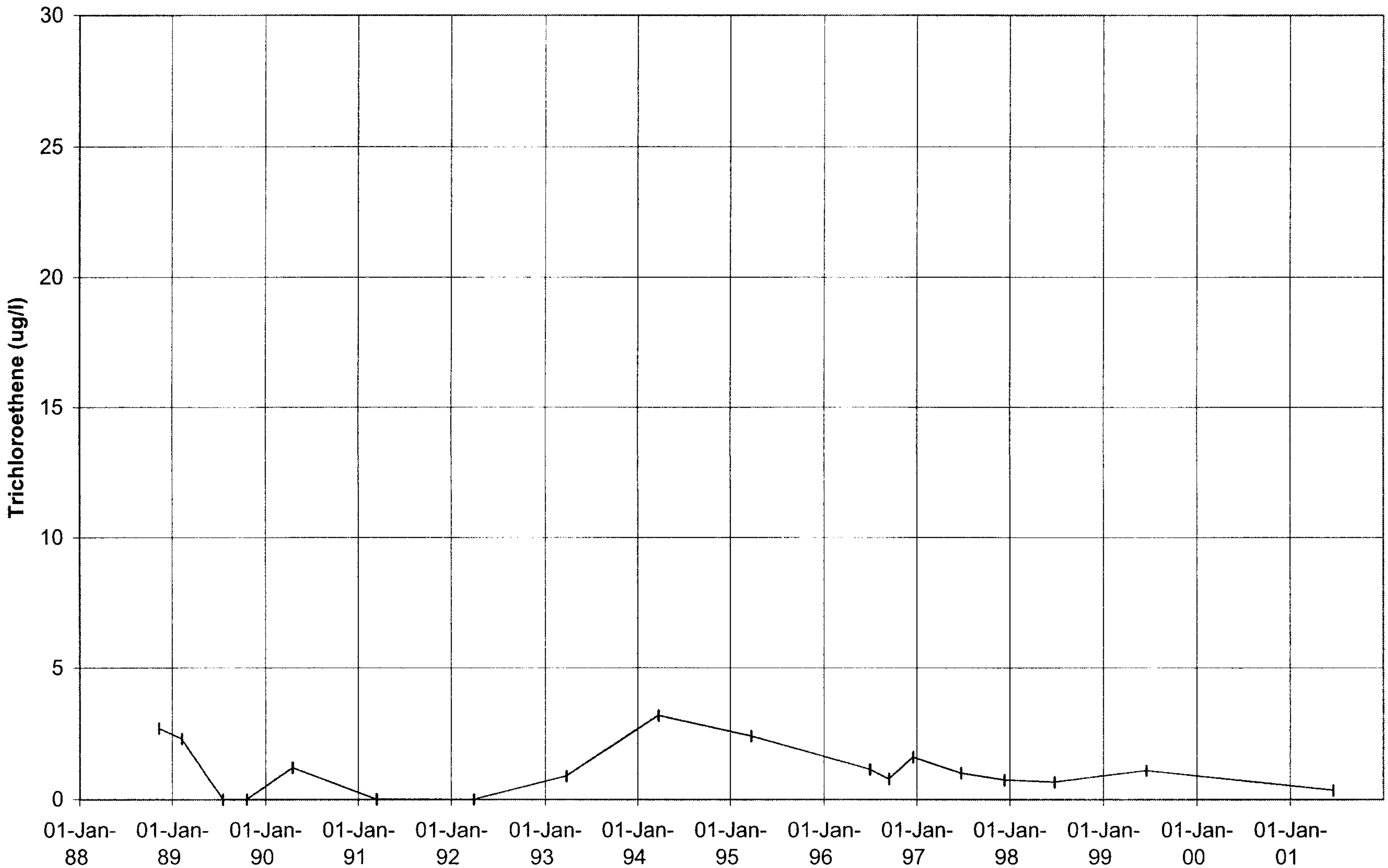
04U881



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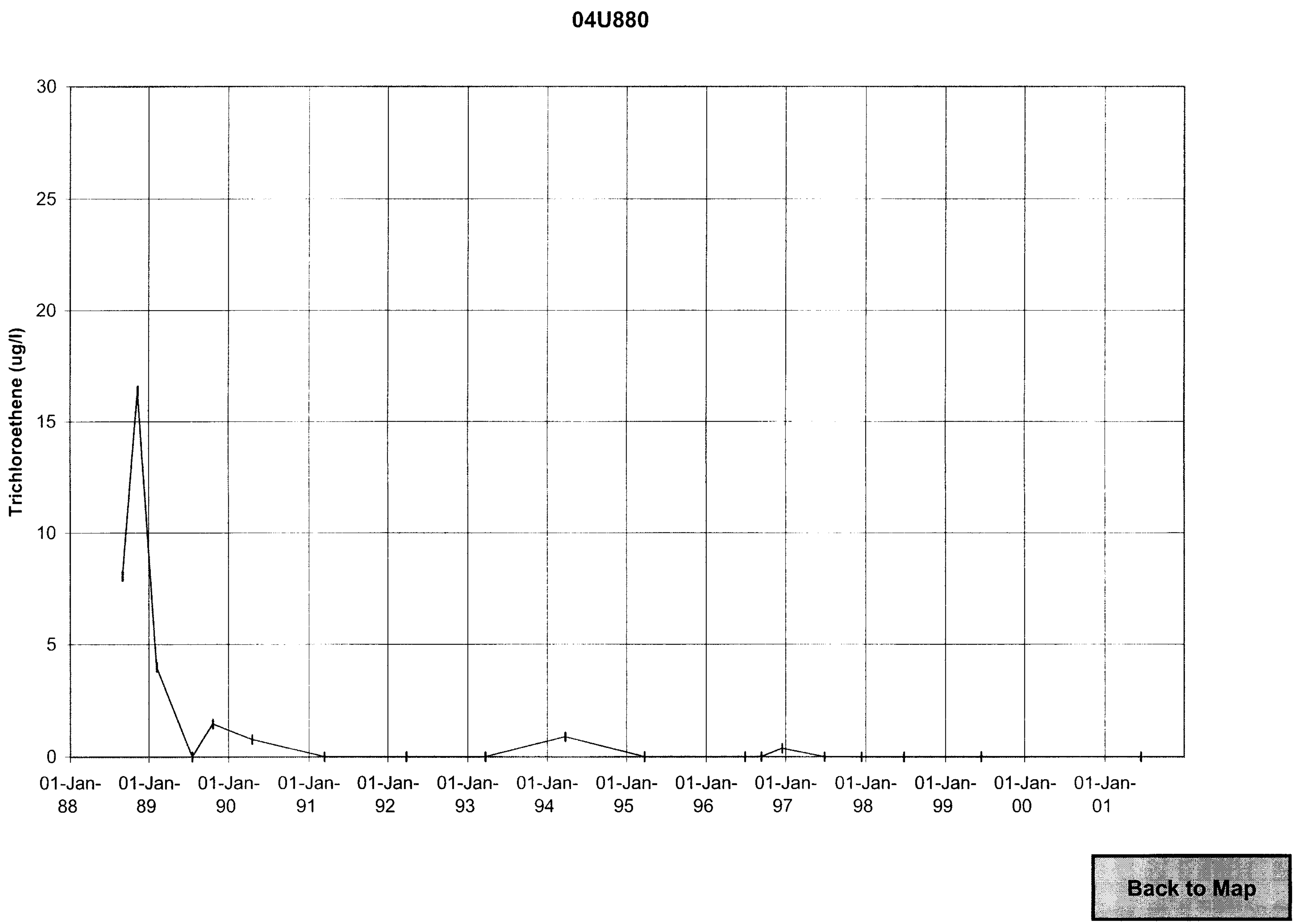
04U880
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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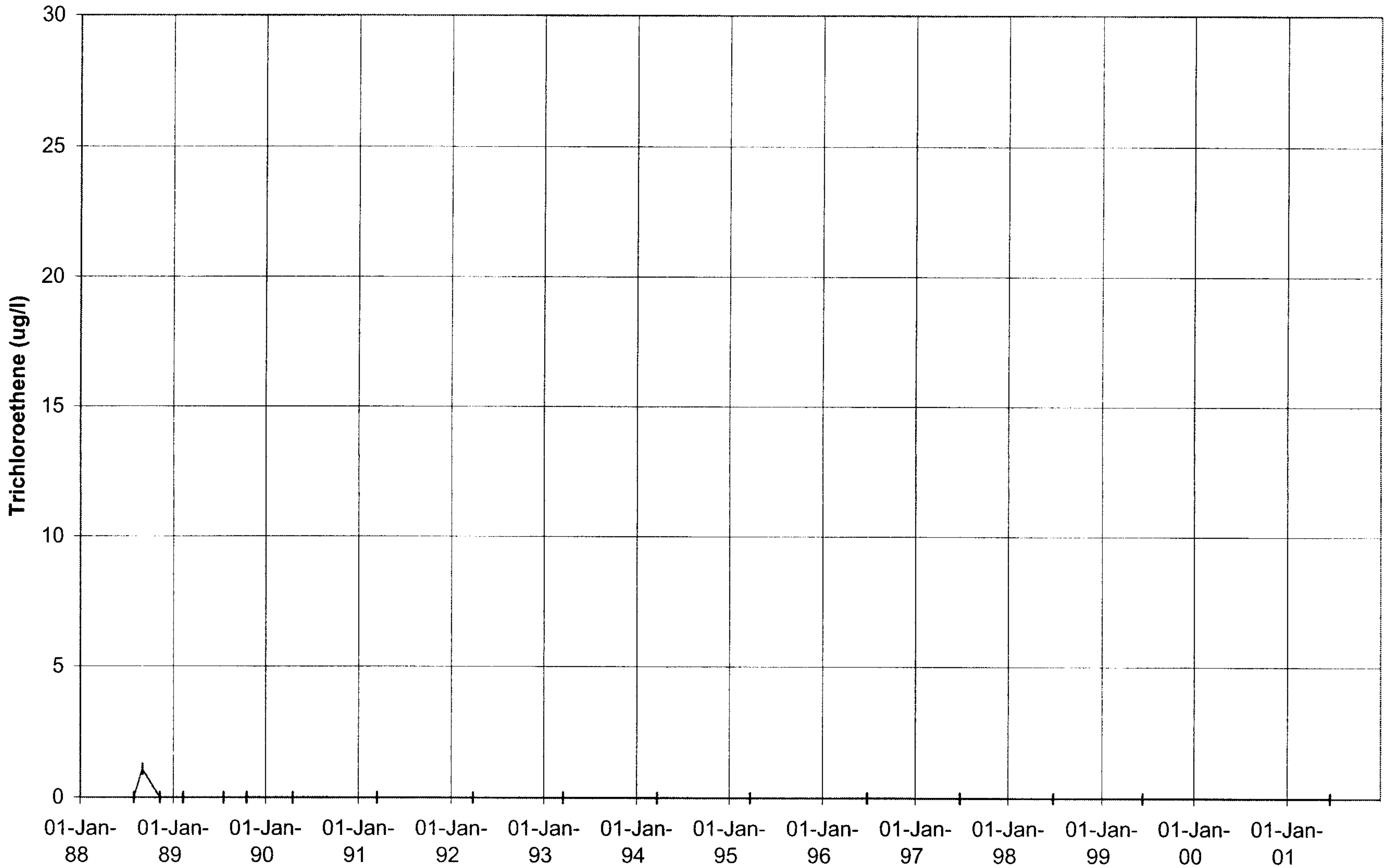
01-Jan-00
01-Jan-01
Back to Map

04U879



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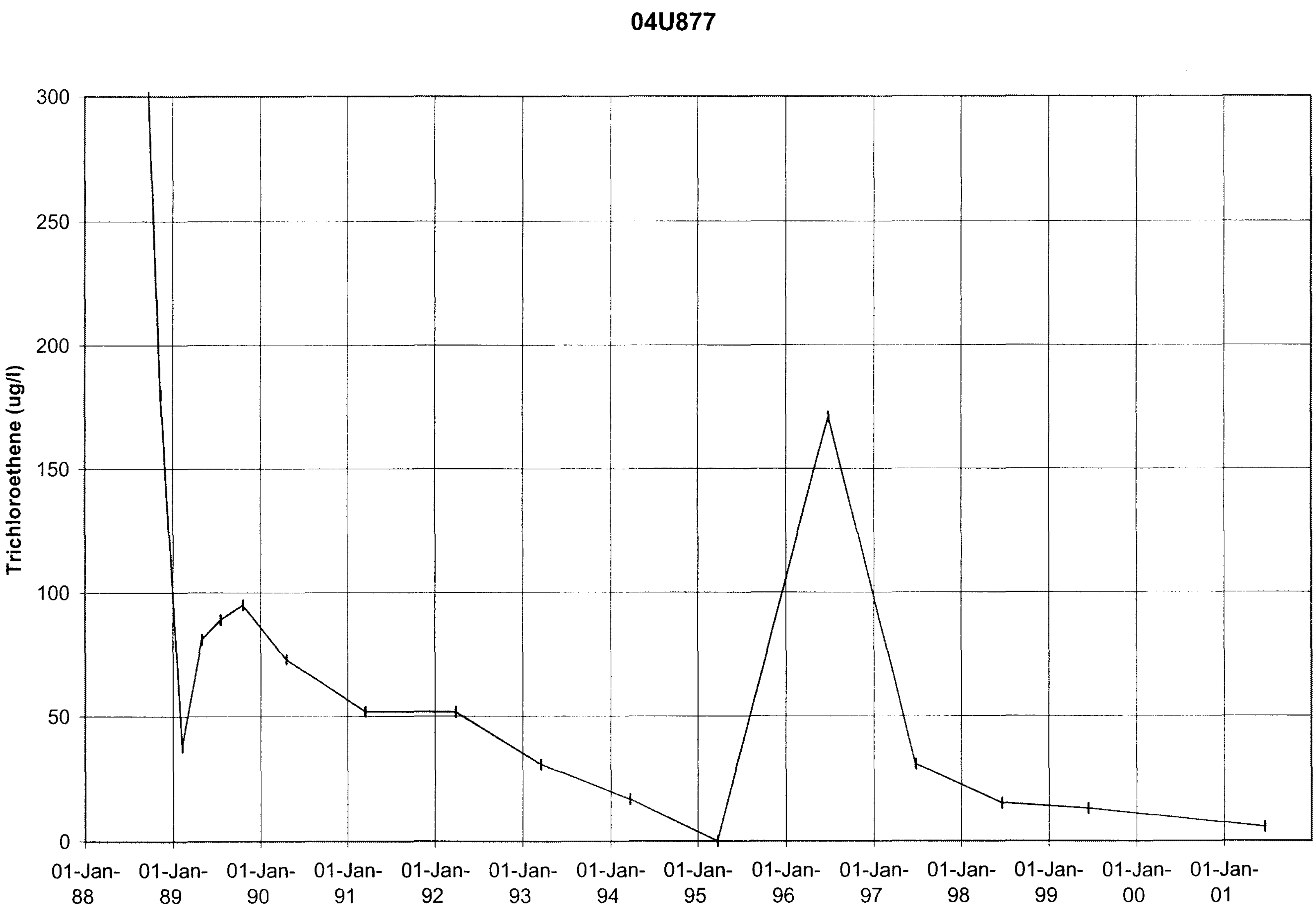
04U877
Trichloroethene (ug/l)
300
250
200
150
100
50
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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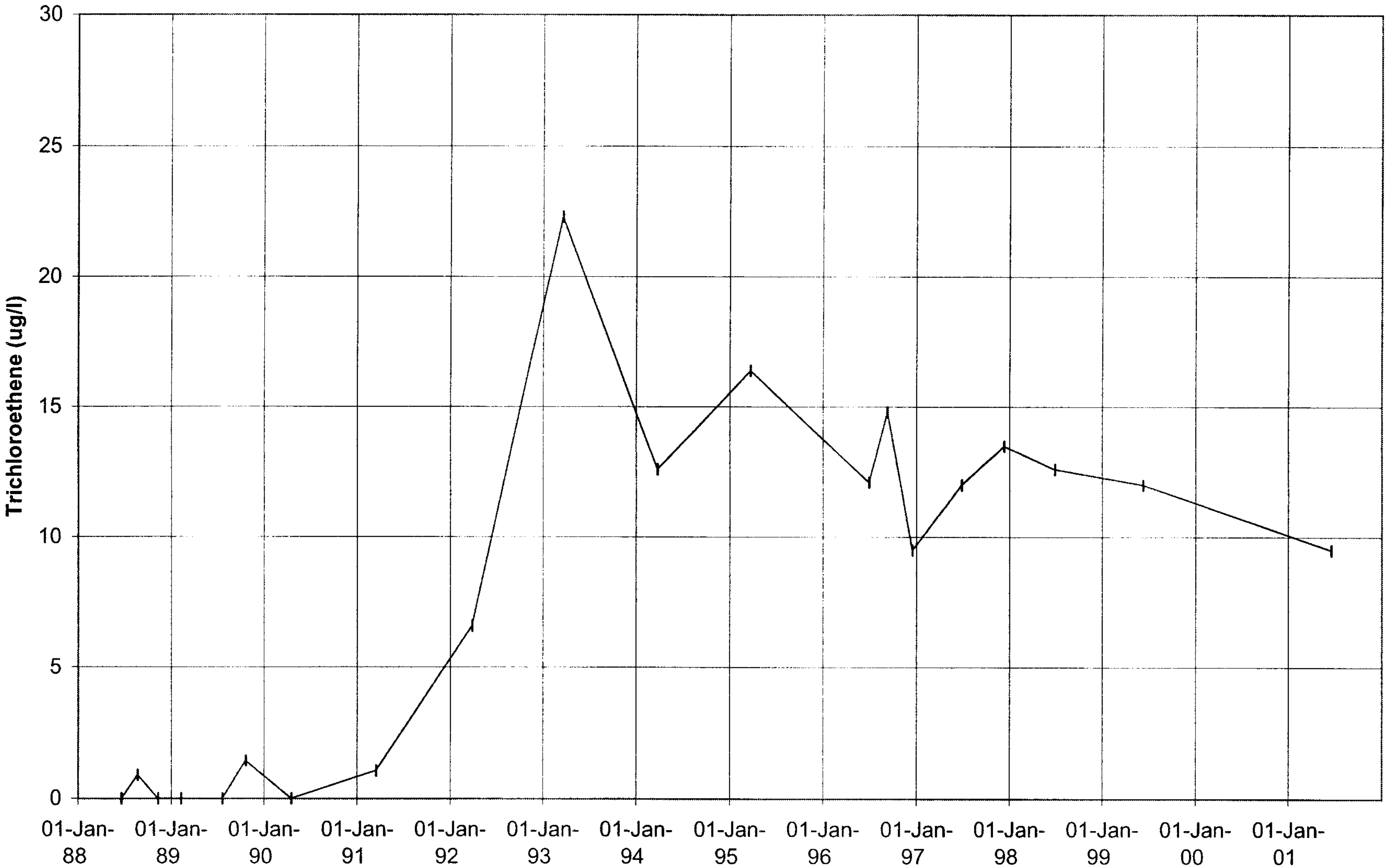
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U875



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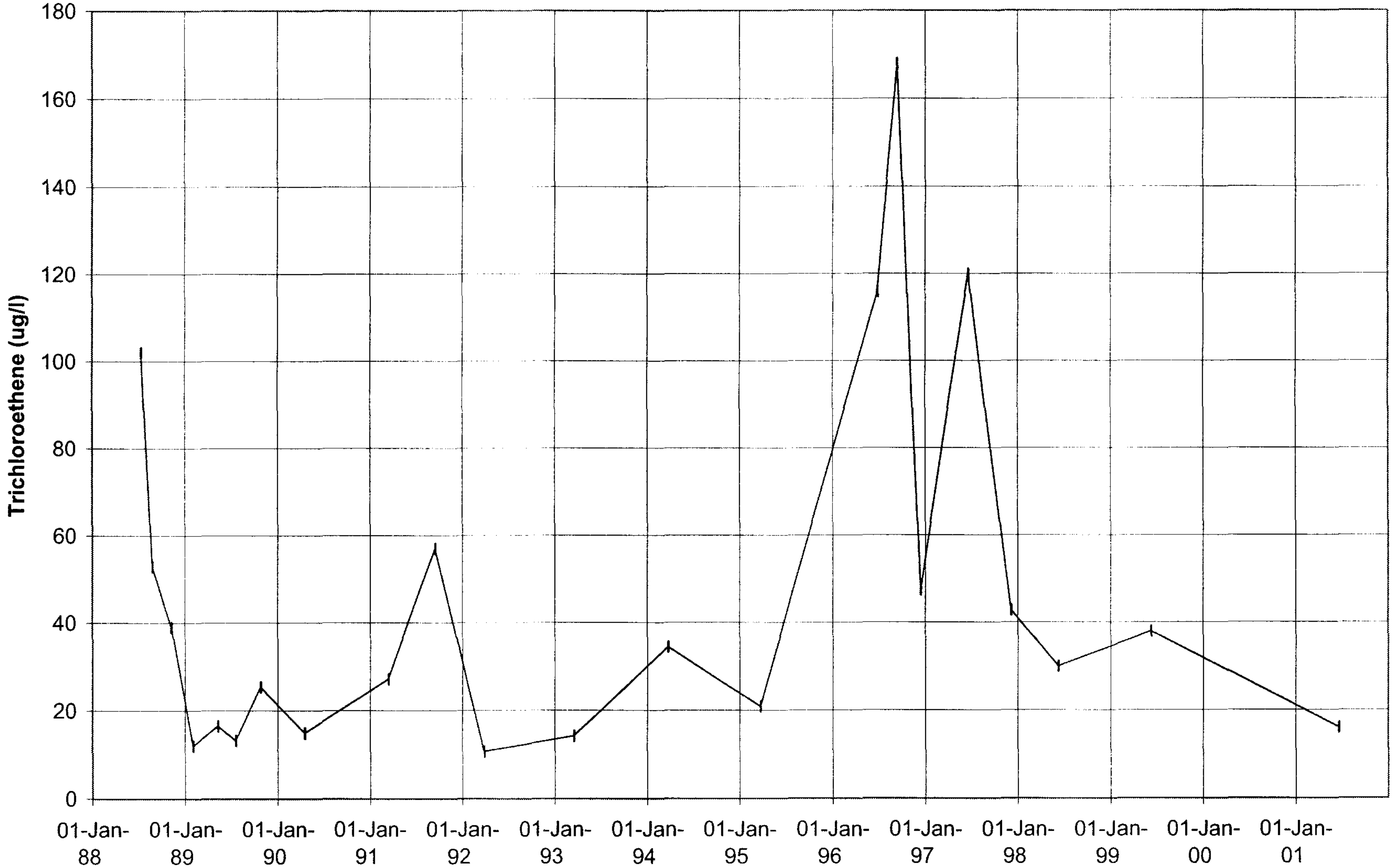
04U872



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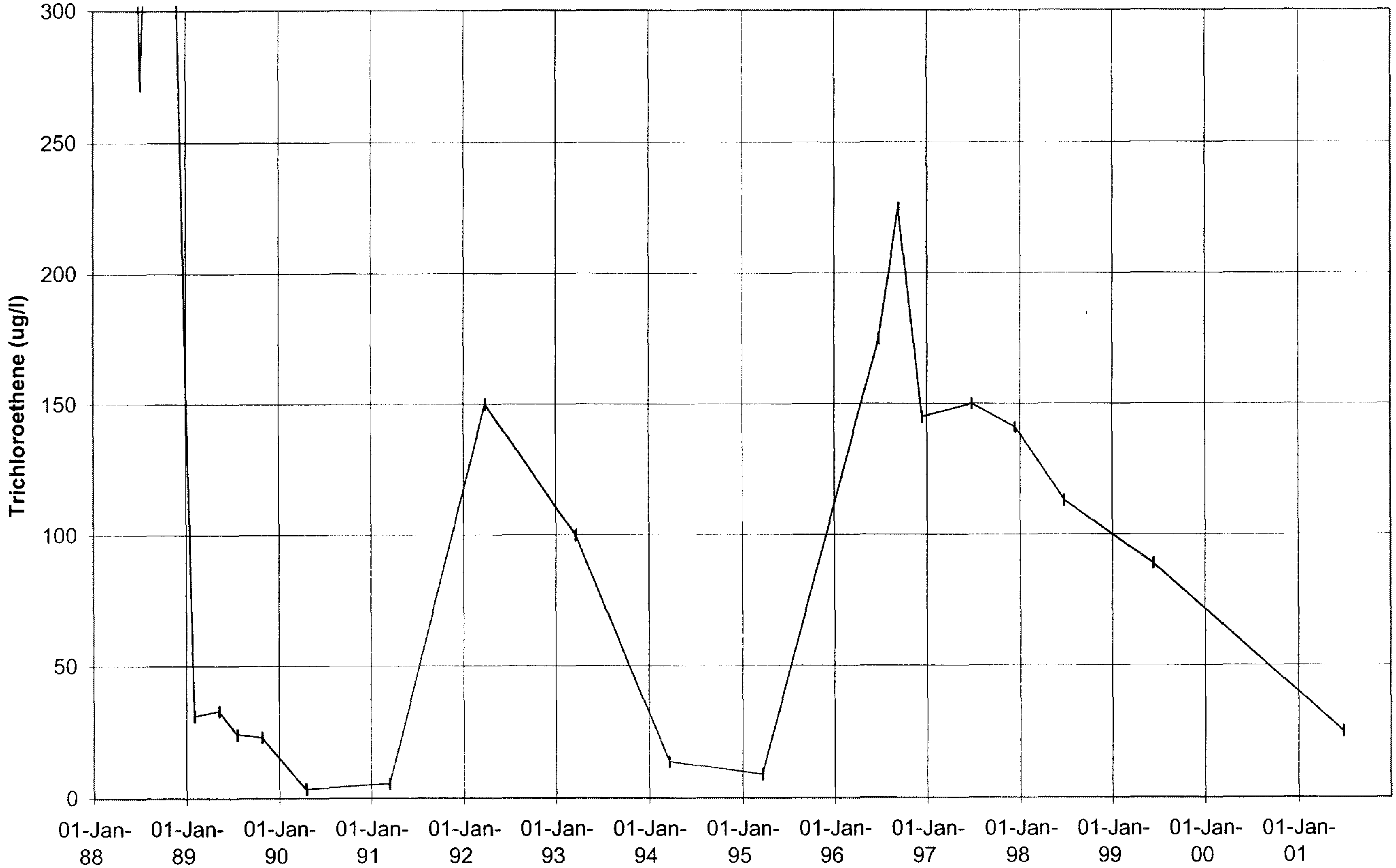
04U871



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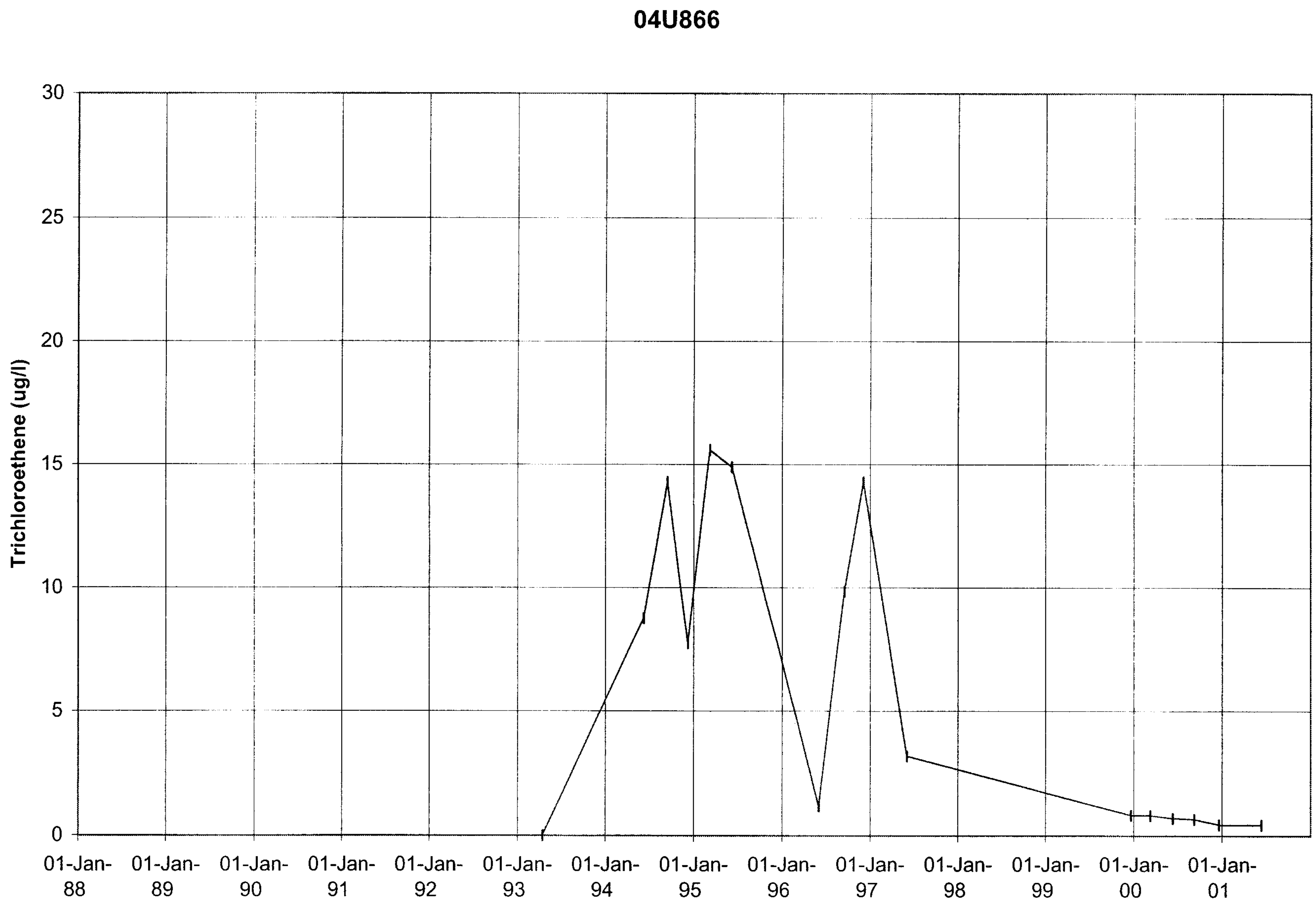
04U866
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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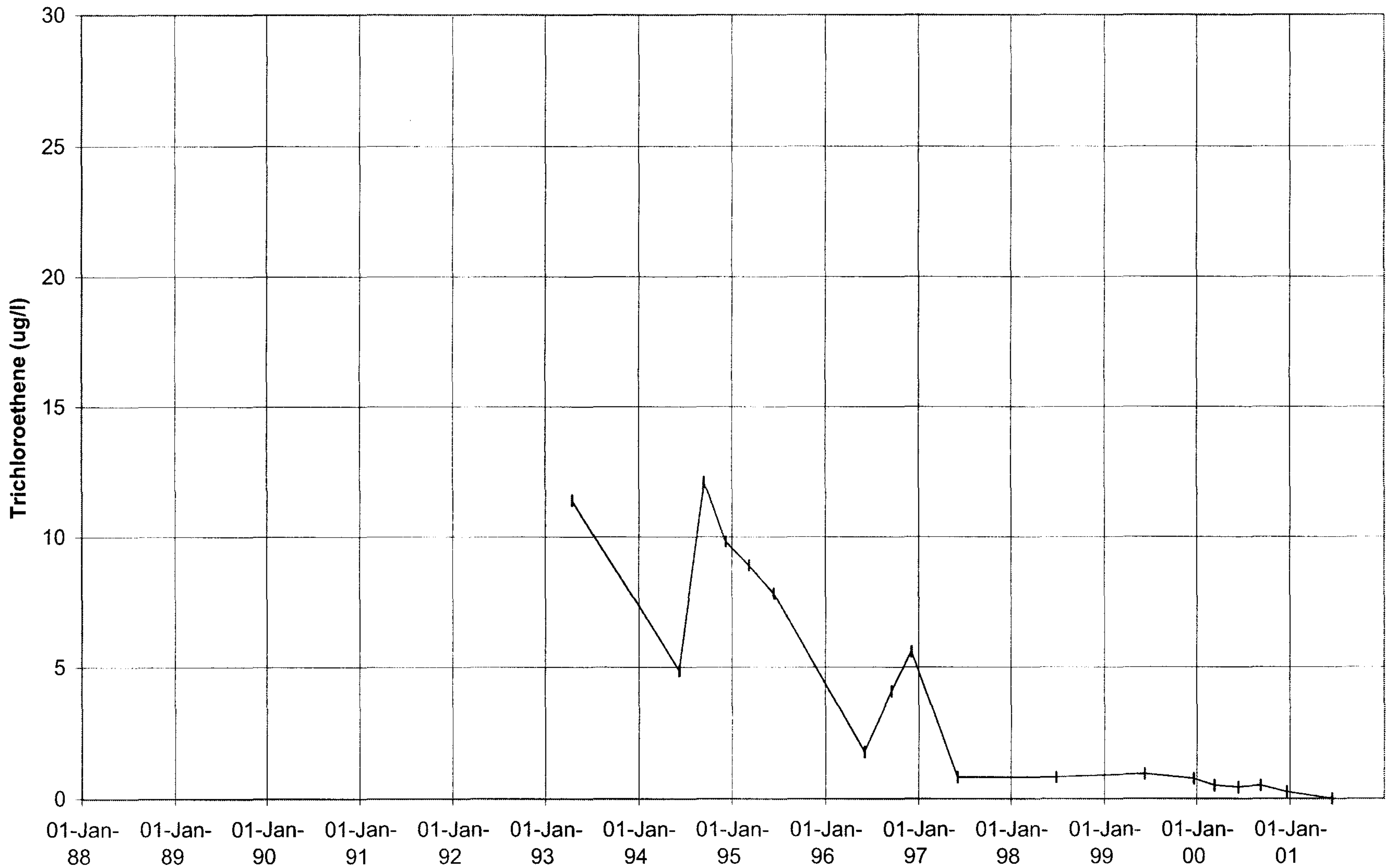
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U865



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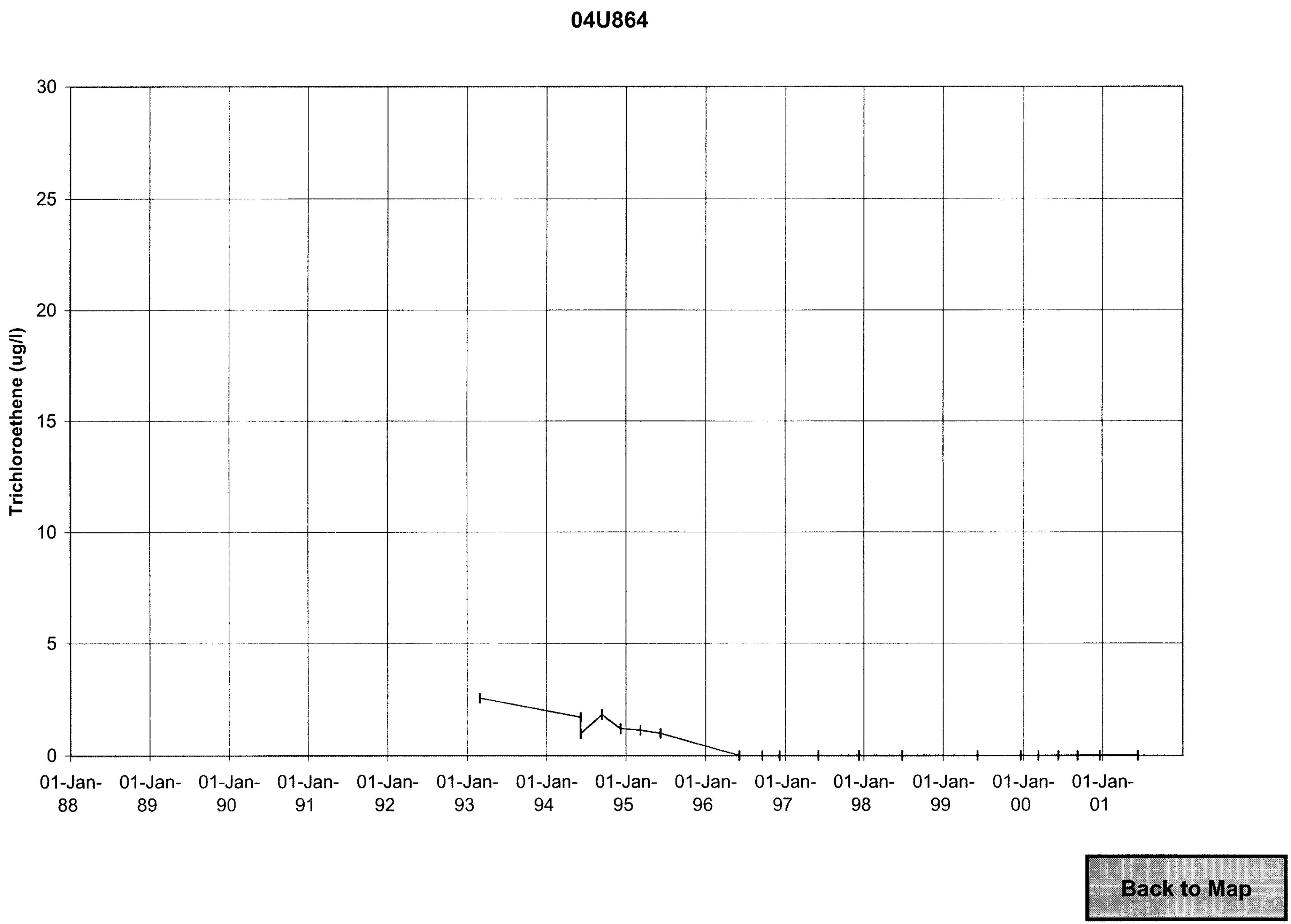
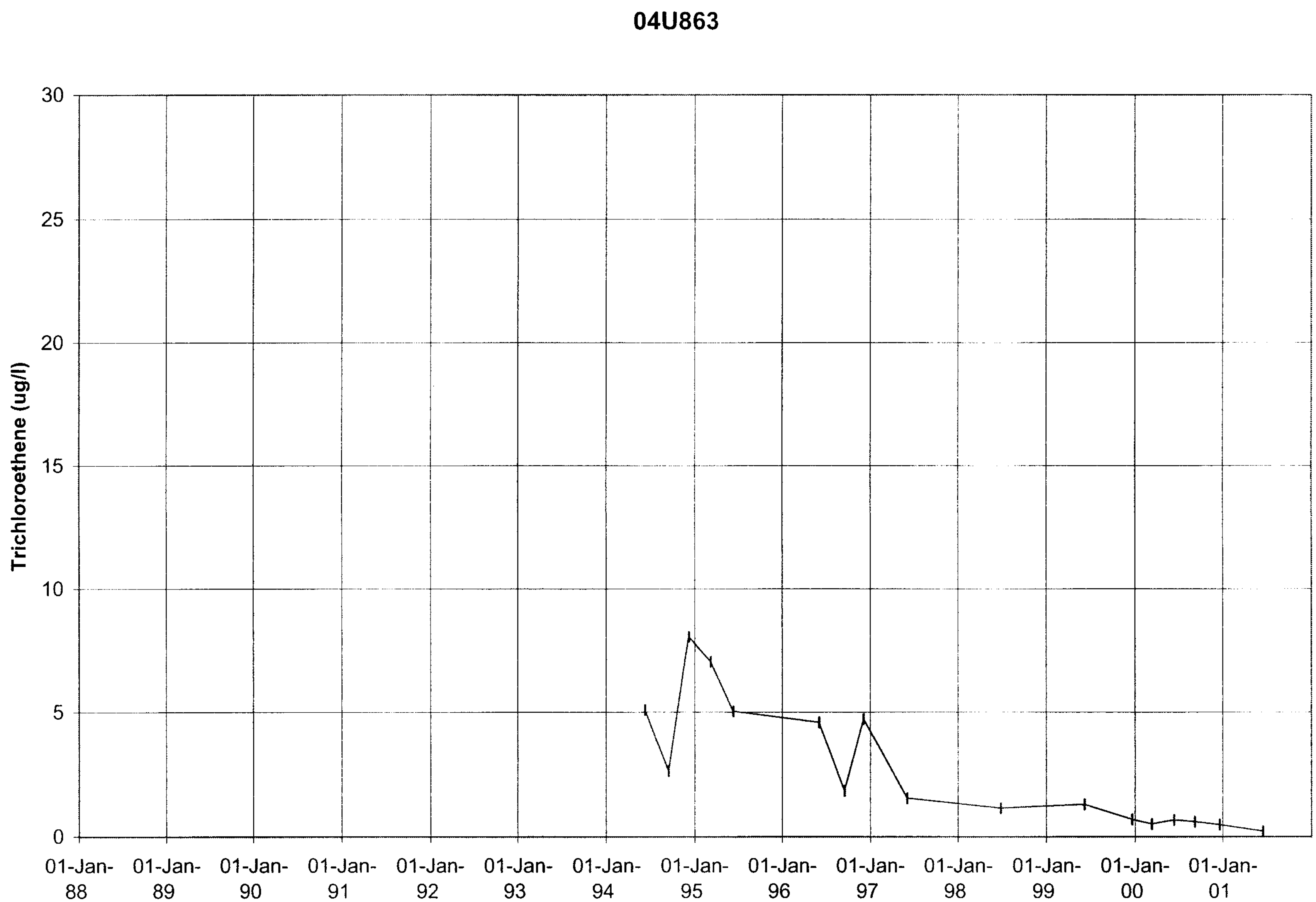

04U864
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01
Back to Map


04U863
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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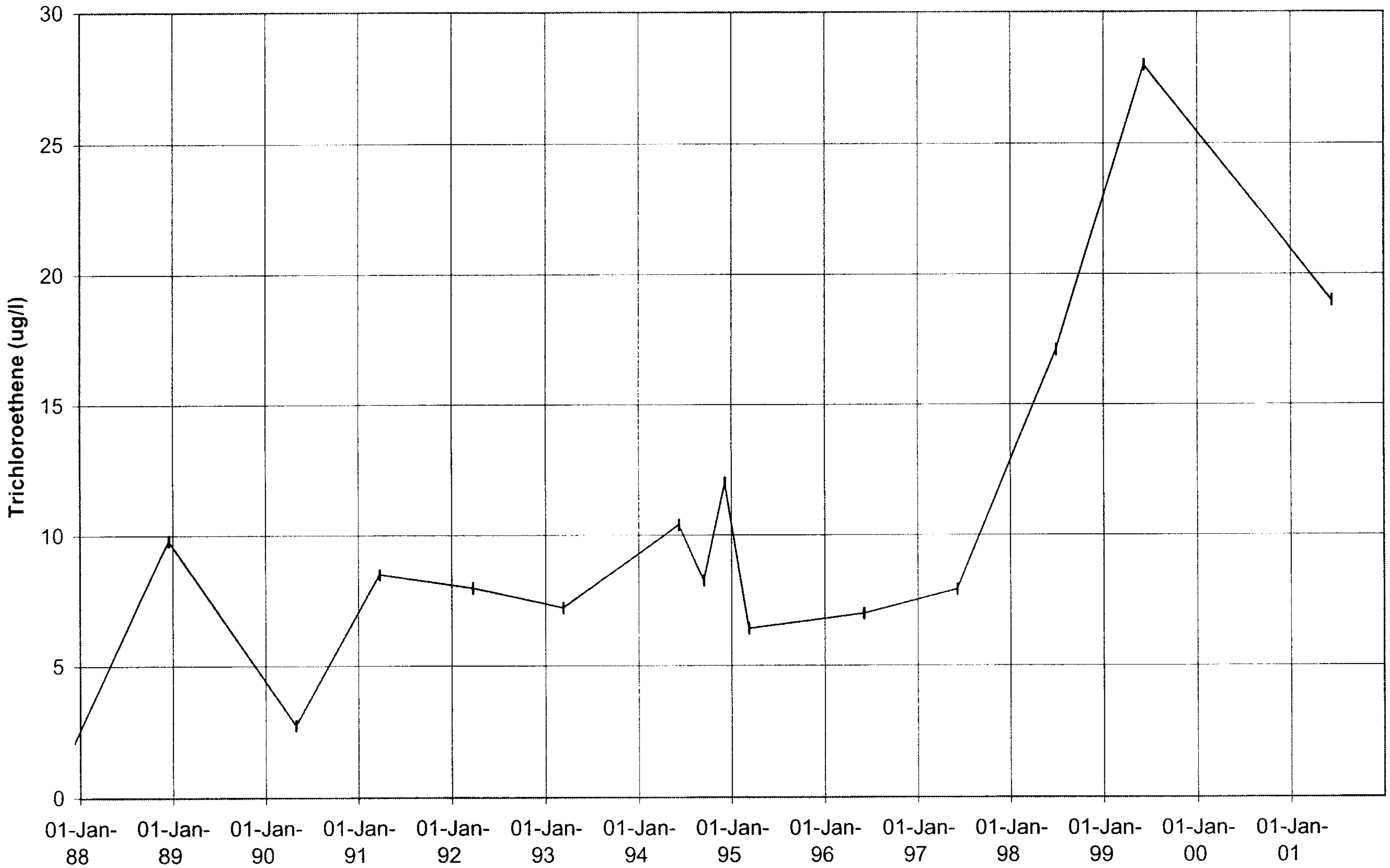
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U861



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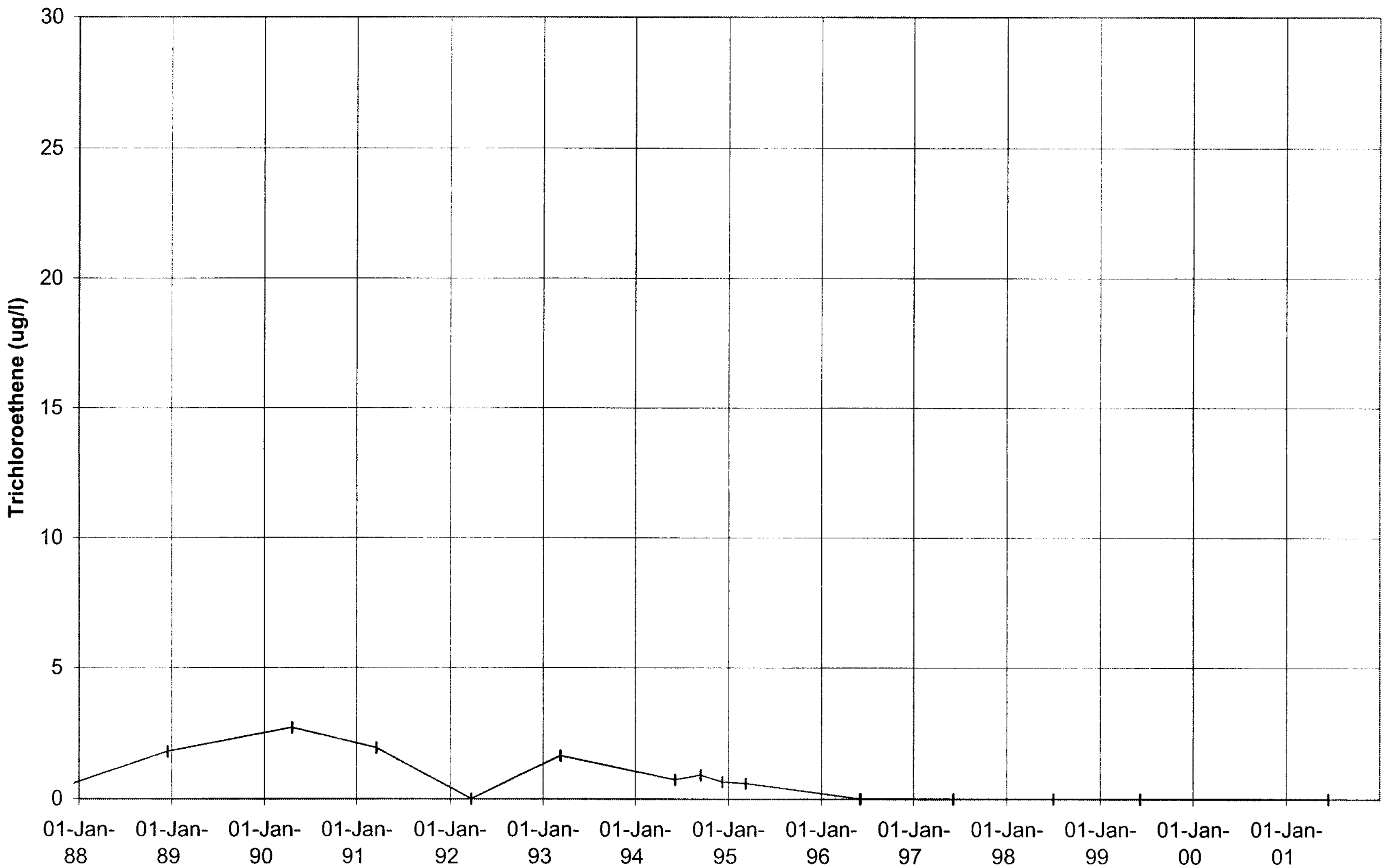
04U860



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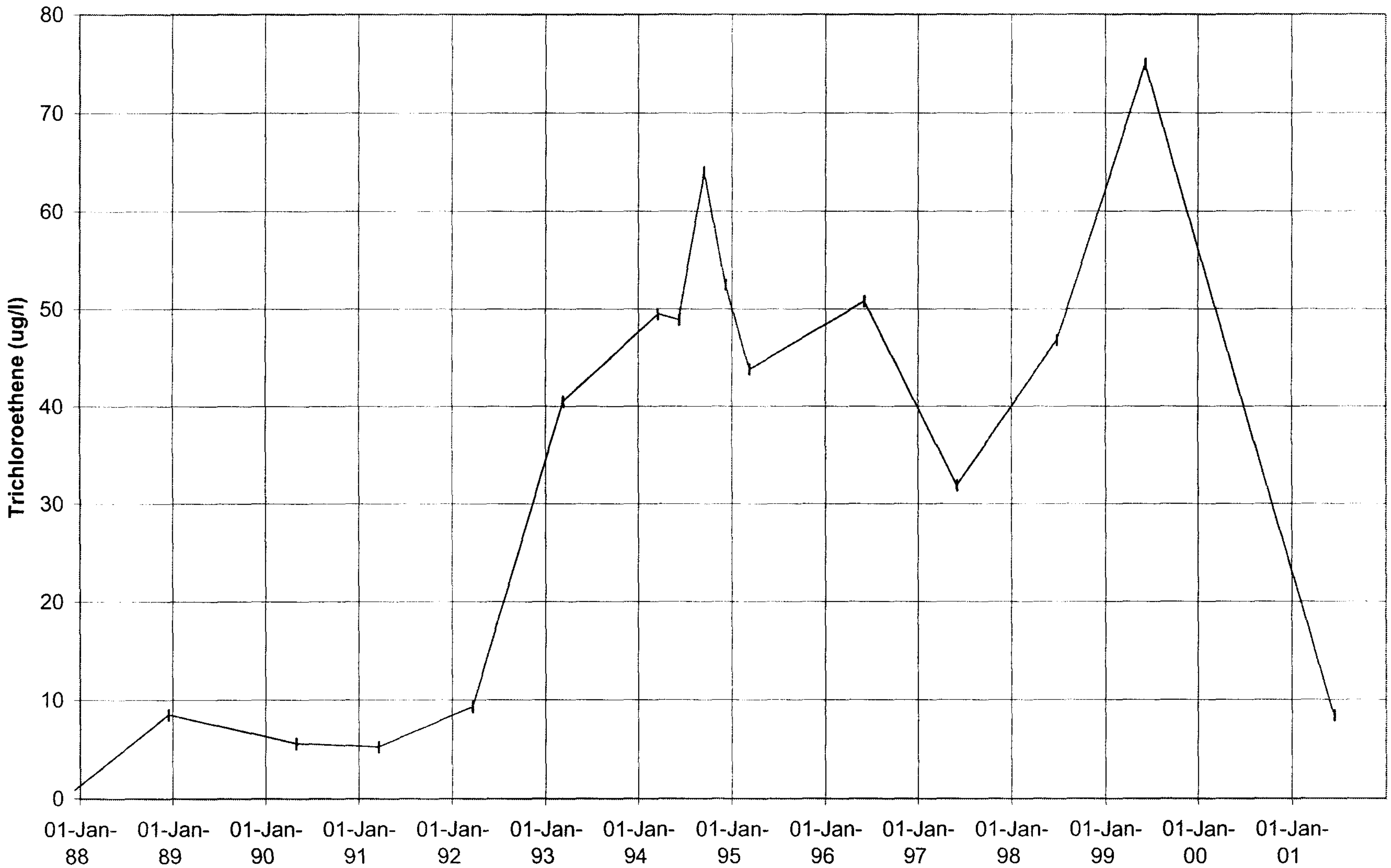
04U859



