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DECEMBER 27, 2000

Post-Restoration Final Effectiveness Monitoring Report

Penn Mine Environmental Restoration Project

Prepared for
East Bay Municipal Utility District and Regional Water
Quality Control Board - Central Valley Region

Project No. 144069.09.09
December 2000



CH2MHILL

Oakland, California

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1.0 Introduction

This Final Effectiveness Monitoring Report was prepared in compliance with the United States Environmental Protection Agency (EPA) Findings of Violation and Order for Compliance, Docket No IX 309-FY97-20 (309 Order) and the SB1108 Remediation Plan prepared by the East Bay Municipal Utility District (EBMUD) and the Central Valley Regional Water Quality Control Board (RWQCB) (May 1997). The 309 Order and SB1108 Remediation Plan require that EBMUD submit an Effectiveness Monitoring Report within one year following completion of restoration construction, documenting the effectiveness of restoration measures implemented at the site. This report presents results of the fourth quarter of post-restoration monitoring, summarizes the results of water quality monitoring at the Penn Mine site from September 1999 through August 2000, and evaluates the effectiveness of the restoration measures implemented at the site.

The objectives of the Penn Mine site water quality monitoring program are to:

- Refine the water budget and constituent load model for the Penn Mine Site
- Evaluate the effectiveness of mitigation measures implemented as part of the Penn Mine Environmental Restoration Project
- Demonstrate improvements in water quality discharged from the Penn Mine Site over time.

The report is organized as follows:

- Section 2 provides background information on the monitoring and reporting conducted for the Penn Mine site during and after restoration.
- Section 3 describes the post-restoration monitoring program.
- Section 4 presents and discussed the data collected for the fourth quarter reporting period (June through August 2000).
- Section 5 provides an annual summary and discussion of monitoring results.
- Section 6 evaluates the site water budget.
- Section 7 estimates annual copper and zinc loads to Camanche Reservoir for the first year following site restoration.
- Section 8 discusses the effectiveness of the site restoration.
- Section 9 recommends revisions to the water quality monitoring program.
- Section 10 presents the revised monitoring program for the 2000-2001 monitoring season.

2.0 Background

The 309 Order required the EBMUD to implement restoration and water quality monitoring activities at the Penn Mine Site. The approach to monitoring water quality at the site during and after restoration construction is described in the Water Quality Management Plan (WQMP) (Dames and Moore, 1998) that was completed for the site. The WQMP describes monitoring activities for three stages of site restoration: Stage I – Pre-Construction; Stage II – Construction and Restoration; and Stage III – Post-Restoration. Addendum 3 of the WQMP, Monitoring and Evaluation of Stage II Site Activities, presented the water quality monitoring plan for Stage II – Construction and Restoration (CH2M HILL, February 1999). Stage III Post-Restoration Monitoring Activities are described in the Post-Restoration Monitoring Plan (CH2M HILL, December 1999) and the Operations and Maintenance Plan (CH2M HILL, December 1999).

EBMUD reported water quality monitoring results during site restoration (Stage II) and post-restoration (Stage III) in the following reports:

- Interim Effectiveness Monitoring Report (CH2M HILL, April 1999)
- Second Interim Effectiveness Monitoring Report (CH2M HILL, July 1999)
- Post Restoration Quarterly Monitoring Report, September, October, November 1999 (CH2M HILL, February 2000)
- Post Restoration Quarterly Monitoring Report, December 1999, January and February 2000 (CH2M HILL, April 2000)
- Post Restoration Quarterly Monitoring Report, March, April, May 2000 (CH2M HILL, August 2000)

This report is the Final Effectiveness Monitoring Report. Based on the evaluation of data presented herein, EBMUD proposes to complete an annual monitoring report presenting data collected during 2000-2001.

3.0 Description of Monitoring Program

Monitoring during Stage II of the Penn Mine Environmental Restoration Project was conducted in accordance with Addendum 3 of the Water Quality Management Plan. Final restoration elements, principally the use of chemical amendments to neutralize residual acidity in the bedrock and engineered drainage controls, were designed and constructed based on data collected during Stage II monitoring. The post-restoration monitoring program, initiated in September 1999, is designed to assess the effectiveness of restoration elements in reducing water quality impacts to Camanche Reservoir. The program includes: sampling and analysis of surface water; surface water flow monitoring; groundwater sampling and analysis; groundwater elevation measurement; receiving water sampling and analysis; compilation of flow data from Pardee Dam; and compilation of precipitation data from regional rain gauging stations. Monitoring of surface water, receiving water, and groundwater elevation is conducted monthly. Groundwater samples are collected quarterly. Site operation and maintenance (O&M) inspections are conducted monthly.

Monitoring data are used to estimate the mass loads of copper and zinc entering and discharging from the site to Camanche Reservoir. These mass loads are compared to the loadings prior to site restoration. The results are also evaluated to determine the need for site operation and maintenance measures to maintain the effectiveness of restoration elements, by assessing the source of any observed copper and zinc loading to Camanche Reservoir originating from the Penn Mine site.

Post-restoration water quality sampling locations are shown in Figures 1 and 2. Surface and receiving water sample locations are described in Table 1. The chemical analytical program for surface water is summarized in Table 2a, and for receiving water, in Table 2b. Groundwater sampling locations are described in Table 3. The chemical analytical program for groundwater is summarized in Table 4. Sample collection and QA/QC procedures are described in the Post-Restoration Monitoring Plan (CH2M HILL, December 1999).

4.0 Fourth Quarter Monitoring Data

The fourth quarter of the post-restoration period comprises June, July, and August 2000. No precipitation was recorded at the Pardee or New Hogan Stations during this period. Daily rainfall records are provided in Table 5.

4.1 Receiving Water Results

Receiving water samples were collected on June 14, July 12, and August 9, 2000. Field parameters and reservoir data are summarized in Table 6. Laboratory analytical results are summarized in Table 7. Field and laboratory data are included in Appendix A.

4.1.1 Physical Parameters

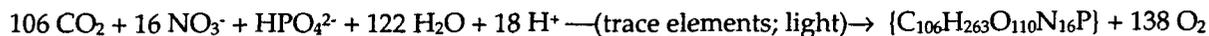
Camanche Reservoir receiving water was characterized once a month during the reporting period at CAMA, upstream of the Penn Mine site, and at Penn20, downstream of the Penn Mine site. The upstream location (CAMA) and downstream location (Penn20) are shown in Figure 2. Temperature, pH, and electrical conductivity were measured at several depths, ranging from the surface to approximately 45 feet below the surface. The resulting measurements, along with the Camanche Reservoir elevation and the outflow from Pardee Dam into Camanche Reservoir, are shown in the Hydrolab Depth Profiles in Appendix A.

Table 6 summarizes the data from three sampling depths (about 10, 20, and 30 feet below the water surface) from each monthly event since post-restoration began in September 1999. Daily outflow data from Pardee Dam to Camanche Reservoir, listed in Table 5, indicate flows ranging from 4 cubic feet per second (cfs) (six days in August) to 1,322 cfs (June 1) during the three-month period.

During the current reporting period, little difference between upstream (CAMA) and downstream (Penn 20) temperature, pH, and conductivity was seen. Temperature, pH, and conductivity decreased with depth at both upstream and downstream stations.

At all depths at both stations, temperature increased from June to August. At the 10-foot depth, pH increased with time, but did not change significantly at 20 and 30 feet. Conductivity changed little over time at 10 feet, while it decreased over time at 20 and 30 feet in the upstream sample and at 30 feet in the downstream sample.

The decrease in pH with increasing depth is attributable to increased photosynthetic algal activity, which depletes dissolved carbon dioxide near the surface, thereby raising the pH at the surface. The overall effect can be expressed in chemical terms by the following equation:



The loss of hydrogen ion and carbon dioxide from the left-side of the equation is what causes the pH to increase seasonally at the surface during active photosynthesis.

4.1.2 Chemical Parameters

Receiving water samples submitted for laboratory analysis are composite water samples collected from three zones representative of the stratified water column, based on temperature, pH, and electrical conductivity. Receiving water samples collected in June and August were composites of samples from depths of 10, 20, and 30 feet. In July, the samples were composites of samples from 12, 24, and 36 feet at CAMA, and from 12, 24, and 46 feet at Penn20. The analytical results of receiving water samples are summarized in Table 7. Compared with results of the previous quarter, more of the chemical parameters reported during the fourth quarter post-restoration monitoring period were near or below practical quantification levels and about the same number of parameters showed increases in concentration as the water moved from upstream to downstream. None of the parameter concentrations consistently increased in value as water moved downstream in Camanche Reservoir during all three months of the fourth quarterly reporting period.

Copper was not detected in upstream or downstream receiving water samples during the reporting period. Zinc was detected at CAMA at concentrations ranging from less than 2.08 to 5.57 $\mu\text{g}/\text{L}$ and at Penn20 from 2.14 to 2.87 $\mu\text{g}/\text{L}$. The upstream zinc concentration was less than the downstream concentration in July (<2.08 vs. 2.29 $\mu\text{g}/\text{L}$, respectively), while in June and August the upstream concentration was greater than the downstream concentration (5.57 vs. 2.87 $\mu\text{g}/\text{L}$, respectively for June and 5.14 vs. 2.14 $\mu\text{g}/\text{L}$, respectively for August).

In addition to zinc, concentration increases between upstream (CAMA) and downstream (Penn20) were noted in alkalinity (July), hardness (July), TDS (June and August), TSS (June), chloride (June), aluminum (July), calcium (June and July), magnesium (June and July), potassium (June and July), sodium (June and July), and sulfate (July). The concentration differences are relatively small and lie within the boundaries of analytical uncertainty.

4.2 Site Surface Water Results

Surface water samples were collected from the Penn Mine site on June 19, July 17, and August 22, 2000. Samples were collected from the established sampling stations that had flow. In addition, a sample from a seep was collected in June and samples from Hinckley Creek were collected in July and August.

In June, samples were collected at PRSW-1, -2, -6, and from a seep located about 10 yards above the Shaft 4 adit (PRSS-3). In July and August, samples were collected from PRSW-2, -6, and from Hinckley Creek below the Adit 4 area (shown as "Hinckley" in Figure 1). Laboratory analytical results are summarized in Table 8. Field and laboratory data sheets are included in Appendix B.

No rainfall occurred during the reporting period. Consequently, runoff from the site was considerably less than in the previous reporting period. Runoff from the site, as measured at PRSW-6 during field sampling events, ranged from 16 gallons per minute (gpm) in June to 2.4 gpm in August.

A sample from PRSW-1 was collected in June. The concentration of copper was 9.54 µg/L, the concentration of zinc was 13 µg/L, and the pH was 6.5. These values were similar to those detected in the previous quarter's samples. The concentration of sulfate, 1.7 mg/L, was lower than that detected in May (5.4 mg/L). Calcium and magnesium concentrations of 13,000 and 11,900 µg/L, respectively, were up from the previous quarter's sample results.

Samples were collected from PRSW-2 in June, July, and August. The pH ranged from 6.5 to 7.1. Copper concentrations were 13.8 µg/L in June, 8.66 µg/L in July, and <15.6 µg/L in August. These concentrations were the lowest detected this monitoring year. Zinc concentrations ranged from 26,200 to 33,200 µg/L and sulfate from 2,600 to 2,800 mg/L. (A duplicate analysis during the June 19, 2000 sampling event was reported to have 37 mg/L of sulfate, but this value is discounted because it is so far removed from previous and subsequent values for the same location.) Calcium concentrations, ranging up to 642,000 µg/L were the highest recorded during post-restoration and magnesium concentrations, > 60,000 to 260,000 µg/L, were the highest recorded since September.

Samples were collected from PRSW-6 in June, July, and August. The pH values, 6.8 to 7.4, were greater than those recorded in the previous quarter. Copper concentrations, < 15.6 to 27.3 µg/L, were significantly lower than the previous quarter's results. Zinc, sulfate, calcium, and magnesium concentrations were higher than the previous quarter's results.

Samples were collected from Hinckley Creek just below the Adit 4 seal area in July and August. The sample pH values were 3.5 and 3.1. Copper concentrations were 2,620 and 2,580 µg/L, zinc concentrations were 25,000 and 18,600 µg/L, and sulfate concentrations were 1,800 and 1,700 mg/L. The low pH, elevated copper, zinc, and sulfate, and the proximity of the sampling location to nearby seeps suggests that this poor quality water is coming from localized, non-point source seepage in the vicinity of the sampling location.

4.3 Groundwater Results

Groundwater samples were collected from onsite wells by Alisto Engineers on July 19, 2000. The well locations are shown in Figure 1. Samples were analyzed by the EBMUD laboratory. Field and laboratory data sheets are provided in Appendix C. Laboratory analytical results are summarized in Table 9.

Groundwater elevations were measured on June 23, July 19, and August 24, 2000 and recorded on monthly well inspection logs (Appendix D). Groundwater elevations are summarized in Table 10.

As described in the Post-Restoration Monitoring Plan, wells PRGW-1 and -2 are included in the monitoring program to monitor the quality of groundwater entering Hinckley Run and wells PRGW-4, -5, -6, and -7 are included to monitor the quality of groundwater entering Mine Run. PRGW-2, -4, and -5 were dry during the July 19, 2000 sampling event. The pH values of samples from PRGW-1, -6, and -7 were lower than the previous quarter, particularly for PRGW-6 where the pH decreased from 5.4 in April to 3.0 in July. Compared to results from the previous quarter, the concentration of copper increased in samples from PRGW-1, -7 -6. The

concentration of zinc in PRGW-1 increased from 1,130 µg/L in April to 2,340 µg/L in August, while zinc concentrations decreased in PRGW-6 and PRGW-7. Sulfate concentrations increased in PRGW-1 and decreased in PRGW-6 and -7. Overall however, decreases in pH in these wells had minimal impact on the constituent concentrations.

Well PRGW-8 was included in the program to monitor the quality of groundwater in shallow bedrock in Mine Run. This well was dry during the July 19, 2000 sampling event.

PRGW-3 is located upland, just above (immediately east of) Hinckley Run, and is the former USGS well GS-18 that intercepts upper portions of the old mine workings. Although PRGW-3 was included in the monitoring program to monitor the water level in the mine workings, water quality data were also collected during this first post-restoration monitoring year. The pH of the sample from PRGW-3 was 2.3, down from 3.0 measured in April. The copper concentration decreased significantly, from 1,150 µg/L in April to 428 µg/L in August. Between April and August, zinc increased from 2,980 to 4,510 µg/L and sulfate increased from 460 to 700 mg/L.

Wells PRGW-9, -10, -11, and -12, located at the inlet to Camanche Reservoir, were included in the monitoring program to monitor the quality of groundwater exiting the site in deep bedrock. PRGW-10, -11, and -12 were not sampled during this reporting period because they were submerged. PRGW-9 differs from the other three wells by being slightly more upland, being slightly deeper, and intercepting the fault and fractures that underlie the former Mine Run Reservoir. The pH of the sample from PRGW-9 decreased from the previous sampling period from 5.5 measured in April to 4.66 measured in August. Copper, zinc, and sulfate concentrations showed decreases from the April sampling event.

4.4 Quality Assurance/Quality Control

Field duplicate samples were collected during each receiving water, surface water, and groundwater sampling events. Results of field duplicate samples are included in the analytical summary tables along with results of the primary samples. Results of field duplicates were in general agreement with the associated primary samples, with the following exceptions:

- In the June 19 surface water sample from PRSW-2, the sulfate concentration was 2600 mg/L. The sulfate concentration in the sample duplicate was 37 mg/L. (This value is discounted because other constituents in this sample such as calcium, magnesium and sodium were considerably higher in concentration, and the low sulfate value would violate the requirement for solution electroneutrality.)
- In the June 14 receiving water sample from CAMA, the aluminum concentration was 140 µg/L. The aluminum concentration in the sample duplicate was 40 µg/L.

Laboratory QA/QC procedures include the analysis of laboratory control samples and of matrix spike/matrix spike duplicate samples. Laboratory QA/QC spikes were within the calibration range during this reporting period. Aluminum, calcium, copper, magnesium, and zinc were detected in laboratory method blanks during this quarter, as indicated on the analysis summary tables. The method blank results were considered during the evaluation of sample results. The amount detected in the blank versus the amount detected in the samples is summarized below.

<u>Sample Type/Month</u>	<u>Parameter</u>	<u>Detected in Blank</u>	<u>Detected in Samples</u>
Receiving Water/June	Magnesium	9.41 µg/L	1,320 to 1,360 µg/L
Receiving Water/July	Aluminum	21.2 µg/L	18.7 to 35.3 µg/L
Receiving Water/July	Calcium	151 and 22.1 µg/L	3,570 to 3,650 µg/L
Receiving Water/July	Zinc	4.4 and 4.94 µg/L	< 2.08 to 2.29 µg/L
Receiving Water/August	Copper	18.6 µg/L	< 3.12 to 3.13 µg/L
Surface Water/June	Aluminum	18.6 and 21.1 µg/L	45.6 to 18,200 µg/L
Surface Water/July	Magnesium	5.58 and 6.66 µg/L	73,100 to 232,000 µg/L
Groundwater/July	Magnesium	4.98 µg/L	16,700 to 378,000 µg/L

4.5 Site Inspections

Routine inspection of the site was conducted on June 22, July 15, and August 25, 2000. The inspection forms and photographs are included in Appendix E. Evidence of trespassing (vehicle tire marks), apparently for off-road joyriding, and vandalism of gates and fencing were observed during the reporting period. EBMUD field staff continues to repair and reinforce fences and gates at the site.

5.0 Summary of Annual Water Quality Monitoring Results

5.1 Precipitation

As shown below, 24.11 inches of rainfall were recorded at the Pardee Station between September 1, 1999 and August 31, 2000. The Pardee Station is located about 3 miles northeast of the Penn Mine Site. January and February experienced the most rainfall, with 6.18 and 8.45 inches, respectively. No precipitation was recorded in September 1999 and June through August 2000. Light to moderate rain fell during the other months.

Month	Precipitation (inches)
September 1999	0
October 1999	0.43
November 1999	3.38
December 1999	0.14
January 2000	6.18
February 2000	8.45
March 2000	1.61
April 2000	1.67
May 2000	2.25
June 2000	0
July 2000	0
August 2000	0
Total	24.11

5.2 Receiving Water

Between September 1, 1999 and August 31, 2000 monthly water samples were collected from Camanche Reservoir, both upstream (CAMA) and downstream (Penn20) of the Penn Mine site. Field measurements of pH, conductivity, and temperature were taken at several depths from the water surface to about 45 feet below the surface. A composite of samples from three depths, generally about 10 feet, 20 feet, and 30 feet below the reservoir surface, was analyzed for the set of parameters listed in Table 2b by the EBMUD laboratory. [The January 2000 sample was exceptional, with the CAMA and Penn20 samples being single samples (rather than composites) collected from depths of 35 feet and 40 feet, respectively.]

Water quality was generally consistent throughout the monitoring season and little difference was noted between upstream and downstream water quality.

Copper. Copper was not detected above the reporting limit (2.08 to 3.54 µg/L) in the upstream sample during the reporting year. In the downstream sample, copper was only detected once: in the sample collected in February at a concentration of 3.54 µg/L.

Zinc. In the upstream sample, zinc concentration ranged from < 2.08 to 9.29 µg/L, with an average of 3.77 µg/L. In the downstream sample, zinc concentrations ranged from 2.12 to 20.7 µg/L, with an average of 7.48 µg/L. In seven of the twelve sampling events, zinc concentrations were higher in the downstream sample than in the upstream sample. The sampling events in which the zinc concentrations were higher in the upstream sample than in the downstream sample, or very close in the two samples, were during months with light or no precipitation.

pH. The pH values of upstream and downstream samples were very similar throughout the year. In the upstream samples, pH ranged from 7.0 to 7.6, with an average of 7.2. In the downstream sample, pH ranged from 7.1 to 7.8, with an average of 7.3.

Sulfate. Sulfate concentrations in upstream and downstream samples were similar throughout most of the year. In the upstream sample, sulfate concentrations ranged from 1.2 to 2.7 mg/L, averaging 1.8 mg/L. Sulfate concentrations in the downstream sample ranged from 1.4 to 3.6 mg/L, with an average of 2.1 mg/L. The biggest differences between upstream and downstream sample concentrations (with downstream being higher) were seen in January and February, the months of highest precipitation.

Calcium. In the upstream sample, calcium concentrations ranged from 3,170 to 4,910 µg/L, with an average of 3,971 µg/L. In the downstream sample, calcium concentrations ranged from 3,310 to 4,900 µg/L, with an average of 3,937 µg/L. The greatest difference between upstream and downstream calcium concentrations was seen in January and March, when the upstream sample calcium concentration was higher than the downstream concentration by 440 and 240 µg/L, respectively.

Magnesium. In the upstream sample, magnesium concentrations ranged from 920 to 2,040 µg/L, with an average of 1,370 µg/L. In the downstream sample, magnesium concentrations ranged from 1,030 to 1,720 µg/L, with an average of 1,365 µg/L.

5.3 Surface Water

The first post-restoration surface water samples were collected in November 8, 1999 following the first significant rainfall event, and were collected monthly thereafter through August 2000. Surface water samples were collected from the established sampling locations described in Table 1 (when there was flow) and from seeps observed in Hinckley Run. The samples were analyzed for the parameters listed in Table 2a by EBMUD's laboratory. Surface water sample results are discussed below, focusing on pH, copper, zinc, magnesium, calcium, and sulfate, the primary indicators of mine site impacts. Table 11 summarizes the annual surface water results for these parameters.

5.3.1 Upstream Hinckley Run (PRSW-1)

PRSW-1 is located at the top of Hinckley Run. Samples were collected in November 1999, and from January through June 2000. There was no flow during the sampling events of December 1999, and July and August 2000.

The highest copper concentration, 42.9 µg/L, was detected in January and the lowest, 9.54 µg/L, in June. Zinc concentrations ranged from 8.27 to 305 µg/L. Sulfate concentrations ranged from 1.7 to 35 mg/L. The higher concentrations of copper, zinc, and sulfate were detected in the first part of the season. No clear relationship between concentration and flow is evident, although sulfate data suggest a seasonal "first flush" effect. The range of pH values was 6.4 to 8.0.

The range of calcium concentrations was 2,930 to 19,300 µg/L. Magnesium concentrations ranged from 2,580 to 11,900 µg/L. Calcium and magnesium concentrations have an approximately inverse relationship with flow.

5.3.2 Upstream Mine Run (PRSW-3 and PRSW-4)

PRSW-3 and PRSW-4 are located on two streams above Mine Run that combine to form Mine Run Creek. Samples were collected from PRSW-3 in January and February 2000. There was no flow in PRSW-3 at the time of the other sampling events. Samples were collected from PRSW-4 in January, February, March, and April 2000. There was no flow in PRSW-4 at the time of the other sampling events.

Copper concentrations in samples from PRSW-3 and PRSW-4 were similar. The average concentration was 96.2 µg/L in PRSW-3 and 96.0 µg/L in PRSW-4. The range of copper concentrations was 44.3 to 148 µg/L in PRSW-3 and was 33.3 to 173 µg/L in PRSW-4. In PRSW-3, zinc concentrations ranged from 31.4 to 150 µg/L, with an average of 90.7 µg/L. In PRSW-4, zinc ranged from 92.1 to 425 µg/L, with an average of 239 µg/L. Sulfate concentrations in PRSW-3 ranged from 1.5 to 2 mg/L. Sulfate concentrations in PRSW-4 were higher: the range was 8.6 to 100 mg/L, again suggesting a "first flush" effect. The pH range was 5 to 6.3 in PRSW-3 and 3.5 to 6.4 in PRSW-4.

Calcium concentrations in PRSW-3 samples ranged from 3,110 to 2,840 µg/L. In PRSW-4, calcium ranged from 2,520 µg/L to 9,610 µg/L. Magnesium concentrations in PRSW-3 ranged from 1,640 to 2,190 µg/L while in PRSW-4, the range was 2,700 µg/L to 12,800 µg/L.

Mine waste piles remaining upstream of PRSW-4 are a likely factor in water quality differences observed between PRSW-3 and PRSW-4.

5.3.3 Downstream Hinckley Run (PRSW-2)

PRSW-2 is located at the downstream end of Hinckley Run. Samples were collected monthly from November 1999 through August 2000.

Copper concentrations ranged from 8.66 to 5,420 µg/L. Concentrations generally decreased from November (998 µg/L) to February (271 µg/L) but increased significantly in March (3,120 µg/L) at the same time that a seep (PRSS-3, described below) was first observed upstream of PRSW-2. The copper concentration did not exceed about 1,000 µg/L when the pH was above

about 6.5, as illustrated in Figure 3. As a consequence, the copper mass load leaving Hinckley Run was approximately proportional to the flow rate, excluding the pH values of 3.7 and 5.3 (Figure 4). This suggests that the copper concentration may be limited by the solubility of a compound such as copper carbonate or basic carbonate (through contact with the limestone that was applied to the site). Copper concentrations were lowest at the end of the season: 13.8 µg/L in June, 8.66 µg/L in July, and 15.6 µg/L in August.

Zinc concentrations ranged from 1,760 to 129,000 µg/L. The highest concentration was detected in December and the lowest in February. Sulfate concentrations ranged from 190 mg/L detected in February to 3,500 mg/L detected in December. For zinc and sulfate, there is an inverse relationship between flow and concentration, as shown in Figures 5 and 6, respectively. In contrast with copper, the zinc mass load from the site rose five-fold over an approximately 400-fold increase in flow rate (Figure 7). This behavior is consistent with zinc oxidizing at a relatively constant rate, independent of site hydraulic conditions. The pH measured in PRSW-2 samples ranged from 3.7 to 7.3, with an average of 6.2. The low pH of 3.7 corresponds to the appearance of the seep, PRSS-3.

Calcium concentrations ranged from 37,200 to 642,000 µg/L. There appears to be an inverse relationship between flow and calcium concentration. Magnesium concentrations ranged from 17,000 to 279,000 µg/L and averaged 117,980 µg/L. Although there appears to be an inverse relationship between concentration and flow, it is less consistent than that for zinc, sulfate and calcium.

The concentrations of copper, zinc, sulfate, calcium, and magnesium detected in PRSW-2 were significantly higher than in the upstream sample PRSW-1. Values of pH were slightly lower in PRSW-2 than in PRSW-1, except for the May sampling event where the pH at PRSW-2 of 3.7 was significantly lower than the pH at PRSW-1 (6.7).

5.3.4 Downstream Mine Run (PRSW-5)

PRSW-5 is located in Mine Run about midway between the top of Mine Run and the confluence of Mine and Hinckley Runs. Samples were collected from PRSW-5 from November 1999 through April 2000.

Copper concentrations ranged from 306 to 7,400 µg/L. As at other locations within the site boundaries, the copper concentration was below about 1,000 µg/L whenever the pH was above about 6.5. These downstream concentrations in Mine Run (PRSW-5) were generally higher than those detected at the downstream end of Hinckley Run (PRSW-2).

Zinc concentrations ranged from 1,530 to 17,000 µg/L. There is an inverse relationship between flow and copper and zinc concentrations, as indicated in Figures 8 and 9, respectively (after the highest copper concentration, 7,400 µg/L, which coincided with the lowest pH was eliminated). The copper and zinc mass loads are shown in Figures 10 and 11, respectively .

Sulfate concentrations in samples from PRSW-5 ranged from 120 to 2,900 mg/L. Values of pH ranged from 6.0 to 6.8. These values are higher than those of upstream samples (PRSW-3 and PRSW-4).

Calcium concentrations ranged from 24,900 to 324,000 $\mu\text{g}/\text{L}$ and magnesium ranged from 17,900 to 156,000 $\mu\text{g}/\text{L}$.

The concentrations of copper, zinc, sulfate, calcium, and magnesium were significantly higher at PRSW-5 than in the upstream samples from PRSW-3 and -4.

5.3.5 Outflow to Camanche Reservoir (PRSW-6)

PRSW-6 is located just below the confluence of Mine Run and Hinckley Run Creeks. The flow from PRSW-6 discharges to Camanche Reservoir. Samples were collected from PRSW-6 from November 1999 through August 2000.

The copper concentrations ranged from 15.6 to 4,790 $\mu\text{g}/\text{L}$. The lowest concentration was detected in August. The highest concentrations were detected in March and May when the seep in Hinckley run was flowing and the pH was below about 6.5. The copper concentration remained below about 1,000 $\mu\text{g}/\text{L}$ over an approximately 590-fold range of flow rates, as illustrated in Figure 12. Excluding two copper data points during a time when the pH at PRSW-6 was below about 6.5, there is an approximately linear relationship between hydraulic flow rate and copper mass load from the site (Figure 13). The combination of consistent copper concentrations over a large flow range, and copper mass load proportional to flow is consistent with the immobilization of copper as a carbonate or basic carbonate compound forming on the limestone surfaces. The dependence of copper concentration on pH is illustrated in Figure 14, which shows the site-wide relationship between pH and the dissolved copper concentration.

Zinc concentrations ranged from 1,880 to 116,000 $\mu\text{g}/\text{L}$. There is an inverse relationship between flow and zinc concentration in PRSW-6, as shown in Figure 15. The zinc mass load rose rapidly at low flow rates, and tapered off approximately asymptotically at high flows, as shown in Figure 16. This behavior is consistent with zinc (possibly sphalerite) oxidizing at a relatively constant rate throughout the site, and showing weak dependence on the hydraulic rate of discharge from the site.

Sulfate ranged from 210 to 3,400 mg/L . The highest concentration was detected in December when the lowest flow was recorded. The lowest concentration corresponds to the highest flow in February. The pH range was 4 to 7.4. The low of 4 corresponds to the low pH in PRSW-2 (downstream Hinckley Run) when the seep, PRSS-3, was flowing. At PRSW-6 the sulfate concentration was inversely proportional to the flow rate and, similar to zinc, the mass load leveled off at higher flows (Figures 17 and 18).

Calcium ranged from 41,000 to 704,000 $\mu\text{g}/\text{L}$. An inverse relationship between calcium concentration and flow is seen in the data. Magnesium ranged from 20,600 to 264,000 $\mu\text{g}/\text{L}$. Although less consistent than for calcium, there is an inverse relationship between flow and magnesium concentration in PRSW-6.

5.3.6 Runoff From Former Shoreline Pile Area (PRSW-7)

PRSW-7 is located on the slope below the former shoreline pile. Samples were collected from PRSW-7 in January, February, and April 2000.

Copper concentrations ranged from 737 to 1,940 µg/L. Zinc concentrations ranged from 1,700 to 3,410 µg/L. Sulfate concentrations ranged from 450 to 1,200 mg/L. Copper, zinc, and sulfate concentrations decreased with each sampling event, suggesting that a limited inventory of dissolved constituents is being depleted. Concentrations detected in April were one-half or less the concentrations detected in January. Values of pH remained consistent, ranging from 4.4 to 4.6.

Calcium and magnesium concentrations also decreased over the sampling period. Calcium concentrations ranged from 108,000 to 178,000 µg/L and magnesium concentrations ranged from 54,600 to 62,000 µg/L.

5.3.7 Hinckley Run Seeps (PRSS Samples)

Three seeps were observed in Hinckley Run and were sampled. The first, PRSS-1, was observed and sampled in January, but was later determined to be surface runoff, rather than a seep from the subsurface. PRSS-1 is located at the bottom of the large bowl on the east side of Hinckley Creek. PRSS-2 was located in the vicinity of Adit 4 and was sampled once in February. The third seep, PRSS-3, was located about ten yards upstream from the Adit 4 area and was sampled in March, May, and June.

In July and August, the PRSS-3 seep was not flowing on the ground surface but was believed to be flowing through the subsurface into Hinckley Creek. To evaluate the effect of the limestone drain downstream of the Adit 4 area, samples were collected from the flow in Hinckley Creek just below the Adit 4 seal where the limestone drain begins. These samples are referred to as "Hinckley" in Table 8 and Figure 1.

PRSS-1, the surface flow sample collected in January, had a pH of 6.1, 1,060 µg/L of copper, 6,050 µg/L of zinc, and 1,100 mg/L of sulfate. Calcium and magnesium concentrations were 165,000 and > 60,000 µg/L, respectively. The copper, zinc, sulfate, calcium, and magnesium concentrations are well above the concentrations detected in upstream PRSW-1 samples, indicating that the surface flow sampled was affected by contributions from within the mine site.

Seep PRSS-2, located near Adit 4, had a pH of 3.6, 1,590 µg/L copper, 13,000 µg/L zinc, and 2,300 mg/L sulfate. Calcium and magnesium concentrations were also elevated.

The pH of the PRSS-3 samples, 2.2 to 3.3, are the lowest detected to date in onsite surface water during the post-restoration period. Copper concentrations ranged from 5,000 to 6,030 µg/L. Zinc concentrations ranged from 9,270 to 17,100 µg/L. Sulfate ranged from 610 to 1,500 µg/L.

The two samples from Hinckley Creek had pH values of 3.5 and 3.1. Copper concentrations were 2,620 and 2,580 µg/L and zinc concentrations were 25,000 and 18,600 µg/L.

The seeps observed above the channel in the vicinity of Adit 4 are likely the result of groundwater/mine water seeping out around the seal. The effect of the seeps on downstream water quality (PRSW-2 and -6) was most noticeable early in the season. This was possibly because the stream channel was saturated at that time and flow from the seep did not get into the treatment zone of the channel.

5.4 Groundwater

Groundwater samples were collected on a quarterly basis from a network of 12 monitoring wells. Samples were collected in October 1999 and January, April, and July 2000. Well locations are shown in Figure 1 and described in Table 3. The samples collected were analyzed for the parameters listed in Table 4 by EBMUD's laboratory. Groundwater sample results are discussed below, focusing on pH, copper, zinc, magnesium, calcium, and sulfate, the primary indicators of mine site impacts. Table 12 summarizes the annual groundwater results for these parameters.

5.4.1 Groundwater Entering the Site

Hinckley Run. Groundwater entering Hinckley Run is represented by samples from wells PRGW-1 and PRGW-2.

Well PRGW-1 was sampled quarterly during post-restoration. The pH of samples from PRGW-1 ranged from 5.49 to 6.2. Copper concentrations averaged 69.5 µg/L, zinc averaged 1,478 µg/L, and sulfate averaged 87 mg/L. Copper and zinc concentrations showed an increasing trend from October 1999 to August 2000. The average concentration of magnesium was 26,400 µg/L and of calcium was 32,750 µg/L.

Well PRGW-2 was sampled once during post-restoration, in April 2000. The pH of the sample from PRGW-2 was 5.1. Concentrations of copper, zinc, sulfate, magnesium, and calcium were considerably lower than those detected in PRGW-1.

Mine Run. Groundwater entering Mine Run is represented by samples from wells PRGW-5, -6, and -7.

Well PRGW-5 was sampled once during post-restoration, in April 2000. The sample pH was 6.9, higher than samples from the other wells intercepting incoming groundwater. The concentration of copper was 36 µg/L, zinc was 233 µg/L, and sulfate was 71 mg/L. Magnesium and calcium concentrations were 7,040 and 66,200 µg/L, respectively. These concentrations of zinc, sulfate, magnesium, and calcium were significantly lower than concentrations in wells PRGW-6 and -7. PRGW-5 appears to monitor shallower groundwater than do PRGW-6 and -7.

Wells PRGW-6 and -7 were sampled quarterly during post-restoration. Values of pH ranged from 3 to 5.4 in PRGW-6 and from 5.19 to 5.88 in PRGW-7. Copper concentrations in PRGW-6 averaged 48 µg/L while in PRGW-7 they averaged 1,318 µg/L. The average zinc concentration was 81,925 µg/L for PRGW-6 and 29,025 µg/L for PRGW-7; sulfate was 1,318 mg/L for PRGW-6 and 5,019 mg/L for PRGW-7; magnesium was 107,000 µg/L for PRGW-6 and 442,750 µg/L for PRGW-7; and calcium was 249,000 µg/L for PRGW-6 and 392,000 µg/L for PRGW-7. The data for wells PRGW-6 and -7 indicate no apparent concentration trends.

Concentrations of zinc, sulfate, magnesium, and calcium were considerably higher in the groundwater entering Mine Run than in the groundwater entering Hinckley Run.

5.4.2 Groundwater in Mine Workings

Groundwater in the mine workings is represented by samples from well PRGW-3, which was sampled quarterly during post-restoration. The pH of samples from PRGW-3 ranged from 2.3 to

3.79. The average copper concentration was 493 µg/L. Concentrations of zinc, sulfate, magnesium, and calcium were significantly lower in PRGW-3 than in the incoming water to Mine Run. This suggests that some stratification of fresh water above old mine water may be occurring. If so, as older mine water drains, the quality of some of the mine-associated seeps might improve.

5.4.3 Groundwater in Shallow Bedrock in Mine Run

Groundwater in shallow bedrock in Mine Run is represented by samples from well PRGW-8, which was sampled two times during post-restoration, in January and April 2000. The average pH of groundwater from PRGW-8 was 7.0. Average concentrations of copper and zinc in PRGW-8 samples, 6.74 and 18 µg/L, respectively, were much lower than concentrations in samples representing incoming groundwater to the site.

5.4.4 Groundwater Exiting the Site in Bedrock

Groundwater exiting the site in bedrock is represented by samples from PRGW-9, -10, -11, and -12.

Well PRGW-9 was sampled quarterly during the post-restoration period. As mentioned in Section 4, PRGW-9 differs from PRGW-10, -11, and -12 by being slightly more upland, being slightly deeper, and intersecting the fault and fractures that underlie the former Mine Run Reservoir. The pH of samples from PRGW-9 ranged from 4.66 to 6.99. The average concentrations of copper and zinc were 1,990 and 57,100 µg/L, respectively. Zinc concentrations showed a decreasing trend over time. The average sulfate concentration was 2,731 mg/L. Magnesium and calcium averages were 333,250 and 340,000 µg/L, respectively. The concentrations of copper, zinc, sulfate, magnesium, and calcium are significantly higher than those recorded in samples from PRGW-10, -11, and -12. Because the fault and fractures provide a preferred pathway for groundwater flow, the quality of water observed at PRGW-9 is poorer than that seen in the other down-gradient wells.

Wells PRGW-10, -11, and -12 were sampled in October, January, and April. The wells were not sampled in July because they were submerged by reservoir water. The average pH values of samples from these three wells were similar, ranging from 6.4 to 6.6. Concentrations of other parameters varied from well to well. The average copper concentration ranged from 20.4 to 54.4 µg/L, the average zinc concentration ranged from 130.7 to 1,128.7 µg/L, and the average sulfate concentration ranged from 25.5 to 95 mg/L. Average magnesium concentrations ranged from 4,327 to 12,767 µg/L. Calcium concentration averages ranged from 7,163 to 26,067 µg/L. In PRGW-10 and -11, concentrations of copper, zinc, sulfate, magnesium, and calcium consistently decreased between October and April. Following restoration, there was an abrupt improvement in the water quality in wells PRGW-10, 11, and 12. Once the poor quality water was displaced, the concentrations have remained very low compared to the initial conditions.

6.0 Water Budget Analysis

This section describes the post-restoration water budget for the Penn Mine site for the 310-day period from October 27, 1999 (the first rainfall of 2000-20001 water year) to August 31, 2000. The Penn Mine site, 60.4 acres in total area, is set within a larger watershed (464 acres). The 60.4 acre site is essentially the discharge area of the larger watershed, and consists of two drainages: Hinckley Run and Mine Run. During the dry season (early May to late October) the upper reaches of Mine Run drain completely. The upper reaches of Hinckley Run drain completely, but later in the season than Mine Run.

6.1 Previous Work

Water budgets were prepared for the site under pre-restoration, during restoration, and (estimated) post-restoration conditions (CH2M HILL, July 1999). The water budget presented in this document is generally consistent with previous concepts and terminology. However, some slight modifications have been made to better accommodate post-restoration site conditions and new data obtained during the first full year after restoration was completed. These modifications are detailed below:

Generic Budget Component	Post-restoration Description	Previous Description
Precipitation	Direct Precipitation (Q_1)	Inflow from Direct Precipitation (Q_1)
Recharge to Site Surface Water from Site Groundwater	Flow from Weathered Bedrock to Site Surface Water via Seeps	Groundwater Inflow from Shallow Bedrock and Shaft 4 (Q_2)
Recharge to Site Surface Water from Up-gradient Surface Water	Run-On – channel flow (Q_6) Run-On – overland flow (assumed = 0)	Upland Watershed Inflow – Surface Water and shallow alluvial groundwater (Q_6)
Evapotranspiration	Evapotranspiration (Q_3)	Evapotranspiration (Q_3)
Discharge of Site Surface Water to Camanche Reservoir	Site Surface Water Discharge to Camanche (Q_4)	Surface Water and Shallow Alluvial Groundwater Discharge to Camanche Reservoir (Q_4)
Discharge of Site Groundwater at Discharge Boundary	Subsurface Flow from Bedrock offsite at Discharge Boundary ("Subsurface Discharge") Acid Rock Drainage Impacted Subsurface Flow from Bedrock offsite at Discharge Boundary to Camanche (Q_5)	Groundwater Discharge from Shallow Bedrock to Camanche Reservoir (Q_5)
Recharge to Site Groundwater from Site Surface Water	Percolation to Weathered Bedrock from Site Surface Water	None
Recharge to Site Groundwater from Up-Basin Groundwater	Subsurface Flow to Bedrock at Up-Basin Site Boundary ("Subsurface Recharge") (Q_2)	None

Generic Budget Component	Post-restoration Description	Previous Description
Surface Water Storage	Storage Change (Surface Water, assumed = 0)	None
Groundwater Storage	Storage Change (Groundwater)	None

Separate budgets were prepared for surface water and groundwater. Interconnections between surface water and groundwater, and changes in storage were accounted for in each budget. The groundwater budget is balanced with less precision than the surface water budget because of the more numerous assumptions that must be made to estimate groundwater conditions and the greater degree of uncertainty associated with estimation of groundwater parameters.

The overall water budget (surface water and groundwater) accounting is presented on Table 13. Hydrogeological parameter assumptions and calculations supporting the groundwater budget are presented on Table 14. The overall water budget for the site during the budget period was approximately 11.8 million cubic feet. Of this amount, about 10.2 million cubic feet (86 percent) were accounted for as surface water and about 1.6 million cubic feet (14 percent) were accounted for as groundwater.

6.2 Surface Water

The surface water budget is composed of:

- Inflow components that consist of direct precipitation, run-on (channel flow and overland flow), and flow from weathered bedrock to site surface water via seeps.
- Outflow components that consist of site surface water discharge to Camanche Reservoir, evapotranspiration, and percolation to weathered bedrock from site surface water.
- A storage component that is assumed to be zero based on the relatively high hydraulic gradients at the site and the lack of surface water impoundments at the site (those having been removed as part of restoration activities).

Each of these components is described individually in more detail below. The volume estimates of each component are shown on Table 13.

6.2.1 Direct Precipitation (Q_1)

Direct precipitation is a surface water inflow component. It is measured daily at the California Department of Water Resources Pardee Rainfall Station. The volume of direct precipitation received by the site is calculated by multiplying inches of precipitation by the area of the site (60.4 acres) and converting acre-inches to cubic feet.

6.2.2 Run-On (Q_6)

Run-on is a surface water inflow component. Two types of run-on are considered: channel flow and overland flow. Overland flow is typically not observed at the site. Therefore, overland flow is assumed to be zero. Channel flow is estimated by adding the cumulative

volumes at PRSW-1 (top of Hinckley Run), PRSW-3 (top of Mine Run) and PRSW-4 (top of Mine Run). Cumulative volumes are calculated by multiplying the measured discharge rate at each weir by duration of the monitoring interval (generally about one month) for each monitoring interval at the three monitoring stations, and summing the results at each of the three monitoring stations.

6.2.3 Weathered Bedrock Seepage

Weathered bedrock seepage is a surface water inflow component and groundwater outflow component. It is estimated by calculating the gains at PRSW-2 (bottom of Hinckley Run) over PRSW-1 (top of Hinckley Run); and at PRSW-5 (middle of Mine Run) over PRSW-3 plus PRSW-4 (the two weirs at the top of Mine Run) during baseflow (i.e. the dry season). Baseflow was determined to be those monitoring intervals where no precipitation fell and no up-gradient run-on was measured at PRSW-1, PRSW-3 and PRSW-4. During baseflow in Mine Run no gains are observed at PRSW-5 over PRSW-3 plus PRSW-4; in fact flow at all three monitoring stations was zero. However, during baseflow in Hinckley Run gain is observed at PRSW-2 over PRSW-1. This volume was estimated by figuring the daily gain rate for the monitoring interval (roughly 30-day period) immediately prior to the seasonal surface water recession in Hinckley Run and, assuming that this rate is approximately representative of the 310-day budget period, multiplying this daily gain rate by 310 days. This value is shown on Table 13.

These quantitative observations are supported by qualitative observations of seeps in each drainage. Seeps (both ephemeral and year-round) are known to exist in both Hinckley Run and Mine Run (Figure 1). Two seeps in Hinckley Run are known to flow generally year-round. One seep in Mine Run is known to flow generally year-round. The seep in Mine Run is located below PRSW-5 and is not directly measured; however, it is assumed to contribute a *de minimus* amount of water to the weathered bedrock seepage component.

6.2.4 Discharge to Camanche Reservoir (Q₄)

Discharge to Camanche Reservoir is a surface water outflow component. It is estimated by the cumulative discharge at PRSW-6 over the 310-day budget period.

6.2.5 Evapotranspiration (Q₃)

Evapotranspiration is a surface water outflow component. It is estimated by subtracting the precipitation yield from direct precipitation. Precipitation yield is the amount of water yielded to the water budget from direct precipitation after evapotranspiration losses. Precipitation yield (Y) is estimated in this budget using the empirical equation:

$$Y = 0.01(P)^2 \quad \text{where: } P = \text{Direct Precipitation over the area of interest}$$

This equation, known as Grunsky's Rule, is based on early twentieth century observations of the relation of precipitation to run-off in San Francisco-area watersheds. Turner (1985) has noted that this relationship may overestimate precipitation yield by about 0.4% during dry years and by about 6% overall due to the hydrological effects of later twentieth century fire-exclusion management practices. Nevertheless, Grunsky's Rule is used in this budget as a reasonable and readily computable estimate of precipitation yield.

6.2.6 Percolation

Percolation to weathered bedrock from site surface water is a surface water outflow component and groundwater inflow component. Because percolation studies have not been done at the site (and are generally effort-intensive to do quantitatively over a relatively large area like the Penn Mine site), percolation to weathered bedrock from site surface water is assumed to be the total inflow minus the total of other outflows other than percolation to weathered bedrock.

6.3 Groundwater

The groundwater budget is composed of:

- Inflow components that consist of percolation to weathered bedrock from site surface water, and subsurface flow to bedrock at up-basin site boundary ("subsurface recharge").
- Outflow components that consist of flow from weathered bedrock to site surface water via seeps, and subsurface flow from bedrock off site at the site discharge boundary ("subsurface discharge").
- A storage change component that is net positive over the budget period. However, over a complete water year the net change to groundwater storage may be zero based on rate of groundwater level recession observed in monitoring wells during the dry season of the current water year.

Each of these components is described individually in more detail below. The volume estimates of each component are shown on Table 13.

6.3.1 Percolation

Percolation to weathered bedrock from site surface water is a groundwater inflow component, and surface water outflow component. It is described above under Surface Water.

6.3.2 Subsurface Recharge (Q_2)

Subsurface recharge is a groundwater inflow component. It is estimated by using the modified form of Darcy's Law:

$$Q = K \times i \times A$$

Where: Q = Discharge rate
 K = Porous Medium Equivalent Hydraulic Conductivity
 i = Hydraulic Gradient
 A = Effective Cross-sectional Area of Discharge

Assumed values for the parameters are shown and described on Table 14. Discharge rate (in Cubic Feet per Day) is multiplied by the number of days in the budget period (310) to arrive at a volume.

A vertical section of two hundred feet is evaluated in this budget because well depths range up to 260 feet deep (PRGW-3) and the poorly-understood fracture-flow dynamics of the bedrock

hydrogeologic system may provide avenues for movement of groundwater up and down along a deep profile.

6.3.3 Weathered Bedrock Seepage

Weathered bedrock seepage is a groundwater outflow component, and surface water inflow component. It is described above under Surface Water.

6.3.4 Subsurface Discharge

Subsurface discharge is a groundwater outflow component. It is estimated by using the modified form of Darcy's Law:

$$Q = K \times i \times A$$

Where: Q = Discharge rate
 K = Porous Medium Equivalent Hydraulic Conductivity
 i = Hydraulic Gradient
 A = Effective Cross-sectional Area of Discharge

Assumed values for the parameters are shown and described on Table 14. Discharge rate (in Cubic Feet per Day) is multiplied by the number of days in the budget period (310) to arrive at a volume.

A vertical section of two hundred feet is evaluated in this budget because well depths range up to 260 feet deep (PRGW-3) and the poorly-understood fracture-flow dynamics of the bedrock hydrogeologic system may provide avenues for movement of groundwater up and down along a deep profile.

The volume computed under these parameters is not equivalent to the volume of acid rock drainage (ARD) discharge in the subsurface to Camanche Reservoir (previously denoted as Q_5 , and that notation is retained herein). Subsurface discharge of ARD to Camanche Reservoir is a small portion of subsurface discharge and is estimated as described below.

Acid Rock Drainage Impacted Subsurface Discharge to Camanche Reservoir (Q_5)

Restoration activities have decreased the hydraulic gradient under which shallow bedrock groundwater discharges from the site. Groundwater contour maps for October 1999, February 2000, June 2000 and August 2000 are included in Appendix F.

The approach of Alpers et al. (1999) to evaluating ARD-impacted subsurface discharge to Camanche Reservoir was maintained in this budget with the sole exception that the post-restoration hydraulic gradient of 0.045 was used in place of the pre-restoration hydraulic gradient (0.14) in the modified form of Darcy's Law (above) used to compute Q_5 . This computation and the resulting volume estimate are shown on Table 13.

6.3.5 Storage Change

Over the budget period storage change is positive because hydrographs show a net gain in select monitoring wells. However, the receding limbs of some hydrographs showing net water

level gains over the budget period also show a strong decreasing trend that would most likely offset any residual water level gain at the end of a complete water year. This would be consistent with the hydrologic setting (i.e. unconfined aquifer underlying a high gradient watershed). Thumbnail hydrographs for site monitoring wells showing the general distribution of water level trends across the site are shown on Figure 19. Annotated hydrographs for PRGW-1 through PRGW-12 are included in Appendix F.

6.4 Water Budget Summary

The 2000 water year Penn Mine water budget was estimated over a budget period of 310 days (October 27, 1999 to August 31, 2000). For this budget period the total water budget was about 11.8 million cubic feet. Of this amount, surface water accounted for approximately 86 percent, and groundwater accounted for approximately 14 percent. Discharge of site surface water to Camanche Reservoir accounted for approximately 58 percent of the surface water budget and approximately 50 percent of the total water budget. Discharge of subsurface ARD to Camanche Reservoir accounted for approximately 0.10 percent of the groundwater budget and approximately 0.014 percent of the total water budget. Groundwater storage gain accounted for approximately 2.3 percent of the groundwater budget and approximately 0.32 percent of the total water budget. However, this percentage is expected to converge to zero over a complete year (i.e. if the budget period were 365 days instead of 310 days). Water moves both from groundwater to surface water ("weathered bedrock seepage") and from surface water to groundwater ("percolation to weathered bedrock") during the budget period. Weathered bedrock seepage accounts for about 895,000 cubic feet (contributing to approximately 9 percent of the surface water budget). Percolation to weathered bedrock accounts for about 301,700 cubic feet (contributing to approximately 18 percent of the groundwater budget). Over the entire site during the course of the budget period, seepage is greater than percolation. This demonstrates that the surface water budget gains approximately a net 593,000 cubic feet (approximately 5 percent of the total water budget) from the groundwater budget via seepage, which is consistent with the hydrologic setting of the site.

7.0 Estimated Copper and Zinc Loadings to Camanche Reservoir

Copper and zinc loadings to Camanche Reservoir were estimated from surface water and groundwater data collected during the post-restoration period to date. Cumulative estimated site surface water runoff and copper and zinc concentrations for the period from the first significant rainfall event following completion of site restoration (November 1999) to the end of August 2000 were used to estimate the mass loads of copper and zinc from surface water to Camanche Reservoir. The copper and zinc loads from groundwater discharging to Camanche Reservoir were estimated using the volume calculated for ARD-impacted subsurface discharge to Camanche Reservoir (Q_5 in Table 13), and the average copper and zinc concentrations from groundwater monitoring wells located downgradient of the site discharge, PRGW-9, -10, -11, and -12.

The copper and zinc loads from surface water discharge were estimated using data from the post-restoration monitoring period to date: November 8, 1999 to August 31, 2000 (298 days). The loads from groundwater discharge were estimated using data representing the period from October 27, 1999, the first rainfall event of the season, to August 31, 2000 (310 days).

The estimated copper mass load from site surface water for this 298-day period, based on data from monitoring station PRSW-6, was 200.4 pounds (lbs). The zinc mass load was estimated at 1,762 lbs. Copper and zinc mass loads entering the site during the same period, from data at monitoring stations PRSW-1, -3, and -4, were 10.2 and 23.78 lbs., respectively. The net mass loads from surface water attributed to the site (after deducting the incoming upland contribution) were, therefore, 190.2 of lbs. copper and 1,738 lbs. of zinc.

The estimated copper mass load from the discharge of ARD-impacted groundwater to Camanche Reservoir is 0.06 lb., and the zinc load 1.57 lbs.

The estimated combined net surface water and groundwater loads for the monitoring period are 190.3 lbs. of copper and 1,740 lbs. of zinc.

To compare these loads that were based on 298- to 310-day periods to annual loads estimated for the pre-restoration condition, they were converted to annual loads estimates. The surface water mass load contribution was adjusted for an annual period by assuming flows and concentrations observed at the site in the dry period (June – August) for an additional 67 days. The resulting loads were added to that estimated for the 298-day period. The groundwater mass load contribution was adjusted for an annual period by assuming the same average concentrations and the same discharge rate used for the 310-day period estimate for the additional 55 day period. The resulting loads were added to the groundwater loads estimated for the 310-day period. Resulting annual load estimates were: 190.4 lbs. of copper and 1,907 lbs. of zinc. These estimated annual copper and zinc loadings are much lower than the estimated pre-restoration annual averages for copper of 19,372 to 23,122 lbs. per year and for zinc of 35,875 to 43,035 lbs. per year (CH2M HILL, February 1999). Consequently, in the first year following

completion of restoration, the copper mass load has fallen about 99 percent from pre-restoration estimates and the zinc mass load has decreased about 95 percent.

Calculations for mass load estimates are provided in Appendix G.

8.0 Effectiveness of Restoration Elements

8.1 Site Surface Water

The monitoring record for the first year following site restoration confirms that implemented Best Management Practice (BMP) remedies have caused the metal mass load from surface water to Camanche Reservoir to be drastically reduced compared to pre-restoration metal mass loads. The net annual mass load of copper has decreased by about 99 percent, to about 190 pounds per year, apparently by immobilization as copper carbonate and/or copper basic carbonate. The net annual mass load of zinc has decreased less, about 95 percent to about 1,907 pounds per year, and appears to be constrained either by the oxidation rate of the mineral sphalerite (ZnS), or by the discharge rates of seeps and non-point subsurface source areas, or both.

8.2 Shaft 4 Area Seal

To assess the effectiveness of the Shaft 4 area seal, surface water flow and water quality data from before and after site restoration were reviewed. Monitoring data from the first post-restoration monitoring year are discussed below with respect to available pre-restoration data.

8.2.1 Flow Data

The amount of groundwater entering the Penn Mine workings during operation was estimated at about 20 gpm of water (Wisser, 1961). After waste rock was removed in Hinckley Run, the flow from the spring in the vicinity of Shaft 4, which is believed to originate from the mine workings, was about 60 gpm. In the post-restoration period, a seep in the Shaft 4 area was observed in February 2000 with an estimated flow of 50 gpm. The seep was not observed during other monitoring events.

Of the first post-restoration monitoring year, February was the month with the most precipitation and the highest site surface water flows. In February, the water elevation measured in the groundwater monitoring well PRGW-3 that intersects the mine workings was the highest measured during the first post-restoration monitoring year (274.19 feet MSL).

In July and August, surface water flow immediately downstream of the Shaft 4 area was measured at 1 gpm. This indicates that the seepage from the Shaft 4 area to Hinckley Run Creek was 1 gpm or less in July and August. The range of discharge from the Shaft 4 area to Hinckley Run Creek was 1 to 50 gpm during the first post-restoration monitoring year.

Groundwater elevations measured in PRGW-3 from October 1999 to August 2000, rose from 227 feet MSL in October to 274 feet MSL in February, then fell to 264 in August. Although not covered in this report, September and October results of groundwater elevation in PRGW-3 were 264.1 and 263.9 feet MSL, respectively. The fact that the October 2000 elevation was approximately 37 feet higher than the elevation measured in October 1999 may be an indication

that the Shaft 4 area seal is effectively reducing the loss of water from the mine workings to the ground surface.

8.2.2 Water Quality Data

According to Hamlin and Alpers, the spring near Shaft 4 had a pH of 2.8 to 4.2 and contained copper at 60 to 36,000 µg/L and zinc at 41,000 to 62,000 µg/L (Hamlin and Alpers, 1996). The pH of the February 2000 sample from the Shaft 4 area seep was 3.6 and copper and zinc concentrations were 1,590 and 13,000 µg/L, respectively. In July and August, surface water samples were collected from Hinckley Run Creek just downstream of the Shaft 4 area. Most of the flow observed at that time was entering Hinckley Run from the Shaft 4 area. The concentrations of copper in the samples were 2,620 µg/L in July and 2,580 µg/L in August. Zinc concentrations were 25,000 µg/L in July and 18,600 µg/L in August. The pH measurements were 3.5 and 3.1 in July and August, respectively. The post-restoration concentrations of copper and zinc and the pH measurements from Shaft 4 area seepage are within the ranges reported during the pre-restoration period. This was expected because the site restoration activities did not address the quality of water in the mine workings.

Hamlin and Alpers estimated the pre-restoration mass load from the Shaft 4 area at 5.3 to 3,200 pounds of copper per year, and 3,500 to 5,400 pounds of zinc per year (Hamlin and Alpers, 1996). The estimated post-restoration mass loads from the Shaft 4 area, based on actual flow and concentration measurements, are 88 pounds of copper and 727 pounds of zinc.

In addition to the reduced mass loads from the Shaft 4 area during post-restoration, water seeping from the area is passively treated as it flows downstream. A magnesium hydroxide treatment zone was constructed beneath the streambed in Hinckley Run between the Shaft 4 area and the downstream surface water sampling station PRSW-2. Limestone drains were also constructed in this area above the low flow magnesium hydroxide. The seepage originating from the Shaft 4 area passes through this treatment zone. Results of the two "Hinckley" samples collected in July and August immediately downstream of the Shaft 4 seep area can be used to assess the effectiveness of the treatment zone in raising pH and reducing copper concentrations by comparing the Hinckley sample results to the PRSW-2 sample results. The pH increased from 3.5 and 3.1 at Hinckley to 7.1 and 6.7 at PRSW-2. Copper concentrations decreased from 2,580 and 2,620 µg/L in the Hinckley samples to 8.66 and < 15.6 µg/L in the samples collected downstream at PRSW-2. Concentrations of zinc, however, increased between the Hinckley sample location and PRSW-2.

8.3 Goundwater

Shallow groundwater in down-gradient wells has improved significantly since April 1999. The rapid improvement was significant because it suggests that down-gradient groundwater may be flowing preferentially through joints, fissures, and seams, but apparently does not communicate directly with the mine workings.

9.0 Recommendations

The system for continuously monitoring surface water flow, i.e., data loggers and weirs, has been re-evaluated to better capture flow data during the rainy season. Monthly monitoring should continue, in order to further confirm these conclusions about site hydraulic and geochemical behavior and its effect on Camanche Reservoir. However, several revisions to the monitoring program are recommended, as described below. The revised monitoring plan for the 2000 –2001 season is presented in Section 10.

9.1 Receiving Water Monitoring

Throughout most of the first year since completing site restoration, there have been virtually no significant differences between upstream and downstream parameters that have been monitored monthly in Camanche Reservoir. Continued monthly monitoring of CAMA and PENN20 provides information of less value than if the receiving water were monitored during conditions that are likely to influence water quality in Camanche reservoir. We recommend that CAMA and PENN20 stations be sampled under three conditions:

- Whenever the release from Pardee Dam into Camanche Reservoir is at a sustained low rate, 10 cubic feet per second (cfs) or below, for at least 48 hours
- Whenever site surveillance indicates a failure of the restoration measures has occurred according to criteria outlined in the failure mode analysis
- When three months have passed since the last field sampling at CAMA and PENN20.

In addition, the selection of laboratory-measured parameters should be reduced to eliminate those that provide no useful information about the performance of the Penn Mine site. The essential minimum list of parameters that are associated with Penn Mine are pH, electrical conductivity, copper, zinc, sulfate, and total hardness.

9.2 Site Surface Water

There are several recommendations for streamlining maintenance and monitoring of the site:

- The data loggers for recording flow data at each of the weirs are not reliable because the transducers are easily damaged by sediment that accumulates behind the weir. The configuration of the transducer installation makes it difficult to keep the area cleaned out. Alternatively, still wells equipped with Stevens strip recorders are recommended to be installed at the weirs to collect flow data for the 2000 – 2001 year. The water quality analyzers associated with these data loggers have also proven unreliable. Because water quality is determined based on laboratory analyses, removal of these data loggers is recommended.

- The list of site performance parameters should be reduced to the following essentials: pH, electrical conductivity, copper, zinc, sulfate, and total hardness.
- Limestone drains should be extended to enclose visible seeps and distressed vegetated zones, especially in Hinckley Run.
- Monthly surface water sampling should continue through the second post-restoration year; however, less emphasis should be placed on sampling during each storm event, and attention directed toward characterizing site performance during more normal periods.
- One storm event should be characterized in detail in the mid-precipitation season. Inflow and outflow from the site should be monitored during the ascending limb, the receding limb, and for a period afterward; groundwater levels should be monitored during the same period to verify that short-term groundwater fluctuations are not occurring.

9.3 Site Groundwater

Groundwater monitoring should continue on a quarterly basis at the site through the second post-restoration year, but the list of measured parameters should be reduced to the field measurements of pH, and electrical conductivity, and the laboratory analysis of copper, zinc, sulfate, and hardness.

9.4 Site Water Budget

Surface and subsurface hydraulic data should continue to be collected. The data will support evolution of the site water budget model toward a predictive tool.

10.0 Revised Post-Restoration Monitoring Plan

Water Quality monitoring during the second post-restoration year will include sampling receiving water, site surface water, and site groundwater. The changes in the monitoring program from the first to the second post-restoration year are:

- The timing of receiving water sampling has been changed to coincide with conditions that are likely to influence water quality in Camanche reservoir.
- Site surface water flow data only will be recorded using new Stevens A-71 data loggers equipped with strip charts, installed at re-built stream gauging stations.
- The monthly surface water sampling will be directed toward characterizing site performance during normal periods rather than storm events.
- One storm event will be characterized in detail in the mid-precipitation season.
- The receiving water, site surface water, and groundwater sample analytical parameters were reduced to eliminate those that did not provide useful information during the first post-restoration year. Parameters to be measured are pH, electrical conductivity, copper, zinc, sulfate, and total hardness.

10.1 Receiving Water Monitoring

To monitor the effect of the site runoff on Camanche Reservoir, surface water samples will be collected upstream (CAMA) and downstream (Penn20) of the confluence of Mine Run/Hinckley Run and Camanche Reservoir. The locations of CAMA and Penn20 are shown on Figure 2.

Samples will be collected when any one of the following conditions are met:

- Whenever the release from Pardee Dam into Camanche Reservoir is at or below a sustained low rate of 10 cubic feet per second for at least 48 hours.
- Whenever site surveillance indicates a failure of the restoration measures has occurred according to criteria outlined in the failure mode analysis included in the Operation and Maintenance Plan, Penn Mine Environmental Restoration Project, December 1999.
- When three months have passed since the last field sampling at CAMA and Penn20.

Sample collection procedures will be as described in the Post-Restoration Monitoring Plan, Penn Mine Environmental Restoration Project, December 1999.

Samples will be analyzed for pH and electrical conductivity in the field and for copper, zinc, sulfate, and total hardness in the laboratory. Analytical methods and method detection limits are shown in Table 15.

10.2 Site Surface Water Monitoring

Site surface water samples will continue to be collected to characterize upstream water entering Mine Run and Hinckley Run, water flowing within Mine Run and Hinckley Run, and water downstream of the confluence of Mine Run and Hinckley Run. The same sampling locations monitored during the first post-restoration year will be monitored during the second post-restoration year. These include:

- The weir upstream of Hinckley Run (PRSW-1)
- The flumes upstream of Mine Run (PRSW-3 and PRSW-4)
- The weir near the lower end of Hinckley Run (PRSW-2)
- The weir in the lower reaches of Mine Run (PRSW-5)
- The weir downstream of the confluence of Mine Run and Hinckley Run (PRSW-6), representing water leaving the Penn Mine site
- The slope below the former shoreline pile area when runoff is observed during a sampling event
- Seeps in Mine Run and Hinckley Run with flows exceeding an estimated 1 gpm

The site surface water sampling locations are shown in Figure 1 and are described in Table 1.

Samples will be collected monthly, with an emphasis on collecting samples during normal conditions as opposed to sampling during storm events. Sample collection procedures will be as described in the Post-Restoration Monitoring Plan, Penn Mine Environmental Restoration Project, December 1999.

Samples will be analyzed for pH and electrical conductivity in the field and for copper, zinc, sulfate, and total hardness in the laboratory. Analytical methods and method detection limits are shown in Table 15.

After the first post-restoration rainy season, the weirs at PRSW-1, PRSW-2, PRSW-5, and PRSW-6 were cleaned of debris and sediment. At PRSW-2 and PRSW-6, rip rap was placed to help control sedimentation. Still wells were installed on the upstream side of each weir. The still wells were equipped with Steven's Strip Recorders. The recorders will record water level in the wells and translate the water level into flow. The water level is measured with a float.

Surface water flow will be measured automatically at the weirs (PRSW-1, PRSW-2, PRSW-5, and PRSW-6) and recorded. Data from the recorders will be downloaded on a monthly basis. In addition to the automatic measurements, during sampling events flow will be measured at each sampling location with a bucket and stopwatch.

One storm event will be characterized in detail in the mid-precipitation season and will include monitoring inflow and outflow from the site during the ascending limb, the receding limb, and for a period afterward. Groundwater levels will be monitored during the same period observe any short-term fluctuations in groundwater elevations.

10.3 Groundwater Monitoring

Groundwater samples will continue to be collected to characterize groundwater quality at the site. The same monitoring wells monitored during the first post-restoration year will be monitored during the second post-restoration year. These include:

- PRGW-1 and PRGW-2 to monitor groundwater quality entering Hinckley Run
- PRGW-3 to monitor groundwater level in the mine workings
- PRGW-4, PRGW-5, PRGW-6, and PRGW-7 to monitor groundwater quality entering Mine Run
- PRGW-8 to monitor groundwater quality in Mine Run shallow bedrock
- PRGW-9, PRGW-10, PRGW-11, and PRGW-12 to monitor the quality of groundwater exiting the site

Groundwater monitoring well locations are shown in Figure 1 and are described in Table 3.

Samples will be collected and groundwater elevations measured quarterly. Sample collection procedures will be as described in the Post-Restoration Monitoring Plan, Penn Mine Environmental Restoration Project, December 1999.

Samples will be analyzed for pH and electrical conductivity in the field and for copper, zinc, sulfate, and total hardness in the laboratory. Analytical methods and method detection limits are shown in Table 15.

10.4 Quality Assurance/Quality Control Procedures and Data Evaluation

The quality assurance/quality control and data evaluation procedures employed during the second post-restoration year will be same as those outlined in the Post-Restoration Monitoring Plan (CH2M HILL, 1999).

10.5 Reporting

After the second post-restoration monitoring year, a monitoring report will be prepared and submitted to the SWRCB and the EPA. The report will include summaries of the data collected, a discussion of the conclusions that are drawn from the data collection activities, and recommendations for future monitoring at the site.

11.0 References

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Tables

Table 1
Surface Water Sample Locations and Rationale
Penn Mine Environmental Restoration Project
Post-Restoration Monitoring Program

Post-Restoration Designator	Previous Designator	Type	Location	Rationale
PRSW-1	SW-10	Upstream weir, grab	Approximately 500 feet above upper end of Hinckley Run	Provide background water quality information and incoming flow data
PRSW-2	None	In-stream weir, grab	Near lower end of Hinckley Run	Monitor effect of mitigation measures on surface water quality and provide flow data
PRSW-3	SW-2	Upstream weir, grab	Approximately 300 feet above upper end of Mine Run on south creek entering Mine Run	Provide background water quality information and incoming flow data
PRSW-4	SW-1	Upstream weir, grab	Approximately 200 feet above upper end of Mine Run on north creek entering Mine Run	Provide background water quality information and incoming flow data
PRSW-5	MR-7	In-stream weir, grab	Near mid-point of Mine Run	Monitor effect of mitigation measures on surface water quality and provide flow data
PRSW-6	None	Mine Run – Hinckley Run Confluence weir, grab	At confluence weir of Mine and Hinckley Runs	Provide data on quality of surface water entering Camanche Reservoir and flow data
PRSW-7	None	Run off grab	Slope below former shoreline pile	Provide water quality information on runoff to Camanche Reservoir from former waste rock area
PRSS_	None	Run off grab	At seeps with flow exceeding 1 gpm	Monitor quality and volume of water entering Mine and Hinckley Runs from surface seeps
CAMA	CAMA	Receiving water-upstream, integrated depth	Camanche Reservoir, about 3,000 feet upstream of site discharge into Camanche Reservoir	Provide background water quality data for receiving water
Penn20	PENN20	Receiving water-downstream, integrated depth	Camanche Reservoir, about 1,000 feet downstream of site discharge into Camanche Reservoir	Monitor effect of site discharge on downstream receiving water
Penn30	None	Receiving water-at confluence, grab	Confluence of Mine and Hinckley Runs, when inundated by Camanche Reservoir	Monitor effect of site discharge on receiving water

Table 2a
Surface Water Quality Monitoring Program
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Location	Frequency	Analyte	Unit	Detection Limit	Method Reference
Mine and Hinckley Run Surface Water	Monthly, including first rain event	Estimated Flow	gpm		
		pH	pH		Field
		Electrical Conductivity (EC)	umhos/c		Field
		Temperature	°C		Field
		Turbidity	NTU		Field
		Aluminum	ug/L	100	EPA 200.7:Filtered
		Cadmium	ug/L	2	EPA 200.7:Filtered
		Copper	ug/L	5	EPA 200.7:Filtered
		Nickel	ug/L	5	EPA 200.7:Filtered
		Lead	ug/L	5	EPA 200.9:Filtered
		Zinc	ug/L	10	EPA 200.7:Filtered
		Sodium	ug/L	20	EPA 200.7
		Potassium	ug/L	3000	EPA 200.7
		Magnesium	ug/L	20	EPA 200.7
		Calcium	ug/L	20	EPA 200.7
		Chloride (Cl-)	mg/L	1	EPA 300.0
		Sulfate (SO ₄)	mg/L	0.03	EPA 300.0 A
		Alkalinity: Total	mg/L	0	SM (18) 2320 B
		Alkalinity: Carbonate (CO ₃)	mg/L	0	SM (18) 2320 B
		Alkalinity: Bicarbonate (HCO ₃)	mg/L	0	SM (18) 2320 B
		Hardness	mg/L	1	SM (18) 2340 C
Total Dissolved Solids (TDS)	mg/L	10	SM (18) 2540 C		
Total Suspended Solids (TSS)	mg/L	10	SM (18) 2540 D		

Table 2b
Surface Water Quality Monitoring Program
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Location	Frequency	Analyte	Unit	Detection Limit	Method Reference
Camanche Reservoir Receiving Water CAMA, Penn20, Penn30 ³	Monthly	pH ¹	pH		Field
		Electrical Conductivity (EC) ¹	umhos/cm		Field
		Temperature ¹	°C		Field
		Alkalinity: Total as CaCO ₃	mg/L	5	SM (18) 2320B ²
		Alkalinity: Carbonate (CO ₃)	mg/L	0	SM (18) 2320 B
		Alkalinity: Bicarbonate (HCO ₃)	mg/L	0	SM (18) 2320 B
		Hardness: Total	mg/L	2	SM (18) 2340C ²
		Total Dissolved Solids (TDS)	mg/L	6	SM (18) 2340C ²
		Total Suspended Solids (TSS)	mg/L	2	SM (18) 2320D ²
		Orthophosphate as P	mg/L	0.005	SM (18) 4500-P ²
		Aluminum	ug/L	20	EPA 200.7:Filtered
		Copper	ug/L	3	EPA 200.7:Filtered
		Zinc	ug/L	5	EPA 200.7:Filtered
		Cadmium	ug/L	0.2	EPA 200.7:Filtered
		Manganese	ug/L	0.8	EPA 200.8:Filtered
		Lead	ug/L	0.4	EPA 200.9:Filtered
		Nickel	ug/L	2	EPA 200.9:Filtered
		Nitrate as N	mg/L	0.003	EPA 300.0 A
		Sulfate (SO ₄)	mg/L	0.03	EPA 300.0 A
		Sodium	ug/L	20	EPA 200.7
Potassium	ug/L	3000	EPA 200.7		
Magnesium	ug/L	20	EPA 200.7		
Calcium	ug/L	20	EPA 200.7		
Chloride	mg/L	1	EPA 300.0		

Notes:

¹ Camanche measurements for pH and EC are collected in the field at three depths.

