AREA 317 RCRA QUARTERLY
GROUND WATER MONITORING REPORT NO. 29
OCTOBER THROUGH DECEMBER 1995
AND ANNUAL 1995 SUMMARY

WHITTAKER CORPORATION, BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD
SANTA CLARITA, CALIFORNIA 91350
AME PROJECT NO. 21001.69

February 29, 1996

Prepared By

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ACTON •
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Consulting Scientists, Engineers, and Geologists

March 1, 1996

Mr. Hamid Saebfar, Chief
Site Mitigation Branch, Region 3
Attn: Whittaker Project Manager
Department of Toxic Substances Control
1011 North Grandview Avenue
Glendale, California 91201

21001.69/1

Subject: Area 317 RCRA Quarterly Ground Water Monitoring Report No. 29, October through December 1995 and Annual 1995 Summary, Whittaker Corporation, Bermite Facility
22116 West Soledad Canyon Road, Santa Clarita, California 91350

Dear Mr. Saebfar:

Enclosed is the Area 317 RCRA Quarterly Ground Water Monitoring Report for the fourth quarter, October through December 1995 and Annual 1995 Summary. The monitoring and reporting were completed according to the requirements of the Water Quality Monitoring and Response Plan for the Interim Status Area 317 Surface Impoundment.

The statistical analyses for this and all 1995 sampling events showed that the established tolerance limits for pH, specific conductance, chloride, sulfate, trichloroethene (TCE), total organic carbon (TOC), or total organic halogens (TOX) were not exceeded. The tolerance limit for sodium has been exceeded throughout 1995 for the sample from monitoring well MW-10.

Please call if there are any questions regarding the enclosed report.

Sincerely,

ACTON • MICKELSON • ENVIRONMENTAL, INC.

Barbara J. Mickelson

Barbara J. Mickelson, P.E.
California Registered Professional Engineer #43417

BJM:mjd
Enclosure

cc/enc: Ms. Lynne M. O. Brickner, Esq., Whittaker Corporation
Mr. Glen AbdunNur, Bermite Facility
Mr. Robert P. Ghirelli, Los Angeles Regional Water Quality Control Board
Mr. Jose Ochoa, Los Angeles County Fire Department
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L96-051.mj

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WHITTAKER CORPORATION, BERMITE FACILITY 22116 WEST SOLEDAD CANYON ROAD SANTA CLARITA, CALIFORNIA 91350

1.0 INTRODUCTION

The Whittaker Corporation (Whittaker), Bermite facility (site) is located at 22116 West Soledad Canyon Road in Santa Clarita, California (Figure 1). Whittaker had interim status permits for 14 Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Units (HWMUs) when operations were terminated in April 1987. A document entitled "Whittaker Corporation, Bermite Division, Santa Clarita, California, CAD064573108, Facility Closure Plan Modifications" (Closure Plan), was prepared by Whittaker and approved by the California Environmental Protection Agency, Department of Toxic Substances Control (Cal-EPA) and U.S. Environmental Protection Agency (EPA) on December 28, 1987. The Closure Plan outlined procedures for obtaining approval by Cal-EPA and EPA of clean closure certification for the different HWMUs, including the 317 Surface Impoundment (Area 317).

The Closure Plan required the implementation of a ground water monitoring system at Area 317 capable of detecting and assessing the impact of the HWMU on the uppermost aquifer underlying Area 317. Implementation of a ground water monitoring system is described in the document entitled "Water Quality Monitoring and Response Plan for the Interim Status Area 317 Surface Impoundment," dated October 9, 1992 (Area 317 Monitoring Plan). This is a revised response plan approved by Cal-EPA which meets the requirements of the revisions to Title 22 and expands the constituents sampled and reported. The revised Area 317 Monitoring Plan was utilized for the nineteenth and subsequent sampling events.

A total of six ground water monitoring wells (MW-1, MW-3, MW-4, MW-5, MW-6, and MW-10) have been installed around Area 317 (Figure 2). Reports detailing the location and construction of monitoring wells, sampling and analysis plans for collecting and analyzing ground water samples from the ground water monitoring wells, abandonment of monitoring well MW-4, and quarterly sampling results which have been submitted to Cal-EPA and EPA are listed in Appendix A.

Quarterly ground water sampling activities were initiated on October 3, 1988, for monitoring wells MW-1, MW-3, and MW-4. The ground water monitoring program included analyses of water samples for volatile organic compounds (VOCs). Laboratory analytical results from the third quarterly sampling event reported trichloroethene (TCE) at 4,800 micrograms per liter (μg/l) in the ground water sample collected from monitoring well MW-4. As a result, two additional monitoring wells were installed in Area 317 (MW-5 and MW-6).

The fourth quarterly monitoring event included sampling of the ground water from monitoring wells MW-1, MW-3, and MW-4. Monitoring wells MW-5 and MW-6 were not equipped for sampling during the fourth quarterly sampling event. Analytical results from the fourth quarter were similar to those reported in the third quarterly sampling event. The concentrations of VOCs reported in samples collected from monitoring wells MW-1 and MW-3 were below laboratory reporting limits; however, analysis of the ground water sample collected from monitoring well MW-4 reported TCE at 7,200 μg/l. Analysis of ground water samples collected from monitoring well MW-4 during the fifth through twelfth quarterly sampling events reported a steady decline in TCE concentration. Based on the results of the initial four sampling events, a reduced list of chemical parameters, approved by Cal-EPA, was utilized for the fifth through eighteenth quarterly sampling events.

Statistical analysis of indicator parameters was initiated during the fifth quarterly sampling event. The ground water samples collected and analyzed for indicator parameters from monitoring wells MW-1, MW-3, and MW-4 for the initial year of monitoring were evaluated to assess whether statistically significant changes to the ground water had occurred as a result of site activities.

A Comprehensive Ground Water Monitoring Evaluation (CME) was conducted by Cal-EPA on January 24 and 25, 1990, during the sixth quarterly monitoring event. Personnel from Cal-EPA were present during all phases of the sixth quarterly monitoring event, from the taking of initial potentiometric surface elevation measurements to the sealing of the coolers containing the quarterly ground water samples.

Ground water samples from monitoring wells MW-3, MW-5, MW-6, and MW-10 were collected on December 6, 1995. Owing to a pump malfunction, samples from monitoring well MW-1 were collected on December 8, 1995. The results of the twenty-ninth quarterly ground water sampling event are discussed in Sections 2 through 6 of this report. Section 7 presents the annual summary of data obtained in the 1995 sampling events. This report closes with recommendations for future quarterly ground water sampling events.

2.0 GROUND WATER LEVEL MEASUREMENTS

Water level measurements were taken on December 4, 1995, prior to well evacuation and sampling activities. Monitoring well locations with respect to Area 317 are shown on Figure 2. Water levels were measured to the nearest 0.01 foot. Water level elevations increased 2.75, 2.82, 3.09, 2.99, and 2.93 feet in monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10,

respectively, between the twenty-eighth and twenty-ninth quarters. Table 1 summarizes potentiometric surface elevation data for monitoring wells in Area 317. Figure 3 graphically illustrates the changes in potentiometric surface elevations in monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10 over time.

The December 4, 1995, water level measurements were used to develop the potentiometric surface contours illustrated on Figure 2. Figure 2 indicates that the inferred flow direction for December 4, 1995, is toward the north-northeast. Based on this data, monitoring wells MW-6 and MW-10 are estimated to be located hydraulically downgradient from Area 317, monitoring well MW-5 is estimated to be located hydraulically downgradient and/or crossgradient from Area 317, monitoring well MW-1 is estimated to be located hydraulically crossgradient and/or upgradient from Area 317, and monitoring well MW-3 is estimated to be located hydraulically upgradient from Area 317. The ground water flow direction estimated for December 4, 1995, is similar to the flow direction estimated for the previous sampling event. The estimated ground water flow direction has varied from north-northwest to north-northeast since initiating quarterly ground water monitoring, possibly contributing to the reported variability in ground water chemistry.

3.0 SAMPLE COLLECTION AND ANALYSES

Ground water evacuation, stabilization, and sampling procedures are outlined in Appendix B.

3.1 Required Ground Water Analyses

For the twenty-ninth sampling event, the following analytical parameters were tested according to the Area 317 Monitoring Plan:

- Ground Water Monitoring Parameters: pH, specific conductance, total organic carbon (TOC), total organic halogens (TOX), TCE, sulfate, sodium, manganese, iron, and chloride.

Background water quality parameters were not analyzed for the twenty-ninth sampling event based on the results from previous sampling events.

All ground water samples collected during the twenty-ninth sampling event were submitted to FGL Environmental (FGL) in Santa Paula, California. FGL is certified by Cal-EPA to perform the ground water analyses outlined in the Closure Plan. Chain-of-custody and sample analyses request forms are included in Appendices C and D, respectively.

A description of FGL's Quality Assurance/Quality Control (QA/QC) program is provided in Appendix E. Copies of the laboratory analytical reports for all trip, field, and method blanks, and duplicate and spiked samples analyzed by FGL are provided in Appendix F.

3.2 Approved Analytical Methods

Ground water monitoring parameters were analyzed by EPA or other approved methodologies. Analytical methodologies were presented in the "Ground Water Sampling and Analysis Plan," dated August 1988. Modifications to this plan were approved by Cal-EPA prior to the fifth quarterly sampling event. Copies of the laboratory test method protocol were included in Appendix B of "Quarterly Sampling Report No. 1," dated December 1988.

A summary of sample volumes, sample containers, and laboratory analytical methods utilized during the twenty-ninth sampling event is presented in Table B-3, Appendix B. Procedures regarding sample containers, sample labeling, sample collection, and field QA/QC are outlined in Appendix B.

4.0 GROUND WATER SAMPLE ANALYTICAL RESULTS

4.1 Ground Water Monitoring Parameters

Ground water samples from each monitoring well were analyzed for pH, specific conductance, chloride, iron, manganese, sodium, sulfate, TCE, TOC, and TOX to serve as ground water monitoring parameters. Table 2 summarizes the results of the ground water monitoring parameter analyses for the twenty-ninth sampling event, along with results from previous 1995 sampling events. Copies of the original laboratory data sheets are presented in Appendix G.

Laboratory pH measurements of 6.9, 7.5, 7.6, 7.5, and 7.5 were recorded for samples collected from monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10, respectively, for the twenty-ninth monitoring event. The laboratory pH measurements recorded for samples collected from the monitoring wells during the twenty-ninth sampling event were generally consistent with the measurements recorded during previous sampling events.

Specific conductance measurements of 780, 620, 550, 580, and 620 micromhos per centimeter squared (μmhos/cm^2) were recorded for samples collected from monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10, respectively, for the twenty-ninth sampling event. The specific conductance measurements recorded during the twenty-ninth sampling event are generally consistent with measurements recorded during previous sampling events.

The results for chloride, sodium, and sulfate were 180, 50, and 12 milligrams per liter (mg/l) for the sample from monitoring well MW-1; 29, 54, and 77 mg/l for the sample from monitoring well MW-3; 46, 52, and 31 mg/l for the sample from monitoring well MW-5; 70, 51, and 32 mg/l for the sample from monitoring well MW-6; and 76, 79, and 42 mg/l for the sample from monitoring well MW-10. Laboratory results for iron were <50, <50, <50, 100, and <50 μg/l for the ground water samples collected from monitoring wells MW-1, MW-3, MW-5, MW-6, and MW-10, respectively, for the twenty-ninth sampling event. The results for iron, sodium, chloride, and sulfate are generally consistent with results from previous sampling events.

The concentration of manganese in samples collected during the twenty-ninth sampling event ranged from less than 0.5 μg/l in the sample collected from monitoring well MW-3 to 3.1 μg/l in the sample collected from monitoring well MW-10.

Laboratory analytical results for samples collected from Area 317 monitoring wells during the twenty-ninth sampling event did not indicate the presence of TCE, TOC, or TOX at method detection limits of 0.5 μg/l, 0.5 mg/l, and 5 μg/l, respectively. The analytical results are consistent with results from previous sampling events.

Copies of the laboratory analytical reports for the ground water monitoring parameters are included in Appendix G.

4.2 Background Water Quality Parameters

Background water quality parameters were not tested during the present monitoring event. The background water quality parameters were last tested during the twenty-third monitoring event because of a third consecutive exceedance with respect to the tolerance limit established for sodium. A summary of historical background water quality parameters is presented in Table 3.

5.0 STATISTICAL ANALYSIS OF RESULTS TO DATE

As was indicated in the document entitled "Ground Water Sampling and Analysis Plan," dated August 1988, and required in 40 CFR Part 265.92, statistical analysis of the indicator parameters was previously performed to determine whether a statistically significant difference in the water quality existed between the individual downgradient monitoring wells and the upgradient or background monitoring wells. At that time, monitoring wells MW-1 and MW-3 were considered upgradient or crossgradient relative to Area 317, and monitoring wells MW-5, MW-6, and MW-10 were considered downgradient or crossgradient relative to Area 317.

After four quarters of sampling and analysis of the monitoring system, the mean, standard deviation, variance, and coefficient of variance of the four indicator parameters were calculated. These values were reported to Cal-EPA in correspondence to Mr. Alan Sorsher, P.E., Cal-EPA, from Wenck Associates Inc. (Wenck), dated October 25, 1989. The statistical analysis, presented in the fifth through tenth quarterly sampling reports, indicated only one statistically significant difference in water quality as determined by the indicator parameters. This was interpreted by Wenck to be caused by erroneous TOC results from the sixth quarter.

Since the approval of the Area 317 Monitoring Plan by Cal-EPA, the statistical comparison of analytical results for each downgradient monitoring well is made against the tolerance limits calculated from upgradient monitoring well results for the ten ground water monitoring parameters (chloride, sulfate, iron, manganese, sodium, TCE, TOC, TOX, specific conductance, and pH). The tolerance limits for the ground water monitoring parameters will be updated at a minimum annually to include the latest analytical data.

Concentrations of the ground water monitoring parameters in the ground water samples collected from Area 317 monitoring wells for the twenty-ninth quarter are included in Table H-1, presented in Appendix H. A summary of the quarterly statistics for each background monitoring well and the tolerance limit calculations for the ground water monitoring parameters are presented in Appendix H, Tables H-2, H-3, and H-4. Graphical presentation of the statistical information is also included in Appendix H.

5.1 Assumptions Used in the Statistical Analysis

As recommended in the document entitled "RCRA Ground Water Monitoring Technical Enforcement Guidance Document," the data points that are less than the detection limit have been given a value equal to one-half the detection limit of the analyte. As recommended in the document entitled "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance" (Guidance Document), the statistical analysis assumes a value for the confidence coefficient (1-a) of 0.95 and a value for the proportion (y) of 0.95. This translates to a 95 percent confidence that 95 percent of future background monitoring well results will fall within the tolerance interval predicted. The tolerance limits for pH were calculated using a two-tailed distribution, and the tolerance limits for the other parameters were calculated using a one-tailed distribution. It was assumed that the data are distributed normally.

5.2 Data Preparation

The ground water sample analytical results from the two background or upgradient monitoring wells (MW-1 and MW-3) for all twenty-nine quarters of ground water sampling to date, and the results for the three downgradient monitoring wells (MW-5, MW-6, and MW-10) for the

twenty-ninth quarter of ground water sampling, have been tabulated and prepared for statistical analysis. In accordance with the tolerance limit methodology used for this statistical analysis, the analytical results for the ten ground water monitoring parameters are summarized by quarter and by monitoring well. Arithmetic mean and standard deviation summary statistics have been calculated from background monitoring well results and are utilized in calculating the tolerance limits for each of the ground water monitoring parameters.

The statistical analysis for the ground water monitoring parameters involves testing the ground water quality downgradient of Area 317 against the set of tolerance limits, i.e., that there are no excursions of the tolerance limits, which are based on the average of all the quarterly statistics for each of the ten ground water monitoring parameters for background monitoring wells MW-1 and MW-3, compared to the twenty-ninth quarter results for each of the downgradient monitoring wells MW-5, MW-6, and MW-10 (Table H-1).

The calculations of the quarterly statistics were performed in the same manner as was outlined in the Area 317 Monitoring Plan. The values of K were taken from the statistical tables based on the number of samples and a one-sided tolerance limit. Note that pH values have not been reported as hydrogen ion concentrations as was done previously and that the value of K for the analysis of pH is derived from the tables for two-sided tolerance limits. TCE has never been reported above the detection limit in samples from monitoring wells MW-1 and MW-3; therefore, the tolerance limit for TCE is set at the detection limit.

5.3 Results

The twenty-ninth quarter results for each ground water monitoring parameter at each downgradient monitoring well were compared to the tolerance limits based on the first through twenty-ninth quarter results for background monitoring wells MW-1 and MW-3. The statistical analysis indicates that there is no excursion of tolerance limits of pH, specific conductance, chloride, sulfate, iron, manganese, sodium, TCE, TOC, or TOX in downgradient ground water quality, except for sodium in the sample from monitoring well MW-10. In the past, an elevated sodium concentration in monitoring well MW-10 relative to sodium concentrations in the other four Area 317 wells has not indicated a statistical impact to ground water quality, based on the concentrations of the other ground water monitoring parameters and retesting of background water quality parameters.

6.0 SUMMARY OF RESULTS, OCTOBER THROUGH DECEMBER 1995

6.1 Ground Water Level Measurements

Based on the December 4, 1995 data, the estimated direction of ground water flow is toward the north-northeast, which is consistent with the ground water flow direction estimated during the previous sampling event. Utilizing this data, monitoring wells MW-6 and MW-10 are estimated to be located hydraulically downgradient from Area 317; monitoring well MW-5 is estimated to be located hydraulically downgradient and/or crossgradient from Area 317; monitoring well MW-1 is estimated to be located hydraulically crossgradient and/or upgradient from Area 317; and monitoring well MW-3 is estimated to be located hydraulically upgradient from Area 317.

6.2 Ground Water Monitoring Parameters

The pH reported in samples from the five monitoring wells ranged from 6.9 (monitoring well MW-1) to 7.6 (monitoring well MW-5). The specific conductance in samples from the five monitoring wells ranged from 550 μmhos/cm^2 (monitoring well MW-5) to 780 μmhos/cm^2 (monitoring well MW-1). TOC was reported at less than 0.5 mg/l, and TOX was reported at less than 5 μg/l, in samples from all five monitoring wells. The pH, specific conductance, TOC, and TOX results reported for the twenty-ninth sampling event are generally consistent with the results reported for the previous sampling events.

The constituent of concern for Area 317 is TCE, which was reported as less than the detection limit in samples from all five monitoring wells. This result is consistent with the previous sampling event.

The ground water sample analytical results for chloride, iron, manganese, sodium, and sulfates from the five monitoring wells are generally consistent with the existing data. All are under the tolerance limits, except for sodium in the sample from monitoring well MW-10.

6.3 Background Water Quality Parameters

Background water quality parameters were not tested in this quarter. If tolerance limits for any water quality parameters are exceeded for three consecutive monitoring events, then additional samples will be collected during the subsequent monitoring event and analyzed for the background water quality parameters. The tolerance limit for sodium was exceeded for the sixth consecutive quarter in the sample from monitoring well MW-10. Acton • Mickelson • Environmental, Inc. (AME), proposes that no further background water quality parameters be tested due to this exceedance at this time. The elevated sodium concentrations in the samples

from monitoring well MW-10 in comparison to concentrations reported for background wells has not indicated an impact with respect to the other ground water quality parameter concentrations. During the twenty-third monitoring event, all six background parameters were analyzed due to the exceedance of the tolerance limit for sodium in the sample from monitoring well MW-10. Analysis of the data indicated that the concentrations of background water quality parameters were consistent with the historical data for these parameters in samples from upgradient wells MW-1 and MW-3.

6.4 Statistical Analysis

The analytical results from the twenty-ninth quarter sampling event indicate that values for pH, specific conductance, chloride, sulfate, iron, manganese, sodium (monitoring wells MW-5 and MW-6), TCE, TOC, and TOX in the downgradient monitoring wells, respectively, are within the tolerance limits set by calculations using historical results from the background monitoring wells. The only tolerance limit exceeded was sodium for the sample from monitoring well MW-10.

7.0 ANNUAL SUMMARY OF RESULTS, 1995 MONITORING

7.1 Ground Water Level Measurements and Estimated Flow Direction

For each sampling event in 1995, the estimated ground water flow direction inferred from ground water level measurements was toward the north-northeast. The historically estimated ground water flow direction has generally been toward the north-northeast, although some variation toward the northwest has been inferred.

7.2 Ground Water Monitoring Parameters

The 1995 analytical results presented in Table 2 indicate concentrations for monitoring parameters to be generally consistent from quarter to quarter. Analytical results for 1995 are also generally consistent with historical data. With regard to the results for TCE, the primary constituent of concern in Area 317, reports for all samples from all wells were non-detect for TCE at a detection limit of 0.5 μg/l.

7.3 Background Water Quality Parameters

Background water quality parameters were not tested during 1995. The Area 317 Monitoring Plan specifies testing for background water quality parameters when tolerance limits for any monitoring parameter are exceeded for three consecutive monitoring events. Background water quality parameters were last tested during the twenty-third monitoring event in 1994, when all

monitoring wells were tested for the background parameters because of results for sodium in samples from monitoring well MW-10 exceeding tolerance limits. The results of the background water quality testing in the twenty-third monitoring event did not indicate a degradation of ground water quality with respect to the background parameters.

7.4 Statistical Analysis

For the monitoring parameters pH, specific conductance, chloride, sulfate, iron, manganese, TCE, TOC, and TOX, statistical analysis of 1995 analytical results from all downgradient monitoring wells indicates these parameters were within tolerance limits established from data for the background monitoring wells, leading to the conclusion that none of these parameters adversely impacted ground water quality. Analytical results for sodium in samples from downgradient monitoring wells MW-5 and MW-6 were also within tolerance limits, but the reported sodium concentration in downgradient monitoring well MW-10 exceeded the tolerance limit in each 1995 sampling event. However, based on the background testing discussed in Section 7.3, along with the results for other parameters in monitoring well MW-10 and the results for all parameters in monitoring wells MW-5 and MW-6 being within tolerance limits, AME concludes that the sodium results for monitoring well MW-10 are an anomaly and not an indication of ground water degradation in Area 317.

8.0 RECOMMENDATIONS

Based upon the data collected, current regulatory guidelines, and the professional judgment of AME, the following recommendations are presented:

- Conduct future sampling events in accordance with the procedures set forth in the document entitled "Water Quality Monitoring and Response Plan for the Interim Status Area 317 Surface Impoundment," dated October 9, 1992.

- Update the tolerance limits for the ground water monitoring parameters following the thirtieth quarterly sampling event.

9.0 REMARKS

The recommendations contained in this report represent our professional opinions. These opinions are based on currently available information and were developed in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

TABLE 1

POTENTIOMETRIC SURFACE ELEVATIONS
RCRA GROUND WATER MONITORING WELLS
WHITTAKER CORPORATION, BERMITE FACILITY

Well No.	MW-1	MW-3	MW-4	MW-5	MW-6	MW-10
Top of Casing Elevation[a]	1,561.32	1,538.51	1,538.43	1,493.37	1,521.09	1,537.49
Date	Potentiometric Surface Elevations[a]					
12/23/87	1,107.81	--[b]				
01/27/88	1,108.03	1,109.51				
02/03/88	1,108.32	1,109.88				
02/04/88	1,108.36	1,109.14				
02/05/88	1,108.36	1,109.17				
02/09/88	1,108.24	1,109.13				
02/10/88	1,108.28	1,109.27				
02/12/88	1,108.28	1,109.27				
02/19/88	1,108.11	1,108.86				
03/28/88	1,107.69	1,108.23				
04/05/88	1,107.76	1,108.23				
04/12/88	1,107.66	1,108.23				
04/19/88	1,107.56	1,108.23				
04/26/88	1,107.61	1,108.23				
05/02/88	1,107.86	1,108.23				
07/27/88	1,103.58	1,104.19	1,102.61			
10/03/88	1,101.75	1,102.11	1,100.77			
01/23/89	1,099.82	1,100.25	1,098.92			
04/17/89	1,097.37	1,097.62	1,096.05			
07/27/89	1,094.67	1,094.85	1,093.53	1,093.02	1,093.15	
08/10/89	1,093.93	1,094.09	1,092.89	1,092.32	1,092.49	
08/18/89	1,093.62	1,093.76	1,092.64	1,092.03	1,092.19	
10/30/89	1,092.07	1,092.16	1,091.08	1,090.62	1,090.64	
01/24/90	1,090.56	1,090.54	1,089.68	1,089.17	1,089.50	
04/16/90	1,088.66	1,088.78	1,087.83	1,087.23	1,087.32	
07/16/90	1,083.56	1,083.53	1,082.29	1,081.41	1,081.85	
10/17/90	1,079.91	1,079.78	1,078.86	1,078.25	1,078.56	
01/28/91	1,076.52	1,076.54	1,075.46	1,074.64	1,074.91	
04/22/91	1,071.22	1,071.29	1,069.75	1,068.90	1,069.25	
07/17/91	1,063.63	1,063.79	1,061.66	1,060.53	1,061.14	
10/08/91	1,055.22	1,055.41	1,053.28	1,052.12	1,052.69	
01/29/92	1,051.88	1,052.29	1,050.63	1,049.76	1,050.06	1,050.57
04/20/92	1,050.47	1,050.88	1,049.33	1,048.78	1,048.92	1,049.37
07/28/92	1,046.84	1,047.40	--[c]	1,045.14	1,045.20	1,045.77
10/19/92	1,043.87	1,044.58	--[c]	1,042.05	1,042.13	1,042.77
01/25/93	1,044.79	1,045.61	--[c]	1,044.22	1,043.64	1,044.29
06/07/93	1,049.24	1,050.36	--[c]	1,049.19	1,048.70	1,049.21
09/20/93	1,052.40	1,054.11	--[c]	1,052.47	1,051.79	1,052.53
12/06/93	1,054.26	1,056.27	--[c]	1,054.29	1,053.58	1,054.53
03/07/94	1,057.58	1,059.63	--[c]	1,057.69	1,056.92	1,057.77
06/21/94	1,056.22	1,058.38	--[c]	1,055.41	1,054.93	1,055.86
09/13/94	1,053.94	1,056.25	--[c]	1,052.79	1,052.44	1,053.43
12/12/94	1,054.62	1,056.79	--[c]	1,054.00	1,053.55	1,054.50
03/27/95	1,059.54	1,061.45	--[c]	1,059.80	1,059.28	1,059.89
06/26/95	1,060.73	1,062.97	--[c]	1,060.35	1,059.87	1,060.82
09/08/95	1,061.46	1,063.59	--[c]	1,061.06	1,060.66	1,061.58
12/04/95	1,064.21	1,066.41	--[c]	1,064.15	1,063.65	1,064.51

[a]NGVD = National Geodetic Vertical Datum.
[b]Measurement not recorded.
[c]Monitoring well abandoned 05/28/92.

TABLE 2

GROUND WATER MONITORING PARAMETER ANALYSES FOR SAMPLES COLLECTED IN 1995

Monitoring Well	Date	pH	Specific Conductance (μmhos/cm)	Chloride (mg/l)	Iron (μg/l)	Manganese (μg/l)	Sodium (mg/l)	Sulfate (mg/l)	TCE[a] (μg/l)	TOC[b] (μg/l)	TOX[c] (μg/l)
MW-1	03/29/95	7.5	770	160	60	1.6	49	12	<0.5	<0.5	<5
	06/27/95	7.4	760	170	50	2.8	45	13	<0.5	<0.5	10
	09/12/95	7.5	780	160	90	3	53	12	<0.5	<0.5	6
	12/6-8/95	6.9	780	180	<50	2.7	50	12	<0.5	<0.5	<5
MW-3	03/29/95	7.7	620	28	<50	0.8	49	71	<0.5	<0.5	7
	06/27/95	7.6	620	32	<50	0.6	53	76	<0.5	<0.5	7
	09/12/95	7.6	620	34	<50	<1	53	73	<0.5	<0.5	<5
	12/6-8/95	7.5	620	29	<50	<0.5	54	77	<0.5	<0.5	<5
MW-5	03/29/95	7.7	540	40	70	1.3	51	32	<0.5	<0.5	6
	06/27/95	7.7	540	47	80	4.3	49	35	<0.5	<0.5	<5
	09/12/95	7.7	540	42	130	2	51	30	<0.5	<0.5	<5
	12/6-8/95	7.6	550	46	<50	1.3	52	31	<0.5	<0.5	<5
MW-6	03/29/95	7.8	580	62	110	1.3	51	30	<0.5	<0.5	7
	06/27/95	7.7	570	67	140	3.0	45	34	<0.5	<0.5	10
	09/12/95	7.7	580	61	120	3	52	29	<0.5	<0.5	<5
	12/6-8/95	7.5	580	70	100	2.2	51	32	<0.5	<0.5	<5
MW-10	03/29/95	7.9	610	62	70	1.2	77	37	<0.5	<0.5	8
	06/27/95	7.8	610	68	70	4.4	76	41	<0.5	<0.5	10
	09/12/95	7.8	620	65	90	3	78	36	<0.5	<0.5	6
	12/6-8/95	7.5	620	76	<50	3.1	79	42	<0.5	<0.5	<5

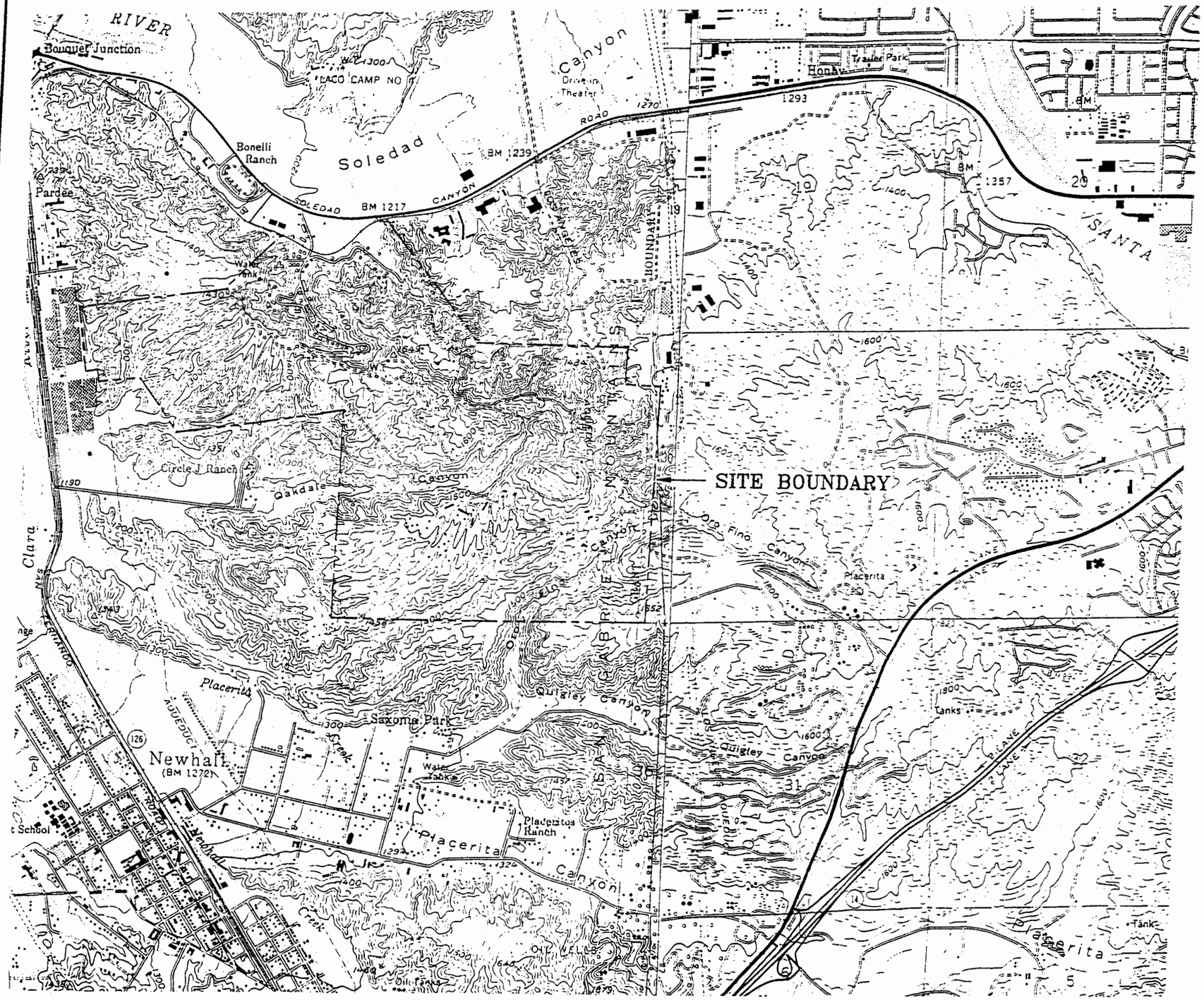
[a]TCE = Trichloroethene.
[b]TOC = Total organic carbon.
[c]TOX = Total organic halogens.