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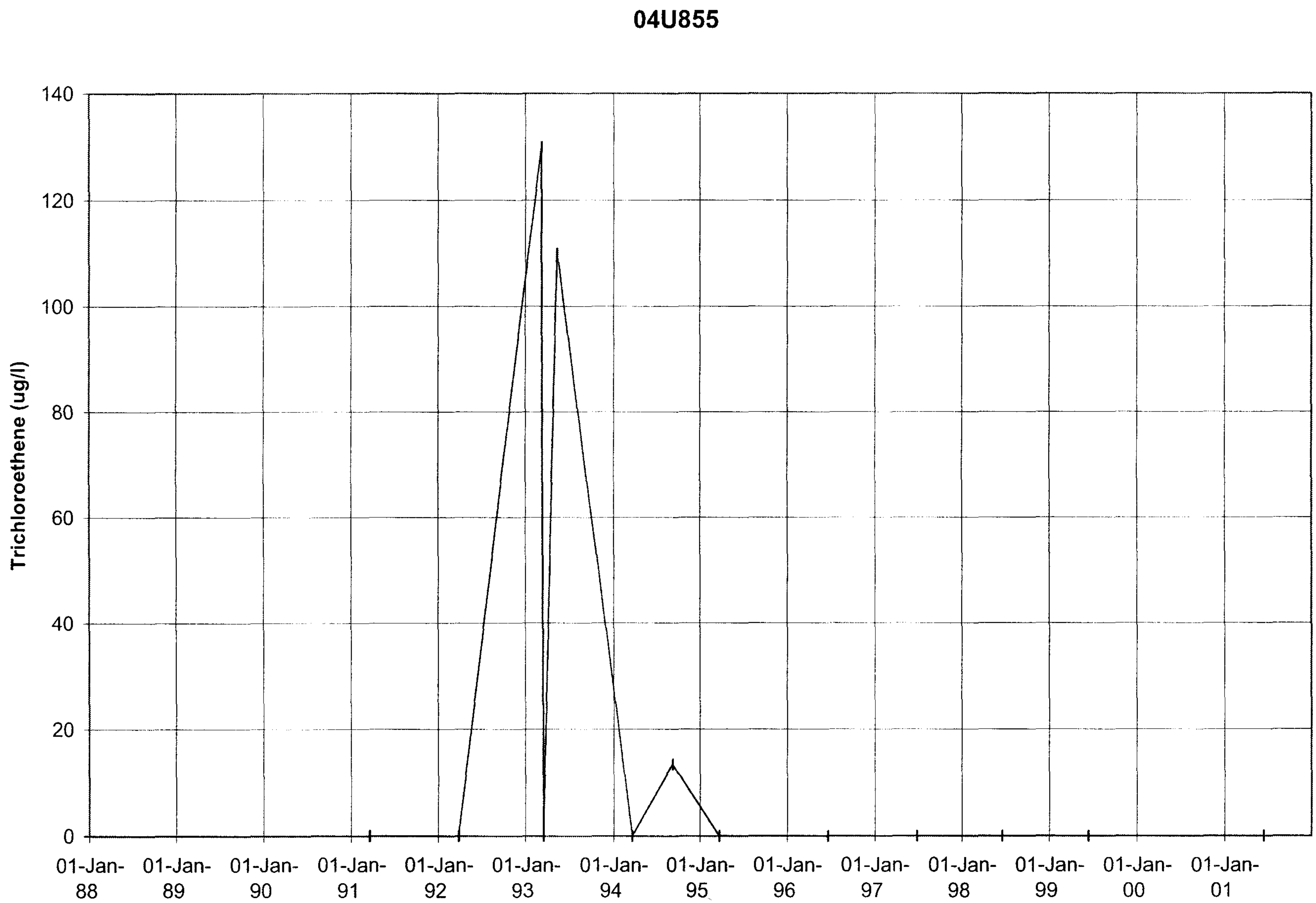
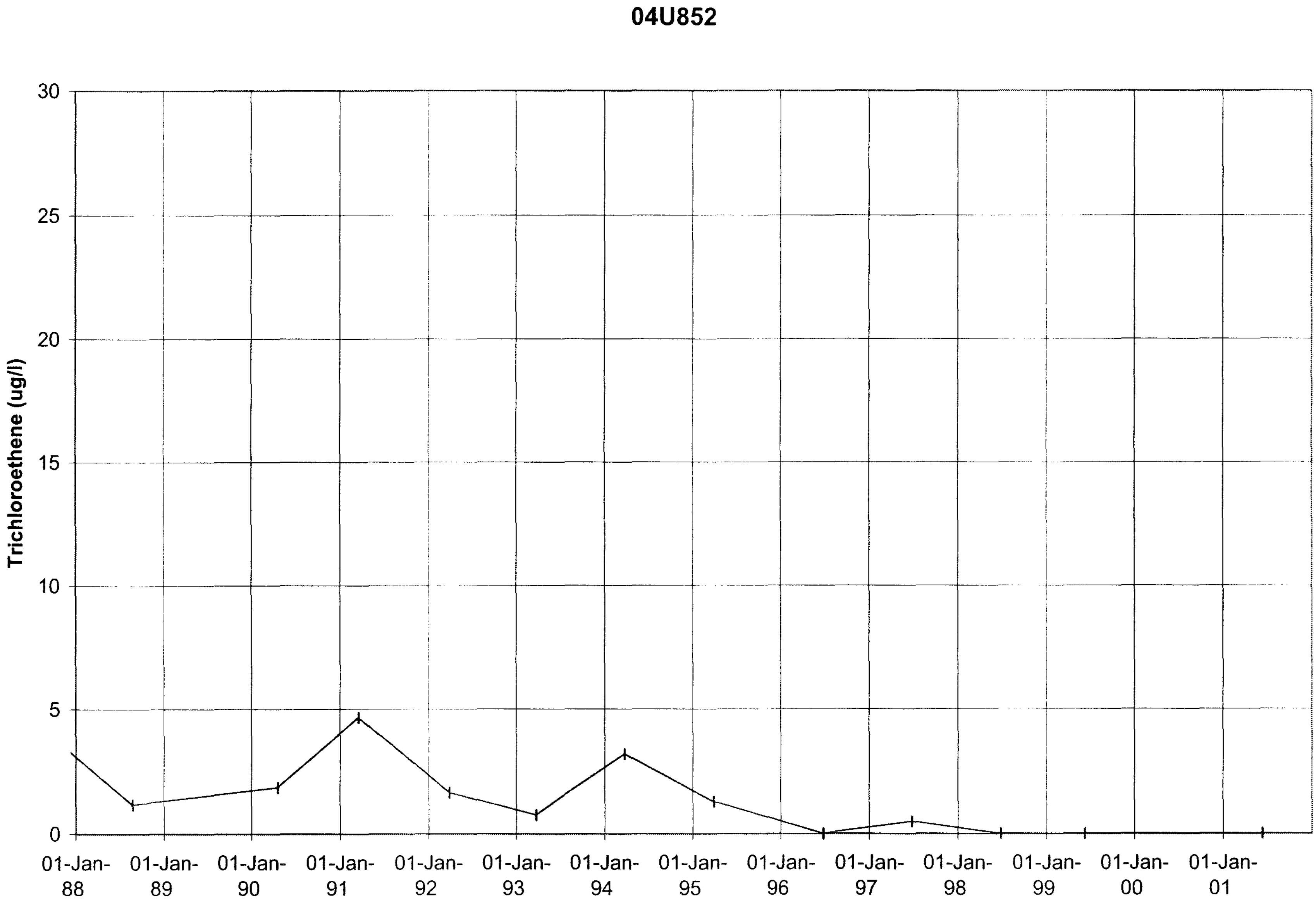
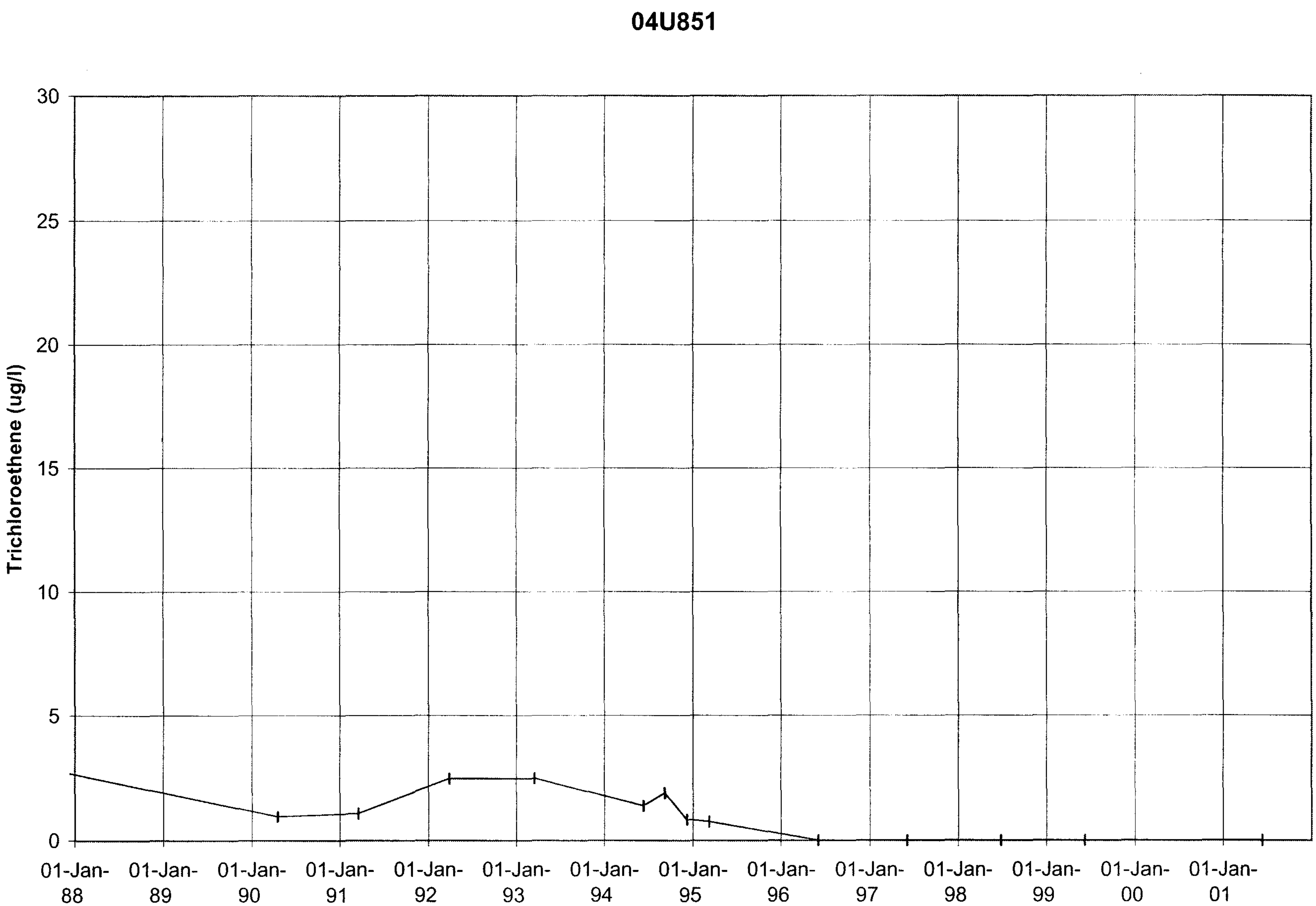


04U855
Trichloroethene (ug/l)
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

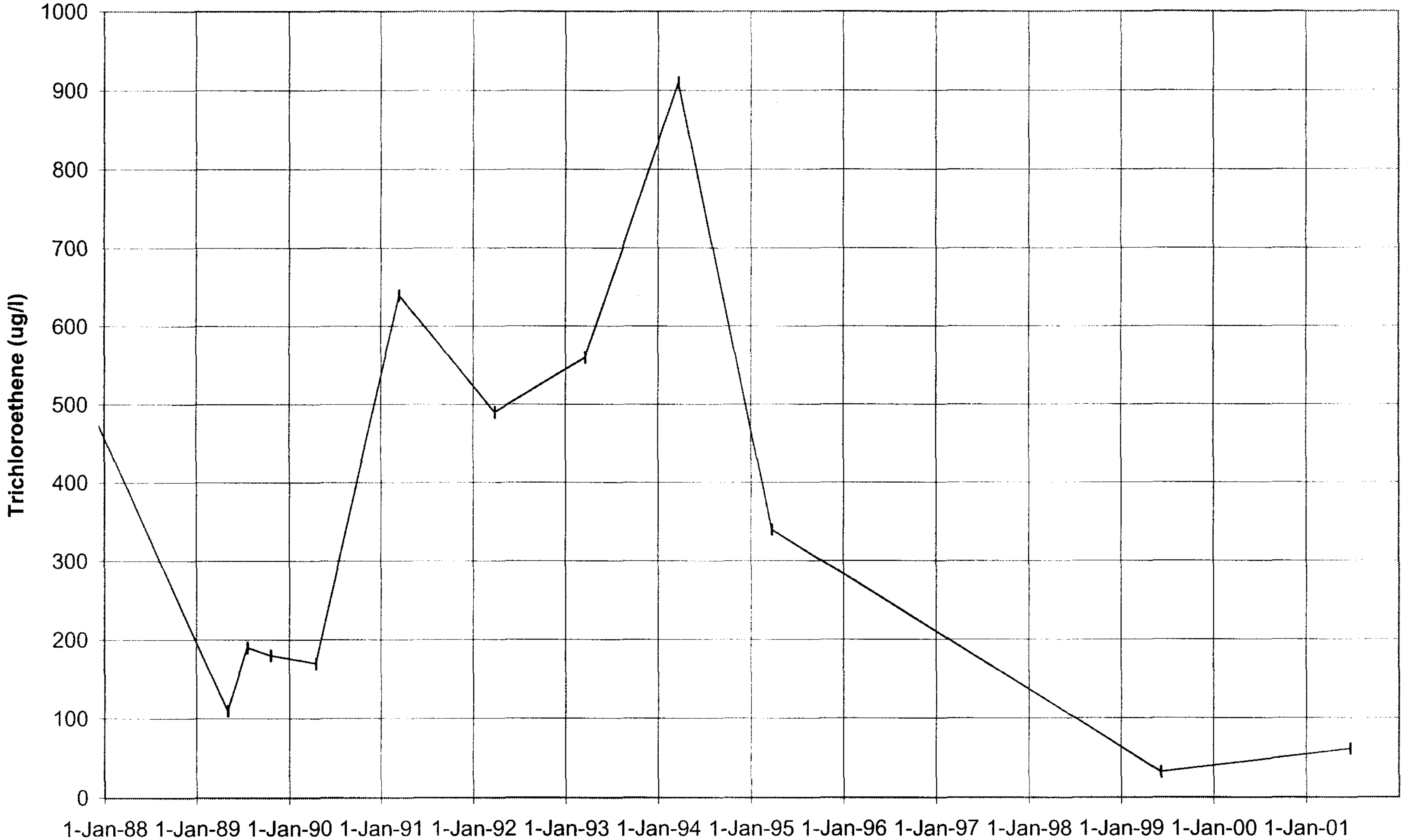

04U852
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


04U851
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U850



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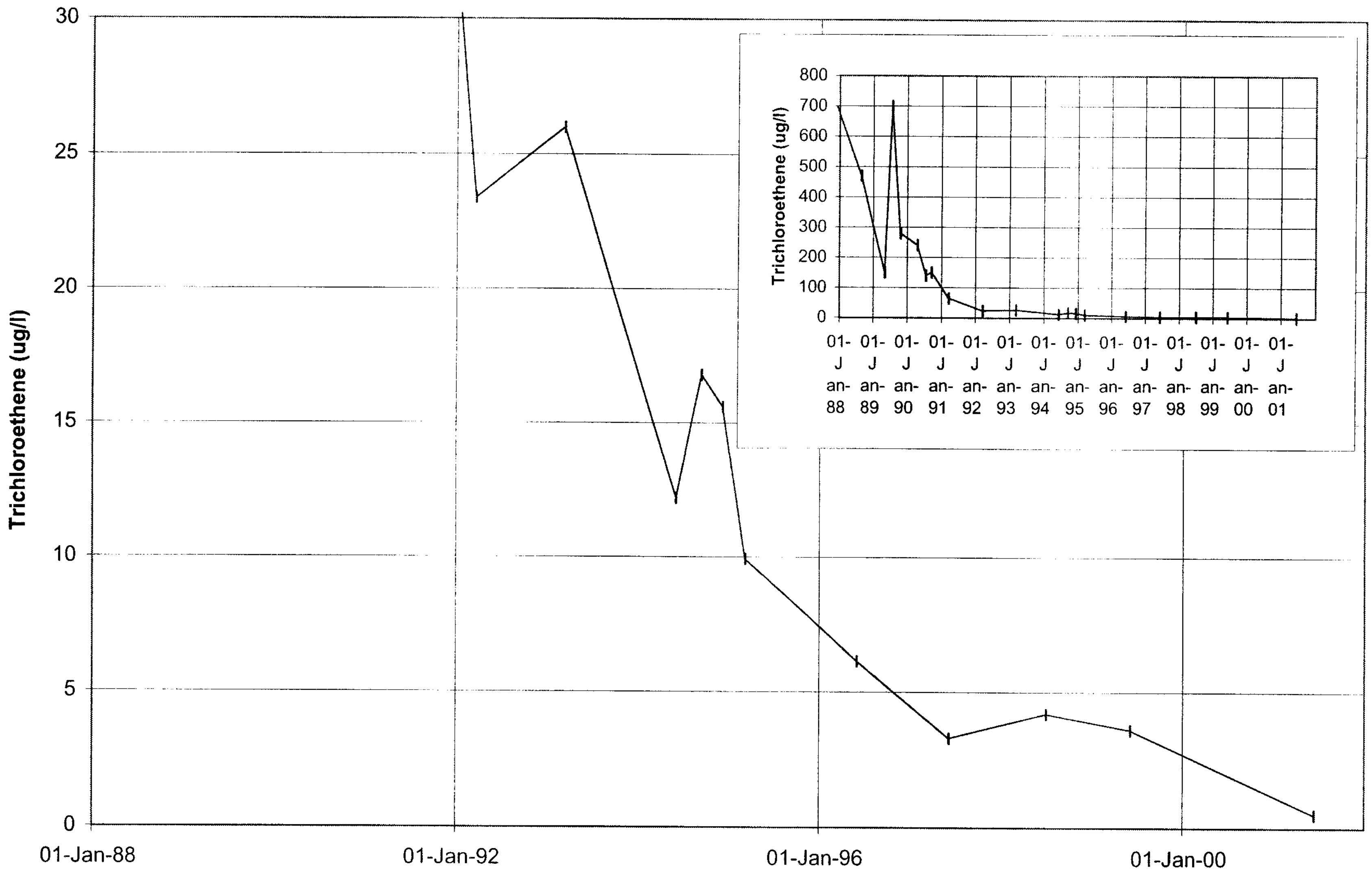
04U848



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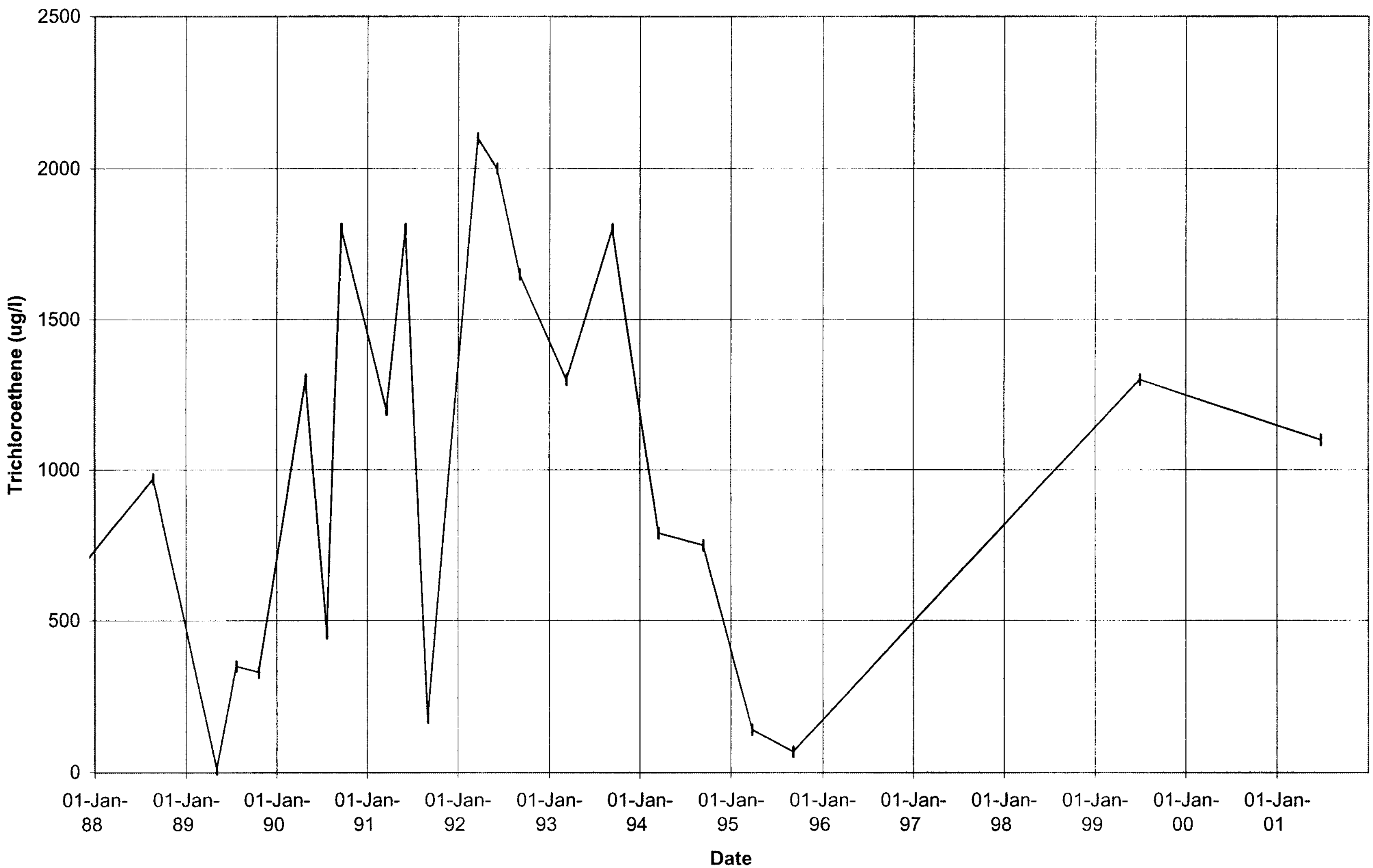
04U847



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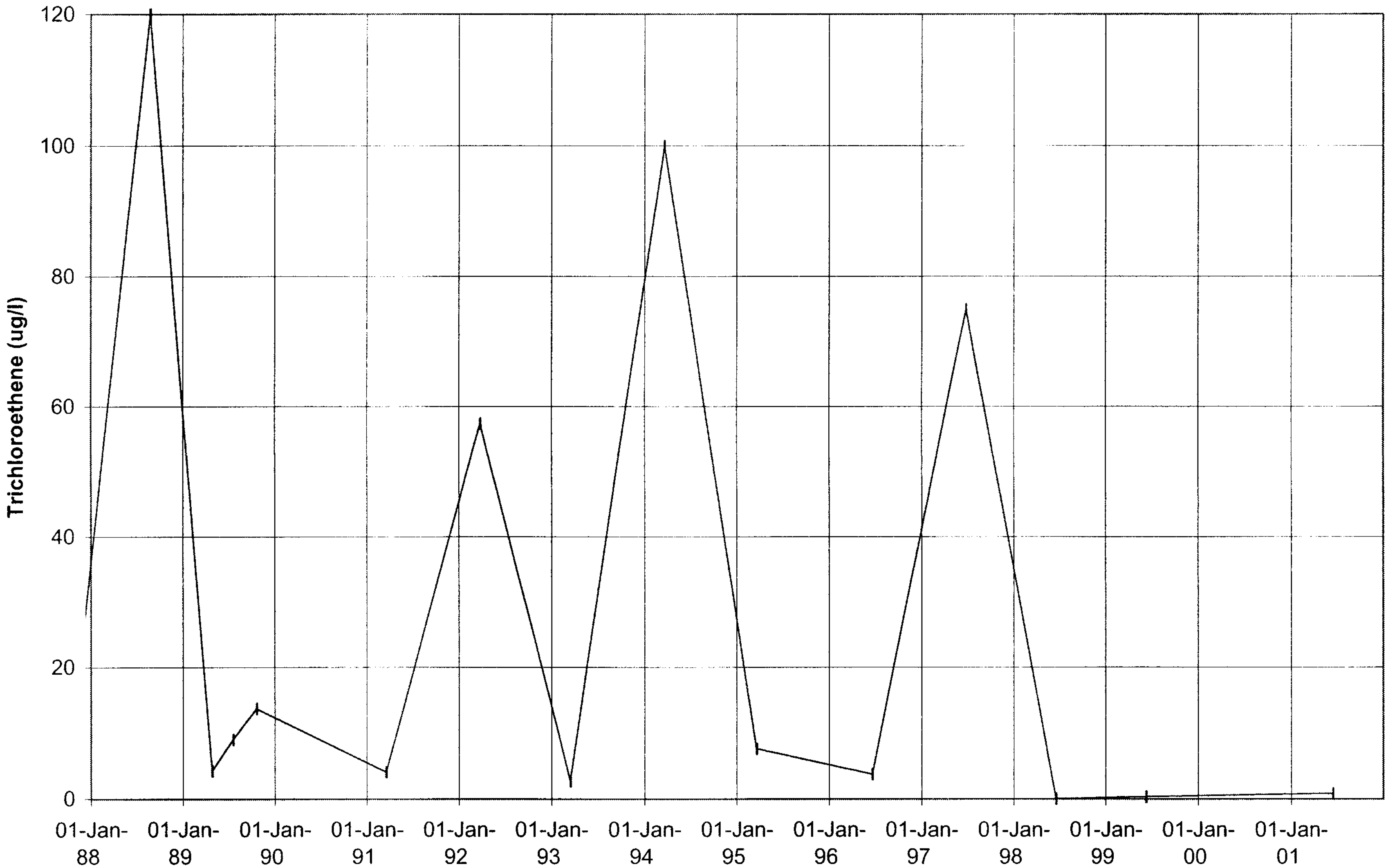
04U846



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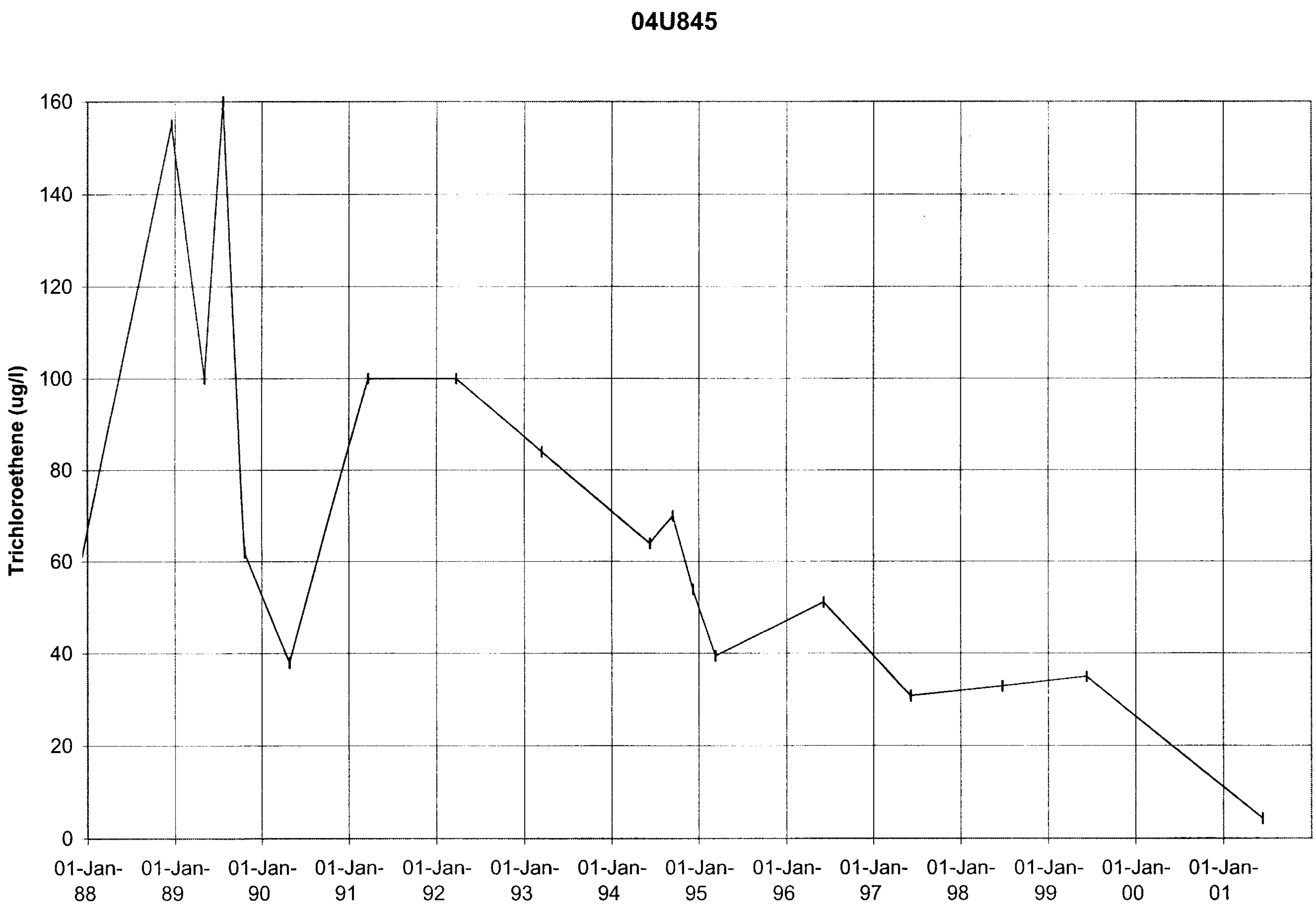
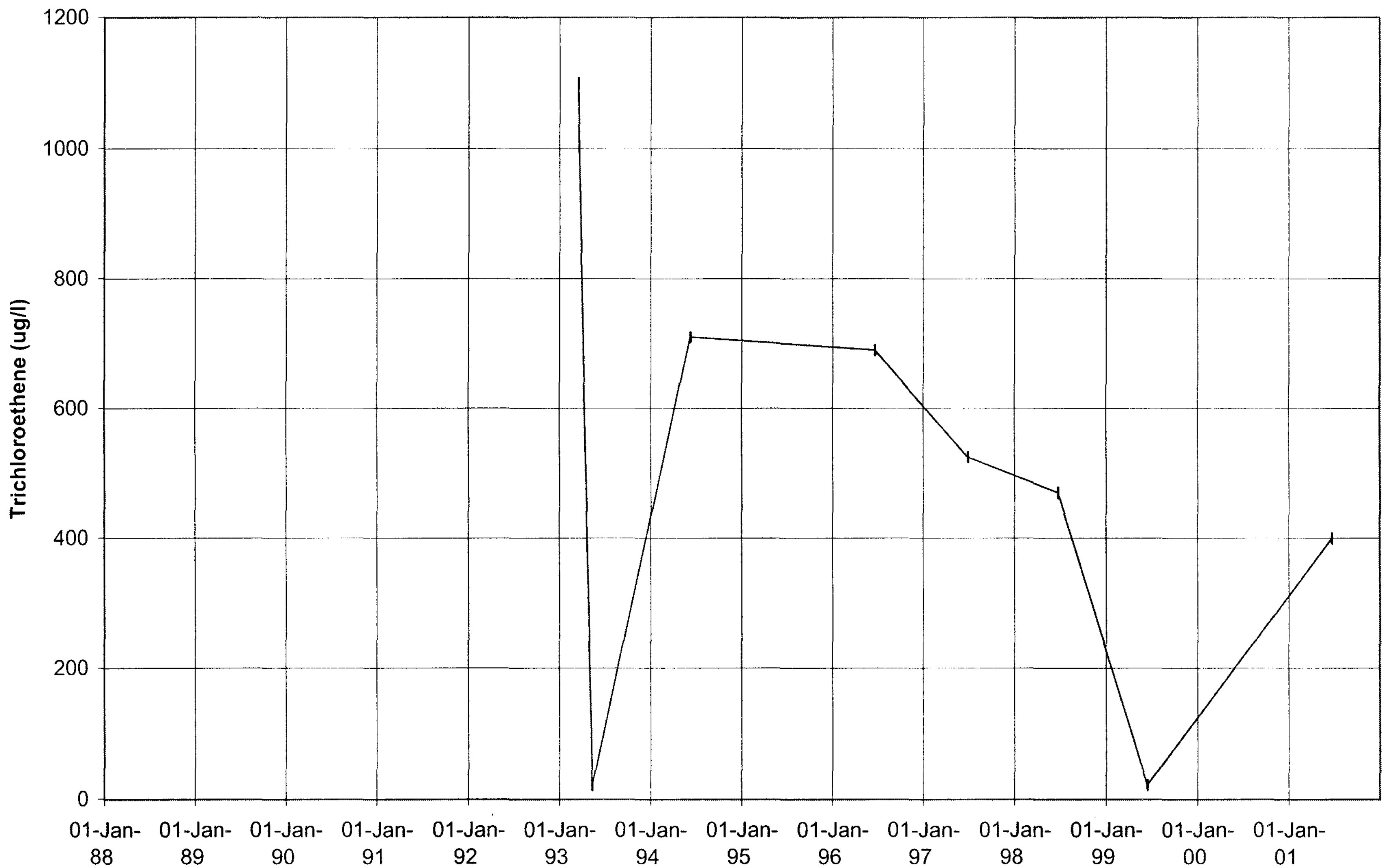

04U845
Trichloroethene (ug/l)
160
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U844



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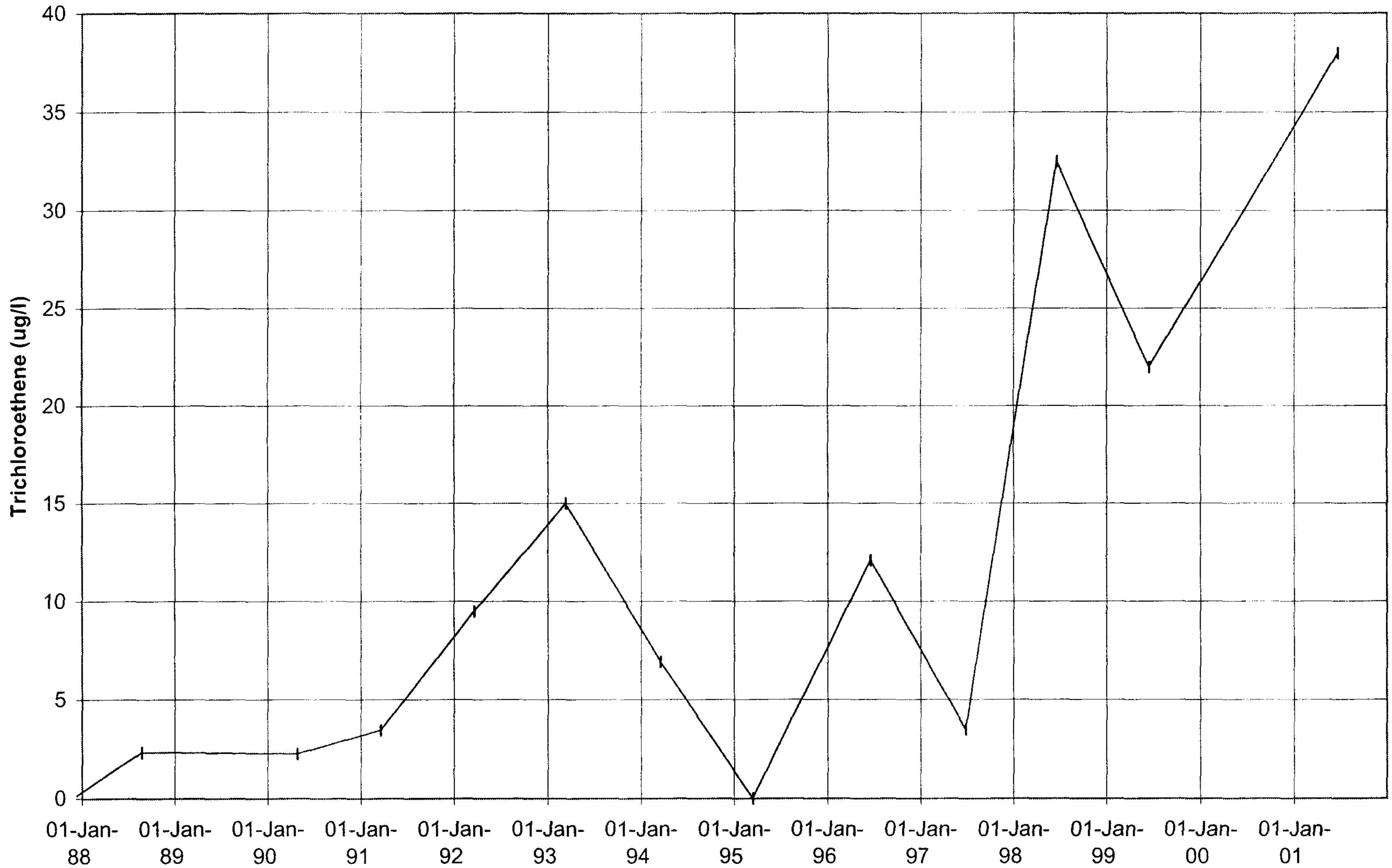
04U843



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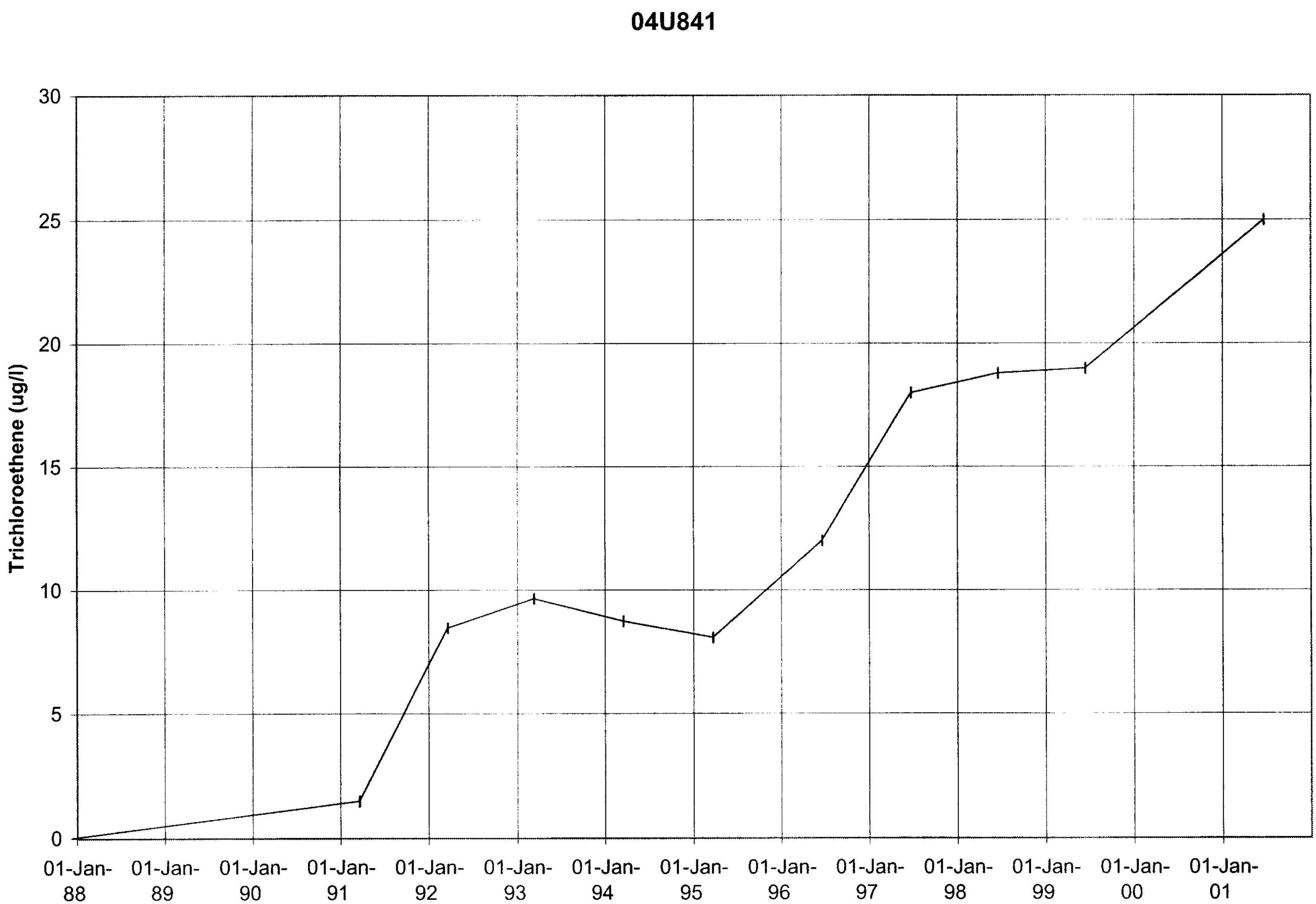

04U841
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
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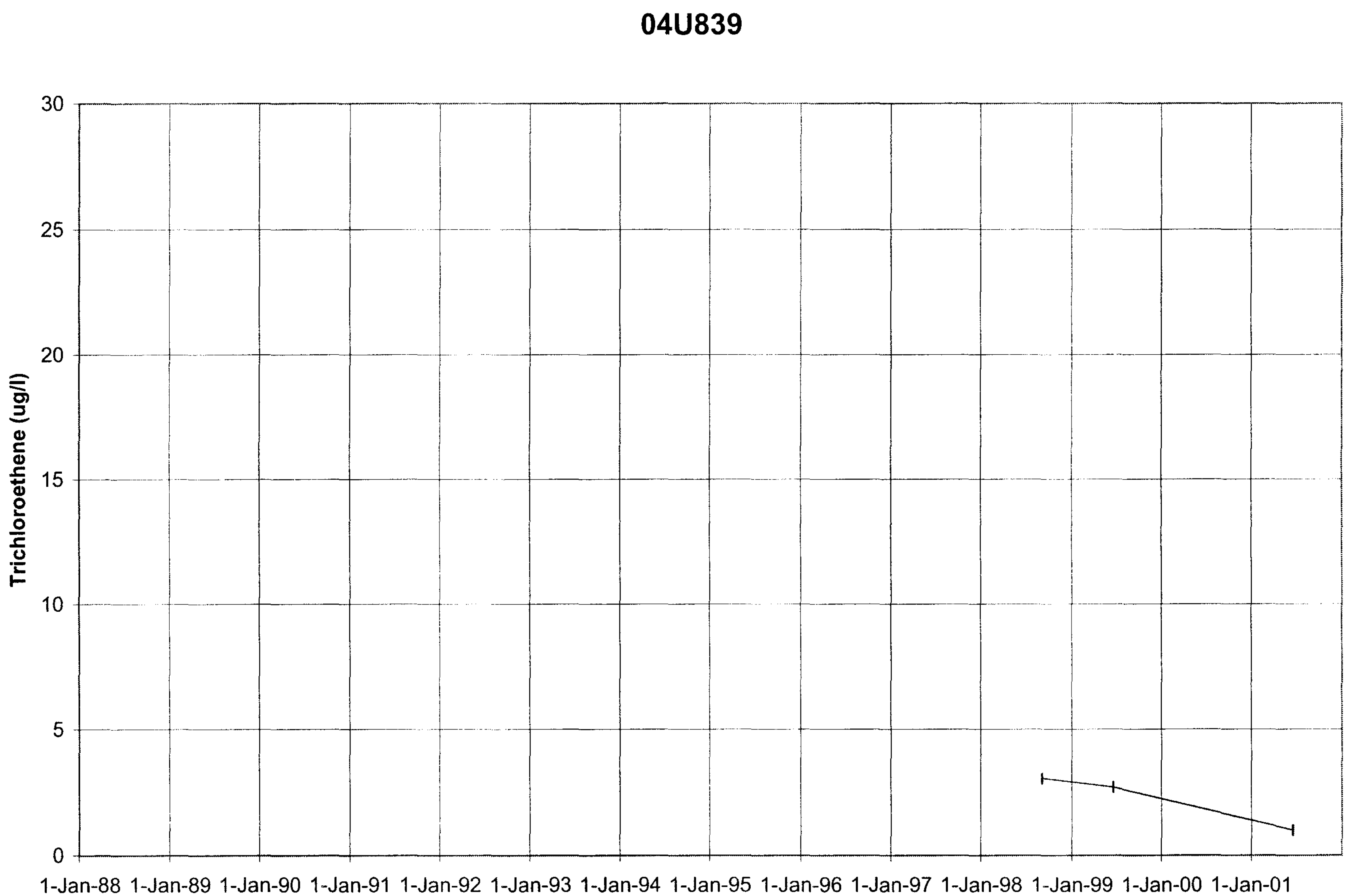
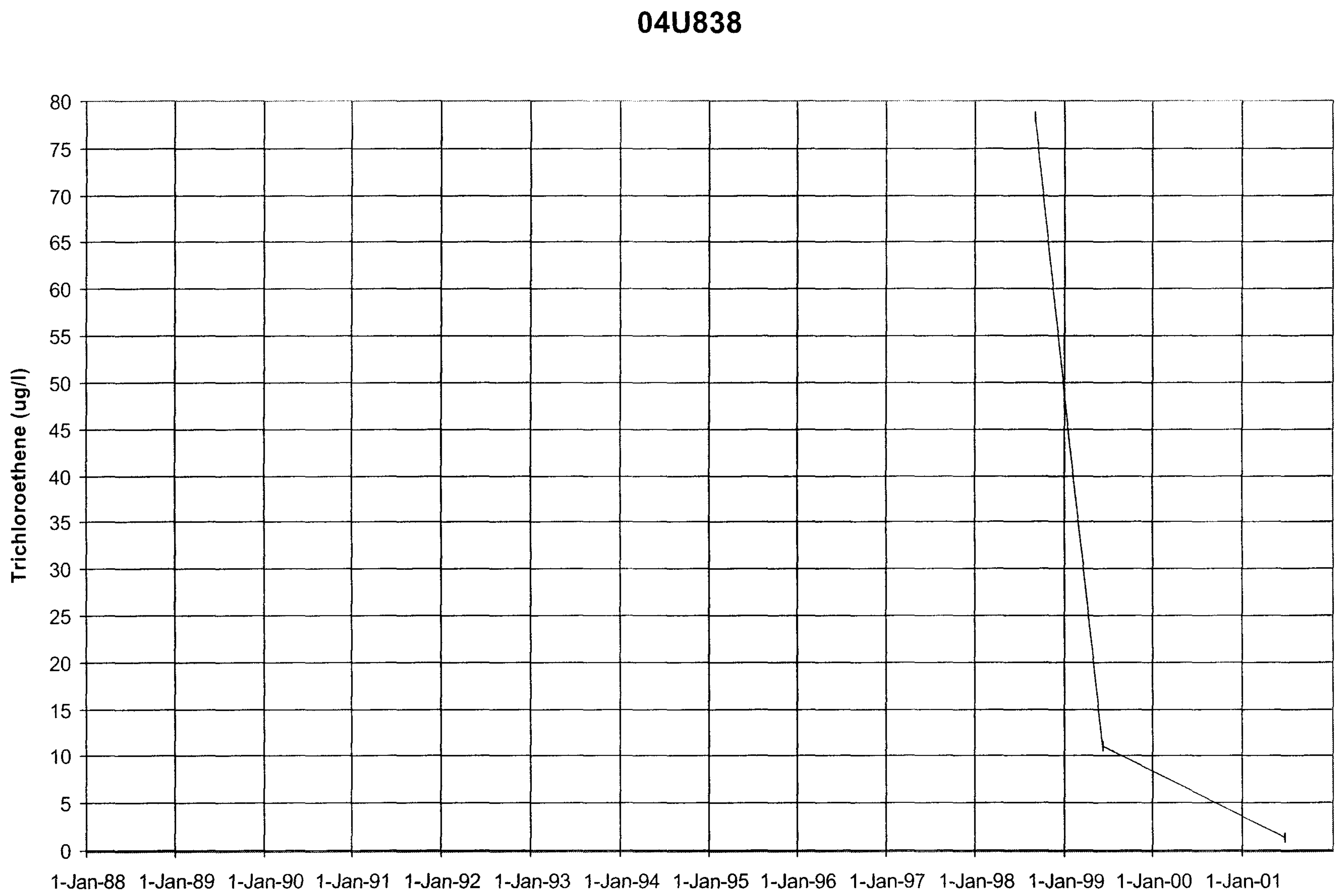
01-Jan-01

Back to Map



04U839
Trichloroethene (ug/l)
30
25
20
15
10
5
0
1-Jan-88
1-Jan-89
1-Jan-90
1-Jan-91
1-Jan-92
1-Jan-93
1-Jan-94
1-Jan-95
1-Jan-96
1-Jan-97
1-Jan-98
1-Jan-99
1-Jan-00
1-Jan-01

Back to Map


04U838
Trichloroethene (ug/l)
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1-Jan-88
1-Jan-89
1-Jan-90
1-Jan-91
1-Jan-92
1-Jan-93
1-Jan-94
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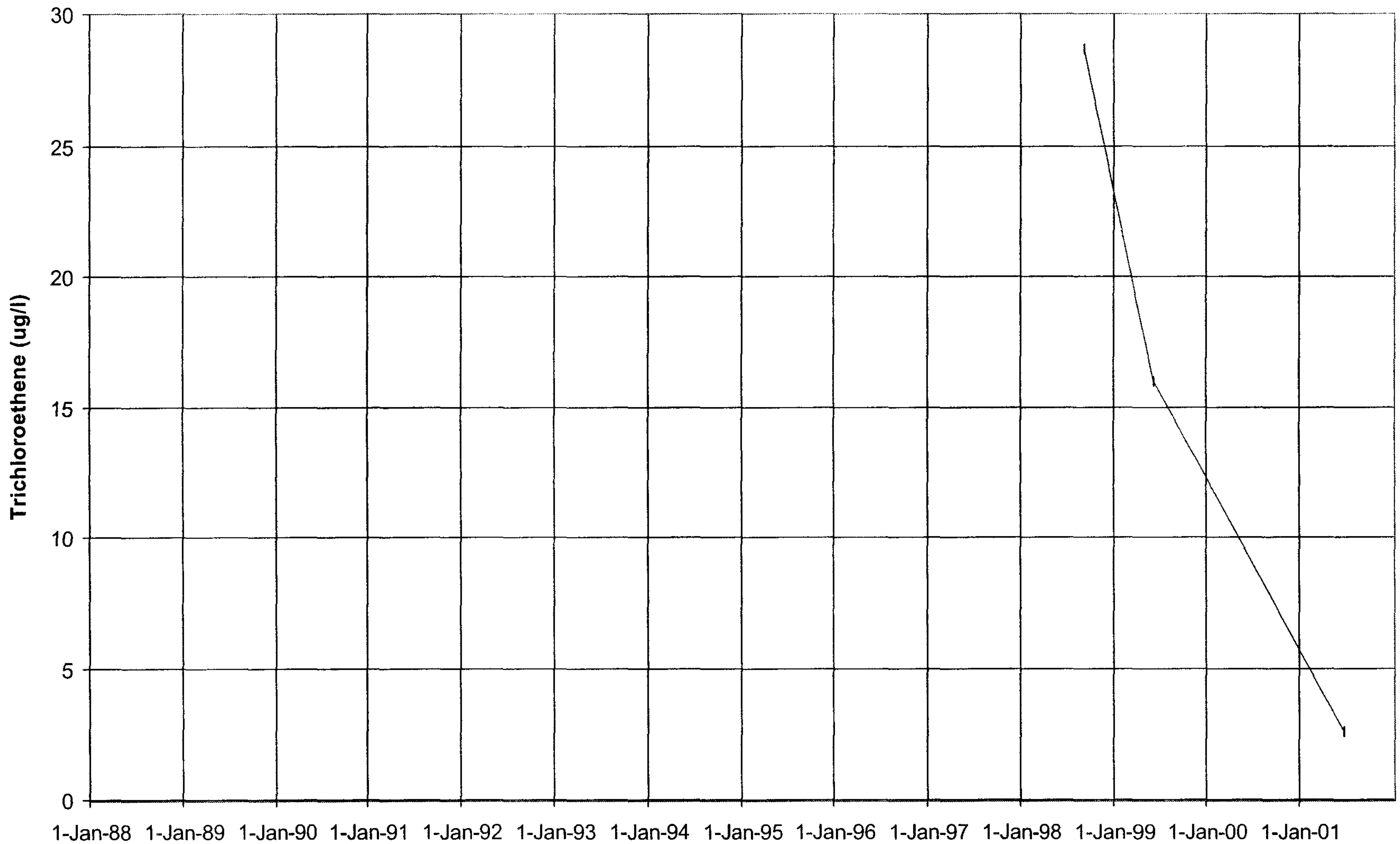
1-Jan-00
1-Jan-01

Back to Map

04U837



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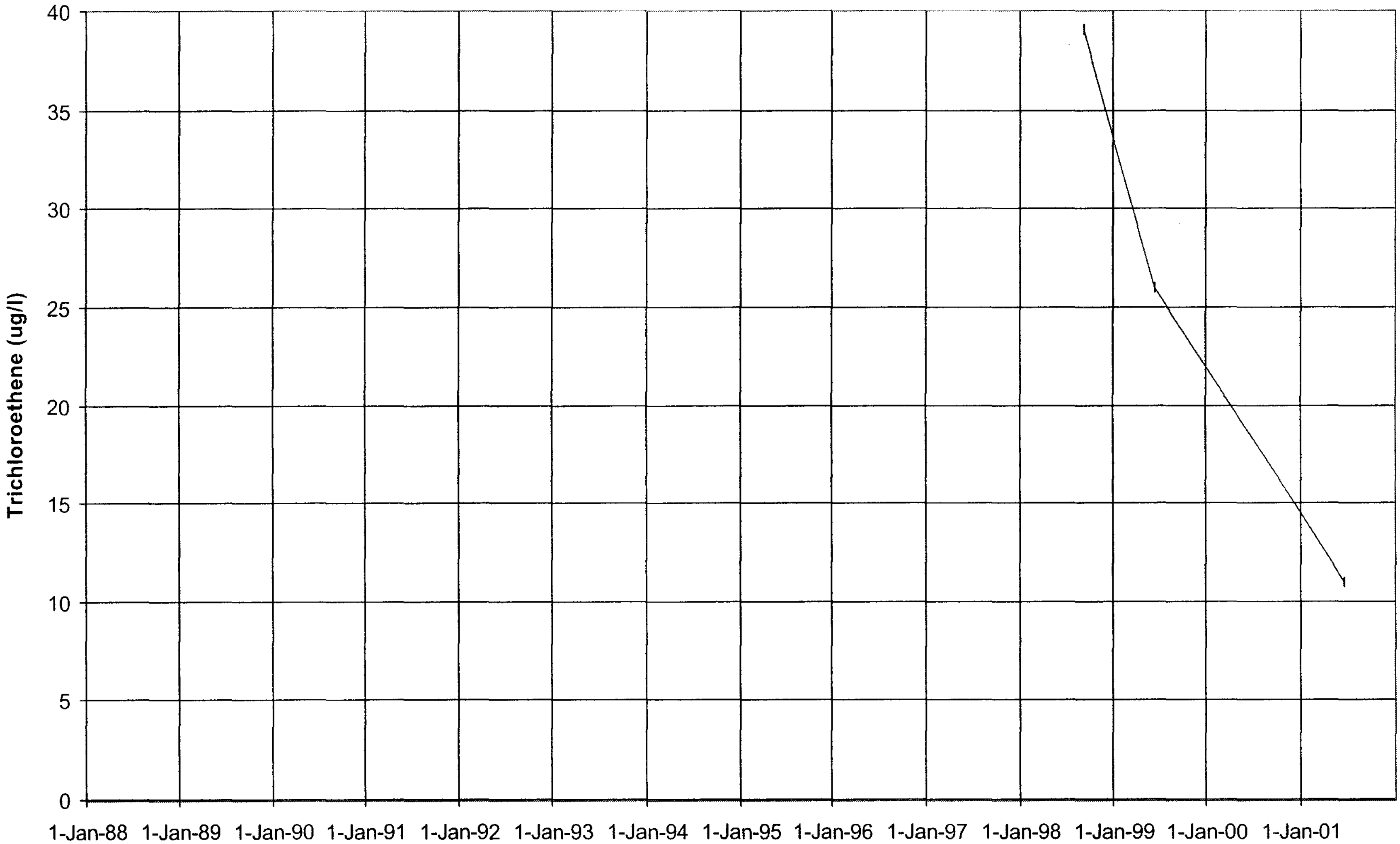
04U836



