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PACIFICORP ELECTRIC OPERATIONS
FUEL RESOURCES
TECHNICAL SERVICES REPORT

CHARLES A. SEMBORSKI

CENTRAL ENGINEERING

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EAST MOUNTAIN PROPERTY
1991

PACIFICORP FUEL RESOURCES

PACIFICORP - FUEL RESOURCES
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ANNUAL REPORT FOR 1991

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I. INTRODUCTION

The 1991 Hydrologic Monitoring Report is hereby submitted in accordance with the U. S. Department of Interior, Office of Surface Mining requirements and the Utah State Division of Oil, Gas and Mining guidelines for hydrologic monitoring in areas of and adjacent to coal mining operations.

This is the fourteenth annual hydrologic report submitted by PacifiCorp since the report entitled "Monitoring of the Water Resources in the Mining Areas of East Mountain, Emery County, Utah" was submitted to the U. S. Geological Survey and the Utah Division of Oil, Gas and Mining in December 1977. It addresses flow observations and water quality characteristics of the water resources adjacent to PacifiCorp's mining areas in Emery County. (See Figure 1.)

Information was compiled the past year from in-house as well as from state and federal agencies and private sources as follow:

U. S. Geological Survey
U. S. Forest Service
U. S. Department of Commerce, National Weather Service
Utah Division of Oil, Gas and Mining
Utah Division of Environmental Health
Huntington-Cleveland Irrigation Company
Emery Water Conservancy District
Cottonwood Creek Consolidated Irrigation Company

Information from outside agencies will continue to be utilized each year for as long as their data gathering programs continue. As a result, cooperative effort is realized and duplication of effort and expense is substantially reduced.

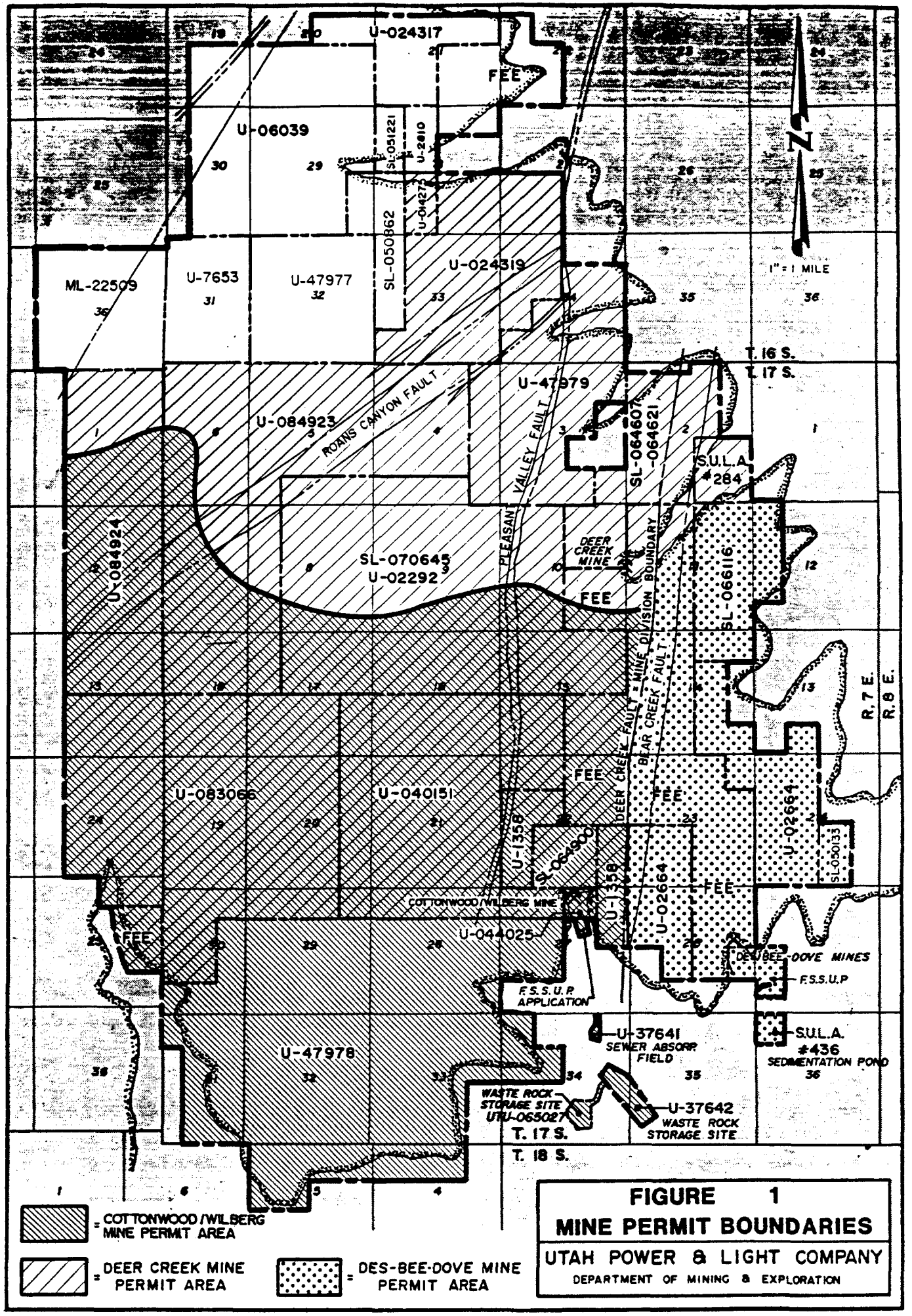


FIGURE 1
MINE PERMIT BOUNDARIES
UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION

II. CLIMATIC OBSERVATIONS

In general, runoff and subsequent water supplies are a direct function of the climatic conditions in any given area. Furthermore, the significance of the weather affecting the flow characteristics of the East Mountain springs cannot be overemphasized.

Most of the water supply in the Western United States originates in the high mountain ranges as snowfall during winter periods. Snowmelt augmented by spring precipitation produces runoff which is utilized downstream. Fall precipitation influences soil moisture conditions prior to snowpack accumulation and has a bearing upon runoff the following year.

A. Regional Climatology

From 1982 to 1984 the Western United States, especially Utah, experienced an unprecedented wet cycle of precipitation. The pattern changed in 1985 with conditions returning to slightly above normal. During the 1986 water year the extremely wet trend returned, and the upper Colorado River Basin experienced above average precipitation. The 1987 weather pattern changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal. The drought continued into 1988, 1989, 1990, and 1991 with runoff amounts much below normal for five consecutive years.

B. Local Climatology

1. Precipitation

Valley precipitation in Emery County during 1991 was above average. The mountains in the San Rafael Basin received below normal snowfall during the

1990-91 winter; however, precipitation at Electric Lake (22.56") was above normal due to an abnormally wet summer.

Precipitation amounts recorded at Hunter Plant, Huntington Plant, Electric Lake, and East Mountain for the 1991 water year (October 1990 to September 1991) will be presented since these sites include low elevation, intermediate elevation, and two high elevation observation sites in the immediate vicinity of mining activities. The values are shown in Table 1 on the following page.