² Samples for Camanche Reservoir are classified as raw water, and standard methods are applied.

³ Penn30 sampling frequency is dependant on level of Camanche Reservoir.

Table 3
Groundwater Quality Monitoring Program
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Post-Restoration Well Designator	Previous Well Designator	Location	Well Depth (feet)	Screened Interval (feet)	Rationale for Post-Restoration Monitoring
PRGW-1	W-5	Top of Hinckley Run	18	8 to 18	Monitor groundwater quality entering Hinckley Run
PRGW-2	W-1	Above east side slope of Hinckley Run	19	9 to 19	Monitor groundwater quality entering Hinckley Run
PRGW-3	GS-18	Hinckley Run, near Mine Shaft #3 and #4	260	251 to 260	Monitor water level relative to mine workings
PRGW-4	CHMW-1	Top of Mine Run, south creek	10	0 to 10	Monitor groundwater quality entering of Mine Run
PRGW-5	EW-1	Top of Mine Run, north creek	25	2 to 16	Monitor groundwater quality entering of Mine Run
PRGW-6	CHMW-2	Above east side slope of Mine Run	102	90 to 100	Monitor groundwater quality entering of Mine Run
PRGW-7	CHMW-3	Above west side slope of Mine Run	34.8	22 to 32	Monitor groundwater quality entering of Mine Run
PRGW-8	W-2S	Lower end of Mine Run	18	8 to 18	Monitor groundwater quality in Mine Run shallow bedrock
PRGW-9	W-1D	Downgradient of Mine/Hinckley Run confluence	48	10 to 40	Monitor quality of groundwater exiting the site in deep bedrock
PRGW-10	GS-4A	Downgradient of Mine/Hinckley Run confluence	51	20 to 55	Monitor quality of groundwater exiting the site in deep bedrock
PRGW-11	GS-7	Downgradient of Mine/Hinckley Run confluence	47.5	40 to 55	Monitor quality of groundwater exiting the site in deep bedrock
PRGW-12	GS-14	Downgradient of Mine/Hinckley Run confluence	67	56 to 66	Monitor quality of groundwater exiting the site in deep bedrock

Table 4
Groundwater Quality Monitoring Program
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Location	Frequency	Analyte	Unit	Detection Limit	Method Reference
Groundwater Wells	Quarterly	Temperature	°C		Field
		pH	pH		Field
		Electrical Conductivity	umhos/cm		Field
		Turbidity	NTU		Field
		Aluminum	ug/L	100	EPA 200.7:Filtered
		Copper	ug/L	5	EPA 200.7:Filtered
		Nickel	ug/L	5	EPA 200.7:Filtered
		Lead	ug/L	5	EPA 200.9:Filtered
		Zinc	ug/L	10	EPA 200.7:Filtered
		Cadmium	ug/L	2	EPA 200.7:Filtered
		Sulfate (SO ₄)	mg/L	1	EPA 300.0
		Nitrate as N	mg/L	0.003	EPA 300.0 A
		Sodium	ug/L	20	EPA 200.7
		Potassium	ug/L	3000	EPA 200.7
		Magnesium	ug/L	20	EPA 200.7
		Calcium	ug/L	20	EPA 200.7
		Chloride	mg/L	1	EPA 300.0
		Alkalinity: Total	mg/L	0	SM (18) 2320 B
		Alkalinity: Bicarbonate (HCO ₃)	mg/L	0	SM (18) 2320 B
	Alkalinity: Carbonate (CO ₃)	mg/L	0	SM (18) 2320 B	
	Hardness (as CaCO ₃)	mg/L	1	SM (18) 2340 C	
Total Dissolved Solids (TDS)	mg/L	10	SM (18) 2540 C		
Total Suspended Solids (TSS)	mg/L	10	SM (18) 2540 D		
	Monthly	Water Level	feet		Field

**Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program**

Day	Sep-99					Oct-99				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)
1	0.00	0.00	218.84	364	3	0.00	0.00	217.48	330	655
2	0.00	0.00	218.76	330	2	0.00	0.00	217.56	331	664
3	0.00	0.00	218.64	329	2	0.00	0.00	217.64	330	665
4	0.00	0.00	218.52	328	2	0.00	0.00	217.76	330	645
5	0.00	0.00	218.4	328	182	0.00	0.00	217.84	330	667
6	0.00	0.00	218.32	328	255	0.00	0.00	217.92	330	667
7	0.00	0.00	218.32	329	255	0.00	0.00	218	330	591
8	0.00	0.00	218.28	327	324	0.00	0.00	218.08	331	669
9	0.00	0.00	218.24	329	254	0.00	0.00	218.2	331	670
10	0.00	0.00	218.24	327	255	0.00	0.00	218.28	331	670
11	0.00	0.00	218.2	326	255	---	0.00	218.36	330	673
12	0.00	0.00	218.12	327	255	0.00	0.00	218.48	331	672
13	0.00	0.00	218.08	327	255	0.00	0.00	218.56	331	677
14	0.00	0.00	218.04	326	255	0.00	0.00	218.68	330	676
15	0.00	0.00	218.04	328	255	0.00	0.00	218.76	331	676
16	0.00	0.00	218	331	255	0.00	0.00	218.84	330	677
17	0.00	0.00	217.96	332	256	0.00	0.00	218.96	331	669
18	0.00	0.00	217.92	330	257	0.00	0.00	219.04	330	828
19	0.00	0.00	217.92	331	257	0.00	0.00	219.16	331	827
20	0.00	0.00	217.84	332	256	0.00	0.00	219.32	333	829
21	0.00	0.00	217.8	331	260	0.00	0.00	219.48	331	831
22	0.00	0.00	217.76	331	256	0.00	0.00	219.6	330	833
23	0.00	0.00	217.76	330	256	0.00	0.00	219.76	330	835
24	0.00	0.00	217.72	330	256	0.00	---	219.92	331	837
25	0.00	0.00	217.68	331	256	0.00	0.00	220.08	331	840
26	0.00	0.00	217.64	331	256	0.00	0.00	220.2	330	844
27	0.00	0.00	217.6	331	244	0.43	0.37	220.36	330	849
28	0.00	0.00	217.56	330	243	0.00	0.00	220.52	330	344
29	0.00	0.00	217.52	331	243	0.00	0.00	220.52	330	344
30	0.00	0.00	217.48	330	246	0.00	0.00	220.52	333	352
31						0.00	0.00	220.52	327	343
Monthly Total	0.00	0.00		9915.00	6606.00	0.43	0.37		9918.00	20676.00
Average			218.04	330.50	220.20			218.98	330.48	678.03

Data Sources:

Pardee Rainfall: California Department of Water Resources Online @ <http://cdec.water.ca.gov/> [<http://cdec.water.ca.gov/cgi-progs/queryDaily?s=par&d=today>]
New Hogan Rainfall: California Department of Water Resources Online @ <http://cdec.water.ca.gov/> [<http://cdec.water.ca.gov/cgi-progs/queryDaily?NHG>]
Camanche Elevations, Outflow, & Inflow: California Department of Water resources Online @

Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Day	Nov-99					Dec-99				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)
1	0.00	0.00	220.52	330	349	0.00	0.01	221.52	330	795
2	0.00	0.00	220.52	330	348	0.03	0.00	221.6	330	796
3	0.00	0.00	220.52	331	357	0.00	0.00	221.72	330	798
4	0.00	---	220.52	330	393	0.00	0.00	221.72	330	487
5	0.00	0.00	220.52	331	361	0.00	0.00	221.76	330	486
6	0.00	0.00	220.56	329	342	0.00	0.00	221.8	331	486
7	1.05	1.13	220.56	332	341	0.00	0.00	221.8	330	486
8	0.23	0.18	220.6	330	429	0.00	0.00	221.84	330	486
9	0.00	0.00	220.64	330	429	0.07	0.14	221.88	330	486
10	0.00	0.00	220.68	331	429	0.00	0.00	221.88	331	486
11	0.00	0.00	220.68	331	429	0.00	0.00	221.92	331	487
12	0.00	0.00	220.72	331	429	0.04	0.00	221.96	330	487
13	0.00	0.00	220.76	330	430	0.00	0.00	221.96	330	487
14	0.07	0.07	220.8	330	430	0.00	0.00	221.96	330	488
15	0.00	0.00	220.8	331	391	0.00	0.00	222	331	489
16	0.70	0.68	220.8	333	484	0.00	0.00	222.04	331	387
17	0.00	0.00	220.88	329	484	0.00	0.00	222	331	387
18	0.00	0.00	220.88	333	484	0.00	0.00	222.04	330	357
19	0.57	0.58	220.92	329	484	0.00	0.00	221.92	330	2
20	0.05	0.06	220.96	331	484	0.00	0.00	221.8	330	2
21	0.00	0.00	221	332	484	0.00	0.00	221.72	332	2
22	0.00	0.00	221	330	484	0.00	0.00	221.64	331	2
23	0.00	0.00	221.04	330	484	0.00	0.00	221.52	331	2
24	0.00	0.00	221.08	328	484	0.00	0.00	221.4	330	3
25	0.00	0.00	221.08	332	484	0.00	0.00	221.32	330	3
26	0.00	0.00	221.12	331	484	0.00	0.00	221.2	331	5
27	0.00	0.00	221.16	330	484	0.00	0.00	221.12	330	5
28	0.00	0.00	221.16	330	484	0.00	0.00	221.04	330	5
29	0.50	0.52	221.2	330	683	0.00	0.00	220.92	329	5
30	0.21	0.23	221.28	332	794	0.00	0.00	---	330	5
31						0.00	---	---	330	5
Monthly Total	3.38	3.45		9917.00	13656.00	0.14	0.15		9910.00	9402.00
Average			220.83	330.57	455.20			221.69	330.32	303.45

Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Day	Jan-00					Feb-00				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Outflow (cfs)	Camanche Inflow (cfs)
1	0.00	0.00	220.6	330	5	0.00	0.00	220.20	998	1407
2	0.00	0.00	220.52	330	5	0.00	0.00	220.28	981	1414
3	0.00	0.00	220.4	330	5	0.50	0.78	220.48	999	1411
4	0.00	0.00	220.28	330	5	0.01	0.01	220.56	1002	1400
5	0.00	0.00	220.2	330	5	0.00	0.00	220.64	1004	1401
6	0.00	0.00	220.08	331	5	0.00	0.00	220.52	1003	691
7	0.00	0.00	219.96	331	5	0.00	0.00	220.44	1002	683
8	0.00	0.00	219.88	330	5	0.00	0.00	220.36	1003	684
9	0.00	0.00	219.76	330	5	0.10	0.13	220.28	1002	685
10	0.00	0.00	219.68	330	5	0.43	0.46	220.08	1002	227
11	0.42	0.44	219.6	330	5	1.37	1.56	220.00	1003	228
12	0.00	0.00	219.48	330	5	0.77	0.82	219.88	1004	233
13	0.00	0.00	219.4	330	5	0.60	1.02	220.24	1003	1485
14	0.15	0.13	219.28	330	5	0.62	0.08	220.48	1004	1334
15	0.52	0.51	219.24	330	5	0.16	0.11	220.48	1496	1340
16	0.03	0.02	219.16	331	5	0.30	0.26	220.28	2000	1333
17	1.09	---	219.04	331	5	0.00	0.00	220.12	2000	1330
18	0.00	0.16	219.04	331	5	0.00	0.00	219.92	1994	1335
19	0.31	0.22	218.96	331	5	---	0.00	219.68	2002	1338
20	0.15	0.14	218.84	332	5	0.46	0.58	219.52	2000	1336
21	0.05	0.02	218.72	330	5	0.00	0.00	219.36	2002	1322
22	0.11	0.00	218.64	330	5	1.50	1.55	219.32	2000	1337
23	1.45	1.60	218.68	329	5	0.00	0.00	219.24	2002	1336
24	1.54	2.00	218.76	331	5	0.00	0.00	219.08	2001	1332
25	0.00	0.12	218.92	331	655	0.00	0.00	218.88	2001	1332
26	0.00	0.00	219.12	330	955	1.06	1.07	218.68	2000	1335
27	0.00	0.00	219.28	330	951	0.25	0.55	218.64	1989	1335
28	0.00	0.00	219.52	476	1351	0.21	0.11	---	2004	2056
29	0.00	0.00	219.72	600	1395	0.11	0.16	219.00	2002	2810
30	0.36	0.44	219.92	601	1403	---	---	---	---	---
31	0.00	0.00	220.08	795	1405	---	---	---	---	---
Monthly Total	6.18	5.80		11391.00	8235.00	8.45	9.25		43503.00	35490.00
Average			212.41	341.81	213.10			219.88	1500.10	1223.79

Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Day	Mar-00					Apr-00				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)
1	0.00	0.00	218.84	936	2217	0	0	215.76	1360	806
2	0.08	0.05	218.52	1323	2406	0	0	215.8	1037	806
3	0.00	0.00	218.24	1466	2404	0	0	215.88	1017	756
4	0.56	0.41	218.04	1656	2401	0	0	215.96	1019	637
5	0.19	0.28	217.76	1416	2402	0	0	216.08	1022	595
6	0.00	0.00	217.44	1329	2402	0	0	216.12	670	599
7	0.25	0.26	217.16	1327	2401	0	0	216.12	666	606
8	0.28	0.25	216.84	1325	2399	0	0	216.12	666	610
9	0.25	0.03	216.52	1326	2400	0	0	216.04	428	605
10	0.00	0.00	216.20	1325	2291	0	0	215.96	431	606
11	0.00	---	215.96	1326	2094	0	0	215.92	406	604
12	0.00	0.00	215.80	1328	1890	0	0.16	215.84	420	603
13	0.00	0.00	215.68	1330	1695	0.21	0.03	215.84	420	544
14	0.00	0.00	215.60	1331	1603	0	0	215.8	419	446
15	0.00	0.00	215.48	1334	1603	0	0	215.8	418	403
16	0.00	0.00	215.40	1334	1602	0.33	0.41	215.76	423	404
17	0.00	0.00	215.28	1335	1601	1.12	1.25	215.88	401	403
18	0.00	0.00	215.20	1335	1602	0	0	215.88	422	397
19	0.00	0.00	215.12	1337	1604	0	0	215.84	423	411
20	0.00	0.00	215.00	1338	1598	0	--	216	881	418
21	0.00	0.00	214.92	1340	1491	0	0	216.12	879	405
22	0.00	0.00	214.96	1344	1298	0.01	0	216.28	877	403
23	0.00	---	214.96	1343	1204	0	0	216.44	986	403
24	0.00	0.00	---	1345	1204	0	0	216.6	1008	404
25	0.00	0.00	215.04	1346	1200	0	0	216.76	1011	411
26	0.00	---	215.08	1348	1198	0	0	216.96	1008	413
27	0.00	---	215.08	1355	1197	0	--	217.08	1012	397
28	0.00	0.00	215.16	1354	1085	0	0	--	1011	401
29	0.00	0.00	215.28	1315	881	0	0	217.36	661	403
30	0.00	0.00	215.44	1355	808	0	0	217.32	425	445
31	0.00	0.00	215.60	1360	806					
Monthly Total	1.61	1.28		41562.00	52987.00	1.67	1.85		21827.00	15344.00
Average			208.87	1296.84	1683.26			216.18	727.57	511.47

Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Day	May-00					June-00				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)
1	0	0	217.24	425	590	0	0	225	1322	748
2	0	0	217.16	425	651	0	--	225.16	1316	747
3	0	0	217.04	318	659	--	--	225.28	1312	756
4	0	0	216.84	10	663	0	0	225.4	1261	750
5	0	0	216.6	4	650	0	--	225.52	1254	755
6	0.35	0.34	216.4	3	653	--	--	225.64	1299	754
7	0.5	0.73	216.24	11	653	--	--	--	1320	748
8	0.8	0.06	216.28	834	653	--	--	225.92	1313	753
9	0	0	216.44	1205	654	--	--	226.04	1276	752
10	0	0	216.56	1081	653	--	--	226.16	1258	752
11	0	0	216.6	914	653	--	--	226.28	1257	753
12	0	0	216.68	912	650	--	--	226.4	1261	748
13	--	0	216.72	913	649	--	--	226.52	1247	747
14	0.1	0.17	216.8	912	650	--	--	226.64	1236	751
15	0.1	1.02	216.92	915	647	--	--	226.76	1244	747
16	0.1	0.04	217.08	1304	649	--	--	226.88	1256	756
17	--	0	217.28	1319	651	--	--	226.92	1019	755
18	--	--	217.48	--	--	--	--	226.96	1007	756
19	--	0	217.64	1325	679	--	--	227	1003	758
20	--	0	217.96	1731	705	--	--	227.04	1003	749
21	--	--	218.54	2584	698	--	--	227.08	1009	753
22	--	--	219.32	3328	700	--	--	227.04	698	759
23	--	--	220.04	3199	710	--	--	227	691	753
24	--	--	220.44	2079	719	--	--	226.92	654	753
25	--	--	221.36	3820	725	--	--	226.88	653	751
26	0	--	222.28	3995	741	--	--	226.84	630	753
27	0	--	222.84	2870	753	--	--	226.8	699	756
28	0	--	223.4	2704	751	--	--	226.64	356	755
29	0	0	224.16	3469	748	--	--	226.52	339	759
30	0	0	224.68	2692	738	--	--	226.36	339	754
31	0	--	224.88	1563	754					
Monthly Total	2.25	2.36		46864.00	20449.00	0.00	0.00		30532.00	22581.00
Average			211.45	1510.03	656.50			218.85	1017.73	752.70

Table 5
Rainfall and Reservoir Data
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Day	July-00					Aug-00				
	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)	Pardee Rainfall (inches)	New Hogan Rainfall (inches)	Camanche Elevation (ft above sea level)	Camanche Inflow (cfs)	Camanche Outflow (cfs)
1	--	--	226.2	270	753	--	--	222.4	456	401
2	--	--	226.04	267	702	--	--	222.4	497	396
3	--	--	225.88	256	649	--	--	222.4	442	402
4	--	--	225.76	265	644	--	--	222.4	533	397
5	--	--	225.64	348	651	--	--	222.28	4	397
6	--	--	225.56	365	651	--	--	222.12	4	404
7	--	--	225.44	360	647	--	--	222.04	197	396
8	--	--	225.28	246	652	--	--	222	313	403
9	--	--	225.2	238	653	--	--	221.96	313	403
10	--	--	225.12	493	654	--	--	221.92	314	404
11	--	--	225.12	642	645	--	--	221.92	410	402
12	--	--	225.08	640	649	--	--	221.8	4	402
13	--	--	225.04	645	651	--	--	221.64	4	398
14	--	--	225.04	641	651	--	--	221.56	197	402
15	--	--	224.84	31	651	--	--	221.52	308	402
16	--	--	224.6	17	650	--	--	221.48	312	406
17	--	--	224.4	8	618	--	--	221.44	314	404
18	--	--	224.2	8	611	--	--	221.4	300	396
19	--	--	224.04	8	607	--	--	221.24	4	400
20	--	--	223.84	7	601	--	--	221.12	4	397
21	--	--	223.64	7	612	--	--	220.96	8	409
22	--	--	223.44	8	602	--	--	220.84	8	406
23	--	--	223.24	7	610	--	--	220.76	210	400
24	--	--	223.08	194	603	--	--	220.72	317	386
25	--	--	223	349	601	--	--	220.68	299	370
26	--	--	222.92	362	547	--	--	220.56	8	372
27	--	--	222.84	357	500	--	--	220.44	8	380
28	--	--	222.8	328	505	--	--	220.28	8	369
29	--	--	222.64	6	502	--	--	220.16	8	370
30	--	--	222.48	7	510	--	--	220.08	228	371
31	--	--	222.4	209	463	--	--	220.08	317	345
Monthly Total	0.00	0.00		7589.00	19045.00	0.00	0.00		6349.00	12190.00
Average			224.35	244.81	614.35			221.37	204.81	393.23

Table 6
Receiving Water Depth Profiles for Temperature, pH, and Electrical Conductivity
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Sample Date	Camanche		Pardee	CAMA				PENN20			
	Elevation (feet above sea level)	Outflow (cfs)	Outflow to Camanche (cfs)	Depth (feet)	Temp. (deg.C)	pH	EC (umhos/cm)	Depth (feet)	Temp. (deg.C)	pH	EC (umhos/cm)
15-Sep-99	218.04	328	-675	10	24.8	7.8	44	11	25.2	8.1	44
				20	22	7.8	38	22	22.3	7.8	39
				30	18.2	7.3	30	33	18.4	7.4	33
13-Oct-99	218.56	331	1038	12	21.7	7.0	40	12	21.9	7.5	40
				23	16.8	7.0	30	23	21	7.2	36
				35	15.7	6.8	27	35	16.8	7.1	29
17-Nov-99	220.88	329	695	10	17.0	7.0	37	12	17.2	7.1	37
				20	16.5	7.0	35	25	17.3	7.1	37
				30	15.2	7.0	30	37	15.9	7	32
08-Dec-99	221.80	330	494	13.1	12.8	7.3	32	13.1	13.4	7.3	34
				23	12.6	7.2	31	23.0	13.3	7.3	35
				32.8	12.5	7.2	30	32.8	13.0	7.3	31
19-Jan-00	219.00	330	0	12.9	11.0	7.2	34	13.2	11.0	7.4	33
				23.1	10.8	7.1	37	23.1	10.9	7.4	34
				33.3	10.8	7.1	46	33.0	10.8	7.4	35
16-Feb-00	220.40	2000	1332	10	9.4	7.3	44	13.0	10.6	7.3	48
				20	9.4	7.3	45	26.0	9.6	7.2	53
				30	9.4	7.2	44	37.0	9.4	7.2	48
08-Mar-00	217.00	2392	1323	9	11.2	7.2	46	11.0	10.9	7.2	43
				18	11.8	7.2	46	22.0	9.1	7.1	46
				27	11.2	7.2	46	33.0	8.9	7.1	46
12-Apr-00	215.90	602	421	9.9	18.9	7.5	41	9.9	18.9	7.7	40
				19.5	12.1	7.3	45	20.1	14.4	7.4	46
				30	11.3	7.2	45	30.0	12.0	7.1	45
10-May-00	216.50	654	1121	9.9	20.2	7.7	40	9.9	20.4	7.7	40
				19.8	10.9	7.1	42	19.8	19.5	7.6	40
				29.7	10.9	7.0	44	30.0	12.5	7.1	43
14-Jun-00	226.60	744	1161	10.2	23.8	7.6	41	9.9	23.7	7.5	41
				19.8	15.4	7.1	37	19.8	16.4	7.2	37
				29.7	14.0	7.0	38	29.7	14.2	7.0	37
12-Jul-00	225.20	646	536	9.6	26.8	7.7	42	9.9	26.7	7.7	42
				19.8	19.5	7.1	34	19.8	21.4	7.3	37
				29.7	16.3	6.9	32	29.7	16.9	7.0	32
09-Aug-00	222	400	310	9.9	27.4	7.9	39	9.7	27.8	8.0	38
				19.8	23.2	7.3	33	19.6	24.1	7.5	35
				29.6	18.0	7.0	28	29.6	19.5	7.1	30

Source: EBMUD hydrolab reports (Appendix A)

Table 7
Receiving Water Laboratory Analysis
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Analyte	Unit	15-Sep-99		13-Oct-99		17-Nov-99		08-Dec-99		19-Jan-00*		16-Feb-00		08-Mar-00		12-Apr-00			10-May-00			14-Jun-00			12-Jul-00			09-Aug-00		
		CAMA	PENN20	CAMA	PENN20	CAMA	PENN20	CAMA	PENN20	CAMA	PENN20	CAMA	PENN20	CAMA	PENN20	CAMA	CAMA Dup.	PENN20	CAMA	CAMA Dup.	PENN20	CAMA	CAMA Dup.	PENN20	CAMA	CAMA Dup.	PENN20	CAMA	CAMA Dup.	PENN20
Alkalinity: Total as CaCO ₃	mg/L	12	17	15	16	16	20	23	16	20	17	20	19	20	19	18	18	18	18	18	17	19	18	18	20	20	24	18	19	18
Hardness: Total	mg/L	14	11	12	12	12	16	12	10	25	16	18	18	18	17	17	17	15	16	15	15	16	16	16	15	15	18	15	15	15
Total Dissolved Solids (TDS)	mg/L	36	36	27	32	29	34	690	37	54	40	50	50	41	37	45	45	35	52	53	41	34	35	38	43	37	36	22	26	32
Total Suspended Solids (TSS)	mg/L	U 2	U 2	U 2	U 2	2	U 2	U 2.4	U 2.4	U 2.4	U 2.4	4.7	4.3	2.3	2.3	U 2.0	U 2.0	U 2.0	U 2.4	U 2.4	U 2.4	U 2.0	U 1.7	3	2	U 2.0	2	2.3	U 1.2	U 2.0
Chloride	mg/L	1.2	1.3	1	1.2	1.1	1.2	300	1.2	2.3	1.8	1.6	1.7	1.5	1.5	1.6	1.6	1.6	1.5	1.5	1.4	1.5	1.5	1.6	1.4	1.4	1.4	1.5	1.4	1.5
Orthophosphate as P	mg/L	U 0.006	U 0.006	0.007	0.008	0.015	0.016	0.006	0.006	0.01	0.01	0.033	0.029	0.017	0.012	0.012	0.013	0.012	0.01	0.011	0.011	0.009	0.009	0.009	0.009	0.007	0.008	U 0.006	U 0.006	U 0.006
Aluminum	ug/L	14.2	14.6	U 10.4	U 10.4	U 10.4	U 10.4	U 10.4	U 10.4	U 10.4	U 10.4	144	96.6	81.8	90.6	38.2	40	41.7	21.8	18.5	31.6	140	40	34.8	B 23.4	B 18.7	B 35.3	11.7	14.6	6.28
Calcium	ug/L	3790	3800	3380	3570	3430	3470	3170	3310	4550	4110	4910	4900	B 4760	B 4520	4060	4060	4080	4140	4090	4000	4060	4030	4080	B 3570	B 3620	3650	3830	3880	3760
Copper	ug/L	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 2.08	U 3.12	3.54	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	U 3.12	B 3.13	U 3.12
Magnesium	ug/L	B 1280	B 1280	1080	1150	B 1110	B 1150	B 920	B 1030	B 2040	B 1710	1640	1720	1640	1600	1400	1410	1420	1420	1400	1390	B 1340	B 1320	B 1360	1200	1210	1230	1370	1330	1340
Potassium	ug/L	736	734	587	640	661	655	700	575	894	795	785	765	687	688	679	684	708	680	675	700	723	724	763	663	675	665	809	756	796
Sodium	ug/L	2140	2130	1680	1810	1880	1950	217000	1770	2820	2350	2360	2380	2270	2240	2130	2150	2180	2190	2160	2170	2170	2160	2220	1980	2000	2000	2330	2160	2320
Zinc	ug/L	3	2.44	0.852	2.12	U 0.832	31.9	4.85	3.74	6.6	20.7	2.34	9.61	U 2.08	3.06	9.29	5.22	4.57	2.55	3.64	4.32	5.57	U 2.08	2.87	U 2.08	U 2.08	B 2.29	5.14	2.9	2.14
Cadmium	ug/L	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4	U 0.4
Manganese	ug/L	0.384	0.324	U 0.2	U 0.2	U 0.2	U 0.2	U 0.2	U 0.2	U 0.2	4.73	1.41	7.51	3.4	3.92	2.44	2.2	2.75	2.31	0.3	0.996	0.446	0.591	0.361	U 0.20	U 0.20	U 0.20	U 0.2	U 0.2	U 0.20
Lead	ug/L	U 0.3	U 0.3	U 0.3	U 0.3	U 0.3	U 0.3	0.7	0.6	U 0.3	U 0.3	U 0.3	U 0.3	U 0.3	0.7	U 0.30	U 0.3	U 0.30	U 0.30	U 0.3	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30	U 0.30
Nickel	ug/L	U 2	U 2	U 2	U 2	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0	U 5.0
Nitrate as N	mg/L	0.005	U 0.003	0.03	0.02	0.005	0.007	U 0.003	0.003	0.014	0.075	0.062	0.058	0.041	0.03	0.019	0.017	0.013	0.025	0.024	0.02	0.006	U 0.0059	U 0.0059	U 0.0059	U 0.0059	0.006	0.007	0.006	U 0.0059
Sulfate	mg/L	1.6	1.7	1.3	1.5	1.2	1.4	1.3	1.4	2.7	3.6	2.1	3.2	2.1	2.4	2	2	2	1.9	1.9	2	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8
pH (field)	pH	7.63	7.8	6.93	7.27	7	7.09	7.2	7.3	7.1	7.2	7.3	7.2	7.2	7.1	7.3	NA	7.4	7.3	NA	7.5	7.2	NA	7.2	7.2	NA	7.3	7.4	NA	7.5
Electrical Conductivity (field)	umhos/cm	37.33	38.67	32.33	35.67	34	35.33	31	33	66	46	44	50	46	45	43.7	NA	43.7	42	NA	41	39	NA	38	36	NA	37	33	NA	34

Key:

U = Analyte not detected, value shown is detection limit
 B = Analyte detected in method blank

Notes

Samples are composites from depths of about 10', 20', and 30', unless otherwise noted.
 a = Sample depth for Penn20 is 44' and for CAMA is 35'

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SAMPLING LOCATION	SAMPLE DATE	FIELD PARAMETER READINGS					DISSOLVED METALS						CATION/ANION PARAMETERS				GENERAL CHEMISTRY			
		FLOW gpm	pH	E.C. (umhos/cm)	TEMP (oC)	TURB NTU	Al (ug/L)	Cd (ug/L)	Cu (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)	Na (ug/L)	K (ug/L)	Mg (ug/L)	Ca (ug/L)	SULFATE (mg/l)	HARDNESS (mg/L)	TDS (mg/L)	TSS (mg/l)
PRSW-1	11/08/1999	4	7.2	190	16	118	87.1	U 0.832	30.3	U 5.2	U 9.36	R 20.3	11300	2520	R 9210	R 10300	35	67	230	54
PRSW-1	12/20/1999	< 1	8	237	6.5	3.6	15.3	U 0.832	11.5	U 5.2	10	14	12400	2500	B 9890	19300	29	86	150	U 2.4
PRSW-1	01/24/2000	159	7.2	850	13.2	73	425	U 8.32	42.9	U 52	U 93.6	305	6000	1350	B 3700	5280	10	33	140	11
PRSW-1 (D)	01/24/2000	NA	NA	NA	NA	NA	1230	U 8.32	67.6	77.3	U 93.6	510	6640	1690	B 4300	9440	11	30	140	12
PRSW-1	02/23/2000	650	6.6	45	13.8	74.5	2800	U 0.728	21.7	7.69	U 5.2	17.2	3380	1020	2580	2930	3.2	18	140	7.4
PRSW-1	03/20/2000	44	6.4	87	17	22.7	1750	U 0.728	29	B 4.43	7.22	15.3	6260	759	5080	5180	3.6	33	100	U 2.0
PRSW-1	04/17/2000	200	6.5	83	13.1	114	151	U 0.728	20.4	3.42	5.92	B 10.5	5480	2550	4190	4470	4.6	75	120	34
PRSW-1	05/15/2000	8	6.7	142	16.5	2.4	48.2	U 0.728	11.5	U 2.08	U 5.2	8.27	10300	867	8740	8610	5.4	58	120	U 2.4
PRSW-1	06/19/2000	1	6.5	222	23.9	1.2	B 45.6	U 0.728	9.54	6.32	6.91	13	15200	1280	11900	13000	1.7	84	170	U 3.0
PRSW-1	07/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-1	08/22/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-2	11/08/1999	4	6.6	4300	18.6	13.8	29.5	233	998	254	36.7	R 43500	87600	17800	R 279000	R 426000	2900	2900	4800	29
PRSW-2	12/20/1999	1.6	7.3	4800	7	6.8	U 10.4	572	453	464	37.6	129000	76800	9700	B >60000	576000	3500	110	5200	12
PRSW-2	01/24/2000	238	6.4	780	13.2	271	45.8	24.9	208	24.7	11.3	3790	9560	3720	B 40000	73200	360	370	600	270
PRSW-2	02/23/2000	650	6.1	387	14.5	214	334	6.42	271	6.18	6.65	1760	7390	2160	17000	37200	190	180	310	200
PRSW-2	03/20/2000	45	5.3	1500	18.7	104	2360	69.1	3120	B 61.8	24.2	13000	21400	4170	79100	178000	1000	900	1400	84
PRSW-2 (D)	03/20/2000	NA	NA	NA	NA	NA	2190	68.9	3130	B 61.0	25.3	13000	21400	4180	78900	178000	1100	1200	1400	100
PRSW-2	04/17/2000	300	6.2	624	14.3	98	61.6	13.4	145	14.9	14.5	B 2300	10700	2890	31700	60300	200	28	470	84
PRSW-2	05/15/2000	32	3.7	2422	16.9	189	23000	125	5420	108	28.1	23800	30700	6730	121000	292000	1800	1400	2500	140
PRSW-2	06/19/2000	16	6.5	3865	21.6	220	B 120	176	13.8	150	30	26200	51000	9680	> 60000	> 400000	2600	2800	4300	63
PRSW-2 (D)	06/19/2000	NA	NA	NA	NA	NA	B 116	177	8.76	150	32.1	26300	52300	9950	205000	> 400000	37	2800	4200	58
PRSW-2	07/17/2000	4	7.1	3790	27.5	175	290	180	8.66	185	67.1	30400	51900	9790	B 232000	> 400000	2800	2900	4200	56
PRSW-2	08/22/2000	2.6	6.7	3933	24.5	188	356	149	U 15.6	166	73.3	33200	52100	9450	260000	642000	2700	3200	4400	47
PRSW-3	11/08/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	12/20/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	01/24/2000	*	5	235	13	15	513	U 8.32	148	U 52	U 93.6	150	2970	754	B 1640	3110	1.5	24	130	6.5
PRSW-3	02/23/2000	135	6.3	49	12.5	44.1	275	U 0.728	44.3	U 2.08	U 5.2	31.4	1830	727	2190	2840	2	17	140	4.2
PRSW-3	03/20/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	04/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	05/15/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	06/19/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	07/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-3	08/22/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF

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SAMPLING LOCATION	SAMPLE DATE	FIELD PARAMETER READINGS					DISSOLVED METALS						CATION/ANION PARAMETERS				GENERAL CHEMISTRY			
		FLOW gpm	pH	E.C. (umhos/cm)	TEMP (oC)	TURB NTU	Al (ug/L)	Cd (ug/L)	Cu (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)	Na (ug/L)	K (ug/L)	Mg (ug/L)	Ca (ug/L)	SULFATE (mg/l)	HARDNESS (mg/L)	TDS (mg/L)	TSS (mg/l)
PRSW-4	11/08/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-4	12/20/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-4	01/24/2000	**	6.2	35	12.7	38	1470	2.3	173	12.2	U 9.36	435	7450	1280	B 12800	9610	100	230	180	16
PRSW-4	02/23/2000	85	3.5	342	13.3	58.4	202	U 0.728	33.3	U 2.08	U 5.2	92.1	3300	330	2700	2520	8.6	76	160	3.4
PRSW-4	03/20/2000	2	6.4	59	15.5	54.5	3990	U 0.728	39.5	B 5.18	U 5.2	108	3880	335	3180	2730	12	19	140	U 3.0
PRSW-4	04/17/2000	5	5.6	159	13.3	15.6	256	1.53	138	10.1	U 5.2	B 319	4010	771	9260	8310	50	120	160	16
PRSW-4	05/15/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-4	06/19/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-4	07/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-4	08/22/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-5	11/08/1999	2	6	3020	17.5	38.3	147	109	3010	59.3	25.8	R 16800	179000	31000	R 156000	R 224000	1500	1600	2800	47
PRSW-5	12/20/1999	Trickle	6	6100	8.4	17.7	1500	90.5	7400	43.9	33	17000	342000	27100	B >60000	324000	2900	210	4800	16
PRSW-5	01/24/2000	53	6.8	1186	14.4	24	119	29.1	702	60.9	U 93.6	4980	31000	8360	B 64000	101000	560	720	970	22
PRSW-5	02/23/2000	225	6.5	299	14.5	58.5	216	10.1	306	U 2.08	8.36	1530	9550	1740	17900	24900	120	130	300	16
PRSW-5	03/20/2000	5	6.3	612	18.5	31	66.2	71.9	675	B 18.8	17.8	9770	13600	1200	37300	45200	320	290	490	46
PRSW-5	04/17/2000	75	6.5	962	12.8	58	102	37.1	370	18.4	15.4	B 5460	24700	4680	49000	93900	360	480	810	54
PRSW-5	05/15/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-5	06/19/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-5	07/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-5	08/22/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-6	11/08/1999	2	6.7	3880	18.5	34.4	15.4	112	606	148	32.9	R 22800	102000	21900	R 229000	R 402000	2400	2800	4000	38
PRSW-6	12/20/1999	1.7	7.3	4786	6.2	26	U 10.4	504	733	409	41	116000	77900	9360	B >60000	> 400000	3400	250	5300	8.4
PRSW-6 (D)	12/20/1999	NA	NA	NA	NA	NA	U 10.4	506	711	409	U 40.6	117000	77300	9410	B >60000	558000	3300	120	5300	5.6
PRSW-6	01/24/2000	353	6.6	1009	13.4	192	31.5	27.2	261	24.6	11.9	4240	15900	4950	B 58500	97700	500	560	800	190
PRSW-6	02/23/2000	1000	6.2	421	14.6	209	289	7.56	244	5.15	7.84	1880	8160	2150	20600	41000	210	230	340	180
PRSW-6	03/20/2000	54	5.6	1517	18.7	118	1360	63.9	2370	B 53.8	23.1	11800	22400	3790	84100	171000	1000	1200	1400	79
PRSW-6	04/17/2000	400	6.6	746	13.9	103	74.6	17.4	153	15.4	10.8	B 2800	14000	3460	38800	73800	250	340	580	100
PRSW-6 (D)	04/17/2000	NA	NA	NA	NA	NA	181	18.7	180	20.1	9.37	B 3050	14000	3650	41100	78300	260	400	600	110
PRSW-6	05/15/2000	40	4	2453	16.9	187	21100	116	4790	100	22	22000	31200	6400	125000	297000	1800	1500	2500	170
PRSW-6 (D)	05/15/2000	NA	NA	NA	NA	NA	19600	109	4420	98	24.7	21000	28000	5710	112000	280000	1900	1500	2500	230
PRSW-6	06/19/2000	16	6.8	3850	21.4	175	B 114	162	27.3	141	30.5	25000	54200	9680	> 60000	> 400000	2600	2800	4200	45
PRSW-6	07/17/2000	4	7.4	3721	27.5	167	203	167	20.4	178	66.8	28900	48500	8890	B 230000	704000	2800	2900	4000	40
PRSW-6	08/22/2000	2.6	6.9	3641	24.5	161	334	126	U 15.6	150	52.5	29200	53500	9180	264000	615000	2700	3000	4500	39
PRSW-6 (D)	08/22/2000	NA	NA	NA	NA	NA	400	135	22.5	153	59.2	30200	55200	9410	272000	632000	2700	3100	4600	30

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		FLOW gpm	pH	E.C. (umhos/cm)	TEMP (oC)	TURB NTU	Al (ug/L)	Cd (ug/L)	Cu (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)	Na (ug/L)	K (ug/L)	Mg (ug/L)	Ca (ug/L)	SULFATE (mg/l)	HARDNESS (mg/L)	TDS (mg/L)	TSS (mg/l)
PRSW-7	11/08/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	12/20/1999	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	01/24/2000	***	4.5	1726	13.7	9	25500	20	1940	75.2	12.1	3410	9620	2340	B >60000	178000	1200	980	1500	4.5
PRSW-7	02/23/2000	10	4.6	952	14.4	9.4	6560	10.1	1040	34	16.4	2110	5920	1830	62000	108000	620	600	880	6.8
PRSW-7 (D)	02/23/2000	NA	NA	NA	NA	NA	6720	10	1090	32.9	11.1	2170	6160	1910	64200	112000	470	610	860	5
PRSW-7	03/20/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	04/17/2000	1	4.4	985	13	17.6	4110	8.23	737	32.4	17.4	B 1700	4280	1950	54600	110000	450	520	830	11
PRSW-7	05/15/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	06/19/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	07/17/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
PRSW-7	08/22/2000	0	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
Hinckley	07/17/2000	1	3.5	2494	26.4	1.1	17800	50.4	2620	98.7	45.3	25000	30200	10100	B 73100	346000	1800	1000	2400	14
Hinckley (D)	07/17/2000	NA	NA	NA	NA	NA	17800	49.1	2650	91.3	49.5	24400	30500	10200	B 72900	336000	1900	1000	2400	6.5
Hinckley	08/22/2000	1	3.1	2476	27.4	2	18500	34.5	2580	51.6	62.5	18600	30500	9750	67900	243000	1700	2000	2600	8
SEEPS																				
PRSS-1	01/24/2000	2	6.1	1845	13.7	93	51.1	34.7	1060	56	17.1	6050	26000	12200	B >60000	165000	1100	1100	6700	140
PRSS-2	02/23/2000	50	3.6	2823	17.4	177	14000	13.8	1590	64.7	37.7	13000	46600	15400	82700	347000	2300	700	3300	160
PRSS-3	03/20/2000	3	3.2	2069	20.5	48.5	18800	48.5	5490	B 57.6	41.6	17100	28900	9020	63000	202000	1500	1100	2000	450
PRSS-3	05/15/2000	1	3.3	1585	18.2	1.2	16500	51.3	5000	56.1	30.5	13000	18400	6030	45500	120000	1000	800	1400	4
PRSS-3	06/19/2000	2	2.2	1234	22	8.5	B 18200	53.3	6030	47.3	23.6	9270	14400	5050	37000	50300	610	250	890	U 3.0

NOTES:

- NA = Not applicable
- NF = No flow
- R = Laboratory QA/QC spike out of calibration range
- U = Analyte not detected, value shown is detection limit
- B = Analyte detected in method blank
- (D) = Field duplicate sample
- * = Water level was 1/2" above weir lip
- ** = Water level was 3/4" above weir lip
- *** = Flow could not be estimated

Hinckley is located on Hinckley Creek below the #4 Adit.
 PRSS-1 is located at first drainage above lower road crossing of Hinckley Run.
 PRSS-2 is Shaft 4 Adit Seep.
 PRSS-3 is located 10 yards above the shaft 4 Seep.

**Table 9
Groundwater Laboratory Analysis Summary
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program**

WELL ID	SAMPLE DATE	SAMPLE TYPE	DEPTH TO WATER (feet)	FIELD PARAMETER READINGS				DISSOLVED METALS (a)						CATION/ANION PARAMETERS					GENERAL CHEMISTRY PARAMETERS					LAB				
				TEMP (oC)	pH	E.C. (umhos/cm)	TURB NTU	Al (ug/L)	Cd (ug/L)	Cu (ug/L)	Ni (ug/L)	Pb (ug/L)	Zn (ug/L)	SULFATE (mg/l)	Na (ug/L)	K (ug/L)	Mg (ug/L)	Ca (ug/L)	CHLORIDE (mg/l)	TSS (mg/l)	TDS (mg/l)	HARDNESS (mg/l)	ALKALINITY(b) (mg/l)		CARBONATE(b) (mg/l)	BICARBONATE (b) (mg/l)		
PRGW-1	04/22/1999	P	8.5	15.2	5.7	146	6.6	---	---	160	---	---	860	20	---	---	---	---	---	---	66	---	---	---	CHR			
PRGW-1	10/20/1999	P	15.51	18.9	5.94	420	33.3	350	U 5	U 50	U 50	U 5	970	48	14000	800	25000	35000	10	23	320	210	180	U 10	180	MCC/GEO		
PRGW-1	10/20/1999	S	NA	NA	NA	NA	NA	18.3	9.5	11.2	20.9	U 9.36	1180	48	B 16600	1080	B 26900	B 37100	9.1	180	270	210	160	U 0.1	164	EBMUD		
FR-1	10/20/1999	R	NA	NA	NA	NA	NA	610	7.8	U 50	U 50	6	960	47	15000	870	24000	36000	10	140	190	206	180	U 10	180	MCC/GEO		
FR-1	10/20/1999	R,S	NA	NA	NA	NA	NA	11.5	5.07	14	11	10.6	881	47	B18000	1120	B 27800	B 37800	8.5	340	270	200	160	0.1	164	EBMUD		
PRGW-1	01/18/2000	P	12.29	21.9	6.2	697	1.7	U 10.4	8.13	39.1	23.4	12.1	1470	190	18400	1430	B 50400	58500	35	6	530	380	120	U 0.1	120	EBMUD		
PRGW-1	04/20/2000	P	8.15	16	6	210	19	42.2	3.67	B 79.0	11.4	U 5.20	B 1130	50	9170	780	13500	16700	8.4	3.2	190	98	61	U 0.10	61	EBMUD		
PRGW-1	07/19/2000	P	11.86	21.4	5.49	320	17.1	24.6	9.84	110	16.7	9.97	2340	61	13800	1320	B 16700	20800	9.4	10	230	160	83	U 0.10	83	EBMUD		
PRGW-2	04/22/1999	P	18.82	16.1	5.44	9	372	---	---	100	---	---	U 100	9.6	---	---	---	---	---	---	---	---	---	---	64	---	CHR	
PRGW-2	10/19/1999	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-2	01/18/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-2	04/20/2000	P	14.41	16	5.1	8.6	120	7100	U 0.728	B 19.2	10.6	U 5.20	B 46	6.7	3120	474	2910	2840	3.3	19	450	22	15	U 0.10	15	EBMUD		
PRGW-2	07/19/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-3	10/20/1999	P	136	17.6	3.79	1560	3.4	45000	41	240	95	22	6200	690	10000	5600	47000	77000	5	10	1500	425	U 10	U 10	U 10	MCC/GEO		
PRGW-3	10/20/1999	S	NA	NA	NA	NA	NA	36700	36.1	247	83.8	31.8	5740	820	B 11200	6180	B 50900	B 79000	36	6.7	1200	400	U 5	U 0.10	U 5	EBMUD		
PRGW-3	01/18/2000	P	101.68	21.4	3.06	1420	12.1	50100	35	154	110	47.8	6720	1100	9840	8180	B 73000	86800	33	28	5400	4900	U 5	U 0.10	U 0.1	EBMUD		
PRGW-3	04/20/2000	P	92.8	19	3	730	3.6	15200	15.8	B 1150	44.8	22.8	B 2980	460	3720	3720	18800	58400	5.1	5	620	240	U 5	U 0.10	U 0.100	EBMUD		
PRGW-3	07/19/2000	P	48.5	21.7	2.3	1240	12.6	27000	22.6	428	70.6	22	4510	700	7920	5390	B 36800	67100	9.4	18	900	320	U 5.0	U 0.10	U 0.100	EBMUD		
PRGW-4	10/19/1999	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-4	01/18/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-4	04/20/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-4	07/19/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-5	04/22/1999	NA	Inaccessible	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-5	10/19/1999	P	13.82	23.6	8.1	1310	869	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	NA	
PRGW-5	01/18/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-5	04/20/2000	P	8.86	16	6.9	320	46	41.8	U 0.728	B 36	3.55	U 5.20	B 233	71	6400	2020	7040	66200	1.9	39	310	190	130	0.2	130	EBMUD		
PRGW-5	07/19/2000	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-6	04/22/1999	P	49.22	20.2	5.36	2340	14	---	---	120	---	---	120000	1400	---	---	---	---	---	---	---	---	---	---	---	U 5	---	CHR
PRGW-6	10/19/1999	P	51.61	19.6	5.25	2360	43.2	1700	270	U 50	82	U 5	86000	1225	88000	8200	110000	240000	88	39	2500	1120	U 10	U 10	U 10	MCC/GEO		
PRGW-6	10/19/1999	S	NA	NA	NA	NA	NA	47.6	232	4.73	107	33	65500	1300	B 104000	8390	B 106000	B 238000	94	27	2200	1200	U 5	U 0.1	4.5	EBMUD		
PRGW-6	01/18/2000	P	52.71	24.5	5.27	1890	49.6	480	182	77.6	210	U 93.6	79900	1400	96800	7290	B 106000	277000	140	88	2300	1100	9	U 0.1	9	EBMUD		
PRGW-6	04/20/2000	P	47.08	19	5.4	1900	27	396	227	B 9.46	120	28.6	B 94700	1500	61000	4620	105000	226000	86	81	2400	1300	18	U 0.10	18	EBMUD		
PRGW-6	07/19/2000	P	50.2	23.9	3	2410	3.7	395	197	55	109	39.5	67100	1400	106000	9490	B 107000	253000	86	7.5	2300	1200	U 5.0	U 0.10	U 0.100	EBMUD		
PRGW-6	07/19/2000	R	NA	NA	NA	NA	NA	354	193	46.9	108	39.2	66400	1500	103000	9180	B 104000	250000	83	6	2300	1200	U 5.0	U 0.10	U 0.100	EBMUD		
PRGW-7	04/22/1999	P	14.42	19.1	5.33	4460	200	---	---	2300	---	---	39000	3600	---	---	---	---	---	---	---	---	---	---	---	67	---	CHR
PRGW-7	10/19/1999	P	21.45	18.9	5.19	4110	78.6	2400	52	1400	51	U 5	33000	3375	48000	3400	600000	430000	45	230	5300	3800	80	U 10	80	MCC/GEO		
PRGW-7	10/19/1999	S	NA	NA	NA	NA	NA	53.7	46	1280	67.2	56.8	27300	3400	B 66000	6130	B 404000	B 382000	38	62	5600	4300	72	U 0.1	72	EBMUD		
PRGW-7	01/18/2000	P	22.64	22.9	5.88	3440	165.9	186	36.7	1200	87.7	33.6	27400	9600	52000	3850	B 423000	392000	110	64	5200	2000	57	U 0.1	57	EBMUD		
PRGW-7	04/20/2000	P	13.71	17	5.6	3700	88	253	35	B 1140	71	49.5	B 28600	3800	51200	2970	370000	375000	35	460	5300	3500	67	U 0.1	67	EBMUD		
PRGW-7	04/20/2000	R	NA	NA	NA	NA	NA	252	35.4	B 1180	72.4	50.3	B 28500	3800	51500	3080	370000	373000	33	210	5200	3500	66	U 0.1	66	EBMUD		
PRGW-7	07/19/2000	P	20.15	20.3	5.48	4340	6.2	252	41.3	1530	66.7	53.7	27100	3300	54200	2980	B 378000	371000	30	8	5100	3400	51	U 0.10	51	EBMUD		
PRGW-8	04/22/1999	P	12.12	19.7	7.11	686	7	---	---	62	---	---	410	190	---	---	---	---	---	---	---	---	---	---	---	250	---	CHR
PRGW-8	10/19/1999	NA	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
PRGW-8	01/18/2000	P	7.6	23.1	7.25	2630	18.8	U 10.4	U 0.832	7.33	8.04	23.8	11	1800	280000	2790	B >60000	243000	100	16	3200	1600	410	0.7	409	EBMUD		
PRGW-8	04/20/2000	P	9.7	15	6.8	2200	4.7	60.5	U 0.728	B 6.15	8.79	28.2	B 25.3	1400	153000	1180	166000	180000	15	9.2	2300	1300	180	U 0.1	180	EBMUD		
PRGW-8	07/19/2000	P	Dry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

Table 10
Groundwater Elevation Data Summary
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Groundwater Well Designator	Top of Casing Elevation (feet above MSL)	Well Depth (feet)	10/19/1999 (a)		11/15/1999 (b)		12/20/1999 (b)		01/21/2000 (b)		02/23-28/00 (b)		03/17/2000 (b)	
			Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)
PRGW-1	331.48	18	15.51	315.97	14.60	316.88	13.30	318.18	8.85	322.63	7.40	324.08	8.02	323.46
PRGW-2	368.33	19	> 19.00	< 349.33	NM	NM	20.00	348.33	20.05	348.28	10.82	357.51	14.40	353.93
PRGW-3	362.99	260	136.00	226.99	102.80	260.19	102.60	260.39	102.00	260.99	88.80	274.19	91.20	271.79
PRGW-4	319.64	12.4	> 12.40	< 307.24	> 12.40	< 307.24	> 12.40	< 307.24	12.35	307.29	11.65	307.99	> 12.40	< 307.24
PRGW-5	317.96	25	13.82	304.14	> 25.00	< 292.96	> 25.00	< 292.96	> 25.00	< 292.96	7.50	310.46	8.52	309.44
PRGW-6	352.74	102	51.61	301.13	51.95	300.79	52.30	300.44	52.75	299.99	50.10	302.64	47.52	305.22
PRGW-7	296.33	34.8	21.45	274.88	21.95	274.38	22.10	274.23	18.50	277.83	9.75	286.58	7.75	288.58
PRGW-8	258.78	18	> 18.00	< 240.78	> 18.00	< 240.78	16.90	241.88	7.60	251.18	1.05	257.73	4.63	254.15
PRGW-9	227.01	48	10.08	216.93	NM	NM	NM	NM	10.00	217.01	9.50	217.51	11.70	215.31
PRGW-10	224.60	51	5.60	219.00	NM	NM	NM	NM	5.40	219.20	5.60	219.00	8.74	215.86
PRGW-11	222.06	47.5	3.15	218.91	1.32	220.74	NM	NM	3.50	218.56	3.60	218.46	7.14	214.92
PRGW-12	220.37	67	0.92	219.45	NM	NM	NM	NM	0.40	219.97	1.65	218.72	4.82	215.55
Camanche Reservoir Elevation			219		221		222		219		219		215	

Notes:

(a) measured by Alisto Engineering Group

(b) measured by EBMUD

NM = not measured

> indicates that no water was encountered in the well, therefore the depth to groundwater is greater than the well depth

< indicates that groundwater elevation is below the elevation of the bottom of the well

Table 10
Groundwater Elevation Data Summary
 Penn Mine Environmental Site Restoration Project
 Post-Restoration Monitoring Program

Groundwater Well Designator	Top of Casing Elevation (feet above MSL)	Well Depth (feet)	04/27/2000 (b)		05/31/2000 (b)		06/23/2000 (b)		07/19/2000 (a)		08/24/2000 (b)	
			Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)	Depth to Water (feet)	Water Elevation (feet above MSL)
PRGW-1	331.48	18	8.05	323.43	8.15	323.33	9.30	322.18	11.86	319.62	12.28	319.20
PRGW-2	368.33	19	14.86	353.47	16.78	351.55	17.95	350.38	> 19.00	< 349.33	19.95	348.38
PRGW-3	362.99	260	93.09	269.90	94.65	268.34	95.95	267.04	98.50	264.49	98.20	264.79
PRGW-4	319.64	12.4	> 12.40	< 307.24	> 12.40	< 307.24	> 12.40	< 307.24	> 12.40	< 307.24	> 12.40	< 307.24
PRGW-5	317.96	25	8.87	309.09	9.82	308.14	11.87	306.09	> 25	< 292.96	13.42	304.54
PRGW-6	352.74	102	48	304.74	47.87	304.87	48.35	304.39	50.20	302.54	49.80	302.94
PRGW-7	296.33	34.8	14.14	282.19	16.33	280.00	17.58	278.75	20.15	276.18	20.08	276.25
PRGW-8	258.78	18	10.74	248.04	13.80	244.98	16.70	242.08	21.31	237.47	> 19.80	< 238.98
PRGW-9	227.01	48	11.96	215.05	NM	NM	NM	NM	6.39	220.62	8.40	218.61
PRGW-10	224.60	51	7.09	217.51	NM	NM	NM	NM	NM	NM	3.32	221.28
PRGW-11	222.06	47.5	5.2	216.86	NM	NM	NM	NM	NM	NM	1.28	220.78
PRGW-12	220.37	67	3.12	217.25	NM	NM	NM	NM	NM	NM	NM	NM
Camarache Reservoir Elevation			216		218		227		224		221	

Notes:

(a) measured by Alisto Engineering Group

(b) measured by EBMUD

NM = not measured

> indicates that no water was encountered i

< indicates that groundwater elevation is be

Table 11
Annual Summary of Selected Parameters in Surface Water
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Sampling Station	Date	Flow gpm	pH	Copper (ug/L)	Zinc (ug/L)	Magnesium (ug/L)	Calcium (ug/L)	Sulfate (mg/l)
Upstream Hinckley Run PRSW-1	11/08/1999	4	7.2	30.3	20.3	9210	10300	35
	12/20/1999	<1	8	11.5	14	9890	19300	29
	01/24/2000	159	7.2	42.9	305	3700	5280	10
	02/23/2000	650	6.6	21.7	17.2	2580	2930	3.2
	03/20/2000	44	6.4	29	15.3	5080	5180	3.6
	04/17/2000	200	6.5	20.4	10.5	4190	4470	4.6
	05/15/2000	8	6.7	11.5	8.27	8740	8610	5.4
	06/19/2000	1	6.5	9.54	13	11900	13000	1.7
	Average		6.9	22.1	50.4	6911	8634	11.6
	Minimum		6.4	9.5	8.3	2580	2930	1.7
Maximum		8.0	42.9	305	11900	19300	35	
Upstream Mine Run PRSW-3	01/24/2000	<1	5	148	150	1640	3110	1.5
	02/23/2000	135	6.3	44.3	31.4	2190	2840	2
	Average		5.7	96.2	90.7	1915	2975	1.8
	Minimum		5.0	44.3	31.4	1640	2840	1.5
	Maximum		6.3	148	150	2190	3110	2
Upstream Mine Run PRSW-4	01/24/2000	<1	6.2	173	435	12800	9610	100
	02/23/2000	85	3.5	33.3	92.1	2700	2520	8.6
	03/20/2000	2	6.4	39.5	108	3180	2730	12
	04/17/2000	5	5.6	138	319	9260	8310	50
	Average		5.4	96.0	238.5	6985	5793	42.7
	Minimum		3.5	33.3	92.1	2700	2520	8.6
Maximum		6.4	173	435	12800	9610	100	
Downstream Hinckley Run PRSW-2	11/08/1999	4	6.6	998	43500	279000	426000	2900
	12/20/1999	1.6	7.3	453	129000	60000	576000	3500
	01/24/2000	238	6.4	208	3790	40000	73200	360
	02/23/2000	650	6.1	271	1760	17000	37200	190
	03/20/2000	45	5.3	3120	13000	79100	178000	1000
	04/17/2000	300	6.2	145	2300	31700	60300	200
	05/15/2000	32	3.7	5420	23800	121000	292000	1800
	06/19/2000	16	6.5	13.8	26200	60000	400000	2600
	07/17/2000	4	7.1	8.66	30400	232000	400000	2800
	08/22/2000	2.6	6.7	15.6	33200	260000	642000	2700
	Average		6.2	1065.31	30695	117980	308470	1805
	Minimum		3.7	8.66	1760	17000	37200	190
	Maximum		7.3	5420	129000	279000	642000	3500
Downstream Mine Run PRSW-5	11/08/1999	2	6	3010	16800	156000	224000	1500
	12/20/1999	<1	6	7400	17000	60000	324000	2900
	01/24/2000	53	6.8	702	4980	64000	101000	560
	02/23/2000	225	6.5	306	1530	17900	24900	120
	03/20/2000	5	6.3	675	9770	37300	45200	320
	04/17/2000	75	6.5	370	5460	49000	93900	360
	Average		6.4	2077	9257	64033	135500	960
	Minimum		6.0	306	1530	17900	24900	120
Maximum		6.8	7400	17000	156000	324000	2900	

Table 11
Annual Summary of Selected Parameters in Surface Water
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Sampling Station	Date	Flow gpm	pH	Copper (ug/L)	Zinc (ug/L)	Magnesium (ug/L)	Calcium (ug/L)	Sulfate (mg/l)		
Site Discharge PRSW-6	11/08/1999	2	6.7	606	22800	229000	402000	2400		
	12/20/1999	1.7	7.3	733	116000	60000	400000	3400		
	01/24/2000	353	6.6	261	4240	58500	97700	500		
	02/23/2000	1000	6.2	244	1880	20600	41000	210		
	03/20/2000	54	5.6	2370	11800	84100	171000	1000		
	04/17/2000	400	6.6	153	2800	38800	73800	250		
	05/15/2000	40	4	4790	22000	125000	297000	1800		
	06/19/2000	16	6.8	27.3	25000	60000	400000	2600		
	07/17/2000	4	7.4	20.4	28900	230000	704000	2800		
	08/22/2000	2.6	6.9	15.6	29200	264000	615000	2700		
	Average			6.4	922.0	26462	117000	320150	1766	
	Minimum			4.0	15.6	1880	20600	41000	210	
Maximum			7.4	4790	116000	264000	704000	3400		
Runoff From Former Shoreline Pile PRSW-7	01/24/2000	NE	4.5	1940	3410	60000	178000	1200		
	02/23/2000	10	4.6	1040	2110	62000	108000	620		
	04/17/2000	1	4.4	737	1700	54600	110000	450		
	Average			4.5	1239	2407	58867	132000	757	
	Minimum			4.4	737	1700	54600	108000	450	
	Maximum			4.6	1940	3410	62000	178000	1200	
Hinckley Creek	07/17/2000	1	3.5	2620	25000	73100	346000	1800		
	08/22/2000	1	3.1	2580	18600	67900	243000	1700		
	Average			3.3	2600	21800	70500	294500	1750	
	Minimum			3.1	2580	18600	67900	243000	1700	
	Maximum			3.5	2620	25000	73100	346000	1800	
Seeps	PRSS-1	01/24/2000	2	6.1	1060	6050	60000	165000	1100	
	PRSS-2	02/23/2000	50	3.6	1590	13000	82700	347000	2300	
	PRSS-3	03/20/2000	3	3.2	5490	17100	63000	202000	1500	
		05/15/2000	1	3.3	5000	13000	45500	120000	1000	
		06/19/2000	2	2.2	6030	9270	37000	50300	610	
		Average			2.9	5507	13123	48500	124100	1037
		Minimum			2.2	5000	9270	37000	50300	610
	Maximum			3.3	6030	17100	63000	202000	1500	

Notes:

When calculating averages, non-detected values were set equal to the detection limit and other laboratory qualifiers were disregarded.
 NE = not estimated

Table 12
Annual Summary of Selected Parameters in Groundwater
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Location	Sample Date	Depth to Water (feet)	pH	Cu (ug/L)	Zn (ug/L)	SULFATE (mg/l)	Mg (ug/L)	Ca (ug/L)
Groundwater Entering Hinckley Run								
PRGW-1	10/20/1999	15.51	5.94	U 50	970	48	25000	35000
	01/18/2000	12.29	6.2	39.1	1470	190	B 50400	58500
	04/20/2000	8.15	6	B 79	B 1130	50	13500	16700
	07/19/2000	11.86	5.49	110	2340	61	B 16700	20800
	average	11.95	5.9	69.5	1478	87	26400	32750
	minimum	8.15	5.49	39.1	970	48	13500	16700
	maximum	15.51	6.2	110	2340	190	50400	58500
PRGW-2	04/20/2000	14.41	5.1	B 19.2	B 46	6.7	2910	2840
Groundwater Entering Mine Run								
PRGW-5	04/20/2000	8.86	6.9	B 36	B 233	71	7040	66200
PRGW-6	10/19/1999	51.61	5.25	U 50	86000	1225	110000	240000
	01/18/2000	52.71	5.27	77.6	79900	1400	B 106000	277000
	04/20/2000	47.08	5.4	B 9.46	B 94700	1500	105000	226000
	07/19/2000	50.2	3	55	67100	1400	B 107000	253000
	average	50.40	4.7	48.0	81925	1381	107000	249000
	minimum	47.08	3	9.46	67100	1225	105000	226000
	maximum	52.71	5.4	77.6	94700	1500	110000	277000
PRGW-7	10/19/1999	21.45	5.19	1400	33000	3375	600000	430000
	01/18/2000	22.64	5.88	1200	27400	9600	B 423000	392000
	04/20/2000	13.71	5.6	B 1140	B 28600	3800	370000	375000
	07/19/2000	20.15	5.48	1530	27100	3300	B 378000	371000
	average	19.49	5.54	1318	29025	5019	442750	392000
	minimum	13.71	5.19	1140	27100	3300	370000	371000
	maximum	22.64	5.88	1530	33000	9600	600000	430000
Groundwater in Mine Workings								
PRGW-3	10/20/1999	136	3.79	240	6200	690	47000	77000
	01/18/2000	101.68	3.06	154	6720	1100	B 73000	86800
	04/20/2000	92.8	3	B 1150	B 2980	460	18800	58400
	07/19/2000	48.5	2.3	428	4510	700	B 36800	67100
	average	94.75	3.04	493	5103	738	43900	72325
	minimum	48.5	2.3	154	2980	460	18800	58400
	maximum	136	3.79	1150	6720	1100	73000	86800

Table 12
Annual Summary of Selected Parameters in Groundwater
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Location	Sample Date	Depth to Water (feet)	pH	Cu (ug/L)	Zn (ug/L)	SULFATE (mg/l)	Mg (ug/L)	Ca (ug/L)
Groundwater in Shallow Bedrock, Mine Run								
PRGW-8	01/18/2000	7.6	7.25	7.33	11	1800	B> 60000	243000
	04/20/2000	9.7	6.8	B 6.15	B 25.3	1400	166000	180000
	average	8.7	7.0	6.74	18	1600	113000	211500
	minimum	7.6	6.8	6.15	11	1400	60000	180000
	maximum	9.7	7.25	7.33	25.3	1800	166000	243000
Groundwater Exiting Site in Bedrock								
PRGW-9	10/19/1999	10.08	5.27	2300	62000	2425	380000	340000
	01/18/2000	9.8	6.99	1960	56200	2900	B 380000	358000
	04/20/2000	12.31	5.5	B 2560	B 58600	3000	276000	310000
	07/19/2000	6.39	4.66	1140	51600	2600	B 297000	352000
	average	9.6	5.6	1990	57100	2731	333250	340000
	minimum	6.39	4.66	1140	51600	2425	276000	310000
	maximum	12.31	6.99	2560	62000	3000	380000	358000
PRGW-10	10/19/1999	5.6	5.97	U 50	170	3	1500	4400
	01/18/2000	5.81	7.19	12.5	355	25	B 4480	7120
	04/20/2000	8.95	6.5	B 22.1	B 445	48	6730	9970
	average	6.8	6.6	28.2	323.3	25.3	4236.7	7163.3
	minimum	5.6	5.97	12.5	170	3	1500	4400
	maximum	8.95	7.19	50	445	48	6730	9970
PRGW-11	10/19/1999	3.15	5.52	U 50	U 50	28	2600	12000
	01/18/2000	3.4	7.16	43.6	966	97	B 9030	26400
	04/20/2000	6.58	6.4	B 69.6	B 2370	160	14000	39800
	average	4.4	6.4	54.4	1128.7	95.0	8543.3	26066.7
	minimum	3.15	5.52	43.6	50	28	2600	12000
	maximum	6.58	7.16	69.6	2370	160	14000	39800
PRGW-12	10/19/1999	0.92	6.28	U 50	U 50	3	1400	4200
	01/18/2000	1.1	7.26	5.54	227	89	B 18900	10800
	04/20/2000	4.24	6.7	B 5.68	B 115	90	18000	11100
	average	2.1	6.7	20.4	130.7	60.7	12766.7	8700.0
	minimum	0.92	6.28	5.54	50	3	1400	4200
	maximum	4.24	7.26	50	227	90	18900	11100

Key

- B Analyte detected in method blank
U Analyte not detected, value shown is detection limit

Table 13
Post-Restoration Water Budget
October 27, 1999 to August 31, 2000 (Budget Period, 310 Days)
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Surface Water

Component	Notation	Estimated Quantity (Cubic Feet)	Specific Geometric/Volumetric Dimensions	Assumptions	Computation
Precipitation Figures					
Precipitation (entire basin) ¹		40,609,000	464 acres, 24.11 inches		464 acres x 24.11 inches, convert acre-inches to cubic feet
Precipitation Yield (entire basin) ^{1,2}	Y_b	9,790,000	464 acres		$0.01 \times (\text{Precipitation})^2 \times 464$, convert acre-inches to cubic feet
Precipitation on site ("Direct Precipitation")	Q_1	5,286,000	60.4 acres, 24.11 inches		60.4 acres x 24.11 inches, convert acre-inches to cubic feet
Precipitation Yield (site only) ²	Y_s	1,274,000	60.4 acres		$0.01 \times (\text{Precipitation})^2 \times 60.4$, convert acre-inches to cubic feet
Inflows					
Precipitation on site ("Direct Precipitation")	Q_1	5,286,000	60.4 acres, 24.11 inches		
Run-on (channel flow)	Q_6	4,013,400			PRSW-4
Run-on (overland flow)		0		<i>de minimus</i>	
Flow from Weathered Bedrock to Site Surface Water via Seeps ("Weathered Bedrock Seepage")		895,000		Gains at PRSW-2 over PRSW-1 during base flow (for 30 days prior to recession) are representative of 310 day period.	(86,592 cubic feet per 30 days) x 310 days
Σ Inflows		10,194,400			
Outflows					
Site Surface Water Discharge to Camanche	Q_4	5,880,700			Weir measurement: PRSW-6
Evapotranspiration (site only)	Q_3	4,012,000	60.4 acres		Direct Precipitation (Q_1) - Precipitation Yield (site only, Y_s)
Percolation to Weathered Bedrock from Site Surface Water		301,700		A relatively small component of the surface water percolates to bedrock. This quantity is the balance of inflow and outflow sums.	$\Sigma [\text{Inflow}] - \Sigma [\text{Other outflow plus Storage Change}]$
Storage Change		0		<i>de minimus</i>	
Σ Outflows plus Storage Change		10,194,400			

Table 13
Post-Restoration Water Budget
October 27, 1999 to August 31, 2000 (Budget Period, 310 Days)
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

Groundwater					
Component	Notation	Estimated Quantity (Cubic Feet)	Specific Geometric/Volumetric Dimensions	Assumptions	Computation
Inflows					
Percolation to Weathered Bedrock from Site Surface Water		301,700	See Above	See Above	See Above
Subsurface Flow to Bedrock at Up-Basin Site Boundary ("Subsurface Recharge")	Q ₂	1,339,000	See Table 2	See Table 2	K x l x A x 310 Days (See Table 2)
<u>Σ Inflows</u>		<u>1,641,000</u>			
Outflows					
Flow from Weathered Bedrock to Site Surface Water via Seeps ("Weathered Bedrock Seepage")		895,000		See Above	
Subsurface Flow from Bedrock off site at Discharge Boundary ("Subsurface Discharge")		698,000	See Table 2	See Table 2	K x l x A x 310 Days (See Table 2)
ARD-impacted Subsurface Discharge to Camanche Reservoir	Q ₅	1,400	A = 1,000 Ft ² (100 Ft x 10 Ft; Alpers et al. 1999)	K = 0.1 Ft/Day (Alpers et al., 1999); l = 0.045 (post-restoration hydraulic gradient)	K x l x A x 310 Days
Storage Change					
gain		38,000	See Table 2	See Table 2	Change in Groundwater Storage = Head Change X Area X Storage Coefficient
loss		--			
<u>Σ Outflows plus Storage Change</u>		<u>1,631,000</u>			

Notes:

3,629.751 cubic feet per acre-inch

¹For comparison and cross-checking purposes only.