TABLE 3

BACKGROUND WATER QUALITY PARAMETERS

Well No.	Date Sampled	Gross Alpha (pCi/l)	Gross Beta (pCi/l)	Lead (mg/l)	Fluoride (mg/l)	Nitrate (mg/l)	Turbidity (NTUs)
Detection Limits				-0.01[a] 0.0002	0.1	0.4	0.2
MW-1	10/04/88	0.4 ± 2	0.7 ± 2	<0.01	--[b]	--	--
	01/27/93	0 ± 1	4 ± 2	<0.01	0.2	--	--
	06/09/93	0.4 ± 1	0.7 ± 2	<0.01	0.2	3.9	0.4
	07/14/93	2 ± 2	0 ± 2	<0.01	0.4	4.8	0.9
	08/11/93	1 ± 1	4 ± 4	<0.01	0.3	4.8	0.9
	09/22/93	--	--	--	--	--	0.5
	03/10/94	--	--	--	--	ND	--
	06/22/94	2 ± 2	4 ± 2	<0.0002	0.2	3.6	1.0
MW-3	10/04/88	0.7 ± 1	2 ± 3	<0.01	--	--	--
	01/27/93	0.8 ± 1	2 ± 2	<0.01	0.3	--	--
	06/09/93	2 ± 1	1 ± 2	<0.01	0.2	1.6	<0.2
	07/14/93	2 ± 2	1 ± 2	<0.01	0.3	2.1	<0.2
	08/11/93	4 ± 2	3 ± 4	<0.01	0.2	2.2	0.3
	09/22/93	--	--	--	--	--	<0.2
	03/10/94	--	--	--	--	1.4	--
	06/22/94	1.0 ± 1	2 ± 2	4.9	0.2	3.6	0.3
MW-5[c]	06/22/94	1.0 ± 1	3 ± 2	<0.0002	0.2	3.6	0.9
MW-6[c]	06/22/94	0.1 ± 1	2 ± 2	<0.0002	0.2	3.8	0.8
MW-10[c]	06/22/94	0.4 ± 1	4 ± 2	<0.0002	0.2	3.7	0.8

[a]Detection limit lowered from 0.01 to 0.0002 mg/l on 6/22/94.
[b]Sample was not taken.
[c]Samples collected from monitoring wells MW-5, MW-6, and MW-7 during the twenty-third sampling event were analyzed for the background water quality parameters because of a repeated tolerance interval exceedence for sodium during previous sampling events.



EXPLANATION:

APPROXIMATE SITE LOCATION BOUNDARY

General Notes

Base Map from U.S.G.S.
MINT CANYON, AND NEWHALL CALIFORNIA
7.5 Minute Topographic
Quadrangle
Photorevised 1988

NORTH

QUADRANGLE LOCATION

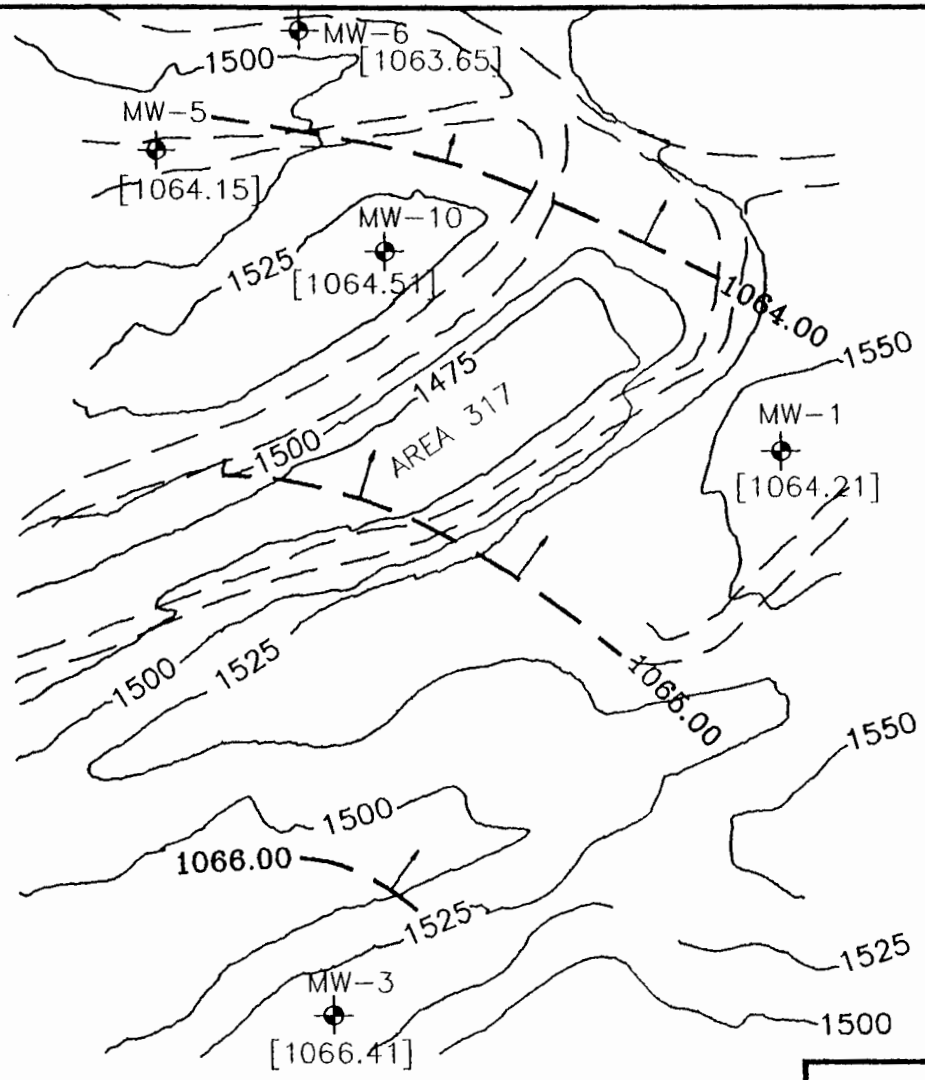
0 2,000

Approximate Scale
(in feet)

FIGURE 1

SITE LOCATION MAP
WHITTAKER CORPORATION, BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD
SANTA CLARITA, CALIFORNIA

Project No. 21001	Drawn CCB	Acton • Mickelson • Environmental, Inc. Consulting Scientists, Engineers, and Geologists
File No. SD101SLM	Prepared PHB	4511 Golden Foothill Parkway, #1 El Dorado Hills, California 95762 (916) 939-7550
Revision 0	Reviewed	



NORTH

0 200

Approximate Scale
(in feet)

LEGEND

MW-1 MONITORING WELL LOCATION

[1064.21] GROUND WATER ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL

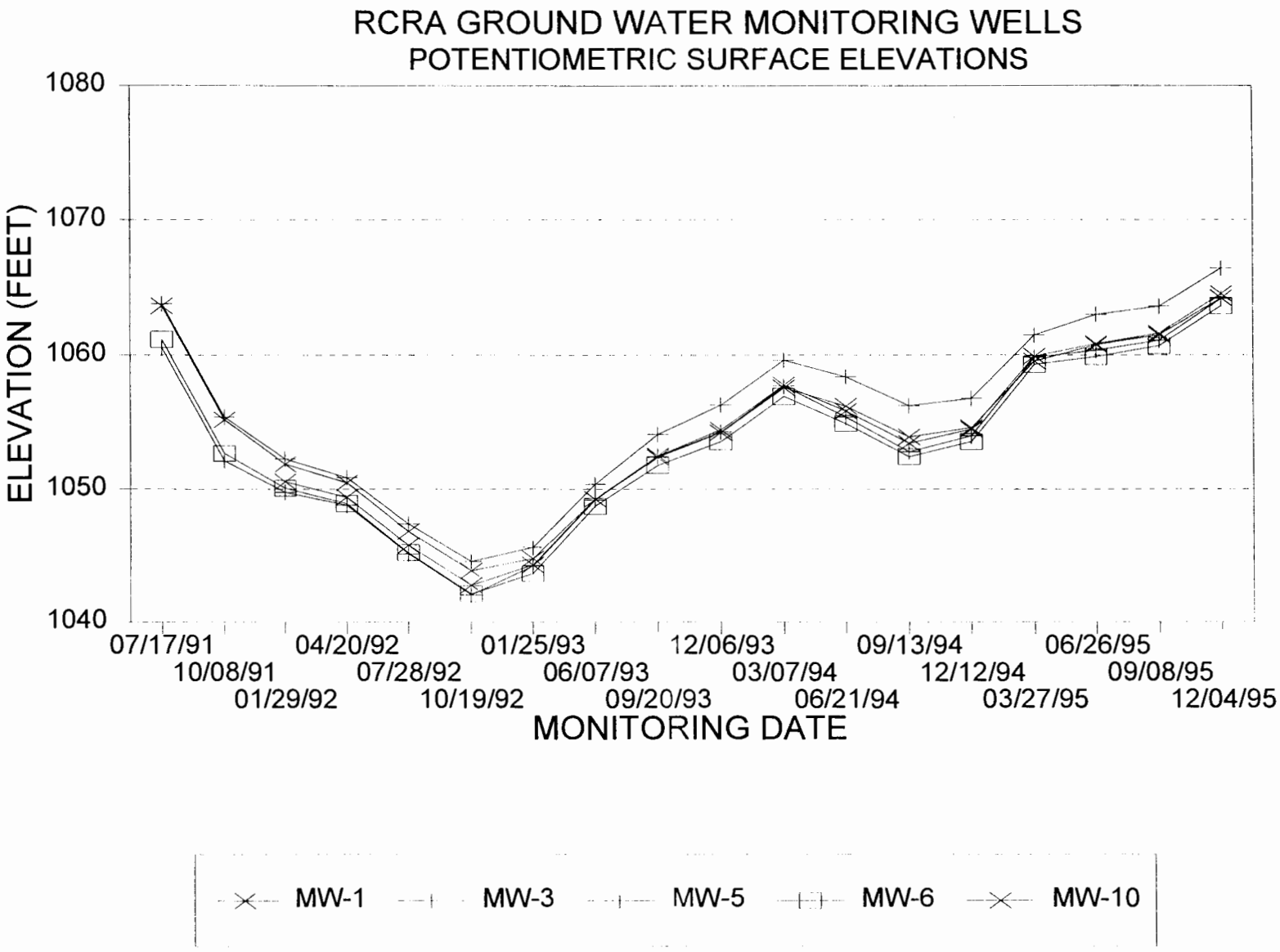
1064.00 ESTIMATED GROUND WATER CONTOUR IN FEET RELATIVE TO MEAN SEA LEVEL WITH ARROW INDICATING INFERRED DIRECTION OF GROUND WATER FLOW

FIGURE 2

AREA 317 GROUND WATER MONITORING WELL LOCATIONS
AND ESTIMATED GROUND WATER FLOW DIRECTION (12-04-95)
WHITTAKER CORPORATION, BERMITE FACILITY
22116 WEST SOLEDAD CANYON ROAD, SANTA CLARITA, CALIFORNIA

Project No. 21001.69	Drawn CCB	Acton • Mickelson • Environmental, Inc. Consulting Scientists, Engineers, and Geologists
File No. QM95WTC2	Prepared LGP	4511 Golden Foothill Parkway, #1 El Dorado Hills, California 95762 (916) 939-7550
Revision 0	Reviewed	

FIGURE 5


RCRA GROUND WATER MONITORING WELLS
POTENTIOMETRIC SURFACE ELEVATIONS
ELEVATION (FEET)
1080
1070
1060
1050
1040
07/17/91
10/08/91
01/29/92
04/20/92
07/28/92
10/19/92
01/25/93
06/07/93
09/20/93
12/06/93
03/07/94
06/21/94
09/13/94
12/12/94
03/27/95
06/26/95
09/08/95
12/04/95
MONITORING DATE
MW-1
MW-3
MW-5
MW-6
MW-10

APPENDIX A

DOCUMENT SUBMITTAL CHRONOLOGY

APPENDIX A

DOCUMENT SUBMITTAL CHRONOLOGY

The following documents have been submitted to Cal-EPA and U.S. EPA, Region IX, in fulfillment of the Closure Plan regarding ground water monitoring at Areas 317 and 342:

- Whittaker Corporation, Bermite Division, Santa Clarita, CA CAD064573108, Facility Closure Plan Modifications, April 1987.
- Revised Ground Water Monitoring Plan for the 317/342 Area, October 8, 1987.
- Proposed Interim Status Ground Water Monitoring Sampling and Analysis Program, December 1987.
- Documentation Report--Construction and Development of Wells for Ground Water Monitoring of the 342 and 317 Areas, February 1988.
- Verification Sampling Results at Selected RCRA Units, March 1988.
- RCRA Ground Water Monitoring System--Proposed Final Configuration, May 1988.
- Ground Water Sampling and Analysis Plan, August 1988.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 1, December 1988.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 2, March 1989.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 3, July 1989.
- Specific Plan for a Ground Water Quality Assessment Program, June 1989.
- Interim Response Action Plan, 317 Area Soil and Ground Water Remediation, June 1989.
- Site Ground Water Sampling and Analysis Plan, Appendix IV of 40 CFR 264.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 4, September 1989.
- Statistical Analysis--Well MW-2 Versus MW-1 and MW-3, October 1989.

- RCRA Ground Water Sampling, Quarterly Sampling Report No. 5, March 1990.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 6, May 1990.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 7, June 1990.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 8, October 1990.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 9, January 1991.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 10, April 1991.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 11, July 1991.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 12, October 1991.
- Specific Plan for a Ground Water Quality Assessment Program for the 317 Surface Impoundment Area.
- RCRA Ground Water Sampling, Quarterly Sampling Report No. 13, January 1992.
- Area 317 RCRA Quarterly Ground Water Quality Monitoring Report No. 14 and Report of Monitoring Well MW-10 Installation, January through March 1992.
- Area 317 RCRA Quarterly Ground Water Quality Monitoring Report No. 15, April through June 1992.
- Area 317 RCRA Quarterly Ground Water Quality Monitoring Report No. 16, July through September 1992.
- Water Quality Monitoring and Response Plan for the Interim Status Area 317 Surface Impoundment, October 1992.
- Area 317 RCRA Quarterly Ground Water Quality Monitoring Report No. 17, October through December 1992.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 18, January through March 1993.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 19, April through June 1993.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 20, July through September 1993.

- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 21, October through December 1993.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 22, January through March 1994.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 23, April through June 1994.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 24, June through September 1994.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 25, October through December 1994.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 26, January through March 1995.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 27, April through June 1995.
- Area 317 RCRA Quarterly Ground Water Monitoring Report No. 28, July through September 1995.

APPENDIX B

GROUND WATER SAMPLING PROCEDURES

TABLE B-1

AREA 317 WELL EVACUATION
BERMITE DIVISION, WHITTAKER CORPORATION

Well Number	Date Pump Started	Evacuation	Sampling[a]	Time and Date of Sample Collection
		Approximate Duration of Pumping (hours)	Duration of Pumping (minutes)	
MW-1	12-04-95	45.00	15	0730 (12-08-95)[b]
MW-3	12-04-95	42.75	25	0945 (12-06-95)
MW-5	12-04-95	41.75	25	0850 (12-06-95)
MW-6	12-04-95	41.25	35	0810 (12-06-95)
MW-10	12-04-95	42.25	20	0920 (12-06-95)

[a]Flow rate from wells was reduced prior to sampling. Actual sample extraction flow rate for all wells, approximately 100 milliliter/minute in a 1/4-inch pipe.

[b]Due to a pipe fitting failure which occurred after well stabilization measurements on 12/05/95, monitoring well MW-1 well development was extended to 0730 hours on 12/08/95 after the pump was restarted at 1030 hours on 12/07/95.

TABLE B-2

WELL STABILIZATION TESTS
BERMITE DIVISION, WHITTAKER CORPORATION

Well	Turbidity (NTUs)[a]	Temperature (°C.)	pH	Specific Conductance (μmhos)[b]/cm^2	Time and Date
MW-1	1.72	23.4	7.78	754	0920 (12/05/95)
	1.98	23.4	7.77	764	1520 (12/05/95)
	3.10	22.8	8.14	780	1430 (12/07/95)
	1.88	22.4	8.10	756	0700 (12/08/95)
MW-3	1.30	25.2	7.81	601	0925 (12/05/95)
	1.23	24.4	7.79	606	1525 (12/05/95)
	1.15	24.0	7.82	608	0755 (12/06/95)
MW-5	1.50	23.6	7.61	543	0910 (12/05/95)
	1.71	23.4	7.78	551	1510 (12/05/95)
	2.24	22.9	7.66	542	0740 (12/06/95)
MW-6	2.47	23.5	7.40	569	0905 (12/05/95)
	2.69	23.8	7.92	574	1505 (12/05/95)
	2.71	23.3	7.82	572	0735 (12/06/95)
MW-10	3.22	23.3	7.71	613	0915 (12/05/95)
	3.04	23.4	7.79	616	1515 (12/05/95)
	2.33	23.0	7.56	610	0745 (12/06/95)

[a]NTUs - nephelometric turbidity units.
[b]μmhos - micromhos.

TABLE B-3

LABORATORY ANALYTICAL METHODS AND SAMPLE VOLUME
AND CONTAINER REQUIREMENTS
AREA 317 GROUND WATER MONITORING WELLS
WHITTAKER CORPORATION, BERMITE DIVISION

Constituent	Analytical Method	Sample Volume (milliliters)	Container Type
Ground Water Monitoring Parameters			
pH/Specific Conductance	EPA 150.1/120.1	500	Plastic/glass
Total Organic Carbon	EPA 415.1	250	Amber glass-TFE cap
Total Organic Halogen	EPA 9020	250	Amber glass-TFE cap
Trichloroethylene	EPA 624	3 x 40	Amber glass-TFE cap
Sulfate/Chloride	EPA 300.0	1000	Plastic/glass
Sodium/Iron/Manganese	EPA 200.7	1000	Plastic

APPENDIX C

CHAIN-OF-CUSTODY FORMS

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244
2-4570

Project Name : MW1 Qtrly 317 Area Monitoring
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s):

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 5081005

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	Wet Chem - E.C., pH Cont. 16oz.(p) A	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	Wet Chem - Cl, SO_4 Cont. 32oz.(p) A	EPA ~~601~~ 624 TCE ONLY Cont. 40ml(v) ABC NO H/S	Trace Metals-P - Fe, Mn, Na Cont. 32oz.(p)-HNO_3 A								Sample Temp °C: __ Sample Cond.: __ Sealed? __
1	MW1/A/29	12/8/95	0730	G	MW		1													
2	MW1/B/29	"	0732	G	MW			1												
3	MW1/C/29	"	0735	G	MW				1											
4	MW1/H/29	"	0738	G	MW					1										
5	MW1/O/29	"	0743	G	MW						3									
6	MW1/R/29	"	0740	G	MW							1								

Misc. Notes:

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
	12-8-95	8 [illegible]		12/8/95	1032			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
	12/8/95	0800	S Bonnington	12/8/95	1035			

Corporate Offices & Laboratory
P.O. Box 272 / 853 Corporation Street
Santa Paula, CA 93061-0272
TEL: (805) 659-0910

Office and Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-0181

Field Office
Visalia, California
TEL: (209) 734-9473

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW3 Qtrly 317 Area Monitoring
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s):

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508503

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	Wet Chem - E.C., pH Cont. 16oz.(p) A	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	Wet Chem - Cl, SO_4 Cont. 32oz.(p) A	EPA ~~601~~ 624 TCE ONLY Cont. 40ml(v) ABC	Trace Metals-P - Fe, Mn, Na Cont. 32oz.(p)-HNO_3 A								Sample Temp °C: __ Sample Cond.: __ Sealed? __
1	MW3/A/29	12/4/95	0945	G	MW		1													
2	MW3/B/29	"	0948	G	MW			1												
3	MW3/C/29	"	0951	G	MW				1											
4	MW3/H/29	"	0954	G	MW					1										
5	MW3/O/29	"	0959	G	MW						3									
6	MW3/R/29	"	1005	G	MW							1								

Misc. Notes: No headspace

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
	12-4-95	11:50 AM		12/4/95	12:50			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
	12/4/95	11:50	SBerrington	12/6/95	1250			

Corporate Offices & Laboratory
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2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-6181

Field Office
Visalia, California
TEL: (209) 734-9473

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY

Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW5 Qtrly 317 Area Monitoring
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s):

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508505

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	Wet Chem - E.C., pH Cont. 16oz.(p) A	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	Wet Chem - Cl, SO_4 Cont. 32oz.(p) A	EPA ~~601~~ 624 TCE only Cont. 40ml(v) ABC	Trace Metals-P - Fe, Mn, Na Cont. 32oz.(p)-HNO_3 A	Sample Temp °C: __ Sample Cond.: __ Sealed? __
1	MW5/A/29	12/6/95	0853	G	MW		1						
2	MW5/B/29	"	0852	G	MW			1					
3	MW5/C/29	"	0855	G	MW				1				
4	MW5/H/29	"	0859	G	MW					1			
5	MW5/O/29	"	0903	G	MW						3		
6	MW5/R/29	"	0910	G	MW							1	

Misc. Notes: Noheadspace

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
	12-6-95	11:50AM		12/6/95	1750			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
	12/6/95	1150	SBerrington	12/6/95	1250			

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FAX (209) 942-0423

Field Office
Visalia, California
TEL (209) 734-9473
Mobile (209) 737-2399

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW5-1A Qtrly 317 Area Monitor.
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s):

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508506

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	EPA ~~601~~ 624 TCE ONLY Cont. 40ml(v) ABC										Sample Temp °C: __ Sample Cond.: __ Sealed? __
1	MW5/B/29/1A	12/6/95	0912	G	MW		1												
2	MW5/C/29/1A	"	0913	G	MW			1											
3	MW5/D/29/1A	"	0914	G	MW				3										

Misc. Notes: no headspace

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
	12-6-95	11:50 AM		12/6/95	1250			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
	12/6/95	1150	SBerrington	12/6/95	1250			

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2500 Stagecoach Road
Stockton, CA 95215

Field Office
Visalia, California
TEL (209) 734-9473

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW6 Qtrly 317 Area Monitoring
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s): [signature]

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508507

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	Wet Chem - E.C., pH Cont. 16oz.(p) A	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	Wet Chem - Cl, SO_4 Cont. 32oz.(p) A	EPA ~~601~~ 624 TCE ONLY Cont. 40ml(v) ABC	Trace Metals-P - Fe, Mn, Na Cont. 32oz.(p)-HNO_3 A	Sample Temp °C: __ Sample Cond.: __ Sealed? __
1	MW6/A/29	12/6/95	0810	G	MW		1						
2	MW6/B/29	"	0812	G	MW			1					
3	MW6/C/29	"	0815	G	MW				1				
4	MW6/H/29	"	0820	G	MW					1			
5	MW6/O/29	"	0823	G	MW						3		
6	MW6/R/29	"	0830	G	MW							1	

Misc. Notes: No headspace

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
[signature]	12-6-95	11:50 AM	[signature]	12/6/95	1250			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
[signature]	12/6/95	1150	S Barrington	12/6/95	1250			

Corporate Offices & Laboratory
P.O. Box 272 / 853 Corporation Street
Santa Paula, CA 93061-0272
TEL: (805) 659-0910

Office and Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-0181

Field Office
Visalia, California
TEL: (209) 734-9473
Mobile: (209) 737-2399

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW6-1A Qtrly 317 Area Monitor.
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s):

Comp sampler setup Date:__/__/__ Time:__:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508508

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	EPA ~~604~~ 624 Cont. 40ml(v) ABC	Sealed?	Sample Cond.:	Sample Temp °C:
1	MW6/B/29/1A	12/6/95	0835	G	MW		1					
2	MW6/C/29/1A	"	0837	G	MW			1				
3	MW6/D/29/1A	"	0840	G	MW				3			

Misc. Notes: No headspace

Final Sample Dispostion:
Lab Disposal:__/__/__ Returned to Client
Meth. of Disposal:_____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
	12-6-95	11:50 Am		12/6/95	1250			
Received by:	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**	**Received by:**	**Date:**	**Time:**
	12/6/95	1158	S Barrington	12/6/95	1250			

Corporate Offices & Laboratory
P.O. Box 272 853 Corporation Street
Santa Paula, CA 93061-0272
TEL (805) 659-0910
FAX (805) 525-4172

Office and Laboratory
2968 Stagecoach Road
Stockton, CA 95215
TEL (209) 932-0181
FAX (209) 932-0423

Field Office
Visalia, California
TEL (209) 734-9473
Mobile (209) 737-2399

ENVIRONMENTAL

CHAIN OF CUSTODY

QUARTERLY — Laboratory Copy (1 of 3)

Client : Bermite Division of Whittaker
Address: 22116 W. Soledad Canyon Road
Saugus CA 91350
Phone : (805)259-2242
Fax : (805)259-2244

2-4570

Project Name : MW10 Qtrly 317 Area Monitoring
Contact person : Mr. Glen Abun-nur
Purchase order Number:
QA/QC report required: Yes No

Sampler(s): [signature]

Comp sampler setup Date: __/__/__ Time: __:__

Rush Results due By: __/__/__

Date Received: __/__/__

Lab Number: 508509

TEST DESCRIPTIONS - See reverse side for Container, Preservative and Sampling information

Samp Num	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite(C) Grab(G)	Type of Sample **SEE REVERSE SIDE**	(P) Potable (NP) Non-Potable	Wet Chem - E.C., pH Cont. 16oz.(p) A	TOC Cont. 250ml(at)-H_2SO_4 A	TOX Cont. 250ml(at)-H_2SO_4 A	Wet Chem - Cl, SO_4 Cont. 32oz.(p) A	EPA ~~601~~ 624 TCE only Cont. 40ml(v) ABC	Trace Metals-P - Fe, Mn, Na Cont. 32oz.(p)-HNO_3 A	Sample Temp °C: __	Sample Cond.: __	Sealed? __
1	MW10/A/ 29	12/6/95	0930	G	MW		1								
2	MW10/B/ 29	"	0922	G	MW			1							
3	MW10/C/ 29	"	0925	G	MW				1						
4	MW10/H/ 29	"	0928	G	MW					1					
5	MW10/O/ 29	"	0930	G	MW						3				
6	MW10/R/ 29	"	0936	G	MW							1			

Misc. Notes: No headspace

Final Sample Dispostion:
Lab Disposal: __/__/__ Returned to Client
Meth. of Disposal: _____ Date Ret. __/__/__

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
[signature]	12/6/95	1150	[signature]	12/6/95	1250			
Received by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
[signature]	12/6/95	1150	S Barrington	12/6/95	1250			

Corporate Offices & Laboratory
P.O. Box 272 / 853 Corporation Street
Santa Paula, CA 93061-0272
TEL: (805) 659-0910
FAX: (805) 525-1173

Office and Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-0181

Field Office
Visalia, California
TEL: (209) 734-9473
Mobile: (209) 737-2399

APPENDIX D

SAMPLE ANALYSES REQUEST FORMS

SAMPLE ANALYSIS REQUEST

Sampling Information

Project No. 85-01-4 Project Name: BERMITE 29TH QTR SAMPLIN 317 AREA

Sampler Name: GLEN ABDUN-NUR/TIM BRICKER Tele. No. (805) 759-2241

Name of Person Receiving Samples: _____

Date Samples Received: _____

Internal Temperature of Sample Container: _____

Notes on Samples: _____

Analysis Required

Sample I.D.	Laboratory I.D.	pH, EC	TOC	TOX	SULFATE, CHLORIDE	EPA 624 TCE ONLY	IRON, MANGANESE, SODIUM
MW1/A/29	508605	X					
MW1/B/29			X				
MW1/C/29				X			
MW1/H/29					X		
MW1/O/29						X	
MW1/R/29							X

SAMPLE ANALYSIS REQUEST

Sampling Information

Project No. 85-01.4 Project Name: 317 AREA BERMITE 29TH QTR. SAMPLING

Sampler Name: GLEN ABDUN-NUR/TIM BRICKER Tele. No. (805) 259-7241

Name of Person Receiving Samples: _____

Date Samples Received: _____

Internal Temperature of Sample Container: _____

Notes on Samples: _____

Analysis Required

Sample I.D.	Laboratory I.D.	pH, EC	TOC	TOX	SULFATE, CHLORIDE	EPA 624 TCE ONLY	IRON, MANGANESE, SODIUM
MW3/A/29	508503	X					
MW3/B/29	↓		X				
MW3/C/29	↓			X			
MW3/H/29	↓				X		
MW3/O/29	↓					X	
MW3/R/29	↓						
							X

SAMPLE ANALYSIS REQUEST

Sampling Information

Project No. 85-01-4 **Project Name:** BERMITE 29TH QTR. SAMPLIN 317 AREA

Sampler Name: GLEN ABDUN-NUR/TIM BRIDGER **Tele. No.** (805) 259-2241

Name of Person Receiving Samples: _____

Date Samples Received: _____

Internal Temperature of Sample Container: _____

Notes on Samples: _____

Analysis Required

Sample I.D.	Laboratory I.D.	pH, EC	TOC	TOX	SULFATE, CHLORIDE	EPA 624 TCE ONLY	IRON, MANGANESE, SODIUM
MW5/A/29	508505	X					
MW5/B/29			X				
MW5/C/29				X			
MW5/H/29					X		
MW5/D/29						X	
MW5/R/29							X
MW6/A/29	508507	X					
MW6/B/29			X				
MW6/C/29				X			
MW6/H/29					X		
MW6/D/29						X	
MW6/R/29							X

SAMPLE ANALYSIS REQUEST

Sampling Information

Project No. 85-014 **Project Name:** 317 AREA BERMITE 29TH QTR. SAMPLING

Sampler Name: GLEN ABDON-NUR/TIM BRICKER **Tele. No.** (805) 257-2741

Name of Person Receiving Samples: _____

Date Samples Received: _____

Internal Temperature of Sample Container: _____

Notes on Samples: _____

Analysis Required

Sample I.D.	Laboratory I.D.	pH, EC	TOC	TOX	SULFATE/ CHLORIDE	EPA 624 TCE ONLY	IRON, MANGANESE, SODIUM
MW10/A/29	508509	X					
MW10/B/29	↓		X				
MW10/C/29	↓			X			
MW10/H/29	↓				X		
MW10/E/29	↓					X	
MW10/R/29	↓						X
MW5/B/29/1A	508506		X				
MW5/C/29/1A	↓			X			
MW5/D/29/1A	↓					X	
MW6/B/29/1A	508508		X				
MW6/C/29/1A	↓			X			
MW6/E/29/1A	↓					X	

APPENDIX E

FGL QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROGRAM

ENVIRONMENTAL

ANALYTICAL CHEMISTS

Quality Assurance Manual

Corporate Offices & Laboratory
P.O. Box 272/853 Corporation Street
Santa Paula, CA 93061-0272
TEL: (805) 659-0910
FAX: (805) 525-4172

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209) 942-0181
FAX: (209) 942-0423

Field Office
Visalia, California
TEL: (209) 734-9473
Mobile: (209) 738-6273

QUALITY ASSURANCE MANUAL

FGL ENVIRONMENTAL
853 Corporation Street
Santa Paula, CA 93060

Reviewed by:_____ _____
Dudley S. Jayasinghe, Ph.D. Date
Technical Director

Concurred by:_____ _____
Kurt Wilkinson, B.S. Date
Quality Assurance Director

Approved by:_____ _____
Darrell H. Nelson, B.S. Date
Laboratory Director

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QA Plan Description

The primary objective of FGL Environmental's quality assurance (QA) program is to ensure that all data is scientifically valid, defensible and of known precision and accuracy. Relative to the use for which the data are obtained, the data must be of sufficient known quality to withstand scientific and legal challenge.

This manual describes the overall approach used by FGL Environmental to ensure that the primary objective of the QA/QC program is met. It outlines quality control procedures to be used with field and analytical methods. It also outlines the individual analysis data quality objectives which will accomplish the primary objective. Detailed project-specific FGL standard operating procedures to supplement this manual are provided whenever requested.

FGL's QA manual is based on the 16 essential elements contained in the U.S. Environmental Protection Agency manual "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS-005/80.

As of the date of revision, this manual reflects the current quality assurance program in effect and items in progress of being implemented.

References for this manual include field and laboratory methods published by the U.S. Environmental Protection Agency and other agencies mainly through the following sources:

(1) "Standard Methods for the Analysis of Water and Wastewater," 17th Edition, 1990.
(2) "Methods for Chemical Analysis in Waters and Waste," (MCAWW) EPA-600/4-79-020
(3) "Methods for the Determination of Organic Compounds in Drinking Water," EPA Method Book, EPA-600/4-88-039, December 1988.
(4) "Methods for the Determination of Organic Compounds in Drinking Water-Supplement I," EPA Method Book, EPA-600/4-90- 020, July 1990.
(5) "Methods for the Determination of Organic Compounds in Drinking Water-Supplement II," EPA Method Book, EPA-600/4- 90-020, July 1990.
(6) "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater," EPA Method Book, EPA 600/4-82-057, July 1982.
(7) "Methods for Evaluating Solid Waste," EPA Method Book, SW- 846, rev. 3, and Proposed Revisions
(8) "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA Method Book, EPA-600/4-80-032, August 1980.
(9) "Handbook for Sampling and Sample Preservation of Water and Wastewater," EPA Method Book, EPA-600/4-82-029, September 1982.
(10) "Eastern Environmental Radiation Facility Radiochemistry Procedures Manual," EPA Method Book, EPA 520/5-84-006, August 1984.
(11) "Environmental Measurements Laboratory Procedures," HASL-300, 27th Edition, February 1992.