A comparison of precipitation for 1990 and 1991 merits consideration in this study. The intent is to develop a correlation between yearly precipitation and spring discharges on East Mountain. Table 2 is a comparison of the 1990-1991 precipitation levels recorded at the four locations.

TABLE 2: COMPARISON OF 1990 AND 1991 PRECIPITATION (Inches)

Station	1990 Amount	1990 % of Normal	1991 Amount	1991 % of Normal	1991 As % of 1990
Hunter Plant	4.73	68	6.66	96	141
Huntington Plant	11.76	157	11.61	155	99
Electric Lake	20.40	104	22.56	115	111
East Mountain	10.90	77	12.69	91	116
Average %		102		114	117

Table 2 indicates that 1991 precipitation was higher than 1990 at Hunter, Electric Lake, and East Mountain and lower at Huntington. The overall precipitation at the four stations averaged seventeen percent (17%) higher in 1991 than in 1990.

TABLE 1: PRECIPITATION IN EMERY COUNTY, UTAH (1991 Water Year)

Month	Hunter Plant (Elev. 5800')		Huntington Plant (Elev. 6500')		Electric Lake (Elev. 8350')		East Mountain (Elev. 8985')	
	Precip (in.)	% Of Normal	Precip (in.)	% Of Normal	Precip. (in.)	% Of Normal	Precip. (in.)	% of Normal
1990								
October	0.04	5	0.45	36	1.32	62	0.48	34
November	0.00	0	0.03	5	0.90	48	0.26	20
December	0.19	35	0.43	91	1.64	57	0.66	63
1991								
January	0.02	5	0.44	83	1.49	74	0.34	33
February	0.29	70	0.37	109	1.61	93	0.39	34
March	0.77	183	0.68	110	4.24	222	2.34	144
April	0.10	23	0.13	24	3.06	182	0.59	66
May	1.09	185	3.13	549	2.60	174	1.83	232
June	0.58	126	0.60	146	0.57	70	0.21	40
July	0.94	162	1.14	120	1.04	89	1.01	72
August	0.53	52	1.87	275	1.39	164	1.48	87
September	2.11	264	2.34	442	2.70	257	3.11	216
TOTALS	6.66	96	11.61	155	22.56	115	12.70	91
Mean Monthly	0.55	---	0.97	---	1.88	---	1.06	---

Tables 3, 4, 5, and 6 indicate monthly precipitation values at Hunter, Huntington, Electric Lake, and East Mountain from the beginning of operation at each site. The tables indicate monthly trends as well as the great fluctuation in yearly totals. Figure 2 shows monthly precipitation at the East Mountain site for the 1991 water year.

The correlation of precipitation levels with spring discharges will be discussed in the East Mountain Springs section of this report.

TABLE 3: HUNTER PLANT PRECIPITATION

Elevation - 5,800 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
75-76	0.13	0.25	0.19	0.02	0.40	0.00	0.89	0.84	0.03	0.31	0.08	0.70	3.84
76-77	0.00	0.02	0.00	0.37	0.07	0.00	0.03	1.28	0.07	1.35	0.41	0.50	4.10
77-78	0.01	0.18	0.00	1.28	1.05	1.74	0.34	1.21	0.00	0.69	1.14	0.14	7.78
78-79	0.03	2.22	0.22	1.43	0.53	2.43	0.24	0.47	0.00	0.00	0.79	0.00	8.36
79-80	0.00	0.00	0.41	1.70	1.70	0.67	0.75	1.11	0.00	0.02	0.51	2.06	8.93
80-81	0.66	0.06	0.02	0.00	0.07	1.48	0.16	0.45	0.14	0.20	0.70	2.43	6.37
81-82	0.58	0.27	0.45	0.94	0.45	0.54	0.00	0.02	0.00	0.15	1.06	1.23	5.69
82-83	0.20	1.25	0.45	0.54	0.41	0.84	0.37	0.51	0.00	2.18	1.58	0.88	9.21
83-84	0.53	0.66	1.07	0.03	0.35	0.34	0.34	0.05	1.09	1.80	1.89	2.35	10.50
84-85	1.6	0.06	1.24	0.20	0.95	1.01	0.67	0.64	0.26	1.50	0.03	0.86	9.11
85-86	0.92	1.40	0.42	0.10	0.97	0.40	0.31	0.00	0.31	0.55	1.01	0.57	7.05
86-87	0.92	0.08	0.10	0.32	0.45	0.90	0.12	1.38	1.25	1.65	1.27	0.11	8.55
87-88	1.91	1.02	0.66	0.55	0.00	0.66	1.64	0.59	0.20	0.69	0.44	0.78	9.14
88-89	0.69	0.04	0.48	1.23	0.02	0.23	0.00	0.37	0.14	1.01	1.70	0.35	6.26
89-90	0.20	0.00	0.03	0.31	0.72	0.71	0.51	0.06	0.24	0.56	0.38	1.11	4.73
90-91	0.04	0.00	0.19	0.02	0.29	0.77	0.10	1.09	0.58	0.94	0.53	2.11	6.66

TABLE 4: HUNTINGTON PLANT PRECIPITATION

Elevation - 6,500 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	---	---	---	---	---	0.08	0.29	0.16	0.11	0.57	0.63	0.43	2.27
71-72	2.26	0.59	1.62	0.04	0.00	0.32	0.28	0.16	0.77	0.40	0.66	1.07	8.17
72-73	4.27	1.28	0.34	0.49	0.80	2.42	0.50	0.17	0.97	1.09	1.94	0.12	14.39
73-74	0.08	0.02	0.37	0.20	0.03	0.01	0.00	0.00	0.00	0.09	0.00	0.07	0.87
74-75	0.68	1.19	1.13	1.01	0.30	0.80	0.03	0.75	1.44	2.62	0.31	0.24	9.50
75-76	0.23	0.95	0.03	0.20	0.23	0.00	2.34	0.86	0.02	0.73	0.19	0.85	6.63
76-77	0.56	0.00	0.00	0.35	0.00	0.00	0.00	1.76	0.00	2.08	0.96	0.70	6.41
77-78	0.66	0.12	0.82	1.45	1.00	1.36	0.94	0.72	0.12	0.05	0.72	0.77	8.73
78-79	0.02	2.65	0.25	1.21	0.52	2.50	0.00	0.84	0.05	0.09	3.32	0.20	11.65
79-80	0.17	0.14	0.15	2.88	3.63	0.68	1.13	1.88	0.65	0.18	0.38	2.22	14.09
80-81	1.20	0.06	0.00	0.00	0.00	0.62	0.08	1.75	0.48	0.00	0.58	1.53	6.30
81-82	1.12	0.25	1.30	1.63	0.20	0.73	0.00	0.17	0.00	0.08	0.71	1.91	8.10
82-83	0.20	0.60	0.67	0.16	0.65	1.87	0.08	0.40	0.00	1.61	0.39	1.15	7.78
83-84	0.76	0.76	2.13	0.10	0.15	1.18	0.72	0.17	1.04	0.74	1.39	0.46	9.60
84-85	2.07	0.34	1.74	0.49	0.27	0.53	0.44	1.08	0.42	3.21	0.04	0.81	11.44
85-86	0.77	1.28	0.64	0.01	0.98	0.28	0.43	0.10	0.17	0.42	0.55	1.08	6.71
86-87	0.38	0.15	0.05	0.81	0.66	0.13	1.22	1.48	1.01	2.14	0.65	0.00	8.68
87-88	1.36	1.35	0.51	1.77	0.00	0.10	1.35	0.94	0.83	0.04	0.13	0.92	9.30
88-89	0.31	0.13	0.83	0.68	0.28	0.21	0.20	0.22	1.28	0.78	1.72	0.74	7.38
89-90	0.21	0.28	0.42	0.51	1.18	0.94	1.30	1.35	0.65	1.30	1.27	2.35	11.76
90-91	0.45	0.03	0.43	0.44	0.37	0.68	0.13	3.13	0.60	1.14	1.87	2.38	11.61

