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CONTRACT NO. DE-AC06-96RL13200

Mr. Keith A. Klein, Manager
U.S. Department of Energy
Richland Operations Office A7-50
Post Office Box 550
Richland, Washington 99352

Dear Mr. Klein:

PHMC SECTION C.4.2 - SUBMITTAL OF SOLID WASTE LANDFILL ANNUAL MONITORING REPORT

The purpose of this letter is to transmit the Annual Monitoring Report for the Hanford Site Solid Waste Landfill in accordance with contract deliverable CD0123 found in PHMC Section C.4.2.42 "Sanitary Waste Disposal."

The report includes data from quarterly monitoring of leachate, groundwater, and soil gas at the Solid Waste Landfill covering the July 2004 through June 2005 time frame. No significant contaminant increases were observed in the leachate, groundwater, or soil gas over the past reporting year.

Technical questions should be directed to Mr. Richard G. Slocum at 372-1843; contractual questions should be referred to Mr. Dan Raap at 373-7389.

Very truly yours,

Ronald G. Gallagher
President and
Chief Executive Officer

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Attachment

RL - J. M. Augustenborg
R. F. Guercia
M. F. Jarvis
R. N. Krekel
S. A. Sieracki (w/o attachment) CD0123

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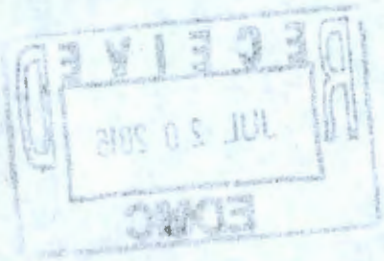
ATTACHMENT

Draft Transmittal Letter to the Washington State Department of Ecology

With Enclosure:
Hanford Site Solid Waste Landfill Annual Monitoring Report
July 2004 through June 2005

Consisting of 25 pages,
including this cover page.



Mr. John Price
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336

Dear Mr. Price:

HANFORD SITE SOLID WASTE LANDFILL ANNUAL MONITORING REPORT

The enclosed report contains information concerning quarterly monitoring at the Hanford Site Solid Waste Landfill. The landfill is in interim closure status and has not received waste since March of 1996.

The report is a compilation of data from quarterly monitoring of leachate, groundwater, and soil gas at the landfill, covering a one-year period from July 2004 through June 2005. No significant contaminant increases were observed in the leachate, groundwater, or soil gas monitoring over the past reporting year. As noted in last year's report, the water table has dropped below the screened interval on one of the eight down-gradient groundwater monitoring wells. An additional well was affected for the second quarter of this year's report but subsequently recovered.

The U.S. Department of Energy will be contacting you soon after the report is transmitted to suggest a meeting to discuss the report and get your recommendations for changes that would make the report more useful to you. With over ten years of monitoring data, we should also evaluate the current monitoring strategy to see if changes are warranted. If you have any questions or concerns, please contact Mr. R. N. Krekel at 376-4264.

Sincerely,

Keith A. Klein
Manager

Enclosure:
Hanford Site Solid Waste Landfill Annual Monitoring Report

cc: w/o enclosure:
B. J. Dixon, FH
L. L. Fritz, FH
B. B. Nelson-Maki, FH

Enclosure

Hanford Site Solid Waste Landfill
Annual Monitoring Report

July 2004 through June 2005

Consisting of 23 pages,
including this cover page.

This report summarizes results of leachate, groundwater, and soil gas monitoring performed at the Hanford Site Solid Waste Landfill during the period of July 2004 through June 2005. The Hanford Site Solid Waste Landfill stopped receiving waste in 1996 and is in interim closure status.

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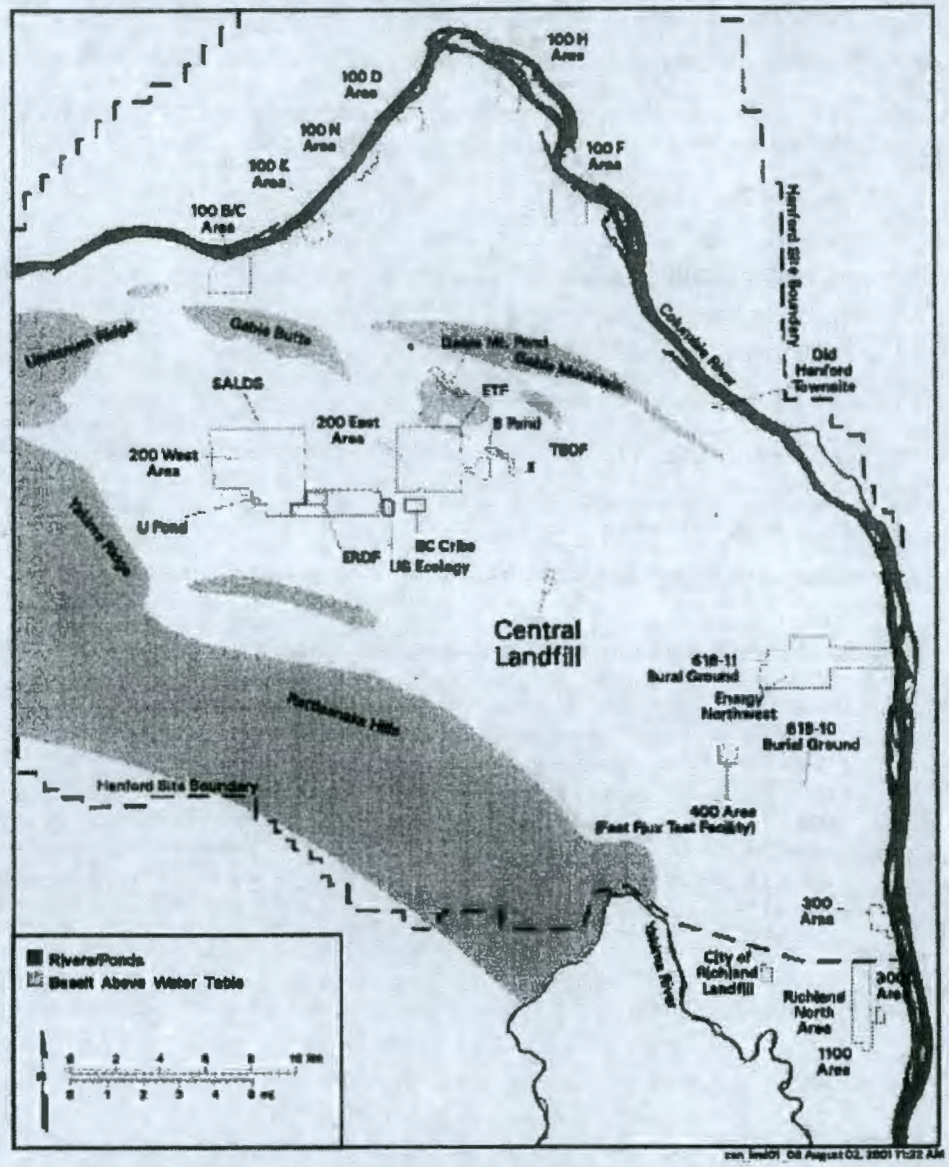
1.0 Introduction

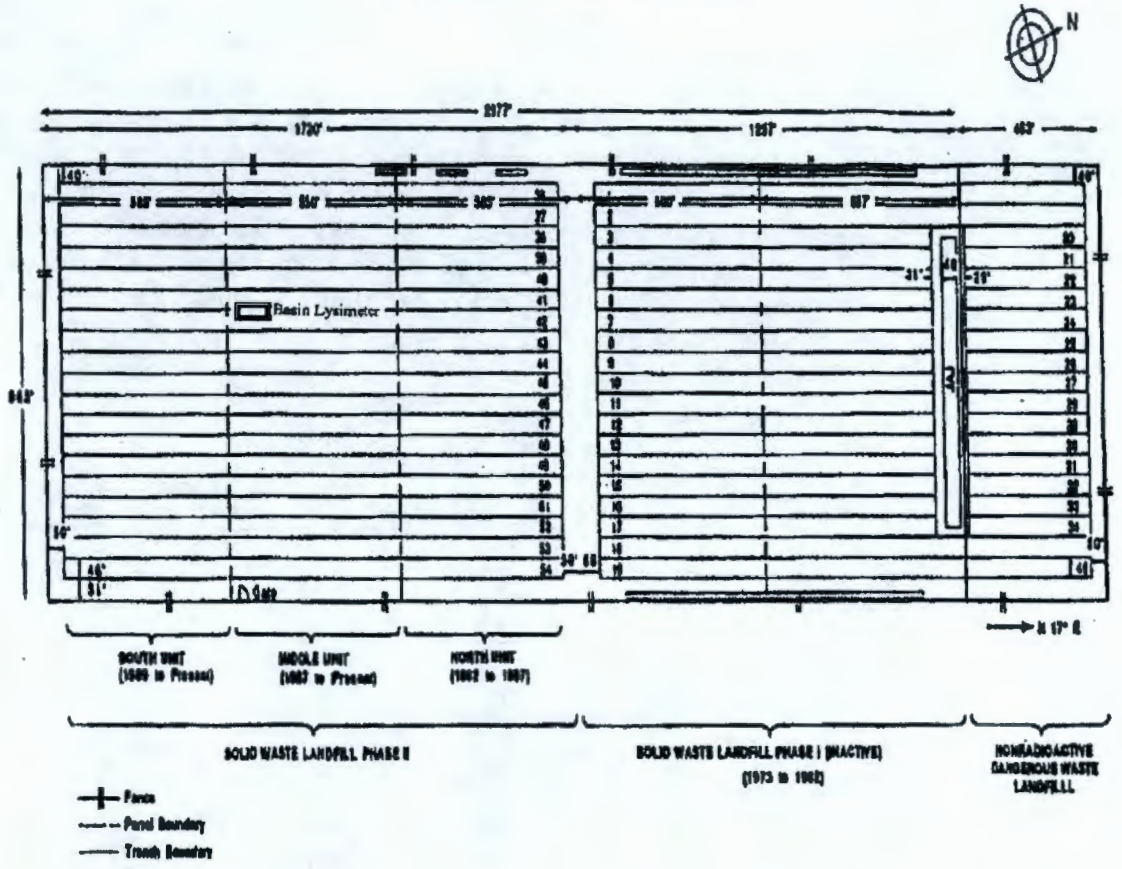
The Hanford Site Solid Waste Landfill (SWL) covers approximately 27 hectares (66 acres) and began operations in 1973. Figure 1 shows location of the SWL (Central Landfill) in relation to the Hanford Site.