Laboratory Organization and Responsibilities

Personnel of FGL Incorporated

Our commitment to providing a superior service requires the high caliber staff employed by FGL. These professionals have considerable experience to meet the technical demand of environmental analysis.

Santa Paula

Darrell H. Nelson, B.S.	President & Lab Director
Kurt Wilkinson, B.S.	Vice-President and Quality Assurance Director
Denis Barry, B.Comm.	Marketing Director
Cheryl Long	Administrative Services Director
Dudley S. Jayasinghe, Ph.D.	Technical Director
Roger Perry, B.A.	Health & Safety Officer
Eric Cotting, M.S.	Radiation Safety Officer
Kurt Wilkinson, B.S.	Inorganic Lab Manager
Randy Johnson	Trace Metals Supervisor
Mike Schraml, B.S.	Environmental Chemist
Shelli Perry, B.S.	Environmental Chemist
Christine Sullivan, B.S.	Wet Chemistry Supervisor
Christy Masyr, B.S.	Environmental Chemist
Katy Prusso, B.S.	Environmental Chemist
Kelly Dunnahoo, B.S.	Organic Lab Manager
Mark Bolyanatz, B.S.	Environmental Chemist
Rick Dotts, B.S.	Environmental Chemist
Sarah Edmondson, B.A.	Environmental Chemist
Dudley S. Jayasinghe, Ph.D.	Environmental Chemist
Juan M. Magana, B.S.	Environmental Chemist
Roger Perry, B.S.	Environmental Chemist
Michel Franco, B.A.	Radioactivity Lab Manager
Laura Reed	Lab Technician
Ricardo Sandoval, B.S.	Agricultural Lab Manager
Joan McKinney	Lab Technician
Raquel Harvey	Bacteriologist
Janelle Nelson	Bacteriologist
George Trouw	Field Services Director
Scott Bucy, B.S.	Field Services/Agronomist
Carl Tashima	Field Services
Jamie Johnson	Field Services
Pete Munoz	Field Services
Vickie Hengehold	Field Services
Eric Cotting, M.S.	Computer Programmer
Gary Hornbeck	Computer Programmer
Eva Anda, Ph.D.	Computer Programmer

Laboratory Organization and Responsibilities

Personnel continued

Santa Paula continued

Beverly Baca	Accounting
Cindy Aguirre	Accounting
Cheryl Long	Administrative Services Director
Kristie Marlow	Customer Services Manager
Tiffany Douglas	Customer Services
Martha Hamblin	Customer Services
Erin Hart	Customer Services
Tonya Lawson	Customer Services
Cathy Metelak	Customer Services
Shawn Parham	Customer Services
Vickie Taylor	Customer Services
Stacey Berrington	Sample Receiving

Stockton

Thomas M. Bartanen, M.S.	Lab Director and Quality Assurance Officer
Mark Ketcherside, B.S.	Inorganic Lab Manager
Mary Laing, B.S.	Environmental Chemist
William Little, B.S.	Environmental Chemist
Madelyn Taasin	Technician
Janyce Huynh	Technician
Thomas M. Bartanen, M.S.	Organic Lab Manager
Cynthia Phipps, B.S.	Environmental Chemist
Hao Van Le, B.S.	Environmental Chemist
Mark D. Brock	Field Services
Patrick Wheeler	Field Services
Joanna Culham	Office Manager
Yolanda Starr	Customer Services
Narine Sylvia	Customer Services

San Joaquin

Neil Jessup, B.S.	Agronomist/Field Service

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Darrell H. Nelson

Current Responsibilities:
President and Lab Director:
- To oversee all operational aspects of the Santa Paula and Stockton laboratories
- To guide and direct managers towards the corporation's goals
- To report to the Board of Directors and the stockholders

Work Experience:
Assistant Manager, FGL
- Chemical analysis of drinking and waste waters, soils and plant materials
- Supervision of a number of lab operations including work scheduling and field services
- Customer Interface

Formal Education:
- B.S. (1970) in Soil and Water Science, University of California, Davis.

Continuing Education:
- University of Southern California (USC) School of Business Administration, "Customer Service Management," April 1990.
- Hazardous Waste Operations and Emergency Response Training, OSHA 29 CFR 1910.120, 40 hr plus annual refresher.
- American Chemical Society (ACS), "Quality Assurance for Analytical Chemistry," Nov. 1991.
- University of California Davis (UCD), "Marketing Professional Services," Feb. 1988.
- University of California Davis (UCD), "Guerrilla Marketing," Feb. 1988.
- University of California Davis (UCD), "Enhancing Sales Skills," Feb. 1988.
- American Water Works Association, "Approved Water Sampling Procedures," March 1991.
- California Agricultural Leadership Program, 1976 - 1978.
- NPDES Requirements for Industrial and Construction Site Storm Water Discharges, ASCE, Feb. 1992.
- Senate bill #198, compliance training (State Fund Insurance)
- Nevada Nuclear Associates, "Fundamentals of Radiochemistry", February 1994.

Memberships:
Professional:
- American Chemical Society
- American Water Works Association
- Association of California Testing Laboratories

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Kurt Wilkinson

Current Responsibilities:

Vice-President:
- To support the president in all operational, technical and strategic aspects relating to the corporation

Quality Assurance Director:
- Primarily responsible for FGL's Quality Assurance Program

Inorganic Lab Manager:
- Work scheduling and planning for Inorganic Lab
- Staff training and general management
- Client consultation on analysis needs
- Data interpretation

Work Experience:
- 8 years experience in environmental testing of drinking water, wastewater, hazardous waste and air analysis
- Additional experience in agricultural testing of soils, plant tissue and food products

Formal Education:
- B.S. (1987) in Biochemistry, California Polytechnic State University, San Luis Obispo

Continuing Education:
- American Chemical Society (ACS), "Environmental Analytical Chemistry, Water and Waste," Nov. 1991.
- American Chemical Society (ACS), "Gas Chromatography/Mass Spectrometry," April 1992.
- Halliburton NUS, "Solving the Mysteries, Collecting Environmental Samples," April 1992.

Memberships:

Professional:
- American Chemical Society (ACS)

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Denis Barry

Current Responsibilities:
Marketing Director:
- Responsible for marketing of FGL's services to city, county and state agencies in addition to private companies
- Compilation and implementation of FGL's marketing plans
- Responsible for FGL's informational and promotional materials

Work Experience:
- 3 years experience in marketing analytical services
- Marketing consultancy experience focused on small to medium sized companies
- International programs targeted mainly at the European Economic Community for small U.S. companies

Formal Education:
- B.Comm (Bachelor of Commerce), University College, Dublin, Ireland

Continuing Education:
- Computer Appreciation - Moorpark College, 1989

Memberships:
- Vice President - Irish American Club of Ventura County

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Dudley S. Jayasinghe

Current Responsibilities:
Technical Director -
- Develop new methods and monitor and improve existing methods
- Provide guidance and technical expertise to analysts, review of data and client reports
- Consult with clients on specific needs

Work Experience:
- 6 years on gas chromatograph/mass spectrometer
- 1 year GC/MS
- 3 years as research officer
- 2 years teaching at undergraduate level

Formal Education:
- B.S. (1980) in Organic Chemistry with minor in Physics, University of Peradeniya, Sri Lanka.
- Ph.D. (1989) in Analytical Chemistry with minor in Physical and Organic Chemistry, Oregon State University.

Continuing Education:
- Post-Doctoral Research in soil chemistry August 1989 - Sept. 1990, Oregon State University.

Memberships:
Professional:
- American Chemical Society
- Phi Lamda Upsilon Academic Honorarium

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Roger Perry

Current Responsibilities:
Health and Safety Officer:
- Responsible for design and implementation of FGL's Health and Safety programs
- Organic Department Chemist

Experience:
- 11 years experience as an environmental analytical chemist
- Health and Safety regulations and compliance
- Handling accumulation and disposal of Hazardous Wastes and Radioactive Materials

Formal Education:
- B.A. (1982) in Chemistry, Sonoma State University, Sonoma, California

Continuing Education:
- Hazardous Waste Operations and Emergency Response Training, OSHA 29 CFR 1910.120, 40 hr plus annual refresher.

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Eric Cotting

Current Responsibilities:
- Development and maintenance of FGL's Laboratory Information Management System (LIMS)
- Training of personnel in the effective use of LIMS

Work Experience:
- Developed customized LIMS system for FGL
- As research assistant with the University of Wisconsin, was involved in the modification of an existing theoretical computational program designed to model quantum mechanical properties of the Helium Atom

Formal Education:
- B.S. (1981) Chemistry, University of Alaska, Fairbanks, Alaska
- B.S. (1981) Math, University of Alaska, Fairbanks, Alaska
- B.S. (1981) Physics, University of Alaska, Fairbanks, Alaska
- M.S. (1987) Physical Chemistry, University of Wisconsin, Madison, Wisconsin

Continuing Education:
- Computer Networking Seminar: Santa Barbara, CA. January 1991
- Nevada Nuclear Associates,"Fundamentals of Radiochemistry", February 1994.

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Kelly Dunnahoo

Current Responsibilities:
Organic Lab Manager:
- Organization of work flow in Organic Laboratory
- Personnel training, methods development, instrument troubleshooting
- Response to specific customer enquiries

Work Experience:
- 8 years experience in environmental and geochemical analysis
- 4 years of supervisory and management roles in organic laboratory operations

Formal Education:
- B.S. (1987) in Biochemistry, University of California, Los Angeles

Continuing Education:
- AOAC, "QA for Analytical Labs", November 1991.

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Michel M. Franco

Current Responsibilities:
Radiochemistry Lab Manager:
- Work scheduling, staff supervision for Radiochemistry Laboratory
- Personnel training, methods development, instrument troubleshooting
- Client interface and project management

Work Experience:
- 6 years experiencein radiochemical analysis, inorganic analysis and organic analysis for TOX and TOC.
- Developed instrument analysis experiment for CSUN (1988)
- Sample trouble shooting, processing and department liason at Reference Laboratory (1986)

Formal Education:
- B.A. (1990) Chemistry, California State University, Northridge

Continuing Education:
- Nevada Nuclear Associates, "Fundamentals of Radiochemistry", February 1994.
- Canberraa Industries Inc., "Environmental Radioactivity Quantification Workshop", March 1994.

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Santa Paula

Ricardo Sandoval

Current Responsibilities:
Agriculture Lab Manager:
- Management of Agricultural Department
- Supervision and training of staff

Work Experience:
- 10 years experience in agricultural testing of soils and plant tissue
- Ranch and Nursery experience dealing with irrigation, pollution, and transplantation

Formal Education:
- B.S. (1985) in Crop Science and Technical Degree in Fruit Science, California Polytechnic State University, San Luis Obispo.

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Stockton

Thomas Bartanen

Current Responsibilities:

Lab Director:
- Management of the Stockton Laboratory
- Liason with Santa Paula (Corporate) on Stockton lab's performance, budgets and financial results

Quality Assurance Officer:
- Oversees Stockton laboratory's Quality Assurance Program
- Responsible for organic analysis on drinking water, wastewater, and hazardous waste samples

Organic Lab Manager:
- Organization of work flow in Organic Laboratory
- Personnel training, methods development, instrument troubleshooting
- Response to specific customer enquiries

Work Experience:
- Experience includes work in soil microbiology, toxicity and reservoir limnology
- Direct customer consultation on needs, concerns and complaints

Formal Education:
- B.S. (1980) in Environmental Science, Bradley University, Peoria, IL
- M.S. (1987) in Aquatic Ecology, University of Nevada, Las Vegas

Continuing Education:
- American Association of Technologists GC/MS Workshop-data interpretation
- CDFA - Pesticide Residue Workshop

Memberships:

Civic:
- SCA Inc. (Historical Society)
- Finnish American Home Association (FAHA)

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - Stockton

Mark Ketcherside

Current Responsibilities:
Inorganic Lab Manager:
- Work scheduling and planning for Inorganic Lab
- Staff training and general management
- Client consultation on analysis needs
- Data interpretation

Work Experience:
- 3 years experience in environmental testing of drinking water, wastewater and hazardous waste
- 6 years experience in microbiological and chemical testing for food, water and medical industries

Formal Education:
- B.S. (1987) in Biological Sciences, California Polytechnic State University, San Luis Obispo

Continuing Education:
Delta College:
- Management and Human Relations
- Business Law

California Chamber of Commerce:
- Hazardous Waste Certification

Laboratory Organization and Responsibilities

Key Personnel Qualification Summary - San Joaquin

Neil Jessup

Current Responsibilities:
Agronomist/Field service - Visalia
- Technical Representative - San Joaquin Valley
- Coordinating sampling and sample pick up in the South San Joaquin Valley
- Consultation with clients on sampling and analysis requirements
- Proposal preparation for contracts on environmental and agricultural testing

Work Experience:
- Ten years experience in areas of field service and sampling
- Considerable background in city, county, state and federal regulations for environmental testing requirements

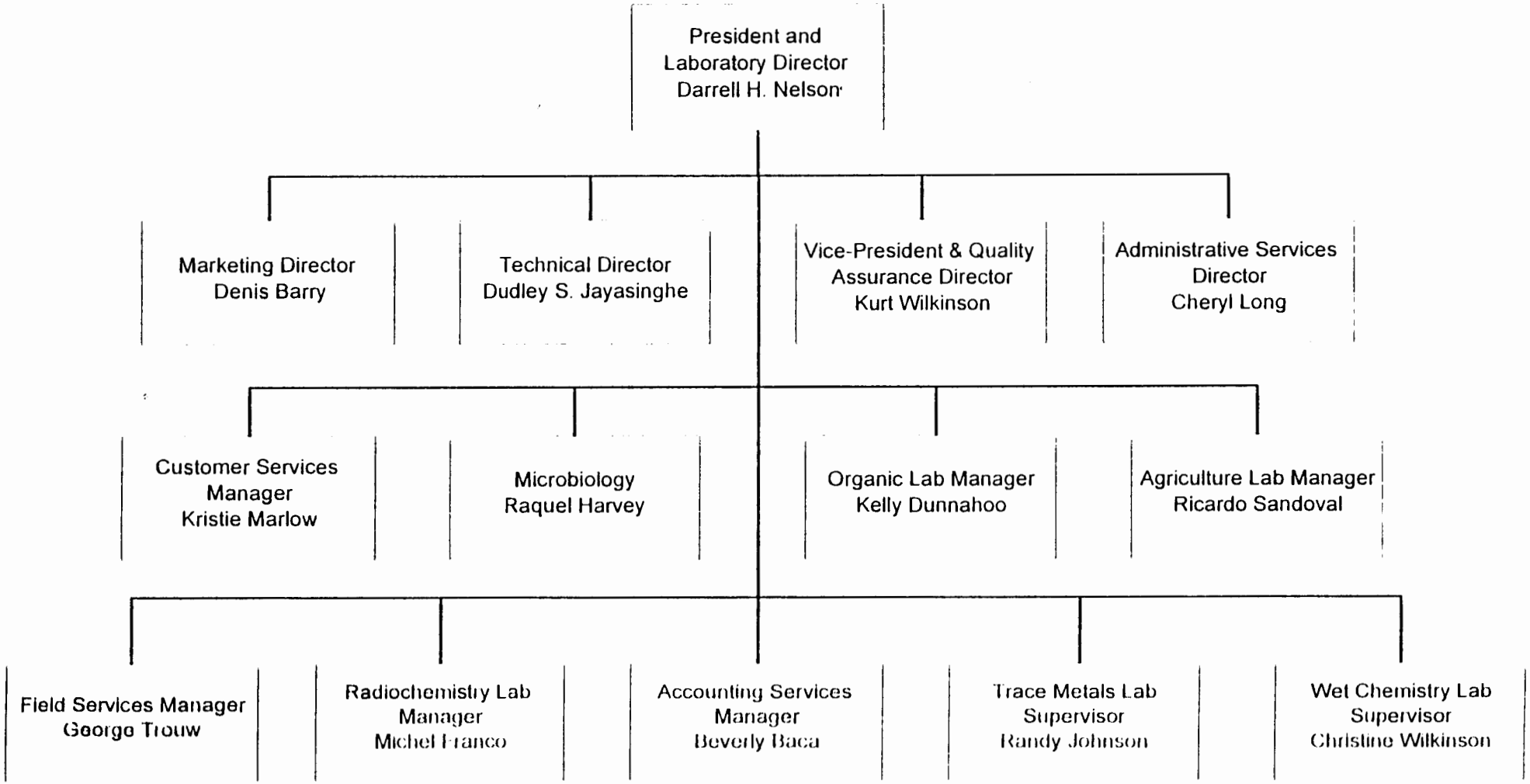
Formal Education:
- B.S. (1977) in Agronomy, California Polytechnic State University, San Luis Obispo

Continuing Education:
- OSHA 40 hour trained for hazardous waste and emergency response, confined space entry and SCBA
- American Water Works Association, "Approved Water Sampling Procedures," March 1991.
- Halliburton NUS, "Solving the Mysteries, Collecting Environmental Samples," April 1992.

Memberships:
Professional:
- California Agriculture Production Consultants Association (CAPCA)
Civic:
- Tulare County Hazardous Waste Advisory Committee

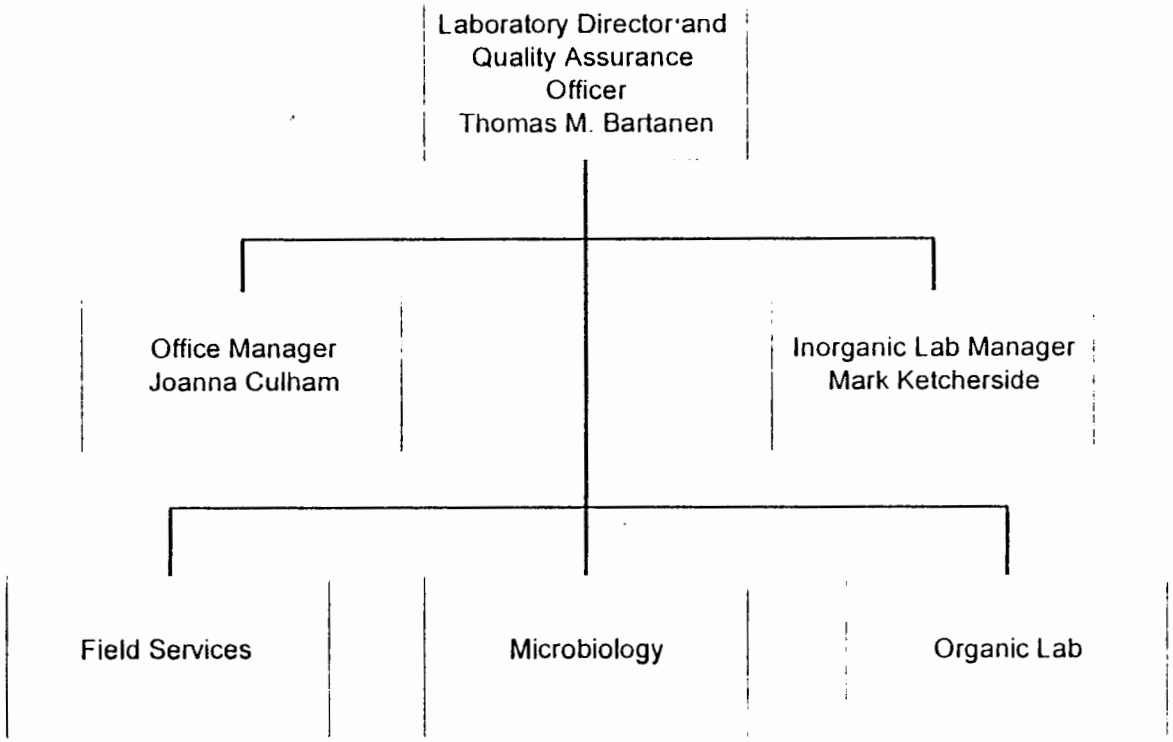
Laboratory Organization and responsibilities

Figure 4-1 Organization Chart Santa Paula Laboratory



aboratory Organization and responsibilities

igure 4-2 Organization Chart Stockton Laboratory



Quality Assurance Objectives

The quality assurance objectives for accuracy, precision, and Detection Limits for Reporting (DLR) are listed in Tables 5-1 (Drinking Water Methods), 5-2 (Wastewater / Hazardous Waste Liquid Methods) and 5-3 (Solid Waste / Hazardous Waste Solids Methods).

Accuracy - is based on the recovery measurement of a target analyte after known addition to a given sample or representative sample matrix (see section 14.2). Accuracy values are expressed as the percent recovery of the known value, and serve as a reflection of the total measurement error (random and systematic). The acceptance ranges for recovery (%REC-AR) are used for data validation.

Precision - is based on the difference measurement of duplicate data points (see section 14.1). Precision values are expressed as relative percent difference (RPD) and serve as a reflection of the variability in measurement replication. Surrogates are not run in duplicate, therefore RPDs are not applicable. The Maximum Acceptance Value for the RPD's (RPD-MAV) are used for data validation.

Detection Limit for Reporting (DLR) - is the routine detection limit FGL uses for reporting purposes. Detection limit studies are performed continually (see section 11.1.2.2) to ensure that the objectives listed in this section are met or exceeded. Surrogates are required for quality assurance purposes only. Therefore, DLR information is not necessary.

Completeness - FGL is currently introducing controls to document incomplete reports. These are reports that are known to lack information at the time of delivery or reports where we are notified by the client that information is not complete. Future QA manuals will have the results for data completeness documented.

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
EPA Method 501.2			
Bromodichloromethane	70-130	20	0.5
Bromoform	70-130	20	0.5
Chloroform	70-130	20	0.5
Dibromochloromethane	70-130	20	0.5
EPA Method 502.2			
Surrogates			
BFB	70-130	N/A	N/A
Fluorobenzene	70-130	N/A	N/A
Chlorofluorobenzene	70-130	N/A	N/A
Analytes			
Benzene	37-151	30	0.5
Bromobenzene	50-150	30	0.5
Bromochloromethane	50-150	30	0.5
Bromodichloromethane	35-155	30	0.5
Bromoform	45-169	30	0.5
Bromomethane	D-242	30	0.5
n-Butylbenzene	50-150	30	0.5
sec-Butylbenzene	50-150	30	0.5
tert-Butylbenzene	50-150	30	0.5

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 502.2 continued			
Carbon tetrachloride	70-140	30	0.5
Chlorobenzene	37-160	30	0.5
Chloroethane	14-320	30	0.5
Chloroform	51-128	30	0.5
Chloromethane	D-273	30	0.5
2-Chlorotoluene	50-150	30	0.5
4-Chlorotoluene	50-150	30	0.5
DBCP	50-150	30	0.5
Dibromochloromethane	53-149	30	0.5
1,2-Dibromoethane	50-150	30	0.5
Dibromomethane	50-150	30	0.5
1,2-Dichlorobenzene	50-150	30	0.5
1,3-Dichlorobenzene	50-150	30	0.5
1,4-Dichlorobenzene	50-150	30	0.5
Dichlorodifluoromethane	50-150	30	0.5
1,1-Dichloroethane	59-155	30	0.5
1,2-Dichloroethane	49-155	30	0.5
1,1-Dichloroethylene	D-234	30	0.5
cis-1,2-Dichloroethylene	50-150	30	0.5
trans-1,2-Dichloroethylene	54-156	30	0.5
1,2-Dichloropropane	D-210	30	0.5
1,3-Dichloropropane	50-150	30	0.5
2,2-Dichloropropane	50-150	30	0.5
1,1-Dichloropropene	50-150	30	0.5
cis-1,3-Dichloropropene	D-227	30	0.5
trans-1,3-Dichloropropene	17-183	30	0.5
Ethylbenzene	37-162	30	0.5
Hexachlorobutadiene	50-150	30	0.5
Isopropylbenzene	50-150	30	0.5
p-Isopropyltoluene	50-150	30	0.5
Methylene Chloride	D-221	30	0.5
Naphthalene	50-150	30	0.5
n-Propylbenzene	50-150	30	0.5
Styrene	50-150	30	0.5
1,1,1,2-Tetrachloroethane	50-150	30	0.5
1,1,2,2-Tetrachloroethane	46-157	30	0.5
Tetrachloroethylene	64-148	30	0.5
Toluene	47-163	30	0.5
1,2,3-Trichlorobenzene	50-150	30	0.5
1,2,4-Trichlorobenzene	50-150	30	0.5
1,1,1-Trichloroethane	52-150	30	0.5
1,1,2-Trichloroethane	71-157	30	0.5
Trichloroethylene	71-157	30	0.5
Trichlorofluoromethane	17-181	30	0.5
1,2,3-Trichloropropane	50-150	30	0.5
1,1,2-Trichlorotrifluoroeth	50-150	30	0.5

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 502.2 continued			
1,2,4-Trimethylbenzene	52-150	30	0.5
1,3,5-Trimethylbenzene	50-150	30	0.5
Vinyl Chloride	D-251	30	0.5
Xylenes m,p	50-150	30	0.5
Xylenes o	50-150	30	0.5
Method EPA 504			
DBCP	70-130	30	0.02
EDB	70-130	30	0.01
Method EPA 505			
Alachlor	50-150	30	0.2
Aldrin	42-122	30	0.01
Chlordane	45-119	30	0.1
Dieldrin	36-146	30	0.01
Endrin	30-147	30	0.01
Heptachlor	34-111	30	0.01
Heptachlor Epoxide	37-142	30	0.01
Hexachlorobenzene	50-150	30	0.01
Lindane	32-127	30	0.05
Methoxychlor	50-150	30	0.1
Toxaphene	41-126	30	0.5
PCB 1016	50-114	30	0.3
PCB 1221	15-178	30	0.3
PCB 1232	10-215	30	0.3
PCB 1242	39-150	30	0.3
PCB 1248	38-158	30	0.3
PCB 1254	29-131	30	0.3
PCB 1260	8-127	30	0.3
Method EPA 507			
Surrogates			
1,3-Dimethyl-2-nitrobenzene	53-105	N/A	N/A
9-Nitroanthracene	50-134	N/A	N/A
Analytes			
Alachlor	70-130	30	1
Atrazine	70-130	30	1
Bromocil	70-130	30	5
Butachlor	70-130	30	1
Diazinon	70-130	30	2
Dimethoate	70-130	30	2
Metolachlor	70-130	30	1
Metribuzin	70-130	30	0.1
Molinate	70-130	30	2
Prometryne	70-130	30	2
Propachlor	70-130	30	1

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 507 continued			
Simazine	70-130	30	1
Thiobencarb	70-130	30	1
Method EPA 508			
Surrogate			
Hexachlorobenzene	70-130	N/A	N/A
Analytes			
Chlorothalonil	70-130	30	0.2
PCB 1016	50-114	30	0.08
PCB 1221	15-178	30	0.2
PCB 1232	10-215	30	0.2
PCB 1242	39-150	30	0.2
PCB 1248	38-158	30	0.1
PCB 1254	29-131	30	0.1
PCB 1260	8-127	30	0.2
Method EPA 508A			
PCB's as Decachlorobiphenyl	70-130	30	0.2
Method EPA 510			
Bromodichloromethane	70-130	30	0.5
Bromoform	70-130	30	0.5
Chloroform	70-130	30	0.5
Dibromochloromethane	70-130	30	0.5
Method EPA 515.1			
Surrogate			
2,4-DCAA	30-150	N/A	N/A
Analytes			
Bentazon	30-150	30	2
Chloramben	30-150	30	1
2,4-D	30-150	30	2
2,4-DB	30-150	30	2
Dalapon	30-150	30	2
Dicamba	30-150	30	5
Dichloroprop	30-150	30	2
Dinoseb	30-150	30	1
Pentachlorophenol	30-150	30	0.2
Picloram	30-150	30	1
2,4,5-T	30-150	30	1
2,4,5-TP (Silvex)	30-150	30	1

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 524.2			
Surrogates			
1,2-Dichloroethane-d4	76-114	N/A	N/A
Toluene-d8	88-110	N/A	N/A
BFB	86-115	N/A	N/A
Analytes			
Acetone	50-150	30	0.5
Benzene	37-151	30	0.5
Bromobenzene	50-150	30	0.5
Bromochloromethane	50-150	30	0.5
Bromodichloromethane	35-155	30	0.5
Bromoform	45-169	30	0.5
Bromomethane	D-242	30	0.5
2-Butanone (MEK)	50-150	30	0.5
n-Butylbenzene	50-150	30	0.5
sec-Butylbenzene	50-150	30	0.5
tert-Butylbenzene	50-150	30	0.5
Carbon disulfide	50-150	30	0.5
Carbon tetrachloride	70-140	30	0.5
Chlorobenzene	37-160	30	0.5
Chloroethane	14-230	30	0.5
Chloroform	51-138	30	0.5
Chloromethane	D-273	30	0.5
2-Chlorotoluene	50-150	30	0.5
4-Chlorotoluene	50-150	30	0.5
Dibromochloromethane	53-149	30	0.5
1,2-Dibromoethane (EDB)	50-150	30	0.5
Dibromomethane	50-150	30	0.5
1,2-Dibromo-3-chloropropane	50-150	30	0.5
1,2-Dichlorobenzene	50-150	30	0.5
1,3-Dichlorobenzene	50-150	30	0.5
1,4-Dichlorobenzene	50-150	30	0.5
Dichlorodifluoromethane	50-150	30	0.5
1,1-Dichloroethane	59-155	30	0.5
1,2-Dichloroethane	49-155	30	0.5
1,1-Dichloroethylene	D-234	30	0.5
cis-1,2-Dichloroethylene	50-150	30	0.5
trans-1,2-Dichloroethylene	54-156	30	0.5
1,2-Dichloropropane	D-210	30	0.5
1,3-Dichloropropane	50-150	30	0.5
2,2-Dichloropropane	50-150	30	0.5
1,1-Dichloropropene	50-150	30	0.5
cis-1,3-Dichloropropene	D-227	30	0.5
trans-1,3-Dichloropropene	17-183	30	0.5
Ethylbenzene	37-162	30	0.5
Hexachlorobutadiene	50-150	30	0.5
2-Hexanone	50-150	30	0.5

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 524.2 continued			
Isopropylbenzene	50-150	30	0.5
p-Isopropyltoluene	50-150	30	0.5
Methylene chloride	D-221	30	0.5
4-Methyl-2-pentanone (MIBK)	50-150	30	0.5
Naphthalene	50-150	30	0.5
n-Propylbenzene	50-150	30	0.5
Styrene	50-150	30	0.5
1,1,1,2-Tetrachloroethane	50-150	30	0.5
1,1,2,2-Tetrachloroethane	46-157	30	0.5
Tetrachloroethylene	64-148	30	0.5
Toluene	47-163	30	0.5
1,2,3-Trichlorobenzene	50-150	30	0.5
1,2,4-Trichlorobenzene	50-150	30	0.5
1,1,1-Trichloroethane	52-162	30	0.5
1,1,2-Trichloroethane	52-150	30	0.5
Trichloroethylene	71-157	30	0.5
Trichlorofluoromethane	17-181	30	0.5
1,2,3-Trichloropropane	50-150	30	0.5
1,1,2-Trichlorotrifluoroeth	50-150	30	0.5
1,2,4-Trimethylbenzene	50-150	30	0.5
Vinyl acetate	50-150	30	0.5
Vinyl chloride	D-251	30	0.5
Xylenes m,p	50-150	30	0.5
Xylenes o	50-150	30	0.5
Method EPA 525			
Surrogate			
Perylene-d12	50-150	N/A	N/A
Analytes			
Acenaphthylene	50-150	30	1
Anthracene	50-150	30	1
Benzo(a)anthracene	50-150	30	1
Benzo(b)fluoranthene	50-150	30	1
Benzo(k)fluoranthene	50-150	30	1
Benzo(g,h,i)perylene	50-150	30	1
Benzo(a)pyrene	50-150	30	0.1
Butylbenzylphthalate	50-150	30	1
Chrysene	50-150	30	1
Dibenzo(a,h)anthracene	50-150	30	1
Dimethylphthalate	50-150	30	1
Diethylphthalate	50-150	30	1
Di-n-butylphthalate	50-150	30	1
bis(2-Ethylhexyl)adipate	50-150	30	1
bis(2-Ethylhexyl)phthalate	29-137	30	3
Fluorene	50-150	30	1
Hexachlorobenzene	50-150	30	1

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 525 continued			
Hexachlorocyclopentadiene	50-150	30	1
Indeno(1,2,3-c,d)pyrene	50-150	30	1
Pentachlorophenol	50-150	30	4
Phenanthrene	50-150	30	1
Pyrene	50-150	30	1
Method EPA 531.1			
Surrogate			
BDMC	70-130	N/A	N/A
Analytes			
Aldicarb	70-130	30	3
Aldicarb Sulfone	70-130	30	3
Aldicarb Sulfoxide	70-130	30	3
Carbofuran	70-130	30	5
Carbaryl	70-130	30	5
3-Hydroxycarbofuran	70-130	30	10
Methiocarb	70-130	30	10
Methomyl	70-130	30	5
1-Napthol	70-130	30	5
Oxymal	70-130	30	5
Propoxur	70-130	30	5
Method EPA 547			
Glyphosate	70-130	20	20
Method EPA 548			
Endothall	70-130	20	40
Method EPA 549			
Diquat	70-130	20	2
Paraquat	70-130	20	1
Method EPA 550.1			
Acenaphthene	70-130	20	3
Acenaphthylene	70-130	20	2
Anthracene	70-130	20	0.1
Benzo(a)anthracene	70-130	20	0.1
Benzo(a)pyrene	70-130	20	0.1
Benzo(b)fluoranthene	70-130	20	0.2
Benzo(g,h,i)perylene	70-130	20	0.1
Benzo(k)fluoranthene	70-130	20	0.1
Chrysene	70-130	20	0.1
Dibenzo(a,h)anthracene	70-130	20	0.3
Fluoranthene	70-130	20	2
Fluorene	70-130	20	2
Indeno(1,2,3-c,d)pyrene	70-130	20	0.1

Quality Assurance Objectives

TABLE 5-1 Quality Assurance Objectives for Drinking Water Methods

CONSTITUENT	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR ug/L
Method EPA 550.1 continued			
1-Methylnaphthalene	70-130	20	2
2-Methylnaphthalene	70-130	20	2
Naphthalene	70-130	20	2
Phenanthrene	70-130	20	2
Pyrene	70-130	20	0.1
Method EPA 552			
Bromochloroacetic acid	70-130	20	1
Dibromoacetic acid	70-130	20	1
Dichloroacetic acid	70-130	20	1
2,4-Dichlorophenol	70-130	20	1
Monobromoacetic acid	70-130	20	1
Monochloroacetic acid	70-130	20	1
Trichloroacetic acid	70-130	20	1
2,4,6-Trichlorophenol	70-130	20	1

CONSTITUENT	Method	ACCURACY % REC-AR	PRECISION RPD-MAV	DLR mg/L
Inorganic Chemicals				
Acidity	305.1	N/A	20	1
Alkalinity (as CaCO3)	310.0	N/A	20	1
Bicarbonate	310.1	N/A	20	1
BOD	405.1	80-120	20	2
Bromide	300.0	80-120	20	0.5
Carbon Dioxide	SM4500C	N/A	20	1
Carbonate	310.1	N/A	20	1
COD	410.4	75-125	20	4
Chloride	300.0	80-120	20	1
Chlorine Residual	330.2	N/A	20	0.1
Chlorine Residual	330.5	N/A	20	0.1
Color	110.3	N/A	20	3 units
Electrical Conductivity	120.1	80-120	20	1 umhos
Cyanide, Total	335.2	75-125	20	0.01
Fluoride by electrode	340.2	80-120	20	0.1
Hydroxide	310.0	N/A	20	1
MBAS	425.1	70-130	20	0.05
Nitrogen				
Ammonia	350.1	80-120	20	1
Nitrate	300.0	80-120	20	0.1
Nitrite	300.0	80-120	20	0.1
Nitrate	353.2	80-120	20	0.1
Nitrite	353.2	80-120	20	0.1
Total Kjeldahl	351.2	80-120	20	1
Odor	140.1	N/A	20	1 TON

Sampling Procedures

6.2.3.5 Product Samples

Free Floating Product (from a well): Sampling of free floating product on the surface of ground water should not be performed until the well has been allowed to stabilize for at least 24 hours after development or other withdrawal procedure. A sample should be collected that is indicative of the thickness of floating product within the monitoring well. This may be accomplished by the use of a clear, acrylic bailer designed to collect a liquid sample where free product and ground water meet. A graduated scale on the bailer is helpful for determining the thickness of free product. Samples should be field-inspected for the presence of odor and/or sheen in addition to the aboveevaluation.

