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River Corridor
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Groundwater and Leachate Monitoring and Sampling at ERDF, CY 2008

September 2009

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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ACRONYMS

BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COCS	contaminant of concern
CY	calendar year
DOW	description of work
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
GPP	groundwater protection plan
PNNL	Pacific Northwest National Laboratory
QA/QC	quality assurance/quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
ROD	Record of Decision
WCH	Washington Closure Hanford, LLC
VOA	Volatile Organic Analysis

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 1996) and to meet the requirements of the ERDF Record of Decision (ROD) (EPA 1995). Based on about 10 years of ERDF monitoring activities and statistical evaluations of the data, the ERDF GPP (WCH 2008a) was revised and a new *Environmental Restoration and Disposal Facility Leachate Sampling and Analysis Plan* (WCH 2008b) was approved. Any new requirements or changes in evaluation that were recommended by the new ERDF GPP and SAP are included in this report and will be in future reports. Ongoing groundwater and leachate monitoring are performed to meet the requirements of the ERDF ROD, and details of the monitoring program are described in the revised ERDF GPP (WCH 2008a), 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, to report leachate results in fulfillment of the requirements specified in the ERDF ROD (EPA 1995) and the ERDF Amended ROD (EPA 1999). The objectives of this report are as follows:

- Review routine groundwater sampling data to statistically evaluate if there have been changes in COCs concentrations over time that may be attributed to ERDF operations
- Assess conditions that may indicate the presence of encroaching groundwater contaminant plumes originating from up-gradient 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 COCs list and to confirm that leachate concentrations do not exceed delisting levels specified in the ERDF Amended ROD (EPA 1999).
- Evaluate the groundwater levels in the ERDF monitoring wells to determine if the existing wells need to be modified or replaced.
- Describe and evaluate the sample data, identify changes or trends in the data, and incorporate a summary of the results.
- Create an initial characterization and establish a baseline to determine if the routine analyte list of indicator parameters is adequate.

Appendix A shows analytical results for groundwater samples that were collected from the ERDF monitoring well network from calendar year (CY) 1996 through CY 2008. 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 2006 through CY 2008 are presented in Appendix C. Leachate data

collected from CY 1996 through CY 2005 are contained in previous ERDF groundwater and leachate monitoring reports (Faurote 2000; BHI 2002, 2003, 2004, 2005b; WCH 2006, WCH 2007).

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 2-1). 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* (CERCLA). 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 ERDF contain elevated levels of radionuclides and hazardous constituents originating from the 100, 200, and 300 Area waste sites.

2.2 ENVIRONMENTAL RESTORATION DISPOSAL FACILITY

ERDF was designed as a series of side-by-side cells that measure 21.3 m (70 ft) in depth, 152.4 m by 152.4 m (500 ft) wide at the base, with a wall slope of 3:1 to measure over 304 m (1,000 ft) wide at the surface. There are currently eight waste cells associated with the ERDF site. Initially, Cells 1 and 2 were constructed and the placement of waste in these cells has since been completed. Cells 3 and 4 were constructed in 2000 and the placement of waste in these cells has since been completed. Construction of cells 5 and 6 was completed during 2004, and two additional cells, cells 7 and 8, have recently been constructed and approved for waste disposal in the first half of CY 2009. Figure 2-2 shows the ERDF as it is currently constructed. Throughout CY 2008, approximately 635,029 metric tons of remediation wastes were disposed at the facility.

2.2.1 Leachate System

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).

Figure 2-1. Location of the Environmental Restoration Disposal Facility.

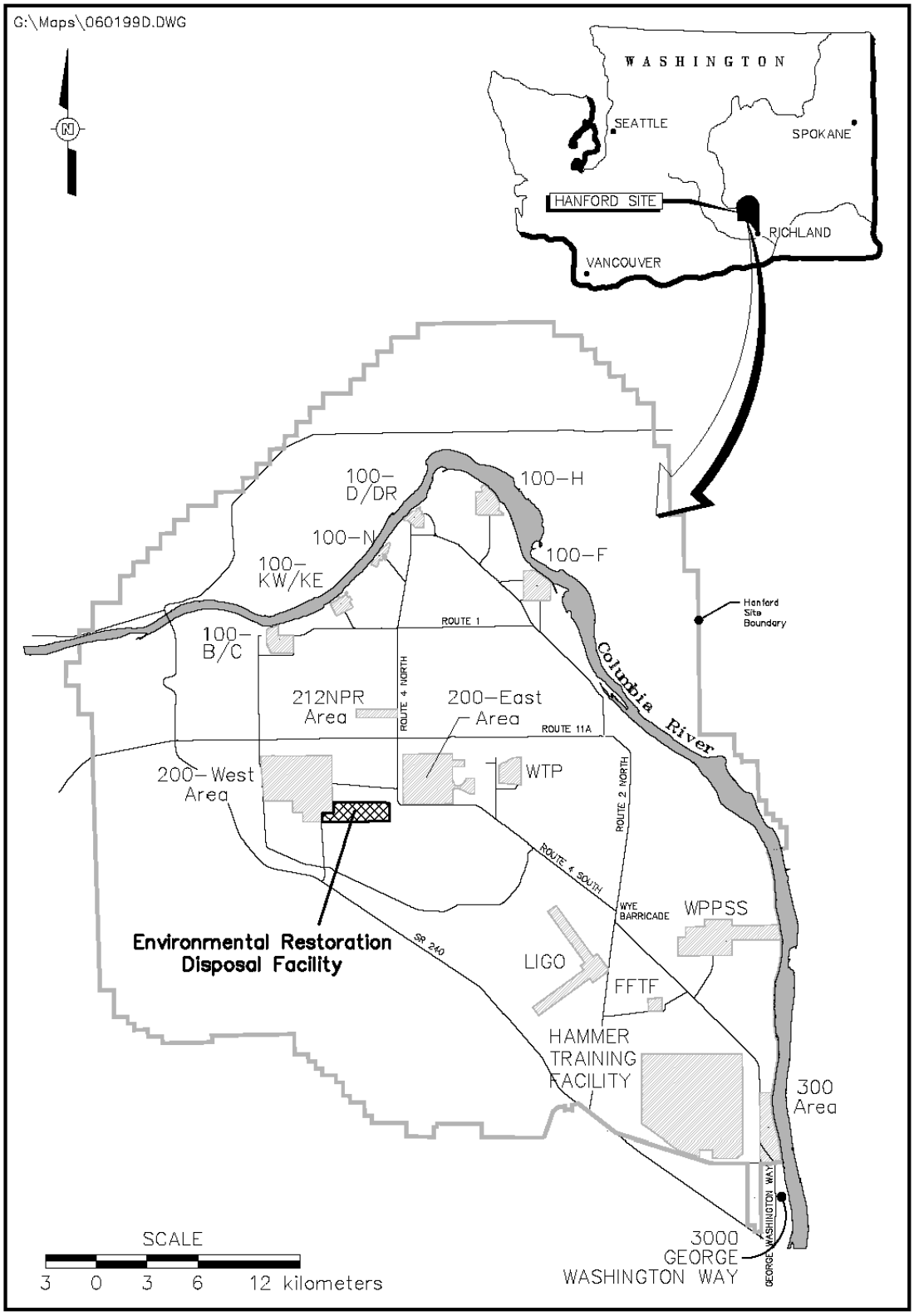
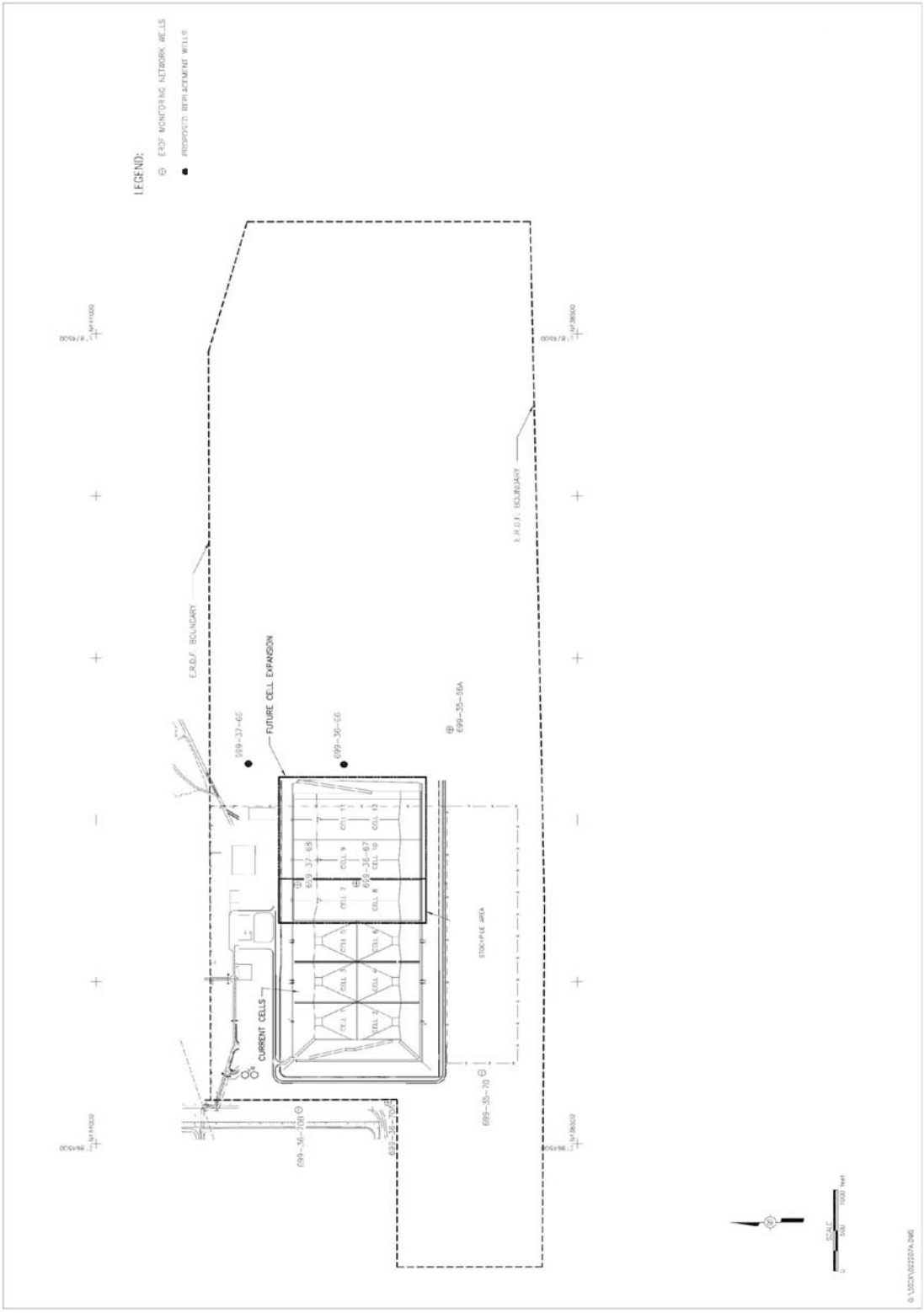


Figure 2-2. ERDF Monitoring Well Location Map.



3.0 GROUNDWATER & LEACHATE MONITORING

The groundwater and leachate monitoring program is described in the ERDF GPP (WCH 2008a). 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 up-gradient well (699-36-70A) and three down-gradient wells (699-37-66, 699-35-66A, and 699-36-66B). During CY 2008, groundwater sampling was completed at all of the ERDF monitoring wells in March and September, in July and December groundwater sampling was also conducted at the two newly installed wells (699-37-66 and 699-36-66B) as mandated by regulatory requirements for newly installed groundwater monitoring wells. Well locations are shown in Figure 2-2.

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. To date, no additional COCs have been identified for addition to the groundwater lists based on leachate analysis results. Table 3-1 lists the 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). Groundwater wells 699-37-68 and 699-36-67 were decommissioned in 2007 due to construction of ERDF waste cells 7 & 8. Groundwater monitoring wells 699-37-66 and 699-36-66B were installed as replacement down-gradient wells.

Table 3-1. List of Groundwater Analytes by Analytical Method. (2 Pages)

Analyte	Method[a]	Practical Quantitation Limit	Accuracy[b] (%)	Precision[b] (%)
Arsenic	6010A	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	6010A	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

Table 3-1. List of Groundwater Analytes by Analytical Method. (2 Pages)

Analyte	Method[a]	Practical Quantitation Limit	Accuracy[b] (%)	Precision[b] (%)
Carbon tetrachloride	8260B	5 μg/L	±25	±25
Alkalinity	310.1[c]	10,000 μg/L	±20	±25
Chloride	300[d]	10,000 μg/L	±20	±25
Fluoride	300[d]	100 μg/L	±20	±25
Nitrogen (in nitrite/nitrate)	353.1	0.05 μg/L	±20	±25
Sulfate	300[d]	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	[e]	200 pCi/L	±20	±25
Iodine-129	[e]	5 pCi/L	±20	±25
Technetium-99	[e]	10 pCi/L	±20	±25
Radium	903.1[f]	1 pCi/L	±20	±25
Total uranium	[e]	0.1 μg/L	±20	±25
Gross alpha	900.0[f]	3 pCi/L	±20	±25
Gross beta	900.0[f]	4 pCi/L	±20	±25
pH	[g]	NA	NA	NA
Specific conductance	[g]	25 μS/cm	±20	NA
Turbidity	180.1[c]	0.05 NTU	±0.05 NTU	NA

[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] Method specified is from *Determination of Inorganic Anions in Aqueous and Solids Samples by Ion Chromatography* (Lindahl 1984), and is a modification of EPA Method 300.0.
[e] Industry standard method, laboratory-specific, based on acceptance by Washington Closure Hanford.
[f] Method specified is from *Prescribed Procedures for Measurement of Radioactivity in Drinking Water* (EPA 1989).
[g] Parameter will be measured in the field.

NA = not available, or not applicable
NTU = nephelometric turbidity units

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 3-1. 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 (QA/QC) 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 (WCH 2008a) 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. 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:

$$TI = X_b + k * S_b \text{ (two-sided)}$$

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

The leachate is sampled semi-annually to provide data for leachate delisting analyses and to assess whether additional COCs should be added to the routine ERDF groundwater monitoring program. Separate leachate sampling may also be performed to verify that waste acceptance criteria for the ETF are met prior to the transfer of leachate to that facility. The evaluation and reporting of the ETF sampling data is outside the scope of this report.

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 (biennial), 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 2008. Composite leachate samples for the short list of analytes were collected during the June 2008 event and composite leachate samples for the long list of analytes were collected during the December 2008 event. Historically, 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 six sumps associated with the upper liners. For the 2008 sampling events, an additional set of duplicate samples were taken from the leachate storage tanks. Subsequent to that sampling, the decision has been made to take samples from the storage tanks, which was done for the December 2008 event. Data for the current year and from the two prior years of leachate sampling (i.e., CYs 2006 to 2008) 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 apparently did not sound indicating 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. This measurement was treated as an anomaly and not used to evaluate water levels and future accessibility. Prior to this wells decommissioning in 2007 subsequent samples have returned to expected levels.

Based on a water table map (Figure 3-1), 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 on the west end of ERDF and 0.003 m/m as an average across the entire width of ERDF with the east end being considerably greater. The average hydraulic gradient for the operable unit (200W) that included ERDF is 0.002 m/m. 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 3-2 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. 2005).

Figure 3-1. Water-Level Contour Map.

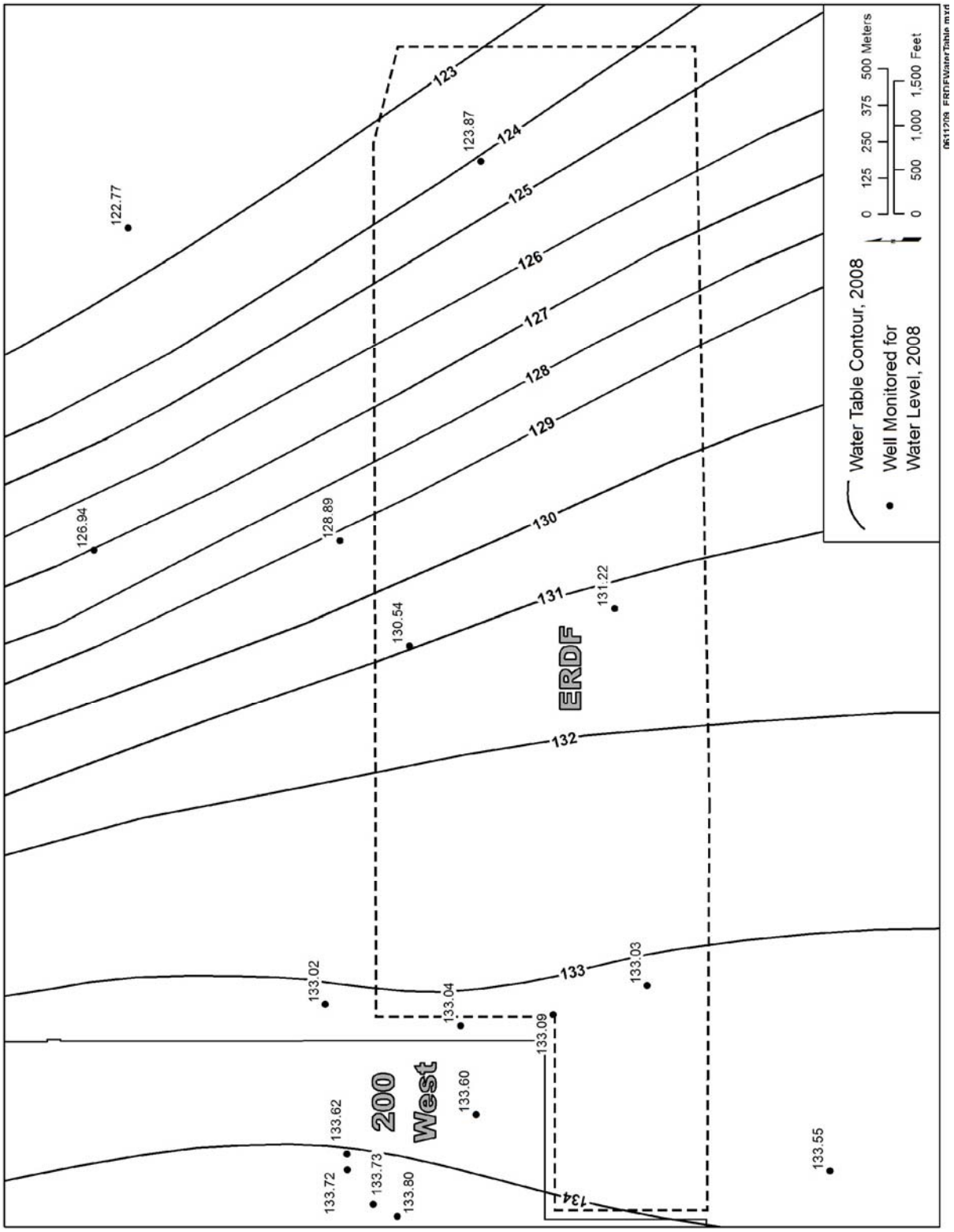
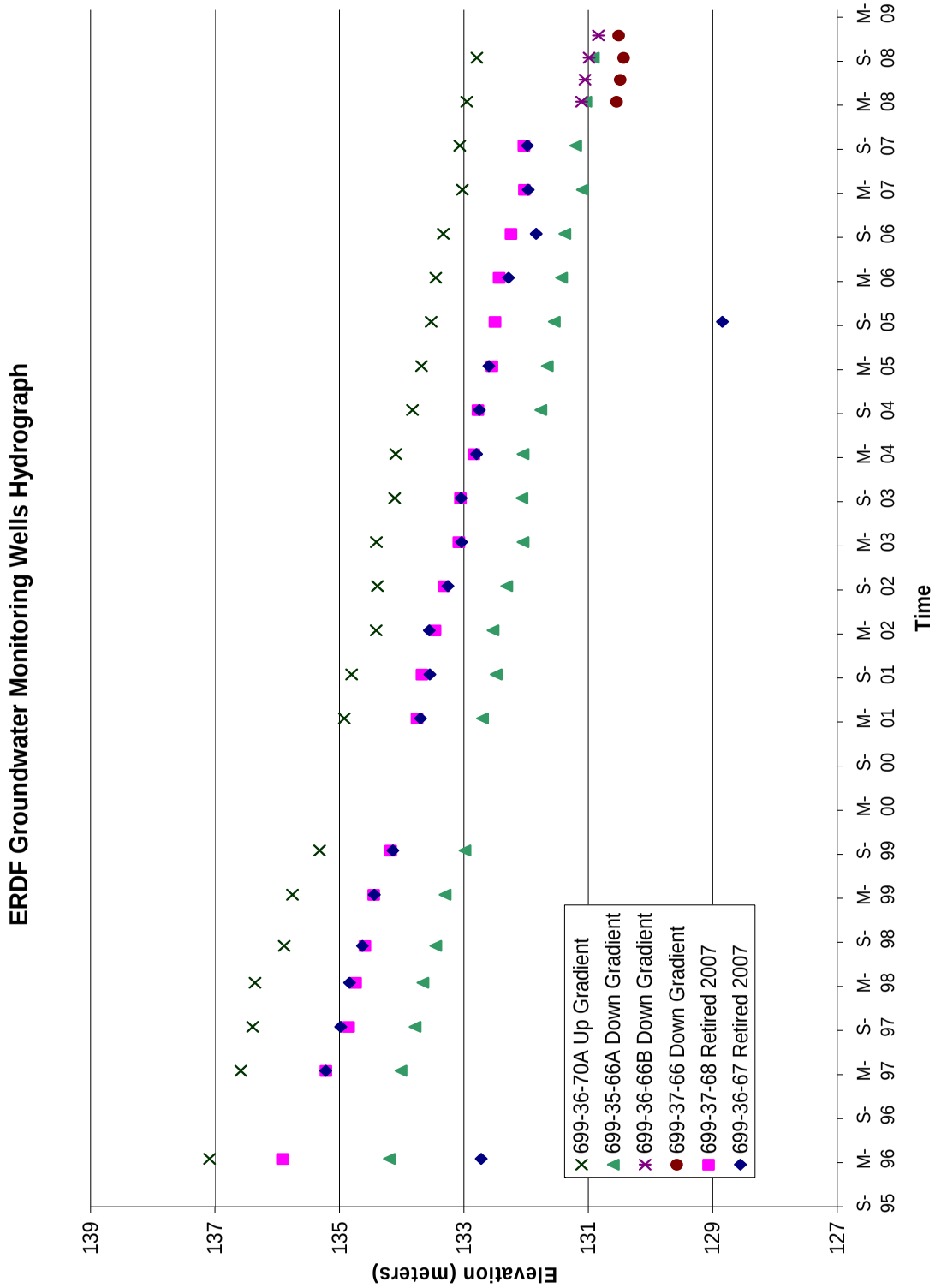


Figure 3-2. Hydrograph from ERDF Groundwater Monitoring Wells.



4.0 ANALYTICAL RESULTS AND FIELD DATA

Analytical results for groundwater and leachate samples collected during CY 2008 are discussed in the following subsections. Also discussed are the data resulting from CY 2008 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. The analyte trend plots summarizing groundwater monitoring results are included in Appendix B and have been revised to reflect the new tolerance limits for 2007 data onward (WCH 2008a). Note that the tolerance limits show an overlap in the graphical presentations in Appendix B. This was done to better show changes, the original tolerance intervals apply to pre-2007 sampling and the new tolerance limits apply only to CY 2007 and later sampling.

Groundwater monitoring results and apparent trends based on CY 2008 data are summarized in Table 4-1.

Table 4-1. Summary of Tolerance Interval Comparisons and Trends. (4 Pages)

Analyte	Upper Tolerance Interval[a]	Well(s) Exceeding Upper Tolerance Interval in CY 2008[b]				Comments
		70A	66A	66B	66	
Arsenic	4.2 μg/L	Yes	No	No	No	Arsenic concentrations in all wells had detectable levels elevated relative to the tolerance level. Arsenic concentrations in well 70A exceeded the tolerance limit for the September 2008 sampling but were below the detection limit in the March 2008 sample. All arsenic detections are very close to analytical detection limits (i.e. higher analytical uncertainty). No apparent trending in the data was seen from the two established wells and this is the first reportable data for the two newly established wells. It should also be noted that the reported arsenic detects for CY 2008 remained below the Hanford Site background levels listed in the ERDF GPP (WCH 2008a) for arsenic (11.8 μg/L).
Barium	122.3 μg/L	No	No	No	No	All wells exhibited concentrations below the tolerance interval, stable with regards to previous years for the established wells. Well 66 showed the highest recordable levels of all the wells but was below the tolerance level.
Chromium	13.4 μg/L	No	Yes	No	No	Chromium levels in 66A are elevated relative to the tolerance limit, but have not changed significantly from previous years. The other wells were all below the upper tolerance level.