Figure 1
Hanford Site Map



The SWL is divided into five units, each consisting of a series of parallel trenches (Figure 2). The two oldest units comprise Phase I. Phase II is comprised of three units: north, middle, and south. The SWL stopped receiving waste in 1996, and an intermediate cover was placed over all disposal trenches. Current plans call for the placement of an engineered final cover to minimize infiltration and leachate generation.

Figure 2
Location of Basin Lysimeter



Monitoring systems at the landfill have been established and provide data for evaluating changes that could indicate increased risks to human health and the environment. Current monitoring includes leachate, groundwater, and soil gas. The following sections provide information for monitoring performed from July 2004 through June 2005.

2.0 Leachate Monitoring

One of the double trenches in the landfill is provided with a liner that allows for collection of leachate in a basin lysimeter. Leachate is generated as precipitation percolates through the refuse. Figure 2 shows the location of the basin lysimeter in relation to other landfill trenches. The collected leachate is disposed through a permitted wastewater system.

Leachate monitoring provides an indication of what contaminants may be reaching the groundwater from unlined disposal cells. However, it is important to note that leachate is only collected under two of more than 90 buried trenches, and is not necessarily representative of total leachate generation throughout the landfill. Contaminants potentially leaching from trenches throughout the SWL represent a 23-year disposal period, dating back to 1973, before many of the regulations putting restrictions on land disposal were enacted. In contrast, the leachate being collected is from one of the newer disposal trenches. There are also varying amounts of vegetation growing over the intermediate cover, which has an effect on the volume of leachate generation. The older trenches have a thick vegetation cover, while some of the newer trenches are still essentially bare.

2.1 Leachate Generation

Leachate is removed from the underground lysimeter collection tank every 10 to 14 days. During the period of July 2004 through June 2005, a total of 1,572 gallons of leachate was generated, for a daily average for the year of 4.3 gallons. This is about a 12 percent decrease in leachate generation over the previous year, when the daily average was only 4.9 gallons. This decrease is mainly attributed to drier than normal precipitation recorded at Hanford this past winter. The Hanford Meteorological Station recorded 1.34 inches of rain during the December through February period, which is 50 percent of normal (i.e., 2.66 inches). Table 1 provides leachate volumes by month for the reporting period. A chart of generation rates over the past four years is provided in Figure 3. As noted in Figure 4, about 31 percent of the precipitation drains through the vadose zone.

Table 1
Leachate Generation Volumes

Month	Volume (gallons)	Average Rate (gallons/day)
July 2004	213	6.87
August 2004	219	7.06
September 2004	110	3.67
October 2004	173	5.58
November 2004	164	5.47
December 2004	140	4.52
January 2005	109	3.52
February 2005	100	3.57
March 2005	110	3.55
April 2005	75	2.50
May 2005	80	2.58
June 2005	79	2.63

Figure 3

Leachate Generation Rate

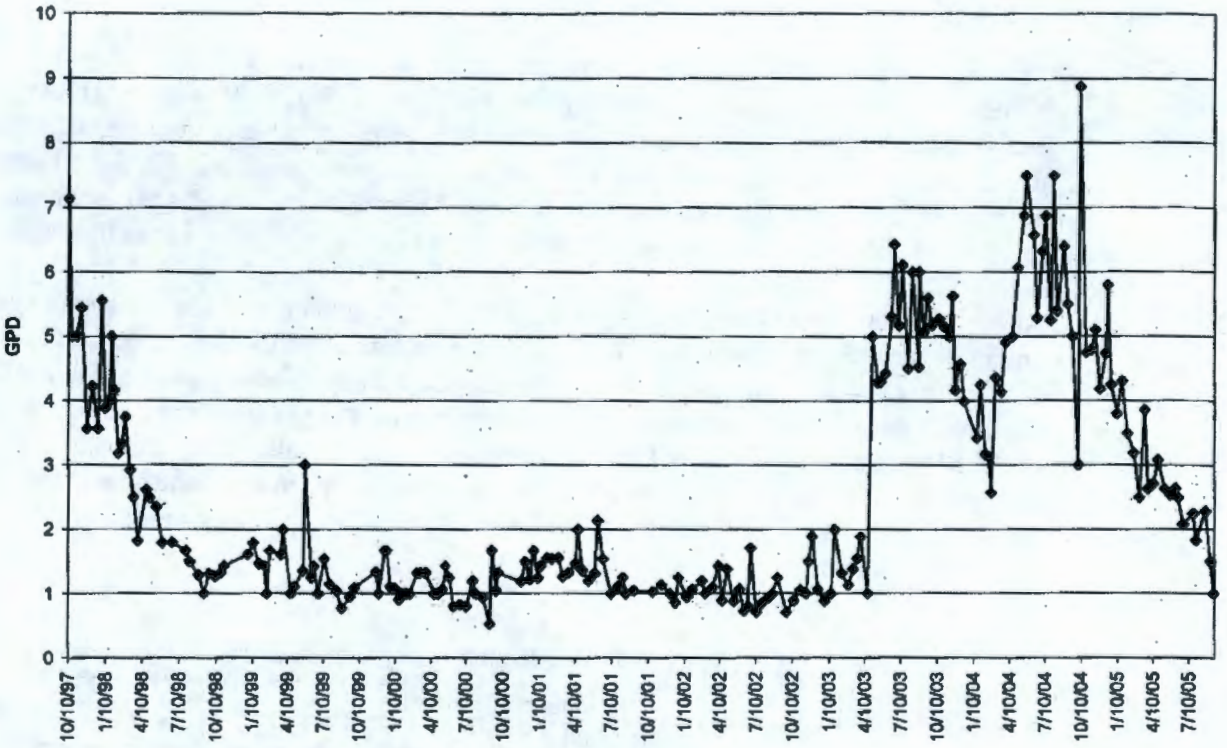
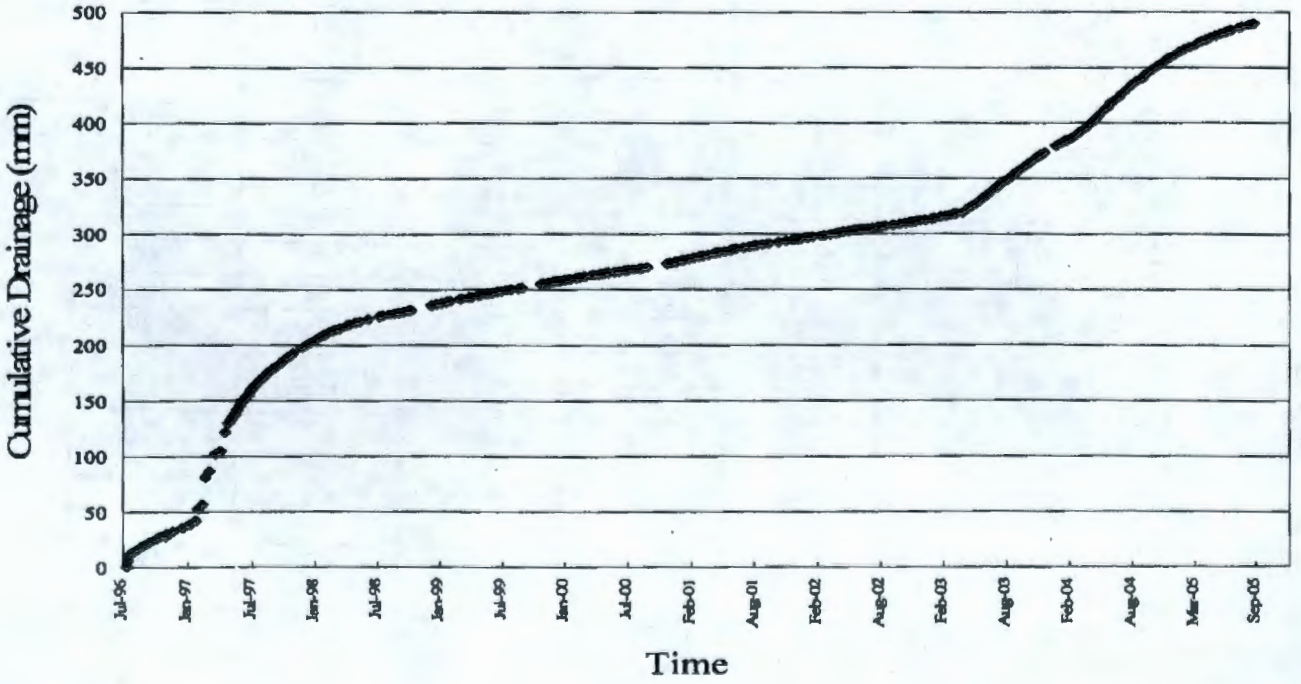


Figure 4

Solid Waste Landfill Drainage



2.2 Leachate Results

Table 2 shows results of several key sample parameters for the leachate. Only the indicator parameters for groundwater monitoring listed in WAC 173-304-490 are monitored on a quarterly basis. In addition to the key sample parameters reported in Table 2, once per year the leachate is tested for a complete range of metals and organics. Laboratory report 20050553 issued April 7, 2005, provides the results of the annual testing. The values identified are similar to previous results and did not identify any areas of concern and so are not provided in this report.

