WCH-88
Rev. 0

River Corridor
Closure Contract

Groundwater and Leachate Monitoring and Sampling at the Environmental Restoration Disposal Facility, Calendar Year 2005

April 2006

Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor

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TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

COC	contaminant of concern
CY	calendar year
DOW	description of work
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
GPP	groundwater protection plan
ICP	inductively coupled plasma
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	Record of Decision

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
inches	25.4	millimeters	millimeters	0.039	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.035	ounces
pounds	0.454	kilograms	kilograms	2.205	pounds
ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.033	fluid ounces
tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
cups	0.24	liters	liters	0.264	gallons
pints	0.47	liters	cubic meters	35.315	cubic feet
quarts	0.95	liters	cubic meters	1.308	cubic yards
gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
picocuries	37	millibecquerel	millibecquerels	0.027	picocuries

1.0 INTRODUCTION

The Environmental Restoration Disposal Facility (ERDF) is a Hanford Site low-level mixed waste disposal facility that was brought into service on July 1, 1996. Baseline sampling and analytical data obtained from monitoring wells and the ERDF leachate collection system were used to determine contaminants of concern (COCs) and background conditions for long-term monitoring as described in the *Groundwater Protection Plan for the Environmental Restoration Disposal Facility* (ERDF GPP) (BHI 1996b) and to meet the requirements of the ERDF Record of Decision (ROD) (EPA 1995). Ongoing groundwater and leachate monitoring are performed to meet the requirements of the ERDF ROD; details of the monitoring program are described in the *Description of Work for Routine Groundwater Sampling at the Environmental Restoration Disposal Facility* (ERDF DOW) (BHI 1996a) and the ERDF Amended ROD (EPA 1999).

1.1 PURPOSE AND OBJECTIVES

The purpose of this annual monitoring report is to evaluate the conditions of and identify trends for groundwater beneath the ERDF and to report leachate results in accordance with the requirements specified in the ERDF ROD (EPA 1995).

The objectives of this report are as follows:

- Review routine groundwater sampling data to statistically evaluate if there have been changes in COC concentrations over time that may be attributed to ERDF operations
- Assess conditions that may indicate the presence of encroaching groundwater contaminant plumes originating from upgradient sources in the 200 West Area
- Assess data from routine ERDF leachate sampling to determine if additional constituents should be added to the ERDF groundwater monitoring COC list
- Evaluate the groundwater levels in the ERDF monitoring wells to determine if the existing wells need to be modified or replaced.

Appendix A shows analytical results for groundwater samples that were collected from the ERDF monitoring well network from calendar year (CY) 1996 through CY 2005. Appendix B graphically shows trends in the monitoring data resulting from routine groundwater sampling in the ERDF well network. The most recent 3 years of leachate analytical results for samples collected from CY 2003 through CY 2005 are presented in Appendix C. Leachate data collected from CY 1996 through CY 2001 are contained in previous ERDF groundwater and leachate monitoring reports (Faurote 2000; BHI 2002, 2003, 2004, 2005).

2.0 BACKGROUND

2.1 GENERAL DESCRIPTION

The ERDF site is located between the 200 East and 200 West Areas of the Hanford Site (Figure 1). This location was selected for the ERDF over other possible locations, in part because of the depth to groundwater in this area, its location above pre-existing groundwater plumes, the relatively flat topography in this area, and the compatibility of this location with stakeholder recommendations.

The ERDF landfill is authorized under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*. The landfill was designed to meet the *Resource Conservation and Recovery Act of 1976* (RCRA) minimum technology requirements; however, the ERDF is not permitted as a RCRA facility. Wastes disposed at the ERDF contain elevated levels of radionuclides and hazardous constituents originating from 100, 200, and 300 Area waste sites.

2.2 ENVIRONMENTAL RESTORATION DISPOSAL FACILITY

There are currently six waste cells within the ERDF disposal trench. Initially, cells 1 and 2 were constructed and the placement of waste in these cells has been largely completed. Waste placement will continue in cell 1 throughout most of FY 2006. Cells 3 and 4 were later constructed at the site and received waste through CY 2005. Construction of cells 5 and 6 was completed during CY 2004, and these cells began receiving waste during CY 2005. All six cells are roughly equal in size. Figure 2 shows the ERDF as it is currently constructed. Throughout CY 2005, approximately 921,540 metric tons (613,938 1,015,824 U.S. tons) of remediation wastes have been disposed at the facility. A total of approximately 5.69 million metric tons (approximately 6.27 million U.S. tons) of remediation wastes have been placed in ERDF from initial operations startup through CY 2005. The total eventual expansion of the ERDF site has been authorized to cover as much as 4.1 km^2 (1.6 mi^2).

2.2.1 Closed Cells

The initial 10.3-ha (25.5-ac) area that comprises cells 1 and 2 has received waste since July 1996. An interim cover has been placed over the portions of the cells that have been brought up to grade.

2.2.2 Open Cells

Cells 3, 4, 5, and 6, which are roughly 19.4 ha (48 ac) in size are operational and received waste through CY 2005.

2.2.3 New Cells

No new waste cell construction occurred during CY 2005.

Figure 1. Location of the Environmental Restoration Disposal Facility.

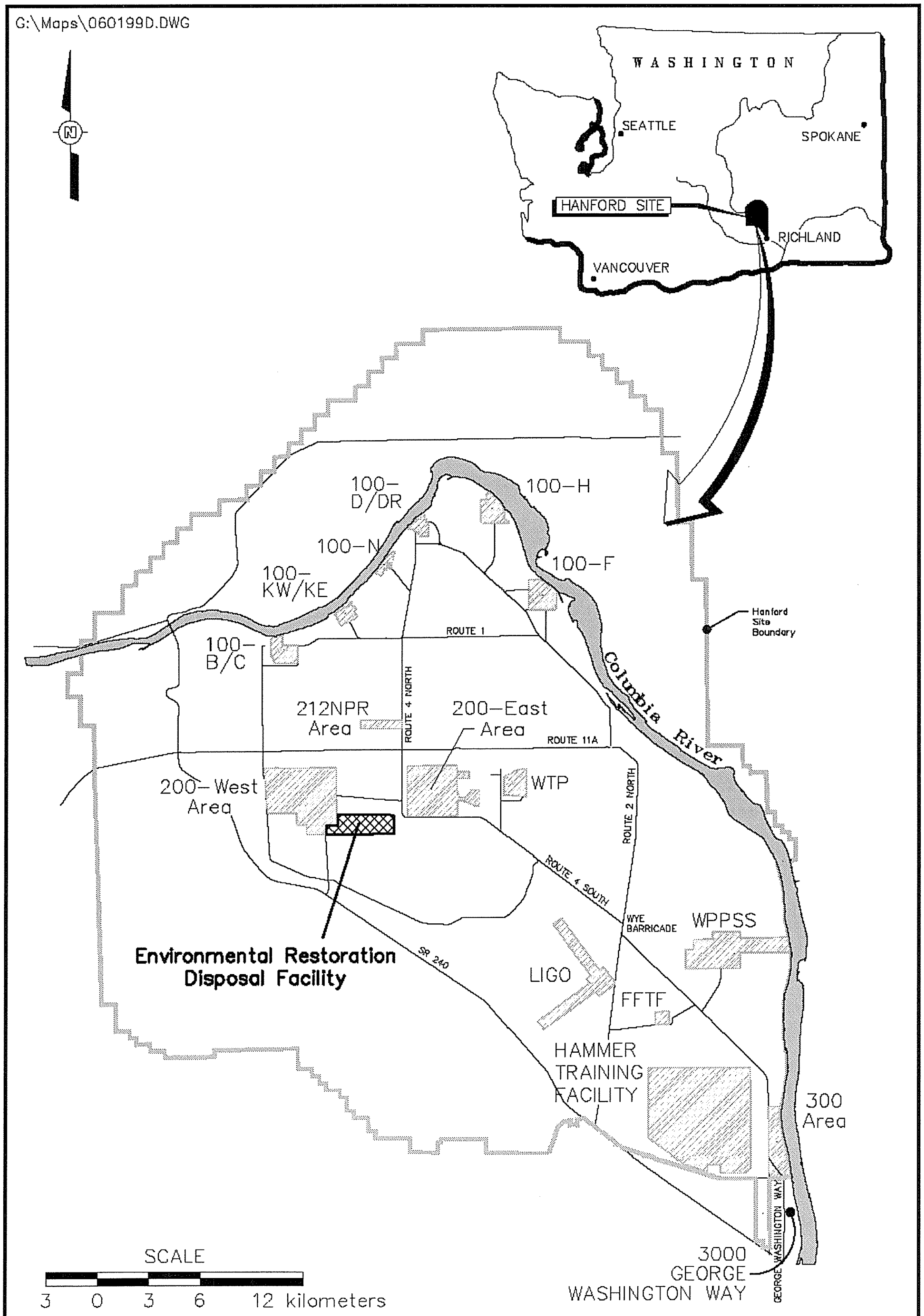
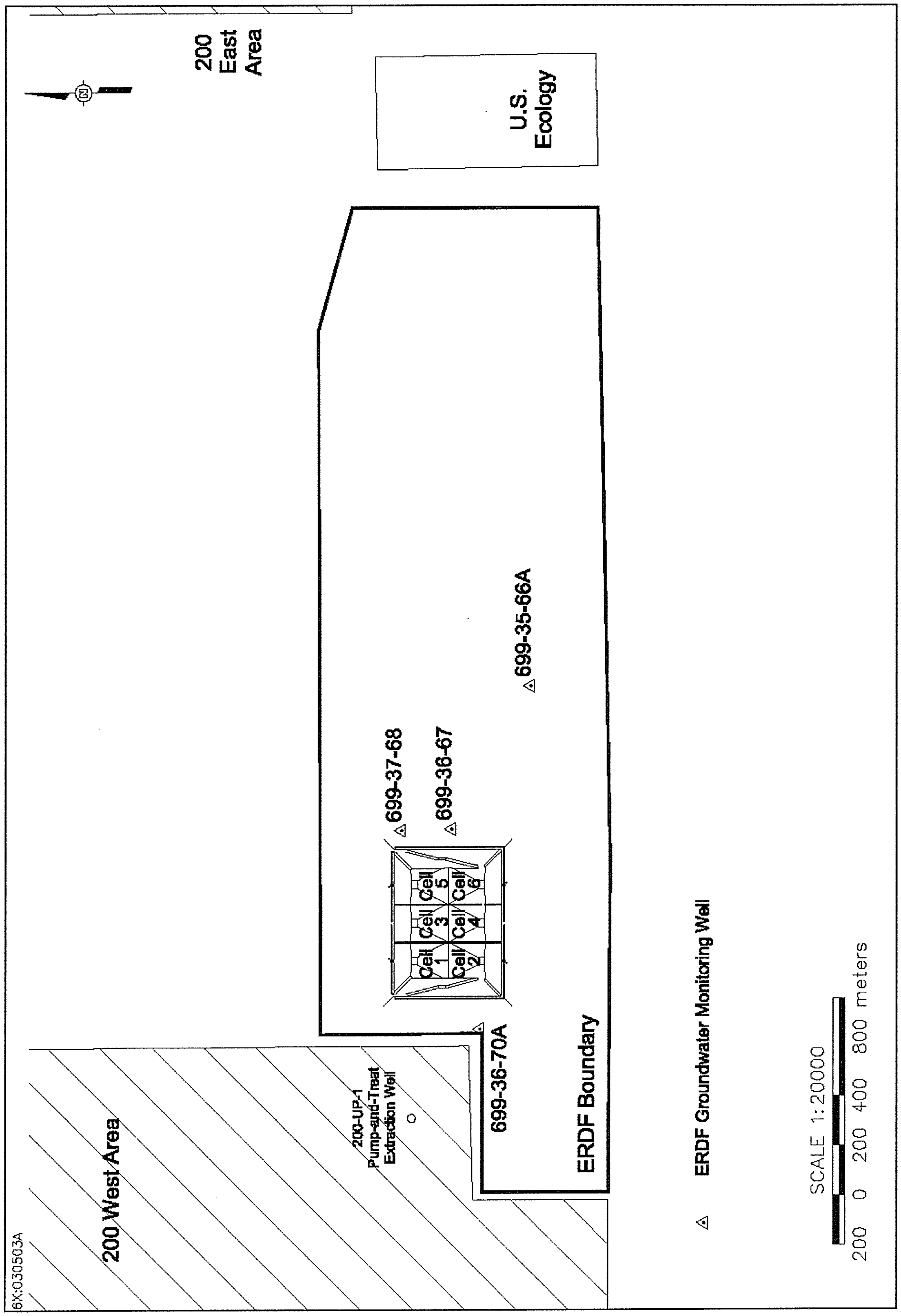


Figure 2. ERDF Monitoring Well Location Map.



3.0 GROUNDWATER AND LEACHATE MONITORING

The groundwater and leachate monitoring program is described in the ERDF GPP (BHI 1996b). This section provides an overview of these monitoring requirements.

3.1 GROUNDWATER SAMPLING

Groundwater samples are collected semiannually from four monitoring wells in the vicinity of the ERDF. This monitoring well network is scheduled for routine sampling during the first and third quarters of each year. The monitoring well network consists of one upgradient well (699-36-70A) and three downgradient wells (699-35-66A, 699-36-67, and 699-37-68). During CY 2005, groundwater sampling was completed at all of the ERDF monitoring wells in March and September. Well locations are shown in Figure 2.

Guidelines for determining COCs for routine groundwater monitoring are described in the ERDF DOW (BHI 1996a). The COCs for routine monitoring were determined based on the results of preoperational baseline sampling conducted in March 1996 and known contaminant plumes beneath the ERDF. Additional COCs may be added to the groundwater monitoring program if analytical results from leachate sampling indicate it is warranted. Table 1 lists the CY 2005 analytes for the groundwater monitoring program.

Routine groundwater sampling has been conducted since ERDF operations commenced. Sampling at the ERDF groundwater wells was not completed during March 2000 due to a Hanford Site moratorium on groundwater sampling, and well 699-37-68 was not sampled during September 2000 because of problems with a dedicated monitoring well pump (BHI 2004).

Table 1. List of Groundwater Analytes by Analytical Method (from BHI 1996a). (2 Pages)

Analyte	Method[a]	Practical Quantitation Limit	Accuracy[b] (%)	Precision[b] (%)
Arsenic	7060[d]	10 μg/L	±25	±25
Barium	6010A	20 μg/L	±25	±25
Chromium	6010A	70 μg/L	±25	±25
Lead	6010A	40 μg/L	±25	±25
Selenium	7740[d]	750 μg/L	±25	±25
Tin	6010A	30 μg/L	±25	±25
Vanadium	6010A	80 μg/L	±25	±25
Zinc	6010A	20 μg/L	±25	±25
Carbon tetrachloride	8240A/8260	5 μg/L	±25	±25
Alkalinity	310.1[c]	10,000 μg/L	±20	±25
Chloride	300/modified	10,000 μg/L	±20	±25

Table 1. List of Groundwater Analytes by Analytical Method (from BHI 1996a). (2 Pages)

Analyte	Method[a]	Practical Quantitation Limit	Accuracy[b] (%)	Precision[b] (%)
Fluoride	300/modified	100 μg/L	±20	±25
Nitrogen (in nitrite/nitrate)	353.1	0.05 μg/L	±20	±25
Sulfate	300/modified	2,000 μg/L	±20	±25
Total dissolved solids	160.1[c]	10,000 μg/L	±20	NA
Total organic halides	9020	5 μg/L	±20	NA
Carbon-14	[d]	200 pCi/L	±20	±25
Iodine-129	[d]	5 pCi/L	±20	±25
Technetium-99	[d]	15 pCi/L	±20	±25
Radium	903.1	1 pCi/L	±20	±25
Total uranium	[d]	0.1 μg/L	±20	±25
Gross alpha	900.0	3 pCi/L	±20	±25
Gross beta	900.0	4 pCi/L	±20	±25
pH	[e]	NA	NA	NA
Specific conductance	[e]	25 μS/m	±20	NA
Turbidity	180.1[c]	0.05 NTU	±0.05 NTU	NA

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[a] Method number indicated is from *Test Method for Evaluating Solid Wastes: Physical Chemical Methods* (SW-846) (EPA 1986), unless otherwise specified.
[b] Accuracy is expressed as percent recovery; precision is expressed as a percent relative difference.
[c] Method specified is from *Methods for Chemical Analysis of Water and Wastes* (Kopp and McKee 1983).
[d] Industry standard method, laboratory-specific, based on acceptance from Washington Closure Hanford.
[e] Parameter will be measured in the field.
NA = not available, or not applicable
NTU = nephelometric turbidity unit

3.1.1 General Approach to Evaluating Results

Groundwater samples collected from the ERDF monitoring well network were analyzed in accordance with the requirements of U.S. Environmental Protection Agency SW-846 (EPA 1986), industry standard, or laboratory-specific test methods as presented in Table 1. Laboratory results for these samples were entered into the Hanford Environmental Information System, a Hanford Site database that contains environmental analytical data. Groundwater monitoring data contained in the Hanford Environmental Information System were evaluated to identify the analytical results needed for inclusion in this report. The following data selection and evaluation criteria were applied:

- Quality assurance/quality control data were evaluated for the purpose of identifying potential collection or analytical problems. However, unless a problem with the data was identified during this review, the results of or a discussion regarding the quality assurance/quality control data were not included in this report.

- All data qualifiers were recorded.

- If the relative percent difference between values reported for main and duplicate samples was greater than 20%, the samples were flagged in the data spreadsheet and the data evaluated to determine their applicability.

- Data acceptance based on a less than 20% relative percent difference criterion was relaxed for analytical results reported at or near the method detection limit (e.g., typically within five times the detection limit). This allows for an expected increased analytical error when values are close to the detection limit.

- Only analytical results for metals from filtered groundwater samples were used for metals evaluation.

3.1.2 Statistical Approach to Evaluating Results

The statistical analysis of ERDF groundwater monitoring data is based on the ERDF GPP (BHI 1996b) and *Hanford Site Groundwater Monitoring Setting, Sources and Methods* (PNNL 2000). The ERDF GPP requires that background water quality be established from four consecutive groundwater sampling events using one of two methods. The background conditions can be determined using either facility-wide groundwater quality data or historical data from each well in the monitoring network. The first approach (facility-wide) results in a single background value for the site for each constituent to which subsequent groundwater quality data are compared. This is referred to as an interwell comparison (PNNL 2000).

The second approach (historical) results in background water quality data for each well to which the subsequent groundwater quality data are compared. This approach is referred to as an intrawell comparison (PNNL 2000). The interwell approach has been selected and used for the ERDF groundwater monitoring program because this method allows for the consideration of impacts from non-ERDF sources.

For each analyte of interest identified in the ERDF GPP, data from four preoperational sampling events at each of the four ERDF monitoring wells were grouped together into data sets. The average concentration, activity, or other appropriate measure for each analyte was determined, and the tolerance interval for each analyte was calculated. Two-sided tolerance intervals were developed to allow for the potential concentration decreases that may be due to the offsite migration of contaminant plumes and improvements in groundwater quality over time. Data from the subsequent semiannual monitoring events are compared to background levels and the tolerance intervals. Those constituents observed to have levels outside of the tolerance interval are evaluated to determine whether the deviation may be related to an ERDF or non-ERDF source(s).

Where analytical results report a nondetect, the detection limit value is used in this assessment. If a current measurement exceeds a tolerance interval based on the reported detection limit, it is not considered to be a confirmed exceedance and is discussed qualitatively.

3.1.3 Determination of Tolerance Intervals

The tolerance interval represents a concentration range that contains a specified proportion of the population with a specified probability (PNNL 2000). Both the upper and lower bounds of the interval (two-sided) were calculated. The parametric tolerance interval was determined using the following equation:

$$TI = \overline{x}_b + k^*S_b \text{ (two-sided)}$$

where:

k	=	normal tolerance factor, which depends on the number of background samples (n), coverage (P%), and the confidence level (Y)
x_b	=	mean of background concentrations
S_b	=	sample standard deviation
TI	=	tolerance interval.

Coverage of 95% and a confidence level of 95% were used. Application of this equation assumes that a normal (or lognormal) distribution is a reasonable approximation of the background concentrations.

3.2 LEACHATE SAMPLING

Each of the ERDF cells was constructed with a double-liner system for the purpose of collecting liquids, or leachate, that may travel through the waste materials stored at the disposal site. These liquids are typically generated from natural precipitation and the application of dust control water that percolates downward through the disposed waste materials and collects on the surface of the lining material. The primary or upper liners and the secondary or lower liners each are designed to deliver leachate to sump areas. Sumps for the upper liners are independent from the sumps associated with the lower liners. The upper and lower sumps at each of the cells are routinely evacuated, and the leachate is stored in holding tanks prior to transfer to the Effluent Treatment Facility (ETF).

The leachate is sampled to provide data for leachate delisting analyses and to assess whether additional COCs should be added to the routine ERDF groundwater monitoring program. This sampling is also utilized to verify that waste acceptance criteria for the ETF are met prior to the transfer of leachate to that facility.

A composite sample of leachate media was collected in duplicate from the sumps (cells 1 through 6) associated with the upper landfill liners. The composite samples consist of equal quantities of material taken from each of the four sumps associated with the upper liners.

Initial leachate sampling (through the end of CY 2000) was performed quarterly for an extensive list of analytes as defined by the ERDF Amended ROD (EPA 1999). This "long list" of analytes is shown in Table C-2 in Appendix C. At the end of the initial baseline sampling, the analyte list was revised (short list), and leachate sampling was reduced to a semiannual basis. The short list of analytes is identified in Table C-1 of Appendix C. Once every 2 years, sampling of the long list of analytes is performed on the leachate as identified in the ERDF Amended ROD (EPA 1999).

The ERDF project continued routine sampling and analysis of landfill leachate during CY 2005. Composite leachate samples for the short list of analytes were collected during June and December monitoring events. Data for the current year and from the two prior years of leachate sampling (i.e., CYs 2003 to 2005) are used to identify trends that may indicate if additional laboratory analysis for groundwater samples is warranted.

3.3 GROUNDWATER LEVELS

Water-level measurements were collected from each of the four monitoring wells during the semiannual groundwater sampling events to determine groundwater accessibility during future monitoring events. Water-level measurements are taken during each routine groundwater monitoring event immediately prior to purging the well for sample collection.

During the September 2005 monitoring event, the exact water level in monitoring well 699-36-67 could not be determined because the electronic tape measure (e-tape) did not appear to reach the top of the water in the well. The water level measuring device did not indicate that water had been reached and appeared to be dry when removed from the well. Based on the length of the e-tape used, the water level in this well was more than 3.5 m (11.5 ft) lower than anticipated. Sampling at this well took place as planned and the well produced a sufficient amount of water for sample collection. It is not clear if the water level in this well has dropped significantly, if the measurement was taken incorrectly, or if there is a problem associated with the monitoring well. This measurement was treated as an anomaly and was not used to evaluate water levels and future accessibility. Future water level measurements will be needed to evaluate the condition of this monitoring well.

Based on a water table map (Figure 3), groundwater in the vicinity of the ERDF generally moves from the west across the site to the east-northeast. The hydraulic gradient is about 0.001 m/m (0.011 ft/ft) (BHI 1995). The groundwater table in and near the 200 West Area has been steadily declining since discharges to the 200 West Area pond and trench systems were discontinued during the mid-1980s.

The current hydrograph for the ERDF monitoring wells presented in Figure 4 indicates an annual decline of less than 0.4 m/yr (1.31 ft/yr), which is consistent with the regional hydrologic changes reported for the area (Swanson et al. 1999, Hartman et al. 2006).