²Precipitation Yield (Y) is the volume of water yielded to the water budget from precipitation after evapotranspiration losses. It is estimated in this budget using the empirical equation, $Y = 0.01(P)^2$, where P = precipitation over the area of interest (Turner, 1985).

Table 14
Post-Restoration Water Budget
Hydrogeological Parameter Values Used In Groundwater Budget
Penn Mine Environmental Site Restoration Project
Post-Restoration Monitoring Program

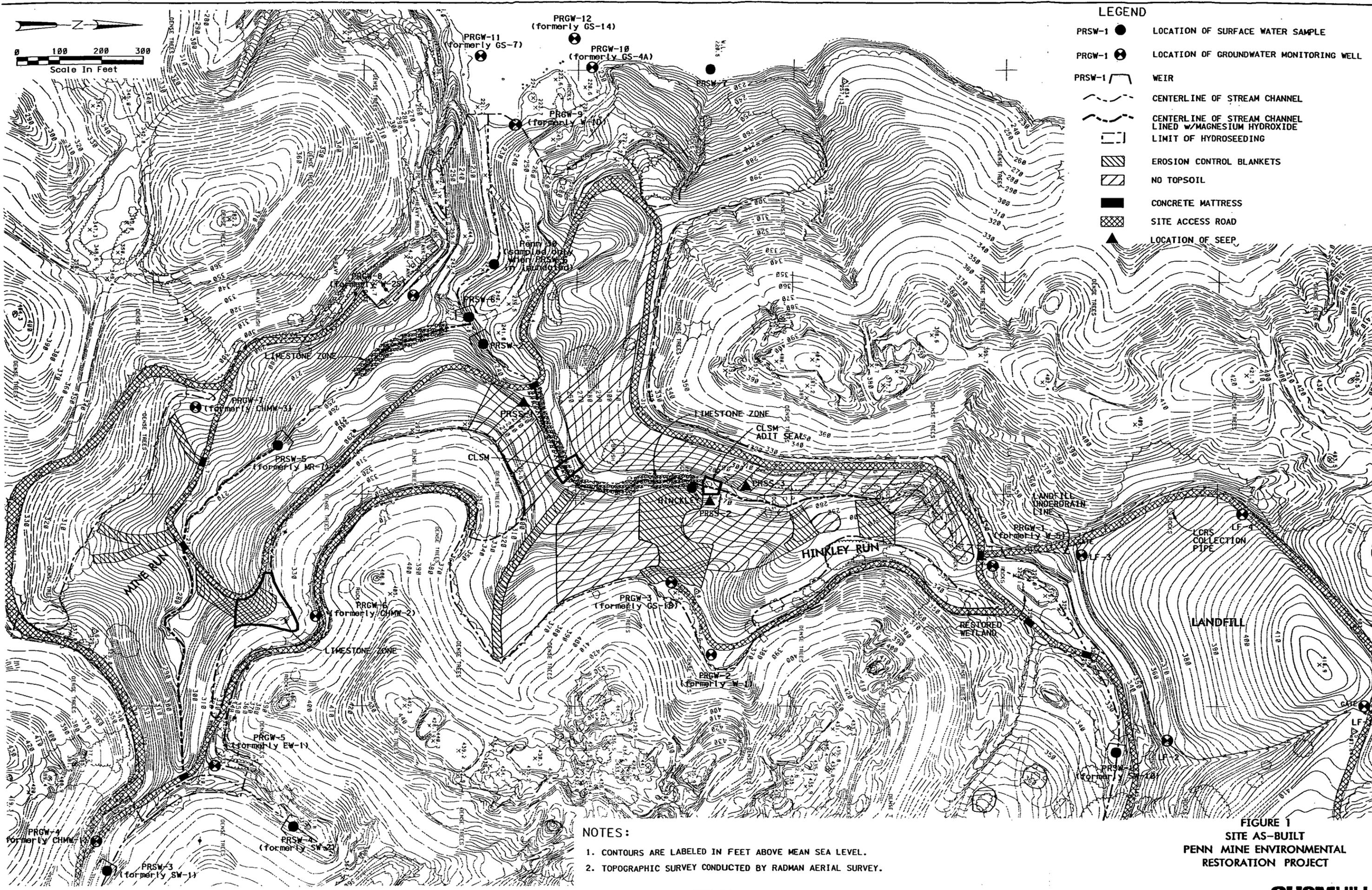
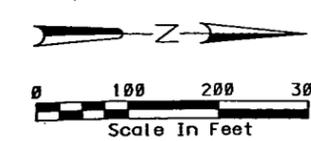
Parameter	Notation	Value	Unit	Basis
Hydraulic Conductivity	K	0.1	Ft/Day	Golder, 1996 (pg. 4-44). Assume potential increases with depth (due to fracturing) are offset by less conductive (slate) lithology at depth. Slate is estimated to be 10 - 50 times less conductive than Gopher Ridge Volcanics [Golder, 1996 (pg. 4-44)].
Hydraulic Gradient	I	0.045		Average of seasonal groundwater contour maps for post-restoration period. Pathways evaluated were from PRGW-1 to PRGW-10 and PRGW-6 to PRGW-8. These pathways are the most reproducible and maintain the best perpendicular orientation to groundwater contour lines season to season.
Vertical section	b	200	Ft	Assume 200 foot thick vertical section of concern within the bedrock aquifer.
Recharge Boundary	R	4,800	Ft	Based on site perimeter and groundwater contour maps.
Discharge Boundary	D	2,500	Ft	Based on site perimeter and groundwater contour maps.
Budget Period		310	Days	
Coefficient of Storage	S	0.01		Assumed value for unconfined aquifer
Calculation of Groundwater Storage Change				
Region 1				
Change in hydraulic head	ΔH	0	Ft	Approximate value from PRGW-7 and PRGW-8
Area	A	NC ¹	Ft ²	Hydrologic sub-basins MR-3, MR-4, MR-5, MRC-3, HR-6, HR-7, half MRC1 and half MRC-2 [Golder, 1996 (Figure 4-8)]
Change in Storage	ΔS_1	0	Ft ³	$\Delta H \times A \times S$
Region 2				
Change in hydraulic head	ΔH	2	Ft	Approximate value from PRGW-5 and PRGW-6
Area	A	666,845	Ft ²	Hydrologic sub-basins MR-2, HR-2, and HRC-1 [Golder, 1996 (Figure 4-8)]
Change in Storage	ΔS_2	13,337	Ft ³	$\Delta H \times A \times S$ (water levels increased)
Region 3				
Change in hydraulic head	ΔH	3	Ft	Approximate value from PRGW-1
Area	A	641,763	Ft ²	Hydrologic sub-basins HR-3, HR-4, HRC-2, HRC-3, HR-5 [Golder, 1996 (Figure 4-8)]
Change in Storage	ΔS_3	19,253	Ft ³	$\Delta H \times A \times S$ (water levels increased)
Region 4				
Change in hydraulic head	ΔH	1.4	Ft	Approximate value from PRGW-9, PRGW-10, PRGW-11 and PRGW-12
Area	A	396,798	Ft ²	Hydrologic sub-basins MR-3, MR-4, MR-5, MRC-3, half MRC1 and half MRC-2 [Golder, 1996 (Figure 4-8)]
Change in Storage	ΔS_4	5,555	Ft ³	$\Delta H \times A \times S$ (water levels increased)
Total Change:	ΔS_{tot}	38,000	Ft ³	$\Delta S_1 + \Delta S_2 + \Delta S_3 + \Delta S_4$ (rounded)

¹Not calculated because $\Delta H = 0$.

Table 15
Water Quality Monitoring Program
Second Post-Restoration Year
Penn Mine Environmental Site Restoration Project

Location	Frequency	Analyte	Unit	Detection Limit	Method Reference
Site Surface Water	Monthly	pH	pH		Field
		Electrical Conductivity	µmhos/cm		Field
		Copper	µg/L	5	EPA 200.7: Filtered
		Zinc	µg/L	10	EPA 200.7: Filtered
		Sulfate	mg/L	1	EPA 300.0
		Hardness	mg/L	10	EPA 130.2
Receiving Water	See Section 10.1	pH	pH		Field
		Electrical Conductivity	µmhos/cm		Field
		Copper	µg/L	3	EPA 200.7: Filtered
		Zinc	µg/L	5	EPA 200.7: Filtered
		Sulfate	mg/L	1	EPA 300.0 A
		Hardness	mg/L	10	SM (18) 2320B
Groundwater	Quarterly	pH	pH		Field
		Electrical Conductivity	µmhos/cm		Field
		Copper	µg/L	5	EPA 200.7: Filtered
		Zinc	µg/L	10	EPA 200.7: Filtered
		Sulfate	mg/L	1	EPA 300.0
		Hardness	mg/L	10	EPA 130.2

Figures

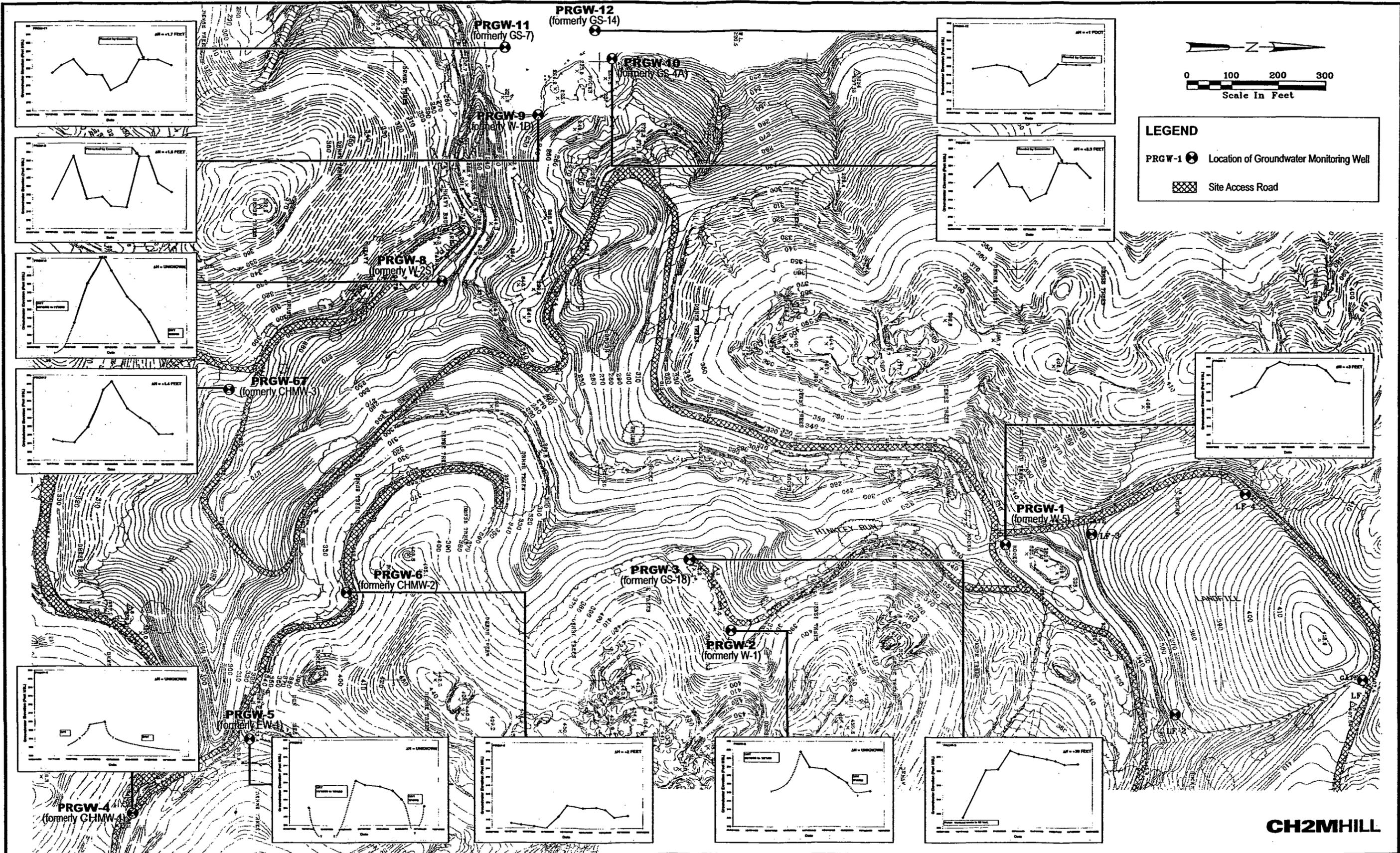


LEGEND

- PRSW-1 ● LOCATION OF SURFACE WATER SAMPLE
- PRGW-1 ⊙ LOCATION OF GROUNDWATER MONITORING WELL
- PRSW-1 [] WEIR
- CENTERLINE OF STREAM CHANNEL
- - - CENTERLINE OF STREAM CHANNEL LINED w/MAGNESIUM HYDROXIDE
- [] LIMIT OF HYDROSEEDING
- [/] EROSION CONTROL BLANKETS
- [\] NO TOPSOIL
- [] CONCRETE MATTRESS
- [X] SITE ACCESS ROAD
- ▲ LOCATION OF SEEP

- NOTES:**
1. CONTOURS ARE LABELED IN FEET ABOVE MEAN SEA LEVEL.
 2. TOPOGRAPHIC SURVEY CONDUCTED BY RADMAN AERIAL SURVEY.

FIGURE 1
SITE AS-BUILT
PENN MINE ENVIRONMENTAL
RESTORATION PROJECT



NOTES: 1. Contours are labeled in feet above mean sea level.
 2. Topographic survey conducted by Radman Aerial Survey.

FIGURE 19
Post-Restoration Hydrographs
 October 1999 to August 2000
 PENN MINE ENVIRONMENTAL RESTORATION PROJECT

CH2MHILL

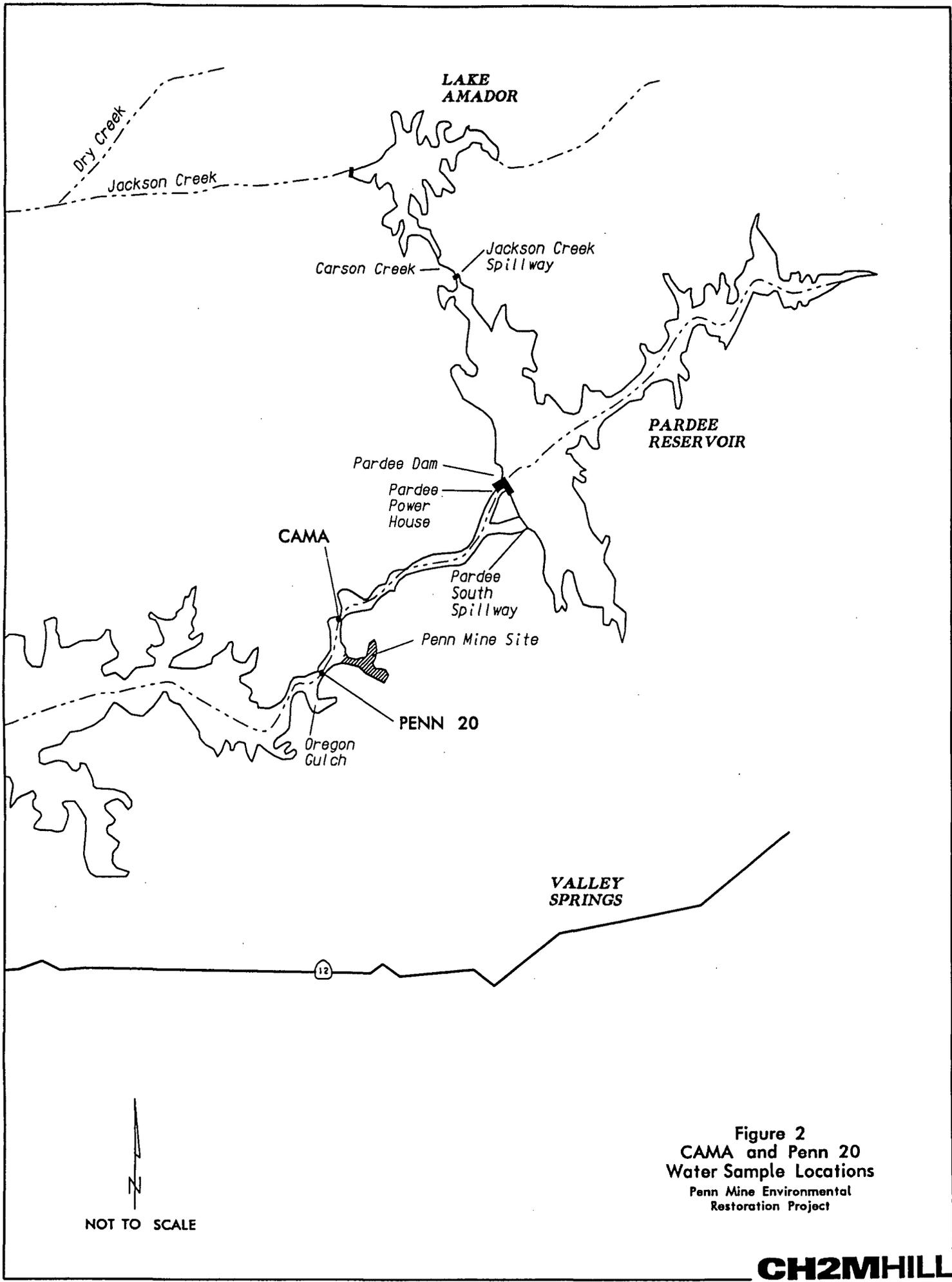


Figure 2
 CAMA and Penn 20
 Water Sample Locations
 Penn Mine Environmental
 Restoration Project

Figure 3
PRSW-2: Copper Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

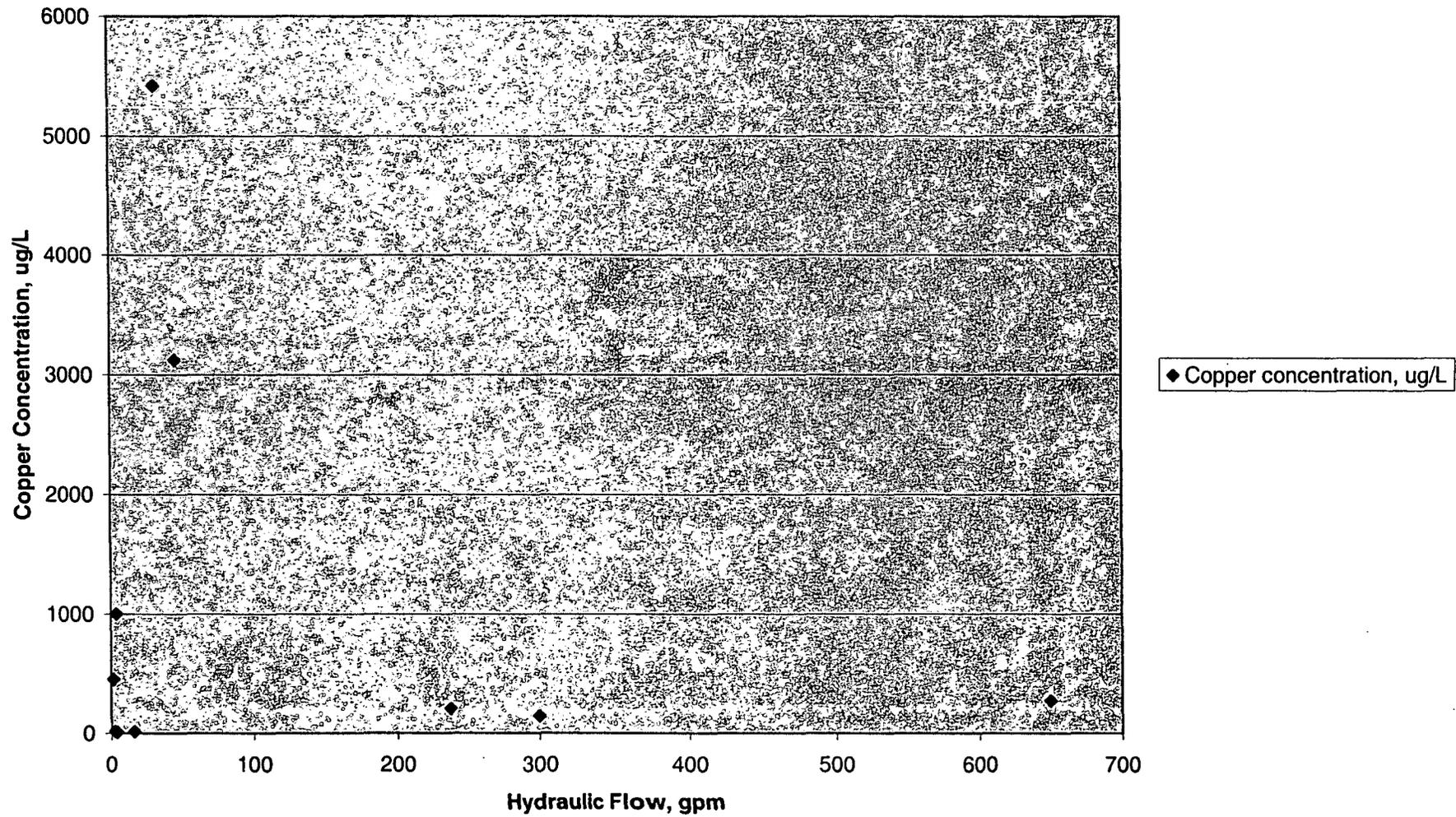


Figure 4
PRSW-2: Copper Mass Load as a Function of Hydraulic Flow - September 1999 through August 2000

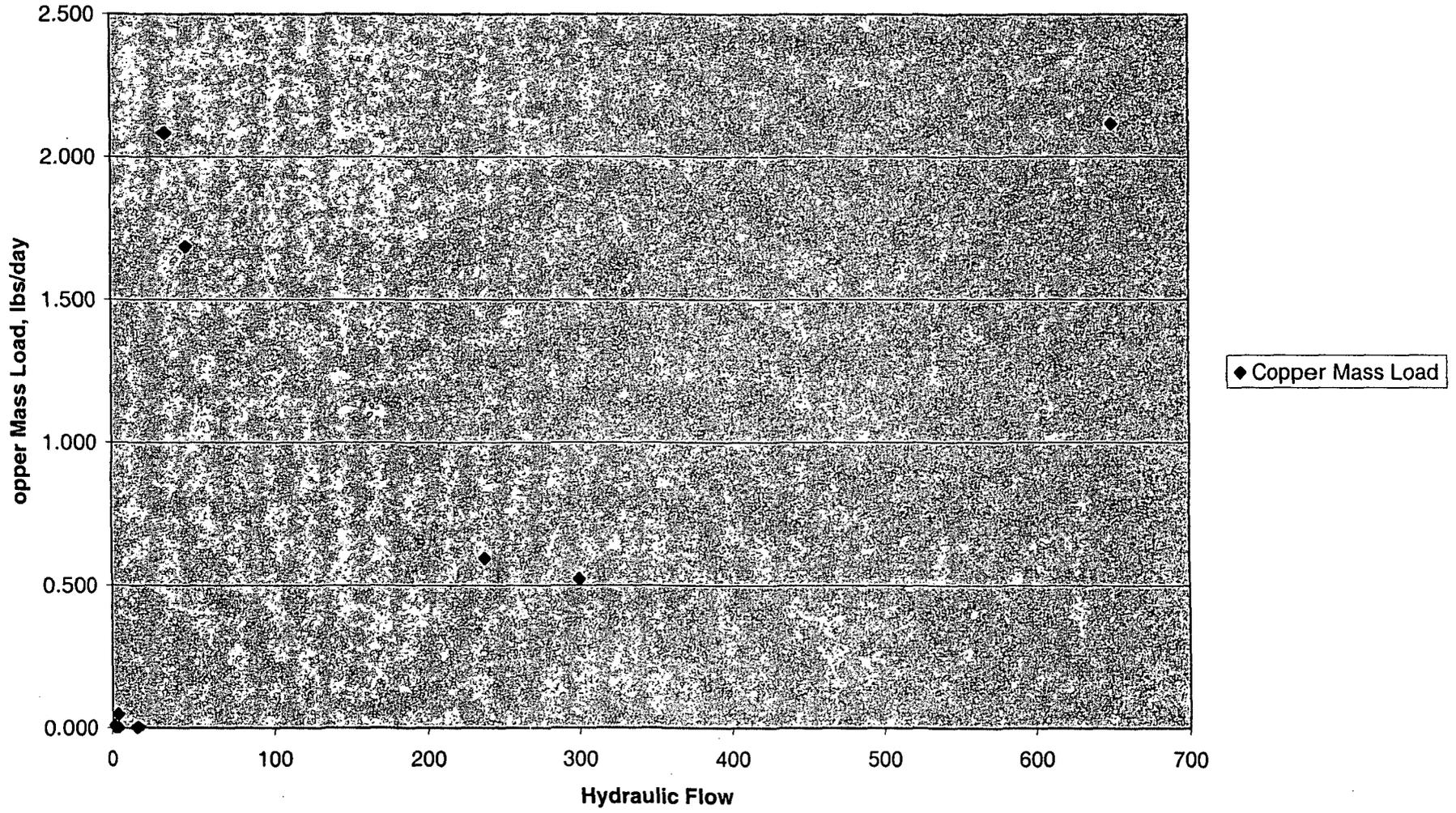


Figure 5
PRSW-2: Zinc Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

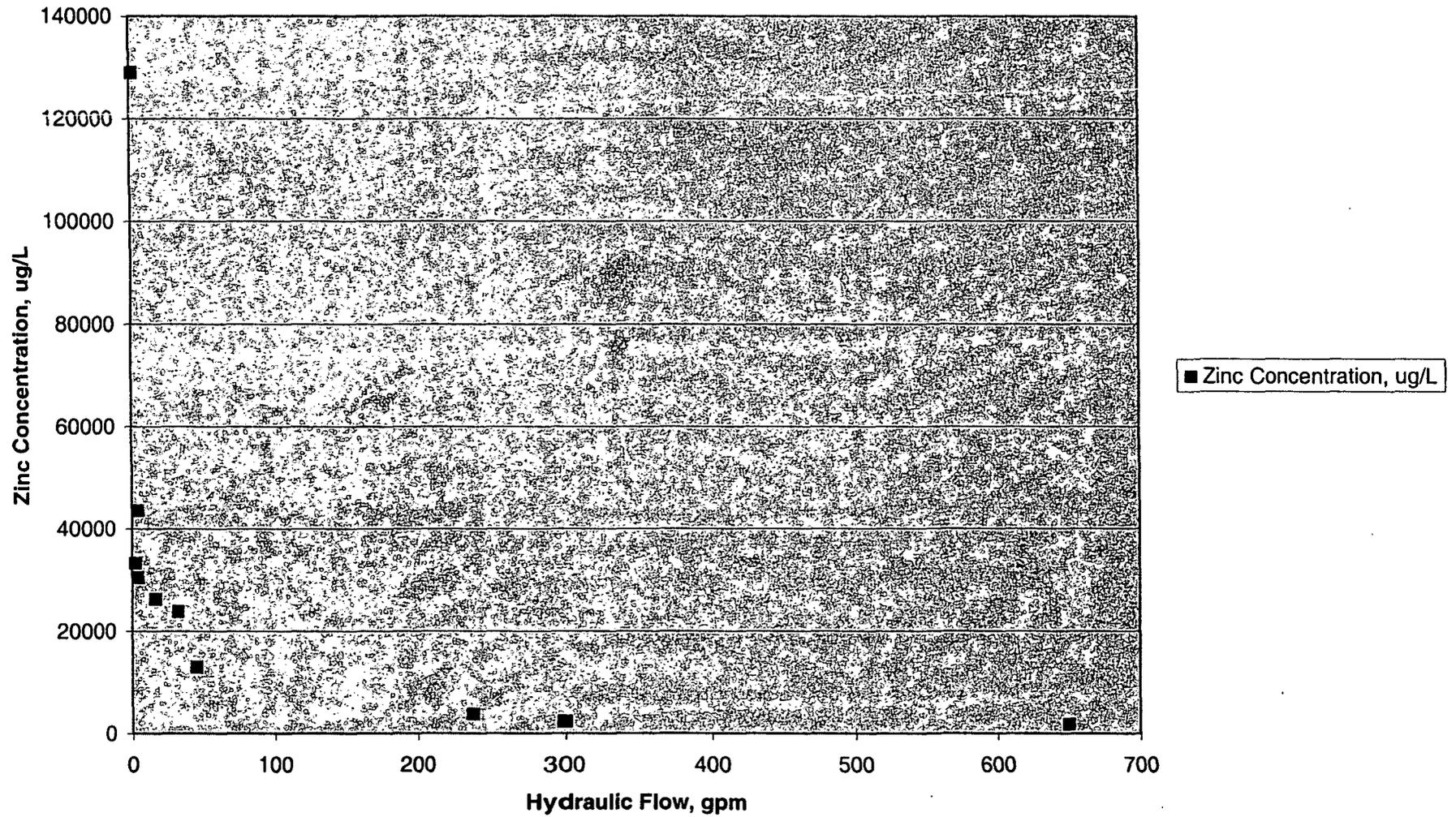


Figure 6
PRSW-2: Sulfate Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

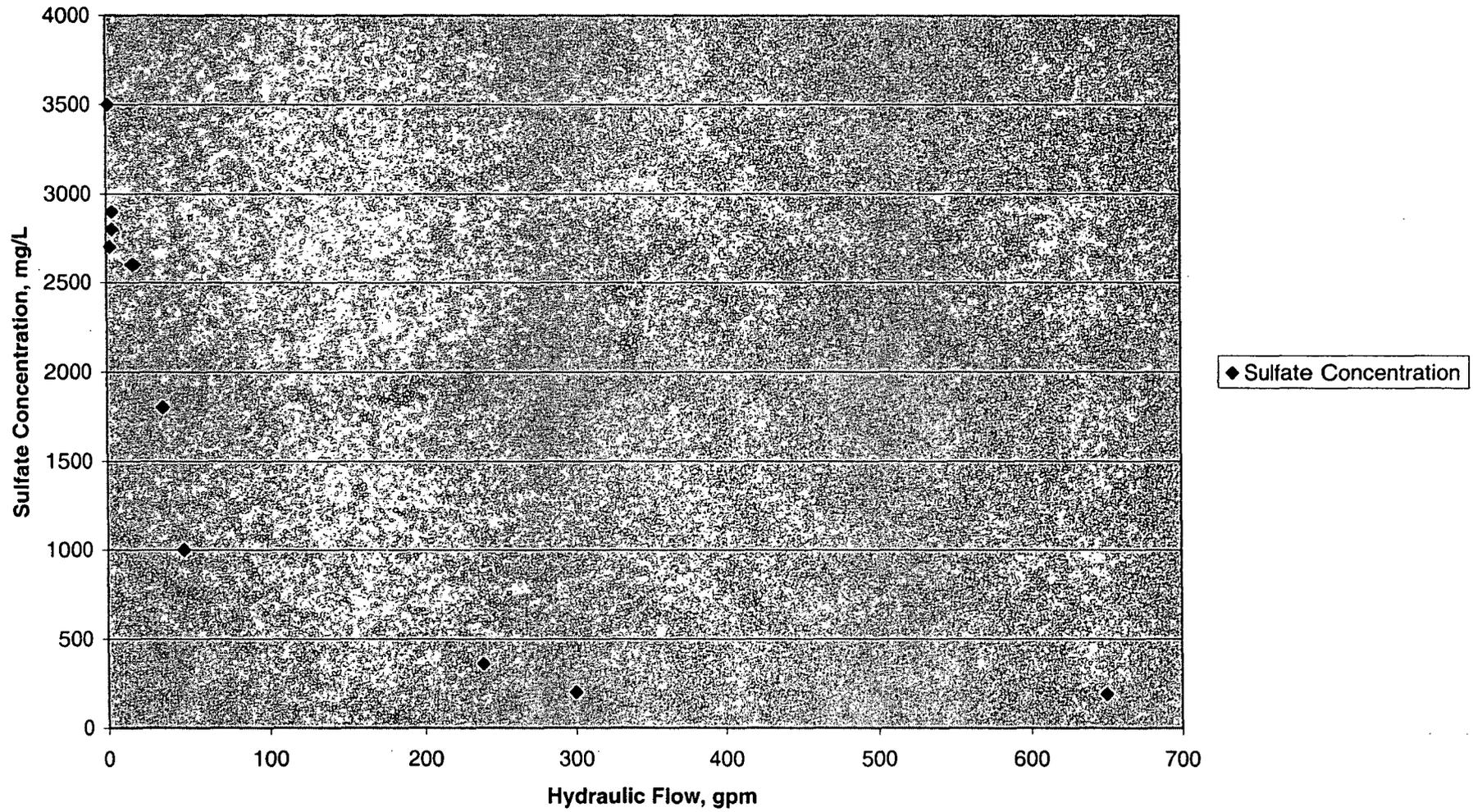


Figure 7
PRSW-2: Zinc Mass Load as Functions of Hydraulic Flow - September 1999 through August 2000

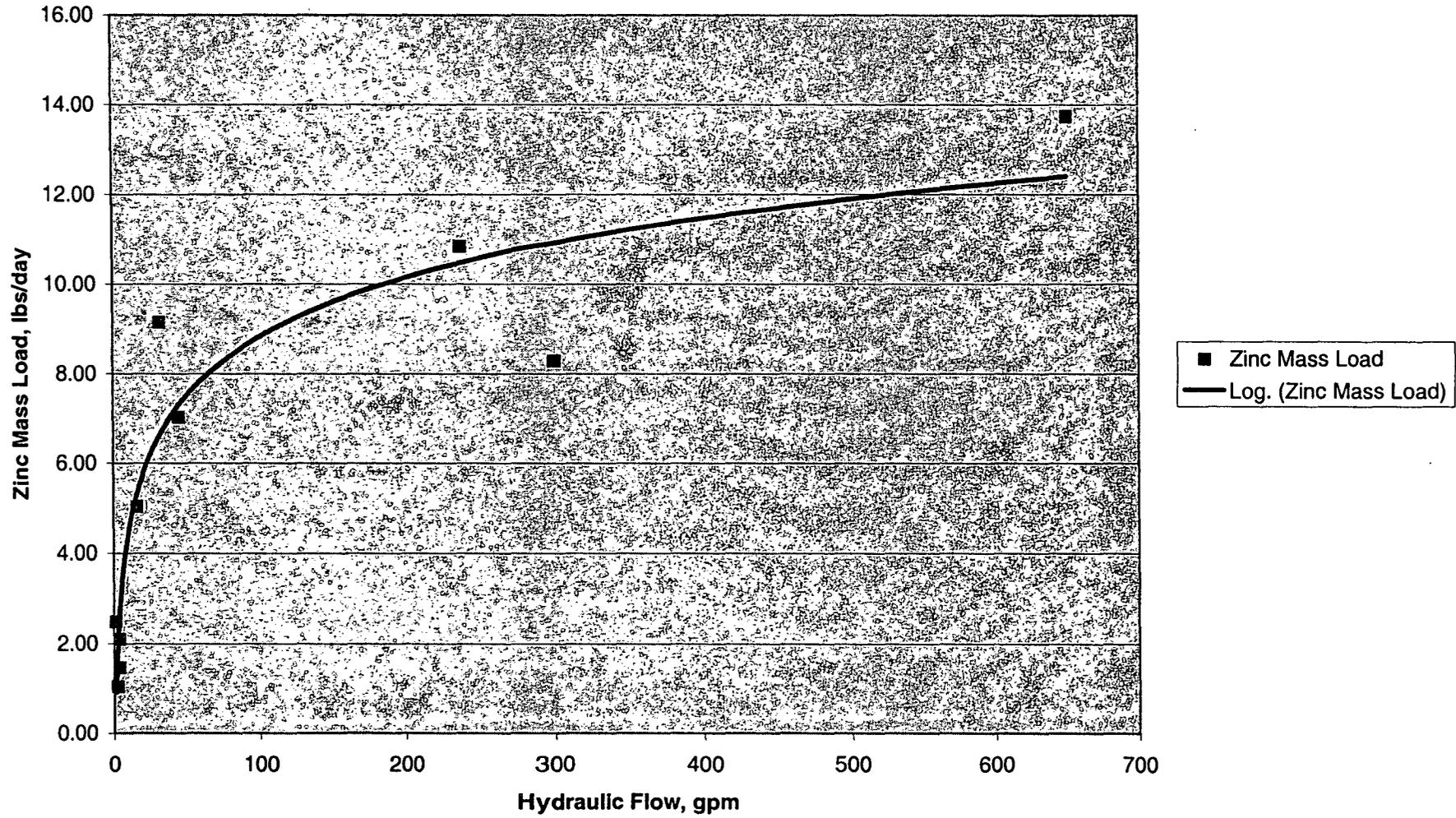


Figure 8
PRSW-5: Copper Concentrations as a Function of Hydraulic Flow - September 1999 through August 2000

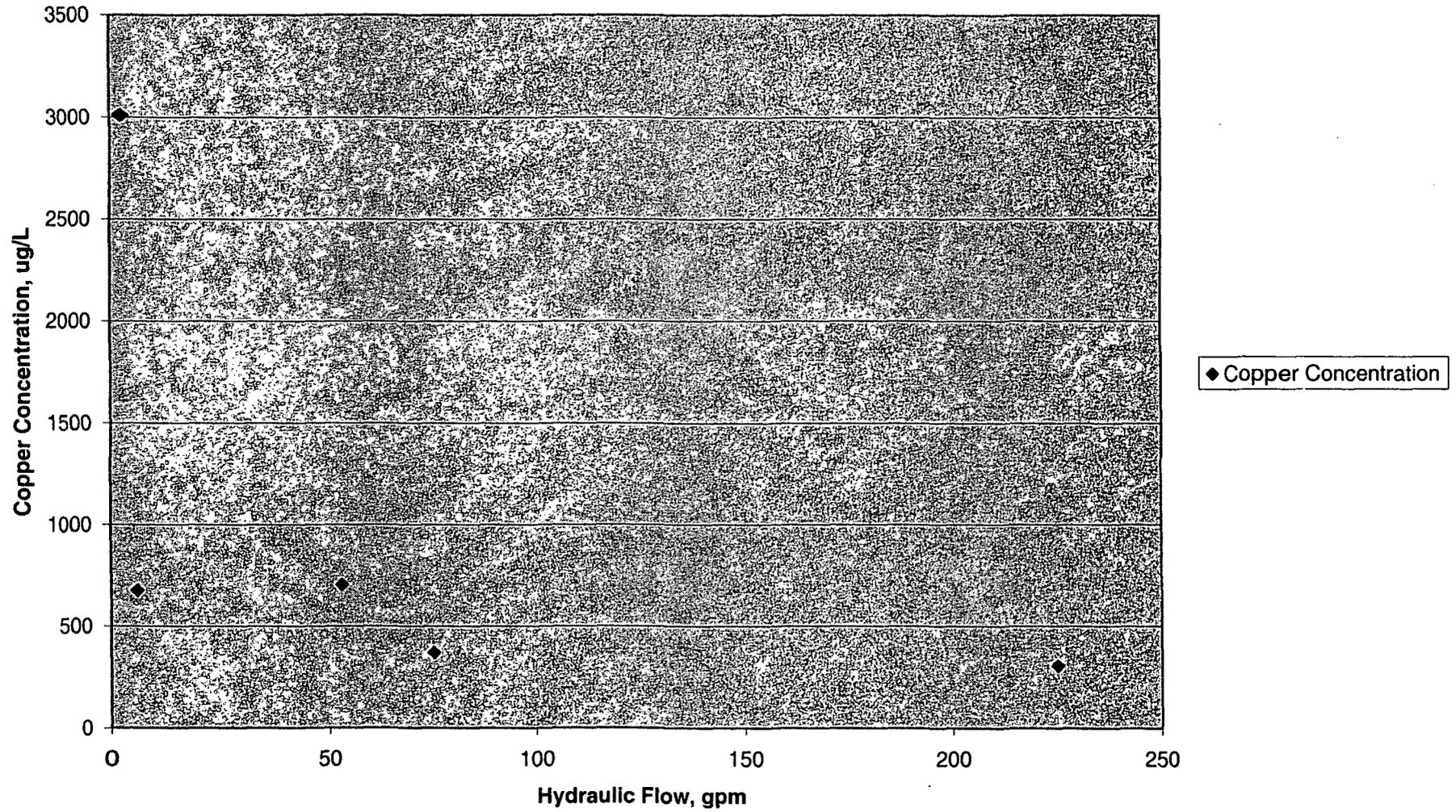


Figure 9
PRSW-5: Zinc Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

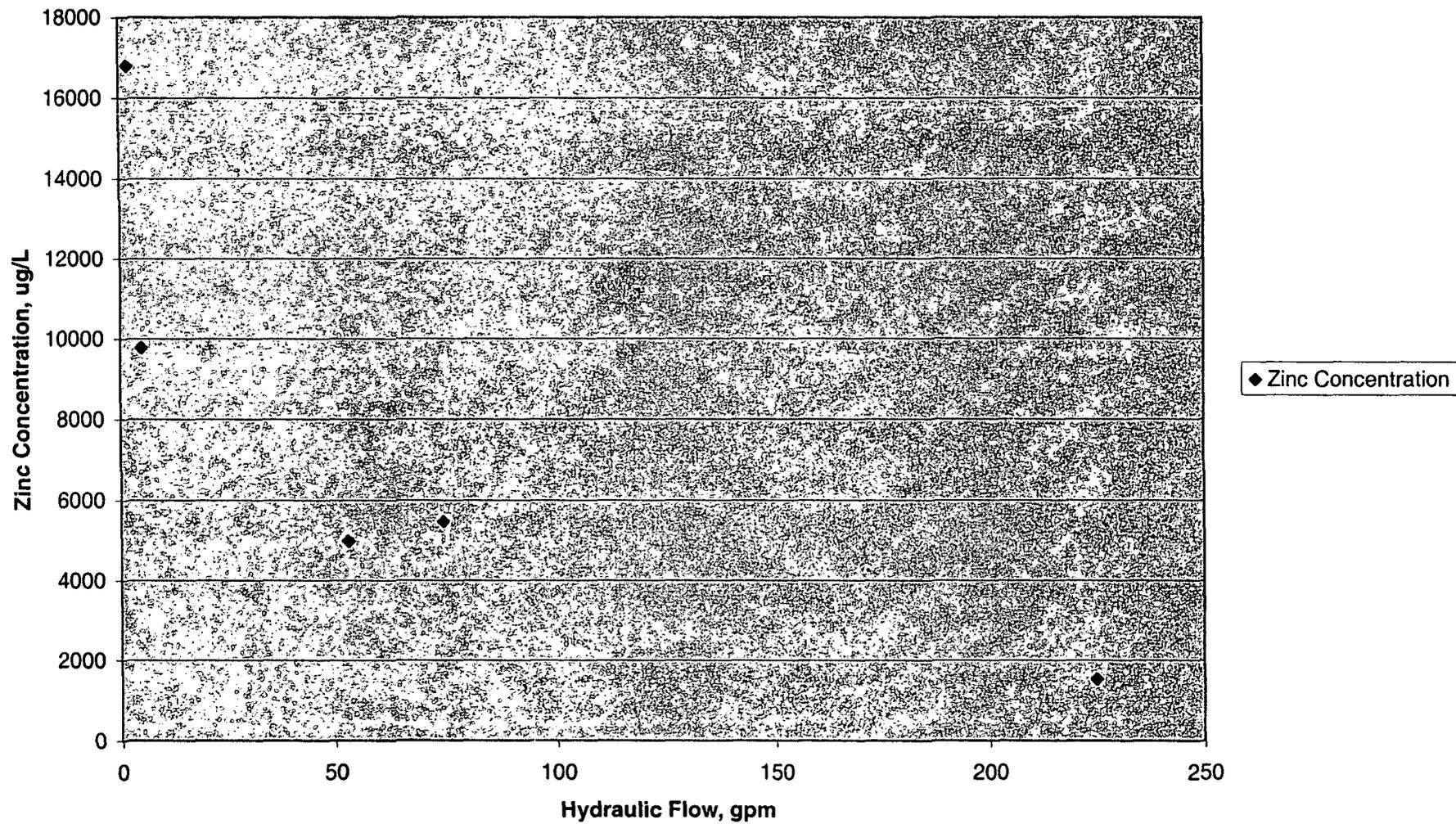


Figure 10
PRSW-5: Copper Mass Load as a Function of Hydraulic Flow - September 1999 through
August 2000

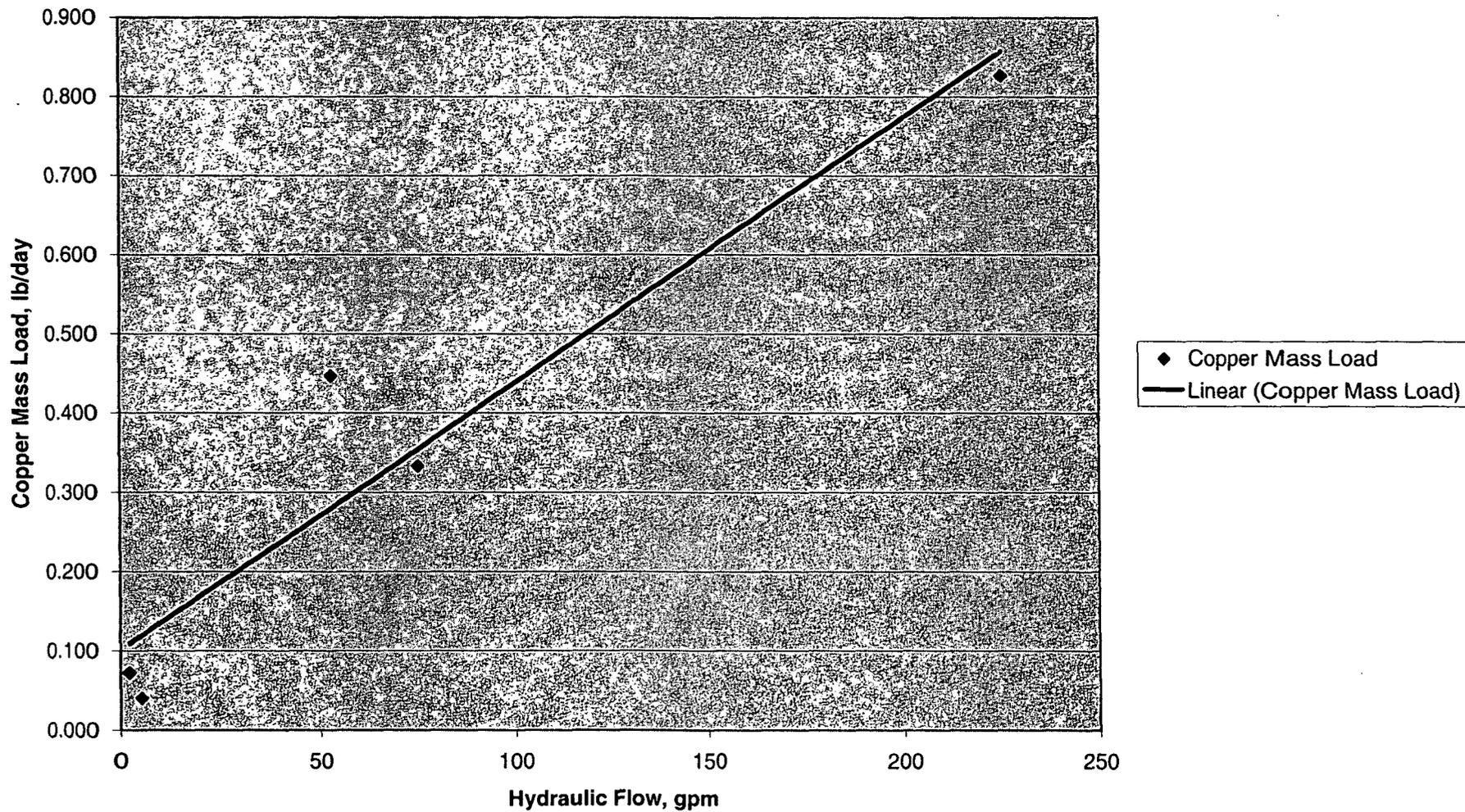


Figure 11
PRSW-5: Zinc Mass Load as a Function of Hydraulic Flow - September 1999 through August 2000

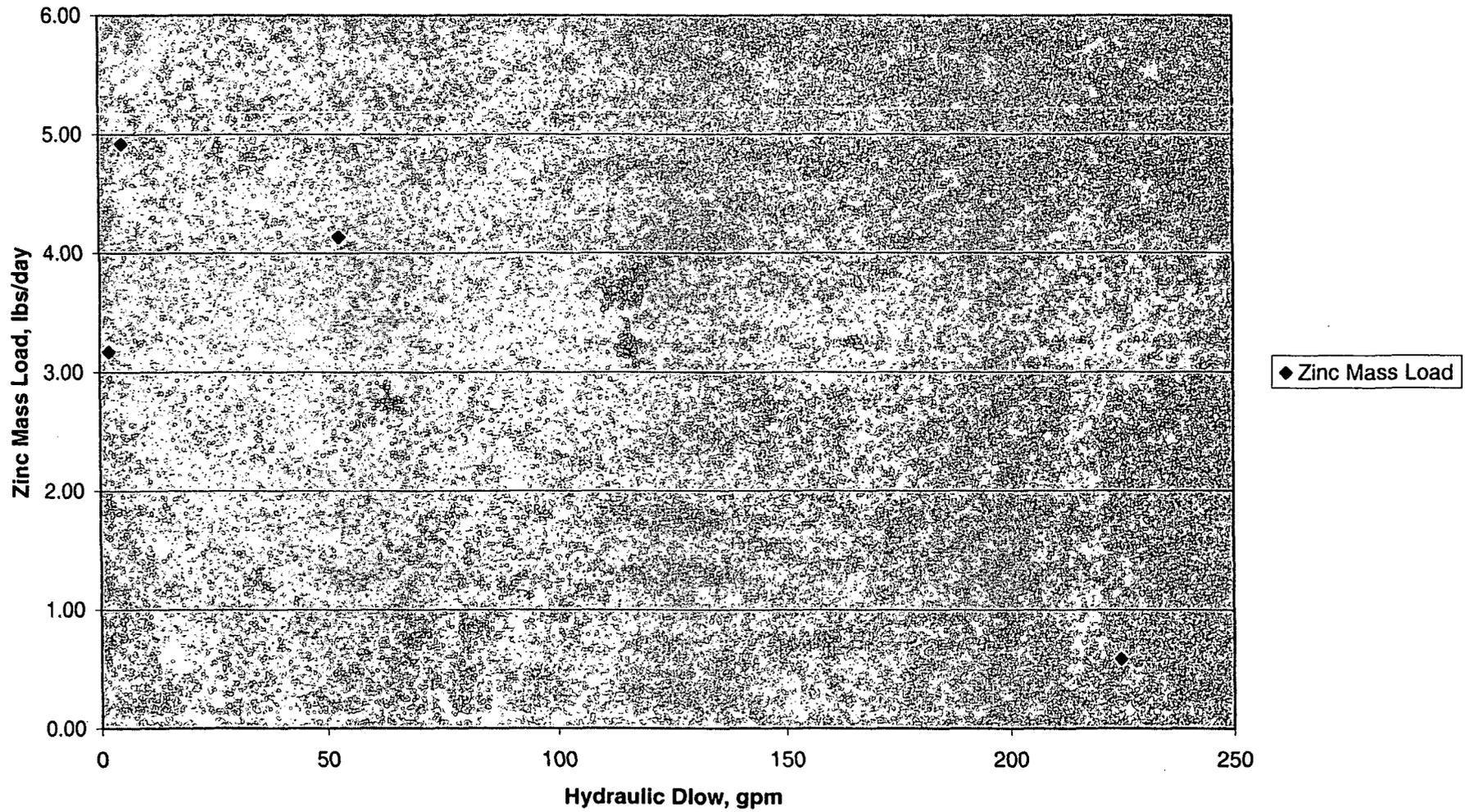


Figure 12
PRSW-6: Copper Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

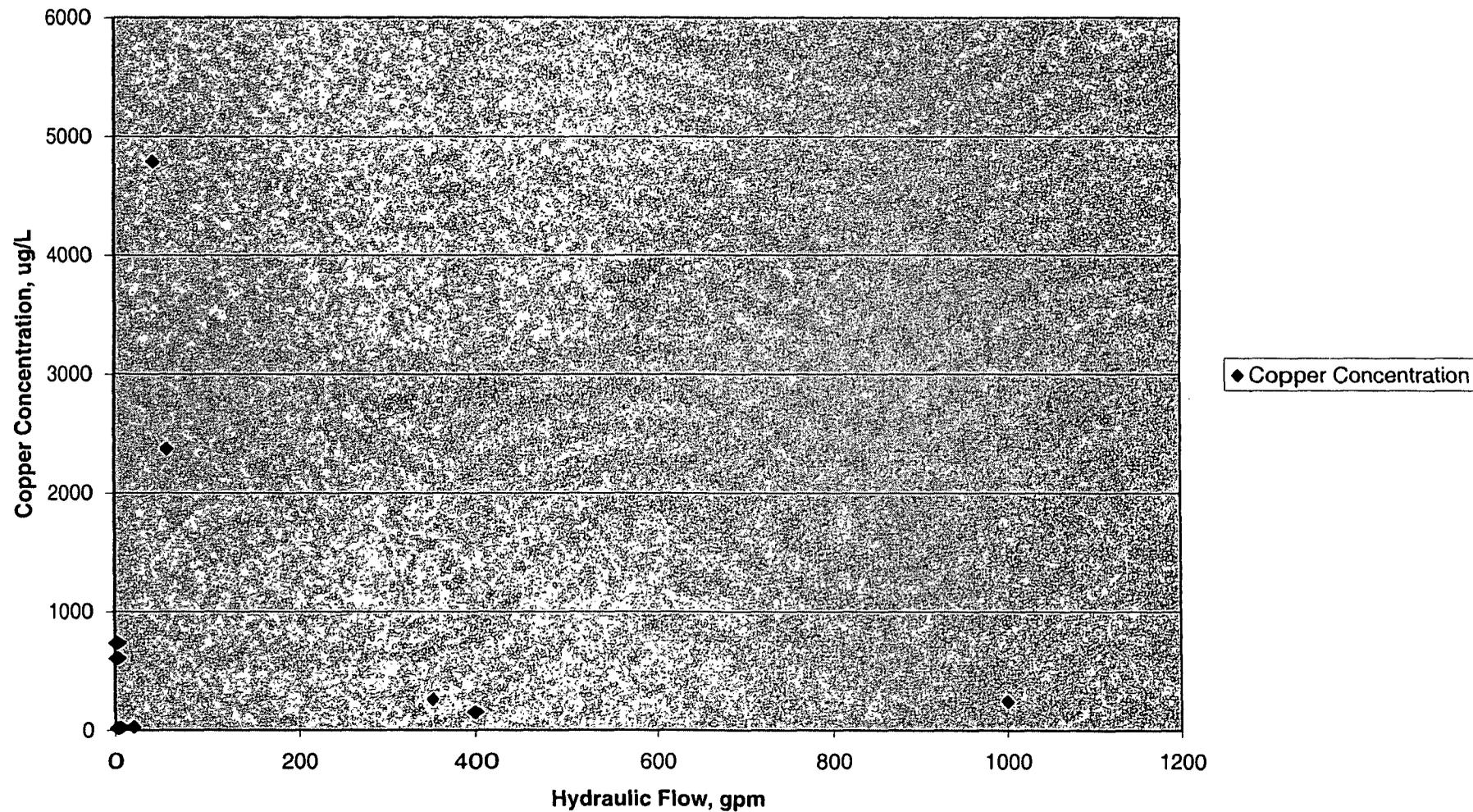


Figure 13
PRSW-6: Copper Mass Load as a Function of Hydraulic Flow - September 1999 through August 2000

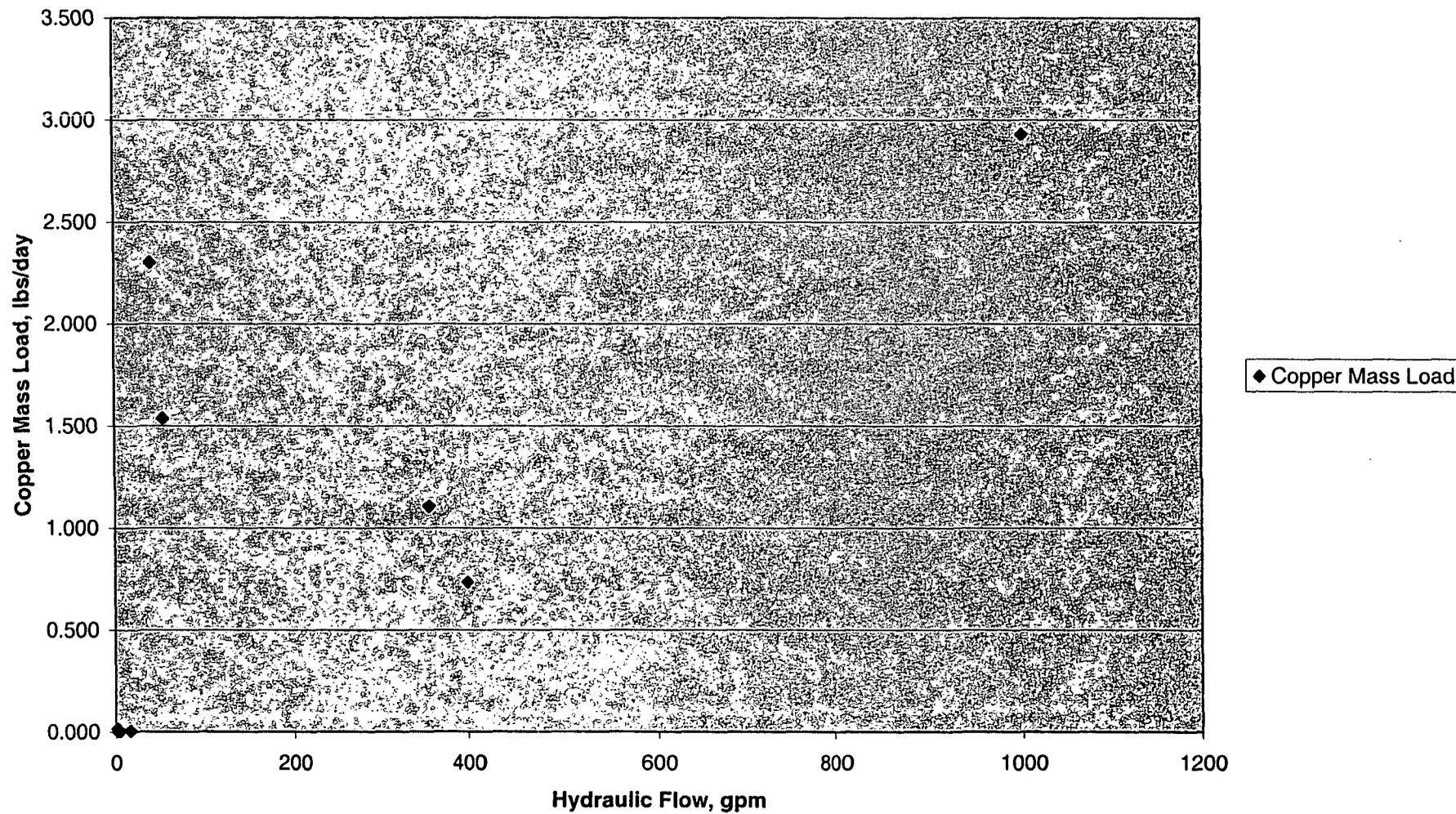


Figure 14
Penn Mine Site Copper Concentration as a Function of pH

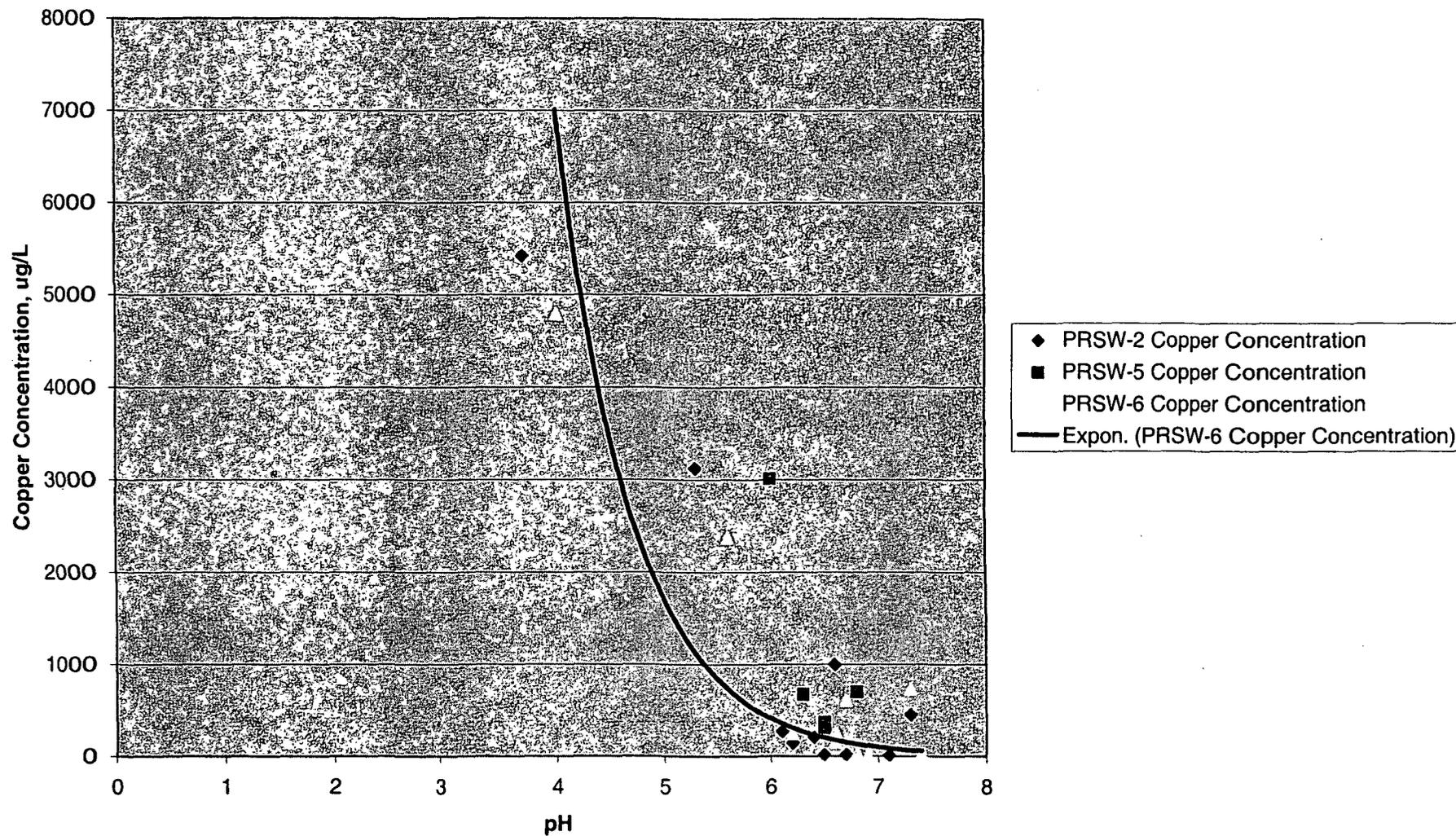


Figure 15
PRSW-6: Zinc Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

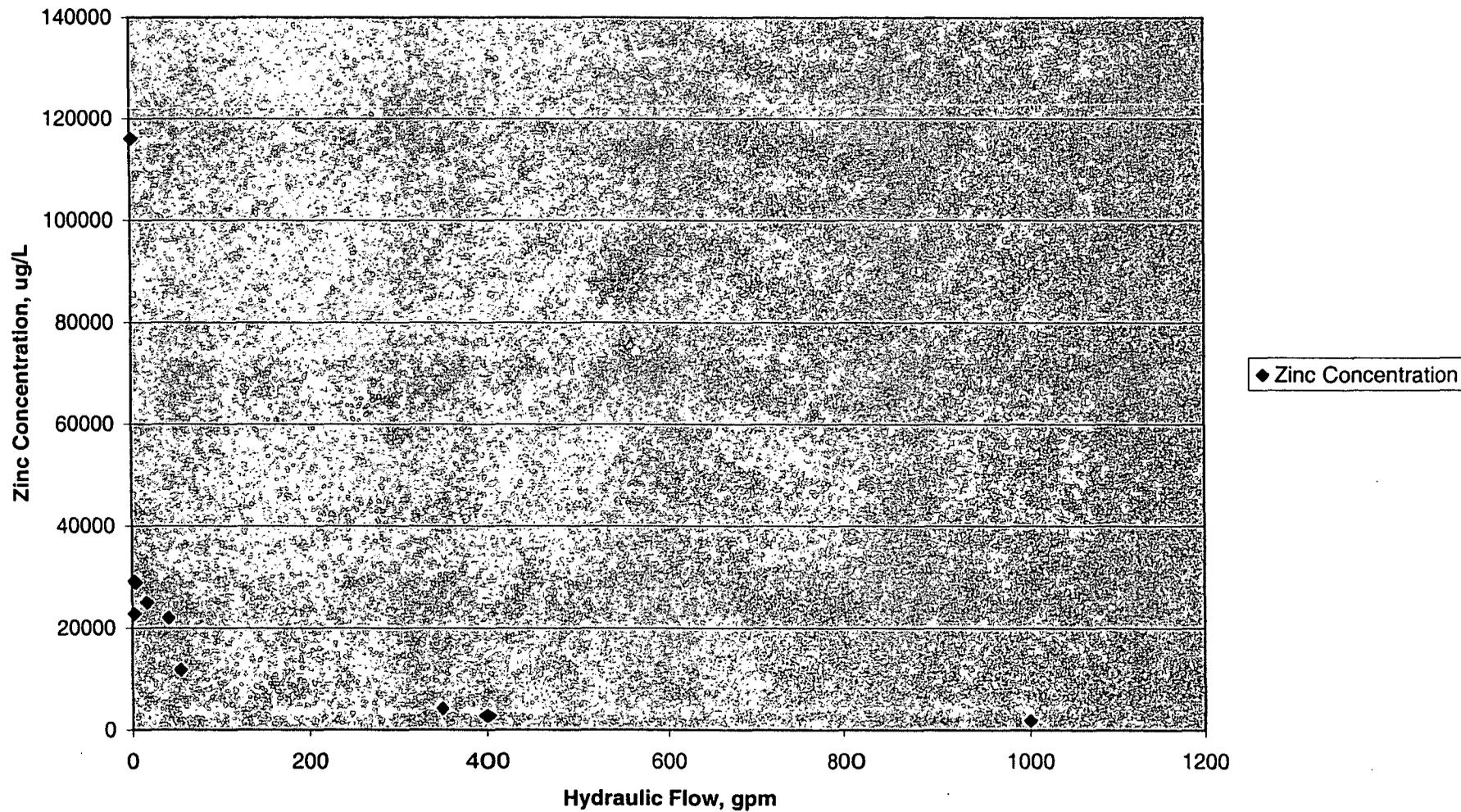


Figure 16
PRSW-6: Zinc Mass Load as a Function of Hydraulic Flow - September 1999 through August
2000

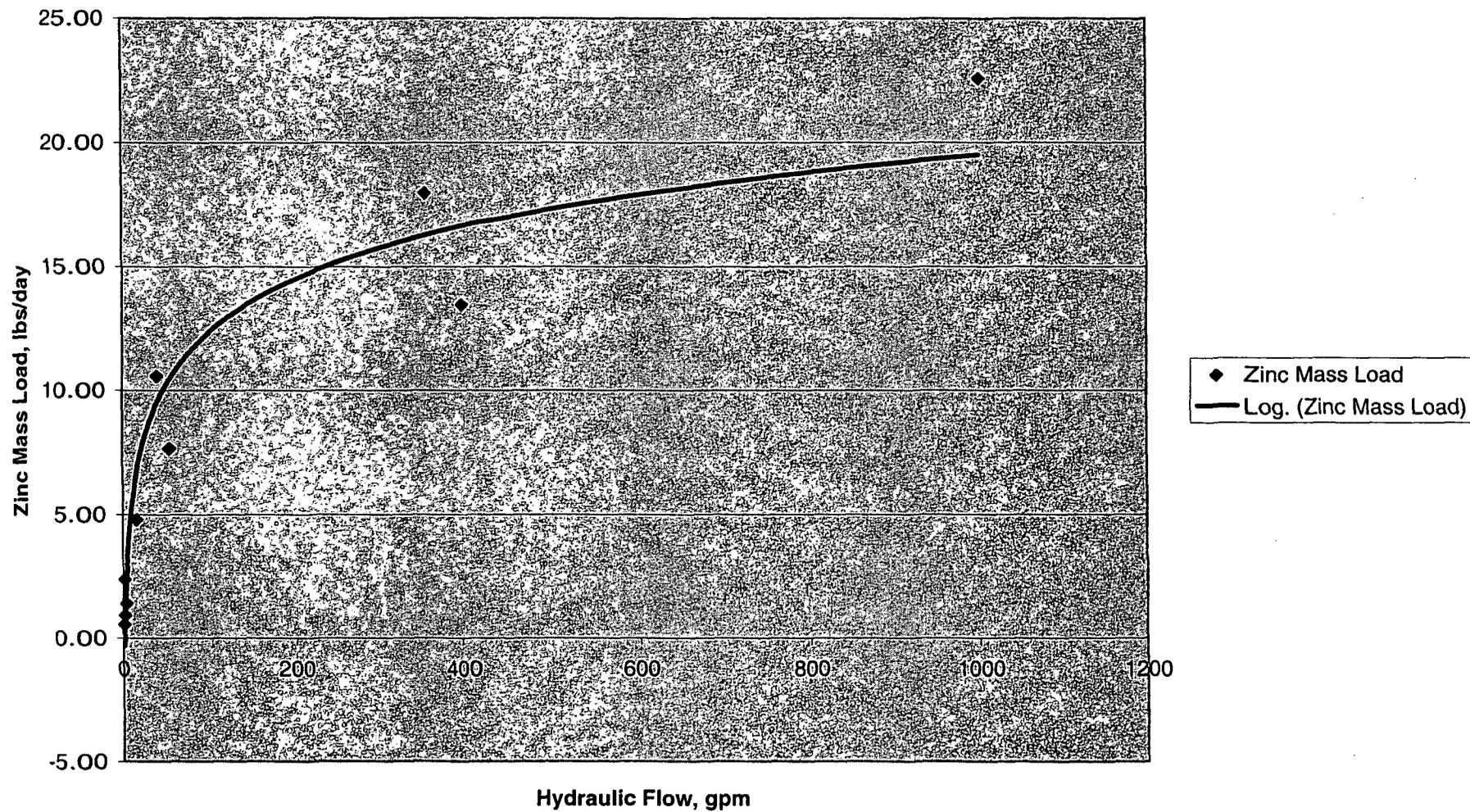


Figure 17
PRSW-6 Sulfate Concentration as a Function of Hydraulic Flow - September 1999 through August 2000

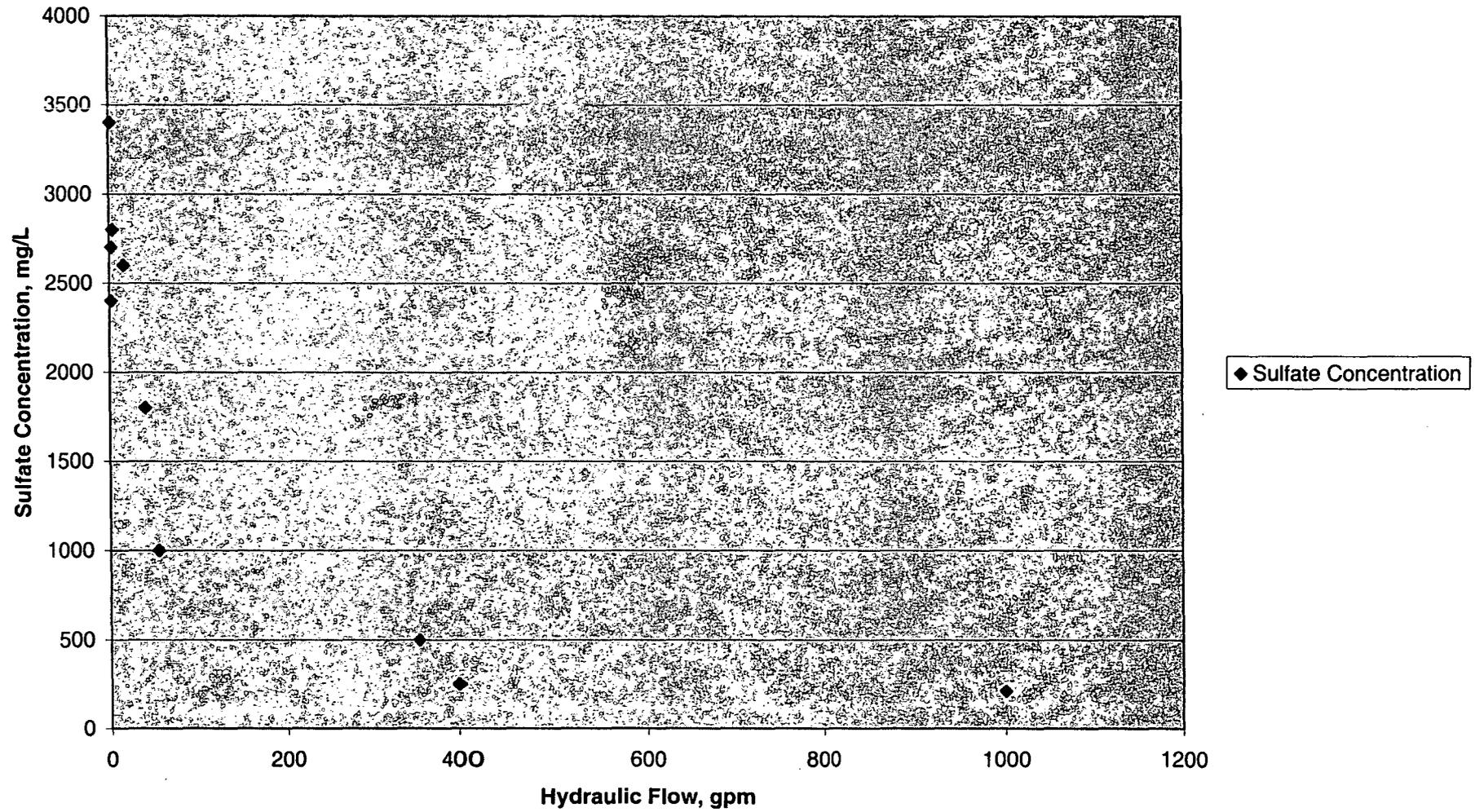
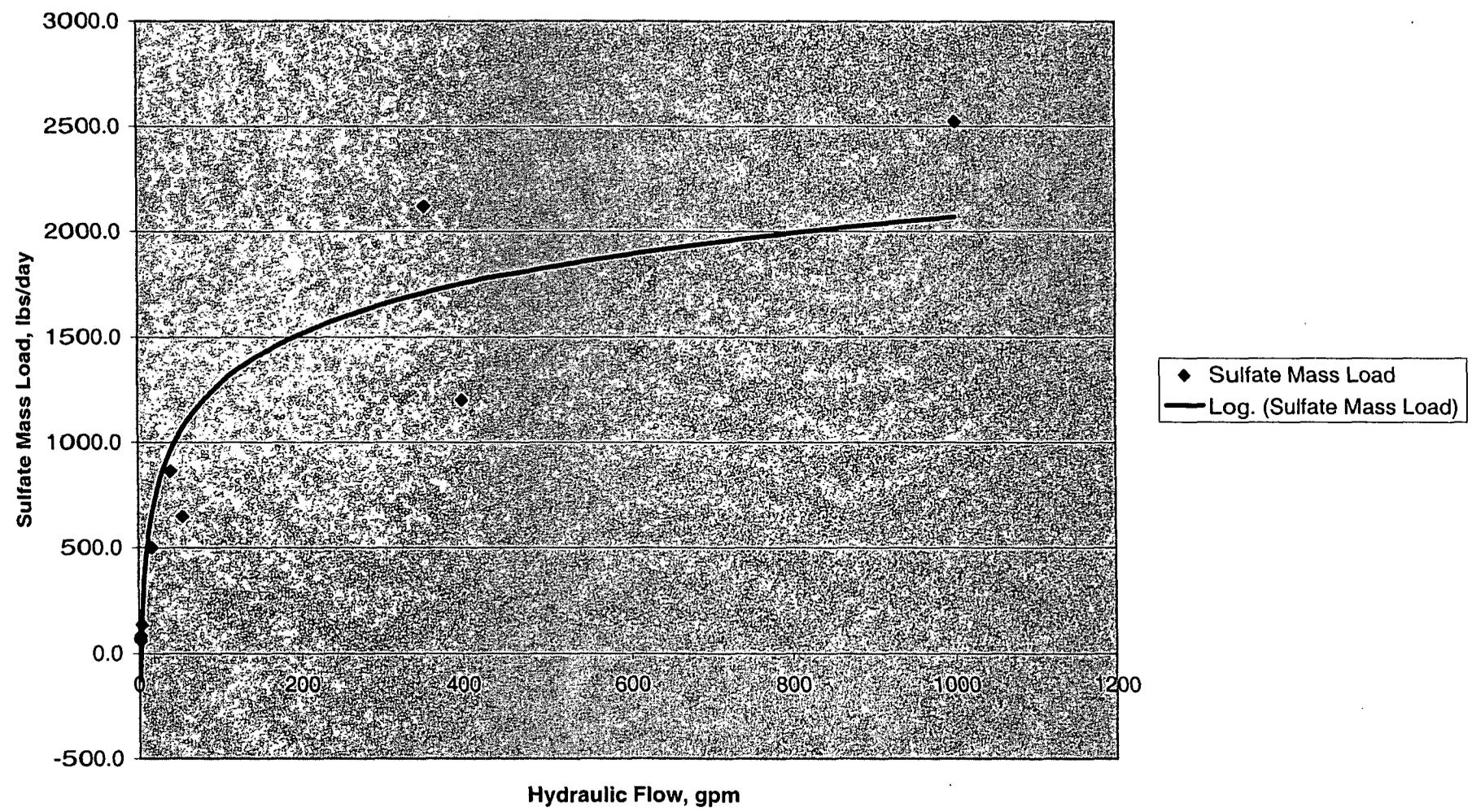


Figure 18
PRSW-6: Sulfate Mass Load as a Function of Hydraulic Flow - September 1999 through August 2000



Appendix A – Receiving Water Field Data and Analytical Reports

HYDROLAB DEPTH PROFILE

STATION: PENN20
 RESERVR ELEV: 226.6 FT.