As can be seen from Table 2, some of the indicator parameters and some organic constituents and metals continue to be above WAC 173-200 Groundwater Quality Criteria (GWQC) and/or Maximum Contaminant Levels (MCL) for public water supplies established in WAC 246-290. However, the point of compliance for contamination is the groundwater underlying the perimeter of the SWL boundary. The fact that these contaminants are above compliance levels in the leachate does not necessarily mean that they will be present in the same concentrations in the groundwater once they reach the point of compliance. Groundwater monitoring results are reported in Section 3.0.

Table 2
Leachate Monitoring Results—Key Constituents.

Parameter	Results by Quarter				GWQC*	MCL**
	3rd 2004	4th 2004	1st 2005	2nd 2005		
pH	6.96	6.79	6.97	7.0	6.5-8.5	NA
Conductivity (uS/cm)	1,920	1,800	1,860	1,920	NA	700
Sulfate (mg/L)	2.85	2.31	<1.50	<7.65	250	250
Chloride (mg/L)	227	245	231	214	250	250
Fluoride (mg/L)	0.325	<0.900	<0.180	0.918	4	4
Total Dissolved Solids (mg/L)	NT	NT	1,330	NT	500	NA
Arsenic (ug/L)	NT	40.7	61	NT	0.05	NA
Barium (ug/L)	572	481	519	NT	1000	2000
Manganese (ug/L)	1,340	1,320	1,380	1,380	50	50
Nickel (ug/L)	128	110	118	NT	NA	100
Cadmium (ug/L)	NT	1.30	0.800	NT	10	5
Copper (ug/L)	NT	<3.30	<3.30	NT	1000	NA
Selenium ug/L)	NT	<18.0	29.3	NT	10	50
Zinc (ug/L)	345	<3.0	1,360	<3.0	5000	5000
Iron (ug/L)	11,900	10,400	11,700	9,770	300	300
1,4-Dioxane (ug/L)	NT	NT	<10.0	NT	7	NA
1,4-Dichlorobenzene (ug/L)	NT	NT	15.0	NT	4	NA
Methylene Chloride (ug/L)	NT	NT	1.80	NT	5	NA
Tetrachloroethene (ug/L)	NT	NT	<1.0	NT	0.8	5

*Groundwater Quality Criteria from WAC 173-200
**Maximum Contamination Levels from WAC 246-290
NT = Not Tested
NA = Not Applicable

3.0 Groundwater Monitoring

The existing SWL groundwater-monitoring network consists of two up-gradient wells on the west side of the SWL and eight down-gradient wells along the east and south sides of the SWL. See Figure 5 for location of SWL groundwater monitoring wells. These wells are monitored quarterly as part of the overall Hanford Site groundwater-monitoring project. Well 699-25-34C continued to be dry during the reporting period. Consequently, only nine wells were monitored. During the January to March 2005 quarter, well 699-24-34A went dry so only eight wells were monitored. That well subsequently recovered to allow sampling in the next quarter. At this time, there are no plans to deepen or replace well 699-25-34C because there are seven other down-gradient wells remaining in the network. The results of groundwater sampling are evaluated each quarter and statistical procedures are applied to determine if there are any significant increases in any of the constituents sampled over established background threshold values and/or the GWQC or MCL.

A complete list of constituents sampled in the groundwater over the past four quarters is provided in Table 3 below.

Table 3
Groundwater Monitoring Constituents.

1,1,1-Trichloroethane	Cadmium	M+P-Xylene	Temperature
1,1,2-Trichloroethane	Calcium	Magnesium	Tetrachloroethene
1,1-Dichloroethane	Carbon Disulfide	Manganese	Tetrahydrofuran
1,2-Dichloroethane	Carbon Tetrachloride	Methylene Chloride	Tolulene
1,4-Dichlorobenzene	Chemical Oxygen Demand	Nickel	Total Organic Carbon
1,4-Dioxane	Chloride	Nitrogen in Nitrate	Total Organic Halides
1-Butanol	Chloroform	Nitrogen as Nitrite	Total Xylenes
2-Butanone	Chromium	Nitrogen in Ammonia	Trans-1,2-Dichloroethylene
4-Methyl-2-Pentanone	Cis-1,2-Dichloroethylene	o-Xylene	Trichloroethene
Acetone	Cobalt	pH Measurement	Turbidity
Aluminum	Coliform Bacteria	Potassium	Vanadium
Antimony	Copper	Silver	Vinyl Chloride
Arsenic	Ethylbenzene	Sodium	Zinc
Barium	Ethyl Cyanide	Specific Conductivity	Gross alpha
Benzene	Fluoride	Strontium (elemental)	Gross beta
Beryllium	Iron	Sulfate	

3.1 Background Threshold Value Exceedances

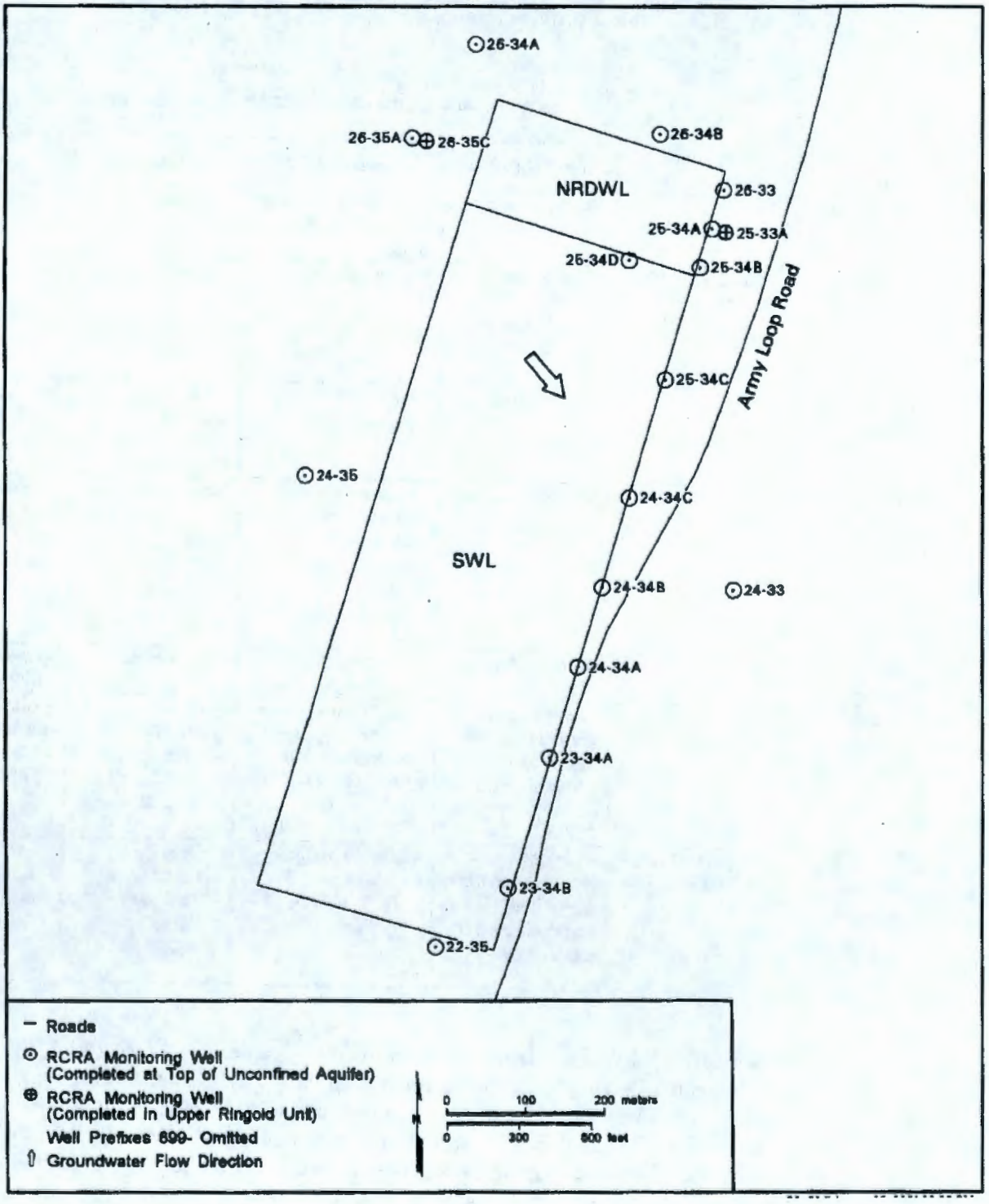
Sample results for monitoring wells for the SWL are evaluated against several background threshold values for several parameters. Table 4 summarizes the exceedances during the four quarters of sampling included in this report.