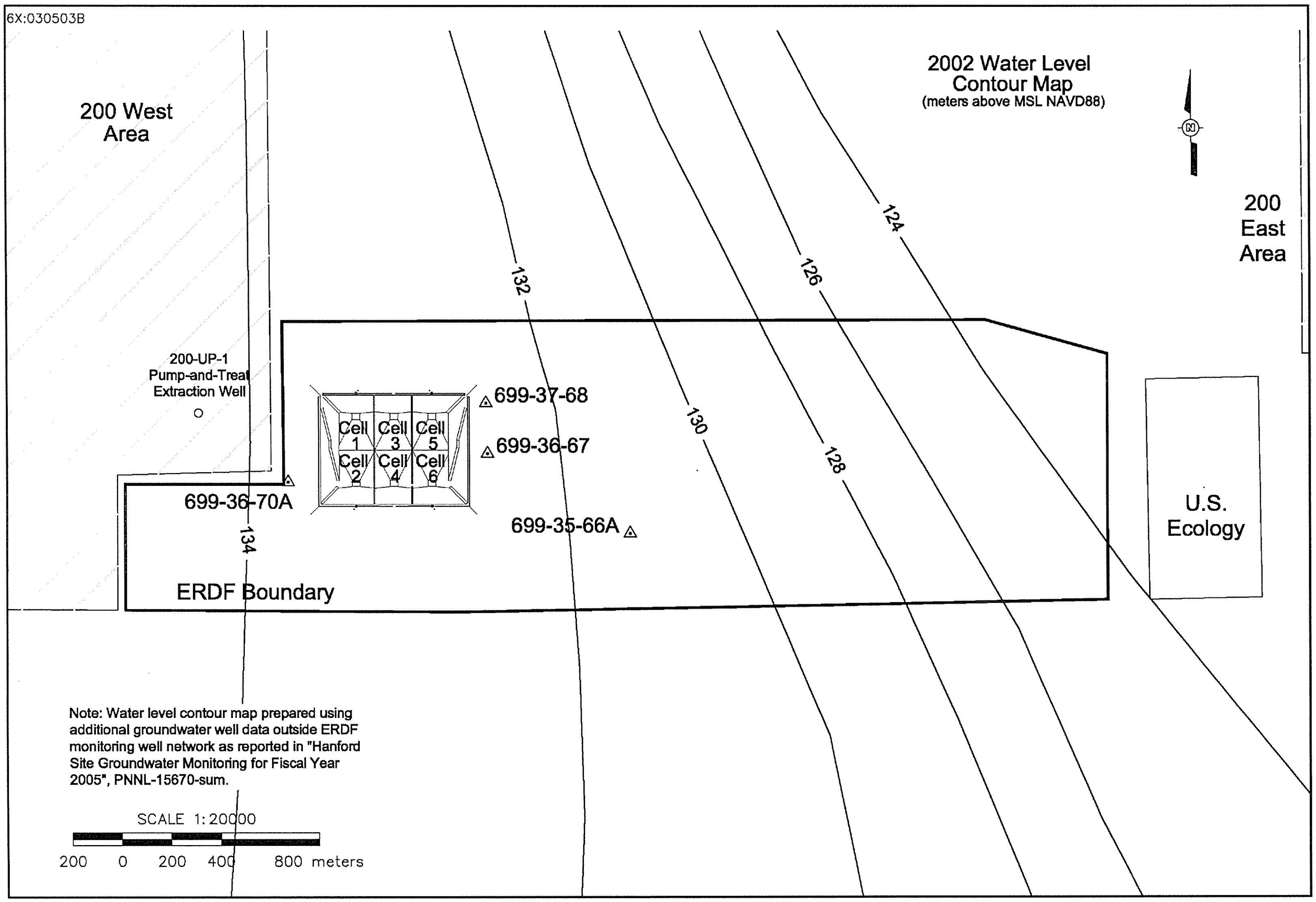
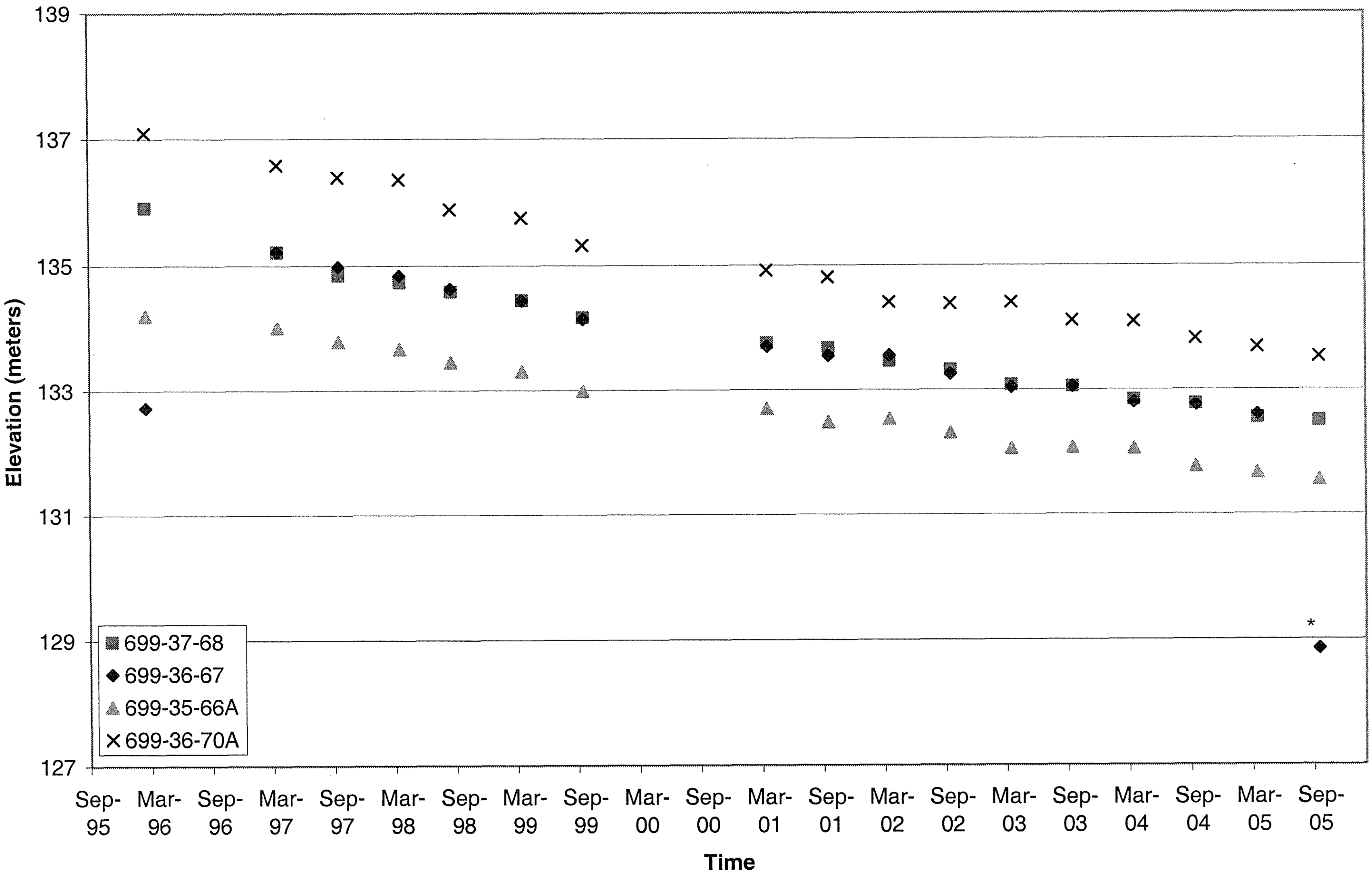


Figure 3. Water-Level Contour Map.

Figure 4. Hydrograph from ERDF Groundwater Monitoring Wells.



* Note: Accuracy of measurement is questionable. See text in Section 3.3.

4.0 ANALYTICAL RESULTS AND FIELD DATA

Analytical results for leachate and groundwater samples collected during CY 2005 are discussed in the following subsections. Also discussed are the data resulting from CY 2005 groundwater-level measurements.

4.1 SUMMARY OF GROUNDWATER ANALYSES

The groundwater results were used to measure analytical and statistical variability. The statistical basis for comparison of the groundwater analysis results is presented in Section 3.1.2 of this report. Analytical results reported for groundwater samples collected from the ERDF monitoring well network are presented in Appendix A, and analyte trend plots summarizing groundwater monitoring results are included in Appendix B.

Groundwater monitoring results and apparent trends based on CY 2005 data are summarized in Table 2. Specific exceedances for CY 2005 are summarized as follows:

- A statistically significant exceedance of the upper tolerance interval for groundwater samples collected from the ERDF monitoring well network occurred for arsenic (all wells), selenium (all wells), chloride (one well), gross beta (all wells), carbon-14 (two wells), and total organic halides (two wells). An exceedance of the lower tolerance interval for chloride (one well) occurred for a groundwater sample collected from the ERDF well network.

- Due to a sample collection error, groundwater collected from the ERDF monitoring wells was not specifically identified for the analysis of arsenic, lead, selenium, or tin during the CY 2005 monitoring events. In an attempt to obtain data for these analytes, the raw inductively coupled plasma (ICP) metals data from other metals analysis was evaluated by the laboratory. Based on this evaluation, the laboratory reported values for arsenic, lead, selenium, and tin, but in most cases the detection levels were reported at values which are higher than would have normally been requested. Given the method used to obtain data for these analytes, the data was generally not useful for evaluating concentration trends.

- The following is a description of the tolerance interval exceedances:

  - Arsenic. The upper tolerance interval for arsenic was exceeded in all four wells during the March and September 2005 monitoring events. All of the arsenic data from these wells is of little value, due to a field sampling collection error. Sample bottles and field paperwork was not prepared for the samples to be analyzed for arsenic. After sample collection was completed and laboratory data received, this error was discovered. The laboratory was requested to re-evaluate the ICP metals data for other metals analysis and attempt to determine the arsenic concentrations in the samples submitted for analysis. In doing this, the reported detection limits for arsenic were abnormally high. With one exception, arsenic was not detected in these wells, however the detection limits are above the upper tolerance interval. Therefore, the arsenic concentrations are reported here as exceedances of the upper tolerance intervals at the laboratory detection limits. The one exception to this is for the data from downgradient well 699-37-68 during the September 2005 monitoring event. The laboratory reported a concentration of 27.5 μg/L in the primary sample. A duplicate sample was also collected

Table 2. Summary of Tolerance Interval Comparisons and Trends. (3 Pages)

Analyte	Upper Tolerance Interval	Well(s) Exceeding Upper Tolerance Interval in CY 2005[a]				Comments
		70A	66A	67	68	
Arsenic	4.4 µg/L	Yes	Yes	Yes	Yes	The upper tolerance interval was exceeded at all wells during both monitoring events due to a sampling error and the subsequent laboratory reporting method. All wells have historically exhibited stable concentrations below the tolerance interval.
Barium	123.3 µg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Chromium	16.5 µg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Lead	70.4 µg/L	No	No	No	No	All wells exhibited elevated concentrations below the upper tolerance interval. The elevated lead concentrations appear to be associated with a sampling error and the subsequent laboratory reporting method. Lead concentrations in these wells have historically been stable.
Selenium	5.6 µg/L	Yes	Yes	Yes	Yes	The upper tolerance interval was exceeded at all wells during both monitoring events due to a sampling error and the subsequent laboratory reporting method. All wells have historically exhibited relatively stable concentrations below or just above the upper tolerance interval.
Tin	55.6 µg/L	N/A	No	N/A	N/A	Limited data was available for during the 2005 monitoring events due to a sampling error and the subsequent laboratory reporting method. Tin concentrations in these wells have historically been stable.
Uranium	3.4 µg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval. The lower tolerance interval was exceeded in downgradient well 67.
Vanadium	41.0 µg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Zinc	757 µg/L	No	No	No	No	Well 67 continued to exhibit stable but elevated concentrations relative to the other three wells, apparently as a continuing impact of galvanic corrosion to well components in previous years.
Alkalinity	151.8 mg/L	No	No	No	No	All wells exhibited concentrations below the tolerance interval.

Table 2. Summary of Tolerance Interval Comparisons and Trends. (3 Pages)

Analyte	Upper Tolerance Interval	Well(s) Exceeding Upper Tolerance Interval in CY 2005[a]				Comments
		70A	66A	67	68	
Chloride	25.9 mg/L	No	No	Yes	No	The chloride concentration in well 67 exceeded the upper tolerance interval during March 2005. The lower tolerance interval was exceeded in downgradient well 66A during the September 2005 monitoring event. The reason for these exceedances was not apparent. All other wells appear to be stable.
Fluoride	0.5 mg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Sulfate	37.8 mg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Gross alpha	3.3 pCi/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Gross beta	31.7 pCi/L	Yes	Yes	Yes	Yes	Gross beta concentrations appear to be stable at concentrations near to or above the upper tolerance interval and appear to be associated with a non-ERDF source(s).
Carbon-14	26.8 pCi/L	No	No	Yes	Yes	Carbon-14 was not detected in any of the wells during the 2005 monitoring events; however, the detection limits exceeded the upper tolerance interval in downgradient wells 67 and 68 during the March 2005 monitoring event.
Iodine-129	21.5 pCi/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Radium	0.5 pCi/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Technetium-99	94.9 pCi/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Carbon tetrachloride	10.6 µg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Total organic halides (TOX)	9.5 µg/L	Yes	No	No	Yes	All wells exhibited stable concentrations with upgradient well 70A exceeding the upper tolerance interval during March and September, and downgradient well 68 exceeding the upper tolerance interval during March but returning to a concentration below the upper tolerance interval during September.
Nitrogen in nitrite and nitrate	51.5 mg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.

Table 2. Summary of Tolerance Interval Comparisons and Trends. (3 Pages)

Analyte	Upper Tolerance Interval	Well(s) Exceeding Upper Tolerance Interval in CY 2005[a]				Comments
		70A	66A	67	68	
Total dissolved solids	573.6 mg/L	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Specific conductance	743 µS/m	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
pH	8.0 units	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.
Turbidity	50 NTU	No	No	No	No	All wells exhibited stable concentrations below the tolerance interval.

[a] Well identification:
70A = upgradient monitoring well 699-36-70A
66A = downgradient monitoring well 699-35-66A
67 = downgradient monitoring well 699-36-67
68 = downgradient monitoring well 699-37-68
CY = calendar year
N/A = not available

from this well at that time and arsenic was not detected in the duplicate sample. However, the detection limit for the duplicate sample was reported at 23.6 µg/L (roughly 8 times typical detection limits for these samples). Given the historical data from previous monitoring events, the result of the duplicate sample, and the method employed to obtain monitoring data for these wells, the usefulness of this data is limited and should not be considered an indication of an upward trend in arsenic concentrations.

– Selenium. The upper tolerance interval for selenium was exceeded in all four wells during the March and September 2005 monitoring events. As with the arsenic data, all of the selenium data from these wells is of little value because of a field sampling collection error. Sample bottles and field paperwork was also not prepared for the samples to be analyzed for selenium and data recovery occurred after sample collection when the error was discovered. The laboratory was requested to re-evaluate the ICP metals data for other metals analysis and attempt to determine the selenium concentrations. In doing this, the reported detection limits for selenium were abnormally high. With one exception, selenium was not detected in these wells, however the detection limits for all non-detects are above the upper tolerance interval. Therefore, the selenium concentrations are reported here as exceedances of the upper tolerance intervals at the laboratory detection limits. Given the historical data from previous monitoring events and the method employed to obtain monitoring data for these wells, the usefulness of this data is limited and should not be considered an indication of an upward trend in selenium concentrations. The exception to this is the data from downgradient well 699-35-66A during the September 2005 monitoring event. The laboratory reported selenium at a concentration slightly above the upper tolerance interval; however, the data was qualified due to the method for which it was obtained.

- Gross Beta. Gross beta concentrations exceeded the upper tolerance interval at downgradient wells 699-35-66A, 699-36-67, and 699-37-68 during the March and September 2005 monitoring events. Gross beta concentrations also exceeded the upper tolerance interval in upgradient well 699-36-70A during the March 2005 monitoring event. Gross beta concentrations have frequently exceeded the tolerance interval in both upgradient and downgradient wells, and it appears that the presence of gross beta is associated with non-ERDF sources.

- Carbon-14. Carbon-14 was reported by the laboratory to be nondetected in all of the ERDF monitoring wells during 2005; however, the detection limit for carbon-14 in downgradient well 699-36-67 and 699-37-68 exceeded the upper tolerance interval during the March 2005 monitoring event. The reported detection limit for carbon-14 at these wells returned to a level below the upper tolerance level during the September 2005 event. Because carbon-14 was not detected in wells 699-36-67 and 699-37-68, it does not appear that an upward trend of carbon-14 concentrations is indicated.

- Total Organic Halides. The concentration of total organic halides slightly exceeded the upper tolerance interval in upgradient well 699-36-70A during the March and September 2005 monitoring events. During the March 2005 monitoring event, the concentration of total organic halides exceeded the upper tolerance interval in downgradient well 699-37-68 and returned to a level below the upper tolerance interval during the September 2005 monitoring event. Total organic halide concentrations in all of the ERDF monitoring wells have been relatively stable since September 2002, and it does not appear that there is an upward trend in reported concentrations.

- Chloride. A statistically significant exceedance of the lower tolerance interval for chloride occurred at downgradient monitoring well 699-35-66A during the September 2005 monitoring event. The upper tolerance interval for chloride was exceeded in downgradient well 699-36-67 during March 2005. The chloride concentrations have generally remained fairly consistent at levels near and occasionally exceeding the upper and lower tolerance intervals since monitoring began in 1996. The reason for these exceedances is not apparent.

• Numerous contaminant plumes that originated from past activities in the 200 West Area are near or beneath the ERDF site. Plumes originating from other sources and detected in ERDF monitoring wells include nitrate, carbon tetrachloride, gross alpha, gross beta, technetium-99, iodine-129, and uranium. The apparent trends in groundwater concentrations of these constituents are as follows:

  - Nitrogen. Reported concentrations for nitrogen (nitrate plus nitrite) have remained fairly stable since monitoring of the ERDF well network was initiated in 1996.

  - Carbon Tetrachloride. Carbon tetrachloride concentrations have remained fairly consistent at levels below the upper tolerance interval within the ERDF monitoring wells.

  - Gross Alpha Activity. Gross alpha activity concentrations have been slightly variable but generally within the calculated tolerance intervals since monitoring at the ERDF well network was initiated in 1996.

- Gross Beta Activity. Activity concentrations for gross beta appear to have generally increased since monitoring of the ERDF wells was initiated in 1996.

- Technetium-99. Technetium-99 activity concentrations in the ERDF monitoring wells have remained fairly consistent and have generally been within tolerance intervals since monitoring was initiated in 1996.

- Iodine-129. Iodine-129 activity concentrations have remained fairly stable in all monitoring wells over the course of ERDF monitoring activities, and no wells have exceeded the upper tolerance interval.

- Uranium. Uranium concentrations in groundwater have generally been stable in the ERDF monitoring wells. During the September 2005 monitoring event, uranium concentrations decreased in all of the wells; however insufficient data is available to determine if this is an indication of a downward trend in the uranium concentrations.

- Downgradient well 699-36-67 continues to exhibit elevated zinc concentrations that are below the upper tolerance interval. The zinc concentrations in this well, and previously in well 699-37-68, were attributed to galvanic corrosion of the galvanized riser pipe with sampling pump equipment (BHI 2003, 2004, 2005). Monitoring well 699-36-67 has not been modified to remedy this issue, and the continued elevated zinc concentration in well 699-36-67 suggests that galvanic corrosion of the pumping equipment may be continuing.

4.2 SUMMARY OF LEACHATE ANALYSIS

Data associated with leachate sampling conducted from CY 2003 through CY 2005 are presented in Appendix C. Only analytical results that were reported as significant detects (>1 ppb) or that were reported as nondetected values but which are on the routine short list or groundwater monitoring COC lists are included in this report.

Leachate samples contained detectable concentrations of common metals, anions, and mobile radionuclides. Constituents that appear to be increasing in concentration include chromium, potassium, specific conductance, bromide, nitrate, gross alpha, and total uranium. The following is a summary of those analytes for which concentrations appear to be increasing:

- Chromium. Chromium concentrations have been slowly increasing at a stable rate over the previous three years.

- Potassium. Potassium, which is on the long list of analytes and is monitored once every two years, appears to be increasing in concentration based on data collected during CY 2004. Additional data is scheduled to be collected during CY 2006 and this apparent upward trend will be re-evaluated.

- Specific Conductance. Specific conductance appeared to remain stable until December 2004, at which time a fairly significant increase was observed. During June 2005, the specific conductance value remained high and decreased slightly during December 2005. Additional data is needed to determine if there is an increasing trend for specific conductance.

- Bromide. Bromide was not detected in leachate samples until June 2004, and the concentration of bromide generally appeared to be increasing through June 2005. Data from the December 2005 monitoring event indicates that bromide concentrations may have either leveled off or may be decreasing. Future sampling data will be necessary to determine if there is an increasing trend.

- Nitrate. Nitrate concentrations have increased at a fairly steady rate through CY 2004 but appear to have dropped back to lower concentrations during CY 2005. Additional data is needed to determine an increasing or decreasing trend in nitrate concentrations.

- Gross Alpha. Gross alpha activity concentrations have generally increased over the past three years.

- Uranium. Uranium activity concentrations appeared to be generally increasing through June 2005; however subsequent data may not support an indication of this trend. Additional monitoring data is needed to determine if this trend is continuing.

4.3 SUMMARY OF WATER-LEVEL MEASUREMENTS

Groundwater monitoring wells in the ERDF well network have exhibited a gradual rate of decline in water levels since monitoring was initiated in September 1996. Water-level measurements collected during CY 2005 from wells 699-37-68, 699-35-66A, and 699-36-70A show a rate of decline that is consistent with recent previous years. The water levels in these wells have decreased an average of 0.26 m (0.85 ft) between September 2004 and September 2005. The water level measurements from monitoring well 699-36-67 were not used to determine the average rate of decline because of apparent problems with collecting a water-level measurement from that well during the September 2005 monitoring event.

Based on the measured water levels in the four ERDF monitoring wells, it was determined that the height of the water columns in the ERDF monitoring wells are 4.41 m (14.46 ft) at well 699-35-66A, 5.36 m (17.59 ft) at well 699-36-70A, and 6.47 m (22.23 ft) at well 699-37-68. If the minimum water level determined for well 699-36-67 is accurate, less than 1.90 m (6.23 ft) of water is present at this well. Water may not be accessible from well 699-36-67 in the near future if this minimum water-level measurement is accurate. At the current average rate of decline, the other three monitoring wells would be available for use, as they are currently constructed, for approximately 15 to 22 years.

It should be noted that any future eastward expansion of the ERDF beyond cells 5 and 6 in the direction of downgradient wells 699-36-67 and 699-37-68 will likely necessitate the abandonment of these wells. If this occurs, the wells will need to be replaced.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the CY 2005 analytical results, the statistical analysis of monitoring data, an evaluation of leachate monitoring data, and a review of the water-level measurement data, the following conclusions and recommendations are presented:

- Nitrogen, carbon tetrachloride, gross alpha, gross beta, technetium-99, iodine-129, and uranium were present in samples collected from the ERDF monitoring wells and are likely due to the migration of contaminants from non-ERDF sources in the 200 West Area.

- Trends indicating increasing concentrations of chromium, potassium, bromide, nitrate, gross alpha, and uranium were noted for leachate samples collected over the past three years. Specific conductance measurements also trended upward during this period. Groundwater monitoring data for these constituents were examined to determine potential impacts to groundwater from ERDF operations. In all cases, groundwater concentrations for these constituents have remained stable, and it appears that ERDF leachate has not negatively impacted groundwater at this location. At this time, no additional analytes are recommended for the groundwater monitoring program based on this evaluation.

- No additional analysis is necessary for the routine leachate sampling given that the groundwater and leachate sampling conducted to date does not indicate potential impacts to the groundwater from ERDF operations.

- Future water level measurements from well 699-36-67 should be monitored to determine if there may be a problem with the condition of that well, or to determine if water levels may be dropping off more quickly than expected due to unanticipated conditions at that location. The remaining ERDF monitoring wells could likely provide sampling access for a minimum of 15 additional years, and it is not anticipated that well modifications will be necessary. However, it may be necessary to decommission and replace downgradient wells 699-36-67 and 699-37-68 as ERDF is expanded to the east of cells 5 and 6. The expansion of ERDF in other directions may also necessitate the addition of other monitoring well locations.

- Elevated levels of zinc in downgradient monitoring well 699-36-67 were reported during CY 2005 monitoring at ERDF. Zinc has historically been reported at elevated concentrations in this well and appears to be the result of galvanic corrosion associated with the riser pipe components of the sampling pump. This well and its associated pumping equipment should be inspected and, if a source is found, modified to minimize the effects of corrosion if long-term use of the well is anticipated.

- The current groundwater sampling frequency appears to be appropriate for future monitoring needs.

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APPENDIX A

GROUNDWATER SAMPLING RESULTS, 1996-2005

Table A-1. Arsenic Data.

Constituent (µg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Arsenic	Mar-96	3	B		1.1	B		3	B		1.7	B	1.7B	4.4	-0.1
Arsenic	Sep-96	2.6	B	2.2B	0.98	B		2.1	B		0.67	B		4.4	-0.1
Arsenic	Mar-97	2.8	B	2.7B	2	B		2.5	B		1.4	B		4.4	-0.1
Arsenic	Sep-97	3.5	B	2.8B	1.9	B		3.3	B		1.6	U		4.4	-0.1
Arsenic	Mar-98	2.1	B		1.6	B	1.1B	2.6	B		0.6	U		4.4	-0.1
Arsenic	Aug-98	2.8	B		1	U		1.2	B		1.4	B	1U	4.4	-0.1
Arsenic	Mar-99	3.3	U		3.3	U	3.3U	3.3	U		3.3	U		4.4	-0.1
Arsenic	Sep-99	3.3	U	3.3U	3.3	U		3.3	U		3.3	U		4.4	-0.1
Arsenic	Mar-00													4.4	-0.1
Arsenic	Sep-00	2.6			2.4	U		3.2		3.8				4.4	-0.1
Arsenic	Mar-01	3			2.3	U		5.2			4.5		3.2	4.4	-0.1
Arsenic	Sep-01	5.6			22.8		10U	52.1	U		52.1	U		4.4	-0.1
Arsenic	Mar-02	4.4		3U	4.6			4.3			3	U		4.4	-0.1
Arsenic	Sep-02	4.4			4.5	U	3.3	3.8			3.3	U		4.4	-0.1
Arsenic	Mar-03	3.5	U		4.4			3.5	U		3.5	U		4.4	-0.1
Arsenic	Sep-03	4.2	U	4.2U	4.2	U		4.2	U		4.2	U		4.4	-0.1
Arsenic	Mar-04	3.4	U		3.40	U		3.4	U		3.4	U	3.4U	4.4	-0.1
Arsenic	Sep-04	3.6	U		3.7		3.6U	3.6	U		3.6	U		4.4	-0.1
Arsenic	Mar-05	34	U	34U	34	U		34	U		34	U		4.4	-0.1
Arsenic	Sep-05	4.7	U		23.6	U		23.6	U		27.5		23.6U	4.4	-0.1

Note: Blank cells denote not applicable.
B = Value is greater than detection limit but less than laboratory-required reporting limit.
DUP = duplicate
Q = qualifier
U = undetected

Table A-2. Barium Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Barium	Mar-96	46	B		81.9	B		92.1	B		92	B	90.6B	123.3	27.7
Barium	Sep-96	42.9	B	42.8B	66.7	B		80.8	B		77.9	B		123.3	27.7
Barium	Mar-97	46.3	B	47B	87.6	B		93.4	B		102	B		123.3	27.7
Barium	Sep-97	42.2	B	40.9B	64.6	B		80	B	76.6	69.6	B		123.3	27.7
Barium	Mar-98	43.7			66.8		66.6	78.4		82.4	79			123.3	27.7
Barium	Aug-98	39.8	B		58.2	B		74.1	B		71.1	B	69B	123.3	27.7
Barium	Mar-99	40.5			59		58.4	76.1		72.8	73.2			123.3	27.7
Barium	Sep-99	40.3	B	40.2B	54.1	B		75.6	B		69.8	B		123.3	27.7
Barium	Mar-00													123.3	27.7
Barium	Sep-00	38.9			51.5			73.8		74.3				123.3	27.7
Barium	Mar-01	38			50			71.4			68.1		69.9	123.3	27.7
Barium	Sep-01	40.5			200	U	200U	71.2			64.9			123.3	27.7
Barium	Mar-02	38.3		38.5	56.2			66.9			68.7			123.3	27.7
Barium	Sep-02	39.8			58.1		0.31	69.4			67.9			123.3	27.7
Barium	Mar-03	37.8			49.6			70			64.3			123.3	27.7
Barium	Sep-03	39.8		41.4	58.3			71.5			65			123.3	27.7
Barium	Mar-04	38.9			56.1			56.5			66.6		66.5	123.3	27.7
Barium	Sep-04	39.9	C		56.3	C	57.2C	60.9	C		68.7	C		123.3	27.7
Barium	Mar-05	39.3		39.5	56.4			60.4			61.6			123.3	27.7
Barium	Sep-05	37.1	C		48.4			54.5			65.4		63.8	123.3	27.7

Note: Blank cells denote not applicable.
C = Analyte detected in associated laboratory batch blank.