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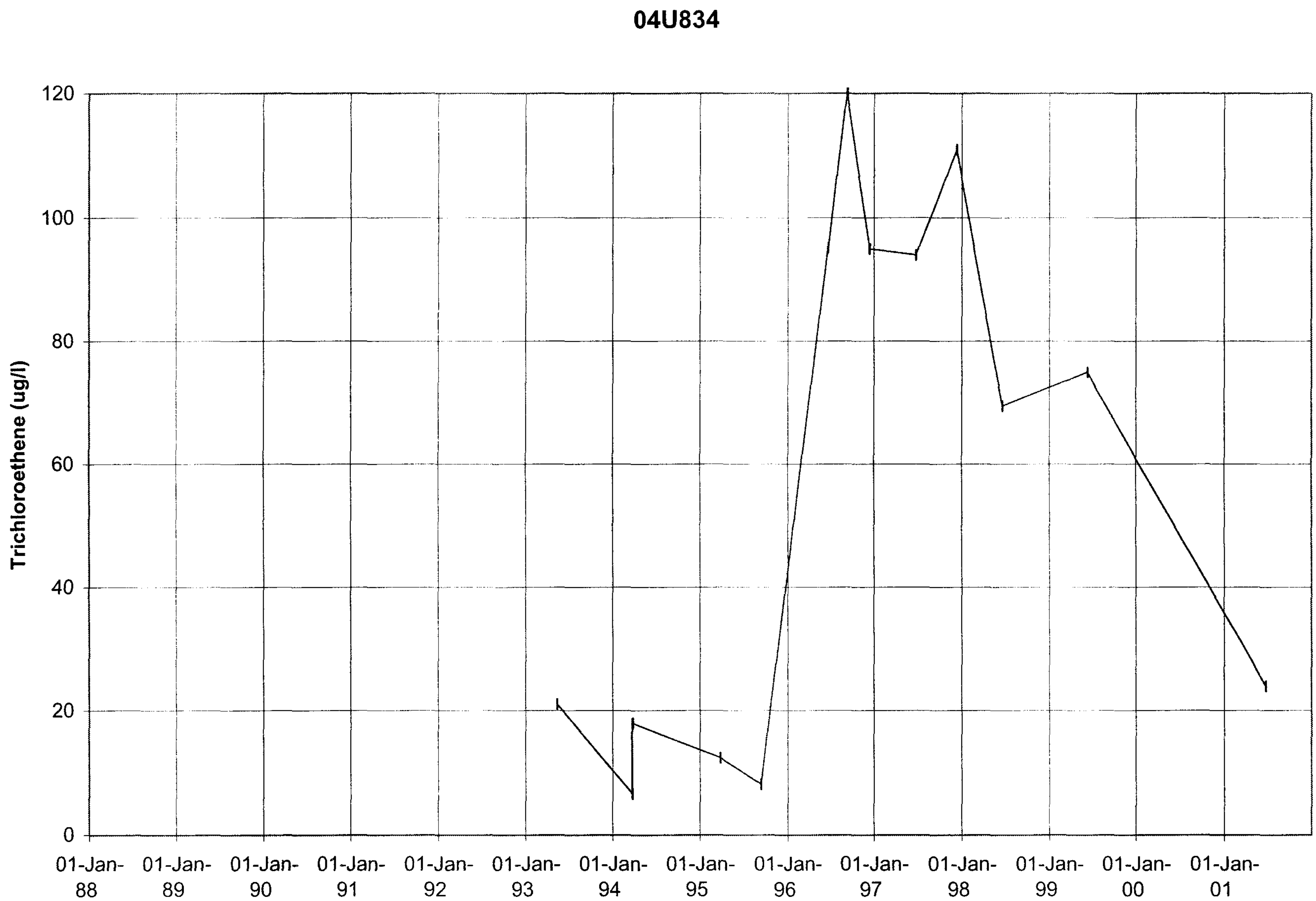

04U834
Trichloroethene (ug/l)
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-97
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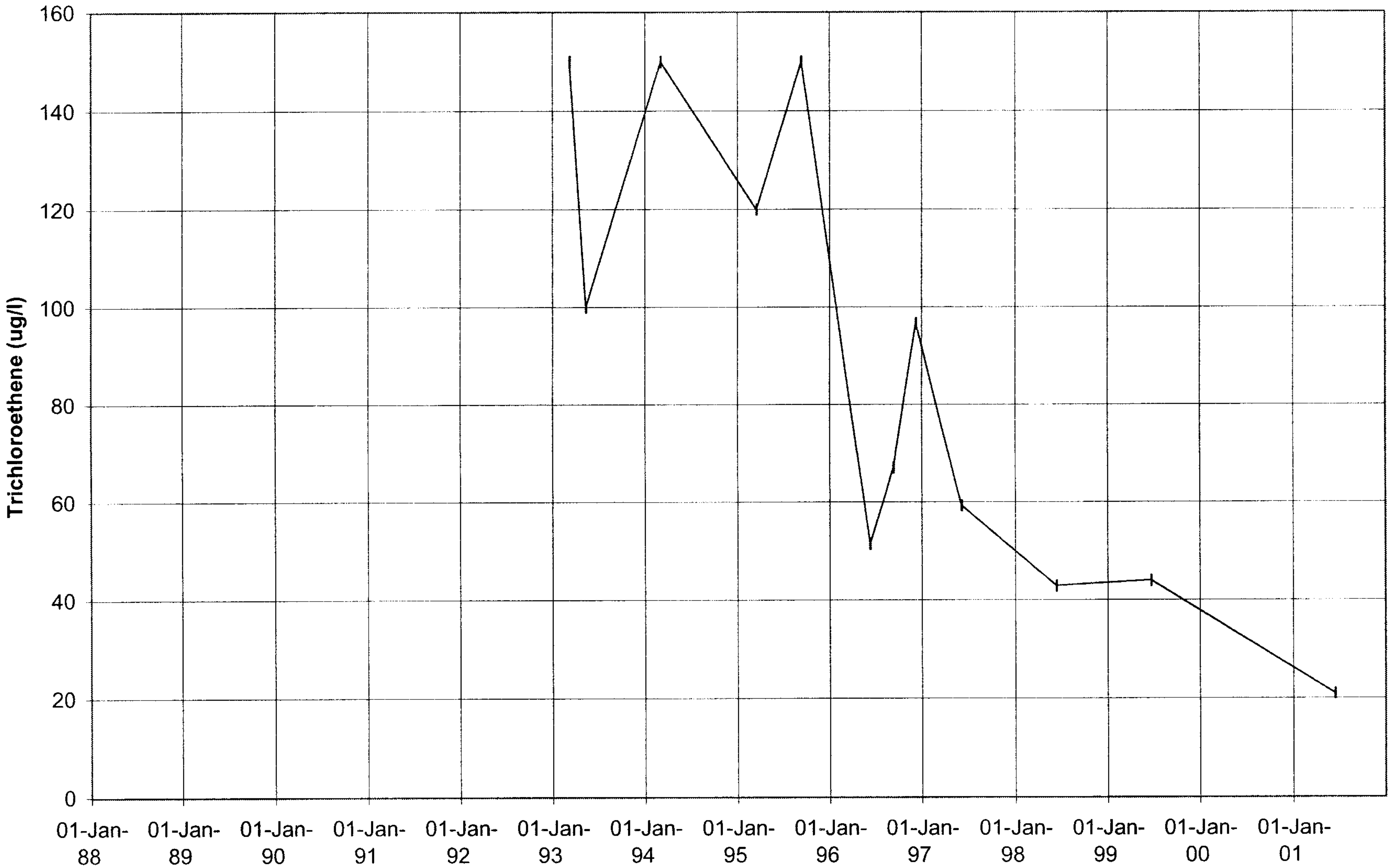
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U833



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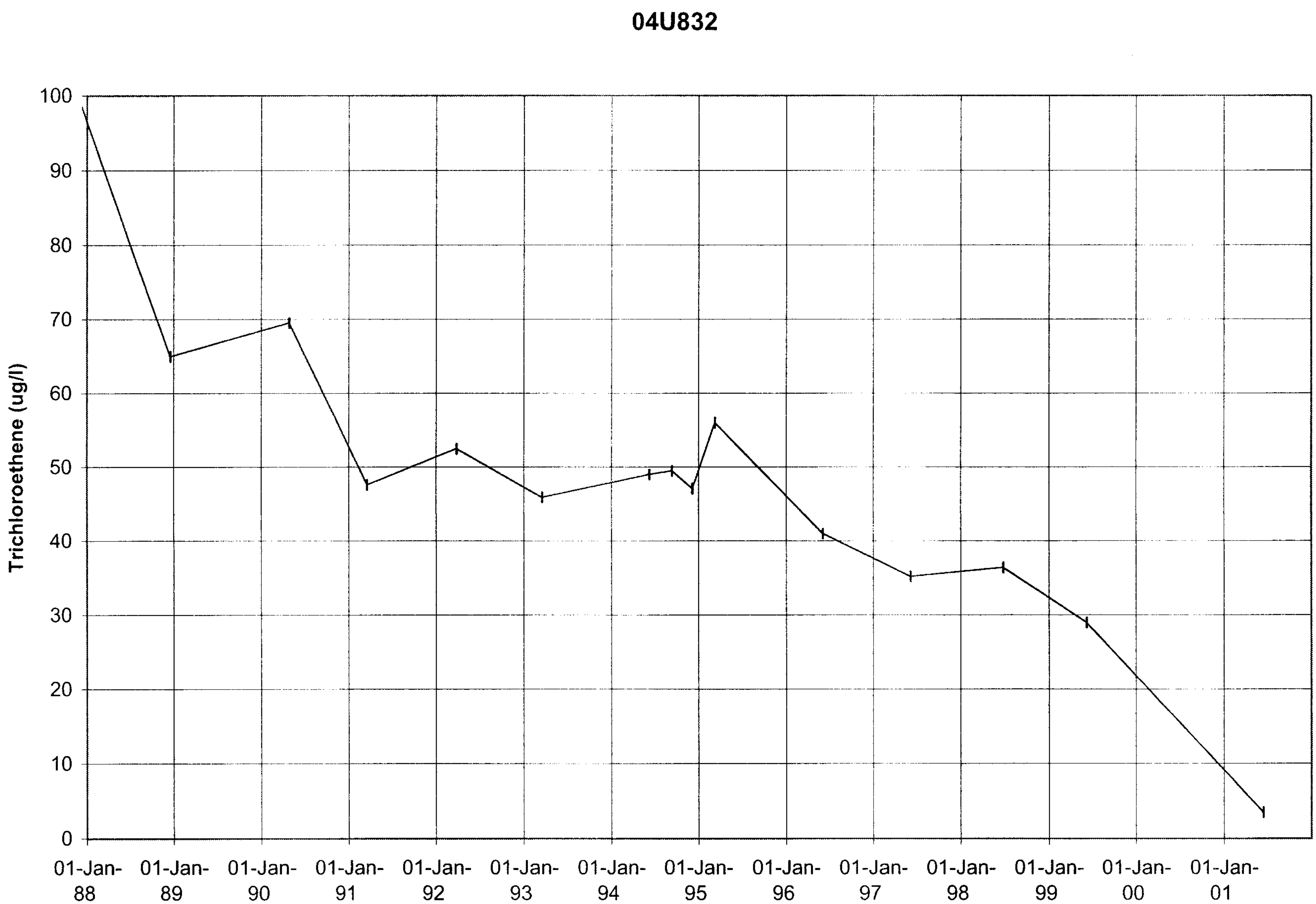
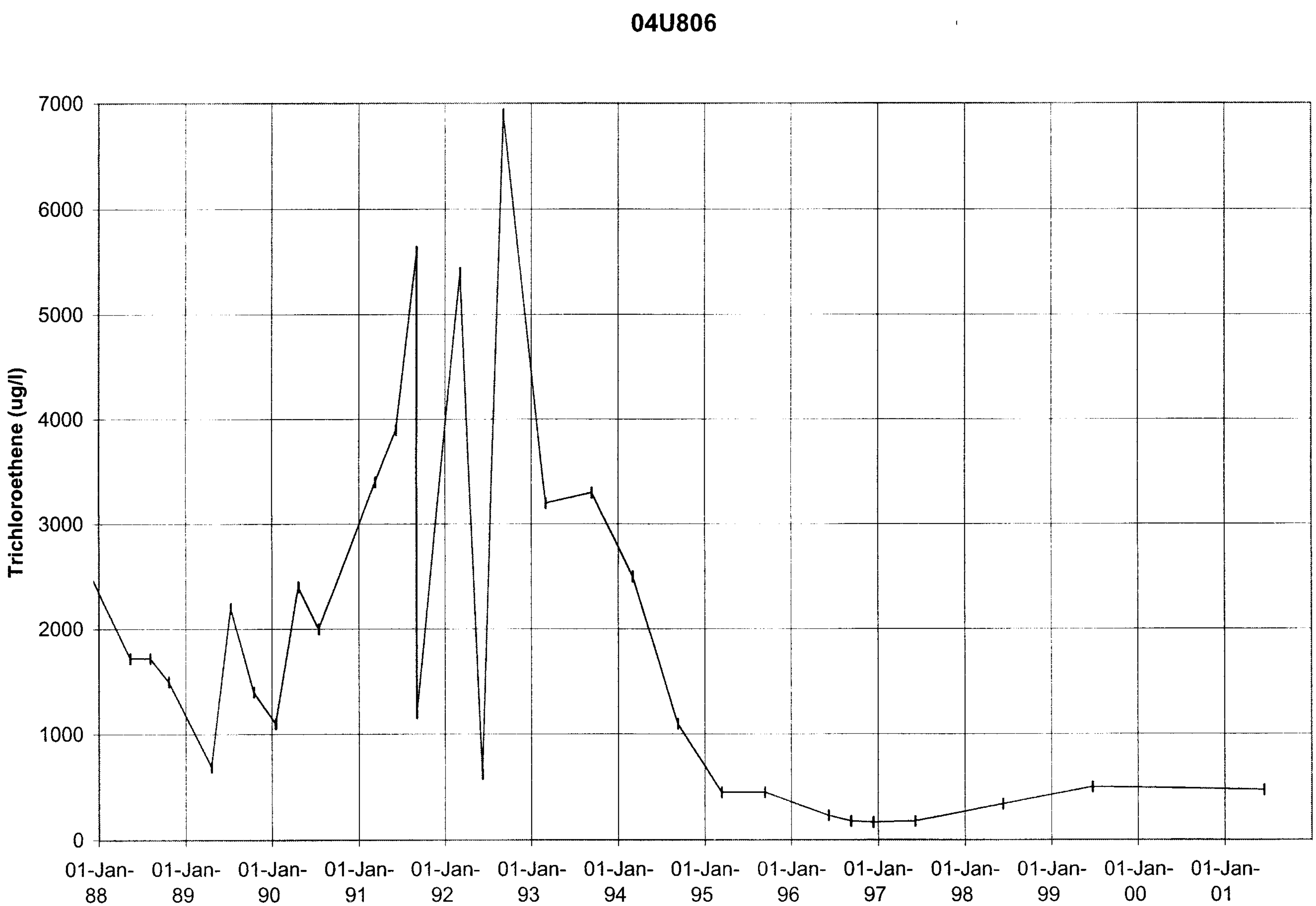

04U832
Trichloroethene (ug/l)
100
90
80
70
60
50
40
30
20
10
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map



04U806
Trichloroethene (ug/l)
7000
6000
5000
4000
3000
2000
1000
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-96
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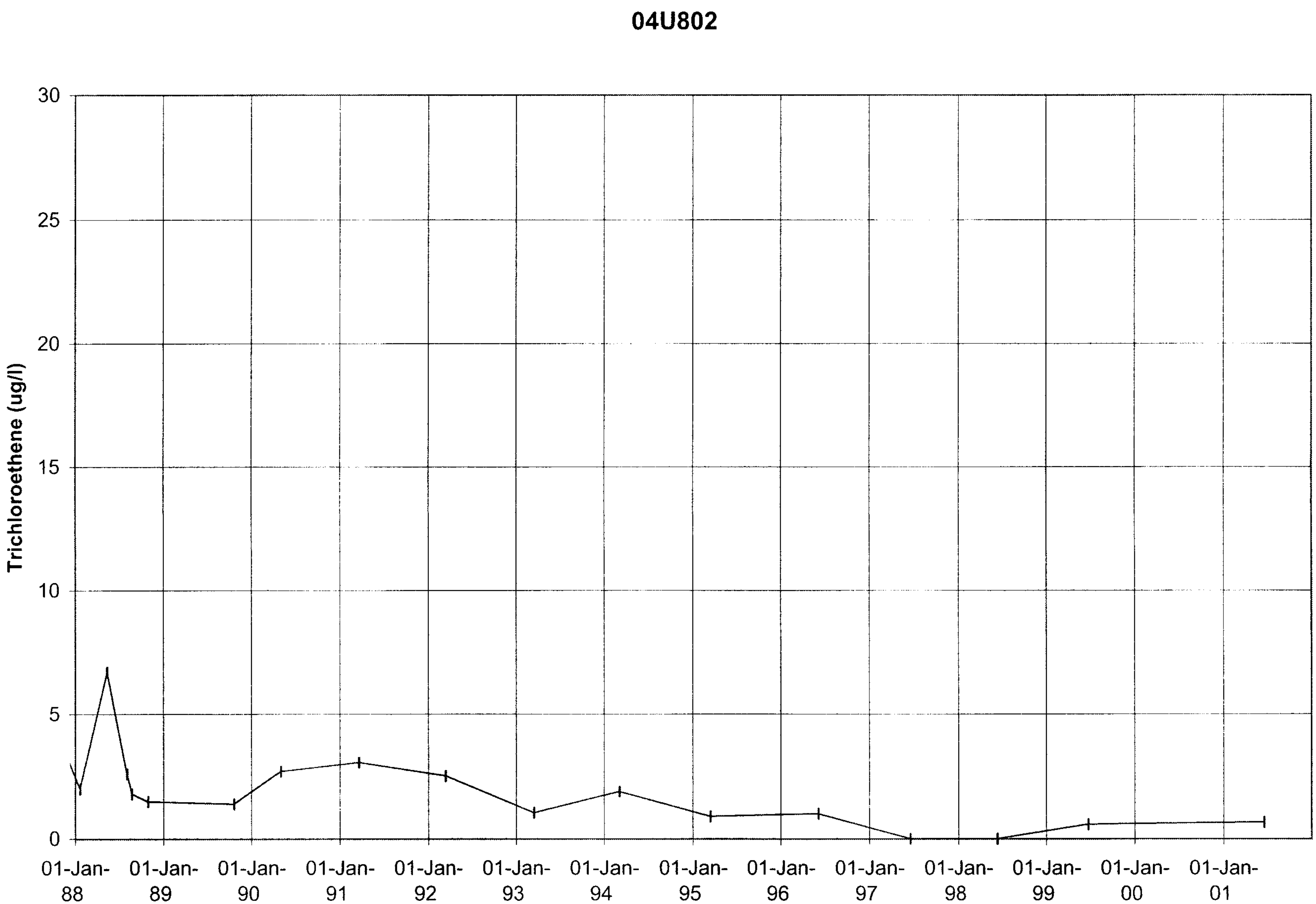
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


04U802
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
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01-Jan-97
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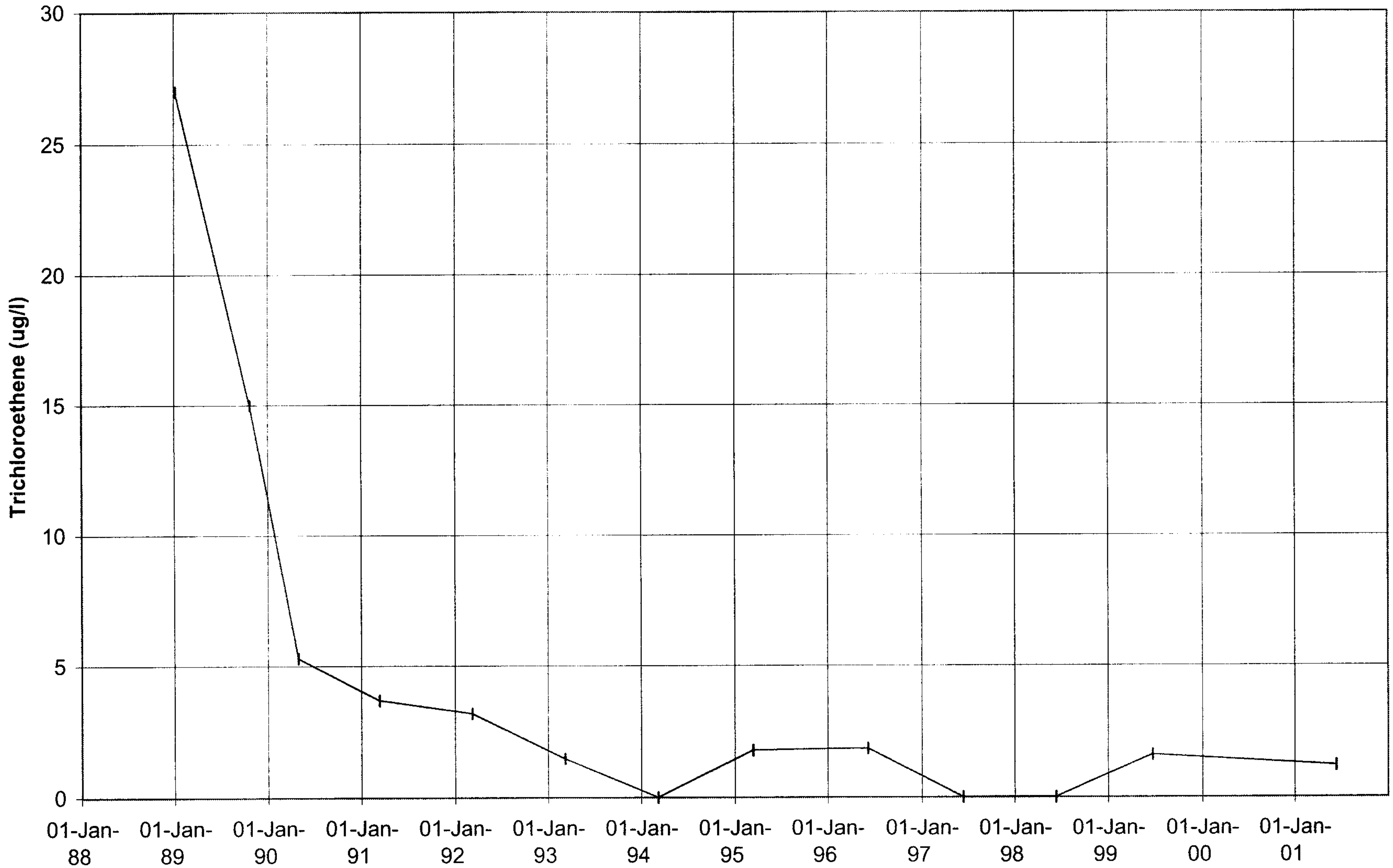
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U713



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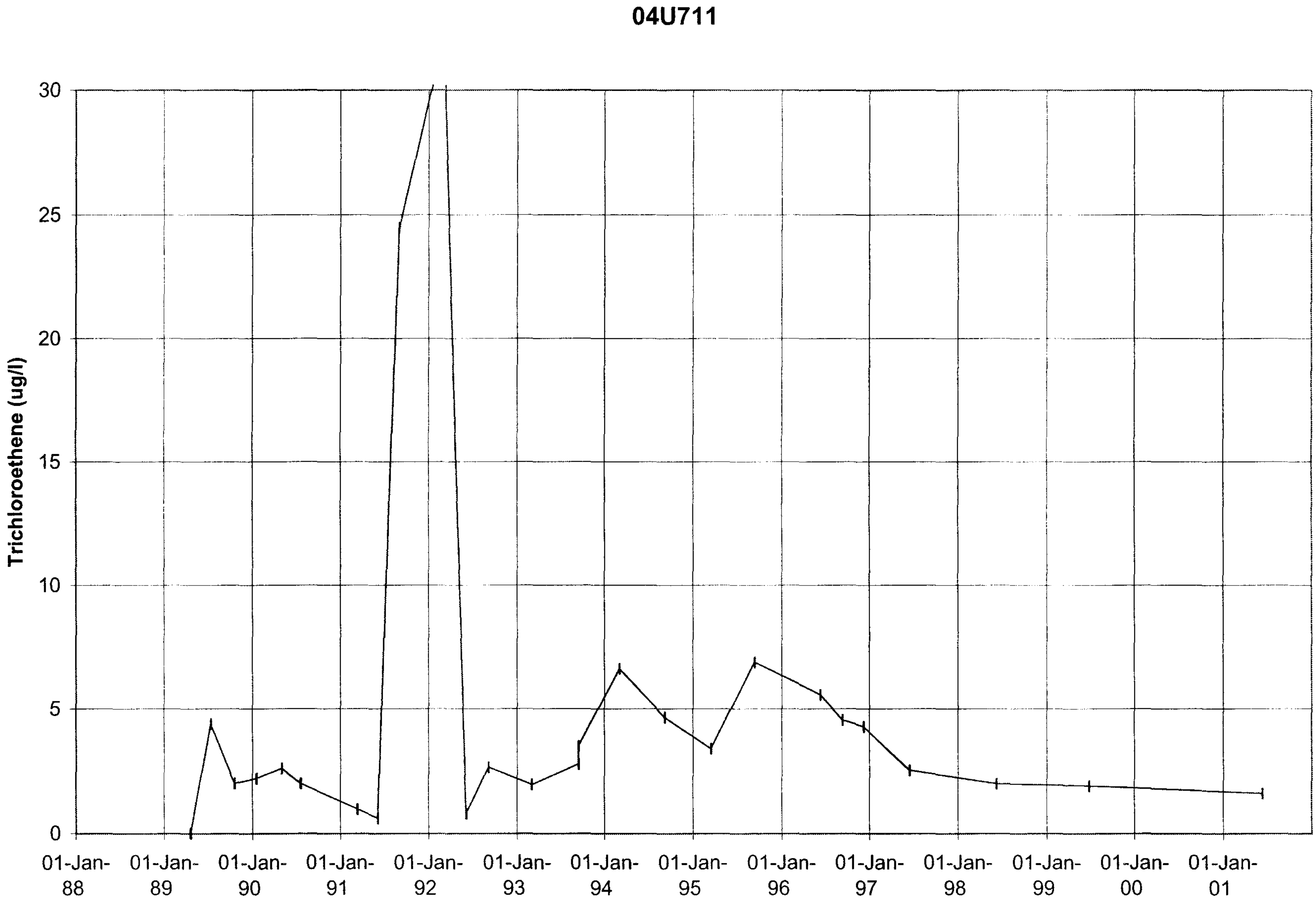
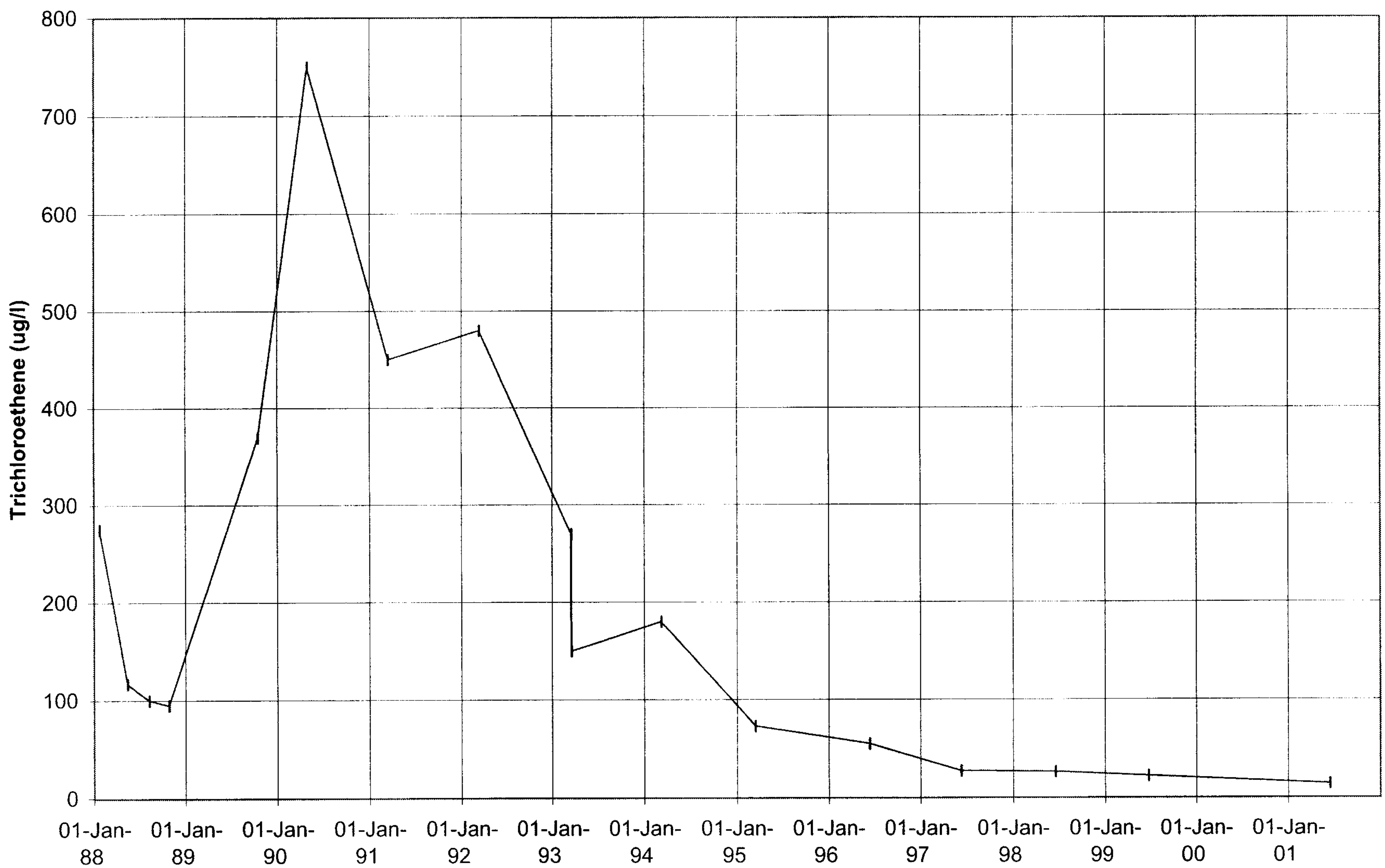


04U711
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

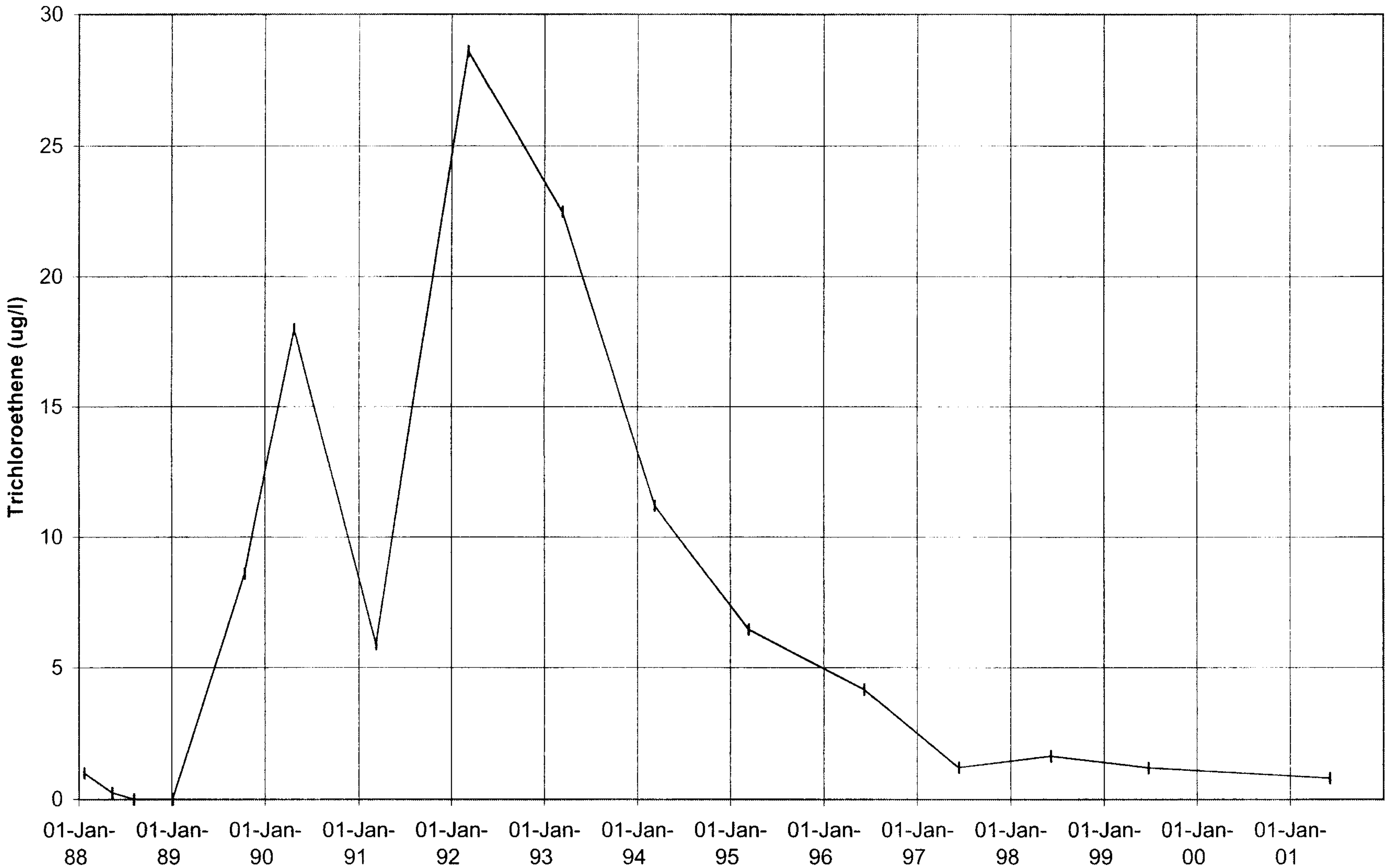
Back to Map

04U709



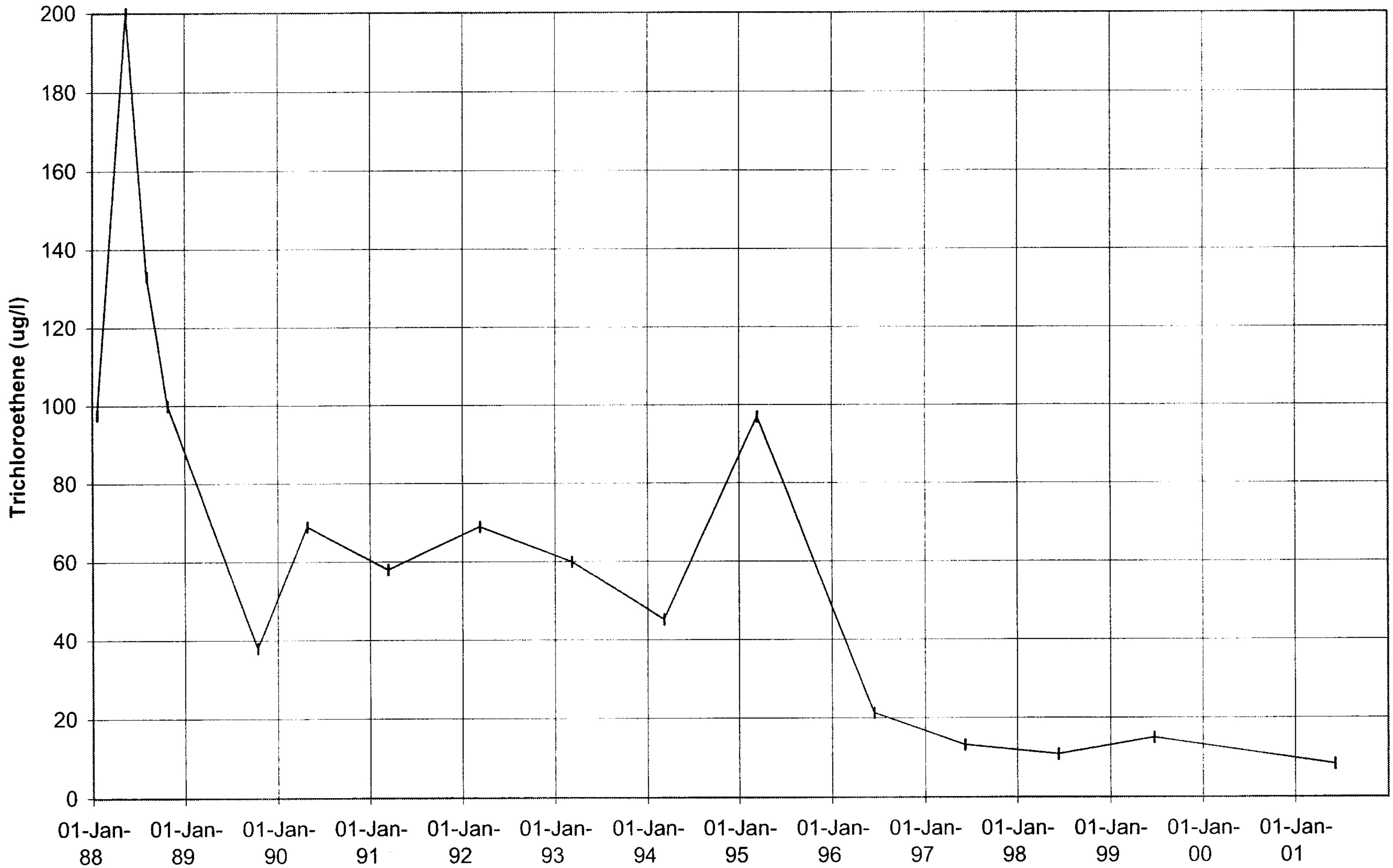
Back to Map

04U708



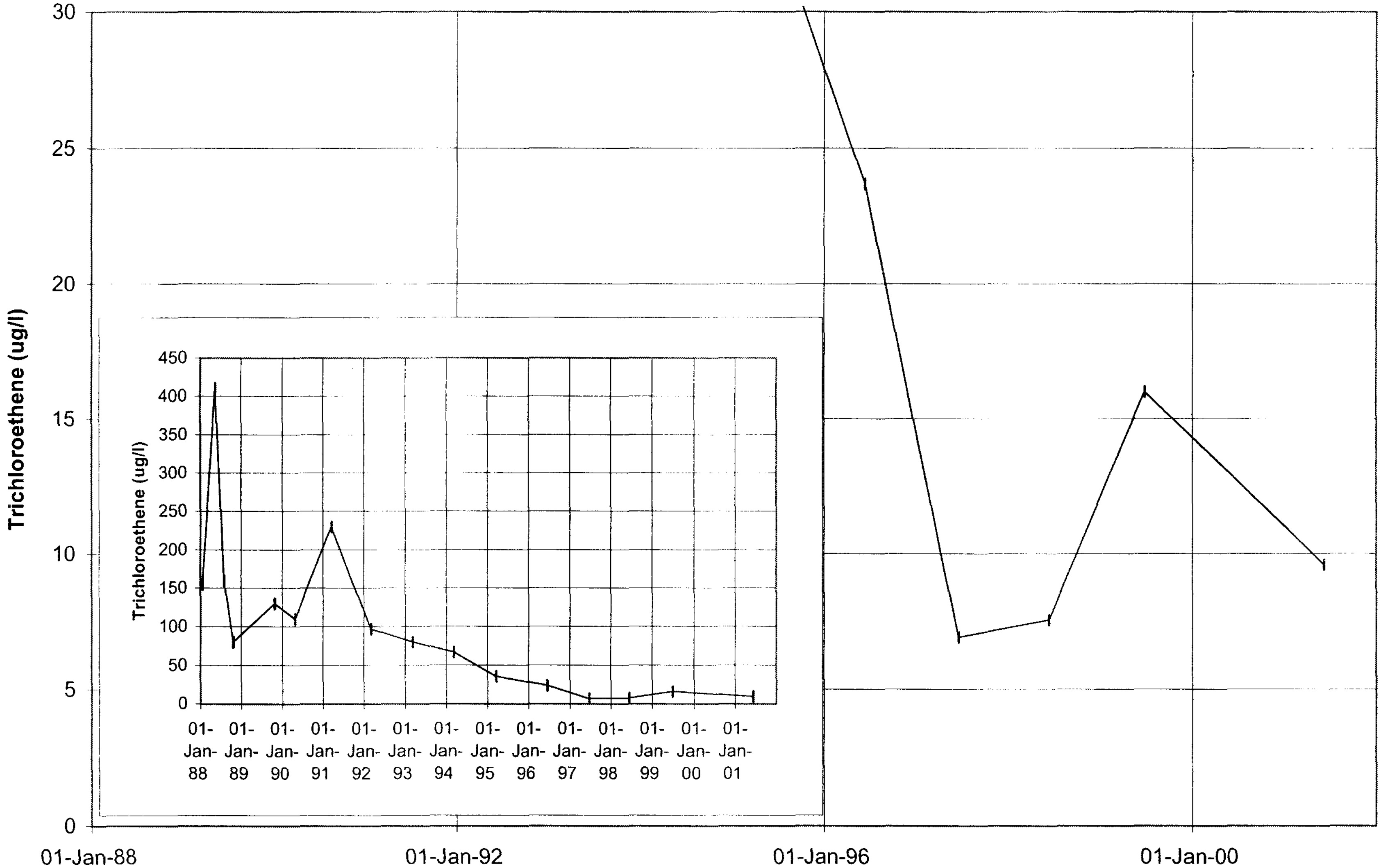
Back to Map

04U702



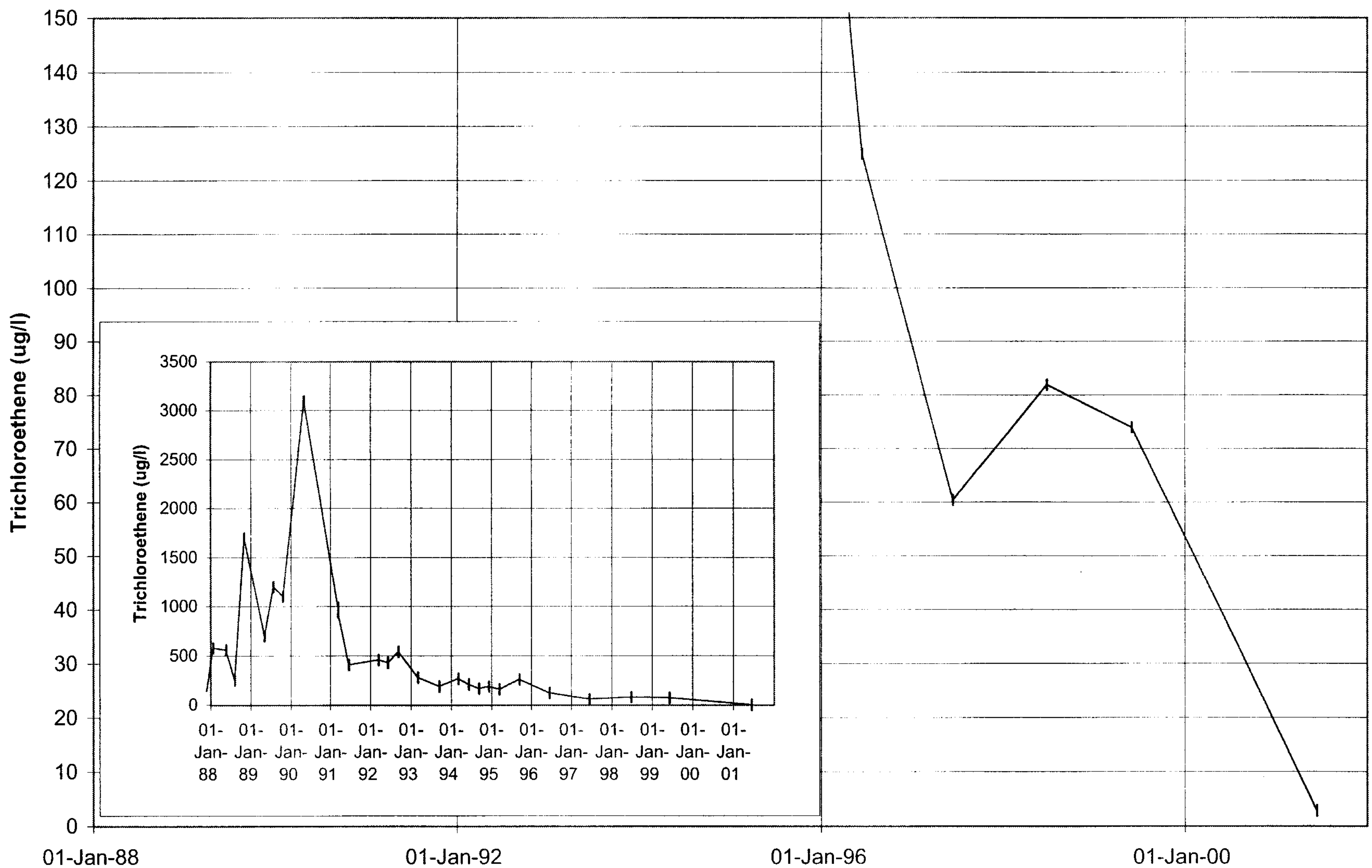
Back to Map

04U701

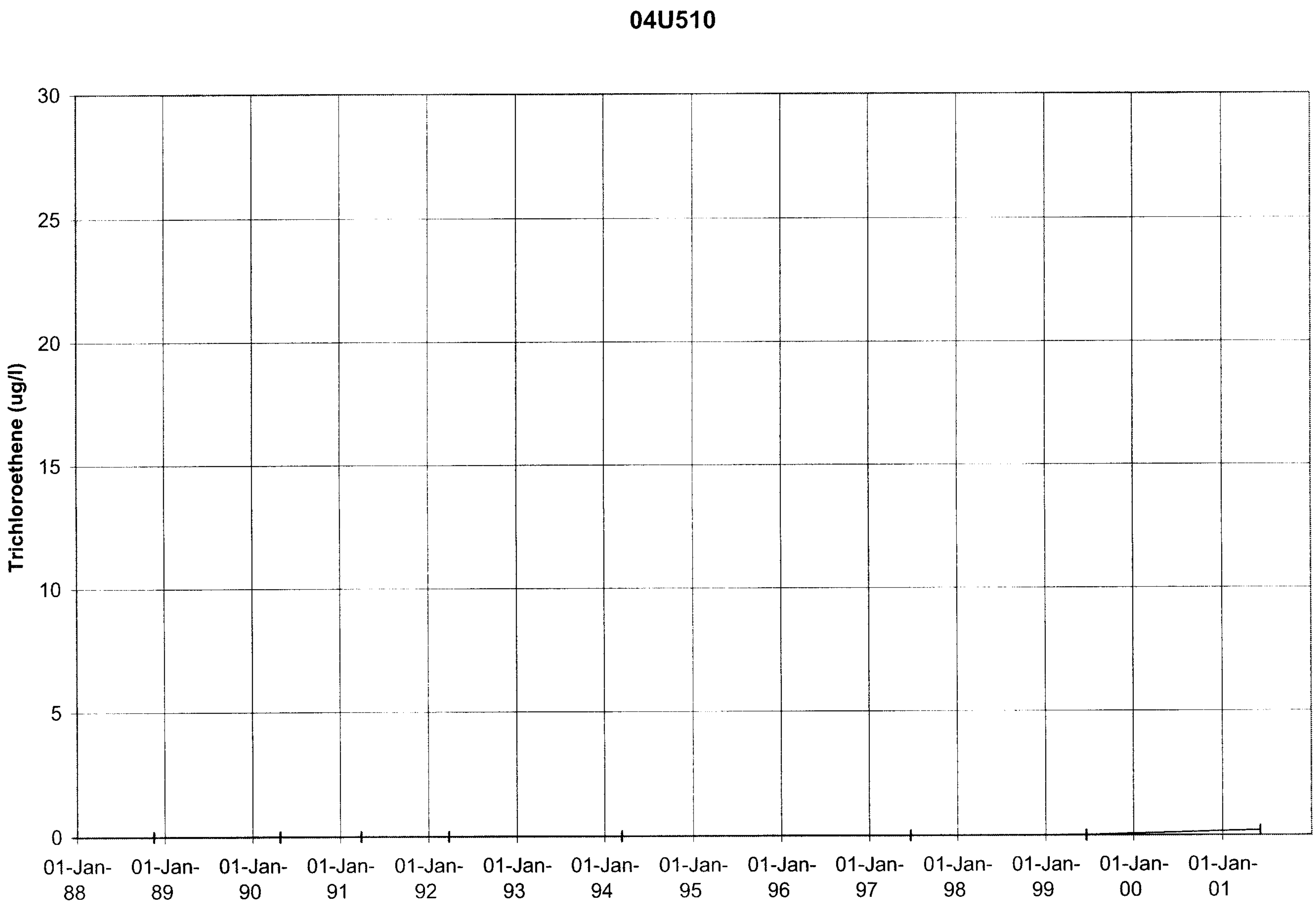


Back to Map

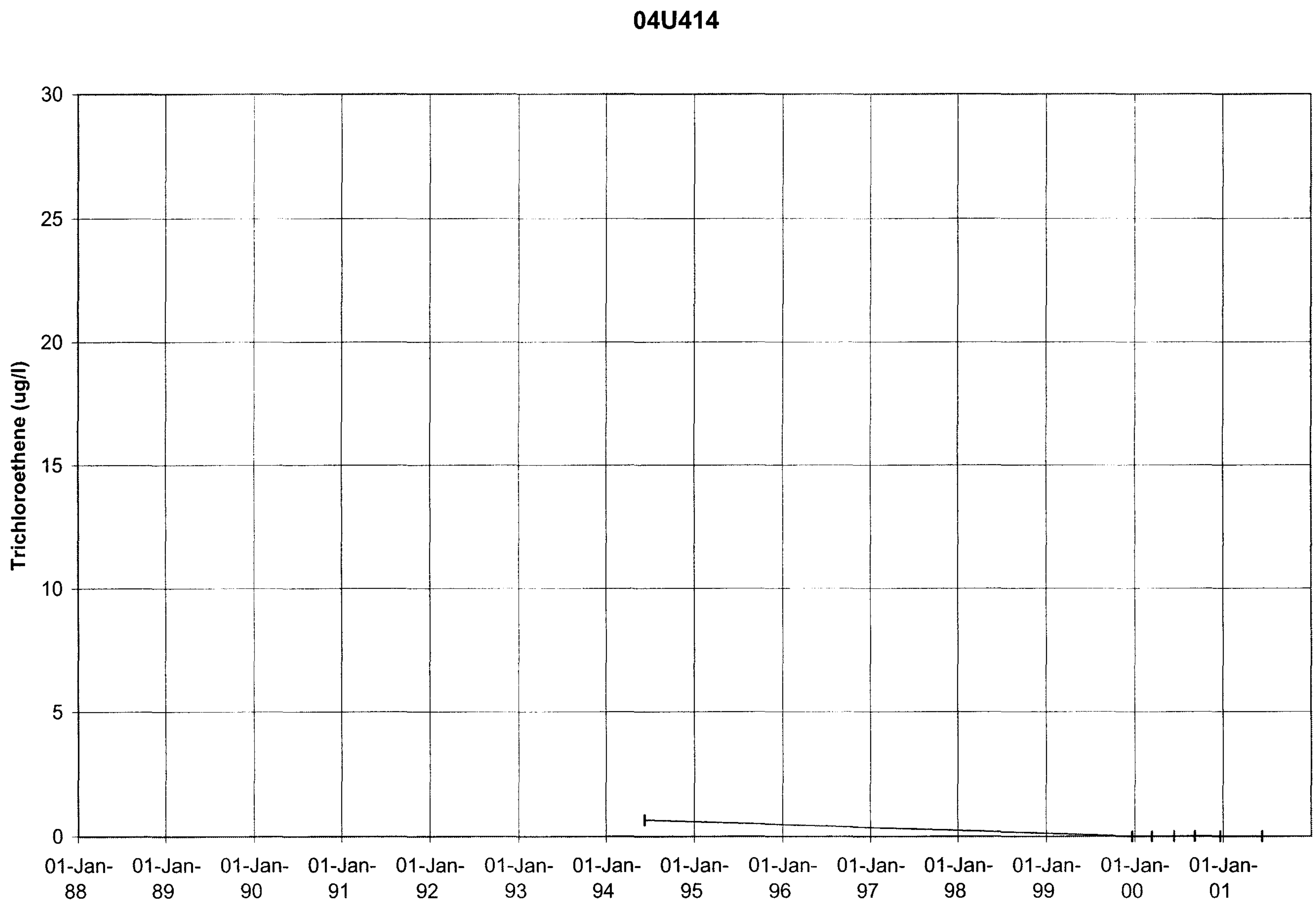
04U673



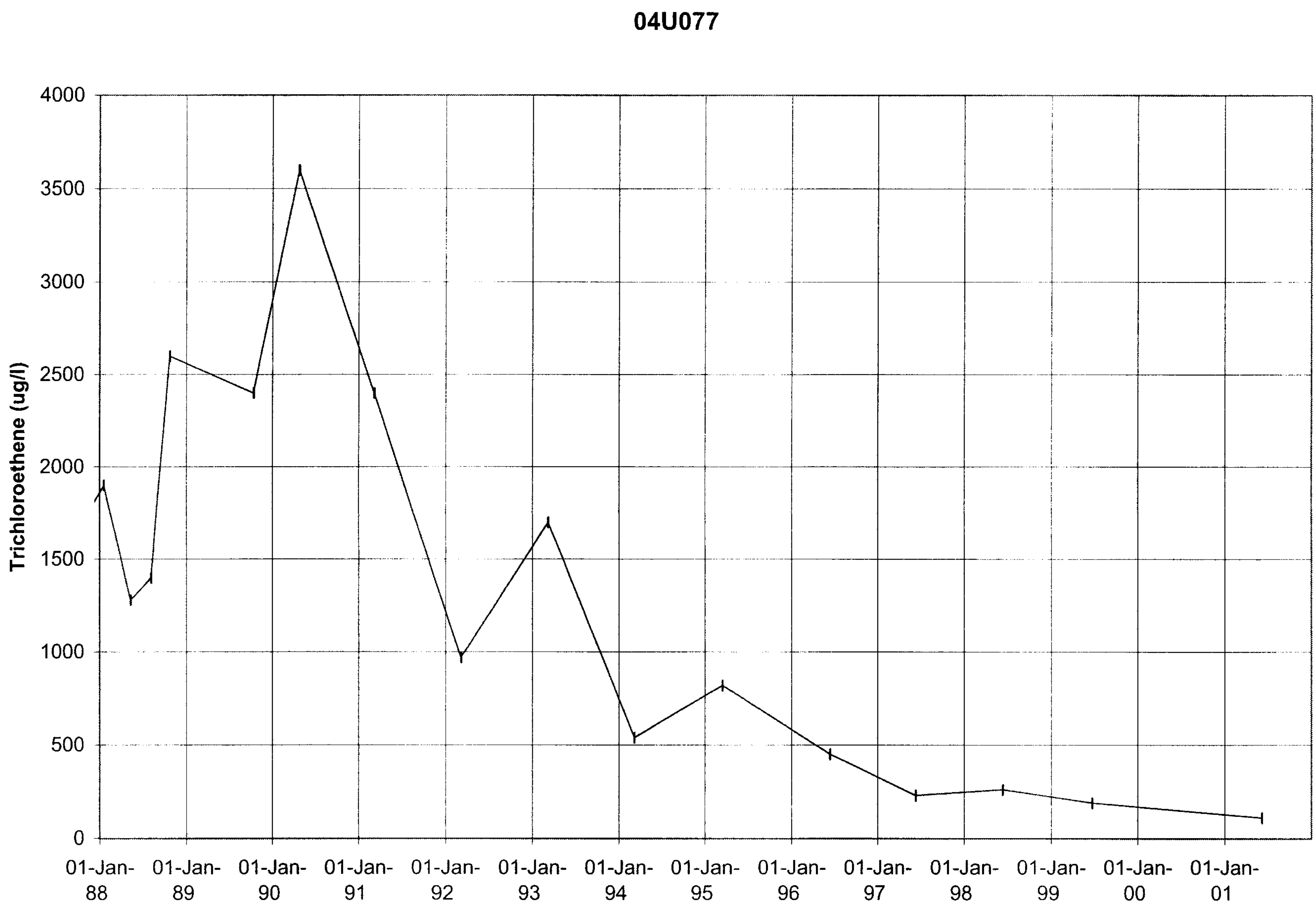
Back to Map


04U510
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

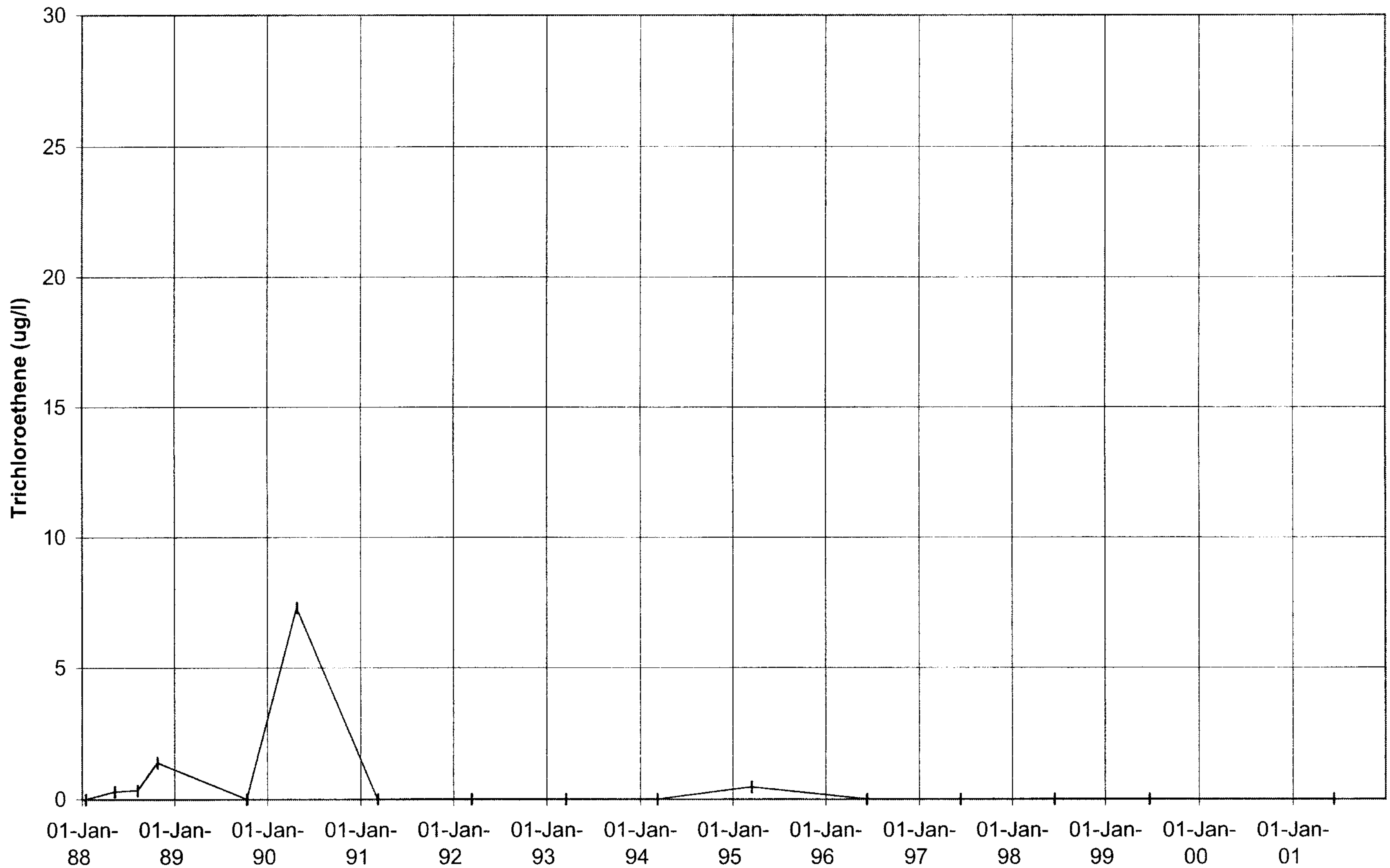

04U414
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


04U077
Trichloroethene (ug/l)
4000
3500
3000
2500
2000
1500
1000
500
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