Table 4
Background Threshold Value (BTV) Exceedances

Parameter (BTV)	Maximum Previous Year	July-Sept 2004	Oct-Dec 2004	Jan-Mar 2005	Apr-June 2005
Ammonium (118 µg/L)	NA	No exceedances	No exceedances	No exceedances	No exceedances
Chemical Oxygen Demand (10,000 µg/L)	17,000 µg/L @ 699-23-34B	- Seven down-gradient and one upgradient - Maximum: 18,000 µg/L @ 699-23-34A	No exceedances	- Four down-gradient and one upgradient - Maximum: 18,000 µg/L @ 699-23-34A	- Six down-gradient and both upgradient - Maximum: 57,000 µg/L @ 699-26-35A
Chloride (7,820 µg/L)	NA	- One well - Maximum: 8,400 µg/L	No exceedances	No exceedances	- One down-gradient - 7,900 µg/L @ 699-24-33
Coliform bacteria (3.7 colonies/100 ml)	517 colonies/ 100 ml	- One down-gradient - 5.2 colonies/100 ml @ 699-24-33	No exceedances	- One down-gradient - 14.6 colonies/100 ml @ 699-24-34A	No exceedances
Field pH (6.68-7.84)	6.59 @ 699-23-34A and 699-23-34A (lowest value)	- Two down-gradient - 6.62 @ 699-23-34A and 6.65 @ 699-24-34B	No exceedances	- Three down-gradient - 6.68 @ 699-24-34B	- One down-gradient - 699-23-34A @ 6.55
Iron (160 µg/L – filtered)	NA	- One down-gradient - 211 µg/L @ 699-24-34A	No exceedances	No exceedances	- One down-gradient - 161 µg/L @ 699-22-351
Manganese (10 µg/L – filtered)	NA	- One down-gradient - 17.9 µg/L @ 699-24-34A	No exceedances	No exceedances	No exceedances
Nitrate (29,000)	NA	No exceedances	No exceedances	No exceedances	No exceedances
Nitrite (59 µg/L)	NA	No exceedances	No exceedances	No exceedances	No exceedances
Specific Conductance (583 µS/cm)	849 µS/cm @ 699-22-35	- Seven down-gradient and one upgradient - Maximum: 834 µS/cm @ 699-22-35	- All down-gradient and one upgradient - Maximum: 831 µS/cm @ 699-22-35	- All down-gradient - Maximum: 821 µS/cm @ 699-22-35	- All down-gradient and one upgradient - Maximum: 826 µS/cm @ 699-22-35
Sulfate (47,200 µg/L)	50,700 µg/L @ 699-23-34B	No exceedances	No exceedances	- One down-gradient - 699-23-34A @ 47,400 µg/L	- Six down-gradient and one upgradient - Maximum: 54,300 µg/L @ 699-23-34A
Temperature (20.7 °C)	21.8 °C @ 699-24-33	No exceedances	No exceedances	No exceedances	No exceedances
Total Organic Carbon (1,510 µg/L)	8,700 µg/L	- One down-gradient - 1,600 µg/L @ 699-22-35	No exceedances	No exceedances	- Two down-gradient - 9,084 µg/L @ 699-24-33 and 5,521 µg/L @ 699-24-34C
Zinc (42.3 µg/L – filtered)	NA	No exceedances	No exceedances	No exceedances	No exceedances

The elevated levels of chemical oxygen demand in wells near the SWL are sporadic and not surprising due to the known disposal of sewage at the landfill. For the reporting period, specific conductance was stable. Values for other background threshold parameters remain relatively steady.

Figure 5
Location of Groundwater Monitoring Wells



3.2 Groundwater Quality Criteria and Drinking Water Maximum Contaminant Level Exceedances

WAC 173-200 Groundwater Quality Criteria (GWQC) exceedances were observed for 1,4-dioxane, carbon tetrachloride, filtered arsenic, pH, and tetrachloroethene (TCE) during the reporting period. The concentration of aluminum exceeded the Washington Drinking Water Maximum Contaminant Level (MCL) and specific conductance exceeded the Federal Drinking Water MCL. Table 5 provides a summary.

Table 5
GWQC and Drinking Water MCL Exceedances

Parameter (Limit)	Maximum Previous Year	July-Sept 2004	Oct-Dec 2004	Jan-Mar 2005	Apr-June 2005
1,4-Dioxane (7 µg/L)	NA	No exceedances	- One down-gradient - 8.1 µg/L @ 699-24-33	No exceedances	No exceedances
Aluminum (50 µg/L)	113 µg/L @ 699-23-34C	- One down-gradient - Maximum: 59.7 µg/L @ 699-23-34A	No exceedances	No exceedances	No exceedances
Carbon tetra-chloride (0.3 µg/L)	NA	No exceedances	No exceedances	- One down-gradient - 0.97 µg/L @ 699-24-34C	No exceedances
Filtered arsenic (0.05 µg/L)	3.4 µg/L @ 699-26-35A	No exceedances	- One upgradient and one down-gradient - 3.1 µg/L @ 699-24-34A - 2.5 µg/L @ 699-24-35	No exceedances	- Two down-gradient - 0.6 µg/L @ 699-22-35 and 3.5 µg/L @ 699-24-34B
pH (6.65-8.5)	NA	No exceedances	No exceedances	No exceedances	- One down-gradient - 699-23-34A @ 6.55
Specific conductance (700 µS/cm)	849 µS/cm @ 699-22-35	- Seven down-gradient and one upgradient - Maximum: 834 µS/cm @ 699-22-35	- All down-gradient and one upgradient - Maximum: 831 µS/cm @ 699-22-35	- All down-gradient - Maximum: 821 µS/cm @ 699-22-35	- All down-gradient and one upgradient - Maximum: 826 µS/cm @ 699-22-35
Tetrachloro-ethene (0.8 µg/L)	2.1 µg/L @ 699-24-34B and 699-24-33	- Six down-gradient and one upgradient - Maximum: 1.7 µg/L @ 699-24-33	- Six down-gradient - Maximum: 1.3 µg/L @ 699-24-33	- Three down-gradient - Maximum: 0.97 µg/L @ 699-24-34B	- Two down-gradient - 1.3 µg/L @ 699-23-34A and 1.2 µg/L @ 699-24-34A

Historically, 1,4-dioxane is not detected in down-gradient well 699-24-33; the reported value was flagged as having blank contamination in the Quality Control sample as well as in the test sample so this result may be in error. The carbon tetrachloride result was estimated because it was less than the quantification limit but greater than the instrument detection limit. The occurrence of arsenic in groundwater at the SWL is most likely from up-gradient sources and is typical of Hanford Site background values. Low pH values have been reported at the SWL wells

since the majority of the well network was installed in the 1980s; this result remains consistent with typical Hanford Site values. While tetrachloroethene exceeds Groundwater Quality Criteria in down-gradient wells, the concentration has been steadily decreasing since 1990. The result for aluminum is probably not reliable. Historical results and laboratory detection levels vary greatly. In addition, a replicate aluminum sample collected at the same time had a result of 45.5 µg/L. The overall trend for specific conductance continues to be stable to slightly upward since 1994.

According to information provided in the *Hanford Site Groundwater Monitoring Report for Fiscal Year 2004* (PNNL-15070), the most likely cause of the fairly widespread low-level chlorinated hydrocarbon contamination in the groundwater underlying the SWL is the dissolution of vadose zone vapors into groundwater. However, the source of these vapors is uncertain. The most probable sources include chlorinated hydrocarbons dissolved in liquid sewage waste and the catch tank liquid from the 1100 Area heavy equipment garage and bus shop that were disposed to SWL trenches until 1987.

3.3 Groundwater Hydrology

The direction and flow of groundwater beneath the SWL is difficult to determine from water table maps because of the extremely low hydraulic gradients. However, flow direction can be inferred from the movement of the major contamination plumes (tritium, iodine-129, and nitrate). Flow direction interpreted from these plumes indicates a southeast direction. The groundwater flow rate was estimated in the *Hanford Site Groundwater Monitoring Report for Fiscal Year 2004* (PNNL-15070) to be in the range of 0.013 to 0.02 meters per day, based on measurements of the hydraulic gradient from water table maps and current understanding of the local hydraulic conductivity and effective porosity.