Table 4-1. Summary of Tolerance Interval Comparisons and Trends. (4 Pages)

Analyte	Upper Tolerance Interval[a]	Well(s) Exceeding Upper Tolerance Interval in CY 2008[b]				Comments
		70A	66A	66B	66	
Lead	5 μg/L	No	No	No	No	Lead concentrations from CY 2008 sampling were not detected and are below the tolerance interval in all wells. Levels are consistent with previous analyses and appear very stable.
Selenium	5.6 μg/L	Yes	No	Yes	Yes	Selenium levels in wells 70A and 66 were elevated relative to the tolerance level from March 2008 sampling and well 66B during the September 2008 sampling. Spikes in the Selenium values in the well 70A have appeared in previous years (e.g., 1999, 2002, 2004 and 2007). Levels in 66 and 66B appear to be normally elevated near the tolerance limit, but CY 2008 is the only sampling period for the new wells.
Tin	10 μg/L	No	No	No	No	All wells exhibited stable Tin concentrations below the tolerance interval and appear to be very stable.
Uranium	3.4 μg/L	No	No	No	No	All wells exhibited stable Uranium concentrations below the tolerance interval and appear to be very stable.
Vanadium	40 μg/L	No	No	No	No	All wells exhibited Vanadium concentrations below the tolerance interval and very stable with regards to previous years.
Zinc	26.5 μg/L	No	No	No	No	All wells exhibited stable Zinc concentrations below the tolerance interval and appear to be very stable. For the established wells (66A & 70A), validation of detects of the CY05, CY06, and CY07 data indicates that all low-level zinc detects should be flagged as nondetect due to laboratory contamination.
Alkalinity	152.9 mg/L	No	No	No	No	All wells exhibited Alkalinity concentrations below the tolerance interval, stable with regards to previous years.
Chloride	26 mg/L	No	No	No	No	All wells exhibited Chloride concentrations below the tolerance interval, stable with regards to previous years.
Fluoride	0.45 mg/L	No	No	No	No	All wells exhibited Fluoride concentrations below the tolerance interval, stable with regards to previous years.
Sulfate	37.8 mg/L	No	No	No	No	All wells exhibited Sulfate concentrations below the tolerance interval. Wells 66, 66A, and 66B appear stable with regards to previous years.
Gross alpha	2.98 pCi/L	No	No	No	No	Spikes in the Gross Alpha values in well 70A have appeared in previous years (2000, 2007). All gross alpha detections are very close to analytical detection limits (i.e. higher analytical uncertainty). No apparent trending in the data was seen.

Table 4-1. Summary of Tolerance Interval Comparisons and Trends. (4 Pages)

Analyte	Upper Tolerance Interval[a]	Well(s) Exceeding Upper Tolerance Interval in CY 2008[b]				Comments
		70A	66A	66B	66	
Gross beta	31.5 pCi/L	No	Yes	Yes	Yes	Gross beta activity was above tolerance limits in all down gradient wells (66, 66A and 66B). Well 66A appears to be upward trending and continues to exceed the tolerance interval. Maximum values in the downgradient wells remained below previously determined maximums in the upgradient well. The maximum values in up-gradient well 70A also remained below the tolerance level.
Carbon-14	58.1 pCi/L	No	No	No	No	Carbon-14 was not detected in any of the wells during the 2008 monitoring events.
Iodine-129	21.1 pCi/L	No	No	No	No	All wells exhibited Iodine-129 concentrations below the tolerance level.
Technetium-99	93.8 pCi/L	No	No	No	No	All wells exhibited concentrations below the tolerance level. Down gradient well 66A appears to be upward trending, while up gradient well 70A appears to be downward trending. The two new down gradient wells (66 & 66B) have elevated levels but remained below the tolerance limit and a determination on trending could not be reached due to lack of historical data.
Radium	0.695 pCi/L	No	No	No	No	Radium was not detected in any of the wells during the 2008 monitoring events; all detection limits were below the tolerance interval in all wells and appear to be stable relative to previous years.
Carbon tetrachloride	11 μg/L	No	No	No	No	All wells exhibited Carbon tetrachloride concentrations below the tolerance interval with no significant trends identified.
Nitrogen in nitrite and nitrate	51.1 mg/L	No	No	No	No	All wells exhibited concentrations below the tolerance interval, stable with regards to previous years with an indication of down trending concentrations in the established wells 66A and 70A. The new down gradient wells 66 displayed elevated levels but remained below the tolerance limit and a determination on trending could not be reached due to lack of historical data.
Total organic halides (TOX)	5 μg/L	No	No	Yes	Yes	Total Organic Halides concentrations were detected in wells 66 and 66B in the March 2008 and in the Sept 2008 sampling of well 66B. The other wells exhibited concentrations below the tolerance level; however the laboratory detection limits were slightly above the tolerance interval (i.e. higher analytical uncertainty). Spikes have been noted in TOX values in previous sampling and no specific trends are apparent.

Table 4-1. Summary of Tolerance Interval Comparisons and Trends. (4 Pages)

Analyte	Upper Tolerance Interval[a]	Well(s) Exceeding Upper Tolerance Interval in CY 2008[b]				Comments
		70A	66A	66B	66	
Total dissolved solids	570 mg/L	No	No	No	No	All wells exhibited concentrations below the tolerance interval, stable with regards to previous years with an indication of down trending concentrations in well 70A. The new down gradient wells 66 displayed elevated levels but remained below the tolerance limit and a determination on trending could not be reached due to lack of historical data.
Turbidity	49.8 NTU	No	No	No	No	All wells exhibited concentrations below the tolerance interval, stable with regards to previous years.
pH	8.01 units/ 7.48 units[c]	No	Yes	No	Yes	All wells exhibited pH concentrations below the upper tolerance interval. Wells 66 and 66A exhibited pH concentrations below the lower tolerance interval for the September 2008 monitoring period and all wells had pH reading that's were below the existing trends in the 2008 monitoring period with the wells indicating an increase to historical trend levels in the Dec 2008 monitoring period..
Specific conductance	774 μS/m	No	No	No	No	All wells exhibited concentrations below the tolerance interval, stable with regards to previous years. There is indication of downward trending concentrations in well 70A. The new down gradient well 66 displayed stable levels and remained below the tolerance limit.

[a] New Upper Tolerance Levels have been set for 2007 onward in the revised ERDF GPP (WCH 2008a)..

[b] Well identification:

70A = up-gradient monitoring well 699-36-70A
66 = down-gradient monitoring well 699-37-66
66A = down-gradient monitoring well 699-35-66A
66B = down-gradient monitoring well 699-36-66B

[c] pH Tolerance Intervals includes upper and lower limits.

CY = calendar year

Numerous contaminant plumes that originated from past activities in the 200 West Area are near or beneath the ERDF site. Chemical processing activities of uranium and plutonium in the 200 West Area are known to have introduced contaminants in the groundwater up-gradient from ERDF. Plumes originating from 200 West Area sources detected in ERDF monitoring wells include nitrogen (nitrate plus nitrite), carbon tetrachloride, gross alpha, gross beta, technetium-99, iodine-129, and uranium. Detailed descriptions of the sources for these constituents are contained in the ERDF GPP (WCH 2008a). The newly established monitoring wells appear to indicate the contaminate plumes are migrating eastward due to the elevated readings of COCs. The apparent trends in groundwater concentrations of these constituents are as follows:

- **Nitrogen**. Concentrations for nitrogen (nitrate plus nitrite) have remained stable and continue to show a long-term downward trend for wells 699-35-66A and 699-36-70A. Well 699-37-66 exhibits elevated but stable readings, but no long term trending data is available.

- **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. Most recent samples have reported nondetect values. The September 2008 values for well 70A did show detection near the upper tolerance level. Similar results have appeared in the results from previous years. No trending is noted.

- **Gross Beta Activity**. Activity for gross beta generally increased over the course of the ERDF monitoring activities for all wells through CY2002. Recent sampling results suggest that gross beta activity in the up-gradient well (70A) has entered a downward trend. Down-gradient well 66A is showing a continuing long term upward trend with activity levels showing a sharp decline during CY 2008. Down-gradient wells 66 and 66B show gross beta activity above the tolerance limit. A determination on trending for wells 66 and 66B is not possible due to the limited historical data available; however, the values are similar to the retired down gradient wells.

- **Technetium-99**. Technetium-99 activity concentrations in the ERDF monitoring wells have remained stable and generally been within tolerance intervals over the course of ERDF monitoring activities. Recent sampling results suggest activity in well 70A may be entering a downward trend and wells 66A shows a very slight upward trend over the long term. Down-gradient wells 66 and 66B show elevated levels of Tc-99 below the tolerance limit and similar to past results from the retired down gradient wells, but a determination on trending is not possible due to the limited historical data available.

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

- **Uranium**. Uranium activity in groundwater has generally been stable in the ERDF monitoring wells. Recent samples suggest a slight long term downward trend in the established wells 66A and 70A.

4.2 SUMMARY OF LEACHATE ANALYSIS

Data associated with leachate sampling conducted from CY 2006 through CY 2008 are presented in Appendix C, Table C-1. 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 COCs lists are included in this report. During the December 2008 sampling a delay at the laboratory allowed the anion samples (bromide, chloride, fluoride, nitrate, nitrite, phosphate, sulfate, formaldehyde, and pH) to exceed their hold times thus preventing analysis for these constituents. Re-sampling for these constituents will occur in June 2009 and the results will be summarized in the CY 2009 report. This report will discuss the findings from the June 2008 sampling period for those constituents.

Leachate samples contained detectable concentrations of common metals, anions, and mobile radionuclides. Based on the CY 2008 leachate sampling results, the constituents that were generally increasing in activity include gross alpha, gross beta, and total uranium. The following is an update of those constituents for which there were detectable concentrations and their activities in evaluation of the CY 2006 sampling results:

- **Chromium**. Chromium concentrations that were previously slowly increasing have stabilized and are beginning to slowly decrease.

- **Nickel**. Nickel, which is on the long list of analytes and monitored once every 2 years, appears to be decreasing in concentration.

- **Potassium**. Potassium appears to be stabilized and slightly decreasing in concentration based on data collected during CY 2008.

- **Specific Conductance**. Specific conductance appears to be fairly stable with some slight upward and downward variations in analytical results during the CY 2006 through CY 2008 monitoring period.

- **Bromide**. Bromide was not detected in leachate samples during the CY 2008 monitoring events.

- **Nitrate**. Nitrate concentrations have remained fairly stable though the CY 2008 monitoring.

- **Total Dissolved Solids**. Total dissolves solids appear to be fairly stable with some slight upward and downward variations in analytical results during the CY 2006 through CY 2008 monitoring period.

- **Gross Alpha**. Gross alpha activity concentrations have continued to increase over the past 3 years and have reached a new peak during the CY 2008.

- **Gross Beta**. Gross beta activity concentrations have continued to increase over the past 3 years and have reached a new peak during the CY 2008.

- **Uranium**. Uranium concentrations have continued to increase over the past 3 years and have reached a new peak during the CY 2008.

- **Technetium-99**. Technetium-99 concentrations have remained stable though the CY 2008 monitoring.

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 2008 from wells 699-35-66A, and 699-36-70A show a rate of decline that may be starting to stabilize. The newly installed well 699-37-66 appears to be fairly stable with little to no water level change between the March and December measurements. A slight drop in water level (~0.1 meters) was identified during the September measurement, but may be associated with normal groundwater level fluctuations. Well 699-36-66B exhibited a gradual rate of decline during CY 2008 monitoring.

Based on the measured water levels in the four ERDF monitoring wells, it was determined that the height of the water column in the ERDF up-gradient monitoring well 699-36-70A is 4.9 m (16 ft). The down-gradient monitoring wells had water column levels of 3.8 m (12.5 ft) at well 699-35-66A, 9.9 m (32.5 ft) of water at well 699-37-66, and 9.8 m (32 ft) of water at well 699-36-66B. At the current average rate of decline, the monitoring wells would be available for use, as they are currently constructed, for approximately 15 to 22 years.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the CY 2008 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:

Due to a laboratory situation during the December 2008 monitoring period it needs to be noted that analytical data results for groundwater anion analysis was not conducted. Additionally, a input error that entered incorrect reporting criteria on some laboratory equipment returned analytical results for arsenic, selenium, and tin that visually suggests they are above the upper tolerance level in Appendix B, when in actuality the laboratory qualifier in Appendix A indicated these analytes were not detected.

Nitrogen, carbon tetrachloride, gross beta, technetium-99, iodine-129, and uranium present in samples collected from the ERDF monitoring wells are due to the migration of contaminants from non-ERDF sources in the 200 West Area. There has been no correlation between leachate COCs levels and groundwater COCs levels to indicate the leachate collection system is impacting the groundwater under ERDF. The two new groundwater wells (699-37-66 and 699-36-66B) appear to have been placed atop the existing groundwater contamination plume that has been slowly moving in the down-gradient direction from ERDF. This may extend the time period needed to allow the contaminant peak from historical releases in 200W to pass the down-gradient wells due to the increased travel time of the groundwater between monitoring locations. The contaminant peak appears to have passed the up-gradient well around 2005 establishing a slight down trend in the up-gradient well.

Groundwater activity from gross beta indicates a long term upward trend in the down-gradient wells with the up-gradient well showing some decline after peaking in 2000 and 2001 and has remained below the upper tolerance level after 2004. Groundwater activity from uranium has remained stable. Groundwater activity from gross alpha showed upward spikes during the CY 2008 monitoring from the up-gradient well, however the overall trend indicates a slight long term decrease. Although levels of Technetium-99 are below the upper tolerance interval, the down-gradient wells have shown a trend of increasing concentrations, while the up-gradient well has shown a trend of decreasing concentrations. This is a good indication that the groundwater contaminant plume from 200W is moving in the easterly direction and beginning to impact the down-gradient wells. Groundwater activity from uranium, gross alpha and gross beta will continue to be monitored in future events to evaluate the data for adverse impacts from ERDF leachate to the groundwater at this location. At this time there is no evidence of any adverse impacts to the groundwater from ERDF.

Although arsenic concentrations remain well below Hanford site background reference values, concentrations in wells 699-36-70A and 699-35-66A appear to be trending upward. No

Hanford-derived sources for arsenic have been identified for potential impact in the groundwater under ERDF. Pre-Hanford use of arsenic in agriculture may be the source of this contamination.

Chromium levels in the down-gradient well 699-35-66A have historically been elevated and after slightly increasing appear to have stabilized at a level greater than the upper tolerance interval. All other wells are stable at a level below the upper tolerance interval. As the chromium levels within the ERDF leachate system have been steadily declining the source of the elevated levels do not appear to be ERDF related and appear to be related to the groundwater contaminant plume from 200W.

Total organic halide concentrations significantly spiked in down-gradient wells during CY 2006 monitoring and were detected again in the newly installed down-gradient wells in CY 2008 sampling. The two new groundwater wells (699-37-66 and 699-36-66B) appear to have been placed atop the existing groundwater contamination plume that has been slowly moving in the down-gradient direction from ERDF. Analysis has shown periodic spikes in the groundwater data in the past. No correlations can be seen between total organic halide results and the volatile organic analyses (VOA) performed at the same time (VOA will report unexpected detections of chlorinated organics – the most likely contributor to total organic halide results). Total organic halide analysis is only an indicator analysis. Any future indication of consistent contamination will be evaluated to establish the source and composition of the compounds.

Trends in leachate indicating increases in the activity of gross alpha, gross beta, and uranium were noted for samples collected over the past 3 years. Analysis of the radionuclide data indicates an apparent correlation of the increasing uranium levels and waste from specific field remediation sites disposed of at ERDF. The 300 Area and 618 Burial Grounds remediation projects have introduced waste into ERDF that contained elevated uranium levels. As these waste materials were placed into ERDF there appears to be a correlation with increased uranium levels in the leachate system. Specifically, during the 618-2 remediation project in 2006 the total estimated uranium within the waste site was 40 Curies and a significant increase in the leachate was detected over the course of the next year. This trend was again noted with the 618-7 remediation project. In 2007 the uranium levels within the leachate system appeared to be stabilizing, but have begun to increase again as ERDF accepted the 618-7 waste, which had a total estimated uranium within the waste site of 30 Curies. The increase in total alpha activity can partially be attributed to these uranium increases. Increases in the total beta and some of the total alpha can be attributed to the acceptance of waste from other remediation sites along the river corridor such as the 100 Area Burial Grounds. Since 2005 ERDF has accepted close to 2 million tons of waste, much of which contained uranium, alpha and beta activity, this volume of waste is expected to increase concentrations of the more soluble elements over time. Groundwater monitoring data for these constituents were examined to determine potential impacts to groundwater from ERDF operations.

Based on this CY 2008 evaluation, no additional analytes are recommended for the groundwater monitoring program and no additional analysis is necessary for the routine leachate sampling. The current monitoring frequency appears to be appropriate for future monitoring needs.

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APPENDIX A

GROUNDWATER SAMPLING RESULTS, 1996-2008

Table 1. Arsenic

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	3 B		1.1 B		3 B		1.7 B	1.7B					4.4	
Sep-96	2.6 B	3.8B	0.98 B		2.1 B		0.67 B						4.4	
Mar-97	2.8 B	2.7B	2 B		2.5 B		1.4 B						4.4	
Sep-97	3.5 B	2.8B	1.9 B		3.3 B		1.6 U						4.4	
Mar-98	2.1 B		1.6 B	1.1B	2.6 B		0.6 U						4.4	
Aug-98	2.8 B		1 U		1.2 B		1.4 B	1U					4.4	
Mar-99	3.3 U		3.3 U	3.3U	3.3 U		3.3 U						4.4	
Sep-99	3.3 U	3.3U	3.3 U		3.3 U		3.3 U						4.4	
Mar-00													4.4	
Sep-00	2.6		2.4 U		3.2	3.8							4.4	
Mar-01	3		2.3 U		5.2		4.5	3.2					4.4	
Sep-01	5.6		22.8	10U	52.1 U		52.1 U						4.4	
Mar-02	4.4	3U	4.6		4.3		3 U						4.4	
Sep-02	4.4		4.5 U	3.3	3.8		3.3 U						4.4	
Mar-03	3.5 U		4.4		3.5 U		3.5 U						4.4	
Sep-03	4.2 U	4.2U	4.2 U		4.2 U		4.2 U						4.4	
Mar-04	3.4 U		3.40 U		3.4 U		3.4 U	3.4U					4.4	
Sep-04	3.6 U		3.7	3.6U	3.6 U		3.6 U						4.4	
Mar-05	34 U	34U	34 U		34 U		34 U						4.4	
Sep-05	4.7 U		23.6 U		23.6 U		27.5	23.6U					4.4	
Mar-06													4.4	
Sep-06	5.3		3.7 U	3.7U	4.7		3.7 U						4.4	4.2
Mar-07	4.6		4.1		4.3	5	4.1 U						4.4	4.2
Sep-07	5.6		4.1 U	4.1U	4.1 U		4.1 U							4.2
Mar-08	5 U				5 U	5			5 U		5 U			4.2
Jun-08									5 U		5 U			4.2
Sep-08	3.8				5.5				3.5		2.9	3.6		4.2
Dec-08									10U		10U	10U		4.2

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 2. Barium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	46 B		81.9 B		92.1 B		92 B	90.6B					123.3	
Sep-96	42.9 B	0.0402B	66.7 B		80.8 B		77.9 B						123.3	
Mar-97	46.3 B	47B	87.6 B		93.4 B		102 B						123.3	
Jun-97					83.6								123.3	
Sep-97	42.2 B	40.9B	64.6 B		80 B	76.6	69.6 B						123.3	
Mar-98	43.7		66.8	66.6	78.4	82.4	79						123.3	
Aug-98	39.8 B		58.2 B		74.1 B		71.1 B	69B					123.3	
Mar-99	40.5		59	58.4	76.1	72.8	73.2						123.3	
Sep-99	40.3 B	40.2B	54.1 B		75.6 B		69.8 B						123.3	
Jan-00					77.8 B								123.3	
Mar-00													123.3	
Sep-00	38.9		51.5		73.8	74.3							123.3	
Dec-00					77.3 B								123.3	
Mar-01	38		50		71.4		68.1	69.9					123.3	
Sep-01	40.5		200 U	200U	71.2		64.9						123.3	
Dec-01					74.6 B								123.3	
Mar-02	38.3	38.5	56.2		66.9		68.7						123.3	
Sep-02	39.8		58.1	0.31	69.4		67.9						123.3	
Mar-03	37.8		49.6		70		64.3						123.3	
Sep-03	39.8	41.4	58.3		71.5		65						123.3	
Mar-04	38.9		56.1		56.5		66.6	66.5					123.3	
Sep-04	39.9 C		56.3 C	57.2C	60.9 C		68.7 C						123.3	
Mar-05	39.3	39.5	56.4		60.4		61.6						123.3	
Sep-05	37.1 C		48.4		54.5		65.4	63.8					123.3	
Mar-06	35.4	38.1	55.2		58.1		64.5						123.3	
Sep-06	39.2 C		53	52.1	55.9 C		60.5						123.3	122.3
Mar-07	40		57.7		61.3	46.1	67.7						123.3	122.3
Sep-07	39 C		55.4	54.9	53.8 C		66.4							122.3
Mar-08	39 C				49.4 C	50.6C			80 C		64.8 C			122.3
Jun-08									77.4		59.8			122.3
Sep-08	39.7 C				51 C				77.9 C		59.8 C	59.9C		122.3
Dec-08									76.8		59.5	59.2		122.3

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 3. Chromium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	13.4		4.4 U		5.9 B		7.7 B	5.1B					16.5	
Sep-96	12.1	0.0205	4.4 U		4.4 U		4.4 U						16.5	
Mar-97	12.2	12	2.7 U		3.9 B		4.5 B						16.5	
Jun-97					7.9 B								16.5	
Sep-97	13.4	13.3	3.3 B		3.5 U	3.6B	3.5 U						16.5	
Mar-98	16.6		3.3 B	3.6B	6.8 B	5.4B	4.1 B						16.5	
Aug-98	13.5		4.2 U		4.2 U		4.2 U	4.2U					16.5	
Mar-99	13.9		2.3	2.2	6.1 B	2.2	3.1						16.5	
Sep-99	14.8	14.8	2.5 B		4.4 B		3.1 B						16.5	
Jan-00					4.4 B								16.5	
Mar-00													16.5	
Sep-00	16.3		1.6		4.6	4.9							16.5	
Dec-00					5.7 U								16.5	
Mar-01	14.8		2.4		4.1		4.5	3.8					16.5	
Sep-01	21.1		10 U	10U	7.4		5.4						16.5	
Dec-01					1.5 B								16.5	
Mar-02	16.3	16.2	5.2		6		11.3						16.5	
Sep-02	16.2		5.6	1.2	5.5		8.7						16.5	
Mar-03	16.3		2.5		3.8		9.9						16.5	
Sep-03	16.2 C	17.2C	3.6		4.9		12 C						16.5	
Mar-04	16.6		4.1		4		4.4	3.8					16.5	
Sep-04	15.6		5.5	5.3	3.8		11.6						16.5	
Mar-05	15.9	17.1	9.7 U		9.7 U		9.7 U						16.5	
Sep-05	14.4		3.6 UC		3.6 UC		3.6 UC	5.4U C					16.5	
Mar-06	14.6	15.8	6.4 U		6.4 U		6.4 U						16.5	
Sep-06	16.3		2.5	2.6	4.8		3.4						16.5	13.4
Mar-07	17.5		3.1		4.9	3.4	4.3						16.5	13.4
Sep-07	17		2.7	3.3	3.4		5							13.4
Mar-08	17.2				4.2	4.7			2.8		4.1			13.4
Jun-08									2.2		3.2			13.4
Sep-08	17.1				4.5				2.5		3.4	3.6		13.4
Dec-08									2.93		3.98	3.93		13.4

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 4. Lead Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	1 UJ		1 UJ		1 UJ		1 UJ	1UJ					70.4	
Sep-96	42.1 U	0.002 U	42.1 U		42.1 U		42.1 U						70.4	
Mar-97	26 U	26U	26 U		34.8 B		26 U						70.4	
Sep-97	1.1 U	1.1U	1.1 U		1.1 U		47.1 U						70.4	
Mar-98	1.1 U		1.1 U	1.1U	1.1 U		2.4 B						70.4	
Aug-98	30.2 U		30.2 U		30.2 U		30.2 U	30.2 U					70.4	
Mar-99	1.8 U		1.8 U	1.8U	1.8 U		2.5						70.4	
Sep-99	2.1 U	4	49.2		6.7		2.4 B						70.4	
Mar-00													70.4	
Sep-00	2.1 U		2.1 U		2.1 U	2.1U							70.4	
Mar-01	2.6 U		2.6 U		2.6 U		2.6 U	2.6U					70.4	
Sep-01	3.7		6.8	3U	22.7 U		22.7 U						70.4	
Mar-02	2.2 U	2.8	2.2 U		2.2 U		4.2						70.4	
Sep-02	2.4 U		2.4 U	2.4U	2.4 U		2.4 U						70.4	
Mar-03	2.6 U		2.3 U		2.6 U		2.6 U						70.4	
Sep-03	1.9 U	1.9U	1.9 U		1.9 U		1.9 U						70.4	
Mar-04	2 U		2 U		2 U		2 U	2					70.4	
Sep-04	1.9 U		1.9 U	1.9U	1.9 U		1.9 U						70.4	
Mar-05	24.7 U	24.7U	24.7 U		24.7 U		24.7 U						70.4	
Sep-05	2.9 U		31.9 U		31.9 U		31.9 U	31.9 U					70.4	
Mar-06													70.4	
Sep-06	3.3 UC		1.2 U	1.2U	1.2 U		1.2 U						70.4	5
Mar-07	2.8 U		2.8 U		2.8 U	2.8U	2.8 U						70.4	5
Sep-07	3.3 U		3.3 U	3.3U	3.3 U		3.3 U							5
Mar-08	3 U				3 U	3U			3 U		3 U			5
Jun-08									3 U		3 U			5
Sep-08	1.5 U				1.5 U				1.5 U		1.5 U	1.5U		5.4
Dec-08									5U		5U	5U		5

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 5. Selenium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	2.1 B		2.6 B		3.5 B		3.4 B	3.6 B					5.6	
Sep-96	3.1 B	0.003 U	3.8 B		4.1 B		4.8 B						5.6	
Mar-97	2.6 BN	2.3BN	3.5 BN		3.1 BN		3.9 BN						5.6	
Sep-97	3.2 B	2.9B	3.6 B		4.8 B		4.6 B						5.6	
Mar-98	3.2 B		3.6 B	3.6B	4.4 B		4.2 B						5.6	
Aug-98	3.2 B		4.5 B		5.8		5.8	5.5					5.6	
Mar-99	5.2		3.6 U	4.5	7.6		4.2						5.6	
Sep-99	3.7 U	5.2	3.7 U		7.3		4.6 B						5.6	
Mar-00													5.6	
Sep-00	3.4		3.5		4	5.5							5.6	
Mar-01	2.6 U		3.1		3.4		2.6	2.6 U					5.6	
Sep-01	5.9		5 U	19.8	62.1 U		62.1 U						5.6	
Mar-02	7.7	7.9	3.6 U		7.8		7.7						5.6	
Sep-02	4.1 U		4.1 U	4.1U	7.4		4.1 U						5.6	
Mar-03	3.6 U		5.7		4.4 U		3.8 U						5.6	
Sep-03	3.8	4.4	3.6		6.9		5.7						5.6	
Mar-04	4.2		5.6		7.4		3.4 U	3.4 U					5.6	
Sep-04	3.9 U		3.9 U	3.9U	3.9 U		3.9 U						5.6	
Mar-05	48.5 U	48.5U	48.5 U		48.5 U		48.5 U						5.6	
Sep-05	6.2 C		44 U		44 U		44 U	44.0 U					5.6	
Mar-06													5.6	
Sep-06	4.4		3.3	5.2	3.7		3						5.6	5.6
Mar-07	5.9		5.1		9.7		5.9						5.6	5.6
Sep-07	4.8		4.3 U	4.3U	4.3 U		4.3 U							5.6
Mar-08	6 U				7.8	9.3			6.5		6 U			5.6
Jun-08									6 U		6 U			5.6
Sep-08	4.3				3.4 C				4.7		6	5.1		5.6
Dec-08									10U		10U	10U		5.6