TABLE 5: ELECTRIC LAKE PRECIPITATION

Elevation - 8,350 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
70-71	2.46	2.35	6.41	1.13	1.66	0.36	1.05	0.66	0.47	0.40	2.15	0.78	19.88
71-72	3.49	1.69	4.07	3.35	0.58	0.70	1.02	0.28	1.49	0.70	0.80	2.91	21.08
72-73	4.18	3.43	3.27	0.97	2.09	2.74	3.67	1.42	0.85	0.82	1.23	1.15	25.82
73-74	0.79	1.90	3.52	2.70	1.12	1.52	2.49	0.20	0.13	2.09	0.06	0.09	16.61
74-75	2.27	0.62	1.73	2.10	2.37	3.42	1.23	3.21	1.08	1.93	0.49	0.25	20.70
75-76	1.31	2.57	0.82	1.44	2.23	1.35	1.47	2.00	1.23	1.07	0.54	1.19	17.22
76-77	1.00	0.25	0.14	0.76	1.14	2.00	0.05	3.00	0.90	2.28	1.31	1.26	14.09
77-78	1.47	2.10	3.20	3.68	2.74	3.16	2.46	1.18	0.30	0.10	0.24	0.77	21.40
78-79	0.40	3.18	2.66	2.90	2.18	2.53	0.72	1.67	0.19	0.96	2.29	0.32	20.00
79-80	1.55	2.23	0.37	4.95	6.01	3.34	1.27	3.09	0.12	0.37	0.38	1.80	25.48
10-Year	1.892	2.032	2.619	2.398	2.212	2.112	1.543	1.671	0.666	1.072	0.949	1.052	20.218
80-81	1.45	0.98	0.32	1.30	1.04	3.20	1.45	3.06	0.39	1.61	2.73	1.44	18.97
81-82	4.18	1.44	4.79	5.26	1.66	5.06	1.11	1.40	0.59	1.26	2.29	5.38	34.42
82-83	1.88	3.68	2.76	2.41	4.00	4.30	2.35	2.81	1.35	1.34	1.50	2.88	31.26
83-84	2.15	4.81	7.43	1.27	1.56	2.77	3.23	1.73	3.41	2.55	2.26	1.47	34.64
84-85	2.92	2.63	3.24	1.54	1.09	3.54	1.95	1.19	0.89	3.04	0.03	4.35	26.41
85-86	4.40	6.62	1.99	1.81	8.54	2.48	3.79	1.62	0.26	1.01	1.68	2.73	36.93
86-87	1.86	1.98	0.55	2.14	2.07	2.47	1.03	2.93	0.79	2.12	1.22	0.49	19.65
87-88	1.39	1.68	3.50	3.06	0.72	3.32	2.14	1.60	0.86	1.04	2.23	1.16	22.70
88-89	1.20	2.68	1.91	1.52	1.99	3.55	0.35	0.06	1.54	1.43	1.37	1.19	18.79
89-90	1.21	1.88	0.70	2.00	4.06	2.30	2.00	0.81	1.87	1.08	0.62	1.87	20.40
90-91	1.32	0.90	1.64	1.49	1.64	4.24	3.06	2.60	0.57	1.04	1.39	2.70	22.56

NOTE: Climatic Station was moved from a point one mile above the dam site to a point 500 feet below dam site on November 15, 1973.
October, November, and December 70-71 were estimated by correlation with Clear Creek Weather Station.

TABLE 6: EAST MOUNTAIN PRECIPITATION

Elevation - 8,985 Feet

Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	TOTAL
80-81	1.28	0.39	0.05	0.29	0.52	2.77	0.64	0.87	0.11	0.57	0.85	2.55	10.90
81-82	1.93	0.53	0.97	3.22	0.14	1.67	0.00	0.45	0.09	1.86	1.10	2.61	14.57
82-83	0.38	2.90	1.39	1.30	1.81	1.98	0.92	0.71	0.61	1.27	4.83	1.62	19.71
83-84	0.76	2.43	2.42	0.27	0.65	1.22	0.50	0.22	1.18	1.90	2.33	0.64	14.53
84-85	3.27	0.97	1.67	0.49	0.59	1.77	1.35	1.73	0.28	2.47	0.12	2.31	17.02
85-86	1.15	2.38	0.87	0.30	2.10	1.43	1.05	0.38	0.53	0.87	2.24	1.63	14.92
86-87	1.57	0.39	0.16	1.37	1.37	1.65	1.16	1.77	0.58	2.49	1.16	0.06	13.73
87-88	2.77	1.91	1.29	1.42	0.00	0.99	2.08	1.03	0.81	0.45	0.96	0.91	14.61
88-89	0.61	0.43	1.56	1.00	0.68	1.03	0.26	0.47	0.43	1.19	2.44	0.49	10.59
89-90	0.28	0.39	0.16	0.74	2.08	1.75	1.03	0.26	0.67	0.88	1.03	1.62	10.90
10-Year	1.40	1.27	1.05	1.04	0.99	1.63	0.90	0.79	0.53	1.40	1.71	1.44	14.15
90-91	0.48	0.26	0.66	0.34	0.39	2.34	0.59	1.83	0.21	1.01	1.48	3.11	12.69