Table A-3. Chromium Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Chromium	Mar-96	13.4			4.4	U		5.9	B		7.7	B	5.1B	16.5	-3.6
Chromium	Sep-96	12.1		11.9	4.4	U		4.4	U		4.4	U		16.5	-3.6
Chromium	Mar-97	12.2		12	2.7	U		3.9	B		4.5	B		16.5	-3.6
Chromium	Sep-97	13.4		13.3	3.3	B		3.5	U	3.6B	3.5	U		16.5	-3.6
Chromium	Mar-98	16.6			3.3	B	3.6B	6.8	B	5.4B	4.1	B		16.5	-3.6
Chromium	Aug-98	13.5			4.2	U		4.2	U		4.2	U	4.2U	16.5	-3.6
Chromium	Mar-99	13.9			2.3		2.2	6.1	B	2.2	3.1			16.5	-3.6
Chromium	Sep-99	14.8		14.8	2.5	B		4.4	B		3.1	B		16.5	-3.6
Chromium	Mar-00													16.5	-3.6
Chromium	Sep-00	16.3			1.6			4.6		4.9				16.5	-3.6
Chromium	Mar-01	14.8			2.4			4.1			4.5		3.8	16.5	-3.6
Chromium	Sep-01	21.1			10	U	10U	7.4			5.4			16.5	-3.6
Chromium	Mar-02	16.3		16.2	5.2			6			11.3			16.5	-3.6
Chromium	Sep-02	16.2			5.6		1.2	5.5			8.7			16.5	-3.6
Chromium	Mar-03	16.3			2.5			3.8			9.9			16.5	-3.6
Chromium	Sep-03	16.2	C	17.2C	3.6			4.9			12	C		16.5	-3.6
Chromium	Mar-04	16.6			4.1			4			4.4		3.8	16.5	-3.6
Chromium	Sep-04	15.6			5.5		5.3	3.8			11.6			16.5	-3.6
Chromium	Mar-05	15.9		17.1	9.7	U		9.7	U		9.7	U		16.5	-3.6
Chromium	Sep-05	14.4			3.6	UC		3.6	UC		3.6	UC	5.4C	16.5	-3.6

Note: Blank cells denote not applicable.

Table A-4. Lead Data.

Constituent (µg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Lead	Mar-96	1	UJ		1	UJ		1	UJ		1	UJ	1UJ	70.4	-28.5
Lead	Sep-96	42.1	U	42.1U	42.1	U		42.1	U		42.1	U		70.4	-28.5
Lead	Mar-97	26	U	26U	26	U		34.8	B		26	U		70.4	-28.5
Lead	Sep-97	1.1	U	1.1U	1.1	U		1.1	U		47.1	U		70.4	-28.5
Lead	Mar-98	1.1	U		1.1	U	1.1U	1.1	U		2.4	B		70.4	-28.5
Lead	Aug-98	30.2	U		30.2	U		30.2	U		30.2	U	30.2U	70.4	-28.5
Lead	Mar-99	1.8	U		1.8	U	1.8U	1.8	U		2.5			70.4	-28.5
Lead	Sep-99	2.1	U	4	49.2			6.7			2.4	B		70.4	-28.5
Lead	Mar-00													70.4	-28.5
Lead	Sep-00	2.1	U		2.1	U		2.1	U	2.1U				70.4	-28.5
Lead	Mar-01	2.6	U		2.6	U		2.6	U		2.6	U	2.6U	70.4	-28.5
Lead	Sep-01	3.7			6.8		3U	22.7	U		22.7	U		70.4	-28.5
Lead	Mar-02	2.2	U	2.8	2.2	U		2.2	U		4.2			70.4	-28.5
Lead	Sep-02	2.4	U		2.4	U	2.4U	2.4	U		2.4	U		70.4	-28.5
Lead	Mar-03	2.6	U		2.3	U		2.6	U		2.6	U		70.4	-28.5
Lead	Sep-03	1.9	U	1.9U	1.9	U		1.9	U		1.9	U		70.4	-28.5
Lead	Mar-04	2	U		2	U		2	U		2	U	2	70.4	-28.5
Lead	Sep-04	1.9	U		1.9	U	1.9U	1.9	U		1.9	U		70.4	-28.5
Lead	Mar-05	24.7	U	24.7U	24.7	U		24.7	U		24.7	U		70.4	-28.5
Lead	Sep-05	2.9	U		31.9	U		31.9	U		31.9	U	31.9U	70.4	-28.5

Note: Blank cells denote not applicable.
J = estimate

Table A-5. Selenium Data.

Constituent (µg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Selenium	Mar-96	2.1	B		2.6	B		3.5	B		3.4	B	3.6B	5.6	1.5
Selenium	Sep-96	3.1	B	3B	3.8	B		4.1	B		4.8	B		5.6	1.5
Selenium	Mar-97	2.6	BN	2.3BN	3.5	BN		3.1	BN		3.9	BN		5.6	1.5
Selenium	Sep-97	3.2	B	2.9B	3.6	B		4.8	B		4.6	B		5.6	1.5
Selenium	Mar-98	3.2	B		3.6	B	3.6B	4.4	B		4.2	B		5.6	1.5
Selenium	Aug-98	3.2	B		4.5	B		5.8			5.8		5.5	5.6	1.5
Selenium	Mar-99	5.2			3.6	U	4.5	7.6			4.2			5.6	1.5
Selenium	Sep-99	3.7	U	5.2	3.7	U		7.3			4.6	B		5.6	1.5
Selenium	Mar-00													5.6	1.5
Selenium	Sep-00	3.4			3.5			4		5.5				5.6	1.5
Selenium	Mar-01	2.6	U		3.1			3.4			2.6		2.6U	5.6	1.5
Selenium	Sep-01	5.9			5	U	19.8	62.1	U		62.1	U		5.6	1.5
Selenium	Mar-02	7.7		7.9	3.6	U		7.8			7.7			5.6	1.5
Selenium	Sep-02	4.1	U		4.1	U	4.1U	7.4			4.1	U		5.6	1.5
Selenium	Mar-03	3.6	U		5.7			4.4	U		3.8	U		5.6	1.5
Selenium	Sep-03	3.8		4.4	3.6			6.9			5.7			5.6	1.5
Selenium	Mar-04	4.2			5.6			7.4			3.4	U	3.4U	5.6	1.5
Selenium	Sep-04	3.9	U		3.9	U	3.9U	3.9	U		3.9	U		5.6	1.5
Selenium	Mar-05	48.5	U	48.5U	48.5	U		48.5	U		48.5	U		5.6	1.5
Selenium	Sep-05	6.2	C		44	U		44	U		44	U	44.0U	5.6	1.5

Note: Blank cells denote not applicable.
N = Spiked sample recovery not within control limits.

Table A-6. Tin Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Tin	Mar-96	35.3	U		35.3	U		35.3	U		40.1	B	35.3U	55.6	-2.1
Tin	Sep-96	33.5	U	33.5U	33.5	U		33.5	U		33.5	U		55.6	-2.1
Tin	Mar-97	24.7	U	24.7U	24.7	U		29	B		24.7	U		55.6	-2.1
Tin	Sep-97	5.6	U	5.6U	5.6	U		5.6	U		33.2	U		55.6	-2.1
Tin	Mar-98	4.9	U		4.9	U	4.9U	4.9	U		4.9	U		55.6	-2.1
Tin	Aug-98	28	U		28	U		28	U		28	U	28U	55.6	-2.1
Tin	Mar-99	2.7	U		2.7	U	2.7U	2.7	U		2.7	U		55.6	-2.1
Tin	Sep-99	2.1	U	2.1U	2.1	U		2.1	U		2.1	U		55.6	-2.1
Tin	Mar-00													55.6	-2.1
Tin	Sep-00													55.6	-2.1
Tin	Mar-01	3.5	U		3.5	U		3.5	U		3.5	U	3.5U	55.6	-2.1
Tin	Sep-01	2.4	U		100	U	100U	13.9	U		13.9	U		55.6	-2.1
Tin	Mar-02	3.3	U	3.3U	3.3	U		3.3	U		3.3	U		55.6	-2.1
Tin	Sep-02	4.7	U		4.7	U	4.7U	4.7	U		4.7	U		55.6	-2.1
Tin	Mar-03	3.6	U		5.8	U		3.6	U		3.6	U		55.6	-2.1
Tin	Sep-03	5.6	U	5.6U	5.6	U		5.6	U		5.6	U		55.6	-2.1
Tin	Mar-04	3.6	U		3.6	U		3.6	U		3.6	U	3.6U	55.6	-2.1
Tin	Sep-04	4	U		4	U	4U	4	U		4	U		55.6	-2.1
Tin	Mar-05													55.6	-2.1
Tin	Sep-05	5.1	U											55.6	-2.1

Note: Blank cells denote not applicable.

Table A-7. Uranium Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Uranium	Sep-95							2.98	U					3.4	1.9
Uranium	Mar-96	2.64			2.24			2.94			2.74		2.77	3.4	1.9
Uranium	Sep-96	2.4			2.26			2.42			2.21			3.4	1.9
Uranium	Mar-97	2.7			2.69			3.16			2.87			3.4	1.9
Uranium	Sep-97	2.76		2.55	2.43			3.01			2.38			3.4	1.9
Uranium	Mar-98	2.33			2.49		2.44	2.99			2.32			3.4	1.9
Uranium	Aug-98	2.59			2.48			3.34			2.34		2.36	3.4	1.9
Uranium	Mar-99	2.6			2.8		3	3.4			2.7			3.4	1.9
Uranium	Sep-99	2.65		2.53	2.63			3.41			2.58			3.4	1.9
Uranium	Mar-00													3.4	1.9
Uranium	Sep-00	3.27			3.19			3.17		3.62				3.4	1.9
Uranium	Mar-01	2.31			2.36			3.12			2.83		2.79	3.4	1.9
Uranium	Sep-01	2.42			2.25		2.28	3.06			2.65			3.4	1.9
Uranium	Mar-02	2.44		2.52	2.46			3.22			2.84			3.4	1.9
Uranium	Sep-02	2.25			2.27		2.14	2.99			2.58			3.4	1.9
Uranium	Mar-03	2.33			4.22			3.27			2.79			3.4	1.9
Uranium	Sep-03	2.19		2.22	2.49			2.97			2.58			3.4	1.9
Uranium	Mar-04	2.24			2.12			2.94			2.8		3.07	3.4	1.9
Uranium	Sep-04	2.35	B		2.15	B	2.38B	2.95	B		2.59	B		3.4	1.9
Uranium	Mar-05	2.26		2.3	2.14			2.86			2.85			3.4	1.9
Uranium	Sep-05	2			1.63			2.34			2.09		2.2	3.4	1.9

Note: Blank cells denote not applicable.

Table A-8. Vanadium Data.

Constituent (µg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Vanadium	Mar-96	26.8	J		12.6	J		23.6	J		14.4	J	15.1J	41	9.9
Vanadium	Sep-96	33.4	B	34.1B	25.1	B		32.9	B		24.3	B		41	9.9
Vanadium	Mar-97	33.2	B	30.3B	26	B		28.9	B		25.3	B		41	9.9
Vanadium	Sep-97	27.8	B	27.2B	18.8	B		25.7	B	28.8	24.9	B		41	9.9
Vanadium	Mar-98	29			18.6		18.3	26.8		28.4	23			41	9.9
Vanadium	Aug-98	39.5	B		30.1	B		39.5	B		36	B	33.9B	41	9.9
Vanadium	Mar-99	28.3			13.9		15	25.2		30	23.6			41	9.9
Vanadium	Sep-99	28.7	B	28.6B	17.5	B		26.4	B		23.5	B		41	9.9
Vanadium	Mar-00													41	9.9
Vanadium	Sep-00	27.5			15.5			27.2		27.3				41	9.9
Vanadium	Mar-01	27.1			16.5			25.8			25		25.3	41	9.9
Vanadium	Sep-01	28.5			50	U	50U	26.2			22.8			41	9.9
Vanadium	Mar-02	26.6		27.4	23.4			25.6			23.4			41	9.9
Vanadium	Sep-02	28.6			26.7		1.1	28.8			24.3			41	9.9
Vanadium	Mar-03	28.5			22.1			26.8			23.8			41	9.9
Vanadium	Sep-03	25.9		26.9	24.4			26.2			16.2			41	9.9
Vanadium	Mar-04	26.8			24.9			24.6			24.2		24.7	41	9.9
Vanadium	Sep-04	27	C		25.4	C	25.2	26.1			24.8	C		41	9.9
Vanadium	Mar-05	25.8		27.4	25.1			25.9			23.3			41	9.9
Vanadium	Sep-05	25.4			21.5			24.9			27.4		23.4	41	9.9

Note: Blank cells denote not applicable.

Table A-9. Zinc Data.

Constituent (µg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Zinc	Mar-96	13.7	U		146			8.5	U		368		155	757	-354.3
Zinc	Sep-96	15.4	B	10.3B	260			23.1			665			757	-354.3
Zinc	Mar-97	26.5		26.7	382			55.4			507			757	-354.3
Zinc	Sep-97	8.1	B	5.7	339			10.3		5.1U	394			757	-354.3
Zinc	Mar-98	5.8	B		318		321	6.1	B	2.2U	386			757	-354.3
Zinc	Aug-98	10.3	B		241			4.7	B		663		629	757	-354.3
Zinc	Mar-99	2.6			164		144	10.6		0.8U	347			757	-354.3
Zinc	Sep-99	2.9	B	3.5B	215			0.8	U		350			757	-354.3
Zinc	Mar-00													757	-354.3
Zinc	Sep-00	7.4			357			2.8		4.2				757	-354.3
Zinc	Mar-01	4.4			262			0.94			17.4		17.5	757	-354.3
Zinc	Sep-01	5.8			310		325	17.1			24.6			757	-354.3
Zinc	Mar-02	3.1		2.6	280			0.4	U		33.4			757	-354.3
Zinc	Sep-02	7.1			329		0.54	2.3			33.6			757	-354.3
Zinc	Mar-03	13.4	C		180			15	C		34.4	C		757	-354.3
Zinc	Sep-03	23.7	C	2.6C	296			3.1			8.9	C		757	-354.3
Zinc	Mar-04	7.8	C		317	C		5.1	C		12.9	C	9.9C	757	-354.3
Zinc	Sep-04	6.9			288		286C	7.3	C		12.8			757	-354.3
Zinc	Mar-05	29.6	C	5.6C	316	C		3.8	C		15.4	C		757	-354.3
Zinc	Sep-05	14.5	C		266	C		8.5	C		9.1	C	8.6C	757	-354.3

Note: Blank cells denote not applicable.

Table A-10. Alkalinity Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Alkalinity	Mar-96	138			121			113			124		125	151.8	101.2
Alkalinity	Sep-96	143			125			117			129			151.8	101.2
Alkalinity	Mar-97	147			129			113			121			151.8	101.2
Alkalinity	Sep-97	138		142	125			119			125			151.8	101.2
Alkalinity	Mar-98	140			122		123	120			127			151.8	101.2
Alkalinity	Aug-98	143			124			124			131		131	151.8	101.2
Alkalinity	Mar-99	143			124		124	123			129			151.8	101.2
Alkalinity	Sep-99	140		139	123			122			130			151.8	101.2
Alkalinity	Mar-00													151.8	101.2
Alkalinity	Sep-00	160			137			119		123				151.8	101.2
Alkalinity	Mar-01	137			145			120			152		144	151.8	101.2
Alkalinity	Sep-01	132			126		128	124			130			151.8	101.2
Alkalinity	Mar-02	138		135	124			126			132			151.8	101.2
Alkalinity	Sep-02	135			130		128	131			146			151.8	101.2
Alkalinity	Mar-03	128			120			111			113			151.8	101.2
Alkalinity	Sep-03	130		129	128			114			123			151.8	101.2
Alkalinity	Mar-04	147			132			140			136		141	151.8	101.2
Alkalinity	Sep-04	137			121		130	126			121			151.8	101.2
Alkalinity	Mar-05	142		138	128			128			130			151.8	101.2
Alkalinity	Sep-05	138			132			126			126		130	151.8	101.2

Note: Blank cells denote not applicable.

Table A-11. Chloride Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Chloride	Mar-96	21.1			24.2			24.2			20.2		20.6	25.9	17.1
Chloride	Sep-96	19			22.9			21.7			20.1			25.9	17.1
Chloride	Mar-97	19.2			23.7						20.08			25.9	17.1
Chloride	Sep-97	20.5		19.9	22.9			22.4			21			25.9	17.1
Chloride	Mar-98	16.1	CD		21.4	D	21.4D	20.9	CD		19.6	CD		25.9	17.1
Chloride	Aug-98	18.3			23.7			21.4			20.7		21	25.9	17.1
Chloride	Mar-99	19.5			24.9		24.4	20.2	CD	23.3	21.7			25.9	17.1
Chloride	Sep-99	18.9		19.9	26.3			23.2			28.1			25.9	17.1
Chloride	Mar-00													25.9	17.1
Chloride	Sep-00	18.4			25.7			21.4		22.4				25.9	17.1
Chloride	Mar-01	18.6			25.7			17.2			22.3		27.6	25.9	17.1
Chloride	Sep-01	19			23.4		24.4	20.5			23.3			25.9	17.1
Chloride	Mar-02	16.6		16.8	22.6			19.3			25.2			25.9	17.1
Chloride	Sep-02	18			25.6		24.5	20.7			26.6			25.9	17.1
Chloride	Mar-03	18.3			22.5			22.8			28.2			25.9	17.1
Chloride	Sep-03	15.7	D	15.6D	22.6	D		23	D		23.8	D		25.9	17.1
Chloride	Mar-04	15	D		21.9	D		16.5	D		23.8	D	24.3D	25.9	17.1
Chloride	Sep-04	15.7			22.3		23.1	17.4			24.1			25.9	17.1
Chloride	Mar-05	20.7		20.1	27.7			22.5			19			25.9	17.1
Chloride	Sep-05	13.4	D		23	D		17.1	D		24.8	D	24.5D	25.9	17.1

Note: Blank cells denote not applicable.
D = Analysis was run at a secondary dilution.

Table A-12. Fluoride Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Fluoride	Mar-96	0.34			0.4			0.42			0.36		0.36	0.5	0.2
Fluoride	Sep-96	0.34			0.37			0.41			0.33			0.5	0.2
Fluoride	Mar-97	0.34			0.36						0.3			0.5	0.2
Fluoride	Sep-97	0.39		0.334	0.348			0.415			0.331			0.5	0.2
Fluoride	Mar-98	0.304			0.363		0.364	0.371			0.33			0.5	0.2
Fluoride	Aug-98	0.342			0.355			0.362			0.343		0.34	0.5	0.2
Fluoride	Mar-99	0.5	U		0.5	U	0.5U	0.335		0.5U	0.5	U		0.5	0.2
Fluoride	Sep-99	0.5	U	0.5U	0.5	U		0.5	U		0.5	U		0.5	0.2
Fluoride	Mar-00													0.5	0.2
Fluoride	Sep-00	0.5	U		0.5	U		0.5	U	0.5U				0.5	0.2
Fluoride	Mar-01	0.5	U		2.5	U		0.5	U		2.5	U	2.5U	0.5	0.2
Fluoride	Sep-01	1	U		1	U	1U	0.5	U		0.5	U		0.5	0.2
Fluoride	Mar-02	0.25	U	0.25U	0.26			0.28			0.25	U		0.5	0.2
Fluoride	Sep-02	0.25	U		0.25	U	0.25U	0.25	U		0.357			0.5	0.2
Fluoride	Mar-03	0.25	U		0.34			0.3			0.34			0.5	0.2
Fluoride	Sep-03	0.3		0.31	0.28			0.3			0.25	U		0.5	0.2
Fluoride	Mar-04	0.3			0.32			0.37			0.286		0.327	0.5	0.2
Fluoride	Sep-04	0.28			0.34		0.29	0.3			0.26			0.5	0.2
Fluoride	Mar-05	0.25		.25U	0.27			0.28			0.29			0.5	0.2
Fluoride	Sep-05	0.268			0.316			0.343			0.289		0.284	0.5	0.2

Note: Blank cells denote not applicable.

Table A-13. Sulfate Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Sulfate	Mar-96	24.2			29.9			30.7			28.9		28.7	37.8	22.3
Sulfate	Sep-96	25.2			32.2			33.2			30.3			37.8	22.3
Sulfate	Mar-97	27			31.5						30.5			37.8	22.3
Sulfate	Sep-97	26.6		26.1	32.6			34.9			31.4			37.8	22.3
Sulfate	Mar-98	22.7	D		31.6	D	31.4D	34.8	D		31.2	D		37.8	22.3
Sulfate	Aug-98	26			30.7			35.4			31.8		31.5	37.8	22.3
Sulfate	Mar-99	26.8			32.4		32	37.3		35.2D	30.8			37.8	22.3
Sulfate	Sep-99	25.9		25.8	32.5			34.6			31.3			37.8	22.3
Sulfate	Mar-00													37.8	22.3
Sulfate	Sep-00	30.5			31.7			37.6		35.9				37.8	22.3
Sulfate	Mar-01	26.9			36			31.6			37.8		39.5	37.8	22.3
Sulfate	Sep-01	27.8			30.3		30.8	34.5			31			37.8	22.3
Sulfate	Mar-02	25.6		25.6	29.2			33.8			30.5			37.8	22.3
Sulfate	Sep-02	26.2			30.2		29.2	32.7			31.1			37.8	22.3
Sulfate	Mar-03	26			30			34.7			31			37.8	22.3
Sulfate	Sep-03	26.6	D	26.7D	31.3	D		34.3	D		31.5	D		37.8	22.3
Sulfate	Mar-04	26.7	D		31	D		32.2	D		31.5	D	32.4D	37.8	22.3
Sulfate	Sep-04	29.2			33.7		36	37.4			34.5			37.8	22.3
Sulfate	Mar-05	27.7		27.3	32.7			33			24			37.8	22.3
Sulfate	Sep-05	24	D		32.8	D		32.3	D		31.5	D	31.1D	37.8	22.3

Note: Blank cells denote not applicable.

Table A-14. Gross Alpha Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Gross alpha	Mar-96	1.45	J		2.12	J		2.28	J		2.43	J	1.73J	3.3	-0.6
Gross alpha	Sep-96	1.69	J		0.109	U		1.57	J		1.15	U		3.3	-0.6
Gross alpha	Mar-97	1.69	J	0.199U	1.31	U		1.26	J		0.837	U		3.3	-0.6
Gross alpha	Sep-97	0.39	U	1.66J	0.791	U		1.2	J		2.5	J		3.3	-0.6
Gross alpha	Mar-98	1.32	J		0.659	U	1.4J	2.17	J		0.683	U		3.3	-0.6
Gross alpha	Aug-98	0.431	U		2.3	J		2.89	J		2.45	J	3.37	3.3	-0.6
Gross alpha	Mar-99	2.7	J		3		1.3U	1.68	U	1.3U	1.5	U		3.3	-0.6
Gross alpha	Sep-99	2.64	J	0.565U	0.535	U		1.31	U	0.928U	1.55	U		3.3	-0.6
Gross alpha	Mar-00													3.3	-0.6
Gross alpha	Sep-00	0.34	U		0.5	U		0.266	U	1.28U				3.3	-0.6
Gross alpha	Mar-01	0.303	U		1.01	U		2.33	J		0.812	U	1.43U	3.3	-0.6
Gross alpha	Sep-01	-0.386	U		0.976	U	0.751U	1.12	U		0.374	U		3.3	-0.6
Gross alpha	Mar-02	0.884	U	0.227U	0.522	U		0.363	U		0.016	U		3.3	-0.6
Gross alpha	Sep-02	0.348	U		0.38	U	0.91U	0.289	U		-0.377	U		3.3	-0.6
Gross alpha	Mar-03	0.748	U		6.01			0.865	U		1.68			3.3	-0.6
Gross alpha	Sep-03	1.44		0.882U	1.11	U		1.16	U		1.64			3.3	-0.6
Gross alpha	Mar-04	2.26			1.73	U		1.83	U		1.52		2.13	3.3	-0.6
Gross alpha	Sep-04	1.21			-0.435	U	-0.173U	0.487	U		0.531	U		3.3	-0.6
Gross alpha	Mar-05	1.53		0.817U	1.33			0.913	U		1.68			3.3	-0.6
Gross alpha	Sep-05	0.862	U		1.06	U		0.646	U		1.16	U	1.78	3.3	-0.6

Note: Blank cells denote not applicable.

Table A-15. Gross Beta Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Gross beta	Mar-96	10.9			22.4			20.4			16		15.5	31.7	4.8
Gross beta	Sep-96	13.2			26.9			25.7			17.6			31.7	4.8
Gross beta	Mar-97	11.2		10.5	21.6			23.2			13.5			31.7	4.8
Gross beta	Sep-97	10.2		12.7	20.7			21			15.9			31.7	4.8
Gross beta	Mar-98	10.5			26.4		25.4	20.2			14.5			31.7	4.8
Gross beta	Aug-98	17.1			27.4			25.1			19.1		13.4	31.7	4.8
Gross beta	Mar-99	25			17		67	25.1		56	27			31.7	4.8
Gross beta	Sep-99	25.1		25.8	57.2			38		50.2	27.1			31.7	4.8
Gross beta	Mar-00													31.7	4.8
Gross beta	Sep-00	27.6			49.2			49.9		47.4				31.7	4.8
Gross beta	Mar-01	26.2			59.4			47.8			31.9		35.5	31.7	4.8
Gross beta	Sep-01	29.8			41.2		39.6	41.2			29.8			31.7	4.8
Gross beta	Mar-02	28		28.5	39.1			42.7			30.8			31.7	4.8
Gross beta	Sep-02	23.3			28.3		26.3	28.7			21.4			31.7	4.8
Gross beta	Mar-03	38.8			47			44.3			36.8			31.7	4.8
Gross beta	Sep-03	38.1		38.1	35.6			44			41.5			31.7	4.8
Gross beta	Mar-04	25.8			28.1			29.8			36.2		41.3	31.7	4.8
Gross beta	Sep-04	39.1			34.1		34.3	33.8			38.3			31.7	4.8
Gross beta	Mar-05	41.4		38.4	32.9			33.2			36.9			31.7	4.8
Gross beta	Sep-05	44.6			35.8			27.8			41.6		41.2	31.7	4.8

Note: Blank cells denote not applicable.