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 6. Tin Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	35.3 U		35.3 U		35.3 U		40.1 B	35.3 U					55.6	
Sep-96	33.5 U	0.033 U	33.5 U		33.5 U		33.5 U						55.6	
Mar-97	24.7 U	24.7U	24.7 U		29 B		24.7 U						55.6	
Sep-97	5.6 U	5.6U	5.6 U		5.6 U		33.2 U						55.6	
Mar-98	4.9 U		4.9 U	4.9 U	4.9 U		4.9 U						55.6	
Aug-98	28 U		28 U		28 U		28 U	28U					55.6	
Mar-99	2.7 U		2.7 U	2.7 U	2.7 U		2.7 U						55.6	
Sep-99	2.1 U	2.1U	2.1 U		2.1 U		2.1 U						55.6	
Mar-00													55.6	
Sep-00													55.6	
Mar-01	3.5 U		3.5 U		3.5 U		3.5 U	3.5 U					55.6	
Sep-01	2.4 U		100 U	100 U	13.9 U		13.9 U						55.6	
Mar-02	3.3 U	3.3U	3.3 U		3.3 U		3.3 U						55.6	
Sep-02	4.7 U		4.7 U	4.7 U	4.7 U		4.7 U						55.6	
Mar-03	3.6 U		5.8 U		3.6 U		3.6 U						55.6	
Sep-03	5.6 U	5.6U	5.6 U		5.6 U		5.6 U						55.6	
Mar-04	3.6 U		3.6 U		3.6 U		3.6 U	3.6 U					55.6	
Sep-04	4 U		4 U	4U	4 U		4 U						55.6	
Mar-05													55.6	
Sep-05	5.1 U												55.6	
Mar-06													55.6	
Sep-06	3.5 U		3.5 U	4.6	3.5 U		3.5 U						55.6	10
Mar-07	4.4		3.4 U		3.4 U	4.1	3.8						55.6	10
Sep-07	6.3 U		6.3 U	6.3 U	6.3 U		6.3 U							10
Mar-08	6 U				6 U	6.5			8.1		6 U			10
Jun-08									6 U		6 U			10
Sep-08	3 U				3 U				3 U		3 U	3U		10
Dec-08									100U		100U	100 U		10

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 7. Uranium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Sep-95					2.98 U								3.4	
Mar-96	2.64		2.24		2.94		2.74	2.77					3.4	
Sep-96	2.4		2.26		2.42		2.21						3.4	
Mar-97	2.7		2.69		3.16		2.87						3.4	
Sep-97	2.76	2.55	2.43		3.01		2.38						3.4	
Mar-98	2.33		2.49	2.44	2.99		2.32						3.4	
Aug-98	2.59		2.48		3.34		2.34	2.36					3.4	
Mar-99	2.6		2.8	3	3.4		2.7						3.4	
Sep-99	2.65	2.53	2.63		3.41		2.58						3.4	
Mar-00													3.4	
Sep-00	3.27		3.19		3.17	3.62							3.4	
Mar-01	2.31		2.36		3.12		2.83	2.79					3.4	
Sep-01	2.42		2.25	2.28	3.06		2.65						3.4	
Mar-02	2.44	2.52	2.46		3.22		2.84						3.4	
Sep-02	2.25		2.27	2.14	2.99		2.58						3.4	
Mar-03	2.33		4.22		3.27		2.79						3.4	
Sep-03	2.19	2.22	2.49		2.97		2.58						3.4	
Mar-04	2.24		2.12		2.94		2.8	3.07					3.4	
Sep-04	2.35 B		2.15 B	2.38B	2.95 B		2.59 B						3.4	
Mar-05	2.26	2.3	2.14		2.86		2.85						3.4	
Sep-05	2		1.63		2.34		2.09	2.2					3.4	
Mar-06	2.35	2.3	2.14		2.94		2.68						3.4	
Sep-06	2.12		1.94	1.95	2.53		2.72						3.4	3.4
Mar-07	1.91		2.57		2.6	2.16	2.53						3.4	3.4
Sep-07	2.55		1.84	1.93	2.59		2.47							3.4
Mar-08	2.12				2.32	2.53			1.64		2.5			3.4
Jun-08									1.63		2.51			3.4
Sep-08	2.45				2.49				1.96		2.48	2.53		3.4
Dec-08									1.65		2.48	2.61		3.4

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 8. Vanadium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	26.8 J		12.6 J		23.6 J		14.4 J	15.1J					41	
Sep-96	33.4 B	0.0258B	25.1 B		32.9 B		24.3 B						41	
Mar-97	33.2 B	30.3B	26 B		28.9 B		25.3 B						41	
Jun-97					36.2								41	
Sep-97	27.8 B	27.2B	18.8 B		25.7 B	28.8	24.9 B						41	
Mar-98	29		18.6	18.3	26.8	28.4	23						41	
Aug-98	39.5 B		30.1 B		39.5 B		36 B	33.9B					41	
Mar-99	28.3		13.9	15	25.2	30	23.6						41	
Sep-99	28.7 B	28.6B	17.5 B		26.4 B		23.5 B						41	
Jan-00					25.7 B								41	
Mar-00													41	
Sep-00	27.5		15.5		27.2	27.3							41	
Dec-00					27.1 B								41	
Mar-01	27.1		16.5		25.8		25	25.3					41	
Sep-01	28.5		50 U	50U	26.2		22.8						41	
Dec-01					26.2 B								41	
Mar-02	26.6	27.4	23.4		25.6		23.4						41	
Sep-02	28.6		26.7	1.1	28.8		24.3						41	
Mar-03	28.5		22.1		26.8		23.8						41	
Sep-03	25.9	26.9	24.4		26.2		16.2						41	
Mar-04	26.8		24.9		24.6		24.2	24.7					41	
Sep-04	27 C		25.4 C	25.2	26.1		24.8 C						41	
Mar-05	25.8	27.4	25.1		25.9		23.3						41	
Sep-05	25.4		21.5		24.9		27.4	23.4					41	
Mar-06	25.3	27.1	24.9		26.4		22.9						41	
Sep-06	28.8 C		23.7 C	23.2C	28.6 C		22.7 C						41	40
Mar-07	27.6		25.1		27.6	21.1	25						41	40
Sep-07	28.5		23.8	23.6	29.1		25.9							40
Mar-08	27.7				28.8	29			23.2		22.1			40
Jun-08									24.3		24.4			40
Sep-08	28.9				30.2				22.6		24.5	23.9		40
Dec-08									27.3		25.9	28.6		40

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 9. Zinc Data

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	13.7 U		146		8.5 U		368	155					757	
Sep-96	15.4 B	0.003U	260		23.1		665						757	
Mar-97	26.5	26.7	382		55.4		507						757	
Jun-97					12								757	
Sep-97	8.1 B	5.7	339		10.3	5.1U	394						757	
Mar-98	5.8 B		318	321	6.1 B	2.2U	386						757	
Aug-98	10.3 B		241		4.7 B		663	629					757	
Mar-99	2.6		164	144	10.6	0.8U	347						757	
Sep-99	2.9 B	3.5B	215		0.8 U		350						757	
Jan-00					10.4 B								757	
Mar-00													757	
Sep-00	7.4		357		2.8	4.2							757	
Dec-00					7.1 U								757	
Mar-01	4.4		262		0.94		17.4	17.5					757	
Sep-01	5.8		310	325	17.1		24.6						757	
Dec-01					1.3 U								757	
Mar-02	3.1	2.6	280		0.4 U		33.4						757	
Sep-02	7.1		329	0.54	2.3		33.6						757	
Mar-03	13.4 C		180		15 C		34.4 C						757	
Sep-03	23.7 C	2.6C	296		3.1		8.9 C						757	
Mar-04	7.8 C		317 C		5.1 C		12.9 C	9.9C					757	
Sep-04	6.9		288	286C	7.3 C		12.8						757	
Mar-05	29.6 UC	5.6UC	316 C		3.8 UC		15.4 UC						757	
Sep-05	14.5 UC		266 C		8.5 UC		9.1 UC	8.6UC					757	
Mar-06	9 UC	15.9UC	286 C		17 UC		12.4 UC						757	
Sep-06	8.7 UC		259 C	260C	10.3 UC		6.6 UC						757	26.5
Mar-07	5.8 UCJ		341		7 UCJ	6.1UCJ	11.7 UCJ						757	25.5
Sep-07	11.8 UC		378	375	3.8 UC		10.3 UC							26.5
Mar-08	6 U				6 U	6U			6 U		19			26.5
Jun-08									6 U		6 U			26.5
Sep-08	4.7				3 U				3 U		6.9	5.9		26.5
Dec-08									10U		10U	10U		26.5

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 10. Alkalinity Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	138		121		113		124	125					151.8	
Sep-96	143		125		117		129						151.8	
Mar-97	147		129		113		121						151.8	
Jun-97					114								151.8	
Sep-97	138	142	125		119		125						151.8	
Dec-97					121								151.8	
Mar-98	140		122	123	120		127						151.8	
Jun-98					122								151.8	
Aug-98	143		124		124		131	131					151.8	
Dec-98					127								151.8	
Mar-99	143		124	124	123		129						151.8	
Jun-99					118								151.8	
Sep-99	140	139	123		122		130						151.8	
Jan-00					135								151.8	
Mar-00													151.8	
Jun-00					137								151.8	
Sep-00	160		137		119	123							151.8	
Mar-01	137		145		120		152	144					151.8	
Jun-01					130								151.8	
Sep-01	132		126	128	124		130						151.8	
Mar-02	138	135	124		126		132						151.8	
Sep-02	135		130	128	131		146						151.8	
Mar-03	128		120		111		113						151.8	
Sep-03	130	129	128		114		123						151.8	
Mar-04	147		132		140		136	141					151.8	
Sep-04	137		121	130	126		121						151.8	
Mar-05	142	138	128		128		130						151.8	
Sep-05	138		132		126		126	130					151.8	
Mar-06	139	139	128		124		128						151.8	
Sep-06	137		125	117	120		123						151.8	152.9
Mar-07	138 J		126 J		126 J	126J	124 J						151.8	152.9
Sep-07	129 J		117 J	120J	118 J		120 J							152.9
Mar-08	123				111	100			117		129			152.9
Jun-08									121		131			152.9
Sep-08	133				121				125		137	135		152.9

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 11. Chloride Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	21.1		24.2		24.2		20.2	20.6					25.9	
Sep-96	19		22.9		21.7		20.1						25.9	
Mar-97	19.2		23.7				20.08						25.9	
Jun-97					22 D								25.9	
Sep-97	20.5	19.9	22.9		22.4		21						25.9	
Dec-97					20.6 D								25.9	
Mar-98	16.1 CD		21.4 D	21.4D	20.9 CD		19.6 CD						25.9	
Jun-98					21								25.9	
Aug-98	18.3		23.7		21.4		20.7	21					25.9	
Dec-98					20.5 D								25.9	
Mar-99	19.5		24.9	24.4	20.2 CD	23.3	21.7						25.9	
Jun-99					21.2 CD								25.9	
Sep-99	18.9	19.9	26.3		23.2		28.1						25.9	
Jan-00					20.4 D								25.9	
Mar-00													25.9	
Jun-00					20.5 CD								25.9	
Sep-00	18.4		25.7		21.4	22.4							25.9	
Dec-00					21.9 D								25.9	
Mar-01	18.6		25.7		17.2		22.3	27.6					25.9	
Jun-01					16.8 D								25.9	
Sep-01	19		23.4	24.4	20.5		23.3						25.9	
Dec-01					18.6 D								25.9	
Mar-02	16.6	16.8	22.6		19.3		25.2						25.9	
Sep-02	18		25.6	24.5	20.7		26.6						25.9	
Mar-03	18.3		22.5		22.8		28.2						25.9	
Sep-03	15.7 D	15.6D	22.6 D		23 D		23.8 D						25.9	
Mar-04	15 D		21.9 D		16.5 D		23.8 D	24.3D					25.9	
Sep-04	15.7		22.3	23.1	17.4		24.1						25.9	
Mar-05	20.7	20.1	27.7		22.5		19						25.9	
Sep-05	13.4 D		23 D		17.1 D		24.8 D	24.5D					25.9	
Mar-06	13.2 D	13.9D	23.5 D		16.7 D		20.6 D						25.9	
Sep-06	15.2		21.2 D	21D	17.5		24.5 D						25.9	26
Mar-07	16.4 D		24.3 D		19.1 D	18.9D	27.2 D						25.9	26
Sep-07	15.8 D		21.3 D	21.9D	16.2 D		23.9 D							26
Mar-08	17 D				18.3 D	18D			18.1 D		22.2 D			26
Jun-08									15.4 D		18.8 D			26
Sep-08	14.4 D				15.2 D						19.6 D	19.8D		26

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 12. Fluoride Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	0.34		0.4		0.42		0.36	0.36					0.5	
Sep-96	0.34		0.37		0.41		0.33						0.5	
Mar-97	0.34		0.36				0.3						0.5	
Jun-97					0.406								0.5	
Sep-97	0.39	0.334	0.348		0.415		0.331						0.5	
Dec-97					0.378								0.5	
Mar-98	0.304		0.363	0.364	0.371		0.33						0.5	
Jun-98					0.383								0.5	
Aug-98	0.342		0.355		0.362		0.343	0.34					0.5	
Dec-98					0.399								0.5	
Mar-99	0.5 U		0.5 U	0.5U	0.335	0.5U	0.5 U						0.5	
Jun-99					0.373								0.5	
Sep-99	0.5 U	0.5U	0.5 U		0.5 U		0.5 U						0.5	
Jan-00					0.41								0.5	
Mar-00													0.5	
Jun-00					0.39								0.5	
Sep-00	0.5 U		0.5 U		0.5 U	0.5U							0.5	
Dec-00					0.36 C								0.5	
Mar-01	0.5 U		2.5 U		0.5 U		2.5 U	2.5U					0.5	
Jun-01					0.35								0.5	
Sep-01	1 U		1 U	1U	0.5 U		0.5 U						0.5	
Dec-01					0.36								0.5	
Mar-02	0.25 U	0.25U	0.26		0.28		0.25 U						0.5	
Sep-02	0.25 U		0.25 U	0.25U	0.25 U		0.357						0.5	
Mar-03	0.25 U		0.34		0.3		0.34						0.5	
Sep-03	0.3	0.31	0.28		0.3		0.25 U						0.5	
Mar-04	0.3		0.32		0.37		0.286	0.327					0.5	
Sep-04	0.28		0.34	0.29	0.3		0.26						0.5	
Mar-05	0.25	.25U	0.27		0.28		0.29						0.5	
Sep-05	0.268		0.316		0.343		0.289	0.284					0.5	
Mar-06	0.27	0.3	0.29		0.31		0.26						0.5	
Sep-06	0.3		0.35	0.37	0.28		0.26						0.5	0.45
Mar-07	0.29		0.25		0.27	0.27	0.25 U						0.5	0.45
Sep-07	0.28		0.3	0.35	0.42		0.33							0.45
Mar-08	0.25 U				0.3	0.3			0.25 U		0.25 U			0.45
Jun-08									0.26		0.29			0.45
Sep-08	0.27				0.35				1.2 UD		0.5 UD	.5U D		0.45

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 13. Sulfate Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	24.2		29.9		30.7		28.9	28.7					37.8	
Sep-96	25.2		32.2		33.2		30.3						37.8	
Mar-97	27		31.5				30.5						37.8	
Jun-97					33.8 D								37.8	
Sep-97	26.6	26.1	32.6		34.9		31.4						37.8	
Dec-97					34.5 D								37.8	
Mar-98	22.7 D		31.6 D	31.4D	34.8 D		31.2 D						37.8	
Jun-98					35								37.8	
Aug-98	26		30.7		35.4		31.8	31.5					37.8	
Dec-98					36.8 D								37.8	
Mar-99	26.8		32.4	32	37.3	35.2D	30.8						37.8	
Jun-99					33.2 D								37.8	
Sep-99	25.9	25.8	32.5		34.6		31.3						37.8	
Jan-00					34.5 D								37.8	
Mar-00													37.8	
Jun-00					34.2 D								37.8	
Sep-00	30.5		31.7		37.6	35.9							37.8	
Dec-00					36.8 D								37.8	
Mar-01	26.9		36		31.6		37.8	39.5					37.8	
Jun-01					36.9 D								37.8	
Sep-01	27.8		30.3	30.8	34.5		31						37.8	
Dec-01					33.1 D								37.8	
Mar-02	25.6	25.6	29.2		33.8		30.5						37.8	
Sep-02	26.2		30.2	29.2	32.7		31.1						37.8	
Mar-03	26		30		34.7		31						37.8	
Sep-03	26.6 D	26.7D	31.3 D		34.3 D		31.5 D						37.8	
Mar-04	26.7 D		31 D		32.2 D		31.5 D	32.4D					37.8	
Sep-04	29.2		33.7	36	37.4		34.5						37.8	
Mar-05	27.7	27.3	32.7		33		24						37.8	
Sep-05	24 D		32.8 D		32.3 D		31.5 D	31.1D					37.8	
Mar-06	27.3 D	27.4D	30.9 D		30.5 D		30.9 D						37.8	
Sep-06	26.6		30.2 D	29.4D	29.9		29.8 D						37.8	37.8
Mar-07	27.1 D		30.7 D		32.1 D	31.8D	31.7 D						37.8	37.8
Sep-07	26.6 D		31.2 D	30.1D	29 D		30.5 D							37.8
Mar-08	28 D				30.7 D	31.1			27.1 D		29.9 D			37.8
Jun-08									27.4 D		30.9 D			37.8
Sep-08	26.7 D				28.4 D				26		28.3 D	29.3 D		37.8

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 14. Gross Alpha Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	1.45 J		2.12 J		2.28 J		2.43 J	1.73J					3.3	
Sep-96	1.69 J		0.109 U		1.57 J		1.15 U						3.3	
Mar-97	1.69 J	0.199U	1.31 U		1.26 J		0.837 U						3.3	
Jun-97					1.68 J								3.3	
Sep-97	0.39 U	1.66J	0.791 U		1.2 J		2.5 J						3.3	
Dec-97					2.36 J								3.3	
Mar-98	1.32 J		0.659 U	1.4J	2.17 J		0.683 U						3.3	
Jun-98					2.17 U								3.3	
Aug-98	0.431 U		2.3 J		2.89 J		2.45 J	3.37					3.3	
Dec-98					1.87 J								3.3	
Mar-99	2.7 J		3	1.3U	1.68 U	1.3U	1.5 U						3.3	
Jun-99					2.75 J								3.3	
Sep-99	2.64 J	0.565U	0.535 U		1.31 U	0.928U	1.55 U						3.3	
Jan-00					3.75								3.3	
Mar-00													3.3	
Jun-00					3.29								3.3	
Sep-00	0.34 U		0.5 U		0.266 U	1.28U							3.3	
Dec-00					2.06 U								3.3	
Mar-01	0.303 U		1.01 U		2.33 J		0.812 U	1.43U					3.3	
Sep-01	-0.386 U		0.976 U	0.751U	1.12 U		0.374 U						3.3	
Mar-02	0.884 U	0.227U	0.522 U		0.363 U		0.016 U						3.3	
Sep-02	0.348 U		0.38 U	0.91U	0.289 U		-0.377 U						3.3	
Mar-03	0.748 U		6.01		0.865 U		1.68						3.3	
Sep-03	1.44	0.882U	1.11 U		1.16 U		1.64						3.3	
Mar-04	2.26		1.73 U		1.83 U		1.52	2.13					3.3	
Sep-04	1.21		-0.435 U	-0.173U	0.487 U		0.531 U						3.3	
Mar-05	1.53	0.817U	1.33		0.913 U		1.68						3.3	
Sep-05	0.862 U		1.06 U		0.646 U		1.16 U	1.78					3.3	
Mar-06	-0.264 U	1.16U	-0.146 U		1.12 U		0.117 U						3.3	
Sep-06	-0.059 U		1.34 U	3.05	1.86		-0.156 U						3.3	2.98
Mar-07	0.083 U		-0.0265 U		-0.442 U	-.857U	-0.864 U						3.3	2.98
Sep-07	-0.352 U		4.71	1.05U	3.62		-0.194 U							2.98
Mar-08	0.897 U				1.06 U	0.656U			0.119 U		-0.095 U			2.98
Jun-08									2.1		0.673 U			2.98
Sep-08	-0.474 U				2.76				1.41 U		0.125 U	-.134U		2.98
Dec-08									0.066 U		-0.187 U	.841 U		2.98

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 15. Gross Beta Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	10.9		22.4		20.4		16	15.5					31.7	
Sep-96	13.2		26.9		25.7		17.6						31.7	
Mar-97	11.2	10.5	21.6		23.2		13.5						31.7	
Jun-97					16.3								31.7	
Sep-97	10.2	12.7	20.7		21		15.9						31.7	
Dec-97					21.4								31.7	
Mar-98	10.5		26.4	25.4	20.2		14.5						31.7	
Jun-98					44.7								31.7	
Aug-98	17.1		27.4		25.1		19.1	13.4					31.7	
Dec-98					21.3								31.7	
Mar-99	25		17	67	25.1	56	27						31.7	
Jun-99					25.8								31.7	
Sep-99	25.1	25.8	57.2		38	50.2	27.1						31.7	
Jan-00					21.7								31.7	
Mar-00													31.7	
Jun-00					21.6								31.7	
Sep-00	27.6		49.2		49.9	47.4							31.7	
Dec-00					23.4								31.7	
Mar-01	26.2		59.4		47.8		31.9	35.5					31.7	
Sep-01	29.8		41.2	39.6	41.2		29.8						31.7	
Mar-02	28	28.5	39.1		42.7		30.8						31.7	
Sep-02	23.3		28.3	26.3	28.7		21.4						31.7	
Mar-03	38.8		47		44.3		36.8						31.7	
Sep-03	38.1	38.1	35.6		44		41.5						31.7	
Mar-04	25.8		28.1		29.8		36.2	41.3					31.7	
Sep-04	39.1		34.1	34.3	33.8		38.3						31.7	
Mar-05	41.4	38.4	32.9		33.2		36.9						31.7	
Sep-05	44.6		35.8		27.8		41.6	41.2					31.7	
Mar-06	45.4	44.6	30		30		45.4						31.7	
Sep-06	45.5		27.6	33.2	29		40.5						31.7	31.5
Mar-07	52.1		35.3		27.8	24	39.6						31.7	31.5
Sep-07	52.5		34.6	38.2	26.4		46.2						31.7	31.5
Mar-08	45.7				20	23.6			38.7		33.4			31.5
Jun-08									31.9		39.2			31.5
Sep-08	42.1				22.8				44.8		38.1	60.3		31.5
Dec-08									39.9		33.7 J	41.8 J		31.5

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 16. Carbon-14 Data

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	22.3 J		6.76 J		4.26 J		4.72 J	2.48U					26.8	
Sep-96													26.8	
Mar-97	21.6 J	22.2J	11.1 J		3.94 U		3.81 U						26.8	
Sep-97	16.7 J	10.7J	3.27 U		1.6 U		5.43 U						26.8	
Mar-98	19.4 J		4.5 U	7.16U	3.69 U		-1.49 U						26.8	
Aug-98	18.5 J		8.63 J		2.07 U		6.46 U	6.4U					26.8	
Mar-99	25 U		9.9 U	12U	-6.1 U		-6.5 U						26.8	
Sep-99	14.1 U	7.43U	-2.74 U		-9.54 U		-5.94 U						26.8	
Mar-00													26.8	
Sep-00	35.2 U		13.7 U		3.75 U	4.81U							26.8	
Mar-01	9.56 U		43.4 U		-28.1 U		47.2 U	57J					26.8	
Sep-01	32.5 U		6.73 U	22.5U	-15.1 U		-1.16 U						26.8	
Mar-02	14 U	21.4U	11.6 U		21.7 U		13.2 U						26.8	
Sep-02	5.02 U		17 U	32.6U	-1.55 U		8.45 U						26.8	
Mar-03	-6.69 U		-0.225 U		25.2 U		1.78 U						26.8	
Sep-03	0.446 U	3.32U	5.74 U		-10.3 U		-4.5 U						26.8	
Mar-04	33.9 U		16.4 U		10.2 U		9.75 U	-12.4U					26.8	
Sep-04	8.8 U		0 U	6.99U	1.22 U		2.45 U						26.8	
Mar-05	11.8 U	42.2U	38.6 U		17.8 U		28.9 U						26.8	
Sep-05	19.9 U		8.17 U		-2.4 U		-2.37 U	-10.7U					26.8	
Mar-06	34.2 U	16.1U	1.44 U		-22.6 U		6.04 U						26.8	
Sep-06	15.8 U		1.42 U	-5.16U	13.6 U		-4.74 U						26.8	58.1
Mar-07	20.8 U		29.4 U		21.2 U	7.41U	16.1 U						26.8	58.1
Sep-07	22.4 U		26.8 U	26.4U	-0.045 U		44.9 U							58.1
Mar-08	30.6 U				23.5 U	-3.8U			0.956 U		18.1 U			58.1
Jun-08									-20.6 U		-4.28 U			58.1
Sep-08	27.6 U				-20.8 U				-8.35 U		-12.9 U	-4.33 U		58.1
Dec-08									19.6 U		34.6 UJ	49.2UJ		58.1