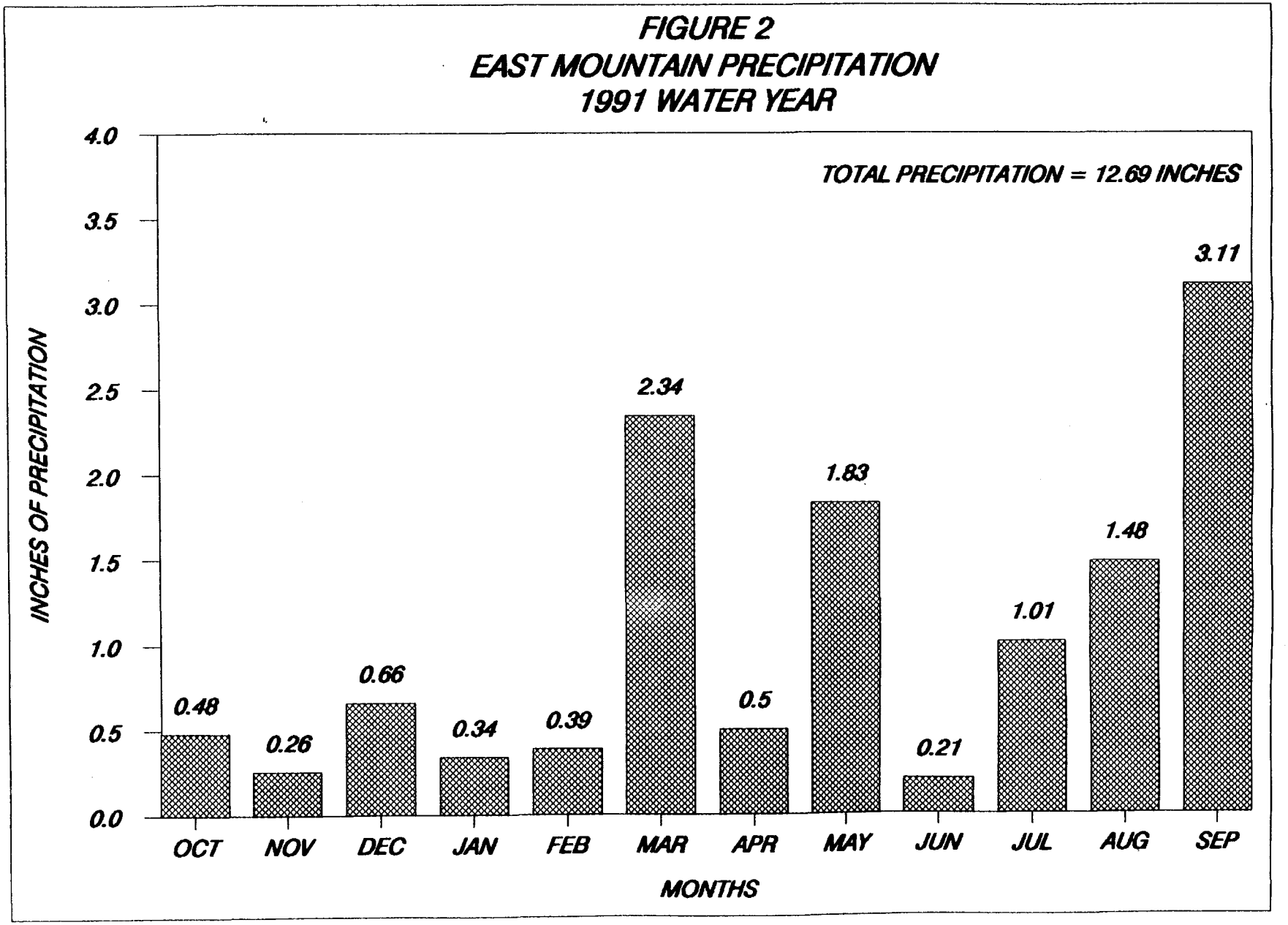


FIGURE 2
EAST MOUNTAIN PRECIPITATION
1991 WATER YEAR
TOTAL PRECIPITATION = 12.69 INCHES
INCHES OF PRECIPITATION
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.48
0.26
0.66
0.34
0.39
2.34
0.5
1.83
0.21
1.01
1.48
3.11
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTHS

2. Temperatures

During the 1991 water year temperatures were above normal at the Hunter Plant and below normal at Huntington, Electric Lake, and East Mountain. Temperatures at the Huntington Plant station were below normal for all months except October, November, and February. At the East Mountain station temperatures were above normal during October, November, and February, while the rest of the year was below normal. Temperatures at the Electric Lake station were below normal for most of the year. (See Table 7.)

A comparison of 1990 and 1991 temperatures for the four stations is addressed since temperatures also influence water supplies from year to year. Table 8 depicts the variation and compares 1990 to 1991.

TABLE 8: COMPARISON OF 1990 AND 1991 TEMPERATURES*

	1990		1991		1991
Station	Average Temp.	Departure From Normal	Average Temp.	Departure From Normal	Departure From 1990
Hunter Plant	53.2	+7.3	49.7	+3.8	-3.5
Huntington Plant	48.8	+1.2	45.1	-2.5	-3.7
Electric Lake	35.8	+1.8	32.6	-1.4	-3.2
East Mountain	41.5	+2.3	37.0	-1.9	-4.5
Average Departure From Normal		+3.2		-0.5	-3.7

* Temperatures reported in degrees Fahrenheit.

TABLE 7: TEMPERATURES IN EMERY COUNTY, UTAH (1991 Water Year)

Month	Hunter Plant		Huntington Plant		Electric Lake		East Mountain	
	Average Temp.*	Departure From Normal	Average Temp.*	Departure From Normal	Average Temp.*	Departure From Normal	Average Temp.*	Departure From Normal
1990								
October	53.7	+5.3	49.0	+0.8	39.4	+1.9	38.5	+0.3
November	37.8	+2.6	36.4	+0.4	26.0	+0.3	30.0	+1.5
December	19.2	-7.5	17.4	-10.0	8.3	-7.5	15.3	-5.7
1991								
January	19.6	-4.5	19.2	-4.4	12.4	-2.2	19.8	-1.9
February	35.9	+7.5	33.9	+3.7	19.9	+0.6	30.0	+5.8
March	38.6	+2.8	31.9	-5.8	18.3	-2.5	13.9	-13.3
April	46.5	+1.9	41.8	-3.3	25.7	-3.0	30.3	-5.5
May	57.2	+5.1	49.8	-5.1	37.2	-1.8	41.8	-0.7
June	69.1	+7.7	63.0	-2.8	48.0	-0.6	53.8	-1.2
July	77.5	+9.1	70.6	-1.1	56.8	+1.1	60.9	-0.6
August	75.0	+8.6	68.6	-0.8	53.3	-0.5	58.9	-1.9
September	66.0	+7.3	60.2	-0.2	46.6	-0.9	51.2	0.0
TOTALS	49.7	+3.8	45.1	-2.5	32.6	-1.4	37.0	-1.9

* Temperatures reported in degrees Fahrenheit.

III. DRAINAGE SYSTEMS

The surface drainage system on East Mountain is divided into two major drainages; the southwest portion forms part of the Cottonwood Creek drainage, and the northeast portion contributes to the Huntington Creek drainage. (See Map 1 in pocket.) The drainage boundaries, including minor subdivisions to Cottonwood and Huntington creeks, are designated on the accompanying map. Both Huntington and Cottonwood creeks flow out of the Wasatch Plateau in a southeasterly direction. The creeks merge with Ferron Creek to form the San Rafael River, which is a tributary of the Green River.