04U027

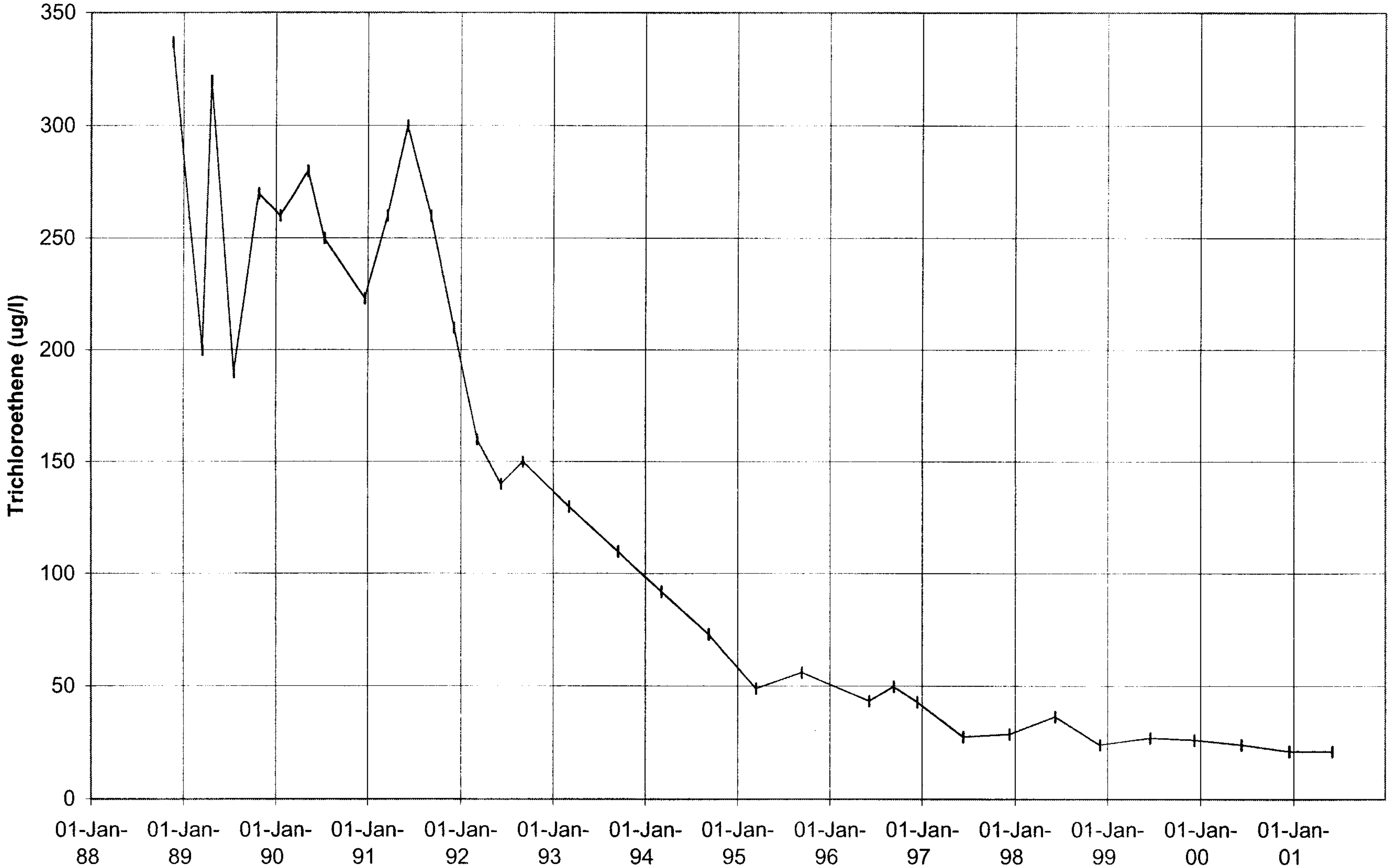


Back to Map

512761
Trichloroethene (ug/l)
140
120
100
80
60
40
20
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

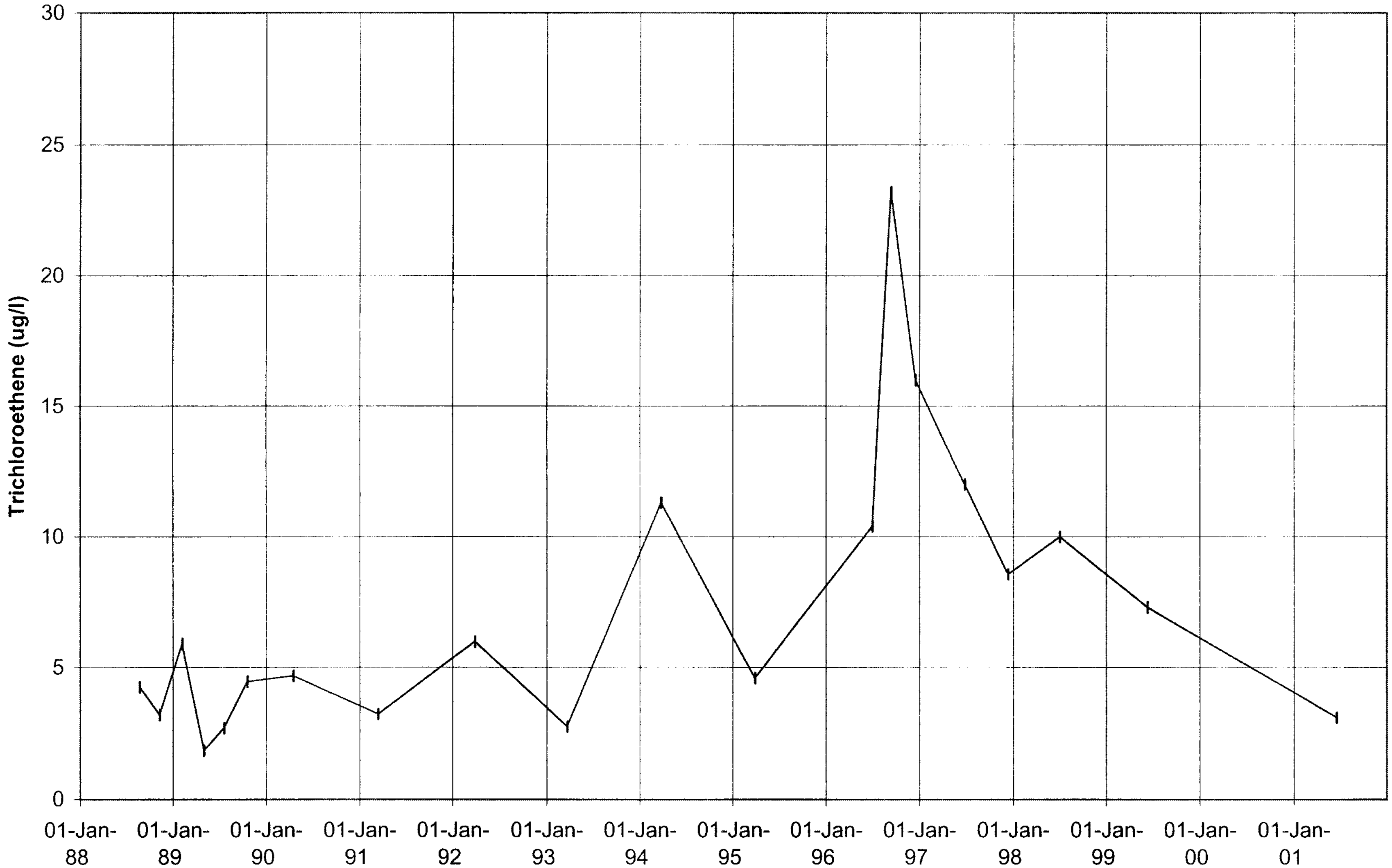
Back to Map

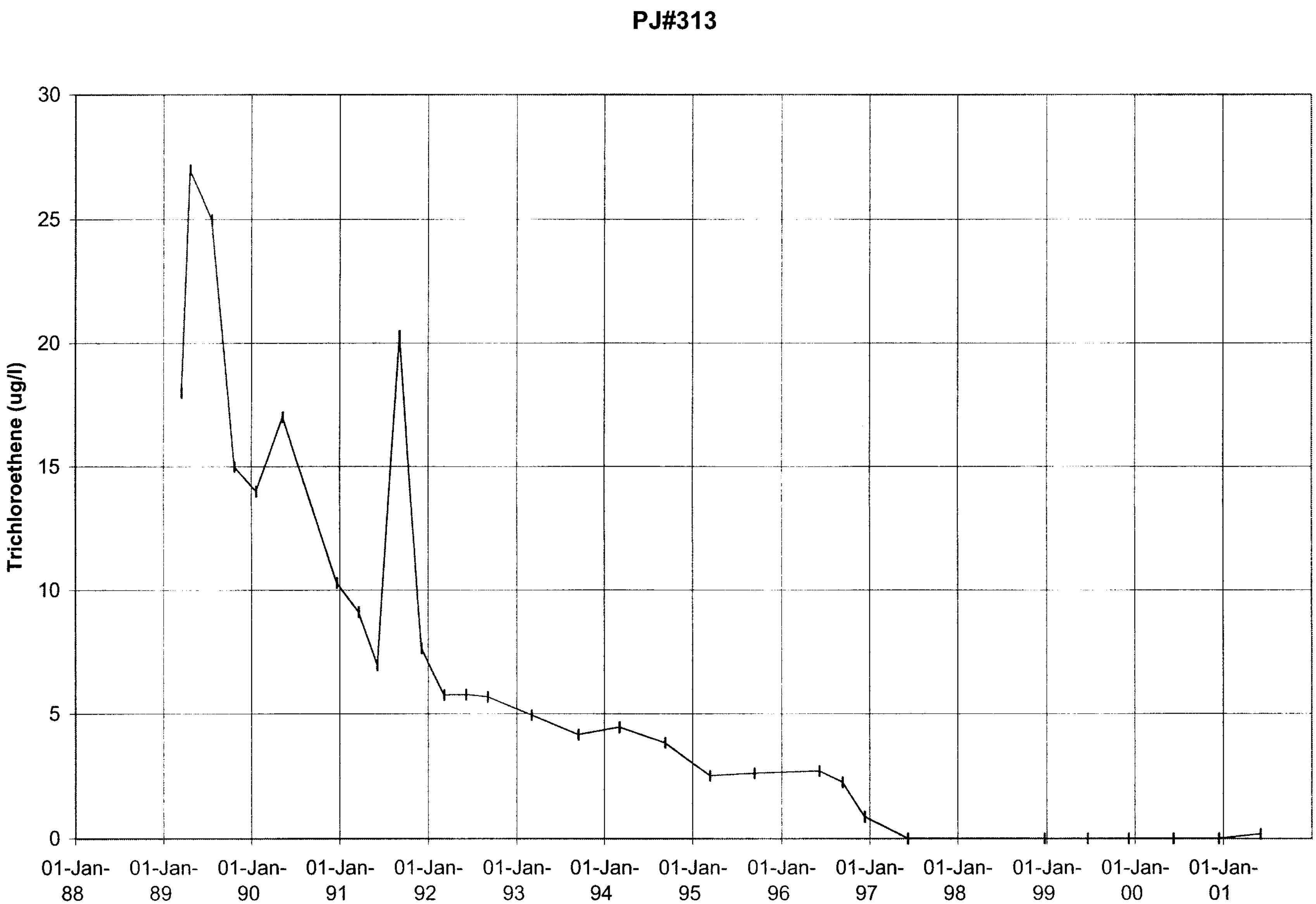
PJ#309



Back to Map

PJ#318

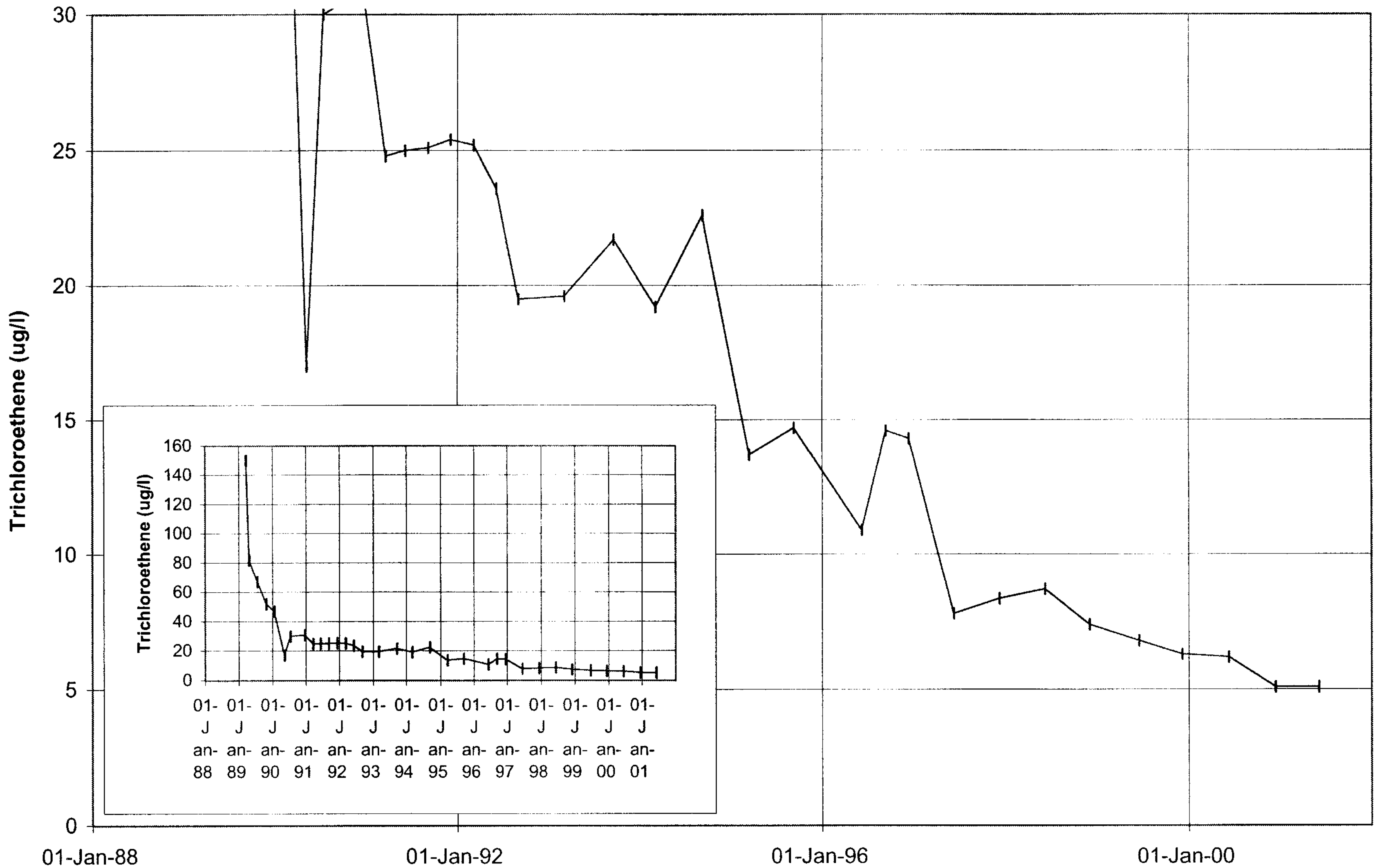

Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01



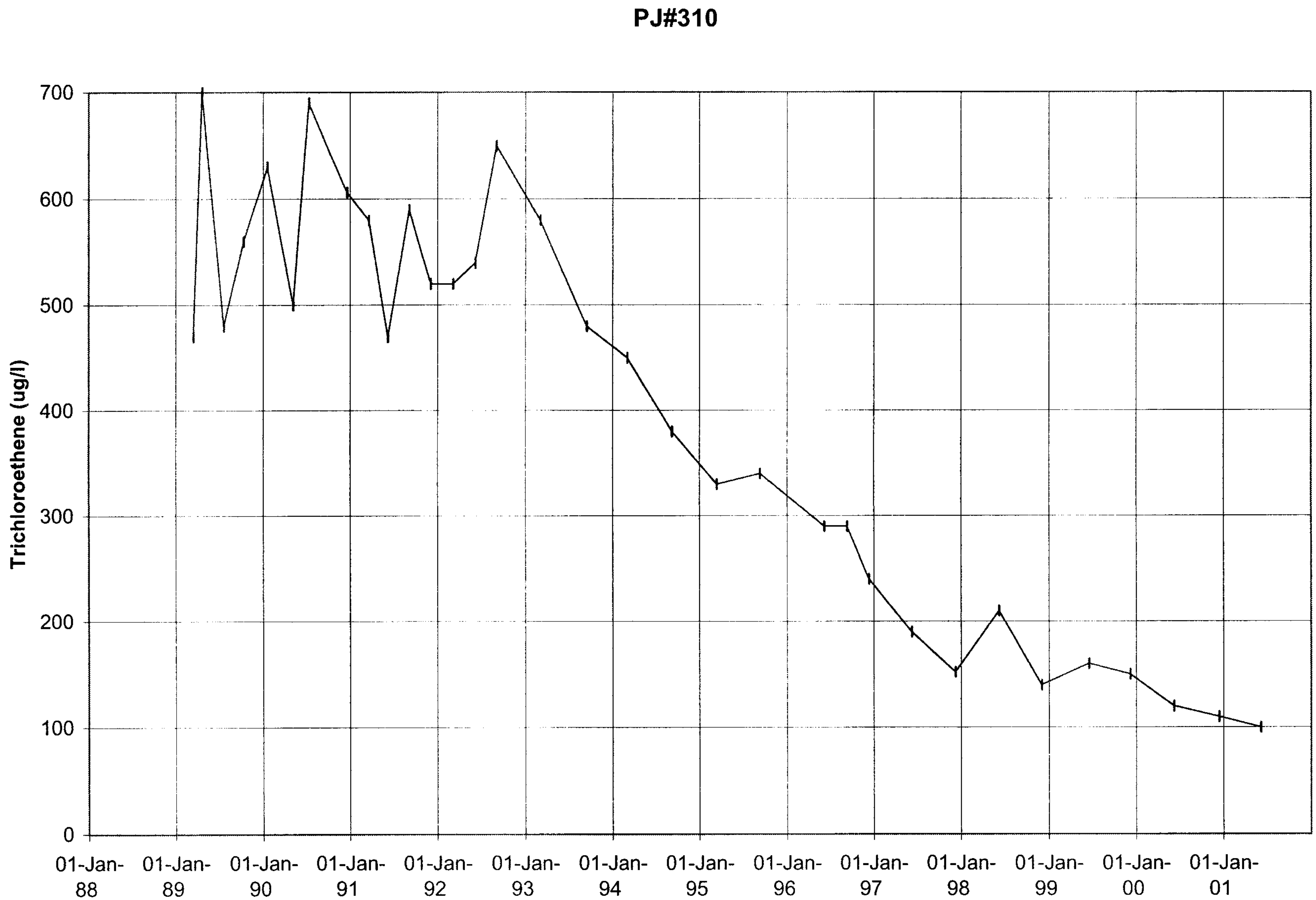
PJ#313
Trichloroethene (ug/l)
30
25
20
15
10
5
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

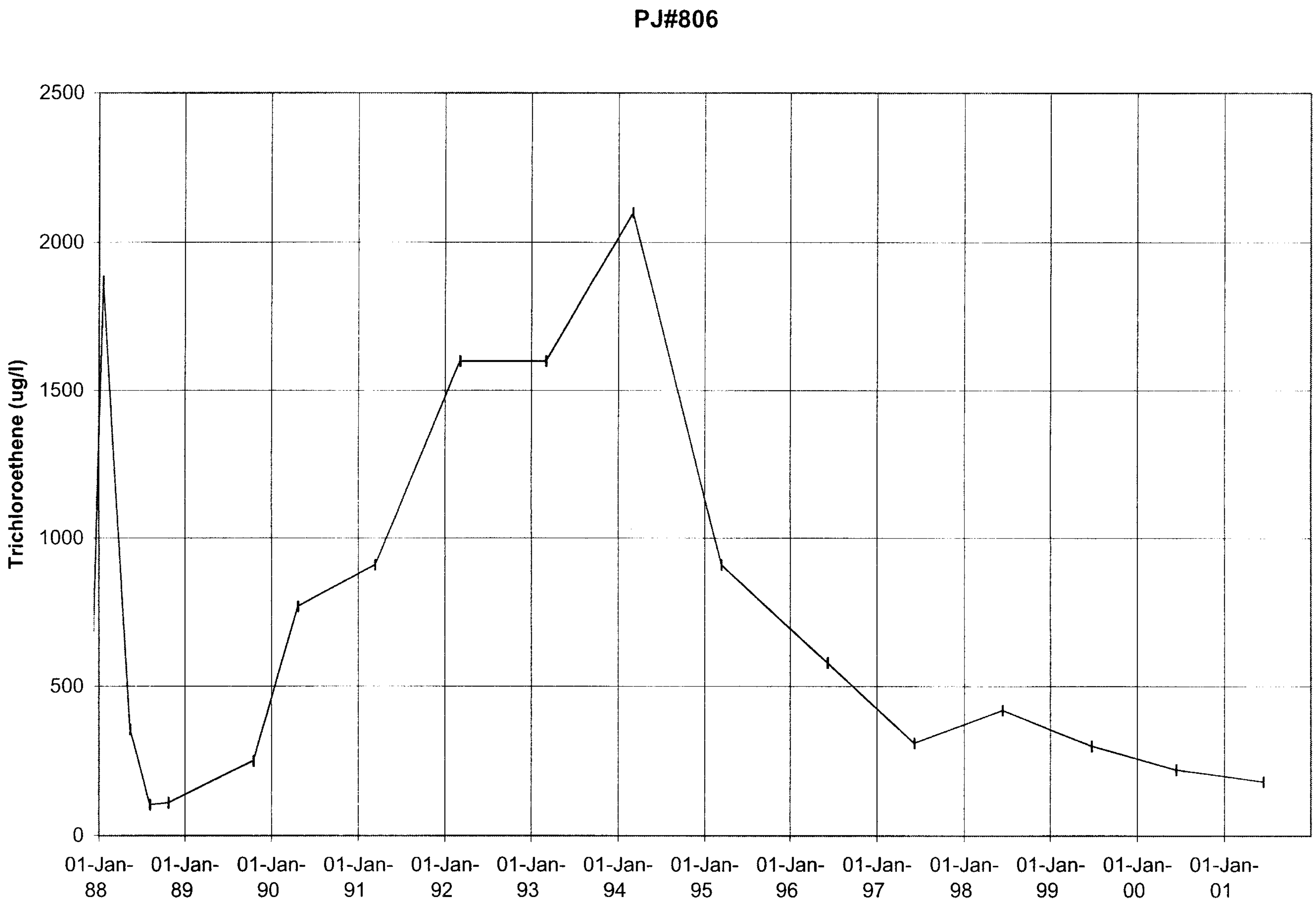
PJ#311



Back to Map


PJ#310
Trichloroethene (ug/l)
0
100
200
300
400
500
600
700
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map


PJ#806
Trichloroethene (ug/l)
2500
2000
1500
1000
500
0
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

Trend Graph Not Available

Back to Map

Trend Graph Not Available

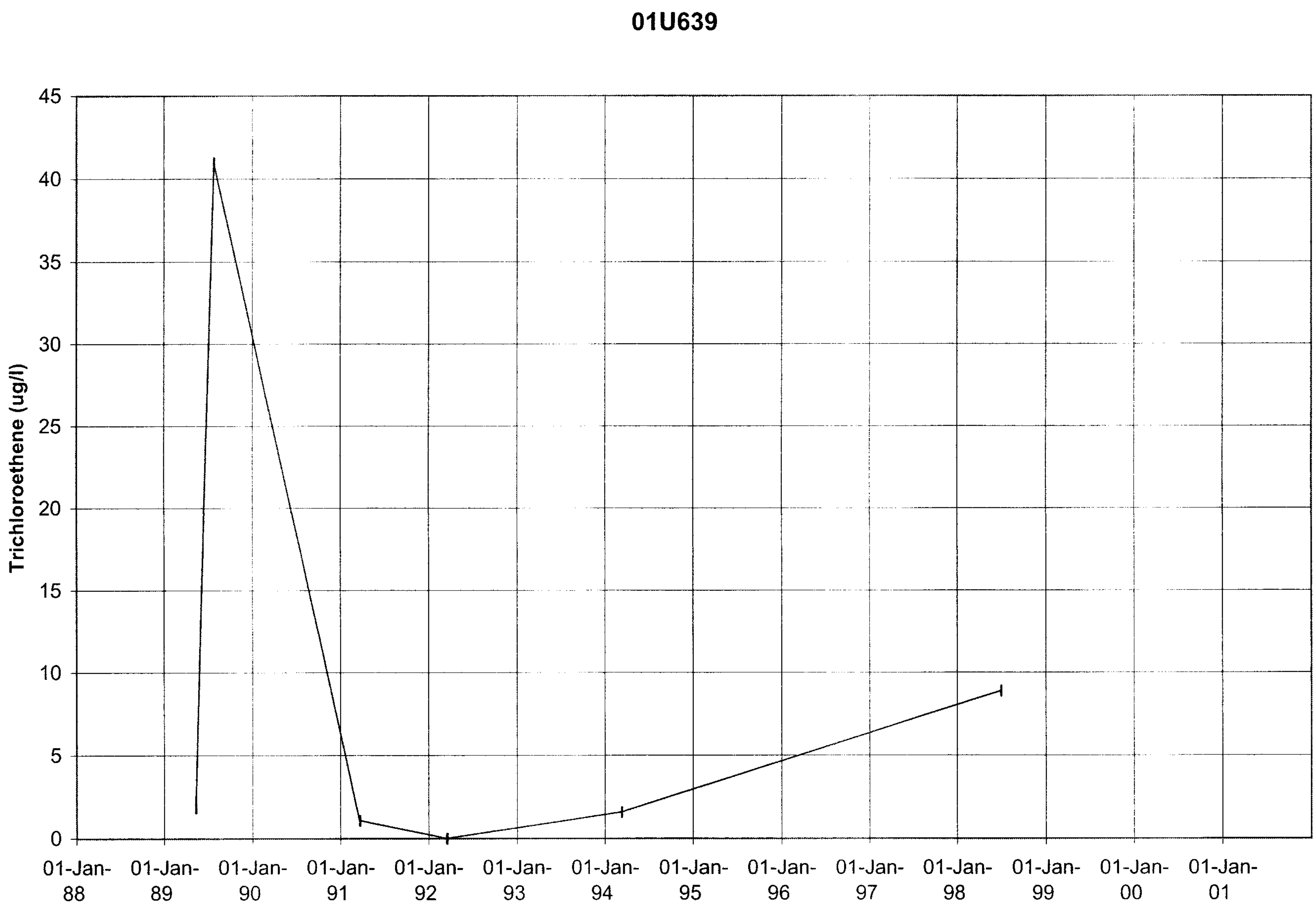
Back to Map

Trend Graph Not Available, Well No Longer Routinely Sampled

Back to Map

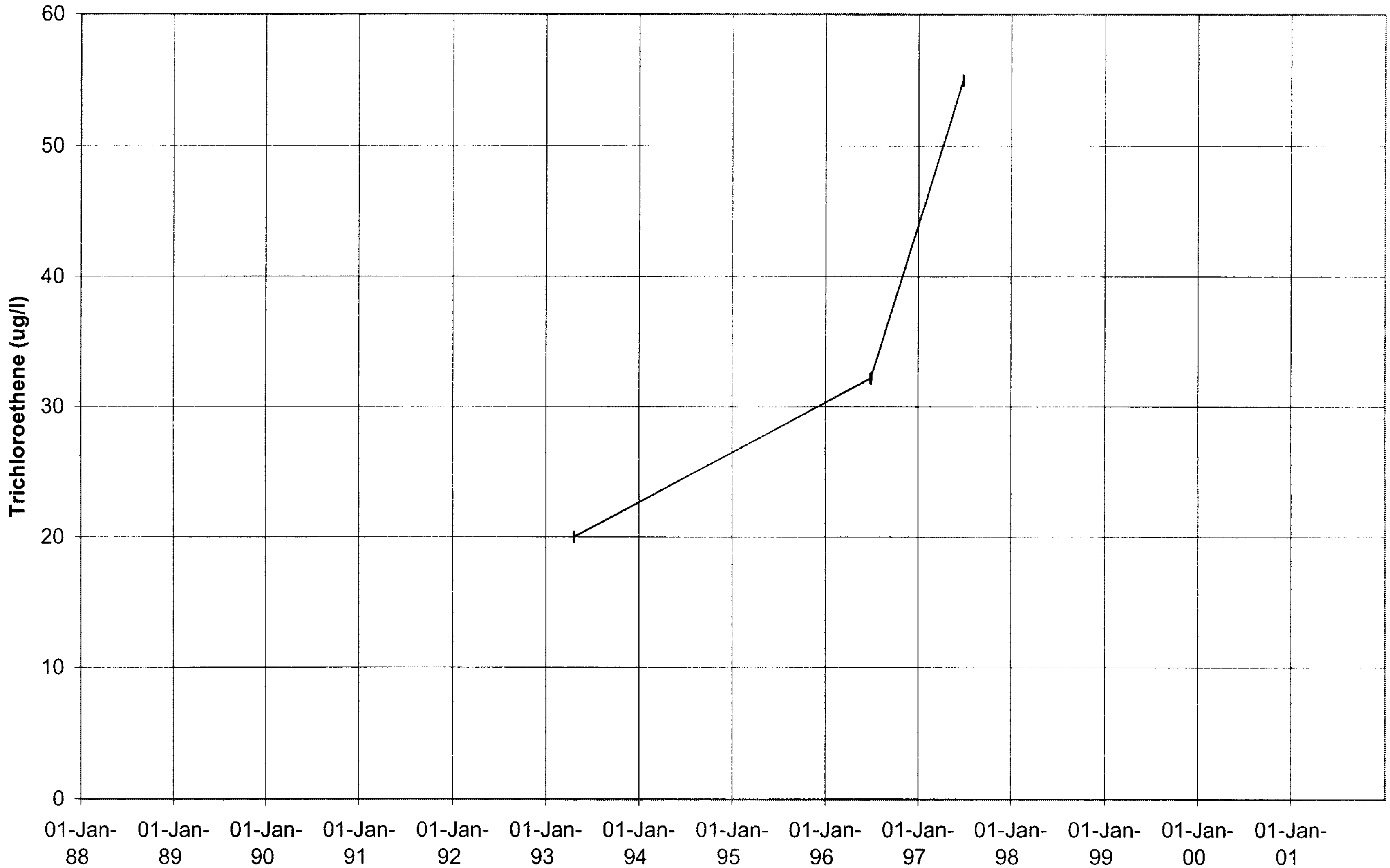
Trend Graph Not Available,
Well No Longer Routinely Sampled

Back to Map


01U639
45
40
35
30
25
20
15
10
5
0
Trichloroethene (ug/l)
01-Jan-88
01-Jan-89
01-Jan-90
01-Jan-91
01-Jan-92
01-Jan-93
01-Jan-94
01-Jan-95
01-Jan-96
01-Jan-97
01-Jan-98
01-Jan-99
01-Jan-00
01-Jan-01

Back to Map

200804



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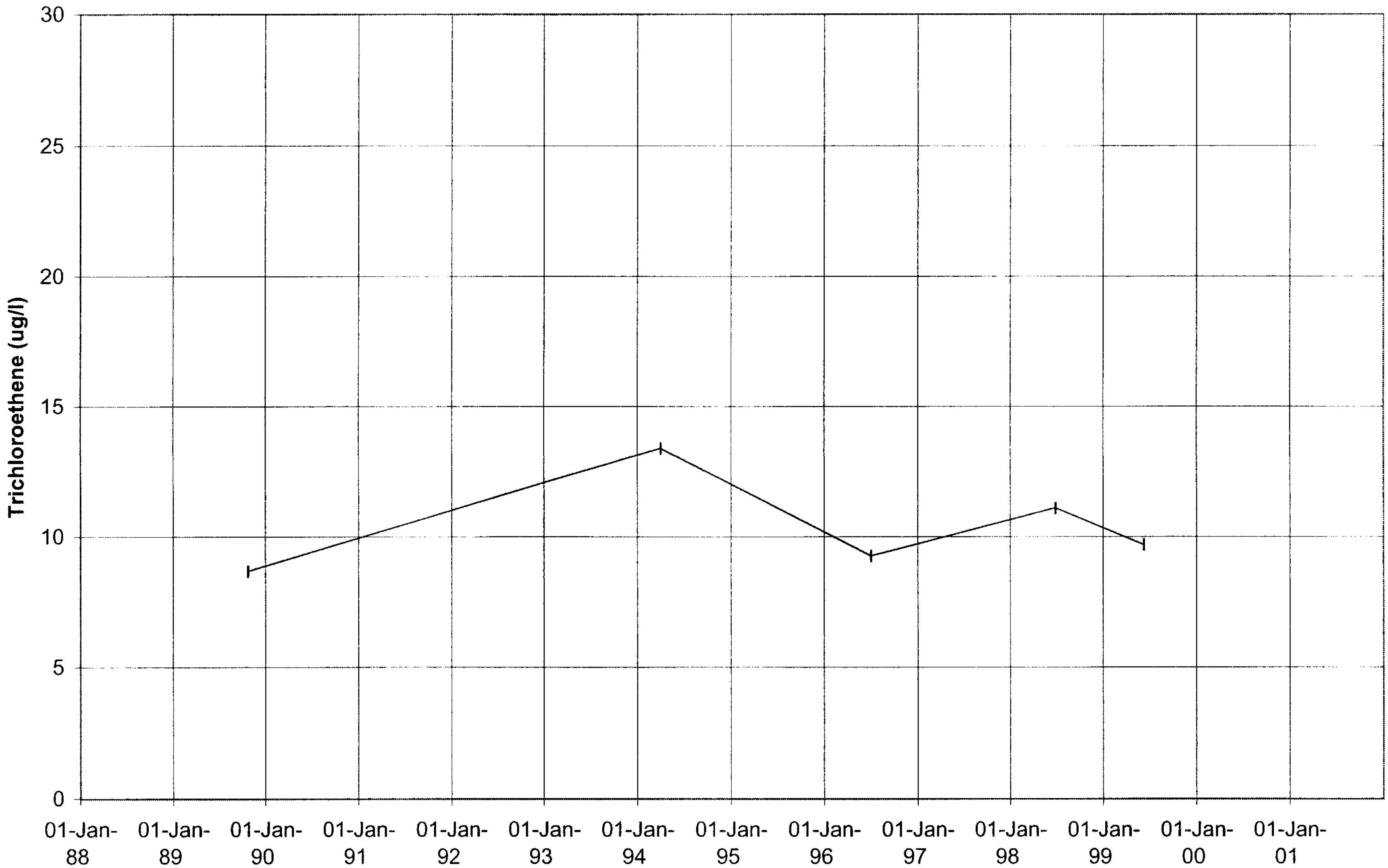
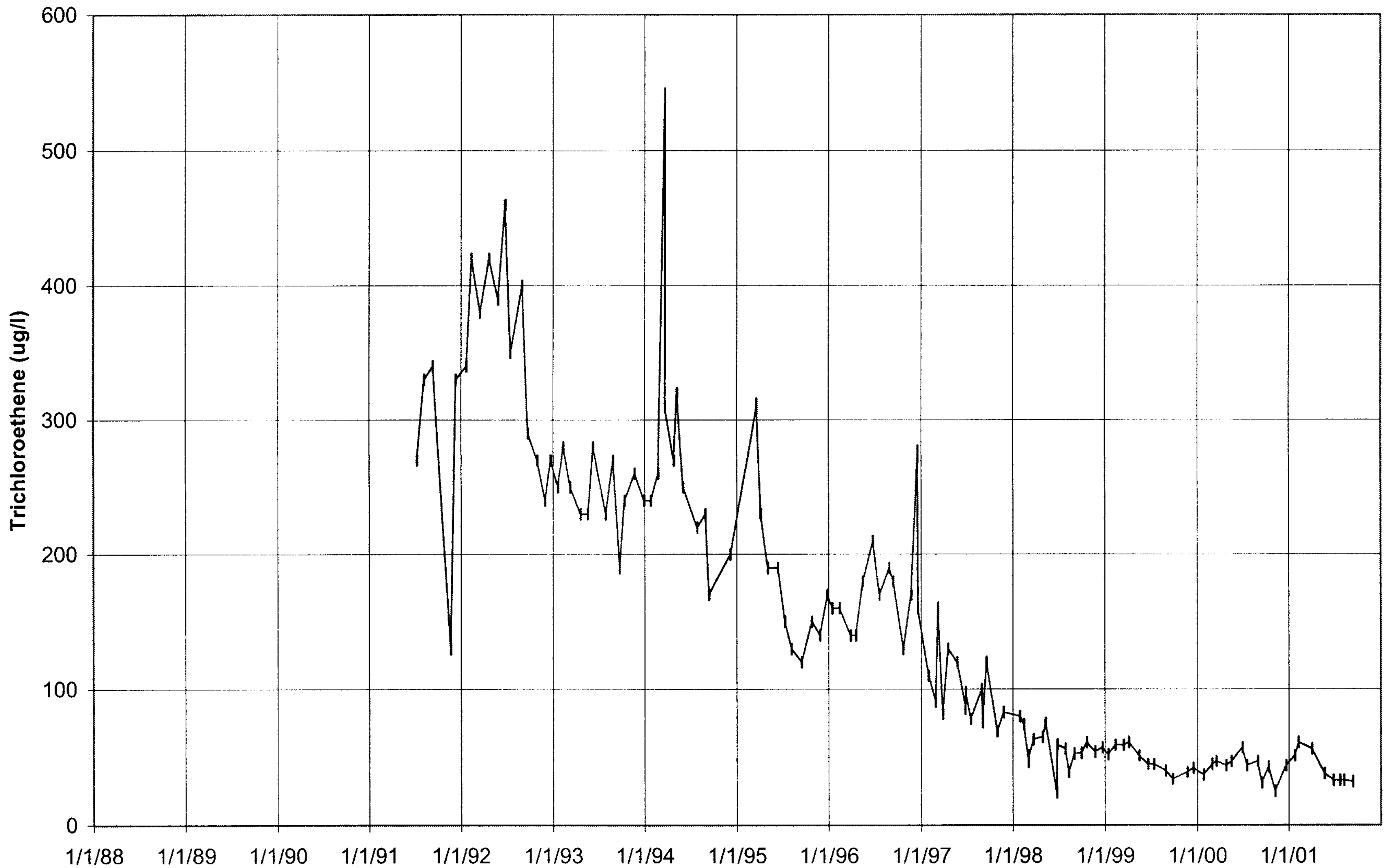
206688



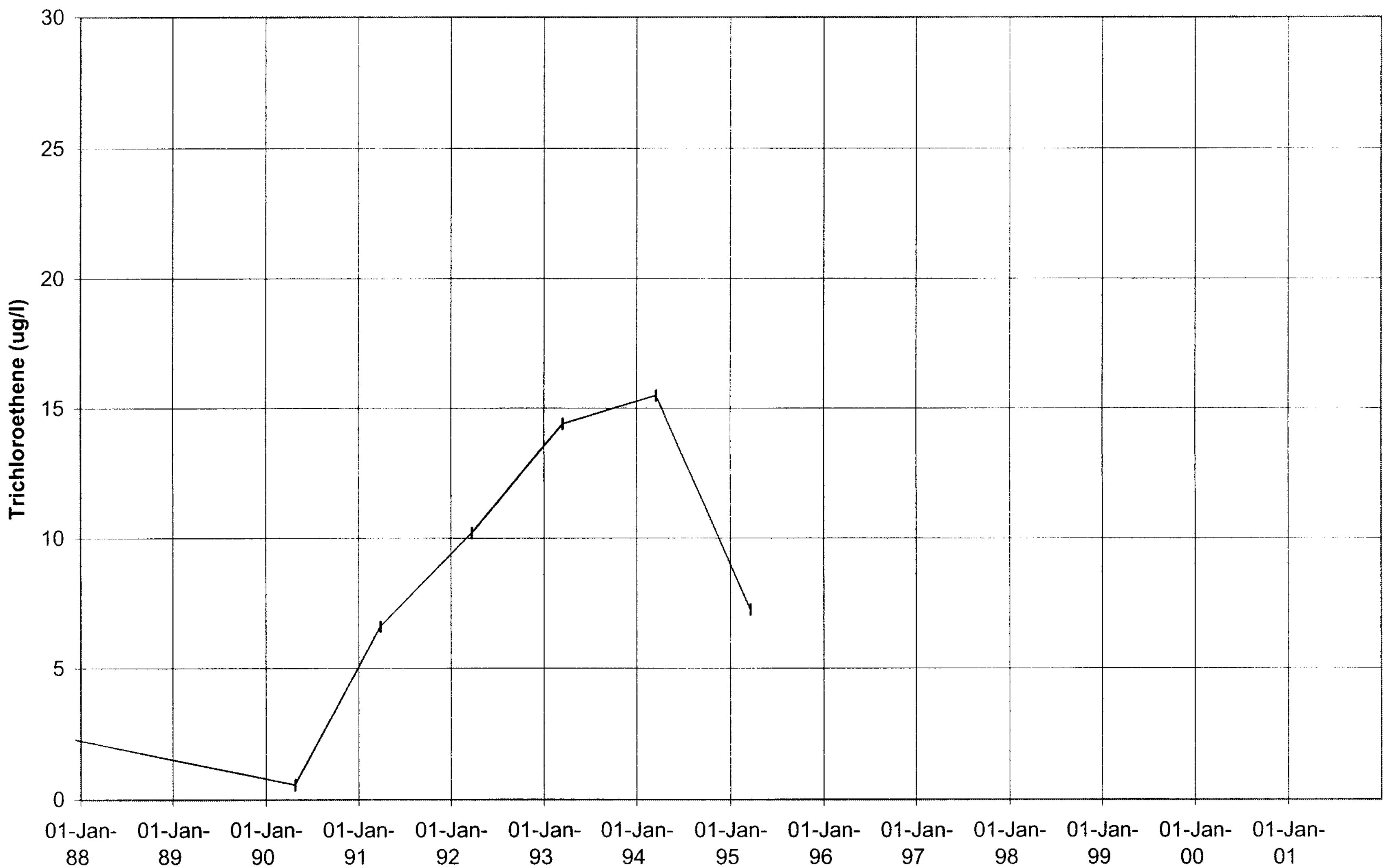
Back to Map

206792

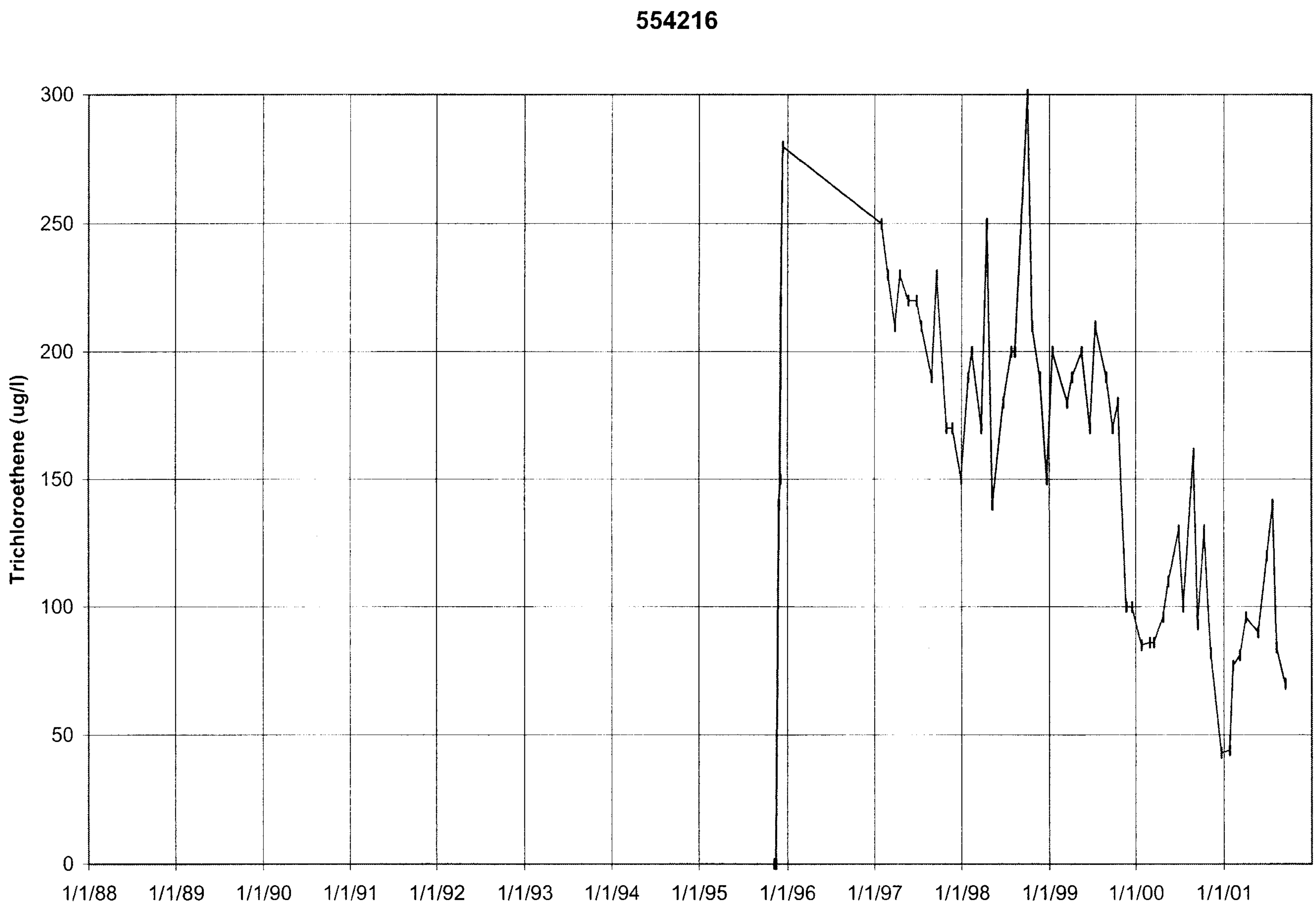


Back to Map

409596

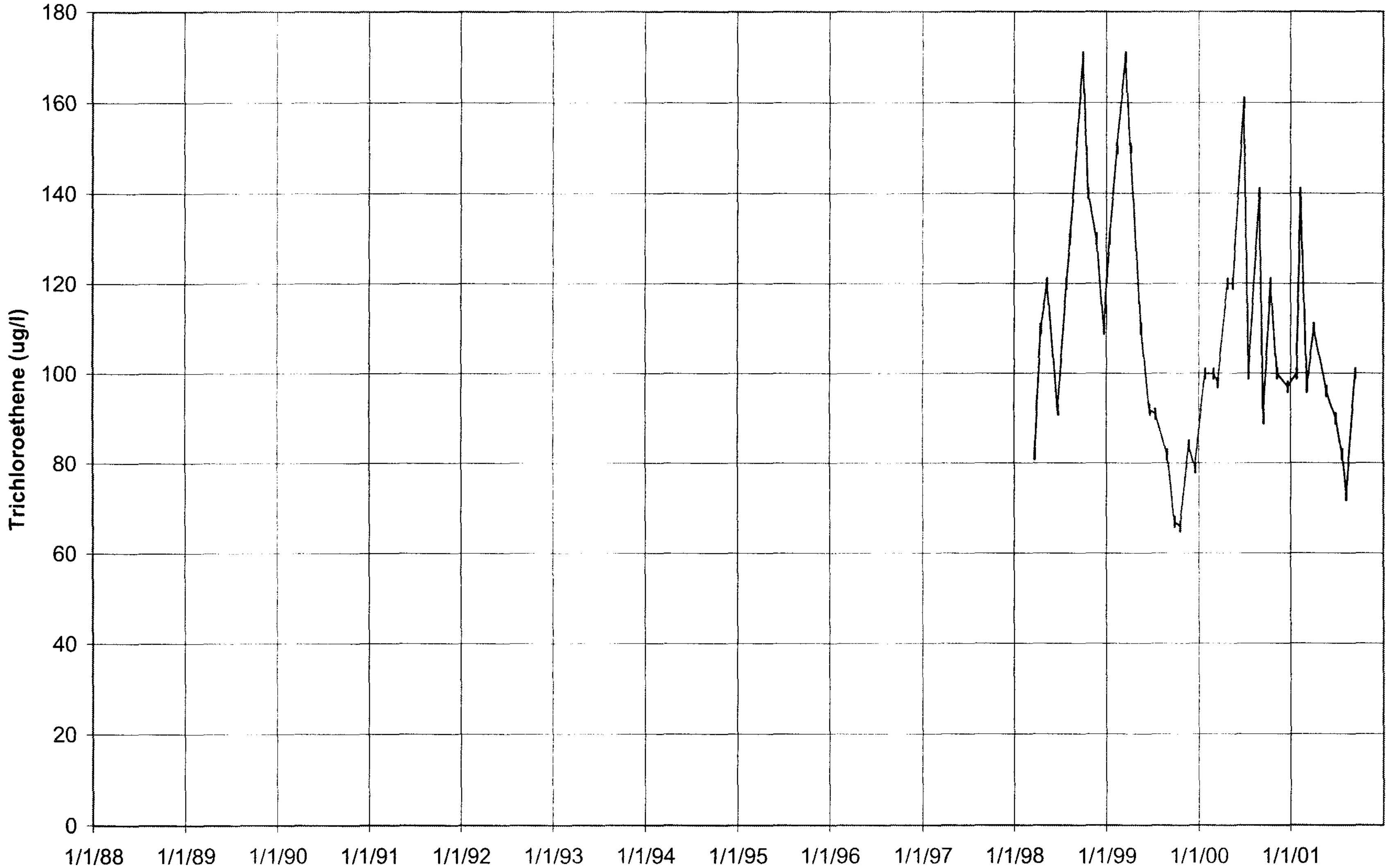


Back to Map


554216
Trichloroethene (ug/l)
300
250
200
150
100
50
0
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01

Back to Map

582628



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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 2001 was comprised of Quarter 69 (October through December), Quarter 70 (January through March), Quarter 71 (April through June), and Quarter 72 (July through September). Water sampling and water level measurements 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. The IRDMIS System was then replaced by the Environmental Restoration Information System (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 2001 Annual Monitoring Plan (Appendix A) which established the monitoring responsibilities for both:

- The Army
- Alliant Techsystems Inc. (tenant and responsible party)

Water level monitoring and groundwater sampling were conducted by TWISS for the Army and by SECOR and CRA for Alliant. Laboratory analysis was performed by DataChem Laboratories for all samples.

Appendix A.4 contains analyte lists which are 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 and antimony. Appendix C.2 presents clarifications and deviations from the FY 2001 Annual Monitoring Plan.