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 17. Iodine-129 Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Jan-95					38.8 J								21.5	
Jun-95					19.9								21.5	
Jan-96			3.06 U				1.04 U						21.5	
Mar-96	9.4		9.42		18.7		6.01	3.69U					21.5	
Sep-96	7.54		11.9		13.7		2.22 U						21.5	
Mar-97	10.1	11	7.81		11.8		2.82 J						21.5	
Jun-97					12.3								21.5	
Sep-97	9.52	11.3	9.73		16.2		3.03 J						21.5	
Mar-98	8.07	4.54U	13.2	9.83U	15.2	15.2	1.62 U	1.62U					21.5	
Aug-98	9.6		12.2		15.2		2.57	2.78					21.5	
Mar-99	6.1		7.9	1.2U	14.4	3.8U	2.9 U						21.5	
Sep-99	5.68	6.96	9.24		6.54 U		1.87 U						21.5	
Jan-00					12.9								21.5	
Mar-00													21.5	
Sep-00	0.307 U		11		13.9	13.1							21.5	
Dec-00					13.3								21.5	
Mar-01	4.63 U		13.8		16.7		6.72	2.74U					21.5	
Jun-01					7.37								21.5	
Sep-01	3.1 U		12.3	-5.52U	13.8		4.59 J						21.5	
Dec-01					9.14								21.5	
Mar-02	4.09	3.79	9.71	10.7	13.9		2.2	2.16U					21.5	
Sep-02	4.66 J		8.34	12	14.3		2.3 U						21.5	
Mar-03	4.97		12.1		14.2		3.43						21.5	
Sep-03	2.91 U	-9.28U	7.88 U		13.4		-1.82 U						21.5	
Mar-04	4.86		11.8		11		2.44 U	1.64U					21.5	
Sep-04	4.99		13.6	13.3	6.53		2.52 U						21.5	
Mar-05	5.25 U	3.66U	15.5		10.6		-1.61 U						21.5	
Sep-05	5.30		14.6		12.5		2.42 U	2.45U					21.5	
Mar-06	2.87 U	1.91U	13.5		7.66		0.379 U						21.5	
Sep-06	3.02 U		12.7	15.4	10.1		3.58 U						21.5	21.1
Mar-07	5.18		14.3		14.3	11.5	3.51						21.5	21.1
Sep-07	5.59		17	16	11.3		2.63 U						21.5	21.1
Mar-08	6.32				12.6	11.6			1.58 U		7.66			21.1
Jun-08									0.236 U		7.94			21.1
Sep-08	3.29				11.2				0.953 U		7.44	7.8		21.1
Dec-08									0.784 U		5.59	7.69		21.1

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 18. Technetium-99 Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Sep-95					60.2								94.9	
Mar-96	25.5		65		64.2		31	32					94.9	
Sep-96	20.3		53.5		52.3		32.1						94.9	
Mar-97	20	21.6	77.5		59.9		30						94.9	
Jun-97					64								94.9	
Sep-97	18.9	17.3	66.8		57		34.8						94.9	
Dec-97					64.2								94.9	
Mar-98	23.2		68.6	75.4	78.2		23.5						94.9	
Jun-98					73.6								94.9	
Aug-98	29.4		74.9		77.4		36.5	16.5					94.9	
Dec-98					72								94.9	
Mar-99	0 U		86	83	70.5	0U	36						94.9	
Jun-99					0.0737 J								94.9	
Sep-99	40.4	34.3	85.2		90.1		44.6						94.9	
Jan-00					126								94.9	
Mar-01													94.9	
Jun-00					85.7								94.9	
Sep-00	35.6		80.1		85.6	76.5							94.9	
Dec-00					60.9								94.9	
Mar-01	45.5		75.9		92		40.2	42.3					94.9	
Jun-01					61.3								94.9	
Sep-01	47.6		56.5	63.7	72.3		46.9						94.9	
Dec-01					66.3								94.9	
Mar-02	51.4	61.3	71.8		76.1		46.3						94.9	
Sep-02	52.8		59.7	51.6	67.1		58.8						94.9	
Mar-03	61.3		62.1		66.3		56.5						94.9	
Sep-03	57.7	59.5	54.5		58.3		58.7						94.9	
Mar-04	59.4		54.7		56.4		66.7	68.1					94.9	
Sep-04	67.2		60.6	63.5	56.5		66.3						94.9	
Mar-05	68.6	78.4	66.2		57.2		65.5						94.9	
Sep-05	73.1		57		50.9		71.8	73					94.9	
Mar-06	74.3	80	59.2		46		60.4						94.9	
Sep-06	75.2		47.1	48.3	40.7		64.5						94.9	93.8
Mar-07	73.3		51.5		40.6	39	67.7						94.9	93.8
Sep-07	84.3		46.7	51.5	37		72.8							93.8
Mar-08	76.9				39	33.2			63.4		67.7			93.8
Jun-08									63.8		65.4			93.8
Sep-08	74.8				33.7				61.3		64.5	66.6		93.8
Dec-08									64.8		64.1	62.3		93.8

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 19. Radium Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	0.141U		0.207U		0.521U		0.276U	0.235J					0.5	
Sep-96	0.0497U		0.135J		0.0482U		0.0248U						0.5	
Mar-97	0.0235U		0.065J		0.0577U		0.07U						0.5	
Sep-97	0.0723U	0.0358U	0.0353U		0.123U		0.0748U						0.5	
Mar-98	0.078U		0.21J	0.103U	0.148U		0.114U						0.5	
Aug-98	0.0391U		0.0864U		0.14U		0.135U	0.0544U					0.5	
Mar-99	0.001U		0.088U	0U	0.087U		0.017U						0.5	
Sep-99	0.025U	.088U	0.083U		0.195U		-0.068U						0.5	
Mar-00													0.5	
Sep-00	0.827U		1.99J		-0.261U	0.182U							0.5	
Mar-01	0.144U		0.431U		-0.037U		0.033U	0.931U					0.5	
Sep-01	-0.387U		-0.537U	0.506U	0.675U		0.18U						0.5	
Mar-02	0.94J	0.599U	0.063U		0.383U		0.258U						0.5	
Sep-02	-0.147U		0.332U	-0.143U	0.147U		-0.271U						0.5	
Mar-03	0.345U		0.474U		-0.392U		0.637U						0.5	
Sep-03	-0.063U	-.009U	0.092U		0.039U		0.039U						0.5	
Mar-04	0.232U		0.611U		0.57U		0.265U	0.411U					0.5	
Sep-04	-0.022U		-0.05U	-0.128U	-0.083U		-0.051U						0.5	
Mar-05	0.144U	-.045U	0.089U		0.037U		-0.058U						0.5	
Sep-05	0.168U		0.085U		0.059U		0.036U	0.04U					0.5	
Mar-06	-0.294U	-0.042U	0.045U		-0.199U		-0.194U						0.5	
Sep-06	-0.215U		-0.117U	0.073U	-0.327U		0.06U						0.5	0.695
Mar-07	-0.136UJ		-0.395UJ		-0.301U	-.21UJ	-0.327UJ						0.5	0.695
Sep-07	-0.229U		-0.008U	.067U	-0.121U		-0.399U							0.695
Mar-08	-0.019U				-0.052U	0.096U			0.102U		0.046U			0.695
Jun-08									0.077U		0.174U			0.695
Sep-08	0.023U				0.027U				0.1U		-0.033U	.424U		0.695
Dec-08									0.088U		-0.069U	.024U		0.695
Mar-96	0.141U		0.207U		0.521U		0.276U	0.235J					0.5	
Sep-96	0.0497U		0.135J		0.0482U		0.0248U						0.5	
Mar-97	0.0235U		0.065J		0.0577U		0.07J						0.5	
Sep-97	0.0723U	0.0358U	0.0353U		0.123U		0.0748U						0.5	
Mar-08	-0.019U				-0.052U	0.096U			0.102U		0.046U			0.695
Jun-08									0.077U		0.174U			0.695
Sep-08	0.023U				0.027U				0.1U		-0.033U	.424U		0.695
Dec-08									0.088U		-0.069U	.024U		0.695

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 20. Carbon Tetrachloride Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	5U		2J		4J		5U	5U					10.6	
Sep-96	4J	5U	7		7		5J						10.6	
Mar-97	4J	3J	6		7		4J						10.6	
Jun-97					7								10.6	
Sep-97	5U	5U	4J		11		5U						10.6	
Mar-98													10.6	
Jun-98					10U								10.6	
Aug-98	2J		6		5		3J	3J					10.6	
Mar-99	1J		4J	4J	7		3J						10.6	
Sep-99	5U	1J	4J		5		3J						10.6	
Mar-00													10.6	
Jun-00					7.1								10.6	
Sep-00	1J		5		9	9							10.6	
Mar-01	1J		6		7		5.26	5					10.6	
Sep-01	5U		4J	4J	7		5J						10.6	
Mar-02	1J	1J	5		9		5						10.6	
Sep-02	1.011J		5.018	5.243	8		5.854						10.6	
Mar-03	5U		4J		6		5J						10.6	
Sep-03	5U	5U	4J		6		5						10.6	
Mar-04	1J		6		8		7.416						10.6	
Sep-04	1J		5	6	8		7	7.223					10.6	
Mar-05	1J	1J	6	6	7		8						10.6	
Sep-05	5U		6		7		8	8					10.6	
Mar-06	1J	1J	4J		5J		10						10.6	
Sep-06	5U		5J	5J	6		6						10.6	11
Mar-07	1J		5J		4J	5J	7J						10.6	11
Sep-07	5U		6	6	5		8							11
Mar-08	5U				5J	4J			5U		2J			11
Jun-08									5U		2J			11
Sep-08	5U				4J				5U		2J	2J		11
Dec-08									1.14J		2.33J	2.32J		11

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 21. Nitrogen Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Sep-95					36.6								51.5	
Mar-96	4.58		20.2		31.9		35.6	36.5					51.5	
Sep-96	4.19		20.6		26.1		33.7						51.5	
Mar-97	0.419	40	22.6		21.3		34.1						51.5	
Sep-97	4.13	4.19	18.9		24.6		35.4						51.5	
Mar-98	4.62D		20.4D	20.1D	25.3D		34.3D						51.5	
Aug-98	4.14		24		26.3		35.2	34.5					51.5	
Mar-99	4.53		20.8	20.6	24.6		31.8						51.5	
Sep-99	4.6	4.5	20		23.7		33						51.5	
Mar-00													51.5	
Sep-00	4.7		19.1		24.6	23.2							51.5	
Mar-01	5.5		19.9		24.7		31.3	32.2					51.5	
Sep-01	4.6		17.3	17.6	23		29.3						51.5	
Mar-02	4.6	4.5	16.3		18.9		27.9						51.5	
Sep-02	4.48		15.8	15.8	19		26.6						51.5	
Mar-03	4.8		17		21.4		29.7						51.5	
Sep-03	5.1D	5.1D	15.9D		19.3D		29.2D						51.5	
Mar-04	4.8D		14.4D		16.8D		32.4D	26D					51.5	
Sep-04	4.9		15.3	15.8	16.8		26.8						51.5	
Mar-05	5.1	5.1	14.3		15.6		25.8						51.5	
Sep-05	7.72D		12.5D		14.4D		24.6D	24D					51.5	
Mar-06	4.6D	4.6D	12.9D		13.8D		23.7D						51.5	
Sep-06	5.3		13.4D	13.2D	13.3		22.8D						51.5	51.1
Mar-07	4.8D		13D		13.8D	14D	28.9D						51.5	51.1
Sep-07	4.4D		12.7D	12.7D	10.7D		22.7D							51.1
Mar-08	3.1D				6.2D	6.1D			39.8D		9.4D			51.1
Jun-08									36.2D		13.4D			51.1
Sep-08	3.4				6.6D				38.3D		9.4D	9.7D		51.1

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 22. Total Organic Halides Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	6.6J		10.5J		5.6J		6.6J	5					9.5	
Sep-96	5U		5U		5U		5U						9.5	
Mar-97	5U		5U		2.9		5U						9.5	
Jun-97					11.7								9.5	
Sep-97	6.05	4.62U	7.05		4.62U		5U						9.5	
Mar-98	4.62U		4.62U	4.62U	4.62U		4.62U						9.5	
Aug-98	5.9		5.85		6.7		5U	5U					9.5	
Mar-99	24U		12U	24U	34.5		14.3						9.5	
Sep-99	128	12U	206		12U		12U						9.5	
Jan-00					14								9.5	
Mar-00													9.5	
Jun-00					4.4B								9.5	
Sep-00	206		271		180	181							9.5	
Dec-00					10.6								9.5	
Mar-01	17.1U		20U		20U		20U	20U					9.5	
Sep-01	6.5U		8.7U	7.4U	6.5U		6.6U						9.5	
Dec-01					13.2								9.5	
Mar-02	5.2U	6.1	9.3		9.5		5.2U						9.5	
Sep-02	10.5		5.6	5.2U	8.5		60.6						9.5	
Mar-03	5.2U		6.3		5.3		5.2U						9.5	
Sep-03	5.2U	5.2U	6.2		6.8		6.3						9.5	
Mar-04	6.7		5.7		9.8		5.2U	6.4					9.5	
Sep-04	5.2U		5.2U	5.2U	6.7		5.2U						9.5	
Mar-05	5U	6.3	8.1		12.8		11.4						9.5	
Sep-05	5U		8.83		12.2		7.46	5.51					9.5	
Mar-06	5.2UC	15.9C	5.2UC		9.2C		10.6D						9.5	
Sep-06	16.9		5U	5U	6.1		38.9						9.5	5
Mar-07	5.2U		5.2U		5.2U	5.2UJ	7.2						9.5	5
Sep-07	5.2U		5.2U	5.2U	5.2U		5.2U							5
Mar-08	5.2U				5.2U	5.2			9.8		7.1			5
Jun-08	5.5								5.2U		5.2U			5
Sep-08					5U		5.2U				5.2U	5.9		5

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 23. Total Dissolved Solids Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	254		340		384		401	420					573.6	
Sep-96	236		367		411		457						573.6	
Mar-97	283	279	404		390		514						573.6	
Jun-97					398								573.6	
Sep-97	277	278	377		401		463						573.6	
Dec-97					379								573.6	
Mar-98	322		320	309	327		456						573.6	
Jun-98					472								573.6	
Aug-98	296		406		422		491	507					573.6	
Dec-98					344								573.6	
Mar-99	280		380	400	390	406	440						573.6	
Jun-99					407								573.6	
Sep-99	270	280	370		410		470						573.6	
Jan-00					355								573.6	
Mar-00													573.6	
Jun-00					434								573.6	
Sep-00	270		340		550	520							573.6	
Mar-01	278		407		400		349	436					573.6	
Sep-01	305		384	391	420		535						573.6	
Mar-02	265	258	333		358		430						573.6	
Sep-02	276		326	328	344		446						573.6	
Mar-03	260		337		349		407						573.6	
Sep-03	269	271	361		381		5U						573.6	
Mar-04	262		323		326		438	442					573.6	
Sep-04	262		331	330	355		392						573.6	
Mar-05	205	253	278		339		386						573.6	
Sep-05	292		387		403		460	500					573.6	
Mar-06	274	269	314		302		391						573.6	
Sep-06	270		464	409	311		521						573.6	570
Mar-07	271J		312J		310J	314J	388J						573.6	570
Sep-07	259J		309J	363J	304J		498J							570
Mar-08	274				295	341			438		344			570
Jun-08									508		222			570
Sep-08	268				285				477		337	345		570

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 24. Turbidity Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Mar-96	0.34J		0.3J		0.26J		3.21J	1.48J					50	
Sep-96													50	
Mar-97	0.71		8.91		0.84		60.6						50	
Jun-97					1.78								50	
Sep-97	1.9		14.4		1.33		4.56						50	
Dec-97					1.38								50	
Mar-98	1.65		23.4		3.52		4.85						50	
Jun-98					3.99								50	
Aug-98	1.29		90.5				2.95						50	
Dec-98					2.62								50	
Mar-99			52.6		4.54								50	
Jun-99					3.25								50	
Sep-99	2.29		87.2		2.68								50	
Jan-00					4.12								50	
Mar-00													50	
Jun-00					1.63								50	
Sep-00	2.3		142		2.6								50	
Dec-00					2.41								50	
Mar-01	1.71		38.2		1.06		16.7						50	
Jun-01					1.71								50	
Sep-01	1.54		3.35		1.17		6.62						50	
Dec-01					4.12								50	
Mar-02	1.85		11.1		5		7.4						50	
Sep-02	2.2		5.6		4.7		6.7						50	
Mar-03	1.86		962		1.29		15						50	
Sep-03	2.41		41.6		2.68		49.7						50	
Mar-04	2.01		16.3		2.49		15						50	
Sep-04	2.93		16.9		4.65		4.19						50	
Mar-05	2.78		7.53		2.13		4.16						50	
Sep-05	0.73		4.61		3.88		3.94						50	
Mar-06	1.93		7.21		1.39		4.07						50	
Sep-06	1.12		4.02		4.41		4.6						50	49.8
Mar-07	1.65		4.99		1.94		7.02						50	49.8
Sep-07	1.17		4.57		3.94		13.5							49.8
Mar-08	2.77				4.74				0.87		3.56			49.8
Jun-08									3.95		2.61			49.8
Sep-08	2.83				1.31				1.93		1.24			49.8
Dec-08									1.65		2.23			49.8

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 25. pH Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Jan-96			7.71				7.68						8	
Mar-96	7.66				7.8								8	
Sep-96					7.7								8	
Mar-97	7.82		7.68		7.67		7.64						8	
Jun-97					7.75								8	
Sep-97	7.86		7.86		7.76		7.74						8	
Dec-97					7.81								8	
Mar-98	7.86		7.8		7.64		7.71						8	
Jun-98					7.72								8	
Aug-98	7.95		8.31		7.95		7.77						8	
Dec-98					7.8								8	
Mar-99			7.72		7.71								8	
Jun-99					7.61								8	
Sep-99	7.95		7.69		7.82								8	
Jan-00					7.77								8	
Mar-00													8	
Jun-00					7.71								8	
Sep-00	7.9		7.7		7.8								8	
Dec-00					7.75								8	
Mar-01	8.56		7.7		7.84		7.74						8	
Jun-01					7.68								8	
Sep-01	7.77		7.7		7.7		7.78						8	
Dec-01					7.74								8	
Mar-02	7.89		7.83		7.73		7.8						8	
Sep-02	7.9		7.8		7.7		7.8						8	
Mar-03	7.9		7.79		7.71		7.76						8	
Sep-03	7.85		7.76		7.63		7.67						8	
Mar-04	7.89		7.77		7.63		7.78						8	
Sep-04	7.76		7.78		7.68		7.76						8	
Mar-05	7.86		7.74		7.64		7.83						8	
Sep-05	7.84		7.74		7.59		7.81						8	
Mar-06	7.9		7.74		7.69		7.86						8	
Sep-06	7.81		7.78		7.72		7.8						8	8.01
Mar-07	7.86		7.78		7.77		8.08						8	8.01
Sep-07	8.07		7.79		7.8		7.9							8.01
Mar-08	7.77				7.62				7.51		7.55			8.01
Jun-08									7.5		7.56			8.01
Sep-08	7.35				7.56				7.47		7.52			8.01
Dec-08									7.67		7.75			8.01

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

Table 26. Specific Conductance Data.

Sample Date	699-35-66A (Down Gradient)	DUP	699-36-67 (Retired 2007)	DUP	699-36-70A (Up Gradient)	DUP	699-37-68 (Retired 2007)	DUP	699-37-66 (Down Gradient)	DUP	699-36-66B (Down Gradient)	DUP	Old Limit (Through 2006)	New Limit (2007 Onward)
Jan-96			461				547						743	
Mar-96	402				618								743	
Sep-96					595								743	
Mar-97	428		545		562		630						743	
Jun-97					591								743	
Sep-97	423		540		575		614						743	
Dec-97					483								743	
Mar-98	441		534		565		671						743	
Jun-98					505								743	
Aug-98	405		510		546		270						743	
Dec-98					558	571C							743	
Mar-99			577		585	552C							743	
Jun-99					556C	571C							743	
Sep-99	413		541		578								743	
Jan-00					533C	584							743	
Mar-00													743	
Jun-00					576								743	
Sep-00	412		537		565								743	
Dec-00					537C	563							743	
Mar-01	416		533		555		618						743	
Jun-01					547								743	
Sep-01	423		522		540		601						743	
Dec-01					460	530							743	
Mar-02	473		518		522		605						743	
Sep-02	412		517		537		605						743	
Mar-03	409		505		535		594						743	
Sep-03	395		502		500		425						743	
Mar-04	409		500		487		604						743	
Sep-04	406		486		483		588						743	
Mar-05	405		487		470		596						743	
Sep-05	402		471		469		562						743	
Mar-06	402		482		465		573						743	
Sep-06	407		475		454		553						743	774
Mar-07	408		482		455		567						743	774
Sep-07	400		491		441		574							774
Mar-08	408				429				667		515			774
Jun-08									676		507			774
Sep-08	397				400				648		500			774
Dec-08									666		504			774

U = Result is non-detected.
B = Estimated Results
C = Detected in both the sample and QC blank, and sample concentration was </= 5x the blank concentration.
J = Estimated Results
D = Reported from dilution

APPENDIX B

GROUNDWATER SAMPLING TRENDS, 1996-2008

Figure B-1 Arsenic (Filtered)

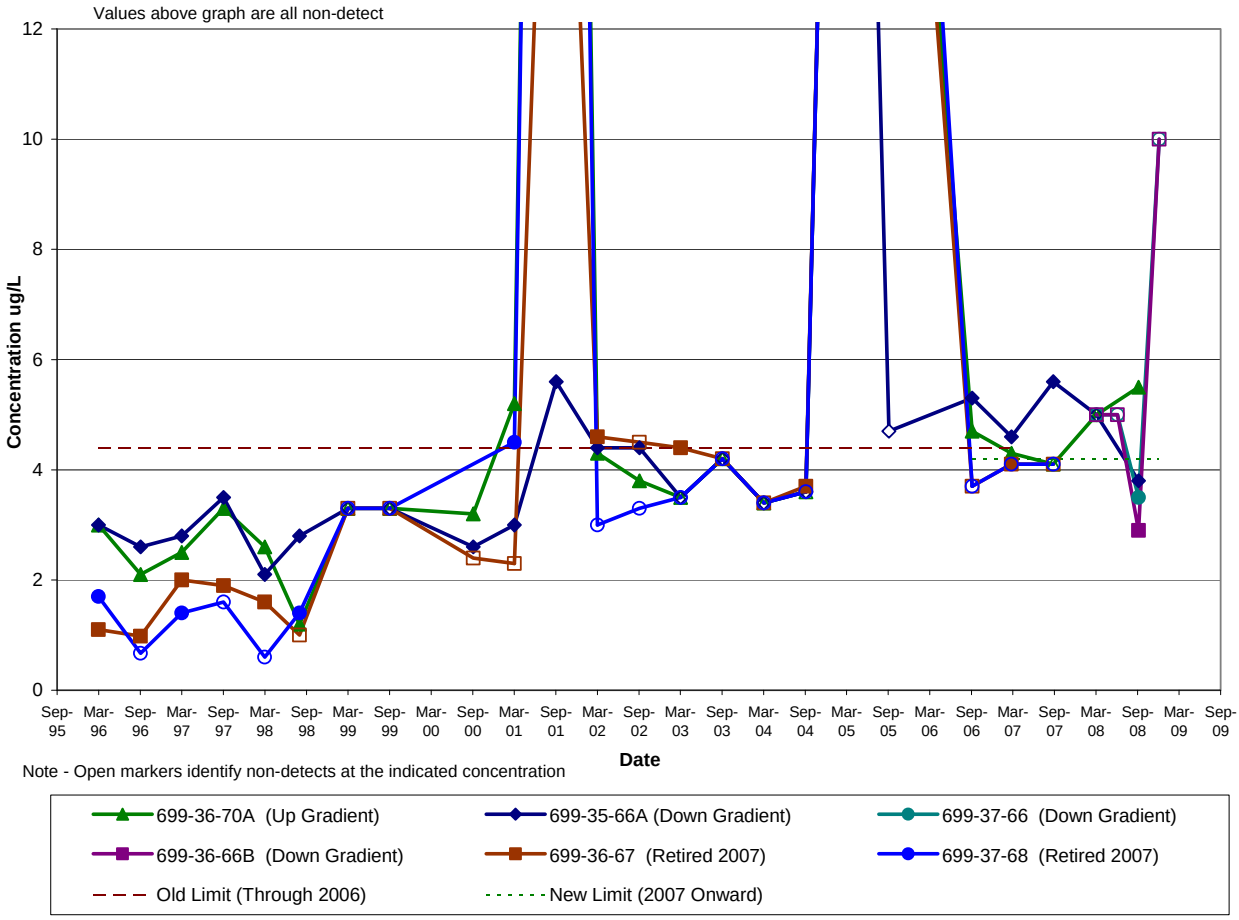


Figure B-2 Barium (Filtered)