A. Huntington Creek Drainage System

Huntington Creek is comprised of many smaller tributary streams that feed the main stream. Deer Creek, Meetinghouse Canyon, and Rilda Canyon creeks are the only tributaries to Huntington Creek that emanate from within PacifiCorp's coal mine permitted area.

1. Huntington Creek

Flow data are recorded on a continuous basis by Utah Power at two locations; one station is located near Utah Power's Huntington Plant, the other about 22 miles upstream from the Huntington Plant. Flow records are maintained by Utah Power in order to determine water entitlements and reservoir storage allocation for the various users on the river.

Table 9 shows a summary of actual Huntington Creek flows below Electric Lake and at Huntington Plant, and calculated natural flow at Huntington Plant. The calculated natural flow considers actual flow recorded at the plant, plant diversions,

Electric Lake storage change, and lake evaporation. The average daily discharges for the 1991 water year (October 1990 - September 1991) at the two stations plus the calculated natural flow and Electric Lake storage are found in Appendix A.

TABLE 9: HUNTINGTON CREEK WATER FLOWS (1991 Water Year)

	Huntington Creek Below Electric Lake	Huntington Creek At Plant	Calc. Natural Flow at Plant
Total Yearly Flow (Acre Feet)	12,450	41,400	53,605
% of Normal	*57	60	77
Mean Discharge in Cubic Feet Per Second (CFS)	17.2	57.2	
Maximum Discharge (CFS)	48	234	
Date of Maximum Discharge	8/22/91	6/11/91	
Minimum Discharge (CFS)	9.3	7.3	
Date of Minimum Discharge	10/3/90	2/5/91	

*Influenced by upstream storage in Electric Lake.

During the 1991 spring runoff period (April through July) approximately 7,143 acre feet of water were impounded behind Electric Lake Dam. During spring runoff the impoundment reached its highest level on June 27. Total storage on that date amounted to 20,054 acre feet, which is 11,218 acre feet below full. Reservoir releases for fishery, irrigation, and Huntington Plant needs during the water year totaled 12,450 acre feet. The total flow of 41,400 acre feet recorded for Huntington Creek at the Huntington Plant is equal to 60% of normal.

A comparison of runoff values from 1990 and 1991 is presented in Table 10.

TABLE 10: COMPARISON OF 1990 AND 1991 RUNOFF VALUES

	1991		1990		
	Amount	% Of Normal	Amount	% Of Normal	1991 as a % of 1990
Spring Runoff Stored in Electric Lake (Acre Feet)	7,143	71	3,646	36	196
Calculated Natural Flow at Plant (Acre Feet)	53,605	77	36,561	52.6	147

The 1991 water quality information on Huntington Creek above the power plant was compiled on a quarterly basis. Utah Power's Environmental Department conducted the sampling program and the analyses were performed by Ford Lab, Salt Lake City. Sampling stations on Huntington Creek monitored by Utah Power's Environmental Department are listed below. The sites listed above are not considered part of PacifiCorp's Hydrologic Monitoring Program but will be included in the annual report as long as data are available.

a. Below Electric Lake

b. Above the Forks

Specific water quality constituents analyzed are shown in Table 11. Values are in milligrams per liter unless otherwise noted. Raw data can be found in Appendix A.

TABLE 11: HUNTINGTON CREEK WATER QUALITY (1991 Water Year)*

Parameter	Below Electric Lake Ave.	Max.	Min.	Right Above Left Fork Ave.	Max.	Min.
pH (N.U.)	7.5	7.9	7.2	7.9	8.1	7.7
Suspended Solids	18	49	1.0	13	22	1.0
Dissolved Solids	162	164	157	194	197	189
Spec. Cond. (umhos)	240	279	170	294	370	210

* Quality parameters reported as mg/l unless otherwise noted.

The comparison of water quality characteristics with the Huntington drainage above the plant for 1990 and 1991 is presented in Table 12. The comparison merits consideration in order to evaluate the changes in water quality from year to year. Average values are presented in milligrams per liter unless otherwise noted.

TABLE 12: HUNTINGTON CREEK WATER QUALITY 1990-1991*

Parameter	Below Electric Lake 1990	1991	Right Fork Above Left Fork 1990	1991
pH (N.U.)	8.0	7.5	8.1	7.9
Total Suspended Solids	1.1	18	4.4	13
Total Dissolved Solids	146	162	203	194

* Quality parameters reported as mg/l unless otherwise noted.

In addition to the sites monitored by Huntington Plant-Environmental Services, three sites were added on Huntington Creek near the Deer Creek confluence

in conjunction with the temporary Deer Creek Discharge Permit. Locations of water quality sampling stations monitored by PacifiCorp-Fuel Resources Department are listed below (refer to Map HM-1).

a. HCC01 - Above Power Plant Bridge

b. HCC02 - Below Deer Creek Confluence

c. HCC04 - Below Bridge @ Research Farm Bridge[+]

[+] Not listed on map due to scale.

Specific water quality constituents analyzed are shown in Tables 13, 14, and 15. Values are in milligrams per liter unless otherwise noted. Raw data can be found in Appendix A.

In general, the water shows a gradual increase in concentration of dissolved minerals as the flow proceeds down Huntington Canyon.

The values at the station below Electric Lake (see Table 11) do not express the actual natural drainage water quality characteristics because of the lake effect, but it appears that the surface flow in Huntington Canyon is of very high quality in the upper reaches with some natural degradation occurring as the flow proceeds to the canyon mouth.