Most of the laboratory data was submitted to PRI for entry into the IRDMIS prior to November 1, 2001. This data was intended to be completely converted into ERIS. The completeness of this conversion (and potential entry of any missing data) was under review at the time of this report.

Data assessment and validation was conducted in accordance with procedures and requirements outlined in the TCAAP QAPP. Appendices C.3 to C.5 present explanations for the flagging codes and data qualifiers used with data reporting. Data assessment and validation information was submitted to the MCPA and USEPA for review. Regulatory approvals for these submittals are included in Appendix C.6.

For water level measurements, the depth to water from the surveyed top of the well casing was measured. Groundwater elevations were calculated and maintained in Installation databases. The water level database capability of ERIS was under review at the time of this report.

2.2 Groundwater Elevation Contour Maps

Using June 2001 data (Quarter 71), groundwater elevation contour maps were prepared for Sites A and K shallow groundwater and for OU1 in the vicinity of the New Brighton municipal wells. These maps are presented as figures which follow the text for relevant sections.

2.3 Groundwater Quality Contour Maps and Cross-Sections

The most extensive sampling event performed during FY 2001 was in June (Quarter 71). This data was used to prepare contour maps and cross-sections to illustrate the spatial distribution of groundwater contamination. Groundwater quality contour maps were generated by hand, based on the observed contaminant concentrations and the extent of past site contamination.

Contour maps are provided for trichloroethene, as this is the principal contaminant on a concentration basis. Contour maps were prepared by TWISS for OU2 (on-post) and OU1/OU3 combined (off-post), with individual maps for Upper Unit 3, Lower Unit 3, and Upper Unit 4. To complement the groundwater quality contour maps, cross-sections have been prepared to illustrate the vertical distribution of trichloroethene. One section line passes through the source area at Site G and follows the north plume (OU1) off-post, extending past Gross Golf Course (well 512761). A second section line passes through the source area at Site I and traces the south plume (OU3) off-post through the Plume Groundwater Recovery System (PGRS).

Contaminant concentrations for Middle Unit 3 wells are shown in parentheses on the Lower Unit 3 contour maps, but were not used for contouring purposes except when no Lower Unit 3 wells are in the vicinity. Similarly, wells completed in the Jordan aquifer (04J) and wells completed as open holes intersecting both the Prairie du Chien and Jordan aquifers (PJ#) are shown with the data in parentheses on the Upper Unit 4 maps, but were not used to develop contour lines.

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

Contaminant concentrations at recovery wells are shown in parentheses on the maps. These values were considered, but were not used alone to prepare the isoconcentration contours. Concentrations of recovery wells generally represent an average contaminant value for all groundwater being drawn to the well; hence, the concentrations do not necessarily represent a discrete location or depth.

APPENDIX C.2
DEVIATIONS FROM MONITORING PROGRAM
FISCAL YEAR 2001, TCAAP

OU1: DEEP GROUNDWATER

June 2001
Four wells listed in the Monitoring Plan could not be sampled: two wells (191942 and 409596) could not be located (Midwest Asphalt property); the pump in the Cloverpond well (206688) was in need of repair at the time of sampling; and St. Anthony Well #3 (200804) was out of service for maintenance purposes.

OU2: SITE A SHALLOW GROUNDWATER

December 2000
1,2-Dichloroethane, which is a Chemical of Concern at Site A, was not analyzed for in this event (inadvertently).

OU2: SITE I SHALLOW GROUNDWATER

June 2001
Monitoring wells I02MW and 01U639 were dry and samples were not collected.
Monitoring wells I05MW and I01MW bailed dry and field parameters were not collected.

OU2: SITE K SHALLOW GROUNDWATER

First Quarter
Monthly influent samples were collected in October, November and December. The monitoring plan requires only quarterly samples.
June 2001
Wells 01U603, 01U604, 01U617 and 01U618 bailed dry during purging so incomplete field parameters were collected

OU2: DEEP GROUNDWATER (TGRS)

June 2001
In addition to the FY 2001 monitoring program, water levels were measured on the three staff gauges in the sand and gravel pit to obtain the water elevation of the sand and gravel pit.

OU3: DEEP GROUNDWATER (PGRS)

Fourth Quarter
The PGRS extraction well was not sampled in July through September by the City of New Brighton.

SURFACE WATER

December 2000
Mercury and 1,2-dichloroethane were not included in this event (inadvertently). The Army conducts this monitoring on a voluntary basis.

1.08 Flagging Code

Element Description

Code assigned by the Laboratory to indicate other-than-usual analytical conditions or results.

Element Size and Characteristics

IRDMIS Record

1 uppercase alphabetical character, full field (as many as 8 per record)

IRDMIS Database

chem/cqc: as many as 8 Flagging Codes per record
flag_quals_desc: 1 Flagging Code per record

Element is Used in the Following IR Records and Database Tables

IRDMIS Record		IRDMIS Database	
Record Type	Column(s)	DB Table(s)	DB Column
Any valid chemical or radiological record type	143 144 145 146 147 148 149 150	chem/cqc flag_quals_desc	flag_codes f_q_code

Acceptable Criteria ** signifies an obsolete term but is retained in the code for past reference.*

A Analyte found in trip blank as well as in field samples . The analyte was detected in the field sample and the trip blank for the same cooler; used for volatiles only.

B Analyte found in the method blank or QC blank as well as the sample. This code is used when an analyte was detected and quantitated at higher-than-normal background levels. For metals in soil, the following rules must be followed:
(1) If the analyte is detected in the method blank, both the field and QC samples are to be flagged.

(2) If the analyte is detected in the QC blank, only the QC samples are to be flagged.

C Analysis was confirmed. This code is used when a confirmation analysis bears out the reported result (if it is above the CRL or MDL). The confirmation analysis must use a different column or analytical technique.

D Duplicate analysis. This code is used to distinguish analytical results when duplicate analyses are required. Flag only the second (duplicate) sample.

E **NOT USED.**

F Sample filtered prior to analysis. This code is used when results of filtered samples are to be differentiated from non-filtered samples. This code is also used when filtering of samples (as a first step in the sample preparation) is a deviation from the approved method SOP. This code may be used to indicate both field and laboratory filtering. It is not used when filtering the extract is the normal procedure.

G Analyte found in rinse blank as well as field sample. The analyte was detected in the field sample as well as that day's rinse blank for the same equipment type.

H **NOT USED.**

I Interferences in sample cause the quantitation and/or identification to be suspect. This code is used when matrix interferences may mask detection of the target analyte. Must always be used with Flagging code J.

J Value is estimated because of one of the following conditions:
(1) Interferences in the sample (use Flagging codes J and I)
(2) The value is below the method detection level but above the instrumental detection level (use Flagging codes J and P)
(3) The value is above the upper reporting level of the method (use Flagging codes J and X).
This code must always be used with Flagging code I, P, or X. Both the J and I and the J and X combinations may be used both for methods demonstrated under the 1990 QA Program and for methods validated under the 1993 QA Guidelines. The J and P combination is only used for methods validated under the 1993 QA Guidelines.

K Reported results affected by interferences or high background. This code is used when analyte levels at or near the CRL or MDL cannot be accurately quantified down to the CRL/MDL due to interferences. This code will allow a laboratory to input a higher CRL/MDL, rather than defaulting to the Methods database.

L **NOT USED.**

M **NOT USED.**

N Tentatively identified compound (result of a GC/MS library search) with a match greater than 70%. Used when specified in the contract/task order.

O **NOT USED.**

P Value is less than the method reporting level but greater than the instrumental detection limit. This code must always be used with J. This code is only used for methods validated under the 1993 QA Guidelines.

Q Confirmatory analysis was performed; however, sample interference obscured the area where the peak of interest would have appeared. Used when the peak of interest fell within the retention-time window on the primary column, but the retention-time window on the secondary column was masked by interferences.

R Non-target compound analyzed for but not detected (must be used with a Boolean of ND). This code is used only for those analytes (in GC/MS methods) which were not performance demonstrated or validated; used when specified in the contract/task order.

S Non-target compound analyzed for and detected. This code is used only for those analytes (in GC/MS methods) which were not performance demonstrated or validated. Also used to report tentatively identified compounds which are quantitated against an internal standard; used when specified in the contract/task order.

T Non-target compound analyzed for but not detected (must be used with a Boolean of ND). This code is used only for those analytes (in non-GC/MS methods) which were not performance demonstrated or validated.

U Analysis is unconfirmed. This code is used when a confirmatory analysis was performed but does not verify the analytical results from the initial analysis.

V Sample was subjected to unusual storage/preservation condition; used when samples are received at the laboratory at greater than 4° C, or were not correctly preserved in the field.

W Single analyte required from a multi-analyte method. This code is used when field samples are to be analyzed for a subset of the demonstrated/validated analytes.

X Analyte concentration is above the upper reporting level. This Flagging code is used when analyte concentrations exceed the upper reporting level and the laboratory feels that additional dilutions are not warranted. This code is also used when no sample or extract remains to make additional dilutions. It must also be used whenever a Boolean of GT is used.

Y Tentatively identified compound (result of a GC/MS library search) with a match of less than 70%, but peak area is greater than 35% of the internal standard. Used when specified in the contract/task order.

Z Non-target compound analyzed for and detected. This code is used only for those analytes (in non-GC/MS methods) which were not performance demonstrated or validated.

* 1 *Result less than the CRL but greater than the Criteria of Detection (COD). Can only be used for methods which were performance demonstrated under the 1990 QA Program.*

2 Ending calibration not within acceptable limits. This code is used for an analyte for which the ending calibration is still unacceptable after multiple attempts.

3 Internal standard(s) not within acceptable limits.

4 Analyte quantitated on the secondary column, when this is not the normal practice.

7 **NOT USED.**

8 **NOT USED.**

9 Non-demonstrated/validated method performed for USAEC. This code is used to identify Method 00 or NTAM data which was produced under contract to USAEC.

Acceptable Entries

A Analyte found in trip blank as well as in field samples.
B Analyte found in the method blank or QC blank as well as the sample.
C Analysis was confirmed.
D Duplicate analysis.
F Sample filtered prior to analysis.
G Analyte found in rinse blank as well as field sample.
I Interferences in sample make quantitation and/or identification to be suspect.
J Value is estimated.
K Reported results are affected by interferences or high background.
N Tentatively identified compound (match greater than 70%).
P Results less than reporting level but greater than instrumental detection limit.
Q Sample interference obscured peak of interest.
R Non-target compound analyzed for but not detected (GC/MS methods).
S Non-target compound analyzed for and detected (GC/MS methods).
T Non-target compound analyzed for but not detected (non-GC/MS methods).
U Analysis is unconfirmed.
V Sample subjected to unusual storage/preservation conditions.
W Single analyte required from a multi-analyte method.
X Analyte concentration is above the upper reporting level.

Y	Tentatively identified compound (match less than 70%).
Z	Non-target compound analyzed for and detected (non-GC/MS methods).
1	Result less than CRL but greater than COD.
2	Ending calibration not within acceptable limits.
3	Internal standard(s) not within acceptable limits.
4	Analyte quantitated on the secondary column.
9	Non-demonstrated/validated method performed for USAEC.

1.30 Data Qualifier

Element Description

Code assigned only by the USAEC Chemist to indicate data acceptance or rejection based on abnormal analytical conditions or results.

Element Size and Characteristics

IRDMIS Record

1 uppercase alphabetical character, full field (as many as 8 per record)

IRDMIS Database

chem/cqc	as many as 8 Data Qualifiers per record
flag_quals_desc	1 Data Qualifier per record

Element is Used in the Following IR Records and Database Tables

IRDMIS Record		IRDMIS Database	
Record Type	Column(s)	DB Table(s)	DB Column
Any valid chemical or radiological record type	151 152 153 154 155 156 157 158	chem/cqc flag_quals_desc	data_quals f_q_code

Acceptable Criteria

? Control chart either not received or not yet approved by USAEC. This Qualifier is automatically set when a lot file has been loaded but the corresponding control chart has not been approved.

I The low-spike recovery is high; used for the single low spike in Class 1 methods and the duplicate low spikes in Class 1P.

J The low-spike recovery is low; used for the single low spike in Class 1 methods and the duplicate low spikes in Class 1P.

K Missed holding times for extraction and preparation (Hold Time 1). This Qualifier is automatically set when the extraction/preparation holding time is exceeded. (Formerly Flagging Code K).

L Missed holding time for sample analysis (Hold Time or Hold Time 2). This Qualifier is automatically set when the analytical holding time is exceeded. (Formerly Flagging Code L)

M The high-spike recovery is high; used for the duplicate high spikes in Class 1 and 1P methods. Also used for the single spike in Class 1A and 1B methods and for the duplicate spikes in Class 1M methods.

N The high-spike recovery is low; used for the duplicate high spikes in Class 1 and 1P methods. Also used for the single spike in Class 1A and 1B methods and for the duplicate spikes in Class 1M methods.

O Low spike recoveries excessively different; used only for the duplicate low spikes in Class 1P methods.

P High spike recoveries excessively different; used for the duplicate high spikes in Class 1 and 1P methods. Also used for the duplicate spikes in Class 1M methods.

R Data is rejected and is not usable.

Acceptable Entries

? Control chart not yet approved by USAEC.
1-9 Number of surrogates failing EPA CLP criteria (used with Data Qualifier Q)
I The low-spike recovery is high.
J The low-spike recovery is low.
K Missed holding time for extraction and preparation.
L Missed holding time for sample analysis.
M The high-spike recovery is high.
N The high-spike recovery is low.
O Low spike recoveries excessively different.
P High spike recoveries excessively different.
R Data is rejected.

4.23 EPA Qualifier

Element Description

Code assigned only by contracted organizations to indicate data acceptance or rejection based on other-than-usual analytical conditions or results according to EPA standards.

Element Size And Characteristics

IRDMIS Record

2 uppercase alphabetical characters, full field (as many as 8 per record)

Element is Used in the Following IR Records And Database Tables

IRDMIS Record		IRDMIS Database	
Record Type	Column(s)	DB Table(s)	DB Column
Any valid chemical or radiological record type		EPA_Data_Quals EPA_Data_Quals	

Acceptable Criteria

B Inorganic and Organic: Not detected substantially above the level reported in laboratory or field blanks.

J Inorganic: The associated value is an estimated quantity.

Organic: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

K Inorganic and Organic: The analyte is present. The reported value may be biased high. The actual value is expected to be lower than reported.

L Inorganic and Organic: The analyte is present. The reported value may be biased low. The actual value is expected to be higher than reported.

N Organic: The analysis indicates the presence of an analyte for which there ispresumptive evidence to make a tentative identification.

NJ Organic: The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

Q Inorganic and Organic: No analytical result.

R Inorganic: The data are unusable. (Note Analyte may or may not be present.)

Organic: The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

U Inorganic: The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

Organic: The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

UJ Inorganic: The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Organic: The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

UL Inorganic and Organic: The analyte was not detected, and the reported quantitation limit is probably higher than reported.

V Data validated by third party based on Contract Laboratory Program (CLP) National Functional Guidelines (or similar criteria) and no qualifiers apply.

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

September 23, 2002

REPLY TO THE ATTENTION OF: SRF-5J

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

Subject: **Approval of the <u>Performance Monitoring Data Assessment and Validation Reports</u>, Fiscal Year 2001 (FY 2001) Annual Performance Report, Twin Cities Army Ammunition Plant**

Ref.: FY 2001 Performance Monitoring Data Assessment and Validation Reports, Tecumseh Wenck Installation Support Services (TWISS, 11/29/01), Conestoga-Rovers & Associates (CRA, 1/30/02) and SECOR International, Inc. (SECOR, 2/6/02);

MPCA Comments (TWISS, 1/14/02; CRA, 5/3/02; SECOR, 2/4/02);

EPA Comments (TWISS, 2/14/02; CRA; 3/14/02; SECOR, 3/14/02);

Responses to MPCA Comments (TWISS, 4/5/02; CRA, 6/5/02; SECOR, 2/6/02);

Responses to EPA Comments (TWISS, 4/5/02; CRA, 4/5/02; SECOR, 4/5/02);

Comments Resolution Meeting, 8/6/02 (Minutes);

Dear Mr. McCleery:

The U.S. Environmental Protection Agency (U.S. EPA) and the Minnesota Pollution Control Agency (MPCA) have completed their review of the subject documents. Based upon the information provided in the referenced documents, the U.S. EPA and the MPCA agree that the information provided in the subject data assessment and validation reports is sufficient to document the adequacy of the FY 2001, performance monitoring data in support of the FY 2001 APR.

You are hereby advised that the U.S. EPA and the MPCA approve the FY 2001 Annual Performance Report Data Assessment and Data Validation Reports.

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

Dagmar Romano

Dagmar Romano
Project Manager
Site Remediation Section
Metro District
Minnesota Pollution Control Agency

APPENDIX D

The historical groundwater tables are located on this CD in a directory named Appendix_D. This directory contains three Microsoft Excel files; Compelev.xls, Comporwq.xls, and Compinwq.xls. These represent historic groundwater elevations, historic groundwater organic water quality, and historic groundwater inorganic water quality, respectively.

APPENDIX E.1

FY 2001 TCAAP WELL INVENTORY UPDATE

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.

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 1,2-dichloroethene contour for the Unit 2 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. Figure E-3 presents the area of concern for the Unit 1 aquifer.

Wells within the study area are categorized based on location, depth, and use. Well categories for the well inventory are described in Table E-1. A new category has been added, category 1e, for wells which the owner has refused an Army offer for abandonment.

Program Requirements

The well inventory program requirements have evolved over time, with changes documented through the update reports. The most recent description of the requirements was outlined in Appendix G of the FY 1999 Annual Performance Report, "Inventory of Wells in the Vicinity of TCAAP, 1998/1999 Update." This served as the basis for work performed in FY 2000 and FY 2001. The following refines and clarifies the Army's intentions for maintaining the well inventory beginning in FY 2002.

Figure E-4 presents a flowchart which outlines the annual requirements for maintaining the TCAAP well inventory database.

At the beginning of each federal fiscal year, an updated version of the Minnesota Department of Health (MDH) database of wells in the study area will be 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 first step will be to screen out new information added since the previous update.

With the new MDH information, the TCAAP well inventory database will be updated by recategorizing wells and adding new wells within the study area. Any new wells found in Categories 1a, 1b, 1c, 2a, 2b, or 2c will be targeted for sampling in that fiscal year. Wells that are not sampled due to non-responsive well owners will be 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. An attempt will be made each year to re-classify Category 4 wells into one of the other categories. This will be 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 will be targeted for sampling in that fiscal year.

It is proposed that a "major" sampling event will occur every four years, which is a switch from the previous recommendation of five years. The major sampling events will be scheduled to coincide with the biennial sampling events for performance purposes as delineated in the APR. The next major well inventory sampling event will occur in FY 2005. For each major event, all wells in Categories 1a, 1b, 1c, 2a, 2b, and 2c will be targeted for sampling. Wells that are not sampled due to non-responsive well owners will be targeted for sampling in the next major sampling event.

After every sampling event, each well owner will be mailed a copy of their testing results.

For each sampling event, if any of the wells have a detection over the applicable TCAAP groundwater cleanup levels for that contaminant, the well will be evaluated using the flow chart presented in Figure E-4 to determine the timing of additional sampling. Wells that are used for drinking water will be sampled again within one month of data validation. Wells that are not used for drinking water, but have possible contact exposure risks, will be 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 will offer to abandon the well and/or offer an alternate water supply.

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

- A list of any wells found or re-classified,
- 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 listing wells by well category.
- An updated database listing water quality of wells.

<u>2000/2001 Update</u>

Two new wells were identified in FY 2001, both found at the Midland Hills Country Club in Roseville. Four wells are located at the site: well #S00002, well #S00342, and the two new wells, tentatively identified as "Old Shop Well" and "Rain Shelter". It is possible that one of the new wells is a duplicate of well #249633. TWISS is attempting to determine the unique numbers for the two new wells. At the time of the site visit, the unique number and categories for wells #S00342, "Old Shop Well", and "Rain Shelter" were not known, so these three wells were sampled. It has since been determined that these wells are in Category 3 (they are located in the study area but are not screened in an aquifer of concern).

Table E-2 shows which wells were re-categorized in FY 2000 and FY 2001.

The Inventory of Wells in the Vicinity of TCAAP, 1998/1999 Update (CRA, 2000) recommended sampling 87 wells in Category 1, Category 2, and Category 4a. Those not recommended for sampling were:

- Category 1d and 2d wells since these wells do not have operational pumps
- Wells that are sampled under the TCAAP Annual Monitoring Plan
- Wells that were targeted for sampling in 1999
- Wells that the Army has previously offered to abandon.

CRA made an initial sampling effort in FY 2000. In October 2000, due to a change of responsibility for maintaining the well inventory from Alliant Techsystems to TWISS, CRA ceased their sampling effort. TWISS resumed the sampling effort in FY 2001. A summary of the 2000/2001 sampling effort is presented in Table E-2.

During the 2000/2001 sampling effort, 20 wells were sampled. The wells 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 2000/2001 sampling efforts are summarized in Table E-3. The well locations are illustrated on Figure E-5, and the latest sampling results can be viewed by clicking on each well. Eight wells did not have any detections of TCAAP contaminants and twelve wells had one or more detections of TCAAP contaminants. Two wells had detections of at least one TCAAP contaminant above the OU1 cleanup level.

Well #234352, owned by Nutter, had a detection of 1,1-dichloroethene at 7.3 μg/l, above the OU1 cleanup level of 6 μg/l. This well is used for outside irrigation, and is not used for drinking water since the residency is connected to the municipal water supply (Category 1b). From the flow chart provided in Figure E-4, this well will be resampled next fiscal year.

Well #235566, owned by the Big Ten Supper Club, had a detection of trichloroethene at 28 μg/l, above the OU1 cleanup level of 5 μg/l, and a detection of 1,1-dichloroethene at 6.8 μg/l. This well is apparently used for drinking water (Category 1a). The Big Ten Supper Club was previously offered, and refused, an Army offer for alternate water supply and well abandonment, so no further action is required by the Army.

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 2002 are:
  - Well #234352, owned by Nutter.
  - Any previously undiscovered wells found to be in Categories 1a, 1b, 1c, 2a, 2b, or 2c from the review of the MDH database.
  - Any Category 4 wells, if from further investigation the well is determined to be in Category 1a, 1b, 1c, 2a, 2b, or 2c.
- The next "major" sampling event will be in FY 2005.
- The refined, clarified procedures for maintaining the well inventory are outlined in the flowchart in Figure E-4. These procedures will be implemented beginning in FY 2002. The MDH has already been contacted for their updated database.

Table E-1

Well Inventory Category Descriptions
FY2001 TCAAP Well Inventory Update

Category	*Subcategory*	*Explanation*
1		Water supply wells screened in an aquifer of concern. 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 an Army offer for abandonment
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:
	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 outside the area of concern, or within the area of concern, but not screened in an aquifer of concern.
4		Water supply wells in the Study Area, but insufficient information to determine if the well is in an aquifer of
	4a	• Unknown depth or aquifer
	4b	• Unknown location. Wells with both an unknown depth and an unknown location are included in 4b
5		Well in the study area but 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

Status of 2000/2001 Sampling Effort
TCAAP Well Inventory - 2000/2001 Update

Status	*Unique Number*	*Use*	*Previous Sample Date*	*Depth*	*Category*	*Name*	*Street Address*	*City*	*Remarks*	*New Remarks*
Sampled	127537	Commercial	7/17/97	117	2c	Midwest Asphalt	1400 Old Hwy 8	New Brighton	Sampled 8/31/00 (W-000831-PS-03). Contact: David Blanski, 651-937-8033	
Sampled	200076	Industrial	3/22/94	550		Old Dutch Foods, Inc.	2375 Terminal Rd	St. Paul	Sampled 9/15/00 (W-000915-PS-08). Contact: Darrell Skogen, 651-633-8810	
Abandoned	200150	Industrial	12/12/84	555	~~2c~~ 7b	~~University of Minnesota~~ Lightning and Transit Research Bldg	2533 Larpenteur	Lauderdale	Well abandoned according to Fay Thompson, 612-626-3676	
Sampled	200173	Irrigation/Cool	3/22/94	525	1b	KSTP Radio TV	3415 University Ave	St. Paul	Bruce Hagerty, maintenance (651-642-4400) is checking to see if there is a good place to collect the sample. Will call back. PJS 9/28/00.	Sampled 11/20/01 [112001001] DMM
Sampled	200176	Industrial		~~745~~ 758	2b	Waldorf Paper Products (Rock-Tenn)	2236 Myrtle Ave	St. Paul	One of four wells at this location. Contact: Gary Kaziukewicz, 651-641-4709. This well was not operating for sampling. Duplicate of S00517.	Sampled 8/30/01 [083001.01 and 083001.02 (DUP)] Contact: Gary Kaziukewicz, 651-641-4709. Well was operational, used in production process. DEK
Abandoned	200178	Industrial		504	~~2c~~ 7b	Farm Oyl	2125 Wabash Ave	St. Paul	Robert Larson responded by letter, and stated that "there are no wells at this address and have been on city water for decades."	
Abandoned	200179	Industrial		516	~~2b~~ 7b	Farm Oyl	2125 Wabash Ave	St. Paul	Robert Larson responded by letter, and stated that "there are no wells at this address and have been on city water for decades."	
Abandoned	200180	Commercial		500	1c	Town and Country Golf Course	300 Mississippi River Blvd N	St. Paul	One of two wells at this location - this one was not sampled because the plumbing was difficult to isolate.	9/24/01 Called William Larson 651-646-6743, and left message for him to call me back. DEK
Abandoned	200263	Commercial		425	~~2c~~ 7b	Land O'Lakes Creameries	2215 NE Kennedy St	Minneapolis	Spoke to Steve Zadnichek, and no wells on the property. All operations and boilers use city water.	
Letter Returned	200522	Commercial		254	1c	Pemtom	Silver Lake Rd	New Brighton	Contact: Stan Hurbst, 612-937-0716 for more info. Message left on 9/29/00. WENCK, 1994 could not find this well.	9/26/01. Called Stan (Dan?) Hurbst 952-937-0716. Left message on answering machine. No reply. Wexford Heights housing development?
Letter Returned	200523	Commercial		255	1c	Pemtom	Silver Lake Rd & Cty Rd E	New Brighton	Contact: Stan Hurbst, 612-937-0716 for more info. Message left on 9/29/00. WENCK, 1994 could not find this well.	9/26/01. Called Stan (Dan?) Hurbst 952-937-0716. Left message on answering machine. No reply. Wexford Heights housing development?
No Response	200603	Public Supply		1110	1a	Miller Milling	2500 Marshall Ave	St. Paul / Mpls?	Talked with Kevin Ball, vice president of operations on 9/28/00. Except for their office, which is located in the Grain Exchange Building, no properties are or were used by Miller Milling at this address or in Minnesota altogether. They have been in business since 1986 and have no knowledge of any well. Visit address.	Plotted address using Mapquest, 2500 Marshall Ave, St. Paul- no such address exists. Plotted it in Yahoo Maps, no such address exists, however, it did show a Marshall Ave located just south of St. Paul Technical College by St. Paul's Cathedral. This location would certainly be out of the area of concern. Plotted 2500 Marshall Ave in Mpls. Came up with the corner of Lowry and Marshall St. This would be more in the line of an area of concern. However, a site visit of that intersection identified that address to be Tony Jaros River Garden Bar. No well was located. DEK
Abandoned	200805	Municipal		427	~~1a~~ 7a	City of St. Anthony	3357 Silver Lake Rd	St. Anthony	Jay Hartman, City of St. Anthony - abandoned Well #2.	
No Response	200818	Industrial		433	~~1c~~ 5	Commercial Gas Co.	2633 4th St SE	Minneapolis	Tried Minnegaso - no help. Not listed with the phone company. *Visit address.*	9/12/01. Site Visit. No businesses are located specifically at the address. Talked to an employee within the building who showed me Dan Parten's door. Dan is the property manager but he wasn't there. Left a letter taped on the door. No response. DE
Abandoned	206689	Domestic		223	~~2a~~ 7b	O'Neil	4629 Polk St NE	Fridley	Called 9/13/00, no response (PJS). Phone: 763-493-4043	9/6/01, Called Fred Foster, 763-493-4043 and left message. Received voice message back that the above number is located in Blaine. 9/12/01 Visited 4629 Polk St. and spoke with owner, O'Neill. She has lived there since the 1960's and claimed that there was not a well on the property. They are on city water for everything. DEK
Abandoned	206724	Public Supply		464	~~1c~~ 7a	TC Ordnance Plant		Arden Hills	Sealed, 1999 AMR	
Abandoned	206754	Industrial	3/17/94	340	~~1c~~ 7a	TC Ordnance Plant No. 1	Mounds View Rd	Arden Hills	Sealed, 1999 AMR	
Abandoned	206756	Industrial	3/17/94	335	~~1c~~ 7a	TC Ordnance Plant No. 2	Mounds View Rd	Arden Hills	Sealed, 1999 AMR	
Abandoned	206763	Domestic	3/23/94	142	~~2a~~ 7b	Zenench	1600 W Hwy 96	Arden Hills	Well closed years ago, PJS, 9/13/00. Phone: 651-636-0206	
Delete	225906	Industrial		551	1c	St. Paul Terminal Warehouse		Roseville	According to WENCK, 1994, Out of the study area, Bldg #2 machine shop (CWI).	
Abandoned	233520	Industrial	8/26/88	232	~~2a~~ 7b	MacGillis & Gibbs Company	440 5th Ave NW	New Brighton	MPCA, Fred Campbell, Site under remediation. Business not in operation. Well either abandoned or used as a monitoring well. *Confirm category by site visit.*	9/7/01 Spoke to Fred Campbell (MPCA) 651-296-7267. He said the well was capped but did not have a sealing record. Site visit confirmed that it was a remediation project. DEK
Info Complete	234341	Industrial			5	Murphy Rigging & Erecting	2225 Cty Rd D	New Brighton	Letter returned. No such number. WENCK, 1994, no such address. *Visit address.*	9/6/01, Called Murphy Rigging in Minneapolis, 612-623-1270, spoke to Bill. The company moved from the location on County Rd D in 1990. The whole area was demoed, regraded, and new buildings were erected. 9/11/01 Site Visit. The site is completely rennovated, all new buildings.
Sampled	234352	Irrigation	6/27/97	120	1b	Aaron Nutter	1206 12th Ave NW	New Brighton	Sampled 9/18/00 (W-000918-PS-10). Mr. Nutter, 651-636-0306, stated that well water was used only for outside faucet, irrigation.	

Table E-2

Status of 2000/2001 Sampling Effort
TCAAP Well Inventory - 2000/2001 Update

Status	Unique Number	Use	Previous Sample Date	Depth	Category	Name	Street Address	City	Remarks	New Remarks
Not Sampled	234355	~~Domestic~~ Irrigation	3/1/84	105	~~4a~~ 1b	Kingdom Hall	1987 Mound St	New Brighton	Contacted by phone, allowed sampling, but pump was plumbed directly to irrigation and the system could not be sampled. On city water for all other purposes. Phone: 651-633-5527. *Call back to arrange sampling.*	9/6/01 Called and left message. 651-633-5527. No response. 9/10/01 Site Visit. Located across from Johnston Filter on Old HWY 8. Nobody in building. Left letter taped to door. 9/19/01 Tried calling the building overseer 651-784-9345 - number disconnected. Called 651-633-5527 and left a message. DEK
Sampled	234356	Domestic	3/21/94	100	1a	Nordquist, Robert	1873 Old Hwy 8	New Brighton	Sampled 9/1/00 (W-000901-PS-06)	
Abandoned	234363	Domestic			~~2a~~ 7b	Resident	1603 14th Ave NW	New Brighton	WENCK, 1994, could not find this address. *Visit address.*	9/11/01 Site visit. Spoke to owner, Hedin. They lived there for 15 yrs. Before that, the house was owned by the wife's parents. The well was sealed 5-6 yrs ago. On city water for everything. DEK
Not Sampled	234368	~~Domestic~~ Irrigation	7/22/97	82	~~4a~~ 3	Bochnak	2600 St. Anthony Blvd	Minneapolis	Out of the aquifer of concern.	9/10/01. Site visit. Bochnak is the name of the current owner. Nobody home. Left letter in front screen door. No response. DEK
Not Sampled	234380	~~Domestic~~ Irrigation	6/1/82	160	~~2a~~ 2d	Podlasek, Fransis	4410 N Snelling Ave	Arden Hills	Called 9/13/00, no response (PJS). Phone: 651-633-2270	9/6/01 Phone call to Mr. Podlasek 651-636-2270. He said the well is inoperable and he would have to repair the pump in order for us to sample it. They used to use the well for irrigation. They are on city water for everything. DEK
Sampled	234421	Industrial	7/17/97	270	1b	BioChem	2151 Mustang Dr	New Brighton	Sampled 9/18/00 (W-000918-PS-11 MS/MSD)	
Not Sampled	234475	Domestic			~~4a~~ 1d	Rissell	2805 Silver Ln NE	Minneapolis		8/30/01. Site visit. The owner of the home was not home, but her sister and her daughter showed me the pump. The pump was inoperable and the resident does not use the well water for any purpose. The resident is on city water for everything. No sample
Letter Returned	234511	Domestic			~~4a~~ 5	Lindberg	2120 W Larpenteur	Roseville	*Visit address*	9/12/01. Site visit. Address does not exist. 2100 is a U of MN agricultural research building. The building at 2118 W Larpenteur is the U of MN Bee Research Building. Spoke to two grad students. They were not aware of any building to the west of them except for the large appartment complex that was built a few years ago. 2120 may have been demolished when the appartment complex was built. DEK
Abandoned	234520	Domestic			~~4a~~ 7b	Thompson, Melissa	2832 Coolidge St NE	St. Anthony	Well sealed according to Ms. Thompson	
No Response	234544	Commercial	7/29/86	500	1b	~~Hillcrest Shopper, Inc.~~ R&D	2201 Kennedy St NE	Minneapolis	Abandoned building found nothing, WENCK 1994	9/12/01. Site visit. Left letter with maintenance personel. They said they would give it to Dave Clausen (head maintenance). R&D Systems owns all of the buildings in the complex- Rueben Meats, the meat packager, has moved out. The property is managed by Hillcrest/Excel Management, Scott Tankinoff manages it (612-371-0123). 9/18/01 Scott said that they have advised R&D not to have the well sampled. He will double check on R&Ds intentions and will call if they wish to have it sampled (unlikely). DEK
No Response	234571	Irrigation	7/24/97	200	2b	Leiser	1901 17th St NW	New Brighton	Non-published phone. WENCK, 1994 also could not reach this resident.	9/11/01. Site visit. Nobody home. Left letter in door. No response.
Delete	235539	Domestic		345	1a	Jackson, Manley	1330 Washington Ave N	Minneapolis	"Old Hotel" contact and well address according to the CWI, therefore, out of the study area. Similar findings by WENCK in1994.	
Sampled	235566	Commercial		286	1a	Big Ten Supper Club	4703 Hwy 10	New Brighton	Sampled 9/1/00 (W-000901-PS-05) open hole: 250' - 286'	
Abandoned	235778	Air Condition		345	~~2a~~ 7b	Limited Partnership	2356 University Ave	St. Paul	Phase I and II by STS, Bob Degroot, and no known well.	
Not Sampled	236029	Commercial		435	2c	~~Hillcrest Shopper (Reuben Meats)~~ R&D	2201 Kennedy St NE	Minneapolis	WENCK, 1994, well was not in use. Didn't want it to be sampled anyway.	9/12/01. Site visit. Left letter with maintenance personel. They said they would give it to Dave Clausen (head maintenance). R&D Systems owns all of the buildings in the complex- Rueben Meats, the meat packager, has moved out. The property is managed
Sampled	236439			790	2c	Waldorf Paper Products (Rock-Tenn)	2250 Wabash Ave	St. Paul	Sampled 9/19/00 (W-000919-PS-09). One of four wells at this location. Contact: Gary Kaziukewicz, 651-641-4709. Duplicate of unlisted - changed as shown. Delete the well with no unique number.	
Not Sampled	236512	Industrial		300	~~4b~~ 1d	Gordon Rendering Co.		New Brighton	John Bohanna, 972-281-4490. Operation shut down power disconnected. PJS 8/220/0.	9/24/01 Called 972-281-4490. Left message on John's voicemail- in Dallas, Texas. 9/25/01 John called back- all operations are shut down there. No power. DEK
More Info	240684	Domestic		330	~~4a~~ 5		15th & Cty Rd 80		CWI - open hole: 276' - 330'	Could not locate this address.... DEK
Abandoned	247434	Public Supply		386	~~4a~~ 7b	Lowry Grove Mobile Home and RV Park		St. Anthony	Margie Gillespie, mgr., 612-781-3148, stated that the well they used to have has been abandoned 10 years ago (at least). PJS 9/5/00.	
Abandoned	249004	Domestic	3/22/94	2/7/00	~~4b~~ 7b	Gamradt	5567 Fairview Ave	Shoreview	Max Gamrandt, 651-786-5181, stated he was on city water and his well was not operating. Will call when he fixes it. PJS 9/12/00.	9/6/01. Phone call. Spoke to Max Gamrandt 651-786-5181. Well driller Ernie Pitusek capped his well the day before 9/5/01. He is on city water for everything. DEK
Abandoned	249112	Domestic			~~4a~~ 7b	Rabbi	1176 Long Lake Rd	New Brighton		9/11/01 Site visit. Spoke to owner, Derose. They purchased the home two years ago and the well was sealed before they could move in. DEK
Abandoned	249114	Unknown			~~4a~~ 7b	Schwab	642 8th Ave NW	New Brighton		9/10/01 Site visit. Spoke to person who was living in the home. He called the owner. The owner said the well was capped and they were on city water for everything. 9/12/01. Call from owner Chris Woulett, he said there used to be a well but it was a

Table E-2

Status of 2000/2001 Sampling Effort
TCAAP Well Inventory - 2000/2001 Update

Status	*Unique Number*	*Use*	*Previous Sample Date*	*Depth*	*Category*	*Name*	*Street Address*	*City*	*Remarks*	*New Remarks*
No Response	249118	Unknown			4a	Cameron, David	1003 7th St NW	New Brighton	Contacted 9/20/00 by phone - no response. 651-636-4694	9/10/01. Site Visit. Nobody home. Left letter taped on sliding door. DEK
No Response	249150	Unknown			4a	Barres, M	3511 Stinson Blvd NE	St. Anthony	Unlisted number.	9/10/01. Site visit. Nobody home. Left letter in door. DEK
Abandoned	249184	Unknown			~~4a~~ 7b	Warner	1964 Carl St	Lauderdale	Letter returned. WENCK. 1994. on city water, not aware of any wells.	9/10/01. Site visit. Spoke to owner Lynn Bauman. The home is a duplex. 1962 is where he lives. 1964 is his tenant's entrance in the back of the house. He has lived there for 15yrs and doesn't have a well and is on city water for everything. DEK
No Response	249185	Unknown			4a	Novotny	1706 Malvern St	Lauderdale		9/6/01 Phone call- no answer, no machine. 9/12/01 Site visit. The owner's brother did not know of any wells at the home- however he wasn't living there. I gave the letter to him and asked to have his brother call me. DEK
No Response	249191	Irrigation			4a	Wells	1651 Millwood Ave	Roseville		9/6/01 Phone call- left message and phone number on machine. No response. 9/12/01 Site visit. Nobody home. Left letter in door. DEK
Sampled	249608	Domestic	7/18/97	375	1a	Rapit Printing Inc.	2520 Larpenteur Ave	Lauderdale	Sampled 9/21/00 (W-000921-PS-12 and W-000921-PS-13, Dup)	
Declined Sampling	249621	Unknown		25	3	Stenger, Jr.	1719 Terrace Dr	Shoreview	Contacted by phone, and does not want any samples collected 9/13/00. Phone: 651-786-1204	
Sampled	249632	Irrigation	7/18/97	240	1b	Montzka, Harold	2301 N Upland Crest NE	Columbia Heights	Sampled 8/31/00 (W-000831-PS-02)	
Abandoned	249898	Domestic		251	~~4a~~ 7b	Hill, James and Patricia	2901 Roosevelt St	St. Anthony	Patricia Hill - well abandoned several years ago.	
Info Complete	250107	Commercial		423	~~4a~~ 5		2630 Cty Rd C	Roseville	Letter returned - no such number	9/11/01 Site visit. The address does not exist. Checked out 2360 Cty Rd C in case of typo. Spoke with employee, no wells in building. DEK
Abandoned	250769	Domestic		258	~~4a~~ 7b		3600 33rd St NE	St. Anthony		9/12/01. Site visit. The address does not exist. Talked to postman. The resident renovated the home ~3 yrs ago and had to change his address to 3223 Croft. I left a letter in the door. 9/12/01 The new resident (Orcutt) called me, the well was capped
Sampled	433298	Domestic		500	1a	Town and Country Golf Course	300 Mississippi River Blvd N	St. Paul	Sampled 9/5/00 (W-000905-PS-07). Contact: William Larson, 651-646-6743	
Info Complete	463528	Unknown			~~4a~~ 6	Burlington Northern Railroad	2575 Doswell	St. Paul	Appeared to be a monitoring well. This property is owned by Minnesota Commercial Railway. Met wih Ray Duran, 651-646-2010. and he knew of no wells used by his company nor were there any buildings. However, there were three monitoring wells at this location.	
More info	497941	DW		140	1a		315 Grant St E 55404	Minneapolis	Letter returned - no such number. Owner address according to the CWI, well address not given. Also a dewatering well.	9/10/01 The location of this address is south of Minneapolis, out of the study area. DEK 12/18/01 Address listed is incorrect. WI database lists address as Intersection of E. River road and Huron St. DMM
Sampled	509052	Medical	3/22/94	302	1a	Shriners Hospital	2025 E River Rd	Minneapolis	Sampled 9/1/00 (W-000901-PS-04). Contact: Denis Campbell	
Sampled	~~600125~~ 756326	~~Unknown~~ Industrial		280	1c	~~American National Can~~ Pechiney Plastic Packaging, Inc.	150 26th Ave SE	Minneapolis	The unique # for this well is 756236. Thomas Miller, engineering mgr., 612-378-3349 - only knows of one well (records show two at this address) He said we could probably collect a sample. but has not returned subsequent calls.	8/29/01 Sampled (08280101). DMM
Sampled	S00002	Irrigation			~~4a~~ 2b	Midland Hills Country Club	2001 N Fulham St	Roseville	Contact: Scott Austin, 651-631-1545. Called a number of times and he has returned but can't seem to connect.	9/10/01. Sampled (091001.01 through 091001.05) Samples were from S00002 (260' deep?) [.01, .02] , 17 rainshelter well (90' deep?) [.03], 16 tee drinking fountain (Wilson house well) [.04], old shop well (130' deep?) [.05] Contact is Scott Austin or Jim
Delete	S00010	Industrial		500	1c	~~American National Can~~ Pechiney Plastic Packaging, Inc.	150 26th Ave SE	Minneapolis	This well should be deleted. Thomas Miller, engineering mgr., 612-378-3349 - only knows of one well (records show two at this address), has no info on this well. He said we could probably collect a sample, but has not returned subsequent calls.	
No Response	S00294	Unknown			4a	Western Remodelers	2520 W Larpenteur Ave	St. Paul		9/6/01 phone call. Rapit Printing owns building. 9/12/01 Site Visit. This business is leasing the space from the building owners, Rapit Printing. Western Remodelers were unaware of any well on their side of the building. I visited Rapit Printing and they gave me the number for Ray Halloway, company owner 651-633-4600. Called Ray several times, leaving messages about whether they have another well in the building (the well associated with Rapit Printing 249608 was sampled in 2000). No reply. DEK
No Response	S00295	Unknown			4a	Alfson	2351 Summer St	Lauderdale		9/12/01 Site visit. Nobody home. Left letter in door. DEK
Sampled	S00311	Domestic			~~4a~~ 1a	~~Anderson~~ Inglebrech, Brenda	1390 Silver Lake Rd	New Brighton	Sampled 9/21/00 (W-000921-PS-14). Field checked and could not measure depth, but this is a 4-inch diameter with a submersible pump. Likely a drift well and probably in the aquifer of concern. This resident is not on city water and uses the well water for all functions.	
No Response	S00409	Unknown			4a	Ohara	3553 Stinson Blvd NE	St. Anthony		9/10/01 Site Visit. Nobody home. Left letter in screen door. DEK

Table E-2

Status of 2000/2001 Sampling Effort
TCAAP Well Inventory - 2000/2001 Update

Status	*Unique Number*	*Use*	*Previous Sample Date*	*Depth*	*Category*	*Name*	*Street Address*	*City*	*Remarks*	*New Remarks*
Not sampled	*S00410*	*Unknown*			~~4a~~ 1d	*Iacarella*	*3555 Stinson Blvd NE*	*Minneapolis*		9/6/01 phone call. Nancy Iacarella 612-789-9346. Has a well but it is inoperable and they do not use it. Hooked up to city water. They are just living there while her mother-in-law is at her summer house. Told Nancy to ask her neighbor (Ohara) to give me a call. DEK
Abandoned	S00432	Unknown			~~4a~~ 7b	~~Curth Mauiding Corp~~ Kurth Malting	27th Ave SE & GNRR	Minneapolis	Dan Truchon, elevator supervisor, stated that only the grain elevator remains. All other associated buildings were removed and associated wells abandoned about 15 years ago. PJS 9/12/00.	
Sampled	S00437	Industrial		450	1c	Northern Star Co	3171 5th St SE	Minneapolis	Sampled 8/31/00 (W-000831-PS-01). Contact: Patch Howitz, 612-339-8981, on city water. Pumphouse located at 543 Malcolm NE.	
Abandoned	S00457	Unknown		518	~~2a~~ 7a	~~Bartusch Packing Co.~~ Rihm Motor Co.	565 N Cleveland Ave	St. Paul	John Rihm, owner, 651-646-7833. Stated well was abandoned. Sealing #H46930.	
Abandoned	S00458	Unknown		518	~~2a~~ 7a	~~Bartusch Packing Co.~~ Rihm Motor Co.	567 N Cleveland Ave	St. Paul	John Rihm, owner, 651-646-7833. Stated well was abandoned. Sealing #H46931.	
Abandoned	S00462	Unknown			~~4a~~ 7b		2053 Old Hwy 8	New Brighton	Letter returned, no such number.	9/10/01 Site Visit. This address exists, however it is the address for a brand new building constructed in June 2001. According to Superior Flooring, the occupants of the new building, the old address was for an A&W Restaurant which was demolished. The new building does not have a well and is on city water for everything. DEK
Letter Returned	S00490	Unknown		500	~~4a~~ 5	Resident	435 Otis Ave	St. Paul	Letter returned, no such number.	9/11/01 Site visit. No such address. Left letter at 433 Otis with a note asking if the occupant knew of a property formerly at 435 and the presence of a well. No response. DEK
Not Sampled	S00491	Unknown			~~4a~~ 7b	MN Diversified Industries, Inc.	666 Pelham Blvd	St. Paul	According to last years study (1999) by CRA of this location, Lee Selton, stated that the well has been inactive since 1970 and the building was on city water. The building continues to be unoccupied.	9/12/01 Site visit. Building is mostly vacant. Mn Diversified Industries has moved. 9/19/01 Called Joe Turner (property manager), he said that there is a well at the site, however it will be abandoned within the next few weeks as the property is about to be sold. It will happen prior to 11/01/01. DEK
Delete	S00517	Unknown		758	2c	Waldorf Paper Products (Rock-Tenn)	2211 Wabash Ave	St. Paul	Delete this well. Duplicate of 200176. Contact: Gary Kaziukewicz, 651-641-4709	Gary said that this was a duplicate well. 8/31/01 DEK
No Response	S00608	Unknown			4a	Grundtner	136 Oakwood Dr	New Brighton	WENCK, 1994, no such address	9/10/01 Found address, site visit. Nobody home. Left letter in screen door. DEK
Abandoned					~~4a~~ 7b		444 County Rd D, Bldg B	New Brighton	Letter returned, no such number.	9/10/01 Site visit. The address and building exists and is owned by Medtox. Suite 444 has been vacant for 15 months. Bob Heitzinger is Medtox maintenance 651-636-7466. 9/19/01 Bob had checked with a former building maintenance person who said all building clients are on city water and no wells existed in the buildings. Speaking to Gail Fischer, property manager- United Properties Mgmt, 952-546-9680, the building has been sold twice in the recent past. Each time it was sold, under the due diligence clause, there has been no mention of groundwater wells on the site. DEK
Abandoned					~~4a~~ 7b		366 County Rd D, Bldg C	New Brighton	Letter returned, no such number.	9/10/01 Site visit. The address and building exists and is owned by Medtox. Suite 366 is occupied by Qualex (photo finishing lab). I spoke and left a letter with John Campbell (Qualex exec). He said they were on city water and wasn't aware of any wells on the property. Bob Heitzinger is Medtox maintenance 651-636-7466. 9/19/01 Bob had checked with a former building maintenance person who said all building clients are on city water and no wells existed in the buildings. Speaking to Gail Fischer, property manager- United Properties Mgmt, 952-546-9680, the building has been sold twice in the recent past. Each time it was sold, under the due diligence clause, there has been no mention of groundwater wells on the site. DEK
No Response					~~4a~~ 5	Goldman	30 12th Ave NW	New Brighton		9/11/01 No such address. Site visit could not locate address. DEK
Not Sampled					~~4a~~ 1d	Delores McCalla	281 Silver Lake Rd S	New Brighton	Field checked for sampling on 9/18/00, and the well was not functional. Resident is on city water.	9/11/01 Site visit. Well is near in the concrete sidewalk by front step. The wires for the pump are cut and not hooked up to any power. Delores McCalla is on city water for everything. Phone 651-631-1523. DEK
No Response					4a	Polynesian Village	1417 NW 10th St	New Brighton	Phone: 651-636-0850. Called several times and left messages - no response.	9/10/01 Site visit. Left letter with receptionist. Spoke to maintenance person who said that for all she knew they were on city water for everything. The receptionist said she would forward the letter to the head maintenance person. No Response. DEK
Abandoned					~~4a~~ 7b	Lawin, Bruce	1263 12th Ave NW	New Brighton	Mr. Lawin has been at this address for ten years and knows of no well. On city water.	
Info Complete					~~4a~~ 5		1405 Old Hwy 8	New Brighton	Letter returned, no such number.	9/10/01 Site visit. The address does not exist. Closest address is an abandoned gas station at 1417 Old HWY 8. DEK
Info Complete					~~4a~~ 5	The Barbers	381 Silver Lake Rd	New Brighton		9/11/01, Site Visit. Spoke with hairdresser at Silver Lake Barber/Stylists, 397 Silver Lake Rd. Jan Martinson called and left message that there is not a well on the property... 763-767-0942 (home). The Barbers was the business that they took over. Same location but back then (apparently) it had a different address, 381. DEK

Table E-2

Status of 2000/2001 Sampling Effort
TCAAP Well Inventory - 2000/2001 Update

Status	*Unique Number*	*Use*	*Previous Sample Date*	*Depth*	*Category*	*Name*	*Street Address*	*City*	*Remarks*	*New Remarks*
Abandoned					~~4a~~ 7b	Donatelle	401 County Rd E2	New Brighton	Phone messge from Carl Donatelle on 8/22/00 stated that no wells are located on his property.	
Not Sampled					~~4a~~ 2d	Sayer	4482 Snelling Ave N	Arden Hills		9/12/01 Site visit. 4483 does not exist. Stopped by 4482 to ask if there ever was a 4483. Denice Sayer answered the door. They have a well, (probably the well in question) but they are not using it- it is inoperable. They tried to fix the pump several years ago but were unsuccessful. No sample was collected. DEK

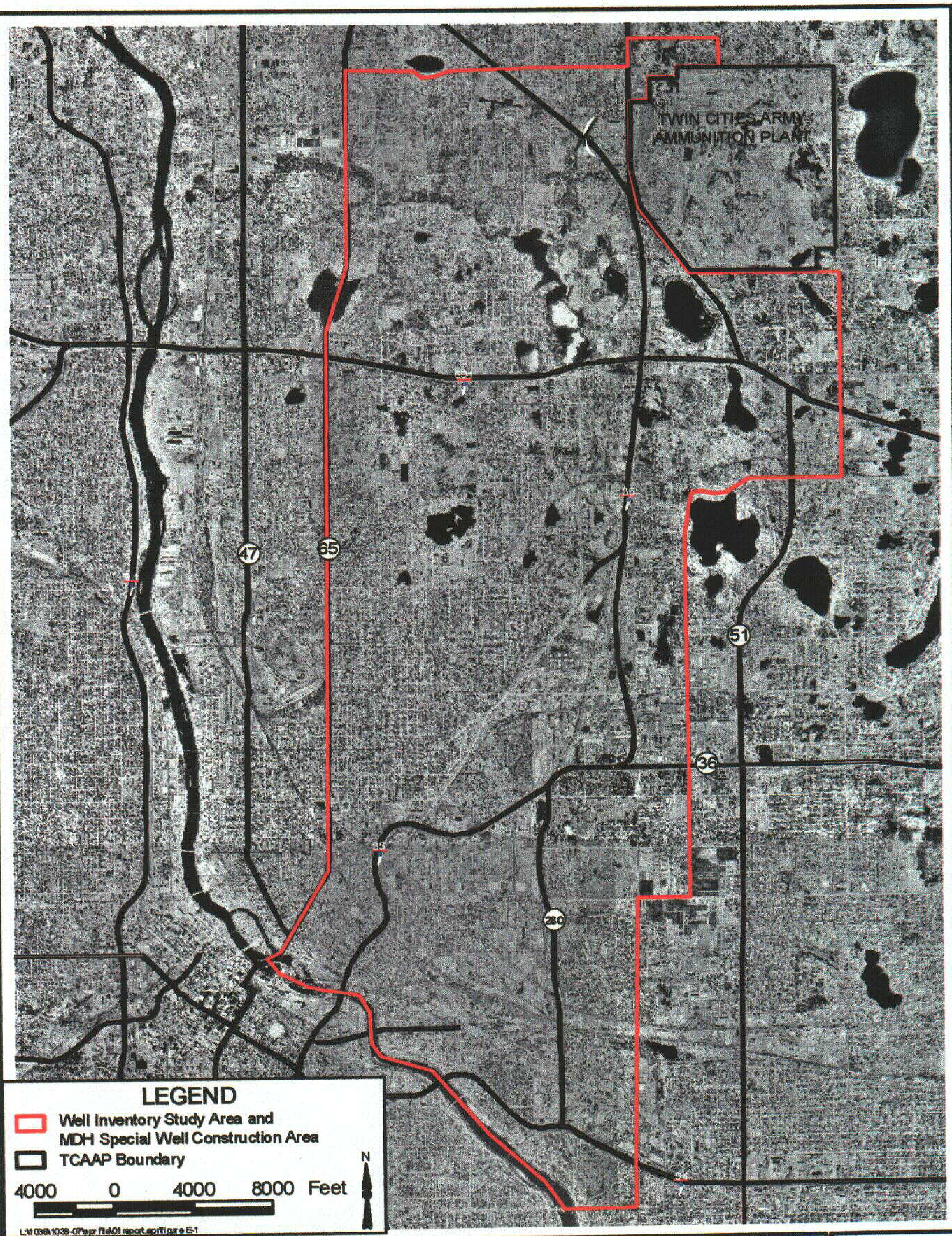
NOTES:
- **If well pump is inoperable,** and the well owner is not **using the well, the well will not be sampled.**
- **The depth of the Category 4a wells will be** measured, **if possible before sampling. If the depth indicates the well is not screened** in an aquifer of concern. **The well will not be sampled.**
- **Bold print denotes new** information from year 2000.