Table A-16. Carbon-14 Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Carbon-14	Mar-96	22.3	J		6.76	J		4.26	J		4.72	J	2.48U	26.8	-10.5
Carbon-14	Sep-96													26.8	-10.5
Carbon-14	Mar-97	21.6	J	22.2J	11.1	J		3.94	U		3.81	U		26.8	-10.5
Carbon-14	Sep-97	16.7	J	10.7J	3.27	U		1.6	U		5.43	U		26.8	-10.5
Carbon-14	Mar-98	19.4	J		4.5	U	7.16U	3.69	U		-1.49	U		26.8	-10.5
Carbon-14	Aug-98	18.5	J		8.63	J		2.07	U		6.46	U	6.4U	26.8	-10.5
Carbon-14	Mar-99	25	U		9.9	U	12U	-6.1	U		-6.5	U		26.8	-10.5
Carbon-14	Sep-99	14.1	U	7.43U	-2.74	U		-9.54	U		-5.94	U		26.8	-10.5
Carbon-14	Mar-00													26.8	-10.5
Carbon-14	Sep-00	35.2	U		13.7	U		3.75	U	4.81U				26.8	-10.5
Carbon-14	Mar-01	9.56	U		43.4	U		-28.1	U		47.2	U	57J	26.8	-10.5
Carbon-14	Sep-01	32.5	U		6.73	U	22.5U	-15.1	U		-1.16	U		26.8	-10.5
Carbon-14	Mar-02	14	U	21.4U	11.6	U		21.7	U		13.2	U		26.8	-10.5
Carbon-14	Sep-02	5.02	U		17	U	32.6U	-1.55	U		8.45	U		26.8	-10.5
Carbon-14	Mar-03	-6.69	U		-0.225	U		25.2	U		1.78	U		26.8	-10.5
Carbon-14	Sep-03	0.446	U	3.32U	5.74	U		-10.3	U		-4.5	U		26.8	-10.5
Carbon-14	Mar-04	33.9	U		16.4	U		10.2	U		9.75	U	-12.4U	26.8	-10.5
Carbon-14	Sep-04	8.8	U		0	U	6.99U	1.22	U		2.45	U		26.8	-10.5
Carbon-14	Mar-05	11.8	U	42.2U	38.6	U		17.8	U		28.9	U		26.8	-10.5
Carbon-14	Sep-05	19.9	U		8.17	U		-2.4	U		-2.37	U	-10.7U	26.8	-10.5

Note: Blank cells denote not applicable.

Table A-17. Iodine-129 Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Iodine-129	Mar-96	9.4			9.42			18.7			6.01		3.69U	21.5	-2.4
Iodine-129	Sep-96	7.54			11.9			13.7			2.22	U		21.5	-2.4
Iodine-129	Mar-97	10.1		11	7.81			11.8			2.82	J		21.5	-2.4
Iodine-129	Sep-97	9.52		11.3	9.73			16.2			3.03	J		21.5	-2.4
Iodine-129	Mar-98	8.07		4.54U	13.2		9.83U	15.2		15.2	1.62	U	1.62U	21.5	-2.4
Iodine-129	Aug-98	9.6			12.2			15.2			2.57		2.78	21.5	-2.4
Iodine-129	Mar-99	6.1			7.9		1.2U	14.4		3.8U	2.9	U		21.5	-2.4
Iodine-129	Sep-99	5.68		6.96	9.24			6.54	U		1.87	U		21.5	-2.4
Iodine-129	Mar-00													21.5	-2.4
Iodine-129	Sep-00	0.307	U		11			13.9		13.1				21.5	-2.4
Iodine-129	Mar-01	4.63	U		13.8			16.7			6.72		2.74U	21.5	-2.4
Iodine-129	Sep-01	3.1	U		12.3		-5.52U	13.8			4.59	J		21.5	-2.4
Iodine-129	Mar-02	4.09		3.79	9.71		10.7	13.9			2.2		2.16U	21.5	-2.4
Iodine-129	Sep-02	4.66	J		8.34		12	14.3			2.3	U		21.5	-2.4
Iodine-129	Mar-03	4.97			12.1			14.2			3.43			21.5	-2.4
Iodine-129	Sep-03	2.91	U	-9.28U	7.88	U		13.4			-1.82	U		21.5	-2.4
Iodine-129	Mar-04	4.86			11.8			11			2.44	U	1.64U	21.5	-2.4
Iodine-129	Sep-04	4.99			13.6		13.3	6.53			2.52	U		21.5	-2.4
Iodine-129	Mar-05	5.25	U	3.66U	15.5			10.6			-1.61	U		21.5	-2.4
Iodine-129	Sep-05	5.30			14.6			12.5			2.42	U	2.45U	21.5	-2.4

Note: Blank cells denote not applicable.

Table A-18. Technetium-99 Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Technetium-99	Mar-96	25.5			65			64.2			31		32	94.9	-6.3
Technetium-99	Sep-96	20.3			53.5			52.3			32.1			94.9	-6.3
Technetium-99	Mar-97	20		21.6	77.5			59.9			30			94.9	-6.3
Technetium-99	Sep-97	18.9		17.3	66.8			57			34.8			94.9	-6.3
Technetium-99	Mar-98	23.2			68.6		75.4	78.2			23.5			94.9	-6.3
Technetium-99	Aug-98	29.4			74.9			77.4			36.5		16.5	94.9	-6.3
Technetium-99	Mar-99	0	U		86		83	70.5	U	0U	36			94.9	-6.3
Technetium-99	Sep-99	40.4		34.3	85.2			90.1			44.6			94.9	-6.3
Technetium-99	Mar-00													94.9	-6.3
Technetium-99	Sep-00	35.6			80.1			85.6		76.5				94.9	-6.3
Technetium-99	Mar-01	45.5			75.9			92			40.2		42.3	94.9	-6.3
Technetium-99	Sep-01	47.6			56.5		63.7	72.3			46.9			94.9	-6.3
Technetium-99	Mar-02	51.4		61.3	71.8			76.1			46.3			94.9	-6.3
Technetium-99	Sep-02	52.8			59.7		51.6	67.1			58.8			94.9	-6.3
Technetium-99	Mar-03	61.3			62.1			66.3			56.5			94.9	-6.3
Technetium-99	Sep-03	57.7		59.5	54.5			58.3			58.7			94.9	-6.3
Technetium-99	Mar-04	59.4			54.7			56.4			66.7		68.1	94.9	-6.3
Technetium-99	Sep-04	67.2			60.6		63.5	56.5			66.3			94.9	-6.3
Technetium-99	Mar-05	68.6		78.4	66.2			57.2			65.5			94.9	-6.3
Technetium-99	Sep-05	73.1			57			50.9			71.8		73	94.9	-6.3

Note: Blank cells denote not applicable.

Table A-19. Radium Data.

Constituent (pCi/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Radium	Mar-96	0.141	U		0.207	U		0.521	J		0.276	U	0.235J	0.5	-0.2
Radium	Sep-96	0.0497	U		0.131	J		0.0482	U		0.0248	U		0.5	-0.2
Radium	Mar-97	0.0235	U		0.065	J		0.0577	U		0.07	J		0.5	-0.2
Radium	Sep-97	0.0723	U	0.0358U	0.0353	U		0.123	U		0.0748	U		0.5	-0.2
Radium	Mar-98	0.078	U		0.21	J	0.103U	0.148	U		0.114	U		0.5	-0.2
Radium	Aug-98	0.0391	U		0.0864	U		0.14	U		0.135	U		0.5	-0.2
Radium	Mar-99	0.001	U		0.088	U		0.087			0.017	U		0.5	-0.2
Radium	Sep-99	0.025	U	.008U	0.083	U	0U	0.195	U		-0.068	U		0.5	-0.2
Radium	Mar-00													0.5	-0.2
Radium	Sep-00	0.827	U		1.99	J		-0.261	U	0.182U				0.5	-0.2
Radium	Mar-01	0.144	U		0.431	U		-0.037	U		0.033	U	0.931 U	0.5	-0.2
Radium	Sep-01	-0.387	U		-0.537	U	0.506U	0.675	U		0.18	U		0.5	-0.2
Radium	Mar-02	0.94	J	0.599U	0.063	U		0.383	U		0.258	U		0.5	-0.2
Radium	Sep-02	-0.147	U		0.332	U	-0.143U	0.147	U		-0.271	U		0.5	-0.2
Radium	Mar-03	0.345	U		0.474	U		-0.392	U		0.637	U		0.5	-0.2
Radium	Sep-03	-0.63	U	-.009U	0.92	U		0.039	U		0.039	U		0.5	-0.2
Radium	Mar-04	0.232	U		0.611	U		0.57	U		0.265	U	0.411 U	0.5	-0.2
Radium	Sep-04	-0.022	U		-0.05	U	-0.128U	-0.083	U		-0.051	U		0.5	-0.2
Radium	Mar-05	0.144	U	-.045U	0.089	U		0.037	U		-0.058	U		0.5	-0.2
Radium	Sep-05	0.168	U		0.085	U		0.059	U		0.036	U	0.04U	0.5	-0.2

Note: Blank cells denote not applicable.

Table A-20. Carbon Tetrachloride Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Carbon tetrachloride	Mar-96	5	U		2	J		4	J		5	U	5U	10.6	0
Carbon tetrachloride	Sep-96	4	J	5U	7			7			5	J		10.6	0
Carbon tetrachloride	Mar-97	4	J	3J	6			7			4	J		10.6	0
Carbon tetrachloride	Sep-97	5	U	5U	4	J		11			5	U		10.6	0
Carbon tetrachloride	Mar-98													10.6	0
Carbon tetrachloride	Aug-98	2	J		6			5	U		3	J	3J	10.6	0
Carbon tetrachloride	Mar-99	1	J		4	J	4J	7			3	J		10.6	0
Carbon tetrachloride	Sep-99	5	U	1J	4	J		5			3	J		10.6	0
Carbon tetrachloride	Mar-00													10.6	0
Carbon tetrachloride	Sep-00	1	J		5			9		9				10.6	0
Carbon tetrachloride	Mar-01	1	J		6			7			5.26		5	10.6	0
Carbon tetrachloride	Sep-01	5	U		4	J	4J	7			5	J		10.6	0
Carbon tetrachloride	Mar-02	1	J	1J	5			9			5			10.6	0
Carbon tetrachloride	Sep-02	1.011	J		5.018		5.243	8			5.854			10.6	0
Carbon tetrachloride	Mar-03	5	U		4	J		6			5	J		10.6	0
Carbon tetrachloride	Sep-03	5	U	5U	4	J		6			5			10.6	0
Carbon tetrachloride	Mar-04	1	J		6			8			7.416			10.6	0
Carbon tetrachloride	Sep-04	1	J		5		6	8			7		7.223	10.6	0
Carbon tetrachloride	Mar-05	1	J	1J	6		6	7			8			10.6	0
Carbon tetrachloride	Sep-05	5	U		6			7			8		8	10.6	0

Note: Blank cells denote not applicable.

Table A-21. Nitrogen in Nitrite and Nitrate Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
N in NO_2 & NO_3	Mar-96	4.58			20.2			31.9			35.6		36.5	51.5	-8.7
N in NO_2 & NO_3	Sep-96	4.19			20.6			26.1			33.7			51.5	-8.7
N in NO_2 & NO_3	Mar-97	0.419		40	22.6			21.3			34.1			51.5	-8.7
N in NO_2 & NO_3	Sep-97	4.13		4.19	18.9			24.6			35.4			51.5	-8.7
N in NO_2 & NO_3	Mar-98	4.62	D		20.4	D	20.1D	25.3	D		34.3	D		51.5	-8.7
N in NO_2 & NO_3	Aug-98	4.14			24			26.3			35.2		34.5	51.5	-8.7
N in NO_2 & NO_3	Mar-99	4.53			20.8		20.6	24.6			31.8			51.5	-8.7
N in NO_2 & NO_3	Sep-99	4.6		4.5	20			23.7			33			51.5	-8.7
N in NO_2 & NO_3	Mar-00													51.5	-8.7
N in NO_2 & NO_3	Sep-00	4.7			19.1			24.6		23.2				51.5	-8.7
N in NO_2 & NO_3	Mar-01	5.5			19.9			24.7			31.3		32.2	51.5	-8.7
N in NO_2 & NO_3	Sep-01	4.6			17.3		17.6	23			29.3			51.5	-8.7
N in NO_2 & NO_3	Mar-02	4.6		4.5	16.3			18.9			27.9			51.5	-8.7
N in NO_2 & NO_3	Sep-02	4.48			15.8		15.8	19			26.6			51.5	-8.7
N in NO_2 & NO_3	Mar-03	4.8			17			21.4			29.7			51.5	-8.7
N in NO_2 & NO_3	Sep-03	5.1	D	5.1D	15.9	D		19.3	D		29.2	D		51.5	-8.7
N in NO_2 & NO_3	Mar-04	4.8	D		14.4	D		16.8	D		32.4	D	26D	51.5	-8.7
N in NO_2 & NO_3	Sep-04	4.9			15.3		15.8	16.8			26.8			51.5	-8.7
N in NO_2 & NO_3	Mar-05	5.1		5.1	14.3			15.6			25.8			51.5	-8.7
N in NO_2 & NO_3	Sep-05	7.72	D		12.5	D		14.4	D		24.6	D	24D	51.5	-8.7

Note: Blank cells denote not applicable.

Table A-22. Total Organic Halides Data.

Constituent (μg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Total organic halides	Mar-96	6.6	J		10.5	J		5.6	J		6.6	J	5	9.5	1.2
Total organic halides	Sep-96	5	U		5	U		5	U		5	U		9.5	1.2
Total organic halides	Mar-97	5	U		5	U		2.9			5	U		9.5	1.2
Total organic halides	Sep-97	6.05		4.62U	7.05			4.62	U		5	U		9.5	1.2
Total organic halides	Mar-98	4.62	U		4.62	U	4.62U	4.62	U		4.62	U		9.5	1.2
Total organic halides	Aug-98	5.9			5.85			6.7			5	U	5U	9.5	1.2
Total organic halides	Mar-99	24	U		12	U	24U	34.5			14.3			9.5	1.2
Total organic halides	Sep-99	128		12U	206			12	U		12	U		9.5	1.2
Total organic halides	Mar-00													9.5	1.2
Total organic halides	Sep-00	206			271			180		181				9.5	1.2
Total organic halides	Mar-01	17.1	U		20	U		20	U		20	U	20U	9.5	1.2
Total organic halides	Sep-01	6.5	U		8.7	U	7.4U	6.5	U		6.6	U		9.5	1.2
Total organic halides	Mar-02	5.2	U	6.1	9.3			9.5			5.2	U		9.5	1.2
Total organic halides	Sep-02	10.5			5.6		5.2U	8.5			60.6			9.5	1.2
Total organic halides	Mar-03	5.2	U		6.3			5.3			5.2	U		9.5	1.2
Total organic halides	Sep-03	5.2	U	5.2U	6.2			6.8			6.3			9.5	1.2
Total organic halides	Mar-04	6.7			5.7			9.8			5.2	U	6.4	9.5	1.2
Total organic halides	Sep-04	5.2	U		5.2	U	5.2U	6.7			5.2	U		9.5	1.3
Total organic halides	Mar-05	5	U	6.3	8.1			12.8			11.4			9.5	1.3
Total organic halides	Sep-05	5	U		8.83			12.2			7.46		5.51	9.5	1.3

Note: Blank cells denote not applicable.

Table A-23. Total Dissolved Solids Data.

Constituent (mg/L)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Total dissolved solids	Mar-96	254			340			384			401		420	573.6	170.9
Total dissolved solids	Sep-96	236			367			411			457			573.6	170.9
Total dissolved solids	Mar-97	283		279	404			390			514			573.6	170.9
Total dissolved solids	Sep-97	277		278	377			401			463			573.6	170.9
Total dissolved solids	Mar-98	322			320		309	327			456			573.6	170.9
Total dissolved solids	Aug-98	296			406			422			491		507	573.6	170.9
Total dissolved solids	Mar-99	280			380		400	390		406	440			573.6	170.9
Total dissolved solids	Sep-99	270		280	370			410			470			573.6	170.9
Total dissolved solids	Mar-00													573.6	170.9
Total dissolved solids	Sep-00	270			340			550		520				573.6	170.9
Total dissolved solids	Mar-01	278			407			400			349		436	573.6	170.9
Total dissolved solids	Sep-01	305			384		391	420			535			573.6	170.9
Total dissolved solids	Mar-02	265		258	333			358			430			573.6	170.9
Total dissolved solids	Sep-02	276			326		328	344			446			573.6	170.9
Total dissolved solids	Mar-03	260			337			349			407			573.6	170.9
Total dissolved solids	Sep-03	269		271	361			381			5	U		573.6	170.9
Total dissolved solids	Mar-04	262			323			326			438		442	573.6	170.9
Total dissolved solids	Sep-04	262			331		330	355			392			573.6	170.9
Total dissolved solids	Mar-05	205		253	278			339			386			573.6	170.9
Total dissolved solids	Sep-05	292			387			403			460		500	573.6	170.9

Note: Blank cells denote not applicable.

Table A-24. Turbidity Data.

Constituent (NTU)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Turbidity	Mar-96	0.34	J		0.3	J		0.26	J		3.21	J	1.48J	50	-34.9
Turbidity	Sep-96							1.31						50	-34.9
Turbidity	Mar-97	0.71			8.91			0.84			60.6			50	-34.9
Turbidity	Sep-97	1.9			14.4			1.33			4.56			50	-34.9
Turbidity	Mar-98	1.65			23.4			3.52			4.85			50	-34.9
Turbidity	Aug-98	1.29			90.5						2.95			50	-34.9
Turbidity	Mar-99				52.6			4.54						50	-34.9
Turbidity	Sep-99	2.29			87.2			2.68						50	-34.9
Turbidity	Mar-00													50	-34.9
Turbidity	Sep-00	2.3			142			2.6						50	-34.9
Turbidity	Mar-01	1.71			38.2			1.06			16.7			50	-34.9
Turbidity	Sep-01	1.54			3.35			1.17			6.62			50	-34.9
Turbidity	Mar-02	1.85			11.1			5			7.4			50	-34.9
Turbidity	Sep-02	2.2			5.6			4.7			6.7			50	-34.9
Turbidity	Mar-03	1.86			962			1.29			15			50	-34.9
Turbidity	Sep-03	2.41			41.6			2.68			49.7			50	-34.9
Turbidity	Mar-04	2.01			16.3			2.49			15			50	-34.9
Turbidity	Sep-04	2.93			16.9			4.65			4.19			50	-34.9
Turbidity	Mar-05	2.78			7.53			2.13			4.16			50	-34.9
Turbidity	Sep-05	0.73			4.61			3.88			3.94			50	-34.9

Note: Blank cells denote not applicable.

Table A-25. pH Data.

Constituent	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
pH Measurement	Mar-96	7.66						7.8						8	7.5
pH Measurement	Sep-96							7.7						8	7.5
pH Measurement	Mar-97	7.82			7.68			7.67			7.64			8	7.5
pH Measurement	Sep-97	7.86			7.86			7.76			7.74			8	7.5
pH Measurement	Mar-98	7.86			7.8			7.64			7.71			8	7.5
pH Measurement	Aug-98	7.95			8.31			7.95			7.77			8	7.5
pH Measurement	Mar-99				7.72			7.71						8	7.5
pH Measurement	Sep-99	7.95			7.69			7.82						8	7.5
pH Measurement	Mar-00													8	7.5
pH Measurement	Sep-00	7.9			7.7			7.8						8	7.5
pH Measurement	Mar-01	8.56			7.7			7.84			7.74			8	7.5
pH Measurement	Sep-01	7.77			7.7			7.7			7.78			8	7.5
pH Measurement	Mar-02	7.89			7.83			7.73			7.8			8	7.5
pH Measurement	Sep-02	7.9			7.8			7.7			7.8			8	7.5
pH Measurement	Mar-03	7.9			7.79			7.71			7.76			8	7.5
pH Measurement	Sep-03	7.85			7.76			7.76			7.63			8	7.5
pH Measurement	Mar-04	7.89			7.77			7.63			7.78			8	7.5
pH Measurement	Sep-04	7.76			7.78			7.68			7.76			8	7.5
pH Measurement	Mar-05	7.86			7.74			7.64			7.83			8	7.5
pH Measurement	Sep-05	7.84			7.74			7.59			7.81			8	7.5

Note: Blank cells denote not applicable.

Table A-26. Specific Conductance Data.

Constituent (μS/m)	Sample Date	699-35-66A (Down Gradient)	Q	DUP	699-36-67 (Down Gradient)	Q	DUP	699-36-70A (Up Gradient)	Q	DUP	699-37-68 (Down Gradient)	Q	DUP	Upper Limit	Lower Limit
Specific Conductance	Mar-96	402						618						743	362.7
Specific Conductance	Sep-96							595						743	362.7
Specific Conductance	Mar-97	428			545			562			630			743	362.7
Specific Conductance	Sep-97	423			540			575			614			743	362.7
Specific Conductance	Mar-98	441			534			565			671			743	362.7
Specific Conductance	Aug-98	405			510			546			270			743	362.7
Specific Conductance	Mar-99				577			585		552C				743	362.7
Specific Conductance	Sep-99	413			541			578						743	362.7
Specific Conductance	Mar-00													743	362.7
Specific Conductance	Sep-00	412			537			565						743	362.7
Specific Conductance	Mar-01	416			533			555			618			743	362.7
Specific Conductance	Sep-01	423			522			540			601			743	362.7
Specific Conductance	Mar-02	473			518			522			605			743	362.7
Specific Conductance	Sep-02	412			517			537			605			743	362.7
Specific Conductance	Mar-03	409			505			535			594			743	362.7
Specific Conductance	Sep-03	395			502			500			425			743	362.7
Specific Conductance	Mar-04	409			500			487			604			743	362.7
Specific Conductance	Sep-04	406			486			483			588			743	362.7
Specific Conductance	Mar-05	405			487			470			596			743	362.7
Specific Conductance	Sep-05	402			471			469			562			743	362.7

Note: Blank cells denote not applicable.

APPENDIX B

GROUNDWATER SAMPLING TRENDS, 1996-2005

Figure B-1. Arsenic (Filtered) Trends.

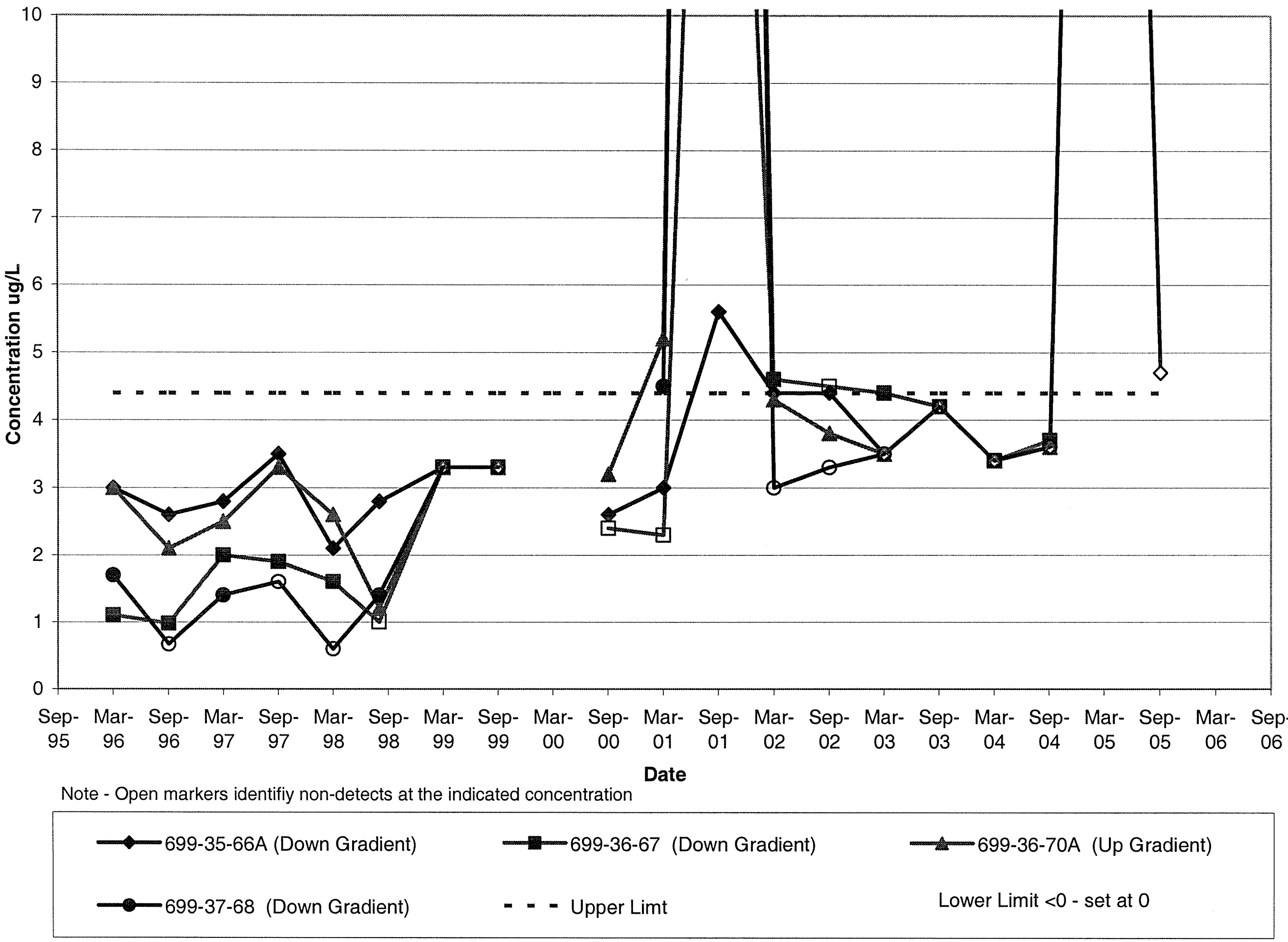


Figure B-2. Barium (Filtered) Trends.