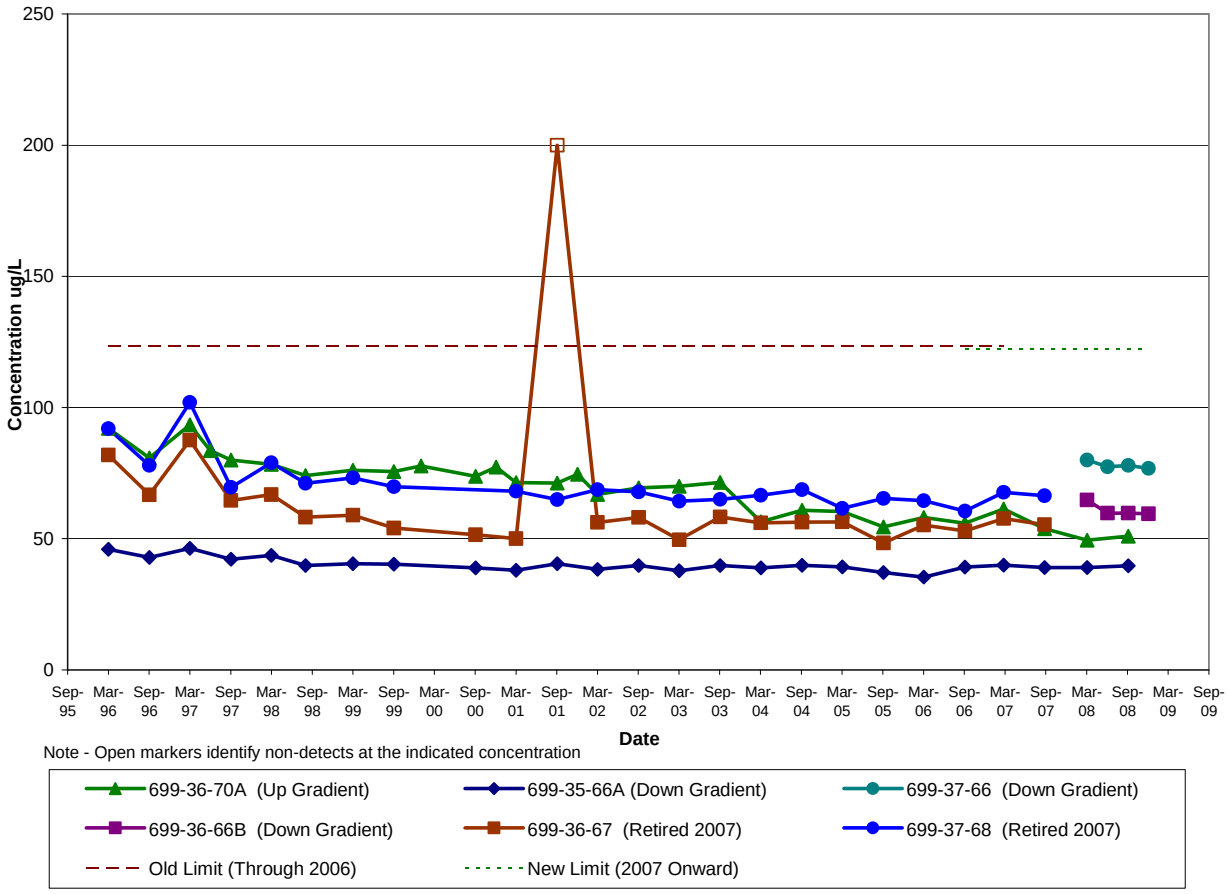


Figure B-3 Chromium (Filtered)

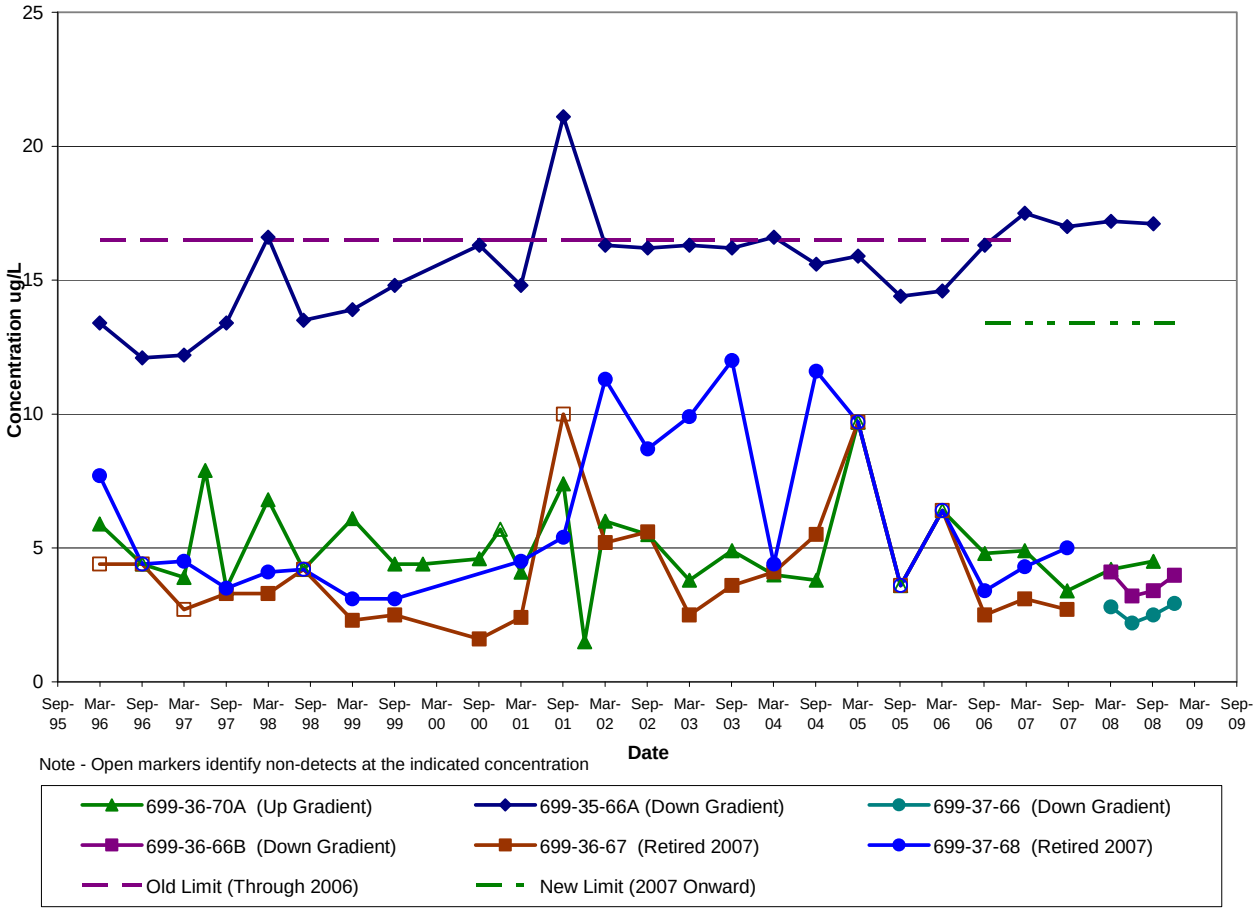


Figure B-4 Lead (Filtered)

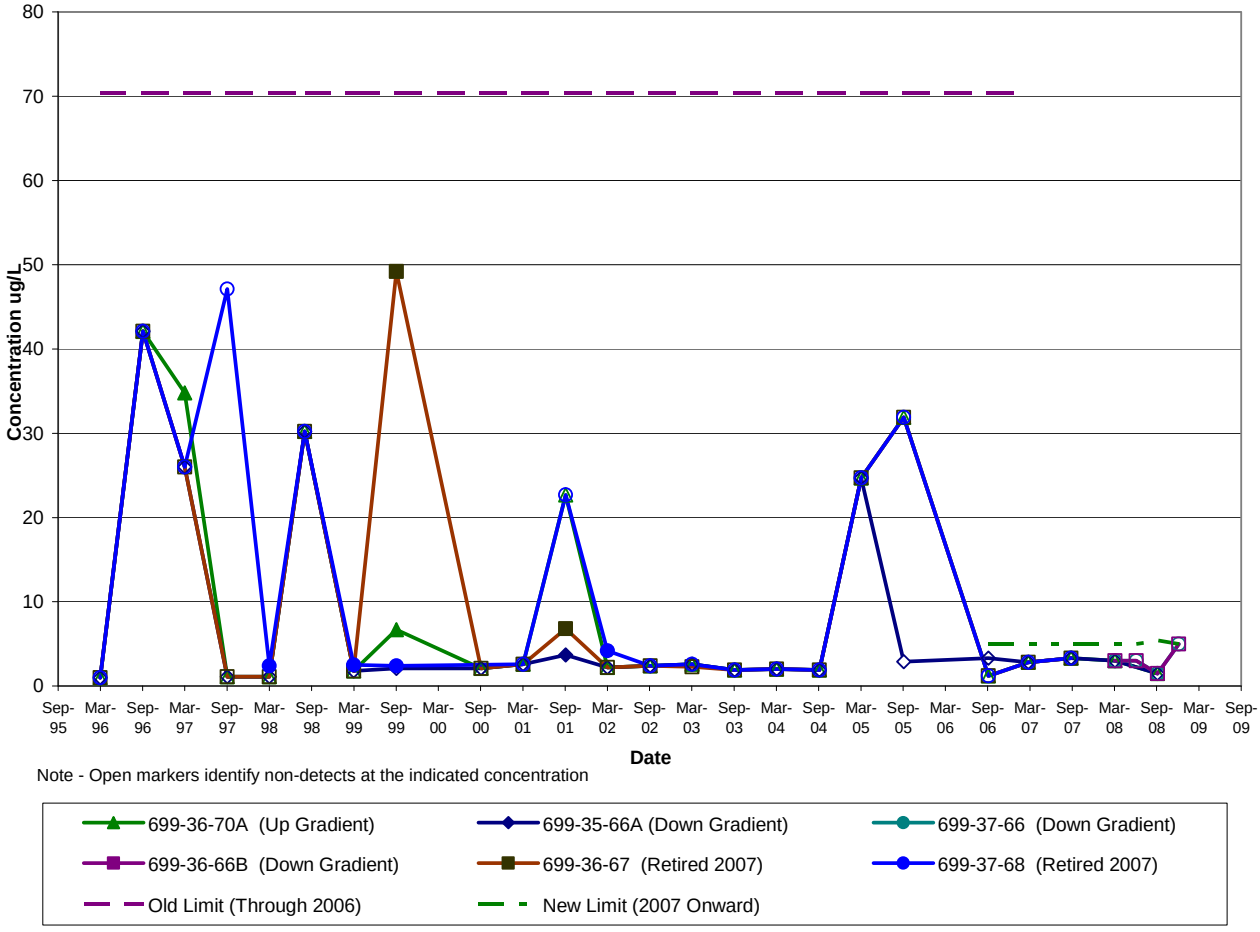


Figure B-5 Selenium (Filtered)

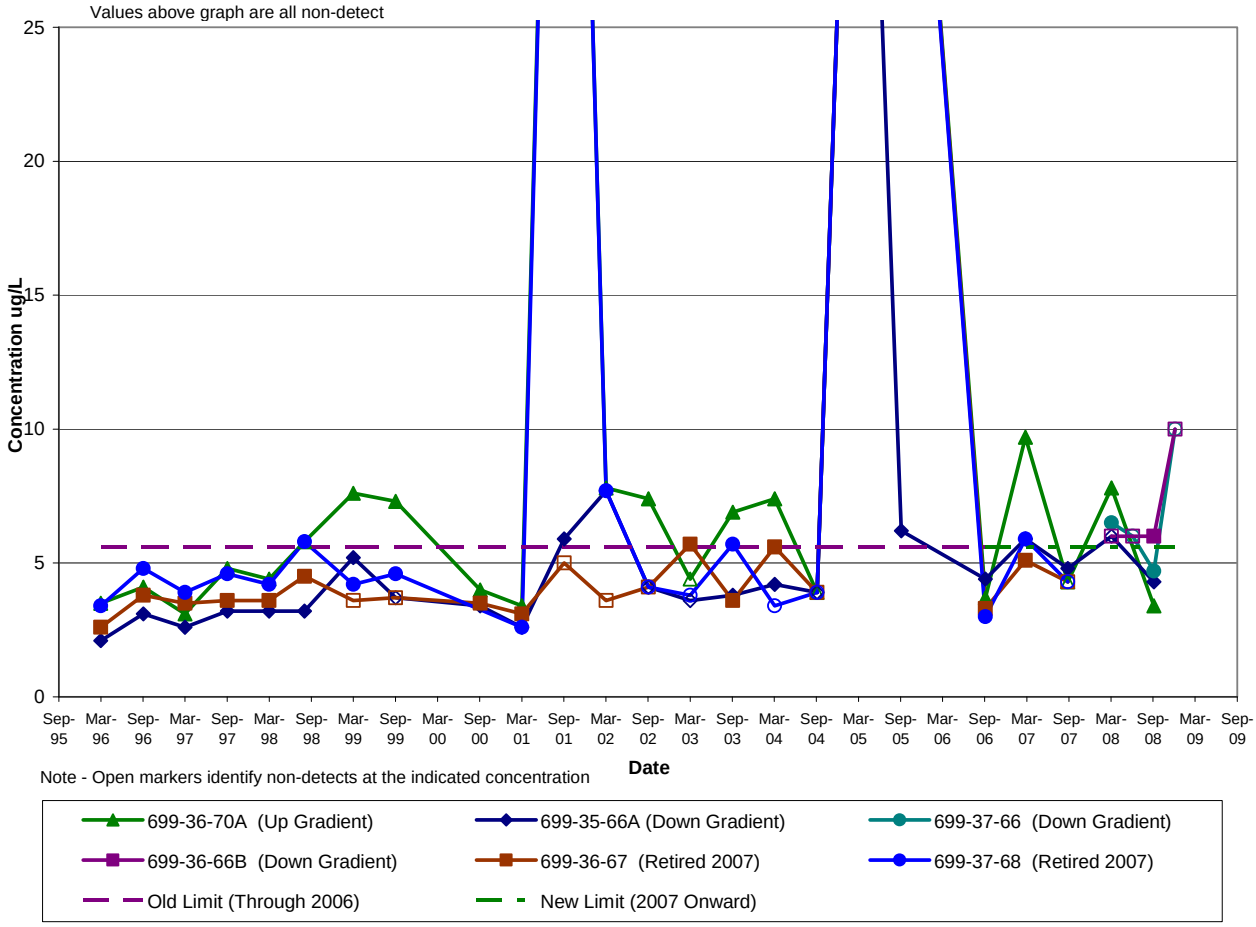


Figure B-7 Tin (Filtered)

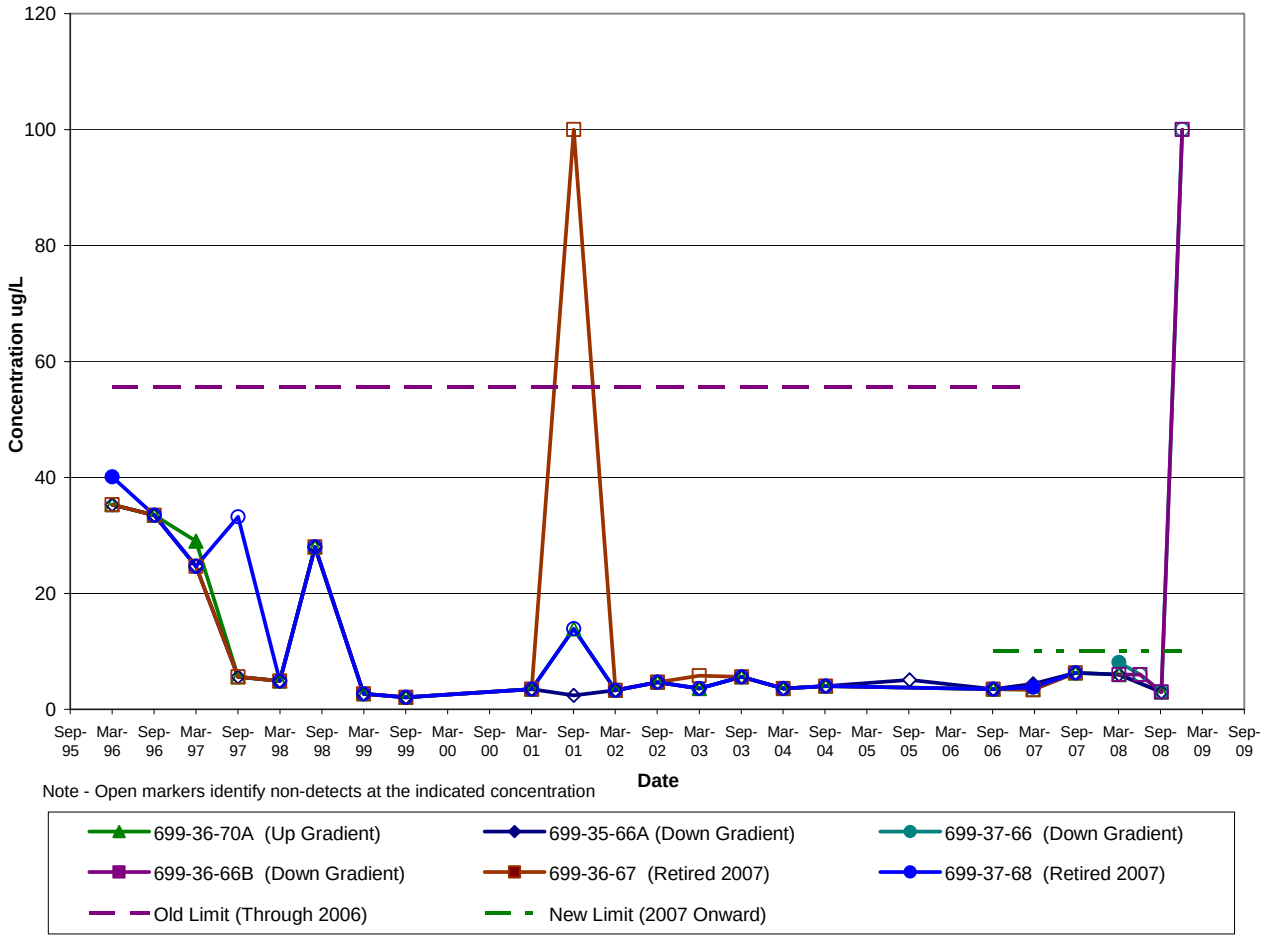


Figure B-6 Uranium

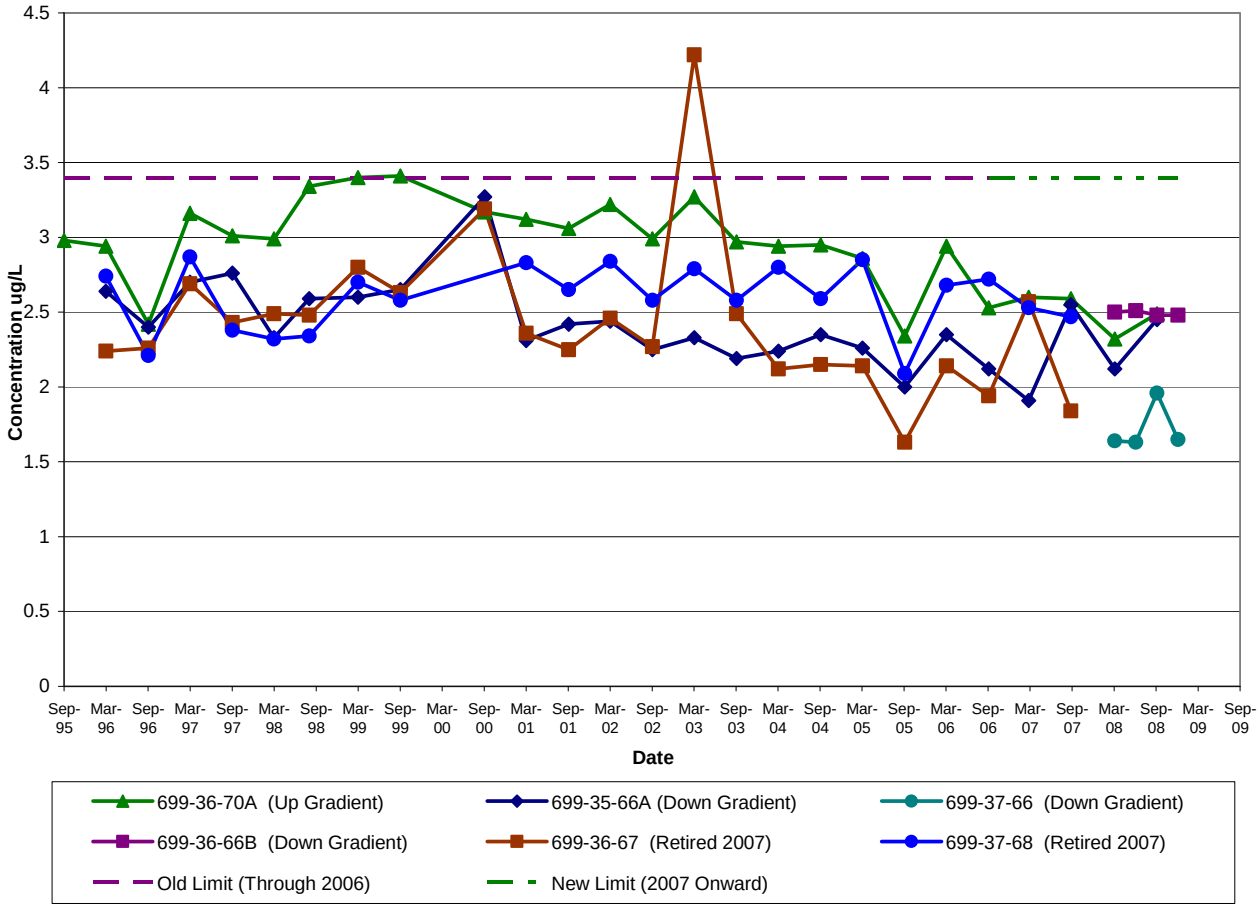


Figure B-8 Vanadium (Filtered)

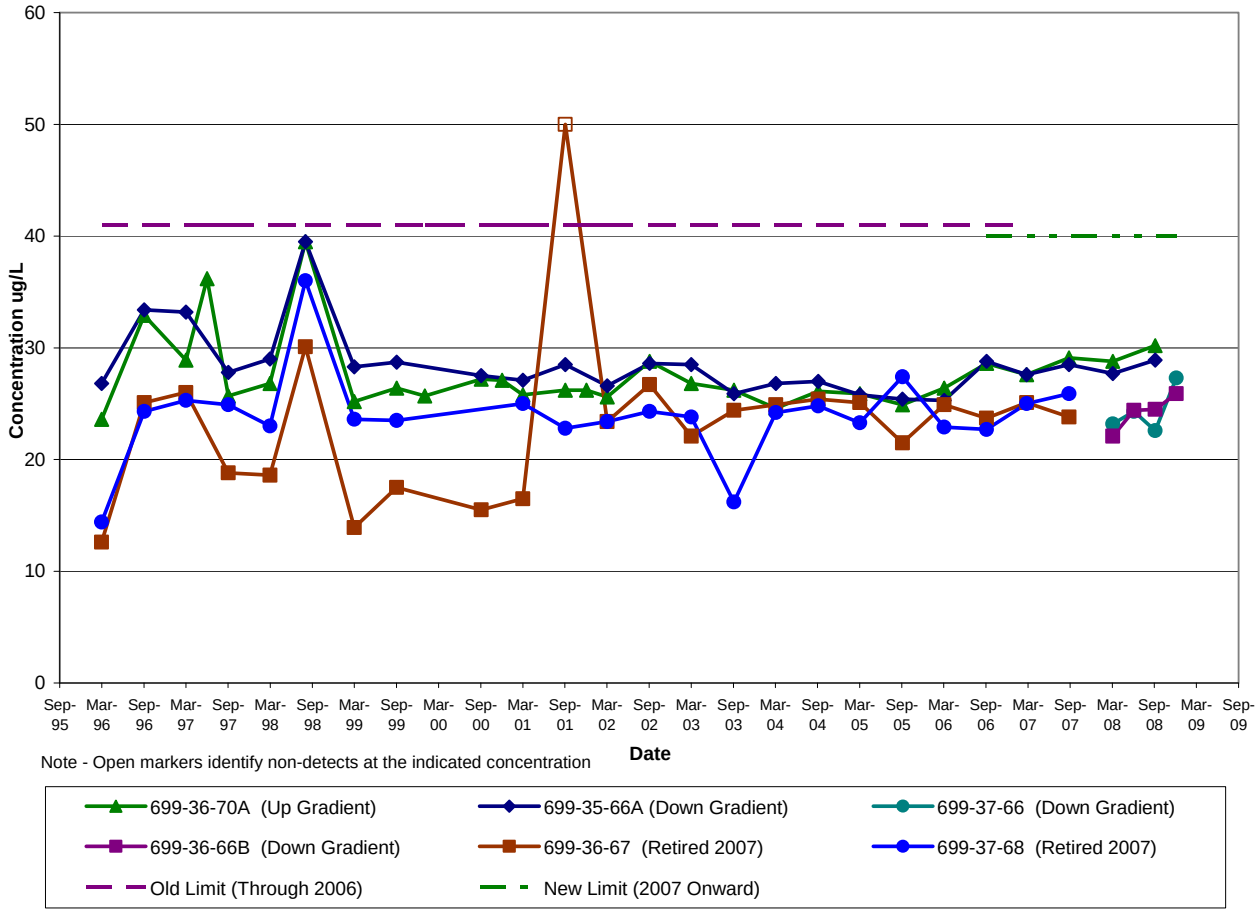


Figure B-9 Zinc (Filtered)