Table E-3

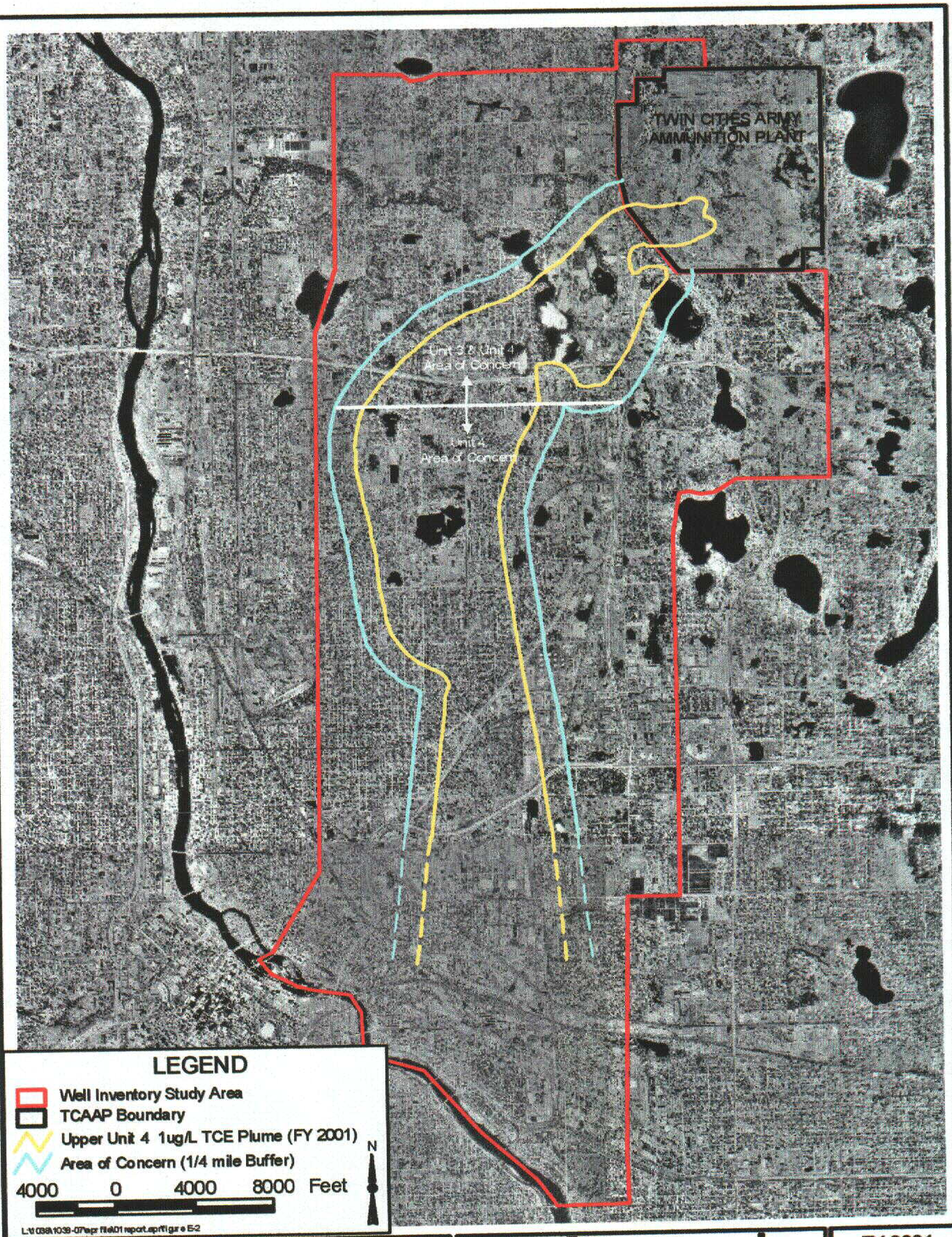
Well Inventory Sampling Results for 2000/2001
FY 2001 TCAAP Well Inventory Update

Well	Address	Name	Date Analyzed	Trichloroethene	1,1-Dichloroethene	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane
OU1 Cleanup level (1)				5	6	70	200	3	70
Wells with no detections:									
127537	1400 Old Hwy 8	Midwest Asphalt	11-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
200076	2375 Terminal Rd	Old Dutch Foods, Inc.	27-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
249608	2520 Larpenteur Ave	Rapit Printing, Inc	27-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
249608 D	2520 Larpenteur Ave	Rapit Printing, Inc	27-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
249632	2301 N Upland Crest NE	Montzka, Harold	11-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
S00311	1390 Silver Lake Road	Ingelbrecht, Brenda	27-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
S00342	2079 W Skillman Ave	Wilson House	04-Oct-01	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Old Shop Well	2001 N Fulham St	Midland Hills Country Club	04-Oct-01	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Rain Shelter	2001 N Fulham St	Midland Hills Country Club	04-Oct-01	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Wells with one or more detections:									
200173	3415 University Avenue, St. Paul	KSTP Radio TV	20-Nov-01	2.0	0.78	19	<1.00	<1.00	56
200176	2236 Myrtle Ave, St.Paul	Waldorf Paper Products (Rock-Tenn)	02-Oct-01	<1.00	<1.00	0.25 J	<1.00	<1.00	<1.00
200176 D	2236 Myrtle Ave, St.Paul	Waldorf Paper Products (Rock-Tenn)	02-Oct-01	<1.00	<1.00	0.24 J	<1.00	<1.00	<1.00
234352	1206 12th Ave NW	Nutter, Aaron	27-Sep-00	<1.00	**7.3**	1.4	0.27 J	<1.00	10
234356	1873 Old Hwy 8	Nordquist, Robert	11-Sep-00	<1.00	2.3	0.31 J	1.6	<1.00	4.8
234421	2151 Mustang Dr	BioChem	27-Sep-00	<1.00	<1.00	<1.00	<1.00	<1.00	0.19 J
235566	4703 Hwy 10	Big Ten Supper Club	11-Sep-00	**28**	**6.8**	2.6	18	<1.00	5.8
236439	2250 Wabash Ave	Rock-Tenn	27-Sep-00	<1.00	<1.00	2.5	<1.00	<1.00	0.18 J
433298	300 Mississippi River Blvd N	Town & Country Golf	13-Sep-00	1.4	<1.00	4.8	<1.00	<1.00	0.17 J
509052	2025 E River Road	Shriners Hospital	11-Sep-00	<1.00	<1.00	0.28 J	<1.00	<1.00	<1.00
756236	150 26th Ave SE, Mpls	Pechiney Plastic Packaging, Inc.	02-Oct-01	1.3	0.067 J	0.093 J	<1.00	<1.00	0.14 J
S00002	2001 N Fulham St	Midland Hills Country Club	04-Oct-01	1.1	0.13 J	6.0	<1.00	<1.00	0.97 J
S00002 D	2001 N Fulham St	Midland Hills Country Club	04-Oct-01	1.1	0.15 J	6.3	<1.00	<1.00	1.0
S00437	3171 5th St SE	Northern Star Co	11-Sep-00	<1.00	<1.00	0.51 J	<1.00	<1.00	<1.00

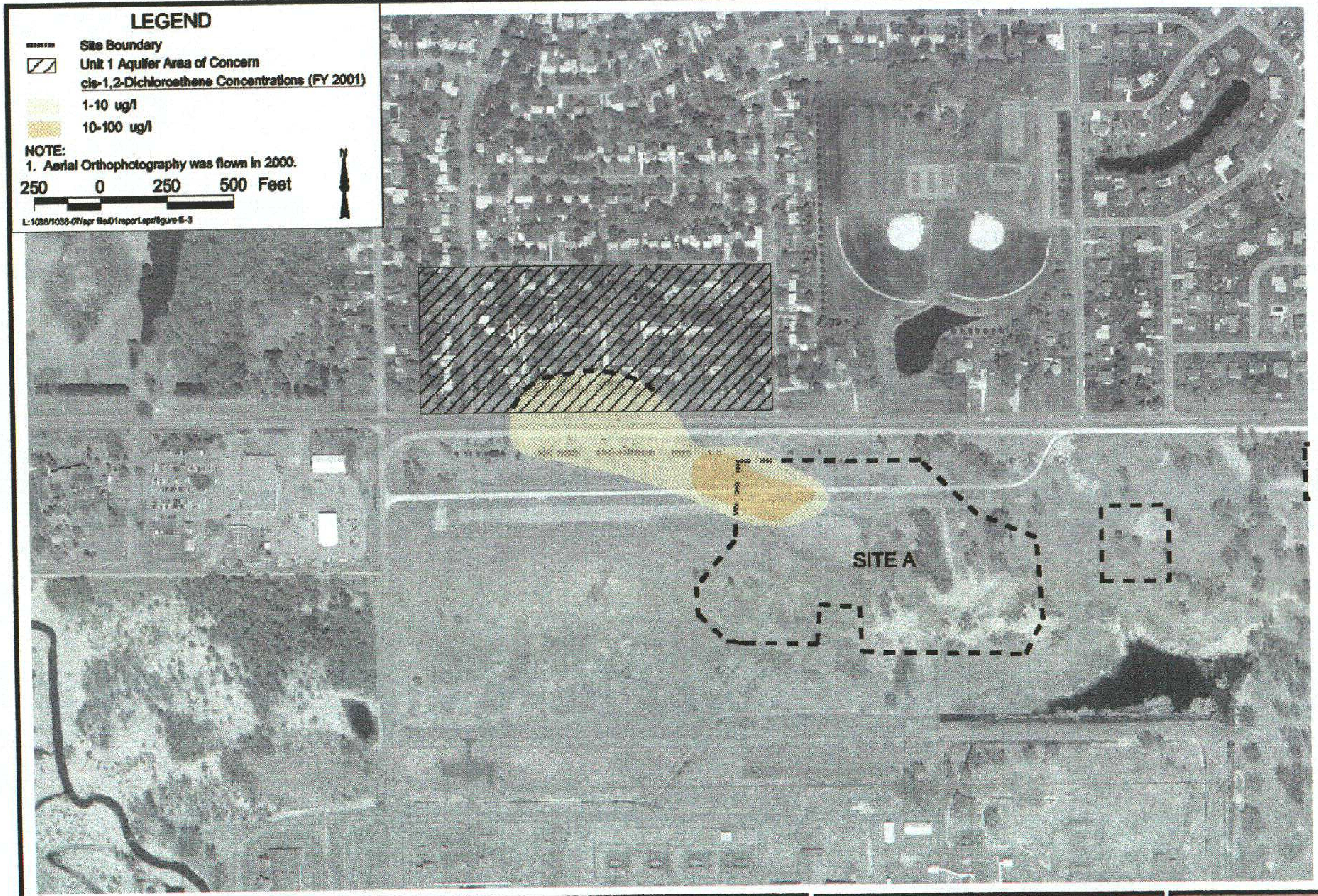
Notes: (1) Cleanup levels for OU1 deep groundwater are from page 18 of the OU1 ROD.
Bolding indicates exceedance of the cleanup level.
J The value is below the reporting limit, but above the method detection limit.
D Duplicate Sample



TWIN CITIES ARMY AMMUNITION PLANT	Wenck	FY 2001
Well Inventory Study Area	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure E-1



TWIN CITIES ARMY AMMUNITION PLANT	Wenck Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	FY 2001
Areas of Concern		Figure E-2



TWIN CITIES ARMY AMMUNITION PLANT

Unit 1, Area of Concern

Wenck

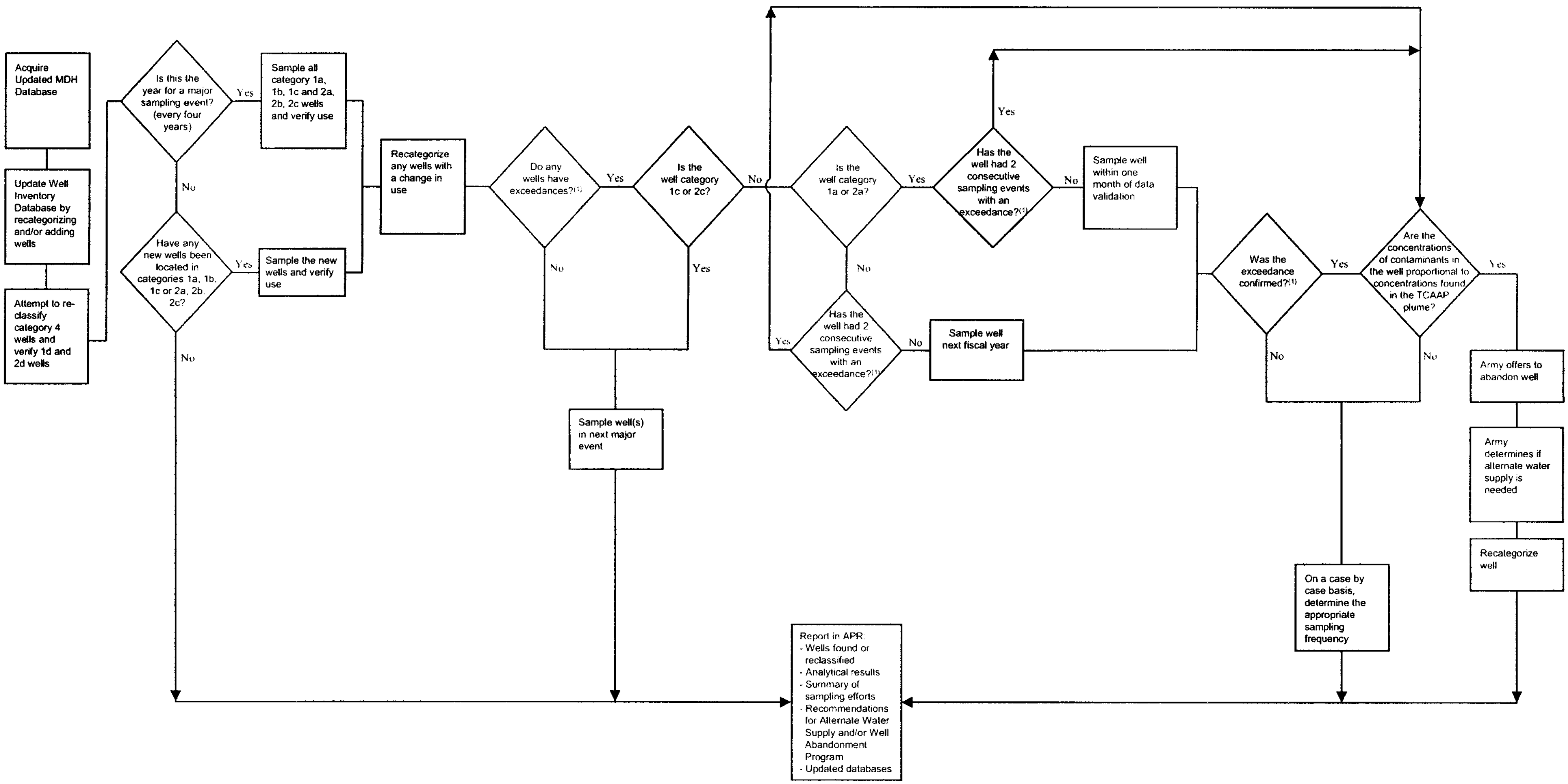
Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359-0249

FY 2001

Figure E-3

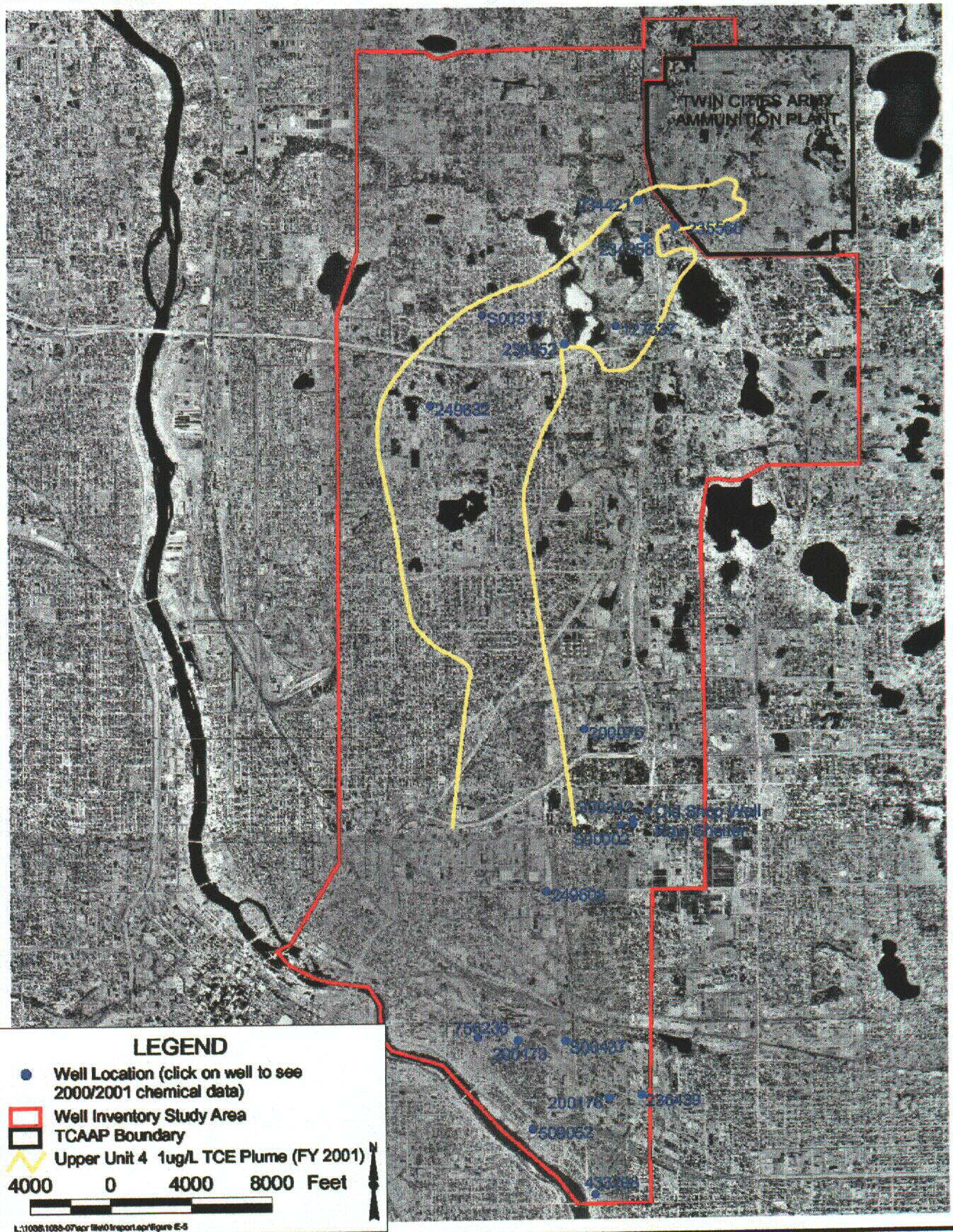
Figure E-4

Annual Requirements for Maintaining TCAAP Well Inventory Database



(1) = Exceedance of a TCAAP Groundwater Cleanup Level

138.07\Figures\Figure E-4.ppt



TWIN CITIES ARMY AMMUNITION PLANT

FY2000/2001 Well Inventory Sampling Locations

Wenck

Wenck Associates, Inc.
Environmental Engineers

1600 Pioneer Creek Center
Maple Plain, MN 55359-0249

FY 2001

Figure E-5

Well #127537
Midwest Asphalt
1400 Old Hwy 8
New Brighton
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #200076
Old Dutch Foods, Inc.
2375 Terminal Rd
St. Paul
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #509052
Shriners Hospital
2025 E River Road
Minneapolis
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	0.28 J
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #S00002
Midland Hills Country Club
1400 Old Hwy 8
Roseville
Analyzed 10/4/2001

Analyte	Concentration (ug/L)
Trichloroethene	1.1
1,1- Dichloroethene	0.13 J
cis 1,2- Dichloroethene	6.0
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.97 J

Duplicate Sample

Analyte	Concentration (ug/L)
Trichloroethene	1.1
1,1- Dichloroethene	0.15 J
cis 1,2- Dichloroethene	6.3
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	1.0

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #756236
Pechiney Plastic Packaging, Inc.
150 26th Ave SE, Mpls
Minneapolis
Analyzed 10/2/2001

Analyte	**Concentration (ug/L)**
Trichloroethene	1.3
1,1- Dichloroethene	0.067 J
cis 1,2- Dichloroethene	0.093 J
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.14 J

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #433298
Town & Country Golf
300 Mississippi River Blvd N
St. Paul
Analyzed 9/13/2000

Analyte	Concentration (ug/L)
Trichloroethene	1.4
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	4.8
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.17 J

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #249608
Rapit Printing, Inc
2520 Larpenteur Ave
Lauderdale
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Duplicate Sample

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #236439
Rock-Tenn
2250 Wabash Ave
St. Paul
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	2.5
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.18 J

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #235566
Big Ten Supper Club
4703 Hwy 10
Arden Hills
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	28
1,1- Dichloroethene	6.8
cis 1,2- Dichloroethene	2.6
1,1,1- Trichloroethane	18
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	5.8

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #234421
BioChem
2151 Mustang Dr
New Brighton
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.19 J

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #234356
Nordquist, Robert
1873 Old Hwy 8
New Brighton
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	2.3
cis 1,2- Dichloroethene	0.31 J
1,1,1- Trichloroethane	1.6
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	4.8

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #234352
Nutter, Aaron
1206 12th Ave NW
New Brighton
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	7.3
cis 1,2- Dichloroethene	1.4
1,1,1- Trichloroethane	0.27 J
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	10

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

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Well #200176
Waldorf Paper Products (Rock-Tenn)
2236 Myrtle Ave
St. Paul
Analyzed 10/2/2001

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	0.25 J
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Duplicate Sample

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	0.24 J
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #200173
KSTP Radio TV
3415 University Avenue
St. Paul
Analyzed 11/20/2001

Analyte	Concentration (ug/L)
Trichloroethene	2.0
1,1- Dichloroethene	0.78
cis 1,2- Dichloroethene	19
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	56

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #S00437
Northern Star Co
3171 5th St SE
Minneapolis
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	1.1
1,1- Dichloroethene	0.13 J
cis 1,2- Dichloroethene	6.0
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	0.97 J

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #249632
Montzka, Harold
2301 N Upland Crest NE
Columbia Heights
Analyzed 9/11/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well #S00311
Ingelbrecht, Brenda
1390 Silver Lake Road
New Brighton
Analyzed 9/27/2000

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Notes:
(J) The value is below the reporting limit, but above the method detection limit.

Back to Map

Well "Old Shop Well"
Midland Hills Country Club
2001 N. Fulham Street
Analyzed 10/4/01

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Well #S00342
Wilson House
2079 W Skillman Ave
Analyzed 10/4/01

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

Well "Rain Shelter"
Midland Hills Country Club
2001 N. Fulham Street
Analyzed 10/4/01

Analyte	Concentration (ug/L)
Trichloroethene	<1.00
1,1- Dichloroethene	<1.00
cis 1,2- Dichloroethene	<1.00
1,1,1- Trichloroethane	<1.00
1,1,2- Trichloroethane	<1.00
1,1- Dichloroethane	<1.00

APPENDIX E.2

The interactive well inventory database is located on this CD in a directory name Appendix_E2. This directory contains ArcExplorer software and a group of GIS files.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

October 2000	**Notes:**
10/2/00	Sump sight glass cleaned. Installed new door handle. Down Time: None.
10/31/00	Monthly inspection conducted. Down Time: None.

November 2000	**Notes:**
11/15/00	Water has splashed out of tower onto sidewalk areas north and south of treatment building forming ice. Down Time: None.
11/20/00	Additional ice formed on building, platform and walk areas. Adjusted system air flow from 26" H_2O to 24" H_2O (by Magnahelic gauge). Down Time: None.
11/27/00	System shut down due to "AST Low Air Flow" alarm. Photohelic switch gauge found out of calibration (displays 3.2" H_2O differential with system down). System restarted, but continues to fail on low/high air flow alarm. Adjust low / high air flow set points to min / max on Photohelic gauge. Restart system pending repair. Down Time: 25 hrs.
11/27/00	Treatment building heater not consistently functioning. Building temperature was 30 deg. F. Install portable electric heater in building and schedule heater repair. Down Time: None.

December 2000	**Notes:**
12/4/00	Building heater not functioning. Continue using a portable heater. Down Time: None.
12/5/00	Water found on building floor. More ice present on tower and roof. Down Time: None.
12/6/00	Remove ice from tower and roof. System continues to emit water during operation. System shut down at 6:00 PM pending system rebalancing. Down Time: see 12/18/01 note.
12/7/00	Building heater repaired and functioning. Down Time: None.
12/8/00	System restarted and rebalanced. Restarted at 11:20 AM. Down Time: 41.5 hrs.
12/11/00	Ice forming on tower top, continue rebalancing system. Down Time: None.
12/15/00	Continue rebalancing treatment system. Down Time: None.
12/18/00	Remove ice from tower and roof. System continues to emit water during operation. Remove snow from pad. No ice on tower. System down due to low air flow alarm, but exterior alarm light not on. Replaced light bulb and restarted system at 10:50 AM. Down Time: 20 hrs.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

12/27/00 Acid wash sight glass on tower. Some ice has formed on top of tower.

January 2001 **Notes:**

1/1/01 No inspection performed due to New Years holiday. Down Time: None.

1/4/01 Cleaned sump sight glass. Down Time: None.

1/5/01 Performed monthly inspection. Down Time: None

1/12/01 System down due to low air flow. Alarms functioned properly. Down Time: None.

1/17/01 Cleaned sump sight glass. Down Time: None.

1/22/01 Discharge hose lowered 2 notches on winch to reduce water level in sump. Down Time: None.

1/26/01 Discharge hose lowered 2 notches on winch to reduce water level in sump. Down Time: None.

1/29/01 System down due to high water level in sump. Drained sump and cleaned sight glass. Reset control panel. Down Time: 0.5 hrs.

1/30/01 Sump within several inches of high water level alarm set point. Water found around tower base. Down Time: None.

1/31/01

System down due to high water level in sump. Reset panel, cleaned and inspected sight glass, sump and associated discharge piping. Deposits of iron sludge identified. Down Time: 16.5 hrs.

February 2001 **Notes:**

2/5/01 Cleaned sump sight glass. Down Time: None.

2/12/01 Cleaned sump sight glass. Down Time: None.

2/19/01 Cleaned sump sight glass. Performed monthly inspection. Down Time: None.

2/20/01 Pump off float was in run position. Repositioned float. Down Time: None.

2/27/01 Cleaned sump sight glass. Reset photohelic gauge (low/high air flow switch) to 1" H_2O to avoid low air flow shutdown. Down Time: None.

March 2001 **Notes:**

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

3/5/01	Cleaned sump sight glass. Down Time: None.
3/12/01	Cleaned sump sight glass. Down Time: None.
3/19/01	Cleaned sump sight glass. Performed monthly inspection. John Alberg (ATK) collected a treatment system sample. Down Time: None.
April 2001	**Notes:**
4/2/01	Cleaned sump sight glass. Down Time: None.
4/16/01	Increased air flow rate to 17.5" H2O. Down Time: None.
4/17/01	Cleaned sump sight glass. Down Time: None.
4/19/01	Increased air flow rate to 18.5" H2O. Repaired leak in discharge pipe. Down Time: None.
4/20/01	Increased flow rate to 21" H2O. Down Time: None.
4/27/01	Water observed splashing out of top of tower. Reduced air flow rate to 20" H2O. Down Time: None.
May 2001	**Notes:**
5/1-5/4/01	No inspections performed - readings are estimated. Down Time: None.
5/15/01	Cleaned sight glass and performed operator training. Down Time: None.
5/21/01	Control panel exterior is wet. The water source not identifed, but a heavy rain occurred during the previous 12 hours. Down Time: None.
5/28/01	No inspection performed and the meter reading is estimated.
June 2001	**Notes:**
6/11/01	Condensation from effluent line dripping onto floor. Down Time: None.
6/26/01	Performed monthly inspection. Down Time: None.
July 2001	**Notes:**

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

7/3/01	Blower motor making high pitch sound, shut down system pending further inspection. Down Time: 46 hrs.
7/5/01	System restarted and inspected. No bearing failure, other mechanical problem, or electrical problem identified. High pitched whine continues. Down Time: 45 hrs.
7/23-7/24/01	Collection manhole and treatment system thoroughly cleaned. During cleaning we were able to completely drain the collection manhole. Down Time: 30 hrs.
7/24-7/26/01	Attempted to restart system after cleaning and system went into failure mode. System down due to "low building temperature" alarm. PLC section of system likely at fault. Troubleshooting performed and repairs scheduled. Down Time: see 7/30/01 notes.
7/30/01	Replaced failed output card in control panel. Restarted and balanced system. Down Time: 142.5 hrs.
7/31/01	7/31/01: Repaired leak in riser pipe, rebalanced system. Down Time: None.
<u>August 2001</u>	**<u>Notes:</u>**
8/6, 8/13-8/16/01	System not operational upon arrival. Assumption was made that the system was cycling during the time of daily inspection. Down Time: see 8/16/01 notes.
8/16/01	Removed collection manhole cover to inspect floats to see if water was present. Observed adequate water elevation present for system operation. It appears that the floats were ("hung-up") not positioned properly. Repositioned float pole and system began treating water. Down Time: 46 hrs.
8/20/01	Treatment system shut down on "Low Air Flow" alarm. Alarm was reset and treatment system restarted automatically. Down Time: None.
<u>September 2001</u>	**<u>Notes:</u>**
9/4/01	Collected effluent and influent quarterly water samples and cleaned sight glass. Down Time: None.
9/7/01	Treatment system shut down on "Low Air Flow" alarm. Alarm reset and treatment system began operating, within 30 seconds system shut down on "Low Air Flow" alarm. Adjusted lower limit on differential pressure gauge, alarm reset and treatment system restarted automatically. Two small leaks were present, one in roof (rain had stopped, location of dripping not determined) and one near the door. Down Time: 24 hrs.

APPENDIX F-1

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
SITE K, TCAAP
ARDEN HILLS, MINNESOTA

9/10/01	Treatment system shut down on "Low Air Flow" alarm. System operated approx. 20 hours between 10:15 AM on 9/07 to 3:00 PM on 9/10. Alarm was reset and treatment system restarted automatically. Down Time: 52 hrs.
9/20/01	Treatment system shut down on "Low Air Flow" alarm. Alarm reset and treatment system restarted automatically. Down Time: 0.5 hrs.
9/28/01	Performed monthly inspection. Down Time: None.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

October 2000

10/03/2000 Pumphouses B1-B12, SC2-SC-5: Install vent covers on door vents and ventilation fans. Shut off ventilation fan.
Down time: 0 hours.

10/12-15/2000 Pumphouses B1-B11, SC2, SC3, and SC5: Locate water level probes inside water level tubes and set immediately above pump shroud.
Down time: B2 - 2 hours on 10/12.

November 2000

11/2-6/2000 Pumphouse B5: ECV valve closing without command. Cleaned strainer screen and adjusted speed control valves, replaced main body and seals. Valve operation not consistent. Schedule control harness replacement.
Down time: 11/2 - 1 hour, 11/3 - 1.5 hours, 11/6 - 8 hours.

11/03/2000 Treatment Center: ECV No. 4 valve would not close. Disassembled and inspected ECV No. 4 valve body and replaced seals, gaskets, and o-rings. Reassembled and reinstalled the valve. ECV No. 4 operated acceptably.
Down time: Pumphouses B1, B4, B5, B6, and SC5 - 4 hours.

11/03/2000 Treatment Center: ECV Nos. 1, 2, 3, and 4. Gathered pilot spring type and color information to determine the pressure range the pilot can control flow. ECV Nos. 1 & 2 - Green - Round Spring, ECV Nos. 3 & 4 - Red - Round Spring.
Down time: 0 hours.

11/3/2000 Treatment Center: Potable water line feeding ECV 1 and ECV 2 leaking. Cut away leaking section of copper pipe and replaced with new section of copper pipe.
Down time: 0 hours.

11/3/2000 Treatment Center: At TWISS's request, replaced existing autodialer telephone numbers for auto dialer channels 1 through 7.
Down time: 0 hours.

11/10/2000 Pumphouse B9: Smoke detected in pumphouse. Rewired a failed connection at the top of casing.
Down time: 0.25 hours.

11/21/2000 Pumphouse B-10: Replaced failed 15A fuse in 120 VAC disconnect box.
Down time: 3 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

December 2000

12/5/2000	Forcemain - Altitude Valve: The valve did not close on command. The valve was manually closed and valve repairs were scheduled. Down time: 0 hours.
12/8/2000	Daily inspection not performed. Keys were not available to open building and gates. Meter readings estimated. Down time: None.
12/11/2000	Pumphouse B5: Pumphouse low water level light active and submersible pump is operating. The failure was reset and pumphouse ECV scheduled for repair. Down time: 0 hours.
12/11/2000	Pumphouse B4: The electrical service connections to submersible cable lead were found to be melting and were replaced. Down time: 1.5 hours.
12/11/2000	Pumphouse SC3: The pumphouse heater wasn't functioning properly. A portable heater is assisting the building heater pending parts delivery. Down time: 0 hours.
12/12, 14, 15/2000	Forcemain - Altitude Valve: The valve was inspected and parts assembled for control repairs. The harness was cleaned and portions of piping and solenoid valve replaced. Down time: 0 hours.
12/14-22/2000	Forcemain - TCAAP Water Level Control System: Trouble shoot autodialer and replace unit; trouble shoot printer and replace printer; trouble shoot recycle valve, clean strainer, and verify proper operation; trouble shoot altitude valve - clean and or replace control harness and open closed valve pressure sensing line to elevated tank; trouble shoot WLCS master unit and RTU's - replace batteries, repair faulty drain cycle light, and verify current version of logic installed in PLC. Down time: 0 hours.
12/17/2000	Pumphouse B11: Pumphouse down on alarm. Reset at pumphouse panel and observed ECV operation. ECV functioned properly. Down time: 12 hours.
12/18/2000	Pumphouse B1: Monitoring panel light flashing; reset well through Main System On/Off switch. Well restarted. Down time: 20 hrs.
12/20/2000	Pumphouse B5: The pumphouse ECV control harness was replaced. Down time: 8.5 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

12/22/2000	Treatment Center: Observed leak in potable water line of electric check valves 1 and 2; removed failed section of piping and replaced with new piping. Down time: 0 hours.
12/24/2000	Pumphouse B8: The electrical service connections to submersible cable lead were found to be melting and were replaced. Down time: 1 hour.

January 2001

1/11-24/2001	Pumphouse SC2: The well, lift system, and pumphouse piping were cleaned twice by recirculating acid. The flow meter measuring chamber assembly remained nonfunctional and was replaced. The pump did not clean sufficiently and it was removed and the pump and motor were replaced. Down time: 1/11 - 24 hours, 1/15 - 23 hours, 1/24 - 8 hours.
1/2-16/2001	Pumphouse B2: Pumphouse electric check valve body failed and was replaced. The flow rate was adjusted during the time period 1/3-16/01. Down time: 24 hours.
1/9/2001	Pumphouse B8: A saddle tap was installed to replace existing air release valve connection to pumphouse piping. Down time: 0.5 hours.
1/25/2001	Pumphouses B4, B5, B8, and B9: The pumphouses were down due to electrical service failure. A connection located by pumphouse B5 separated. Down time: 14 hours.
1/26/2001	Pumphouse SC1: Increase flow rate to maximum output. Pump appears to be wearing out. Pumping water level 120.5' @ 27 psi. Down time: 0 hours.
1/26/2001	Pumphouse B11: 30 Amp fuse in 480 VAC disconnect failed and was replaced. Down time: 1 hour.
1/30/2001	Pumphouse B2: The well, lift system, and pumphouse piping were cleaned by recirculating acid. Pumping pressure for pumphouse flow is excessive, indicating a flow restriction downstream of electric check valve. Down time: 26 hours.

February 2001

2/28/2001	Pumphouse B7: Low water indicator light on at pumphouse control panel; Reset motor and pump via control panel. Measured pumping water level after 15 minutes of operation. Pumping water level remained above water sensor probe. Down time: 13 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

March 2001

3/24/2001	Pumphouse B5: Low water level light on a pumphouse control panel. Reset the starter and restarted the pump. Normal operation observed. Down time: 15 hours.

April 2001

4/2/2001	Treatment Center: Potable water supply line to ECV No. 2 leaking. Replaced leaking section of pipe. Down time: 0 hours.
4/7/2001	Pumphouse B5: B5 light on well field panel in Building 116 flashing. Reset Hand/Off/Auto switch at pumphouse. Down time: 14.5 hours.
4/19/2001	Treatment Center: Well field and treatment center shut down to replace leaking gate valves at B1 and B6. Laughlin Electric performed Treatment Center annual electrical inspection at the same time. Down time: 6 hours.
4/20/2001	Treatment Center: CRA was informed that the auto dialer answering service, Gemini Communications, would no longer be in operation and Time Communications would assume their responsibilities. The auto dialer was reprogrammed to the Time Communications number. Down time: 0 hours.
4/20/2001	Pumphouse B7: Potential meter reading anomaly. Down time: 0 hours.
4/25-30/2001	Pumphouses B1, B6, SC3, and SC5: Flow rates slowed due to swapping of flow meters between pumphouses as one of the annual preventive maintenance tasks. Flow meter gaskets to be replaced. Down time: B1 - 10 hours; B6 - 19 hours; SC3 - 18.5 hours; SC5 - 22 hours.
4/30/2001	Treatment Center: Treatment system and auto dialer shut down. Swapped treatment system flow meters as part of the annual preventive maintenance tasks. Down time: 2 hours.
4/30/2001	Treatment Center: Potable water supply line to ECV No. 1 leaking. Replaced leaking section of pipe. Down time: 0 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

May 2001

5/22/2001	Pumphouses B1, B2, B3, B4, B5, B8, B9, SC2, SC3, and SC5: Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: B1 & B2 - 5/23 - 2 hours, B3 - 5/24 - 3.5 hours, B4 & B5 - 5/25 - 1.5 hours, B8 & B9 - 5/25 - 1 hour, SC2 - 5/23 - 1 hour, SC3 - 5/22 - 1.5 hours, and SC5 - 5/22 - 2 hours.
5/24/2001	Pumphouse B7: Replaced high voltage disconnect box. Down time: 2 hours.

June 2001

6/1/2001	Pumphouses B1, B4, and B6: Purchased, painted and installed new doors on pumphouses. Down time: 0 hours.
6/9/2001	Pumphouse SC1: A storm caused an electrical outage at the pumphouse. Down time: 58 hours.
6/18/2001	Pumphouse SC-5: Low level light flashing on TGRS well field panel. Reset Hand/Off/Auto switch at pumphouse panel. Down time: 8 hours.
6/20/2001	Treatment Center: Wet well pump No. 1 flow meter inoperable. Replaced flow meter with flow meter from inventory. Down time: 2.5 hours.
6/28-30/2001	Pumphouse B5: Meter readings assumed due to inoperable flow meter. Flow meter replaced with rebuilt flow meter from inventory. Totalizer from inoperable flow meter was reinstalled on rebuilt flow meter. Down time: 0 hours.

July 2001

7/13/2001	Pumphouse B11: Hissing sound coming from inside well casing. Removed and inspected pump and piping. Replaced leaking stick of pipe and reinstalled the pump and remaining pipe. Pump makes a rattling noise, may require a new pump. Down time: 3 hours.
7/17/2001	Elevated Tank: Low level alarm on at elevated tank; Trouble shoot problem and reload EEPROM program. Down time: 0 hours.

APPENDIX F-2

MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

7/18/2001	Pumphouse B4: Surged, brushed, and bailed the inside of the casing. Replaced the wet end of the submersible pump. Down time: 9 hours.
7/22/2001	Pumphouses B7 and B10: Wells were found to be off during daily inspection; Replaced I/O cards in control panel. Down time: 40 hours.
7/26/2001	Pumphouse B11: Pump is making a rattling noise; Replace pump, motor and 2 sticks of pipe. Down time: 6 hours.

August 2001

8/1/2001	Pumphouses B1, B2, and B3: Power outage/damage due to lightning strike. New fuse, digital meters, weather heads, and service box were installed. Down time: 27.5 hours.
8/3/2001	Elevated Tank: Low level alarm on for elevated tank. Down time: 0 hours.
8/6/2001	Pumphouse B1: Valve not opening. Valve stem nut was adjusted. Down time: 8 hours.
8/28/2001	Treatment Center: Leaking potable waterline to ECVs No. 1 and No. 2. Down time: 0 hours.
8/30/2001	Treatment Center: Rebuild ECV No. 2 valve. Valve lining and seals replacement. Down time: Pumphouses B6-B11, SC2, and SC3 - 4 hours.

September 2001

9/7/2001	Pumphouse B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, SC1, SC2, SC3, and SC5: Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours per well.
9/16/2001	Pumphouse SC5: Piping above saddle tap for pressure gauge broken off at reducer bushing; Replaced pipe nipple and reducer bushing. Down time: 0.25 hours.
9/17/2001	Pumphouse SC2: Totalizer on water flow meter not advancing; Replaced flow meter assemblv. Down time: 0.25 hours.
9/25/2001	Pumphouses B6, B11, and SC1: Installed locks on pumphouse doors. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Pumphouse B1

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
12/18/2000	Monitoring panel light flashing; reset well through Main System On/Off switch. Well started. Down time: 20 hours.
4/19/2001	Well field and Treatment Center shut down to replace leaking gate valves at B1 and B6. Laughlin Electric performed Treatment Center annual electrical inspection at the same time. Down time: 6 hours.
4/25-30/2001	Flow rates slowed due to swapping of flow meters between pumphouses and one of the annual preventive maintenance tasks. Flow meter gaskets to be replaced. Down time: 10 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/23/01 - 2 hours
6/1/2001	Purchased, painted and installed new door on pumphouse. Down time: 0 hours.
8/1/2001	Power outage/damage due to lightning strike. New fuses, digital meter, weather head, and service box were installed. Down time: 27.5 hours.
8/6/2001	Valve not opening. Valve stem nut was adjusted. Down time: 8 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B2

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 2 hours on 10/12.
1/2-16/2001	Pumphouse electric check valve body failed and was replaced. The flow rate was adjusted during the time period 1/3-16/01. Down time: 24 hours.
1/30/2001	The well, lift system, and pumphouse piping were cleaned by recirculating acid. Pumping pressure for pumphouse flow is excessive, indicating a flow restriction downstream of electric check valve. Down time: 26 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/23/01 - 2 hours.
8/1/2001	Power outage/damage due to lightning strike. New fuses, digital meter, weather head, and service box was installed. Down time: 27.5 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B3

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/24/01 - 3.5 hours.
8/1/2001	Power outage/damage due to lightning strike. New fuses, digital meter, weather head, and service box was installed. Down time: 27.5 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Pumphouse B4

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
12/11/2000	The electrical service connections to submersible cable lead were found to be melting and were replaced. Down time: 1.5 hours.
1/25/2001	The pumphouse was down due to electrical service failure. A connection located by pumphouse B5 separated. Down time: 14 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/25/01 - 1.5 hours.
6/1/2001	Purchased, painted and installed new door on pumphouse. Down time: 0 hours.
7/18/2001	Surged, brushed, and bailed the inside of the casing. Replaced the wet end of the submersible pump. Down time: 9 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B5

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
11/2-6/2000	ECV valve closing without command. Cleaned strainer screen and adjusted speed control valves, replaced main body and seals. Valve operation not consistent. Schedule control harness replacement. Down time: 11/2 - 1 hour, 11/3 - 1.5 hours, 11/6 - 8 hours.
12/11/2000	Pumphouse low water level light active and submersible pump is operating. The failure was reset and pumphouse ECV scheduled for repair. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

12/20/2000	The pumphouse ECV control harness was replaced. Down time: 8.5 hours.
1/25/2001	The pumphouse was down due to electrical service failure. A connection located by pumphouse B5 separated. Down time: 14 hours.
3/24/2001	Low water level light on at pumphouse control panel. Reset the starter and restarted the pump. Normal operation observed. Down time: 15 hours.
4/7/2001	B5 light on well field panel in Building 116 flashing. Reset Hand/Off/Auto switch at pumphouse. Down time: 14.5 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/25/01 - 1.5 hours.
6/28-30/2001	Meter readings assumed due to inoperable flow meter. Flow meter replaced with rebuilt flow meter from inventory. Totalizer from inoperable flow meter was reinstalled on rebuilt flow meter. Down time: 0 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B6

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
4/19/2001	Well field and Treatment Center shut down to replace leaking gate valves at B1 and B6. Laughlin Electric performed Treatment Center annual electrical inspection at the same time. Down time: 6 hours.
4/25-30/2001	Flow rates slowed due to swapping of flow meters between pumphouses and one of the annual preventive maintenance tasks. Flow meter gaskets to be replaced. Down time: 19 hours.
6/1/2001	Purchased, painted and installed new door on pumphouse. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.
9/25/01	Installed locks on pumphouse door. Down time: 0 hours.

Pumphouse B7

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
2/28/2001	Low water indicator light on at pumphouse control panel; Reset motor and pump via control panel. Measured pumping water level after 15 minutes of operation. Pumping water level remained above water sensor probe. Down time: 13 hours.
4/20/2001	Potential meter reading anomaly. Down time: 0 hours.
5/24/2001	Replaced high voltage disconnect box. Down time: 2 hours.
7/22/2001	Well was found to be off during daily inspection; Replaced I/O card in control panel. Down time: 40 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B8

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
12/24/2000	The electrical service connections to submersible cable lead were found to be melting and were replaced. Down time: 1 hour.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

1/9/2001	A saddle tap was installed to replace existing air release valve connection to pumphouse piping. Down time: 0.5 hours.
1/25/2001	The pumphouse was down due to electrical service failure. A connection located by pumphouse B5 separated. Down time: 14 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/25/01 - 1 hour.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B9

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
11/10/2000	Smoke detected in pumphouse. Rewired a failed connection at the top of casing. Down time: 0.25 hours.
1/25/01	The pumphouse was down due to electrical service failure. A connection located by pumphouse B5 separated. Down time: 14 hours.
5/22-25/01	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/25/01 - 1 hour.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B10

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

11/21/2000	Replace failed 15A fuse in 120 VAC disconnect box. Down time: 3 hours.
7/22/2001	Well was found to be off during daily inspection; Replaced I/O card in control panel. Down time: 40 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse B11

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
12/17/2000	Pumphouse down on alarm. Reset at pumphouse panel and observed ECV operation. ECV functioned properly. Down time: 12 hours.
1/26/2001	30 Amp fuse in 480 VAC disconnect failed and was replaced. Down time: 1 hour.
7/13/2001	Hissing sound coming from well casing. Removed and inspected pump and piping. Replaced leaking stick of pipe and reinstalled the pump and remaining pipe. Pump makes a rattling noise, may require a new pump. Down time: 3 hours.
7/26/2001	Pump is making a rattling noise; Replaced pump, motor and 2 sticks of pipe. Down time: 6 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.
9/25/01	Installed locks on pumphouse door. Down time: 0 hours.

PumphouseB12

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Pumphouse SC1

1/26/2001	Increase flow rate to maximum output. Pump appears to be wearing out. Pumping water level 120.5' @ 27 psi. Down time: 0 hours.
6/9/2001	A storm caused an electrical outage at the pumphouse. Down time: 58 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.
9/25/01	Installed locks on pumphouse door. Down time: 0 hours.

Pumphouse SC2

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
1/11-24/2001	The well, lift system, and pumphouse piping were cleaned twice by recirculating acid. The flow meter measuring chamber assembly remained nonfunctional and was replaced. The pump did not clean sufficiently and it was removed and the pump and motor replaced. Down time: 1/11 - 24 hours, 1/15 - 23 hours, 1/24 - 8 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/23/01 - 1 hour.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.
9/17/2001	Totalizer on water flow meter not advancing; Replaced flow meter assembly. Down time: 0.25 hours.

Pumphouse SC3

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
12/11/2000	The pumphouse heater wasn't functioning properly. A portable heater is assisting the building heater pending parts delivery. Down time: 0 hours.
4/25-30/2001	Flow rates slowed due to swapping of flow meters between pumphouses and one of the annual preventive maintenance tasks. Flow meter gaskets to be replaced. Down time: 18.5 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/22/01 - 1.5 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

Pumphouse SC4

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.

Pumphouse SC5

10/3/2000	Install vent covers on door vents and at ventilation fan. Shut off ventilation fan. Down time: 0 hours.
10/12-15/2000	Locate water level probes inside water level tubes and set immediately above pump shroud. Down time: 0 hours.
4/25-30/2001	Flow rates slowed due to swapping of flow meters between pumphouses and one of the annual preventive maintenance tasks. Flow meter gaskets to be replaced. Down time: 22 hours.
5/22-25/2001	Laughlin Electric relocated electrical connections on pumphouse well heads. Down time: 5/22/01 - 2 hours.
6/18/2001	Low level light flashing on TGRS well field panel. Rest Hand/Off/Auto switch at pumphouse panel. Down time: 8 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

9/16/2001	Piping above saddle tap for pressure gauge broken off at reducer bushing; Replaced pipe nipple and reducer bushing. Down time: 0.25 hours.
9/07/2001	Compared the pumphouse flow rate of the current meter with the flow rate of a factory calibrated meter. Down time: 0.5 hours.

TREATMENT CENTER

11/3/2000	ECV #4 valve would not close. Disassembled and inspected ECV #4 valve body and replaced seals, gaskets and o-rings. Reassembled and reinstalled the valve. ECV #4 operated acceptably. Down time: 4 hours (B1, B4, B5, B6, and SC5).
11/3/2000	ECV Nos. 1, 2, 3, and 4. Gathered pilot spring type and color information to determine the pressure range the pilot can control flow. ECV Nos. 1 and 2 - Green - Round Spring, ECV Nos. 3 and 4 - Red - Round Spring. Down time: 0 hours.
11/3/2000	Potable water line feeding ECV 1 and ECV 2 leaking. Cut away leaking section of copper pipe and replaced with new section of copper pipe. Down time: 0 hours.
11/3/2000	At TWISS's request, replaced existing autodialer telephone numbers for autodialer channels 1 through 7. Down time: 0 hours.
12/22/2000	Observed leak in potable water line of electric check valves 1 and 2; removed failed section of piping and replaced with new piping. Down time: 0 hours.
4/2/2001	Potable water supply line to ECV #2 leaking. Replaced leaking section of pipe. Down time: 0 hours.
4/19/2001	Well field and Treatment Center shut down to replace leaking gate valves at B1 and B6. Laughlin Electric performed Treatment Center annual electrical inspection at the same time. Down time: 6 hours.
4/20/2001	CRA was informed that the autodialer answering service, Gemini Communications, would no longer be in operation and Time Communications would assume their responsibilities. The autodialer was reprogrammed to the Time Communications number. Down time: 0 hours.

APPENDIX F-3

MAINTENANCE ACTIVITIES BY LOCATION
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

4/30/2001	Treatment system and autodialer shut down. Swapped treatment system flow meters as part of the annual preventive maintenance tasks. Down time: 2 hours.
4/30/2001	Potable water supply line to ECV #1 leaking. Replaced leaking section of pipe. Down time: 0 hours.
6/20/2001	Wet well pump #1 flow meter inoperable. Replaced flow meter with flow meter from inventory. Down time 2.5 hours.
8/28/2001	Leaking potable waterline to ECVs No. 1 and No. 2. Down time: 0 hours.
8/30/2001	Rebuild ECV No. 2 valve. Valve lining and seals replacement. Down time: Pumphouses B6-B11, SC2, and SC3 - 4 hours.

ELEVATED TANK

7/17/2001	Low level alarm on at elevated tank; Trouble shoot problem and reload EEPROM program. Down time: 0 hours.
8/3/2001	Low level alarm on for elevated tank. Down time: 0 hours.

FORCEMAIN

12/5/2000	Altitude Valve did not close on command. The valve was manually closed and valve repairs were scheduled. Down time: 0 hours.
12/12, 14, 15/2000	Altitude Valve was inspected and parts assembled for control repairs. The harness was cleaned and portions of piping and solenoid valve replaced. Down time: 0 hours.
12/14-22/2000	TCAAP Water Level Control System, During this period: Trouble shoot autodialer and replace unit; trouble shoot printer and replace printer; trouble shoot recycle valve and clean strainer and verify proper operation; trouble shoot altitude valve - clean and or replace control harness and open closed valve pressure sensing line to elevated tank; trouble shoot WLCS master unit and RTU's - replace batteries, repair faulty drain cycle light, and verify current version of logic installed in PLC. Down time: 0 hours.

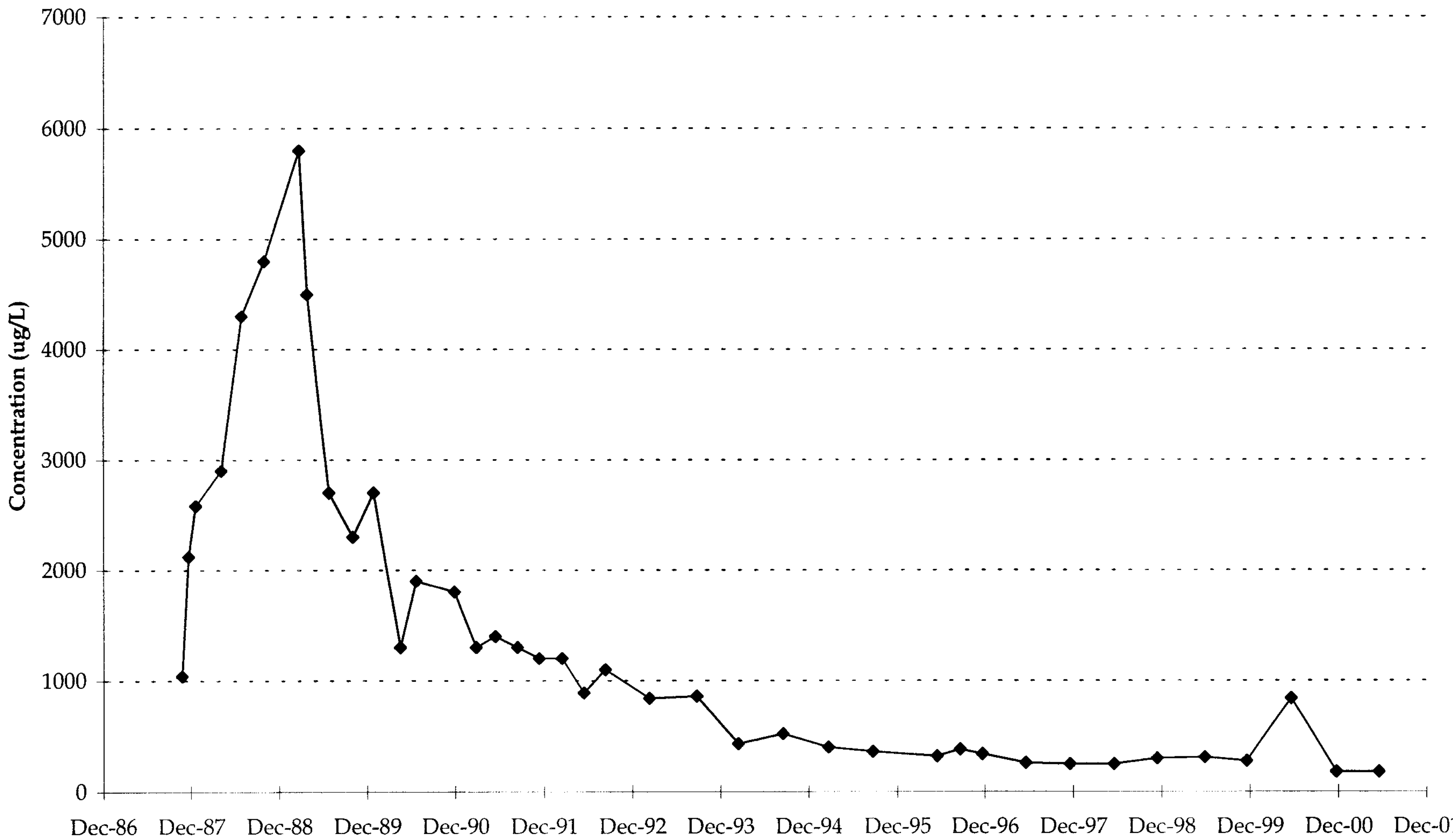
APPENDIX F-4

INSPECTION AND MAINTENANCE ACTIVITIES
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

October 2000	None.
November 2000	None.
December 2000 - January 2001	**Notes:** 12/15/00 through 1/27/01 - The well was pulled for routine maintenance, repair of the pump, replacement of bent column pipes, and disinfecting of the well, particularly to remove H_2S producing bacteria.
February 2001	None.
March 2001	None.
April 2001	**Notes:** 4/21-4/28 - False high level alarms on backwash tanks caused multiple PGRS plant to shut down.
May 2001	None.
June 2001	None.
July 2001	None.
August 2001	**Notes:** 8/3/01 - Date of last production from NB 13 during FY 2001.
September 2001	None.