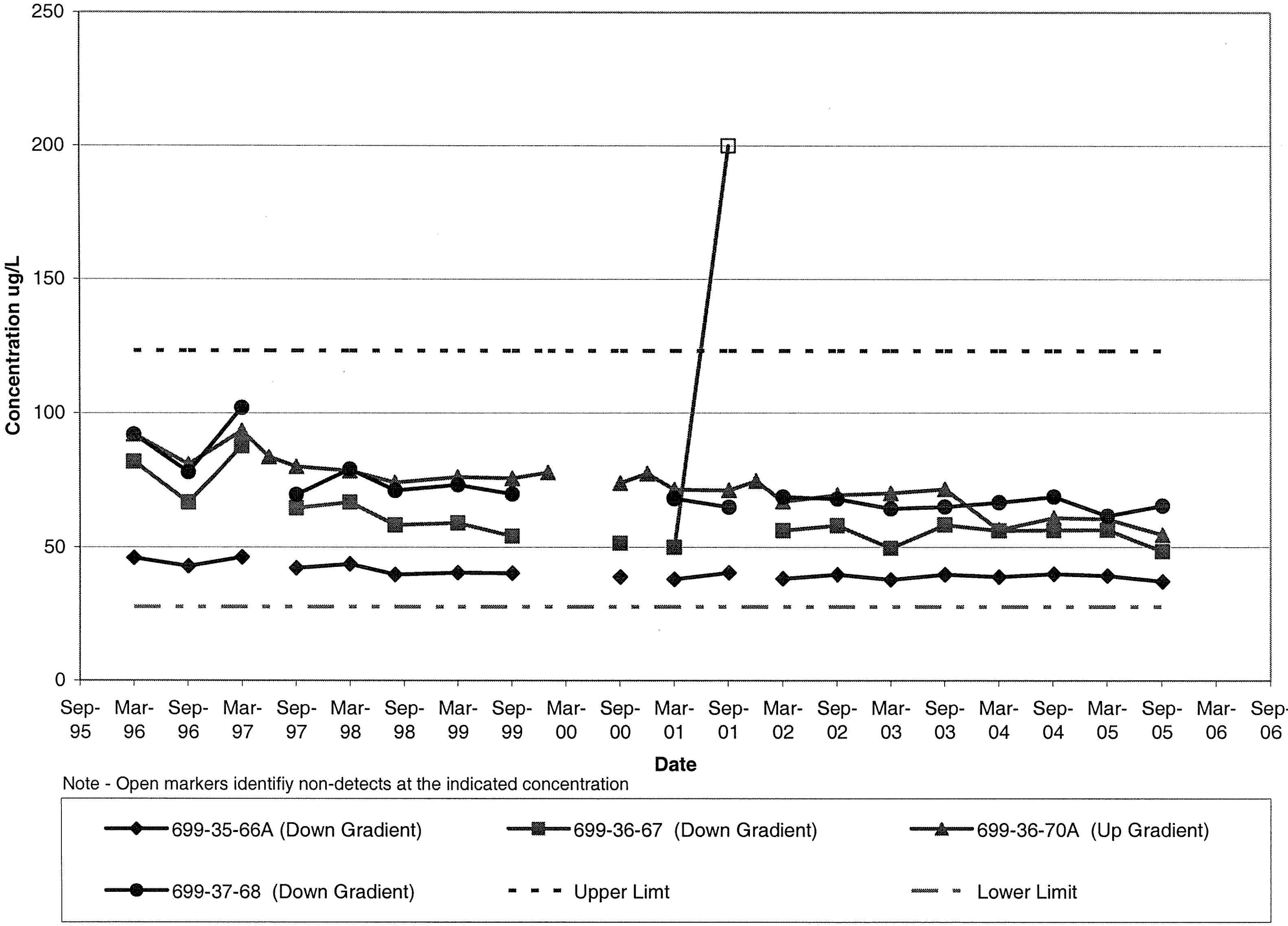


Figure B-3. Chromium (Filtered) Trends.

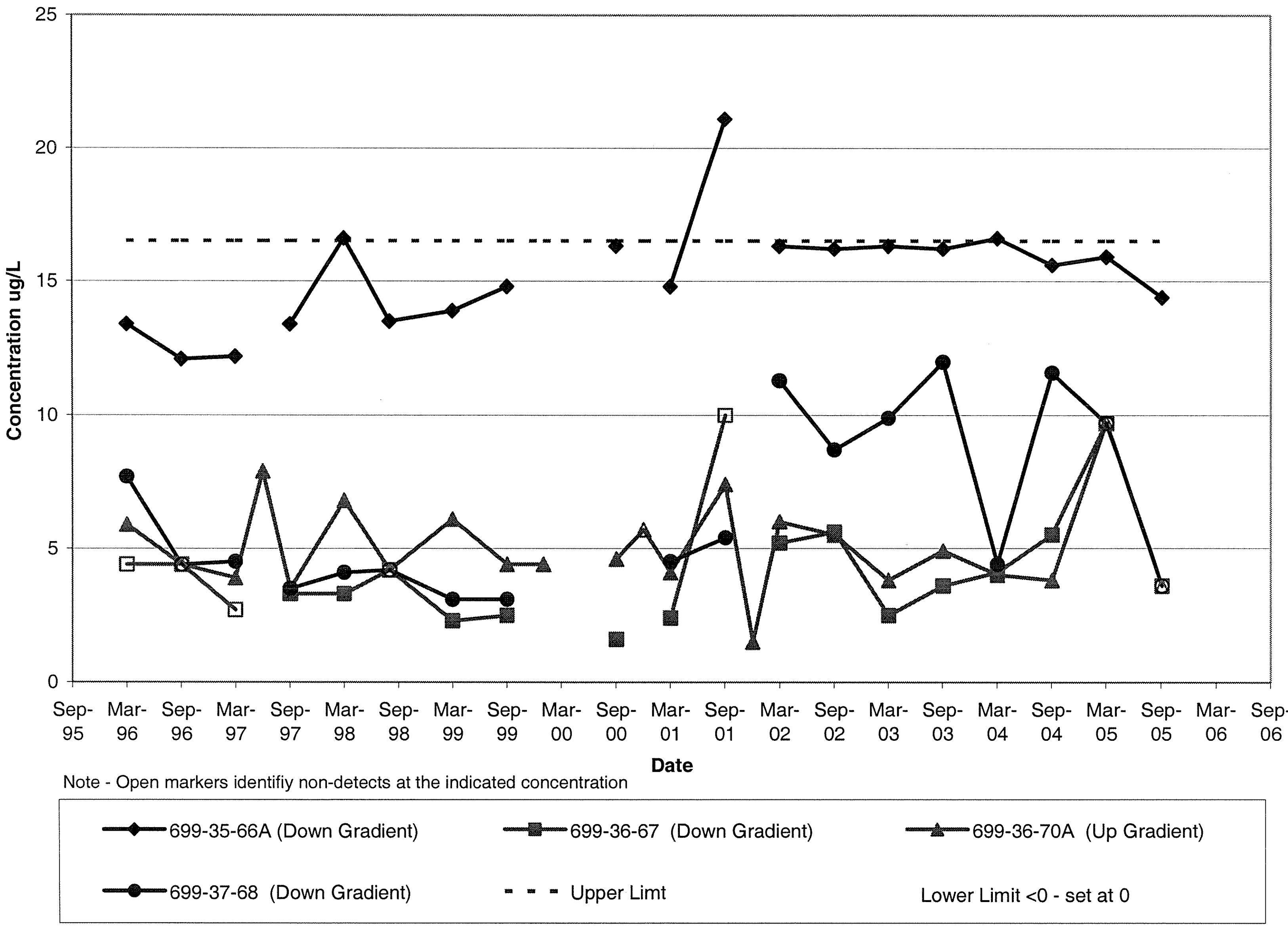


Figure B-4. Lead (Filtered) Trends.

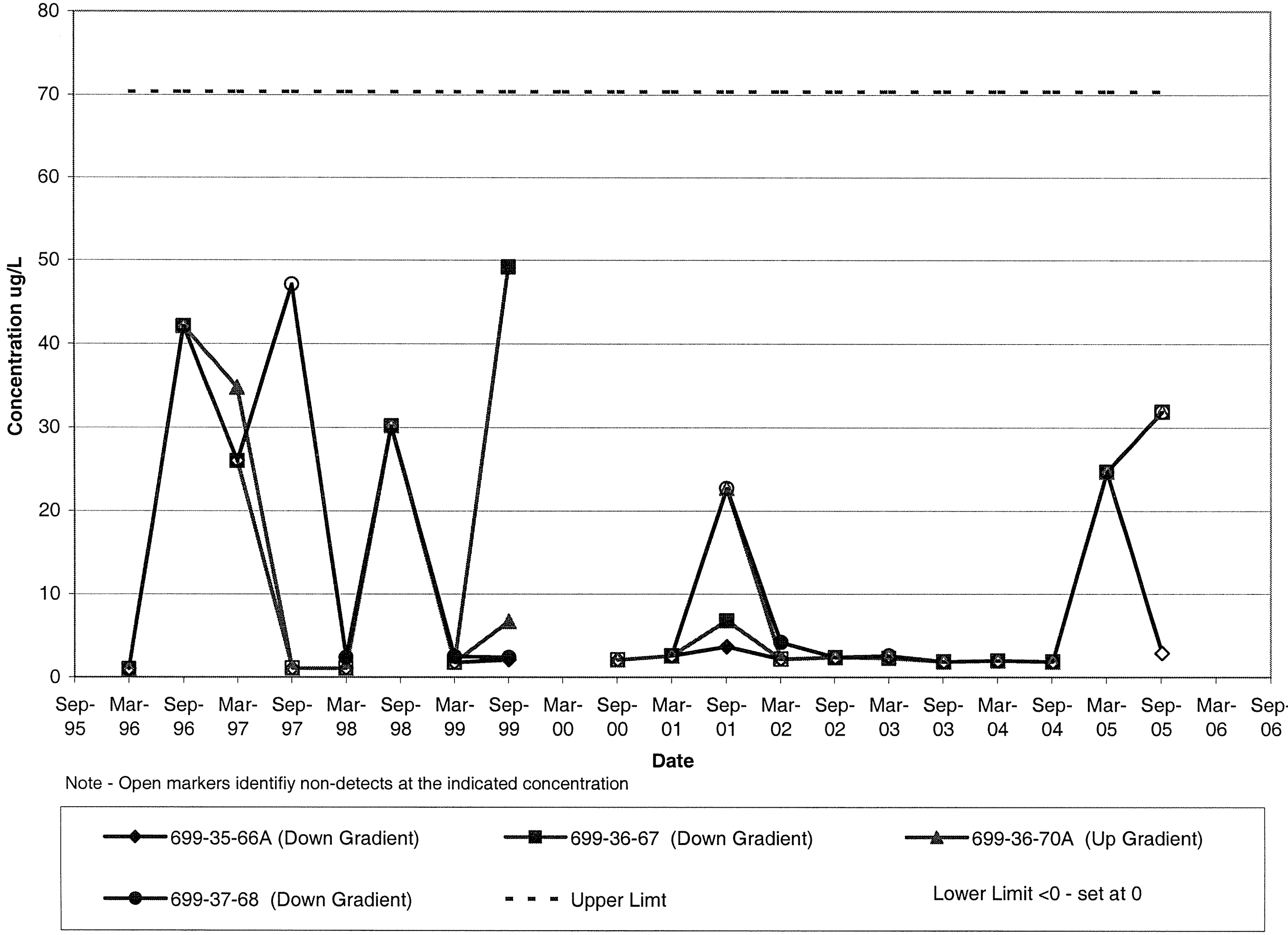


Figure B-5. Selenium (Filtered) Trends.

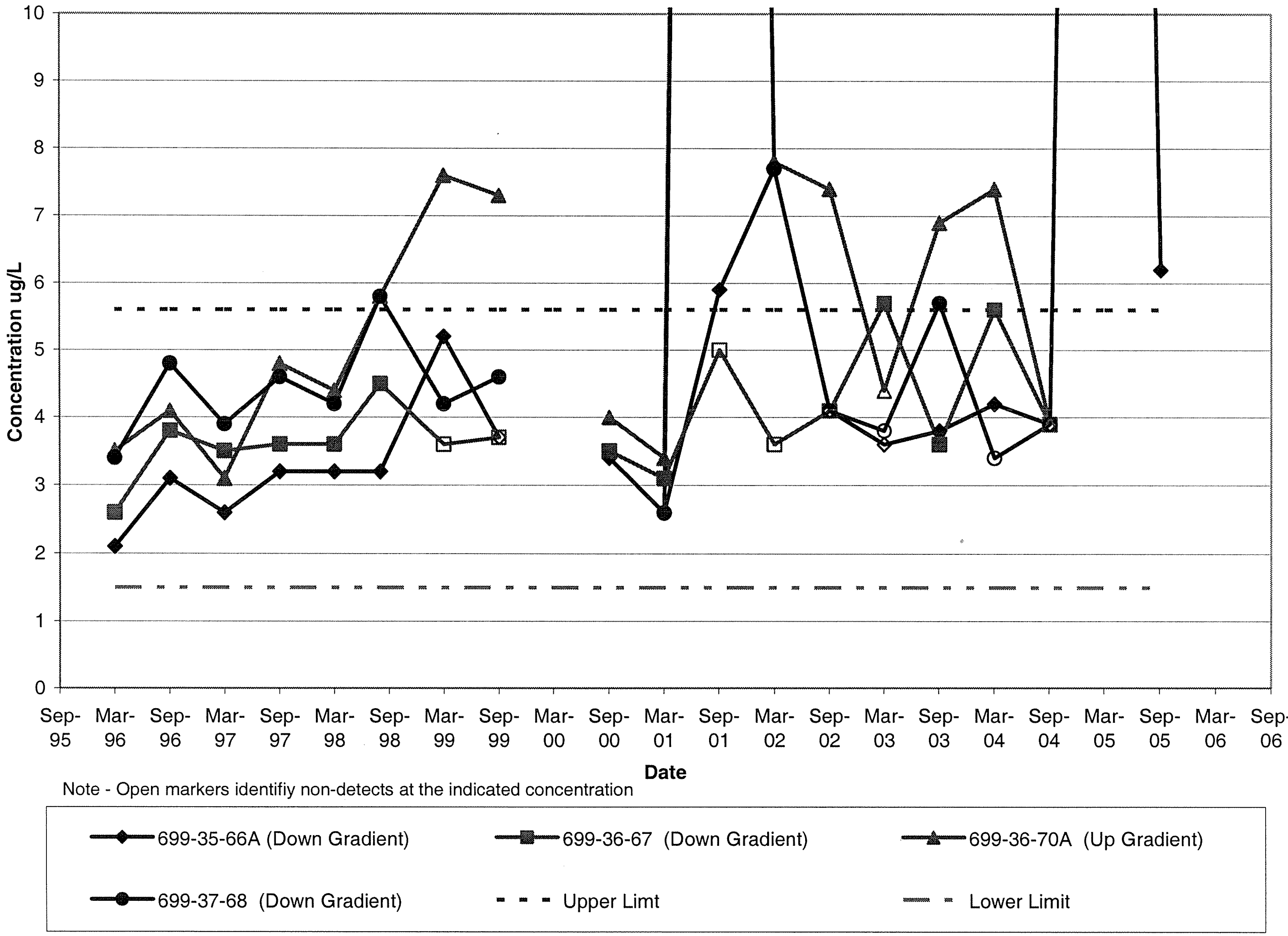


Figure B-6. Tin (Filtered) Trends.

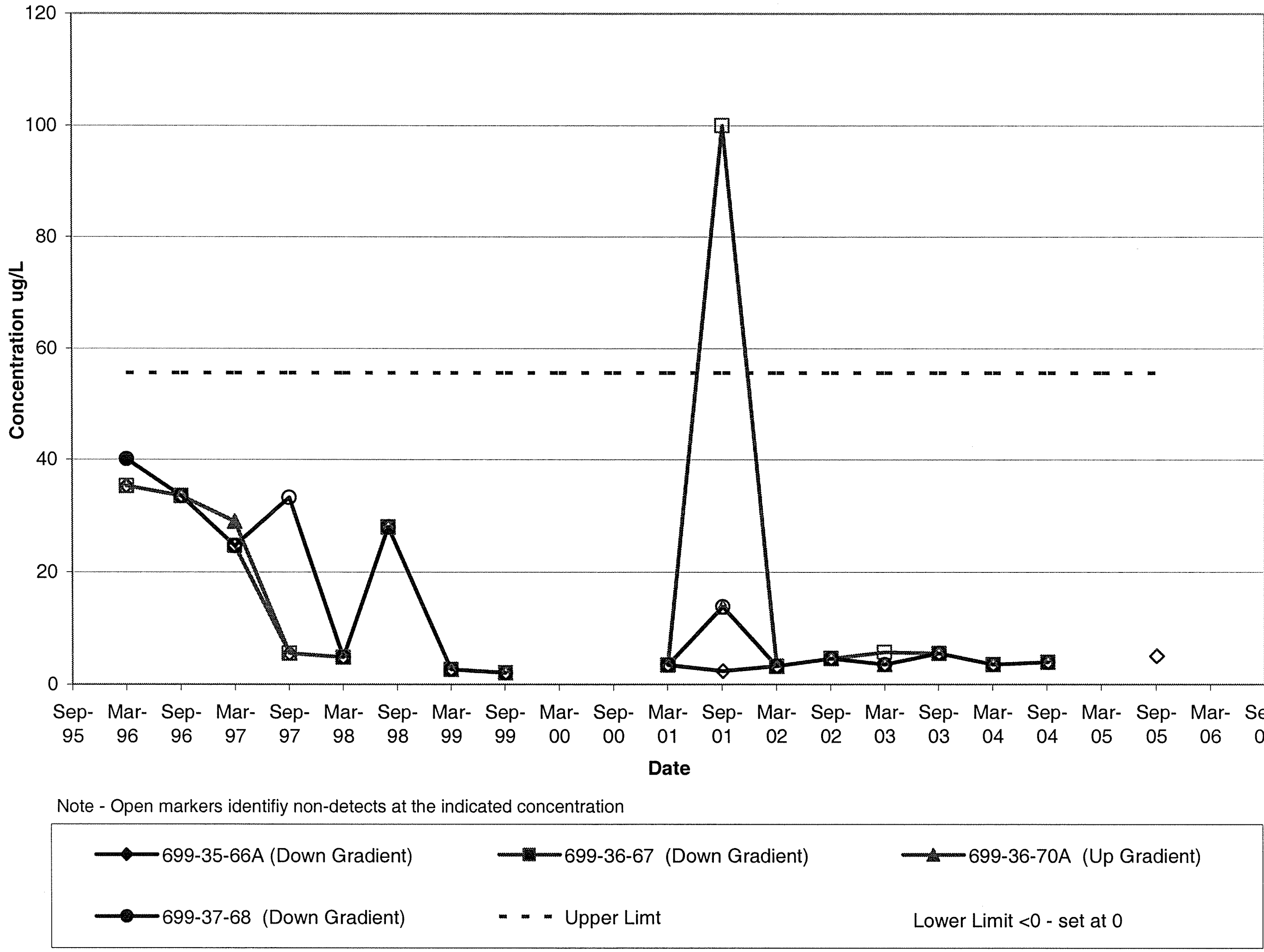


Figure B-7. Uranium Trends.

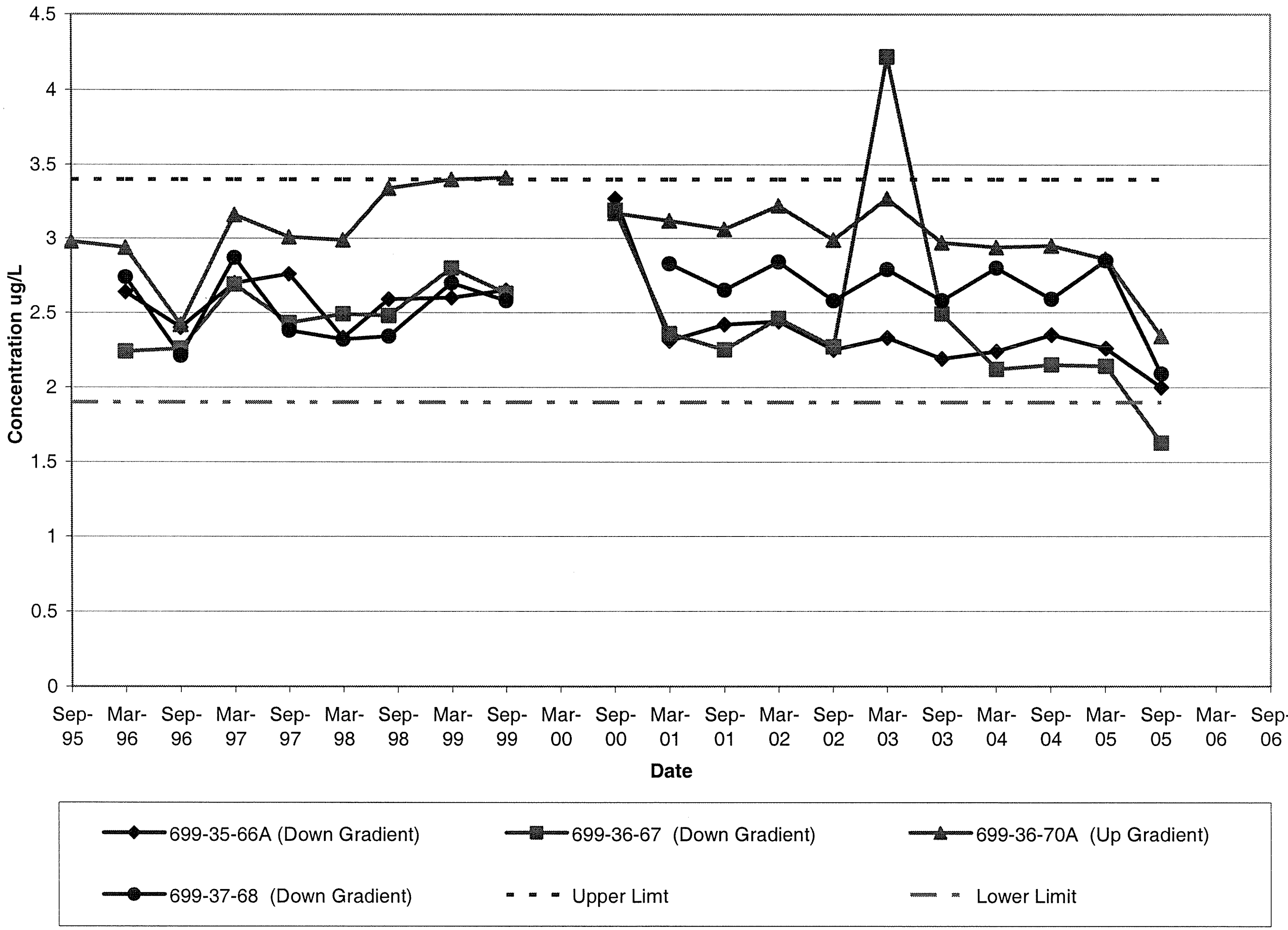


Figure B-8. Vanadium (Filtered) Trends.

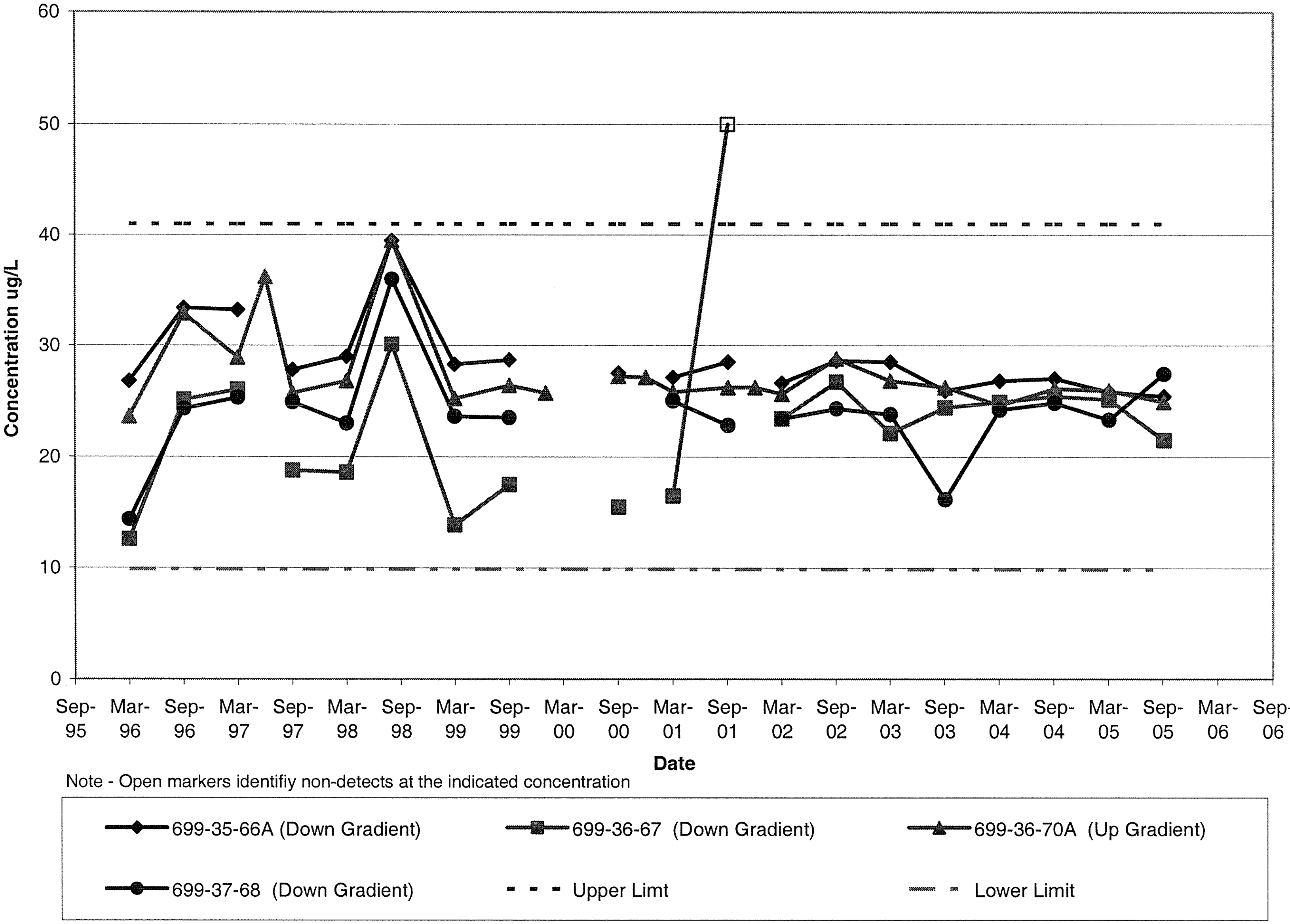


Figure B-9. Zinc (Filtered) Trends.