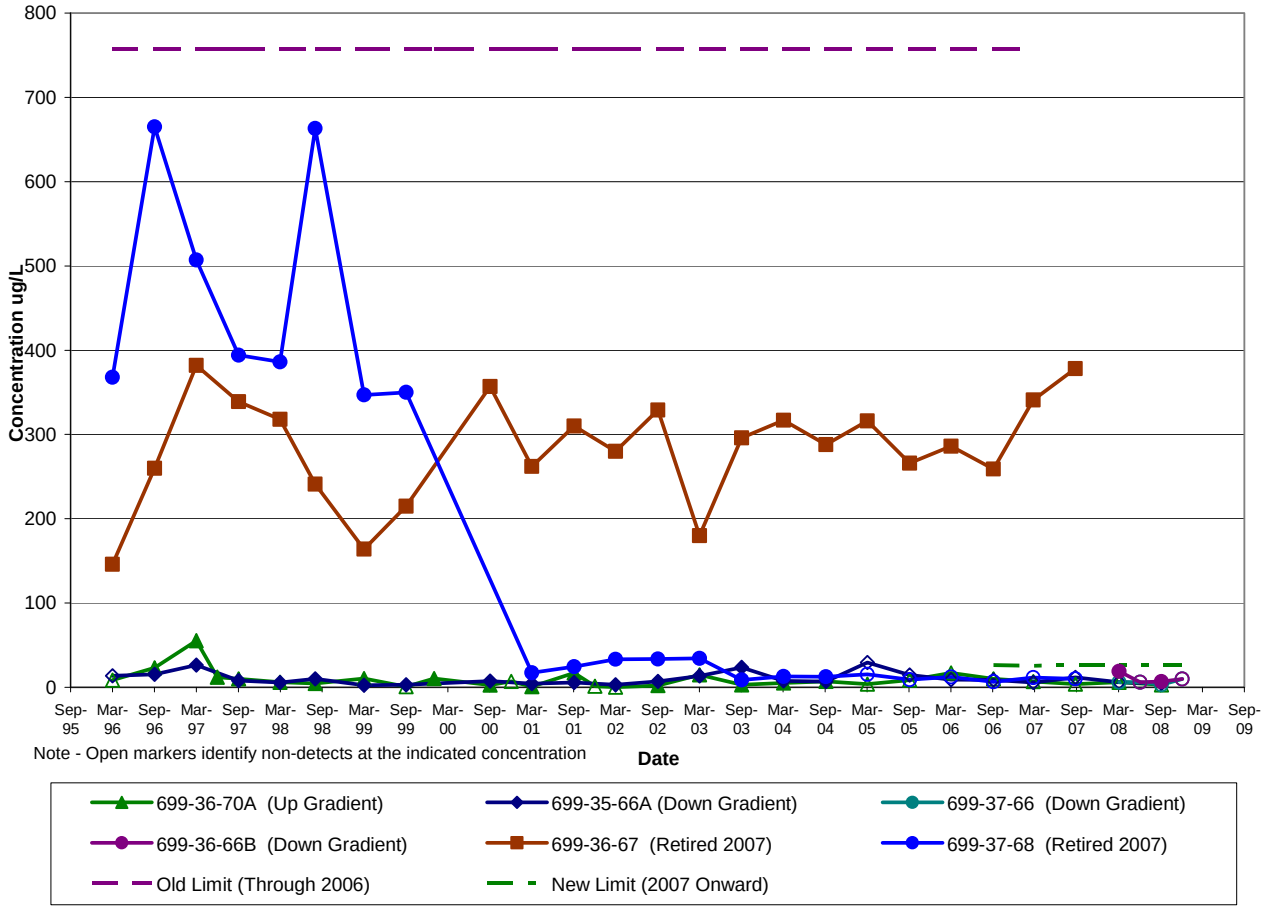


Figure B-10 Alkalinity

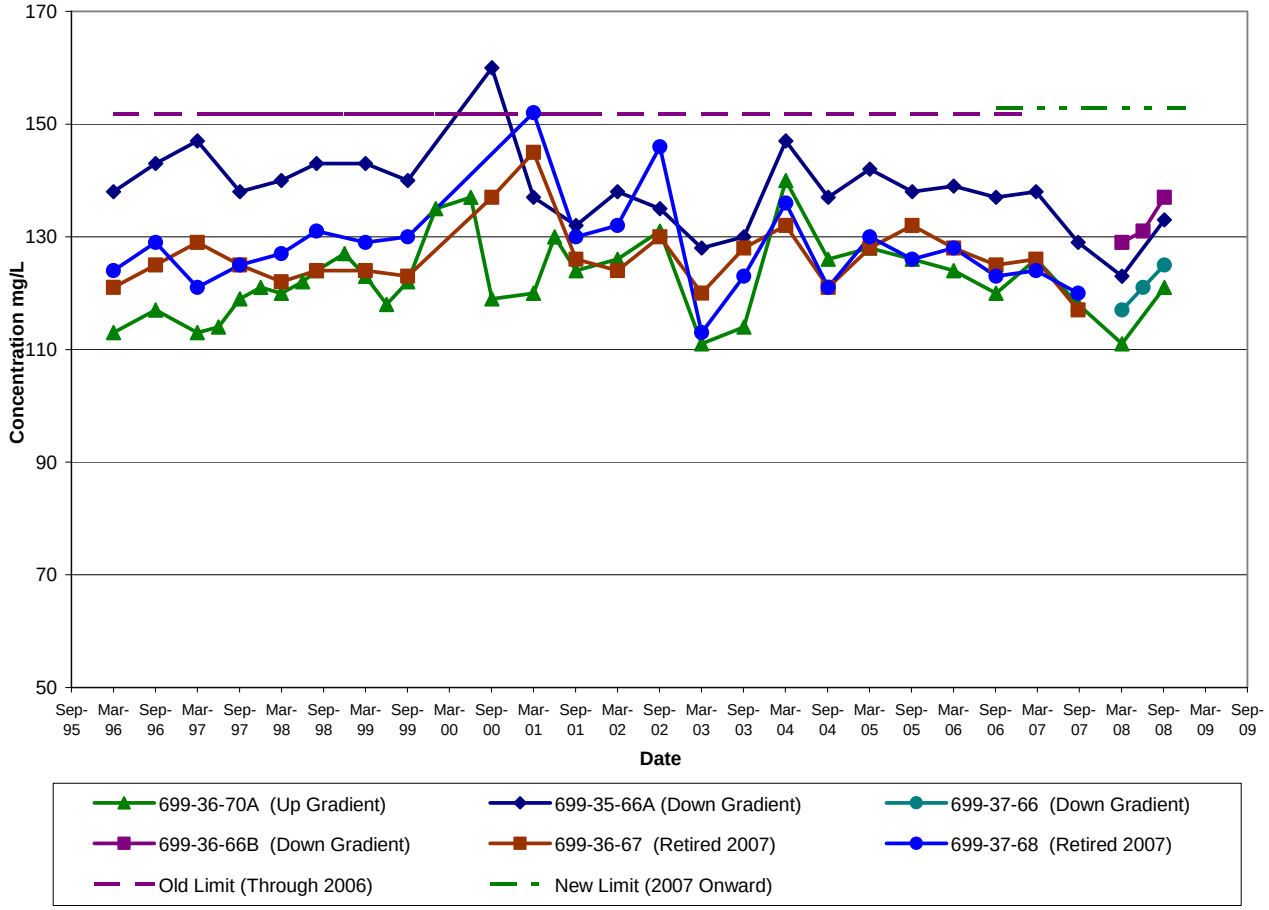


Figure B-12 Chloride

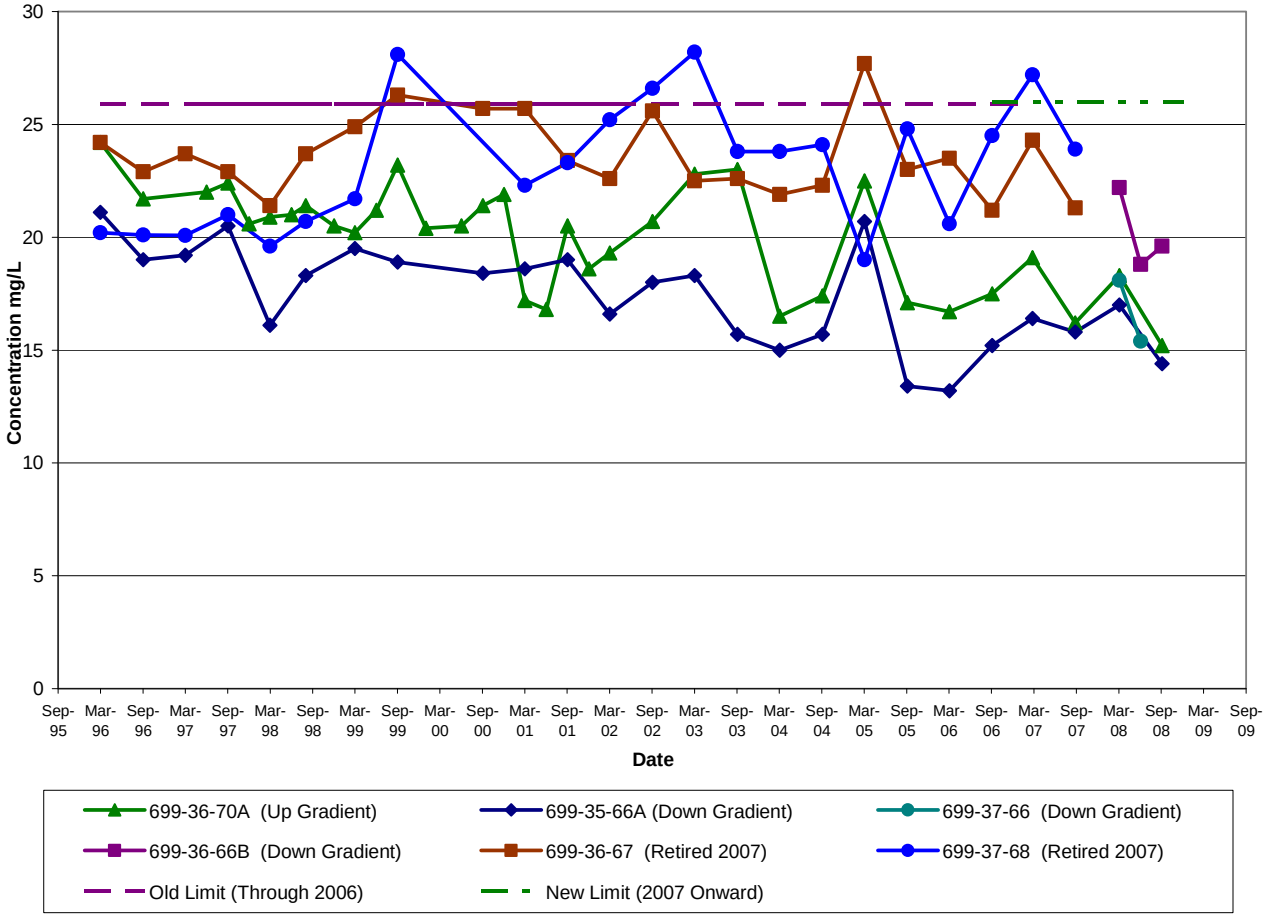


Figure B-11 Fluoride

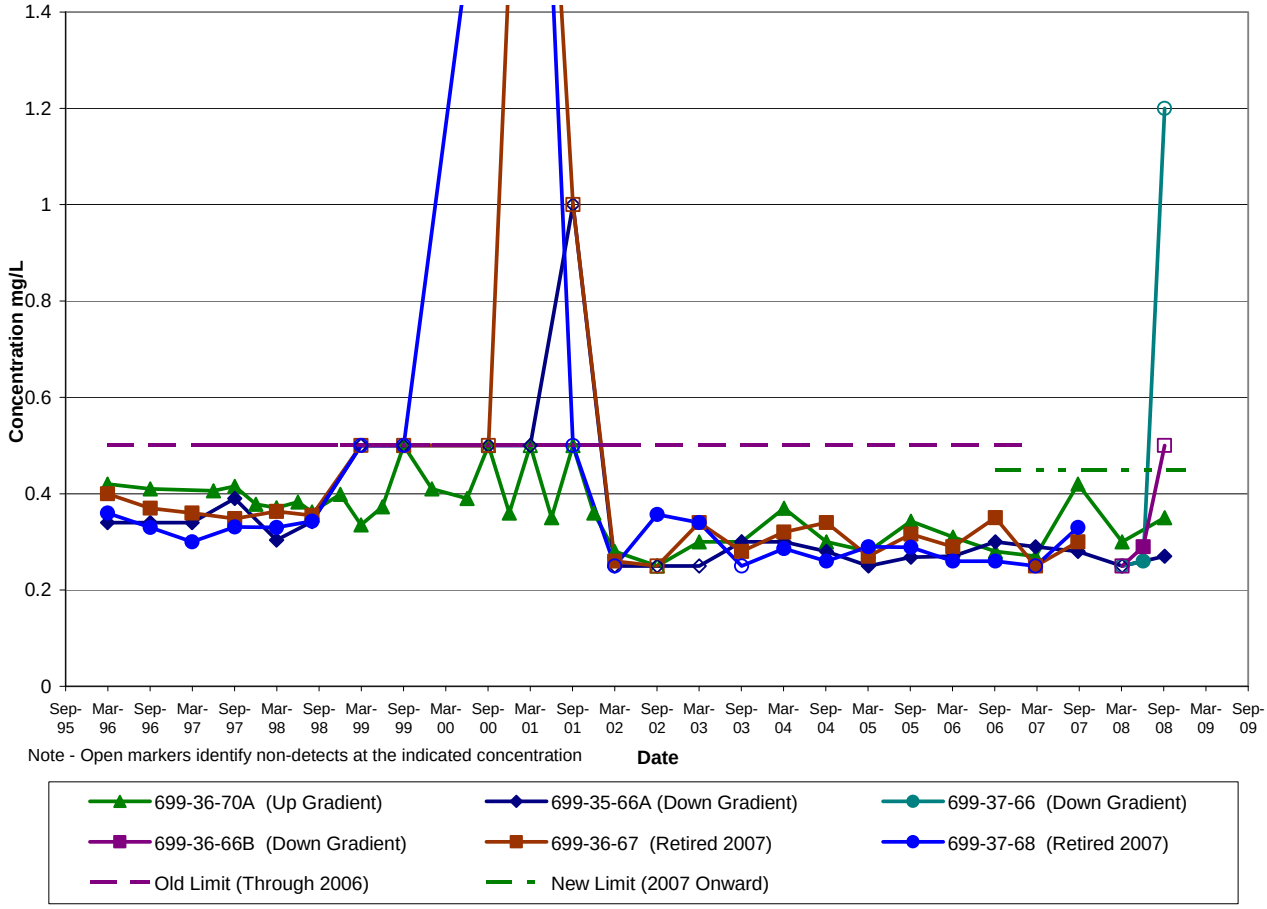


Figure B-13 Sulfate

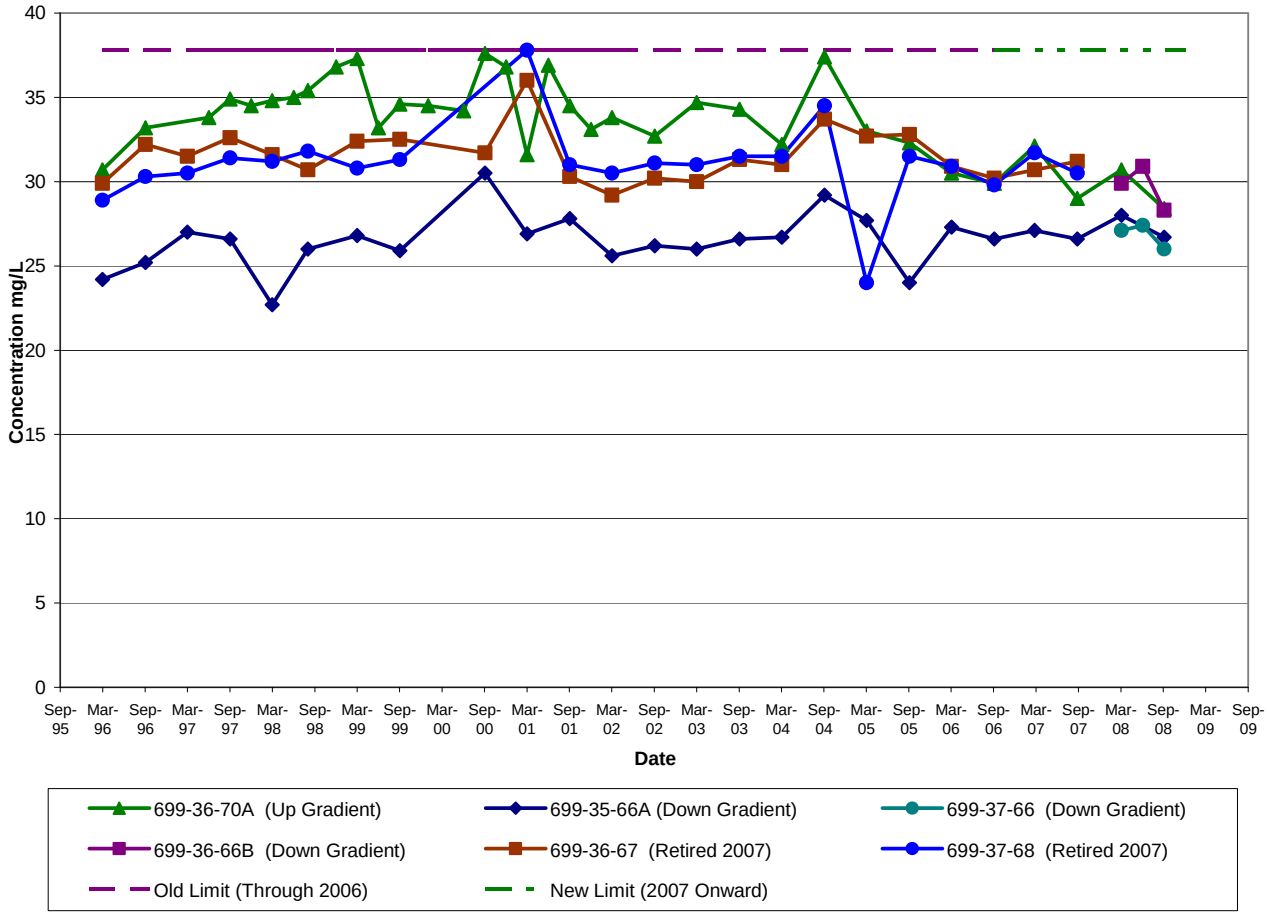
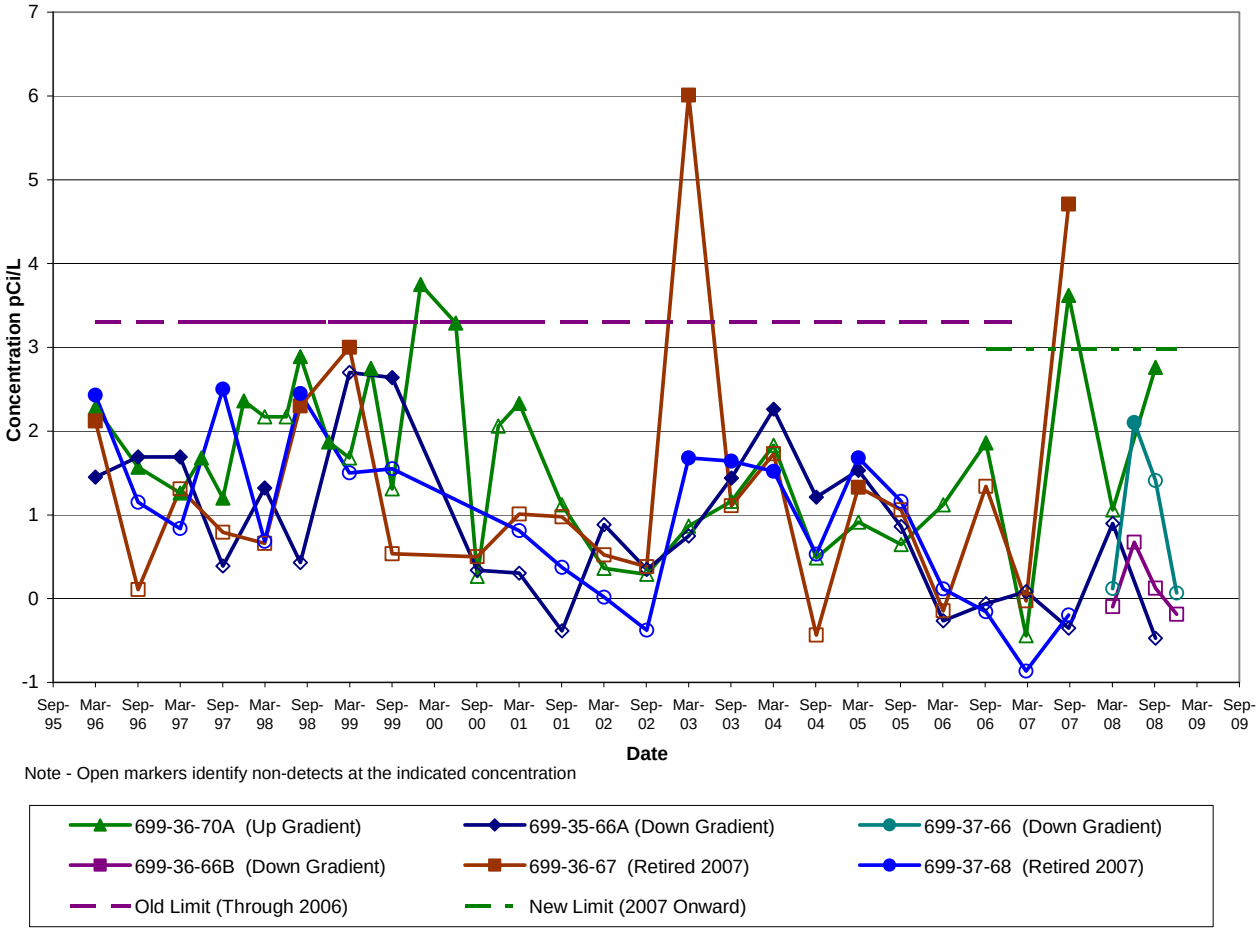