TABLE 13: HUNTINGTON CREEK WATER QUALITY *

HCC01 - ABOVE POWER PLANT

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	------ SOLIDS ------ TDS	TSS	SETTLEABLE
1-2						460	8.8							8.3				6.0	369	0.50
2-4	1.0	251	77.9	5.0	20.0	325	9.9	288	0.02	0.04	22.60	0.04	1.6	8.4	1.02	5.57	52.0	4.0	241	0.00
2-19	1.0	271	73.7	1.0	20.0	400	9.7	273	0.02	0.02	21.62	0.03	0.4	8.3	1.25	6.85	43.0	7.0	278	0.50
2-25						450	8.2							8.1				4.0	296	0.50
3-18	1.0	276	72.8	1.0	30.0	410	8.5	285	0.20	0.22	25.00	0.02	1.0	7.9	0.37	9.03	61.0	9.0	264	0.50
4-8		234	60.6	1.0	25.0	330	7.9	241	0.02	0.02	21.80	0.01	3.9	8.4	0.24	7.30	43.0	15.0	277	0.50
4-24	1.0	248	56.2	1.0	5.0	275	8.7	220	0.06	0.24	19.23	0.04	3.4	7.6	0.01	4.07	33.0	28.0	227	0.50
5-14	1.0	195	76.8	1.0	45.0	310	8.8	247	0.02	0.17	13.30	0.06	1.0	8.3	0.07	3.32	21.0	21.0	204	0.50
6-11	1.0	188	46.7	1.0	40.0	290	7.1	263	0.14	0.33	35.50	0.02	1.0	8.4	0.02	1.20	18.0	85.0	170	0.50
7-18	7.0	192	71.2	1.0	30.0	290	7.6	238	0.06	0.08	14.70	0.02	0.6	8.4	0.00	2.98	17.0	15.0	270	0.50
8-19	1.0	187	57.4	1.0	0.0	300	7.7	202	0.03	0.20	14.20	0.04	0.2	8.2	0.25	4.07	17.0	31.0	208	0.50
9-10	1.0	183	55.4	1.0	30.0	250	7.8	189	0.08	0.17	12.30	0.02	1.6	8.2	0.09	2.77	27.0	23.0	181	0.50
10-21	1.0	187	58.8	11.0	10.0	210	8.0	224	0.02	0.11	18.70	0.05	1.4	7.8	0.73	1.92	80.0	10.0	178	0.50
11-13	25.0	288	70.2	0.0	10.0	390	10.5	261	0.00	0.00	20.70	0.00	0.0	8.1	3.30	5.46	31.0	0.0	256	0.00
12-12	16.0	246	65.6	0.0	15.0	420	10.1	249	0.10	0.17	20.70	0.02	0.0	7.1	4.52	4.88	35.0	8.0	231	0.00
1991																				
MIN	1.0	183	46.7	0.0	0.0	210	7.1	189	0.00	0.00	12.30	0.00	0.0	7.1	0.00	1.20	17.0	0.0	170	0.00
MAX	25.0	288	77.9	11.0	45.0	460	10.5	288	0.20	0.33	35.50	0.06	3.9	8.4	4.52	9.03	80.0	85.0	369	0.50
MEAN	4.8	227	64.9	1.9	21.5	341	8.6	245	0.06	0.14	20.03	0.03	1.2	8.1	0.91	4.57	36.8	17.7	243	0.40
1990																				
MIN	1.0	260	68.6	1.0	0.0	300	5.8	252	0.02	0.02	18.10	0.01	1.0	8.1	0.00	6.45	30.0	1.0	172	0.50
MAX	1.0	400	102.6	10.0	40.0	510	9.6	392	0.08	0.08	44.70	0.05	2.7	8.5	4.02	55.00	130.0	31.0	310	1.00
MEAN	1.0	303	79.3	3.4	17.1	425	8.2	300	0.03	0.03	24.70	0.02	1.5	8.3	0.85	18.72	59.7	4.2	248	0.53
No. of Analyses	7	7	7	7	7	15	15	7	7	7	7	7	7	15	7	7	7	15	15	15

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 14: HUNTINGTON CREEK WATER QUALITY *

HCC02 - @ POWER PLANT (BELOW DEER CREEK CONFLUENCE)

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	------ SOLIDS ------ TDS	TSS	SETTLEABLE
1-2						480	8.6							8.3				3.0	335	0.50
2-4	1.0	268	78.7	1.0	10.0	420	10.3	324	0.02	0.02	30.90	0.02	4.3	8.4	2.48	20.03	65.0	12.0	337	0.00
2-19	1.0	300	83.1	1.0	35.0	590	8.8	353	0.02	0.02	35.30	0.02	1.0	8.3	0.78	22.94	130.0	16.0	425	0.50
2-25						610	7.5							8.2				23.0	417	0.50
3-5	1.0	240	67.8	1.0	35.0	450	9.0	313	0.21	0.26	34.80	0.02	1.0	8.4	0.00	17.97	100.0	9.0	323	0.50
4-8		228	66.1	1.0	30.0	350	7.8	232	0.02	0.02	16.30	0.01	5.1	8.3	1.04	14.55	60.0	18.0	274	0.50
5-14	1.0	205	77.2	1.0	40.0	330	8.6	256	0.02	0.16	15.30	0.06	1.0	8.3	0.18	4.13	25.0	25.0	206	0.50
6-11	1.0	201	64.1	1.0	45.0	300	7.0	218	0.01	0.27	14.09	0.01	1.3	8.5	0.02	2.00	18.0	77.0	195	0.50
7-18	1.0	227	75.9	1.0	10.0	210	5.8	257	0.02	0.07	16.40	0.03	0.6	7.5	2.11	4.49	17.0	12.0	199	0.50
8-19	1.0	210	63.6	1.0	10.0	310	9.0	224	0.06	0.32	15.80	0.03	1.0	7.7	0.40	5.49	28.0	31.0	236	0.50
9-10	1.0	192	61.0	1.0	25.0	290	7.5	214	0.04	0.11	15.10	0.02	0.4	8.3	0.42	7.08	50.0	26.0	222	0.50
10-21	1.0	183	49.1	1.0	10.0	220	7.9	179	0.02	0.19	13.76	0.07	1.0	7.8	0.00	2.73	15.0	14.0	174	0.50
11-13	0.0	278	74.5	0.0	35.0	430	9.8	295	0.00	0.00	26.50	0.00	0.0	8.1	3.37	9.68	52.0	3.0	292	0.00
12-12	14.0	264	74.5	0.0	15.0	700	9.7	287	0.04	0.13	24.40	0.00	1.1	7.7	4.90	8.93	100.0	6.0	256	0.00
1991																				
MIN	0.0	183	49.1	0.0	10.0	210	5.8	179	0.00	0.00	13.76	0.00	0.0	7.5	0.00	2.00	15.0	3.0	174	0.00
MAX	14.0	300	83.1	1.0	45.0	700	10.3	353	0.21	0.32	35.30	0.7	5.1	8.5	4.90	22.94	130.0	77.0	425	0.50
MEAN	2.1	233	69.6	0.8	25.0	406	8.4	263	0.04	0.13	21.55	0.02	1.5	8.1	1.31	10.00	55.0	19.6	278	0.39
No. of Analyses	11	12	12	12	12	14	14	12	12	12	12	12	12	14	12	12	12	14	14	14
1990																				
MIN	1.0	249	72.4	1.0	5.0	373	5.2	284	0.02	0.02	22.80	0.01	1.0	7.7	0.00	9.07	43.0	1.0	190	0.50
MAX	1.0	310	91.7	6.0	30.0	610	9.1	365	0.18	0.41	39.90	0.04	3.2	8.5	1.23	16.19	150.0	29.0	392	1.00
MEAN	1.0	277	80.8	1.7	17.1	470	8.2	321	0.05	0.14	28.81	0.02	1.6	8.3	0.56	11.30	89.0	6.6	303	0.53
No. of Analyses	7	7	7	7	7	15	15	7	7	7	7	7	7	15	7	7	7	15	15	15

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 15: HUNTINGTON CREEK WATER QUALITY *