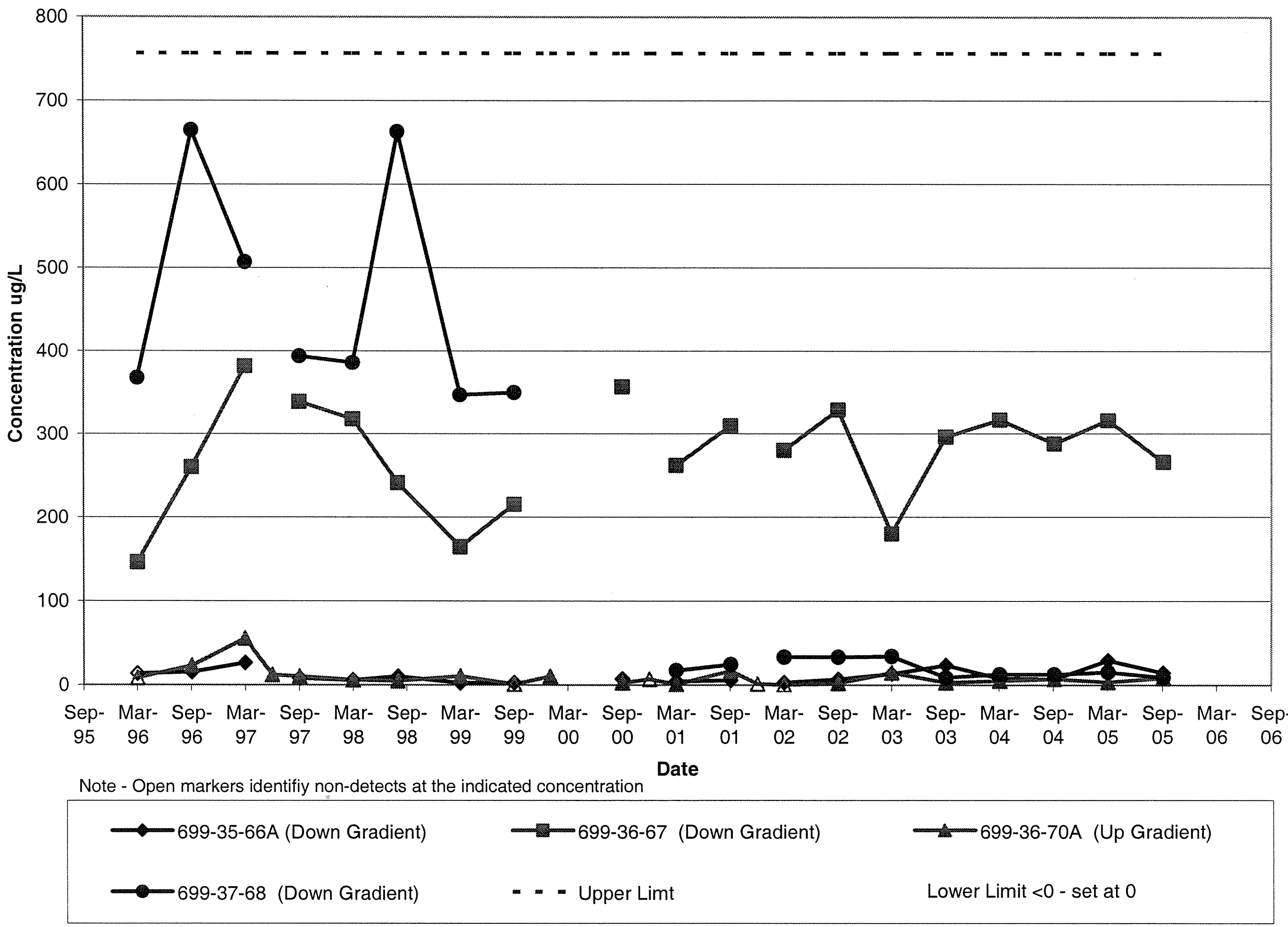


Figure B-10. Alkalinity Trends.

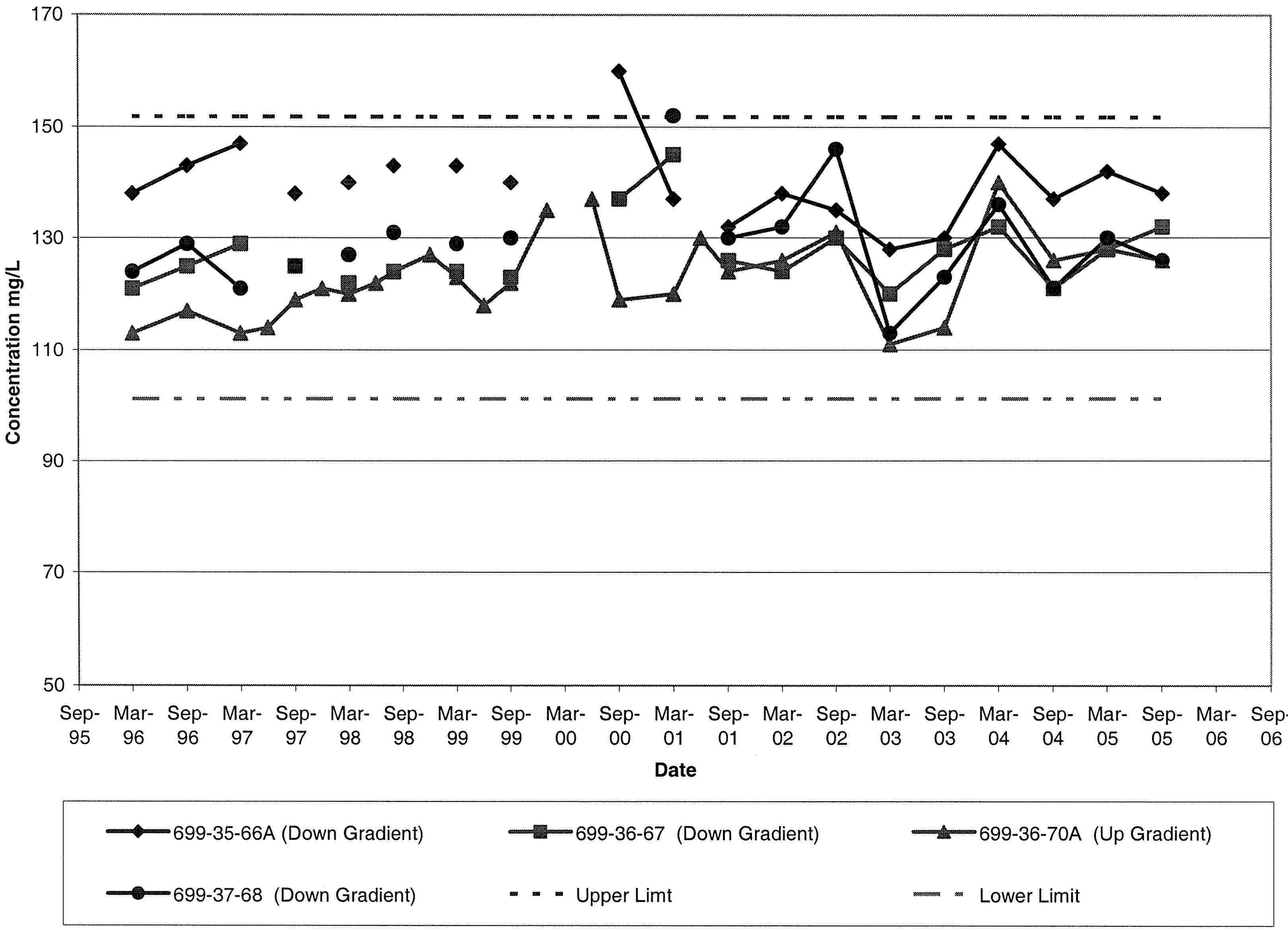


Figure B-11. Chloride Trends.

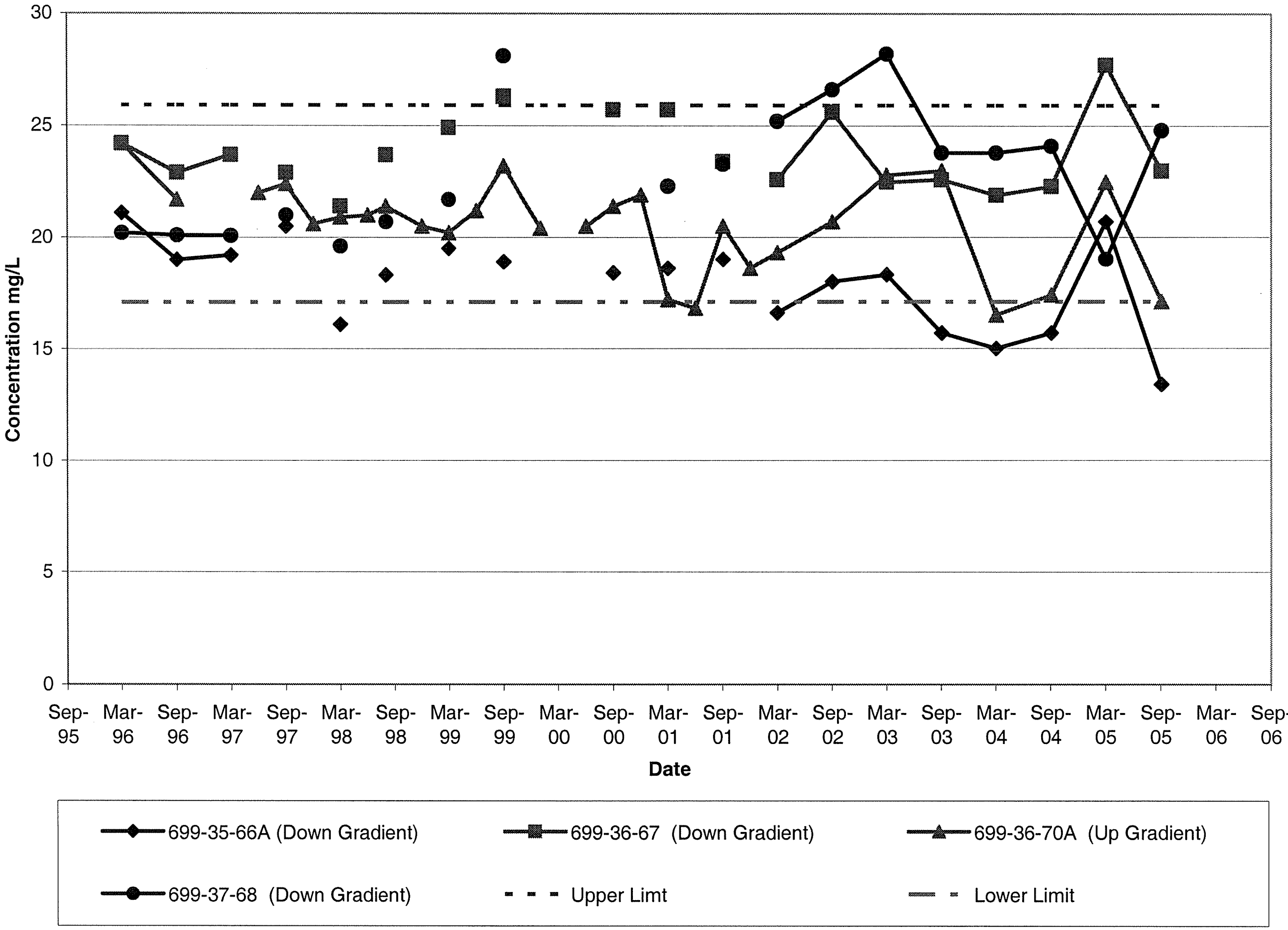


Figure B-12. Fluoride Trends.

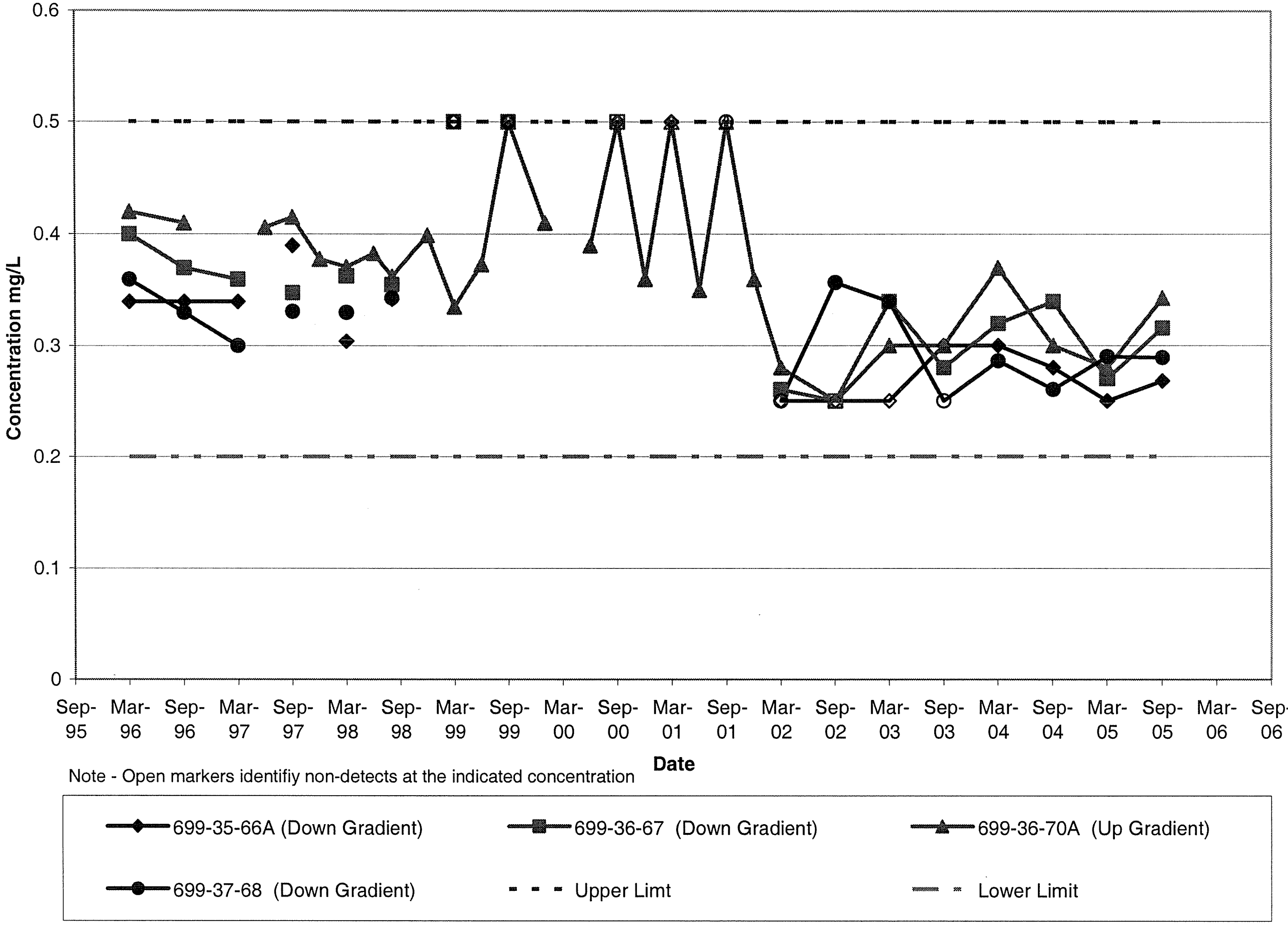


Figure B-13. Sulfate Trends.

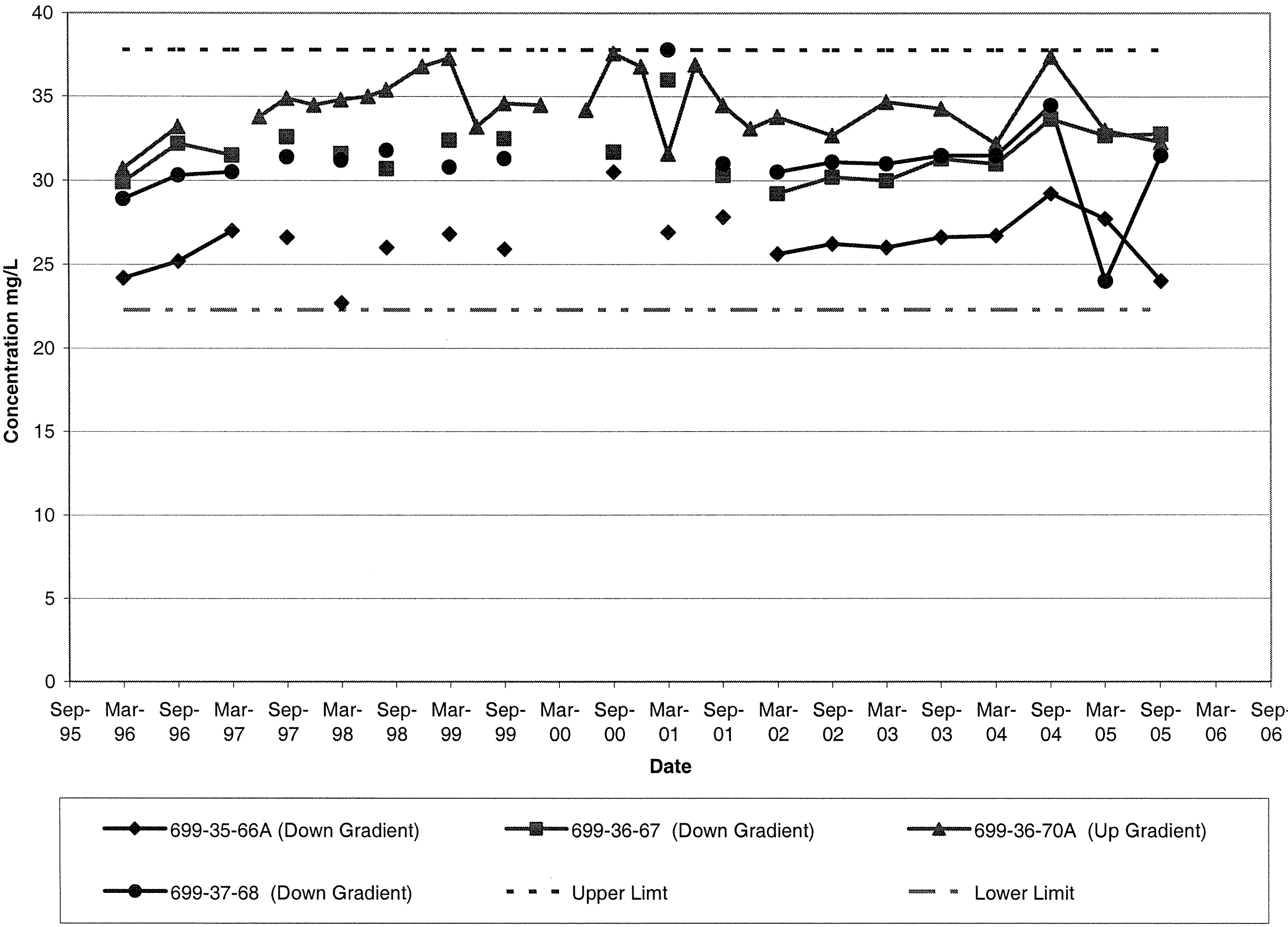
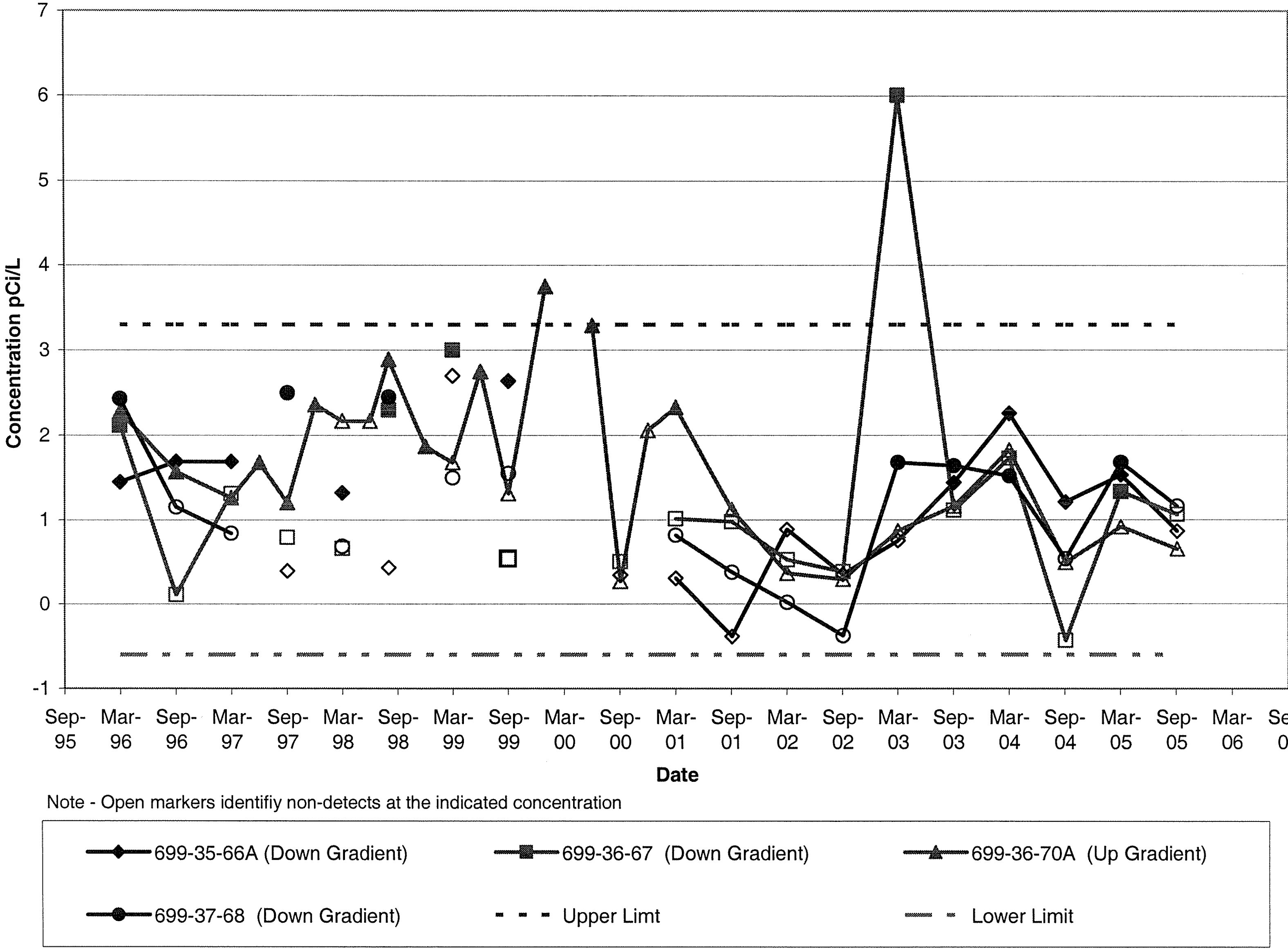


Figure B-14. Gross Alpha Trends.



Note - Open markers identifiy non-detects at the indicated concentration

Figure B-15. Gross Beta Trends.

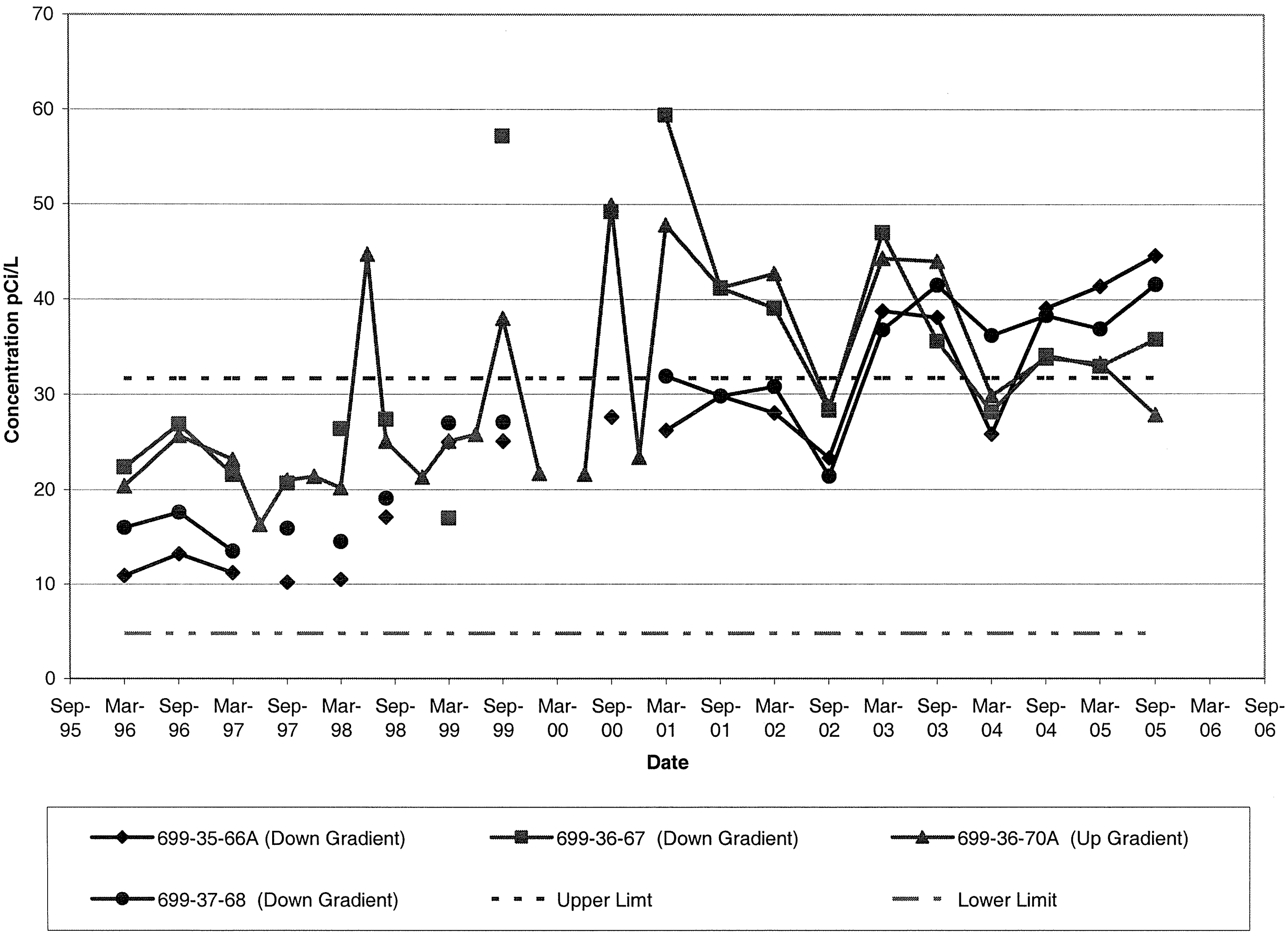


Figure B-16. Carbon-14 Trends.