According to information provided by PNNL (PNNL-15070), water levels at SWL wells continue to drop on average approximately 0.09 meter from March 2003 to March 2004; the region affected by this decline extends from Gable Gap through the 200 East Area to the SWL. During this reporting period, down-gradient monitoring well 699-25-34C continued to be dry and was not sampled. A second well (699-24-34A) went "dry" during the January – March 2005 quarter but subsequently recovered to allow sampling in the subsequent quarter. At this time there are no plans to deepen or replace the well because there are seven other down-gradient wells remaining in the network.

3.4 Chlorinated Organics in Target Wells

Based on past monitoring of the 10 wells in the SWL groundwater monitoring program, six primary contaminants have been identified in the groundwater below the SWL for inclusion in this report: 1) 1,1-Dichloroethane, 2) 1,1,1-Trichloroethane, 3) Chloroform, 4) Carbon Tetrachloride, 5) Tetrachloroethylene, and 6) Trichloroethylene. These chlorinated hydrocarbons are detected in both up-gradient and down-gradient wells, although concentrations for most constituents are slightly higher in the down-gradient wells. The three wells that historically have shown the highest levels of contamination are included in this report. These three wells are referred to as the target wells, and are all down-gradient wells. Well 699-22-35 is located outside the south perimeter fence of the SWL; well 699-23-34A is located outside the east perimeter fence near the southeast corner; and well 699-24-34C is located outside the east perimeter fence near the mid-point of the landfill. Table 6 shows the results of analyses for the six primary contaminants in the three target down-gradient wells, in addition to comparison data from one of the up-gradient wells (699-24-35).

The historical trend for each of the six contaminants in the three target wells is downward. With the exception of tetrachloroethene, the levels for all of the chlorinated organic constituents shown in these figures are currently below WAC 173-300 GWQC. Tetrachloroethene levels, as indicated previously, are slightly above GWQC thresholds in some of the wells, with an apparent downward trend. Of note is that tetrachloroethene levels are about the same in the up-gradient well as in the down-gradient wells.

Charts showing decreases in concentrations of these six organic chemical contaminants in the groundwater are provided in the Appendix at the end of this report as Figures 7 through 12. Since well number 699-22-35 has traditionally had the highest concentration of these contaminants, results from that well are used in the charts. All contaminants have steadily decreased over the past 10 years as shown on the charts. Other wells exhibit similar downward trends.

Table 6
Results of Groundwater Monitoring
in Three Target Wells Compared with One Up-gradient Well.*

699-22-35				699-23-34A				699-24-34C				699-24-35 (up-gradient)			
2004		2005		2004		2005		2004		2005		2004		2005	
3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
1,1,1 Trichloroethane (GWQC of 200 ug/L)**															
1.4	1.9	1.7	1.3	1.4	1.8	1.4	1.2	0.94	1.2	0.87j	0.47j	1.2n	1.4	1	0.65j
1,1 Dichloroethane (GWQC of 1 ug/L)**															
0.48j	0.65j	0.64j	0.52j	0.57j	0.64j	0.65j	0.58j	0.3j	0.4j	0.31j	0.07u	0.12un	0.26j	0.23j	0.07u
Carbon Tetrachloride (GWQC of 0.3 ug/L)**															
0.1u	0.1u	0.09u	0.09u	0.1u	0.1u	0.09u	0.09u	0.1u	0.1u	0.97j	0.09u	0.1un	0.1u	0.09u	0.09u
Chloroform (GWQC of 7 ug/L)**															
0.2j	0.27j	0.42j	0.38j	0.29j	0.39j	0.38j	0.29j	0.11u	0.11u	0.082j	0.07u	0.11un	0.11u	0.07u	0.07u
Tetrachloroethene (GWQC of 0.8 ug/L)**															
0.78j	0.67j	0.57jn	0.76j	1.4	1	0.84jn	1.3	1.6	1.2	0.86j	0.7j	0.92jn	0.7j	0.53jn	0.47j
Trichloroethene (GWQC of 3 ug/L)**															
0.35j	0.4j	0.48j	0.36j	0.46j	0.5j	0.53j	0.46j	0.58j	0.64j	0.5j	0.31j	0.32j	0.4j	0.37j	0.19j

*Units in ug/L
**Groundwater Quality Criteria from WAC 173-200
j means the analyte was detected but result near the analytical detection limit and analytical error is potentially significant by comparison.
u means non-detect or below the method detection level.
n means one of the blanks had detectable quantities of the analyte

4.0 Soil Gas Monitoring

The soil gas-monitoring network consists of eight shallow monitoring stations located around the perimeter of the SWL. Each monitoring station consists of two dedicated soil-gas probes driven to depths of approximately 9 and 15 feet, respectively. The gas is monitored quarterly to determine concentrations of oxygen, carbon dioxide, and methane. The wells are also monitored for several key volatile organic constituents, such as methylene chloride, 1,1-dichloroethane, chloroform, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, 1,1,2-trichloroethane, and tetrachloroethylene. See Figure 6 for location of soil gas monitoring wells.

A summary of soil gas monitoring results are provided in Table 7. Results are consistent with results of previous monitoring. Contaminants of concern were not detected or were at or near detection limits. Methane concentrations remain low and other parameters are normal. Oxygen monitoring was

not completed during this reporting period due to equipment problems and will probably be discontinued since no adverse trend has been noted in eight years of monitoring.

Figure 6
Soil Gas Monitoring Wells

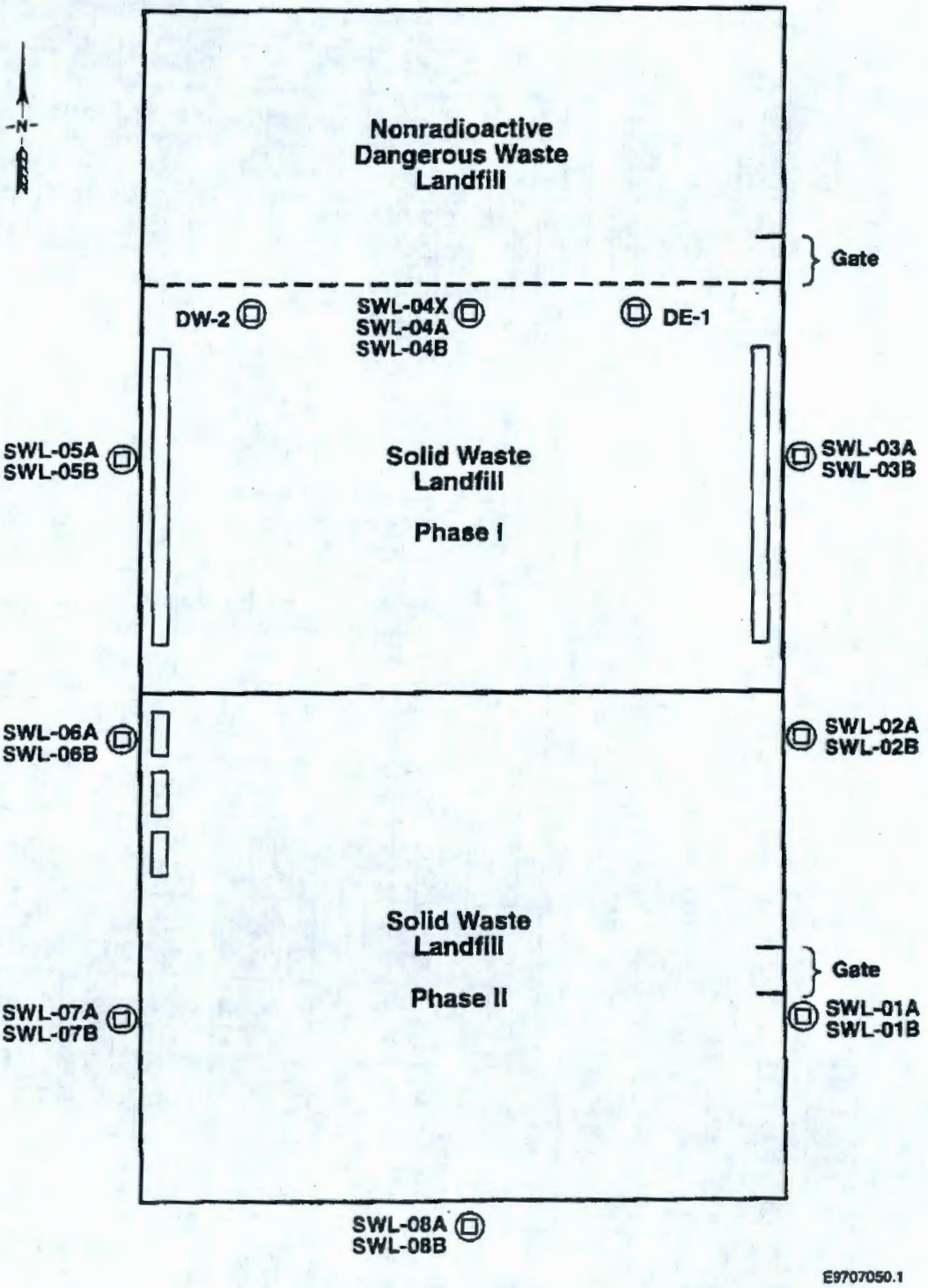


Table 7
SWL Soil Gas Monitoring Results
(July 2004 through June 2005)