Figure B-14 Gross Alpha



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

Figure B-15 Gross Beta

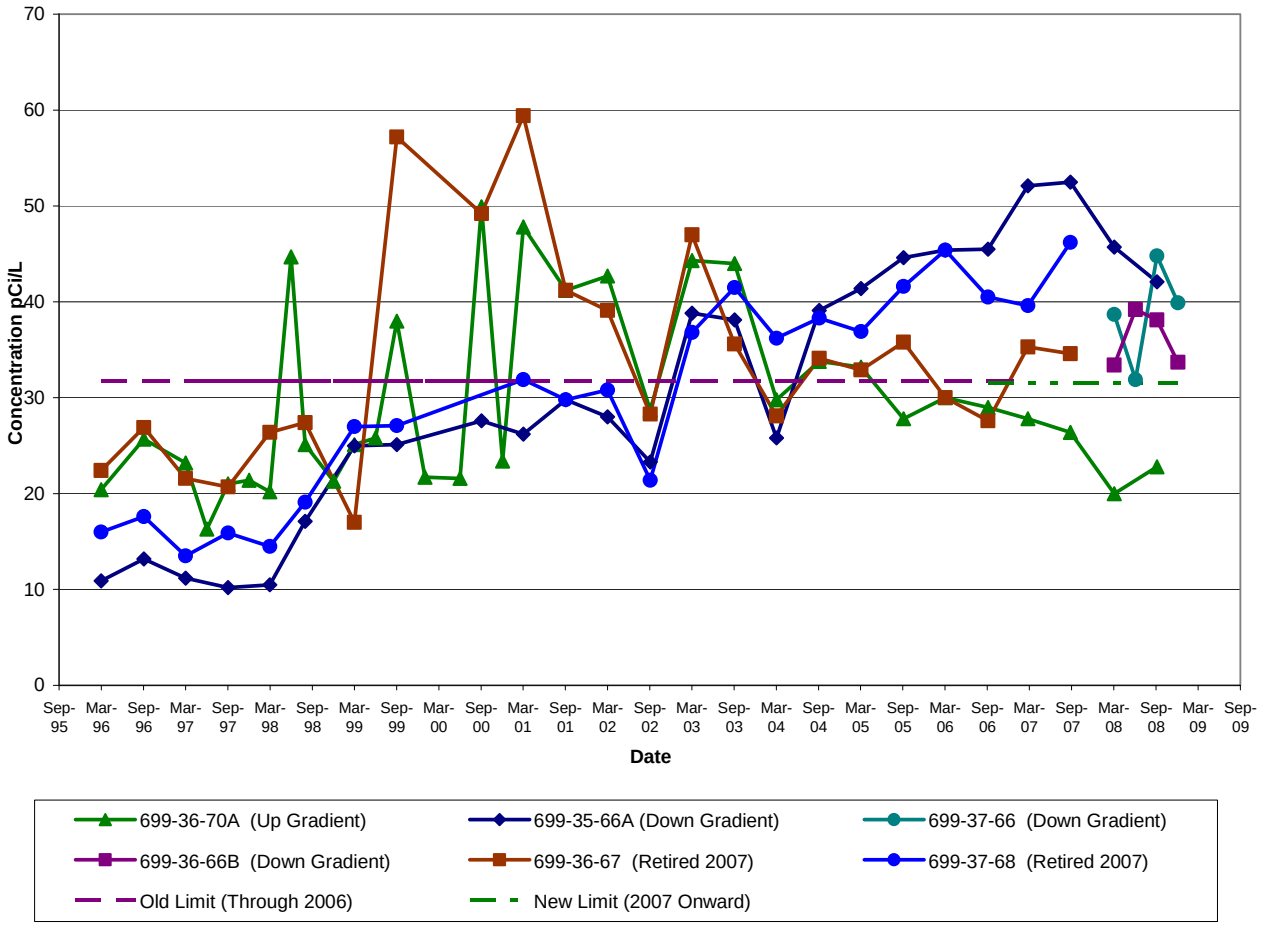


Figure B-16 Carbon-14

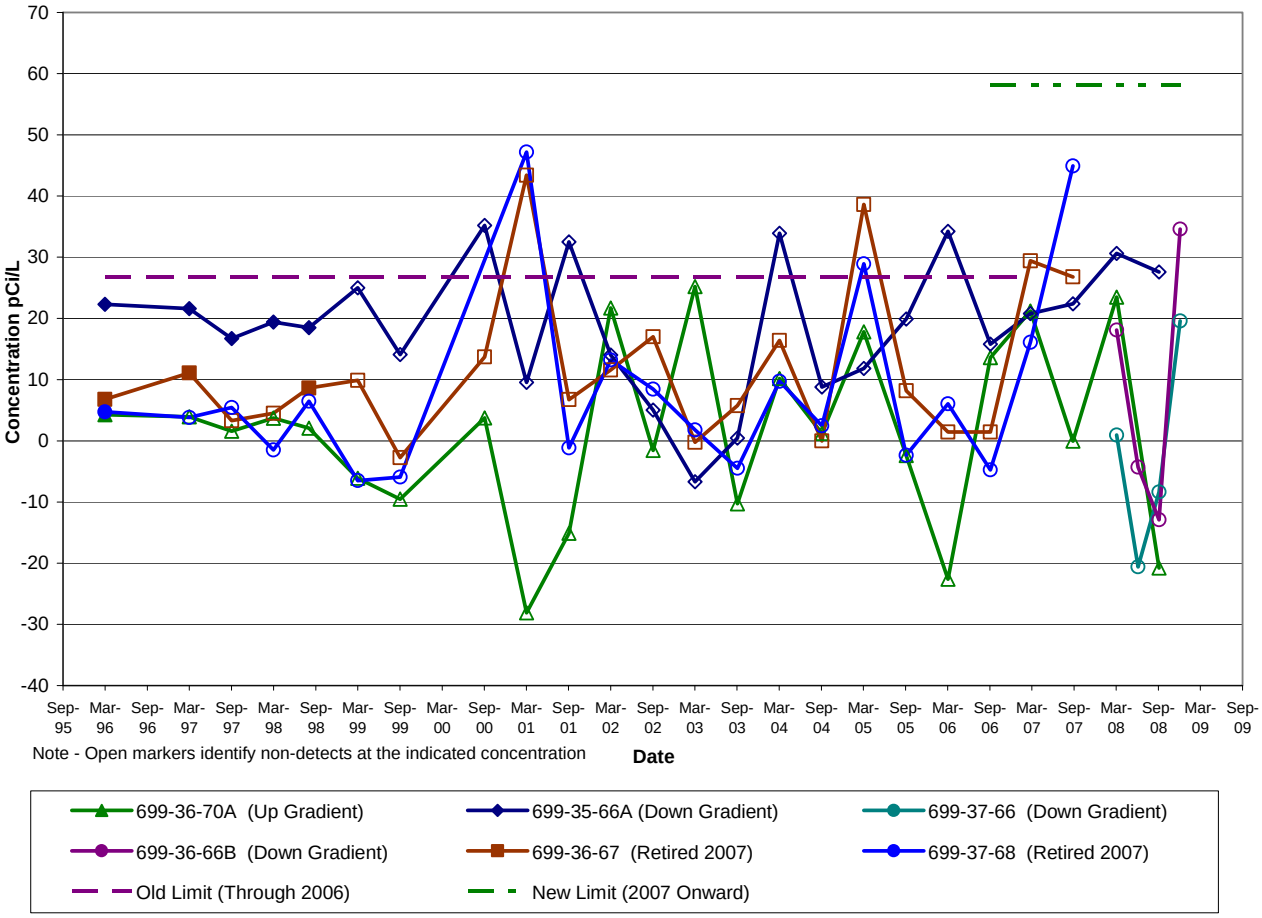


Figure B-17 Iodine-129

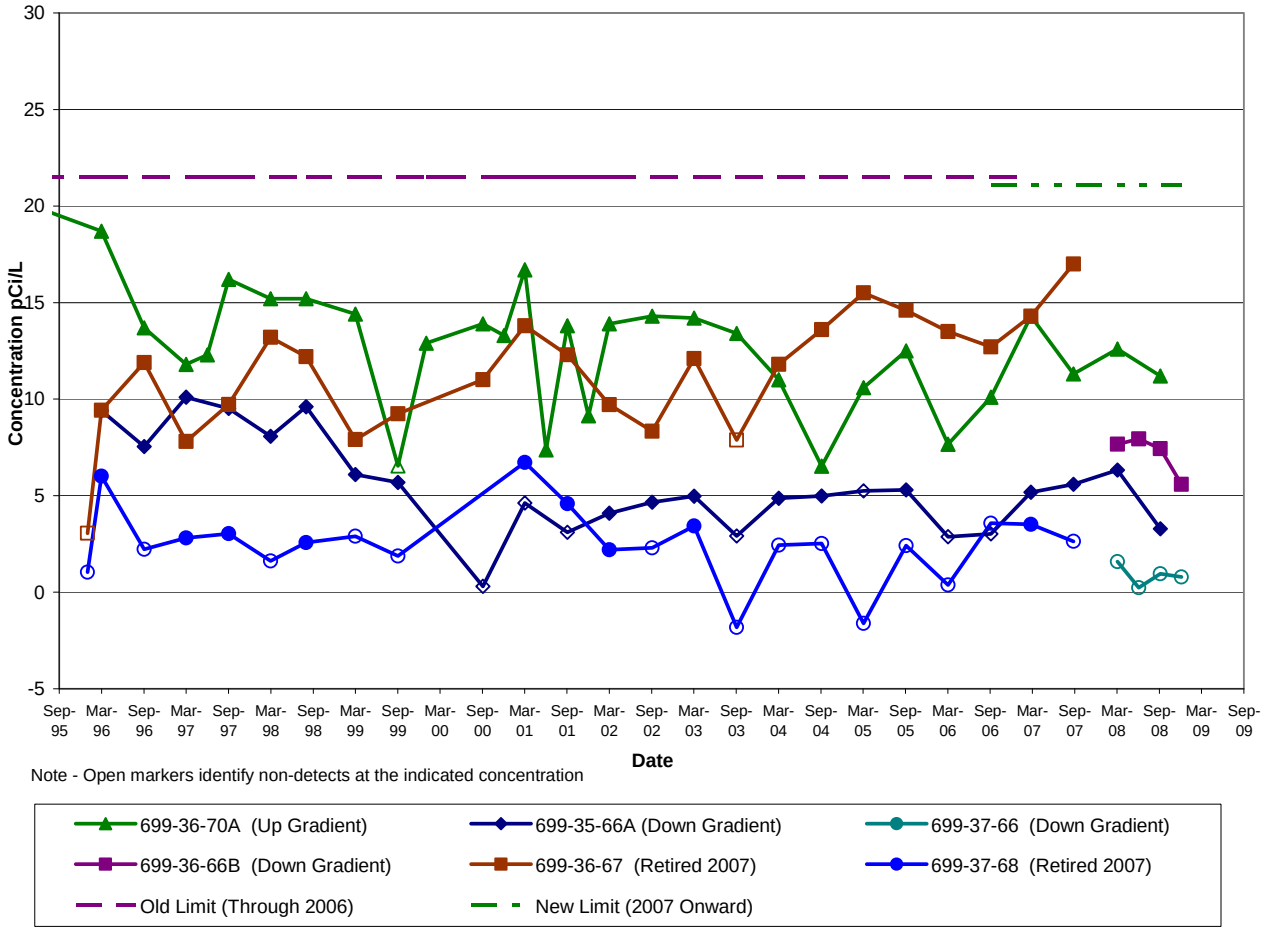


Figure B-18 Technetium-99

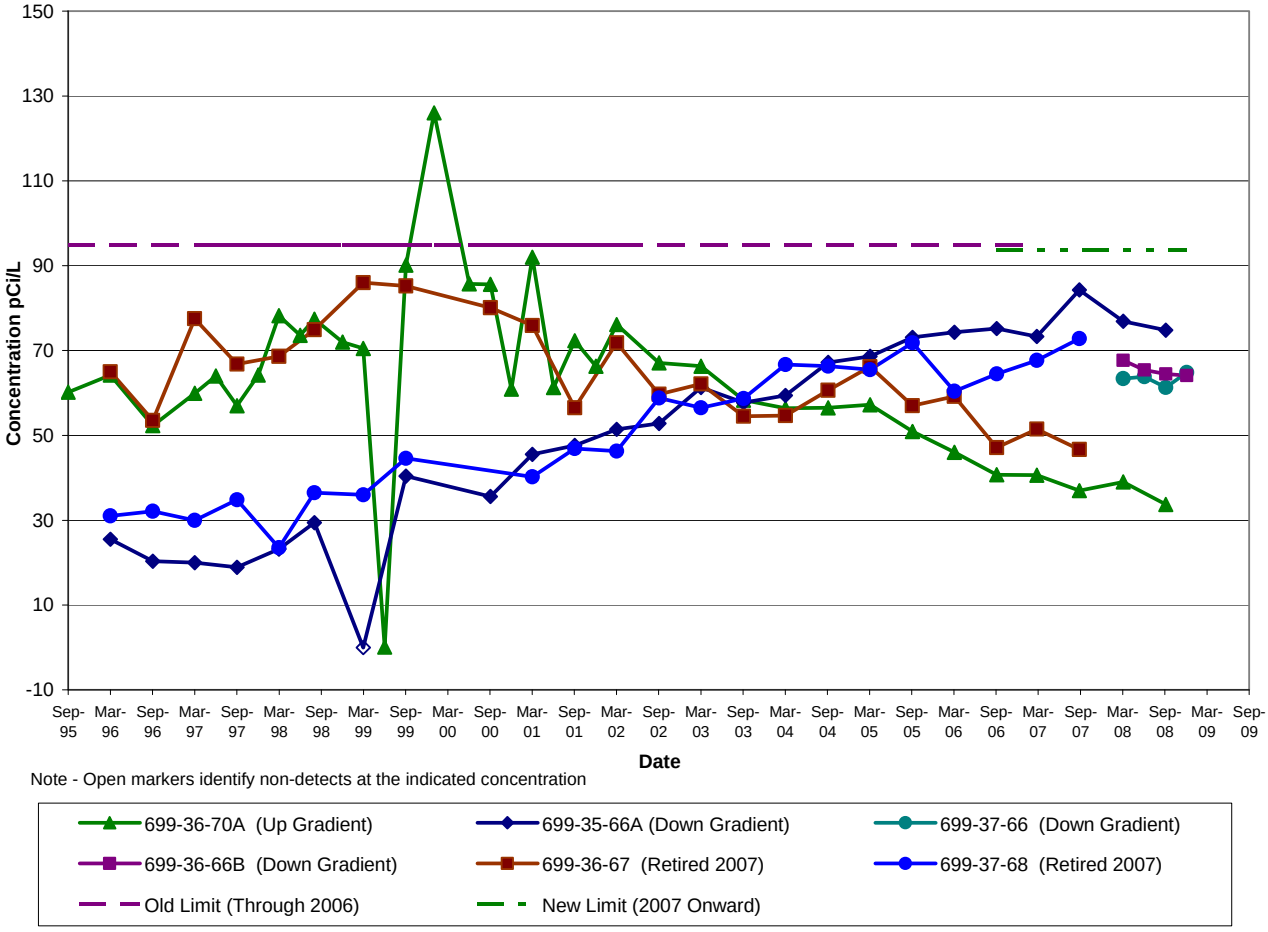


Figure B-19 Radium

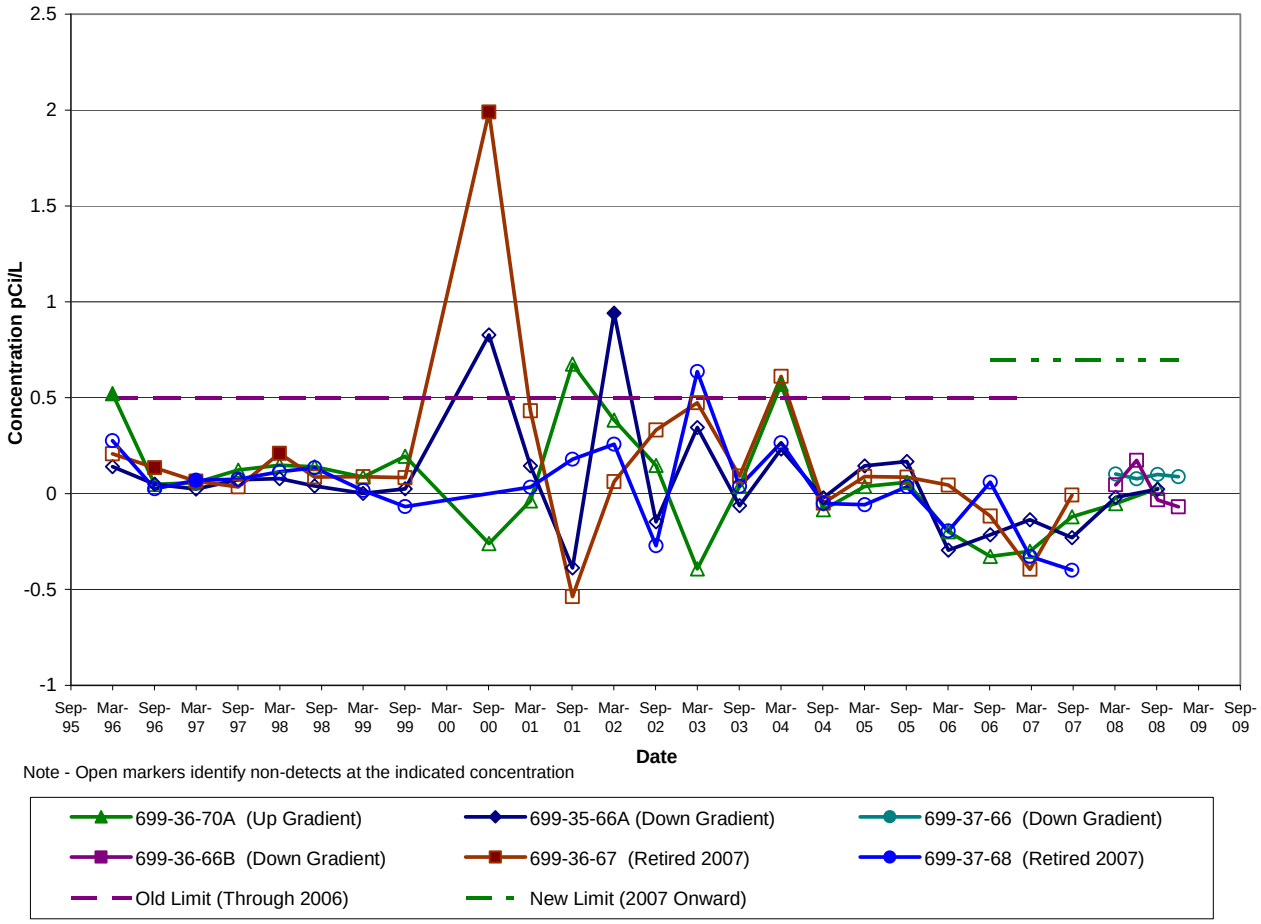


Figure B-20 Carbon Tetrachloride

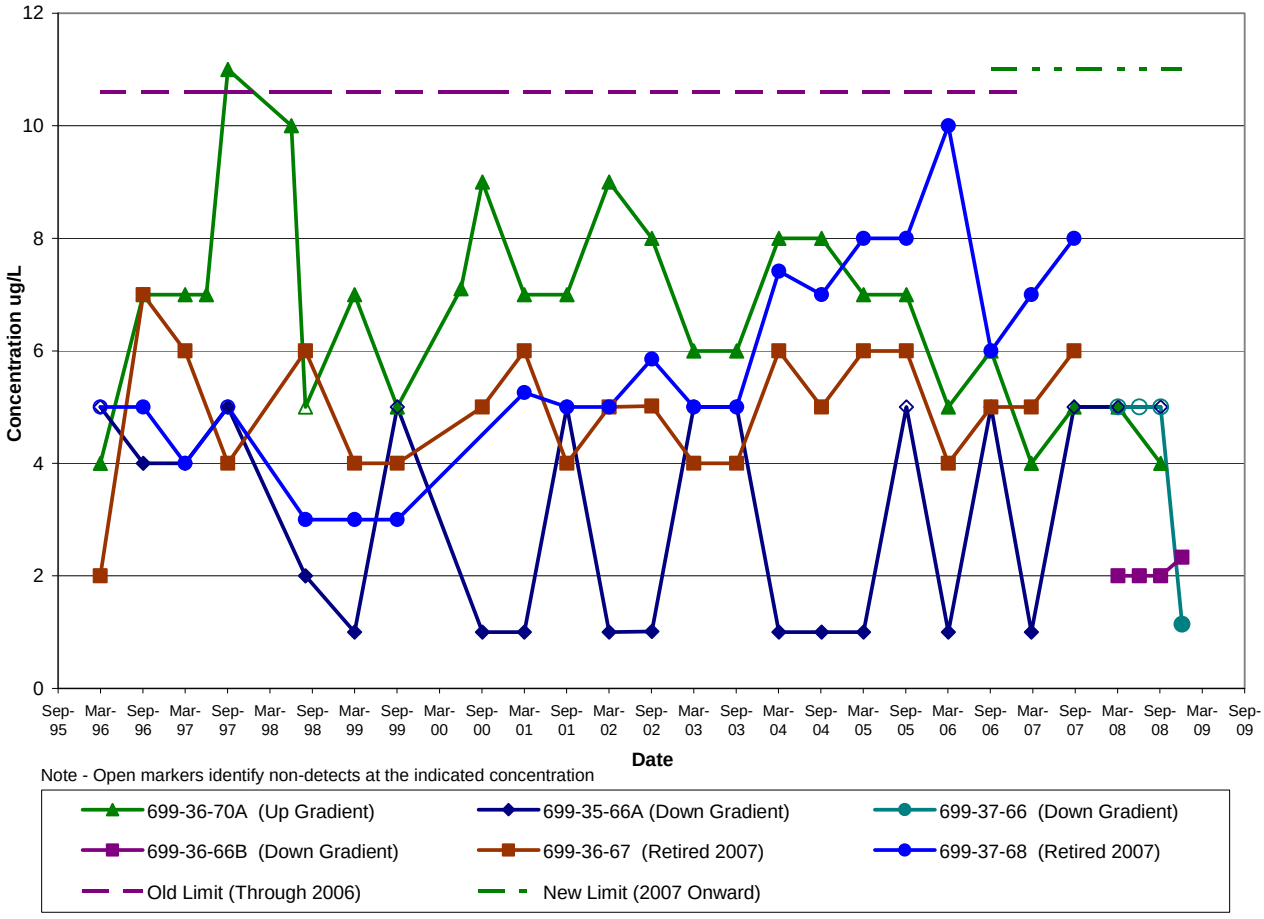


Figure B-21 Nitrogen in Nitrite and Nitrate

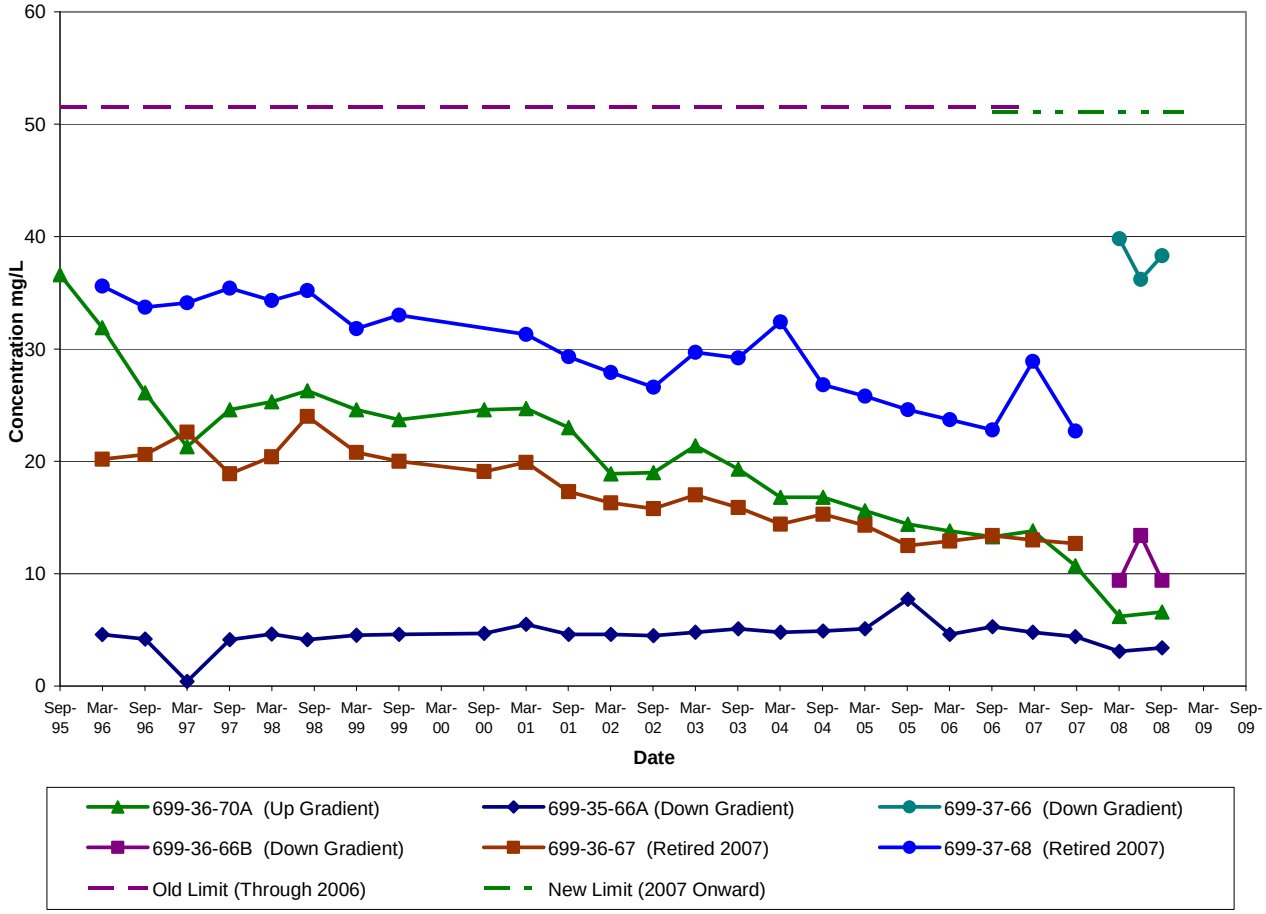


Figure B-22 Total Organic Halides

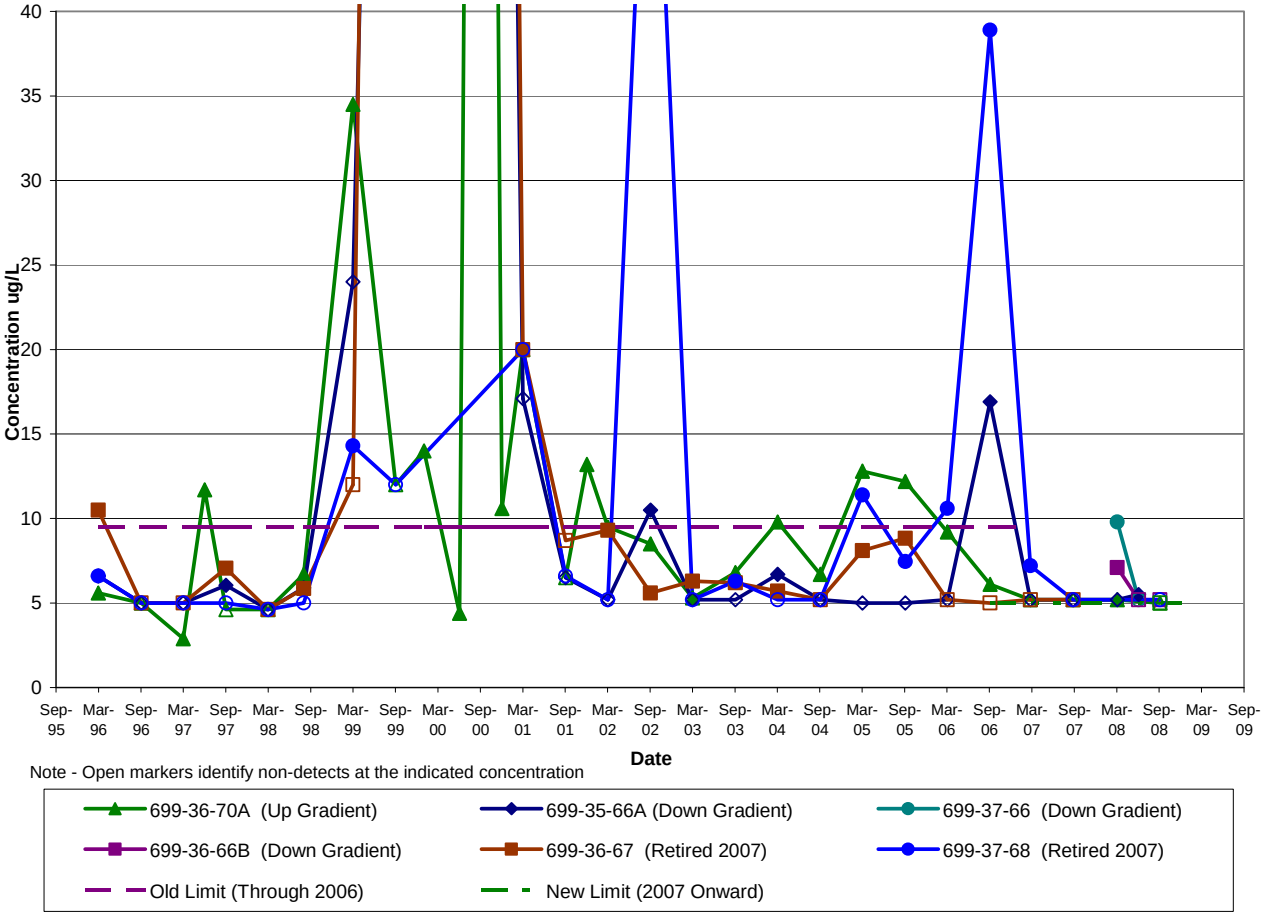


Figure B-23 Total Dissolved Solids

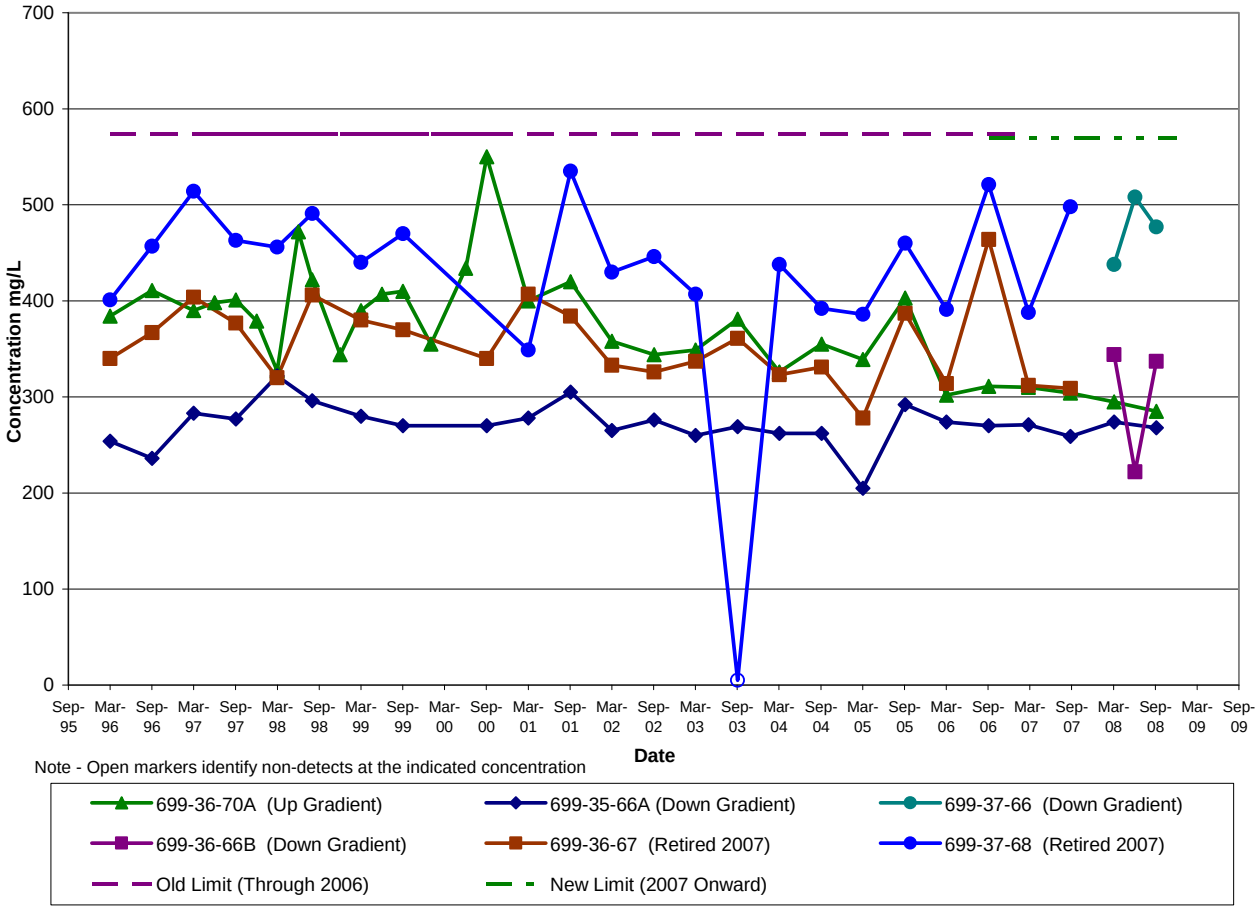


Figure B-24 Turbidity

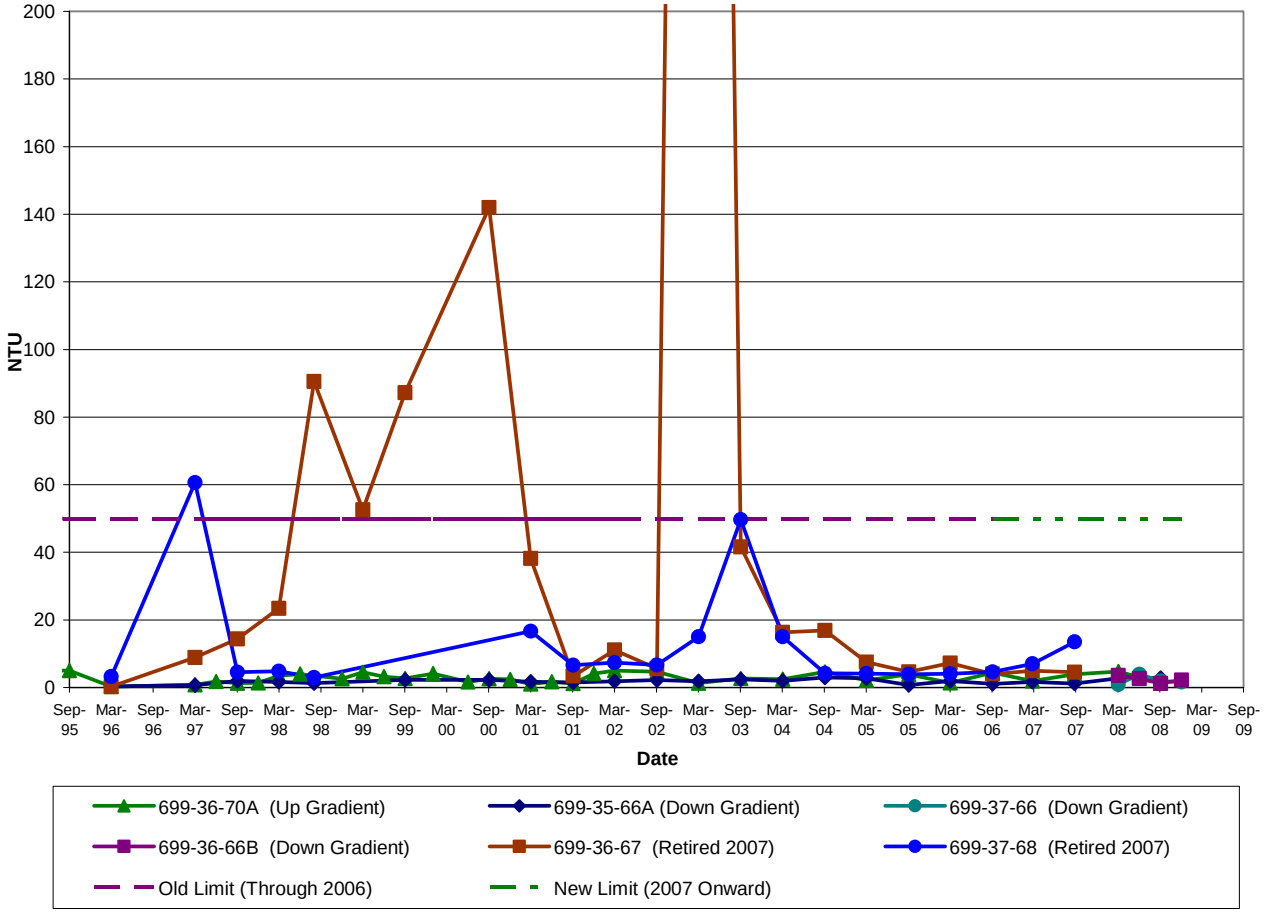


Figure B-25 pH

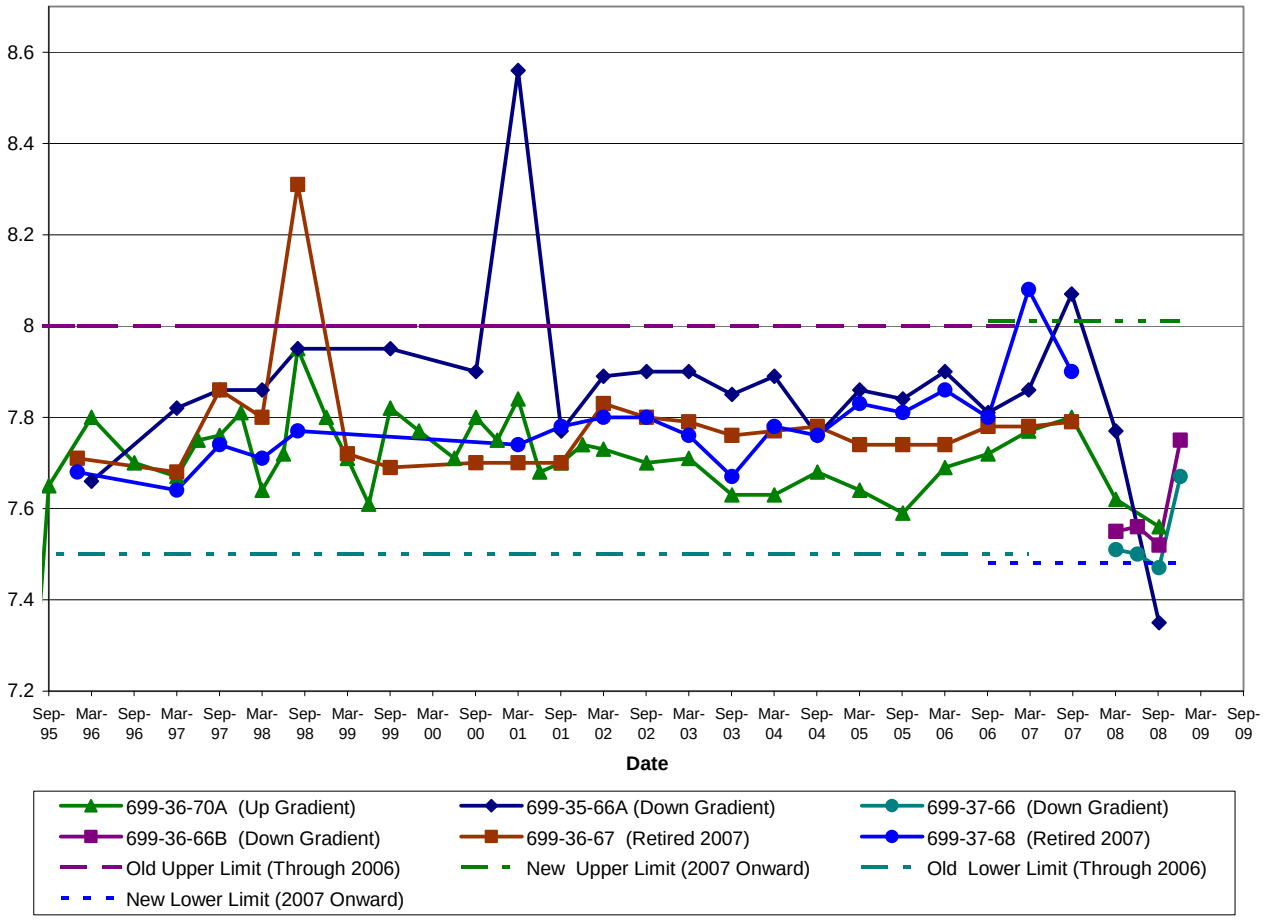
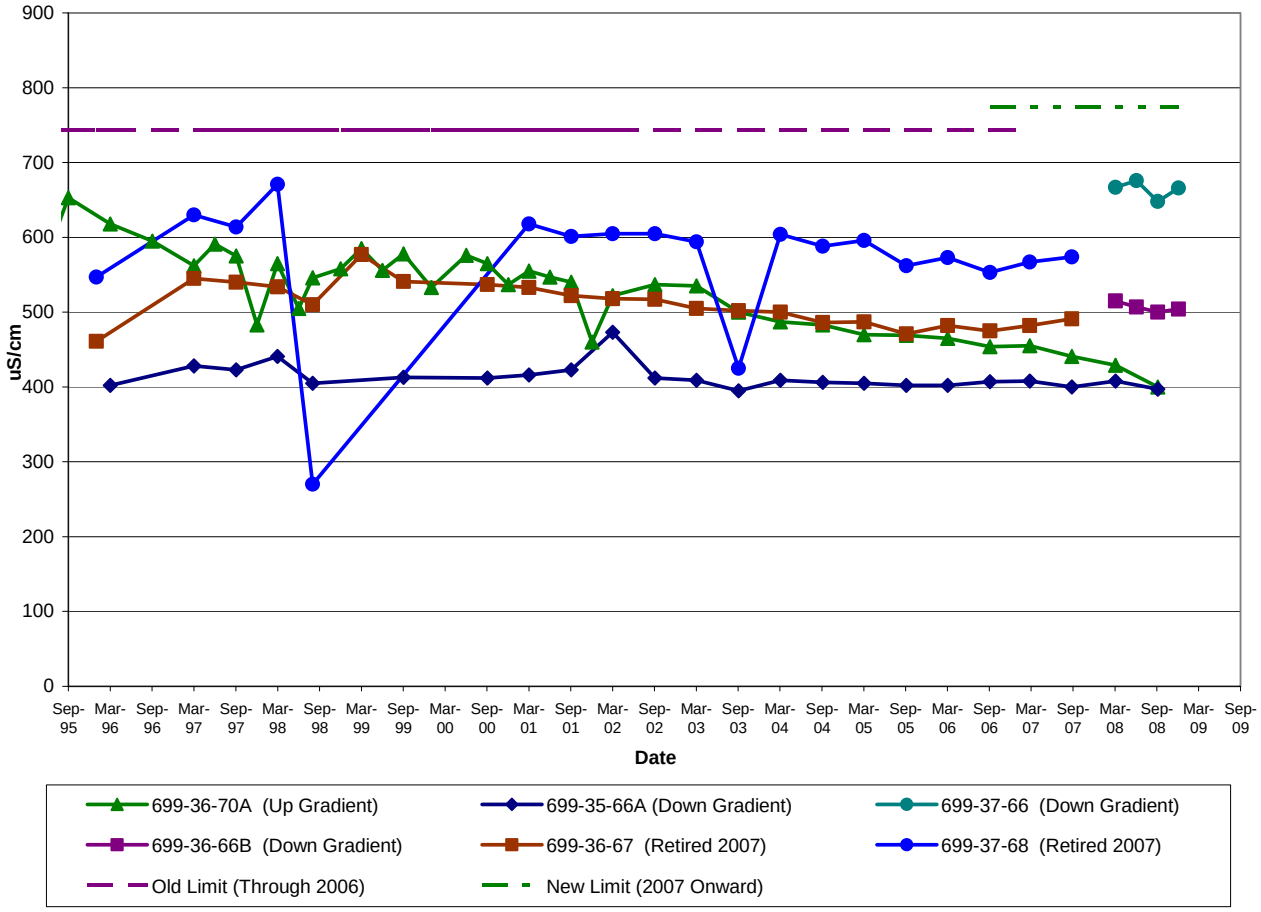


Figure B-26 Specific Conductance



APPENDIX C

LEACHATE SAMPLING RESULTS SUMMARY, 2006-2008

Table C-1. Summary of Leachate Sampling Results, 2006-2008.

Constituent	Jun-06	Jun-06	Dec-06	Dec-06	Jun-07	Jun-07	Jun-07	Jun-07	Dec-07	Dec-07	Jun-08	Jun-08	Dec-08	Dec-08	Units
Aluminum	NR	NR	54.4UC	63.2UC	NR	NR	NR	NR	NR	NR	NR	NR	12.5U	12.5U	ug/L
Antimony	NR	NR	2.5U	2.5U	NR	NR	NR	NR	NR	NR	NR	NR	1.5U	1.5U	ug/L
Arsenic	6.6	9	7.3	6.6	11.8	10.3	9.4	9.4	7	15U	5U	5U	7.9	7.7	ug/L
Barium	103	108	127C	127C	102	103	84.5	84.5	84.5	87.1	77.1	77.8	78.2	78.1	ug/L
Calcium	NR	NR	260000C	254000C	241000C	243000C	199000C	199000C	199000	203000	180000	182000	213000	212000	ug/L
Chromium	57.5	33.5	29.6	28.5	27.6	27.4	17.7	17.7	16.5	20.1	16	14.6	21.5	21.1	ug/L
Copper	NR	NR	9	9.1	NR	NR	NR	NR	NR	NR	NR	NR	2.5U	2.5U	ug/L
Iron	NR	NR	91.1	58.9	NR	NR	NR	NR	NR	NR	NR	NR	12.5U	12.6	ug/L
Lead	3.1U	3.1U	1.6U	1.6U	3.3U	3.3U	3.3U	3.3U	9U	9U	3U	3U	1.2U	1.2U	ug/L
Magnesium	NR	NR	76100C	76600C	NR	NR	NR	NR	NR	NR	NR	NR	89700	89400	ug/L
Nickel	NR	NR	22.7	18.7	NR	NR	NR	NR	NR	NR	NR	NR	16.1	15.8	ug/L
Potassium	NR	NR	27000	27000	19500	20500	24100	24100	23400	23900	26100	26300	26100	26000	ug/L
Selenium	5.2	4.7U	6.4	4.5	9.6C	9C	5.2C	5.2C	6U	18U	6U	6U	3.2	2.7	ug/L
Silcon	NR	NR	20000C	19700C	21600	21800	21000	21000	16700	17100	18800	19100	21100	21100	ug/L
Sodium	NR	NR	267000C	257000C	240000	254000	313000	313000	244000	251000	318000	325000	309000	311000	ug/L
Tin	10.7U	10.7U	3.6U	3.6U	6.3U	6.3U	6.3U	6.3U	6U	18U	6U	6U	0.9	0.8	ug/L
Thallium	NR	NR	5.6U	5.6U	8U	8U	8U	8U	6U	18U	6.8	6U	1.2U	1.2U	ug/L
Vanadium	18.9	18.4	16.9	17	20	19.8	22.2	22.2	18.4C	18.3C	20.7	20.8	25.7	25.6	ug/L
Zinc	9.1	10.3	5.7	6.7	10.2C	8.8C	5C	5C	6U	18U	6U	6U	2.5U	2.5U	ug/L
Carbon tetrachloride	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	5U	ug/L
Methyl alcohol	NR	NR	5000U	5000U	NR	NR	NR	NR	NR	NR	NR	NR	500U	500U	ug/L
Trichlorofluoromethane	NR	NR	5J	5	NR	NR	NR	NR	NR	NR	NR	NR	5U	5U	ug/L
pH	7.3	7.3	7.3	7.6	7.1	7.1	7.4	7.4	7.7	7.6	7.58	7.56	7.4	7.6	pH
Specific Conductance	2710	2770	3650	3640	2700	2770	3300	3300	2710	2720	3040	3060	NR	NR	umS/cm
Bromide	1100	1100	2500UD	2500UD	1200U	1200UD	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	ug/L
Chloride	175000D	186000D	224000D	224000D	183000D	184000D	251000D	251000D	239000D	253000D	264000D	261000D	266000D	266000D	ug/L
Fluoride	290	310	2500UD	2500UD	1200UD	1200UD	2500UD	2500UD	250U	250U	250U	1500	2500UD	2500UD	ug/L
Nitrate	358000D	341000D	418000D	373000D	320000D	320000D	377000D	377000D	366000D	360000D	381000D	376000D	388000D	394000D	ug/L
Nitrite	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	2500UD	5000UD	5000UD	2500UD	2500UD	2500UD	2500UD	ug/L
Sulfate	408000D	412000D	573000D	563000D	416000D	413000D	531000D	531000D	491000D	499000D	589000D	571000D	564000D	565000D	ug/L
Total Organic Carbon	NR	NR	12000	11900	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ug/L
Oil & Grease	NR	NR	1100U	1100U	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ug/L
Total Dissolved Solids	2040000	2110000	2280000	2360000	2030000	1940000	2220000	2220000	1970000	1960000	2000000	1980000	2200000	2150000	ug/L
Total Suspended Solids	NR	NR	5000U	5000U	5000U	5000U	5000U	5000U	5000U	5000U	7000	6000	5000U	5000U	ug/L
Gross alpha	652	578	1310	1090	2950	2480	2960	2960	2150	2120	2470	2610	3380	3360	pCi/L
Gross beta	633	613	764	1100	855	894	1050	1050	876	906	1000	996	1500	1460	pCi/L
Carbon-14	33.4U	46.8U	118U	20.1U	51.1U	51.5U	21.4U	21.4U	60U	32.6U	50.8	31.5U	40.2U	68.7	pCi/L
Technetium-99	738	55.4	738	817	529	632	816	816	587	597	719	775	746	828	pCi/L