Electronic measuring devices also are available for determining the thickness of the hydrocarbon layer floating on ground water.

6.2.3.6 Aqueous Dissolved Product

If free product (from a well) is detected, analysis of water for dissolved product should be conducted after the free product has been substantially removed from the well. Before collecting a water sample, a well should be purged until temperature, conductivity and pH stabilize. Often, this will require removal of four or more well volumes by bailing or pumping. Once well volumes are removed and well water is stabilized, a sample can be taken after the water level approaches 80 percent of its initial level. Where water level recovery is slow, the sample can be collected after stabilization is achieved.

Ground water samples should be collected in a manner which reduces or eliminates the possibility of loss of volatile constituents from the sample. For collecting samples, a gas-actuated positive displacement pump or a submersible pump is preferred. A Teflon or stainless steel bailer is acceptable. Peristaltic pumps or airlift pumps should not be used.

Cross-contamination from transferring pumps (or bailers) from well to well can occur and should be avoided by thorough cleaning between sampling episodes. Dedicated (i.e., permanent installation) well pumps, while expensive, are often cost effective in the long term and ensure data reliability relative to cross-contamination. If transfer of equipment is necessary, sampling should proceed from the least contaminated to the most contaminated well, if the latter information is available before sample collection.

Water samples should be collected in vials or containers specifically designed to prevent loss of volatile constituents from the sample. These vials should be provided by an analytical laboratory, and preferably, the laboratory conducting the analysis. No headspace should be present in the sample container once the container has been capped. This can be checked by inverting the bottle, once the sample is collected, and looking for bubbles. Sometimes it is not possible to collect a sample without air bubbles, particularly if water is aerated. In these cases, the investigator should record the problem and account for probable error. Cooling samples may also produce headspace (bubbles), but these will disappear once the sample is warmed for analysis.

Samples should be placed in an ice chest maintained at 4 C with blue ice (care should be taken to prevent freezing of the water and bursting of the glass vial). A thermometer with a protected bulb should be carried in each ice chest.

Sampling Procedures

6.3 Sample Handling Policy

Proper sample containers, sample volumes, preservatives, and holding times are essential to providing reliable data. Table 6-1 provides information for each of these items. FGL references the following sources for compiling Table 6-1.

(1) Federal Register, Volume 49, No. 209, October 26, 1984 and subsequent updates.
(2) "Handbook for Sampling and Sample Preservation of Water and Wastewater", EPA Method Book, EPA-600/4-82-029, September 1982.
(3) "Methods for Chemical Analysis in Waters and Waste" (MCAWW) EPA-600/4-79-020
(4) "Methods for Evaluating Solid Waste", EPA Method Book, SW- 846, rev. 3, and Proposed Revisions.
(5) "Standard Methods for the Analysis of Water and Wastewater", 17th Edition, 1990.
(6) "Methods for the Determination of Organic Compounds in Drinking Water", EPA Method Book, EPA-600/4-88-039, December 1988.
(7) "Methods for the Determination of Organic Compounds in Drinking Water-Supplement I", EPA Method Book, EPA-600/4- 90-020, July 1990.
(8) "Methods for the Determination of Organic Compounds in Drinking Water-Supplement II", EPA Method Book, EPA-600/4- 90-020, July 1990.
(9) "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA Method Book, EPA 600/4-82-057, July 1982.
(10) "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA Method Book, EPA-600/4-80-032, August 1980.

6.3.1 Container Check Policy

Sample bottles for most analyses, such as metals, and organics analyses, are purchased precleaned according to EPA Protocol specification from various vendors. Cases of sample bottles are logged in upon receipt. The log book contains the bottle type, lot number or manufacture date, receive date and number of cases. This information is also recorded on the document provided by the manufacturer and is retained in a file for that bottle type. Most containers are checked and documented by the manufacturer. Bacteriology and Santa Paula metals bottles must be checked in-house by lot or on a manufacture date basis. If neither of these are available then one container must be checked from every ten cases. The following files are to be maintained for storing certificates or in-house analysis data:

40 mL VOA - for all VOA styles
125 mL Boston Round (B.R.) - for all 125 mL B.R. bottle styles
250 mL Boston Round (B.R.) - for all 250 mL B.R. bottle styles
1 L Boston Round (B.R.)
250 mL Wide Mouth (W.M.)
1 Qt. Wide Mouth (W.M.)
4 oz. Bact
500 mL Plastic (SP only, for Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn)

For those bottles not listed and not verified (such as 1 Qt plastic) it has been determined that the tests performed from those containers are not at risk from contamination by the container.

Sampling Procedures

6.3.1 Container Check Policy continued

When an in-house verification is required the sample is given a lab number, chain-of-custody and is treated as a regular sample. The results are formally reported but only the signature of the QA Director or Officer to verify cleanliness is required prior to filing.

Lots determined to be contaminated are returned and replaced.

6.3.2 Shipping Samples

Prior to shipment of samples, all documentation must be ready for proper chain of custody. The information necessary for documenting chain of custody is outlined in the following section of the quality assurance manual (section 7). After filling out the proper sample documentation, the samples and documents should be placed in an ice chest with adequate protection. Normally "Blue Ice" is used for keeping samples cool. However, dry ice may be used if approved by Department of Transportation (DOT).

6.3.3 Sample Kits

FGL Environmental supplies the appropriate sample containers, preservatives, chain-of-custody forms, coolers with blue ice, and packing materials to client upon request. There is no charge for these services as long as FGL is the laboratory receiving the samples for analysis. Arrangements for sample kits may be made through the client services department.

Sampling Procedures

TABLE 6-1 RECOMMENDED SAMPLE COLLECTION AND PRESERVATION

Analysis	Container	Volume (mL)	Preservation	Holding Time
General Inorganic Chemistry continued				
Phosphorus				
Ortho dissolved	P.G	250	Cool. 4 C	48 hr.
Total	P.G	250	H_2SO_4, pH<2; Cool. 4 C	28 days
Resistivity	P	250	Cool. 4 C	28 days
Silica	P	250	Cool. 4 C	28 days
Sodium Absorption Ratio	P	250	HNO3. pH<2	6 mo.
Solids.				
Filterable	P.G	250	Cool. 4 C	7 days
Non-filterable	P.G	250	Cool. 4 C	7 days
Total	P.G	250	Cool. 4 C	7 days
Volatile	P.G	250	Cool. 4 C	7 days
Settleable	P.G	1000	Cool. 4 C	48 hr.
Sulfate	P.G	250	Cool. 4 C	28 days
Sulfide				
Total	P.G	500	2 ml ZnAcetate+NaOH. pH>9	7 days
Dissolved	P.G	500	NaOH. pH>9	7 days
Tannin & Lignin	G	250		
Titration - pH adjustment	P.G	250	Cool. 4 C	14 days
Turbidity	P.G	250	Cool. 4 C	48 hr.
Trace Metals				
Chromium VI	P.G	500	Cool. 4 C	24 hr.
Mercury	P.G	500	HNO_3, pH<2	28 days
All other metals	P	500	HNO_3, pH<2	6 mo.
Radiochemistry				
Gross Alpha & Beta**	P	1000	HNO_3, pH <2	6 mo.
Total Radium	P	1000	HNO_3, pH <2	6 mo.
Total Uranium	P	1000	HCl. pH <2	6 mo.
Radon*	G	2x250	Cool. 4 C	4 days
Tritium	G	2x250	Cool. 4 C	6 mo.
Strontium 90	P	1000	HCl. pH <2	6 mo.

P = plastic. G = glass
* No headspace over sample
** For non-preserved samples, the holding time is 5 days. For preserved samples, please provide either a non-preserved sample (100 mL) or the electrical conductivity prior to acidification.
Note: All solid samples should be collected in stainless steel sleeves, brass sleeves or in glass jars all with teflon-lined caps and 4-8 oz. capacity. All solid samples should be kept cool at 4 C.

Sampling Procedures

TABLE 6-1 RECOMMENDED SAMPLE COLLECTION AND PRESERVATION

Analysis	Container	Volume (mL)	Preservation	Holding Time
Organic Chemicals				
Drinking Water				
EPA 531	G. amber	1 x 250	$Na_2S_2O_3$, if chlorinated Monochloroacetic acid buffer	14 days
EPA 547	G. amber	1 x 125	$Na_2S_2O_3$, if chlorinated Cool, 4 C	6 mo.
EPA 548	G. amber	1 x 125	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days
EPA 549	G. amber silanized	1 x 1000	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days
EPA 550.1	G. amber	1 x 1000	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days
EPA 552	G. amber	1 x 1000	NH_4Cl, Cool, 4 C	7 days
EPA 1613A	G. amber	1 x 1000	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days
Wastewater and Hazardous Waste				
EPA 601 8010*	G. VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated HCl, pH <2; Cool, 4 C	14 days
EPA 8011	G. VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated Cool, 4 C	28 days
EPA 602 8020*	G. VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated HCl, pH <2; Cool, 4 C	14 days
EPA 603 8030*	G. VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated Adjust pH to 4-5; Cool, 4 C	14 days
EPA 604 8040**	G. amber TFE-lined cap	1 x 1000	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days
EPA 608 8080**	G. amber TFE-lined cap	1 x 1000	$Na_2S_2O_3$, if chlorinated Cool, 4 C	7 days

* No head space over sample.
** This is the maximum holding time prior to extraction. The extracted sample may be held up to 40 days before analysis.

Sampling Procedures

TABLE 6-1 RECOMMENDED SAMPLE COLLECTION AND PRESERVATION

Analysis	Container	Volume (mL)	Preservation	Holding Time
Organic Chemicals				
Underground Storage Tank Analyses				
EPA 418.1	G, amber TFE-lined cap	1 x 1000	Cool, 4 C	28 days
EPA 8015/8015M*	G, VOA TFE-septa cap	2 x 40	HCl, pH <2 Cool, 4 C	14 days
EPA 601/8010*	G, VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated HCl, pH <2; Cool, 4 C	14 days
EPA 602/8020*	G, VOA TFE-septa cap	2 x 40	$Na_2S_2O_3$, if chlorinated HCl, pH <2; Cool, 4 C	14 days

Analysis	Container	Volume (mL)	Preservation	Holding Time
Hazardous Waste Characterization				
Corrosivity	P,G	100	Cool, 4 C	7 days
Ignitability	G TFE-lined cap	100	Cool, 4 C	7 days
Reactivity Reactions	G TFE-lined cap	100	Cool, 4 C	7 days
Sulfide/Sulfide generation	G TFE-lined cap	100	Cool, 4 C	7 days

* No head space over sample.
Note: All solid samples should be collected in stainless steel sleeves, brass sleeves or in glass jars all with teflon-lined caps and 4-8 oz. capacity. All solid samples should be kept cool at 4 C.

Sample Custody

7.1 Sample Custody

It is essential to ensure sample integrity from the time of collection through analysis and final disposition. This includes the ability to trace possession and handling of the samples. This is referred to as chain-of-custody and is important in the event of litigation involving the results. Where litigation is not involved, chain-of-custody procedures are useful for routine control of sample flow.

A sample is considered to be under a person's custody if it is in the individual's physical possession, in the individual's sight, secured in a tamper-proof manner by that individual, or is secured in an area restricted to authorized personnel. The following procedures summarize the major aspects of chain-of-custody.

7.1.1 Sample Labels

Use labels to prevent sample misidentification. Gummed paper labels or tags generally are adequate. Include at least the following information: sample number, name of collector, date and time of collection, and place of collection. Affix labels to sample containers before or at the time of sampling. Fill label out with waterproof ink at time of collection.

7.1.2 Custody Seals

Use sample seals to detect unauthorized tampering with samples up to the time of analysis. Plastic seals are normally used. Attach seal in such a way that it is necessary to break the seal to open the sample container. Affix seal to container before sample leaves custody of sampling personnel.

7.1.3 Field Log Book

Record all information pertinent to a field survey or sampling in a bound log book. As a minimum, include the following in the log book: purpose of sampling; location of sampling point; name and address of field contact; producer of material being sampled and address, if different from location; and type of sample. Because sampling situations vary widely, no general rule can be given as to the information to be entered in the log book. It is desirable to record sufficient information between the logbook and chain-of-custody so that one could reconstruct the sampling without reliance on the collector's memory. Protect the log book and keep it in a safe place.

7.1.5 Shipping Samples or Sample Delivery to Laboratory

Prior to shipping samples all documentation must be ready for proper chain of custody. The information necessary for documenting chain of custody is outlined section 7.3. After filling out the proper sample documentation, the samples and documents should be placed in an ice chest with adequate protection. Normally "Blue Ice" is used for keeping samples cool. However, dry ice may be used if approved by Department of Transportation (DOT).

If client provides direct delivery of sample to laboratory, samples should be delivered as soon as practical. Documentation must be ready for proper chain of custody. Again, all information necessary for documenting chain of custody is outlined section 7.3. Accompany sample with chain- of-custody record and a sample analysis request sheet. Deliver sample to sample custodian.

Sample Custody

7.3.1 Obtain the following client information and record on chain of custody:

Reporting -
- Address
  Phone Number
  Fax Number
  Person to Contact

Billing -
  Address
  Phone Number
  Fax Number
  P.O. or contract Number
  Person to Contact

7.3.2 Obtain the following project and sample information and record on chain of custody:

Project description
Sample descriptions
Sample type
Sampling date and time
Sample containers, preservatives
EPA Method Numbers or method descriptions
Report form required: ____ State ____ FGL
Determine turn-around-time requirement:
  Rush_____ Number of Days_____

7.3.3 Inspect the sample for the following:

Have holding times been observed and determine if it is possible for FGL to meet holding times?
Has the correct preservative been used?
Is the sample size adequate?
Is the sample container satisfactory?
Note sample condition :
  Broken leaking container
  Temperature _____Ambient _____Chilled
  Record Actual Temperature
  Check for headspace when appropriate

Also note on the chain of custody any problems with sample condition, the person notified, time and date notified, and customers response, if any.

Screen all samples for radio chemical hazard using the Geiger counter kept in the sample receiving area. Consult the radiation safety SOP and Radiation Safety Officer for proper handling of samples.

7.3.4 Log the sample information into the LIMS under one of the following divisions:

Inorganic
Organic
Radioactivity
Bacteriology
Agriculture

Sample Custody

Figure 7-1 Chain of Custody

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ENVIRONMENTAL

CHAIN OF CUSTODY AND ANALYSIS REQUEST DOCUMENT

CLIENT DETAILS — SECTION I

Client:

Customer Number:

Address:

Phone:

FAX:

Project name:

Contact person:

Billing Information (if different from above)

Name:

Address:

Phone:

FAX:

Contact person:

Purchase order/contract number:

SAMPLING — SECTION II

Sampler (s):

Comp Sampler Set up Date: Time:

Time: Date up:

REPORT INFORMATION — SECTION III

Rush Analysis: Yes 5 Days 2 Days 24 hrs.

Subject to surcharge

QA/QC report required: yes no

State Form required: yes no

Lab number:

Lab Use: SP: SFR: VT:

SAMPLE INFORMATION — SECTION IV

Sample Number	Location/Description	Date Sampled	Time Sampled	Type of Sampling: Composite (C) Grab (G)	Number of Containers	Type of Containers: (G) Glass (P) Plastic (V) VOA (B) Brass	(P) Potable (NP) Non-Potable	(SW) Surface Water (MW) Monitoring Well (GW) Ground Water (TB) Travel Blank (WW) Wastewater (DW) Drinking Water	(S) Soil (SLG) Sludge (SLD) Solid (O) Oil	Bact: (Sys) System: (SRC) Source (W) Waste	(LT) Leaf Tissue (PET) Petiole Tissue (PRD) Product	Preservative: (1) NaOH + ZnAc (2) NaOH (3) HCl (4) H2SO4 (5) HNO3 (6) Na2S2O3 (7) Other	ANALYSES REQUESTED								Sample Condition: Temperature	(L) Leaking (B) Broken (HS) VOA Headspace	Custody Seal (Y) (N)

REMARKS — SECTION V

CUSTODY — SECTION VI

Relinquished by and subject to the terms and conditions on the reverse of this document:

Relinquished by: Date: Time:

Received by: Date: Time:

Relinquished by: Date: Time:

Received by: Date: Time:

Relinquished by: Date: Time:

Received by: Date: Time:

Relinquished by: Date: Time:

Received by: Date: Time:

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Calibration Procedures and Frequency

The production of analytical data of known, defensible and documented quality requires adherence to standardized procedures which cover all aspects of laboratory operation. The following sections provide details of the standardized procedures relating to instrumentation calibration.

8.1 Instrument Calibration

Prior to use, every instrument must be calibrated according to the procedure found in the method specific Standard Operating Procedure (SOP). A list of all laboratory equipment may be found in section 17. Tables 8-1 and 8-2 list the organic mass spectrometer calibration ion abundance criteria which must be met.

The analytical balances are certified once a year by a certified specialist. All balances are labeled as certified. All balances are checked monthly using NIST traceable S weights which are calibrated annually.

All refrigerator, oven, and incubator temperatures are monitored daily, and all oven and incubator thermometers are checked for accuracy on a quarterly basis.

8.2 Calibration Standards

All chemicals used by FGL Environmental are ACS reagent grade, or better. Wherever possible, standards are from sources that are traceable to the National Institute of Standards and Technology. A log book is maintained for all working standards. Each log contains the standard ID or code, date of working standard preparation, analyst initials who prepared the standard, the manufacturers lot number, stock solution expiration date, stock analyte concentration(s), analyte concentration(s), and initial and final volumes used in dilutions. The working standard container is also labeled with ID or code, date of standard preparation, analyst initials who prepared the standard, expiration date, analytes and analyte concentration.

8.3 Calibration Policy

8.3.1 Applicability

This policy is designed to be a guideline to ensure that all data are treated alike, and thus ensuring that data generated on any particular day of analysis are representative of the firm. However, the policies are not intended to be absolute criteria for the acceptance or rejection of any analytical data.

In cases where the acceptance criteria outlined in policy or SOPs cannot be achieved then the analyst uses a non- conformance report form to document the difficulty. More than one continuing difficulty will result in a Corrective Action Report (CAR, see section 15). These are on record and will be included in a project data package if that is required by the project plan. An example of a CAR form is shown in figure 15-1.

8.3.2 Linearity

All calibrations should be linear unless otherwise defined in the specific SOP. FGL's definition of linearity is a calibration curve that has a linear regression equal to or greater than 0.995. For organics, if a linear regression is used, a single average response factor may be used if acceptance criteria pass. Specific protocols outlined in a given SOP will take precedence over these generic policies.

Calibration Procedures and Frequency

8.3.6 Selection of Calibration Levels

Two standards should be included per order of magnitude of concentration of the calibration curve. For example 0.1, 1.0, 10.0 has 2 standards per order magnitude (0.1 and 1.0; 1.0 and 10.0). In cases where instrumentation spans several orders of magnitude, the SOP for that method may not require this policy.

The lowest calibration level should be within a factor of 10 of the detection limit for reporting (DLR) for each target compound unless otherwise specified in the SOP.

8.3.7 Calibration Analysis Sequence

The calibration must progress from the analysis of the lowest to highest standard unless the instrumentation does not permit it. A blank must be analyzed after the highest calibration standard.

If the analysis requires an initial high standard to set the gain, a blank must be run before starting with the low calibration standard unless the instrumentation does not permit it.

8.3.8 Calibration Acceptance Criteria

In general, for inorganics, the calculated value for standards must be within 10% of the expected value. However, the value determined by the calibration curve for the lowest standard must be within – -50% of the true value and if the calibration is linear through the origin (at less than – -1/2 the detection limit). For organics, if a linear regression is used, a single average response factor may be used. The percent relative standard deviation for the individual standard response factors must be less than the maximum value listed for the method in the SOP.

8.3.9 Calibration Check Compounds (CCC) and Initial Calibration Verifications (ICV's)

The CCC or ICV is used to check the validity of the initial calibration. This standard is composed of some or all of the same analytes used for calibration but from a different source than the calibration standard. The standard should be at a concentration near the midpoint of the curve. In many cases FGL uses a Laboratory Control Sample (LCS) as an ICV. In this case the LCS verifies both the calibration and sample preparation. FGL uses control charts for LCS's and acceptance ranges for many analytes have been statistically derived. Please see table 5-1 for acceptance limits. If calculated acceptance criteria are not listed, the general acceptance range is +/-25% of the true value for organics and – -10% for inorganics.

8.3.10 Continuing Calibration Verifications (CCV)

The CCV is used to verify continuing calibration validity without having to completely restandardize the instrument. Refer to specific EPA methods or SOPs to determine whether this is required. The continuing calibration standard should be near the mid-point of the calibration curve. If calculated acceptance criteria are not listed, the general acceptance range is – -25% of the true value for organics and +/-10% for inorganics.

Calibration Procedures and Frequency

8.3.12 Calibration Frequency

8.3.12.1 Inorganics

For trace metals analyses calibrations are performed initially for each analytical run. After initial calibration verification (ICV) recalibration or continuing calibration checks are used every ten analyses. For wet chem analyses, a new curve is generated every six months. To verify daily calibration of wet chem methods a continuing calibration verifications (CCV) is used. Exceptions may exist for method specific SOPs.

8.3.12.2 Organics

GC and GC MS methods are calibrated initially for all analytes. For each additional day of operation, a calibration check standard is analyzed and evaluated. If the calibration is deemed valid the analysis may be performed. Otherwise, the system is recalibrated. Exceptions may exist for method specific SOPs.

8.3.12.3 Radiochemistry

All methods utilize recalibration or continuing calibration verifications every ten samples. EPA check samples are performed quarterly. DOE check sample are performed on a semiannual basis. The results must be acceptable to maintain certification. Exceptions may exist for certain method specific SOP's

8.3.12.3.1 Gas Proportional Counters

Gas proportional counters are calibrated for each matrix and sample size. For most liquid samples an efficiency vs. mg chart for each instrument is fit to a polynomial equation, which is stored in the computer for automated calculation.

8.3.12.3.2 Liquid Scintillation

Liquid Scintillation analyzers are calibrate for each matrix and sample size. Standards are initially run in duplicate with calibration verifications performed on each analytical run.

8.3.12.3.3 Gamma Spectroscopy

Gamma spectroscopy analyses are calibrated for both energy and efficiency. The calibration range is from 20 keV to 1350 keV with a minimum of 7 strong peaks per calibration for each geometry and matrix.

Analytical Procedures

TABLE 9-1 Specific Analytical Drinking Water Methods

Parameter	Method	Description
General Inorganic Analyses continued		
Nitrogen		
Ammonia (NH3-N)	EPA 350.1	Colorimetric
Nitrate (NO3-N)	EPA 300.0	IC
Nitrite (NO2-N)	EPA 300.0	IC
Nitrate (NO3-N)	EPA 353.2	Colorimetric
Nitrite (NO2-N)	EPA 353.2	Colorimetric
Organic (TKN-NH3-N)	N/A	Calculation
Total (TKN+NO3-N+NO2-N)	N/A	Calculation
Total Kjeldahl	EPA 351.2	Colorimetric
Odor	EPA 140.1	Observation
Oil and Grease	EPA 413.1	Gravimetric
Oxygen, Dissolved (DO)	EPA 360.1	ISE
pH	EPA 150.1	ISE
Phenols	EPA 420.1	Colorimetric
Phosphorous		
Phosphate (PO4-P)	EPA 300.0	IC
Phosphate-dissolved (PO4-P)	EPA 300.0	IC
Total (P)	EPA 365.2	Colorimetric
Total-dissolved (P)	EPA 365.2	Colorimetric
Resistivity	N/A	Calculation
Sodium Percent	N/A	Calculation
Sodium Absorption Ratio (SAR)	EPA 200.7	ICP
Solids/Residue		
Filterable (TDS)	EPA 160.1	Gravimetric
Non-filterable (TSS)	EPA 160.2	Gravimetric
Total	EPA 160.3	Gravimetric
Volatile	EPA 160.4	Gravimetric
Settleable	EPA 160.5	Gravimetric
Sulfate (SO4)	EPA 300.0	IC
Sulfide (H2S)		
Total	EPA 376.2	Methylene Blue
Dissolved	EPA 376.2	Methylene Blue
Sulfite (SO2)	EPA 377.1	Titrimetric
Tannin & Lignin	SM 5500B	Colorimetric
Titration - pH adjustment	N/A	Titration
Turbidity	EPA 180.1	Nephelometric
Trace Metals Analyses		
Aluminum (Al)	EPA 200.9	Furnace Atomic Absorption
Aluminum (Al)	EPA 200.8	ICP/MS
Antimony (Sb)	EPA 200.9	Furnace Atomic Absorption
Antimony (Sb)	EPA 200.8	ICP/MS
Arsenic (As)	EPA 200.9	Furnace Atomic Absorption
Arsenic (As)	EPA 200.8	ICP/MS
Barium (Ba)	EPA 200.7	ICP
Barium (Ba)	EPA 200.8	ICP/MS
Beryllium (Be)	EPA 200.7	ICP

Analytical Procedures

TABLE 9-1 Specific Analytical Drinking Water Methods

Parameter	Method	Description
Radiochemical Analyses		
Gross Alpha	EPA 900.0	Proportional Counter
Gross Beta	EPA 900.0	Proportional Counter
Gross Alpha & Beta	EPA 900.0	Proportional Counter
Gamma Emmitters	EPA 901.1	HPGe, gamma spectroscope
Total Radium*	EPA 900.1	Isolation, Proportional Counter
Radium 226	EPA 903.1	Radon bubbler, Lucas cell scintillation
Radium 228	EPA 904.0	Isolation, Proportional Counter
Uranium	EPA 908.0	Isolation, Proportional Counter
Tritium	EPA 906.0	Distillation, Liquid Scintillation
Radon	EPA 913.0	Liquid Scintillation
Bacteriological Analyses		
Total & Fecal Coliform	SM9221E	Fermentation, MPN, 10 tube
Total Coliform-Colilert	SM9221D	Presence-Absence
Standard Plate Count	SM9215B	Incubation, visual count

* Can be reported as Radium 226 if less than 3 pCi/liter.

Analytical Procedures

TABLE 9-2 Specific Analytical Wastewater / Hazardous Waste Liquid Methods

Parameter	Method	Description
General Inorganic Analyses continued		
Nitrogen		
Ammonia (NH3-N)	EPA 350.1	Colorimetric
Nitrate (NO3-N)	EPA 300.0	IC
Nitrite (NO2-N)	EPA 300.0	IC
Organic (TKN-NH3-N)	Calculation	
Total (TKN−NO3-N−NO2-N)	Calculation	
Total Kjeldahl	EPA 351.2	Colorimetric
Odor	EPA 140.1	Observation
Oil and Grease	EPA 413.1	Gravimetric
Oxygen, Dissolved (DO)	EPA 360.1	ISE
pH	EPA 150.1	ISE
Phenols	EPA 420.1	Colorimetric
Phosphorous		
Phosphate (PO4-P)	EPA 300.0	IC
Phosphate-dissolved (PO4-P)	EPA 300.0	IC
Total (P)	EPA 365.2	Colorimetric
Total-dissolved (P)	EPA 365.2	Colorimetric
Resistivity	N/A	Calculation
Sodium Percent	N/A	Calculation
Sodium Absorption Ratio (SAR)	EPA 200.7	ICP
Solids/Residue		
Filterable (TDS)	EPA 160.1	Gravimetric
Non-filterable (TSS)	EPA 160.2	Gravimetric
Total	EPA 160.3	Gravimetric
Volatile	EPA 160.4	Gravimetric
Settleable	EPA 160.5	Gravimetric
Sulfate (SO4)	EPA 300.0	IC
Sulfide (H2S)		
Total	EPA 376.2	Methylene Blue
Dissolved	EPA 376.2	Methylene Blue
Sulfite (SO2)	EPA 377.1	Titrimetric
Tannin & Lignin	SM 513	Colorimetric
Titration - pH adjustment	N/A	Titration
Turbidity	EPA 180.1	Nephelometric
Trace Metals Analyses		
Sample Preparation	EPA 3015	Digestion
Aluminum (Al)	EPA 200.9	Furnace Atomic Absorption
Aluminum (Al)	EPA 200.8	ICP/MS
Antimony (Sb)	EPA 200.9	Furnace Atomic Absorption
Antimony (Sb)	EPA 200.8	ICP/MS
Arsenic (As)	EPA 200.9	Furnace Atomic Absorption
Arsenic (As)	EPA 200.8	ICP/MS
Barium (Ba)	EPA 200.7	ICP
Barium (Ba)	EPA 200.8	ICP/MS
Beryllium (Be)	EPA 200.7	ICP
Beryllium (Be)	EPA 200.8	ICP/MS

Analytical Procedures

TABLE 9-2 Specific Analytical Wastewater / Hazardous Waste Liquid Methods

Parameter	Method	Description
Radio Chemical Analyses		
Gross Alpha	EPA 900.0	Proportional counter
Gross Beta	EPA 900.0	Proportional counter
Gross Alpha & Beta	EPA 900.0	Proportional counter
Gamma Emmitters	EPA 901.1	HPGe, gamma spectroscope
Total Radium*	EPA 900.1	Isolation, Proportional Counter
Radium 226	EPA 903.1	Radon bubbler, Lucas cell scintillation
Radium 228	EPA 904.0	Isolation, Proportional Counter
Uranium	EPA 908.0	Isolation, proportional counter
Tritium	EPA 906.0	Distillation, liquid scintillation
Radon	EPA 913.0	Liquid scintillation
Bacteriological Analyses		
Total Coliform	SM9221E	Fermentation, MPN, 15 tube
Total & Fecal Coliform	SM9221E	Fermentation, MPN, 15 tube
Standard Plate Count	SM9215B	Incubation, visual count

* Can be reported as Radium 226 if less than 3 pCi/liter.