Constituents / Sample Month	Wells																		
	01-A	01-B	02-A	02-B	03-A	03-B	04-A	04-B	04-X	DE-1	DW-2	05-A	05-B	06-A	06-B	07-A	07-B[1]	08-A	08-B[1]
Methane (CH_4) (ppm)																			
Dec 2004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dec 2004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
March 2005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
June 2005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carbon dioxide (CO_2) (ppm)																			
Dec 2004	0.0	19	89	179	58	51	538	349	404	517	780	111	360	611	616	0.0	0.0	1,000	1,150
Dec 2004	524	625	628	16,834	250	12,585	18,835	21,254	673	11,090	2,187	801	800	574	644	320	398	2,041	1,575
March 2005	450	486	426	71	56	827	3,204	3,148	2,630	3,690	2,258	379	152	834	888	25	0.0	213	1,859
June 2005	671	1,584	606	50	47	1,515	4,200	5,128	3,945	4,788	3,865	778	1,640	1,755	3,476	1,299	0.0	2,578	4,456
Methylene chloride (DCM) (ppm)																			
Dec 2004	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
Dec 2004	<0.44	<0.44	<0.44	3.2[2]	<0.44	3.3[2]	<0.09[2]	3.9[2]	<0.44	2.2[2]	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
March 2005	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
June 2005	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44	<0.44
1,1-Dichloroethane (1,1-DCA) (ppm)																			
Dec 2004	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
Dec 2004	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
March 2005	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
June 2005	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
Chloroform (TCM) (ppm)																			
Dec 2004	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Dec 2004	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
March 2005	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
June 2005	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
1,1,1-Trichloroethane (1,1,1-TCA) (ppm)																			
Dec 2004	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Dec 2004	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
March 2005	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
June 2005	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Carbon tetrachloride (CCl_4) (ppm)																			
Dec 2004	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
Dec 2004	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
March 2005	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
June 2005	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09

Trichloroethylene (TCE) (ppm)																			
Dec 2004	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Dec 2004	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
March 2005	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
June 2005	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
1,1,2-Trichloroethane (1,1,2-TCA) (ppm)																			
Dec 2004	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Dec 2004	<0.07	<0.07	<0.07	<0.07	<0.07	<0.12[2]	<0.13[2]	<0.16[2]	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
March 2005	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
June 2005	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Tetrachloroethylene (PCE) (ppm)																			
Dec 2004	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
Dec 2004	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
March 2005	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16
June 2005	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16	<0.16

NA - Not Analyzed

< - value less than the reporting limit

[2] The vapor sample line was blocked by water. The sample is suspect.

[3] Value is believed to be a false positive due to interference from high CO_2 concentrations.

Appendix - Groundwater Trends

Figure 7

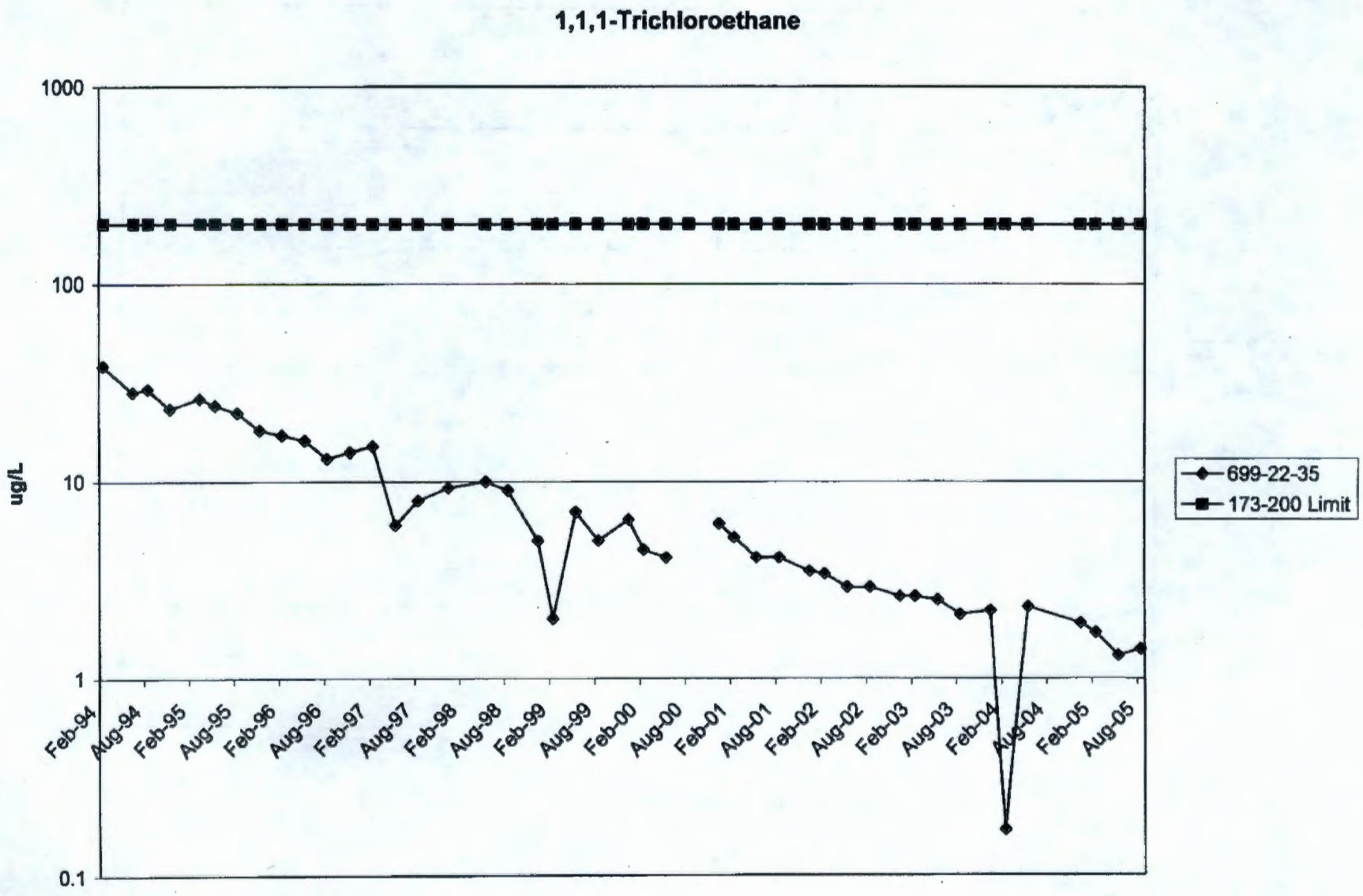

1,1,1-Trichloroethane
1000
100
10
1
0.1
ug/L
Feb-94
Aug-94
Feb-95
Aug-95
Feb-96
Aug-96
Feb-97
Aug-97
Feb-98
Aug-98
Feb-99
Aug-99
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Feb-03
Aug-03
Feb-04
Aug-04
Feb-05
Aug-05
699-22-35
173-200 Limit