DATE: 06/14/2000
 TIME: 1340

SAMPLE LOCATION	OUTLETS (ft)	DEPTH (ft)	TEMP (deg c)	pH (units)	TRUE DO (mg/l)	COND (ms/cm)	ORP (mV)	
		0.0	27.14		7.55	8.05	0.043	328
		3.3	25.23		7.63	8.33	0.042	328
		6.6	24.67		7.64	8.30	0.041	328
		9.9	23.67		7.52	8.28	0.041	334
		13.2	23.39		7.48	8.15	0.041	335
		16.2	19.18		7.29	8.36	0.039	345
		19.8	16.37		7.16	8.84	0.037	352
		23.4	15.02		7.05	8.79	0.037	355
		26.7	14.67		7.03	8.80	0.037	356
		29.7	14.19		6.97	8.85	0.037	359
		33.3	14.16		6.93	8.79	0.037	361
		36.6	14.12		6.93	8.83	0.037	361
		42.9	14.07		6.91	8.81	0.037	362
		46.2	14.04		6.90	8.79	0.037	362
		49.5	13.99		6.90	8.71	0.037	363

SONDE: DS4A-1

RELEASES: PARDEE: 1161 CFS CAMANCHE: 744 CFS

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Jul 13 2000, 08:41 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Jun 15 2000, 11:00 am
Login #: L82421
LSR #: B785-9802-1
Project Title: Penn Mine Environmental Restoration

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

* = Duplicate value outside of control limits	M = Duplicate injection precision not met
+ = Positive	N = Spike recovery outside of control limits
- = Negative	NEG = Negative
< = Less than	P = Present
> = Greater than	PASS = Pass
A = Absent	POS = Positive
B = Analyte detected in method blank	Q = Data qualified by the Data Review Committee
C = GC/MS confirmation	R = Spike out of calibration range
CG = Confluent growth	S = Method of standard additions used
D = Surrogate spike outside of control limits	SP = Spreader
E = Estimated value, concentration outside calibration range	T = Diesel/Gasoline pattern is atypical
FAIL = Fail	TNTC = Too Numerous to Count
H = Analyzed past hold time	U = Analyte not detected
I = Dual Column quantitation difference > 40% RPD	W = Post-digestion spike (HGA) outside control limits
J = Estimated value, quantitation does not meet SOP criteria	X = Presumptive evidence of a compound
LA = Lost analysis	- = Approximately

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-1 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see comments for depth
 Locator: DEPTH PENN20
 Client ID:
 Collect Date: Jun 14 2000, 02:00pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 10'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
NONE	RawH2O		14-JUN-00	14-JUN-00	FR81224	WG72152	
PH	1.0		7.5	pH units			
TEMPERATURE	1.0		24	deg C			
CONDUCTIVITY	1.0		41	umhos/cm		TDS calc = 21 mg/L	
DEPTH	1.0		10	feet			
TURBIDITY	1.0		1.8	NTU			

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-2 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jun 14 2000, 02:02pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 20'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RAWH2O			14-JUN-00	14-JUN-00	R81224	WG72152
PH	1.0			7.2	pH units		
TEMPERATURE	1.0			16	deg C		
CONDUCTIVITY	1.0			37	umhos/cm		TDS calc = 19 mg/L
DEPTH	1.0			20	feet		
TURBIDITY	1.0			1.3	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-3 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumme R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jun 14 2000, 02:04pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 30'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			14 JUN-00	14 JUN-00	R81224	WG72152
PH	1.0			7.0	pH units		
TEMPERATURE	1.0			14	deg C		
CONDUCTIVITY	1.0			37	umhos/cm		TDS calc = 19 mg/L
DEPTH	1.0			30	feet		
TURBIDITY	1.0			1.9	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jun 14 2000, 02:06pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: comp of 10', 20', 30'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
EPA 300.0	RawH2O			15-JUN-00	15-JUN-00	R81273	WG72157
CHLORIDE	1.0			1.6	mg/L	0.015	
NITRATE AS N	1.0	U		0.0059	mg/L	0.0059	
SULFATE	1.0			1.8	mg/L	0.015	
SM(18)2320B	RawH2O			15-JUN-00	15-JUN-00	R81254	WG72177
ALKALINITY: TOTAL AS CaCO3	1.0			18	mg/L	5.0	
SM(18)2340C	RawH2O			15-JUN-00	15-JUN-00	R81255	WG72178
HARDNESS: TOTAL	1.0			16	mg/L	2.0	
SM(18)2540C	RawH2O			20-JUN-00	20-JUN-00	R81493	WG72300
TOTAL DISSOLVED SOLIDS	1.0			38	mg/L	6.0	
SM(18)2540D	RawH2O	U		15-JUN-00	15-JUN-00	R81323	WG72193
TOTAL SUSPENDED SOLIDS	0.50			3.0	mg/L	3.0	
SM(18)4500: P-E	RawH2O			15-JUN-00	15-JUN-00	R81249	WG72161
ORTHO PHOSPHATE AS P	1.0			0.0090	mg/L	0.0060	
EPA 200.7: FILTER	RawH2O			15-JUN-00	21-JUN-00	R81437	WG72321
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04			34.8	ug/L	6.24	
SILVER	1.04	U		3.12	ug/L	3.12	
BORON	1.04			10.7	ug/L	3.12	
BARIUM	1.04			17.8	ug/L	0.312	
BERYLLIUM	1.04	B		0.602	ug/L	0.0208	
CALCIUM	1.04			4,080	ug/L	19.8	
CADMIUM	1.04	U		0.728	ug/L	0.728	
COBALT	1.04			1.27	ug/L	1.04	
CHROMIUM	1.04			1.24	ug/L	0.728	
COPPER	1.04	U		3.12	ug/L	3.12	
IRON	1.04			22.8	ug/L	7.28	
POTASSIUM	1.04			763	ug/L	16.6	
MAGNESIUM	1.04	B		1,360	ug/L	2.08	
MANGANESE	1.04			1.30	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			2,220	ug/L	13.5	
NICKEL	1.04	U		2.08	ug/L	2.08	
LEAD	1.04	U		5.20	ug/L	5.20	
ANTIMONY	1.04	U		7.28	ug/L	7.28	
SELENIUM	1.04	U		18.7	ug/L	18.7	
SILICON	1.04			4,200	ug/L	9.36	
STRONTIUM	1.04			43.6	ug/L	0.312	
THALLIUM	1.04	U		12.5	ug/L	12.5	
VANADIUM	1.04			1.84	ug/L	0.936	
ZINC	1.04			2.87	ug/L	2.08	
EPA 200.8: FILTER	RawH2O			15-JUN-00	22-JUN-00	R81545	WG72380
SILVER	1.00	U		0.800	ug/L	0.800	
ARSENIC	1.00	U		2.00	ug/L	2.00	
BERYLLIUM	1.00	U		0.200	ug/L	0.200	
BARIUM	1.00			16.5	ug/L	0.400	
CADMIUM	1.00	U		0.400	ug/L	0.400	
CHROMIUM	1.00	U		2.00	ug/L	2.00	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jun 14 2000, 02:06pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: comp of 10', 20', 30'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
COPPER	1.00			1.83	ug/L	1.00	
MANGANESE	1.00			0.361	ug/L	0.200	
NICKEL	1.00			2.88	ug/L	1.00	
LEAD	1.00	U		1.00	ug/L	1.00	
ANTIMONY	1.00	U		1.00	ug/L	1.00	
SELENIUM	1.00	U		2.00	ug/L	2.00	
THALLIUM	1.00	U		0.200	ug/L	0.200	
ZINC	1.00	U		10.0	ug/L	10.0	
EPA 200.9: FILTER	RawH2O			15-JUN-00		20-JUN-00	R81387 WG72296
LEAD	1.0	U		0.30	ug/L	0.30	
EPA 200.9: FILTER	RawH2O			15-JUN-00		22-JUN-00	R81496 WG72405
NICKEL	1.0	U		5.0	ug/L	5.0	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-5 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jun 14 2000, 01:09pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 10'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			14-JUN-00	14-JUN-00	R81224	WG72152
PH	1.0			7.6	pH units		
TEMPERATURE	1.0			24	deg C		
CONDUCTIVITY	1.0			40	umhos/cm		TDS calc = 20 mg/L
DEPTH	1.0			10	feet		
TURBIDITY	1.0			1.7	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-6 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jun 14 2000, 01:07pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 20'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
NONE	RawH2O			14-JUN-00	14-JUN-00	R81224	WG72152
PH	1.0		7.1		pH units		
TEMPERATURE	1.0		15		deg C		
CONDUCTIVITY	1.0		37		umhos/cm	TDS calc = 19 mg/L	
DEPTH	1.0		20		feet		
TURBIDITY	1.0		2.2		NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-7 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumme R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jun 14 2000, 01:05pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: depth = 30'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	1.0	RawH2O		14-JUN-00	14-JUN-00	RB1224	WG72152
PH	1.0			7.0	pH units		
TEMPERATURE	1.0			14	deg C		
CONDUCTIVITY	1.0			38	umhos/cm		TDS calc = 19 mg/L
DEPTH	1.0			30	feet		
TURBIDITY	1.0			1.0	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jun 14 2000, 01:15pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: comp of 10', 20' 30'

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
EPA 300.0	RawH2O		15-JUN-00	15-JUN-00	R81273	WG72157	
CHLORIDE	1.0		1.5	mg/L	0.015		
NITRATE AS N	1.0		0.0060	mg/L	0.0059		
SULFATE	1.0		1.8	mg/L	0.015		
SM(18)2320B	RawH2O		15-JUN-00	15-JUN-00	R81254	WG72177	
ALKALINITY: TOTAL AS CaCO3	1.0		19	mg/L	5.0		
SM(18)2340C	RawH2O		15-JUN-00	15-JUN-00	R81255	WG72178	
HARDNESS: TOTAL	1.0		16	mg/L	2.0		
SM(18)2540C	RawH2O		20-JUN-00	20-JUN-00	R81493	WG72300	
TOTAL DISSOLVED SOLIDS	1.0		34	mg/L	6.0		
SM(18)2540D	RawH2O		15-JUN-00	15-JUN-00	R81323	WG72193	
TOTAL SUSPENDED SOLIDS	0.33	U	2.0	mg/L	2.0		
SM(18)4500: P-B	RawH2O		15-JUN-00	15-JUN-00	R81249	WG72161	
ORTHOPHOSPHATE AS P	1.0		0.0090	mg/L	0.0060		
EPA 200.7: FILTER	RawH2O		15-JUN-00	21-JUN-00	R81437	WG72321	
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04		140	ug/L	6.24		
SILVER	1.04	U	3.12	ug/L	3.12		
BORON	1.04		8.19	ug/L	3.12		
BARIUM	1.04		15.6	ug/L	0.312		
BERYLLIUM	1.04	B	0.0244	ug/L	0.0208		
CALCIUM	1.04		4,060	ug/L	19.8		
CADMIUM	1.04	U	0.728	ug/L	0.728		
COBALT	1.04	U	1.04	ug/L	1.04		
CHROMIUM	1.04	U	0.728	ug/L	0.728		
COPPER	1.04	U	3.12	ug/L	3.12		
IRON	1.04		117	ug/L	7.28		
POTASSIUM	1.04		723	ug/L	16.6		
MAGNESIUM	1.04	B	1,340	ug/L	2.08		
MANGANESE	1.04		1.46	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		2,170	ug/L	13.5		
NICKEL	1.04		3.84	ug/L	2.08		
LEAD	1.04	U	5.20	ug/L	5.20		
ANTIMONY	1.04	U	7.28	ug/L	7.28		
SELENIUM	1.04	U	18.7	ug/L	18.7		
SILICON	1.04		4,420	ug/L	9.36		
STRONTIUM	1.04		42.6	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		2.13	ug/L	0.936		
ZINC	1.04		5.57	ug/L	2.08		
EPA 200.8: FILTER	RawH2O		15-JUN-00	22-JUN-00	R81545	WG72380	
SILVER	1.00	U	0.800	ug/L	0.800		
ARSENIC	1.00	U	2.00	ug/L	2.00		
BERYLLIUM	1.00	U	0.200	ug/L	0.200		
BARIUM	1.00		14.6	ug/L	0.400		
CADMIUM	1.00	U	0.400	ug/L	0.400		
CHROMIUM	1.00	U	2.00	ug/L	2.00		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jun 14 2000, 01:15pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: comp of 10', 20' 30'

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
COPPER	1.00	U		1.00	ug/L	1.00	
MANGANESE	1.00			0.446	ug/L	0.200	
NICKEL	1.00	U		1.00	ug/L	1.00	
LEAD	1.00	U		1.00	ug/L	1.00	
ANTIMONY	1.00	U		1.00	ug/L	1.00	
SELENIUM	1.00	U		2.00	ug/L	2.00	
THALLIUM	1.00	U		0.200	ug/L	0.200	
ZINC	1.00	U		10.0	ug/L	10.0	
EPA 200.9: FILTER	RawH2O			15-JUN-00		20-JUN-00	
LEAD	1.0	U		0.30	ug/L	0.30	R81387 WG72296
EPA 200.9: FILTER	RawH2O			15-JUN-00		22-JUN-00	
NICKEL	1.0	U		5.0	ug/L	5.0	R81496 WG72405

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jun 14 2000, 01:15pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: blind field rep

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
EPA 300.0	RawH2O			15-JUN-00	15-JUN-00	R81273	WG72157
CHLORIDE	1.0			1.5	mg/L	0.015	
NITRATE AS N	1.0	U		0.0059	mg/L	0.0059	
SULPATE	1.0			1.8	mg/L	0.015	
SM(18)2320B	RawH2O			15-JUN-00	15-JUN-00	R81254	WG72177
ALKALINITY: TOTAL AS CaCO3	1.0			18	mg/L	5.0	
SM(18)2340C	RawH2O			15-JUN-00	15-JUN-00	R81255	WG72178
HARDNESS: TOTAL	1.0			16	mg/L	2.0	
SM(18)2540C	RawH2O			20-JUN-00	20-JUN-00	R81493	WG72300
TOTAL DISSOLVED SOLIDS	1.0	*		35	mg/L	6.0	
SM(18)2540D	RawH2O			15-JUN-00	15-JUN-00	R81323	WG72193
TOTAL SUSPENDED SOLIDS	0.28	U		1.7	mg/L	1.7	
SM(18)4500: P-E	RawH2O			15-JUN-00	15-JUN-00	R81249	WG72161
ORTHOPHOSPHATE AS P	1.0			0.0090	mg/L	0.0060	
EPA 200.7: FILTER	RawH2O			15-JUN-00	21-JUN-00	R81437	WG72321
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04			40.0	ug/L	6.24	
SILVER	1.04	U		3.12	ug/L	3.12	
BORON	1.04			8.93	ug/L	3.12	
BARIIUM	1.04			15.3	ug/L	0.312	
BERYLLIUM	1.04	B		0.0407	ug/L	0.0208	
CALCIUM	1.04			4,030	ug/L	19.8	
CADMIUM	1.04	U		0.728	ug/L	0.728	
COBALT	1.04	U		1.04	ug/L	1.04	
CHROMIUM	1.04	U		0.728	ug/L	0.728	
COPPER	1.04	U		3.12	ug/L	3.12	
IRON	1.04			19.6	ug/L	7.28	
POTASSIUM	1.04			724	ug/L	16.6	
MAGNESIUM	1.04	B		1,320	ug/L	2.08	
MANGANESE	1.04			0.903	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			2,160	ug/L	13.5	
NICKEL	1.04	U		2.08	ug/L	2.08	
LEAD	1.04	U		5.20	ug/L	5.20	
ANTIMONY	1.04	U		7.28	ug/L	7.28	
SELENIUM	1.04	U		18.7	ug/L	18.7	
SILICON	1.04			4,430	ug/L	9.36	
STRONTIUM	1.04			42.6	ug/L	0.312	
THALLIUM	1.04	U		12.5	ug/L	12.5	
VANADIUM	1.04			1.41	ug/L	0.936	
ZINC	1.04	U		2.08	ug/L	2.08	
EPA 200.8: FILTER	RawH2O			15-JUN-00	22-JUN-00	R81545	WG72380
SILVER	1.00	U		0.800	ug/L	0.800	
ARSENIC	1.00	U		2.00	ug/L	2.00	
BERYLLIUM	1.00	U		0.200	ug/L	0.200	
BARIIUM	1.00			14.2	ug/L	0.400	
CADMIUM	1.00	U		0.400	ug/L	0.400	
CHROMIUM	1.00	U		2.00	ug/L	2.00	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82421-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jun 14 2000, 01:15pm
 Receive Date: Jun 15 2000, 11:00am
 Sample Comments: blind field rep

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
COPPER	1.00			1.91	ug/L	1.00	
MANGANESE	1.00			0.591	ug/L	0.200	
NICKEL	1.00			3.06	ug/L	1.00	
LEAD	1.00	U		1.00	ug/L	1.00	
ANTIMONY	1.00	U		1.00	ug/L	1.00	
SELENIUM	1.00	U		2.00	ug/L	2.00	
THALLIUM	1.00	U		0.200	ug/L	0.200	
ZINC	1.00	U		10.0	ug/L	10.0	
EPA 200.9: FILTER		RawH2O		15-JUN-00		20-JUN-00	R81387
LEAD	1.0	U		0.30	ug/L	0.30	WG72296
EPA 200.9: FILTER		RawH2O		15-JUN-00		22-JUN-00	R81496
NICKEL	1.0	U		5.0	ug/L	5.0	WG72405

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 13 2000, 08:41 pm

Method Reference	Samp_tag	BatchPrepDate	AnalysisDate	RunID	Worknum
Parameter	Qual Blank	Units	Qual Dup	Qual MS REC SPIKE	Qual LCS REC SPIKE
SM(18)4500: P-E ORTHOPHOSPHATE AS P	LIQUID U .006	mg/L	15-JUN-00 15	15-JUN-00 100	R81249 WG72161 110
SM(18)2320B ALKALINITY: TOTAL AS CaCO3 ALKALINITY: TOTAL AS CaCO3	LIQUID		15-JUN-00 0	15-JUN-00 100	R81254 WG72177 100
SM(18)2340C HARDNESS: TOTAL HARDNESS: TOTAL	LIQUID		15-JUN-00 0	15-JUN-00 100	R81255 WG72178 100
EPA 300.0 FLUORIDE CHLORIDE NITRITE AS N NITRITE AS N NITRITE AS N NITRATE AS N NITRATE AS N NITRATE AS N NITRATE AS N NITRATE AS N ORTHOPHOSPHATE AS P ORTHOPHOSPHATE AS P ORTHOPHOSPHATE AS P ORTHOPHOSPHATE AS P SULFATE SULFATE SULFATE SULFATE	WATER U .014 U .015 U .004 U .0059 U .018 U .015	mg/L mg/L mg/L mg/L mg/L mg/L	2.3 U 0 U 0 U 0 0 9.1 U 0 U 0 U 0 U 0 U 0 U 0 U 0 U 0 1.9 .21 3.6	100 N 64 99 98 120 97 100 97 94 94 94 100 99 99 97	R81273 WG72157 83 100 110 100 130 100
EPA 160.2 TOTAL SUSPENDED SOLIDS TOTAL SUSPENDED SOLIDS	LIQUID U 6	mg/L	15-JUN-00 0	15-JUN-00 8	R81323 WG72193

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 13 2000, 08:41 pm

Method Reference	Sample tag	Batch/Prep Date	Analysis Date	Run ID	Worknum	
Parameter	Qual Blank	Units	Qual Dup RPD	Qual MS REC SPIKE	Qual MSD RPD	Qual LCS REC SPIKE
EPA 200.9: FILTER	LIQUIDF	15-JUN-00	20-JUN-00	R81387	WG72296	
LEAD	U .3	ug/L		97	5	
LEAD	U .3	ug/L				
EPA 200.7: FILTER	WP	15-JUN-00	21-JUN-00	R81437	WG72321	
ARSENIC	U 7.28	ug/L		101	.633	128
ARSENIC	U 7.28	ug/L		98.7	2.44	
ALUMINUM	U 7.16	ug/L		98	.042	103
ALUMINUM	U 6.24	ug/L		96.7	3.94	
SILVER	U 3.12	ug/L		100	1.16	113
SILVER	U 3.12	ug/L		99.8	3.4	
BORON	U 3.12	ug/L		107	.189	116
BORON	U 3.12	ug/L		105	2.61	
BARIUM	U .312	ug/L		102	.735	97.6
BARIUM	U .312	ug/L		98.4	2.43	
BERYLLIUM	U .0509	ug/L		103	.47	99.3
BERYLLIUM	U .0208	ug/L		101	2.48	
CALCIUM	U 19.8	ug/L		103	.499	96.9
CALCIUM	U 19.8	ug/L		87.6	12.2	
CADMIUM	U .728	ug/L		100	.784	96.5
CADMIUM	U .728	ug/L		97.8	2.05	
COBALT	U 1.04	ug/L		102	.00464	103
COBALT	U 1.04	ug/L		100	3.43	
CHROMIUM	U .728	ug/L		101	.547	97.8
CHROMIUM	U .728	ug/L		99.1	2.44	
COPPER	U 3.12	ug/L		97.3	.181	92.6
COPPER	U 3.12	ug/L		95.4	3.02	
IRON	U 7.28	ug/L		100	.757	101
IRON	U 7.28	ug/L		99.2	2.04	
POTASSIUM	U 16.6	ug/L		103	.4	100
POTASSIUM	U 16.6	ug/L		85.8	19.5	
MAGNESIUM	U 9.41	ug/L		103	.839	98
MAGNESIUM	U 2.08	ug/L		85.8	19.3	
MANGANESE	U .312	ug/L		103	1	98.4
MANGANESE	U .312	ug/L		101	4.61	
MOLYBDENUM	U 3.12	ug/L		99.8	1.05	98.8
MOLYBDENUM	U 3.12	ug/L		98.4	3.97	
SODIUM	U 19.3	ug/L		103	.0208	98.4
SODIUM	U 13.5	ug/L		86.4	14.5	
NICKEL	U 2.08	ug/L		100	1.18	98
NICKEL	U 2.08	ug/L		98.6	.967	
LEAD	U 5.2	ug/L		106	.5	104
LEAD	U 5.2	ug/L		104	2.12	
ANTIMONY	U 7.28	ug/L		104	.254	118
ANTIMONY	U 7.28	ug/L		102	2.06	
SELENIUM	U 18.7	ug/L		104	4.27	96
SELENIUM	U 18.7	ug/L		101	4.38	
SILICON	U 9.36	ug/L		N 136	1.23	97.6
SILICON	U 11.8	ug/L		98	2.34	
STRONTIUM	U .363	ug/L		102	.821	100
STRONTIUM	U .312	ug/L		99	2.08	

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 13 2000, 08:41 pm

Method Reference Parameter	Qual Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
THALLIUM	U 12.5	ug/L		102	1.88	88.7
THALLIUM	U 12.5	ug/L		101	2.78	
VANADIUM	U .936	ug/L		106	.182	101
VANADIUM	U .936	ug/L		102	3.17	
ZINC	U 2.08	ug/L		98.4	.0347	98.5
ZINC	U 2.08	ug/L		97	2.34	
SM(18)2540C	LIQUID		20-JUN-00	20-JUN-00	R81493	WG72300
TOTAL DISSOLVED SOLIDS	12	mg/L	* 29			100
EPA 200.9: FILTER	LIQUID		15-JUN-00	22-JUN-00	R81496	WG72405
NICKEL	U 5	ug/L		97	13	102
NICKEL	U 5	ug/L				
EPA 200.8: FILTER	WATER:F		15-JUN-00	22-JUN-00	R81545	WG72380
SILVER	U .8	ug/L			U .00000000	
SILVER	U .8	ug/L				
ARSENIC	U 2	ug/L		88.2	.773	
ARSENIC	U 2	ug/L				
BERYLLIUM	U .2	ug/L		89.8	1.09	
BERYLLIUM	U .2	ug/L				
BARIUM	U .4	ug/L		93.9	.728	
BARIUM	U .4	ug/L				
CADMIUM	U .4	ug/L		88.9	.434	
CADMIUM	U .4	ug/L				
CHROMIUM	U 2	ug/L		106	8.74	
CHROMIUM	U 2	ug/L				
COPPER	U 1	ug/L		92.3	13.2	
COPPER	U 1	ug/L				
MANGANESE	U .2	ug/L		102	9.86	
MANGANESE	U .2	ug/L				
NICKEL	U 1	ug/L		94.3	9.37	
NICKEL	U 1	ug/L				
LEAD	U 1	ug/L		100	3.92	
LEAD	U 1	ug/L				
ANTIMONY	U 1	ug/L		90	1.5	
ANTIMONY	U 1	ug/L				
SELENIUM	U 2	ug/L		75.2	8.58	
SELENIUM	U 2	ug/L				
THALLIUM	U .2	ug/L		105	1.55	
THALLIUM	U .2	ug/L				
ZINC	U 10	ug/L		89.3	5.63	
ZINC	U 10	ug/L				

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Jul 31 2000, 08:35 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Jul 13 2000, 10:10 am
Login #: L83053
LSR #: B785-9802-1
Project Title: Penn Mine Environmental Restoration:Receiving Water Monitoring

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

- | | |
|--|---|
| * = Duplicate value outside of control limits | M = Duplicate injection precision not met |
| + = Positive | N = Spike recovery outside of control limits |
| - = Negative | NEG = Negative |
| < = Less than | P = Present |
| > = Greater than | PASS = Pass |
| A = Absent | POS = Positive |
| B = Analyte detected in method blank | Q = Data qualified by the Data Review Committee |
| C = GC/MS confirmation | R = Spike out of calibration range |
| CG = Confluent growth | S = Method of standard additions used |
| D = Surrogate spike outside of control limits | SP = Spreader |
| E = Estimated value, concentration outside calibration range | T = Diesel/Gasoline pattern is atypical |
| FAIL = Fail | TNTC = Too Numerous to Count |
| H = Analyzed past hold time | U = Analyte not detected |
| I = Dual Column quantitation difference > 40% RPD | W = Post-digestion spike (HGA) outside control limits |
| J = Estimated value, quantitation does not meet SOP criteria | X = Presumptive evidence of a compound |
| LA = Lost analysis | - = Approximately |

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration: Receiving Water Monitoring
 Sample Id: L83053-1 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jul 12 2000, 03:24pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			12-JUL-00	12-JUL-00	RB2187	WG73131
PH	1.0			7.7	pH units		
TEMPERATURE	1.0			27	deg C		
CONDUCTIVITY	1.0			42	umhos/cm		TDS CALC = 21 mg/L
DEPTH	1.0			12	feet		
TURBIDITY	1.0			2.1	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-2 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jul 12 2000, 03:26pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch-PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		12-JUL-00	12-JUL-00	R82187	WG73131
PH	1.0		7.1	pH units		
TEMPERATURE	1.0		19	deg C		
CONDUCTIVITY	1.0		34	umhos/cm		TDS CALC = 17 mg/L
DEPTH	1.0		24	feet		
TURBIDITY	1.0		1.3	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-3 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jul 12 2000, 03:28pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			12-JUL-00	12-JUL-00	R82187	WG73131
PH	1.0			6.7	pH units		
TEMPERATURE	1.0			14	deg C		
CONDUCTIVITY	1.0			41	umhos/cm		TDS CALC = 21 mg/L
DEPTH	1.0			46	feet		
TURBIDITY	1.0			3.9	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jul 12 2000, 03:30pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: comp of

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
EPA 300.0	RawH2O		13-JUL-00	13-JUL-00	R82248	WG73129
CHLORIDE	1.0		1.4	mg/L	0.015	
NITRATE AS N	1.0		0.0060	mg/L	0.0059	
SULFATE	1.0		1.8	mg/L	0.015	
SM(18)2320B	RawH2O		14-JUL-00	14-JUL-00	R82289	WG73198
ALKALINITY: TOTAL AS CaCO3	1.0		24	mg/L	5.0	
SM(18)2340C	RawH2O		14-JUL-00	14-JUL-00	R82277	WG73201
HARDNESS: TOTAL	1.0		18	mg/L	2.0	
SM(18)2540C	RawH2O		18-JUL-00	18-JUL-00	R82403	WG73270
TOTAL DISSOLVED SOLIDS	1.0		36	mg/L	6.0	
SM(18)2540D	RawH2O	U	13-JUL-00	13-JUL-00	R82233	WG73151
TOTAL SUSPENDED SOLIDS	0.33		2.0	mg/L	2.0	
SM(18)4500: P-BE	RawH2O		13-JUL-00	13-JUL-00	R82200	WG73137
ORTHOPHOSPHATE AS P	1.0		0.0080	mg/L	0.0060	
EPA 200.7: FILTER	RawH2O		17-JUL-00	18-JUL-00	R82384	WG73285
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04	B	35.3	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		8.14	ug/L	3.12	
BARIIUM	1.04		15.4	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04	B	3,650	ug/L	19.8	
CADMIUM	1.04	U	0.728	ug/L	0.728	
COBALT	1.04	U	1.04	ug/L	1.04	
CHROMIUM	1.04		0.919	ug/L	0.728	
COPPER	1.04	U	3.12	ug/L	3.12	
IRON	1.04		18.8	ug/L	7.28	
POTASSIUM	1.04		665	ug/L	16.6	
MAGNESIUM	1.04		1,230	ug/L	2.08	
MANGANESE	1.04	U	0.312	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		2,000	ug/L	13.5	
NICKEL	1.04	U	2.08	ug/L	2.08	
LEAD	1.04	U	5.20	ug/L	5.20	
ANTIMONY	1.04	U	7.28	ug/L	7.28	
SELENIUM	1.04	U	18.7	ug/L	18.7	
SILICON	1.04		4,000	ug/L	9.36	
STRONTIUM	1.04		38.9	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04	U	0.936	ug/L	0.936	
ZINC	1.04	B	2.29	ug/L	2.08	
EPA 200.8: FILTER	RawH2O		14-JUL-00	26-JUL-00	R82640	WG73558
SILVER	1.00	U	0.800	ug/L	0.800	
ARSENIC	1.00	U	2.00	ug/L	2.00	
BERYLLIUM	1.00	U	0.200	ug/L	0.200	
BARIIUM	1.00		14.6	ug/L	0.400	
CADMIUM	1.00	U	0.400	ug/L	0.400	
CHROMIUM	1.00	U	2.00	ug/L	2.00	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration: Receiving Water Monitoring
 Sample Id: L83053-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokolumme R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Jul 12 2000, 03:30pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: comp of

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
COPPER	1.00			2.00	ug/L	1.00	
MANGANESE	1.00	U		0.200	ug/L	0.200	
NICKEL	1.00			2.35	ug/L	1.00	
LEAD	1.00	U		1.00	ug/L	1.00	
ANTIMONY	1.00	U		1.00	ug/L	1.00	
SELENIUM	1.00	U		2.00	ug/L	2.00	
THALLIUM	1.00	U		0.200	ug/L	0.200	
ZINC	1.00	U		10.0	ug/L	10.0	
EPA 200.9: FILTER	RAWH2O			14-JUL-00		17-JUL-00	R82317
NICKEL	1.0	U		5.0	ug/L	5.0	WG73249
EPA 200.9: FILTER	RAWH2O			14-JUL-00		25-JUL-00	R82581
LEAD	1.0	U		0.30	ug/L	0.30	WG73523

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration: Receiving Water Monitoring
 Sample Id: L83053-5 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jul 12 2000, 02:34pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
NONE	RawH2O			12-JUL-00	12-JUL-00	R82187	WG73131
PH	1.0			7.7	pH units		
TEMPERATURE	1.0			26	deg C		
CONDUCTIVITY	1.0			42	umhos/cm	TDS CALC = 21 mg/L	
DEPTH	1.0			12	feet		
TURBIDITY	1.0			1.7	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-6 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comme
 Locator: DEPTH CAMA nts for depth
 Client ID:
 Collect Date: Jul 12 2000, 02:36pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			12-JUL-00	12-JUL-00	R82187	WG73131
PH	1.0			7.0	pH units		
TEMPERATURE	1.0			17	deg C		
CONDUCTIVITY	1.0			32	umhos/cm		TDS CALC = 16 mg/L
DEPTH	1.0			24	feet		
TURBIDITY	1.0			1.2	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-7 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jul 12 2000, 02:38pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			12-JUL-00	12-JUL-00	R82187	WG73131
PH	1.0			6.8	pH units		
TEMPERATURE	1.0			16	deg C		
CONDUCTIVITY	1.0			30	umhos/cm		TDS CALC = 15 mg/L
DEPTH	1.0			36	feet		
TURBIDITY	1.0			1.5	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration: Receiving Water Monitoring
 Sample Id: L83053-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumme R 1/4 mi above Penn Mine -- see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jul 12 2000, 02:40pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: comp of

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate	Analysis Date	Run ID Units mdlvalue Text	Worknum
EPA 300.0	RawH2O			13-JUL-00	13-JUL-00	R82248	WG73129
CHLORIDE	1.0		1.4		mg/L 0.015		
NITRATE AS N	1.0	U	0.0059		mg/L 0.0059		
SULFATE	1.0		1.7		mg/L 0.015		
SM(18)2320B	RawH2O			14-JUL-00	14-JUL-00	R82289	WG73198
ALKALINITY: TOTAL AS CaCO3	1.0		20		mg/L 5.0		
SM(18)2340C	RawH2O			14-JUL-00	14-JUL-00	R82277	WG73201
HARDNESS: TOTAL	1.0		15		mg/L 2.0		
SM(18)2540C	RawH2O			18-JUL-00	18-JUL-00	R82403	WG73270
TOTAL DISSOLVED SOLIDS	1.0		43		mg/L 6.0		
SM(18)2540D	RawH2O			13-JUL-00	13-JUL-00	R82233	WG73151
TOTAL SUSPENDED SOLIDS	0.33	U	2.0		mg/L 2.0		
SM(18)4500: P-B	RawH2O			13-JUL-00	13-JUL-00	R82200	WG73137
ORTHOPHOSPHATE AS P	1.0		0.0090		mg/L 0.0060		
EPA 200.7: FILTER	RawH2O			17-JUL-00	19-JUL-00	R82384	WG73285
ARSENIC	1.04	U	7.28		ug/L 7.28		
ALUMINUM	1.04	B	23.4		ug/L 6.24		
SILVER	1.04	U	3.12		ug/L 3.12		
BORON	1.04		8.46		ug/L 3.12		
BARIUM	1.04		15.4		ug/L 0.312		
BERYLLIUM	1.04	U	0.0208		ug/L 0.0208		
CALCIUM	1.04	B	3,570		ug/L 19.8		
CADMIUM	1.04	U	0.728		ug/L 0.728		
COBALT	1.04	U	1.04		ug/L 1.04		
CHROMIUM	1.04	U	0.728		ug/L 0.728		
COPPER	1.04	U	3.12		ug/L 3.12		
IRON	1.04		11.4		ug/L 7.28		
POTASSIUM	1.04		663		ug/L 16.6		
MAGNESIUM	1.04		1,200		ug/L 2.08		
MANGANESE	1.04	U	0.312		ug/L 0.312		
MOLYBDENUM	1.04	U	3.12		ug/L 3.12		
SODIUM	1.04		1,980		ug/L 13.5		
NICKEL	1.04	U	2.08		ug/L 2.08		
LEAD	1.04	U	5.20		ug/L 5.20		
ANTIMONY	1.04	U	7.28		ug/L 7.28		
SELENIUM	1.04	U	18.7		ug/L 18.7		
SILICON	1.04		3,880		ug/L 9.36		
STRONTIUM	1.04		38.6		ug/L 0.312		
THALLIUM	1.04	U	12.5		ug/L 12.5		
VANADIUM	1.04		1.09		ug/L 0.936		
ZINC	1.04	U	2.08		ug/L 2.08		
EPA 200.8: FILTER	RawH2O			14-JUL-00	26-JUL-00	R82640	WG73558
SILVER	1.00	U	0.800		ug/L 0.600		
ARSENIC	1.00	U	2.00		ug/L 2.00		
BERYLLIUM	1.00	U	0.200		ug/L 0.200		
BARIUM	1.00		15.2		ug/L 0.400		
CADMIUM	1.00	U	0.400		ug/L 0.400		
CHROMIUM	1.00	U	2.00		ug/L 2.00		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Jul 12 2000, 02:40pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: comp of

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Analysis Date	Run ID Text	Worknum
COPPER	1.00			2.37 ug/L	1.00	
MANGANESE	1.00	U		0.200 ug/L	0.200	
NICKEL	1.00	U		1.00 ug/L	1.00	
LEAD	1.00	U		1.00 ug/L	1.00	
ANTIMONY	1.00	U		1.00 ug/L	1.00	
SELENIUM	1.00	U		2.00 ug/L	2.00	
THALLIUM	1.00	U		0.200 ug/L	0.200	
ZINC	1.00	U		10.0 ug/L	10.0	
EPA 200.9: FILTER	RAWH2O		14-JUL-00	17-JUL-00	R82317	WG73249
NICKEL	1.0	U		5.0 ug/L	5.0	
EPA 200.9: FILTER	RAWH2O		14-JUL-00	25-JUL-00	R82581	WG73523
LEAD	1.0	U		0.30 ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 12 2000, 02:40pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Analysis Date	Run ID Text	Worknum
EPA 300.0	RawH2O		13-JUL-00	13-JUL-00	R82248	WG73129
CHLORIDE	1.0		1.4	mg/L	0.015	
NITRATE AS N	1.0	U	0.0059	mg/L	0.0059	
SULPATE	1.0		1.7	mg/L	0.015	
SM(18)2320B	RawH2O		14-JUL-00	14-JUL-00	R82289	WG73198
ALKALINITY: TOTAL AS CaCO3	1.0		20	mg/L	5.0	
SM(18)2340C	RawH2O		14-JUL-00	14-JUL-00	R82277	WG73201
HARDNESS: TOTAL	1.0		15	mg/L	2.0	
SM(18)2540C	RawH2O		18-JUL-00	18-JUL-00	R82403	WG73270
TOTAL DISSOLVED SOLIDS	1.0		37	mg/L	6.0	
SM(18)2540D	RawH2O		13-JUL-00	13-JUL-00	R82233	WG73151
TOTAL SUSPENDED SOLIDS	0.33	U	2.0	mg/L	2.0	
SM(18)4500-P-E	RawH2O		13-JUL-00	13-JUL-00	R82200	WG73137
ORTHOPHOSPHATE AS P	1.0		0.0070	mg/L	0.0060	
EPA 200.7 FILTER	RawH2O		17-JUL-00	19-JUL-00	R82384	WG73285
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04	B	18.7	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		7.48	ug/L	3.12	
BARIUM	1.04		15.5	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04	B	3,620	ug/L	19.8	
CADMIUM	1.04	U	0.728	ug/L	0.728	
COBALT	1.04	U	1.04	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04	U	3.12	ug/L	3.12	
IRON	1.04		11.8	ug/L	7.28	
POTASSIUM	1.04		675	ug/L	16.6	
MAGNESIUM	1.04		1,210	ug/L	2.08	
MANGANESE	1.04	U	0.312	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		2,000	ug/L	13.5	
NICKEL	1.04		5.14	ug/L	2.08	
LEAD	1.04	U	5.20	ug/L	5.20	
ANTIMONY	1.04	U	7.28	ug/L	7.28	
SELENIUM	1.04	U	18.7	ug/L	18.7	
SILICON	1.04		3,890	ug/L	9.36	
STRONTIUM	1.04		39.0	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		1.40	ug/L	0.936	
ZINC	1.04	U	2.08	ug/L	2.08	
EPA 200.8 FILTER	RawH2O		14-JUL-00	26-JUL-00	R82640	WG73558
SILVER	1.00	U	0.800	ug/L	0.600	
ARSENIC	1.00	U	2.00	ug/L	2.00	
BERYLLIUM	1.00	U	0.200	ug/L	0.200	
BARIUM	1.00		14.9	ug/L	0.400	
CADMIUM	1.00	U	0.400	ug/L	0.400	
CHROMIUM	1.00	U	2.00	ug/L	2.00	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration:Receiving Water Monitoring
 Sample Id: L83053-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 12 2000, 02:40pm
 Receive Date: Jul 13 2000, 10:10am
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Text	Worknum
COPPER	1.00	U	1.00	ug/L	1.00		
MANGANESE	1.00	U	0.200	ug/L	0.200		
NICKEL	1.00	U	1.00	ug/L	1.00		
LEAD	1.00	U	1.00	ug/L	1.00		
ANTIMONY	1.00	U	1.00	ug/L	1.00		
SELENIUM	1.00	U	2.00	ug/L	2.00		
THALLIUM	1.00	U	0.200	ug/L	0.200		
ZINC	1.00	U	10.0	ug/L	10.0		
EPA 200.9: FILTER NICKEL	RawH2O 1.0	U	14-JUL-00 5.0	ug/L	17-JUL-00 5.0	R82317	WG73249
EPA 200.9: FILTER LEAD	RawH2O 1.0	U	14-JUL-00 0.30	ug/L	25-JUL-00 0.30	R82581	WG73523

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 31 2000, 08:35 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID	Worknum
	Qual	Blank Units	Qual	Dup RPD	Qual	MS REC SPIKE	Qual MSD RPD	Qual LCS REC SPIKE
SM(18)4500: P-B ORTHOPHOSPHATE AS P	LIQUID		13-JUL-00		13-JUL-00		R82200	WG73137
	U	.006 mg/L		13		97		93
EPA 160.2 TOTAL SUSPENDED SOLIDS TOTAL SUSPENDED SOLIDS	LIQUID		13-JUL-00		13-JUL-00		R82233	WG73151
	U	6 mg/L		2.3		1.4		100
SM(18)2540D TOTAL SUSPENDED SOLIDS	WATER		13-JUL-00		13-JUL-00		R82233	WG73151
				U		0		
EPA 300.0 FLUORIDE FLUORIDE FLUORIDE CHLORIDE CHLORIDE CHLORIDE NITRITE AS N NITRITE AS N NITRITE AS N NITRATE AS N NITRATE AS N NITRATE AS N ORTHOPHOSPHATE AS P ORTHOPHOSPHATE AS P ORTHOPHOSPHATE AS P SULFATE SULFATE SULFATE	WATER		13-JUL-00		13-JUL-00		R82248	WG73129
	U	.014 mg/L		0		91		83
				1				
				0				
	U	.015 mg/L		0				83
				0				
				0				
	U	.004 mg/L		U		99		110
				U		88		
				U				
	U	.0059 mg/L		U		100		97
				U		110		
				U		100		
	U	.018 mg/L		U				120
				0				
				U		93		
	U	.015 mg/L				120		100
				0				
				0				
SM(18)2340C HARDNESS: TOTAL HARDNESS: TOTAL HARDNESS: TOTAL	LIQUID		14-JUL-00		14-JUL-00		R82277	WG73201
				0		100		
				0		100		
				18		94		

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Batch QC Report
 Report generated on: Jul 31 2000, 08:35 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
SM(18)2320B			LIQUID	14-JUL-00	14-JUL-00	R82289	WG73198
ALKALINITY: TOTAL AS CaCO3				4.9	99		
ALKALINITY: TOTAL AS CaCO3				12	100		
ALKALINITY: TOTAL AS CaCO3				4.1	100		
EPA 200.9: FILTER			LIQUID	14-JUL-00	17-JUL-00	R82317	WG73249
NICKEL	U	5	ug/L		100	3.9	110
NICKEL	U	5	ug/L				
EPA 200.7: FILTER			WP	17-JUL-00	19-JUL-00	R82384	WG73285
ARSENIC	U	7.28	ug/L		97.9	.374	124
ARSENIC	U	7.28	ug/L		97.9	2.54	
ALUMINUM	U	6.24	ug/L		112	3.36	102
ALUMINUM		21.2	ug/L		N 127	12.2	
SILVER	U	3.12	ug/L		102	2.67	98.5
SILVER	U	3.12	ug/L		97.8	1.56	
BORON	U	3.12	ug/L		104	.0817	113
BORON	U	3.12	ug/L		105	.0864	
BARIUM	U	.312	ug/L		102	.149	97
BARIUM	U	.312	ug/L		102	.0248	
BERYLLIUM	U	.0208	ug/L		104	.766	98.8
BERYLLIUM	U	.0208	ug/L		104	.276	
CALCIUM		22.1	ug/L		104	.986	95.7
CALCIUM		151	ug/L		103	.51	
CADMIUM	U	.728	ug/L		97.4	.107	93
CADMIUM	U	.728	ug/L		97	.0666	
COBALT	U	1.04	ug/L		102	.901	102
COBALT	U	1.04	ug/L		102	.886	
CHROMIUM	U	.728	ug/L		100	.61	96.2
CHROMIUM	U	.728	ug/L		99.9	.316	
COPPER	U	3.12	ug/L		96.2	.33	93.9
COPPER	U	3.12	ug/L		96.5	.182	
IRON	U	7.28	ug/L		101	.169	100
IRON	U	7.28	ug/L		102	1.46	
POTASSIUM	U	16.6	ug/L		103	.544	99.2
POTASSIUM	U	16.6	ug/L		104	.0157	
MAGNESIUM	U	2.08	ug/L		103	.111	96.2
MAGNESIUM	U	2.08	ug/L		104	.492	
MANGANESE	U	.312	ug/L		98.2	.00599	95.9
MANGANESE	U	.312	ug/L		98.1	.198	
MOLYBDENUM	U	3.12	ug/L		103	2.19	100
MOLYBDENUM	U	3.12	ug/L		102	1.24	
SODIUM		18.6	ug/L		104	.188	98.5

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 31 2000, 08:35 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID	Worknum	
	Qual	Blank	Units	Qual	Dup	Qual	MS	Qual	LCS
				RPD		REC	SPIKE	RPD	REC
									SPIKE
SODIUM		19.4	ug/L			105		.339	
NICKEL	U	2.08	ug/L			102		1.9	97.9
NICKEL	U	2.08	ug/L			100		.456	
LEAD	U	5.2	ug/L			106		.987	102
LEAD	U	5.2	ug/L			105		.189	
ANTIMONY	U	7.28	ug/L			104		.804	112
ANTIMONY	U	7.28	ug/L			102		.00278	
SELENIUM	U	18.7	ug/L			102		2.28	93.5
SELENIUM	U	18.7	ug/L			99.2		1.43	
SILICON		18.4	ug/L			R 139		1.18	97.1
SILICON	U	9.36	ug/L			R 129		.187	
STRONTIUM	U	.312	ug/L			101		.276	98.8
STRONTIUM		.35	ug/L			102		.123	
THALLIUM	U	12.5	ug/L			104		.136	86.6
THALLIUM	U	12.5	ug/L			104		1.22	
VANADIUM	U	.936	ug/L			107		.119	100
VANADIUM		1.01	ug/L			107		.753	
ZINC		4.4	ug/L			99.4		.82	98.2
ZINC		4.94	ug/L			98.8		.458	
SM(18)2540C		LIQUID		18-JUL-00		18-JUL-00		R82403	WG73270
TOTAL DISSOLVED SOLIDS		12	mg/L		13				98
EPA 200.9: FILTER		LIQUID		14-JUL-00		25-JUL-00		R82581	WG73523
LEAD	U	.3	ug/L			110		0	
LEAD	U	.3	ug/L						
EPA 200.8: FILTER		WATER:P		14-JUL-00		26-JUL-00		R82640	WG73558
SILVER	U	.8	ug/L					U 0	
SILVER	U	.8	ug/L						
ARSENIC	U	2	ug/L			90.5		1.34	
ARSENIC	U	2	ug/L						
BERYLLIUM	U	.2	ug/L			90.5		1.57	
BERYLLIUM	U	.2	ug/L						
BARIUM	U	.4	ug/L			98.1		.475	
BARIUM	U	.4	ug/L						
CADMIUM	U	.4	ug/L			94.6		2.76	
CADMIUM	U	.4	ug/L						
CHROMIUM	U	2	ug/L			100		2.58	
CHROMIUM	U	2	ug/L						
COPPER	U	1	ug/L			96.9		1.97	
COPPER	U	1	ug/L						
MANGANESE	U	.2	ug/L			104		.263	
MANGANESE	U	.2	ug/L						
NICKEL	U	1	ug/L			96.4		.981	
NICKEL	U	1	ug/L						
LEAD	U	1	ug/L			100		3.92	
LEAD	U	1	ug/L						
ANTIMONY	U	1	ug/L			97.5		1.75	
ANTIMONY	U	1	ug/L						
SELENIUM	U	2	ug/L			77.9		5.43	

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 4S REC SPIKE - Matrix Spike Recovery for accuracy (%)
 4SD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 31 2000, 08:35 pm

Method Reference Parameter	Qual Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate		RunID		Worknum	
				Qual MS REC SPIKE		Qual MSD RPD		Qual LCS REC SPIKE	
SELENIUM	U 2	ug/L							
THALLIUM	U .2	ug/L			100		.334		
THALLIUM	U .2	ug/L							
ZINC	U 10	ug/L			94.4		11.8		
ZINC	U 10	ug/L							

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or Login No.: L83053	Project Title Penn Mine Environmental Restoration:Receiving Water Monitoring Account or Project: B785-9802-1	Client PM: EILEEN PANELLI Tel No.: 287-1661 Lab PM: SUSAN B. BERG	Sampled by: T Suarez Rcvd: 13-JUL-00 10:10 Sample Date: 12-JUL-00
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Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative Initials pH
L83053-1	GRAB	15:24	RES CAMANCHE	DEPTH PENN20	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-2	GRAB	15:26	RES CAMANCHE	DEPTH PENN20	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-3	GRAB	15:28	RES CAMANCHE	DEPTH PENN20	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-4	COMP	15:30	RES CAMANCHE	DEPTH PENN20	RawH2O	226134	PLSTL ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	
					RawH2O	226135	NUTR CHLORIDE: IC;NITRATE: IC;PHOSPHATE: ORTHO;SULPATE: IC	
					RawH2O	226136	PLSTM ICP:9;F EPA 200.7;ICP/MS:F EPA 200.8;NI:F EPA 200.9;PB:F EPA 200.9	
					RawH2O		*300 IC ANIONS (1-3);+REPORT;+SAMP KIT	
ClientID: Sample Comments: comp of								
L83053-5	GRAB	14:34	RES CAMANCHE	DEPTH CAMA	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-6	GRAB	14:36	RES CAMANCHE	DEPTH CAMA	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-7	GRAB	14:38	RES CAMANCHE	DEPTH CAMA	RawH2O		+PLD DATA	
ClientID: Sample Comments: field data: use attached data sheet								
L83053-8	COMP	14:40	RES CAMANCHE	DEPTH CAMA	RawH2O	226137	PLSTL ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or Login No.: L83053	Project Title Penn Mine Environmental Restoration:Receiving Water Monitoring Account or Project: B785-9802-1	Client PM: BILEEN FANELLI Tel No.: 287-1661 Lab PM: SUSAN B. BERG	Sampled by: T Suarez Rcvd: 13-JUL-00 10:10 Sample Date: 12-JUL-00
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Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
L83053-8	COMP	14:40	RES CAMANCHE	DEPTH CAMA	RawH2O	226138 NUTR	CHLORIDE: IC;NITRATE: IC;PHOSPHATE: ORTHO;SULFATE: IC			
					RawH2O	226139 PLSTM	ICP 9:F EPA 200.7;ICP/MS:F EPA 200.8;NI:F EPA 200.9;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3)			

ClientID: Sample Comments: comp of

L83053-9	QCPR	14:40	MISC	MISC	RawH2O	226161 PLSTL	ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	226162 NUTR	CHLORIDE: IC;NITRATE: IC;PHOSPHATE: ORTHO;SULFATE: IC			
					RawH2O	226163 PLSTM	ICP 9:F EPA 200.7;ICP/MS:F EPA 200.8;NI:F EPA 200.9;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3)			

ClientID: Sample Comments: blind field rep

Total containers received: 9

Signature	Print Name	Time	Date
Relinquished by			
Received by			
Relinquished by			
Received by			
Relinquished by			
Received by			

Type Codes: CF01 ; CF02;CF03;CFV;COMP;CT01;CT02;CT03
CT04 ; CT05;CT06;CT07;CT08;CTV;GRAB

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Aug 30 2000, 08:36 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Aug 10 2000, 11:00 am
Login #: L83688
LSR #: B785-9802-1
Project Title: Penn Mine Restoration:Receiving Water

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

- | | |
|--|---|
| * = Duplicate value outside of control limits | M = Duplicate injection precision not met |
| + = Positive | N = Spike recovery outside of control limits |
| - = Negative | NEG = Negative |
| < = Less than | P = Present |
| > = Greater than | PASS = Pass |
| A = Absent | POS = Positive |
| B = Analyte detected in method blank | Q = Data qualified by the Data Review Committee |
| C = GC/MS confirmation | R = Spike out of calibration range |
| CG = Confluent growth | S = Method of standard additions used |
| D = Surrogate spike outside of control limits | SP = Spreader |
| E = Estimated value, concentration outside calibration range | T = Diesel/Gasoline pattern is atypical |
| FAIL = Fail | TNTC = Too Numerous to Count |
| H = Analyzed past hold time | U = Analyte not detected |
| I = Dual Column quantitation difference > 40% RPD | W = Post-digestion spike (HGA) outside control limits |
| J = Estimated value, quantitation does not meet SOP criteria | X = Presumptive evidence of a compound |
| LA = Lost analysis | - = Approximately |

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-1 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Aug 09 2000, 04:15pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			09-AUG-00	09-AUG-00	R83125	WG74097
PH	1.0			8.0	pH units		
TEMPERATURE	1.0			28	deg C		
CONDUCTIVITY	1.0			38	umhos/cm		
DEPTH	1.0			10	feet		
TURBIDITY	1.0			2.0	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83688-2 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumme R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Aug 09 2000, 04:17pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text
NONE	1.0	RawH2O	09-AUG-00	09-AUG-00	R83125	WG74097
PH	1.0		7.5	pH units		
TEMPERATURE	1.0		24	deg C		
CONDUCTIVITY	1.0		35	umhos/cm		
DEPTH	1.0		20	feet		
TURBIDITY	1.0		1.9	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83688-3 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumme R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Aug 09 2000, 04:20pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
NONE	RawH2O			09-AUG-00	09-AUG-00	R83125	NG74097
PH	1.0		7.1		pH units		
TEMPERATURE	1.0		20		deg C		
CONDUCTIVITY	1.0		31		umhos/cm		
DEPTH	1.0		30		feet		
TURBIDITY	1.0		1.7		NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83688-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokolunne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Aug 09 2000, 04:22pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: comp of 10' 20' and 30'

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
EPA 300.50	RawH2O		10-AUG-00	10-AUG-00	R83150	WG74082	
CHLORIDE	1.0		1.5	mg/L	0.015		
NITRATE AS N	1.0	U	0.0059	mg/L	0.0059		
SULFATE	1.0		1.8	mg/L	0.015		
SM(18)2320B	RawH2O		10-AUG-00	10-AUG-00	R83149	WG74141	
ALKALINITY: TOTAL AS CaCO3	1.0		18	mg/L	5.0		
SM(18)2340C	RawH2O		11-AUG-00	11-AUG-00	R83151	WG74143	
HARDNESS: TOTAL	1.0		15	mg/L	2.0		
SM(18)2540C	RawH2O		14-AUG-00	14-AUG-00	R83310	WG74186	
TOTAL DISSOLVED SOLIDS	2.0		32	mg/L	12.		
SM(18)2540D	RawH2O	U	10-AUG-00	10-AUG-00	R83146	WG74118	
TOTAL SUSPENDED SOLIDS	0.33		2.0	mg/L	2.0		
SM(18)4500: P-B	RawH2O	U	10-AUG-00	10-AUG-00	R83108	WG74089	
ORTHOPHOSPHATE AS P	1.0		0.0060	mg/L	0.0060		
EPA 200.7: FILTER	RawH2O		12-AUG-00	24-AUG-00	R83625	WG74563	
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04		6.28	ug/L	6.24		
SILVER	1.04	U	3.12	ug/L	3.12		
BORON	1.04		8.53	ug/L	3.12		
BARIIUM	1.04		19.1	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04		3,760	ug/L	19.8		
CADMIUM	1.04	U	0.728	ug/L	0.728		
COBALT	1.04	U	1.04	ug/L	1.04		
CHROMIUM	1.04	U	0.728	ug/L	0.728		
COPPER	1.04	U	3.12	ug/L	3.12		
IRON	1.04		8.68	ug/L	7.28		
POTASSIUM	1.04		796	ug/L	16.6		
MAGNESIUM	1.04		1,340	ug/L	2.08		
MANGANESE	1.04	U	0.312	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		2,320	ug/L	13.5		
NICKEL	1.04	U	2.08	ug/L	2.08		
LEAD	1.04	U	5.20	ug/L	5.20		
ANTIMONY	1.04	U	7.28	ug/L	7.28		
SELENIUM	1.04	U	18.7	ug/L	18.7		
SILICON	1.04		3,960	ug/L	9.36		
STRONTIUM	1.04		44.8	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		1.50	ug/L	0.936		
ZINC	1.04		2.14	ug/L	2.08		
EPA 200.8: FILTER	RawH2O		12-AUG-00	16-AUG-00	R83326	WG74256	
SILVER	1.00	U	0.800	ug/L	0.800		
ARSENIC	1.00	U	2.00	ug/L	2.00		
BERYLLIUM	1.00	U	0.200	ug/L	0.200		
BARIIUM	1.00		19.3	ug/L	0.400		
CADMIUM	1.00	U	0.400	ug/L	0.400		
CHROMIUM	1.00	U	2.00	ug/L	2.00		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-4 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R upstream of Oregon Gulch - see com
 Locator: DEPTH PENN20 ments for depth
 Client ID:
 Collect Date: Aug 09 2000, 04:22pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: comp of 10' 20' and 30'

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Result	Analysis Date Units	mdlvalue	Run ID Text	Worknum
COPPER	1.00	U		1.00	ug/L	1.00		
MANGANESE	1.00	U		0.200	ug/L	0.200		
NICKEL	1.00	U		1.00	ug/L	1.00		
LEAD	1.00	U		1.00	ug/L	1.00		
ANTIMONY	1.00	U		1.00	ug/L	1.00		
SELENIUM	1.00	U		4.00	ug/L	3.00		
THALLIUM	1.00	U		0.200	ug/L	0.200		
ZINC	1.00	U		10.0	ug/L	10.0		
EPA 200.9: FILTER	RawH2O		12-AUG-00				R83400	WG74254
NICKEL	1.0	U		5.0	ug/L	5.0		
EPA 200.9: FILTER	RawH2O		12-AUG-00				R83431	WG74441
LEAD	1.0	U		0.30	ug/L	0.30		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-5 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Aug 09 2000, 03:35pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			09-AUG-00	09-AUG-00	R83125	WG74097
PH	1.0			7.8	pH units		
TEMPERATURE	1.0			27	deg C		
CONDUCTIVITY	1.0			39	umhos/cm		
DEPTH	1.0			10	feet		
TURBIDITY	1.0			1.7	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-6 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Aug 09 2000, 03:38pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
NONE	RawH2O		09-AUG-00		09-AUG-00	R83125	WG74097
PH	1.0			7.3		pH units	
TEMPERATURE	1.0			23		deg C	
CONDUCTIVITY	1.0			33		umhos/cm	
DEPTH	1.0			20		feet	
TURBIDITY	1.0			1.8		NTU	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-7 Instantaneous Grab
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Aug 09 2000, 03:40pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	1.0	RawH2O		09-AUG-00	09-AUG-00	R83125	WG74097
pH	1.0			7.0	pH units		
TEMPERATURE	1.0			18	deg C		
CONDUCTIVITY	1.0			28	umhos/cm		
DEPTH	1.0			30	feet		
TURBIDITY	1.0			1.4	NTU		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Aug 09 2000, 03:42pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: comp of 10' 20' and 30'

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date	Result Units	Analysis Date mdlvalue	Run ID Text	Worknum
EPA 300.0	RawH2O		10-AUG-00		10-AUG-00	R83150	WG74082
CHLORIDE	1.0			1.5 mg/L	0.015		
NITRATE AS N	1.0			0.0070 mg/L	0.0059		
SULFATE	1.0			1.8 mg/L	0.015		
SM(18)2320B	RawH2O		10-AUG-00		10-AUG-00	R83149	WG74141
ALKALINITY: TOTAL AS CaCO3	1.0			18 mg/L	5.0		
SM(18)2340C	RawH2O		11-AUG-00		11-AUG-00	R83151	WG74143
HARDNESS: TOTAL	1.0			15 mg/L	2.0		
SM(18)2540C	RawH2O		14-AUG-00		14-AUG-00	R83310	WG74186
TOTAL DISSOLVED SOLIDS	2.0			22 mg/L	12.		
SM(18)2540D	RawH2O		10-AUG-00		10-AUG-00	R83146	WG74118
TOTAL SUSPENDED SOLIDS	0.33			2.3 mg/L	2.0		
SM(18)4500: P-B	RawH2O		10-AUG-00		10-AUG-00	R83108	WG74089
ORTHOPHOSPHATE AS P	1.0	U		0.0060 mg/L	0.0060		
EPA 200.7: FILTER	RawH2O		12-AUG-00		24-AUG-00	R83625	WG74563
ARSENIC	1.04	U		7.28 ug/L	7.28		
ALUMINUM	1.04			11.7 ug/L	6.24		
SILVER	1.04	U		3.12 ug/L	3.12		
BORON	1.04			8.32 ug/L	3.12		
BARIIUM	1.04			19.3 ug/L	0.312		
BERYLLIUM	1.04	U		0.0208 ug/L	0.0208		
CALCIUM	1.04		3,830	ug/L	19.8		
CADMIUM	1.04	U		0.728 ug/L	0.728		
COBALT	1.04	U		1.04 ug/L	1.04		
CHROMIUM	1.04	U		0.728 ug/L	0.728		
COPPER	1.04	U		3.12 ug/L	3.12		
IRON	1.04			8.77 ug/L	7.28		
POTASSIUM	1.04		809	ug/L	16.6		
MAGNESIUM	1.04		1,370	ug/L	2.08		
MANGANESE	1.04	U		0.312 ug/L	0.312		
MOLYBDENUM	1.04	U		3.12 ug/L	3.12		
SODIUM	1.04		2,330	ug/L	13.5		
NICKEL	1.04	U		2.08 ug/L	2.08		
LEAD	1.04	U		5.20 ug/L	5.20		
ANTIMONY	1.04	U		7.28 ug/L	7.28		
SELENIUM	1.04	U		18.7 ug/L	18.7		
SILICON	1.04		3,980	ug/L	9.36		
STRONTIUM	1.04		45.1	ug/L	0.312		
THALLIUM	1.04	U		12.5 ug/L	12.5		
VANADIUM	1.04		2.30	ug/L	0.936		
ZINC	1.04		5.14	ug/L	2.08		
EPA 200.8: FILTER	RawH2O		12-AUG-00		16-AUG-00	R83326	WG74256
SILVER	1.00	U		0.800 ug/L	0.800		
ARSENIC	1.00	U		2.00 ug/L	2.00		
BERYLLIUM	1.00	U		0.200 ug/L	0.200		
BARIIUM	1.00			18.6 ug/L	0.400		
CADMIUM	1.00	U		0.400 ug/L	0.400		
CHROMIUM	1.00	U		2.00 ug/L	2.00		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-8 Mult Sample Loc Comp Collect Date is end of composite period.
 Site: RES CAMANCHE Variable depth sample @ Mokelumne R 1/4 mi above Penn Mine - see comments for depth
 Locator: DEPTH CAMA
 Client ID:
 Collect Date: Aug 09 2000, 03:42pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: comp of 10' 20' and 30'