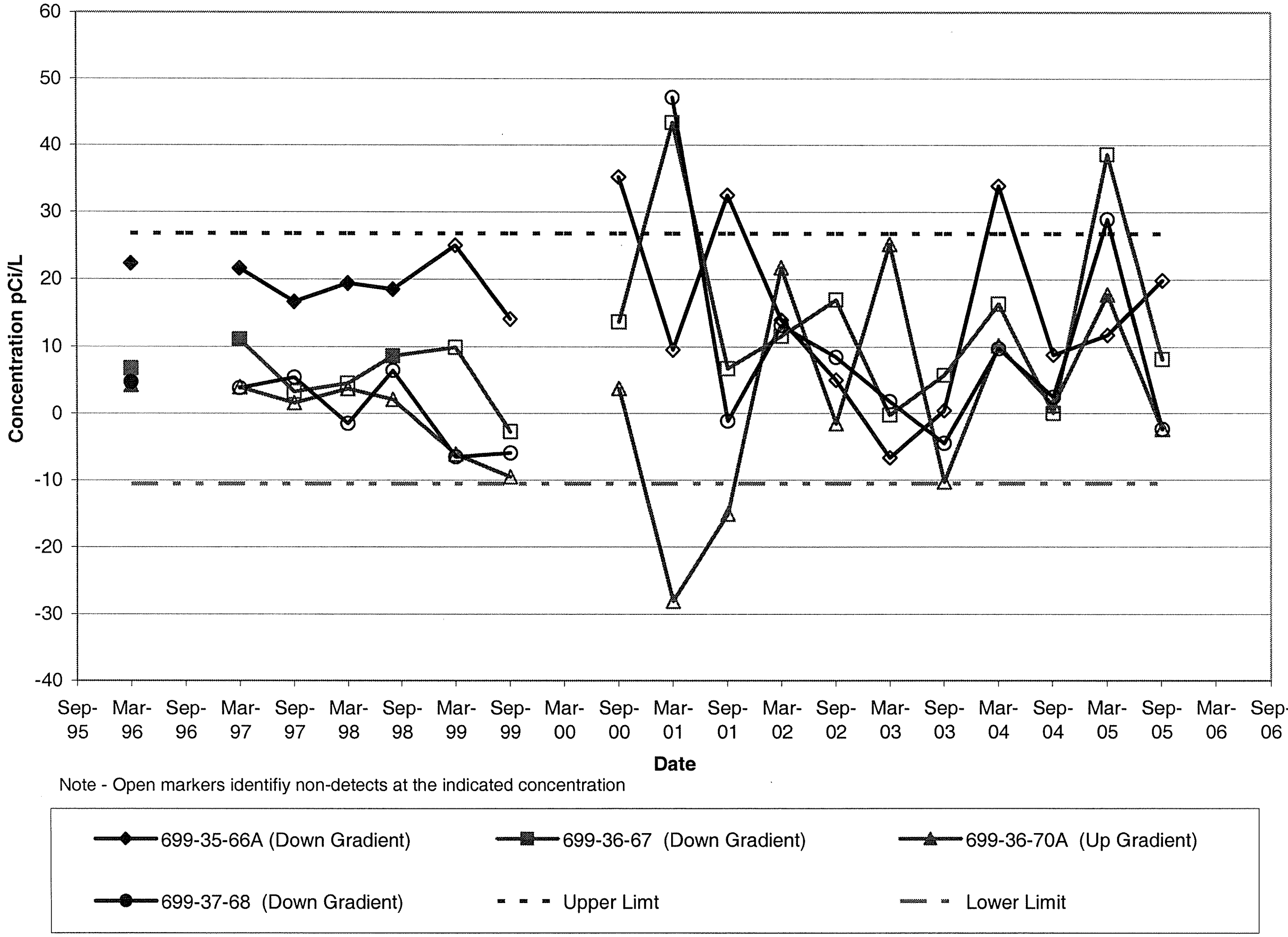


Figure B-17. Iodine-129 Trends.

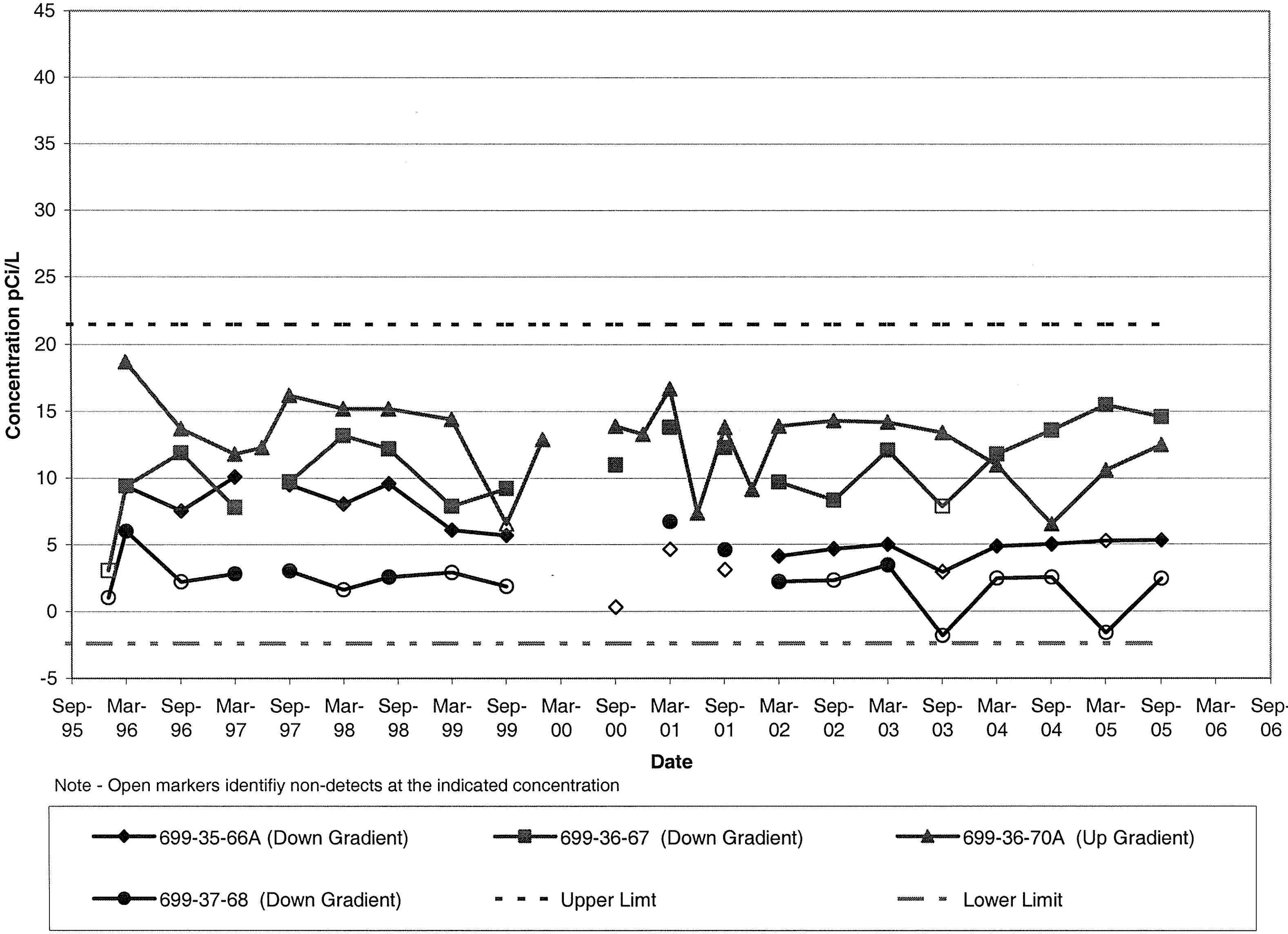


Figure B-18. Technetium-99 Trends.

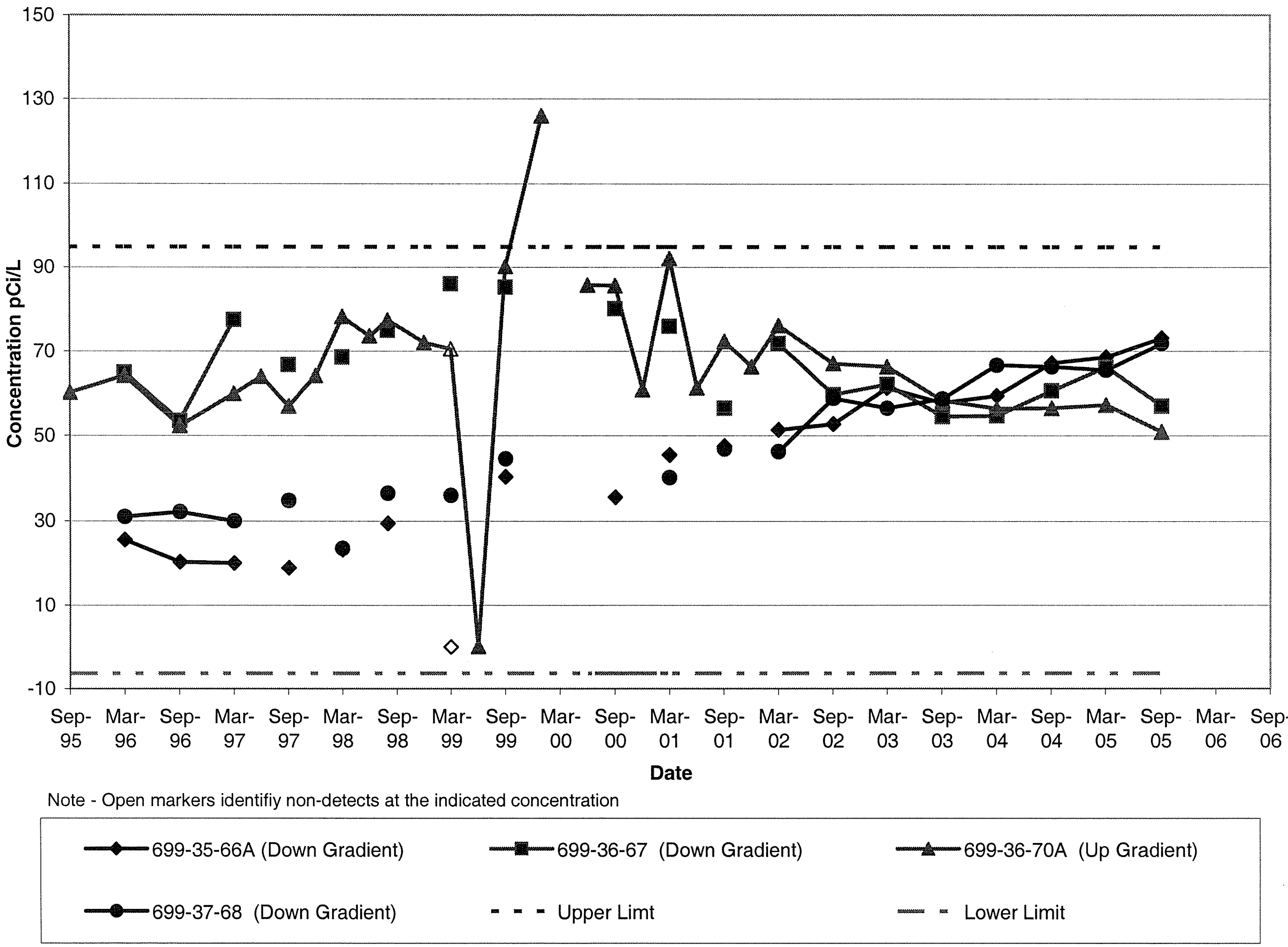


Figure B-19. Radium Trends.

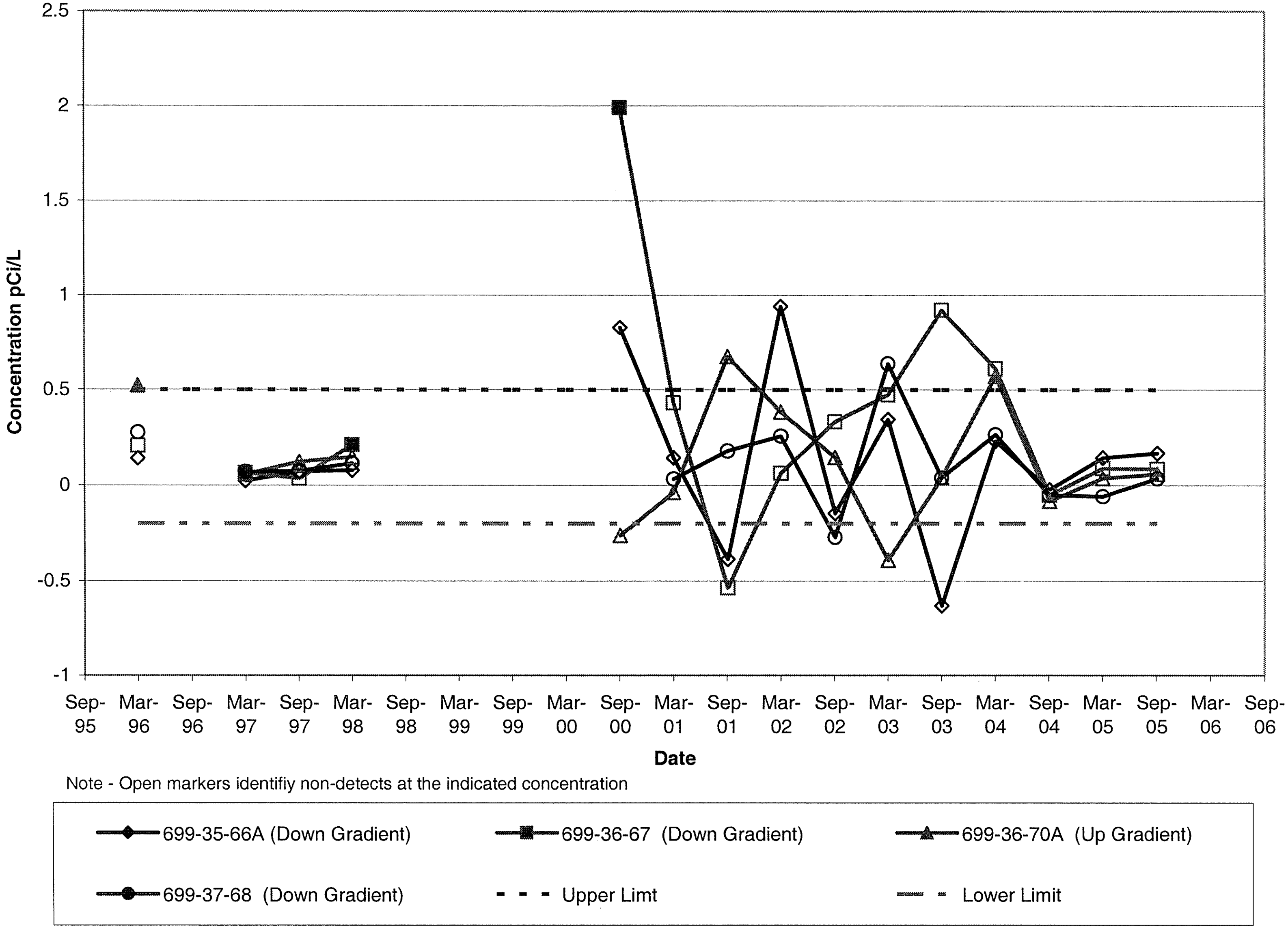


Figure B-20. Carbon Tetrachloride Trends.

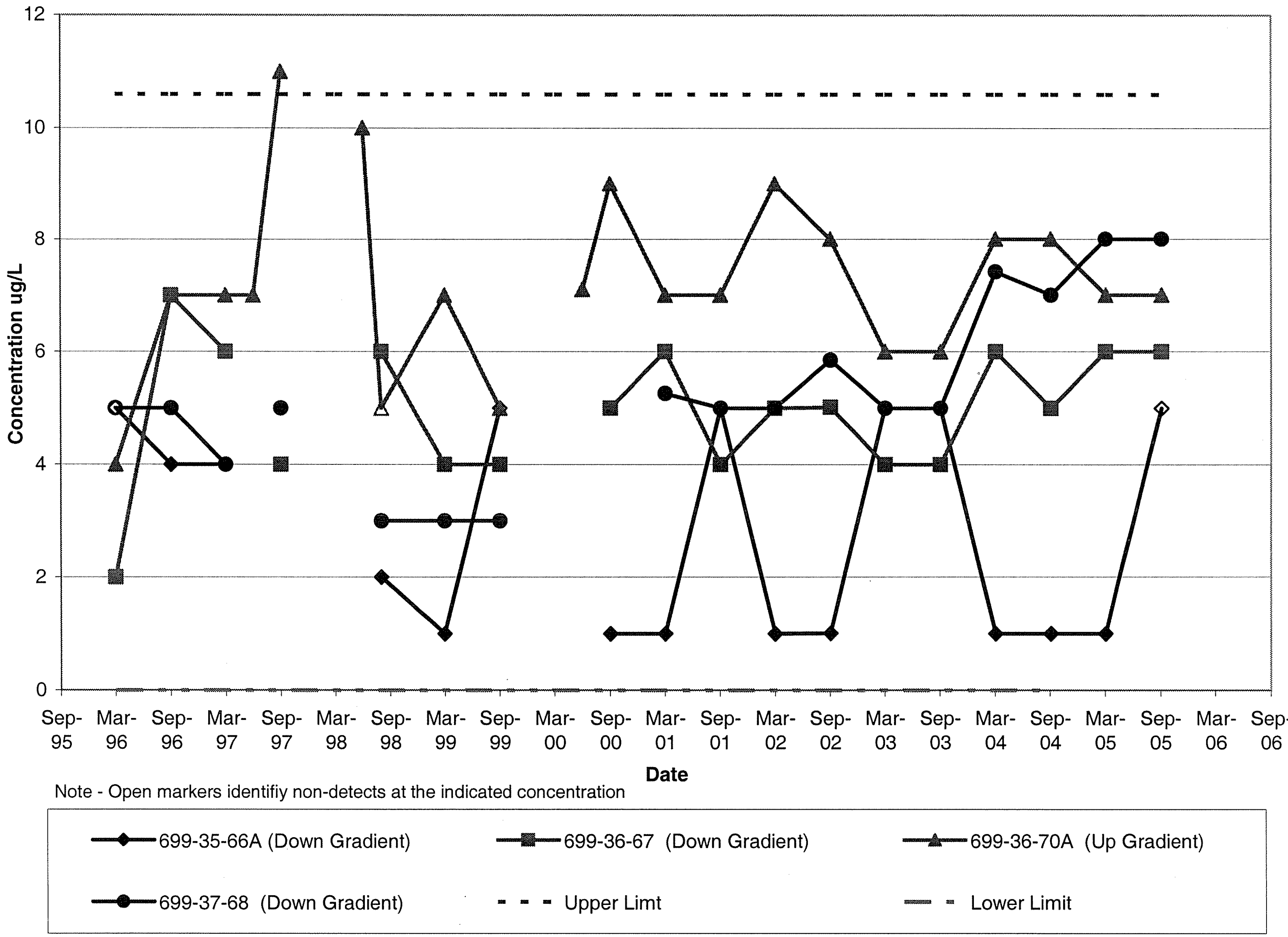


Figure B-21. Nitrogen in Nitrite and Nitrate Trends.

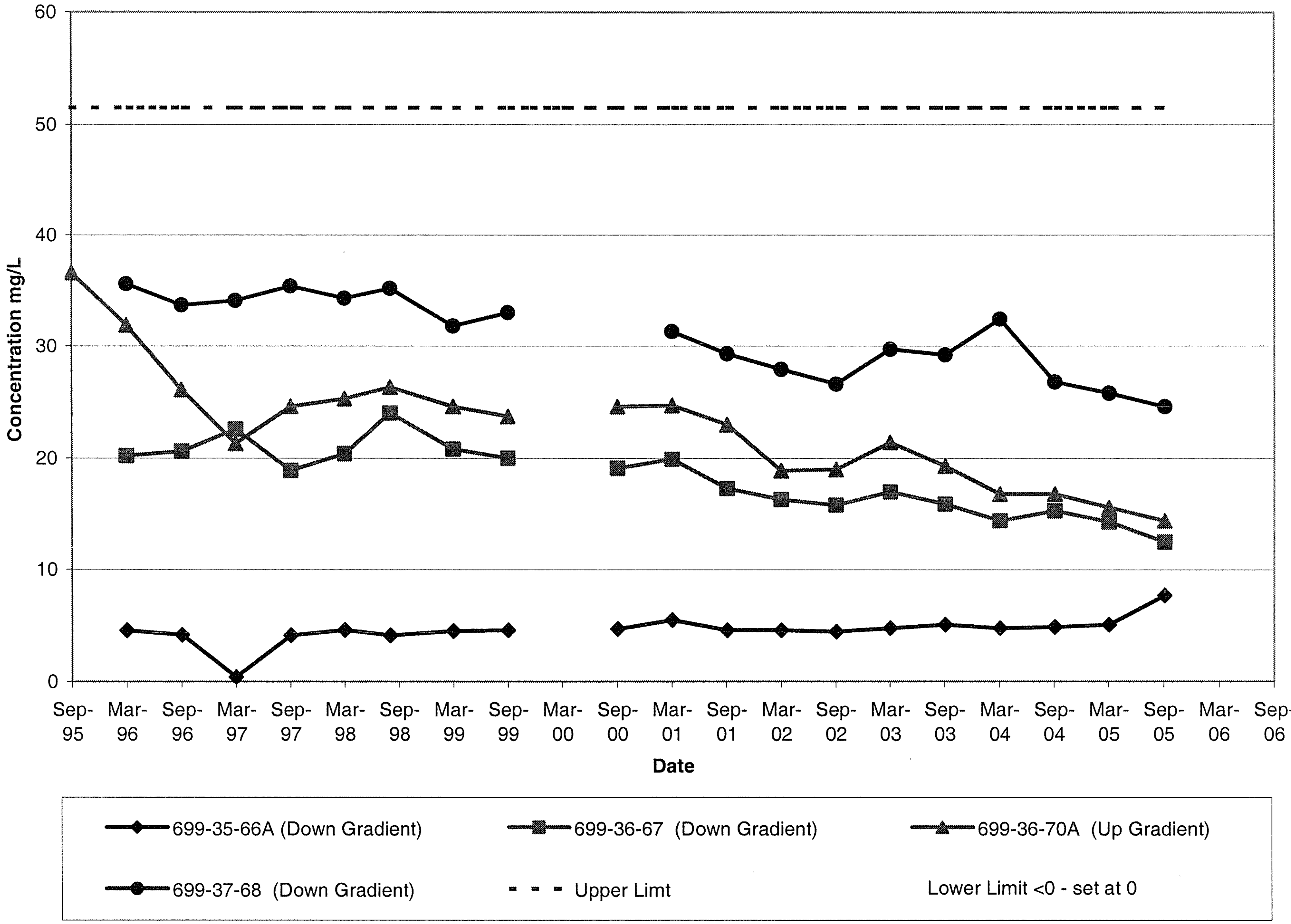


Figure B-22. Total Organic Halides Trends.

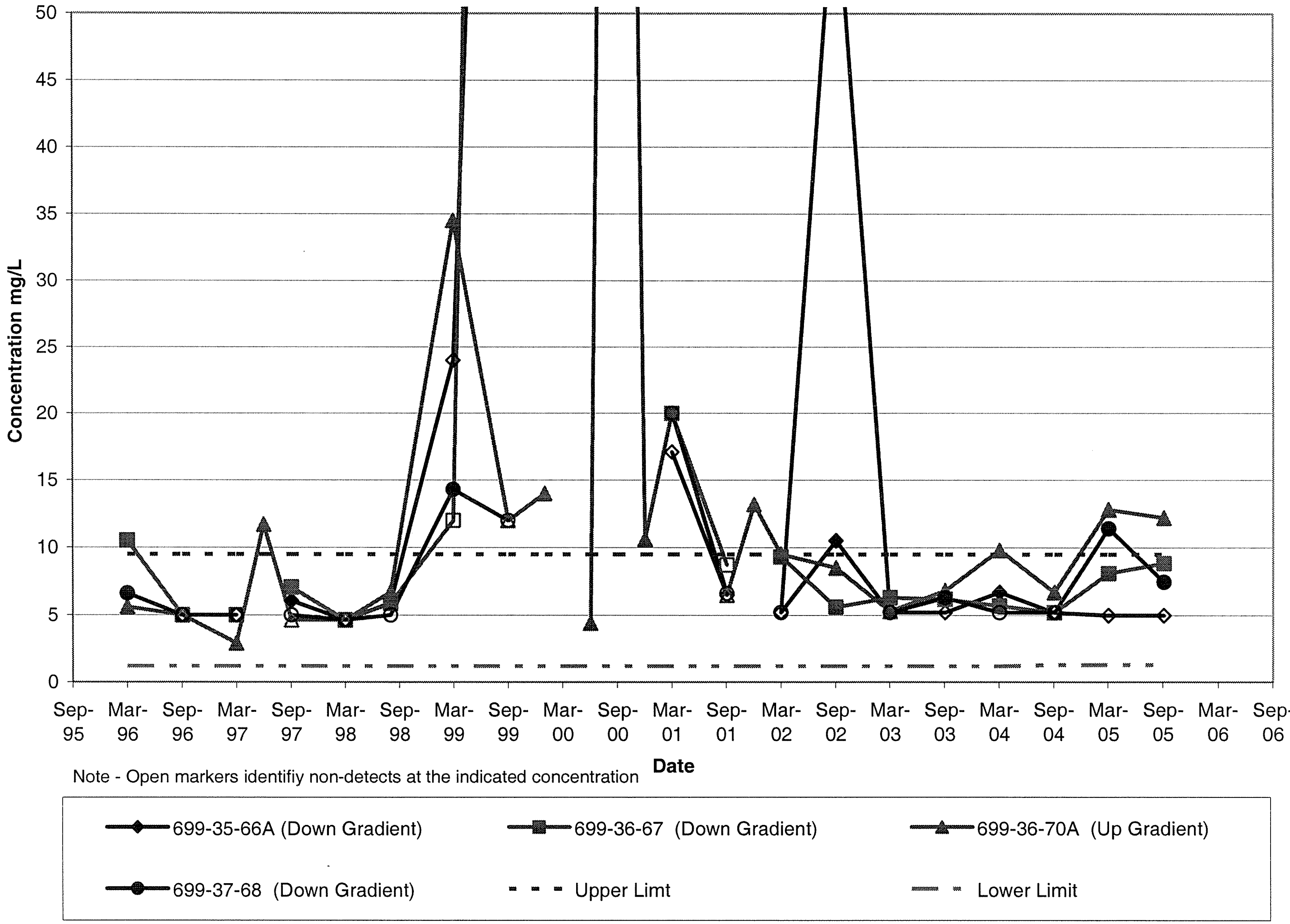


Figure B-23. Total Dissolved Solids Trends.