Analytical Procedures

TABLE 9-3 Specific Analytical Solid Waste / Hazardous Waste Methods

Parameter	Method	Description
General Inorganic Analyses continued		
pH	EPA 9045	ISE
Phosphorous		
Phosphate (PO4)	EPA 9056	IC
Total (P)	See Trace Metals	
Sulfate (SO4)	EPA 9056	IC
Sulfide (H2S)	EPA 376.2	Colorimetric
Hazardous Waste Characterization Analyses		
Corrosivity (pH)		
Aqueous sample	EPA 9040	ISE
Nonaqueous sample	EPA 9045	ISE
Ignitability		
Aqueous (Flashpoint)	EPA 1010	Flashpoint
Nonaqueous (Flammability)	EPA 1020	Flashpoint
Reactivity	SW-846 Ch 8	Observations
Reaction with water		
Reaction with dilute acid		
Reaction with dilute base		
Reaction with oxidizing agent		
Reaction with reducing agent		
Generation	SW-846 Ch 7	Screens
Sulfide		
Cyanide		
Trace Metals		
Sample Preparation - TTLC	EPA 3050	Digestion
Sample Preparation - STLC	Title 22	Extraction
Sample Preparation - EP TOX	EPA 1310	Extraction
Sample Preparation - TCLP	EPA 1311	Extraction
Aluminum (Al)	EPA 6010	ICP
Aluminum (Al)	EPA 6020	ICP/MS
Antimony (Sb)	EPA 7041	Furnace Atomic Absorption
Antimony (Sb)	EPA 6020	ICP/MS
Arsenic (As)	EPA 7060	Furnace Atomic Absorption
Arsenic (As)	EPA 6020	ICP/MS
Barium (Ba)	EPA 6010	ICP
Barium (Ba)	EPA 6020	ICP/MS
Beryllium (Be)	EPA 6010	ICP
Beryllium (Be)	EPA 6020	ICP/MS
Boron (B)	EPA 6010	ICP
Boron (B)	EPA 6020	ICP/MS
Cadmium (Cd)	EPA 6010	ICP
Cadmium (Cd)	EPA 6020	ICP/MS
Calcium (Ca)	EPA 6010	ICP
Chromium (Cr)	EPA 6010	ICP
Chromium (Cr)	EPA 6010	ICP/MS
Chromium VI (Cr-6)	EPA 7196	Colorimetric

Data Reduction, Validation, and Reporting

The process of transforming raw analytical data into a finished report involves steps which are generally grouped into the categories of data reduction, data validation, and reporting. It involves mathematical modeling of the standard calibration curves, statistical analysis of the acquired data, calculations to account for preparation steps and dilutions, verification of adherence to quality assurance procedures, and the generation of hardcopy output.

10.1 Data Reduction

At FGL Environmental the analyst has the primary responsibility for reducing raw data. This process consists primarily of converting raw data into final reportable values by comparing individual sample results against those obtained for calibration purposes then accounting for any dilutions or concentration.

For each method, all raw data results are recorded on method specific forms or in a standardized output from each of the various instruments. Details on procedures for data reduction may be found in the laboratory SOP for each method.

10.2 Data Validation

Upon completion of each analytical run, the analyst enters or transfers the data to LIMS. The analytical raw data and LIMS generated QC summary sheets are validated by the laboratory supervisor or a backup peer analyst. They verify that all quality control parameters fall within acceptance limits and also review the analytical data for calculation errors and inconsistencies.

10.3 Data Review Policy

The raw data review includes all documentation associated with the samples, including chromatograms, instrument run logs, digestion logs, and other instrument printouts. Upon approval by the analyst or supervisor, the analytical results for the run are transferred to a results database for compiling with other data for that sample. When all results for a sample have been entered, an on screen report is generated for review and validation by the supervisor. Upon approval by the supervisor sample reports are then released for final hardcopy reporting, which is forwarded to the client.

Data review includes the following:

1. All data packages are reviewed by a second analyst or the supervisor. The QC batch report and analytical run sheets (if applicable) must be signed by the reviewer.
2. All supervisors must review the data released for reporting.
3. Analysis reports are printed and again reviewed by the supervisor and lab director and signed by each upon approval.
4. Quality Control reports are printed and are reviewed and signed by the quality assurance director or officer.

Internal Quality Control Checks

An internal quality control program requires a set of routine internal procedures for assuring that the data generated from a measurement system meets prescribed criteria for data quality. An effective internal QC program must be capable of measuring and controlling the quality of the data, in terms of precision, accuracy, and completeness (see sections 5 and 14 for these details).

This section identifies QC protocols associated with analytical procedures. Table 11-1 is a general outline of quality control parameters monitored for each procedure. Included are general quality control measures as well as specific quality control checks which provide continual control and assessment of data quality. Figures 11-1 through 11-3 are examples of FGL Control Charts.

FGL uses continuing calibration verifications (CCV) and initial calibration verification (ICV) for instrument quality control. The laboratory control sample (LCS) is used for sample preparation quality control. The CCV standard only verifies continuing calibration. The ICV standard is used to independently verify the calibration and may take the place of CCV when used on a continuing basis during analysis. The LCS may take the place of both ICV and CCV when prepared independently and used on a continuing basis during analysis.

11.1 Quality Control Parameters

11.1.1 Initial Demonstration of Capability

Before analyzing samples, the laboratory must prove proficiency in the method by preparing a data package for certification. The laboratory normally provides the following information:

1. calibration data
2. calibration verification from an independent source
3. method detection limit data
4. detection limit verification data
5. accuracy and precision data

These must all be acceptable under the method QC criteria or, when requirements are not specified, reasonably meet good laboratory practices and Department of Health Services requirements.

11.1.2 Analysis Quality Controls

11.1.2.1 Instrument Blank

The instrument or calibration blank is used to calibrate the instrument. This blank contains the same reagents used in the standards and samples. However, the blank is prepared under controlled conditions and is not processed like all samples.

11.1.2.2 Detection Limit Standard (DLS)

Normally, method detection limits (MDLs) are performed on an annual basis. However, this doesn't adequately reflect the day-to-day variations in the analysis. FGL has taken a different approach. We perform what we call detection limit standards on a daily basis. This gives more "representative" method detection limits. Tracking the DLS using our LIMS allows us to monitor instrument and method performance. Historically, we can also prove what our MDL was at a particular time. The standard should be 3-10 times the MDL and may or may not be prepared independently of the calibration standards.

Internal Quality Control Checks

11.1.3.3 Travel Blank

The travel blank is used to ensure that any positive results were not because of contamination occurring during shipping and handling of the samples. The travel blank samples should be carried through all stages of the sample preparation and analysis. Lack of contamination is demonstrated if all target analytes with the exception of common laboratory reagents are below their DLRs.

11.1.3.4 Laboratory Control Sample (LCS)

The LCS is used to verify overall accuracy of the method. EPA protocol requires analysis of an LCS for each analytical batch when appropriate. The LCS consists of either a control matrix spiked with analytes representative of the target analytes or a certified reference material. Whenever possible, the LCS contains the analyte of interest at a concentration in the mid-calibration range. This standard may or may not be independent of the calibration stock standards. Initially method specific acceptance criteria are used. Eventually, or when method specific criteria are unavailable, the recoveries are control charted to obtain acceptance limits.

11.1.3.5 Surrogate Spikes

Surrogate spikes serve as a check on the extraction process where extraction is a necessary part of the analytical procedure. When surrogate recovery is within limits it indicates that the extraction was complete. A surrogate is a compound not expected to occur in an environmental sample but has chemical behavior similar to that of the target analytes. EPA protocol requires surrogate spikes for specific methods on a per sample basis (including QC samples). Initially method specific acceptance criteria are used. Eventually, or when method specific criteria are unavailable, the recoveries are control charted to obtain acceptance limits.

11.1.3.6 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

The MS/MSD is used to verify matrix specific precision and accuracy. EPA protocol normally requires analysis of MS/MSD samples for each analytical batch or matrix type. The MS/MSD spikes are manufacturer or laboratory prepared from suitable reference standards. This standard may or may not be independent of the calibration stock standards. The matrix spike recovery and relative percent difference (RPD) acceptance criteria are shown in Section 5. When matrix spike results fall outside limits published in the respective methods. The LCS is used to verify method control. If spike recoveries are outside normal limits due to matrix problems, the data should be reported noting matrix interference. The spike recovery and RPD acceptance limits are test specific and are control charted.

11.1.3.7 Duplicates

Duplicates are used to verify matrix specific precision. EPA protocol normally requires analysis of duplicate samples for each analytical batch or matrix type. The relative percent difference (RPD) calculated from duplicate analyses provide an assessment of precision. The RPD acceptance limits are test specific and are control charted.

Internal Quality Control Checks

11.1.4 Radiochemical Specific Quality Controls

11.1.4.1 Efficiency vs. Dissolved Solids Chart

Dissolved solids (TDS) mask or decrease the radiation picked in the proportional counters. For each instrument an efficiency vs. solids chart must be generated as part of the initial demonstration of capability. In addition, whenever an instrument is maintained or repaired (i.e. a counting wire replaced) a new efficiency vs. TDS chart must be generated. Samples containing solids such that the efficiency of a counter could drop below ten percent must be reprepared using a smaller aliquot so that the solids give acceptable counting efficiency. Whenever possible an electrical conductivity measurement is used to estimate TDS and sample aliquots.

11.1.4.2 Background

Background samples are run daily, prior to sample analysis. However, monthly average may be used for calculation purposes. If a run background is used for sample calculation the background must be within 2 standard deviations of the monthly average to be acceptable.

11.1.4.3 Minimum Detectable Activity (MDA)

MDA's are calculated every six months. This data is used to determine if a sample is not detectable. EPA guidelines for sensitivity are followed for each isotope. MDA'scan be calculated on per sample basis. Background samples are run daily, prior to sample analysis. However, monthly average may be used for calculation purposes.

Internal Quality Control

Table 11-1 Quality Controls for Drinking Water Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Semivolatile Organics											
EPA 501.2	Daily	Batch	Batch			Batch		Batch			
EPA 504	Daily	Batch	Batch			Batch		Batch			
EPA 505	Daily	Batch	Batch			Batch		Batch			
EPA 507	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 508	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 508A	Daily	Batch	Batch			Batch		Batch			
EPA 510	Daily	Batch	Batch			Batch		Batch			
EPA 515.1	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 525	Daily	Batch	Batch			Batch		Batch		Sample	Sample
EPA 531	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 547	Daily	Batch	Batch			Batch		Batch			
EPA 548	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 549	Daily	Batch	Batch			Batch		Batch			
EPA 550.1	Daily	Batch	Batch			Batch		Batch		Sample	
EPA 552	Daily	Batch	Batch			Batch		Batch		Sample	
TOC	Daily	Batch			Batch			Batch			
TOX	Daily	Batch			Batch			Batch			
Volatile Organics											
EPA 502.2	Daily	Batch			Batch			Batch		Sample	Sample
EPA 524.2	Daily	Batch			Batch			Batch		Sample	Sample
Inorganic Chemicals											
Alkalinity	Daily				Batch				Batch		
Ammonia	Daily	Batch			Batch			Batch			
BOD	Daily	Batch				Batch			Batch		
Carbon Dioxide									Batch		
COD	Daily	Daily				Batch		Batch			
COD, % Transmittance	Daily	Daily				Batch		Batch			
Cl Res., colorimetric	Daily	Batch			Batch				Batch		
Cl Res., titrimetric					Batch				Batch		

Internal Quality Control

Table 11-1 Quality Controls for Drinking Water Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Inorganic Chemical continued											
Cyanide, Free	Daily	Batch			Batch			Batch			
Cyanide, Total	Daily	Batch	Batch	Batch			Batch	Batch			
E.C.	Daily				Batch				Batch		
Fluoride (Distillation)		Batch	Batch			Batch		Batch			
Fluoride	Daily	Batch			Batch			Batch			
Gen. Physical									Batch		
Ignitability				Batch					Batch		
Ion Chromatography	Daily	Batch			Batch			Batch			
MBAS Extraction	Daily	Batch				Batch		Batch			
MBAS Screen										Batch	
Moisture, percent										Batch	
Oxygen, Dissolved										Batch	
Nitrate - Technicon	Daily	Batch			Batch			Batch			
Nitrite - Technicon	Daily	Batch			Batch			Batch			
Oil & Grease, Pet	Daily	Batch				Batch	Batch				
Oil & Grease, Sox	Daily	Batch				Batch	Batch				
Oil & Grease	Daily	Batch				Batch	Batch				
pH					Batch				Batch		
pH, Adjustment										Batch	
Phenols	Daily	Batch	Batch			Batch		Batch			
Phosphorous, Total	Daily	Batch	Batch			Batch		Batch			
Reactivity, Generation										Batch	
Reactivity									Batch		
Solids, Fixed	Daily	Batch				Batch			Batch		
Solids, Settleable											
Solids, Total	Daily	Batch				Batch			Batch		
[illegible]ds, T. Dissolved	Daily	Batch				Batch			Batch		
Solid[illegible] Suspended	Daily	Batch				Batch			Batch		
[illegible]olat[illegible]	Daily	Batch							Batch		
[illegible]	Daily	Batch							Batch		
									Batch		

Internal Quality Control

Table 11-1 Quality Controls for Drinking Water Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Inorganic Chemical continued											
Sulfide, Total									Batch		
Sulfite									Batch		
TKN	Daily	Batch				Batch		Batch			
Tannin & Lignin	Daily	Batch				Batch		Batch			
Trace Metals											
Cr VI	Daily	Batch			Batch			Batch			Batch
FAA	Daily	Batch				Batch		Batch			
GFAA	Daily	Batch				Batch		Batch			
ICP	Daily	Batch				Batch		Batch			
ICP/MS	Daily	Batch				Batch		Batch			Sample
Hg - CVAA	Daily	Batch				Batch		Batch			
Radiochemistry											
Gross A & B		Batch						Batch			
Gamma		Batch						Batch			
Nuclide Screen		Batch					Batch				
Radium 226		Batch					Batch				
Radium 228		Batch					Batch				
Radium 226 & 228		Batch					Batch				
Radon		Batch							Batch		
Strontium 90		Batch					Batch				
Tritium		Batch					Batch				
Uranium		Batch					Batch				

Internal Quality Control

Table 11-2 Quality Controls for Wastewater / Hazardous Waste Liquid Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Semivolatile Organics											
EPA 3510			Batch			Batch		Batch			
EPA 3520			Batch			Batch		Batch			
EPA 3540			Batch			Batch		Batch			
EPA 3550			Batch			Batch		Batch			
EPA 3580			Batch			Batch			Batch		
TCLP			Batch						Batch		
EPA 8015	Daily	Batch			Batch						
EPA 8015M (Purgeable)	Daily	Batch			Batch						
EPA 8015M (Extract)	Daily	Batch			Batch						
EPA 604/8040	Daily	Batch			Batch						Sample
EPA 608/8080	Daily	Batch			Batch					Sample	
EPA 610/8310	Daily	Batch			Batch						
EPA 614/8140	Daily	Batch			Batch						Sample
EPA 615/8150	Daily	Batch			Batch						
EPA 625/8270	Daily	Batch			Batch						Sample
EPA 632	Daily	Batch			Batch						
TOC	Daily	Batch			Batch			Batch			
TOX	Daily	Batch			Batch			Batch			
TPH by IR	Daily	Batch	Batch			Batch		Batch			
Volatile Organics											
EPA 601/8010	Daily	Batch			Batch			Batch		Sample	Sample
EPA 602/8020	Daily	Batch			Batch			Batch		Sample	
EPA 624/8240	Daily	Batch			Batch			Batch		Sample	Sample
Inorganic Chemicals											
[illegible]alinity	Daily				Batch				Batch		
Amm[illegible]	Daily	Batch			Batch			Batch			
[illegible]	Daily	Batch				Batch			Batch		
[illegible]	Daily	Daily				Batch		Batch		Batch	

Internal Quality Control

Table 11-2 Quality Controls for Wastewater / Hazardous Waste Liquid Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Inorganic Chemicals continued											
COD, % Transmittance	Daily	Daily				Batch		Batch			
Cl Res., colorimetric	Daily	Batch			Batch				Batch		
Cl Res., titrimetric					Batch				Batch		
Cyanide, Free	Daily	Batch			Batch			Batch			
Cyanide, Total	Daily	Batch	Batch	Batch			Batch	Batch			
E.C.	Daily				Batch				Batch		
Fluoride (Distillation)		Batch	Batch			Batch		Batch			
Fluoride	Daily	Batch			Batch			Batch			
Gen. Physical									Batch		
Ignitability				Batch					Batch		
Ion Chromatography	Daily	Batch			Batch			Batch			
MBAS Extraction	Daily	Batch				Batch		Batch			
MBAS Screen									Batch		
Moisture, percent										Batch	
Oxygen, Dissolved									Batch		
Nitrate - Technicon	Daily	Batch			Batch			Batch			
Nitrite - Technicon	Daily	Batch			Batch			Batch			
Oil & Grease, Pet	Daily	Batch				Batch	Batch				
Oil & Grease, Sox	Daily	Batch				Batch	Batch				
Oil & Grease	Daily	Batch				Batch	Batch				
pH					Batch				Batch		
pH, Adjustment										Batch	
Phenols	Daily	Batch	Batch			Batch		Batch			
Phosphorus, Total	Daily	Batch	Batch			Batch		Batch			
Reactivity, Generation									Batch		
Reactivity									Batch		
Solids, Fixed	Daily	Batch				Batch			Batch		
Solids, Settleable											
Solids, Total	Daily	Batch				Batch			Batch		
Solids, T. Dissolved	Daily	Batch				Batch			Batch		
Solids, T. Suspended	Daily	Batch				Batch			Batch		

Internal Quality Control

Table 11-2 Quality Controls for Wastewater / Hazardous Waste Liquid Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Inorganic Chemicals continued											
Solids, Volatile	Daily	Batch							Batch		
Solids, V. Suspended	Daily	Batch							Batch		
Sulfide, Diss									Batch		
Sulfide, Total									Batch		
Sulfite									Batch		
TKN	Daily	Batch				Batch		Batch			
Tannin & Lignin	Daily	Batch				Batch		Batch			
Trace Metals											
3015			Batch			Batch		Batch			
STLC			Batch						Batch		
TCLP			Batch			Batch		Batch			
Cr VI	Daily	Batch	Batch			Batch		Batch			
FAA	Daily	Batch			Batch						
GFAA	Daily	Batch			Batch						
ICP	Daily	Batch			Batch						
ICP/MS	Daily	Batch			Batch						Sample
Hg - CVAA	Daily	Batch			Batch						
Radiochemistry											
Gross A & B		Batch					Batch				
Gamma		Batch						Batch			
Nuclide Screen		Batch					Batch				
Radium 226		Batch					Batch				
Radium 228		Batch					Batch				
Radon		Batch							Batch		
Radium 226 & 228		Batch					Batch				
Strontium 90		Batch					Batch				
Tritium		Batch					Batch				
Uranium		Batch					Batch				

Internal Quality Control

Table 11-3 Quality Controls for Solid Waste / Hazardous Waste Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Semivolatile Organics											
EPA 3510			Batch			Batch		Batch			
EPA 3520			Batch			Batch		Batch			
EPA 3540			Batch			Batch		Batch			
EPA 3550			Batch			Batch		Batch			
EPA 3580			Batch			Batch			Batch		
TCLP			Batch						Batch		
EPA 8015	Daily	Batch			Batch						
EPA 8015M (Diesel)	Daily	Batch			Batch						
EPA 8015M (Gas)	Daily	Batch			Batch						Sample
EPA 8040	Daily	Batch			Batch						Sample
EPA 8080	Daily	Batch			Batch						
EPA 8140	Daily	Batch			Batch						Sample
EPA 8150	Daily	Batch			Batch						
EPA 8310	Daily	Batch			Batch						
EPA 632	Daily	Batch			Batch						
EPA 8270	Daily	Batch			Batch						
TOC	Daily	Batch			Batch			Batch			
TOX	Daily	Batch			Batch			Batch			
TPH by IR	Daily	Batch	Batch		Batch			Batch			
Volatile Organics											
TCLP			Batch						Batch		
EPA 601/8010	Daily	Batch			Batch			Batch		Sample	Sample
EPA 602/8020	Daily	Batch			Batch			Batch		Sample	
EPA 624/8240	Daily	Batch			Batch			Batch		Sample	Sample
EPA 8260	Daily	Batch			Batch			Batch		Sample	Sample

Internal Quality Control

Table 11-3 Quality Controls for Solid Waste / Hazardous Waste Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Solids Inorganic Chemicals											
Ammonia	Daily	Batch				Batch		Batch			
Corrosivity (pH)					Batch				Batch		
Cyanide, Total	Daily	Batch	Batch	Batch			Batch		Batch		
E.C.	Daily				Batch				Batch		
Fluoride (Distillation)		Batch	Batch			Batch		Batch			
Ignitability				Batch					Batch		
Ion Chromatography	Daily	Batch				Batch		Batch			
Moisture, percent										Batch	
Nitrate - Technicon	Daily	Batch				Batch		Batch			
Nitrite - Technicon	Daily	Batch				Batch		Batch			
Oil & Grease, Sox	Daily	Batch				Batch	Batch				
Oil & Grease	Daily	Batch				Batch	Batch				
pH				Batch					Batch		
Phenols	Daily	Batch	Batch			Batch		Batch			
Phosphorus (See Trace metals - ICP)											
Reactivity, Generation									Batch		
Reactivity									Batch		
Solids, Percent									Batch		
Sulfide, Total									Batch		
TKN	Daily	Batch				Batch	Batch	Batch			
Trace Metals											
3050			Batch			Batch		Batch			
STLC			Batch						Batch		
TCLP			Batch			Batch		Batch			
VI	Daily	Batch	Batch			Batch		Batch			
AA	Daily	Batch			Batch						
	Daily	Batch			Batch						
	Daily	Batch			Batch						
	Daily	Batch			Batch						Sample
	Daily	Batch			Batch						

Internal Quality Control

Table 11-3 Quality Controls for Solid Waste / Hazardous Waste Methods

TEST	DLS	INST BLANK	METHOD BLANK	CCV	ICV	LCS	BS/BSD	MS/MSD	DUP	SURR	I.S.
Radiochemistry											
Gross A & B		Batch					Batch				
Gamma		Batch						Batch			
Nuclide Screen		Batch					Batch				
Radium 226		Batch					Batch				
Radium 228		Batch					Batch				
Radium 226 & 228		Batch					Batch				
Radon		Batch							Batch		
Strontium 90		Batch					Batch				
Tritium		Batch					Batch				
Uranium		Batch					Batch				

Internal Quality Control Checks

Figure 11-1 FGL Control Chart for LCS

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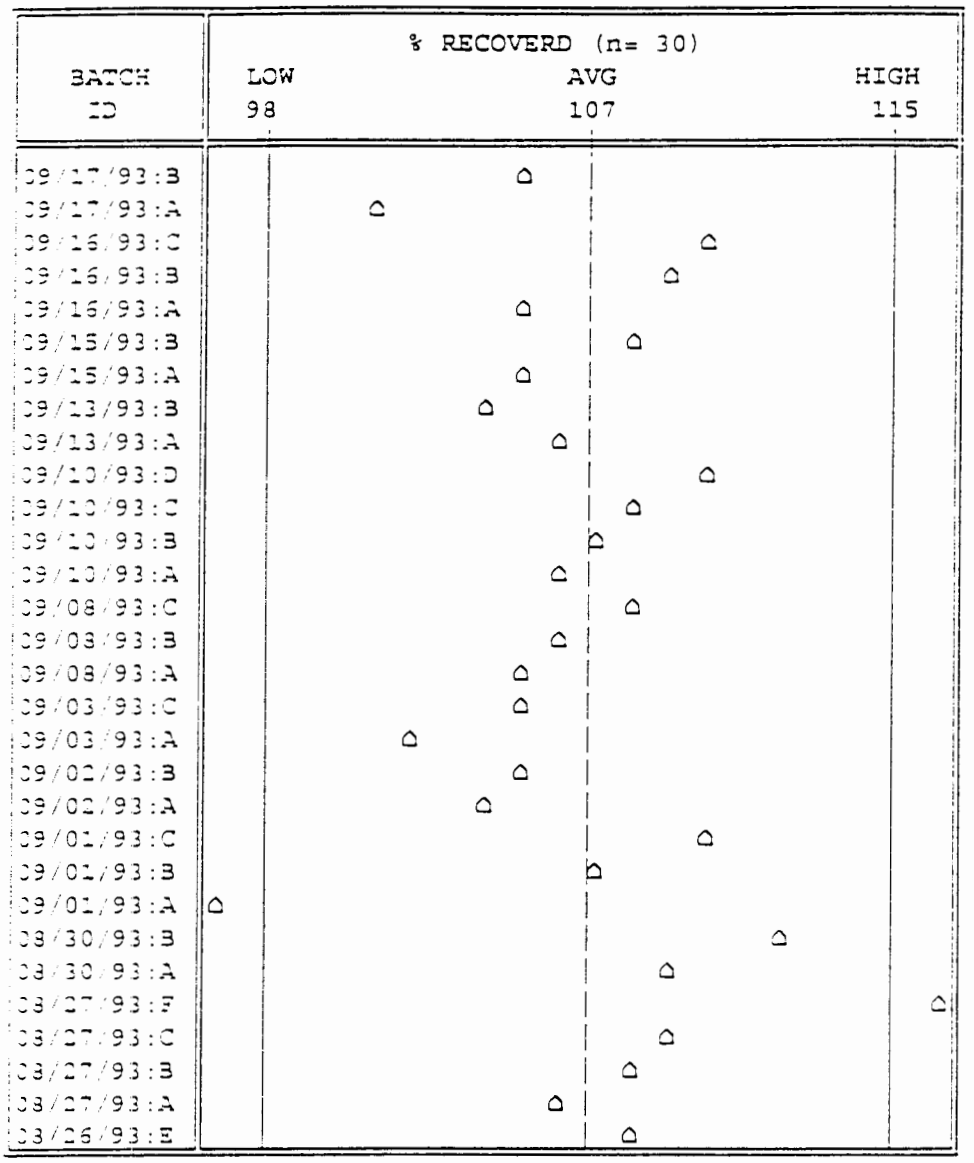
QALCS-LBW

FGL ENVIRONMENTAL TREND CONTROL CHART

300.0 Anions for CL

09/23/93



△/■ => Matrix Spike / Dup

Reporting Limits : AR % 98 - 115 MAV % ____ on 9/23/93 by: CO / 10/13/93 SA

OK KRW

QALCS-LBW

FGL ENVIRONMENTAL TREND CONTROL CHART

300.0 Anions for CL

09/23/93

BATCH ID	DATE COMPLETED	Theo. Conc.	MS %	MSD %	AR %	See Notes
09/17/93:B	09/17/93	213	105	75-125		
09/17/93:A	09/17/93	213	101	75-125		
09/16/93:C	09/16/93	213	110	75-125		
09/16/93:B	09/16/93	213	109	75-125		
09/16/93:A	09/16/93	213	105	75-125	1	
09/15/93:B	09/15/93	213	108	75-125		
09/15/93:A	09/15/93	213	105	75-125		
09/13/93:B	09/13/93	213	104	75-125		
09/13/93:A	09/13/93	213	106	75-125		
09/10/93:D	09/10/93	213	110	75-125		
09/10/93:C	09/10/93	213	108	75-125		
09/10/93:B	09/10/93	213	107	75-125		
09/10/93:A	09/10/93	213	106	75-125		
09/08/93:C	09/08/93	213	108	75-125		
09/08/93:B	09/08/93	213	106	75-125		
09/08/93:A	09/08/93	213	105	75-125		
09/03/93:C	09/03/93	213	105	75-125		
09/03/93:A	09/03/93	213	102	75-125		
09/02/93:B	09/02/93	213	105	75-125		
09/02/93:A	09/02/93	213	104	75-125		
09/01/93:C	09/01/93	213	110	75-125		
09/01/93:B	09/01/93	213	107	75-125		
09/01/93:A	09/01/93	213	95.2	75-125		
08/30/93:B	08/30/93	213	112	75-125		
08/30/93:A	08/30/93	213	109	75-125		
08/27/93:F	08/27/93	213	121	75-125		
08/27/93:C	08/27/93	213	109	75-125		
08/27/93:B	08/27/93	213	108	75-125		
08/27/93:A	08/27/93	213	106	75-125		
08/26/93:E	08/26/93	213	108	75-125		

Internal Quality Control Checks

Figure 11-2 FGL Control Chart for MS/MSD and RPD

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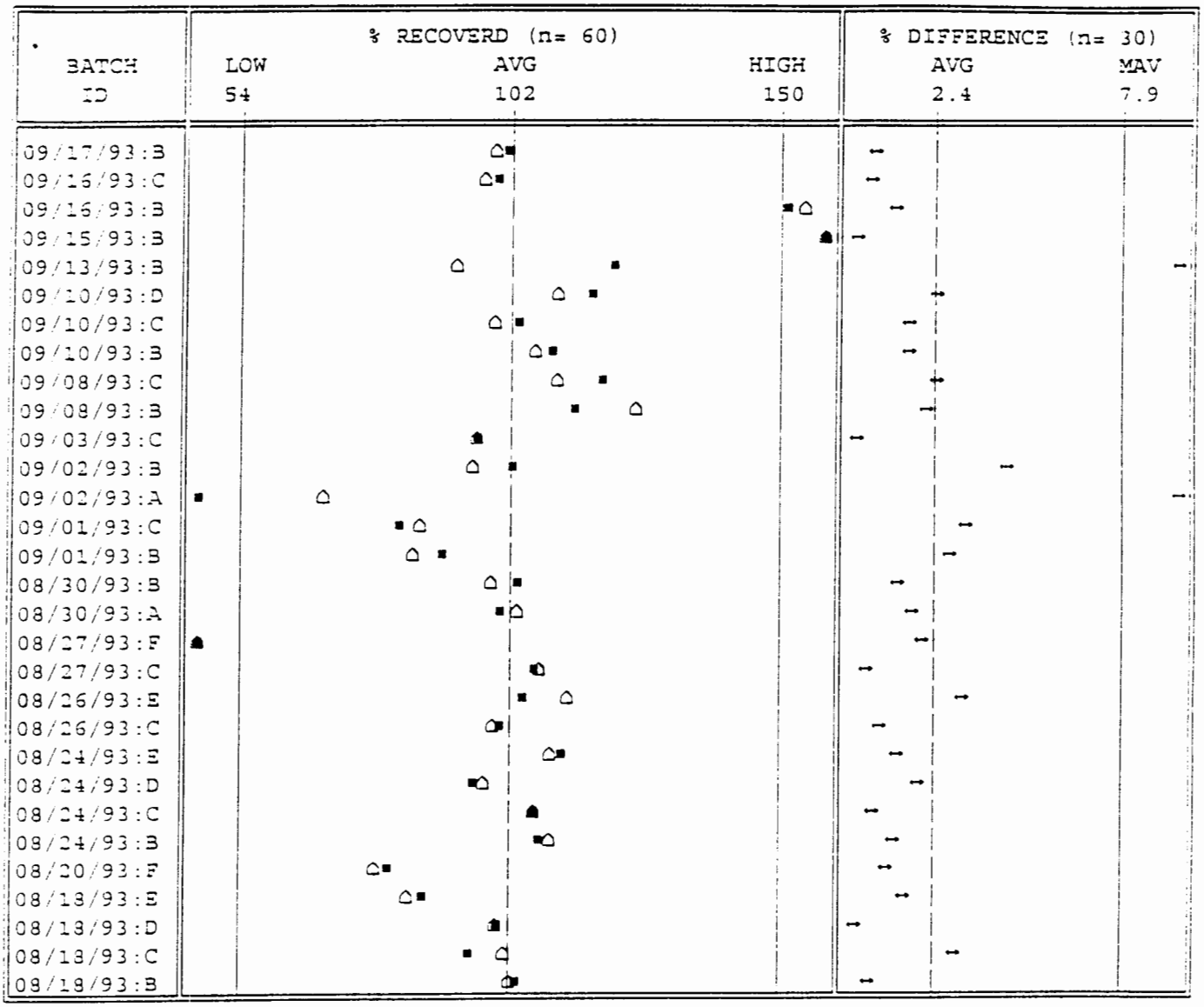
QAMS-WW

FGL ENVIRONMENTAL TREND CONTROL CHART

300.0 Anions for CL

09/23/93



Δ/■ => Matrix Spike / Dup ↔ => % Difference

Reporting Limits : AR % 54 - 150 MAV % 7.9 on 9/23/93 by: CS / 10/18/93 SA

OK KBW

QAMS-WW

FGL ENVIRONMENTAL TREND CONTROL CHART

300.0 Anions for CL

09/23/93

BATCH ID	DATE COMPLETED	Theo. Conc.	MS %	AR %	DIFF. %	MAV %	See Notes	
09 17 93:B	09/17/93	100	98.9	101	75-125	0.6	20.0	10
09 16 93:C	09/16/93	40.0	96.9	99.3	75-125	0.5	20.0	
09 16 93:B	09/16/93	100	154	151	75-125	1.2	20.0	*
09 15 93:B	09/15/93	145	180	180	75-125	0.1	20.0	*
09 13 93:B	09/13/93	100	92.0	120	75-125	13.4	20.0	*
09 10 93:D	09/10/93	100	110	116	75-125	2.4	20.0	
09 10 93:C	09/10/93	200	98.9	103	75-125	1.6	20.0	
09 10 93:B	09/10/93	100	106	109	75-125	1.6	20.0	
09 08 93:C	09/08/93	100	110	118	75-125	2.4	20.0	10
09 08 93:B	09/08/93	200	124	113	75-125	2.1	20.0	
09 03 93:C	09/03/93	100	95.7	95.8	75-125	0.1	20.0	
09 02 93:B	09/02/93	100	95.0	102	75-125	4.5	20.0	
09 02 93:A	09/02/93	100	68.6	46.0	75-125	14.1	20.0	10
09 01 93:C	09/01/93	200	85.7	82.0	75-125	3.3	20.0	13
09 01 93:B	09/01/93	200	84.5	89.7	75-125	2.8	20.0	
08 30 93:B	08/30/93	100	98.5	103	75-125	1.3	20.0	
08 30 93:A	08/30/93	100	103	100	75-125	1.7	20.0	
08 27 93:F	08/27/93	4000	45.7	38.0	75-125	2.0	20.0	10
08 27 93:C	08/27/93	100	107	106	75-125	0.4	20.0	10
08 26 93:E	08/26/93	200	112	104	75-125	3.2	20.0	10
08 26 93:C	08/26/93	40.0	98.9	100	75-125	0.8	20.0	
08 24 93:E	08/24/93	50.0	109	111	75-125	1.3	20.0	
08 24 93:D	08/24/93	625	97.2	95.3	75-125	1.9	20.0	
08 24 93:C	08/24/93	250	106	106	75-125	0.6	20.0	13
08 24 93:B	08/24/93	250	109	107	75-125	1.2	20.0	
08 20 93:F	08/20/93	50.0	77.9	80.3	75-125	1.0	20.0	
08 18 93:E	08/18/93	250	83.8	86.4	75-125	1.5	20.0	13
08 18 93:D	08/18/93	100	99.5	99.7	75-125	0.1	20.0	10
08 18 93:C	08/18/93	100	101	94.7	75-125	3.0	20.0	10
08 18 93:B	08/18/93	40.0	102	103	75-125	0.5	20.0	13

Performance and System Audits

The Quality Assurance Director or Officer is responsible for internal system audits, coordinating all external audits and performance evaluation (PE) samples. In addition, the QA Director or Officer is responsible for maintaining state and agency certification.