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
COPPER	1.00	U	1.00	ug/L	1.00		
MANGANESE	1.00	U	0.200	ug/L	0.200		
NICKEL	1.00	U	1.00	ug/L	1.00		
LEAD	1.00	U	1.00	ug/L	1.00		
ANTIMONY	1.00	U	1.00	ug/L	1.00		
SELENIUM	1.00	U	3.00	ug/L	3.00		
THALLIUM	1.00	U	0.200	ug/L	0.200		
ZINC	1.00	U	10.0	ug/L	10.0		
EPA 200.9: FILTER NICKEL	1.0	RawH2O U	12-AUG-00 5.0	15-AUG-00 ug/L	5.0	R83400	WG74254
EPA 200.9: FILTER LEAD	1.0	RawH2O U	12-AUG-00 0.30	21-AUG-00 ug/L	0.30	R83431	WG74441

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83688-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Aug 09 2000, 04:23pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch-PrepDate Result	Analysis Date Units	mdlvalue	Run ID Text	Worknum
EPA 300.0	RawH2O		10-AUG-00	10-AUG-00		R83150	WG74082
CHLORIDE	1.0		1.4	mg/L	0.015		
NITRATE AS N	1.0		0.0060	mg/L	0.0059		
SULFATE	1.0		1.8	mg/L	0.015		
SM(18)2320B	RawH2O		10-AUG-00	10-AUG-00		R83149	WG74141
ALKALINITY: TOTAL AS CaCO3	1.0		19	mg/L	5.0		
SM(18)2340C	RawH2O		11-AUG-00	11-AUG-00		R83151	WG74143
HARDNESS: TOTAL	1.0		15	mg/L	2.0		
SM(18)2540C	RawH2O		14-AUG-00	14-AUG-00		R83310	WG74186
TOTAL DISSOLVED SOLIDS	2.0		26	mg/L	12.		
SM(18)2540D	RawH2O		10-AUG-00	10-AUG-00		R83146	WG74118
TOTAL SUSPENDED SOLIDS	0.20	U	1.2	mg/L	1.2		
SM(18)4500: P-B	RawH2O		10-AUG-00	10-AUG-00		R83108	WG74089
ORTHOPHOSPHATE AS P	1.0	U	0.0060	mg/L	0.0060		
EPA 200.7: FILTER	RawH2O		12-AUG-00	24-AUG-00		R83625	WG74563
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04		14.6	ug/L	5.24		
SILVER	1.04	U	3.12	ug/L	3.12		
BORON	1.04		7.74	ug/L	3.12		
BARIUM	1.04		18.5	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04		3,880	ug/L	19.8		
CADMIUM	1.04	U	0.728	ug/L	0.728		
COBALT	1.04	U	1.04	ug/L	1.04		
CHROMIUM	1.04	U	0.728	ug/L	0.728		
COPPER	1.04	B	3.13	ug/L	3.12		
IRON	1.04		14.4	ug/L	7.28		
POTASSIUM	1.04		756	ug/L	16.6		
MAGNESIUM	1.04		1,330	ug/L	2.08		
MANGANESE	1.04	U	0.312	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		2,160	ug/L	13.5		
NICKEL	1.04	U	2.08	ug/L	2.08		
LEAD	1.04	U	5.20	ug/L	5.20		
ANTIMONY	1.04	U	7.28	ug/L	7.28		
SELENIUM	1.04	U	18.7	ug/L	18.7		
SILICON	1.04		3,890	ug/L	9.36		
STRONTIUM	1.04		42.7	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		1.53	ug/L	0.936		
ZINC	1.04		2.90	ug/L	2.08		
EPA 200.8: FILTER	RawH2O		12-AUG-00	16-AUG-00		R83326	WG74256
SILVER	1.00	U	0.800	ug/L	0.800		
ARSENIC	1.00	U	2.00	ug/L	2.00		
BERYLLIUM	1.00	U	0.200	ug/L	0.200		
BARIUM	1.00		19.4	ug/L	0.400		
CADMIUM	1.00	U	0.400	ug/L	0.400		
CHROMIUM	1.00	U	2.00	ug/L	2.00		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83688-9 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Aug 09 2000, 04:23pm
 Receive Date: Aug 10 2000, 11:00am
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	mdlvalue	Run ID Text	Worknum
COPPER	1.00	U	1.00	ug/L	1.00		
MANGANESE	1.00	U	0.200	ug/L	0.200		
NICKEL	1.00	U	1.00	ug/L	1.00		
LEAD	1.00	U	1.00	ug/L	1.00		
ANTIMONY	1.00	U	1.00	ug/L	1.00		
SELENIUM	1.00		3.00	ug/L	3.00		
THALLIUM	1.00	U	0.200	ug/L	0.200		
ZINC	1.00	U	10.0	ug/L	10.0		
EPA 200.9: FILTER NICKEL	RawH2O 1.0	U	12-AUG-00 5.0	15-AUG-00 ug/L		R83400	WG74254
EPA 200.9: FILTER LEAD	RawH2O 1.0	U	12-AUG-00 0.30	21-AUG-00 ug/L		R83431	WG74441

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 30 2000, 08:36 pm

Method Reference	Qual	Samp_tag	BatchPrepDate	AnalysisDate	RunID	Worknum
Parameter	Blank	Units	Qual Dup	Qual MS	Qual MSD	Qual LCS
			RPD	REC	RPD	REC SPIKE
SM(18)4500: P-E ORTHOPHOSPHATE AS P	LIQUID U .006	mg/L	10-AUG-00 U 0	10-AUG-00 110	R83108	WG74089 100
EPA 160.2 TOTAL SUSPENDED SOLIDS	LIQUID U 6	mg/L	10-AUG-00 5.8	10-AUG-00 19	R83146	WG74118 93
TOTAL SUSPENDED SOLIDS			* 190			
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	LIQUID		10-AUG-00 .95	10-AUG-00 100	R83149	WG74141
ALKALINITY: TOTAL AS CaCO3			1	98		
EPA 300.0 FLUORIDE	WATER U .014	mg/L	10-AUG-00 .12	10-AUG-00 88	R83150	WG74082 71
CHLORIDE	U .015	mg/L				83
NITRITE AS N	U .004	mg/L	0	92		100
NITRATE AS N	U .0059	mg/L	1.6	110		100
NITRATE AS N			U 0	100		
NITRATE AS N			3.5	110		
NITRATE AS N			0	100		
ORTHOPHOSPHATE AS P	U .018	mg/L				97
ORTHOPHOSPHATE AS P			U 0	96		
ORTHOPHOSPHATE AS P			U 0	100		
ORTHOPHOSPHATE AS P			U 0			
SULFATE	U .015	mg/L				110
SM(18)2340C HARDNESS: TOTAL	LIQUID		11-AUG-00 2.8	11-AUG-00 99	R83151	WG74143
HARDNESS: TOTAL			0	100		

- BLANK - background Method Blank
- DUP RPD - duplicate RPD for precision
- MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
- MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
- LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 30 2000, 08:36 pm

Method Reference Parameter	Qual	Samp_tag Blank Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
SM(18)2540C TOTAL DISSOLVED SOLIDS		LIQUID U 6 mg/L	14-AUG-00 13	14-AUG-00	R83310	WG74186 94
EPA 200.8: FILTER		WATER:F	12-AUG-00	16-AUG-00	R83326	WG74256
SILVER		U .8 ug/L			U 0	
SILVER		U .8 ug/L				
ARSENIC		U 2 ug/L		102	1.07	
ARSENIC		U 2 ug/L				
BERYLLIUM		U .2 ug/L		85.3	.0946	
BERYLLIUM		U .2 ug/L				
BARIUM		U .4 ug/L		102	1.23	
BARIUM		U .4 ug/L				
CADMIUM		U .4 ug/L		98.1	1.9	
CADMIUM		U .4 ug/L				
CHROMIUM		U 2 ug/L		102	.675	
CHROMIUM		U 2 ug/L				
COPPER		U 1 ug/L		97.2	3.51	
COPPER		U 1 ug/L				
MANGANESE		U .2 ug/L		106	1.13	
MANGANESE		U .2 ug/L				
NICKEL		U 1 ug/L		100	8.36	
NICKEL		U 1 ug/L				
LEAD		U 1 ug/L		104	3.92	
LEAD		U 1 ug/L				
ANTIMONY		U 1 ug/L		103	.971	
ANTIMONY		U 1 ug/L				
SELENIUM		U 3 ug/L		84.2	5.36	
SELENIUM		U 4 ug/L				
THALLIUM		U .2 ug/L		101	1.74	
THALLIUM		U .2 ug/L				
ZINC		U 10 ug/L		111	.52	
ZINC		U 10 ug/L				
EPA 200.9: FILTER		LIQUID	12-AUG-00	15-AUG-00	R83400	WG74254
NICKEL		U 5 ug/L		110	8.7	110
NICKEL		U 5 ug/L				
EPA 200.9: FILTER		LIQUID:P	12-AUG-00	21-AUG-00	R83431	WG74441
LEAD		U .3 ug/L		96	9.9	6
LEAD		U .3 ug/L				

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 30 2000, 08:36 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
EPA 200.7: FILTER		WP		12-AUG-00	24-AUG-00	R83625	WG74563
ARSENIC		7.29	ug/L		102	.988	127
ARSENIC	U	7.28	ug/L		98.1	1.25	
ALUMINUM	U	6.24	ug/L		109	* 29	104
ALUMINUM	U	6.24	ug/L		104	* 24.3	
SILVER	U	3.12	ug/L		100	.792	98.6
SILVER	U	3.12	ug/L		97.2	1.62	
BORON	U	3.12	ug/L		110	.476	117
BORON	U	3.12	ug/L		104	2.97	
BARIUM	U	.312	ug/L		106	1.3	97.5
BARIUM	U	.312	ug/L		99.6	2.86	
BERYLLIUM	U	.0208	ug/L		106	.544	97.8
BERYLLIUM	U	.0208	ug/L		99.7	3.53	
CALCIUM	U	19.8	ug/L		104	.257	96.1
CALCIUM	U	19.8	ug/L		98.6	2.14	
CADMIUM	U	.728	ug/L		103	.431	94.8
CADMIUM	U	.728	ug/L		97.4	3.02	
COBALT	U	1.04	ug/L		104	.4	102
COBALT	U	1.04	ug/L		98.5	2.97	
CHROMIUM	U	.728	ug/L		103	.67	96.8
CHROMIUM	U	.728	ug/L		97.1	2.89	
COPPER		18.6	ug/L		98.8	.691	91.2
COPPER	U	3.12	ug/L		92.4	3.16	
IRON	U	7.28	ug/L		104	.884	102
IRON	U	7.28	ug/L		97.2	3.3	
POTASSIUM	U	16.6	ug/L		108	1.22	101
POTASSIUM	U	16.6	ug/L		101	2.56	
MAGNESIUM	U	2.08	ug/L		105	.787	98.1
MAGNESIUM	U	2.08	ug/L		98.8	2.56	
MANGANESE	U	.312	ug/L		105	.515	98.1
MANGANESE	U	.312	ug/L		98.6	2.82	
MOLYBDENUM	U	3.12	ug/L		104	.68	101
MOLYBDENUM	U	3.12	ug/L		97.8	3.03	
SODIUM	U	13.5	ug/L		108	1.22	101
SODIUM	U	13.5	ug/L		101	1.81	
NICKEL	U	2.08	ug/L		104	.396	98.1
NICKEL	U	2.08	ug/L		98.6	3.15	
LEAD	U	5.2	ug/L		105	1.26	99
LEAD	U	5.2	ug/L		100	3.01	
ANTIMONY	U	7.28	ug/L		107	.841	114
ANTIMONY	U	7.28	ug/L		102	2.1	
SELENIUM	U	18.7	ug/L		102	1.72	94.8
SELENIUM	U	18.7	ug/L		98.2	3.11	
SILICON	U	9.36	ug/L		N 122	.183	97.8
SILICON	U	9.36	ug/L		110	.177	
STRONTIUM	U	.312	ug/L		106	1.68	99.6
STRONTIUM	U	.312	ug/L		99.9	2.24	
THALLIUM	U	12.5	ug/L		102	.674	91.9
THALLIUM	U	12.5	ug/L		95.8	2.82	
VANADIUM		1.5	ug/L		110	.772	102
VANADIUM		1.43	ug/L		104	2.54	
ZINC	U	2.08	ug/L		102	.0367	99
ZINC	U	2.08	ug/L		96.1	3.06	

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 1 of 2

Prelog or
Login No.: L83688

Project Title
Penn Mine Restoration:Receiving Water
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: B Matteson
Rcvd: 10-AUG-00 11:00
Sample Date: 09-AUG-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
L83688-1	GRAB	16:15	RES CAMANCHE	DEPTH PENN20	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-2	GRAB	16:17	RES CAMANCHE	DEPTH PENN20	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-3	GRAB	16:20	RES CAMANCHE	DEPTH PENN20	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-4	COMP	16:22	RES CAMANCHE	DEPTH PENN20	RawH2O	233921	PLSTL ALKALINITY: TOTAL; HARDNESS: TOTAL; TDS: GRAVIMETRIC; TSS:			
					RawH2O	233922	NUTR CHLORIDE: IC; NITRATE: IC; PHOSPHATE: ORTHO; SULFATE: IC			
					RawH2O	233923	PLSTM ICP 9:F EPA 200.7; ICP/MS:F EPA 200.8; NI:F EPA 200.9; PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3); +REPORT; +SAMP KIT			
ClientID: Sample Comments: comp of 10' 20' and 30'										
L83688-5	GRAB	15:35	RES CAMANCHE	DEPTH CAMA	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-6	GRAB	15:38	RES CAMANCHE	DEPTH CAMA	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-7	GRAB	15:40	RES CAMANCHE	DEPTH CAMA	RawH2O		+FLD DATA			
ClientID: Sample Comments: field data: use attached data sheet										
L83688-8	COMP	15:42	RES CAMANCHE	DEPTH CAMA	RawH2O	233924	PLSTL ALKALINITY: TOTAL; HARDNESS: TOTAL; TDS: GRAVIMETRIC; TSS:			
					RawH2O					

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: L83688

Project Title
Penn Mine Restoration:Receiving Water
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: B Matteson
Rcvd: 10-AUG-00 11:00
Sample Date: 09-AUG-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative Initials	pH
L83688-8	COMP	15:42	RES CAMANCHE	DEPTH CAMA	RawH2O	233925	NUTR CHLORIDE: IC;NITRATE: IC;PHOSPHATE: ORTHO;SULFATE: IC			
					RawH2O	233926	PLSTM ICP 9:P EPA 200.7;ICP/MS:P EPA 200.8;NI:P EPA 200.9;PB:P EPA 200.9 *300 IC ANIONS (1-3)			

ClientID: Sample Comments: comp of 10' 20' and 30'

L83688-9	QCPR	16:23	MISC	MISC	RawH2O	234204	PLSTL ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	234205	NUTR CHLORIDE: IC;NITRATE: IC;PHOSPHATE: ORTHO;SULFATE: IC			
					RawH2O	234206	PLSTM ICP 9:P EPA 200.7;ICP/MS:P EPA 200.8;NI:P EPA 200.9;PB:P EPA 200.9 *300 IC ANIONS (1-3)			

ClientID: Sample Comments: blind field rep

Total containers received: 9

	Signature	Print Name	Time	Date
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

Type Codes: CF01;CF02;CF03;CFV;COMP;CT01;CT02;CT03
CT04;CT05;CT06;CT07;CT08;CTV;GRAB

Appendix B – Surface Water Field Data and Analytical Reports

**Post-Restoration Monitoring
Field Data Form - Surface Water
Penn Mine Environmental Restoration Project**

Date: 06/29/00		Time: 930		Weather: Clear and hot						
Lower Weir Inundated? Almost - ~1" low										
Penn 30 Sampled? No										
Field Sampler Name: Chris Swann										
Field Sampler Affiliation: EBMUD										
Location	Sampled	Duplicate (a)	Equipment Blank (a)	pH	EC (ms/cm)	Temp (degrees C)	Turbidity	Estimated Flow (gpm)	Data Logger Inspection & Download	Comments (include condition of weirs and data logger)
PRSW-1	yes	no		6.5	0.222	23.9	1.2	~1	no	things look good, clear water
PRSW-2	yes	yes		6.5	3.865	21.6	220	~16	no	Recent dirt work in the area
PRSW-3	no									
PRSW-4	no									
PRSW-5	no									
PRSW-6	yes	no		6.8	3.85	21.39	175	~16	no	Camanche Res is nearly over the weir
PRSW-7	no								NA	
PRSS- (b)	yes	no		2.2	1.234	22	8.5	~2	NA	This sample is collected in the drainage, just upstream of the Adit #4 seep and represents several smaller seeps
PRSS- (b)									NA	
PRSS- (b)									NA	
PRSS- (b)									NA	
Penn 30	no								NA	

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

(b) record seep locations on seep map

NA = not applicable

List of laboratory analyses on reverse

**Post-Restoration Monitoring
Field Data Form - Surface Water
Penn Mine Environmental Restoration Project**

Date: 7/17/00		Time: 1210			Weather: Overcast and cool					
Lower Weir Inundated? no		Penn 30 Sampled? no								
Field Sampler Name: Chris Swann		Field Sampler Affiliation: EBMUD								
Location	Sampled	Duplicate (a)	Equipment Blank (a)	pH	EC (ms/cm)	Temp (degrees C)	Turbidity	Estimated Flow (gpm)	Data Logger Inspection & Download	Comments (Include condition of weirs and data logger)
PRSW-1	no									
PRSW-2	yes			7.1	3.79	27.5	175	~4 gpm		
PRSW-3	no									
PRSW-4	no									
PRSW-5	no									
PRSW-6	yes			7.4	3.721	27.5	167	~4 gpm		
PRSW-7	no								NA	
PRSS- (b)	yes	yes		3.5	2.494	26.4	1.1	~1 gpm	NA	Hinkely Creek, just below the #4 adit
PRSS- (b)									NA	
PRSS- (b)									NA	
PRSS- (b)									NA	
Penn 30	no								NA	

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

(b) record seep locations on seep map

NA = not applicable

List of laboratory analyses on reverse

Surface Water Laboratory Analyses

Mine and Hinckley Runs (PRSW-1 through -7 and PRSS-)

Aluminum, copper, nickel, lead, zinc, cadmium by EPA 200.7:Filtered

Hardness (as CaCO₃) by EPA 130.2

TDS by EPA 160.1

TSS by EPA 160.2

Sulfate by EPA 300.0

Penn 30

(a) Alkalinity: Total as CaCO₃ by SM(18) 2320B

(a) Hardness: Total by SM(18) 2340C

(a) TDS by SM(18) 2340C

(a) TSS by SM(18) 2320D

(a) Chloride by SM(18) 4500-C

(a) Orthophosphate as P by SM(18) 4500-P

Aluminum, calcium, copper, magnesium, potassium, sodium, zinc by EPA 200.7:Filtered

Cadmium, manganese by EPA 200.8:Filtered

Lead, nickel by EPA 200.9: Filtered

Nitrate as N by EPA 300.0 A

Sulfate by EPA 300.0 A

Notes:

(a) samples are classified as raw water, and standard methods are applied.

**Post-Restoration Monitoring
Field Data Form - Surface Water
Penn Mine Environmental Restoration Project**

Date: 08/22/00		Time: 1000		Weather: clear						
Lower Weir Inundated? No		Penn 30 Sampled? No								
Field Sampler Name: Chris Swann		Field Sampler Affiliation: EBMUD								
Location	Sampled	Duplicate (a)	Equipment Blank (a)	pH	EC (ms/cm)	Temp (degrees C)	Turbidity	Estimated Flow (gpm)	Data Logger Inspection & Download	Comments (include condition of weirs and data logger)
PRSW-1	No								no	Dry
PRSW-2	Yes			6.7	3.933	24.5	188	2.6	no	
PRSW-3	No								no	Dry
PRSW-4	No								no	Dry
PRSW-5	No								no	Dry
PRSW-6	Yes	Yes		6.9	3.641	24.5	161	2.6	no	Duplicate taken
PRSW-7	No								NA	
PRSS- (8)	Yes								NA	Same Hinkely site above Adit 4 as was
PRSS- (9)	Yes			3.1	2.467	27.4	2	(1)	NA	monitored in July.
PRSS- (b)									NA	
PRSS- (b)									NA	
Penn 30									NA	

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

(b) record seep locations on seep map

NA = not applicable

List of laboratory analyses on reverse

Surface Water Laboratory Analyses

Mine and Hinckley Runs (PRSW-1 through -7 and PRSS-)

Aluminum, copper, nickel, lead, zinc, cadmium by EPA 200.7: Filtered

Hardness (as CaCO₃) by EPA 130.2

TDS by EPA 160.1

TSS by EPA 160.2

Sulfate by EPA 300.0

Penn 30

(a) Alkalinity: Total as CaCO₃ by SM(18) 2320B

(a) Hardness: Total by SM(18) 2340C

(a) TDS by SM(18) 2340C

(a) TSS by SM(18) 2320D

(a) Chloride by SM(18) 4500-C

(a) Orthophosphate as P by SM(18) 4500-P

Aluminum, calcium, copper, magnesium, potassium, sodium, zinc by EPA 200.7: Filtered

Cadmium, manganese by EPA 200.8: Filtered

Lead, nickel by EPA 200.9: Filtered

Nitrate as N by EPA 300.0 A

Sulfate by EPA 300.0 A

Notes:

(a) samples are classified as raw water, and standard methods are applied.

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Jul 06 2000, 08:49 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Jun 20 2000, 03:00 pm
Login #: L82531
LSR #: B785-9802-1
Project Title: Penn Mine Environmental Restoration

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

* = Duplicate value outside of control limits	M = Duplicate injection precision not met
+ = Positive	N = Spike recovery outside of control limits
- = Negative	NEG = Negative
< = Less than	P = Present
> = Greater than	PASS = Pass
A = Absent	POS = Positive
B = Analyte detected in method blank	Q = Data qualified by the Data Review Committee
C = GC/MS confirmation	R = Spike out of calibration range
CG = Confluent growth	S = Method of standard additions used
D = Surrogate spike outside of control limits	SP = Spreader
E = Estimated value, concentration outside calibration range	T = Diesel/Gasoline pattern is atypical
FAIL = Fail	TNTC = Too Numerous to Count
H = Analyzed past hold time	U = Analyte not detected
I = Dual Column quantitation difference > 40% RPD	W = Post-digestion spike (HGA) outside control limits
J = Estimated value, quantitation does not meet SOP criteria	X = Presumptive evidence of a compound
LA = Lost analysis	- = Approximately

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-1 Instantaneous Grab
 Site: WS PENN MINE -500 ft above upper end of Hinckley Run
 Locator: PRSW-1
 Client ID:
 Collect Date: Jun 19 2000, 10:30am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
NONE	RawH2O		19-JUN-00	19-JUN-00	R81435	WG72311	
PH	1.0		6.5	pH units			
TEMPERATURE	1.0		24	deg C			
CONDUCTIVITY	1.0		220	umhos/cm			
TURBIDITY	1.0		1.2	NTU			
EPA 300.0 CHLORIDE	RawH2O 5.0	1	22-JUN-00 12	23-JUN-00 mg/L	R81543 0.075	WG72268	
EPA 300.0 SULFATE	RawH2O 1.0		20-JUN-00 1.7	21-JUN-00 mg/L	R81458 0.015	WG72268	
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		21-JUN-00 90	21-JUN-00 mg/L	R81439 5.0	WG72333	
SM(18)2340C HARDNESS: TOTAL	RawH2O 2.0		21-JUN-00 84	21-JUN-00 mg/L	R81460 4.0	WG72371	
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		23-JUN-00 170	23-JUN-00 mg/L	R81589 6.0	WG72438	
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 0.50	U	21-JUN-00 3.0	21-JUN-00 mg/L	R81470 3.0	WG72345	
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	RawH2O 1.00		21-JUN-00 90.0	21-JUN-00 mg/L	R81438 0.100	WG72357	
SM(18)4500-CO2 D ALKALINITY: CARBONATE	RawH2O 1.0	U	21-JUN-00 0.10	21-JUN-00 mg/L	R81438 0.10	WG72357	
EPA 200.7	RawH2O		21-JUN-00	27-JUN-00	R81649	WG72530	
ARSENIC	1.04	U	14.6	ug/L	14.6		
ALUMINUM	1.04		58.5	ug/L	18.7		
SILVER	1.04	U	4.16	ug/L	4.16		
BORON	1.04		25.0	ug/L	4.16		
BARIUM	1.04		112	ug/L	0.832		
BERYLLIUM	1.04	U	0.832	ug/L	0.832		
CALCIUM	1.04		13,100	ug/L	18.7		
CADMIUM	1.04	U	1.46	ug/L	1.46		
COBALT	1.04	U	1.25	ug/L	1.25		
CHROMIUM	1.04	U	1.25	ug/L	1.25		
COPPER	1.04		14.8	ug/L	4.16		
IRON	1.04		75.6	ug/L	22.9		
POTASSIUM	1.04		1,220	ug/L	22.9		
MAGNESIUM	1.04		11,900	ug/L	2.08		
MANGANESE	1.04		9.36	ug/L	0.832		
MOLYBDENUM	1.04	U	4.16	ug/L	4.16		
SODIUM	1.04		15,300	ug/L	22.9		
VICKEL	1.04	U	4.16	ug/L	4.16		
LEAD	1.04	U	6.24	ug/L	6.24		
ANTIMONY	1.04	U	6.24	ug/L	6.24		
SELENIUM	1.04		41.2	ug/L	25.0		
SILICON	1.04		15,200	ug/L	27.0		
STRONTIUM	1.04		138	ug/L	0.312		
THALLIUM	1.04		44.2	ug/L	22.9		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-1 Instantaneous Grab
 Site: WS PENN MINE -500 ft above upper end of Hinckley Run
 Locator: PRSW-1
 Client ID:
 Collect Date: Jun 19 2000, 10:30am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
VANADIUM	1.04	U		1.66	ug/L	1.66	
ZINC	1.04			19.0	ug/L	8.32	
EPA 200.7: FILTER							
	RawH2O			21-JUN-00		28-JUN-00	R81693 WG72588
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04	B		45.6	ug/L	6.24	
SILVER	1.04	U		3.12	ug/L	3.12	
BORON	1.04			27.5	ug/L	3.12	
BARIUM	1.04			110	ug/L	0.312	
BERYLLIUM	1.04			0.395	ug/L	0.0208	
CALCIUM	1.04			13,000	ug/L	19.8	
CADMIUM	1.04	U		0.728	ug/L	0.728	
COBALT	1.04	U		1.04	ug/L	1.04	
CHROMIUM	1.04			2.74	ug/L	0.728	
COPPER	1.04			9.54	ug/L	3.12	
IRON	1.04			34.9	ug/L	7.28	
POTASSIUM	1.04			1,280	ug/L	16.6	
MAGNESIUM	1.04			11,900	ug/L	2.08	
MANGANESE	1.04			7.53	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			15,200	ug/L	13.5	
NICKEL	1.04			6.32	ug/L	2.08	
LEAD	1.04			6.91	ug/L	5.20	
ANTIMONY	1.04	U		7.28	ug/L	7.28	
SELENIUM	1.04	U		18.7	ug/L	18.7	
SILICON	1.04			15,300	ug/L	9.36	
STRONTIUM	1.04			138	ug/L	0.312	
THALLIUM	1.04	U		12.5	ug/L	12.5	
VANADIUM	1.04	U		0.936	ug/L	0.936	
ZINC	1.04			13.0	ug/L	2.08	
EPA 200.9: FILTER							
	RawH2O			21-JUN-00		25-JUN-00	R81631 WG72469
LEAD	1.0			0.40	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-2 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Jun 19 2000, 09:30am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	Prep Date	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mlvalue	Text
NONE	RawH2O			19-JUN-00	19-JUN-00	R81435	WG72311
PH	1.0			6.5	pH units		
TEMPERATURE	1.0			22	deg C		
CONDUCTIVITY	1.0			3,900	umhos/cm		
TURBIDITY	1.0			220	NTU		
EPA 300.0	RawH2O	1		26-JUN-00	26-JUN-00	R81624	WG72398
SULFATE	200			2,600	mg/L	3.0	
EPA 300.0	RawH2O				23-JUN-00	R81543	WG72398
CHLORIDE	5.0			26	mg/L	0.075	
SM(18)2320B	RawH2O			21-JUN-00	21-JUN-00	R81439	WG72333
ALKALINITY: TOTAL AS CaCO3	1.0			210	mg/L	5.0	
SM(18)2340C	RawH2O			21-JUN-00	21-JUN-00	R81460	WG72371
HARDNESS: TOTAL	50			2,800	mg/L	100	
SM(18)2540C	RawH2O			23-JUN-00	23-JUN-00	R81589	WG72438
TOTAL DISSOLVED SOLIDS	1.0			4,300	mg/L	6.0	
SM(18)2540D	RawH2O			21-JUN-00	21-JUN-00	R81470	WG72345
TOTAL SUSPENDED SOLIDS	1.0			63	mg/L	6.0	
SM(18)4500-CO2 D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: BICARBONATE	1.00			210	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: CARBONATE	1.0			0.10	mg/L	0.10	
EPA 200.7	RawH2O			21-JUN-00	27-JUN-00	R81649	WG72530
ARSENIC	1.04	U		14.6	ug/L	14.6	
ALUMINUM	1.04			150	ug/L	18.7	
SILVER	1.04	U		4.16	ug/L	4.16	
BORON	1.04			1,550	ug/L	4.16	
BARIUM	1.04			24.9	ug/L	0.832	
BERYLLIUM	1.04	U		0.832	ug/L	0.832	
CALCIUM	1.04	>		400,000	ug/L	18.7	
CADMIUM	1.04			202	ug/L	1.46	
COBALT	1.04			248	ug/L	1.25	
CHROMIUM	1.04			3.03	ug/L	1.25	
COPPER	1.04			176	ug/L	4.16	
IRON	1.04			22,800	ug/L	22.9	
POTASSIUM	1.04			9,490	ug/L	22.9	
MAGNESIUM	1.04	>		60,000	ug/L	2.08	
MANGANESE	1.04			18,100	ug/L	0.832	
MOLYBDENUM	1.04	U		4.16	ug/L	4.16	
SODIUM	1.04			51,500	ug/L	22.9	
NICKEL	1.04			150	ug/L	4.16	
LEAD	1.04			50.3	ug/L	6.24	
ANTIMONY	1.04	U		6.24	ug/L	6.24	
SELENIUM	1.04			99.4	ug/L	25.0	
SILICON	1.04			15,400	ug/L	27.0	
STRONTIUM	1.04			1,510	ug/L	0.312	
THALLIUM	1.04			85.5	ug/L	22.9	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-2 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Jun 19 2000, 09:30am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
VANADIUM	1.04			9.12	ug/L	1.66	
ZINC	1.04			28,400	ug/L	8.32	
EPA 200.7: FILTER							
	RawH2O			21-JUN-00		28-JUN-00	R81693 WG72588
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04	B		120	ug/L	6.24	
SILVER	1.04			13.5	ug/L	3.12	
BORON	1.04			1,540	ug/L	3.12	
BARIUM	1.04			22.8	ug/L	0.312	
BERYLLIUM	1.04	U		0.0208	ug/L	0.0208	
CALCIUM	1.04	>		400,000	ug/L	19.8	
CADMIUM	1.04			176	ug/L	0.728	
COBALT	1.04			244	ug/L	1.04	
CHROMIUM	1.04			4.42	ug/L	0.728	
COPPER	1.04			13.8	ug/L	3.12	
IRON	1.04	U		7.28	ug/L	7.28	
POTASSIUM	1.04			9,680	ug/L	16.6	
MAGNESIUM	1.04	>		60,000	ug/L	2.08	
MANGANESE	1.04			17,700	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			51,000	ug/L	13.5	
NICKEL	1.04			150	ug/L	2.08	
LEAD	1.04			30.0	ug/L	5.20	
ANTIMONY	1.04			24.7	ug/L	7.28	
SELENIUM	1.04			88.6	ug/L	18.7	
SILICON	1.04			13,600	ug/L	9.36	
STRONTIUM	1.04			1,500	ug/L	0.312	
THALLIUM	1.04			20.7	ug/L	12.5	
VANADIUM	1.04			10.7	ug/L	0.936	
ZINC	1.04			26,200	ug/L	2.08	
EPA 200.9: FILTER							
	RawH2O			21-JUN-00		25-JUN-00	R81631 WG72469
LEAD	1.0			0.40	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Perrin Mine Environmental Restoration
 Sample Id: L82531-3 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Jun 19 2000, 09:38am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method/Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			19-JUN-00	19-JUN-00	R81435	WG72311
PH	1.0			6.8	pH units		
TEMPERATURE	1.0			21	deg C		
CONDUCTIVITY	1.0			3,900	umhos/cm		
TURBIDITY	1.0			180	NTU		
EPA 300.0	RawH2O	1		26-JUN-00	26-JUN-00	R81624	WG72398
SULFATE	200			2,600	mg/L	3.0	
EPA 300.0	RawH2O				23-JUN-00	R81543	WG72398
CHLORIDE	5.0			25	mg/L	0.075	
SM(18)2320B	RawH2O			21-JUN-00	21-JUN-00	R81439	WG72333
ALKALINITY: TOTAL AS CaCO3	1.0			190	mg/L	5.0	
SM(18)2340C	RawH2O			21-JUN-00	21-JUN-00	R81460	WG72371
HARDNESS: TOTAL	50.			2,800	mg/L	100	
SM(18)2540C	RawH2O			23-JUN-00	23-JUN-00	R81589	WG72438
TOTAL DISSOLVED SOLIDS	1.0			4,200	mg/L	6.0	
SM(18)2540D	RawH2O			21-JUN-00	21-JUN-00	R81470	WG72345
TOTAL SUSPENDED SOLIDS	1.0			45	mg/L	6.0	
SM(18)4500-CO2-D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: BICARBONATE	1.00			190	mg/L	0.100	
SM(18)4500-CO2-D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: CARBONATE	1.0			0.10	mg/L	0.10	
EPA 200.7	RawH2O			21-JUN-00	27-JUN-00	R81649	WG72530
ARSENIC	1.04	U		14.6	ug/L	14.6	
ALUMINUM	1.04			161	ug/L	18.7	
SILVER	1.04	U		4.16	ug/L	4.16	
BORON	1.04			1,530	ug/L	4.16	
BARIUM	1.04			24.1	ug/L	0.832	
BERYLLIUM	1.04	U		0.832	ug/L	0.832	
CALCIUM	1.04	>		400,000	ug/L	18.7	
CADMIUM	1.04			183	ug/L	1.46	
COBALT	1.04			233	ug/L	1.25	
CHROMIUM	1.04			3.00	ug/L	1.25	
COPPER	1.04			276	ug/L	4.16	
IRON	1.04			16,300	ug/L	22.9	
POTASSIUM	1.04			9,280	ug/L	22.9	
MAGNESIUM	1.04	>		60,000	ug/L	2.08	
MANGANESE	1.04			17,700	ug/L	0.832	
MOLYBDENUM	1.04	U		4.16	ug/L	4.16	
SODIUM	1.04			53,100	ug/L	22.9	
NICKEL	1.04			140	ug/L	4.16	
LEAD	1.04			44.5	ug/L	6.24	
ANTIMONY	1.04	U		6.24	ug/L	6.24	
SELENIUM	1.04			98.8	ug/L	25.0	
SILICON	1.04			14,800	ug/L	27.0	
STRONTIUM	1.04			1,530	ug/L	0.312	
THALLIUM	1.04			79.2	ug/L	22.9	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-3 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Jun 19 2000, 09:38am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
VANADIUM	1.04		8.27	ug/L	1.66		
ZINC	1.04		26,800	ug/L	8.32		
EPA 200.7: FILTER							
	RawH2O		21-JUN-00		28-JUN-00	R81693	WG72588
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04	B	114	ug/L	6.24		
SILVER	1.04		10.5	ug/L	3.12		
BORON	1.04		1,560	ug/L	3.12		
BARIUM	1.04		23.3	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04	>	400,000	ug/L	19.8		
CADMIUM	1.04		162	ug/L	0.728		
COBALT	1.04		234	ug/L	1.04		
CHROMIUM	1.04		4.43	ug/L	0.728		
COPPER	1.04		27.3	ug/L	3.12		
IRON	1.04	U	7.28	ug/L	7.28		
POTASSIUM	1.04		9,680	ug/L	16.6		
MAGNESIUM	1.04	>	60,000	ug/L	2.08		
MANGANESE	1.04		18,100	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		54,200	ug/L	13.5		
NICKEL	1.04		141	ug/L	2.08		
LEAD	1.04		30.5	ug/L	5.20		
ANTIMONY	1.04		22.3	ug/L	7.28		
SELENIUM	1.04		64.6	ug/L	18.7		
SILICON	1.04		13,500	ug/L	9.36		
STRONTIUM	1.04		1,560	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		10.6	ug/L	0.936		
ZINC	1.04		25,000	ug/L	2.08		
EPA 200.9: FILTER							
	RawH2O		21-JUN-00		25-JUN-00	R81631	WG72469
LEAD	1.0		0.40	ug/L	0.30		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-4 Instantaneous Grab
 Site: WS PENN MINE At seeps w/flow exceeding 1 gpm - location in comments
 Locator: PRSS
 Client ID:
 Collect Date: Jun 19 2000, 10:00am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: location: In Hinckley Run- collectio of seeps near adit #4 field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	Prep Date	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			19-JUN-00	19-JUN-00	R81435	WG72311
PH	1.0			2.2	pH units		
TEMPERATURE	1.0			22	deg C		
CONDUCTIVITY	1.0			1,200	umhos/cm		
TURBIDITY	1.0			8.5	NTU		
EPA 300.0	RawH2O			26-JUN-00	26-JUN-00	R81624	WG72398
SULFATE	50.			610	mg/L	0.75	
EPA 300.0	RawH2O			23-JUN-00	23-JUN-00	R81543	WG72398
CHLORIDE	5.0			8.3	mg/L	0.075	
SM(18)2320B	RawH2O			21-JUN-00	21-JUN-00	R81439	WG72333
ALKALINITY: TOTAL AS CaCO3	1.0	U		5.0	mg/L	5.0	
SM(18)2340C	RawH2O			21-JUN-00	21-JUN-00	R81460	WG72371
HARDNESS: TOTAL	2.0			250	mg/L	4.0	
SM(18)2540C	RawH2O			23-JUN-00	23-JUN-00	R81589	WG72438
TOTAL DISSOLVED SOLIDS	1.0			890	mg/L	6.0	
SM(18)2540D	RawH2O			21-JUN-00	21-JUN-00	R81470	WG72345
TOTAL SUSPENDED SOLIDS	0.50	U		3.0	mg/L	3.0	
SM(18)4500-CO2-D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: BICARBONATE	1.00	U		0.100	mg/L	0.100	
SM(18)4500-CO2-D	RawH2O			21-JUN-00	21-JUN-00	R81438	WG72357
ALKALINITY: CARBONATE	1.0	U		0.10	mg/L	0.10	
EPA 200.7	RawH2O			21-JUN-00	27-JUN-00	R81649	WG72530
ARSENIC	1.04	U		14.6	ug/L	14.6	
ALUMINUM	1.04			18,100	ug/L	18.7	
SILVER	1.04	U		4.16	ug/L	4.16	
BORON	1.04			106	ug/L	4.16	
BARIUM	1.04			10.2	ug/L	0.832	
BERYLLIUM	1.04	U		0.832	ug/L	0.832	
CALCIUM	1.04			49,500	ug/L	18.7	
CADMIUM	1.04			52.2	ug/L	1.46	
COBALT	1.04			45.1	ug/L	1.25	
CHROMIUM	1.04			4.41	ug/L	1.25	
COPPER	1.04			5,790	ug/L	4.16	
IRON	1.04			28,200	ug/L	22.9	
POTASSIUM	1.04			4,900	ug/L	22.9	
MAGNESIUM	1.04			36,300	ug/L	2.08	
MANGANESE	1.04			1,370	ug/L	0.832	
MOLYBDENUM	1.04	U		4.16	ug/L	4.16	
SODIUM	1.04			14,400	ug/L	22.9	
NICKEL	1.04			42.8	ug/L	4.16	
LEAD	1.04			22.5	ug/L	6.24	
ANTIMONY	1.04			6.55	ug/L	6.24	
SELENIUM	1.04			59.7	ug/L	25.0	
SILICON	1.04			33,700	ug/L	27.0	
STRONTIUM	1.04			210	ug/L	0.312	
THALLIUM	1.04			33.0	ug/L	22.9	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-4 Instantaneous Grab
 Site: WS PENN MINE At seeps w/flow exceeding 1 gpm - location in comments
 Locator: PRSS
 Client ID:
 Collect Date: Jun 19 2000, 10:00am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: location: In Hinckley Run- collectio of seeps near adit #4 field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
VANADIUM	1.04			3.71	ug/L	1.66	
ZINC	1.04			9,000	ug/L	8.32	
EPA 200.7: FILTER							
	RawH2O			21-JUN-00		28-JUN-00	R81693 WG72588
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04	B		18,200	ug/L	6.24	
SILVER	1.04	U		3.12	ug/L	3.12	
BORON	1.04			112	ug/L	3.12	
BARIUM	1.04			10.8	ug/L	0.312	
BERYLLIUM	1.04			0.248	ug/L	0.0208	
CALCIUM	1.04			50,300	ug/L	19.8	
CADMIUM	1.04			53.3	ug/L	0.728	
COBALT	1.04			46.7	ug/L	1.04	
CHROMIUM	1.04			10.6	ug/L	0.728	
COPPER	1.04			6,030	ug/L	3.12	
IRON	1.04			27,200	ug/L	7.28	
POTASSIUM	1.04			5,050	ug/L	16.6	
MAGNESIUM	1.04			37,000	ug/L	2.08	
MANGANESE	1.04			1,410	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			14,400	ug/L	13.5	
NICKEL	1.04			47.3	ug/L	2.08	
LEAD	1.04			23.6	ug/L	5.20	
ANTIMONY	1.04			17.6	ug/L	7.28	
SELENIUM	1.04			31.2	ug/L	18.7	
SILICON	1.04			34,300	ug/L	9.36	
STRONTIUM	1.04			214	ug/L	0.312	
THALLIUM	1.04	U		12.5	ug/L	12.5	
VANADIUM	1.04			26.1	ug/L	0.936	
ZINC	1.04			9,270	ug/L	2.08	
EPA 200.9: FILTER							
LEAD	1.0			4.0	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Fern Mine Environmental Restoration
 Sample Id: L82531-5 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jun 19 2000, 12:00am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: blind field rep, sample time not recorded

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
EPA 300.0 SULFATE	200	RawH2O	1	26-JUN-00	26-JUN-00	R81624	WG72398
				37	mg/L	3.0	
EPA 300.0 CHLORIDE	5.0	RawH2O		23-JUN-00	23-JUN-00	R81543	WG72398
				25	mg/L	0.075	
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	1.0	RawH2O		21-JUN-00	21-JUN-00	R81439	WG72333
				210	mg/L	5.0	
SM(18)2340C HARDNESS: TOTAL	50.	RawH2O		21-JUN-00	21-JUN-00	R81460	WG72371
				2,800	mg/L	100	
SM(18)2540C TOTAL DISSOLVED SOLIDS	1.0	RawH2O		23-JUN-00	23-JUN-00	R81589	WG72438
				4,200	mg/L	6.0	
SM(18)2540D TOTAL SUSPENDED SOLIDS	1.0	RawH2O		21-JUN-00	21-JUN-00	R81470	WG72345
				58	mg/L	6.0	
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	1.00	RawH2O		21-JUN-00	21-JUN-00	R81438	WG72357
				210	mg/L	0.100	
SM(18)4500-CO2 D ALKALINITY: CARBONATE	1.0	RawH2O		21-JUN-00	21-JUN-00	R81438	WG72357
				0.10	mg/L	0.10	
EPA 200.7 ARSENIC	1.04	RawH2O		21-JUN-00	27-JUN-00	R81649	WG72530
			U	14.6	ug/L	14.6	
ALUMINUM	1.04			181	ug/L	18.7	
SILVER	1.04		U	4.16	ug/L	4.16	
BORON	1.04			1,570	ug/L	4.16	
BARIUM	1.04			25.3	ug/L	0.832	
BERYLLIUM	1.04		U	0.832	ug/L	0.832	
CALCIUM	1.04		>	400,000	ug/L	18.7	
CADMIUM	1.04			203	ug/L	1.46	
COBALT	1.04			249	ug/L	1.25	
CHROMIUM	1.04			3.12	ug/L	1.25	
COPPER	1.04			176	ug/L	4.16	
IRON	1.04			22,100	ug/L	22.9	
POTASSIUM	1.04			9,490	ug/L	22.9	
MAGNESIUM	1.04			60,000	ug/L	2.08	
MANGANESE	1.04			17,600	ug/L	0.832	
MOLYBDENUM	1.04		U	4.16	ug/L	4.16	
SODIUM	1.04			51,300	ug/L	22.9	
NICKEL	1.04			155	ug/L	4.16	
LEAD	1.04			45.4	ug/L	6.24	
ANTIMONY	1.04		U	6.24	ug/L	6.24	
SELENIUM	1.04			76.1	ug/L	25.0	
SILICON	1.04			15,400	ug/L	27.0	
STRONTIUM	1.04			1,510	ug/L	0.312	
THALLIUM	1.04			101	ug/L	22.9	
VANADIUM	1.04			8.87	ug/L	1.66	
ZINC	1.04			28,200	ug/L	8.32	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Environmental Restoration
 Sample Id: L82531-5 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jun 19 2000, 12:00am
 Receive Date: Jun 20 2000, 03:00pm
 Sample Comments: blind field rep, sample time not recorded

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdvalue	Text	
EPA 200.7 FILTER	RawH2O			21-JUN-00	28-JUN-00	R81693	WG72588
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04	B	116	ug/L	6.24		
SILVER	1.04		10.1	ug/L	3.12		
BORON	1.04		1,580	ug/L	3.12		
BARIUM	1.04		23.6	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04	>	400,000	ug/L	19.8		
CADMIUM	1.04		177	ug/L	0.728		
COBALT	1.04		245	ug/L	1.04		
CHROMIUM	1.04		4.52	ug/L	0.728		
COPPER	1.04		8.76	ug/L	3.12		
IRON	1.04		18.4	ug/L	7.28		
POTASSIUM	1.04		9,950	ug/L	16.6		
MAGNESIUM	1.04		205,000	ug/L	2.08		
MANGANESE	1.04		18,200	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		52,300	ug/L	13.5		
NICKEL	1.04		150	ug/L	2.08		
LEAD	1.04		32.1	ug/L	5.20		
ANTIMONY	1.04		22.9	ug/L	7.28		
SELENIUM	1.04		79.1	ug/L	18.7		
SILICON	1.04		13,900	ug/L	9.36		
STRONTIUM	1.04		1,540	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		11.3	ug/L	0.936		
ZINC	1.04		26,300	ug/L	2.08		
EPA 200.9 FILTER	RawH2O			21-JUN-00	25-JUN-00	R81631	WG72469
LEAD	1.0		0.50	ug/L	0.30		

BATCH PREPDATE as initial date of sample preparation
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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 06 2000, 08:49 pm

Method Reference	Parameter	Qual	Blank	Units	BatchPrepDate	AnalysisDate	RunID	Worknum
		Qual	Blank	Units	Qual Dup	Qual MS	Qual MSD	Qual LCS
					RPD	REC SPIKE	RPD	REC SPIKE
SM(18)2320B				LIQUID	21-JUN-00	21-JUN-00	R81439	WG72333
	ALKALINITY: TOTAL AS CaCO3				0	N 68		
	ALKALINITY: TOTAL AS CaCO3				0	82		
EPA 300.0				WATER	20-JUN-00	20-JUN-00	R81458	WG72268
	FLUORIDE	U	.014	mg/L		100		67
	CHLORIDE	U	.015	mg/L				130
	NITRITE AS N	U	.004	mg/L		92		110
	BROMIDE	U	.013	mg/L		96		90
	NITRATE AS N	U	.0059	mg/L		95		100
	ORTHOPHOSPHATE AS P	U	.018	mg/L	4.8	90		77
	ORTHOPHOSPHATE AS P					90		
	SULFATE	U	.015	mg/L	.34	80		81
	SULFATE				1.6	100		
	SULFATE					100		
SM(18)2340C				LIQUID	21-JUN-00	21-JUN-00	R81460	WG72371
	HARDNESS: TOTAL				0	100		
	HARDNESS: TOTAL				1.8	100		
EPA 160.2				LIQUID	21-JUN-00	21-JUN-00	R81470	WG72345
	TOTAL SUSPENDED SOLIDS	U	6	mg/L		0		89
	TOTAL SUSPENDED SOLIDS					3.7		
	TOTAL SUSPENDED SOLIDS					0		
EPA 300.0				WATER	22-JUN-00		R81543	WG72398

- BLANK - background Method Blank
- DUP RPD - duplicate RPD for precision
- MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
- MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
- LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 06 2000, 08:49 pm

Method Reference	Qual	Blank	Samp_tag	Units	BatchPrepDate	Qual	MS	AnalysisDate	RunID	Worknum
Parameter					Qual Dup	REC	SPIKE	Qual MS	Qual MSD	Qual LCS
					RPD			REC	RPD	REC
										SPIKE
FLUORIDE	U	.014		mg/L		.1		91		92
FLUORIDE						0				
FLUORIDE						2.4		94		
FLUORIDE						0				
CHLORIDE	U	.015		mg/L		0				100
CHLORIDE						0				
CHLORIDE						0				
CHLORIDE						.31		100		
NITRITE AS N	U	.004		mg/L	U	0				110
NITRITE AS N					U	0				
NITRITE AS N					U	0		86		
NITRITE AS N					U	0				
NITRATE AS N	U	.0059		mg/L	*	160		100		93
NITRATE AS N					U	0		97		
NITRATE AS N					U	0		100		
NITRATE AS N						0				
ORTHOPHOSPHATE AS P	U	.018		mg/L		0				110
ORTHOPHOSPHATE AS P					U	0		88		
ORTHOPHOSPHATE AS P						0				
ORTHOPHOSPHATE AS P					U	0				
SM(18)2540C LIQUID 23-JUN-00 23-JUN-00 R81589 WG72438										
TOTAL DISSOLVED SOLIDS		13		mg/L		0				99
EPA 300.0 WATER 26-JUN-00 26-JUN-00 R81624 WG72498										
FLUORIDE	U	.014		mg/L		.6		93		100
FLUORIDE						1.6		98		
FLUORIDE										
CHLORIDE	U	.015		mg/L		.43		92		130
CHLORIDE										
NITRITE AS N	U	.004		mg/L				100		110
NITRATE AS N	U	.0059		mg/L				100		110
NITRATE AS N						12		100		
NITRATE AS N						1.7		100		
ORTHOPHOSPHATE AS P	U	.018		mg/L		6.9		91		110
SULFATE	U	.015		mg/L		1.6		100		110
EPA 200.19: FILTER LIQUID 21-JUN-00 25-JUN-00 R81631 WG72469										
LEAD	U	.3		ug/L				110	1.8	87.5
LEAD	U	.3		ug/L						
EPA 200.7 W 27-JUN-00 27-JUN-00 R81649 WG72530										
ARSENIC	U	14.6		ug/L				101	.361	123

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 06 2000, 08:49 pm

Method Reference Parameter	Qual	Blank	Samp_Tag Units	BatchPrepDate	AnalysisDate	RunID	Worknum
				Qual Dup RPD	Qual MS REC SPIKE	Qual MSD RPD	Qual LCS REC SPIKE
ARSENIC	U	14.6	ug/L		102	2.72	
ALUMINUM	U	18.7	ug/L		N 127	9.98	96.5
ALUMINUM	U	18.7	ug/L		114	3.23	
SILVER	U	4.16	ug/L		96	4.97	97.5
SILVER	U	4.16	ug/L		93.3	1.77	
BORON	U	4.16	ug/L		107	.733	114
BORON	U	4.16	ug/L		106	.528	
BARIUM	U	.832	ug/L		104	.124	97.3
BARIUM	U	.832	ug/L		103	.666	
BERYLLIUM	U	.832	ug/L		105	.978	98.1
BERYLLIUM	U	.832	ug/L		104	1.09	
CALCIUM		26.4	ug/L		98.3	.0818	95.9
CALCIUM	U	18.7	ug/L		97.8	.292	
CADMIUM	U	1.46	ug/L		99.6	.472	92.4
CADMIUM	U	1.46	ug/L		98.8	.733	
COBALT	U	1.25	ug/L		103	.228	102
COBALT	U	1.25	ug/L		104	.276	
CHROMIUM	U	1.25	ug/L		100	.0401	94.9
CHROMIUM	U	1.25	ug/L		102	1.39	
COPPER	U	4.16	ug/L		98.2	.362	92.9
COPPER	U	4.16	ug/L		97.6	.548	
IRON	U	22.9	ug/L		102	.558	99.5
IRON	U	22.9	ug/L		102	1.23	
POTASSIUM		24.4	ug/L		99.9	.121	100
POTASSIUM	U	22.9	ug/L		99.8	.347	
MAGNESIUM		4.56	ug/L		99	.0718	98.2
MAGNESIUM	U	2.08	ug/L		99	.482	
MANGANESE	U	.832	ug/L		99.8	.429	94.7
MANGANESE	U	.832	ug/L		100	.0677	
MOLYBDENUM	U	4.16	ug/L		103	.285	100
MOLYBDENUM	U	4.16	ug/L		103	.126	
SODIUM	U	22.9	ug/L		99.8	.211	100
SODIUM	U	22.9	ug/L		101	1.17	
NICKEL	U	4.16	ug/L		101	.484	95.8
NICKEL	U	4.16	ug/L		103	.198	
LEAD	U	6.24	ug/L		106	.454	100
LEAD	U	6.24	ug/L		105	.676	
ANTIMONY	U	6.24	ug/L		104	2.52	113
ANTIMONY	U	6.24	ug/L		104	1.58	
SELENIUM		30.8	ug/L		104	2.82	92.7
SELENIUM	U	25	ug/L		103	.554	
SILICON	U	27	ug/L		R 122	.204	98
SILICON	U	27	ug/L		R 126	.164	
STRONTIUM	U	.312	ug/L		105	.00399	100
STRONTIUM	U	.312	ug/L		106	.321	
THALLIUM	U	22.9	ug/L		109	.0419	99.8
THALLIUM	U	22.9	ug/L		109	.126	
VANADIUM	U	1.66	ug/L		107	.314	99.3
VANADIUM	U	1.66	ug/L		107	.0486	
ZINC	U	8.32	ug/L		102	.093	98.1
ZINC	U	8.32	ug/L		102	.792	
<hr/>							
BPA 200 µm FILTER 21 JUN 00 28 JUN 00 R81693 R872588							
ARSENIC	U	7.28	ug/L		102	.636	125
ARSENIC	U	7.28	ug/L				
ALUMINUM		18.6	ug/L		119	13.5	102
ALUMINUM		21.1	ug/L				

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Jul 06 2000, 08:49 pm

Method Reference	Samp_tag	BatchPrepDate	AnalysisDate	RunID	Worknum	
Parameter	Qual Blank	Units	Qual Dup RPD	Qual MS REC SPIKE	Qual MSD RPD	Qual LCS REC SPIKE
SILVER	U 3.12	ug/L		106	.687	113
SILVER	U 3.12	ug/L				
BORON	U 3.12	ug/L		108	.247	113
BORON	U 3.12	ug/L				
BARIUM	U .312	ug/L		105	.416	96.6
BARIUM	U .312	ug/L				
BERYLLIUM	U .0208	ug/L		106	.384	98.6
BERYLLIUM	U .0208	ug/L				
CALCIUM	34.7	ug/L		103	.363	95.8
CALCIUM	33.5	ug/L				
CADMIUM	U .728	ug/L		100	.79	92.6
CADMIUM	U .728	ug/L				
COBALT	U 1.04	ug/L		105	.515	102
COBALT	U 1.04	ug/L				
CHROMIUM	U .728	ug/L		103	.684	97.1
CHROMIUM	U .728	ug/L				
COPPER	U 3.12	ug/L		101	.37	92.3
COPPER	U 3.12	ug/L				
IRON	U 7.28	ug/L		103	.056	99.9
IRON	U 7.28	ug/L				
POTASSIUM	U 16.6	ug/L		107	.618	100
POTASSIUM	U 16.6	ug/L				
MAGNESIUM	3.75	ug/L		102	.0872	97.3
MAGNESIUM	U 2.08	ug/L				
MANGANESE	U .312	ug/L		102	.482	95.6
MANGANESE	U .312	ug/L				
MOLYBDENUM	U 3.12	ug/L		105	.687	101
MOLYBDENUM	U 3.12	ug/L				
SODIUM	U 13.5	ug/L		105	.656	98.7
SODIUM	U 13.5	ug/L				
NICKEL	U 2.08	ug/L		103	.385	97.3
NICKEL	U 2.08	ug/L				
LEAD	U 5.2	ug/L		106	.191	102
LEAD	U 5.2	ug/L				
ANTIMONY	U 7.28	ug/L		108	1.48	115
ANTIMONY	U 7.28	ug/L				
SELENIUM	U 18.7	ug/L		109	1.11	93
SELENIUM	U 18.7	ug/L				
SILICON	U 9.36	ug/L		R 140	.351	97.5
SILICON	U 9.36	ug/L				
STRONTIUM	.34	ug/L		106	.27	99.6
STRONTIUM	U .312	ug/L				
THALLIUM	U 12.5	ug/L		107	.404	89.8
THALLIUM	U 12.5	ug/L				
VANADIUM	U .936	ug/L		110	.0526	100
VANADIUM	U .936	ug/L				
ZINC	U 2.08	ug/L		102	.586	98.6
ZINC	2.1	ug/L				

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Aug 08 2000, 08:33 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Jul 18 2000, 02:45 pm
Login #: L83155
LSR #: B785-0008-1
Project Title: Penn Mine Restoration:Surface Water

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

* = Duplicate value outside of control limits	M = Duplicate injection precision not met
+ = Positive	N = Spike recovery outside of control limits
- = Negative	NEG = Negative
< = Less than	P = Present
> = Greater than	PASS = Pass
A = Absent	POS = Positive
B = Analyte detected in method blank	Q = Data qualified by the Data Review Committee
C = GC/MS confirmation	R = Spike out of calibration range
CG = Confluent growth	S = Method of standard additions used
D = Surrogate spike outside of control limits	SP = Spreader
E = Estimated value, concentration outside calibration range	T = Diesel/Gasoline pattern is atypical
FAIL = Fail	TNTC = Too Numerous to Count
H = Analyzed past hold time	U = Analyte not detected
I = Dual Column quantitation difference > 40% RPD	W = Post-digestion spike (HGA) outside control limits
J = Estimated value, quantitation does not meet SOP criteria	X = Presumptive evidence of a compound
LA = Lost analysis	- = Approximately

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-1 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Jul 17 2000, 12:40pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: field data: use attached data shee;

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
NONE	RawH2O		17-JUL-00	17-JUL-00	R82345	WG73297	
PH	1.0		7.1	pH units			
TEMPERATURE	1.0		28	deg C			
CONDUCTIVITY	1.0		3,800	umhos/cm		TDS calc = 1875 mg/L	
TURBIDITY	1.0		180	NTU			
EPA 300.0	RawH2O		19-JUL-00	19-JUL-00	R82407	WG73312	
CHLORIDE	100		25	mg/L	1.5		
SULFATE	100		2,800	mg/L	1.5		
SM(18)2320B	RawH2O		19-JUL-00	19-JUL-00	R82383	WG73335	
ALKALINITY: TOTAL AS CaCO3	1.0		240	mg/L	5.0		
SM(18)2340C	RawH2O		19-JUL-00	19-JUL-00	R82385	WG73337	
HARDNESS: TOTAL	20.		2,900	mg/L	40.		
SM(18)2540C	RawH2O		20-JUL-00	20-JUL-00	R82530	WG73396	
TOTAL DISSOLVED SOLIDS	1.0		4,200	mg/L	6.0		
SM(18)2540D	RawH2O		24-JUL-00	24-JUL-00	R82560	WG73487	
TOTAL SUSPENDED SOLIDS	0.67		56	mg/L	4.0		
SM(18)4500-CO2.D	RawH2O		19-JUL-00	19-JUL-00	R82386	WG73338	
ALKALINITY: BICARBONATE	1.00		244	mg/L	0.100		
SM(18)4500-CO2.D	RawH2O		19-JUL-00	19-JUL-00	R82386	WG73338	
ALKALINITY: CARBONATE	1.0		0.30	mg/L	0.10		
EPA 200.7	RawH2O		19-JUL-00	21-JUL-00	R82474	WG73397	
ARSENIC	1.04	U	14.6	ug/L	14.6		
ALUMINUM	1.04		64.0	ug/L	18.7		
SILVER	1.04		8.38	ug/L	4.16		
BORON	1.04		1,560	ug/L	4.16		
BARIUM	1.04		23.0	ug/L	0.832		
BERYLLIUM	1.04	U	0.832	ug/L	0.832		
CALCIUM	1.04	>	400,000	ug/L	18.7		
CADMIUM	1.04		188	ug/L	1.46		
COBALT	1.04		267	ug/L	1.25		
CHROMIUM	1.04		5.14	ug/L	1.25		
COPPER	1.04		89.2	ug/L	4.16		
IRON	1.04		16,000	ug/L	22.9		
POTASSIUM	1.04		8,920	ug/L	22.9		
MAGNESIUM	1.04		214,000	ug/L	2.08		
MANGANESE	1.04		17,600	ug/L	0.832		
MOLYBDENUM	1.04	U	4.16	ug/L	4.16		
SODIUM	1.04		47,400	ug/L	22.9		
NICKEL	1.04		158	ug/L	4.16		
LEAD	1.04		31.2	ug/L	6.24		
ANTIMONY	1.04		30.2	ug/L	6.24		
SELENIUM	1.04		64.2	ug/L	25.0		
SILICON	1.04		14,600	ug/L	27.0		
STRONTIUM	1.04		1,410	ug/L	0.312		
THALLIUM	1.04	U	22.9	ug/L	22.9		
VANADIUM	1.04		8.25	ug/L	1.66		
ZINC	1.04		31,500	ug/L	8.32		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-1 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Jul 17 2000, 12:40pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: field data: use attached data shee;

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
EPA 200.7: FILTER	RawH2O			20-JUL-00		02-AUG-00	R82853 WG73780
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04			290	ug/L	6.24	
SILVER	1.04			11.0	ug/L	3.12	
BORON	1.04			1,660	ug/L	3.12	
BARIUM	1.04			21.4	ug/L	0.312	
BERYLLIUM	1.04	U		0.0208	ug/L	0.0208	
CALCIUM	1.04	>		400,000	ug/L	19.8	
CADMIUM	1.04			180	ug/L	0.728	
COBALT	1.04			281	ug/L	1.04	
CHROMIUM	1.04			7.22	ug/L	0.728	
COPPER	1.04			8.66	ug/L	3.12	
IRON	1.04			43.7	ug/L	7.28	
POTASSIUM	1.04			9,790	ug/L	16.6	
MAGNESIUM	1.04	B		232,000	ug/L	2.08	
MANGANESE	1.04			19,600	ug/L	0.312	
MOLYBDENUM	1.04	U		3.12	ug/L	3.12	
SODIUM	1.04			51,900	ug/L	13.5	
NICKEL	1.04			185	ug/L	2.08	
LEAD	1.04			67.1	ug/L	5.20	
ANTIMONY	1.04			14.1	ug/L	7.28	
SELENIUM	1.04			83.3	ug/L	18.7	
SILICON	1.04			13,900	ug/L	9.36	
STRONTIUM	1.04			1,470	ug/L	0.312	
THALLIUM	1.04			28.2	ug/L	12.5	
VANADIUM	1.04			11.7	ug/L	0.936	
ZINC	1.04			30,400	ug/L	2.08	
EPA 200.9: FILTER	RawH2O			20-JUL-00		25-JUL-00	R82619 WG73524
LEAD	1.0			0.50	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-2 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Jul 17 2000, 12:50pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONH	RawH2O		17-JUL-00	17-JUL-00	R82345	WG73297
PH	1.0		7.4	pH units		
TEMPERATURE	1.0		28	deg C		
CONDUCTIVITY	1.0		3,700	umhos/cm		TDS calc = 1860 mg/L
TURBIDITY	1.0		170	NTU		
EPA 300.0	RawH2O		19-JUL-00	19-JUL-00	R82407	WG73312
CHLORIDE	100		26	mg/L	1.5	
SULFATE	100		2,800	mg/L	1.5	
SM(18)2320B	RawH2O		19-JUL-00	19-JUL-00	R82383	WG73335
ALKALINITY: TOTAL AS CaCO3	1.0		220	mg/L	5.0	
SM(18)2340C	RawH2O		19-JUL-00	19-JUL-00	R82385	WG73337
HARDNESS: TOTAL	20		2,900	mg/L	40	
SM(18)2540C	RawH2O		20-JUL-00	20-JUL-00	R82530	WG73396
TOTAL DISSOLVED SOLIDS	1.0		4,000	mg/L	6.0	
SM(18)2540D	RawH2O		19-JUL-00	19-JUL-00	R82453	WG73323
TOTAL SUSPENDED SOLIDS	4.0		40	mg/L	24	
SM(18)4500-CO2 D	RawH2O		19-JUL-00	19-JUL-00	R82386	WG73338
ALKALINITY: BICARBONATE	1.00		221	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		19-JUL-00	19-JUL-00	R82386	WG73338
ALKALINITY: CARBONATE	1.0		0.40	mg/L	0.10	
EPA 200.17	RawH2O		19-JUL-00	21-JUL-00	R82474	WG73397
ARSENIC	1.04	U	14.6	ug/L	14.6	
ALUMINUM	1.04		80.3	ug/L	18.7	
SILVER	1.04		6.47	ug/L	4.16	
BORON	1.04		1,500	ug/L	4.16	
BARIUM	1.04		20.8	ug/L	0.832	
BERYLLIUM	1.04	U	0.832	ug/L	0.832	
CALCIUM	1.04	>	400,000	ug/L	18.7	
CADMIUM	1.04		182	ug/L	1.46	
COBALT	1.04		256	ug/L	1.25	
CHROMIUM	1.04		5.50	ug/L	1.25	
COPPER	1.04		175	ug/L	4.16	
IRON	1.04		15,400	ug/L	22.9	
POTASSIUM	1.04		8,060	ug/L	22.9	
MAGNESIUM	1.04		214,000	ug/L	2.08	
MANGANESE	1.04		17,300	ug/L	0.832	
MOLYBDENUM	1.04	U	4.16	ug/L	4.16	
SODIUM	1.04		44,600	ug/L	22.9	
NICKEL	1.04		157	ug/L	4.16	
LEAD	1.04		33.9	ug/L	6.24	
ANTIMONY	1.04		29.6	ug/L	6.24	
SELENIUM	1.04		67.5	ug/L	25.0	
SILICON	1.04		14,600	ug/L	27.0	
STRONTIUM	1.04		1,320	ug/L	0.312	
THALLIUM	1.04	U	22.9	ug/L	22.9	
VANADIUM	1.04		7.64	ug/L	1.66	
ZINC	1.04		31,400	ug/L	8.32	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-2 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Jul 17 2000, 12:50pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID Text	Worknum
EPA 200.7: FILTER	RawH2O		20-JUL-00	02-AUG-00	R82853	WG73780
ARSENIC	1.04	U	7.28	ug/L		7.28
ALUMINUM	1.04		203	ug/L		6.24
SILVER	1.04		16.4	ug/L		3.12
BORON	1.04		1,580	ug/L		3.12
BARIUM	1.04		19.3	ug/L		0.312
BERYLLIUM	1.04	U	0.0208	ug/L		0.0208
CALCIUM	1.04		704,000	ug/L		19.8
CADMIUM	1.04		167	ug/L		0.728
COBALT	1.04		274	ug/L		1.04
CHROMIUM	1.04		8.48	ug/L		0.728
COPPER	1.04		20.4	ug/L		3.12
IRON	1.04		33.5	ug/L		7.28
POTASSIUM	1.04		8,890	ug/L		16.6
MAGNESIUM	1.04	B	230,000	ug/L		2.08
MANGANESE	1.04		19,000	ug/L		0.312
MOLYBDENUM	1.04	U	3.12	ug/L		3.12
SODIUM	1.04		48,500	ug/L		13.5
NICKEL	1.04		178	ug/L		2.08
LEAD	1.04		66.8	ug/L		5.20
ANTIMONY	1.04		10.4	ug/L		7.28
SELENIUM	1.04		116	ug/L		18.7
SILICON	1.04		13,700	ug/L		9.36
STRONTIUM	1.04		1,350	ug/L		0.312
THALLIUM	1.04		40.8	ug/L		12.5
VANADIUM	1.04		11.5	ug/L		0.936
ZINC	1.04		28,900	ug/L		2.08
EPA 200.9: FILTER	RawH2O		20-JUL-00	25-JUL-00	R82619	WG73524
LEAD	1.0		0.40	ug/L		0.30

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-4 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 17 2000, 12:40pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: blind field rep.