APPENDIX G-1

EXTRACTION WELL B1 - TRCLE VS.TIME

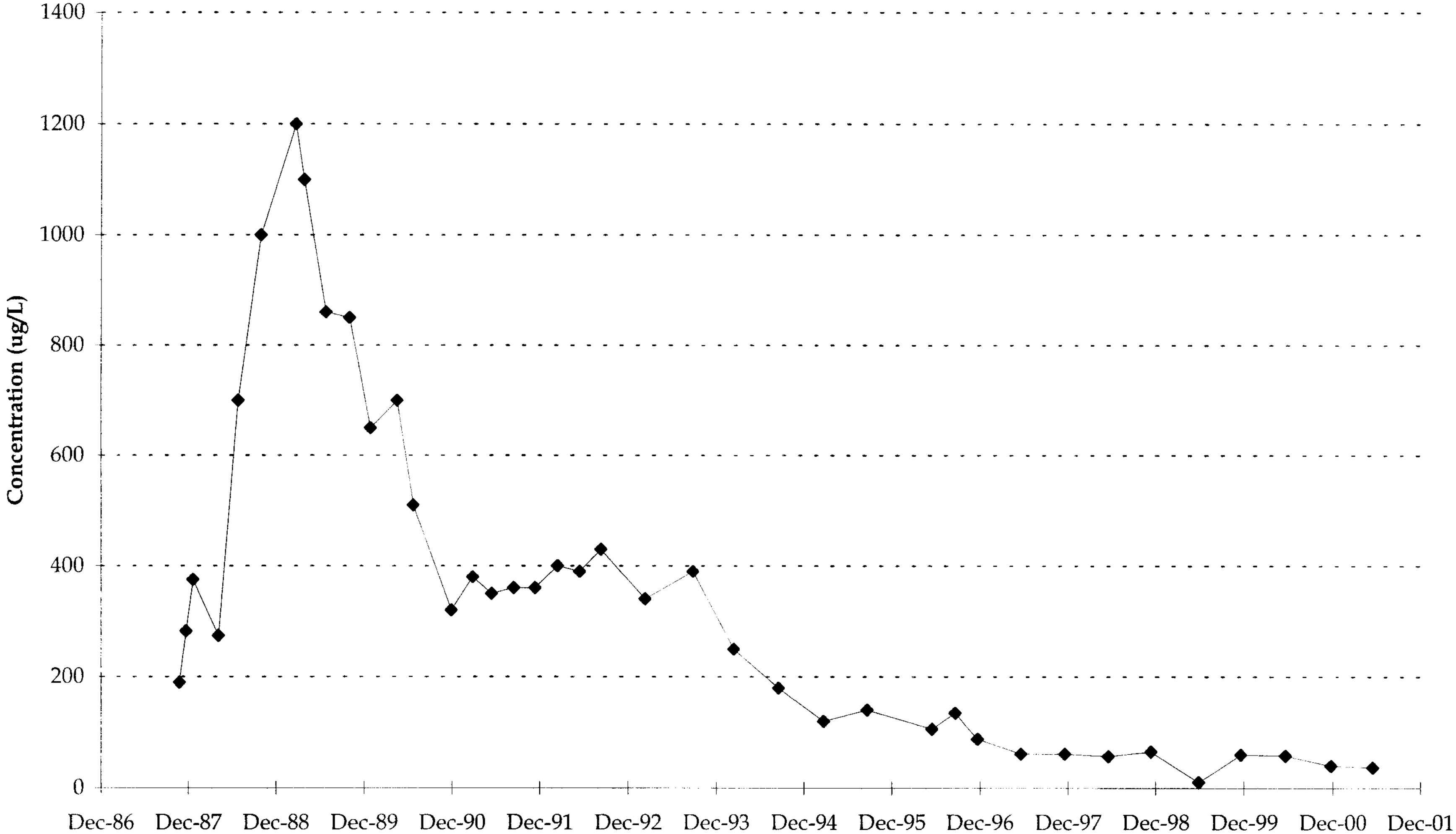


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B2 - TRCLE VS. TIME

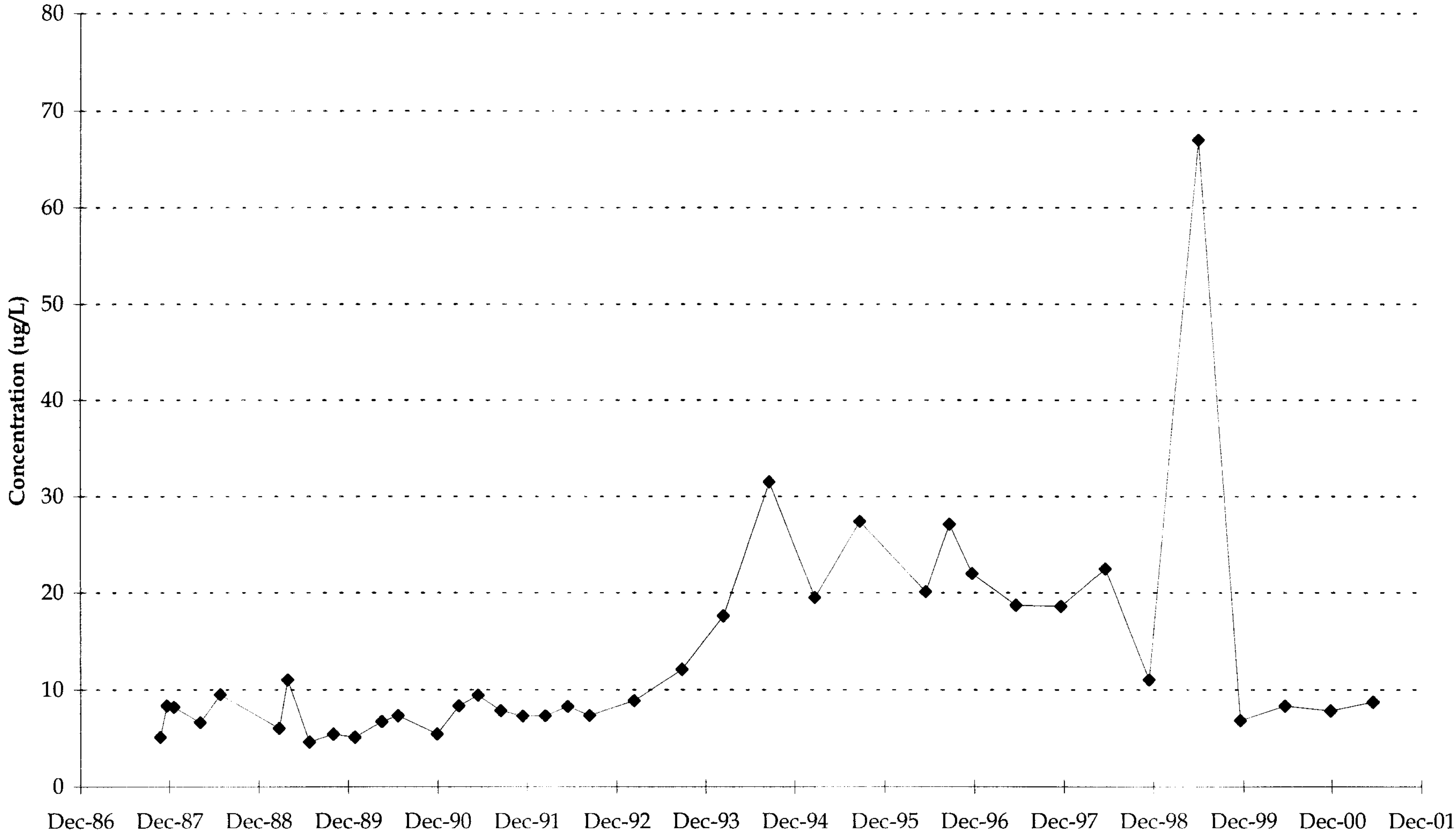


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

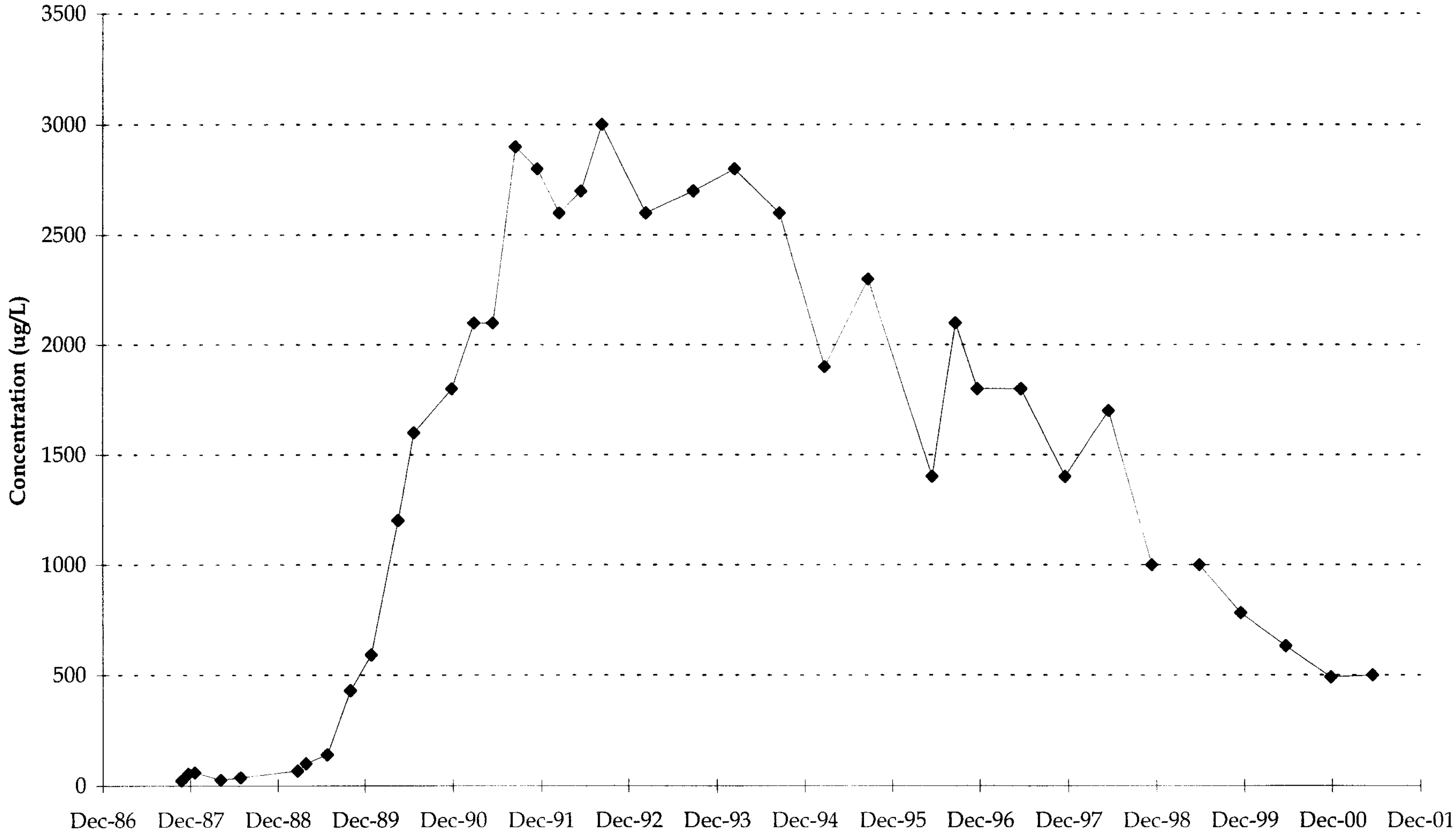
EXTRACTION WELL B3 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

APPENDIX G-1

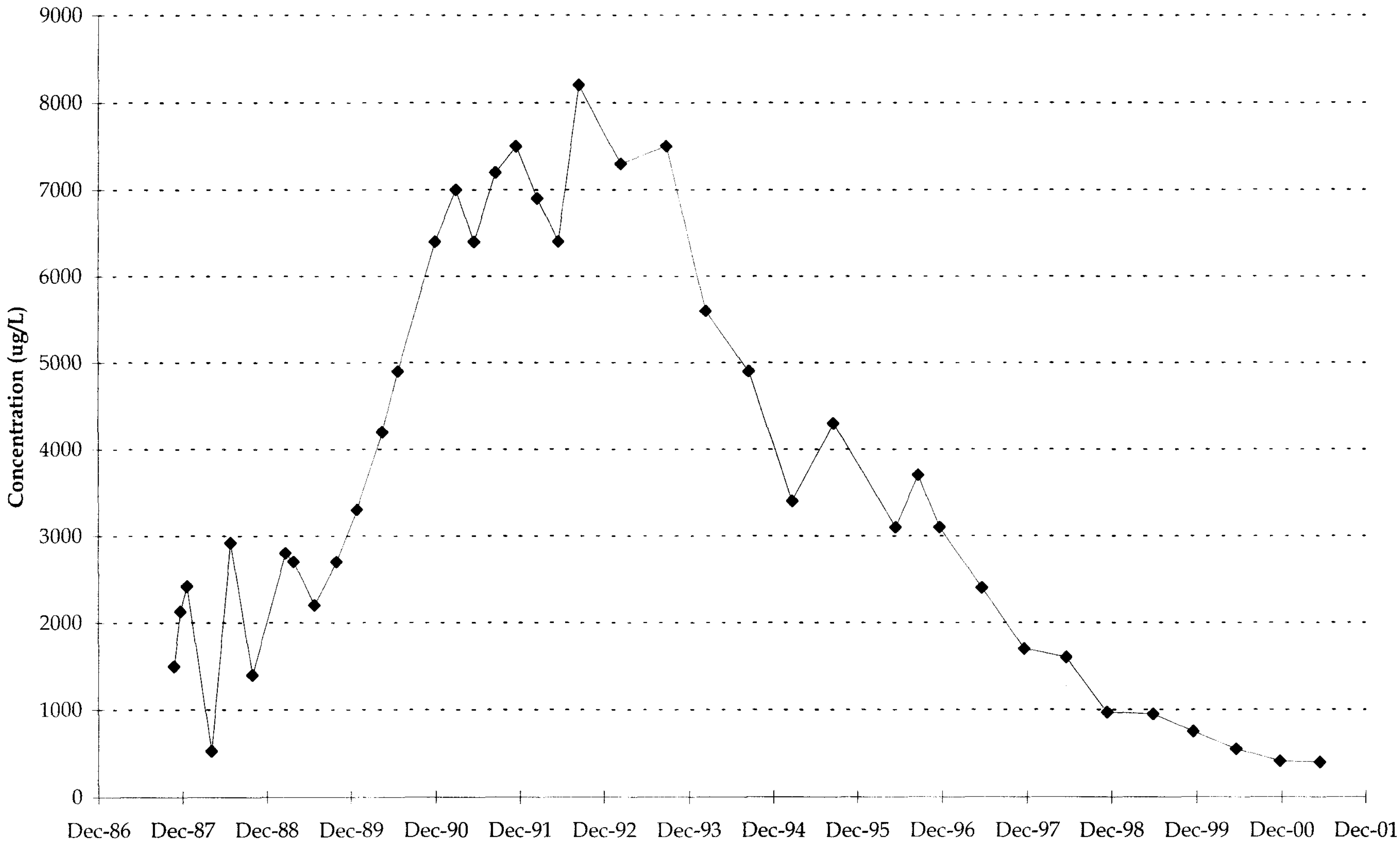
EXTRACTION WELL B4 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

APPENDIX G-1

EXTRACTION WELL B5 - TRCLE VS. TIME

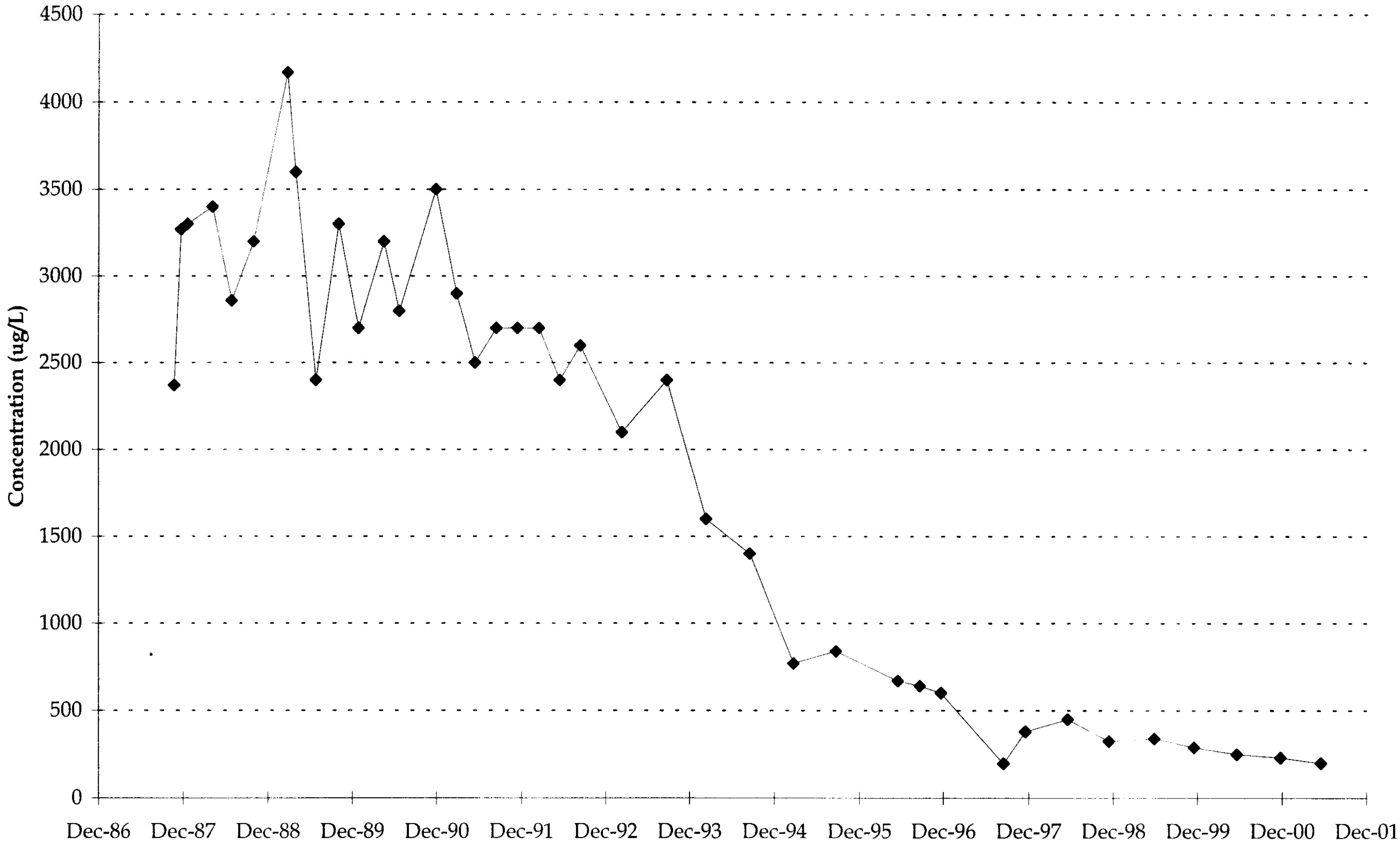


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B6 - TRCLE VS. TIME

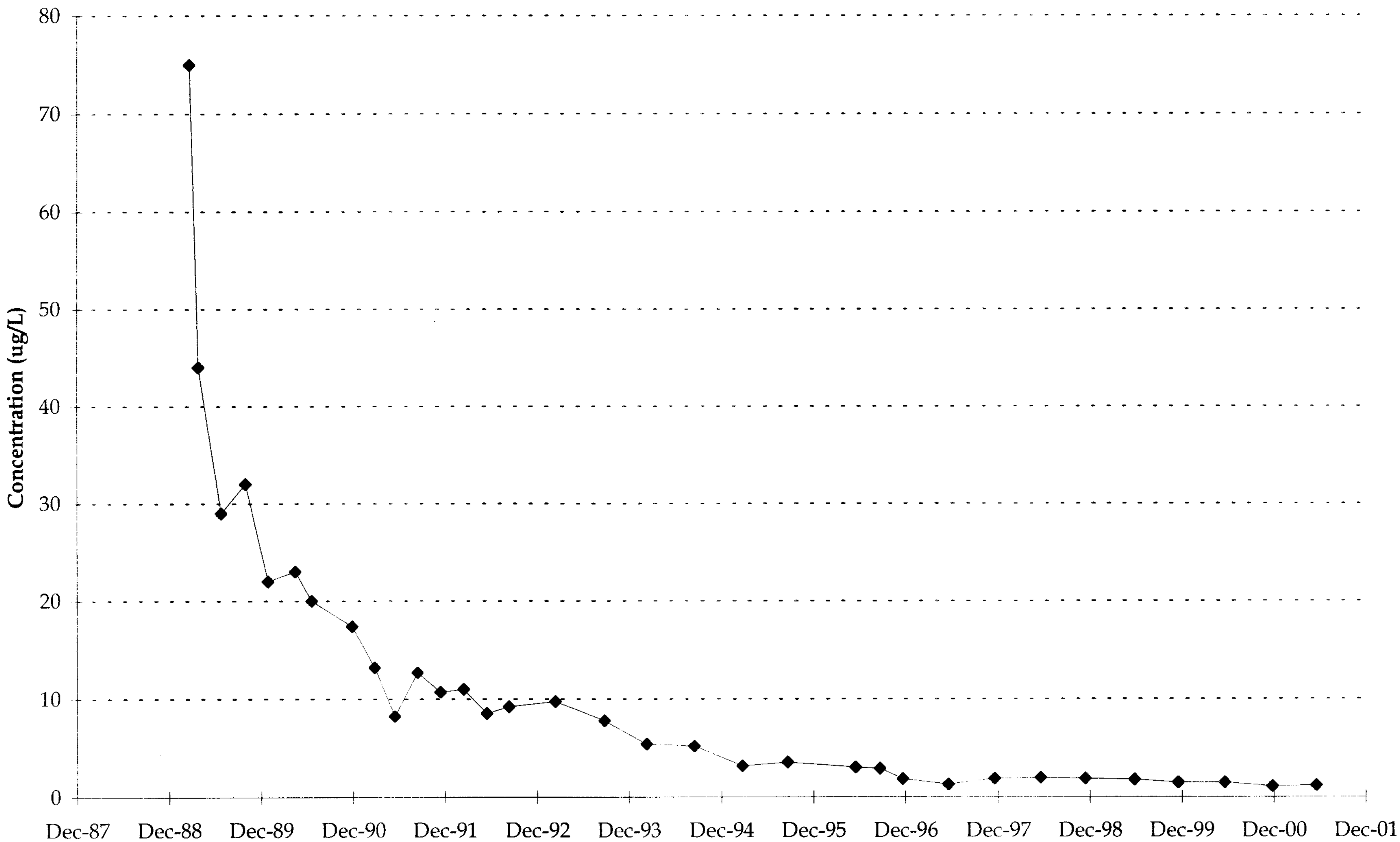


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B7 - TRCLE VS. TIME

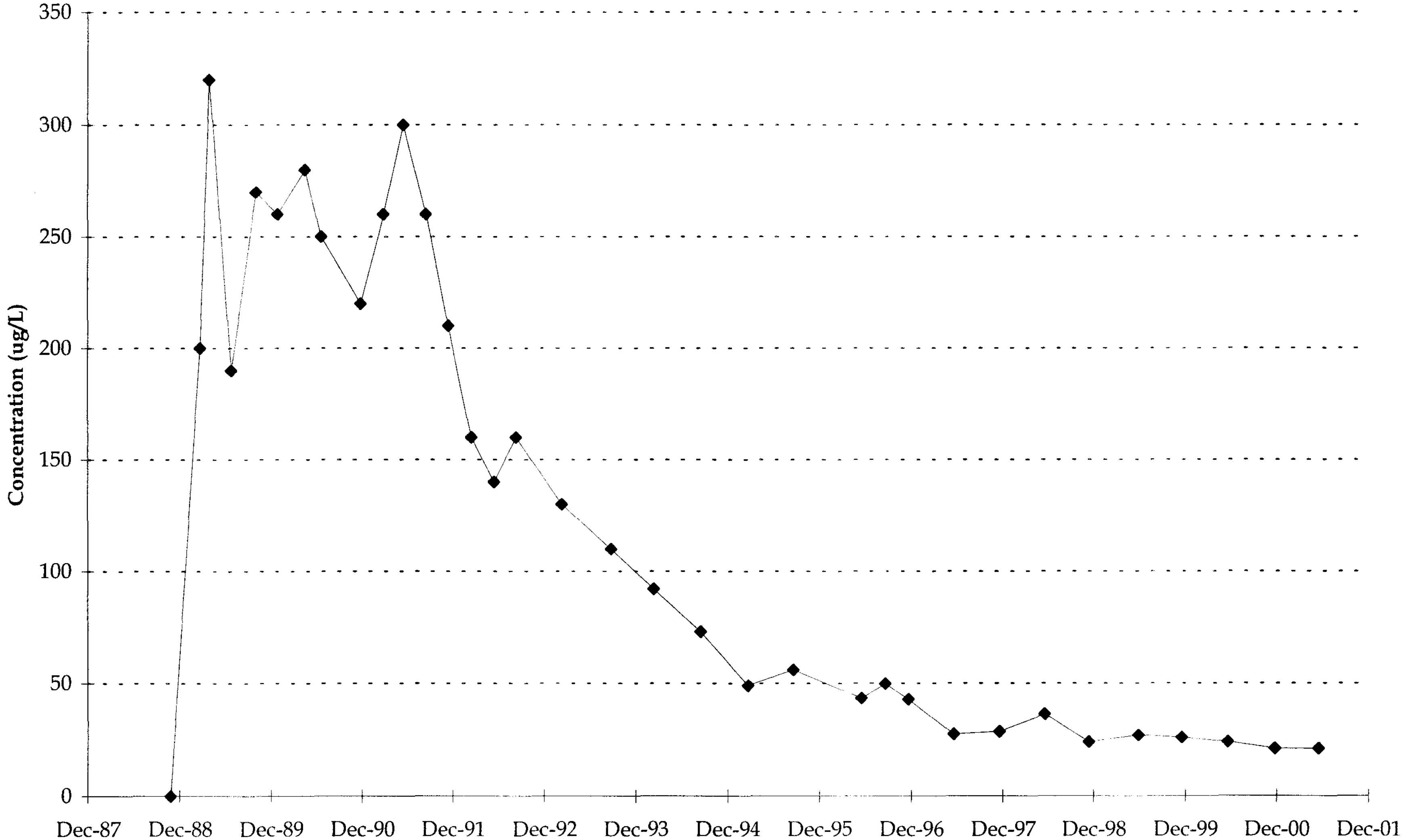


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B8 - TRCLE VS. TIME

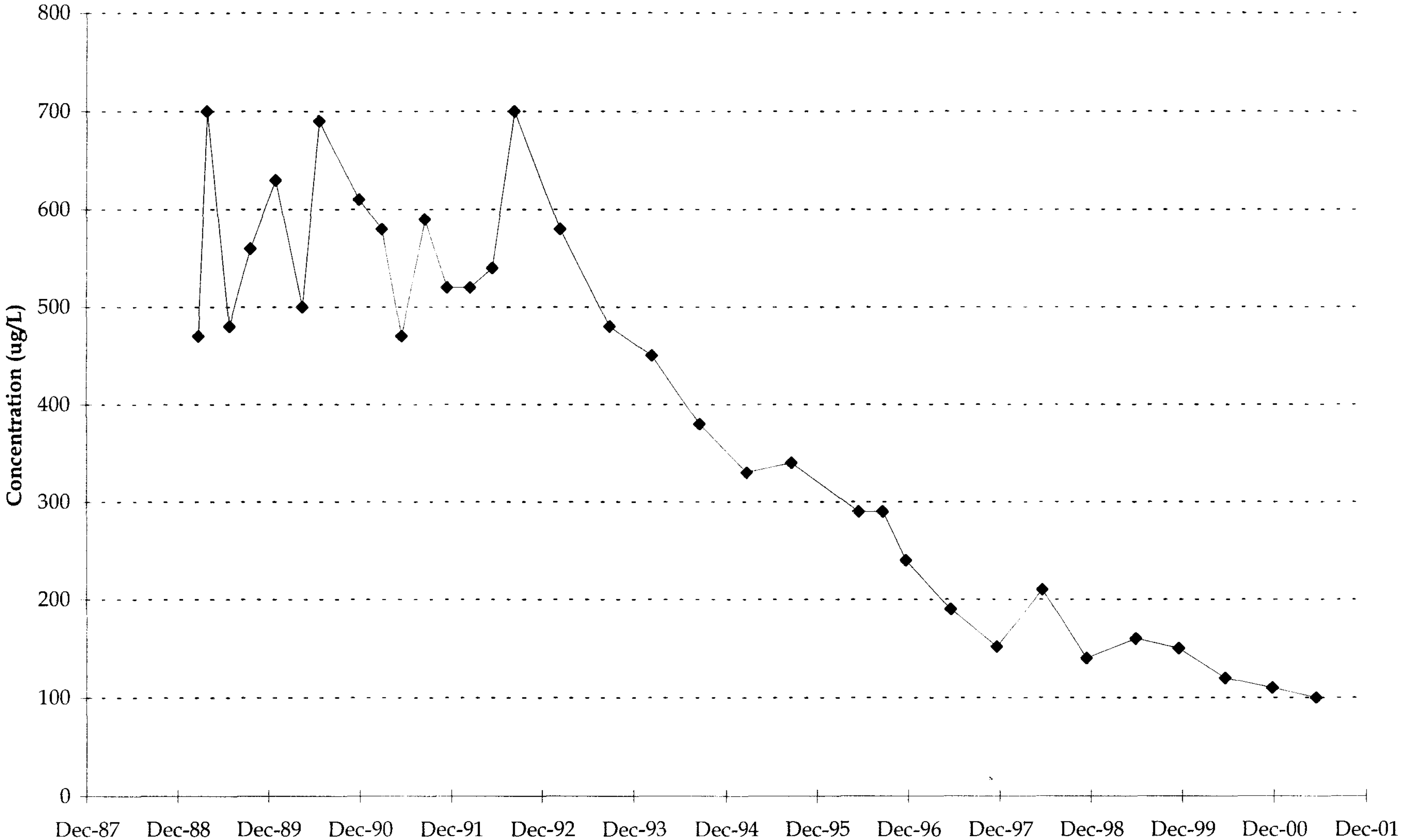


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

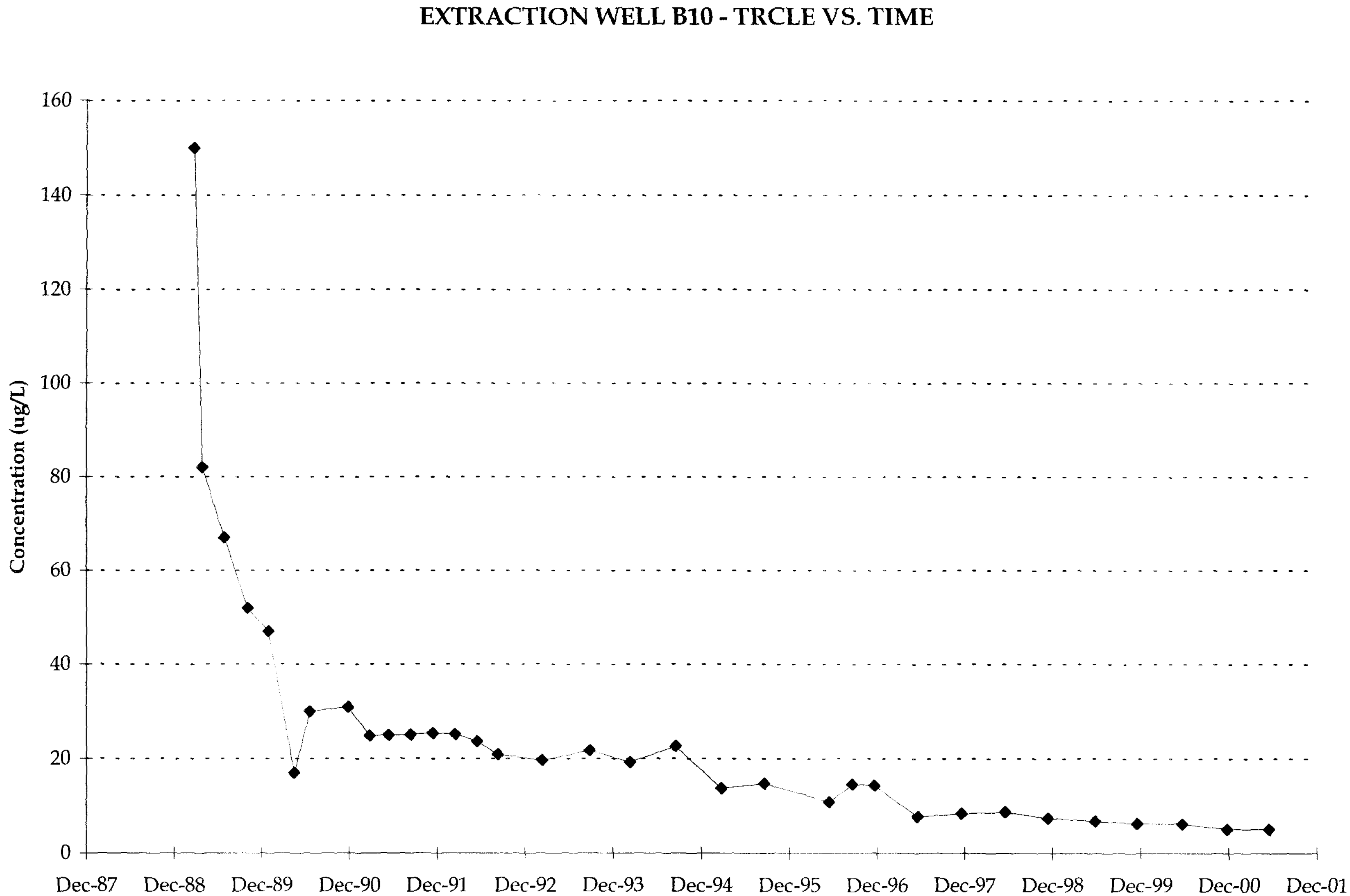
EXTRACTION WELL B9 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

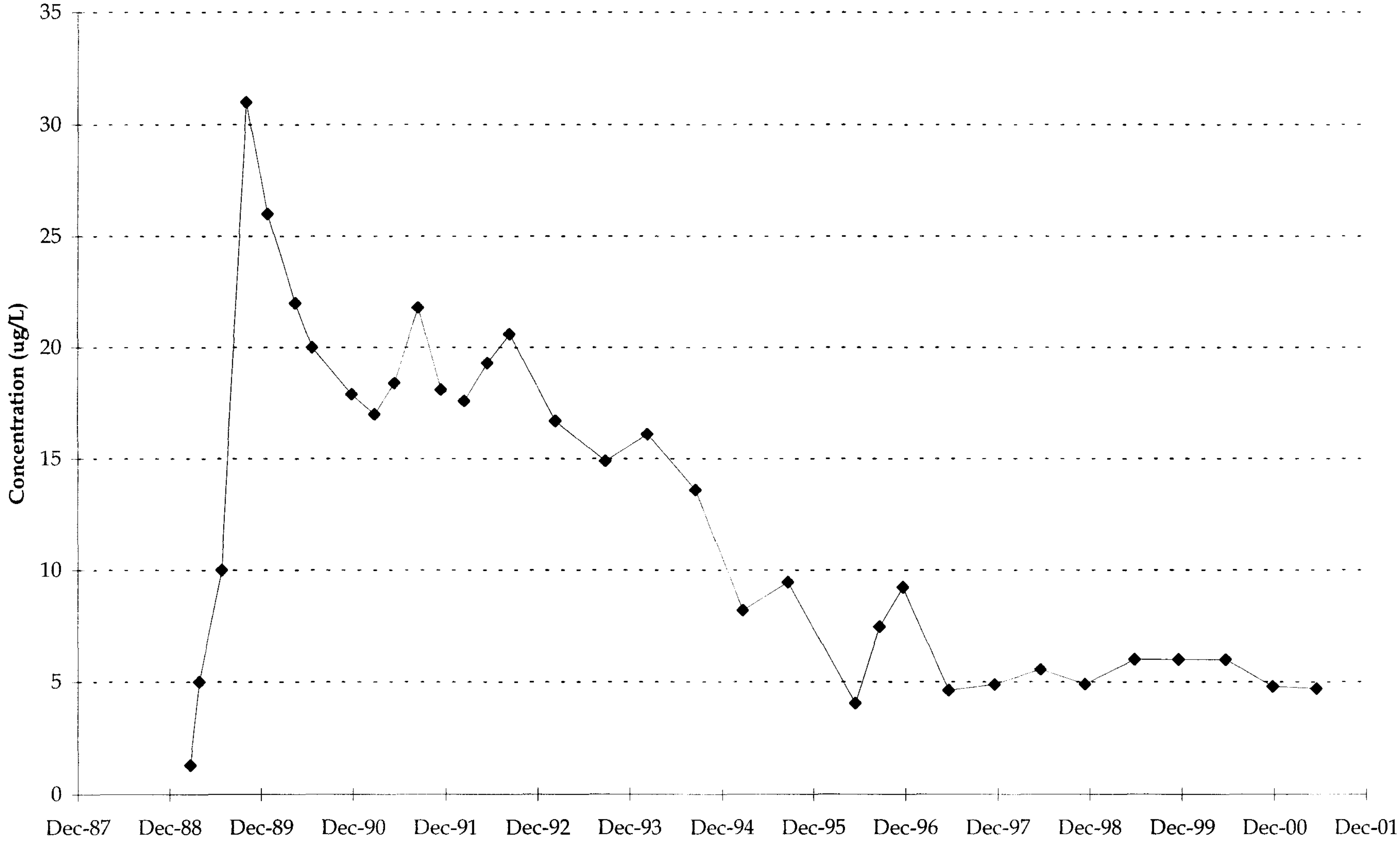


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B11 - TRCLE VS. TIME

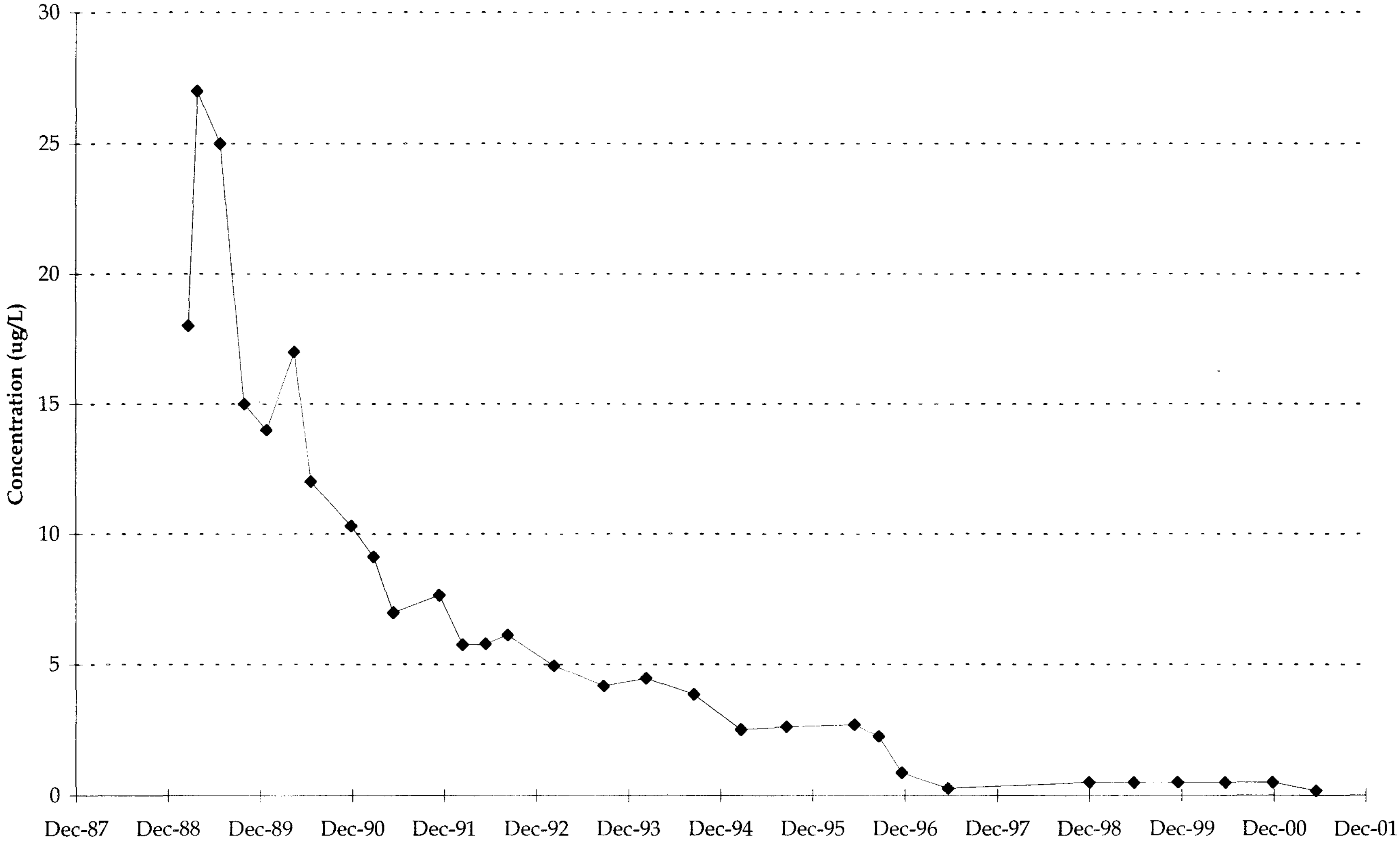


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL B12 - TRCLE VS. TIME

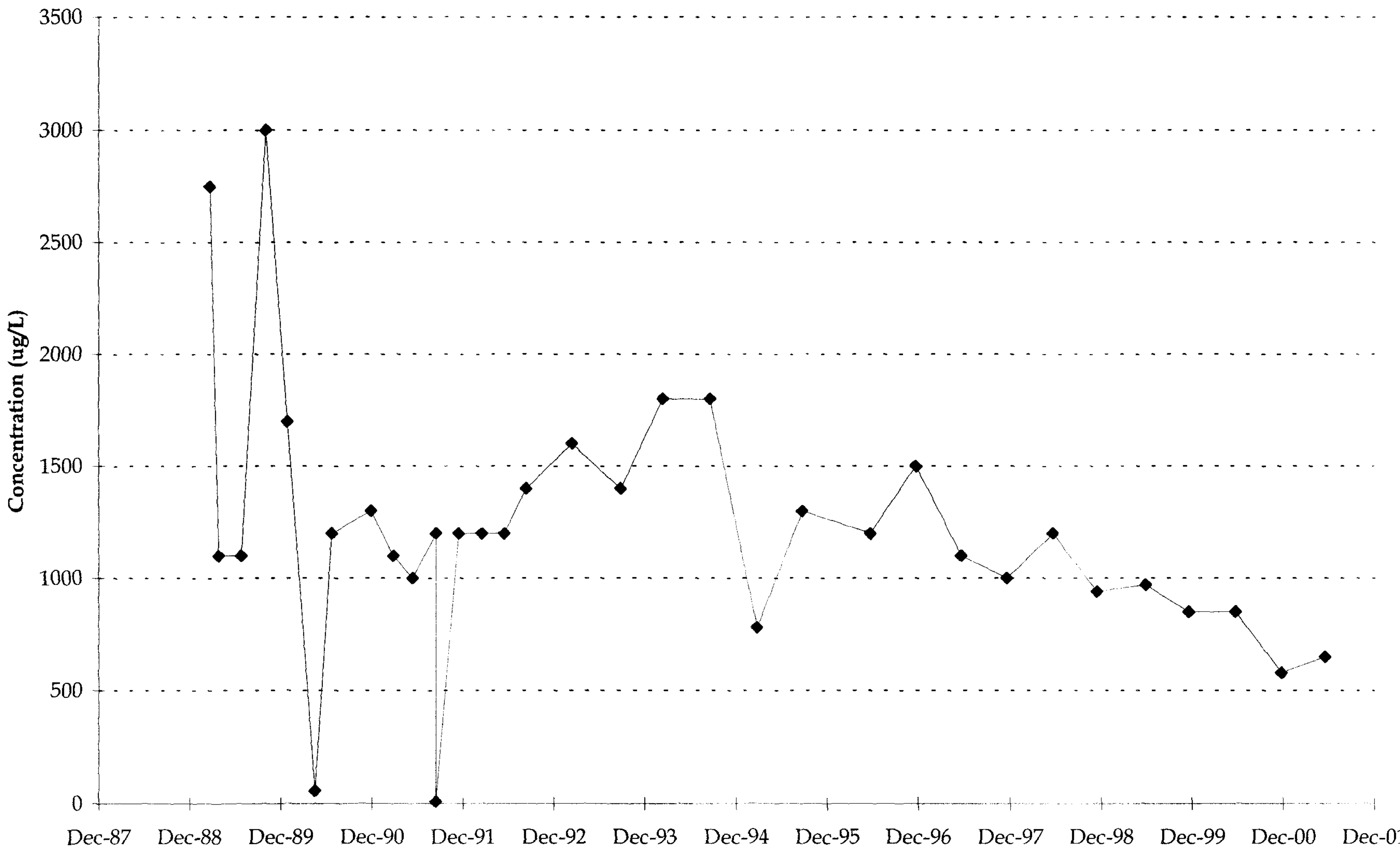


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

EXTRACTION WELL SC1 - TRCLE VS. TIME

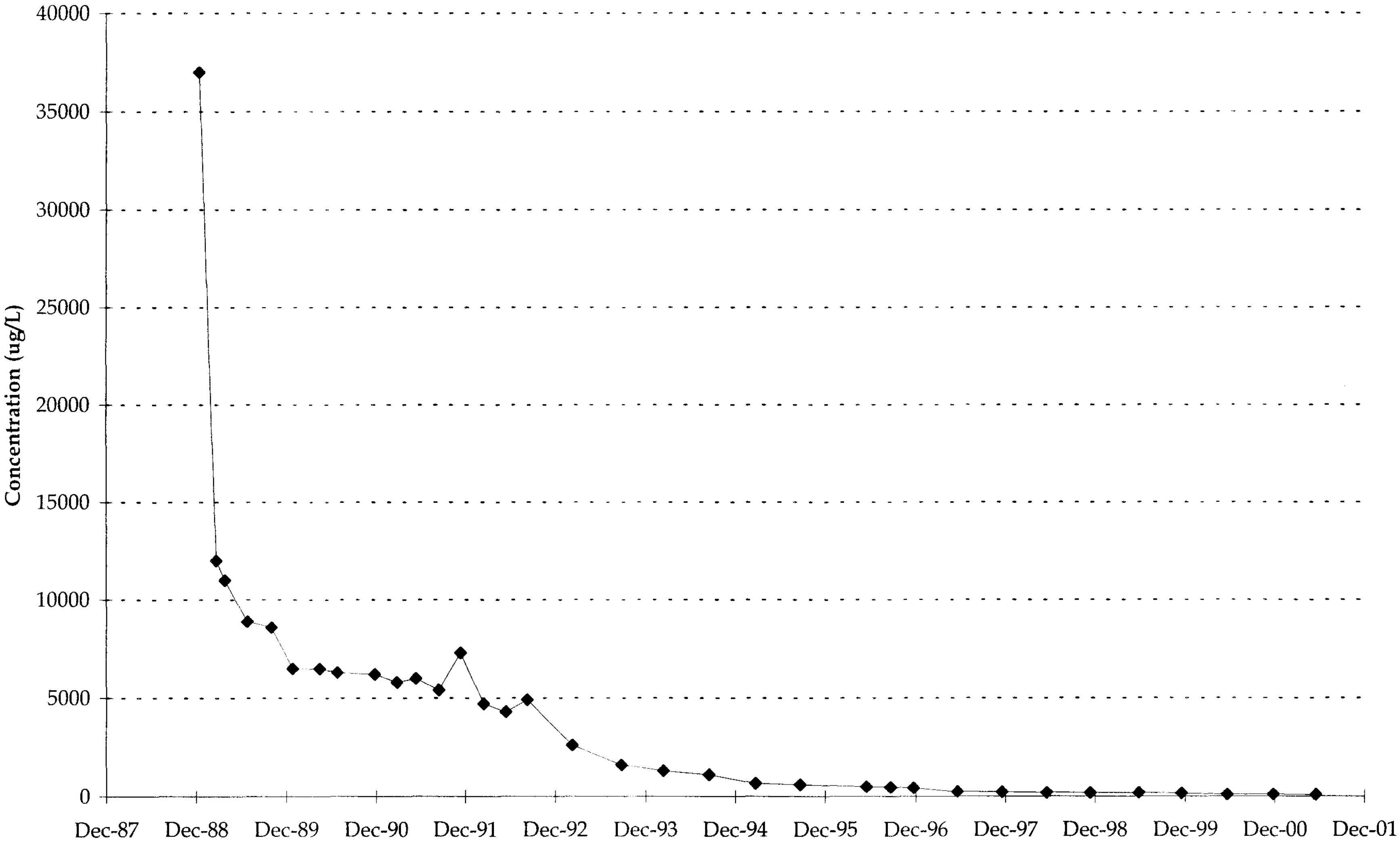


Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1

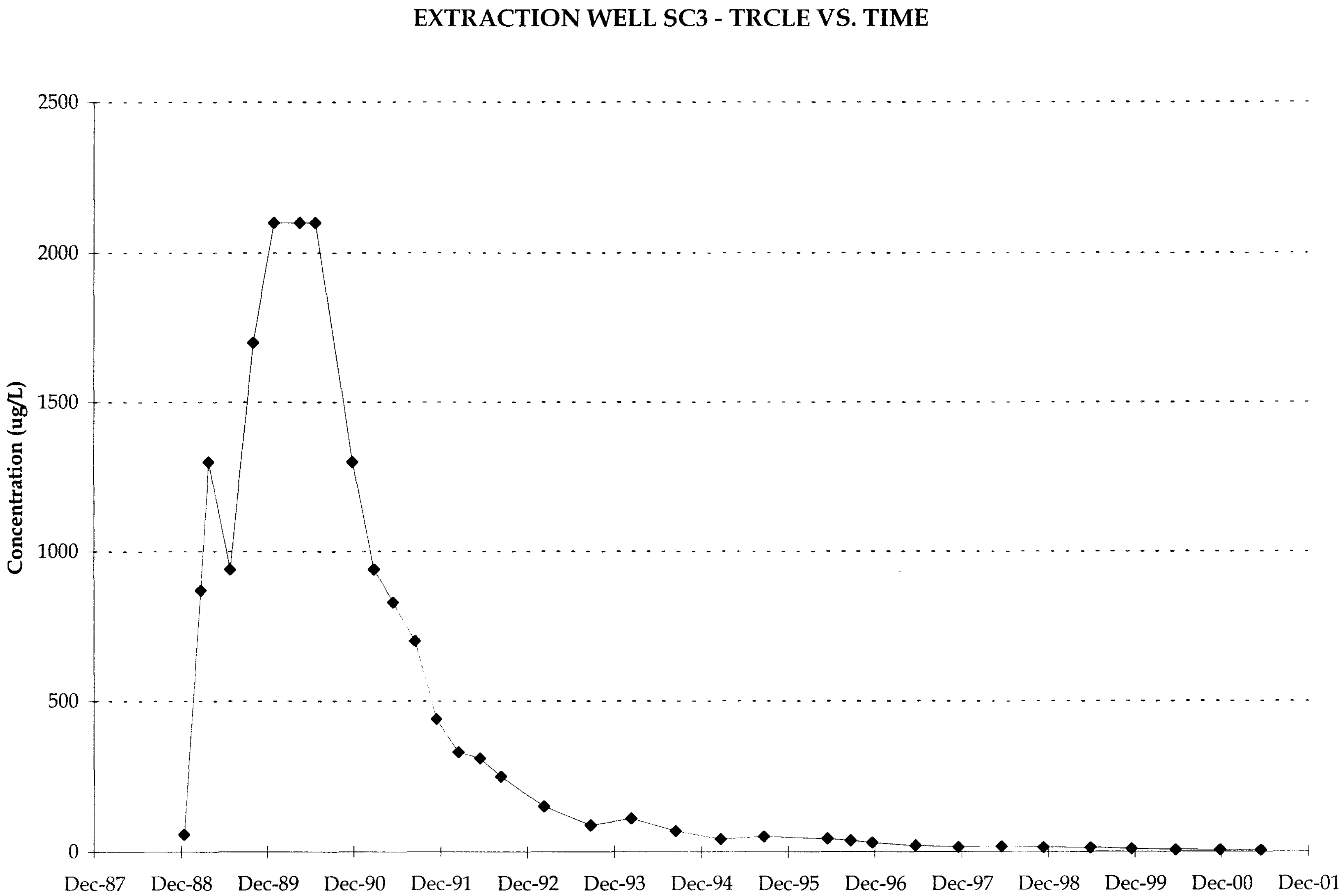
EXTRACTION WELLSC2 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

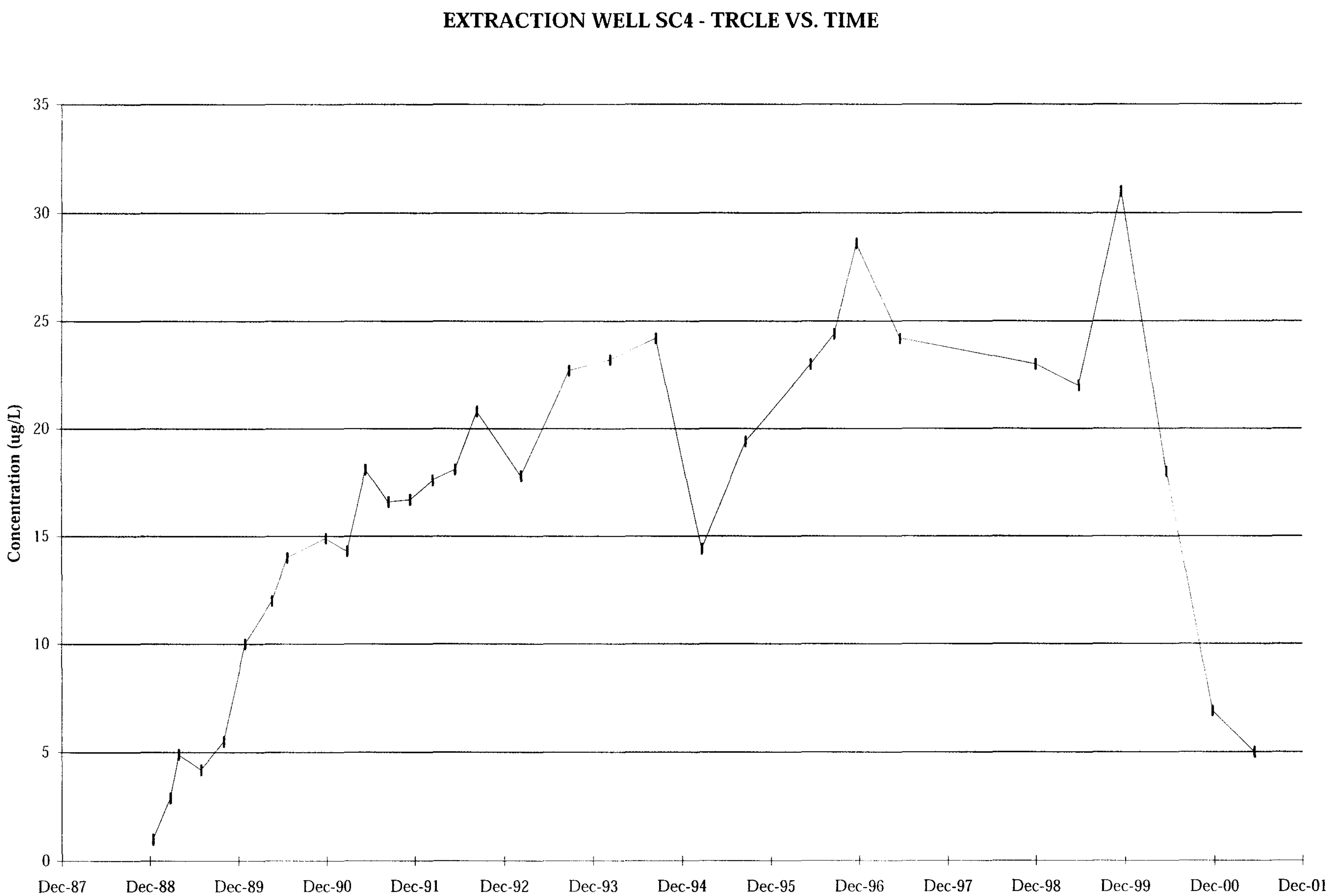
APPENDIX G-1



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-1



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)
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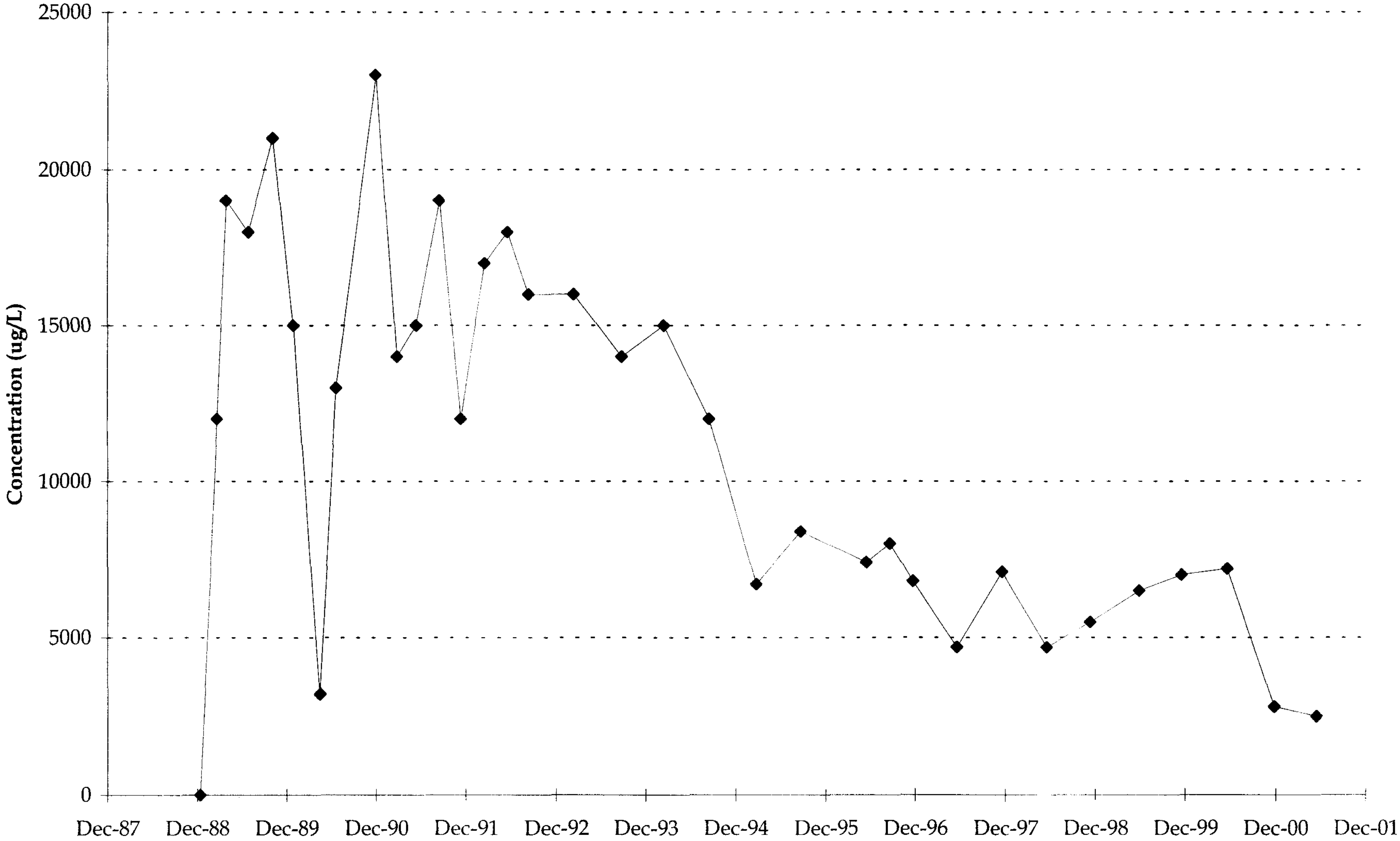
APPENDIX G-1

EXTRACTION WELL SC5 - TRCLE VS. TIME



Note: Samples reporting concentrations less than the detection limit were plotted as half the detection limit.