12.1 System Audits

System audits are performed both by external agencies, and by the laboratory Quality Assurance group. The focus of these audits is the overall analytical "system", from login to delivery of the finished reports. The purpose of the audit is to document compliance with the specified methodology contained in our Standard Operating Procedures (SOPs).

12.1.1 Internal System Audit Program

Internal system audits are conducted on a monthly basis. Several analytical methods are selected each month for a systems audit. Compliance with all the required QC is evaluated and indicated on the QA inspection summary report form (figure 16-1). This report contains all the new nonconformance items, previously uncompleted non-conformance items and finally all non-conformance items completed. Dates are recorded when the non-conformance was found and when it was completed. This report is given to all supervisors and managers. With these steps an ongoing quantitative assessment of the analytical system is provided.

12.1.2 External System Audits

System audits are performed by outside government agencies such as the California Department of Health Services, Lawrence Livermore National Laboratory and the Army Corp of Engineers. Audits are also performed by private agencies such as Chemical Waste Management, Inc.

12.2 Performance Evaluation Samples

Performance evaluation audits are used to provide a direct evaluation of the ability of the analytical systems to generate data that is consistent with the laboratory's stated objectives for accuracy and precision. External PE samples are analyzed as part of the certification and approval process for various state and federal agencies, as well as for other organizations.

12.2.1 External Performance Evaluation Samples

Performance evaluation samples are analyzed for a number of outside agencies including:

(1) USEPA semi-annual drinking water check samples (WS series)
(2) USEPA semi-annual wastewater check samples (WP series)
(3) USEPA annual wastewater check samples (DMR studies)
(4) EMSL, Las Vegas, radiochemistry check samples
(6) DOE, Environmental Measurements Laboratory QA Program

12.3 Certifications, Accreditations and Agency Approvals

FGL Environmental participates in laboratory certification programs with California, and other states. A copy of the California Environmental Laboratory Accredititation Program (ELAP) approved analyses list may be found in Figures 12-3 and 12-4. A copy of the Nevada Department of Human Resources approved analyses list may be found in Figure 12-5.

Performance and System Audits

Figure 12-1 FGL QA Inspection Form

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FGL - Santa Paula QC Inspection Report

Date:_____

Inspector:_____

Item	In Compliance?	Corrective Action
Overall -		
Oven Temps	_____	_____
Ref. Temps	_____	_____
Balance Checks	_____	_____
Container Checks	_____	_____
QC SOP's	_____	_____

Comments:_____

_____

Front Office and Login -

Sample #'s - _____

_____

LIMS Logbook	_____	_____
File Tracking		
Chain of Custody	_____	_____
Report	_____	_____
Bill	_____	_____
Training	_____	_____
SOP's	_____	_____

Comments:_____

_____

_____

Bacteriology -		
D.W. Prep Log	_____	_____
W.W. Prep Log	_____	_____
P.C. Prep Log	_____	_____
Client Notifications	_____	_____
Media Prep Log	_____	_____
Autoclave Temps	_____	_____
Incubator Temps	_____	_____
Water Suitability	_____	_____
Corrective Actions	_____	_____

Bact Method Check

Method:_____ Sample #:_____ Date Comp:_____

Analyst Training	_____	_____
SOP	_____	_____

Comments:_____

_____

_____

Item	In Compliance?	Corrective Action
Inorganics -		
Standard Prep Log	_____	_____
Corrective Actions	_____	_____
Water Suitability	_____	_____
Instrument Maintenance:		
Dionex DX-300	_____	_____
.P.E. Lambda 3	_____	_____
Turner Neph.	_____	_____
Fisher pH/ISE	_____	_____
Orion E.C.	_____	_____
Orion BOD	_____	_____
P.E. 5000	_____	_____
P.E. 5100	_____	_____
Fisons PQ-II	_____	_____
Leeman PS200	_____	_____

Wet Chemistry Method Checks

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Metals Method Check

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Comments:_____

Item	In Compliance?	Corrective Action
Organics -		
GC Lab:		
Standard prep Log	_____	_____
Corrective Actions	_____	_____
Instrument Maintenance:		
GC 1	_____	_____
GC 2	_____	_____
GC 4	_____	_____
GC 5	_____	_____
GC 7	_____	_____
GC 8	_____	_____
Hitachi HPLC	_____	_____
HP HPLC	_____	_____
IR	_____	_____

GC Lab Method Check

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

GC/MS Lab:		
Standard prep Log	_____	_____
Corrective Actions	_____	_____
Instrument Maintenance:		
GC/MS 1	_____	_____
GC/MS 2	_____	_____
GC/MS 3	_____	_____
GC/MS 4	_____	_____
MCI TOX	_____	_____
Astro TOC	_____	_____

GC/MS Lab Method Check

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Comments:_____

_____

_____

Item	In Compliance?	Corrective Action
Radioactivity -		
Standard Prep. Log	_____	_____
Corrective Actions	_____	_____
Instrument Maintenance:		
Alpha 1	_____	_____
Alpha 2	_____	_____
Alpha 5	_____	_____
Alpha 6	_____	_____
Alpha 7	_____	_____
Alpha/Beta 3	_____	_____
Alpha/Beta 4	_____	_____
Alpha/Beta 8	_____	_____
Liquid Scintillation	_____	_____
Gamma Spec.	_____	_____

Radiochemistry Method Check

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Ag Lab -		
Standard Prep. Log	_____	_____
Corrective Actions	_____	_____
Instrument Maintenance:		
Technicon - nitrate	_____	_____
Technicon - TKN	_____	_____
LECO	_____	_____
pH meter	_____	_____
E.C. meter	_____	_____
ARL 3410	_____	_____

Ag Method Check

Method:_____ Sample #:_____ Date Comp:_____

Data Package		
Batch QC Report	_____	_____
Reviewed Report	_____	_____
Batch Sheet	_____	_____
Inst. Printout	_____	_____
Control Charts	_____	_____
Analyst Training	_____	_____
SOP	_____	_____

Comments:_____

Performance and System Audits

Figure 12-2 FGL Santa Paula - CA DHS ELAP Certification

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CERTIFICATE NUMBER: 1573
EXPIRATION DATE: 7/31/95

6 Radiochemistry (07-15-91)

6.1 Gross Alpha and Beta Radiation ----- Y
6.2 Total Radium ---------- Y
6.3 Radium 226 ---------- Y
6.4 Uranium ---------- Y
6.5 Radon 222 ---------- Y
6.6 Radioactive Cesium ---------- N
6.7 Iodine 131 ---------- N
6.8 Radioactive Strontium ---------- Y
6.9 Tritium ---------- Y
6.10 Gamma and Photon Emitters ---------- N
6.11 Gross Alpha by Co-precipitation --------- Y
6.12 Radium 228 ---------- Y
6.13 Radioactive Iodine ---------- N
6.14 Gross Alpha & Beta in Hazardous Wastes -- Y
6.15 Alpha Emitting Radium Isotopes in Haz. Wastes ---------- Y
6.16 Radium 228 in Hazardous Wastes ---------- Y

7 Shellfish Sanitation (--------)

7.1 Shellfish meat Microbiology ---------- N
7.2 Paralytic Shellfish Poison ---------- N
7.3 Domoic Acid ---------- N

8 Aquatic Toxicity Bioassays (------)

8.1 Hazardous Waste Aquatic Toxicity Bioassay (Title 22, CCR, 66261.24(a)(6)) ---------- N
8.2 Wastewater Testing According to Kopperdahl (1976) using Freshwater Fish. ---------- N
8.3 Wastewater Testing According to EPA/600/4-85/013 using Freshwater and/or Marine Organisms --------- N
8.4 Wastewater Testing by EPA Method 1000.0 ---------- N
8.5 Wastewater Testing by EPA Method 1002.0 ---------- N
8.6 Wastewater Testing by EPA Method 1003.0 ---------- N
8.7 Wastewater Testing by EPA Method 1006 ---------- N
8.8 Wastewater Testing by EPA Method 1007 ---------- N
8.9 Wastewater Testing by EPA Method 1009 ---------- N
8.10 Wastewater Testing According to Anderson, et. al. (1990) using Giant Kelp (Macrocystis pyrifera) -- N
8.11 Wastewater Testing According to Anderson, et. al. (1990) using Red Abalone (Haliotus rufescens) --- N
8.12 Wastewater Testing According to Dinnel and Stober (1987) using Purple Sea Urchin (Strongylocentrotus purpuratus) ---------- N
8.13 Wastewater Testing According to Dinnel and Stober (1987) using Red Sea Urchin (Strongylocentrotus franciscanus) ---------- N
8.14 Wastewater Testing According to Dinnel and Stober (1987) using Sand Dollar (Dendraster excentricus) ---------- N
8.15 Wastewater Testing According to procedure E 724-89 (ASTM, 1989) using Pacific Oyster (Crassostrea gigas) ---------- N
8.16 Wastewater Testing According to procedure E 724-89 (ASTM, 1989) using California Bay Mussel (Mytilus edulis) ---------- N
8.17 Wastewater Testing According to Standard Methods (APHA, 1989) using an alga (Skeletonema costatum) ---------- N
8.18 Wastewater Testing According to EPA/600/4-90/027 using Freshwater and/or Marine Organisms --------- N

9 Physical Properties Testing of Hazardous Waste (07-15-91)

9.1 Ignitability by Flashpoint determination (Title 22, CCR, 66261.21) ---------- Y
9.2 Corrosivity - pH determination (Title 22, CCR, 66261.22) ---------- Y
9.3 Corrosivity - Corrosivity towards steel (Title 22, CCR, 66261.22) ---------- N
9.4 Reactivity (Title 22, CCR, 66261.23) ---------- Y

10 Inorganic Chemistry and Toxic Chemical Elements of Hazardous Waste

10.1 Antimony
7040(--------) ---------- N
7041(06-06-86) ---------- Y
10.2 Arsenic
7060(06-06-86) ---------- Y
7061(--------) ---------- N
10.3 Barium
7080(--------) ---------- N
7081(--------) ---------- N
10.4 Beryllium
7090(--------) ---------- N
7091(--------) ---------- N
10.5 Cadmium
7130(--------) ---------- N
7131(06-06-86) ---------- Y
10.6 Chromium, total
7190(--------) ---------- N
7191(11-30-93) ---------- Y
10.7 Cobalt
7200(--------) ---------- N
7201(--------) ---------- N
10.8 Copper
7210(06-06-86) ---------- Y
7211(--------) ---------- N
10.9 Lead
7420(06-06-86) ---------- Y
7421(06-06-86) ---------- Y
10.10 Mercury
7470(06-06-86) ---------- Y
7471(11-30-93) ---------- Y
10.11 Molybdenum
7480(--------) ----------
7481(11-30-93) ----------
10.12 Nickel
7520(06-06-86) ----------

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10.13 Selenium
- 7740(06-06-86) ---------- Y
- 7741(--------) ---------- N

10.14 Silver
- 7760(06-06-86) ---------- Y
- 7761(--------) ---------- N

10.15 Thallium
- 7840(--------) ---------- N
- 7841(06-06-86) ---------- Y

10.16 Vanadium
- 7910(--------) ---------- N
- 7911(--------) ---------- N

10.17 Zinc
- 7950(06-06-86) ---------- Y
- 7951(--------) ---------- N

10.18 Chromium (VI)
- 7195(--------) ---------- N
- 7196(06-06-86) ---------- Y
- 7197(--------) ---------- N
- 7198(--------) ---------- N

10.19 Cyanide
- 9010(06-06-86) ---------- Y

10.20 Fluoride
- 300.0(11-30-93) ---------- Y
- 340.1(--------) ---------- N
- 340.2(06-06-86) ---------- Y
- 340.3(--------) ---------- N

10.21 Sulfide
- 9030(06-06-86) ---------- Y

10.22 Total Organic Lead
- (--------) ---------- N

10.23 EPA Method 6010(06-06-86) ---------- Y
10.24 EPA Method 6020(11-30-93) ---------- Y

11 Extraction Tests of Hazardous Waste (06-06-86)

11.1 California Waste Extraction Test (WET) (Title 22, CCR, 66261.100, Appendix II) ---------- Y
11.2 Extraction Procedure Toxicity ---------- Y
11.3 Toxicity Characteristic Leaching Procedure (TCLP) All Classes ---------- Y
11.4 Toxicity Characteristic Leaching Procedure (TCLP) Inorganics Only ---------- N
11.5 Toxicity Characteristic Leaching Procedure (TCLP) Extractables Only ---------- N
11.6 Toxicity Characteristic Leaching Procedure (TCLP) Volatiles Only ---------- N

12 Organic Chemistry of Hazardous Waste (measurement by GC/MS combination)

12.1 EPA Method 8240(02-05-87) ---------- Y
12.2 EPA Method 8250(--------) ---------- N
12.3 EPA method 8270(02-05-87) ---------- Y
12.4 EPA Method 8280(--------) ---------- N
12.5 EPA Method 8290(--------) ---------- N
12.6 EPA Method 8260(11-30-93) ---------- Y

13 Organic Chemistry of Hazardous Waste (excluding measurements by GC/MS combination)

13.1 EPA Method 8010(--------) ---------- N
13.2 EPA Method 8015(01-09-90) ---------- Y
13.3 EPA Method 8020(06-06-86) ---------- Y
13.4 EPA Method 8030(--------) ---------- N
13.5 EPA Method 8040(--------) ---------- N
13.6 EPA Method 8060(--------) ---------- N
13.7 EPA Method 8080(06-06-86) ---------- Y
13.8 EPA Method 8090(--------) ---------- N
13.9 EPA Method 8100(--------) ---------- N
13.10 EPA Method 8120(--------) ---------- N
13.11 EPA Method 8140(06-06-86) ---------- Y
13.12 EPA Method 8150(06-06-86) ---------- Y
13.13 EPA Method 8310(05-27-92) ---------- Y
13.14 EPA Method 632 (07-15-91) ---------- Y
13.15 Total Petroleum Hydrocarbons (LUFT Manual) (06-06-86) ---------- Y
13.16 EPA Method 8011(11-08-87) ---------- Y
13.17 EPA Method 8021(--------) ---------- N
13.18 EPA Method 8070(--------) ---------- N
13.19 EPA Method 8110(--------) ---------- N
13.20 EPA Method 8141(11-30-93) ---------- Y
13.21 EPA Method 8330(--------) ---------- N

14 Bulk Asbestos Analysis (--------)

14.1 1% or Greater Asbestos Concentrations (Title 22, CCR, 66261.24(a)(2)(A)) ----------N

15 Substances Regulated Under the California Safe Drinking Water and Toxic Enforcement Act (Proposition 65) and Not Included in Other listed Groups.

16 Wastewater Inorganic Chemistry, Nutrients and Demand (07-15-91)

16.1 Acidity ---------- Y
16.2 Alkalinity ---------- Y
16.3 Ammonia ---------- Y
16.4 Biochemical Oxygen Demand ---------- Y
16.5 Boron ---------- Y
16.6 Bromide ---------- Y
16.7 Calcium ---------- Y
16.8 CBOD ---------- N
16.9 Chemical Oxygen Demand ---------- Y
16.10 Chloride ---------- Y
16.11 Chlorine Residual, total ---------- Y
16.12 Cyanide ---------- Y
16.13 Cyanide amenable to Chlorination ---------- Y
16.14 Fluoride ---------- Y
16.15 Hardness ---------- Y
16.16 Kjeldahl Nitrogen ---------- Y
16.17 Magnesium ---------- Y
16.18 Nitrate ---------- Y
16.19 Nitrite ---------- Y
16.20 Oil and Grease ---------- Y
16.21 Organic Carbon ---------- Y
16.22 Oxygen, Dissolved ---------- Y

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16.23 pH ---------- Y
16.24 Phenols ---------- Y
16.25 Phosphate, ortho- ---------- Y
16.26 Phosphorus, total ---------- Y
16.27 Potassium ---------- Y
16.28 Residue, Total ---------- Y
16.29 Residue, Filterable (TDS) ---------- Y
16.30 Residue, Nonfilterable (TSS) ---------- Y
16.31 Residue, Settleable (SS) ---------- Y
16.32 Residue, Volatile ---------- Y
16.33 Silica ---------- Y
16.34 Sodium ---------- Y
16.35 Specific Conductance ---------- Y
16.36 Sulfate ---------- Y
16.37 Sulfide (includes total & soluble) - Y
16.38 Sulfite ---------- Y
16.39 Surfactants (MBAS) ---------- Y
16.40 Tannin and Lignin ---------- Y
16.41 Turbidity ---------- Y
16.42 Iron (Colorimetric Only) ---------- N
16.43 Manganese (Colorimetric Only) ---------- N
16.44 Total Recoverable
Petroleum Hydrocarbons ---------- Y
16.45 Total Organic Halides ---------- Y

17 Toxic Chemical Elements in Wastewater (07-15-91)

17.1 Aluminum ---------- Y
17.2 Antimony ---------- Y
17.3 Arsenic ---------- Y
17.4 Barium ---------- Y
17.5 Beryllium ---------- Y
17.6 Cadmium ---------- Y
17.7 Chromium (VI) ---------- Y
17.8 Chromium, total ---------- Y
17.9 Cobalt ---------- Y
17.10 Copper ---------- Y
17.11 Gold ---------- Y
17.12 Iridium ---------- N
17.13 Iron ---------- Y
17.14 Lead ---------- Y
17.15 Manganese ---------- Y
17.16 Mercury ---------- Y
17.17 Molybdenum ---------- Y
17.18 Nickel ---------- Y
17.19 Osmium ---------- N
17.20 Palladium ---------- N
17.21 Platinum ---------- N
17.22 Rhodium ---------- N
17.23 Ruthenium ---------- N
17.24 Selenium ---------- Y
17.25 Silver ---------- Y
17.26 Strontium ---------- Y
17.27 Thallium ---------- Y
17.28 Tin ---------- Y
17.29 Titanium ---------- Y
17.30 Vanadium ---------- Y
17.31 Zinc ---------- Y
17.32 EPA Method 200.7 ---------- Y
17.33 EPA Method 200.8 ---------- Y
17.34 DCP ---------- N
17.35 Asbestos ---------- N

18 Organic Chemistry of Wastewater (measurements by GC/MS combination (07-15-91)

18.1 EPA Method 624 ---------- Y
18.2 EPA Method 625 ---------- Y
18.3 EPA Method 1613 ---------- N
18.4 EPA Method 1625 ---------- N
18.5 EPA Method 613 ---------- N

19 Organic Chemistry of Wastewater (excluding measurements by GC/MS combination) (07-15-91)

19.1 EPA Method 601 ---------- N
19.2 EPA Method 602 ---------- Y
19.3 EPA Method 603 ---------- N
19.4 EPA Method 604 ---------- N
19.5 EPA Method 605 ---------- N
19.6 EPA Method 606 ---------- N
19.7 EPA Method 607 ---------- N
19.8 EPA Method 608 ---------- Y
19.9 EPA Method 609 ---------- N
19.10 EPA Method 610 ---------- Y
19.11 EPA Method 611 ---------- N
19.12 EPA Method 632 ---------- Y
19.13 EPA Method 619 ---------- N
19.99 EPA Method 615 ---------- Y

20 Inorganic Chemistry and Toxic Chemical Elements of Pesticide Residues in Food (--------)

20.1 Processed Foods by One of the Following Methods
Atomic Absorption Spectrophotometry ---------- N
Inductively Coupled Plasma Atomic Emission Spectrophotometry ---------- N
Inductively Coupled Plasma/Mass Spectrometry ---------- N
Colorimetry ---------- N
20.2 Raw Commodities by One of the Following Methods
Atomic Absorption Spectrophotometry ---------- N
Inductively Coupled Plasma Atomic Emission Spectrophotometry ---------- N
Inductively Coupled Plasma/Mass Spectrometry ---------- N
Colorimetric ---------- N
20.3 Dairy Products by One of the Following Methods
Atomic Absorption Spectrophotometry ---------- N
Inductively Coupled Plasma Atomic Emission Spectrophotometry ---------- N
Inductively Coupled Plasma/Mass Spectrometry ---------- N
Colorimetry ---------- N

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20.4 Feed Products by One of the Following Methods
- Atomic Absorption Spectrophotometry ---------- N
- Inductively Coupled Plasma Atomic Emission Spectrophotometry ---------- N
- Inductively Coupled Plasma/Mass Spectrometry ---------- N
- Colorimetry ---------- N

21 Organic Chemistry of Pesticide Residues in Food (measurements by GC/MS) (--------)

21.1 Gas Chromatographic/Mass Spectrometric Methods in Processed Foods ---------- N
21.2 Gas Chromatographic/Mass Spectrometric Methods in Raw Commodities ---------- N
21.3 Gas Chromatographic/Mass Spectrometric Methods in Dairy Products ---------- N
21.4 Gas Chromatographic/Mass Spectrometric Methods in Feed Products ---------- N

22 Organic Chemistry of Pesticide Residues in Food (Excluding Measurement by GC/MS Combination) (--------)

22.1 Halogenated Compounds in Processed Foods by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.2 Organophosphorous Compounds in Processed Foods by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.3 Carbamates in Processed Foods by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.4 Halogenated Compounds in Raw Commodities by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.5 Organophosphorous Compounds in Raw Commodities by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.6 Carbamates in Raw Commodities by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.7 Halogenated Compounds in Dairy Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.8 Organophosphorous Compounds in Dairy Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.9 Carbamates in Dairy Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.10 Halogenated Compounds in Feed Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.11 Organophosphorous Compounds in Feed Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

22.12 Carbamates in Feed Products by One of the Following Methods
- Gas Chromatography ---------- N
- High Pressure Liquid Chromatography ---------- N
- Liquid Chromatography/Mass Spectrometry ---------- N

ENVIRONMENTAL LABORATORY ACCREDITATION/REGISTRATION
List of Approved Fields of Testing and Analytes

FGL Environmental
2500 Stagecoach Road
Stockton, CA

TELEPHONE No: (209) 942-0181
CALIFORNIA COUNTY: San Joaquin

CERTIFICATE NUMBER: 1563
EXPIRATION DATE: 07/31/95

1 Microbiology of Drinking Water and Wastewater (07-03-91)

1.1	Total Coliforms in Drinking Water by Multiple Tube Fermentation	Y
1.2	Fecal Coliforms/E. Coli in Drinking Water by MTF	Y
1.3	Total Coliforms in Drinking Water by Membrane Filter Technics	N
1.4	Fecal Coliforms/E. Coli in Drinking Water by Membrane Filter Technics	N
1.5	Total Coliforms and E. Coli in Drinking Water by MMO-MUG	Y
1.6	Total Coliforms in Drinking Water by Clark's Presence/Absence	Y
1.7	Fecal Coliforms/E. Coli in Drinking Water by Clark's Presence/Absence	Y
1.8	Heterotrophic Plate Count	Y
1.9	Total Coliforms in Wastewater by Multiple Tube Fermentation	Y
1.10	Fecal Coliforms in Wastewater by MTF	Y
1.11	Total Coliforms in Wastewater by Membrane Filter Technics	N
1.12	Fecal Coliforms in Wastewater by Membrane Filter Technics	N
1.13	Fecal Streptococci or Enterococci by Multiple Tube Technics	N
1.14	Fecal Streptococci or Enterococci by Membrane Filter Technics	N

2 Inorganic Chemistry and Physical Properties of Drinking Water excluding Toxic Chemical Elements (07-03-91)

2.1	Alkalinity	Y
2.2	Calcium	Y
2.3	Chloride	Y
2.4	Corrosivity	Y
2.5	Fluoride	Y
2.6	Hardness	Y
2.7	Magnesium	Y
2.8	MBAS	Y
2.9	Nitrate	Y
2.10	Nitrite	Y
2.11	Sodium	Y
2.12	Sulfate	Y
2.13	Total Filterable Residue and Conductivity	Y
2.14	Iron (Colorimetric Methods Only)	N
2.15	Manganese (Colorimetric Methods Only)	N
2.16	Phosphate, ortho	Y
2.17	Silica (Colorimetric Methods Only)	Y
2.18	Cyanide	Y

3 Analysis of Toxic Chemical Elements in Drinking Water (07-03-91)

3.1	Arsenic	Y
3.2	Barium	Y
3.3	Cadmium	Y
3.4	Chromium, total	Y
3.5	Copper	Y
3.6	Iron	Y
3.7	Lead	Y
3.8	Manganese	Y
3.9	Mercury	Y
3.10	Selenium	Y
3.11	Silver	Y
3.12	Zinc	Y
3.13	Aluminum	Y
3.14	Asbestos	N
3.15	EPA Method 200.7	Y
3.16	EPA Method 200.8 (Unregulated Elements and Lead Only)	N
3.17	Antimony	Y
3.18	Beryllium	Y
3.19	Nickel	Y
3.20	Thallium	Y

4 Organic Chemistry of Drinking Water (measurement by GC/MS combination) (07-03-91)

4.1	EPA Method 501.3	Y
4.2	EPA Method 524.2	Y
4.3	EPA Method 525	Y
4.4	EPA Method 513	N

5 Organic Chemistry of Drinking Water (excluding measurements by GC/MS combination) (07-03-91)

5.1	EPA Method 501.1	Y
5.2	EPA Method 501.2	Y
5.3	EPA Method 502.1	Y
5.4	EPA Method 502.2	Y
5.5	EPA Method 503.1	Y
5.6	EPA Method 504	Y
5.7	EPA Method 505	Y
5.8	EPA Method 506	N
5.9	EPA Method 507	N
5.10	EPA Method 508	Y
5.11	EPA Method 508A	N
5.12	EPA Method 510.1	Y
5.13	EPA Method 515.1	Y
5.14	EPA Method 531.1	N
5.15	EPA Method 547	N
5.16	EPA Method 548	N
5.17	EPA Method 549	N
5.18	EPA Method 550	N
5.19	EPA Method 550.1	N
5.20	EPA Method 551	N
5.21	EPA Method 552	Y

CERTIFICATE NUMBER: 1563
EXPIRATION DATE: 07-31-95

6 Radiochemistry (--------)

6.1 Gross Alpha and Beta Radiation ----- N
6.2 Total Radium ---------- N
6.3 Radium 226 ---------- N
6.4 Uranium ---------- N
6.5 Radon 222 ---------- N
6.6 Radioactive Cesium ---------- N
6.7 Iodine 131 ---------- N
6.8 Radioactive Strontium ---------- N
6.9 Tritium ---------- N
6.10 Gamma and Photon Emitters ---------- N
6.11 Gross Alpha by Co-precipitation --------- N
6.12 Radium 228 ---------- N
6.13 Radioactive Iodine ---------- N
6.14 Gross Alpha & Beta in Hazardous Wastes -- N
6.15 Alpha Emitting Radium Isotopes in Haz. Wastes ---------- N
6.16 Radium 228 in Hazardous Wastes ---------- N

7 Shellfish Sanitation (--------)

7.1 Shellfish meat Microbiology ---------- N
7.2 Paralytic Shellfish Poison ---------- N
7.3 Domoic Acid ---------- N

8 Aquatic Toxicity Bioassays (------)

8.1 Hazardous Waste Aquatic Toxicity Bioassay (Title 22, CCR, 66261.24(a)(6)) ---------- N
8.2 Wastewater Testing According to Kopperdahl (1976) using Freshwater Fish. ---------- N
8.3 Wastewater Testing According to EPA/600/4-85/013 using Freshwater and/or Marine Organisms --------- N
8.4 Wastewater Testing by EPA Method 1000.0 ---------- N
8.5 Wastewater Testing by EPA Method 1002.0 ---------- N
8.6 Wastewater Testing by EPA Method 1003.0 ---------- N
8.7 Wastewater Testing by EPA Method 1006 ---------- N
8.8 Wastewater Testing by EPA Method 1007 ---------- N
8.9 Wastewater Testing by EPA Method 1009 ---------- N
8.10 Wastewater Testing According to Anderson, et. al. (1990) using Giant Kelp (Macrocystis pyrifera) -- N
8.11 Wastewater Testing According to Anderson, et. al. (1990) using Red Abalone (Haliotus rufescens) --- N
8.12 Wastewater Testing According to Dinnel and Stober (1987) using Purple Sea Urchin (Strongylocentrotus purpuratus) ---------- N
8.13 Wastewater Testing According to Dinnel and Stober (1987) using Red Sea Urchin (Strongylocentrotus franciscanus) ---------- N
8.14 Wastewater Testing According to Dinnel and Stober (1987) using Sand Dollar (Dendraster excentricus) ---------- N
8.15 Wastewater Testing According to procedure E 724-89 (ASTM, 1989) using Pacific Oyster (Crassostrea gigas) ---------- N
8.16 Wastewater Testing According to procedure E 724-89 (ASTM, 1989) using California Bay Mussel (Mytilus equlis) ---------- N
8.17 Wastewater Testing According to Standard Methods (APHA, 1989) using an alga (Skeletonema costatum) ---------- N
8.18 Wastewater Testing According to EPA/600/4-90/027 using Freshwater and/or Marine Organisms --------- N

9 Physical Properties Testing of Hazardous Waste (11-09-93)

9.1 Ignitability by Flashpoint determination (Title 22, CCR, 66261.21) ---------- N
9.2 Corrosivity - pH determination (Title 22, CCR, 66261.22) ---------- Y
9.3 Corrosivity - Corrosivity towards steel (Title 22, CCR, 66261.22) ---------- N
9.4 Reactivity (Title 22, CCR, 66261.23) ---------- Y

10 Inorganic Chemistry and Toxic Chemical Elements of Hazardous Waste

10.1 Antimony
7040(07-03-91) ---------- Y
7041(07-03-91) ---------- Y
10.2 Arsenic
7060(07-03-91) ---------- Y
7061(--------) ---------- N
10.3 Barium
7080(07-03-91) ---------- Y
7081(07-03-91) ---------- Y
10.4 Beryllium
7090(07-03-91) ---------- Y
7091(07-03-91) ---------- Y
10.5 Cadmium
7130(07-03-91) ---------- Y
7131(07-03-91) ---------- Y
10.6 Chromium, total
7190(07-03-91) ---------- Y
7191(07-03-91) ---------- Y
10.7 Cobalt
7200(07-03-91) ---------- Y
7201(07-03-91) ---------- Y
10.8 Copper
7210(07-03-91) ---------- Y
7211(07-03-91) ---------- Y
10.9 Lead
7420(07-03-91) ---------- Y
7421(07-03-91) ---------- Y
10.10 Mercury
7470(07-03-91) ---------- Y
7471(07-03-91) ---------- Y
10.11 Molybdenum
7480(07-03-91) ---------- Y
7481(07-03-91) ---------- Y
10.12 Nickel
7520(07-03-91) ---------- Y

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Preventive Maintenance

13.1 Maintenance and Repair of Instruments

Routine maintenance of equipment is performed by the analyst when appropriate. The department supervisor must be notified immediately if any sign of serious malfunction occurs in any instrument so that he can decide if a qualified serviceman should be consulted. If warranted, instrument repair and calibration is performed by qualified service technicians (usually service representatives of the instrument manufacturer). A record containing the date, the nature of the problem, description of the repair, and the name of the technician is also kept.