Figure 8

1,1-Dichloroethane

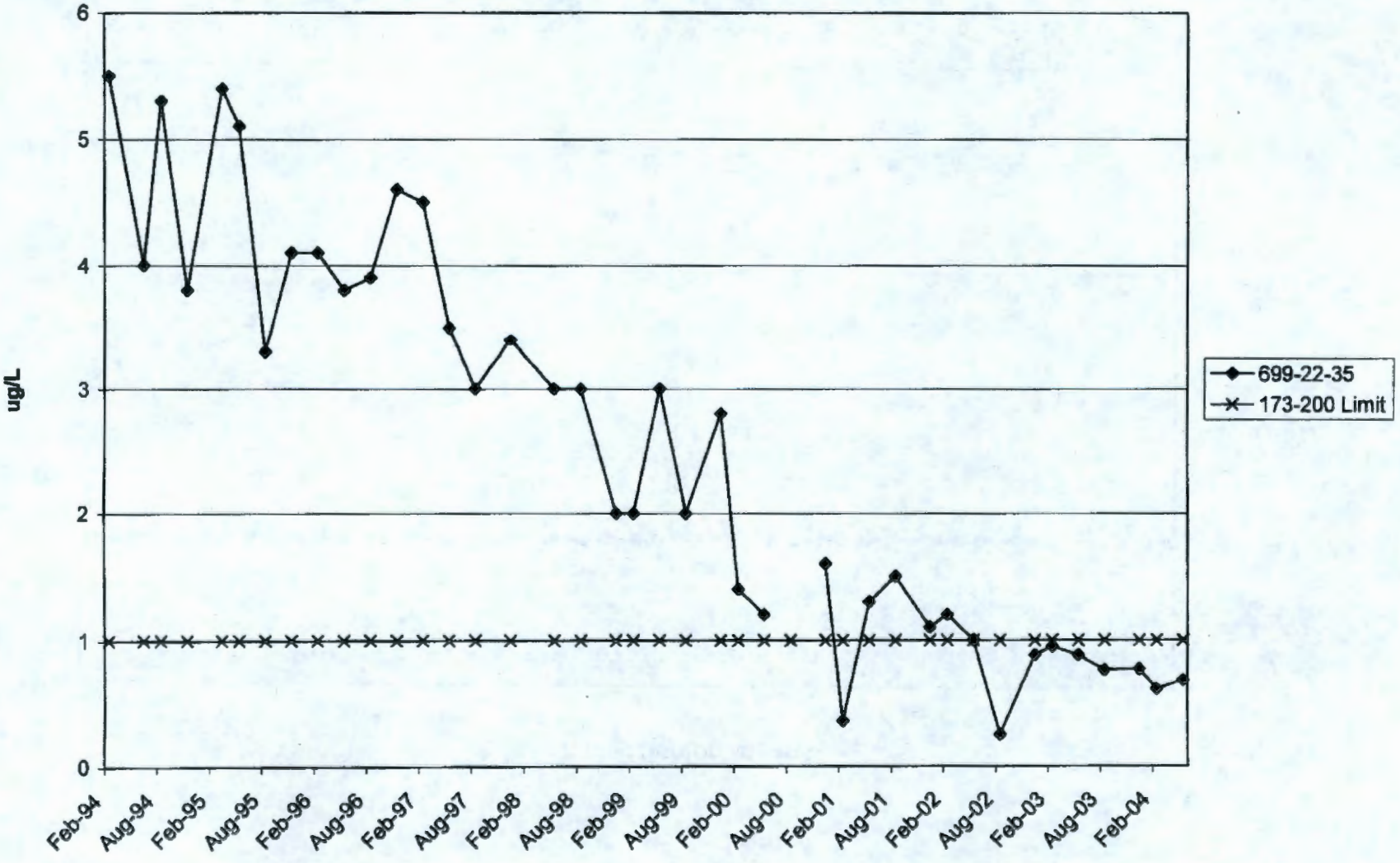


Figure 9

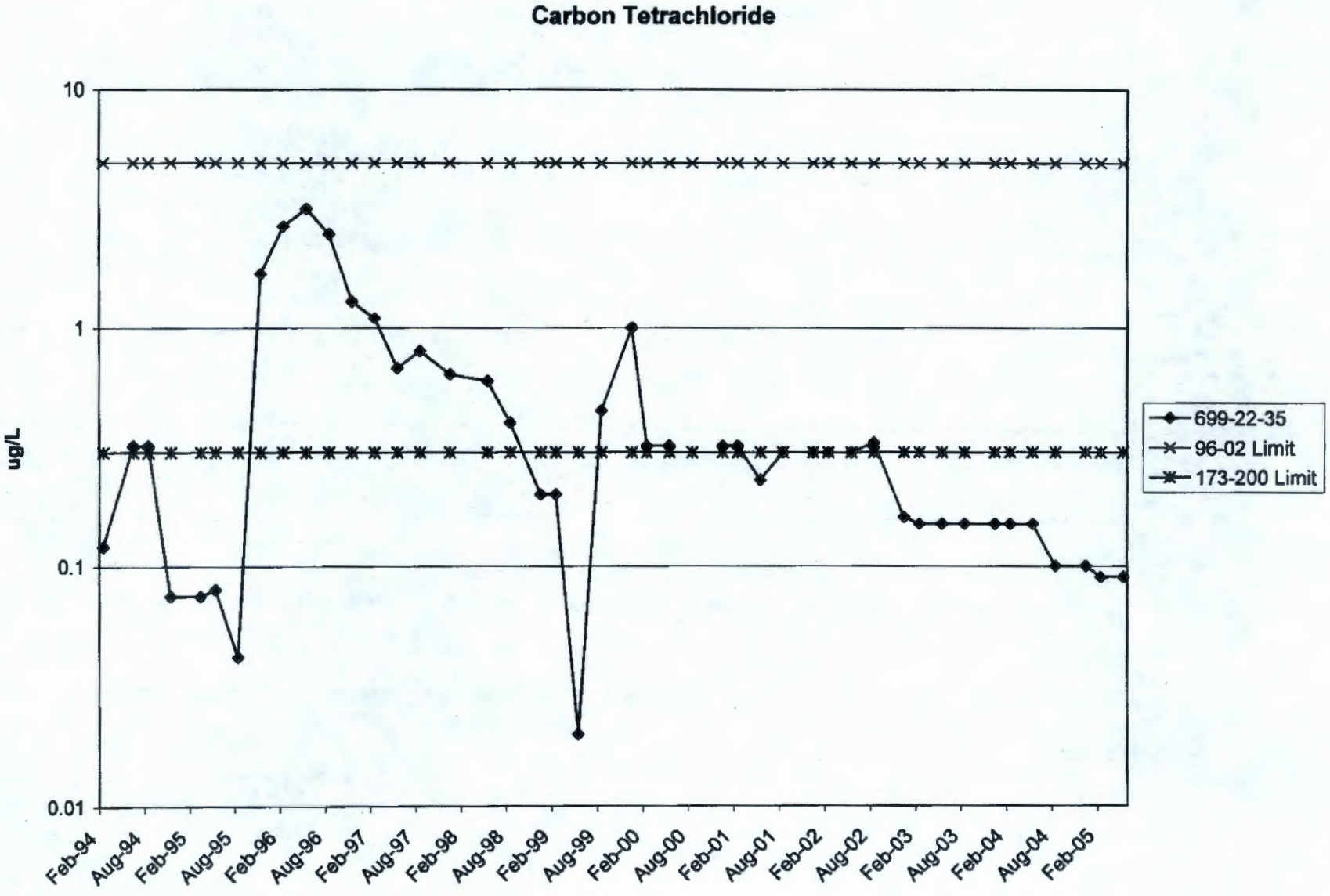

Carbon Tetrachloride
10
1
0.1
0.01
ug/L
699-22-35
96-02 Limit
173-200 Limit
Feb-94
Aug-94
Feb-95
Aug-95
Feb-96
Aug-96
Feb-97
Aug-97
Feb-98
Aug-98
Feb-99
Aug-99
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Feb-03
Aug-03
Feb-04
Aug-04
Feb-05

Figure 10

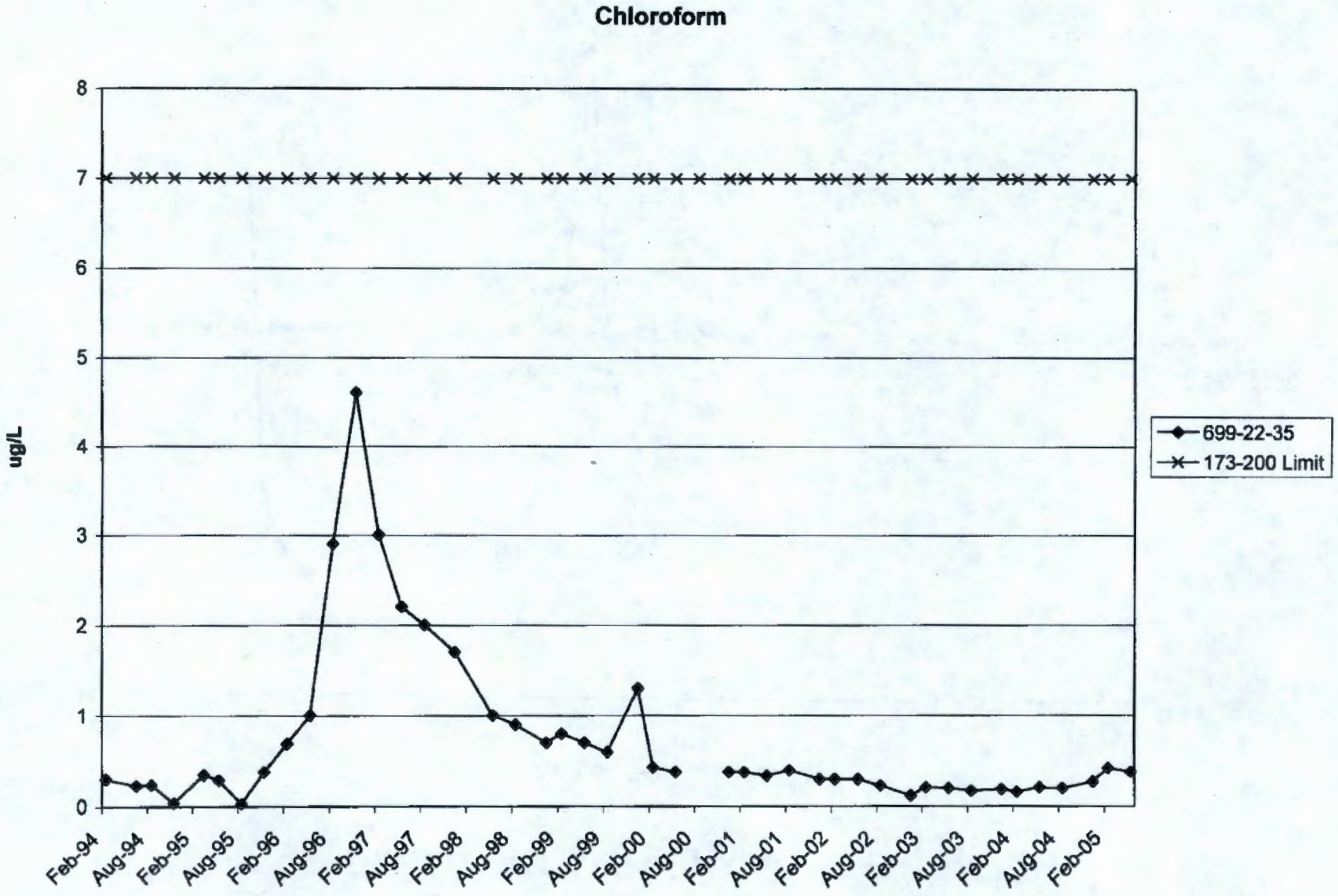

Chloroform
ug/L
8
7
6
5
4
3
2
1
0
699-22-35
173-200 Limit
Feb-94
Aug-94
Feb-95
Aug-95
Feb-96
Aug-96
Feb-97
Aug-97
Feb-98
Aug-98
Feb-99
Aug-99
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Feb-03
Aug-03
Feb-04
Aug-04
Feb-05