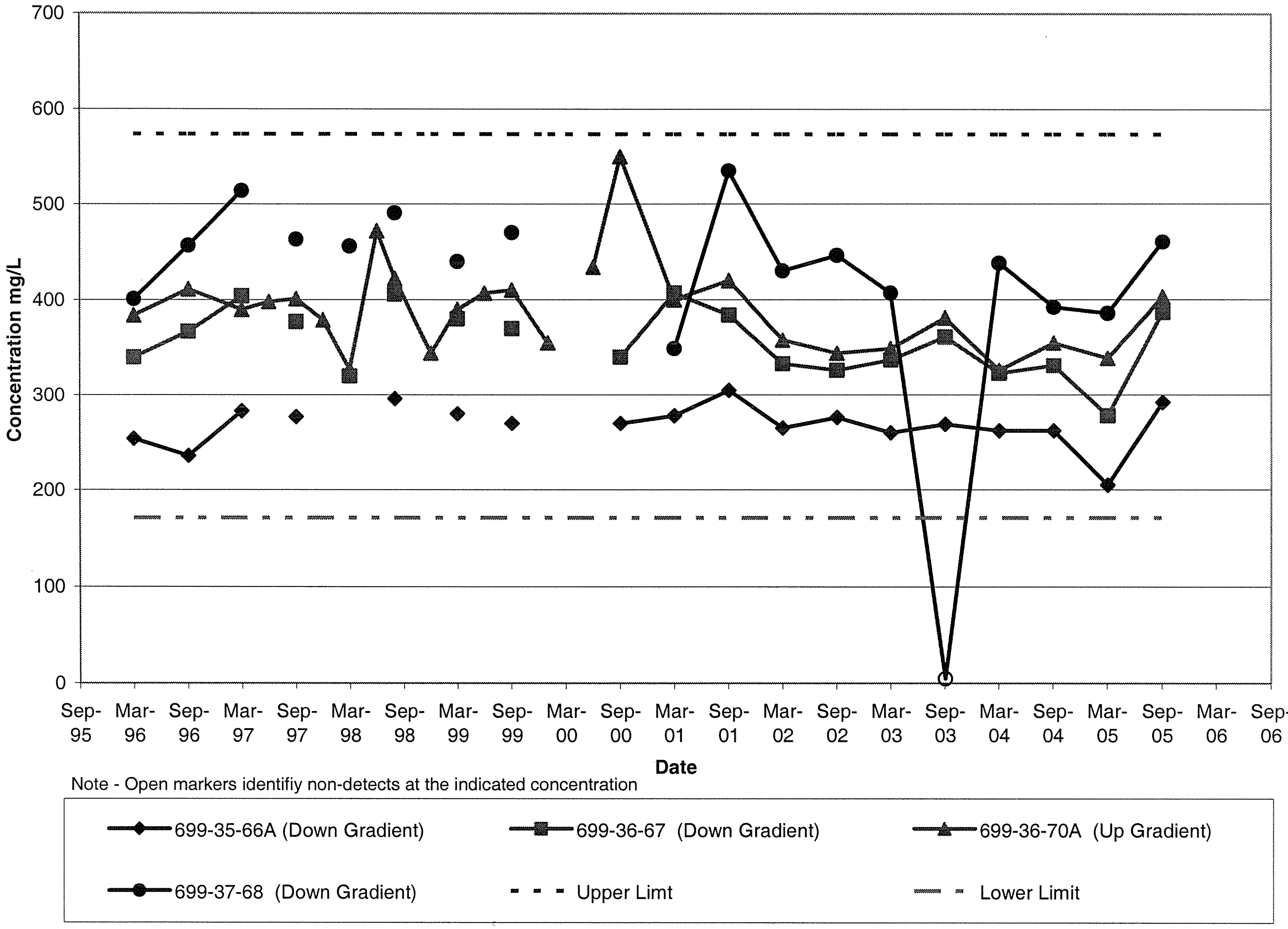


Figure B-24. Turbidity Trends.

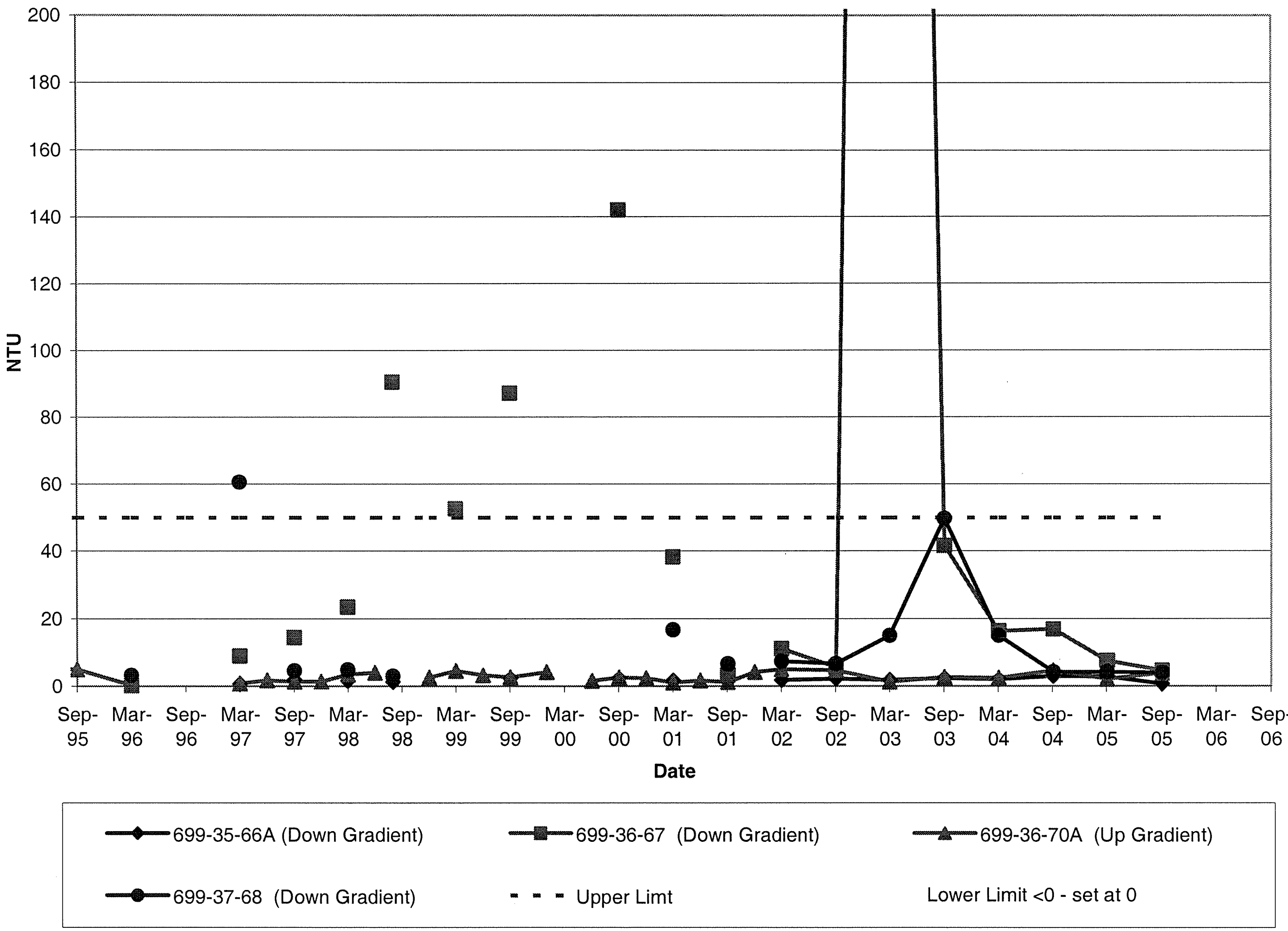


Figure B-25. pH Trends.

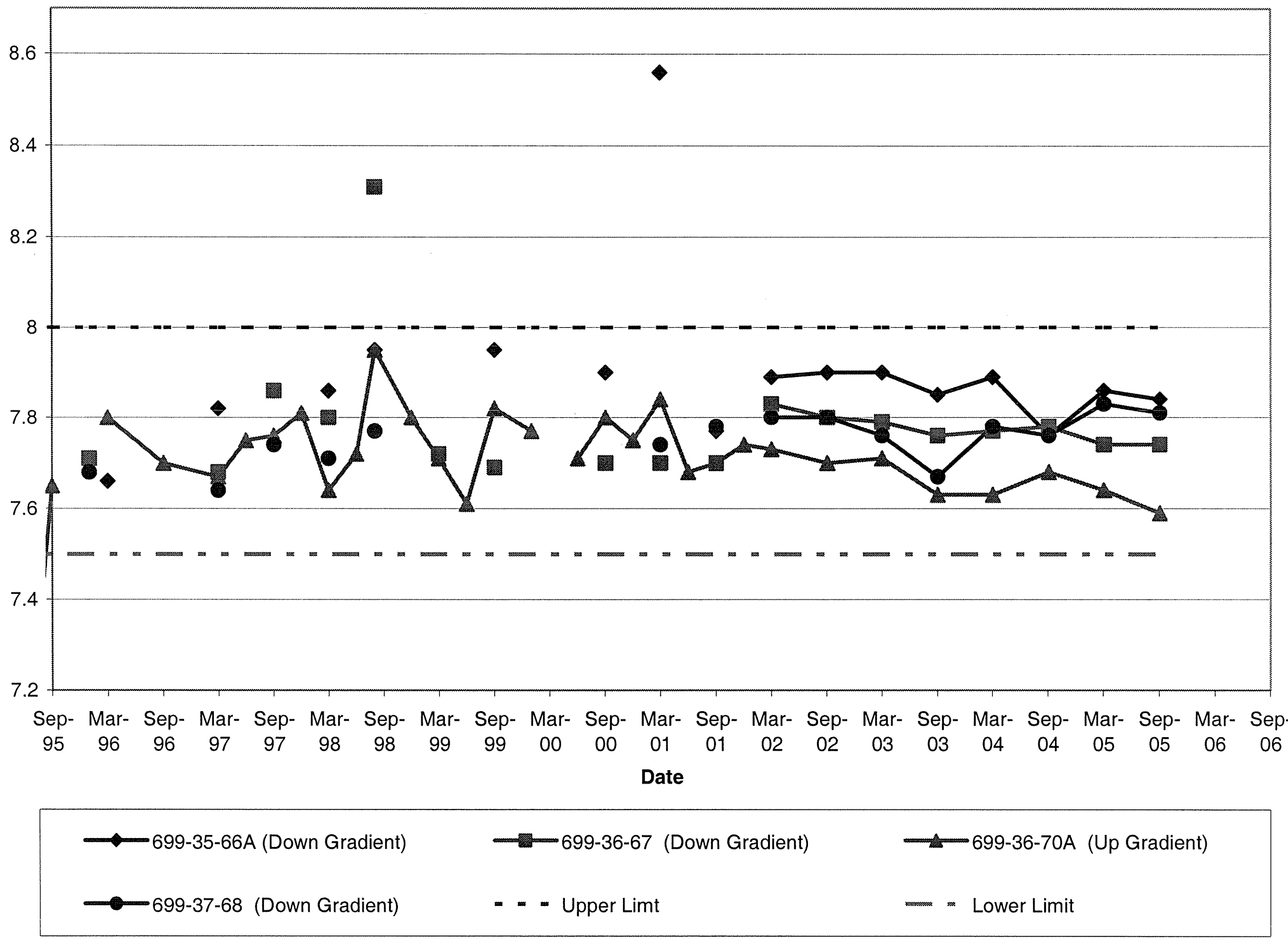
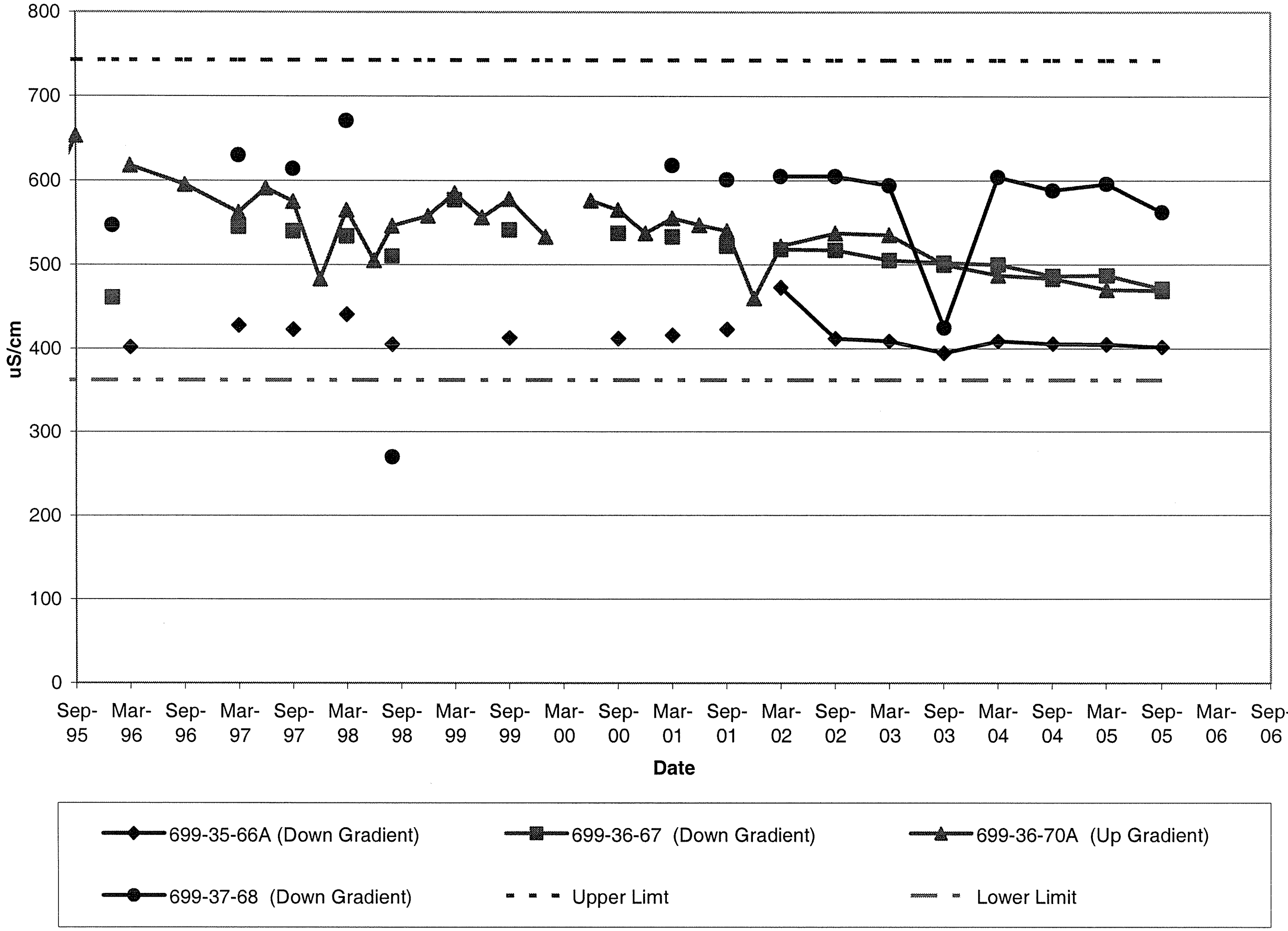


Figure B-26. Specific Conductance Trends.



APPENDIX C

LEACHATE SAMPLING RESULTS SUMMARY, 2003-2005

Table C-1. Summary of Leachate Sampling Results, 2003-2005.[a] (2 Pages)

Constituent	Jun-03	Jun-03	Dec-03	Dec-03	Jun-04	Jun-04	Dec-04	Dec-04	Jun-05	Jun-05	Dec-05	Dec-05	Units
Aluminum	NR	NR	NR	NR	NR	NR	32.2	44.7	NR	NR	NR	NR	µg/L
Antimony	NR	NR	NR	NR	NR	NR	2.8U	2.8	NR	NR	NR	NR	µg/L
Arsenic	11.6	8.2	6.3	10	7.7	7.1	8.4	9	30.5U	30.5U	7.2	8.3	µg/L
Barium	79.6	80.8	97.1	100	84	81.7	109	109	100	94.5	108	108	µg/L
Calcium	NR	NR	NR	NR	NR	NR	244000	246000	NR	NR	NR	NR	µg/L
Chromium	23.1	25.1	27.1	27.6	34.8	33.1	32.6	34.8	30.8	34.8	37.8	36.1	µg/L
Copper	NR	NR	NR	NR	NR	NR	10.3	9.3	NR	NR	NR	NR	µg/L
Iron	NR	NR	NR	NR	NR	NR	27.9U	27.9U	NR	NR	NR	NR	µg/L
Lead	2.3U	2.3U	1.9U	1.9U	3.1U	3.1U	2.2U	2.2U	32.7U	32.7U	3.1U	3.1U	µg/L
Magnesium	NR	NR	NR	NR	NR	NR	78300	78300	NR	NR	NR	NR	µg/L
Nickel	NR	NR	NR	NR	NR	NR	12.6	14.9	NR	NR	NR	NR	µg/L
Potassium	NR	NR	NR	NR	NR	NR	28100	27200	NR	NR	NR	NR	µg/L
Selenium	4.2U	4.2U	9.3	8.2	3.6	3.6	6.6	6.7	30.7U	30.7U	3.9	4.7	µg/L
Silicon	NR	NR	NR	NR	NR	NR	21300	21600	NR	NR	NR	NR	µg/L
Sodium	NR	NR	NR	NR	NR	NR	253000	254000	NR	NR	NR	NR	µg/L
Tin	5.8U	5.8U	5.6U	5.6U	3.7U	3.7U	2.8U	2.8U	16U	16U	NR	5.2U	µg/L
Vanadium	20.9	21.5	20.8	21.4	19.7	19.9	20	19.6	24.5	24	18.7	18.1	µg/L
Zinc	19.4UJ	24.9UJ	35.5	13.4	4.9	4.7	7.6	4.9	19.8	15.4	16.6	11.7	µg/L
Carbon tetrachloride	1U	1U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	µg/L
Methyl alcohol	NR	NR	NR	NR	NR	NR	5000U	5000U	NR	NR	NR	NR	µg/L
Trichlorofluoromethane	NR	NR	NR	NR	NR	NR	5U	5U	NR	NR	NR	NR	µg/L
pH	NR	NR	NR	NR	NR	NR	7.5	7.6	NR	NR	NR	NR	pH
Specific Conductance	2560	2550	2500	2430	2250	2470	3480	3520	3120	2980	2770	2750	µmS/cm
Bromide	1200J	1200J	1200UD	1200UD	780	690	1000	980	900	920	805	781	µg/L
Chloride	202000J	212000J	221000D	230000D	178000D	176000D	289000D	497000	288000D	242000D	211000D	221000D	µg/L
Fluoride	400J	390J	1200UD	1200UD	260	270	250U	280	260	250U	279	273	µg/L
Nitrate	305000	300000	450000D	448000D	309000D	294000D	449000D	536000	477000D	458000D	316000D	324000D	µg/L
Nitrite	1250U	1250U	1250UD	1250UD	1250UD	1250UD	250U	250U	2500UD	2500UD	5000UD	5000UD	µg/L
Sulfate	398000	395000	45800D	458000D	391000D	380000D	512000D	539000	632000D	507000D	431000D	404000D	µg/L
Total Organic Carbon	NR	NR	NR	NR	NR	NR	4100	10200	NR	NR	NR	NR	µg/L
Oil & Grease	NR	NR	NR	NR	NR	NR	1100U	2200	NR	NR	NR	NR	µg/L
Total Dissolved Solids	1760000	1700000	1940000	1970000	1820000	1810000	2490000	2070000	2200000	2120000	1920000	1860000	µg/L
Total Suspended Solids	NR	NR	NR	NR			5000U	5000U	NR	NR	NR	NR	µg/L
Gross alpha	142	198	730	821	526	422	232	277	414	445	444	340	pCi/L
Gross beta	553	561	697	718	515	514	520	533	736	704	530	471	pCi/L
Carbon-14	44.2U	66.8U	79.4U	87.4U	27.2U	29.2U	104	57.7U	75.8U	67.7U	12.8U	25.3U	pCi/L
Technetium-99	729	802	1000	997	717	628	805	858	808	814	631	612	pCi/L

Appendix C – Leachate Sampling Results Summary, 2003-2005

Table C-1. Summary of Leachate Sampling Results, 2003-2005.[a] (2 Pages)

Constituent	Jun-03	Jun-03	Dec-03	Dec-03	Jun-04	Jun-04	Dec-04	Dec-04	Jun-05	Jun-05	Dec-05	Dec-05	Units
Uranium (Total)	780	761	1310	1390	756	751	953	933	1090	1030	941	754	μg/L
Iodine-129	.013U	1.52U	-1.01U	-1.23U	-1.1U	-0.524U	0.288U	0.792U	-0.366U	0.41U	0.951U	0.844U	pCi/L
Total Radium Alpha Emissions	.123U	-0.012U	0.056U	-0.318U	-0.246U	-0.067U	0.193U	-0.044U	0.054U	0.06U	-0.02U	0.135U	pCi/L

[a] Both main and duplicate sample data presented in Table C-1.
D = Analysis was run at a secondary dilution.
J = Value is an estimate.
NR = not requested
U = undetected

Table C-2. Leachate Long List Analytes. (2 Pages)

(1-Methylethyl)benzene	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2,2-Tetrachloroethene	1,1,2-Trichloroethane
1,1,2-Trichloroethylene	1,1-Dichloroethane	1,1-Dichloroethene	1,2,2-Trichlorotrifluoroethane (Freon 113)	1,2,4-Trichlorobenzene
1,2-cis-Dichloroethene	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,2-Diphenylhydrazine
1,2-trans-Dichloroethene	1,3-Butadiene	1,3-Dichlorobenzene	1,3-Dichloropropene	1,3-Dinitrobenzene
1,4-Dichlorobenzene	1,4-Dinitrobenzene	1,4-Dioxane	1-Acetyl-2-thiourea	1-Chloroethene (Vinyl Chloride)
2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dichlorphenoxyacetic acid	2,4-Dimethylphenol
2,4-Dinitrophenol	2,5-Diamintoluene	2-Butanone (MEK)	2-Butenaldehyde (Crotonaldehyde)	2-Chloroethyl vinyl ether
2-Chloronaphthalene	2-Chlorophenol	2-Cyclohexyl-4,6-dinitrophenol	2-Methyl-2-propenenitrile (Methacrylonitrile)	2-Methylpropyl alcohol (Isobutyl alcohol)
2-Naphthylamine	2-Propanone (Acetone)	2-Propen-1-ol (Allyl alcohol)	3-Chloropropene (Allyl chloride)	4,4-DDD
4,4-DDE	4,4-DDT	4-Bromophenylphenyl ether	4-Chloro-3-methylphenol	4-Methyl-2-pentanone (MIBK)
4-Nitrophenol	7,12-Dimethylbenz[a] anthracene	Acenaphthene	Acetic acid ethyl ester (Ethyl acetate)	Acetic acid vinyl ester (Vinyl acetate)
Acetonitrile	Acetophenone	Acrolein	Acrylonitrile	Aldrin
alpha-BHC	alpha-Naphthylamine	Aluminum	Americium-241	Ammonia
Aniline	Anthracene	Antimony	Arsenic	Barium
Benzene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
Benzyl alcohol	Beryllium	beta-BHC	Bis(2-Chloroethoxy)methane	Bis(2-chloroethyl) ether
Bis(2-Chloroisopropyl) ether	Bis(2-ethylhexyl) phthalate	Bromide	Bromodichloromethane	Bromomethane
Butylbenzylphthalate	Cadmium	Calcium	Carbon disulfide	Carbon tetrachloride
Carbon-14	Cesium-137	Chloride	Chlorobenzene	Chloroethane
Chloroform	Chloromethane	Chromium	Chrysene	cis-1,3-Dichloropropene
Cobalt	Cobalt-60	Copper	Cresols, total	Dibenz[a,h]anthracene
Dibromochloromethane	Dichlorobenzene	Dichlorodifluoromethane	Dichloromethane (Methylene Chloride)	Dichloroproponol

Table C-2. Leachate Long List Analytes. (2 Pages)

Dieldrin	Diethyl phthalate	Dimethyl phthalate	Di-n-butylphthalate	Dinitrobenzene
Di-n-octylphthalate	Endrin	Ethyl benzene	Ethyl ether	Ethyl methanesulfonate
Ethylene dibromide	Europium-152	Europium-154	Europium-155	Fluoranthene
Fluorene	Fluoride	Gamma-BHC (lindane)	Gross alpha	Gross beta
Heptachlor	Heptachlor Epoxide	Hexachlorobutadiene	Hexachloroethane	Hexachlorophene
Indeno(1,2,3-cd)pyrene	Iodine-129	Isophorone	Lead	Magnesium
Manganese	m-Cresol	Mercury	Methyl alcohol	N,N-Diphenylamine
Naphthalene	n-Butyl alcohol	Nickel	Nitrate	Nitrite
Nitrobenzene	N-Nitroso-di-n-propylamine	N-Nitrosodiphenylamine	N-Nitrosomorpholine	N-Nitroso-N,N-dimethylamine
O,O,O-Triethyl phosphorothioate	o-Cresol	Oil & Grease	PCB-1016	PCB-1221
PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
p-Cresol	Pentachlorophenol	Phenol	Phosphate	Polychlorinated biphenyls (PCBs)
Potassium	Potassium-40	p-Phenylenediamine	Pyrene	Pyridine
Radium-226	Radium-228	Selenium	Silicon	Silver
Sodium	Styrene	Sulfate	Technetium-99	Thallium
Thorium-228	Thorium-232	Tin	Toluene	Total Dissolved Solids
Total Organic Carbon	Total Radium Alpha Emissions	Total Suspended Solids	Toxaphene	trans-1,3-Dichloropropene
Tribromomethane (Bromoform)	Trichlorofluoromethane	Trichloromethanetiol	Uranium (Total)	Uranium-235
Uranium-238	Vanadium	Xylene	Zinc	

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