13.2 Good Laboratory Practices

Good laboratory practices are followed to prevent contamination of samples and standards. This includes the careful cleaning of glassware, and the use of disposable labware and containers when practical. Sample containers are monitored for contamination when received, according to lot number and proposed use.

The bacteriology water is monitored for suitability. Standard plate count, electrical conductivity and residual chlorine are checked monthly. Heavy metals (including lead, cadmium, chromium, copper, nickel and zinc) are checked annually.

Specific Routine Procedures used to assess Data Precision, Accuracy, and Completeness

Before analytical data can be used, it is necessary to determine the suitability of the data for a given purpose. The characteristics used to determine data suitability are precision, accuracy, and completeness. FGL Environmental deterimines these characteristics by using specific procedures, which are detailed in the following sections.

14.1 Precision

Precision is the measure of how closely replicate analyses agree. FGL Environmental uses Relative Percent Difference (RPD) to measure between duplicate analyses.

Precision is monitored for nearly all methods by RPD's plotted on control charts. The mean RPD +/- 2 standard deviations are the warning limits, and the mean RPD +/- 3 standard deviation are the control limits. To assess precision, FGL Environmental uses the following on a regular basis:

(1) Duplicate samples
(2) Duplicate Matrix Spikes
(3) Control Charts

14.1.1 Precision Calculation

The RPD of duplicate samples is an absolute value from the following calculation:

$$\frac{(\text{First Sample Value} - \text{Second Sample Value}) \times 100}{(\text{First Sample Value} + \text{Second Sample Value}) / 2}$$

14.2 Accuracy

Accuracy measures the deviation of the analytical value from the "true" or known value. The true value for field samples are never known, so accuracy measurements are made on the analysis of QC samples analyzed with field samples.

Accuracy is monitored for nearly all methods by percent recoveries plotted on control charts. The mean recovery +/- 2 standard deviation are the warning limits, and the mean recovery +/- 3 standard deviation are the control limits. To assess accuracy, FGL Environmental uses the following on a regular basis:

(1) Laboratory Control Samples
(2) Matrix Spikes
(3) Matrix Spike Duplicates
(4) Surrogate Spikes
(5) Control Charts

14.2.1 Accuracy Calculations

Percent recoveries are calculated as follows (identical units would be used through each calculation):

Laboratory control sample percent recoveries:

$$\frac{\text{value found} \times 100}{\text{true value}}$$

Specific Routine Procedures used to assess Data Precision, Accuracy, and Completeness

14.2.1 Accuracy Calculations continued
Spike percent recoveries:

$$\frac{(\text{spiked sample result} - \text{sample result}) \times 100}{\text{spike amount added}}$$

14.3 Completeness
Completeness is defined by QAMS-005/80 as - a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

By this definition the influence of the laboratory on completeness involves three areas: appropriate sample handling and storage, conformance to holding time requirements and data validity as measured by meeting acceptance criteria for the quality control parameters. We do not track completeness as a measurable form at this point. We do strive to provide data packages that are 100% complete and give explanations when there are deficiencies.

Corrective Actions

Corrective actions are necessary when trends of more than one out-of- control situations occur. Corrective action reports are used to document the corrections made. Corrective actions are not normally used in isolated out-of-control situations that have routine explanations as the data in these situations must be resolved before continuing and reporting analyses.

15.1 Corrective Action Reports

Each work area has a corrective action report logbook. When corrective actions are necessary, a corrective action report form (figure 15-1) is filled out identifying the analyst, date, method, client and lab number (if applicable), QA batch number (if applicable) problems encountered, investigation and proposed corrective actions. After implementing the actions another entry is required to verify that the problem was solved. This process may need to be repeated in some situations. The reports are on record and will be included in a project data package if that is required by the project plan. An example of a corrective action report form is shown in figure 15-1.

Corrective Actions

Figure 15-1 Corrective Action Report Form

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Corrective Actions

Corrective Action Report Form

Method: _____

Problem Assigned To: _____

Problem encountered: _____

_____

_____

_____

_____

_____

Cause of the problem: _____

_____

_____

_____

_____

_____

Corrective action: _____

_____

_____

_____

_____

Closure of Investigation:

Performed by: _____ Date: _____

Verified by: _____ Date: _____

Quality Assurance Reports to Management

In order to insure that the Quality Assurance program at the lab maintains a high profile, there are several mechanisms in place which insure the QA information is routinely conveyed to laboratory management. This includes a formal monthly QA inspection summary report, reports on internal and external PE samples and summary reports for external system audits.

16.1 Monthly QA Inspection Summary Reports

The QA Director or Officer prepares a report to all managers on a monthly basis. This is a two section report containing the following details:

(1) All uncompleted non-conformance items, the manager responsible for resolving the item, and date found.
(2) All completed non-conformance items, the manager responsible and the date resolved.

This provides a historical record of progress in quality control and tracks non-conformance items that have not been resolved. This helps management prioritize on going non-conformance items.

16.2 Performance Evaluation Failure Reports

Evaluations of any failures on external PE samples are outlined by department supervisors and prepared by the QA Director or Officer for certifying agencies. Copies are given to the department supervisors and Lab Director.

16.3 External System Audit Summary Reports

After debriefing by the auditors a summary report is prepared by the QA Director or Officer for the supervisors and Lab Director. Rather than waiting for an audit report, this initiates corrective actions for any non-conformance items promptly.

Quality Assurance Reports to Management

Figure 16-1 FGL QA Inspection Summary Report Form

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Quality Assurance Reports to Management

FGL QC Inspection Non-Comformance Summary Report

Current Non-conformance Items

Non-Comformance Item	Person Resp.	Date Found

Corrected Non-comformance Items

Non-Comformance Item	Person Resp.	Date Found	Date Comp.

Equipment List

FGL is dedicated to having state-of-the-art equipment throughout thelaboratory. The top quality equipment is essential to providing reliable data. Autosamplers are used when available and appropriate to increase throughput. The following is a list of equipment:

Organics

5 GCMS's -
1 HP 5890II/5972 with 7673A autosampler
1 HP 5890II/5972 with LSC3000/ALS2016 autosampler
1 HP 5890II/5971A with 7673A autosampler
1 HP 5890/5970 with 7673A autosampler
1 Finnigan XL 50 with LSC2000/ALS2032 autosampler

9 GC's -
2 HP 5890 with ECD + ECD detectors and 7673A autosampler
1 HP 5890 with NPD + NPD detectors and 7673A autosampler
1 HP 5890 with NPD + FPD detectors and 7673A autosampler
1 HP 5890 with PID detector and LSC2000/ALS2016 autosampler
1 HP 5890 with FID detector and LSC2000/ALS2016 autosampler
1 HP 5890 with FID detector
1 HP 5890 with ELCD + ELCD detectors
1 Varian 3700 with ECD + ECD detectors
1 Varian 3700 with ECD + FPD + FID detectors

2 HPLC's -
1 HP 1090 with UV and fluorescence detectors and postcolumn derivatization
1 Hitachi system with diode array and fluorescence detectors

2 IR's -
1 Perkin-Elmer 700
1 Foxboro Miran 1FF

1 TOX -
1 MCI TOX 10

1 TOC -
1 ASTRO 2001

Inorganics

1 ICP/MS -
Fisons PlasmaQuad 2

2 ICP's -
1 ARL 3410 with model 101 autosampler
1 Thermo-Jarrell Ash Atomscan 25

2 Graphite Furnaces with Zeeman-AA -
1 Perkin-Elmer 5100Z with AS-60 autosampler
1 Hitachi Z-8100

Equipment List

Inorganics continued

2 Flame AA's -
2 Perkin-Elmer 5000

2 Microwave Digesters -
2 CEM - MDS 2100 Microwave Digester

2 IC's -
2 Dionex 300 - Ion Chromatograph and Spectraphysics AS3500 autosampler

3 Autoanalyzer's -
3 Technicon AA2 autoanalyzer

3 UV/VIS Spectrophotometer's -
1 Perkin-Elmer Lambda 3
1 Beckman model 24

2 Nephelometers (turbidimeters) -
2 Seqouia-Turner model 690

Radioactivity

1 Gamma ray spectroscope -
1 Princeton Gamma Tech

1 Gas scintillation -
1 Radom 5C-5

1 Liquid scintillation autoanalyzer -
1 Packard 2500TR

8 Proportional counter's -
5 NMC PCC11T Alpha counters
2 Tennelec LB 1000 Alpha/Beta counters
1 Tennelec LB 5100 Alpha/Beta counter with autosampler

Microbiology

3 Incubators
3 Autoclaves

Field Services

11 Field vehicles
8 Isco composite autosamplers

LIMS capabilities

3 Microvax with PCSA pathworks fileserver and Dbase IV
80 DOS/OS2/Windows based computers

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APPENDIX F

BLANK, DUPLICATE, AND SPIKE SAMPLE ANALYTICAL REPORTS

EnVIrOnMEnTAL

Analytical Chemists

January 3, 1996

INORGANIC Quality Assurance Report for sample: 508605

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	Result	NOTE	CALIBRAION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
Conductivity	20A 2E	120.1	umhos/cm2	N/A			CCV	1410	96.6	75-125		Dup	519	N/A	N/A	N/A	0.4	0.8	
pH	0A 2B	150.1	units	N/A			CCV	8.00	99.8	90-110		Dup	7.00	N/A	N/A	N/A	0.1	1.4	

FGL ID = 19951208 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

FGL ENVIRONMENTAL, INC.

CJ/DHN:kdm

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Mobile: (209) 737-2399

ENVIRONMENTAL

Analytical Chemists

December 28, 1995

ORGANIC Quality Assurance Report for sample: 508605

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	81.2	40-140		BS	10.0	105	105	40-140	0.8	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	80.9	64-139		BS	10.0	91.2	101	64-139	10.4	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	111	50-149		BS	10.0	86.1	89.4	50-149	3.7	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	110	37-151		BS	10.0	96.3	87.6	37-151	9.4	23.0	
TOC	2A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	1A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951213 N/A => Not Applicable NOTE => See note indicated below.

FGL ENVIRONMENTAL, INC.

KAD/DHN:kdm

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ENVIRONMENTAL

Analytical Chemists

December 28, 1995

INORGANIC Quality Assurance Report for sample: 508605

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	Result	NOTE	CALIBRAION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
Iron	2K12B	200.7	ug/L-mg/L	50	ND		CCV	10000	103	90-110		MS	556	102	104	92-113	1.7	6.7	
Manganese	8E 2C	200.8	ug/L-mg/L	0.50	ND		CCV	50.0	90.8	90-110		MS	87.0	82.4	82.9	75-125	0.6	20.0	
Sodium	6A 2A	200.7	ug/L-mg/L	1.0	ND		CCV	10.0	95.2	90-110		MS	22.2	92.3	93.2	75-125	0.3	20.0	
Chloride	0A 2C	300.0	mg/L	1.0	ND		CCV	72.5	109	90-110		MS	200	98.0	97.8	85-111	0.1	4.1	
Sulfate	0A 2C	300.0	mg/L	1.0	ND		CCV	65.5	108	90-110		MS	200	97.5	97.6	75-123	0.1	2.8	

FGL ID = 19951211 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

FGL ENVIRONMENTAL, INC.

CJ/DHN:kdm

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ENVIRONMENTAL

Analytical Chemists

January 3, 1996

INORGANIC Quality Assurance Report for sample: 508503

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Chloride	1A 2E	300.0	mg/L	1.0	ND		CCV	72.5	109	90-110		MS	200	93.2	92.3	86-106	0.8	4.2	
Conductivity	2A 2A	120.1	umhos/cm2	N/A			CCV	1410	98.8	75-125		Dup	1120	N/A	N/A	N/A	0.3	1.3	
pH	0A 2A	150.1	units	N/A			CCV	8.00	100	90-110		Dup	7.38	N/A	N/A	N/A	0.4	1.4	
Sulfate	1A 2E	300.0	mg/L	1.0	ND		CCV	65.5	105	90-110		MS	200	87.7	87.0	80-113	0.5	2.3	

FGL ID = 19951206 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

FGL ENVIRONMENTAL, INC.

CJ/DHN:kdm

Darrell H. Nelson, President, Laboratory Director

ENVIRONMENTAL

Analytical Chemists

December 28, 1995

ORGANIC Quality Assurance Report for sample: 508503

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

FGL ENVIRONMENTAL, INC.

KAD/DHN:kdm

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ENVIRONMENTAL

Analytical Chemists

December 28, 1995

INORGANIC Quality Assurance Report for sample: 508503

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Iron	0K12A	200.7	ug/L-mg/L	50	ND		CCV	10000	107	90-110		MS	556	93.5	92.8	75-125	0.6	20.0	
Manganese	6E 2C	200.8	ug/L-mg/L	0.50	ND		CCV	50.0	90.8	90-110		MS	87.0	82.4	82.9	75-125	0.6	20.0	
Sodium	4A 2A	200.7	ug/L-mg/L	1.0	ND		CCV	10.0	95.2	90-110		MS	22.2	92.3	93.2	75-125	0.3	20.0	

FGL ID = 19951213 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

January 3, 1996

INORGANIC Quality Assurance Report for sample: 508505

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Chloride	1A 2E	300.0	mg/L	1.0	ND		CCV	72.5	109	90-110		MS	200	93.2	92.3	86-106	0.8	4.2	
Conductivity	2A 2A	120.1	umhos/cm2		N/A		CCV	1410	98.8	75-125		Dup	1120	N/A	N/A	N/A	0.3	1.3	
pH	0A 2A	150.1	units		N/A		CCV	8.00	100	90-110		Dup	7.38	N/A	N/A	N/A	0.4	1.4	
Sulfate	1A 2E	300.0	mg/L	1.0	ND		CCV	65.5	105	90-110		MS	200	87.7	87.0	80-113	0.5	2.3	

FGL ID = 19951206 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

ORGANIC Quality Assurance Report for sample: 508505

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

INORGANIC Quality Assurance Report for sample: 508505

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Iron	0K12A	200.7	ug/L-mg/L	50	ND		CCV	10000	107	90-110		MS	556	93.5	92.8	75-125	0.6	20.0	
Manganese	6E 2C	200.8	ug/L-mg/L	0.50	ND		CCV	50.0	90.8	90-110		MS	87.0	82.4	82.9	75-125	0.6	20.0	
Sodium	4A 2A	200.7	ug/L-mg/L	1.0	ND		CCV	10.0	95.2	90-110		MS	22.2	92.3	93.2	75-125	0.3	20.0	

FGL ID = 19951213 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 27, 1995

ORGANIC Quality Assurance Report for sample: 508506

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

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ENVIRONMENTAL

Analytical Chemists

January 3, 1996

INORGANIC Quality Assurance Report for sample: 508507

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Chloride	1A 2E	300.0	mg/L	1.0	ND		CCV	72.5	109	90-110		MS	200	93.2	92.3	86-106	0.8	4.2	
Conductivity	2A 2A	120.1	umhos/cm2	N/A			CCV	1410	98.8	75-125		Dup	1120	N/A	N/A	N/A	0.3	1.3	
pH	0A 2A	150.1	units	N/A			CCV	8.00	100	90-110		Dup	7.38	N/A	N/A	N/A	0.4	1.4	
Sulfate	1A 2E	300.0	mg/L	1.0	ND		CCV	65.5	105	90-110		MS	200	87.7	87.0	80-113	0.5	2.3	

FGL ID = 19951206 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

ORGANIC Quality Assurance Report for sample: 508507

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

INORGANIC Quality Assurance Report for sample: 508507

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Iron	OK12A	200.7	ug/L-mg/L	50	ND		CCV	10000	107	90-110		MS	556	93.5	92.8	75-125	0.6	20.0	
Manganese	6E 2C	200.8	ug/L-mg/L	0.50	ND		CCV	50.0	90.8	90-110		MS	87.0	82.4	82.9	75-125	0.6	20.0	
Sodium	4A 2A	200.7	ug/L-mg/L	1.0	ND		CCV	10.0	95.2	90-110		MS	22.2	92.3	93.2	75-125	0.3	20.0	

FGL ID = 19951213 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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December 27, 1995

ORGANIC Quality Assurance Report for sample: 508508

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

January 3, 1996

INORGANIC Quality Assurance Report for sample: 508509

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Chloride	1A 2E	300.0	mg/L	1.0	ND		CCV	72.5	109	90-110		MS	200	93.2	92.3	86-106	0.8	4.2	
Conductivity	2A 2A	120.1	umhos/cm2	N/A			CCV	1410	98.8	75-125		Dup	1120	N/A	N/A	N/A	0.3	1.3	
pH	0A 2A	150.1	units	N/A			CCV	8.00	100	90-110		Dup	7.38	N/A	N/A	N/A	0.4	1.4	
Sulfate	1A 2E	300.0	mg/L	1.0	ND		CCV	65.5	105	90-110		MS	200	87.7	87.0	80-113	0.5	2.3	

FGL ID = 19951206 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

ORGANIC Quality Assurance Report for sample: 508509

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	CALIBRATION QA/QC Type	Conc.	% REC	AR	NOTE	METHOD QA/QC Type	Conc.	% REC	% REC	AR	% DIF	MAV	NOTE
1,2-Dichloroethane-d4	OH12A	624	ug/L	LCS	10.0	86.5	40-140		BS	10.0	92.5	95.7	40-140	3.4	30.0	
Toluene-d8	OH12A	624	ug/L	LCS	10.0	86.2	64-139		BS	10.0	92.2	93.2	64-139	1.1	30.0	
BFB	OH12A	624	ug/L	LCS	10.0	95.0	50-149		BS	10.0	91.8	89.1	50-149	2.9	30.0	
Trichloroethylene	OH12A	624	ug/L	LCS	10.0	116	37-151		BS	10.0	92.4	79.0	37-151	15.6	23.0	
TOC	7A 2A	TOC	mg/L	LCS	50.0	94.0	75-125		MS	50.0	114	118	75-125	3.4	20.0	
TOX	6A 2A	TOX	ug/L	CCV	10.0	71.0	70-116		MS	100	99.0	115	70-116	15.0	20.0	

FGL ID = 19951208 N/A => Not Applicable NOTE => See note indicated below.

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Analytical Chemists

December 28, 1995

INORGANIC Quality Assurance Report for sample: 508509

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

Constituent	BATCH ID	EPA Method	Units	BLANK QA/QC DLR	BLANK QA/QC Result	BLANK QA/QC NOTE	CALIBRAION QA/QC Type	CALIBRAION QA/QC Conc.	CALIBRAION QA/QC % REC	CALIBRAION QA/QC AR	CALIBRAION QA/QC NOTE	METHOD QA/QC Type	METHOD QA/QC Conc.	METHOD QA/QC % REC	METHOD QA/QC % REC	METHOD QA/QC AR	METHOD QA/QC % DIF	METHOD QA/QC MAV	METHOD QA/QC NOTE
Iron	0K12B	200.7	ug/L-mg/L	50	ND		CCV	10000	103	90-110		MS	556	102	104	92-113	1.7	6.7	
Manganese	6E 2C	200.8	ug/L-mg/L	0.50	ND		CCV	50.0	90.8	90-110		MS	87.0	82.4	82.9	75-125	0.6	20.0	
Sodium	4A 2A	200.7	ug/L-mg/L	1.0	ND		CCV	10.0	95.2	90-110		MS	22.2	92.3	93.2	75-125	0.3	20.0	

FGL ID = 19951213 ND => Not Detected at ar above DLR. DLR => Detection Limit for Reporting purposes. N/A => Not Applicable NOTE => See note indicated below.

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CJ/DHN:kdm

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APPENDIX G

ANALYTICAL REPORTS FOR GROUND WATER MONITORING PARAMETERS

ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508605-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW1 Quarterly Sampling Area 317
Description: MW1/A/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 8, 1995
Received : December 8, 1995
Completed : December 28, 1995
QA/QC ID# : 50860501-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Conductivity	120.1	umhos/cm2	1	780
pH	150.1	units	---	6.9

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

Charles Johnson, B.S.

Darrell H. Nelson, B.S.
Laboratory Director

CJ/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508605-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW1 Quarterly Sampling Area 317
Sample Description: MW1/B/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 8, 1995
Received : December 8, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

If you have any questions, please call.

FGL ENVIRONMENTAL

Kelly A. Dunnahoo, B.S.
Organic Laboratory Manager

Darrell H. Nelson, B.S.
Laboratory Director

KAD/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508605-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW1 Quarterly Sampling Area 317
Sample Description: MW1/C/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 8, 1995
Received : December 8, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

If you have any questions, please call.

FGL ENVIRONMENTAL

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508605-4

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW1 Quarterly Sampling Area 317
Description: MW1/H/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 8, 1995
Received : December 8, 1995
Completed : December 11, 1995
QA/QC ID# : 50860504-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Chloride	300.0	mg/L	2.0♦	180
Sulfate	300.0	mg/L	1	12

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

Charles Johnson, B.S.

Darrell H. Nelson, B.S.
Laboratory Director

CJ/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508605-5

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW1 Quarterly Sampling Area 317
Sample Description: MW1/0/29
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 8, 1995
Received : December 8, 1995
Extracted : N/A
Analyzed : December 13, 1995
QA/QC ID# : SP 95121301H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	101	40-140	103
Toluene-d8	64-139	103	64-139	104
BFB	50-149	91	50-149	88

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

If you have any questions, please call.

FGL ENVIRONMENTAL

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Darrell H. Nelson, B.S.
Laboratory Director

KAD/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508605-6

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW1 Quarterly Sampling Area 317
Description: MW1/R/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 8, 1995
Received : December 8, 1995
Completed : December 19, 1995
QA/QC ID# : 50860506-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS	MCL
Iron	200.7	ug/L	50	ND	300
Manganese	200.8	ug/L	0.5	2.7	50
Sodium	200.7	mg/L	1	50	

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) HNO3 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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Darrell H. Nelson, B.S.
Laboratory Director

CJ/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508503-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW3 Quarterly Sampling Area 317
Description: MW3/A/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 8, 1995
QA/QC ID# : 50850301-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Conductivity	120.1	umhos/cm2	1	620
pH	150.1	units	---	7.5

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) H2SO4 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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Darrell H. Nelson, B.S.
Laboratory Director

CJ/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508503-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW3 Quarterly Sampling Area 317
Sample Description: MW3/B/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508503-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW3 Quarterly Sampling Area 317
Sample Description: MW3/C/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

FGL ENVIRONMENTAL

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508503-4

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW3 Quarterly Sampling Area 317
Description: MW3/H/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 7, 1995
QA/QC ID# : 50850304-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Chloride	300.0	mg/L	2.0♦	29
Sulfate	300.0	mg/L	2.0♦	77

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) H_2SO_4 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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Laboratory Director

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508503-5

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW3 Quarterly Sampling Area 317
Sample Description: MW3/0/29
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	92	40-140	95
Toluene-d8	64-139	90	64-139	96
BFB	50-149	97	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

FGL ENVIRONMENTAL

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Darrell H. Nelson, B.S.
Laboratory Director

KAD/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508503-6

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW3 Quarterly Sampling Area 317
Description: MW3/R/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 19, 1995
QA/QC ID# : 50850306-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS	MCL
Iron	200.7	ug/L	50	ND	300
Manganese	200.8	ug/L	0.5	ND	50
Sodium	200.7	mg/L	1	54	

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) HNO3 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508505-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW5 Quarterly Sampling Area 317
Description: MW5/A/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 8, 1995
QA/QC ID# : 50850501-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Conductivity	120.1	umhos/cm2	1	550
pH	150.1	units	---	7.6

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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FGL ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508505-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5 Quarterly Sampling Area 317
Sample Description: MW5/B/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

FGL ENVIRONMENTAL

Kelly A. Dunnahoo, B.S.
Organic Laboratory Manager

Darrell H. Nelson, B.S.
Laboratory Director

KAD/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508505-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5 Quarterly Sampling Area 317
Sample Description: MW5/C/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

FGL ENVIRONMENTAL

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Darrell H. Nelson, B.S.
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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508505-4

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW5 Quarterly Sampling Area 317
Description: MW5/H/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 7, 1995
QA/QC ID# : 50850504-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Chloride	300.0	mg/L	2.0♦	46
Sulfate	300.0	mg/L	2.0♦	31

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

Charles Johnson, B.S.

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Laboratory Director

CJ/DHN:kdm

ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508505-5

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5 Quarterly Sampling Area 317
Sample Description: MW5/0/29
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	97	40-140	95
Toluene-d8	64-139	94	64-139	96
BFB	50-149	92	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

FGL ENVIRONMENTAL

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508505-6

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW5 Quarterly Sampling Area 317
Description: MW5/R/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 19, 1995
QA/QC ID# : 50850506-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS	MCL
Iron	200.7	ug/L	50	ND	300
Manganese	200.8	ug/L	0.5	1.3	50
Sodium	200.7	mg/L	1	52	

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) HNO3 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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FGL ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508506-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5-1A Quarterly Sampling Area 317
Sample Description: MW5/B/29/1A
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call.

FGL ENVIRONMENTAL

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508506-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5-1A Quarterly Sampling Area 317
Sample Description: MW5/C/29/1A
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508506-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW5-1A Quarterly Sampling Area 317
Sample Description: MW5/0/29/1A
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	107	40-140	95
Toluene-d8	64-139	92	64-139	96
BFB	50-149	96	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508507-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW6 Quarterly Sampling Area 317
Description: MW6/A/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 8, 1995
QA/QC ID# : 50850701-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Conductivity	120.1	umhos/cm2	1	580
pH	150.1	units	---	7.5

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508507-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6 Quarterly Sampling Area 317
Sample Description: MW6/B/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please cal

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508507-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6 Quarterly Sampling Area 317
Sample Description: MW6/C/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508507-4

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW6 Quarterly Sampling Area 317
Description: MW6/H/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 7, 1995
QA/QC ID# : 50850704-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Chloride	300.0	mg/L	2.0♦	70
Sulfate	300.0	mg/L	2.0♦	32

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

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FGL ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508507-5

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6 Quarterly Sampling Area 317
Sample Description: MW6/0/29
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	101	40-140	95
Toluene-d8	64-139	96	64-139	96
BFB	50-149	103	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508507-6

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW6 Quarterly Sampling Area 317
Description: MW6/R/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 19, 1995
QA/QC ID# : 50850706-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS	MCL
Iron	200.7	ug/L	50	100	300
Manganese	200.8	ug/L	0.5	2.2	50
Sodium	200.7	mg/L	1	51	

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) HNO3 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

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ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508508-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6-1A Quarterly Sampling Area 317
Sample Description: MW6/B/29/1A
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please cal

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508508-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6-1A Quarterly Sampling Area 317
Sample Description: MW6/C/29/1A
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 27, 1995

LAB No: SP 508508-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW6-1A Quarterly Sampling Area 317
Sample Description: MW6/0/29/1A
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	94	40-140	95
Toluene-d8	64-139	103	64-139	96
BFB	50-149	95	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

See attached report for Quality Assurance data. If you have any questions, please call

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508509-1

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW10 Quarterly Sampling Area 317
Description: MW10/A/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 8, 1995
QA/QC ID# : 50850901-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Conductivity	120.1	umhos/cm2	1	620
pH	150.1	units	---	7.5

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508509-2

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW10 Quarterly Sampling Area 317
Sample Description: MW10/B/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 15, 1995
QA/QC ID# : SP 95121500A A

TOTAL ORGANIC CARBON

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOC	415.1	mg/L	0.5	ND	0.5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
mg/L = Milligrams Per Liter (ppm) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508509-3

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW10 Quarterly Sampling Area 317
Sample Description: MW10/C/29
Sampled by : Abdun-Nur/Bricker
Container : Amber Glass TFE-Cap
Preservatives: H2SO4 pH < 2

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 14, 1995
QA/QC ID# : SP 95121400A A

TOTAL ORGANIC HALOGENS

CONSTITUENT	EPA METHOD	UNITS	SAMPLE DLR	SAMPLE RESULTS	LAB DLR	BLANK RESULTS
TOX	9020	ug/L	5	ND	5	ND

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR.
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

January 3, 1996

LAB No: SP 508509-4

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW10 Quarterly Sampling Area 317
Description: MW10/H/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 7, 1995
QA/QC ID# : 50850904-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS
Chloride	300.0	mg/L	2.0♦	76
Sulfate	300.0	mg/L	2.0♦	42

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C Containers: (a) Plastic

If you have any questions, please call.

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ENVIRONMENTAL

ANALYTICAL CHEMISTS

December 28, 1995

LAB No: SP 508509-5

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Organic Analysis
Matrix: Monitoring Well

Sampling Site: MW10 Quarterly Sampling Area 317
Sample Description: MW10/0/29
Sampled by : Abdun-Nur/Bricker
Container : VOA
Preservatives:

Sampled : December 6, 1995
Received : December 6, 1995
Extracted : N/A
Analyzed : December 8, 1995
QA/QC ID# : SP 95120801H A

EPA METHOD 624

CONSTITUENT	SAMPLE DLR ug/L	SAMPLE RESULTS ug/L	LAB DLR ug/L	BLANK RESULTS ug/L
Trichloroethylene	0.5	ND	0.5	ND

SURROGATES	SAMPLE AR	SAMPLE % REC.	LAB BLANK AR	LAB BLANK % REC.
1,2-Dichloroethane-d4	40-140	97	40-140	95
Toluene-d8	64-139	94	64-139	96
BFB	50-149	97	50-149	92

DLR = Detection Limit for Reporting Purposes. MCL = Maximum Contaminant Level (--- indicates none determined.)
ug/L = Micrograms Per Liter (ppb) ND = Not Detected at or above the DLR. AR = Acceptable Range
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.

If you have any questions, please call.

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December 28, 1995

LAB No: SP 508509-6

Bermite Division of Whittaker
22116 W. Soledad Canyon Road
Saugus , CA 91350

RE: Inorganic Analysis

Sample Site: MW10 Quarterly Sampling Area 317
Description: MW10/R/29
Sampled by : Abdun-Nur/Bricker
Type of Sample: Monitoring Well

Sampled : December 6, 1995
Received : December 6, 1995
Completed : December 19, 1995
QA/QC ID# : 50850906-

Analytical Results

CONSTITUENT	EPA METHOD	UNITS	DLR	RESULTS	MCL
Iron	200.7	ug/L	50	ND	300
Manganese	200.8	ug/L	0.5	3.1	50
Sodium	200.7	mg/L	1	79	

DLR = Detection Limit for Reporting Purposes. ND = Not Detected at or above the DLR.
ug/L = Micrograms Per Liter (ppb) mg/L = Milligrams Per Liter (ppm) mg/kg = Milligrams Per Kilogram
♦ = DLR adjusted because of dilutions, concentrations, or limited sample.
Preservatives: (1) Cool 4°C (2) HNO3 pH < 2 Containers: (a) Plastic

If you have any questions, please call.

FGL ENVIRONMENTAL

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APPENDIX H

STATISTICAL ANALYSES

TABLE H-1

TWENTY-NINTH QUARTER SAMPLING EVENT

Parameter	Units	Tolerance Limit	Well No.		
			MW-5	MW-6	MW-10
Chloride	mg/l	191	46	70	76
pH		7.04/7.97	7.6	7.5	7.5
Specific Conductance	μmhos/cm^2	783	550	580	620
Sulfate	mg/l	104	31	32	42
Iron	μg/l	216	<50	100	50
Manganese	μg/l	24.3	1.3	2.2	3.1
Sodium	mg/l	58.7	52	51	79
TCE	μg/l	0.5[a]	<0.5	<0.5	<0.5
TOC	mg/l	3.19	<0.5	<0.5	<0.5
TOX	μg/l	57.4	<5	<5	<5

Note: All tolerance limits are upper limits except pH which has both upper and lower limits.

[a]Tolerance limit set at detection limit.