HCC04 - @ RESEARCH FARM

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	------ SOLIDS ------ TDS	TSS	SETTLEABLE
1-2						350	8.8							8.3				2.0	343	0.50
2-4	1.0	270	87.9	1.0	20.0	460	10.0	367	0.02	0.07	35.90	0.03	1.8	8.5	1.42	22.58	79.0	10.0	380	0.00
2-19	1.0	317	88.3	1.0	35.0	640	8.3	393	0.02	0.02	42.00	0.02	1.0	8.4	1.37	28.78	170.0	14.0	469	0.50
2-25						620	8.3							8.4				11.0	465	0.50
3-5	1.0	249	78.5	1.0	45.0	480	8.7	341	0.15	0.18	35.10	0.02	1.2	8.2	1.13	22.28	130.0	22.0	350	0.50
4-8		228	65.1	1.0	25.0	400	7.9	252	0.02	0.08	21.70	0.01	0.0	8.5	0.97	14.93	75.0	15.0	320	0.50
5-14	1.0	200	80.5	1.0	40.0	332	8.1	261	0.02	0.18	14.50	0.04	1.0	8.1	0.34	5.10	32.0	21.0	231	0.50
6-11	1.0	187	61.5	1.0	25.0	300	6.7	210	0.02	0.13	13.70	0.01	0.1	8.5	0.01	5.50	17.0	82.0	182	0.50
7-18	1.0	205	73.1	1.0	15.0	280	6.9	245	0.02	0.07	15.10	0.02	1.2	8.3	0.00	5.16	22.0	40.0	216	0.50
8-19	1.0	249	59.4	1.0	10.0	350	6.6	221	0.02	0.25	17.60	0.01	1.0	7.9	0.30	7.24	31.0	52.0	235	0.50
9-10	1.0	188	64.3	1.0	30.0	300	7.2	228	0.04	10.00	16.40	0.02	0.3	8.3	0.49	8.52	36.0	30.0	239	0.50
10-21	1.0	192	40.4	1.0	10.0	220	8.1	163	0.02	0.17	15.10	0.08	1.0	7.9	0.00	3.79	18.0	11.0	196	0.50
11-13	0.0	261	78.1	0.0	30.0	510	9.6	358	0.00	0.00	39.60	0.00	0.0	8.2	3.71	16.86	130.0	3.0	374	0.00
12-12	8.0	254	76.7	0.0	20.0	500	8.7	300	0.10	0.14	26.40	0.00	1.4	7.7	4.70	12.63	110.0	5.0	323	0.00
1991																				
MIN	0.0	187	40.4	0.0	10.0	220	6.6	163	0.00	0.00	13.70	0.00	0.0	7.70	0.00	3.79	17.0	2.0	182	0.00
MAX	8.0	317	88.3	1.0	45.0	640	10.0	393	0.15	10.00	42.00	0.08	1.8	8.5	4.70	28.78	170.0	82.0	469	0.50
MEAN	1.6	233	71.2	0.8	25.4	410	8.1	278	0.04	0.94	24.43	0.02	0.8	8.2	1.20	12.78	70.8	22.7	309	0.39
1990																				
MIN	1.00	262	66.4	1.0	10.0	300	5.5	267	0.02	0.02	23.30	0.01	0.0	7.9	0.00	8.19	57.0	1.0	218	0.50
MAX	1.00	315	108.1	7.0	20.0	630	9.6	382	0.17	0.41	29.40	0.03	1.9	8.5	1.13	16.06	120.0	19.0	435	1.00
MEAN	1.00	290	78.7	2.4	16.4	478	8.3	306	0.05	0.19	26.64	0.02	0.9	8.3	0.62	12.13	81.4	5.5	324	0.57
No. of Analyses	7	7	7	7	7	15	15	7	7	7	7	7	7	15	7	7	7	15	15	15

* Quality parameters are reported as mg/l unless otherwise noted.

2. Deer Creek

Deer Creek is an ephemeral tributary of Huntington Creek and flows from the same canyon in which the Deer Creek Mine is located. PacifiCorp monitors the characteristics of Deer Creek according to the following flow and sampling schedule (see Hydrologic Monitoring Schedule Appendix M).

a. Flow and Sampling Schedule

(1) Locations:
(a) Above the Mine - DCR01
(b) @ Permit Boundary - DCR04
(c) Below the Mine - DCR06
(See Map No. 1 in pocket)

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:
Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix M.) The program was initiated in March 1988 and will continue through 1992; i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quantity measurements.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map No. 1 for flume locations.) A hydrograph showing all the data collected for 1991 and 1986-1990 has been generated for each location. (See Appendix B.) Deer Creek stream above the mine did not flow during 1991. Deer Creek drainage did receive flow below Deer Creek Mine throughout the year as a result of the temporary mine discharge Bypass Agreement granted by the State Department of Health. The quantity and quality of water discharge and impacts to the receiving streams (Deer Creek and Huntington Creek) will be

discussed in the Deer Creek Discharge section of this report. Both locations and schedules for hydrologic monitoring were updated in 1991 to reflect the Bypass Agreement (see Appendix M).

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 1991. Baseline analysis will be repeated once every five (5) years. No samples were collected in 1991 at the Deer Creek above mine location due to the severe drought. Samples were collected and analyzed at two locations below the mine (DCR04 and DCR06) in accordance with the Bypass Agreement. The results of the historical operational quality analysis are listed in Tables 16 and 17. The minimum, maximum, and mean values are given for a five-year period along with the historical results. Values are in milligrams per liter unless otherwise noted. It is apparent from historical information in the tables that the quality of the Deer Creek runoff degradates slightly from the upper to the lower sampling point. The quality of the lower sampling point is thought to be affected by the Mancos Shale which outcrops above the lower sampling location.

3. Meetinghouse Canyon Creek

Meetinghouse Canyon Creek is an ephemeral tributary of Huntington Creek and is monitored according to the following schedule (see Hydrologic Monitoring Schedule in Appendix M).

a. Flow and Sampling Schedule
   (1) Location: South Fork of Meetinghouse Canyon (See Map No. 1 in pocket.)
   (2) Flow: Information is collected during the first or second week of each month.