Figure 11

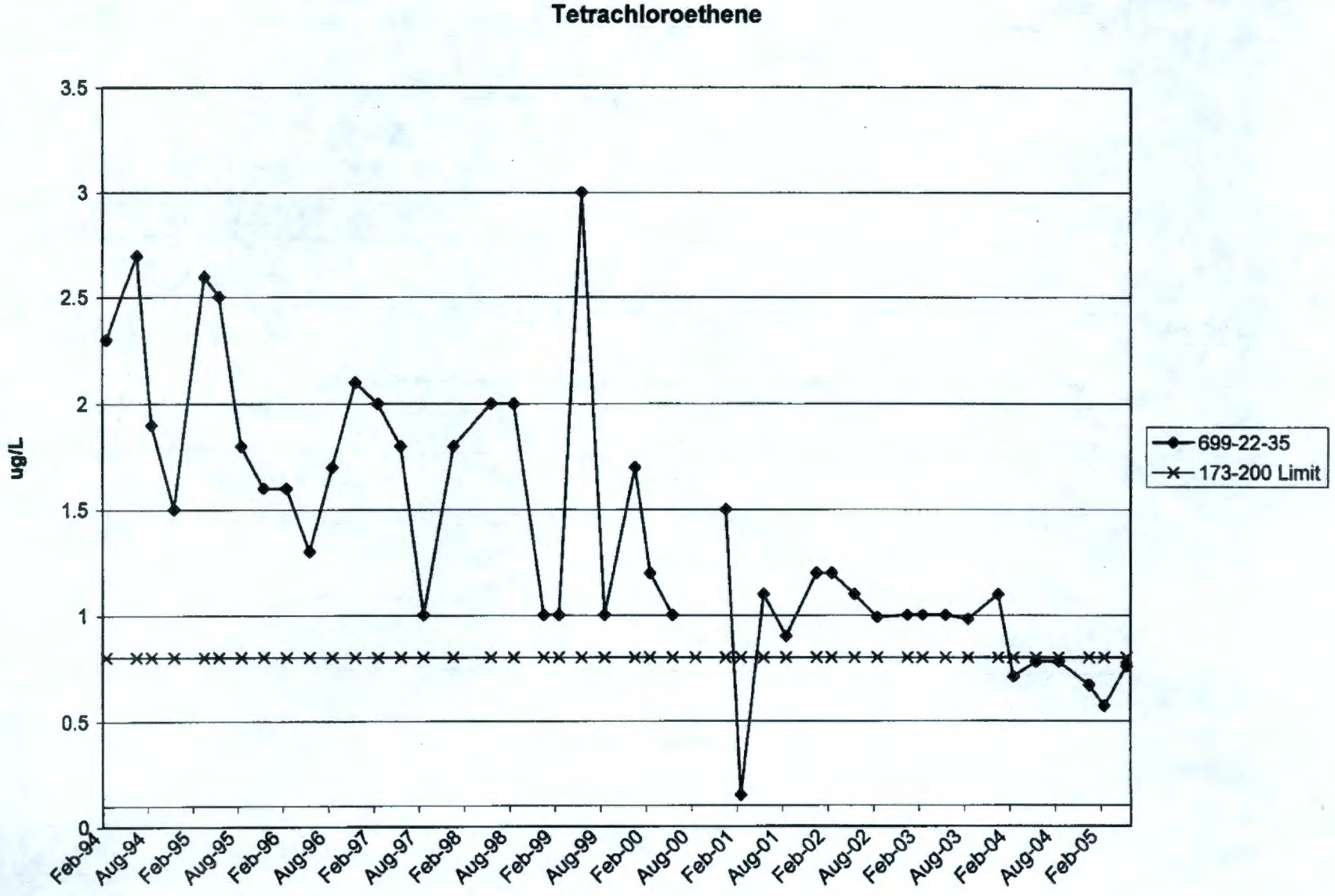
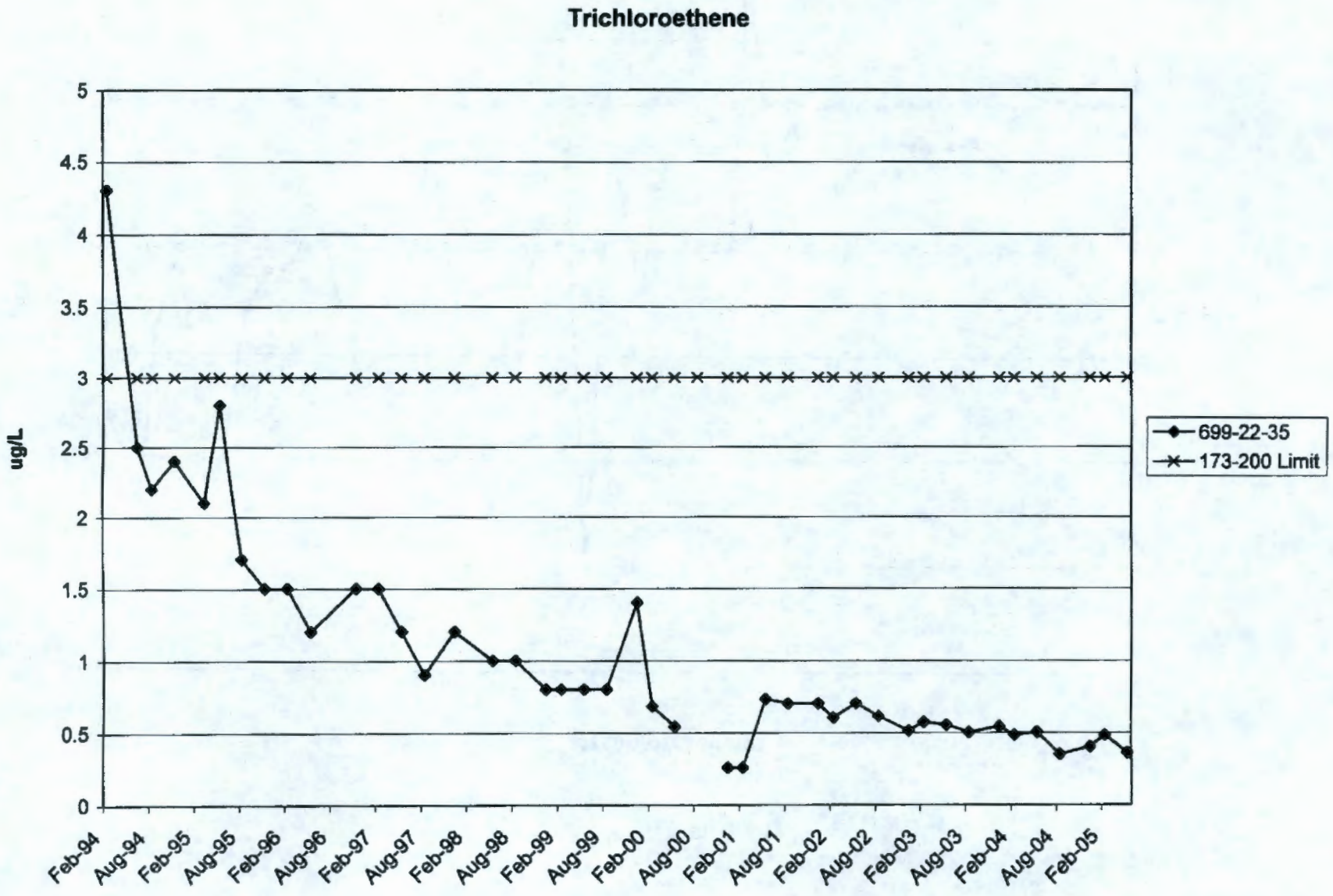

Tetrachloroethene
ug/L
3.5
3
2.5
2
1.5
1
0.5
0
Feb-94
Aug-94
Feb-95
Aug-95
Feb-96
Aug-96
Feb-97
Aug-97
Feb-98
Aug-98
Feb-99
Aug-99
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Feb-03
Aug-03
Feb-04
Aug-04
Feb-05
699-22-35
173-200 Limit

Figure 12


Trichloroethene
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-94
Aug-94
Feb-95
Aug-95
Feb-96
Aug-96
Feb-97
Aug-97
Feb-98
Aug-98
Feb-99
Aug-99
Feb-00
Aug-00
Feb-01
Aug-01
Feb-02
Aug-02
Feb-03
Aug-03
Feb-04
Aug-04
Feb-05
699-22-35
173-200 Limit