Uranium (Total)	930	932	1730	1740	2070	2130	2120	2120	1990	1950	2400	2370	2820	2660	ug/L
Iodine-129	-1.2U	-2.61U	-0.375U	-0.481U	-0.352U	0.577U	0.053U	0.053U	0.054U	-0.151U	0.084U	0.611U	-2.34U	-3.84U	pCi/L
Total Radium Alpha Emissions	-0.168U	0.022U	-0.316U	-0.046U	-0.129U	-0.079U	0.015U	0.015U	-0.36U	-0.365U	0.036U	0.157U	-0.041U	0.183U	pCi/L

U = Result is nondetected.
D = Result reported from secondary dilution.
C = Analyte detected in associated laboratory batch blank.
J = Value is an estimate.
NR = Not requested for this analysis round. Constituents that are not requested are not required for the short list required for routine semi-annual sampling.

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

Constituent	Constituent	Constituent	Constituent
(1-Methylethyl) benzene	7,12-Dimethylbenz[a]anthracene	Dibenz[a,h]anthracene	O,O,O-Triethyl phosphorothioate
1,1,1-Trichloroethane	Acenaphthene	Dibromochloromethane	o-Cresol
1,1,2,2-Tetrachloroethane	Acetic acid ethyl ester (Ethyl acetate)	Dibromomethane	Oil & Grease
1,1,2,2-Tetrachloroethene	Acetic acid vinyl ester (Vinyl acetate)	Dichlorodifluoromethane	PCB-1016
1,1,2-Trichloroethane	Acetonitrile	Dichloromethane (Methylene Chloride)	PCB-1221
1,1,2-Trichloroethylene	Acetophenone	Dichloropropanol	PCB-1232
1,1-Dichloroethane	Acrolein	Dieldrin	PCB-1242
1,1-Dichloroethene	Acrylonitrile	Diethyl phthalate	PCB-1248
1,2,2-Trichlorotrifluoroethane	Aldrin	Dimethyl phthalate	PCB-1254
1,2,4-Trichlorobenzene	alpha-BHC	Di-n-butylphthalate	PCB-1260
1,2-cis-Dichloroethene	alpha-Naphthylamine	Di-n-octylphthalate	p-Cresol
1,2-Dichlorobenzene	Aluminum	Endrin	Pentachlorobenzene
1,2-Dichloroethane	Americium-241	Ethyl benzene	Pentachlorophenol
1,2-Dichloropropane	Ammonia	Ethyl ether	pH
1,2-Diphenylhydrazine	Aniline	Ethyl methanesulfonate	Phenol
1,2-trans-Dichloroethene	Anthracene	Ethylene dibromide	Phosphate
1,3-Butadiene	Antimony	Europium-152	Potassium
1,3-Dichlorobenzene	Arsenic	Europium-154	Potassium-40
1,3-Dinitrobenzene	Barium	Europium-155	p-Phenylenediamine
1,4-Dichlorobenzene	Bendiocarb	Fluoranthene	Pyrene
1,4-Dinitrobenzene	Benzene	Fluorene	Pyridine
1,4-Dioxane	Benzo(a)anthracene	Fluoride	Radium-226
1-Acetyl-2-thiourea	Benzo(a)pyrene	Formaldehyde	Radium-228
1-Chloroethene (Vinyl Chloride)	Benzo(b)fluoranthene	Formic Acid	Selenium
2,4,5-Trichlorophenol	Benzo(k)fluoranthene	Gamma-BHC (lindane)	Silcon
2,4,6-Trichlorophenol	Benzyl alcohol	Gross alpha	Silver
2,4-D	Beryllium	Gross beta	Sodium
2,4-Dichlorophenol	beta-BHC	Heptachlor	Specific Conductance
2,4-Dimethylphenol	Bis(2-Chloroethoxy)methane	Heptachlor Epoxide	Styrene
2,4-Dinitrophenol	Bis(2-chloroethyl) ether	Hexachlorobutadiene	Sulfate
2,5-Diamintoluene	Bis(2-Chloroisopropyl) ether	hexachlorocyclopentadiene	Sulfide
2,6-dinitrotoluene	Bis(2-ethylhexyl) phthalate	Hexachloroethane	Technetium-99

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

Constituent	Constituent	Constituent	Constituent
2-Butanone (MEK)	Bromide	Hexachlorophene	Tetrahydrofuran
2-Butenaldehyde (Crotonaldehyde)	Bromodichloromethane	Hexavalent chromium	Thallium
2-Chloroethyl vinyl ether	Bromomethane	Indeno(1,2,3-cd)pyrene	Thorium-228
2-Chloronaphthalene	Butylbenzylphthalate	Iodine-129	Thorium-232
2-Chlorophenol	Cadmium	Isophorone	Tin
2-Cyclohexyl-4,6-dinitrophenol	Calcium	Lead	Toluene
2-Methyl-2-propenenitrile (Methacrylonitrile)	Carbon disulfide	Magnesium	Total Dissolved Solids
2-Methylpropyl alcohol (Isobutyl alcohol)	Carbon tetrachloride	Manganese	Total Organic Carbon
2-Naphthylamine	Carbon-14	m-Cresol	Total radium alpha emissions
2-nitroaniline	Cesium-137	Mercury	Total Suspended Solids
2-Propanone (Acetone)	Chloride	Methyl alcohol	Toxaphene
2-Propen-1-ol (Allyl alcohol)	Chlorobenzene	N,N-Diphenylamine	trans-1,3-Dichloropropene
2-secbutyl-4,6-dinitrophenol	Chloroethane	Naphthalene	Tribromomethane (Bromoform)
3,3-dichlorobenzidine	Chloroform	n-Butyl alcohol	Trichlorofluoromethane
3-Chloropropene (Allyl chloride)	Chloromethane	Nickel	Trichloromethanetiol
4,4-DDD	Chromium	Nitrate	Uranium (Total)
4,4-DDE	Chrysene	Nitrite	Uranium-235
4,4-DDT	cis-1,3-Dichloropropene	Nitrobenzene	Uranium-238
4-Bromophenylphenyl ether	Cobalt	N-Nitroso-di-n-propylamine	Vanadium
4-Chloro-3-methylphenol	Cobalt-60	N-Nitrosodiphenylamine	Xylene
4-Methyl-2-pentanone (MIBK)	Copper	N-Nitrosomorpholine	Zinc
4-Nitrophenol	Cyanide	N-Nitroso-N,N-dimethylamine	

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