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
EPA 300.0 CHLORIDE	RawH2O 100		18-JUL-00 12	mg/L	19-JUL-00 1.5	R82393	WG73268
SULPATE	100		1,900	mg/L	1.5		
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0	U	19-JUL-00 5.0	mg/L	19-JUL-00 5.0	R82383	WG73335
SM(18)2340C HARDNESS: TOTAL	RawH2O 20.		19-JUL-00 1,000	mg/L	19-JUL-00 40.	R82385	WG73337
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		20-JUL-00 2,400	mg/L	20-JUL-00 6.0	R82530	WG73396
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 0.50		24-JUL-00 6.5	mg/L	24-JUL-00 3.0	R82560	WG73487
SM(18)4500-CO2-D ALKALINITY: BICARBONATE	RawH2O 1.00	U	19-JUL-00 0.100	mg/L	19-JUL-00 0.100	R82386	WG73338
SM(18)4500-CO2-D ALKALINITY: CARBONATE	RawH2O 1.0	U	19-JUL-00 0.10	mg/L	19-JUL-00 0.10	R82386	WG73338
EPA 200.7 ARSENIC	RawH2O 1.04		19-JUL-00 39.1	ug/L	21-JUL-00 14.6	R82474	WG73397
ALUMINUM	1.04		16,600	ug/L	18.7		
SILVER	1.04	U	4.16	ug/L	4.16		
BORON	1.04		1,190	ug/L	4.16		
BARIUM	1.04		6.95	ug/L	0.832		
BERYLLIUM	1.04	U	0.832	ug/L	0.832		
CALCIUM	1.04		285,000	ug/L	18.7		
CADMIUM	1.04		43.0	ug/L	1.46		
COBALT	1.04		68.9	ug/L	1.25		
CHROMIUM	1.04		6.08	ug/L	1.25		
COPPER	1.04		2,490	ug/L	4.16		
IRON	3.00		190,000	ug/L	66.0		
POTASSIUM	1.04		8,680	ug/L	22.9		
MAGNESIUM	1.04		66,300	ug/L	2.08		
MANGANESE	1.04		4,200	ug/L	0.832		
MOLYBDENUM	1.04	U	4.16	ug/L	4.16		
SODIUM	1.04		26,700	ug/L	22.9		
NICKEL	1.04		79.1	ug/L	4.16		
LEAD	1.04		37.4	ug/L	6.24		
ANTIMONY	1.04		48.4	ug/L	6.24		
SELENIUM	1.04		87.6	ug/L	25.0		
SILICON	1.04		37,800	ug/L	27.0		
STRONTIUM	1.04		722	ug/L	0.312		
THALLIUM	1.04	U	22.9	ug/L	22.9		
VANADIUM	1.04		17.0	ug/L	1.66		
ZINC	1.04		22,800	ug/L	8.32		
EPA 200.7 FILTERT	RawH2O		20-JUL-00		02-AUG-00	R82853	WG73780

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-1 Penn Mine Restoration: Surface Water
 Sample Id: L83155-4 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 17 2000, 12:40pm
 Receive Date: Jul 18 2000, 02:45pm
 Sample Comments: blind field rep.

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		17,800	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		1,300	ug/L	3.12	
BARIIUM	1.04		7.26	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04		336,000	ug/L	19.8	
CADMIUM	1.04		49.1	ug/L	0.728	
COBALT	1.04		74.6	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04		2,650	ug/L	3.12	
IRON	1.04		214,000	ug/L	7.28	
POTASSIUM	1.04		10,200	ug/L	16.6	
MAGNESIUM	1.04	B	72,900	ug/L	2.08	
MANGANESE	1.04		4,700	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		30,500	ug/L	13.5	
NICKEL	1.04		91.3	ug/L	2.08	
LEAD	1.04		49.5	ug/L	5.20	
ANTIMONY	1.04		30.6	ug/L	7.28	
SELENIUM	1.04		113	ug/L	18.7	
SILICON	1.04		40,100	ug/L	9.36	
STRONTIUM	1.04		801	ug/L	0.312	
THALLIUM	1.04		25.3	ug/L	12.5	
VANADIUM	1.04		32.7	ug/L	0.936	
ZINC	1.04		24,400	ug/L	2.08	
EPA 200.9: FILTER		RawH2O	20-JUL-00	25-JUL-00	R82619	WG73524
LEAD	1.0		2.1	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:33 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
SM(18)2320B			LIQUID	19-JUL-00	19-JUL-00	R82383	WG73335
ALKALINITY: TOTAL AS CaCO3				.56	100		
ALKALINITY: TOTAL AS CaCO3				1.5	88		
SM(18)2340C			LIQUID	19-JUL-00	19-JUL-00	R82385	WG73337
HARDNESS: TOTAL				9.7	88		100
HARDNESS: TOTAL				9.2	100		
EPA 300.0			WATER	18-JUL-00	18-JUL-00	R82393	WG73268
FLUORIDE	U	.014	mg/L				110
FLUORIDE				.57	86		
FLUORIDE				0			
FLUORIDE				0			
CHLORIDE	U	.015	mg/L				120
CHLORIDE				0			
NITRITE AS N	U	.004	mg/L				110
NITRITE AS N				U 0	93		
NITRITE AS N				U 0			
NITRITE AS N				U 0			
BROMIDE	U	.013	mg/L				110
BROMIDE				U 0			
BROMIDE				0			
BROMIDE				14	97		
NITRATE AS N	U	.0059	mg/L				100
NITRATE AS N				U 0	100		
NITRATE AS N				U 0	98		
NITRATE AS N				U 0	98		
ORTHOPHOSPHATE AS P	U	.018	mg/L				90
ORTHOPHOSPHATE AS P				3.2	98		
ORTHOPHOSPHATE AS P				0			
ORTHOPHOSPHATE AS P				U 0	94		
ORTHOPHOSPHATE AS P				U 0	93		
SULFATE	U	.015	mg/L				100
SULFATE				0			
SULFATE				0			
SULFATE				.26	92		
EPA 300.0			WATER	19-JUL-00	19-JUL-00	R82407	WG73312
FLUORIDE	U	.014	mg/L				96
FLUORIDE				0			
FLUORIDE				3.2	90		

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:33 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID		Worknum		
	Qual	Blank	Units	Qual	Dup	Qual	MS	Qual	MSD	Qual	LCS
				RPD		REC	SPIKE		RPD		SPIKE
FLUORIDE				0							
CHLORIDE	U	.015	mg/L	0							100
CHLORIDE				0							
NITRITE AS N	U	.004	mg/L	U	0						110
NITRITE AS N				U	0		88				
NITRITE AS N				U	0						
BROMIDE	U	.013	mg/L		11		100				93
BROMIDE				U	0						
BROMIDE					0						
NITRATE AS N	U	.0059	mg/L		1.5		100				97
NITRATE AS N					17		110				
NITRATE AS N				U	0		100				
ORTHOPHOSPHATE AS P	U	.018	mg/L		5.1		100				140
ORTHOPHOSPHATE AS P					0						
ORTHOPHOSPHATE AS P				U	0		94				
SULFATE	U	.015	mg/L		.053		96				100
SULFATE					0						
SULFATE					0						
EPA 160.2 LIQUID 19-JUL-00 19-JUL-00 R82453 WG73323											
TOTAL SUSPENDED SOLIDS	U	6	mg/L		8						98
TOTAL SUSPENDED SOLIDS					4.4						
TOTAL SUSPENDED SOLIDS					1.4						
EPA 200.7 W 21-JUL-00 21-JUL-00 R82474 WG73397											
ARSENIC	U	14.6	ug/L				102		.631		122
ARSENIC	U	14.6	ug/L				107		1.96		
ALUMINUM	U	18.7	ug/L				113		.67		99.8
ALUMINUM	U	18.7	ug/L				N 122		3.19		
SILVER	U	4.16	ug/L				96.7		4.94		114
SILVER	U	4.16	ug/L				99.7		1.2		
BORON	U	4.16	ug/L				106		.301		113
BORON	U	4.16	ug/L				89		.582		
BARIUM	U	.832	ug/L				102		.337		96.6
BARIUM	U	.832	ug/L				87.9		2.87		
BERYLLIUM	U	.832	ug/L				104		.827		98.7
BERYLLIUM	U	.832	ug/L				93.2		.651		
CALCIUM	U	18.7	ug/L				101		.653		96.4
CALCIUM	U	18.7	ug/L				R 63.4		1.39		
CADMIUM	U	1.46	ug/L				98.6		.529		93.5
CADMIUM	U	1.46	ug/L				102		.359		
COBALT	U	1.25	ug/L				103		.216		102
COBALT	U	1.25	ug/L				105		.925		
CHROMIUM	U	1.25	ug/L				102		.386		97.6
CHROMIUM	U	1.25	ug/L				103		.266		
COPPER	U	4.16	ug/L				98.8		.218		92.3

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:33 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate		RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
					REC	SPIKE		
COPPER	U	4.16	ug/L			85	2.77	
IRON	U	22.9	ug/L			101	.84	100
IRON	U	22.9	ug/L			115	.528	
POTASSIUM	U	22.9	ug/L			104	.675	98.3
POTASSIUM	U	22.9	ug/L			87.4	4.16	
MAGNESIUM		4.18	ug/L			102	.131	98.2
MAGNESIUM	U	2.08	ug/L			R 50	1.23	
MANGANESE	U	.832	ug/L			100	.228	96.1
MANGANESE	U	.832	ug/L			R 121	.703	
MOLYBDENUM	U	4.16	ug/L			103	.0305	102
MOLYBDENUM	U	4.16	ug/L			97	.795	
SODIUM	U	22.9	ug/L			98	1.06	97
SODIUM	U	22.9	ug/L			N 60.9	5.04	
NICKEL	U	4.16	ug/L			103	.161	96.6
NICKEL	U	4.16	ug/L			97.3	2.62	
LEAD	U	6.24	ug/L			104	.0386	103
LEAD	U	6.24	ug/L			110	.488	
ANTIMONY	U	6.24	ug/L			106	1.64	112
ANTIMONY	U	6.24	ug/L			105	1.16	
SELENIUM	U	25	ug/L			105	.556	93.2
SELENIUM	U	25	ug/L			109	4.01	
SILICON	U	27	ug/L			R 128	.0863	98.1
SILICON	U	27	ug/L			104	.643	
STRONTIUM	U	.312	ug/L			102	.165	98.5
STRONTIUM	U	.312	ug/L			N 61.9	3.91	
THALLIUM	U	22.9	ug/L			101	.271	102
THALLIUM	U	22.9	ug/L			91.6	1.35	
VANADIUM	U	1.66	ug/L			107	.0565	99
VANADIUM	U	1.66	ug/L			99.8	1.25	
ZINC	U	8.32	ug/L			101	.478	98.5
ZINC	U	8.32	ug/L			R 131	.372	
SM(18)2540C								
TOTAL DISSOLVED SOLIDS		LIQUID		20-JUL-00		20-JUL-00	R82530	WG73396
		9	mg/L	6.5				94
EPA 160.2								
TOTAL SUSPENDED SOLIDS		LIQUID		24-JUL-00		24-JUL-00	R82560	WG73487
		U 6	mg/L	6.9				93
TOTAL SUSPENDED SOLIDS				5.7				
TOTAL SUSPENDED SOLIDS				14				
TOTAL SUSPENDED SOLIDS				22				

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
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 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:33 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID		Worknum		
	Qual	Blank	Units	Qual	Dup	Qual	MS	Qual	MSD	Qual	LCS
				RPD		REC	SPIKE	RPD		REC	SPIKE
EPA 200.9: FILTER		LIQUID		20-JUL-00		25-JUL-00		R82619		WG73524	
LEAD	U	.3	ug/L			110		.91		100	
LEAD	U	.3	ug/L								
EPA 200.7: FILTER		WF		20-JUL-00		02-AUG-00		R82853		WG73780	
ARSENIC	U	7.28	ug/L			109		.799			
ARSENIC	U	7.28	ug/L								
ALUMINUM	U	6.24	ug/L			N 125		4.84			
ALUMINUM	U	6.24	ug/L								
SILVER	U	3.12	ug/L			105		.035			
SILVER	U	3.12	ug/L								
BORON	U	3.12	ug/L			113		1.69			
BORON	U	3.12	ug/L								
BARIUM	U	.312	ug/L			108		1.33			
BARIUM	U	.312	ug/L								
BERYLLIUM		.0328	ug/L			114		1.15			
BERYLLIUM	U	.0208	ug/L								
CALCIUM	U	19.8	ug/L			99.2		8.25			
CALCIUM	U	19.8	ug/L								
CADMIUM	U	.728	ug/L			106		1.71			
CADMIUM	U	.728	ug/L								
COBALT	U	1.04	ug/L			113		1.39			
COBALT	U	1.04	ug/L								
CHROMIUM	U	.728	ug/L			111		1.47			
CHROMIUM	U	.728	ug/L								
COPPER	U	3.12	ug/L			103		1.23			
COPPER	U	3.12	ug/L								
IRON	U	7.28	ug/L			110		1.52			
IRON	U	7.28	ug/L								
POTASSIUM	U	16.6	ug/L			97.7		9.89			
POTASSIUM		17.8	ug/L								
MAGNESIUM		6.66	ug/L			96.9		9.55			
MAGNESIUM		5.58	ug/L								
MANGANESE	U	.312	ug/L			110		1.39			
MANGANESE	U	.312	ug/L								
MOLYBDENUM	U	3.12	ug/L			112		1.83			
MOLYBDENUM	U	3.12	ug/L								
SODIUM		13.8	ug/L			98.2		8.85			
SODIUM	U	13.5	ug/L								
NICKEL	U	2.08	ug/L			112		1.67			
NICKEL	U	2.08	ug/L								
LEAD		6.25	ug/L			118		.84			
LEAD	U	5.2	ug/L								
ANTIMONY		7.35	ug/L			112		.511			
ANTIMONY	U	7.28	ug/L								
SELENIUM	U	18.7	ug/L			113		2.32			
SELENIUM	U	18.7	ug/L								
SILICON	U	9.36	ug/L			N 130		1.35			
SILICON	U	9.36	ug/L								
STRONTIUM	U	.312	ug/L			110		.71			
STRONTIUM	U	.312	ug/L								
THALLIUM	U	12.5	ug/L			116		.492			

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:33 pm

Method Reference Parameter	Qual Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate		RunID		Worknum	
				Qual MS REC SPIKE	Qual MSD RPD	Qual LCS REC SPIKE	Qual LCS REC SPIKE		
THALLIUM	U 12.5	ug/L							
VANADIUM	U .936	ug/L			115	.769			
VANADIUM	U .936	ug/L							
ZINC	U 2.08	ug/L			108	1.46			
ZINC	U 2.08	ug/L							

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 CS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: L83155

Project Title
Penn Mine Restoration: Surface Water
Account or Project: B785-0008-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: C SWANN
Rcvd: 18-JUL-00 14:45
Sample Date: 17-JUL-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
L83155-1	GRAB	12:40	WS PENN MINE	PRSW-2	RawH2O	236120	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236121	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236122	PLSTL ICP 9 EPA 200.7			
					RawH2O	236123	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet;

L83155-2	GRAB	12:50	WS PENN MINE	PRSW-6	RawH2O	236136	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236137	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236138	PLSTL ICP 9 EPA 200.7			
					RawH2O	236139	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

L83155-3	GRAB	13:10	WS PENN MINE	PRSS	RawH2O	236216	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236217	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236218	PLSTL ICP 9 EPA 200.7			
					RawH2O	236219	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: location = field data: use attached data sheet

L83155-4	QCPR	12:40	MISC	MISC	RawH2O	236212	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236213	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236214	PLSTL ICP 9 EPA 200.7			
					RawH2O	236215	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+REPORT;+SAMP KIT			

ClientID: Sample Comments: blind field rep.

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: L83155

Project Title
Penn Mine Restoration: Surface Water
Account or Project: B785-0008-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: C SWANN
Rcvd: 18-JUL-00 14:45
Sample Date: 17-JUL-00

Total containers received: 16

	Signature	Print Name	Time	Date
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

Type Codes: CF01;CF02;CF03;CFV;COMP;CT01;CT02;CT03
CT04;CT05;CT06;CT07;CT08;CTV;GRAB

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Sep 14 2000, 03:41 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Aug 22 2000, 03:00 pm
Login #: L83965
LSR #: B785-9802-1
Project Title: Penn Mine Restoration:Receiving Water

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

* = Duplicate value outside of control limits	M = Duplicate injection precision not met
+ = Positive	N = Spike recovery outside of control limits
- = Negative	NEG = Negative
< = Less than	P = Present
> = Greater than	PASS = Pass
A = Absent	POS = Positive
B = Analyte detected in method blank	Q = Data qualified by the Data Review Committee
C = GC/MS confirmation	R = Spike out of calibration range
CG = Confluent growth	S = Method of standard additions used
D = Surrogate spike outside of control limits	SP = Spreader
E = Estimated value, concentration outside calibration range	T = Diesel/Gasoline pattern is atypical
FAIL = Fail	TWTC = Too Numerous to Count
H = Analyzed past hold time	U = Analyte not detected
I = Dual Column quantitation difference > 40% RPD	W = Post-digestion spike (HGA) outside control limits
J = Estimated value, quantitation does not meet SOP criteria	X = Presumptive evidence of a compound
LA = Lost analysis	- = Approximately

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83965-1 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Aug 22 2000, 10:00am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		22-AUG-00	22-AUG-00	R83495	WG74506
PH	1.0		6.7	pH units		
TEMPERATURE	1.0		25	deg C		
CONDUCTIVITY	1.0		3,900	umhos/cm		
TURBIDITY	1.0		190	NTU		
EPA 300.0 SULFATE	RawH2O 100		22-AUG-00 2,700	23-AUG-00 mg/L	R83616	WG74474
EPA 300.0 CHLORIDE	RawH2O 10.		22-AUG-00 35	22-AUG-00 mg/L	R83557	WG74474
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		25-AUG-00 250	25-AUG-00 mg/L	R83632	WG74640
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		25-AUG-00 3,200	25-AUG-00 mg/L	R83633	WG74641
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 4.0		29-AUG-00 4,400	29-AUG-00 mg/L	R83874	WG74716
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 1.3		23-AUG-00 47	23-AUG-00 mg/L	R83568	WG74540
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	RawH2O 1.00		25-AUG-00 250	25-AUG-00 mg/L	R83627	WG74637
SM(18)4500-CO2 D ALKALINITY: CARBONATE	RawH2O 1.0		25-AUG-00 0.20	25-AUG-00 mg/L	R83627	WG74637
EPA 200.7	RawH2O		22-AUG-00	01-SEP-00	R83896	WG74850
ARSENIC	1.04	U	14.6	ug/L	14.6	
ALUMINUM	1.04		29.2	ug/L	18.7	
SILVER	1.04		6.72	ug/L	4.16	
BORON	1.04		1,600	ug/L	4.16	
BARIUM	1.04		20.9	ug/L	0.832	
BERYLLIUM	1.04	U	0.832	ug/L	0.832	
CALCIUM	1.04	>, B	416,000	ug/L	18.7	
CADMIUM	1.04		179	ug/L	1.46	
COBALT	1.04		254	ug/L	1.25	
CHROMIUM	1.04		1.54	ug/L	1.25	
COPPER	1.04		72.8	ug/L	4.16	
IRON	1.04		16,800	ug/L	22.9	
POTASSIUM	1.04		9,160	ug/L	22.9	
MAGNESIUM	1.04	>	62,400	ug/L	2.08	
MANGANESE	1.04		18,100	ug/L	0.832	
MOLYBDENUM	1.04	U	4.16	ug/L	4.16	
SODIUM	1.04		51,100	ug/L	22.9	
NICKEL	1.04		170	ug/L	4.16	
LEAD	1.04		49.2	ug/L	6.24	
ANTIMONY	1.04		11.9	ug/L	6.24	
SELENIUM	1.04		71.6	ug/L	25.0	
SILICON	1.04		13,100	ug/L	27.0	
STRONTIUM	1.04		1,430	ug/L	0.312	
THALLIUM	1.04		76.0	ug/L	22.9	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83965-1 Instantaneous Grab
 Site: WS PENN MINE Near lower end of Hinckley Run
 Locator: PRSW-2
 Client ID:
 Collect Date: Aug 22 2000, 10:00am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
VANADIUM	1.04			9.67	ug/L	1.66	
ZINC	1.04			34,100	ug/L	8.32	
EPA 200.7: FILTER							
	RawH2O			24-AUG-00		14-SEP-00	R84192 WG75200
ARSENIC	5.20	U		36.4	ug/L	36.4	
ALUMINUM	5.20			356	ug/L	31.2	
SILVER	5.20	U		15.6	ug/L	15.6	
BORON	5.20			1,640	ug/L	15.6	
BARIUM	5.20			21.5	ug/L	1.56	
BERYLLIUM	5.20	U		0.104	ug/L	0.104	
CALCIUM	5.20			642,000	ug/L	98.8	
CADMIUM	5.20			149	ug/L	3.64	
COBALT	5.20			268	ug/L	5.20	
CHROMIUM	5.20	U		3.64	ug/L	3.64	
COPPER	5.20	U		15.6	ug/L	15.6	
IRON	5.20	U		36.4	ug/L	36.4	
POTASSIUM	5.20			9,450	ug/L	83.2	
MAGNESIUM	5.20			260,000	ug/L	10.4	
MANGANESE	5.20			20,000	ug/L	1.56	
MOLYBDENUM	5.20	U		15.6	ug/L	15.6	
SODIUM	5.20			52,100	ug/L	67.6	
NICKEL	5.20			166	ug/L	10.4	
LEAD	5.20			73.3	ug/L	26.0	
ANTIMONY	5.20	U		36.4	ug/L	36.4	
SELENIUM	5.20			238	ug/L	93.6	
SILICON	5.20			11,700	ug/L	46.8	
STRONTIUM	5.20			1,510	ug/L	1.56	
THALLIUM	5.20	U		62.4	ug/L	62.4	
VANADIUM	5.20			15.6	ug/L	4.68	
ZINC	5.20			33,200	ug/L	10.4	
EPA 200.9: FILTER							
	RawH2O			24-AUG-00		01-SEP-00	R83866 WG74859
LEAD	1.0			0.80	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83965-2 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Aug 22 2000, 10:15am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Dilution	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
			Qualifier		Result	Units	mdlvalue	Text
NONE		RawH2O			22-AUG-00	22-AUG-00	R83495	WG74506
PH	1.0				6.9	pH units		
TEMPERATURE	1.0				25	deg C		
CONDUCTIVITY	1.0				3,600	umhos/cm		
TURBIDITY	1.0				160	NTU		
EPA 300.0 SULFATE	100	RawH2O	1		22-AUG-00	23-AUG-00	R83616	WG74474
					2,700	mg/L	1.5	
EPA 300.0 CHLORIDE	10.	RawH2O			22-AUG-00	22-AUG-00	R83557	WG74474
					28	mg/L	0.15	
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	1.0	RawH2O			25-AUG-00	25-AUG-00	R83632	WG74640
					230	mg/L	5.0	
SM(18)2340C HARDNESS: TOTAL	1.0	RawH2O			25-AUG-00	25-AUG-00	R83633	WG74641
					3,000	mg/L	2.0	
SM(18)2540C TOTAL DISSOLVED SOLIDS	4.0	RawH2O			29-AUG-00	29-AUG-00	R83874	WG74716
					4,500	mg/L	24.	
SM(18)2540D TOTAL SUSPENDED SOLIDS	1.3	RawH2O			23-AUG-00	23-AUG-00	R83568	WG74540
					39	mg/L	8.0	
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	1.00	RawH2O			25-AUG-00	25-AUG-00	R83627	WG74637
					227	mg/L	0.100	
SM(18)4500-CO2 D ALKALINITY: CARBONATE	1.0	RawH2O			25-AUG-00	25-AUG-00	R83627	WG74637
					0.30	mg/L	0.10	
EPA 200.7		RawH2O			22-AUG-00	01-SEP-00	R83896	WG74850
ARSENIC	1.04		U		14.6	ug/L	14.6	
ALUMINUM	1.04				44.9	ug/L	18.7	
SILVER	1.04				10.5	ug/L	4.16	
BORON	1.04				1,440	ug/L	4.16	
BARIUM	1.04				18.6	ug/L	0.832	
BERYLLIUM	1.04		U		0.832	ug/L	0.832	
CALCIUM	1.04		>, B		416,000	ug/L	18.7	
CADMIUM	1.04				160	ug/L	1.46	
COBALT	1.04				231	ug/L	1.25	
CHROMIUM	1.04				2.01	ug/L	1.25	
COPPER	1.04				146	ug/L	4.16	
IRON	1.04				12,900	ug/L	22.9	
POTASSIUM	1.04				8,270	ug/L	22.9	
MAGNESIUM	1.04		>		62,400	ug/L	2.08	
MANGANESE	1.04				16,700	ug/L	0.832	
MOLYBDENUM	1.04		U		4.16	ug/L	4.16	
SODIUM	1.04				48,900	ug/L	22.9	
NICKEL	1.04				159	ug/L	4.16	
LEAD	1.04				49.3	ug/L	6.24	
ANTIMONY	1.04				12.4	ug/L	6.24	
SELENIUM	1.04				65.2	ug/L	25.0	
SILICON	1.04				12,300	ug/L	27.0	
STRONTIUM	1.04				1,330	ug/L	0.312	
THALLIUM	1.04				57.9	ug/L	22.9	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83965-2 Instantaneous Grab
 Site: WS PENN MINE At confluence weir of Mine and Hinckley Runs
 Locator: PRSW-6
 Client ID:
 Collect Date: Aug 22 2000, 10:15am
 Receive Date: Aug.22 2000, 03:00pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text	
VANADIUM	1.04			7.69	ug/L	1.66	
ZINC	1.04			31,700	ug/L	8.32	
EPA 200.7: FILTER	RawH2O		24-AUG-00		14-SEP-00	R84192	WG75200
ARSENIC	5.20	U		36.4	ug/L	36.4	
ALUMINUM	5.20			334	ug/L	31.2	
SILVER	5.20	U		15.6	ug/L	15.6	
BORON	5.20			1,570	ug/L	15.6	
BARIUM	5.20			21.1	ug/L	1.56	
BERYLLIUM	5.20	U		0.104	ug/L	0.104	
CALCIUM	5.20			615,000	ug/L	98.8	
CADMIUM	5.20			126	ug/L	3.64	
COBALT	5.20			240	ug/L	5.20	
CHROMIUM	5.20	U		3.64	ug/L	3.64	
COPPER	5.20	U		15.6	ug/L	15.6	
IRON	5.20	U		36.4	ug/L	36.4	
POTASSIUM	5.20			9,180	ug/L	83.2	
MAGNESIUM	5.20			264,000	ug/L	10.4	
MANGANESE	5.20			18,600	ug/L	1.56	
MOLYBDENUM	5.20	U		15.6	ug/L	15.6	
SODIUM	5.20			53,500	ug/L	67.6	
NICKEL	5.20			150	ug/L	10.4	
LEAD	5.20			52.5	ug/L	26.0	
ANTIMONY	5.20			53.8	ug/L	36.4	
SELENIUM	5.20			135	ug/L	93.6	
SILICON	5.20			11,300	ug/L	46.8	
STRONTIUM	5.20			1,520	ug/L	1.56	
THALLIUM	5.20	U		62.4	ug/L	62.4	
VANADIUM	5.20			15.0	ug/L	4.68	
ZINC	5.20			29,200	ug/L	10.4	
EPA 200.9: FILTER	RawH2O		24-AUG-00		01-SEP-00	R83866	WG74859
LEAD	1.0			0.40	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83965-3 Instantaneous Grab
 Site: WS PENN MINE At seeps w/flow exceeding 1 gpm - location in comments
 Locator: PRSS
 Client ID:
 Collect Date: Aug 22 2000, 10:40am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: location = field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
NONE	RawH2O			22-AUG-00	22-AUG-00	R83495	WG74506
PH	1.0			3.1	pH units		
TEMPERATURE	1.0			27	deg C		
CONDUCTIVITY	1.0			2,500	umhos/cm		
TURBIDITY	1.0			2.0	NTU		
EPA 300.0	RawH2O			22-AUG-00	22-AUG-00	R83557	WG74474
CHLORIDE	50.			15	mg/L	0.75	
SULFATE	50.			1,700	mg/L	0.75	
SM(18)2320B	RawH2O			25-AUG-00	25-AUG-00	R83632	WG74640
ALKALINITY: TOTAL AS CaCO3	1.0	U		5.0	mg/L	5.0	
SM(18)2340C	RawH2O			25-AUG-00	25-AUG-00	R83633	WG74641
HARDNESS: TOTAL	1.0			2,000	mg/L	2.0	
SM(18)2540C	RawH2O			29-AUG-00	29-AUG-00	R83874	WG74716
TOTAL DISSOLVED SOLIDS	4.0			2,600	mg/L	24.	
SM(18)2540D	RawH2O			23-AUG-00	23-AUG-00	R83568	WG74540
TOTAL SUSPENDED SOLIDS	1.3			8.0	mg/L	8.0	
SM(18)4500-CO2-D	RawH2O			25-AUG-00	25-AUG-00	R83627	WG74637
ALKALINITY: BICARBONATE	1.00	U		0.100	mg/L	0.100	
SM(18)4500-CO2-D	RawH2O			25-AUG-00	25-AUG-00	R83627	WG74637
ALKALINITY: CARBONATE	1.0	U		0.10	mg/L	0.10	
EPA 200.7	RawH2O			22-AUG-00	01-SEP-00	R83896	WG74850
ARSENIC	1.04			15.8	ug/L	14.6	
ALUMINUM	1.04			18,500	ug/L	18.7	
SILVER	1.04	U		4.16	ug/L	4.16	
BORON	1.04			1,160	ug/L	4.16	
BARIUM	1.04			6.87	ug/L	0.832	
BERYLLIUM	1.04	U		0.832	ug/L	0.832	
CALCIUM	1.04	B		253,000	ug/L	18.7	
CADMIUM	1.04			42.1	ug/L	1.46	
COBALT	1.04			60.1	ug/L	1.25	
CHROMIUM	1.04			1.99	ug/L	1.25	
COPPER	1.04			2,580	ug/L	4.16	
IRON	4.16			224,000	ug/L	91.6	
POTASSIUM	1.04			9,880	ug/L	22.9	
MAGNESIUM	1.04	>		62,400	ug/L	2.08	
MANGANESE	1.04			3,900	ug/L	0.832	
MOLYBDENUM	1.04	U		4.16	ug/L	4.16	
SODIUM	1.04			30,900	ug/L	22.9	
NICKEL	1.04			68.2	ug/L	4.16	
LEAD	1.04			47.8	ug/L	6.24	
ANTIMONY	1.04			19.8	ug/L	6.24	
SELENIUM	1.04			66.3	ug/L	25.0	
SILICON	1.04			35,800	ug/L	27.0	
STRONTIUM	1.04			783	ug/L	0.312	
THALLIUM	1.04			69.0	ug/L	22.9	
VANADIUM	1.04			13.0	ug/L	1.66	
ZINC	1.04			19,800	ug/L	8.32	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83965-3 Instantaneous Grab
 Site: WS PENN MINE At seeps w/flow exceeding 1 gpm - location in comments
 Locator: PRSS
 Client ID:
 Collect Date: Aug 22 2000, 10:40am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: location = field data: use attached data sheet

Method Reference	Matrix	Tag	Batch Prep Date	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdvalue	Text
EPA 200.7 FILTER	RawH2O		24-AUG-00	14-SEP-00	R84192	WG75200
ARSENIC	5.20	U	36.4	ug/L	36.4	
ALUMINUM	5.20		18,500	ug/L	31.2	
SILVER	5.20	U	15.6	ug/L	15.6	
BORON	5.20		1,210	ug/L	15.6	
BARIUM	5.20		7.86	ug/L	1.56	
BERYLLIUM	5.20		0.358	ug/L	0.104	
CALCIUM	5.20		243,000	ug/L	98.8	
CADMIUM	5.20		34.5	ug/L	3.64	
COBALT	5.20		58.3	ug/L	5.20	
CHROMIUM	5.20	U	3.64	ug/L	3.64	
COPPER	5.20		2,580	ug/L	15.6	
IRON	5.20		207,000	ug/L	36.4	
POTASSIUM	5.20		9,750	ug/L	83.2	
MAGNESIUM	5.20		67,900	ug/L	10.4	
MANGANESE	5.20		3,900	ug/L	1.56	
MOLYBDENUM	5.20	U	15.6	ug/L	15.6	
SODIUM	5.20		30,500	ug/L	67.6	
NICKEL	5.20		51.6	ug/L	10.4	
LEAD	5.20		62.5	ug/L	26.0	
ANTIMONY	5.20	U	36.4	ug/L	36.4	
SELENIUM	5.20		121	ug/L	93.6	
SILICON	5.20		33,600	ug/L	46.8	
STRONTIUM	5.20		805	ug/L	1.56	
THALLIUM	5.20	U	62.4	ug/L	62.4	
VANADIUM	5.20		37.6	ug/L	4.68	
ZINC	5.20		18,600	ug/L	10.4	
EPA 200.9 FILTER	RawH2O		24-AUG-00	01-SEP-00	R83866	WG74859
LEAD	1.0		2.3	ug/L	0.30	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration: Receiving Water
 Sample Id: L83965-4 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Aug 22 2000, 10:40am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: blind field rep.

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date	Result	Units	Analysis Date mdlvalue	Run ID Text	Worknum
EPA 300.0 SULFATE	RawH2O 100	1	22-AUG-00	2,700	mg/L	23-AUG-00 1.5	R83616	WG74474
EPA 300.0 CHLORIDE	RawH2O 10.		22-AUG-00	27	mg/L	22-AUG-00 0.15	R83557	WG74474
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		25-AUG-00	230	mg/L	25-AUG-00 5.0	R83632	WG74640
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		25-AUG-00	3,100	mg/L	25-AUG-00 2.0	R83633	WG74641
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 4.0		29-AUG-00	4,600	mg/L	29-AUG-00 24.	R83874	WG74716
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 1.0		23-AUG-00	30	mg/L	23-AUG-00 6.0	R83568	WG74540
EPA 200.7 ARSENIC	RawH2O 1.04	U	22-AUG-00	14.6	ug/L	01-SEP-00 14.6	R83896	WG74850
ALUMINUM	1.04			65.0	ug/L	18.7		
SILVER	1.04			10.5	ug/L	4.16		
BORON	1.04			1,470	ug/L	4.16		
BARIUM	1.04			19.2	ug/L	0.832		
BERYLLIUM	1.04	U		0.832	ug/L	0.832		
CALCIUM	1.04	>, B		416,000	ug/L	18.7		
CADMIUM	1.04			162	ug/L	1.46		
COBALT	1.04			233	ug/L	1.25		
CHROMIUM	1.04			1.73	ug/L	1.25		
COPPER	1.04			152	ug/L	4.16		
IRON	1.04			13,500	ug/L	22.9		
POTASSIUM	1.04			8,600	ug/L	22.9		
MAGNESIUM	1.04	>		62,400	ug/L	2.08		
MANGANESE	1.04			16,900	ug/L	0.832		
MOLYBDENUM	1.04	U		4.16	ug/L	4.16		
SODIUM	1.04			50,600	ug/L	22.9		
NICKEL	1.04			162	ug/L	4.16		
LEAD	1.04			47.2	ug/L	6.24		
ANTIMONY	1.04			10.8	ug/L	6.24		
SELENIUM	1.04			55.2	ug/L	25.0		
SILICON	1.04			12,500	ug/L	27.0		
STRONTIUM	1.04			1,380	ug/L	0.312		
THALLIUM	1.04			80.1	ug/L	22.9		
VANADIUM	1.04			7.65	ug/L	1.66		
ZINC	1.04			32,000	ug/L	8.32		
EPA 200.7, FILTER ARSENIC	RawH2O 5.20	U	24-AUG-00	36.4	ug/L	14-SEP-00 36.4	R84192	WG75200
ALUMINUM	5.20			400	ug/L	31.2		
SILVER	5.20	U		15.6	ug/L	15.6		
BORON	5.20			1,660	ug/L	15.6		
BARIUM	5.20			25.0	ug/L	1.56		
BERYLLIUM	5.20			2.37	ug/L	0.104		
CALCIUM	5.20			632,000	ug/L	98.8		
CADMIUM	5.20			135	ug/L	3.64		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-9802-1 Penn Mine Restoration:Receiving Water
 Sample Id: L83965-4 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Aug 22 2000, 10:40am
 Receive Date: Aug 22 2000, 03:00pm
 Sample Comments: blind field rep.

Method Reference	Matrix	Tag	Batch PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text
COBALT	5.20		252	ug/L	5.20	
CHROMIUM	5.20	U	3.64	ug/L	3.64	
COPPER	5.20		22.5	ug/L	15.6	
IRON	5.20	U	36.4	ug/L	36.4	
POTASSIUM	5.20		9,410	ug/L	83.2	
MAGNESIUM	5.20		272,000	ug/L	10.4	
MANGANESE	5.20		19,300	ug/L	1.56	
MOLYBDENUM	5.20	U	15.6	ug/L	15.6	
SODIUM	5.20		55,200	ug/L	67.6	
NICKEL	5.20		153	ug/L	10.4	
LEAD	5.20		59.2	ug/L	26.0	
ANTIMONY	5.20	U	36.4	ug/L	36.4	
SELENIUM	5.20	U	93.6	ug/L	93.6	
SILICON	5.20		11,700	ug/L	46.8	
STRONTIUM	5.20		1,580	ug/L	1.56	
THALLIUM	5.20	U	62.4	ug/L	62.4	
VANADIUM	5.20		20.3	ug/L	4.68	
ZINC	5.20		30,200	ug/L	10.4	
EPA 200.9: FILTER	RawH2O		24-AUG-00	01-SEP-00	R83866	WG74859
LEAD	1.0		0.70	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Sep 14 2000, 03:41 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID		Worknum		
	Qual	Blank	Units	Qual	Dup	Qual	MS	Qual	MSD	Qual	LCS
				RPD		REC	SPIKE	RPD		REC	SPIKE
EPA 300.0 WATER 22-AUG-00 22-AUG-00 R83557 WG74474											
FLUORIDE	U	.014	mg/L								96
FLUORIDE					.11		83				
FLUORIDE					.53		88				
CHLORIDE	U	.015	mg/L		2.1		120				100
CHLORIDE					.59		110				
NITRITE AS N	U	.004	mg/L								120
NITRATE AS N	U	.0059	mg/L								97
NITRATE AS N					11		110				
NITRATE AS N					1.7		100				
NITRATE AS N					15		100				
ORTHOPHOSPHATE AS P	U	.018	mg/L								73
SULFATE	U	.015	mg/L								99
EPA 160.2 LIQUID 23-AUG-00 23-AUG-00 R83568 WG74540											
TOTAL SUSPENDED SOLIDS	U	6	mg/L		* 38						96
TOTAL SUSPENDED SOLIDS					6.4						
TOTAL SUSPENDED SOLIDS					4.7						
EPA 300.0 WATER 23-AUG-00 23-AUG-00 R83616 WG74535											
FLUORIDE	U	.014	mg/L		.13		92				120
CHLORIDE	U	.015	mg/L								80
CHLORIDE					.034		85				
CHLORIDE					2		100				
CHLORIDE					.93		81				
NITRITE AS N	U	.004	mg/L	U	0		86				100
NITRATE AS N	U	.0059	mg/L	U	0		110				97
NITRATE AS N				U	0		100				
ORTHOPHOSPHATE AS P	U	.018	mg/L								83
ORTHOPHOSPHATE AS P				U	0		87				
SULFATE	U	.015	mg/L								99

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Sep 14 2000, 03:41 pm

Method Reference Parameter	Qual	Samp_tag Blank	Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum Qual LCS REC SPIKE
SM(18)2320B ALKALINITY: TOTAL AS CaCO3		LIQUID		25-AUG-00 0	25-AUG-00 88	R83632	WG74640
SM(18)2340C HARDNESS: TOTAL		LIQUID		25-AUG-00 2.8	25-AUG-00 99	R83633	WG74641
EPA 200.9 LEAD		LIQUID:F		24-AUG-00	01-SEP-00	R83866	WG74859
LEAD		.3	ug/L		110	1.8	
LEAD		U .3	ug/L				
SM(18)2540C TOTAL DISSOLVED SOLIDS		LIQUID		29-AUG-00 1.4	29-AUG-00	R83874	WG74716 100
EPA 200.7 ARSENIC		U 14.6	ug/L		100	R83896	WG74850 121
ARSENIC		U 14.6	ug/L		101	.681	
ALUMINUM		34.1	ug/L		110	.732	
ALUMINUM		U 18.7	ug/L		N 76.4	1.83	100
SILVER		U 4.16	ug/L		97.8	3.35	
SILVER		U 4.16	ug/L		N 78.7	3.02	108
BORON		U 4.16	ug/L		106	10.6	
BORON		U 4.16	ug/L		N 65.6	.932	113
BARIUM		U .832	ug/L		104	.121	
BARIUM		U .832	ug/L		N 75.4	1.59	96.7
BERYLLIUM		U .832	ug/L		104	2.9	
BERYLLIUM		U .832	ug/L		N 76.8	1.77	97.5
CALCIUM		67.4	ug/L		102	1.33	
CALCIUM		U 18.7	ug/L		R 0	.483	96.3
CADMIUM		U 1.46	ug/L		98	.556	
CADMIUM		U 1.46	ug/L		89.3	1.07	92.3
COBALT		U 1.25	ug/L		103	.704	
COBALT		U 1.25	ug/L		82.4	1.39	103
CHROMIUM		U 1.25	ug/L		101	.144	
CHROMIUM		U 1.25	ug/L		83.7	1.14	96.6
COPPER		U 4.16	ug/L		99.7	.0884	
COPPER		U 4.16	ug/L		N 71	1.08	93.2
IRON		U 22.9	ug/L		103	2.13	
IRON		U 22.9	ug/L		R 0	1.34	101
POTASSIUM		U 22.9	ug/L		104	1.06	
POTASSIUM		U 22.9	ug/L		81.1	1.4	99.5
MAGNESIUM		U 2.08	ug/L		103	2.42	
MAGNESIUM		U 2.08	ug/L		R 0	1.24	98.7
MANGANESE		U .832	ug/L		101	1.15	
MANGANESE		U .832	ug/L		R 0	1.21	95.8
						.42	

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Sep 14 2000, 03:41 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum	
							Qual	LCS REC SPIKE
MOLYBDENUM	U	4.16	ug/L		102	.599		99.4
MOLYBDENUM	U	4.16	ug/L		84.9	3.16		
SODIUM	U	22.9	ug/L		103	.681		99.3
SODIUM	U	22.9	ug/L		N 51	1.82		
NICKEL	U	4.16	ug/L		102	1.04		98.3
NICKEL	U	4.16	ug/L		87.2	.498		
LEAD	U	6.24	ug/L		105	1.17		104
LEAD	U	6.24	ug/L		99.9	1.11		
ANTIMONY	U	6.24	ug/L		104	1.13		109
ANTIMONY	U	6.24	ug/L		99.7	1.67		
SELENIUM	U	25	ug/L		102	4.47		92.2
SELENIUM	U	25	ug/L		108	2.88		
SILICON	U	27	ug/L		N 123	.0524		97.5
SILICON	U	27	ug/L		R 51.5	.0589		
STRONTIUM	U	.312	ug/L		103	1.51		98
STRONTIUM	U	.312	ug/L		N 43.3	1.78		
THALLIUM	U	22.9	ug/L		101	.811		92.5
THALLIUM	U	22.9	ug/L		84.9	1.24		
VANADIUM	U	1.66	ug/L		108	1.31		99.7
VANADIUM	U	1.66	ug/L		84.4	1.6		
ZINC	U	8.32	ug/L		100	1.19		97.9
ZINC	U	8.32	ug/L		R 0	.886		
EPA 200.7 FIFILTER								
ARSENIC	U	7.28	ug/L	24-AUG-00	14-SEP-00	R84192	WG75200	
ARSENIC	U	7.28	ug/L		90.8	.864		126
ALUMINUM	U	6.24	ug/L		N 145	* 23.1		102
ALUMINUM	U	6.24	ug/L					
SILVER	U	3.12	ug/L		108	1.71		115
SILVER	U	3.12	ug/L					
BORON	U	3.12	ug/L		N 75.8	.723		112
BORON	U	3.12	ug/L					
BARIUM	U	.312	ug/L		93.1	.699		96.4
BARIUM	U	.312	ug/L					
BERYLLIUM	U	.0239	ug/L		93.1	.0976		99
BERYLLIUM	U	.0208	ug/L					
CALCIUM	U	19.8	ug/L		N, R 0	.642		96.4
CALCIUM	U	19.8	ug/L					
CADMIUM	U	.728	ug/L		85.8	.708		92
CADMIUM	U	.728	ug/L					
COBALT	U	1.04	ug/L		84.2	.0309		102
COBALT	U	1.04	ug/L					
CHROMIUM	U	.728	ug/L		91.2	.284		96.1
CHROMIUM	U	.728	ug/L					
COPPER	U	3.12	ug/L		92.9	.0832		92
COPPER	U	3.12	ug/L					
IRON	U	7.28	ug/L		91.7	.339		102
IRON	U	7.28	ug/L					
POTASSIUM	U	16.6	ug/L		94	2.64		99.5
POTASSIUM	U	16.6	ug/L					
MAGNESIUM	U	2.08	ug/L		N, R 36.5	.000761		98
MAGNESIUM	U	2.08	ug/L					
MANGANESE	U	.312	ug/L		N, R 0	.764		94.1
MANGANESE	U	.312	ug/L					
MOLYBDENUM	U	3.12	ug/L		88.3	.183		100
MOLYBDENUM	U	3.12	ug/L					
SODIUM	U	13.5	ug/L		85.6	1.06		98.6

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Sep 14 2000, 03:41 pm

Method Reference Parameter	Qual Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum	
						Qual LCS REC SPIKE	
SODIUM	U 13.5	ug/L					
NICKEL	U 2.08	ug/L		93.4	.974		98
NICKEL	U 2.08	ug/L					
LEAD	U 5.2	ug/L		100	7.34		100
LEAD	U 5.2	ug/L					
ANTIMONY	U 7.28	ug/L		104	4.16		114
ANTIMONY	U 7.28	ug/L					
SELENIUM	U 18.7	ug/L		91.2	6.15		93.8
SELENIUM	U 18.7	ug/L					
SILICON	U 9.36	ug/L		N,R 43.9	.326		96.8
SILICON	U 9.36	ug/L					
STRONTIUM	U .312	ug/L		80.1	.526		98.8
STRONTIUM	U .312	ug/L					
THALLIUM	U 12.5	ug/L		86.9	.869		85
THALLIUM	U 12.5	ug/L					
VANADIUM	U .936	ug/L		96.5	.328		100
VANADIUM	U .936	ug/L					
ZINC	U 2.08	ug/L		N,R 0	.709		97.9
ZINC	U 2.08	ug/L					

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: L83965

Project Title
Penn Mine Restoration:Receiving Water
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: C SWANN
Rcvd: 22-AUG-00 15:00
Sample Date: 22-AUG-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
L83965-1	GRAB	10:00	WS PENN MINE	PRSW-2	RawH2O	239316	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	239317	PLSTM CHLORIDE: IC;SULFATE: IC			
					RawH2O	239318	PLSTL ICP 9 EPA 200.7			
					RawH2O	239319	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			
ClientID: Sample Comments: field data: use attached data sheet										
L83965-2	GRAB	10:15	WS PENN MINE	PRSW-6	RawH2O	239332	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	239333	PLSTM CHLORIDE: IC;SULFATE: IC			
					RawH2O	239334	PLSTL ICP 9 EPA 200.7			
					RawH2O	239335	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			
ClientID: Sample Comments: field data: use attached data sheet										
L83965-3	GRAB	10:40	WS PENN MINE	PRSS	RawH2O	239344	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	239345	PLSTM CHLORIDE: IC;SULFATE: IC			
					RawH2O	239346	PLSTL ICP 9 EPA 200.7			
					RawH2O	239347	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			
ClientID: Sample Comments: location = field data: use attached data sheet										
L83965-4	QCPR	10:40	MISC	MISC	RawH2O	239340	PLSTL ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	239341	PLSTM CHLORIDE: IC;SULFATE: IC			
					RawH2O	239342	PLSTL ICP 9 EPA 200.7			
					RawH2O	239343	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+REPORT;+SAMP KIT			
ClientID: Sample Comments: blind field rep.										

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: L83965

Project Title
Penn Mine Restoration:Receiving Water
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: C SWANN
Rcvd: 22-AUG-00 15:00
Sample Date: 22-AUG-00

Total containers received: 16

	Signature	Print Name	Time	Date
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

Type Codes: CF01;CF02;CF03;CFV;COMP;CT01;CT02;CT03
CT04;CT05;CT06;CT07;CT08;CTV;GRAB

**Appendix C – Groundwater Field Data and
Analytical Report**



ALISTO ENGINEERING GROUP

July 31, 2000

Ms. Eileen Fanelli
East Bay Municipal Utility District
375 Eleventh Street
Oakland, California 94607-4240

10-443-48-005

Subject: Groundwater Monitoring Well Sampling at Penn Mine
Valley Springs, California

Dear Ms. Fanelli:

As per your request, Alisto Engineering is pleased to submit the field form and chain of custody documentation for the July 19 and 20, 2000 groundwater monitoring well sampling for the Penn Mine-Environmental Restoration Project. Upon receipt of the analytical report, the summary table will be updated and submitted.

Please call if you have questions or need additional information.

Sincerely,

ALISTO ENGINEERING GROUP

Brady Nagle
Project Manager

Enclosures

~~cc: Madeline Wall, CH2M Hill (with enclosures)~~

f:\04\10443\443_48\letter3

PENN MINE GROUND WATER FIELD DATA

ANALYSIS DATE: _____

Page 1 of 32

LOG #	L	L	L	L
SITE	WS PENN MINE	WS PENN MINE	WS PENN MINE	WS PENN MINE
LOCATOR	PRGW-1	PRGW-2	PRGW-3	PRGW-4
TIME	0800	1300	0930	NOT
ANALYTE	RESULT	RESULT	RESULT	RESULT
TURBIDITY, NTU	17.1 NTU	NA	12.6 NTU	DRY
COND, Ms/cm	320 μ S/cm		1.24 M S/cm	
TDS, mg/L				
pH - units	5.49		2.30	
TEMP, deg C	21.4 C		21.7 C	
Water Level	11.86'	DRY WELL	48.50	DRY
ID of field analyst	DTB		DTB	DTB

LOG #	L	L	L	L
SITE	WS PENN MINE	WS PENN MINE	WS PENN MINE	WS PENN MINE
LOCATOR	PRGW-5	PRGW-6	PRGW-7	PRGW-8
TIME	NOT	1801	1640	1600
ANALYTE	RESULT	RESULT	RESULT	RESULT
TURBIDITY, NTU	DRY	DRY 3.7	6.2	NOT ENOUGH WATER TO SAMPLE
COND, Ms/cm		2.4 M S/cm	4.34 M S/cm	
TDS, mg/L				
pH - units		3.00	5.48	
TEMP, deg C		23.9 C	20.3 C	TD 22'
Water Level	DRY	50.20'	20.15'	21.31'
ID of field analyst	DTB	DTB	DTB	DTB

LOG #	L	L	L	L
SITE	WS PENN MINE	WS PENN MINE	WS PENN MINE	WS PENN MINE
LOCATOR	PRGW-9	PRGW-10	PRGW-11	PRGW-12
TIME	1430	NOT	NOT	NOT
ANALYTE	RESULT	RESULT	RESULT	RESULT
TURBIDITY, NTU	4-6 NTU	submerged well	submerged well	submerged well
COND, Ms/cm	3.70 M S/cm			well
TDS, mg/L				
pH - units	4.66 PH			
TEMP, deg C	22.2 C			
Water Level	6.39'			
ID of field analyst	DTB	DTB	DTB	DTB

WG	R			
WORK GROUP	RUNID	DATA ENTRY / DATE	REVIEWED BY / DATE	APPROVED BY / DATE

LABORATORY SERVICES DIVISION

PENN MINE GROUND WATER FIELD DATA

Page 2 of 2

ANALYSIS DATE: _____

LOG #	L	L	L	L
SITE	WS PENN MINE	WS PENN MINE	WS PENN MINE	WS PENN MINE
LOCATOR	LF-1	LF-2	LF-3	LF-4
TIME	1036	0935	0700	1115
ANALYTE	RESULT	RESULT	RESULT	RESULT
TURBIDITY, NTU	12.2	7.6 NTU	16.1 NTU	7.1
COND, Ms/cm	708 μ S/cm	542 μ S/cm	0.76 μ S/cm	856 μ S/cm
TDS, mg/L				
pH - units	7.13	6.71	7.10 pH	6.83 PH
TEMP, deg C	21.4 C	21.7 C	19.2 C	19.9 C
Water Level	69.52'	37-34'	21.02'	55.05'
ID of field analyst	ATB	ATB	ATB	ATB

LOG #	L	L	L	L
SITE	WS Penn mine			
LOCATOR	FR-1	FR-2		
TIME	1120	1806		
ANALYTE	RESULT	RESULT	RESULT	RESULT
TURBIDITY, NTU	7.1	3.7		
COND, Ms/cm	856 μ S/cm	2.41 μ S/cm		
TDS, mg/L				
pH - units	6.83	3.00		
TEMP, deg C	19.9	23.9 C		
Water Level	55.05	50.20		
ID of field analyst	ATB	ATB		

WG R DATA ENTRY / DATE REVIEWED BY / DATE APPROVED BY / DATE

3-17-00 W:\CASS\FORMS\PENN_FIELD_DATA_gw2.doc

LF-4
 ↑
 P16W-6

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or Login No.: P82464
Project Title: Penn Mine Environmental Restoration
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: *DAW BIRCH*
Rcvd:
Sample Date: *7/19/00*

Lab No.	Sample Type	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative	Initials	pH
---------	-------------	------	---------	---------------	----------------------	----------------	------	--------------	----------	----

P82464-1	GRAB	WS PENN MINE	<u>PRGW-1</u>	RawH2O	236144	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
				RawH2O	236145	NUTR CHLORIDE: IC;SULFATE: IC				
				RawH2O	236146	PLSTL ICP 9 EPA 200.7				
				RawH2O	236147	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

7/19/00 5.49 pH
0800
DJB

ClientID: Sample Comments: field data: use attached data sheet

P82464-2	GRAB	WS PENN MINE	PRGW-2	RawH2O	236148	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
				RawH2O	236149	NUTR CHLORIDE: IC;SULFATE: IC				
				RawH2O	236150	PLSTL ICP 9 EPA 200.7				
				RawH2O	236151	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

7/19/00

ClientID: Sample Comments: field data: use attached data sheet

DRY WELL - NO SAMPLES

P82464-3	GRAB	WS PENN MINE	<u>PRGW-3</u>	RawH2O	236152	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
				RawH2O	236153	NUTR CHLORIDE: IC;SULFATE: IC				
				RawH2O	236154	PLSTL ICP 9 EPA 200.7				
				RawH2O	236155	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

7/19/00 2.30 pH
0930
DJB

ClientID: Sample Comments: field data: use attached data sheet

P82464-4	GRAB	WS PENN MINE	PRGW-4	RawH2O	236156	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
				RawH2O	236157	NUTR CHLORIDE: IC;SULFATE: IC				
				RawH2O	236158	PLSTL ICP 9 EPA 200.7				
				RawH2O	236159	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

7/19/00 5.48 pH
1806
DJB

ClientID: Sample Comments: field data: use attached data sheet

DRY Well - No Samples

FR-2

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or Login No.: P82464
Project Title: Penn Mine Environmental Restoration
Account or Project: B785-9802-1

Client PM: EILBEN PANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: DAN BIRCH
Rcvd:
Sample Date: 7/19/00

Lab No.	Sample Type	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
P82464-5	GRAB	WS PENN MINE	<u>PRGW-5</u>	RawH2O	236160	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
				RawH2O	236161	NUTR CHLORIDE: IC;SULFATE: IC			
				RawH2O	236162	PLSTL ICP 9 EPA 200.7			
				RawH2O	236163	PLSTM ICP 9;F EPA 200.7;PB;F EPA 200.9			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

DRY WELL NO SAMPLE

P82464-6	GRAB	WS PENN MINE	<u>PRGW-6</u>	RawH2O	236164	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
				RawH2O	236165	NUTR CHLORIDE: IC;SULFATE: IC			
				RawH2O	236166	PLSTL ICP 9 EPA 200.7			
				RawH2O	236167	PLSTM ICP 9;F EPA 200.7;PB;F EPA 200.9			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

7/19/00
1801 S-18PTF
DJB 3:00

P82464-7	GRAB	WS PENN MINE	<u>PRGW-7</u>	RawH2O	236168	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
				RawH2O	236169	NUTR CHLORIDE: IC;SULFATE: IC			
				RawH2O	236170	PLSTL ICP 9 EPA 200.7			
				RawH2O	236171	PLSTM ICP 9;F EPA 200.7;PB;F EPA 200.9			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

7/19/00
1640 S.48
DJB

P82464-8	GRAB	WS PENN MINE	<u>PRGW-8</u>	RawH2O	236172	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
				RawH2O	236173	NUTR CHLORIDE: IC;SULFATE: IC			
				RawH2O	236174	PLSTL ICP 9 EPA 200.7			
				RawH2O	236175	PLSTM ICP 9;F EPA 200.7;PB;F EPA 200.9			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

DRY WELL

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 3 of 5

Prelog or
Login No.: P82464

Project Title
Penn Mine Environmental Restoration
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: DAN BIRCH
Rcvd:
Sample Date: 7/19/00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date Preservative	Initials	pH
P82464-9	GRAB		WS PENN MINE	<u>PRGW-9</u>	RawH2O	236176	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236177	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236178	PLSTL ICP 9 EPA 200.7			
					RawH2O	236179	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

7/19/00
1430
DJB
4.66pH

ClientID: Sample Comments: field data: use attached data sheet

P82464-10	GRAB		WS PENN MINE	<u>PRGW-10</u>	RawH2O	236180	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236181	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236182	PLSTL ICP 9 EPA 200.7			
					RawH2O	236183	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

Submerged DRY well - NO SAMPLES

P82464-11	GRAB		WS PENN MINE	<u>PRGW-11</u>	RawH2O	236184	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236185	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236186	PLSTL ICP 9 EPA 200.7			
					RawH2O	236187	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

SUBMERGED WELL - NO SAMPLES

P82464-12	GRAB		WS PENN MINE	<u>PRGW-12</u>	RawH2O	236188	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236189	NUTR CHLORIDE: IC;SULFATE: IC			
					RawH2O	236190	PLSTL ICP 9 EPA 200.7			
					RawH2O	236191	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

ClientID: Sample Comments: field data: use attached data sheet

SUBMERGED WELL - NO SAMPLES

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: P82464

Project Title
Penn Mine Environmental Restoration
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: DAN BIRCH
Rcvd:
Sample Date: 7/20/00

Lab No.	Sample Type	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative Initials	pH
P82464-13	GRAB	WS PENN MINE	LF-1	RawH2O	236192	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	7/20/00		
				RawH2O	236193	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC			
				RawH2O	236194	PLSTM HG:P EPA 245.2;ICP 9:P EPA 200.7;PB:P EPA 200.9			
				RawH2O	236195	PLSTL ICP 9 EPA 200.7			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

7/20/00
1036
DJB 7.13
pH

ClientID: Sample Comments: field data: use attached data sheet

P82464-14	GRAB	WS PENN MINE	LF-2	RawH2O	236196	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	7/20/00		
				RawH2O	236197	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC			
				RawH2O	236198	PLSTM HG:P EPA 245.2;ICP 9:P EPA 200.7;PB:P EPA 200.9			
				RawH2O	236199	PLSTL ICP 9 EPA 200.7			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

7/20/00
0935
DJB 6.71
pH

ClientID: Sample Comments: field data: use attached data sheet

P82464-15	GRAB	WS PENN MINE	LF-3	RawH2O	236200	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	7/20/00		
				RawH2O	236201	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC			
				RawH2O	236202	PLSTM HG:P EPA 245.2;ICP 9:P EPA 200.7;PB:P EPA 200.9			
				RawH2O	236203	PLSTL ICP 9 EPA 200.7			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

7/20/00
0700
DJB 7.10
pH

ClientID: Sample Comments: field data: use attached data sheet

P82464-16	GRAB	WS PENN MINE	LF-4	RawH2O	236204	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS	7/20/00		
				RawH2O	236205	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC			
				RawH2O	236206	PLSTM HG:P EPA 245.2;ICP 9:P EPA 200.7;PB:P EPA 200.9			
				RawH2O	236207	PLSTL ICP 9 EPA 200.7			
				RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT			

7/20/00
1115
DJB

ClientID: Sample Comments: field data: use attached data sheet

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or
Login No.: P82464

Project Title
Penn Mine Environmental Restoration
Account or Project: B785-9802-1

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: *DAW BIRCH*
Rcvd:
Sample Date: *7/20/00*

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative Initials	pH
P82464-17	QCFR		MISC	MISC <i>FR-1</i>	RawH2O	236208	PLSTL ALKALINITY: CO3; ALKALINITY: HCO3; ALKALINITY: TOTAL; HARDNESS: TOTAL; TDS: GRAVIMETRIC; TSS			
					RawH2O	236209	NUTR CHLORIDE: IC; SULFATE: IC			
					RawH2O	236210	PLSTL ICP 9 EPA 200.7			
					RawH2O	236211	PLSTM ICP 9. F EPA 200.7; PB. F. EPA 200.7			
					RawH2O		*300 IC ANIONS (1-3); *REPORT; *SAME KIT			

7/20/00
HTD
1/20
RJB

ClientID: Sample Comments: blind field rep

Total containers received: 68

	Signature	Print Name	Time	Date
Relinquished by	<i>[Signature]</i>	<i>DAW BIRCH</i>	<i>1340</i>	<i>7/20/00</i>
Received by				
Relinquished by	<i>[Signature]</i>			
Received by				
Relinquished by				
Received by	<i>[Signature]</i>	<i>K. Henn</i>	<i>1340</i>	<i>20/00</i>

Type Codes: CF01, CF02, CF03, CFV, COMP, CT01, CT02, CT03, CT04, CT05, CT06, CT07, CT08, CTV, GRAB

COPIES

EBMUD Laboratory Analytical Report

EAST BAY MUNICIPAL UTILITY DISTRICT
Laboratory Services Division
Phone (510) 287-1432 Fax (510) 465-5462
Analytical Results Report

Report generated on: Aug 08 2000, 08:39 pm
Turn-around-time (min to max): 21 to 21 calendar days
Sample(s) received by the lab on: Jul 20 2000, 01:40 pm
Login #: L83211
LSR #: B785-0008-3
Project Title: Penn Mine Restoration:Groundwater Wells

Please route this report to:

Lab PM: SUSAN B. BERG

Client PM: EILEEN FANELLI

Lab Manager: WILLIAM M. ELLGAS

This is an electronic transmittal of a Laboratory Analytical Report

Legend to the Report Qualifier Flags:

* = Duplicate value outside of control limits	M = Duplicate injection precision not met
+ = Positive	N = Spike recovery outside of control limits
- = Negative	NEG = Negative
< = Less than	P = Present
> = Greater than	PASS = Pass
A = Absent	POS = Positive
B = Analyte detected in method blank	Q = Data qualified by the Data Review Committee
C = GC/MS confirmation	R = Spike out of calibration range
CG = Confluent growth	S = Method of standard additions used
D = Surrogate spike outside of control limits	SP = Spreader
E = Estimated value, concentration outside calibration range	T = Diesel/Gasoline pattern is atypical
FAIL = Fail	TNTC = Too Numerous to Count
H = Analyzed past hold time	U = Analyte not detected
I = Dual Column quantitation difference > 40% RPD	W = Post-digestion spike (HGA) outside control limits
J = Estimated value, quantitation does not meet SOP criteria	X = Presumptive evidence of a compound
LA = Lost analysis	- = Approximately

THIS REPORT MAY ONLY BE REPRODUCED IN ITS ENTIRETY. RESULTS CONTAINED IN THIS REPORT ARE REFLECTIVE ONLY OF THE ITEMS REQUESTED TO BE ANALYZED AND REPORTED. UNUSED PORTIONS OF SAMPLE WILL BE DISCARDED WITHIN THIRTY DAYS OF RECEIPT UNLESS OTHER ARRANGEMENTS ARE MADE BY THE CLIENT.