CRA 17520 (2)

APPENDIX G-2

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
TGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	Sample Date	111TCE	112TCE	11DCE	11DCLE	12DCLE	C12DCE	C2H3CL	CCL4	CH2CL2	CHCL3	T12DCE	TCLEE	TCLTFE	TRCLE
Effluent	10/4/00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.68 JP
Effluent	10/4/00	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.65 JPD
Effluent	11/7/00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U	< 1	< 1	< 1	< 1	0.61 JP
Effluent	11/7/00	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	< 1 D	< 1 D	0.64 JPD
Effluent	12/5/00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.88 JP
Effluent	12/5/00	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.9 JPD
Effluent	1/2/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.69 JP
Effluent	1/2/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.61 JPD
Effluent	2/6/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1 U
Effluent	2/6/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 UD
Effluent	3/6/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.54 JP
Effluent	3/6/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.56 JPD
Effluent	4/3/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.79 JP
Effluent	4/3/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.8 JPD
Effluent	5/1/01	< 1	< 1	< 1	< 1	< 1	0.07 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.64 JP
Effluent	5/1/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.63 JPD
Effluent	6/5/01	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.73 JP
Effluent	6/5/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.69 JPD
Effluent	7/5/01	< 1	< 1	< 1	< 1	< 1	0.16 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1
Effluent	7/5/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.15 JPD	< 1 D	< 1 D	< 1 UD	< 1 D	< 1 D	< 1 D	< 1 D	1.1 D
Effluent	8/7/01	< 1	< 1	< 1	0.094 JP	< 1	0.17 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2
Effluent	8/7/01	< 1 D	< 1 D	< 1 D	0.091 JPD	< 1 D	0.14 JPD	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	1.2 D
Effluent	9/4/01	< 1	< 1	< 1	< 1	< 1	0.17 JP	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3
Effluent	9/4/01	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	0.14 JPD	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	< 1 D	1.3 D
Influent	10/4/00	62.5	< 1	5	5.9	< 1	2.9	< 1	< 1	0.5 JP	< 1	< 1	0.38 JP	< 1	300
Influent	11/7/00	55	< 1	5.9	5.6	0.17 JP	3.4	< 1	< 1	< 1 U	< 1	< 1	0.54 JP	< 1	300
Influent	12/5/00	72.5	< 1	7.7	6.8	< 1	4.3	< 1	< 1	< 1	< 1	< 1	0.71 JP	< 1	325
Influent	1/2/01	57.5	< 1	6.7	6	0.26 JP	4	< 1	< 1	< 1	< 1	< 1	0.71 JP	< 1	325
Influent	2/6/01	55	0.32 JP	5.6	6	0.22 JP	3.4	< 1	< 1	< 1	< 1	< 1	0.65 JP	< 1	235
Influent	3/6/01	52.5	< 1	6.8	6.9	0.16 JP	4	< 1	< 1	< 1	< 1	< 1	0.56 JP	< 1	300
Influent	4/3/01	57.5	< 1	6.3	7	0.2 JP	3.6	< 1	< 1	< 1	< 1	< 1	0.54 JP	< 1	350
Influent	5/1/01	52	< 2	5.2	5.6	< 2	3.2	< 2	< 2	< 2	< 2	< 2	0.46 JP	0.58 JP	325
Influent	6/5/01	38	< 1	4.4	5.8	0.24 JP	3.5	< 1	< 1	< 1	< 1	< 1	0.48 JP	< 1	250
Influent	7/5/01	51	0.39 JP	6.8	6.9	0.25 JP	3.8	< 1	< 1	< 1 U	< 1	< 1	0.74 JP	< 1	300
Influent	8/7/01	58	0.28 JP	6.4	6.6	0.29 JP	4.1	< 1	< 1	< 1 U	0.086 JP	< 1	0.5 JP	< 1	280
Influent	9/4/01	47	< 1	6	6.3	0.25 JP	3.6	< 1	< 1	< 1 U	< 1	0.069 JP	0.26 JP	< 1	240

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

DAILY PUMPING SUMMARY (IN 1,000,000 GALLONS)
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Day	October 2000	November 2000	December 2000	January 2001	February 2001	March 2001	April 2001	May 2001	June 2001	July 2001	August 2001	September 2001
1	0.720	0.720	0.223	0.000	0.720	0.720	0.717	0.711	0.713	1.440	0.009	0.000
2	0.676	0.716	0.000	0.000	0.716	0.720	0.690	0.725	0.716	1.381	0.000	0.000
3	0.000	0.720	0.000	0.000	0.720	0.716	0.716	0.721	0.720	1.440	0.166	0.000
4	0.000	0.720	0.000	0.000	0.717	0.720	0.720	0.716	0.000	1.382	0.000	0.000
5	2.157	0.720	0.480	0.000	0.720	0.720	0.717	0.720	0.000	1.441	0.000	0.000
6	0.668	0.720	0.717	0.000	0.716	0.717	0.720	0.716	0.000	1.381	0.000	0.000
7	0.716	0.716	0.720	0.000	0.720	0.720	0.675	0.721	2.860	1.381	0.000	0.000
8	0.720	0.720	0.720	0.000	0.717	0.720	0.319	0.716	0.720	1.440	0.000	0.000
9	0.720	0.717	0.720	0.000	0.720	0.720	0.711	0.720	0.717	1.488	0.000	0.000
10	0.721	0.720	0.720	0.000	0.716	0.716	0.726	0.716	0.720	1.534	0.000	0.000
11	0.716	0.720	0.720	0.000	0.720	0.720	0.711	0.720	0.000	1.529	0.000	0.000
12	0.720	0.720	0.720	0.000	0.717	0.720	0.725	0.717	0.000	1.382	0.000	0.000
13	0.720	0.720	0.716	0.000	0.720	0.717	0.711	0.720	0.000	1.440	0.000	0.000
14	0.716	0.720	0.284	0.000	0.716	0.720	0.726	0.716	2.870	1.381	0.000	0.000
15	0.720	0.720	0.000	0.000	0.720	0.720	0.710	0.000	0.717	1.441	0.000	0.000
16	0.720	0.720	0.000	0.000	0.717	0.681	0.726	1.435	0.720	1.440	0.000	0.000
17	0.717	0.716	0.000	0.000	0.720	0.720	0.711	0.720	0.717	1.381	0.000	0.000
18	0.720	0.720	0.000	0.000	0.716	0.717	0.725	0.717	0.720	1.440	0.000	0.000
19	0.716	0.659	0.000	0.000	0.720	0.720	0.711	0.719	0.714	1.382	0.000	0.000
20	0.720	0.717	0.000	0.000	0.717	0.716	0.726	0.692	1.192	1.440	0.000	0.000
21	0.717	0.720	0.000	0.000	0.720	0.720	0.000	0.721	1.382	1.382	0.000	0.000
22	0.720	0.720	0.000	0.000	0.716	0.716	0.000	0.720	1.440	1.440	0.000	0.000
23	0.719	0.720	0.000	0.000	0.720	0.720	0.000	0.719	1.382	1.440	0.000	0.000
24	0.000	0.716	0.000	0.000	0.716	0.717	0.000	0.720	0.805	1.317	0.000	0.000
25	0.000	0.720	0.000	0.023	0.721	0.720	0.000	0.721	0.576	1.403	0.000	0.000
26	0.000	0.720	0.000	0.000	0.716	0.716	0.000	0.716	1.081	1.440	0.000	0.000
27	0.000	0.720	0.000	0.584	0.720	0.720	0.000	0.720	0.933	1.382	0.000	0.000
28	3.598	0.720	0.000	0.720	0.720	0.717	5.746	0.716	1.440	0.786	0.000	0.000
29	0.720	0.340	0.000	0.717	--	0.720	0.711	0.698	1.382	0.000	0.000	0.000
30	0.750	0.000	0.000	0.719	--	0.716	0.725	0.716	1.440	0.000	0.000	0.000
31	0.717	--	0.000	0.717	--	0.720	--	0.720	--	0.000	0.000	--
	22.224	20.417	6.740	3.480	20.114	22.242	21.075	22.225	26.677	39.154	0.175	0.000

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	3/30/94	3/31/94	4/10/94	4/17/94	4/18/94 (AM)	4/18/94 (noon)
03U673	897.84	843.91	844.33	844.11	843.94	844.70	844.74
03L673	898.44	843.01	843.37	843.15	842.99	843.94	843.95
04U673	898.34	843.16	843.54	843.32	843.16	844.13	844.13
03U832	886.82	834.71	835.06	834.98	835.03	835.52	835.54
03L832	886.85	834.58	834.90	834.89	834.95	835.40	835.42
04U832	885.31	834.45	834.74	834.79	835.29	835.29	835.29
03L841	911.91	842.37	842.76	842.53	842.26	843.29	843.31
04U841	912.47	842.56	842.91	842.70	842.45	843.50	843.52
04U844	886.74	834.39	834.72	834.69	834.76	835.23	835.24
04U845	894.91	- -	836.46	836.43	836.43	836.99	836.98
03L846	888.54	- -	- -	- -	832.63	832.95	832.89
04U846	889.46	831.87	831.96	832.13	832.31	832.56	832.06
03M848	904.12	840.95	841.39	841.15	841.02	841.77	841.80
03L848	903.91	841.44	841.84	841.61	841.47	842.28	842.30
04U848	903.92	842.18	842.57	842.37	842.18	843.11	843.15
04U851	914.51	831.29	831.38	831.63	831.81	832.05	831.69
04U852	905.66	829.18	829.28	829.61	829.76	830.03	829.71
03L854	892.41	838.39	838.88	838.58	838.55	839.16	839.19
04U854	891.95	834.73	835.14	835.20	835.27	835.66	835.71
03L859	903.55	838.96	839.48	839.16	839.08	839.77	839.79
04U859	903.73	841.83	842.22	841.98	841.81	842.75	842.78
03L860	896.79	838.65	839.10	838.83	838.81	839.43	839.45
04U860	896.61	834.70	835.04	835.11	835.18	835.61	835.61
03L861	891.35	836.95	837.47	837.18	837.15	837.77	837.80
04U861	890.91	834.90	835.25	835.28	835.31	835.77	835.76
04U863	895.33	834.31	834.59	834.67	834.79	835.13	835.13
04U864	908.67	832.60	832.70	832.91	833.07	833.25	832.07
04J864	908.79	827.76	828.03	828.45	829.15	829.53	829.42
04U865	915.60	833.15	833.30	833.45	833.63	833.83	832.46
04U866	910.60	831.97	832.05	832.27	832.44	832.60	831.25
04J866	910.69	828.46	828.73	829.14	829.87	830.19	830.07
04U877	923.08	831.31	831.30	831.57	831.77	831.95	831.53
MPCA1L3	898.25	- -	838.03	837.71	837.65	838.30	838.35
MPCA1U4	898.60	- -	836.33	836.18	836.13	836.74	836.75
MPCA2L3	872.05	- -	833.60	833.59	833.68	834.10	833.95
MPCA2U4	872.19	- -	832.71	832.78	832.93	833.29	832.99
414U4	893.95	834.05	834.33	834.45	834.61	834.94	834.85
MW15H	911.52	- -	834.81	834.67	834.77	835.28	835.27
NB WELL 13	914.66	- -	- -	- -	- -	- -	820.66

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	4/18/94 (PM)	4/19/94	4/20/94	4/21/94	4/22/94	4/25/94
03U673	897.84	844.74	844.10	844.00	844.04	844.13	844.67
03L673	898.44	843.86	843.12	843.09	843.09	843.17	843.58
04U673	898.34	844.04	843.29	843.27	843.26	843.34	843.73
03U832	886.82	835.43	834.87	834.98	835.08	835.17	835.37
03L832	886.85	835.27	834.71	834.85	834.99	835.07	835.24
04U832	885.31	835.11	834.59	834.74	834.89	834.98	835.12
03L841	911.91	843.21	842.42	842.39	842.39	842.50	842.90
04U841	912.47	843.42	842.59	842.59	842.56	842.67	843.03
04U844	886.74	835.08	834.47	834.64	834.76	834.83	835.01
04U845	894.91	836.84	836.26	836.38	836.47	836.53	836.80
03L846	888.54	832.81	832.48	832.63	832.71	832.72	832.83
04U846	889.46	831.91	831.51	832.16	832.27	832.22	832.31
03M848	904.12	841.79	841.15	841.11	841.15	841.25	841.69
03L848	903.91	842.27	841.58	841.55	841.59	841.70	842.11
04U848	903.92	843.07	842.32	842.29	842.28	842.42	842.80
04U851	914.51	831.44	830.98	831.45	831.70	831.65	831.76
04U852	905.66	829.40	828.94	829.32	829.49	829.41	829.59
03L854	892.41	839.21	838.66	838.62	838.70	838.93	839.27
04U854	891.95	835.50	834.97	835.11	835.22	835.40	835.49
03L859	903.55	839.79	839.21	839.16	838.72	839.47	839.77
04U859	903.73	842.68	841.93	841.92	841.92	842.12	842.39
03L860	896.79	839.45	838.92	838.89	838.94	839.06	839.52
04U860	896.61	835.46	834.89	835.08	835.21	835.23	835.46
03L861	891.35	837.80	837.24	837.21	837.29	837.54	837.83
04U861	890.91	835.61	835.06	835.22	835.36	835.49	835.60
04U863	895.33	834.93	834.44	834.63	834.70	834.88	835.06
04U864	908.67	831.80	831.30	832.26	833.04	833.04	833.16
04J864	908.79	829.15	828.31	828.54	828.52	828.28	828.45
04U865	915.60	832.16	831.66	832.80	833.64	833.69	833.79
04U866	910.60	830.96	830.51	831.60	832.40	832.39	832.46
04J866	910.69	829.79	828.94	829.23	829.21	829.22	829.13
04U877	923.08	831.34	830.95	831.54	831.71	831.64	831.76
MPCA1L3	898.25	838.34	837.76	837.73	837.81	838.02	838.33
MPCA1U4	898.60	836.68	836.08	836.14	836.20	836.36	836.57
MPCA2L3	872.05	833.83	833.33	833.60	833.74	833.74	833.88
MPCA2U4	872.19	832.85	832.39	832.83	832.93	832.93	832.98
414U4	893.95	834.61	834.10	834.37	834.59	834.65	834.82
MW15H	911.52	835.23	834.61	834.72	834.83	834.92	835.14
NB WELL 13	914.66	- -	824.16	829.86	- -	832.78	- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	4/26/94	4/28/94	4/29/94	5/2/94	5/9/94	5/16/94
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	5/23/94	6/20/94	7/19/94	10/10/94	1/27/95	3/6/95
03U673	897.84	844.35	844.01	845.00	843.06	843.42	843.31
03L673	898.44	843.20	842.81	844.33	842.23	842.24	842.12
04U673	898.34	843.34	842.95	843.93	842.43	842.39	842.24
03U832	886.82	834.31	833.55	833.48	832.65	833.36	833.24
03L832	886.85	834.14	833.33	833.25	832.49	833.20	833.48
04U832	885.31	833.99	833.19	833.09	832.39	833.07	833.14
03L841	911.91	842.50	842.10	843.37	841.48	841.55	841.42
04U841	912.47	842.60	842.20	843.55	841.71	841.65	841.53
04U844	886.74	833.90	833.18	833.20	832.29	833.09	833.16
04U845	894.91	835.83	835.16	835.29	834.23	834.94	834.94
03L846	888.54	831.96	831.16	830.78	830.16	830.74	830.92
04U846	889.46	830.91	830.06	829.74	829.44	830.11	830.23
03M848	904.12	841.31	840.84	841.46	839.75	840.21	840.14
03L848	903.91	841.69	841.18	841.95	840.28	840.62	frozen
04U848	903.92	842.36	841.94	843.02	841.27	841.40	841.27
04U851	914.51	830.23	829.20	829.01	828.85	829.72	829.87
04U852	905.66	827.90	plugged	826.62	826.83	827.91	828.13
03L854	892.41	838.81	838.26	838.30	836.93	837.56	837.59
04U854	891.95	834.44	833.63	833.60	832.83	833.52	833.54
03L859	903.55	839.30	838.79	839.07	837.48	838.14	838.15
04U859	903.73	841.92	841.51	842.57	840.83	840.96	840.88
03L860	896.79	839.09	838.51	838.54	837.22	837.86	837.84
04U860	896.61	834.31	833.57	833.41	832.75	833.38	833.43
03L861	891.35	837.17	836.55	836.54	835.25	835.99	836.03
04U861	890.91	834.53	833.78	833.76	832.97	833.63	833.66
04U863	895.33	833.82	832.92	832.79	832.18	832.85	832.95
04U864	908.67	830.76	829.72	829.55	829.07	829.71	829.88
04J864	908.79	826.49	825.46	825.93	825.04	826.81	826.92
04U865	915.60	831.14	830.22	830.04	829.54	830.14	830.24
04U866	910.60	829.96	828.90	828.72	828.28	828.97	829.22
04J866	910.69	827.25	826.26	826.71	825.71	827.46	827.57
04U877	923.08	830.30	829.34	828.98	828.84	829.50	829.76
MPCA1L3	898.25	837.70	837.13	837.27	835.82	836.58	836.59
MPCA1U4	898.60	835.64	835.03	835.22	834.05	834.74	834.80
MPCA2L3	872.05	832.75	831.94	831.81	831.12	831.89	831.93
MPCA2U4	872.19	831.78	830.93	830.71	830.14	830.91	830.99
414U4	893.95	833.44	832.55	832.43	831.91	832.59	832.67
MW15H	911.52	834.12	833.30	833.12	832.36	833.11	833.19
NB WELL 13	914.66	- -	820.58	820.26	819.41	819.66	819.66

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	6/21/95 8:00 A.M.	9/5/95	12/14/95	3/5/96	5/28/96	9/16/96	12/3/96
03U673	897.84	843.59	842.55	843.33	843.28	843.84	842.44	842.16
03L673	898.44	842.76	841.34	842.14	842.23	842.84	840.97	840.99
04U673	898.34	842.96	841.49	842.29	842.38	843.00	841.08	841.13
03U832	886.82	833.02	832.57	833.26	833.55	834.26	831.27	832.31
03L832	886.85	832.82	832.40	833.11	833.40	834.55	831.09	832.16
04U832	885.31	832.63	832.27	832.97	833.27	833.89	830.93	832.04
03L841	911.91	842.03	840.53	841.48	841.47	842.13	840.18	840.31
04U841	912.47	842.23	840.69	841.59	841.63	842.30	840.27	840.48
04U844	886.74	832.59	832.22	833.00	833.26	833.75	830.99	832.02
04U845	894.91	834.64	834.06	834.87	835.07	835.70	832.94	833.93
03L846	888.54	830.62	830.20	830.51	830.94	831.51	828.83	829.46
04U846	889.46	829.35	829.25	829.69	830.08	830.17	827.71	828.49
03M848	904.12	840.39	839.38	840.18	frozen	840.85	838.97	839.01
03L848	903.91	840.91	840.48	840.61	frozen	841.28	839.39	frozen
04U848	903.92	841.82	840.49	841.33	frozen	841.99	840.08	840.22
04U851	914.51	828.58	828.55	829.49	829.91	829.86	827.25	828.46
04U852	905.66	826.08	826.04	827.66	828.16	827.76	obstructed	obstructed
03L854	892.41	837.56	836.87	837.63	837.65	838.41	836.06	836.38
04U854	891.95	833.00	832.68	833.46	833.71	834.36	831.41	832.56
03L859	903.55	838.12	837.33	838.14	838.13	838.95	836.53	836.68
04U859	903.73	841.42	840.09	840.95	841.00	841.63	839.47	839.84
03L860	896.79	837.83	837.11	837.90	837.92	838.66	836.58	836.68
04U860	896.61	832.98	832.57	833.40	833.59	834.30	831.38	832.53
03L861	891.35	835.86	835.23	836.03	836.09	836.89	834.22	834.79
04U861	890.91	833.20	832.80	833.59	833.75	834.45	831.56	832.65
04U863	895.33	832.42	832.09	832.76	833.14	833.75	830.86	831.88
04U864	908.67	829.10	829.01	829.50	829.97	830.23	827.63	828.59
04J864	908.79	824.22	824.77	827.23	827.49	826.50	823.55	825.99
04U865	915.60	829.50	829.33	829.67	830.41	830.63	827.84	829.01
04U866	910.60	828.24	828.14	828.40	829.06	829.14	826.74	827.43
04J866	910.69	825.13	825.55	827.80	828.07	827.17	824.83	826.54
04U877	923.08	828.63	828.71	829.14	829.53	829.48	827.06	827.85
MPCA1L3	898.25	836.45	835.79	836.58	836.63	837.35	834.80	835.34
MPCA1U4	898.60	834.49	833.89	834.68	834.85	835.45	832.73	833.66
MPCA2L3	872.05	831.43	831.08	831.63	832.03	832.55	829.74	830.62
MPCA2U4	872.19	830.31	830.07	830.62	830.99	831.36	828.69	829.54
414U4	893.95	832.03	830.77	832.48	832.90	833.36	830.57	831.64
MW15H	911.52	832.85	832.41	833.02	833.34	834.10	831.10	832.11
NB WELL 13	914.66	819.66	819.66	816.10	820.01	819.66	819.66	818.33

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	5/30/97	9/2/97	12/6/97	6/1/98	5/27/99	12/20/99	3/9/00	6/5/00
03U673	897.84	842.39	- -	842.03	843.33	843.14	- -	- -	- -
03L673	898.44	841.06	- -	840.99	842.11	841.91	- -	- -	- -
04U673	898.34	841.21	- -	841.19	842.30	842.06	- -	- -	- -
03U832	886.82	831.36	- -	- -	- -	- -	- -	- -	- -
03L832	886.85	831.22	- -	- -	- -	832.03	- -	- -	- -
04U832	885.31	831.11	- -	831.76	832.38	832.02	- -	- -	- -
03L841	911.91	840.34	- -	- -	- -	- -	- -	- -	- -
04U841	912.47	840.42	- -	- -	- -	- -	- -	- -	- -
04U844	886.74	831.23	- -	- -	- -	- -	- -	- -	- -
04U845	894.91	833.23	- -	833.74	834.46	834.19	- -	- -	- -
03L846	888.54	828.41	- -	- -	- -	- -	- -	- -	- -
04U846	889.46	827.60	- -	- -	- -	- -	- -	- -	- -
03M848	904.12	838.99	- -	838.80	839.95	839.71	- -	- -	- -
03L848	903.91	839.40	- -	839.27	840.41	840.20	- -	- -	- -
04U848	903.92	840.18	- -	840.17	841.20	841.02	- -	- -	- -
04U851	914.51	827.97	- -	827.93	828.61	828.12	- -	- -	- -
04U852	905.66	- -	- -	826.57	826.74	826.63	- -	- -	- -
03L854	892.41	836.20	- -	836.10	837.29	836.92	- -	- -	- -
04U854	891.95	831.68	- -	832.44	832.98	832.77	- -	- -	- -
03L859	903.55	836.77	- -	836.62	837.81	837.40	- -	- -	- -
04U859	903.73	839.82	- -	839.83	840.97	840.61	- -	- -	- -
03L860	896.79	836.49	- -	836.39	837.46	837.24	- -	- -	- -
04U860	896.61	831.41	- -	832.33	832.81	832.72	- -	- -	- -
03L861	891.35	834.41	- -	834.47	835.53	835.14	- -	- -	- -
04U861	890.91	831.79	- -	832.43	833.09	832.76	- -	- -	- -
04U863	895.33	830.92	- -	831.80	832.33	832.11	832.36	832.80	817.42
04U864	908.67	828.68	- -	828.02	828.87	827.92	829.19	829.50	827.35
04J864	908.79	825.07	- -	826.32	826.40	825.77	826.99	827.49	827.95
04U865	915.60	829.05	- -	828.57	829.30	828.63	830.11	830.30	833.09
04U866	910.60	826.23	- -	826.30	827.42	825.89	827.53	827.82	848.44
04J866	910.69	825.76	- -	826.80	827.02	826.31	827.50	827.98	826.34
04U877	923.08	827.45	- -	- -	- -	- -	- -	- -	- -
MPCA1L3	898.25	835.04	- -	- -	- -	- -	- -	- -	- -
MPCA1U4	898.60	832.99	- -	- -	- -	- -	- -	- -	- -
MPCA2L3	872.05	829.66	- -	- -	- -	- -	- -	- -	- -
MPCA2U4	872.19	828.58	- -	- -	- -	- -	- -	- -	- -
414U4	893.95	830.72	830.40	831.64	832.12	831.86	832.10	832.77	833.05
MW15H	911.52	831.08	- -	831.66	832.36	832.02	- -	- -	- -
NB WELL 13	914.66	827.94	- -	816.59	816.21	815.46	- -	- -	- -

APPENDIX H-2

HISTORICAL GROUNDWATER ELEVATIONS (FT. AMSL)
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	TOC Elevation	9/5/00	12/18/00	3/13/01	6/1/01	9/4/01
03U673	897.84	- -	- -	- -	842.2	- -
03L673	898.44	- -	- -	- -	841.1	- -
04U673	898.34	- -	- -	- -	841.3	- -
03U832	886.82	- -	- -	- -	832.6	- -
03L832	886.85	- -	- -	- -	832.5	- -
04U832	885.31	- -	- -	- -	832.4	- -
03L841	911.91	- -	- -	- -	- -	- -
04U841	912.47	- -	- -	- -	- -	- -
04U844	886.74	- -	- -	- -	- -	- -
04U845	894.91	- -	- -	- -	834.5	- -
03L846	888.54	- -	- -	- -	- -	- -
04U846	889.46	- -	- -	- -	- -	- -
03M848	904.12	- -	- -	- -	839.9	- -
03L848	903.91	- -	- -	- -	840.4	- -
04U848	903.92	- -	- -	- -	841.1	- -
04U851	914.51	- -	- -	- -	828.2	- -
04U852	905.66	- -	- -	- -	827.5	- -
03L854	892.41	- -	- -	- -	837.2	- -
04U854	891.95	- -	- -	- -	833.1	- -
03L859	903.55	- -	- -	- -	837.7	- -
04U859	903.73	- -	- -	- -	837.9	- -
03L860	896.79	- -	- -	- -	837.5	- -
04U860	896.61	- -	- -	- -	831.3	- -
03L861	891.35	- -	- -	- -	835.5	- -
04U861	890.91	- -	- -	- -	833.1	- -
04U863	895.33	831.59	831.98	- -	832.5	- -
04U864	908.67	828.22	829.45	828.93	829.1	828.04
04J864	908.79	825.62	826.49	826.84	826.8	824.91
04U865	915.60	829.19	830.29	829.77	831	830.44
04U866	910.60	826.59	827.90	827.23	827.4	826.70
04J866	910.69	826.24	827.21	827.35	827.30	825.59
04U877	923.08	- -	- -	- -	- -	- -
MPCA1L3	898.25	- -	- -	- -	- -	- -
MPCA1U4	898.60	- -	- -	- -	- -	- -
MPCA2L3	872.05	- -	- -	- -	- -	- -
MPCA2U4	872.19	- -	- -	- -	- -	- -
414U4	893.95	831.31	831.88	- -	832.4	- -
MW15H	911.52	- -	- -	- -	832.5	- -
NB WELL 13	914.66	- -	- -	- -	- -	- -

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 4/5/94	NB13INF. 4/21/94	NB13INF. 7/28/94	NB13INF. 8/30/94	NB13INF. 9/13/94	NB13INF. 10/31/94	NB13INF. 12/27/94	NB13INF. 1/25/95	NB13INF. 2/14/95	NB13INF. 3/9/95	NB13INF. 4/7/95	NB13INF. 5/4/95	NB13INF. 6/15/95
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
1,1-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
1,2-Dichloroethylene	12DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<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
1,1,2-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
Trichloroethylene	TRCLE	**5.0**	**4.9**	**10**	**13**	**10**	**12**	**7.9**	**9.6**	**10**	**11**	**11**	**9.8**	**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	<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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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	<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	<1.0	<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
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
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
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
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
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	<3.0	<3.0

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 7/13/95	NB13INF. 8/7/95	NB13INF. 9/28/95	NB13INF. 10/11/95	NB13INF. 11/28/95	NB13INF. 12/27/95	NB13INF. 1/26/96	NB13INF. 2/12/96	NB13INF. 3/28/96	NB13INF. 4/17/96	NB13INF. 5/31/96	NB13INF. 6/25/96	NB13INF. 7/18/96
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	**10**	**13**	**10**	**9.4**	**8.3**	**8.0**	**3.8**	**7.6**	**6.0**	**4.9**	**1.6**	**5.3**	**6.2**
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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	**4.3 b**	<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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 8/27/96	NB13INF. 9/12/96	NB13INF. 10/22/96	NB13INF. 11/21/96	NB13INF. 12/17/96	NB13INF. 1/30/97	NB13INF. 2/26/97	NB13INF. 3/27/97	NB13INF. 4/17/97	NB13INF. 5/22/97	NB13INF. 6/26/97	NB13INF. 7/16/97	NB13INF. 8/28/97
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	**9.1**	**7.1**	**7.1**	**6.7**	**5.7**	**4.6**	**4.0**	**3.4**	**2.7**	**2.9**	**2.5**	**4.4**	**2.7**
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 9/17/97	NB13INF. 10/30/97 RMS	NB13INF. 11/24/97 RMS	NB13INF. 12/30/97 RMS	NB13INF. 1/29/98 RMS	NB13INF. 2/12/98 RMS	NB13INF. 3/23/98 RMS	NB13INF. 4/16/98 RMS	NB13INF. 5/20/98 RMS	NB13INF. 5/29/98 RMS	NB13INF. 6/25/98 RMS	NB13INF. 7/27/98	NB13INF. 8/20/98
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	**2.4**	**2.6**	**2.2**	**1.6**	**1.8**	**1.5**	**1.2**	**1.8**	<1.0	<1.0	<1.0	**1.0**	**1.5**
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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	**2.4**	<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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.2 b**	<1.0	<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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 9/30/98	NB13INF. 10/21/98	NB13INF. 11/23/98	NB13INF. 12/21/98	NB13INF. 1/14/99	NB13INF. 2/11/99	NB13INF. 3/17/99	NB13INF. 4/6/99	NB13INF. 5/18/99	NB13INF. 6/21/99	NB13INF. 7/13/99	NB13INF. 8/30/99	NB13INF. 9/27/99
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	**2.1**	**1.2**	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
Methylene chloride	CH2CL2	**12 b**	**8.6 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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 10/19/99	NB13INF. 12/16/99	NB13INF. 1/25/00	NB13INF. 2/28/00	NB13INF. 3/16/00	NB13INF. 4/24/00	NB13INF. 5/16/00	NB13INF. 6/28/00	NB13INF. 7/17/00	NB13INF. 9/5/00	NB13INF. 9/14/00	NB13INF. 10/12/00	NB13INF. 11/8/00
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13INF. 1/29/01	NB13INF. 2/8/01	NB13INF. 3/7/01	NB13INF. 4/3/01	NB13INF. 5/23/01	NB13INF. 6/29/01
1,1-Dichloroethane	11DCLE	<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
1,2-Dichloroethylene	12DCE	<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
1,1,2-Trichloroethane	112TCE	<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
Benzene	C6H6	<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
Bromoform	CHBR3	<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
Carbon tetrachloride	CL4	<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
Chloroethane	C2H5CL	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<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
Chlorodibromomethane	DBRCLM	<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
1,2-Dichlorobenzene	12DCLB	<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
1,4-Dichlorobenzene	14DCLB	<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
1,3-Dichloro-1-propene, cis	C13DCP	<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
Ethyl benzene	ETC6H5	<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
1,1,2,2-Tetrachloroethane	TCLEA	<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
Toluene	MEC6H5	<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
Vinyl chloride	C2H3CL	<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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	4/4/94	4/21/94	7/28/94	8/30/94	9/13/94	9/13/94	10/31/94	12/27/94	12/27/94	1/25/95	1/25/95	2/14/95	3/9/95
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 4/7/95	NB13EFF. 4/7/95	NB13EFF. 5/4/95	NB13EFF. 6/15/95	NB13EFF. 6/15/95	NB13EFF. 7/13/95	NB13EFF. 7/13/95	NB13EFF. 8/7/95	NB13EFF. 9/28/95	NB13EFF. 10/11/95	NB13EFF. 10/11/95	NB13EFF. 11/28/95	NB13EFF. 12/27/95
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.2**	**1.7**
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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	**1.2**	**1.2**	**1.3**	**1.3**	**1.3**
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 10/22/96	NB13EFF. 11/21/96	NB13EFF. 12/17/96	NB13EFF. 1/30/97	NB13EFF. 2/26/97	NB13EFF. 3/27/97	NB13EFF. 4/17/97	NB13EFF. 5/22/97	NB13EFF. 6/26/97	NB13EFF. 7/16/97	NB13EFF. 8/28/97	NB13EFF. 8/28/97	NB13EFF. 9/17/97
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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**	**1.1**	**1.0**	**1.2**	**1.2**	**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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 10/30/97 RMS	NB13EFF. 11/24/97 RMS	NB13EFF. 11/24/97 DUP	NB13EFF. 12/30/97 RMS	NB13EFF. 1/29/98 RMS	NB13EFF. 2/12/98 RMS	NB13EFF. 2/12/98 RMS	NB13EFF. 3/23/98 RMS	NB13EFF. 4/16/98 RMS	NB13EFF. 4/16/98 DUP	NB13EFF. 5/29/98 RMS	NB13EFF. 6/25/98 RMS	NB13EFF. 7/27/98
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	2.4	2.2	1.2	3.0	2.8	2.8	2.9	3.8	2.6	2.9	2.5	2.7	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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
Methylene chloride	CH2CL2	<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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	**IRDMIS**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**
Sample Date	**Abbreviation**	**8/20/98**	**8/20/98**	**9/30/98**	**10/21/98**	**11/23/98**	**11/23/98**	**12/21/98**	**1/14/99**	**2/11/99**	**3/17/99**	**4/6/99**	**5/18/99**	**5/18/99**
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**2.6**	**2.8**	**1.9**	**1.8**	**1.4**	**1.5**	**1.5**	**1.3**	<1.0	<1.0	**1.2**	**1.2**	**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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
Methylene chloride	CH2CL2	<5.0	<5.0	**12 b**	**8.7 b**	<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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 6/21/99	NB13EFF. 7/13/99	NB13EFF. 8/30/99	NB13EFF. 8/30/99 DUP	NB13EFF. 9/27/99	NB13EFF. 10/19/99	NB13EFF. 4/4/94	NB13EFF. 10/27/95	NB13EFF. 11/28/95	NB13EFF. 12/27/95	NB13EFF. 1/26/96	NB13EFF. 1/26/96	NB13EFF. 2/12/96
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
1,1-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
1,2-Dichloroethylene	12DCE	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<1.0	<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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.1**	**1.2**	<1.0	<1.0	**1.1**	**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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
Ethyl benzene	ETC6H5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.4**	<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	<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
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
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
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
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
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	**7.5**	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	**IRDMIS**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**
Sample Date	**Abbreviation**	**3/28/96**	**4/17/96**	**4/17/96**	**5/31/96**	**6/25/96**	**7/18/96**	**7/18/96**	**8/27/96**	**9/12/96**	**10/22/96**	**10/22/96**	**11/21/96**	**12/17/96**
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	<1.0	<1.0	<1.0	**1.0 b**	**1.4**	**1.7**	**1.7**	**2.0**	**2.1**	**1.6**	**1.6**	**3.1**	**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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	1/30/97	1/30/97	2/26/97	3/27/97	4/17/97	4/17/97	5/22/97	6/26/97	7/16/97	8/28/97	9/17/97	10/30/97	11/24/97
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
1,1-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
1,2-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
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
1,1,2-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
Trichloroethylene	TRCLE	<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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.5**	**1.6**	**1.4**	**1.4**	**1.9**	**1.9**	**2.5**	**1.6**	**1.5**	<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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
1,1,2,2-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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	12/30/97	1/29/98	2/12/98	3/23/98	4/16/98	5/29/98	6/25/98	7/27/98	8/20/98	9/30/98	10/21/98	11/23/98	12/21/98
Dup		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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<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	**1.1**	**1.5**
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
Methylene chloride	CH2CL2	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	**12 b**	**8.8 b**	<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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	**IRDMIS**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**	**NB13EFF.**
Sample Date	**Abbreviation**	**1/14/99**	**2/11/99**	**3/17/99**	**4/6/99**	**5/18/99**	**6/21/99**	**7/13/99**	**8/30/99**	**9/27/99**	**10/19/99**	**12/16/99**	**12/16/99**	**1/25/00**
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**1.3**	<1.0	**1.3**	**1.4**	**1.6**	**1.4**	**1.5**	**1.3**	**1.6**	**1.5**	**1.5**	<1.0	**3.2**
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
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
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
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
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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location	IRDMIS	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.	NB13EFF.
Sample Date	Abbreviation	1/25/00	2/28/00	3/16/00	3/16/00	4/24/00	7/17/00	7/17/00	9/5/00	9/14/00	9/14/00	10/12/00	11/8/00	11/8/00
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
1,1-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
1,2-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
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
1,1,2-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
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
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
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
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
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
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
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
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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**2.8**	**2.8**	**3.0**	**2.9**	**2.8**	**2.8**	**2.3**	**2.5**	**2.3**	**2.2**	**2.1**	**2.2**	**2.3**
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
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
1,2-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
1,2-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
1,3-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
1,4-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
1,2-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
1,3-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
1,3-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
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
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
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
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
Toluene	MEC6H5	<1.0	<1.0	<1.0	<1.0	<2.0	<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
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
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

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
PGRS, TCAAP
ARDEN HILLS, MINNESOTA

Location Sample Date Dup	IRDMIS Abbreviation	NB13EFF. 1/29/01	NB13EFF. 2/8/01	NB13EFF. 2/8/01 DUP	NB13EFF. 3/7/01	NB13EFF. 4/3/01	NB13EFF. 4/3/01 DUP	NB13EFF. 5/23/01	NB13EFF. 5/23/01 DUP	NB13EFF. 6/29/01
1,1-Dichloroethane	11DCLE	<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
1,2-Dichloroethylene	12DCE	<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
1,1,2-Trichloroethane	112TCE	<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
Benzene	C6H6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	BRDCLM	**1.1**	**1.2**	**1.0**	<1.0	**1.1**	<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
Bromomethane	CH3BR	<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
Chlorobenzene	CLC6H5	<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
2-Chloroethylvinyl ether	2CLEVE	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *	<10 *
Chloroform	CHCL3	**4.3**	**4.2**	**3.8**	**3.6**	**3.1**	**2.9**	**2.3**	**2.3**	**1.4**
Chloromethane	CH3CL	<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
1,2-Dichloroethane	12DCLE	<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
1,3-Dichlorobenzene	13DCLB	<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
1,2-Dichloropropane	12DCLP	<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
1,3-Dichloro-1-propene trans	T13DCP	<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
Methylene chloride	CH2CL2	<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
Tetrachloroethylene	TCLEE	<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
Trichlorofluoromethane	CCL3F	<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
Xylenes total	XYLEN	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

APPENDIX H.3

INFLUENT/EFFLUENT DATABASE
FISCAL YEAR 2001
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 Ingineering for City of New Brighton.

Final sampling date 6-29-01. System shut down per agreement with Agencies.

Appendix I

Other Installation Restoration Activities During FY 2001

This appendix is intended to give the reader a brief overview of other activities at TCAAP which are related to the Installation Restoration Program, but are not required by the RODs for OU1 through OU3. These activities are not part of the performance evaluation or the performance monitoring programs.

A. BACKGROUND MONITORING

1. Deep Groundwater

In order to periodically assess the quality of deep groundwater flowing from off-site to beneath TCAAP, monitoring is performed at locations near the upgradient side of TCAAP (the northeast corner and east side). Locations of these wells are shown on Figure B-3 (Appendix B). The FY 2001 results are:

Well	Trichloroethene
03U007	<1.0
03U009	<1.0
03L007	<1.0
04U007	<1.0
04U510	JP 0.19
04U510 (duplicate)	<1.0

The data qualifier "JP" means that the value is between the contract required reporting limit and the method detection limit. The FY 1999 result for 04U510 showed no detection of trichloroethene. Future monitoring will help determine whether this year's value is an anomaly (perhaps cross-contamination) or if it is truly indicative of contamination moving beneath TCAAP from off-site.

These locations will be sampled again in FY 2003 as shown in Appendix A.1 (the wells are listed under TGRS in the appendix).

2. Surface Water

The FY 2001 – FY 2005 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 meet 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 regulatory required) is simply intended to establish baseline characteristics for Rice Creek. Monitoring was conducted annually beginning with FY 2001 (previous years had been quarterly). The FY 2001 data is presented in Table I-1. Other than phosphorus, all analytes showed non-detectable concentrations entering and leaving TCAAP. Phosphorus results were similar at both locations. Mercury and one VOC, 1,2-dichloroethane, were inadvertently omitted from the analyte list and will be included in future events. Also, the analytical methods listed in Appendix A.3 for copper, lead, zinc, and silver have been revised to provide lower detection limits for future events (5, 2, 4 and 1 μg/l, respectively).

B. AQUATIC STUDIES

The U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM) was in the process of preparing a Tier II Ecological Risk Assessment Report for aquatic sites during FY 2001.

C. GRENADE RANGE

The removal action to address contaminated soils was completed in early FY 2000. The removal action report prepared by Alliant Techsystems was under regulatory review at the end of FY 2001. A groundwater report is also being prepared by Alliant Techsystems documenting monitoring well sampling conducted in October 2000.

D. OUTDOOR FIRING RANGE

The removal action to address metals-contaminated soils was completed in early FY 2000. The removal action report prepared by Alliant Techsystems was under regulatory review at the end of FY 2001. Alliant Techsystems also began preparing a work plan for a soil cover to be installed over a portion of the 1900-yard range that was contaminated with polynuclear aromatic hydrocarbons (PAHs). The soil cover will be documented in an addendum to the Outdoor Firing Range removal action report.

E. #150 RESERVOIR AREA

A small area of contamination was found near the water storage reservoir in FY 1999. Alliant Techsystems sampled the area and prepared a characterization report. This area was cleaned up as part of the removal action at the Outdoor Firing Range in early FY 2000. Documentation was included with the Outdoor Firing Range removal action report, which was under regulatory review at the end of FY 2001.

F. PHYTOREMEDIATION STUDY

In FY 1997, the U.S. Army Environmental Center agreed to fund and lead a demonstration study of phytoremediation of soil at TCAAP. A final phytoremediation study report was distributed in FY 2001.

G. PRIMER/TRACER AREAS 135 AND 535

Preliminary assessment reports for both of these sites were prepared by Alliant Techsystems and were under regulatory review at the end of FY 2001. Alliant Techsystems also began working on site investigation work plans for both of these sites in FY 2001.

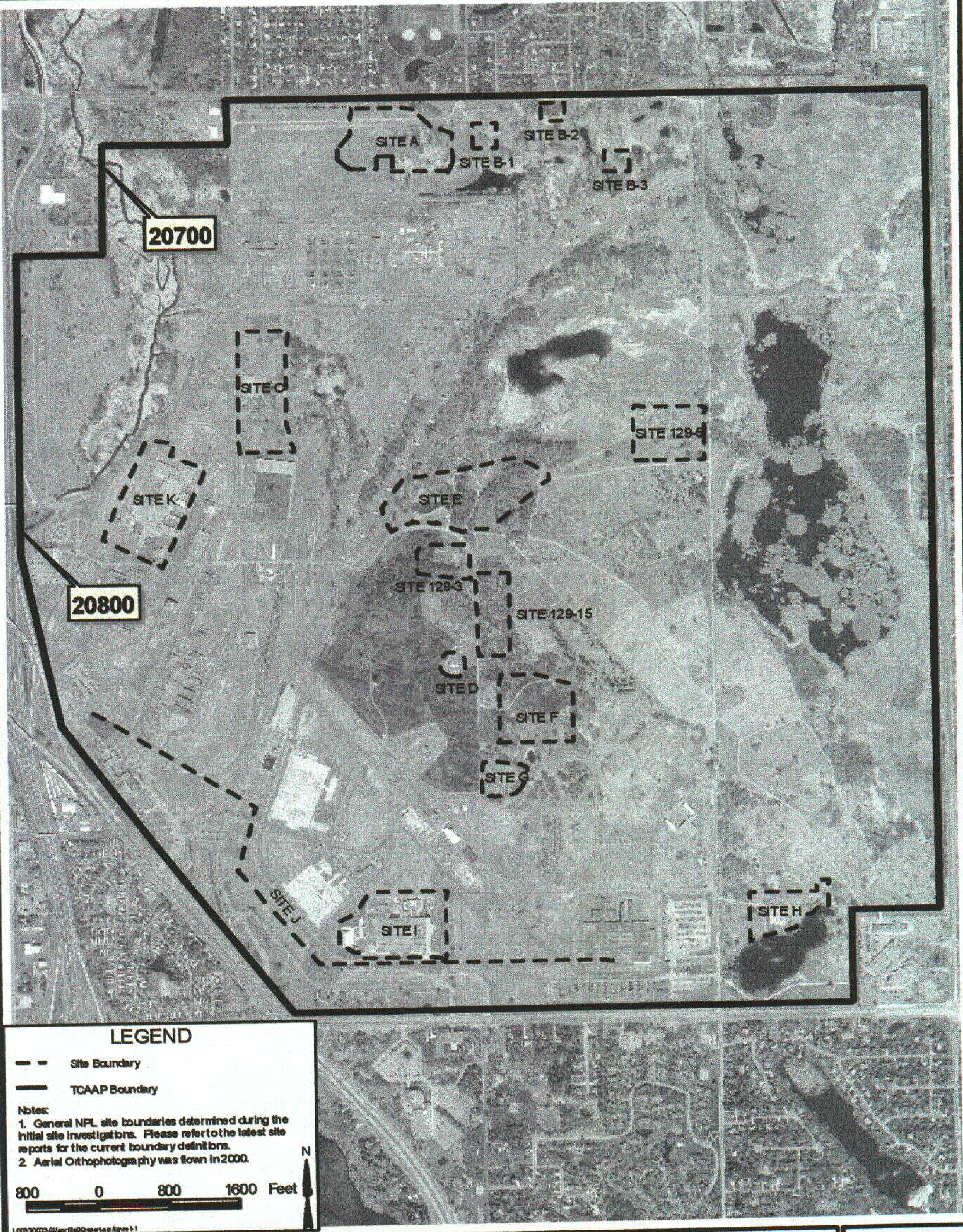
H. MONITORING WELL ABANDONMENT

In FY2001, MPCA and USEPA approved the Final Sitewide Groundwater Monitoring Well Abandonment Work Plan for monitoring wells that no longer serve a purpose. The well sealing will be performed in FY2002.

Table I-1
Surface Water Quality Data : FY 2001

		11DCE (ug/l)	11DCLE (ug/l)	12DCLE (ug/l)	C12DCE (ug/l)	C2H3CL (ug/l)	T12DCE (ug/l)	TRCLE (ug/l)	AG (ug/l)	CU (ug/l)	CYN (ug/l)	HG (ug/l)	P4 (ug/l)	PB (ug/l)	ZN (ug/l)
20700	19-Dec-00	*<1.0*	*<1.0*	NS	*<1.0*	*<1.0*	*<1.0*	*<1.0*	<10 R	<20	<10	NS	91.6	<100	<20
20800	19-Dec-00	*<1.0*	*<1.0*	NS	*<1.0*	*<1.0*	*<1.0*	*<1.0*	<10 R	<20	<10	NS	99.6	<100	<20

Note: Italics indicate data not from IRDMIS/ERIS
NS Parameter was not included in lab analysis.
R Data Rejected. (Matrix spike and matrix spike recoveries were low (11.5 and 17.8%).



TWIN CITIES ARMY AMMUNITION PLANT

Surface Water Monitoring Locations

Wenck

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

FY 2001

Figure I-1