TABLE H-2

CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-1

Date	Quarter	pH[a]	Conductance[a] (μmhos/cm^2)	TOC[a] (mg/l)	TOX[a] (μg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (μg/l)	Mn (μg/l)	Na (mg/l)	TCE (μg/l)
10/04/88[b]	1	7.5	598	<3	<100	11					<5
01/25/89	2	7.48	572	2.4[c]	<100	22					
04/17/89	3	7.2		<3	<100	11					
07/27/89	4	7.48	500	2.4[c]	<100	13					
10/31/89	5	7.6	524	<3	<100	10	83				
01/25/90	6	7.4	570	<3	<100	16	85				
04/17/90	7	7.55	504	<4	<20	11	88				
07/17/90	8	8.28	530	<4	<20	10	82				
10/18/90	9	7.4	544	<1	75[c]	23	98				
01/29/91	10	7.5	573	1.4	<5	8	96				
04/23/91	11	7.68	559	1.8	<5	10	100				
07/19/91	12	7.33	575	1.2	<5	11	97				
10/08/91[d]	--	--	--	--	--	--	--				
03/13/92	14	7.5	639	0.4[c]	<5	13	131				
04/21/92	15	7.5	643	<0.5	<5	9	130				
07/29/92	16	7.55	660	<0.5	6.9	11	133				
10/20/92	17	7.5	676	<0.5	<5	10	138				
01/27/93	18	7.68	707	<0.5	<5	6	137				
06/09/93[e]	19	7.5	715	<0.5	<5	9	134	250	<30	52	
07/14/93	20	--	--	--	--	--	--	220	<30	46	
08/11/93	20	--	--	--	--	--	--	60	<30	54	
09/22/93	20	7.5	720	<0.5	9	13	161	100	<30	52	
12/08/93	21	7.4	726	<0.5	<5	10	151	50	<30	57	

TABLE H-2 (continued)

CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-1

Date	Quarter	pH[a]	Conductance[a] (μmhos/cm^2)	TOC[a] (mg/l)	TOX[a] (μg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (μg/l)	Mn (μg/l)	Na (mg/l)	TCE (μg/l)
03/10/94	22	7.5	730	<0.5	<5	10	150	200	<30	48	<0.5
06/22/94	23	7.5	740	<0.5	<5	15	150	150	<30	54	<0.5
09/14/94	24	7.4	750	<0.5	8	9	160	60	2.5	57	<0.5
12/14/94	25	7.5	770	<0.5	<5	10	150	80	4	51	<0.5
03/29/95	26	7.5	770	<0.5	<5	12	160	60	1.6	49	<0.5
06/27/95	27	7.4	760	<0.5	10	13	170	50	2.8	45	<0.5
09/12/95	28	7.5	780	<0.5	6	12	160	90	3	53	<0.5
12/08/95	29	6.9	780	<0.5	<5	12	180	<50	2.7	50	<0.5

[a]Each value is the average result from four replicate samples.
[b]Samples from 01/27/88, 07/29/88, 08/15/88, and 10/04/88 reported TCE at <5 μg/l.
[c]The replicates included a portion with results below the detection limit. The average was calculated after assigning a value of one-half the detection limit for the samples below the detection limit.
[d]Not sampled because water elevation dropped below elevation of sampling pump intake.
[e]Single sample. Replicates no longer taken.

TABLE H-3

CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-3

Date	Quarter	pH[a]	Conductance[a] (μmhos/cm^2)	TOC[a] (mg/l)	TOX[a] (μg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (μg/l)	Mn (μg/l)	Na (mg/l)	TCE (μg/l)
10/04/88[b]	1	7.48	699	<3	361.25	73					<5
01/25/89	2	7.73	664	<3	<100	74					
04/17/89	3	7.3		<3	<100	9					
07/27/89	4	7.5	661	<3	<100	65					
10/31/89	5	7.53	617	<3	<100	68	35				
01/25/90	6	7.18	641	7.1[c]	<100	74	36				
04/17/90	7	7.33	590	<4	<20	60	46				
07/17/90	8	8.23	589	<4	<20	67	39				
10/18/90	9	7.63	642	0.7[c]	<100	15	34				
01/29/91	10	7.28	656	2.2	<5	80	54				
04/23/91	11	7.55	629	2.0	<5	77	34				
07/19/91	12	7.23	633	1.3	<5	85	45				
10/09/91	13	7.65	642	<0.5	<5	34	37				
03/13/92	14	7.45	648	0.6	3.3[c]	85	33				
04/21/92	15	7.5	644	<0.5	<5	81	37				
07/29/92	16	7.55	643	0.34[c]	<5	74	33				
10/20/92	17	7.55	641	<0.5	<5	67	34				
01/27/93	18	7.6	640	<0.5	<5	69	30				
06/09/93[d]	19	7.6	627	<0.5	<5	70	28	50	<30	48	
07/14/93	20	--	--	--	--	--	--	<50	<30	44	
08/11/93	20	--	--	--	--	--	--	<50	<30	50	
09/22/93	20	7.4	630	<0.5	<5	87	37	<50	<30	50	
12/08/93	21	7.4	627	<0.5	<5	72	35	<50	<30	54	

TABLE H-3 (continued)

CONCENTRATIONS OF GROUND WATER MONITORING PARAMETERS
IN SAMPLES FROM BACKGROUND MONITORING WELL MW-3

Date	Quarter	pH[a]	Conductance[a] (μmhos/cm^2)	TOC[a] (mg/l)	TOX[b] (μg/l)	SO_4^{2-} (mg/l)	Cl^- (mg/l)	Fe (μg/l)	Mn (μg/l)	Na (mg/l)	TCE (μg/l)
03/10/94	22	7.4	620	<0.5	<5	74	31	<50	<30	47	<0.5
06/22/94	23	7.6	630	<0.5	8[e]	71	29	<50	<30	53	<0.5
09/14/94	24	7.5	630	<0.5	<5	80	31	<50	0.7	52	<0.5
12/14/94	25	7.5	630	<0.5	<5	69	28	<50	<1	48	<0.5
03/29/95	26	7.7	620	<0.5	7	71	28	<50	0.8	49	<0.5
06/27/95	27	7.6	620	<0.5	7	76	32	<50	0.6	53	<0.5
09/12/95	28	7.6	620	<0.5	<5	73	34	<50	<1	53	<0.5
12/06/95	29	7.5	620	<0.5	<5	77	29	<50	<0.5	54	<0.5

[a]Each value is the average result from four replicate samples.
[b]Samples from 02/17/88, 05/27/88, 07/19/88, 08/15/88, and 10/04/88 reported TCE at <5 μg/l.
[c]The replicates included a portion with results below the detection limit. The average was calculated after assigning a value of one-half the detection limit for the samples below the detection limit.
[d]Single sample. Replicates no longer taken.
[e]Duplicate sample analytical result also 8 μg/l.

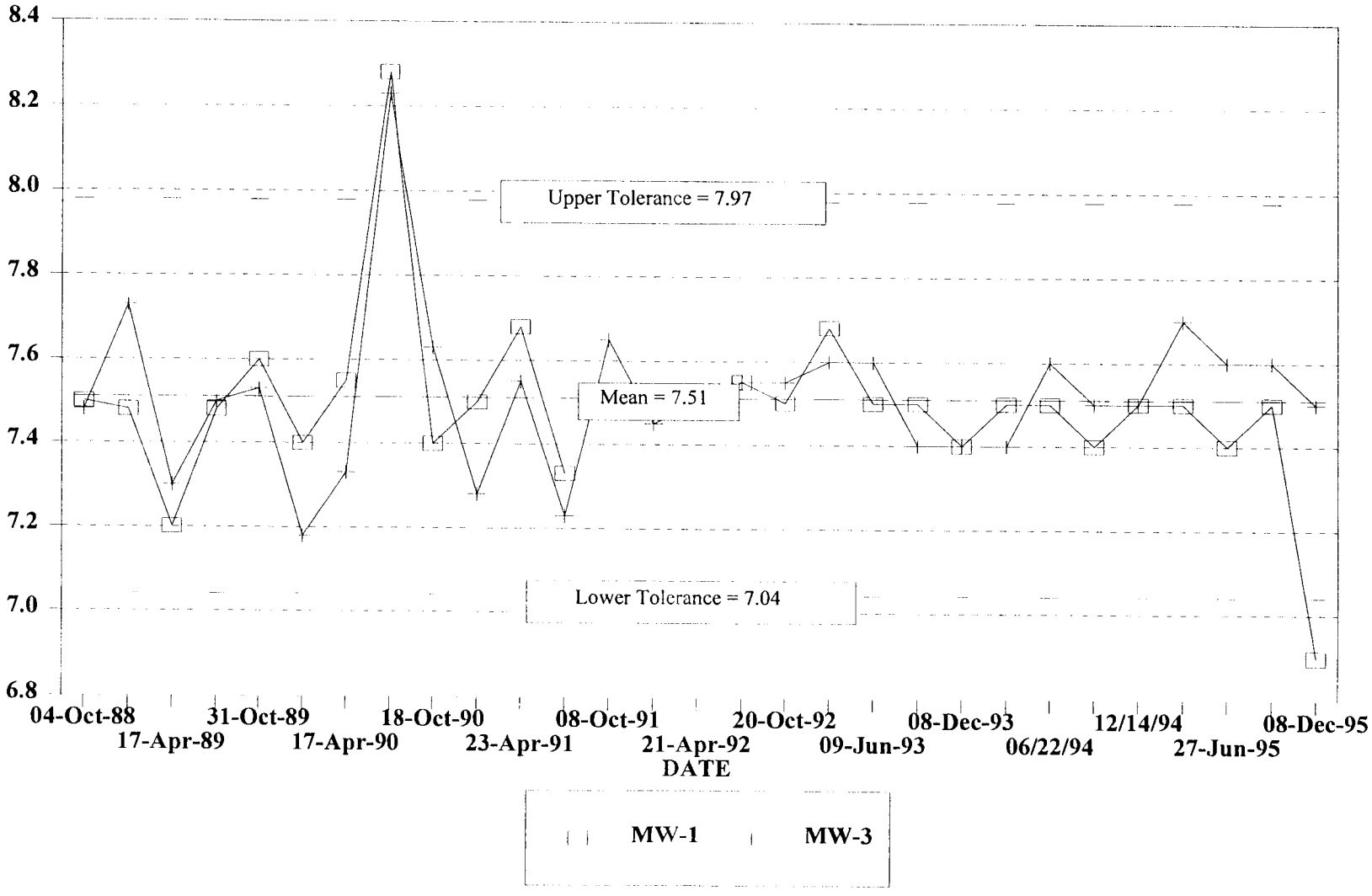
TABLE H-4

TOLERANCE LIMIT CALCULATIONS

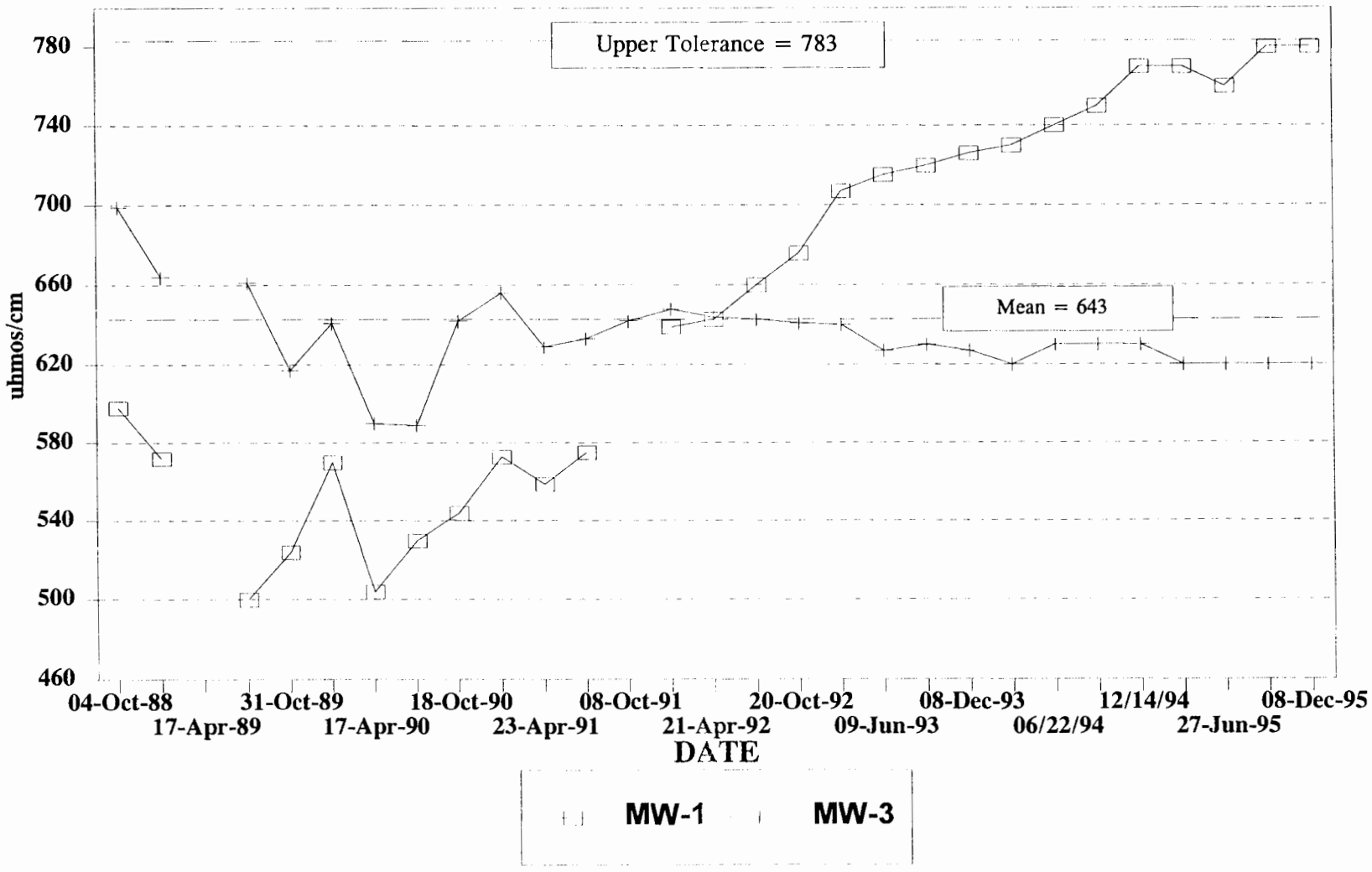
	pH	Conductance	TOC	TOX	Chloride	Sulfate	Iron	Manganese	Sodium
Σ x	427.8	35,368	53.34	855.20	3,993	2,307	1,745	230	1,324
n (number of samples)	57	55	57	56	49	57	26	26	26
_x (mean)	7.51	643	0.94	15.3	81.5	40.5	67.11	8.8	50.9
s (sample standard deviation)	0.20	68.8	1.11	20.7	52.9	31.3	65.5	6.8	3.44
k (from tables)	2.341	2.036	2.027	2.034	2.070	2.027	2.278	2.278	2.278
Upper Tolerance Limit[a]	7.97	783	3.19	57.4	191	104	216	24.3	58.7
Lower Tolerance Limit[b]	7.04								

[a]Upper Tolerance Limit = x + ks.
[b]Lower Tolerance Limit = x − ks.

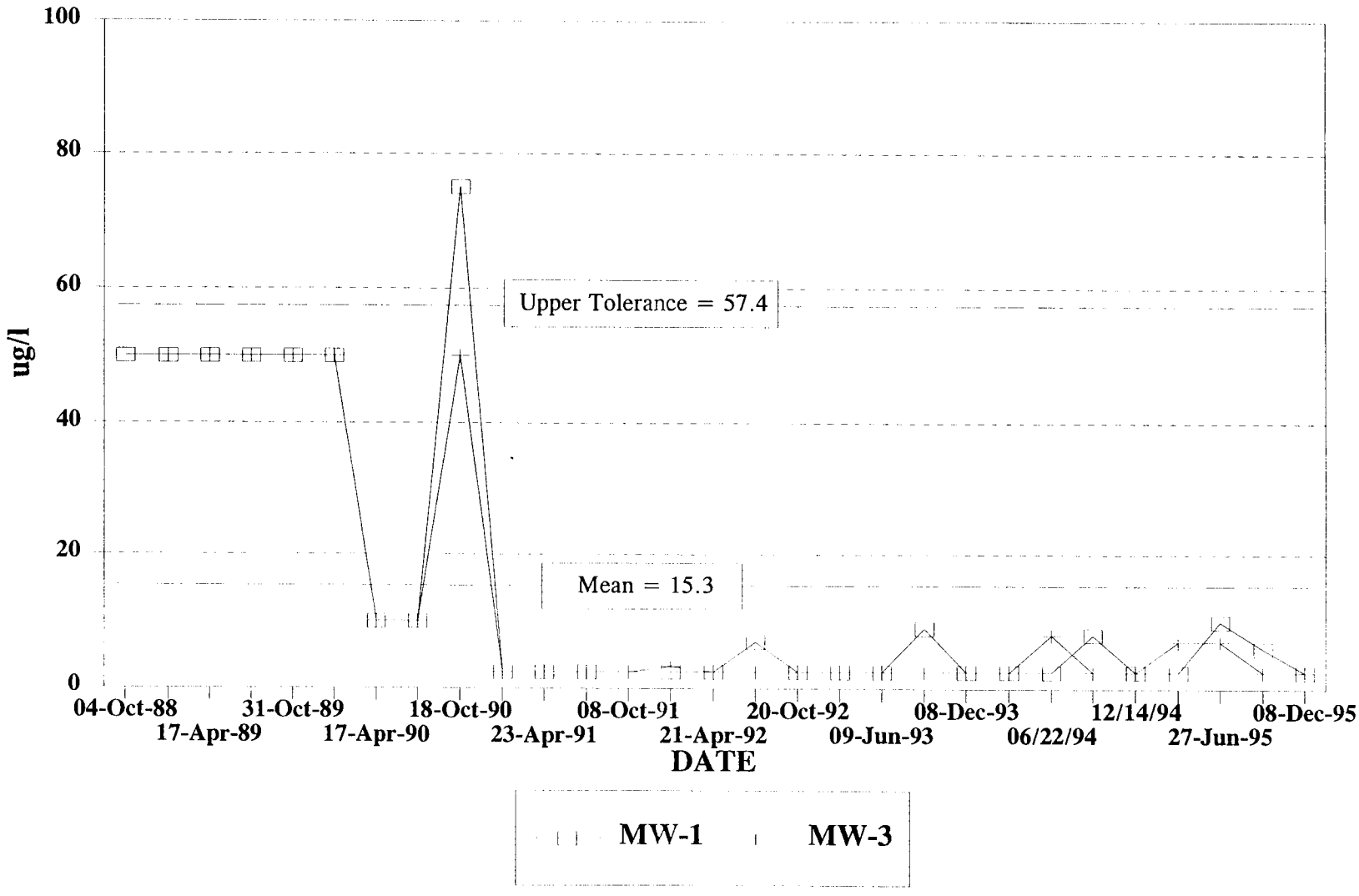
pH
MONITORING WELLS MW-1 AND MW-3



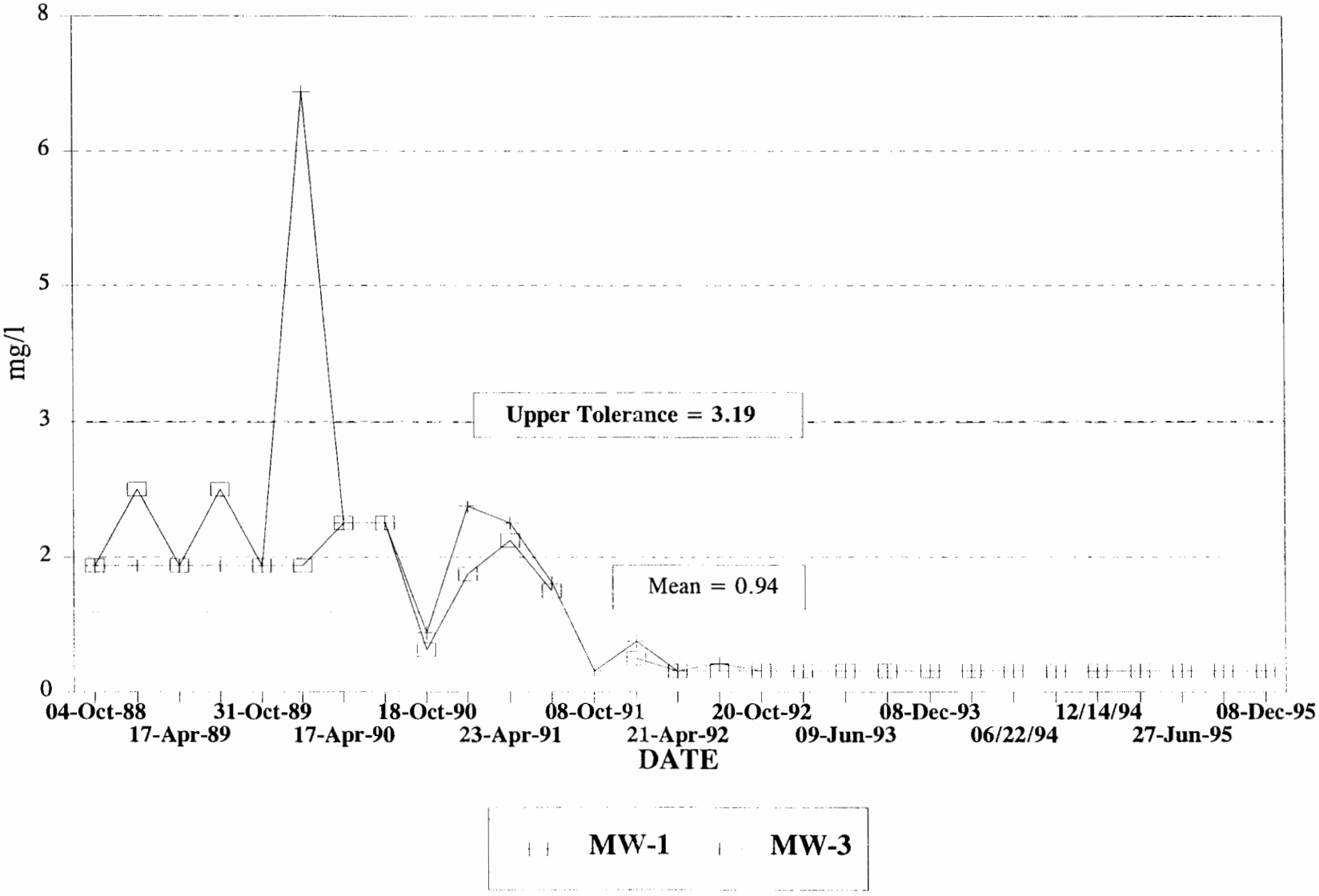
SPECIFIC CONDUCTANCE
MONITORING WELLS MW-1 AND MW-3



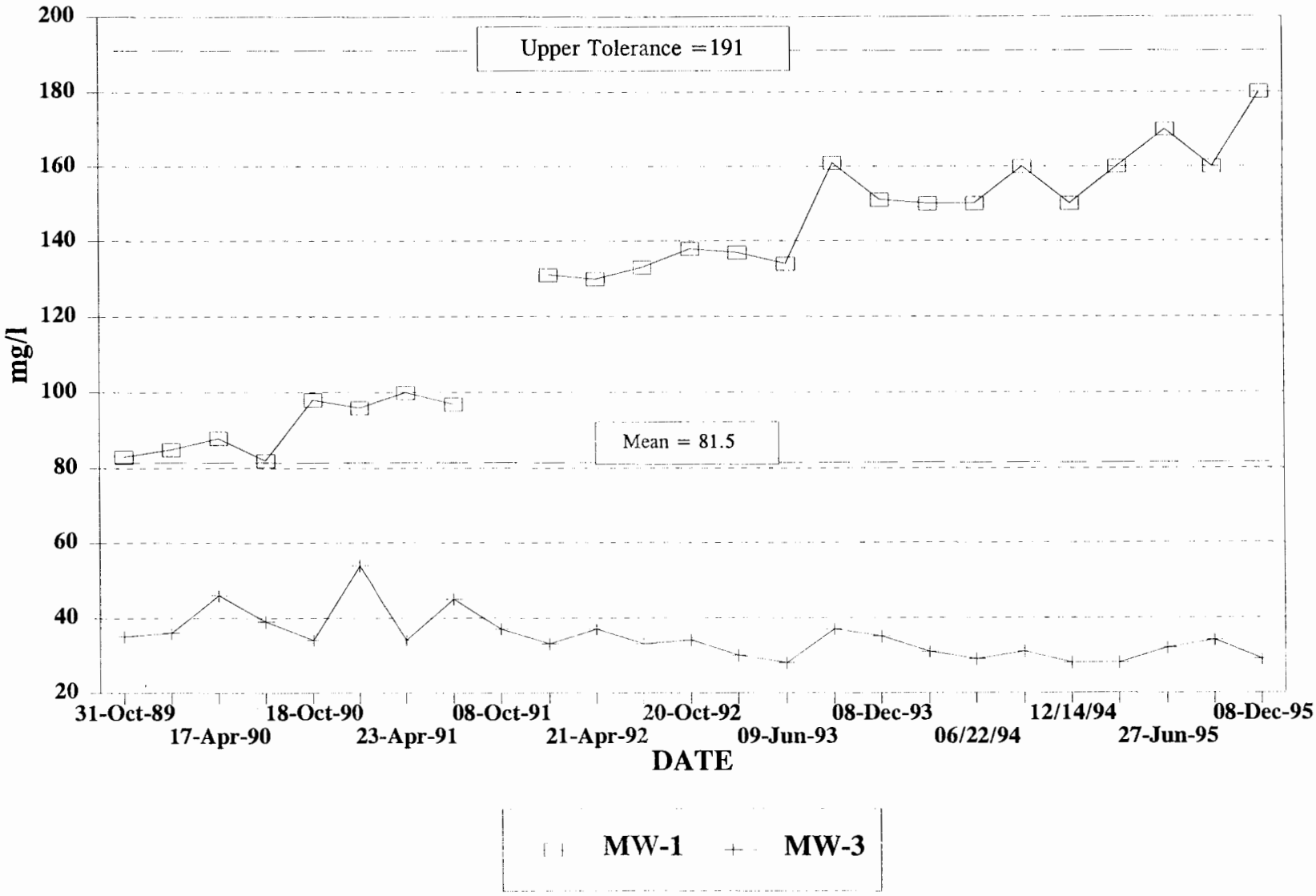
TOTAL ORGANIC HALOGENS
MONITORING WELLS MW-1 AND MW-3



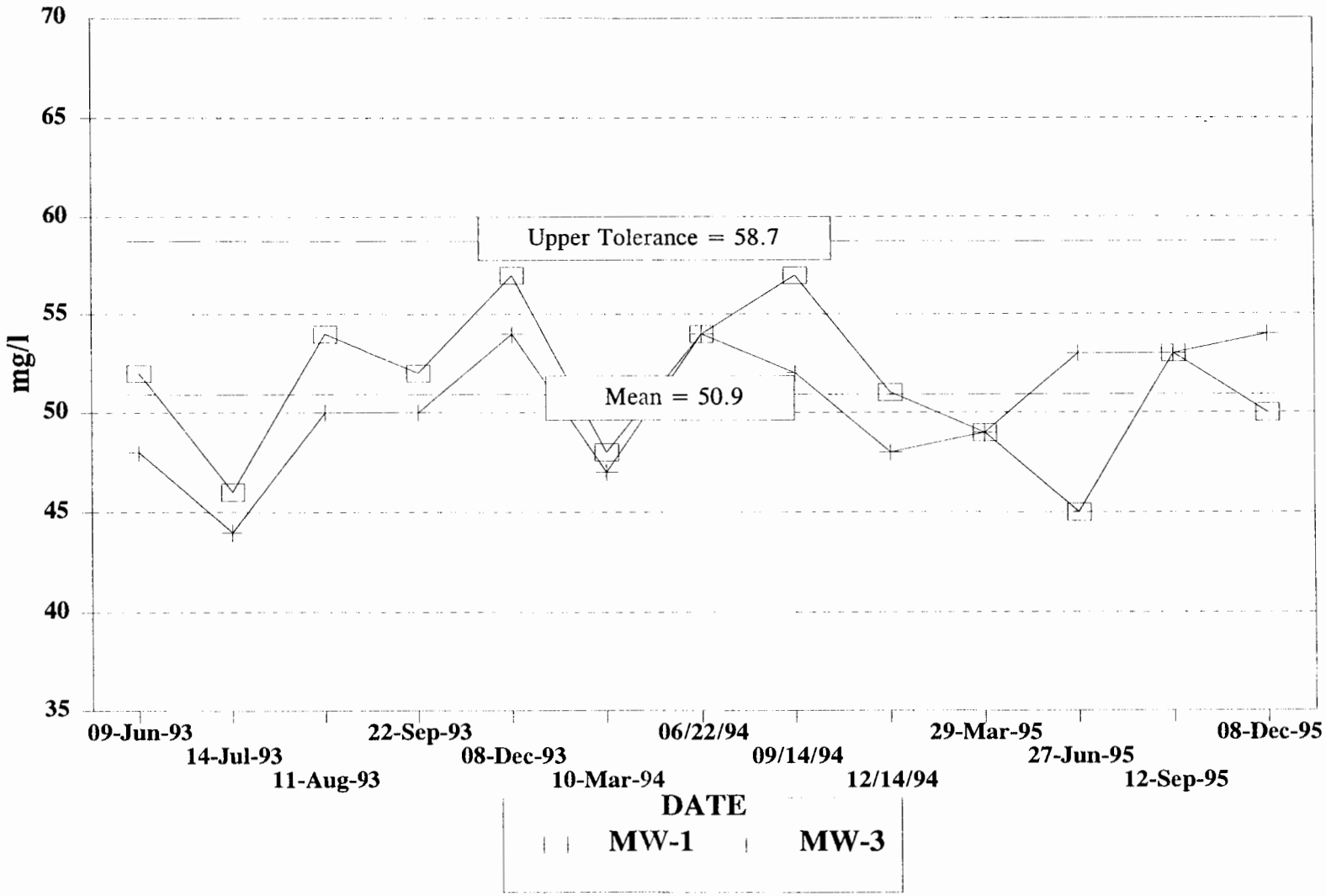
TOTAL ORGANIC CARBON
MONITORING WELLS MW-1 AND MW-3



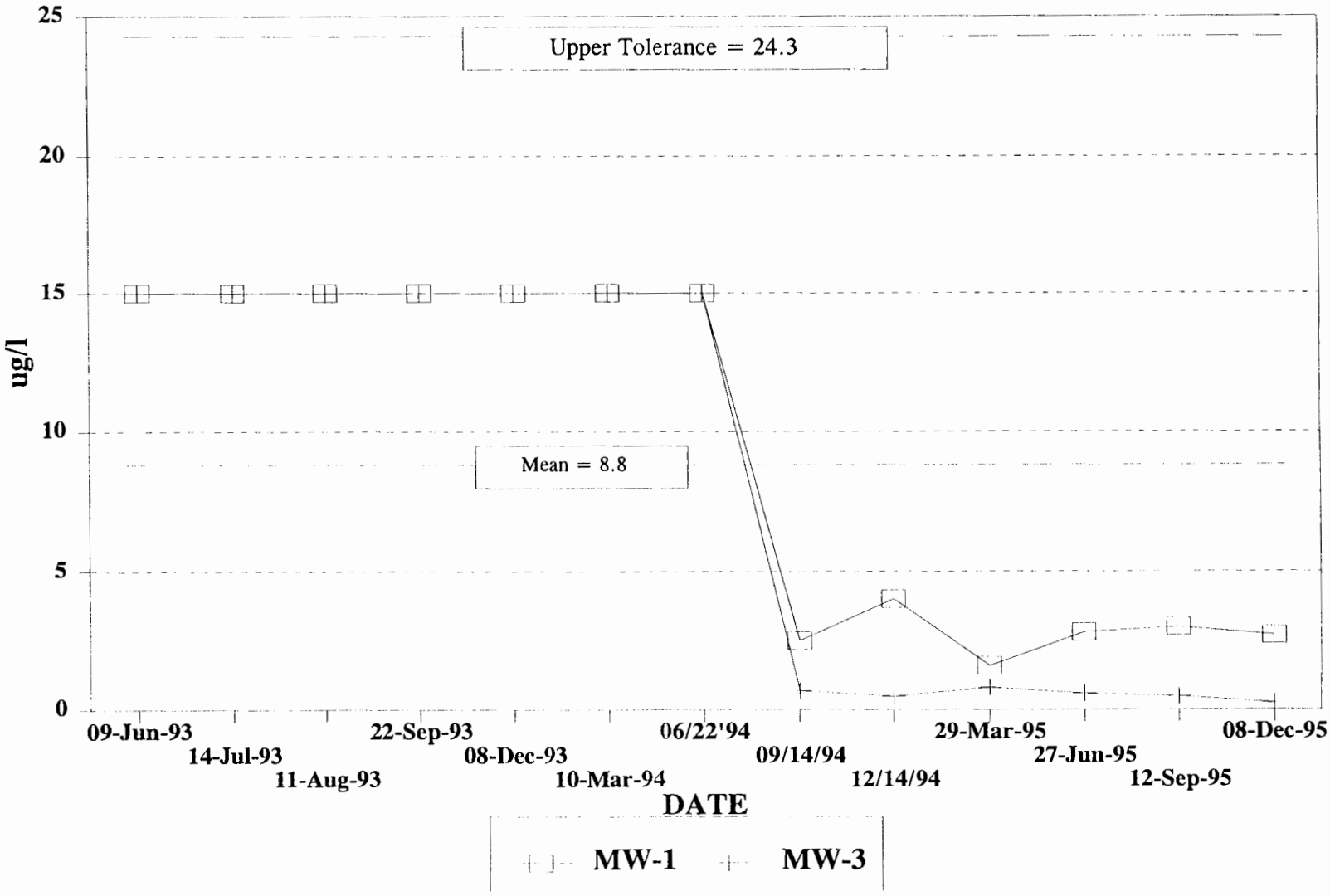
CHLORIDE
MONITORING WELLS MW-1 AND MW-3



SODIUM
MONITORING WELLS MW-1 AND MW-3



MANGANESE
MONITORING WELLS MW-1 AND MW-3



SULFATE
MONITORING WELLS MW-1 AND MW-3