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-1 Instantaneous Grab
 Site: WS PENN MINE Top of Hinckley Run
 Locator: PRGW-1
 Client ID:
 Collect Date: Jul 19 2000, 08:00am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate	Analysis Date	Run ID Text	Worknum
NONE	RawH2O			20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		5.5		pH units		
TEMPERATURE	1.0		21		deg C		
CONDUCTIVITY	1.0		320		umhos/cm		
TURBIDITY	1.0		17		NTU		
EPA 300.0	RawH2O			20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	10.		9.4		mg/L	0.15	
SULFATE	10.		61		mg/L	0.15	
SM(18)2320B	RawH2O			21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0		83		mg/L	5.0	
SM(18)2340C	RawH2O			21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		160		mg/L	2.0	
SM(18)2540C	RawH2O			21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		230		mg/L	6.0	
SM(18)2540D	RawH2O			21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	1.0		10		mg/L	6.0	
SM(18)4500-CO2 D	RawH2O			24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00		83.0		mg/L	0.100	
SM(18)4500-CO2 D	RawH2O			24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0	U	0.10		mg/L	0.10	
EPA 200.7	RawH2O			25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4		ug/L	15.4	
ALUMINUM	1.10	B	138		ug/L	19.8	
SILVER	1.10	U	4.40		ug/L	4.40	
BORON	1.10		50.8		ug/L	4.40	
BARIUM	1.10		161		ug/L	0.880	
BERYLLIUM	1.10	U	0.880		ug/L	0.880	
CALCIUM	1.10	B	20,700		ug/L	19.8	
CADMIUM	1.10		11.2		ug/L	1.54	
COBALT	1.10		9.72		ug/L	1.32	
CHROMIUM	1.10	U	1.32		ug/L	1.32	
COPPER	1.10		135		ug/L	4.40	
IRON	1.10		1,030		ug/L	24.2	
POTASSIUM	1.10		1,290		ug/L	24.2	
MAGNESIUM	1.10		17,100		ug/L	2.20	
MANGANESE	1.10		1,340		ug/L	0.880	
MOLYBDENUM	1.10	U	4.40		ug/L	4.40	
SODIUM	1.10	B	14,200		ug/L	24.2	
NICKEL	1.10	B	15.3		ug/L	4.40	
LEAD	1.10		9.18		ug/L	6.60	
ANTIMONY	1.10	U	6.60		ug/L	6.60	
SELENIUM	1.10	U	26.4		ug/L	26.4	
SILICON	1.10		18,500		ug/L	28.6	
STRONTIUM	1.10	B	233		ug/L	0.330	
THALLIUM	1.10	U	24.2		ug/L	24.2	
VANADIUM	1.10	U	1.76		ug/L	1.76	
ZINC	1.10		2,520		ug/L	8.80	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-1 Instantaneous Grab
 Site: WS PENN MINE Top of Hinckley Run
 Locator: PRGW-1
 Client ID:
 Collect Date: Jul 19 2000, 08:00am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier	Result	Units	mdlvalue	Text
EPA 200.7.1 FILTER	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		24.6	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		53.0	ug/L	3.12	
BARIUM	1.04		166	ug/L	0.312	
BERYLLIUM	1.04	B	0.0511	ug/L	0.0208	
CALCIUM	1.04		20,800	ug/L	19.8	
CADMIUM	1.04		9.84	ug/L	0.728	
COBALT	1.04		11.5	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04		110	ug/L	3.12	
IRON	1.04		432	ug/L	7.28	
POTASSIUM	1.04		1,320	ug/L	16.6	
MAGNESIUM	1.04	B	16,700	ug/L	2.08	
MANGANESE	1.04		1,530	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		13,800	ug/L	13.5	
NICKEL	1.04		16.7	ug/L	2.08	
LEAD	1.04		9.97	ug/L	5.20	
ANTIMONY	1.04		12.9	ug/L	7.28	
SELENIUM	1.04		30.1	ug/L	18.7	
SILICON	1.04		18,500	ug/L	9.36	
STRONTIUM	1.04		235	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		1.28	ug/L	0.936	
ZINC	1.04		2,340	ug/L	2.08	
EPA 200.9.1 FILTER	RawH2O		21-JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0	U	0.30	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Perm Mine Restoration: Groundwater Wells
 Sample Id: L83211-2 Instantaneous Grab
 Site: WS PENN MINE Hinckley Run, near Mine Shaft #3 and #4
 Locator: PRGW-3
 Client ID:
 Collect Date: Jul 19 2000, 09:30am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date Result	Analysis Date Units	Run ID mdlvalue Text	Worknum
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		2.3	pH units		
TEMPERATURE	1.0		22	deg C		
CONDUCTIVITY	1.0		1,200	umhos/cm		
TURBIDITY	1.0		13	NTU		
EPA 300.0 CHLORIDE	RawH2O 10.	1	21-JUL-00 9.4	21-JUL-00 mg/L	R82488 0.15	WG73359
EPA 300.0 SULFATE	RawH2O 100		700	mg/L	20-JUL-00 1.5	R82402 WG73359
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0	U	21-JUL-00 5.0	21-JUL-00 mg/L	R82514 5.0	WG73474
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		21-JUL-00 320	21-JUL-00 mg/L	R82494 2.0	WG73476
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		21-JUL-00 900	21-JUL-00 mg/L	R82547 6.0	WG73422
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 2.0		21-JUL-00 18	21-JUL-00 mg/L	R82493 12.	WG73431
SM(18)4500-CO2-D ALKALINITY: BICARBONATE	RawH2O 1.00	U	24-JUL-00 0.100	24-JUL-00 mg/L	R82516 0.100	WG73484
SM(18)4500-CO2-D ALKALINITY: CARBONATE	RawH2O 1.0	U	24-JUL-00 0.10	24-JUL-00 mg/L	R82516 0.10	WG73484
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	27,100	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		103	ug/L	4.40	
BARIUM	1.10		25.4	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	69,300	ug/L	19.8	
CADMIUM	1.10		24.2	ug/L	1.54	
COBALT	1.10		57.5	ug/L	1.32	
CHROMIUM	1.10		4.31	ug/L	1.32	
COPPER	1.10		435	ug/L	4.40	
IRON	1.10		40,700	ug/L	24.2	
POTASSIUM	1.10		5,970	ug/L	24.2	
MAGNESIUM	1.10		39,500	ug/L	2.20	
MANGANESE	1.10		1,500	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	7,630	ug/L	24.2	
NICKEL	1.10	B	71.5	ug/L	4.40	
LEAD	1.10		81.7	ug/L	6.60	
ANTIMONY	1.10	U	6.60	ug/L	6.60	
SELENIUM	1.10		39.8	ug/L	26.4	
SILICON	1.10		31,700	ug/L	28.6	
STRONTIUM	1.10	B	377	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample ID: L83211-2 Instantaneous Grab
 Site: WS PENN MINE Hinckley Run, near Mine Shaft #3 and #4
 Locator: PRGW-3
 Client ID:
 Collect Date: Jul 19 2000, 09:30am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
VANADIUM	1.10		5.22	ug/L	1.76	
ZINC	1.10		4,640	ug/L	8.80	
EPA 200.7: FILTER						
	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINIUM	1.04		27,000	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		103	ug/L	3.12	
BARIUM	1.04		7.78	ug/L	0.312	
BERYLLIUM	1.04	B	0.626	ug/L	0.0208	
CALCIUM	1.04		67,100	ug/L	19.8	
CADMIUM	1.04		22.6	ug/L	0.728	
COBALT	1.04		56.6	ug/L	1.04	
CHROMIUM	1.04		1.10	ug/L	0.728	
COPPER	1.04		428	ug/L	3.12	
IRON	1.04		24,200	ug/L	7.28	
POTASSIUM	1.04		5,390	ug/L	16.6	
MAGNESIUM	1.04	B	36,800	ug/L	2.08	
MANGANESE	1.04		1,460	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		7,920	ug/L	13.5	
NICKEL	1.04		70.6	ug/L	2.08	
LEAD	1.04		22.0	ug/L	5.20	
ANTIMONY	1.04		11.0	ug/L	7.28	
SELENIUM	1.04		30.8	ug/L	18.7	
SILICON	1.04		30,600	ug/L	9.36	
STRONTIUM	1.04		370	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		35.5	ug/L	0.936	
ZINC	1.04		4,510	ug/L	2.08	
EPA 200.9: FILTER						
	RawH2O		21-JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0		1.9	ug/L	0.30	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

(PREP)

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-3 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 19 2000, 06:06pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: undocumented blind field rep as per B Nagle/Alisto, corrected on 7/25/00 by sb. pH for alk calc is 3.00 as per Alisto. pH on field coc is 5.48

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82492	WG73359
CHLORIDE	100		83	mg/L	1.5	
SULFATE	100		1,500	mg/L	1.5	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0	U	5.0	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		1,200	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		2,300	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50		6.0	mg/L	3.0	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00	U	0.100	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0	U	0.10	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	350	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		59.4	ug/L	4.40	
BARIUM	1.10		29.3	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	283,000	ug/L	19.8	
CADMIUM	1.10		215	ug/L	1.54	
COBALT	1.10		79.2	ug/L	1.32	
CHROMIUM	1.10		3.04	ug/L	1.32	
COPPER	1.10		50.4	ug/L	4.40	
IRON	1.10		4,820	ug/L	24.2	
POTASSIUM	1.10		10,300	ug/L	24.2	
MAGNESIUM	1.10		122,000	ug/L	2.20	
MANGANESE	1.10		3,440	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	96,400	ug/L	24.2	
NICKEL	1.10	B	144	ug/L	4.40	
LEAD	1.10		17.6	ug/L	6.60	
ANTIMONY	1.10		26.4	ug/L	6.60	
SELENIUM	1.10		75.0	ug/L	26.4	
SILICON	1.10		39,600	ug/L	28.6	
STRONTIUM	1.10	B	938	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		2.56	ug/L	1.76	
ZINC	1.10		75,700	ug/L	8.80	
EPA 200.7a: FOLLOVER	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-3 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 19 2000, 06:06pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: undocumented blind field rep as per B Nagle/Alisto, corrected on 7/25/00 by sb. pH for alk calc
 is 3.00 as per Alisto. pH on field coc is 5.48

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04		354	ug/L	6.24		
SILVER	1.04	U	3.12	ug/L	3.12		
BORON	1.04		62.7	ug/L	3.12		
BARIUM	1.04		28.8	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04		250,000	ug/L	19.8		
CADMIUM	1.04		193	ug/L	0.728		
COBALT	1.04		71.6	ug/L	1.04		
CHROMIUM	1.04	U	0.728	ug/L	0.728		
COPPER	1.04		46.9	ug/L	3.12		
IRON	1.04		1,370	ug/L	7.28		
POTASSIUM	1.04		9,180	ug/L	16.6		
MAGNESIUM	1.04	B	104,000	ug/L	2.08		
MANGANESE	1.04		3,260	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		103,000	ug/L	13.5		
NICKEL	1.04		108	ug/L	2.08		
LEAD	1.04		39.2	ug/L	5.20		
ANTIMONY	1.04	U	7.28	ug/L	7.28		
SELENIUM	1.04		71.4	ug/L	18.7		
SILICON	1.04		37,500	ug/L	9.36		
STRONTIUM	1.04		992	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		3.73	ug/L	0.936		
ZINC	1.04		66,400	ug/L	2.08		
EPA 200.9: FILTER	RawH2O		21-JUL-00		25-JUL-00	R82621	WG73526
LEAD	1.0		0.50	ug/L	0.30		

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 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-4 Instantaneous Grab
 Site: WS PENN MINE Above east side slope of Mine Run
 Locator: PRGW-6
 Client ID:
 Collect Date: Jul 19 2000, 06:01pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		3.0	pH units		
TEMPERATURE	1.0		24	deg C		
CONDUCTIVITY	1.0		2,400	umhos/cm		
TURBIDITY	1.0		3.7	NTU		
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	100		86	mg/L	1.5	
SULFATE	100		1,400	mg/L	1.5	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0	U	5.0	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		1,200	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		2,300	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50		7.5	mg/L	3.0	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00	U	0.100	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0	U	0.10	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	325	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		56.8	ug/L	4.40	
BARIUM	1.10		27.5	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	298,000	ug/L	19.8	
CADMIUM	1.10		227	ug/L	1.54	
COBALT	1.10		82.4	ug/L	1.32	
CHROMIUM	1.10		1.64	ug/L	1.32	
COPPER	1.10		50.8	ug/L	4.40	
IRON	1.10		2,970	ug/L	24.2	
POTASSIUM	1.10		8,420	ug/L	24.2	
MAGNESIUM	1.10		124,000	ug/L	2.20	
MANGANESE	1.10		3,520	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	92,000	ug/L	24.2	
NICKEL	1.10	B	151	ug/L	4.40	
LEAD	1.10		11.4	ug/L	6.60	
ANTIMONY	1.10		16.4	ug/L	6.60	
SELENIUM	1.10		71.9	ug/L	26.4	
SILICON	1.10		40,300	ug/L	28.6	
STRONTIUM	1.10	B	888	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10	U	1.76	ug/L	1.76	
ZINC	1.10		80,400	ug/L	8.80	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-4 Instantaneous Grab
 Site: WS PENN MINE Above east side slope of Mine Run
 Locator: PRGW-6
 Client ID:
 Collect Date: Jul 19 2000, 06:01pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	Prep Date	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
EPA 200.7: FILTER	RawH2O		21	JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04			395	ug/L	6.24	
SILVER	1.04			3.58	ug/L	3.12	
BORON	1.04			63.6	ug/L	3.12	
BARIUM	1.04			29.9	ug/L	0.312	
BERYLLIUM	1.04	B		0.0368	ug/L	0.0208	
CALCIUM	1.04		253,000		ug/L	19.8	
CADMIUM	1.04		197		ug/L	0.728	
COBALT	1.04		73.0		ug/L	1.04	
CHROMIUM	1.04	U	0.728		ug/L	0.728	
COPPER	1.04		55.0		ug/L	3.12	
IRON	1.04		1,120		ug/L	7.28	
POTASSIUM	1.04		9,490		ug/L	16.6	
MAGNESIUM	1.04	B	107,000		ug/L	2.08	
MANGANESE	1.04		3,330		ug/L	0.312	
MOLYBDENUM	1.04	U	3.12		ug/L	3.12	
SODIUM	1.04		106,000		ug/L	13.5	
NICKEL	1.04		109		ug/L	2.08	
LEAD	1.04		39.5		ug/L	5.20	
ANTIMONY	1.04	U	7.28		ug/L	7.28	
SELENIUM	1.04		68.6		ug/L	18.7	
SILICON	1.04		38,200		ug/L	9.36	
STRONTIUM	1.04		1,030		ug/L	0.312	
THALLIUM	1.04	U	12.5		ug/L	12.5	
VANADIUM	1.04		2.75		ug/L	0.936	
ZINC	1.04		67,100		ug/L	2.08	
EPA 200.9: FILTER	RawH2O		21	JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0			0.60	ug/L	0.30	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-5 Instantaneous Grab
 Site: WS PENN MINE Above west side slope of Mine Run
 Locator: PRGW-7
 Client ID:
 Collect Date: Jul 19 2000, 04:40pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		5.5	pH units		
TEMPERATURE	1.0		20	deg C		
CONDUCTIVITY	1.0		4,300	umhos/cm		
TURBIDITY	1.0		6.2	NTU		
EPA 300.0 SULFATE	RawH2O 100		20-JUL-00 3,300	21-JUL-00 mg/L	R82488	WG73359
EPA 300.0 CHLORIDE	RawH2O 10.		20-JUL-00 30	20-JUL-00 mg/L	R82402	WG73359
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		21-JUL-00 51	21-JUL-00 mg/L	R82514	WG73474
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		21-JUL-00 3,400	21-JUL-00 mg/L	R82494	WG73476
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		21-JUL-00 5,100	21-JUL-00 mg/L	R82547	WG73422
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 0.50		21-JUL-00 8.0	21-JUL-00 mg/L	R82493	WG73431
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	RawH2O 1.00		24-JUL-00 51.0	24-JUL-00 mg/L	R82516	WG73484
SM(18)4500-CO2 D ALKALINITY: CARBONATE	RawH2O 1.0	U	24-JUL-00 0.10	24-JUL-00 mg/L	R82516	WG73484
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	404	ug/L	19.8	
SILVER	1.10		7.52	ug/L	4.40	
BORON	1.10		208	ug/L	4.40	
BARIUM	1.10		15.8	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	442,000	ug/L	19.8	
CADMIUM	1.10		48.0	ug/L	1.54	
COBALT	1.10		317	ug/L	1.32	
CHROMIUM	1.10		3.15	ug/L	1.32	
COPPER	1.10		1,370	ug/L	4.40	
IRON	1.10		430	ug/L	24.2	
POTASSIUM	1.10		3,210	ug/L	24.2	
MAGNESIUM	1.10		680,000	ug/L	2.20	
MANGANESE	1.10		11,400	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	44,800	ug/L	24.2	
NICKEL	1.10	B	91.6	ug/L	4.40	
LEAD	1.10		25.5	ug/L	6.60	
ANTIMONY	1.10		30.2	ug/L	6.60	
SELENIUM	1.10		96.5	ug/L	26.4	
SILICON	1.10		18,000	ug/L	28.6	
STRONTIUM	1.10	B	3,290	ug/L	0.330	
THALLIUM	1.10		61.9	ug/L	24.2	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample ID: L83211-5 Instantaneous Grab
 Site: WS PENN MINE Above west side slope of Mine Run
 Locator: PRGW-7
 Client ID:
 Collect Date: Jul 19 2000, 04:40pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID Text	Worknum
VANADIUM	1.10		6.07	ug/L	1.76	
ZINC	1.10		32,000	ug/L	8.80	
EPA 200.7: FILTER						
	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		252	ug/L	6.24	
SILVER	1.04		8.45	ug/L	3.12	
BORON	1.04		230	ug/L	3.12	
BARIUM	1.04		15.9	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04		371,000	ug/L	19.8	
CADMIUM	1.04		41.3	ug/L	0.728	
COBALT	1.04		276	ug/L	1.04	
CHROMIUM	1.04		1.33	ug/L	0.728	
COPPER	1.04		1,530	ug/L	3.12	
IRON	1.04	U	7.28	ug/L	7.28	
POTASSIUM	1.04		2,980	ug/L	16.6	
MAGNESIUM	1.04	B	378,000	ug/L	2.08	
MANGANESE	1.04		10,900	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		54,200	ug/L	13.5	
NICKEL	1.04		66.7	ug/L	2.08	
LEAD	1.04		53.7	ug/L	5.20	
ANTIMONY	1.04	U	7.28	ug/L	7.28	
SELENIUM	1.04		56.0	ug/L	18.7	
SILICON	1.04		16,900	ug/L	9.36	
STRONTIUM	1.04		3,920	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		7.51	ug/L	0.936	
ZINC	1.04		27,100	ug/L	2.08	
EPA 200.9: FILTER						
LEAD	1.0	RawH2O	21-JUL-00	25-JUL-00	R82621	WG73526
			1.2	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-6 Instantaneous Grab
 Site: WS PENN MINE Downgradient of Mine/Hinckley Run confluence-slag pile base of former
 Locator: PRGW-9 Mine Run Dam
 Client ID:
 Collect Date: Jul 19 2000, 02:30pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		4.7	pH units		
TEMPERATURE	1.0		22	deg C		
CONDUCTIVITY	1.0		3,700	umhos/cm		
TURBIDITY	1.0		4.6	NTU		
EPA 300.0 SULFATE	RawH2O 100	1	20-JUL-00 2,600	21-JUL-00 mg/L	R82488	WG73359
EPA 300.0 CHLORIDE	RawH2O 10.		20-JUL-00 58	20-JUL-00 mg/L	R82402	WG73359
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		21-JUL-00 29	21-JUL-00 mg/L	R82514	WG73474
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		21-JUL-00 2,600	21-JUL-00 mg/L	R82494	WG73476
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		21-JUL-00 4,100	21-JUL-00 mg/L	R82547	WG73422
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 0.50		21-JUL-00 3.0	21-JUL-00 mg/L	R82493	WG73431
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	RawH2O 1.00		24-JUL-00 29.0	24-JUL-00 mg/L	R82516	WG73484
SM(18)4500-CO2 D ALKALINITY: CARBONATE	RawH2O 1.0	U	24-JUL-00 0.10	24-JUL-00 mg/L	R82516	WG73484
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	226	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		3,600	ug/L	4.40	
BARIUM	1.10		16.8	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	389,000	ug/L	19.8	
CADMIUM	1.10		1,300	ug/L	1.54	
COBALT	1.10		162	ug/L	1.32	
CHROMIUM	1.10		3.18	ug/L	1.32	
COPPER	1.10		1,200	ug/L	4.40	
IRON	1.10		623	ug/L	24.2	
POTASSIUM	1.10		4,100	ug/L	24.2	
MAGNESIUM	1.10		456,000	ug/L	2.20	
MANGANESE	1.10		12,700	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	124,000	ug/L	24.2	
NICKEL	1.10	B	122	ug/L	4.40	
LEAD	1.10		22.4	ug/L	6.60	
ANTIMONY	1.10		32.1	ug/L	6.60	
SELENIUM	1.10		89.2	ug/L	26.4	
SILICON	1.10		20,200	ug/L	28.6	
STRONTIUM	1.10	B	1,140	ug/L	0.330	
THALLIUM	1.10		50.1	ug/L	24.2	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-6 Instantaneous Grab
 Site: WS PENN MINE Downgradient of Mine/Hinckley Run confluence-slag pile base of former
 Locator: PRGW-9 Mine Run Dam
 Client ID:
 Collect Date: Jul 19 2000, 02:30pm
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
VANADIUM	1.10		4.73	ug/L	1.76	
ZINC	1.10		59,600	ug/L	8.80	
EPA 200.7: FILTER RawH2O 21-JUL-00 202-AUG-00 R82852 WG73779						
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		143	ug/L	6.24	
SILVER	1.04		6.91	ug/L	3.12	
BORON	1.04		3,890	ug/L	3.12	
BARIUM	1.04		17.5	ug/L	0.312	
BERYLLIUM	1.04	B	0.106	ug/L	0.0208	
CALCIUM	1.04		352,000	ug/L	19.8	
CADMIUM	1.04		1,160	ug/L	0.728	
COBALT	1.04		147	ug/L	1.04	
CHROMIUM	1.04		2.45	ug/L	0.728	
COPPER	1.04		1,140	ug/L	3.12	
IRON	1.04	U	7.28	ug/L	7.28	
POTASSIUM	1.04		3,080	ug/L	16.6	
MAGNESIUM	1.04	B	297,000	ug/L	2.08	
MANGANESE	1.04		12,500	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		142,000	ug/L	13.5	
NICKEL	1.04		89.5	ug/L	2.08	
LEAD	1.04		53.7	ug/L	5.20	
ANTIMONY	1.04		9.20	ug/L	7.28	
SELENIUM	1.04		81.9	ug/L	18.7	
SILICON	1.04		19,200	ug/L	9.36	
STRONTIUM	1.04		1,310	ug/L	0.312	
THALLIUM	1.04		35.9	ug/L	12.5	
VANADIUM	1.04		6.89	ug/L	0.936	
ZINC	1.04		51,600	ug/L	2.08	
EPA 200.9: FILTER RawH2O 21-JUL-00 25-JUL-00 R82621 WG73526						
LEAD	1.0		0.50	ug/L	0.30	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-7 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #1
 Locator: LP-1
 Client ID:
 Collect Date: Jul 20 2000, 10:36am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		7.1	pH units		
TEMPERATURE	1.0		21	deg C		
CONDUCTIVITY	1.0		710	umhos/cm		
TURBIDITY	1.0		12	NTU		
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	10.		43	mg/L	0.15	
NITRATE AS N	10.		3.6	mg/L	0.059	
SULFATE	10.		27	mg/L	0.15	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0		310	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		300	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		450	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50		3.0	mg/L	3.0	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00		310	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0		0.40	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	36.8	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		253	ug/L	4.40	
BARIUM	1.10		109	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	46,300	ug/L	19.8	
CADMIUM	1.10	U	1.54	ug/L	1.54	
COBALT	1.10		2.40	ug/L	1.32	
CHROMIUM	1.10		2.44	ug/L	1.32	
COPPER	1.10		10.4	ug/L	4.40	
IRON	1.10		73.1	ug/L	24.2	
POTASSIUM	1.10		6,280	ug/L	24.2	
MAGNESIUM	1.10		52,000	ug/L	2.20	
MANGANESE	1.10		8.14	ug/L	0.880	
MOLYBDENUM	1.10		4.94	ug/L	4.40	
SODIUM	1.10	B	56,700	ug/L	24.2	
NICKEL	1.10	B	24.1	ug/L	4.40	
LEAD	1.10		10.1	ug/L	6.60	
ANTIMONY	1.10		13.5	ug/L	6.60	
SELENIUM	1.10		39.2	ug/L	26.4	
SILICON	1.10		14,300	ug/L	28.6	
STRONTIUM	1.10	B	1,660	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		6.29	ug/L	1.76	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-7 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #1
 Locator: LP-1
 Client ID:
 Collect Date: Jul 20 2000, 10:36am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference	Matrix	Tag	Batch	PrepDate	Analysis Date	Run ID	Worknum
Parameter	Dilution	Qualifier		Result	Units	mdlvalue	Text
ZINC	1.10			40.1	ug/L	8.80	
EPA 200.7: FILTER	RawH2O			21-JUL-00		02-AUG-00	R82852 WG73779
ARSENIC	1.04	U		7.28	ug/L	7.28	
ALUMINUM	1.04			43.0	ug/L	6.24	
SILVER	1.04	U		3.12	ug/L	3.12	
BORON	1.04			263	ug/L	3.12	
BARIUM	1.04			118	ug/L	0.312	
BERYLLIUM	1.04	U		0.0208	ug/L	0.0208	
CALCIUM	1.04			41,100	ug/L	19.8	
CADMIUM	1.04	U		0.728	ug/L	0.728	
COBALT	1.04			1.22	ug/L	1.04	
CHROMIUM	1.04	U		0.728	ug/L	0.728	
COPPER	1.04			6.55	ug/L	3.12	
IRON	1.04	U		7.28	ug/L	7.28	
POTASSIUM	1.04			6,380	ug/L	16.6	
MAGNESIUM	1.04	B		47,300	ug/L	2.08	
MANGANESE	1.04			4.24	ug/L	0.312	
MOLYBDENUM	1.04			3.86	ug/L	3.12	
SODIUM	1.04			61,100	ug/L	13.5	
NICKEL	1.04			21.9	ug/L	2.08	
LEAD	1.04			20.8	ug/L	5.20	
ANTIMONY	1.04			15.9	ug/L	7.28	
SELENIUM	1.04			25.2	ug/L	18.7	
SILICON	1.04			13,700	ug/L	9.36	
STRONTIUM	1.04			1,820	ug/L	0.312	
THALLIUM	1.04	U		12.5	ug/L	12.5	
VANADIUM	1.04			5.45	ug/L	0.936	
ZINC	1.04			24.0	ug/L	2.08	
EPA 200.9: FILTER	RawH2O			21-JUL-00		25-JUL-00	R82621 WG73526
LEAD	1.0	U		0.30	ug/L	0.30	
EPA 245.2: FILTER	RawH2O			21-JUL-00		03-AUG-00	R82961 WG73846
MERCURY	1.0	U		0.020	ug/L	0.020	

BATCH PREPDATE as initial date of sample preparation
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 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration:Groundwater Wells
 Sample Id: L83211-8 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #2
 Locator: LP-2
 Client ID:
 Collect Date: Jul 20 2000, 09:35am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Analysis Date	Run ID	Worknum
			Result	Units	mdlvalue	Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		6.7	pH units		
TEMPERATURE	1.0		22	deg C		
CONDUCTIVITY	1.0		540	umhos/cm		
TURBIDITY	1.0		7.6	NTU		
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	10.		14	mg/L	0.15	
NITRATE AS N	10.		2.5	mg/L	0.059	
SULFATE	10.		28	mg/L	0.15	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0		260	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		290	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		380	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50	U	3.0	mg/L	3.0	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00		260	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0		0.10	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	156	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		29.9	ug/L	4.40	
BARIUM	1.10		45.0	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	81,300	ug/L	19.8	
CADMIUM	1.10	U	1.54	ug/L	1.54	
COBALT	1.10		1.37	ug/L	1.32	
CHROMIUM	1.10	U	1.32	ug/L	1.32	
COPPER	1.10		4.92	ug/L	4.40	
IRON	1.10		244	ug/L	24.2	
POTASSIUM	1.10		1,030	ug/L	24.2	
MAGNESIUM	1.10		32,300	ug/L	2.20	
MANGANESE	1.10		4.30	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	17,900	ug/L	24.2	
NICKEL	1.10	B	10.7	ug/L	4.40	
LEAD	1.10		7.05	ug/L	6.60	
ANTIMONY	1.10		7.05	ug/L	6.60	
SELENIUM	1.10		36.2	ug/L	26.4	
SILICON	1.10		18,400	ug/L	28.6	
STRONTIUM	1.10	B	194	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		4.01	ug/L	1.76	

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EAST-BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
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 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-8 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #2
 Locator: LF-2
 Client ID:
 Collect Date: Jul 20 2000, 09:35am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
ZINC	1.10		24.0	ug/L	8.80	
EPA 200.7: FILTER	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		55.2	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		29.9	ug/L	3.12	
BARIUM	1.04		47.6	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04		72,700	ug/L	19.8	
CADMIUM	1.04	U	0.728	ug/L	0.728	
COBALT	1.04	U	1.04	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04	U	3.12	ug/L	3.12	
IRON	1.04	U	7.28	ug/L	7.28	
POTASSIUM	1.04		1,110	ug/L	16.6	
MAGNESIUM	1.04	B	29,800	ug/L	2.08	
MANGANESE	1.04		1.83	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		19,000	ug/L	13.5	
NICKEL	1.04		2.89	ug/L	2.08	
LEAD	1.04		18.1	ug/L	5.20	
ANTIMONY	1.04	U	7.28	ug/L	7.28	
SELENIUM	1.04		39.9	ug/L	18.7	
SILICON	1.04		17,600	ug/L	9.36	
STRONTIUM	1.04		208	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		4.64	ug/L	0.936	
ZINC	1.04		11.8	ug/L	2.08	
EPA 200.9: FILTER	RawH2O		21-JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0	U	0.30	ug/L	0.30	
EPA 245.2: FILTER	RawH2O		21-JUL-00	03-AUG-00	R82961	WG73846
MERCURY	1.0	U	0.020	ug/L	0.020	

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EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-9 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #3
 Locator: LF-3
 Client ID:
 Collect Date: Jul 20 2000, 07:00am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		7.1	pH units		
TEMPERATURE	1.0		19	deg C		
CONDUCTIVITY	1.0		760	umhos/cm		
TURBIDITY	1.0		16	NTU		
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	10.		11	mg/L	0.15	
NITRATE AS N	10.		6.5	mg/L	0.059	
SULFATE	10.		160	mg/L	0.15	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0		160	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		280	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		460	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50		4.0	mg/L	3.0	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00		160	mg/L	0.100	
SM(18)4500-CO2 D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0		0.20	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	147	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		108	ug/L	4.40	
BARIUM	1.10		17.2	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	55,700	ug/L	19.8	
CADMIUM	1.10	U	1.54	ug/L	1.54	
COBALT	1.10		1.87	ug/L	1.32	
CHROMIUM	1.10		1.95	ug/L	1.32	
COPPER	1.10	U	4.40	ug/L	4.40	
IRON	1.10		204	ug/L	24.2	
POTASSIUM	1.10		3,650	ug/L	24.2	
MAGNESIUM	1.10		42,700	ug/L	2.20	
MANGANESE	1.10		18.1	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	43,500	ug/L	24.2	
NICKEL	1.10	B	5.11	ug/L	4.40	
LEAD	1.10		10.3	ug/L	6.60	
ANTIMONY	1.10		8.99	ug/L	6.60	
SELENIUM	1.10		39.2	ug/L	26.4	
SILICON	1.10		11,900	ug/L	28.6	
STRONTIUM	1.10	B	1,070	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		4.22	ug/L	1.76	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-9 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #3
 Locator: LF-3
 Client ID:
 Collect Date: Jul 20 2000, 07:00am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
ZINC	1.10		231	ug/L	8.80	
EPA 200.7: FILTER	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		71.6	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		112	ug/L	3.12	
BARIUM	1.04		17.2	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04		49,200	ug/L	19.8	
CADMIUM	1.04	U	0.728	ug/L	0.728	
COBALT	1.04		1.11	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04	U	3.12	ug/L	3.12	
IRON	1.04		11.3	ug/L	7.28	
POTASSIUM	1.04		7,960	ug/L	16.6	
MAGNESIUM	1.04	B	38,000	ug/L	2.08	
MANGANESE	1.04		2.07	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		46,000	ug/L	13.5	
NICKEL	1.04		5.27	ug/L	2.08	
LEAD	1.04		19.6	ug/L	5.20	
ANTIMONY	1.04	U	7.28	ug/L	7.28	
SELENIUM	1.04		25.2	ug/L	18.7	
SILICON	1.04		11,100	ug/L	9.36	
STRONTIUM	1.04		1,160	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		4.34	ug/L	0.936	
ZINC	1.04		19.6	ug/L	2.08	
EPA 200.9: FILTER	RawH2O		21-JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0	U	0.30	ug/L	0.30	
EPA 245.2: FILTER	RawH2O		21-JUL-00	03-AUG-00	R82961	WG73846
MERCURY	1.0	U	0.020	ug/L	0.020	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration:Groundwater Wells
 Sample Id: L83211-10 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #4
 Locator: LP-4
 Client ID:
 Collect Date: Jul 20 2000, 11:15am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Analysis Date	Run ID	Worknum
			Result	Units	mdlvalue	Text
NONE	RawH2O		20-JUL-00	20-JUL-00	R82448	WG73395
PH	1.0		6.8	pH units		
TEMPERATURE	1.0		20	deg C		
CONDUCTIVITY	1.0		860	umhos/cm		
TURBIDITY	1.0		7.1	NTU		
EPA 300.0	RawH2O		20-JUL-00	20-JUL-00	R82402	WG73359
CHLORIDE	10.		32	mg/L	0.15	
NITRATE AS N	10.		1.4	mg/L	0.059	
SULFATE	10.		16	mg/L	0.15	
SM(18)2320B	RawH2O		21-JUL-00	21-JUL-00	R82514	WG73474
ALKALINITY: TOTAL AS CaCO3	1.0		420	mg/L	5.0	
SM(18)2340C	RawH2O		21-JUL-00	21-JUL-00	R82494	WG73476
HARDNESS: TOTAL	1.0		200	mg/L	2.0	
SM(18)2540C	RawH2O		21-JUL-00	21-JUL-00	R82547	WG73422
TOTAL DISSOLVED SOLIDS	1.0		540	mg/L	6.0	
SM(18)2540D	RawH2O		21-JUL-00	21-JUL-00	R82493	WG73431
TOTAL SUSPENDED SOLIDS	0.50		14	mg/L	3.0	
SM(18)4500-CO2-D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: BICARBONATE	1.00		420	mg/L	0.100	
SM(18)4500-CO2-D	RawH2O		24-JUL-00	24-JUL-00	R82516	WG73484
ALKALINITY: CARBONATE	1.0		0.30	mg/L	0.10	
EPA 200.7	RawH2O		25-JUL-00	08-AUG-00	R83029	WG73891
ARSENIC	1.10	U	15.4	ug/L	15.4	
ALUMINUM	1.10	B	200	ug/L	19.8	
SILVER	1.10	U	4.40	ug/L	4.40	
BORON	1.10		499	ug/L	4.40	
BARIUM	1.10		37.3	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	35,500	ug/L	19.8	
CADMIUM	1.10	U	1.54	ug/L	1.54	
COBALT	1.10		1.45	ug/L	1.32	
CHROMIUM	1.10		6.08	ug/L	1.32	
COPPER	1.10		5.94	ug/L	4.40	
IRON	1.10		790	ug/L	24.2	
POTASSIUM	1.10		6,490	ug/L	24.2	
MAGNESIUM	1.10		32,400	ug/L	2.20	
MANGANESE	1.10		25.3	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	128,000	ug/L	24.2	
NICKEL	1.10	B	14.9	ug/L	4.40	
LEAD	1.10	U	6.60	ug/L	6.60	
ANTIMONY	1.10		8.27	ug/L	6.60	
SELENIUM	1.10		37.6	ug/L	26.4	
SILICON	1.10		14,200	ug/L	28.6	
STRONTIUM	1.10	B	1,770	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		3.80	ug/L	1.76	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-10 Instantaneous Grab
 Site: WS PENN MINE Landfill Well #4
 Locator: LF-4
 Client ID:
 Collect Date: Jul 20 2000, 11:15am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: field data: use attached data sheet

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Result	PrepDate Units	Analysis Date mdlvalue	Run ID Text	Worknum
ZINC	1.10		11.1	ug/L	8.80		
EPA 200.7: FILTER	RawH2O		21-JUL-00		02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28		
ALUMINUM	1.04		35.8	ug/L	6.24		
SILVER	1.04	U	3.12	ug/L	3.12		
BORON	1.04		521	ug/L	3.12		
BARIUM	1.04		41.0	ug/L	0.312		
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208		
CALCIUM	1.04		31,700	ug/L	19.8		
CADMIUM	1.04	U	0.728	ug/L	0.728		
COBALT	1.04	U	1.04	ug/L	1.04		
CHROMIUM	1.04	U	0.728	ug/L	0.728		
COPPER	1.04	U	3.12	ug/L	3.12		
IRON	1.04		12.6	ug/L	7.28		
POTASSIUM	1.04		10,400	ug/L	16.6		
MAGNESIUM	1.04	B	30,000	ug/L	2.08		
MANGANESE	1.04		14.5	ug/L	0.312		
MOLYBDENUM	1.04	U	3.12	ug/L	3.12		
SODIUM	1.04		138,000	ug/L	13.5		
NICKEL	1.04		3.35	ug/L	2.08		
LEAD	1.04		12.3	ug/L	5.20		
ANTIMONY	1.04		12.3	ug/L	7.28		
SELENIUM	1.04		22.4	ug/L	18.7		
SILICON	1.04		13,300	ug/L	9.36		
STRONTIUM	1.04		1,920	ug/L	0.312		
THALLIUM	1.04	U	12.5	ug/L	12.5		
VANADIUM	1.04		3.54	ug/L	0.936		
ZINC	1.04		7.74	ug/L	2.08		
EPA 200.9: FILTER	RawH2O		21-JUL-00		25-JUL-00	R82621	WG73526
LEAD	1.0	U	0.30	ug/L	0.30		
EPA 245.2: FILTER	RawH2O		21-JUL-00		03-AUG-00	R82961	WG73846
MERCURY	1.0	U	0.020	ug/L	0.020		

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Fern Mine Restoration: Groundwater Wells
 Sample Id: L83211-11 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 20 2000, 11:20am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch Prep Date Result	Analysis Date Units	Run ID mdlvalue	Worknum Text
EPA 300.0 CHLORIDE	RawH2O 10.		20-JUL-00 32	20-JUL-00 mg/L	R82402 0.15	WG73359
SULFATE	10.		16	mg/L	0.15	
SM(18)2320B ALKALINITY: TOTAL AS CaCO3	RawH2O 1.0		21-JUL-00 420	21-JUL-00 mg/L	R82514 5.0	WG73474
SM(18)2340C HARDNESS: TOTAL	RawH2O 1.0		21-JUL-00 200	21-JUL-00 mg/L	R82494 2.0	WG73476
SM(18)2540C TOTAL DISSOLVED SOLIDS	RawH2O 1.0		21-JUL-00 540	21-JUL-00 mg/L	R82547 6.0	WG73422
SM(18)2540D TOTAL SUSPENDED SOLIDS	RawH2O 0.50		21-JUL-00 36	21-JUL-00 mg/L	R82493 3.0	WG73431
SM(18)4500-CO2 D ALKALINITY: BICARBONATE	RawH2O 1.00		24-JUL-00 419	24-JUL-00 mg/L	R82516 0.100	WG73484 no ph field data - used pH cm L83211-10 as this appears to be blind rep
SM(18)4500-CO2 D ALKALINITY: CARBONATE	RawH2O 1.0		24-JUL-00 0.27	24-JUL-00 mg/L	R82516 0.10	WG73484 no ph field data - used pH cm L83211-10 to determine value
EPA 200.7 ARSENIC	RawH2O 1.10	U	25-JUL-00 15.4	08-AUG-00 ug/L	R83029 15.4	WG73891
ALUMINUM	1.10	B	1,670	ug/L	19.8	
SILVER	1.10		19.3	ug/L	4.40	
BORON	1.10		496	ug/L	4.40	
BARIUM	1.10		42.3	ug/L	0.880	
BERYLLIUM	1.10	U	0.880	ug/L	0.880	
CALCIUM	1.10	B	36,700	ug/L	19.8	
CADMIUM	1.10	U	1.54	ug/L	1.54	
COBALT	1.10		2.26	ug/L	1.32	
CHROMIUM	1.10		13.0	ug/L	1.32	
COPPER	1.10		7.23	ug/L	4.40	
IRON	1.10		2,310	ug/L	24.2	
POTASSIUM	1.10		6,740	ug/L	24.2	
MAGNESIUM	1.10		34,800	ug/L	2.20	
MANGANESE	1.10		64.4	ug/L	0.880	
MOLYBDENUM	1.10	U	4.40	ug/L	4.40	
SODIUM	1.10	B	128,000	ug/L	24.2	
NICKEL	1.10	B	9.79	ug/L	4.40	
LEAD	1.10	U	6.60	ug/L	6.60	
ANTIMONY	1.10		11.9	ug/L	6.60	
SELENIUM	1.10		52.4	ug/L	26.4	
SILICON	1.10		17,900	ug/L	28.6	
STRONTIUM	1.10	B	1,780	ug/L	0.330	
THALLIUM	1.10	U	24.2	ug/L	24.2	
VANADIUM	1.10		10.5	ug/L	1.76	
ZINC	1.10		36.2	ug/L	8.80	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Analytical Results Report

Project Number: B785-0008-3 Penn Mine Restoration: Groundwater Wells
 Sample Id: L83211-11 Field Replicate Grab
 Site: MISC Miscellaneous Sample - See Sample Comment Field for Detail
 Locator: MISC
 Client ID:
 Collect Date: Jul 20 2000, 11:20am
 Receive Date: Jul 20 2000, 01:40pm
 Sample Comments: blind field rep

Method Reference Parameter	Matrix Dilution	Tag Qualifier	Batch PrepDate	Analysis Date	Run ID Text	Worknum
EPA 200.7: FILTER	RawH2O		21-JUL-00	02-AUG-00	R82852	WG73779
ARSENIC	1.04	U	7.28	ug/L	7.28	
ALUMINUM	1.04		36.4	ug/L	6.24	
SILVER	1.04	U	3.12	ug/L	3.12	
BORON	1.04		523	ug/L	3.12	
BARIUM	1.04		44.8	ug/L	0.312	
BERYLLIUM	1.04	U	0.0208	ug/L	0.0208	
CALCIUM	1.04		32,600	ug/L	19.8	
CADMIUM	1.04	U	0.728	ug/L	0.728	
COBALT	1.04	U	1.04	ug/L	1.04	
CHROMIUM	1.04	U	0.728	ug/L	0.728	
COPPER	1.04	U	3.12	ug/L	3.12	
IRON	1.04	U	7.28	ug/L	7.28	
POTASSIUM	1.04		7,050	ug/L	16.6	
MAGNESIUM	1.04	B	30,900	ug/L	2.08	
MANGANESE	1.04		19.1	ug/L	0.312	
MOLYBDENUM	1.04	U	3.12	ug/L	3.12	
SODIUM	1.04		139,000	ug/L	13.5	
NICKEL	1.04		3.18	ug/L	2.08	
LEAD	1.04		15.9	ug/L	5.20	
ANTIMONY	1.04		7.97	ug/L	7.28	
SELENIUM	1.04		31.5	ug/L	18.7	
SILICON	1.04		13,200	ug/L	9.36	
STRONTIUM	1.04		1,920	ug/L	0.312	
THALLIUM	1.04	U	12.5	ug/L	12.5	
VANADIUM	1.04		4.23	ug/L	0.936	
ZINC	1.04		6.34	ug/L	2.08	
EPA 200.9: FILTER	RawH2O		21-JUL-00	25-JUL-00	R82621	WG73526
LEAD	1.0	U	0.30	ug/L	0.30	

BATCH PREPDATE as initial date of sample preparation
 ANALYSIS DATE as date of analysis

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:39 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum	
							Qual	LCS REC SPIKE
EPA 300.0			WATER	20-JUL-00	20-JUL-00	R82402		WG73359
FLUORIDE	U	.014	mg/L		88			100
FLUORIDE				0				
FLUORIDE				.91	89			
FLUORIDE				.9	86			
CHLORIDE	U	.015	mg/L	.8				
CHLORIDE				0	87			
CHLORIDE				0				
NITRITE AS N	U	.004	mg/L					110
NITRITE AS N				U 0				
NITRITE AS N				0	93			
NITRITE AS N					92			
NITRATE AS N	U	.0059	mg/L	.55	100			140
NITRATE AS N				U 0	100			
NITRATE AS N				4.4	100			
NITRATE AS N				2.9	100			
SULFATE	U	.015	mg/L	.99				
SULFATE					100			
SULFATE				0				
EPA 300.0			WATER	21-JUL-00	21-JUL-00	R82488		WG73418
FLUORIDE	U	.014	mg/L	.56	94			92
CHLORIDE	U	.015	mg/L					87
NITRITE AS N	U	.004	mg/L	U 0	97			110
NITRATE AS N	U	.0059	mg/L	U 1.7	100			120
SULFATE	U	.015	mg/L					110
EPA 160.2			LIQUID	21-JUL-00	21-JUL-00	R82493		WG73431
TOTAL SUSPENDED SOLIDS	U	6	mg/L	.17				96
TOTAL SUSPENDED SOLIDS				10				
TOTAL SUSPENDED SOLIDS				9.5				
SM(18)2340C			LIQUID	21-JUL-00	21-JUL-00	R82494		WG73476
HARDNESS: TOTAL				0	94			

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:39 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID	Worknum
	Qual	Blank Units	Qual	Dup RPD	Qual MS REC SPIKE	MSD RPD	Qual LCS REC SPIKE	
SM(18)2320B ALKALINITY: TOTAL AS CaCO3		LIQUID	21-JUL-00	0	21-JUL-00	84	R82514	WG73474
SM(18)2540C TOTAL DISSOLVED SOLIDS	U 6	mg/L	21-JUL-00	4.4	21-JUL-00		R82547	WG73422 96
EPA 200.9: FILTER LEAD	U .3	ug/L	21-JUL-00		25-JUL-00	85	R82621	WG73526
EPA 200.9: FILTER LEAD	U .3	ug/L						
EPA 200.7: FILTER	U		21-JUL-00		02-AUG-00		R82852	WG73779
ARSENIC	U 7.28	ug/L				102	4.59	258
ARSENIC	U 7.28	ug/L						
ALUMINUM	U 6.24	ug/L				N 121	.357	208
ALUMINUM	U 6.24	ug/L						
SILVER	U 3.12	ug/L				104	3.64	198
SILVER	U 3.12	ug/L						
BORON	U 3.12	ug/L				108	4.28	230
BORON	U 3.12	ug/L						
BARIUM	U .312	ug/L				103	3.54	194
BARIUM	U .312	ug/L						
BERYLLIUM	.11	ug/L				105	4.84	200
BERYLLIUM	.0573	ug/L						
CALCIUM	U 19.8	ug/L				99.8	3.39	196
CALCIUM	U 19.8	ug/L						
CADMIUM	U .728	ug/L				100	3.92	189
CADMIUM	U .728	ug/L						
COBALT	U 1.04	ug/L				103	4.35	208
COBALT	U 1.04	ug/L						
CHROMIUM	U .728	ug/L				102	4.99	192
CHROMIUM	U .728	ug/L						
COPPER	U 3.12	ug/L				97.8	4.13	185
COPPER	U 3.12	ug/L						
IRON	U 7.28	ug/L				99.6	3.17	202
IRON	U 7.28	ug/L						
POTASSIUM	U 16.6	ug/L				105	5.3	201
POTASSIUM	U 16.6	ug/L						
MAGNESIUM	4.98	ug/L				98.7	3.79	198
MAGNESIUM	U 2.08	ug/L						
MANGANESE	U .312	ug/L				90.9	2.84	193
MANGANESE	U .312	ug/L						
MOLYBDENUM	U 3.12	ug/L				105	4.33	203
MOLYBDENUM	U 3.12	ug/L						
SODIUM	U 13.5	ug/L				104	4.64	199
SODIUM	U 13.5	ug/L						
NICKEL	U 2.08	ug/L				102	5.52	200
NICKEL	U 2.08	ug/L						

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:39 pm

Method Reference Parameter	Samp_tag		BatchPrepDate		AnalysisDate		RunID	Worknum.	
	Qual	Blank	Units	Qual Dup	Qual MS	REC SPIKE	Qual MSD	Qual LCS	REC SPIKE
LEAD	U	5.2	ug/L			106	4.52		210
LEAD	U	5.2	ug/L						
ANTIMONY	U	7.28	ug/L			103	5.27		231
ANTIMONY	U	7.28	ug/L						
SELENIUM	U	18.7	ug/L			99.2	5.38		190
SELENIUM	U	18.7	ug/L						
SILICON	U	9.36	ug/L		N 75.3		2.19		198
SILICON	U	9.36	ug/L						
STRONTIUM	U	.312	ug/L			103	3.93		201
STRONTIUM	U	.312	ug/L						
THALLIUM	U	12.5	ug/L			107	2.84		188
THALLIUM	U	12.5	ug/L						
VANADIUM	U	.936	ug/L			106	4.58		204
VANADIUM	U	.936	ug/L						
ZINC	U	2.08	ug/L			88.3	1.87		200
ZINC	U	2.08	ug/L						
EPA 245.2: FILTER									
LIQUID: 21-JUL-00 03-AUG-00 R82961 WG73846									
MERCURY	U	.02	ug/L			110	3.7		120
MERCURY	U	.02	ug/L						
EPA 200.7									
W 25-JUL-00 08-AUG-00 R83029 WG73891									
ARSENIC	U	15.4	ug/L			95.7	.627		125
ARSENIC	U	15.4	ug/L						
ALUMINUM	U	19.8	ug/L			116	3.1		100
ALUMINUM		156	ug/L						
SILVER	U	4.4	ug/L			92.9	3.8		113
SILVER	U	4.4	ug/L						
BORON	U	4.4	ug/L			100	.631		109
BORON	U	4.4	ug/L						
BARIUM	U	.88	ug/L			101	.321		96.2
BARIUM	U	.88	ug/L						
BERYLLIUM	U	.88	ug/L			101	1.39		97.8
BERYLLIUM	U	.88	ug/L						
CALCIUM		25.6	ug/L			92	.18		98.9
CALCIUM		75.9	ug/L						
CADMIUM	U	1.54	ug/L			92.8	.18		90.6
CADMIUM	U	1.54	ug/L						
COBALT	U	1.32	ug/L			94	.189		99.9
COBALT	U	1.32	ug/L						
CHROMIUM	U	1.32	ug/L			93.2	.422		93.8
CHROMIUM	U	1.32	ug/L						
COPPER	U	4.4	ug/L			94.2	.0484		91.2
COPPER		6.51	ug/L						
IRON	U	24.2	ug/L			86.7	1.12		96.1
IRON		42.4	ug/L						
POTASSIUM	U	24.2	ug/L			99.6	.337		100
POTASSIUM	U	24.2	ug/L						
MAGNESIUM	U	2.2	ug/L			95.1	1.38		98.6
MAGNESIUM	U	2.2	ug/L						
MANGANESE	U	.88	ug/L			85.6	.231		94.2
MANGANESE	U	.88	ug/L						
MOLYBDENUM	U	4.4	ug/L			99.5	1.76		97.5

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

EAST BAY MUNICIPAL UTILITY DISTRICT
 Laboratory Services Division
 Phone (510) 287-1432 Fax (510) 465-5462
 Batch QC Report
 Report generated on: Aug 08 2000, 08:39 pm

Method Reference Parameter	Qual	Blank	Samp_tag Units	BatchPrepDate Qual Dup RPD	AnalysisDate Qual MS REC SPIKE	RunID Qual MSD RPD	Worknum		
							Qual	LCS	REC SPIKE
MOLYBDENUM	U	4.4	ug/L						
SODIUM	U	24.2	ug/L		103	.0792		102	
SODIUM		70.8	ug/L						
NICKEL	U	4.4	ug/L		93.3	.189		94	
NICKEL		11	ug/L						
LEAD	U	6.6	ug/L		95.6	.332		100	
LEAD	U	6.6	ug/L						
ANTIMONY	U	6.6	ug/L		103	.585		107	
ANTIMONY	U	6.6	ug/L						
SELENIUM	U	26.4	ug/L		96	2.66		92.3	
SELENIUM	U	26.4	ug/L						
SILICON	U	28.6	ug/L		N 58.5	.0424		95.5	
SILICON		45.9	ug/L						
STRONTIUM	U	.33	ug/L		99.4	.483		98.3	
STRONTIUM		1.44	ug/L						
THALLIUM	U	24.2	ug/L		N 74	1.6		76.5	
THALLIUM	U	24.2	ug/L						
VANADIUM	U	1.76	ug/L		102	.784		98.8	
VANADIUM	U	1.76	ug/L						
ZINC	U	8.8	ug/L		N 68.9	.168		95.2	
ZINC	U	8.8	ug/L						

BLANK - background Method Blank
 DUP RPD - duplicate RPD for precision
 MS REC SPIKE - Matrix Spike Recovery for accuracy (%)
 MSD RPD - Matrix Spike Duplicate precision (%) (determined by base results)
 LCS REC SPIKE - Laboratory Control Sample Recovery for Accuracy (%)

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 1 of 4

Prelog or Login No.: L83211 Project Title: Penn Mine Restoration:Groundwater Wells Client PM: EILEEN PANELLI Sampled by: d birch/alisto
 Account or Project: B785-0008-3 Tel No.: 287-1661 Lab PM: SUSAN B. BERG Rcvd: 20-JUL-00 13:40
 Sample Date: 19-JUL-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative	Initials	pH
L83211-1	GRAB	08:00	WS PENN MINE	PRGW-1	RawH2O	236144	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236145	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236146	PLSTL ICP 9 EPA 200.7				
					RawH2O	236147	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O		*300:IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-2	GRAB	09:30	WS PENN MINE	PRGW-3	RawH2O	236152	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236153	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236154	PLSTL ICP 9 EPA 200.7				
					RawH2O	236155	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O		*300:IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-3	QCFR	18:06	MISC	MISC	RawH2O	236156	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236157	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236158	PLSTL ICP 9 EPA 200.7				
					RawH2O	236159	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O		*300:IC ANIONS (1-3);+REPORT;+SAMP KIT				

ClientID: Sample Comments: undocumented blind field rep as per B Nagle/Alisto, corrected on 7/25/00 by sb. pH for alk calc is 3.00 as per Alisto. pH on field coc is 5.48

L83211-4	GRAB	18:01	WS PENN MINE	PRGW-6	RawH2O	236164	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236165	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236166	PLSTL ICP 9 EPA 200.7				
					RawH2O	236167	PLSTM ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O		*300:IC ANIONS (1-3);+PLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

East Bay Municipal Utility District
 Laboratory Services Chain of Custody Record

Prelog or Login No. : L83211	Project Title Penn Mine Restoration:Groundwater Wells Account or Project: B785-0008-3	Client PM: EILEEN PANELLI Tel No. : 287-1661 Lab PM: SUSAN B. BERG	Sampled by: d birch/alisto Rcvd: 20-JUL-00 13:40 Sample Date: 19-JUL-00
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Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative	Initials	pH
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L83211-5	GRAB	16:40	WS PENN MINE	PRGW-7	RawH2O	236168	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236169	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236170	PLSTL ICP: 9: EPA 200.7				
					RawH2O	236171	PLSTM ICP: 9: F: EPA 200.7; PB: F: EPA 200.9				
					RawH2O		*300: IC ANIONS (1-3); +PLD DATA; +REPORT; +SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-6	GRAB	14:30	WS PENN MINE	PRGW-9	RawH2O	236176	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236177	NUTR CHLORIDE: IC;SULFATE: IC				
					RawH2O	236178	PLSTL ICP: 9: EPA 200.7				
					RawH2O	236179	PLSTM ICP: 9: F: EPA 200.7; PB: F: EPA 200.9				
					RawH2O		*300: IC ANIONS (1-3); +PLD DATA; +REPORT; +SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Page 3 of 4

Prelog or
Login No.: L83211

Project Title
Penn Mine Restoration:Groundwater Wells
Account or Project: B785-0008-3

Client PM: EILEEN FANELLI
Tel No.: 287-1661
Lab PM: SUSAN B. BERG

Sampled by: d birch/alisto
Rcvd: 20-JUL-00 13:40
Sample Date: 20-JUL-00

Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Date	Preservative	Initials	pH
L83211-7	GRAB	10:36	WS PENN MINE	LP-1	RawH2O	236192	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236193	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC				
					RawH2O	236194	PLSTM HG:F EPA 245.2;ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O	236195	PLSTL ICP 9 EPA 200.7				
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-8	GRAB	09:35	WS PENN MINE	LP-2	RawH2O	236196	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236197	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC				
					RawH2O	236198	PLSTM HG:F EPA 245.2;ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O	236199	PLSTL ICP 9 EPA 200.7				
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-9	GRAB	07:00	WS PENN MINE	LP-3	RawH2O	236200	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236201	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC				
					RawH2O	236202	PLSTM HG:F EPA 245.2;ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O	236203	PLSTL ICP 9 EPA 200.7				
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

L83211-10	GRAB	11:15	WS PENN MINE	LP-4	RawH2O	236204	PLSTL ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS				
					RawH2O	236205	NUTR CHLORIDE: IC;NITRATE: IC;SULFATE: IC				
					RawH2O	236206	PLSTM HG:F EPA 245.2;ICP 9:F EPA 200.7;PB:F EPA 200.9				
					RawH2O	236207	PLSTL ICP 9 EPA 200.7				
					RawH2O		*300 IC ANIONS (1-3);+FLD DATA;+REPORT;+SAMP KIT				

ClientID: Sample Comments: field data: use attached data sheet

East Bay Municipal Utility District
Laboratory Services Chain of Custody Record

Prelog or Login No.: L83211	Project Title Penn Mine Restoration:Groundwater Wells Account or Project: B785-0008-3	Client PM: EILEEN FANELLI Tel No.: 287-1661 Lab PM: SUSAN B. BERG	Sampled by: d birch/alisto Rcvd: 20-JUL-00 13:40 Sample Date: 20-JUL-00
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Lab No.	Sample Type	Time	Site	Locator	Sample Matrix	Container ID Barcode	Tests Required	Preservative	Date Initials	pH
L83211-11	QCPR	11:20	MISC	MISC	RawH2O	236208 PLSTL	ALKALINITY: CO3;ALKALINITY: HCO3;ALKALINITY: TOTAL;HARDNESS: TOTAL;TDS: GRAVIMETRIC;TSS			
					RawH2O	236209 NUTR	CHLORIDE: IC;SULFATE: IC			
					RawH2O	236210 PLSTL	ICP 9 EPA 200.7			
					RawH2O	236211 PLSTM	ICP 9:F EPA 200.7;PB:F EPA 200.9			
					RawH2O		*300 IC ANIONS: (1-3);+REPORT;+SAMP KIT			

ClientID: Sample Comments: blind field rep

Total containers received: 44

	Signature	Print Name	Time	Date
Relinquished by				
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by				

Type Codes: CF01;CF02;CF03;CFV;COMP;CT01;CT02;CT03
CT04;CT05;CT06;CT07;CT08;CTV;GRAB

Appendix D – Well Inspections

**Post-Restoration Monitoring
Field Data Form - Groundwater
Penn Mine Environmental Restoration Project**

Date: 6/23/00		Time: 940		Weather: Sunny							
Field Sampler Name: Tom Suarez				Reservoir elevation: 227.0 ft.							
Field Sampler Affiliation: EBMUD											
Location	Total Depth (feet)	Casing Diameter (inches)	Depth to Water (feet)	Total Purge Volume (gallons)	Temp (degree C)	pH	EC (ms/cm)	Sampled	Duplicate (a)	Equipment Blank (a)	Comments (Include well condition, dry wells, and other significant observations)
PRGW-1	18	4	9.30								
PRGW-2	19	4	17.95								
PRGW-3	260	8	95.95								
PRGW-4	12.4	2	dry								
PRGW-5	25	4	11.87								
PRGW-6	102	2	48.35								
PRGW-7	34.8	2	17.58								
PRGW-8	18	4	16.70								
PRGW-9	48	4									not accessible due to lake level.
PRGW-10	51	8									under water
PRGW-11	47.5	8									under water
PRGW-12	67	8									under water

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

NA = not applicable

Laboratory analysis:

Aluminum, copper, nickel, lead, zinc, cadmium by EPA 200.7:Filtered

Hardness (as CaCO₃) by EPA 130.2

TDS by EPA 160.1

TSS by EPA 160.2

Sulfate by EPA 300.0

**Post-Restoration Monitoring
Field Data Form - Groundwater
Penn Mine Environmental Restoration Project**

Date: 7/21/00		Time: 900		Weather: Sunny							
Field Sampler Name: Tom Suarez		Camanche Reservoir elevation: 223.8 ft.									
Field Sampler Affiliation: EBMUD											
Location	Total Depth (feet)	Casing Diameter (inches)	Depth to Water (feet)	Total Purge Volume (gallons)	Temp	pH	EC	Sampled	Duplicate (a)	Equipment Blank (a)	Comments (Include well condition, dry wells, and other significant observations)
PRGW-1	18	4	10.60								
PRGW-2	19	4	19.95								
PRGW-3	260	8	97.40								
PRGW-4	10	2	dry								dry 12.4 ft. to bottom.
PRGW-5	25	4	13.75								
PRGW-6	102	2	49.40								
PRGW-7	34.8	2	19.25								
PRGW-8	18	4	19.00								
PRGW-9	48	4	5.30								
PRGW-10	51	8									Lake level (underwater)
PRGW-11	47.5	8									Lake level (underwater)
PRGW-12	67	8									Lake level (underwater)

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

NA = not applicable

Laboratory analysis:

Aluminum, copper, nickel, lead, zinc, cadmium by EPA 200.7:Filtered

Hardness (as CaCO₃) by EPA 130.2

TDS by EPA 160.1

TSS by EPA 160.2

Sulfates by EPA 300.0

**Post-Restoration Monitoring
Field Data Form - Groundwater
Penn Mine Environmental Restoration Project**

Date: 8/24/00		Time: 1045				Weather: Clear						
Field Sampler Name: Tom Suarez, Bob Matteson						Camanche Reservoir elevation: 220.8 ft.						
Field Sampler Affiliation: EBMUD												
Location	Total Depth (feet)	Casing Diameter (Inches)	Depth to Water (feet)	Total Purge Volume (gallons)	Temp (degree C)	pH	EC (ms/cm)	Sampled	Duplicate (a)	Equipment Blank (a)	Comments (include well condition, dry wells, and other significant observations)	
PRGW-1	18	4	12.28									
PRGW-2	19	4	19.95									
PRGW-3	260	8	98.20	NA	NA	NA	NA	No	No	No		
PRGW-4	12.4	2	dry								dry - 12.4 ft. to bottom.	
PRGW-5	25	4	13.42									
PRGW-6	102	2	49.80									
PRGW-7	34.8	2	20.08									
PRGW-8	18	4	dry								dry - 19.8 ft. to bottom.	
PRGW-9	48	4	8.40									
PRGW-10	51	8	3.32									
PRGW-11	47.5	8	1.28									
PRGW-12	67	8									lake level, well not accessible.	

Notes:

(a) field duplicate and equipment blank samples to be collected at a rate of 10%

NA = not applicable

Laboratory analysis:

Aluminum, copper, nickel, lead, zinc, cadmium by EPA 200.7:Filtered

Hardness (as CaCO₃) by EPA 130.2

TDS by EPA 160.1

TSS by EPA 160.2

Sulfate by EPA 300.0

Appendix E – Operation and Maintenance Inspection Reports and Photographs

Operation and Maintenance Inspection Checklist Penn Mine Environmental Restoration Project

Inspection Type: (circle one)

Routin X

Emergency

Date: June 22, 2000

Inspector(s): Bolton

Weather: Hot and Sunny

Photographs Taken: (list numbers here and show locations on site map) ___ see attached photo files

Directions: Mark an "X" in the Yes or No Column. Provide additional comments in Remarks column.
Use second sheet for remarks, if needed.

Item	Yes	No	Remarks
1. Access Roads			
a. Access ways open and passable	X		
b. Roadside drainages clear	X		
c. Significant erosion of roadways		X	
d. Erosion at culvert locations		X	
e. Culvert size adequate	X		
2. Fences and Gates			
a. Damaged fence materials		X	
b. Damaged posts		X	
c. Evidence of human or animal trespassing	X		
d. Damaged gate	X		Gate at upper end of landfill still down
e. Gate lock in place and functioning	X		
3. Hinckley Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
4. Mine Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
5. Vegetation			
a. Photos taken of revegetated areas	X		
b. Indicate observed vegetation on site map			
6. Soil Cover			
a. Erosion control blankets in place, intact, and functioning	X		



Operation and Maintenance Inspection Checklist Penn Mine Environmental Restoration Project

Inspection Type: (circle one) Routine Emergency
 Date: 15 JUL 00
 Inspector(s): TIMOTHY COX
 Weather: CLEAR & DRY

Photographs Taken: (list numbers here and show locations on site map) pmJuly00-1.jpg, pmJuly00-2.jpg, pmJuly00-3.jpg

Directions: Mark an "X" in the Yes or No Column. Provide additional comments in Remarks column.
 Use second sheet for remarks, if needed.

Item	Yes	No	Remarks
1. Access Roads			
a. Access ways open and passable	X		
b. Roadside drainages clear	X		
c. Significant erosion of roadways	X		See remarks section
d. Erosion at culvert locations		X	
e. Culvert size adequate	X		
2. Fences and Gates			
a. Damaged fence materials		X	
b. Damaged posts		X	
c. Evidence of human or animal trespassing	X		See remarks section
d. Damaged gate	X		See remarks section
e. Gate lock in place and functioning	X		
3. Hinckley Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
4. Mine Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
5. Vegetation			
a. Photos taken of revegetated areas	X		
b. Indicate observed vegetation on site map	X		
6. Soil Cover			
a. Erosion control blankets in place, intact, and functioning	X		



Operation and Maintenance Inspection Checklist Penn Mine Environmental Restoration Project

Inspection Type: (circle one)

Routin X

Emergency

Date: 8/25/00

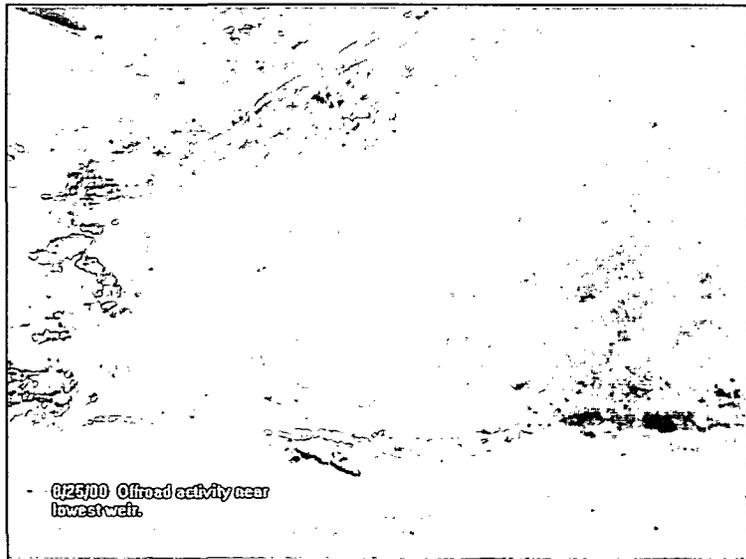
Inspector(s): Mark Bolton

Weather: Clear and Warm

Photographs Taken: (list numbers here and show locations on site map) _____

*Directions: Mark an "X" in the Yes or No Column. Provide additional comments in Remarks column.
Use second sheet for remarks, if needed.*

Item	Yes	No	Remarks
1. Access Roads			
a. Access ways open and passable	X		
b. Roadside drainages clear	X		
c. Significant erosion of roadways		X	
d. Erosion at culvert locations		X	
e. Culvert size adequate	X		
2. Fences and Gates			
a. Damaged fence materials	X		See remarks next page.
b. Damaged posts		X	
c. Evidence of human or animal trespassing	X		See remarks next page.
d. Damaged gate	X		See remarks next page.
e. Gate lock in place and functioning	X		
3. Hinckley Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
4. Mine Run Stream Channel			
a. Flow obstruction from erosion or slump		X	
b. Local scour around erosion controls		X	
c. Undercutting/bypassing stream channel crossings		X	
d. Runoff bypassing stream channel		X	
e. Rip rap movement		X	
f. Sediment deposition		X	
5. Vegetation			
a. Photos taken of revegetated areas	X		
b. Indicate observed vegetation on site map			
6. Soil Cover			
a. Erosion control blankets in place, intact, and functioning			



Appendix F – Groundwater Elevation and Contour Maps

Attachment F

Groundwater Elevation Data and Contour Maps

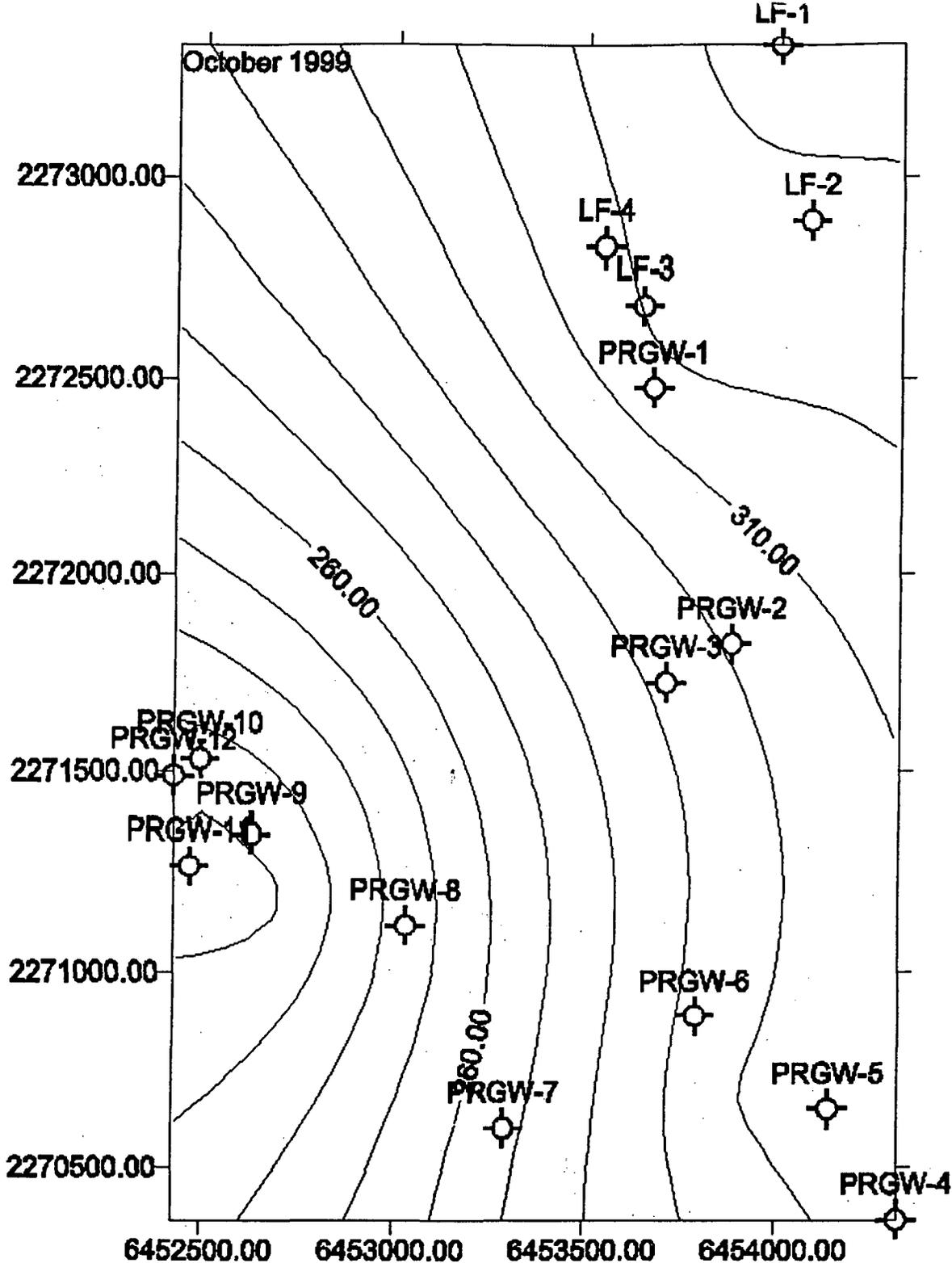
Groundwater elevation data from monitoring wells for the budget period are summarized on table A-1. Not all groundwater elevation data for each monitoring period was used to create groundwater contour maps as certain wells (e.g. PRGW-3 that penetrates former mine workings) are not appropriate to contour with other wells. Groundwater contour maps for October 1999, February 2000, June 2000 and August 2000, and the specific data subsets used to create each contour map are included in this attachment.

This groundwater contour map was made with Surfer (version 6.04, Copyright 1997 Golden Software) using Kriging. Kriging is a mathematical process that develops an optimal estimated surface for a set of three-dimensional ("x-y-z") data. Because the mapped surface is optimal estimated representation of the data rather than direct linear interpolation, the points at which the surface is intersected by a well may not necessarily reflect the actual water level elevation in that well. Please see Table F-1 for actual water level elevations in wells.

The Error of Estimation ranges for each map are summarized below.

ERROR OF ESTIMATION FOR GROUNDWATER CONTOUR MAPS

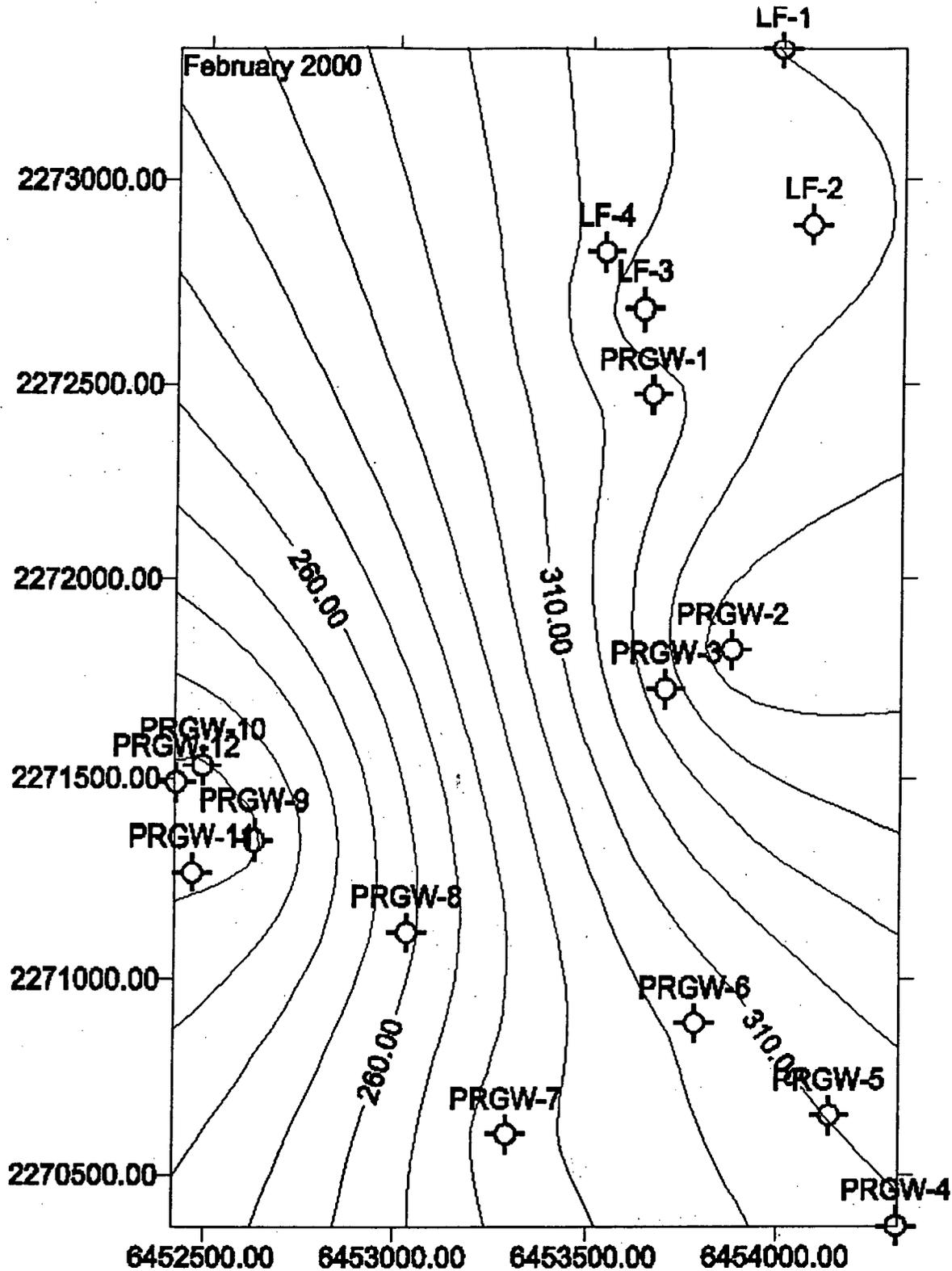
Map	Error of Estimation Range (Absolute Value of [Feet _{predicted} - Feet _{actual}])
October 1999	0.00076 to 1.56
February 2000	0.004 to 2.76
June 2000	0.22 to 1.75
August 2000	0.018 to 1.3



This groundwater contour map was made with Surfer (version 6.04, Copyright 1997 Golden Software) using Kriging. Kriging is a mathematical process that develops an optimal estimated surface for a set of three-dimensional ("x-y-z") data. Because the mapped surface is optimal estimated representation of the data rather than direct linear interpolation, the points at which the surface is intersected by a well may not necessarily reflect the actual water level elevation in that well. Please see Table E-1 for actual water level elevations in wells.

Data Used for October 1999 Groundwater Contour Map

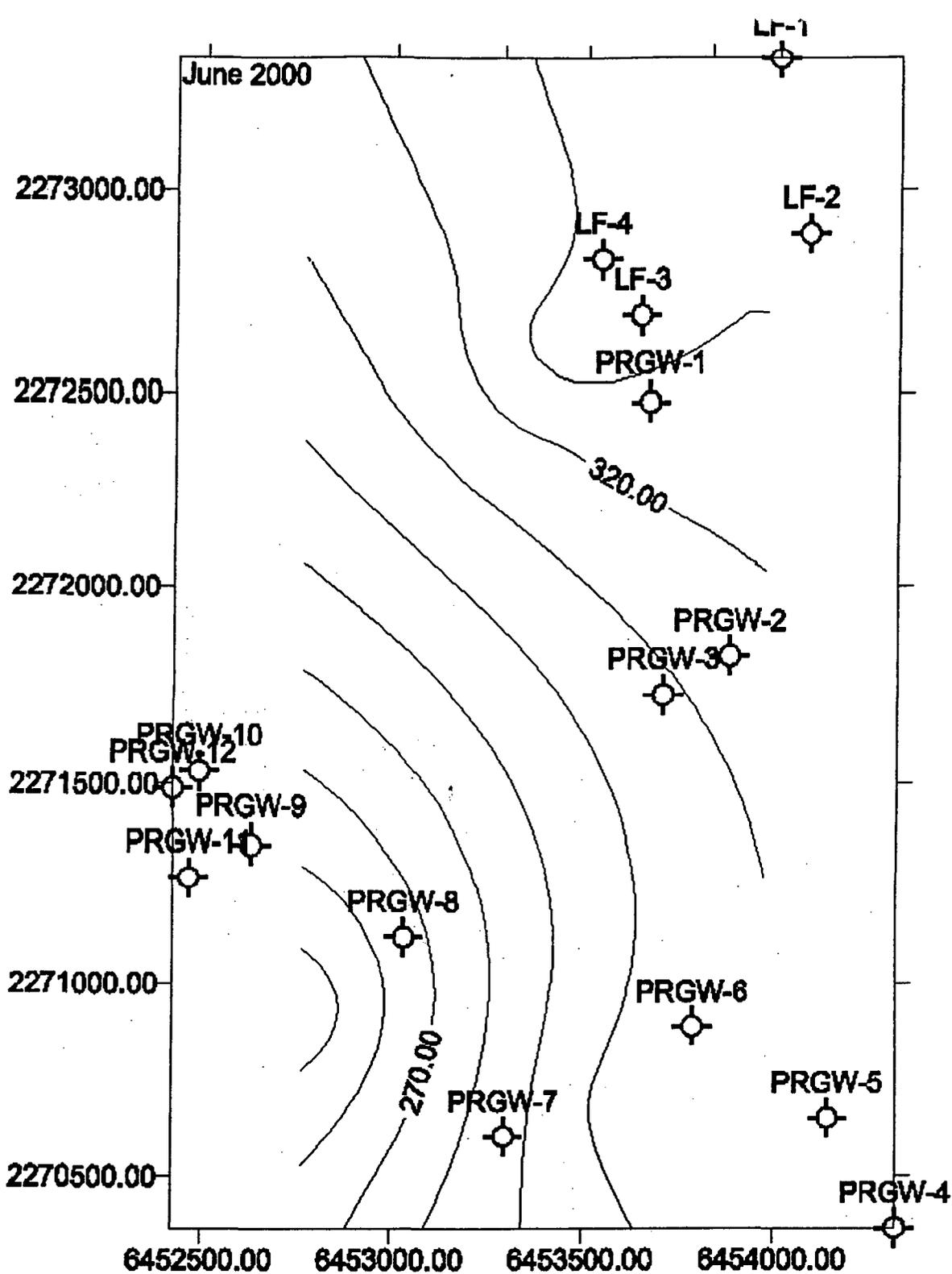
6453669.64	2272475.41	315.97	PRGW-1
6454140.31	2270649.59	304.14	PRGW-5
6453788.26	2270887.50	301.13	PRGW-6
6453293.72	2270602.20	274.88	PRGW-7
6452628.39	2271355.27	216.93	PRGW-9
6452492.53	2271532.11	219	PRGW-10
6452465.67	2271273.17	218.91	PRGW-11
6452423.80	2271490.26	219.45	PRGW-12
6453999.40	2273343.08	339.48	LF-1
6454080.88	2272888.44	323.19	LF-2
6453643.65	2272685.20	325.23	LF-3
6453540.42	2272823.47	321.66	LF-4



This groundwater contour map was made with Surfer (version 6.04, Copyright 1997 Golden Software) using Kriging. Kriging is a mathematical process that develops an optimal estimated surface for a set of three-dimensional ("x-y-z") data. Because the mapped surface is optimal estimated representation of the data rather than direct linear interpolation, the points at which the surface is intersected by a well may not necessarily reflect the actual water level elevation in that well. Please see Table F-1 for actual water level elevations in wells.

Data Used for February 2000 Groundwater Contour Map

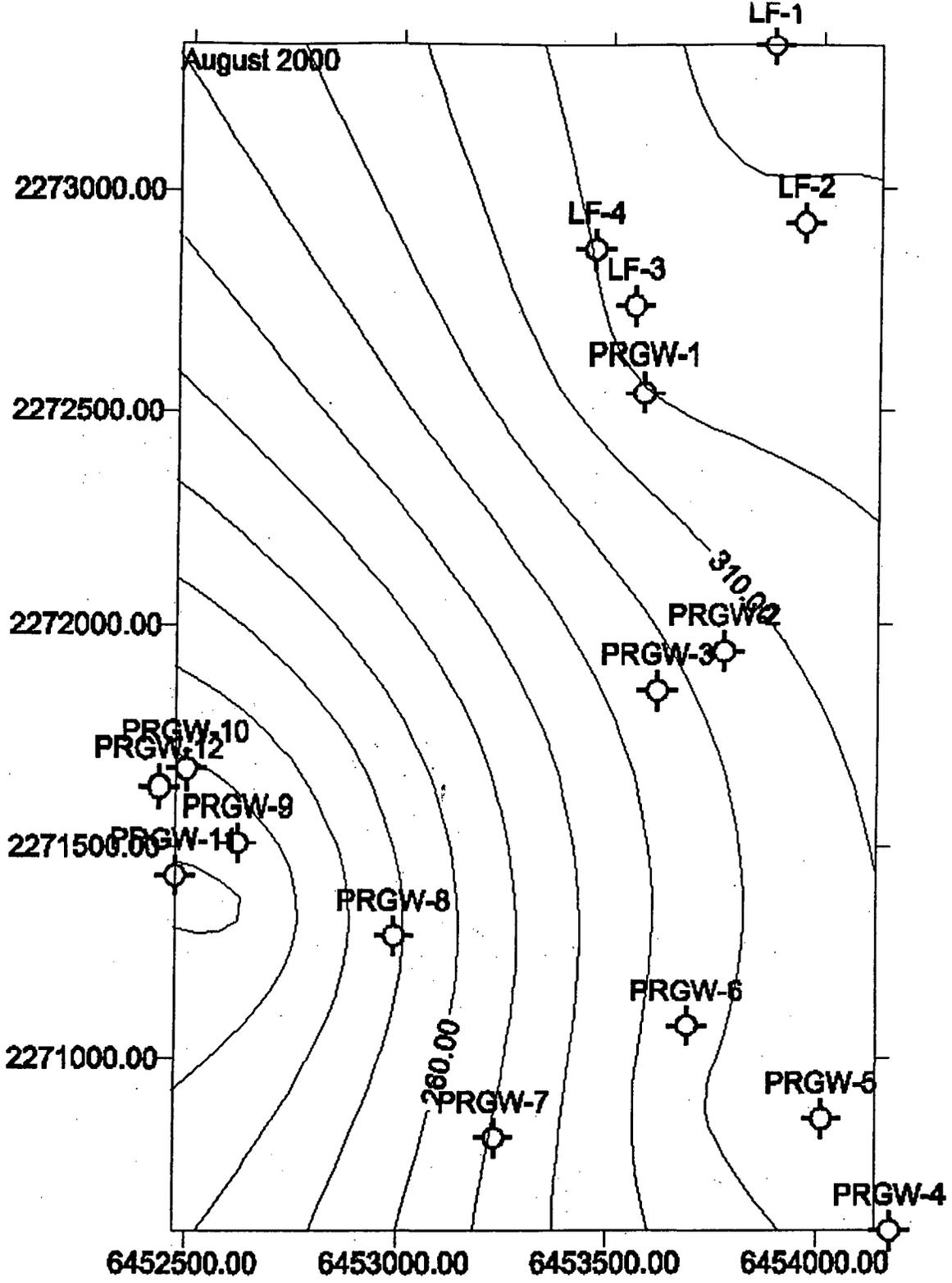
6453669.64	2272475.41	324.08	PRGW-1
6453879.34	2271821.20	357.51	PRGW-2
6454318.83	2270367.28	307.99	PRGW-4
6454140.31	2270649.59	310.46	PRGW-5
6453788.26	2270887.50	302.64	PRGW-6
6453293.72	2270602.20	286.58	PRGW-7
6453031.46	2271120.49	257.73	PRGW-8
6452628.39	2271355.27	217.51	PRGW-9
6452492.53	2271532.11	219	PRGW-10
6452465.67	2271273.17	218.46	PRGW-11
6452423.80	2271490.26	218.72	PRGW-12
6453999.40	2273343.08	340.45	LF-1
6454080.88	2272888.44	333.37	LF-2
6453643.65	2272685.20	339.68	LF-3
6453540.42	2272823.47	323.26	LF-4



This groundwater contour map was made with Surfer (version 6.04, Copyright 1997 Golden Software) using Kriging. Kriging is a mathematical process that develops an optimal estimated surface for a set of three-dimensional ("x-y-z") data. Because the mapped surface is optimal estimated representation of the data rather than direct linear interpolation, the points at which the surface is intersected by a well may not necessarily reflect the actual water level elevation in that well. Please see Table E-1 for actual water level elevations in wells.

Data Used for June 2000 Groundwater Contour Map

6453669.64	2272475.41	322.18	PRGW-1
6454140.31	2270649.59	306.09	PRGW-5
6453788.26	2270887.50	304.39	PRGW-6
6453293.72	2270602.20	278.75	PRGW-7
6453031.46	2271120.49	242.08	PRGW-8
6453999.40	2273343.08	339.7	LF-1
6454080.88	2272888.44	330.07	LF-2
6453643.65	2272685.20	337.13	LF-3
6453540.42	2272823.47	323.86	LF-4

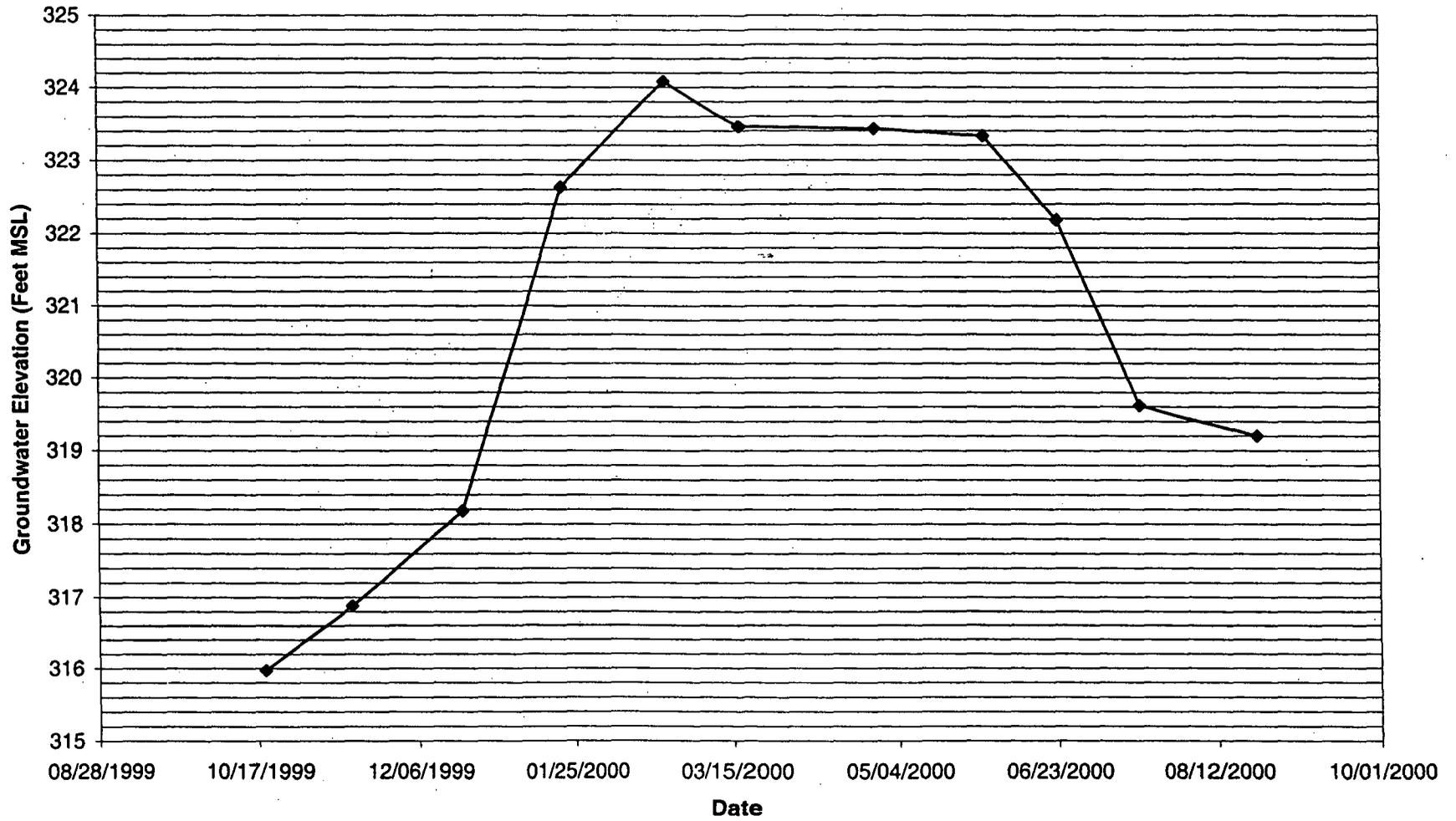


This groundwater contour map was made with Surfer (version 6.04, Copyright 1997 Golden Software) using Kriging. Kriging is a mathematical process that develops an optimal estimated surface for a set of three-dimensional ("x-y-z") data. Because the mapped surface is optimal estimated representation of the data rather than direct linear interpolation, the points at which the surface is intersected by a well may not necessarily reflect the actual water level elevation in that well. Please see Table E-1 for actual water level elevations in wells.

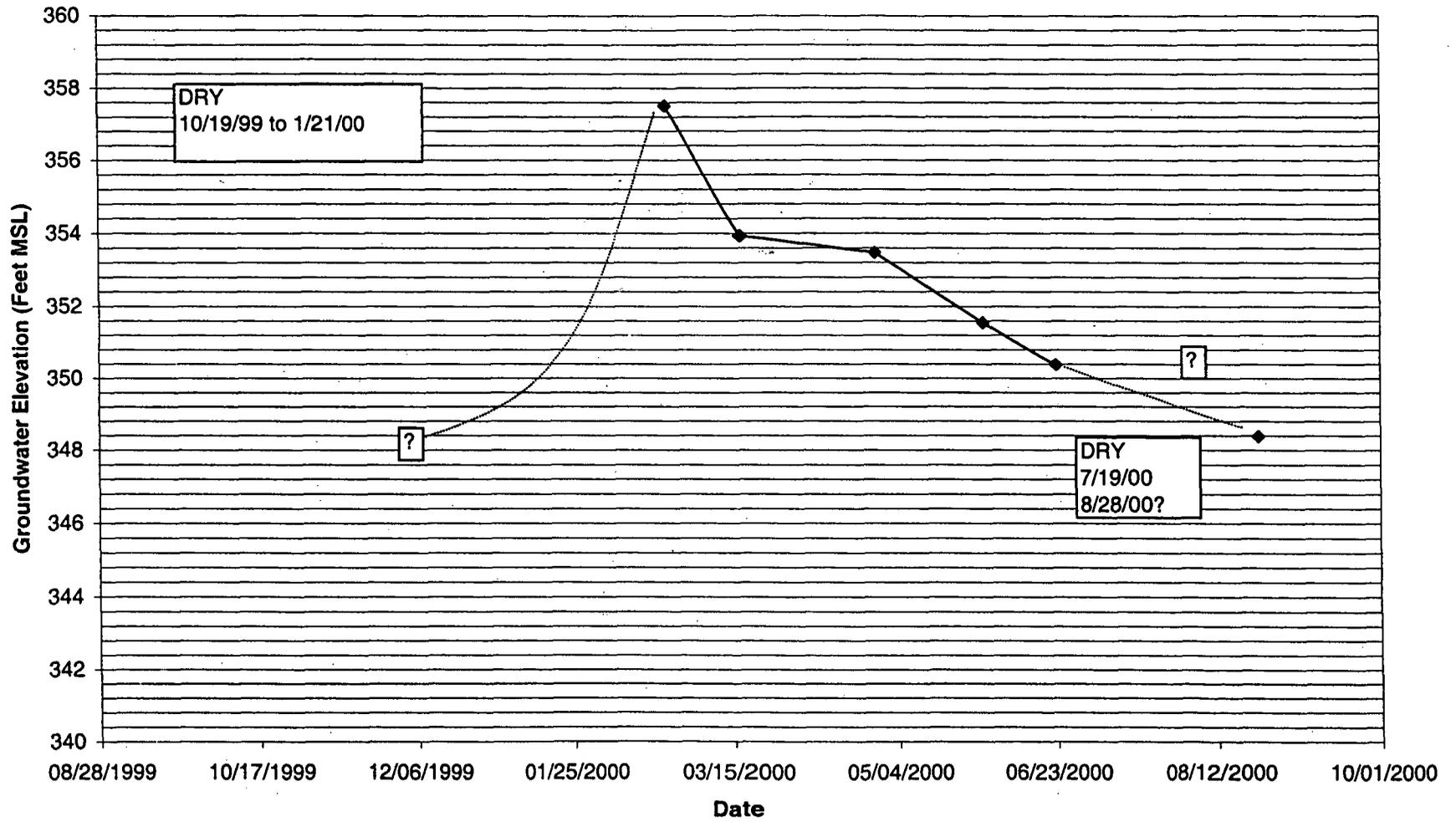
Data Used for August 2000 Groundwater Contour Map

6453669.64	2272475.41	319.2	PRGW-1
6454140.31	2270649.59	304.54	PRGW-5
6453788.26	2270887.50	302.94	PRGW-6
6453293.72	2270602.20	276.25	PRGW-7
6452628.39	2271355.27	218.61	PRGW-9
6452492.53	2271532.11	221.28	PRGW-10
6452465.67	2271273.17	220.78	PRGW-11
6453999.40	2273343.08	338.88	LF-1
6454080.88	2272888.44	325.21	LF-2
6453643.65	2272685.20	328.36	LF-3
6453540.42	2272823.47	323.26	LF-4

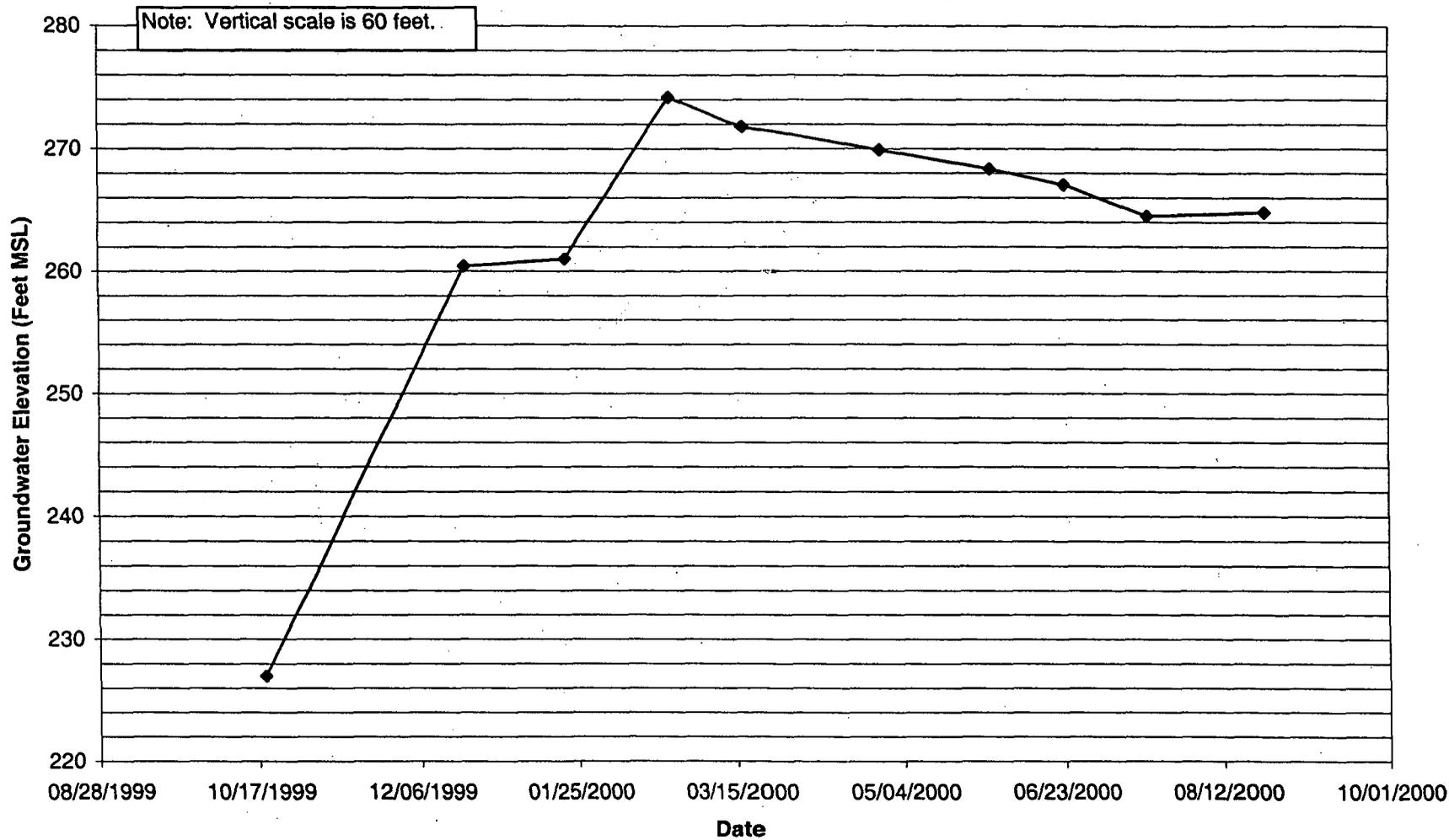
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-1



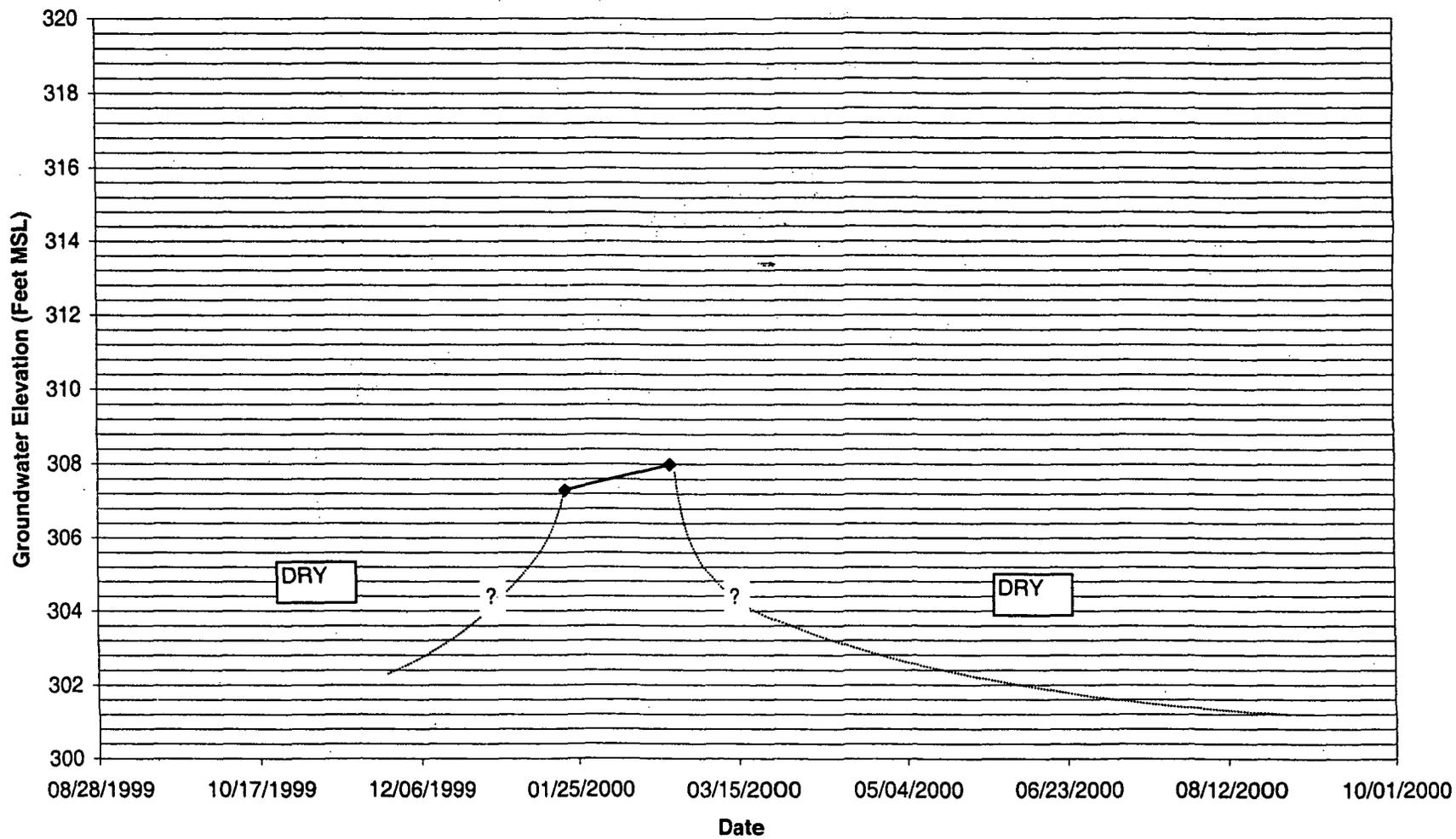
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-2



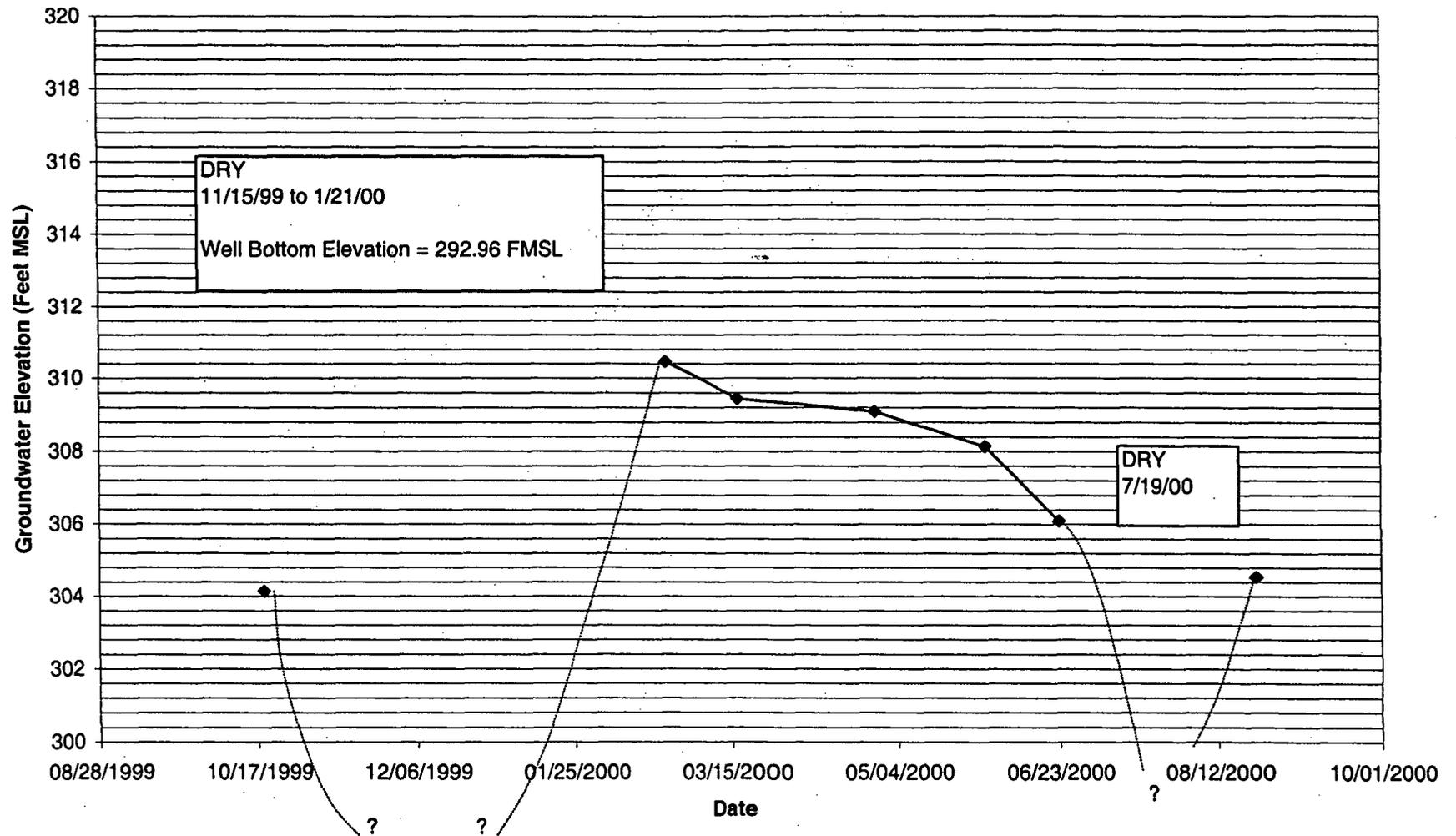
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-3



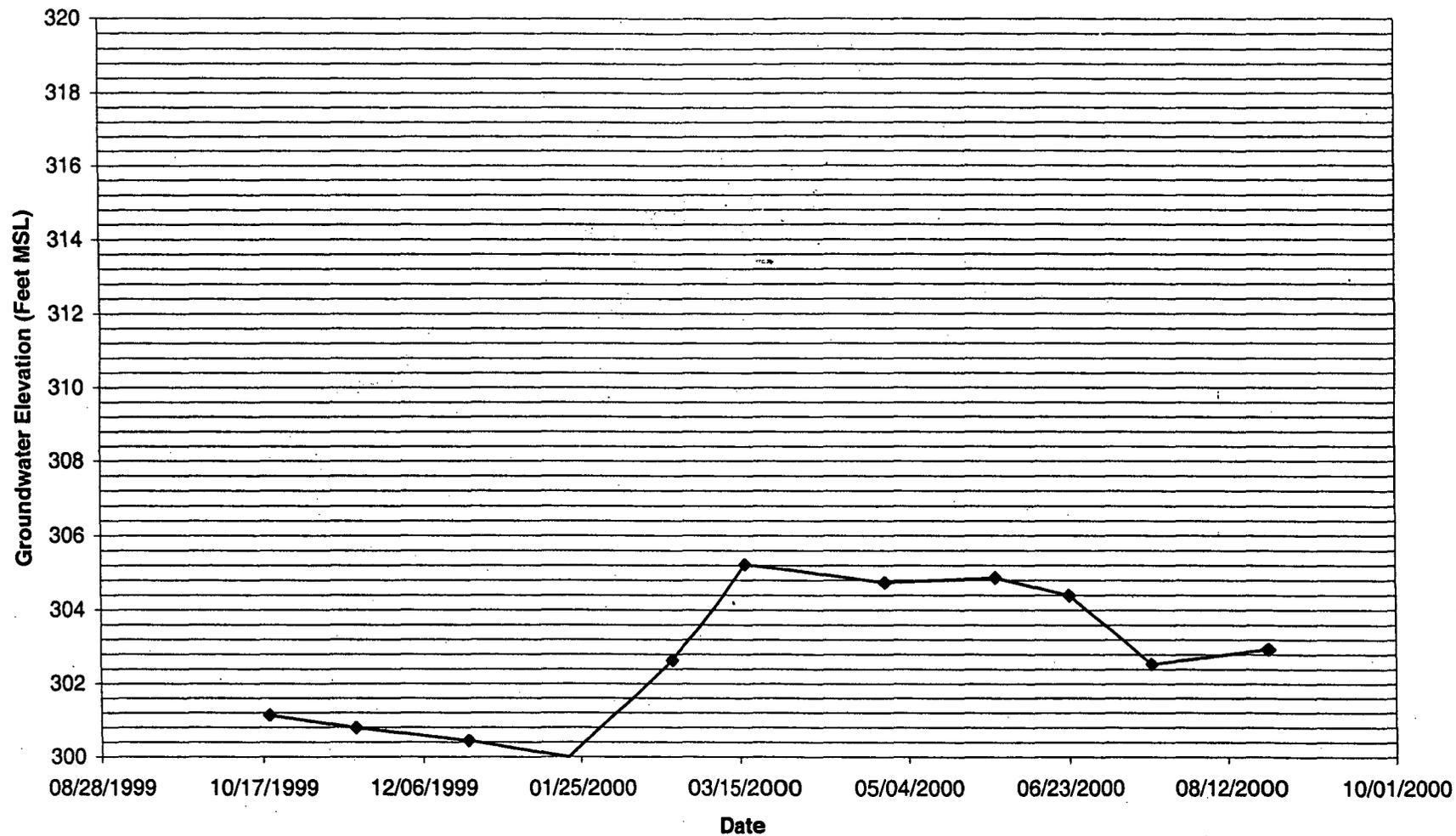
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-4



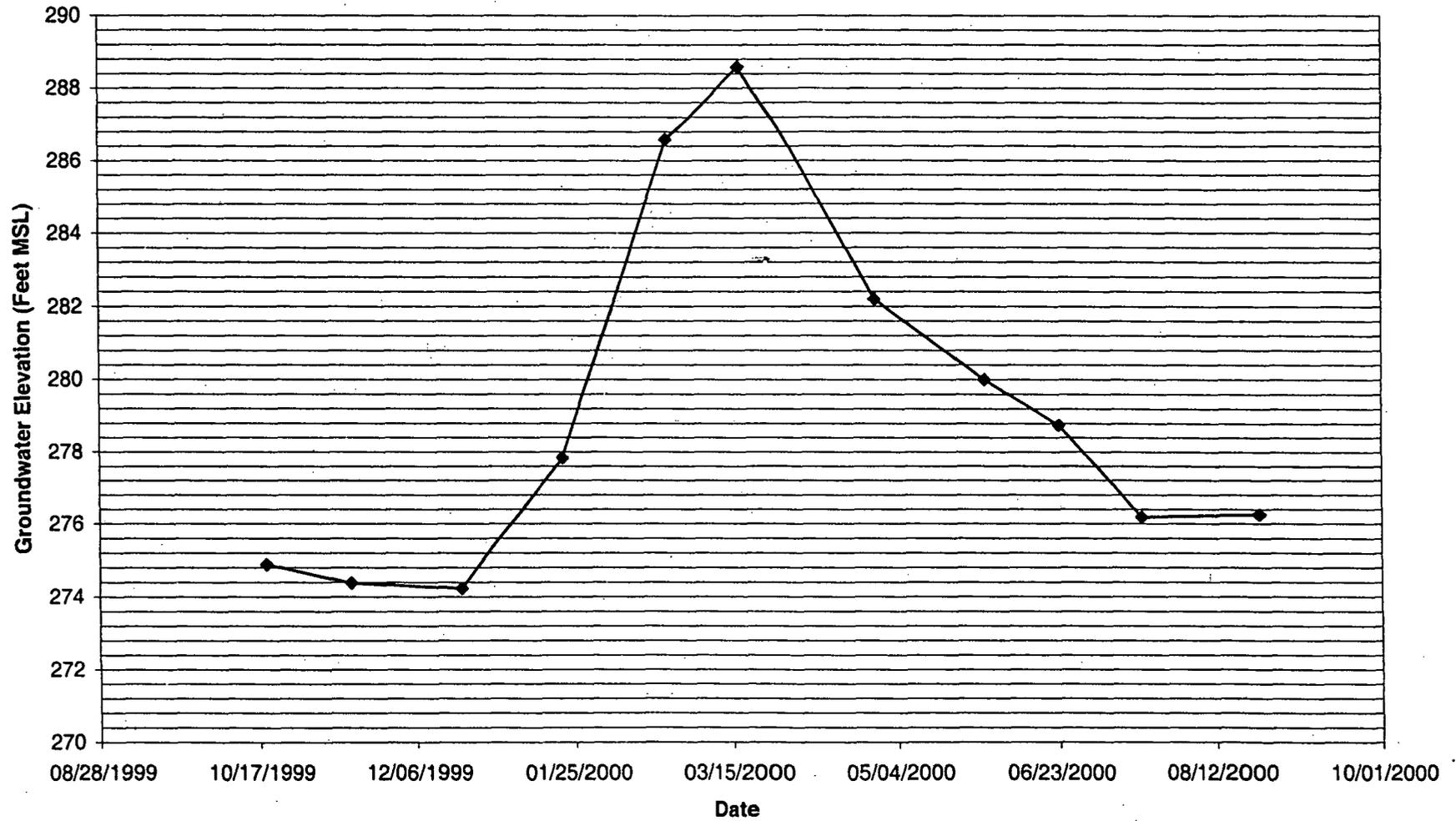
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-5



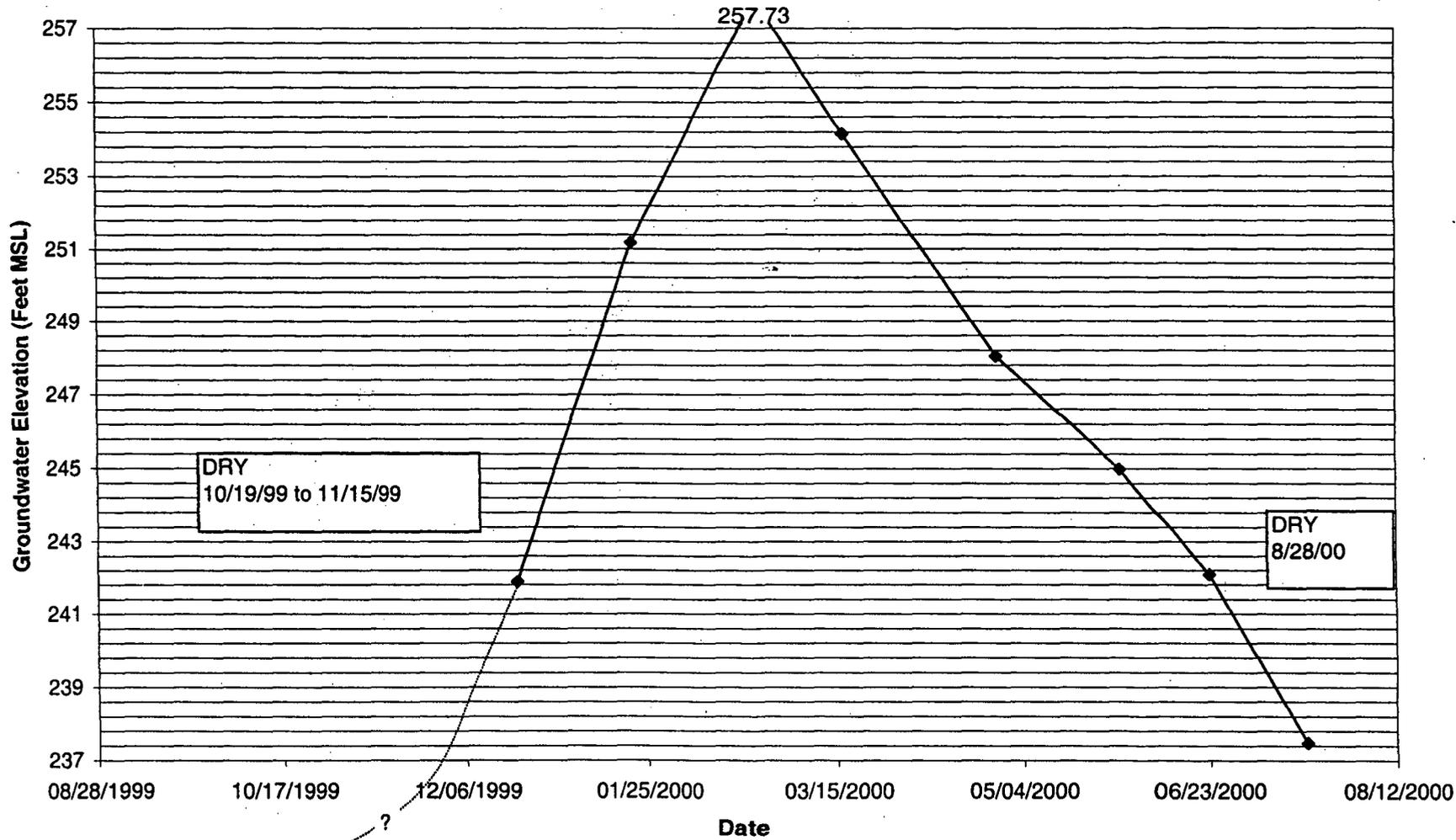
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-6



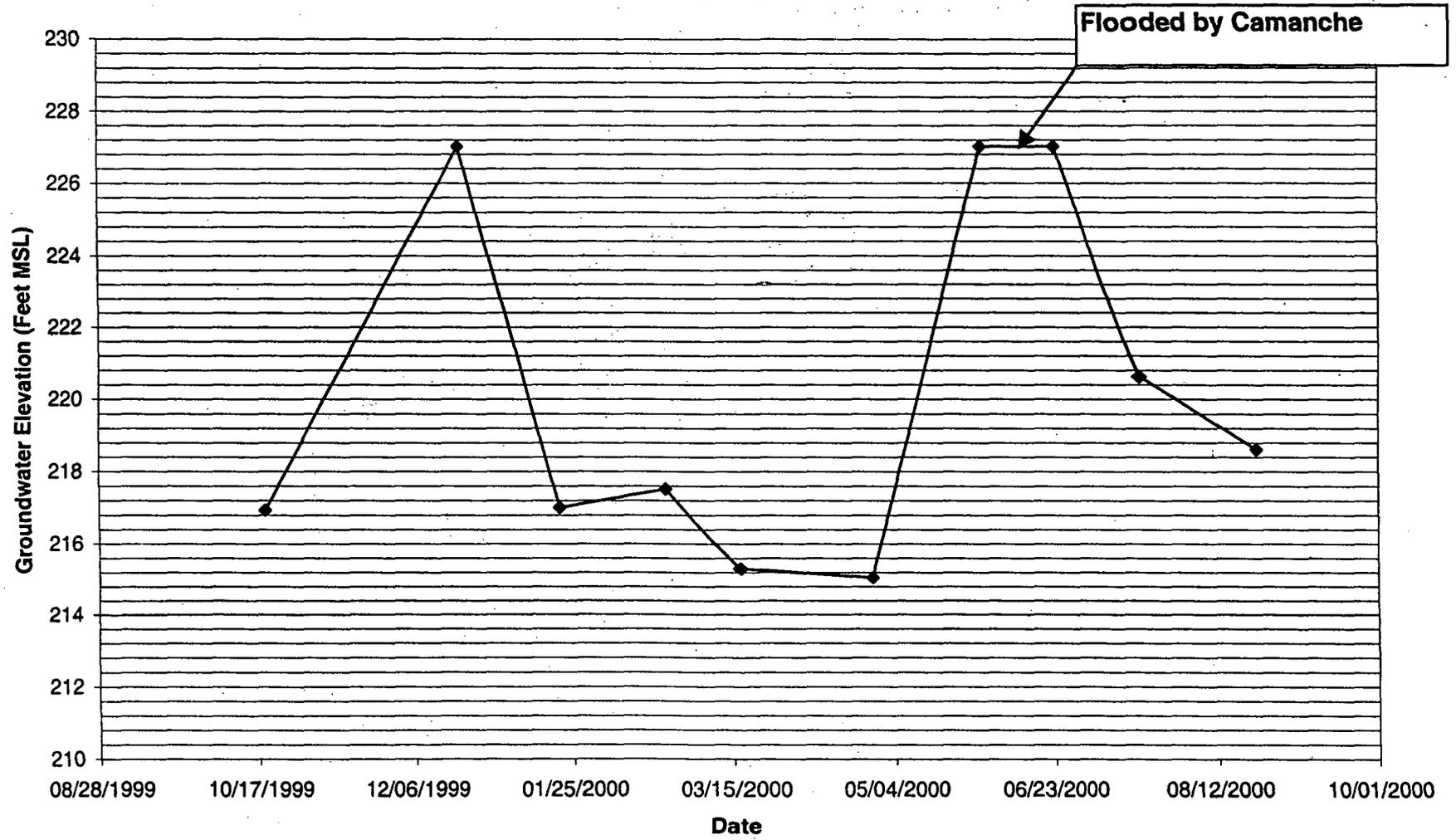
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-7



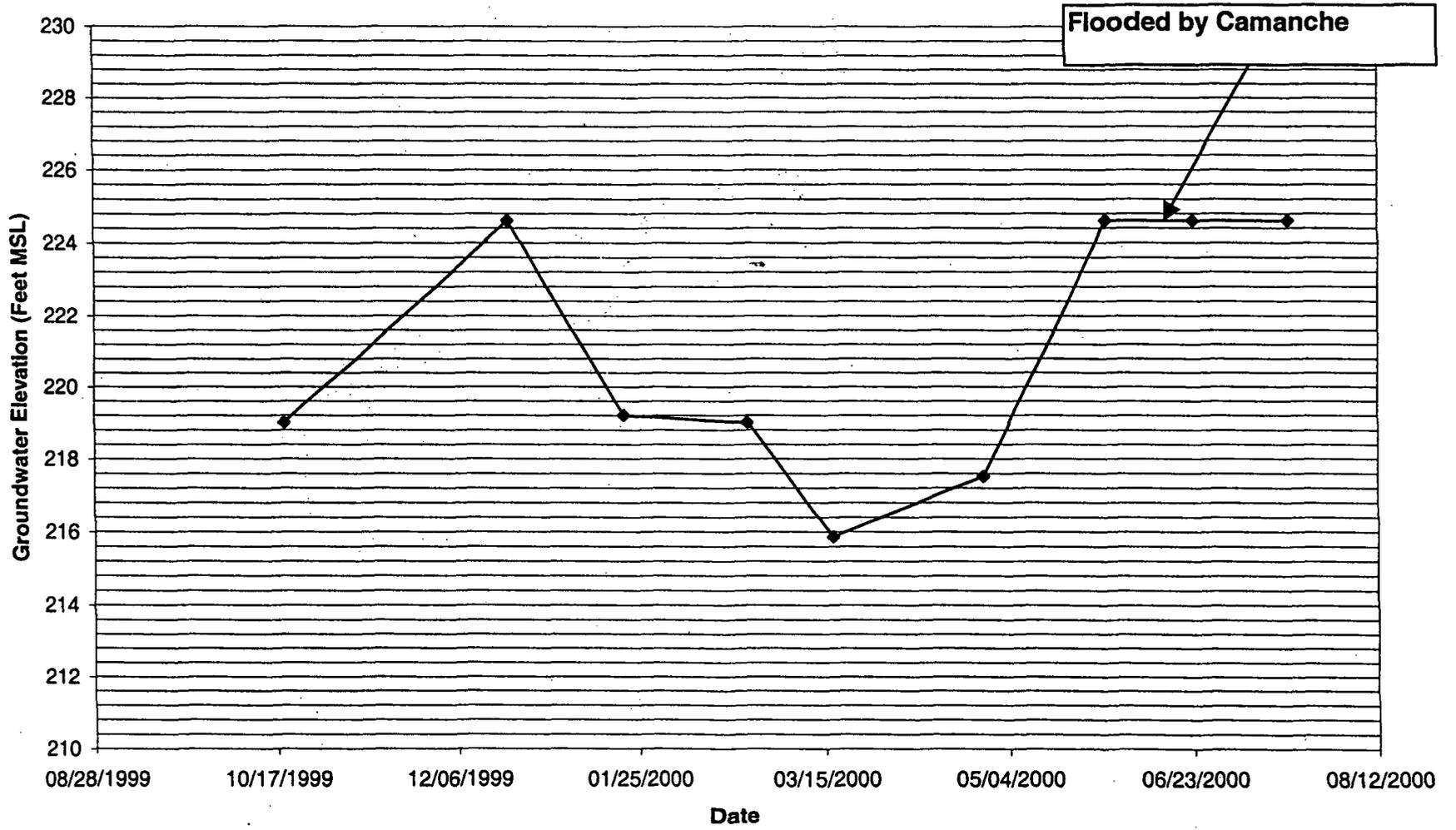
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-8



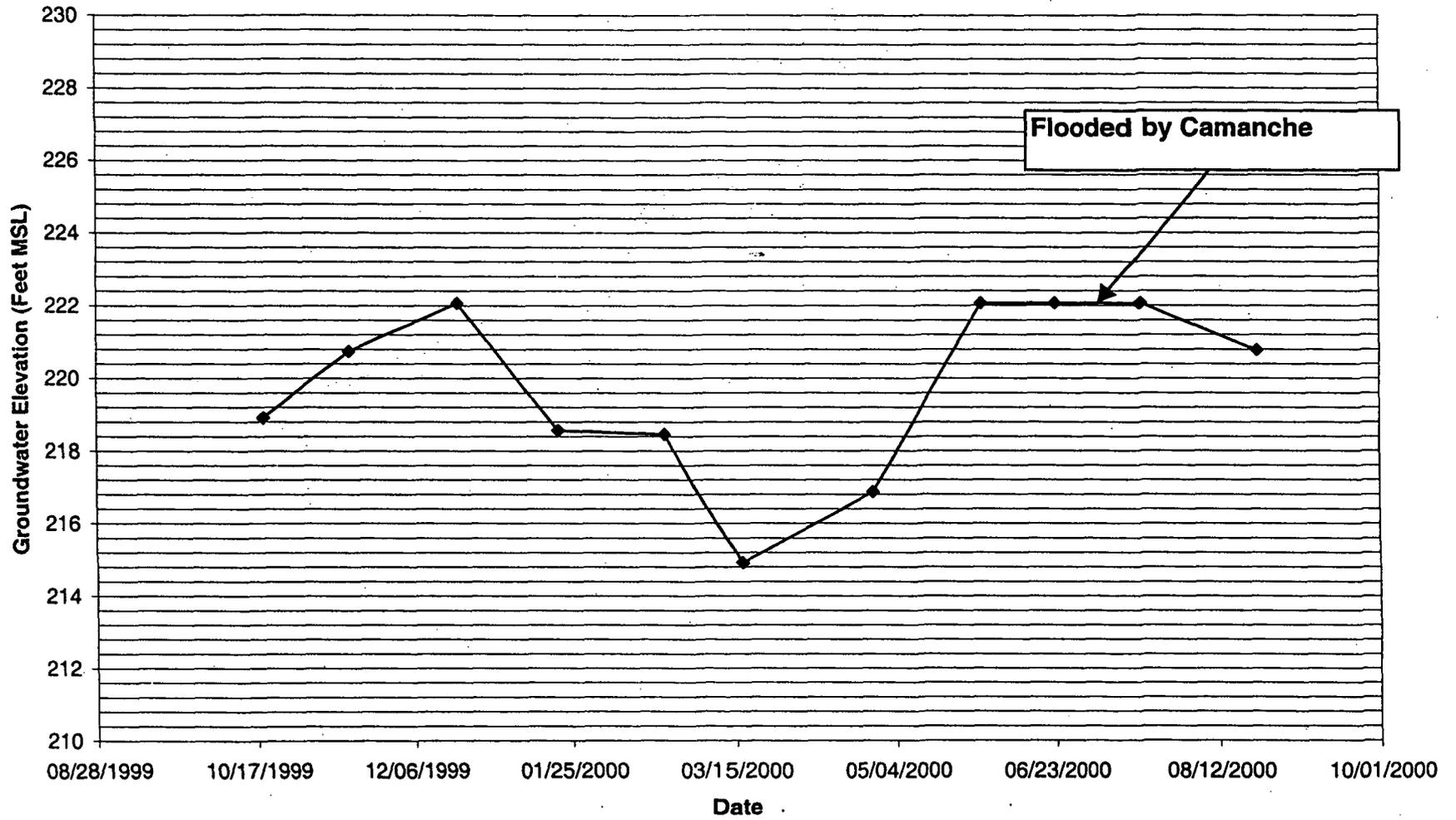
Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-9



Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-10



Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-11



Post-Restoration Groundwater Levels
October 1999 - August 2000
PRGW-12

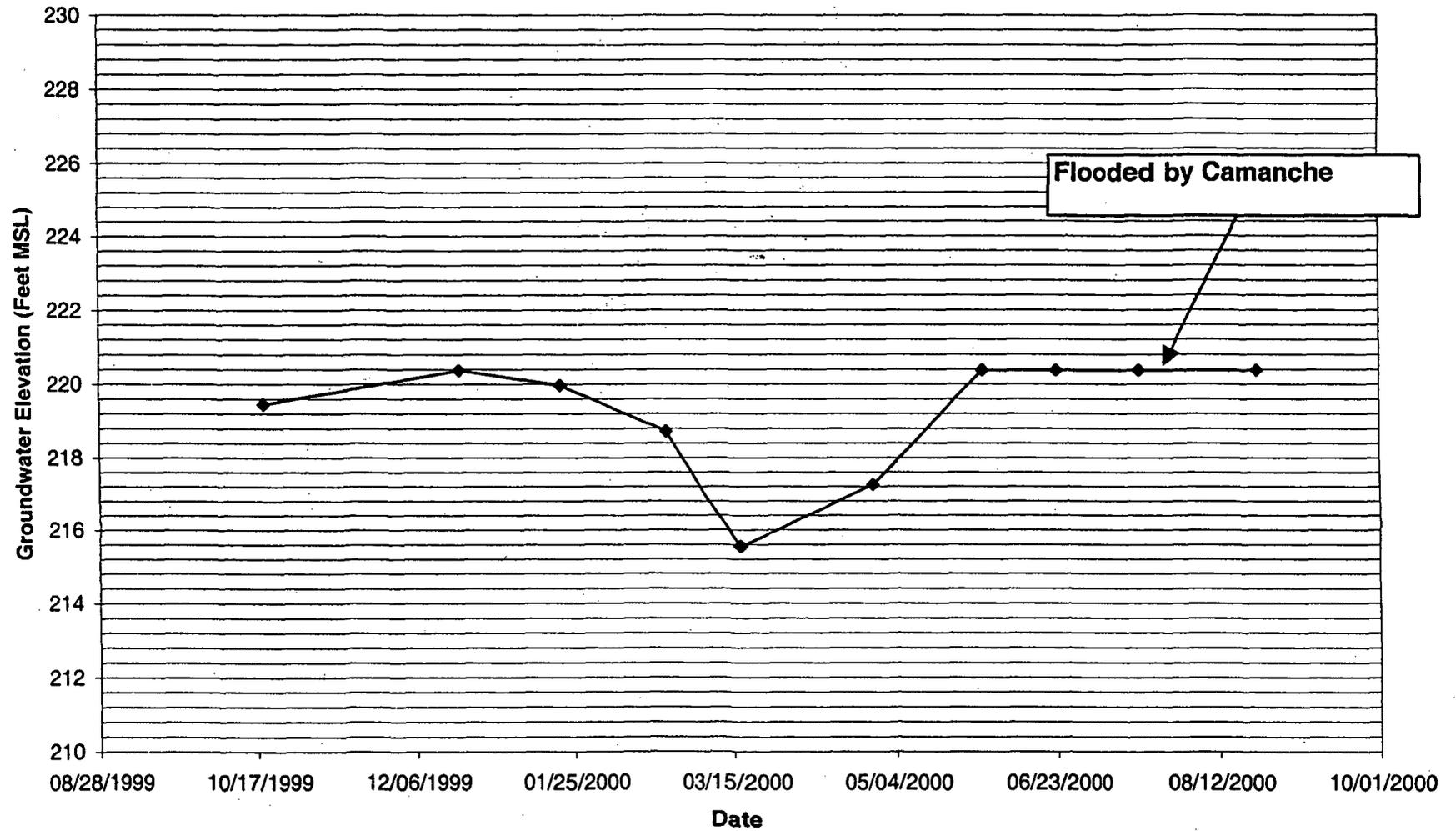


Table F-1
Penn Mine Environmental Site Restoration Project
Groundwater Elevation Data
Post-Restoration Monitoring Program

PRGW-1			PRGW-2			PRGW-3			PRGW-4			PRGW-5			PRGW-6			PRGW-7		
Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE
10/19/1999	15.51	315.97	10/19/1999	dry		10/19/1999	136	226.99	10/19/1999	dry		10/19/1999	13.82	304.14	10/19/1999	51.61	301.13	10/19/1999	21.45	274.88
11/15/1999	14.6	316.88	11/15/1999	nm	NM	11/15/1999	nm	nm	11/15/1999	dry		11/15/1999	dry		11/15/1999	51.95	300.79	11/15/1999	21.95	274.38
12/20/1999	13.3	318.18	12/20/1999	?	#VALUE!	12/20/1999	102.6	260.39	12/20/1999	dry		12/20/1999	dry		12/20/1999	52.3	300.44	12/20/1999	22.1	274.23
01/21/2000	8.85	322.63	01/21/2000	?	#VALUE!	01/21/2000	102	260.99	01/21/2000	12.35	307.29	01/21/2000	dry		01/21/2000	52.75	299.99	01/21/2000	18.5	277.83
02/23/2000	7.4	324.08	02/23/2000	10.82	357.51	02/23/2000	88.8	274.19	02/23/2000	11.65	307.99	02/23/2000	7.5	310.46	02/23/2000	50.1	302.64	02/23/2000	9.75	286.58
03/17/2000	8.02	323.46	03/17/2000	14.4	353.93	03/17/2000	91.2	271.79	03/17/2000	dry		03/17/2000	8.52	309.44	03/17/2000	47.52	305.22	03/17/2000	7.75	288.58
04/27/2000	8.05	323.43	04/27/2000	14.86	353.47	04/27/2000	93.09	269.9	04/27/2000	dry		04/27/2000	8.87	309.09	04/27/2000	48	304.74	04/27/2000	14.14	282.19
05/31/2000	8.15	323.33	05/31/2000	16.78	351.55	05/31/2000	94.65	268.34	05/31/2000	dry		05/31/2000	9.82	308.14	05/31/2000	47.87	304.87	05/31/2000	16.33	280
06/23/2000	9.3	322.18	06/23/2000	17.95	350.38	06/23/2000	95.95	267.04	06/23/2000	dry		06/23/2000	11.87	306.09	06/23/2000	48.35	304.39	06/23/2000	17.58	278.75
07/19/2000	11.86	319.62	07/19/2000	dry		07/19/2000	98.5	264.49	07/19/2000	dry		07/19/2000	dry		07/19/2000	50.2	302.54	07/19/2000	20.15	276.18
08/24/2000	12.28	319.2	08/24/2000	19.95	348.38	08/24/2000	98.2	264.79	08/24/2000	dry		08/24/2000	13.42	304.54	08/24/2000	49.8	302.94	08/24/2000	20.08	276.25

PRGW-8			PRGW-9			PRGW-10			PRGW-11			PRGW-12			Camanche	
Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	DTW	WLE	Date	Elev.
10/19/1999	dry		10/19/1999	10.08	216.93	10/19/1999	5.6	219	10/19/1999	3.15	218.91	10/19/1999	0.92	219.45	10/19/1999	219
11/15/1999	dry		11/15/1999	nm	nm	11/15/1999	nm	nm	11/15/1999	1.32	220.74	11/15/1999	nm	nm	11/15/1999	221
12/20/1999	16.9	241.88	12/20/1999	0	227.01	12/20/1999	0	224.6	12/20/1999	0	222.06	12/20/1999	0	220.37	12/20/1999	222
01/21/2000	7.6	251.18	01/21/2000	10	217.01	01/21/2000	5.4	219.2	01/21/2000	3.5	218.56	01/21/2000	0.4	219.97	01/21/2000	219
02/23/2000	1.05	257.73	02/23/2000	9.5	217.51	02/23/2000	5.6	219	02/23/2000	3.6	218.46	02/23/2000	1.65	218.72	02/23/2000	219
03/17/2000	4.63	254.15	03/17/2000	11.7	215.31	03/17/2000	8.74	215.86	03/17/2000	7.14	214.92	03/17/2000	4.82	215.55	03/17/2000	215
04/27/2000	10.74	248.04	04/27/2000	11.96	215.05	04/27/2000	7.09	217.51	04/27/2000	5.2	216.86	04/27/2000	3.12	217.25	04/27/2000	216
05/31/2000	13.8	244.98	05/31/2000	0	227.01	05/31/2000	0	224.6	05/31/2000	0	222.06	05/31/2000	0	220.37	05/31/2000	218
06/23/2000	16.7	242.08	06/23/2000	0	227.01	06/23/2000	0	224.6	06/23/2000	0	222.06	06/23/2000	0	220.37	06/23/2000	227
07/19/2000	21.31	237.47	07/19/2000	6.39	220.62	07/19/2000	0	224.6	07/19/2000	0	222.06	07/19/2000	0	220.37	07/19/2000	223.8
08/24/2000	dry		08/24/2000	8.4	218.61	08/24/2000	3.32	221.28	08/24/2000	1.28	220.78	08/24/2000	0	220.37	08/24/2000	220.8

LF-1			LF-2			LF-3			LF-4		
Date	DTW	WLE									
10/19/1999	67.97	339.48	10/19/1999	40.68	323.19	10/19/1999	29.05	325.23	10/19/1999	55.55	321.66
11/15/1999	nm		11/15/1999	nm		11/15/1999	nm		11/15/1999	nm	
12/20/1999	nm		12/20/1999	nm		12/20/1999	nm		12/20/1999	nm	
01/21/2000	66.56	340.89	01/21/2000	37.74	326.13	01/21/2000	27.62	326.66	01/21/2000	56.21	321
02/23/2000	67	340.45	02/23/2000	30.5	333.37	02/23/2000	14.6	339.68	02/23/2000	53.95	323.26
03/17/2000	67.15	340.3	03/17/2000	31.22	332.65	03/17/2000	15.05	339.23	03/17/2000	52.92	324.29
04/27/2000	70.05	337.4	04/27/2000	31.3	332.57	04/27/2000	15.45	338.83	04/27/2000	61.25	315.96
05/31/2000	67.5	339.95	05/31/2000	31.9	331.97	05/31/2000	16.27	338.01	05/31/2000	53.45	323.76
06/23/2000	67.75	339.7	06/23/2000	33.8	330.07	06/23/2000	17.15	337.13	06/23/2000	53.35	323.86
07/19/2000	69.52	337.93	07/19/2000	37.34	326.53	07/19/2000	21.02	333.26	07/19/2000	55.05	322.16
08/24/2000	68.57	338.88	08/24/2000	38.66	325.21	08/24/2000	25.92	328.36	08/24/2000	53.95	323.26

note: zero = wellhead flooded by reservoir level

Appendix G – Mass Load Calculations

Loadings from ARD-affected groundwater discharge to Camanche

time period	310 days
discharge, cubic feet	1400
pH*	6.3
copper ug/L*	636
zinc ug/L*	17934
liters	39,662
copper mg	25,225
zinc mg	711,298
copper lbs	0.056
zinc lbs	1.568

*average from wells PRGW-9, -10, -11, and -12

PRSW-1												
time period	1	2	3	4	5	6	7	8	9	10		
	11/8 to 12/13	12/14 to 1/11	1/12 to 2/4	2/5 to 2/28	2/29 to 3/31	4/1 to 4/30	5/1 to 5/31	6/1 to 6/30	7/1 to 7/31	8/1 to 8/31		total
days	36	29	24	24	32	30	31	30	31	31		298
Flow Range in gpm	1 to 3	0 to 1	10 to 250	250 to 650				1	0	0		
Est Avg flow in gpm	2	0.5	150	300	44	48	8	1	0	0		
cf/day	385	96	28864	57728	8467	9237	1539	192	0	0		
cf/time period	13855	2790	692739	1385479	270938	277096	47722	5773	0	0		2,696,392
sample date	08-Nov	20-Dec	24-Jan	23-Feb	20-Mar	17-Apr	15-May	19-Jun	17-Jul	22-Aug		
pH	7.2	8	7.2	6.6	6.4	6.5	6.7	6.5				
copper ug/L	30.3	11.5	42.9	21.7	29	20.4	11.5	9.54				
zinc ug/L	20.3	14	305	17.2	15.3	10.5	8.27	13				
liters	392,506	79,046	19,625,308	39,250,616	7,675,676	7,850,123	1,351,966	163,544	0	0		
copper mg	11,893	909	841,926	851,738	222,595	160,143	15,548	1,560	0	0		
zinc mg	7,968	1,107	5,985,719	675,111	117,438	82,426	11,181	2,126	0	0		
												total
copper lbs	0.026	0.002	1.856	1.878	0.491	0.353	0.034	0.003	0	0		4.644
zinc lbs	0.018	0.002	13.196	1.488	0.259	0.182	0.025	0.005	0	0		15.174

PRSW-2												
time period	1	2	3	4	5	6	7	8	9	10		
	11/8 to 12/13	12/14 to 1/11	1/12 to 2/4	2/5 to 2/28	2/29 to 3/31	4/1 to 4/30	5/1 to 5/31	6/1 to 6/30	7/1 to 7/31	8/1 to 8/31	total	
days	36	29	24	24	32	30	31	30	31	31	298	
Flow Range in gpm												
Est Avg flow in gpm	4	1.6	50	350	45	60	32	16	4	2.6		
cf/day	770	308	9621	67350	8659	11546	6158	3079	770	500		
cf/time period	27710	8929	230913	1616392	277096	346370	190888	92365	23861	15510	2,830,033	
sample date	08-Nov	20-Dec	24-Jan	23-Feb	20-Mar	17-Apr	15-May	19-Jun	17-Jul	22-Aug		
pH	6.6	7.3	6.4	6.1	5.3	6.2	3.7	6.1	7.1	6.7		
copper ug/L	998	453	208	271	3120	145	5420	13.8	8.66	15.6		
zinc ug/L	43500	129000	3790	1760	13000	2300	23800	26200	30400	33200		
liters	785,012	252,948	6,541,769	45,792,385	7,850,123	9,812,654	5,407,863	2,616,708	675,983	439,389		
copper mg	783,442	114,586	1,360,688	12,409,736	24,492,384	1,422,835	29,310,615	36,111	5,854	6,854		
zinc mg	34,148,036	32,630,345	24,793,306	80,594,597	102,051,601	22,569,104	128,707,130	68,557,742	20,549,878	14,587,709		
											total	
copper lbs	1.727	0.253	3.000	27.358	53.996	3.137	64.618	0.080	0.013	0.015	154.196	
zinc lbs	75.282	71.936	54.659	177.678	224.981	49.756	283.746	151.141	45.304	32.160	1166.643	

PRSW-4												
time period	1	2	3	4	5	6	7	8	9	10		
	11/8 to 12/13	12/14 to 1/11	1/12 to 2/4	2/5 to 2/28	2/29 to 3/31	4/1 to 4/30	5/1 to 5/31	6/1 to 6/30	7/1 to 7/31	8/1 to 8/31	total	
days	36	29	24	24	32	30	31	30	31	31	298	
Flow Range in gpm												
Est Avg flow in gpm	0	0	25	85	2	2	0	0	0	0		
cf/day	0	0	4811	16356	385	385	0	0	0	0		
cf/time period	0	0	115457	392552	12315	11546	0	0	0	0	531,870	
sample date	08-Nov	20-Dec	24-Jan	23-Feb	20-Mar	17-Apr	15-May	19-Jun	17-Jul	22-Aug		
pH			6.2	3.5	6.4	5.6						
copper ug/L			173	33.3	39.5	138						
zinc ug/L			435	92.1	108	319						
liters	0	0	3,270,885	11,121,008	348,894	327,088	0	0	0	0		
copper mg	0	0	565,863	370,330	13,781	45,138	0	0	0	0		
zinc mg	0	0	1,422,835	1,024,245	37,681	104,341	0	0	0	0		
											total	
copper lbs	0.000	0.000	1.247	0.816	0.030	0.100	0.000	0.000	0.000	0.000	2.194	
zinc lbs	0.000	0.000	3.137	2.258	0.083	0.230	0.000	0.000	0.000	0.000	5.708	

PRSW-5												
time period	1	2	3	4	5	6	7	8	9	10		
	11/8 to 12/13	12/14 to 1/11	1/12 to 2/4	2/5 to 2/28	2/29 to 3/31	4/1 to 4/30	5/1 to 5/31	6/1 to 6/30	7/1 to 7/31	8/1 to 8/31	total	
days	36	29	24	24	32	30	31	30	31	31	298	
Flow Range in gpm												
Est Avg flow in gpm	2	1	178	535	5	8	0	0	0	0		
cf/day	385	192	34252	102949	962	1539	0	0	0	0		
cf/time period	13855	5580	822051	2470771	30788	46183	0	0	0	0	3,389,228	
sample date	08-Nov	20-Dec	24-Jan	23-Feb	20-Mar	17-Apr	15-May	19-Jun	17-Jul	22-Aug		
pH	6	6	6.8	6.5	6.3	6.5						
copper ug/L	3010	7400	702	306	675	370						
zinc ug/L	16800	17000	4980	1530	9770	5460						
liters	392,506	158,093	23,288,699	69,996,931	872,236	1,308,354	0	0	0	0		
copper mg	1,181,444	1,169,886	16,348,666	21,419,061	588,759	484,091	0	0	0	0		
zinc mg	6,594,103	2,687,577	115,977,719	107,095,305	8,521,745	7,143,612	0	0	0	0		
											total	
copper lbs	2.605	2.579	36.042	47.220	1.298	1.067	0.000	0.000	0.000	0.000	90.811	
zinc lbs	14.537	5.925	255.683	236.101	18.787	15.749	0.000	0.000	0.000	0.000	546.781	

PRSW-6												
time period	1	2	3	4	5	6	7	8	9	10		
	11/8 to 12/13	12/14 to 1/11	1/12 to 2/4	2/5 to 2/28	2/29 to 3/31	4/1 to 4/30	5/1 to 5/31	6/1 to 6/30	7/1 to 7/31	8/1 to 8/31	total	
days	36	29	24	24	32	30	31	30	31	31		298
Flow Range in gpm												
Est Avg flow in gpm	10	2	250	760	54	75	40	16	4	2.6		
cf/day	1924	385	48107	146245	10391	14432	7697	3079	770	500		
cf/time period	69274	11161	1154566	3509880	332515	432962	238610	92365	23861	15510	5,880,703	
sample date	08-Nov	20-Dec	24-Jan	23-Feb	20-Mar	17-Apr	15-May	19-Jun	17-Jul	22-Aug		
pH	6.7	7.3	6.6	6.2	5.6	6.6	4	6.8	7.4	6.9		
copper ug/L	606	733	261	244	2370	153	4790	27.3	20.4	15.6		
zinc ug/L	22800	116000	4240	1880	11800	2800	22000	25000	28900	29200		
liters	1,962,531	316,186	32,708,846	99,434,893	9,420,148	12,265,817	6,759,828	2,616,708	675,983	439,389		
copper mg	1,189,294	231,764	8,537,009	24,262,114	22,325,750	1,876,670	32,379,577	71,436	13,790	6,854		
zinc mg	44,745,702	36,677,520	138,685,508	186,937,599	111,157,743	34,344,289	148,716,221	65,417,693	19,535,904	12,830,154		
											total	
copper lbs	2.622	0.511	18.821	53.488	49.219	4.137	71.384	0.157	0.030	0.015	200.384	
zinc lbs	98.646	80.859	305.744	412.120	245.057	75.715	327.858	144.219	43.069	28.285	1761.570	