TABLE 16: DEER CREEK SURFACE WATER QUALITY *
ABOVE THE MINE

SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	----- SOLIDS ----- TDS	TSS	SETTLEABLE
No flow during 1989-91																				
1988																				
MIN	<1.0	285	56.8	<1.0	6.0	442	5.8	283	<0.02	<0.02	24.8	<0.01	<1.0	8.2	0.68	13.4	22.0	362	<1.0	<0.05
MAX	51.0	397	107.2	8.0	138.0	1300	8.1	599	0.09	0.13	80.5	<0.01	2.6	8.5	3.30	59.0	185.0	663	19.0	<0.1
MEAN	22.5	336.0	76.7	3.2	51.3	794.0	7.0	372.5	0.06	0.07	46.8	<0.01	1.4	7.5	1.37	34.4	100.7	499	9.3	0.08
1987																				
MIN	0	272	2.2	<1.0	3.5	360	5.3	225	0.02	0.04	27.9	<0.01	0.6	7.0	0.50	16.0	24.0	252		0
MAX	137.0	337	82.0	6.0	176.0	1580	8.4	550	0.05	0.31	83.9	0.06	<1.0	8.4	4.33	111.6	255.0	897		<0.1
MEAN	23.5	298.2	48.0	1.8	34.4	647.5	6.94	311.7	0.05	0.11	42.4	0.02	0.84	7.6	1.48	36.2	93.3	395		0.08
1986																				
MIN	1.0	262	42.0	<1.0	4.5	470	8.2	232	<0.05	<0.05	26.3	<0.01	<0.5	7.3	0.80	13.9	30.0	269	<0.5	<0.1
MAX	1.0	322	62.0	<1.0	10.8	660	10.2	290	<0.05	0.26	40.1	0.03	0.5	7.9	1.12	27.6	90.0	385	130.0	<0.5
MEAN	1.0	299.7	50.7	<1.0	7.29	573.1	9.5	263.9	<0.05	0.08	33.4	0.01	0.5	7.7	1.00	20.0	52.9	318	23.9	0.02
1985																				
MIN						439				<0.05		<0.01		7.4				246	1.0	
MAX						685				0.21		0.08		8.0				378	162.0	
MEAN						573.1				0.07		0.02		7.8				318	24.3	
1984																				
MIN						480				<0.05		<0.01		7.3				231	<0.5	
MAX						700				<0.05		<0.01		8.3				381	41.5	
MEAN						582.5				<0.05		<0.01		7.9				320	11.5	
HISTORICAL 1978-1990																				
MIN	<1.0	262	2.2	0.6	3.5	360	5.3	225	<0.02	0.02	24.8	<0.01	<0.5	7.0	0.50	13.4	10.0	231	<0.5	<0.05
MAX	137.0	337	107.2	8.0	176.0	1580	10.2	599	0.09	40.10	83.9	0.24	2.6	8.5	4.33	111.6	255.0	897	3592.0	1.0
MEAN	15.4	311	59.7	1.7	28.9	602	8.0	321	0.05	0.82	40.5	0.03	0.9	7.9	1.26	29.7	74.3	352	113.6	0.26
NO. OF ANALYSES	19	19	19	19	20	59	20	19	12	60	19	58	20	60	18	19	21	60	60	18

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 17: DEER CREEK SURFACE WATER QUALITY *

BELOW THE MINE

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	----- SOLIDS ----- TDS	TSS	SETTLEABLE
1-2						700	7.7							8.2				408	6.0	<0.5
1-28	60	331	105.1	<1.0	55.0	750	10.8	485	0.18	0.22	54.10	0.01	1.1	8.1	5.28	58.23	170	629	7.0	--
2-4	<1.0	316	93.5	6.0	70.0	620	9.4	452	<0.02	0.11	53.00	0.02	3.0	8.4	2.47	57.33	160	528	3.0	--
2-19	<1.0	456	98.3	<1.0	45.0	820	7.8	503	<0.02	<0.02	62.50	0.03	2.3	8.4	3.73	50.55	170	549	53.0	<0.5
2-25						730	8.4							8.4				573	37.0	<0.5
3-5	<1.0	300	90.6	6.0	55.0	750	7.4	460	0.34	0.25	56.80	0.02	<1.0	8.4	5.10	50.63	230	539	49.0	<0.5
4-8'	--	309	53.5	<1.0	55.0	530	7.7	278	<0.02	<0.02	35.10	<0.02	2.3	8.5	4.81	48.41	80	459	36.0	<0.5
5-14	<1.0	294	91.0	<1.0	40.0	780	7.7	414	<0.02	<0.02	45.40	<0.02	<1.0	8.3	5.64	34.83	210	536	14.0	<0.5
6-11	<1.0	277	71.6	<1.0	90.0	890	5.9	424	<0.02	<0.02	59.60	<0.02	1.9	8.5	5.70	71.40	230	678	2.0	<0.5
7-18	<1.0	268	82.6	<1.0	30.0	530	7.2	386	0.00	0.01	43.54	0.02	0.6	7.4	2.29	39.43	170	304	5.0	<0.5
8-19	<1.0	303	78.3	<1.0	25.0	700	8.3	382	0.10	0.19	45.40	0.03	0.5	8.1	3.91	29.98	160	460	56.0	<0.5
9-10	<1.0	290	96.6	<1.0	25.0	830	6.9	353	<0.02	0.19	27.14	<0.02	0.7	8.3	4.32	38.99	180	741	59.0	<0.5
10-21	<1.0	325	75.9	<1.0	25.0	520	7.5	374	0.03	0.25	44.80	0.05	<1.0	7.5	4.39	29.77	180	452	4.0	<0.5
11-13	3.0	323	83.7	0.0	25.0	680	8.5	390	0.00	0.00	44.00	0.00	0.0	8.5	6.64	28.13	140	455	16.0	0.0
12-12	15.0	317	74.3	0.0	25.0	610	8.1	385	0.14	0.16	48.50	0.00	3.7	8.1	7.36	28.14	130	449	10.0	0.0

' Sample locality move downstream - DCR06 (See HM-1). Flow at DCR04-06 was the result of Deer Creek Discharge.

MIN	<1.0	268	53.5	0.0	25.0	520	5.9	278	0.00	0.00	27.14	0.00	0.0	7.4	2.29	28.13	80	304	2.0	0.0
MAX	60.0	456	105.1	6.0	90.0	890	10.8	503	0.25	0.34	62.50	0.05	3.7	8.5	7.36	71.40	230	741	59.0	0.5
MEAN	7.25	316	84.2	1.6	43.5	696	8.0	407	0.06	0.12	47.68	0.02	1.5	8.2	4.74	43.52	170	517	23.8	0.4

No flow during 1989-90

1988																				
MIN	<1.0	244	88.4	<1.0	75.0	800	7.2	382	0.03	0.04	39.2	<0.01	3.6	8.1	1.70	49.2	130.0	472	<1.0	<0.05
MAX	27.0	442	129.1	11.0	195.0	1450	7.9	700	0.64	0.78	95.1	0.06	9.0	8.4	7.60	145.8	350.0	1164	372.0	1.5
MEAN	15.2	309	113.7	3.5	117.3	1155	7.4	547	0.19	0.27	63.9	0.02	5.6	8.3	5.00	90.9	263.3	832	136.3	0.53
1987																				
MIN	<1.0	255	2.4	<1.0	34.6	620	5.4	285	<0.05	<0.05	40.1	<0.01	<1.0	7.4	1.00	39.0	90.0	429	<4.0	<0.1
MAX	90.0	371	124.0	8.0	420.0	2650	8.2	815	0.07	0.29	122.8	0.02	1.2	8.5	7.31	233.8	500.0	1544	410.0	<1.0
MEAN	15.2	302.3	71.4	2.2	118.9	1303.3	6.8	540.3	0.53	0.10	78.2	0.01	0.8	7.8	4.05	127.3	234.5	806	11.2	0.4
1986																				
MIN	<1.0	260	46.0	<1.0	30.3	698	9.4	284	<0.05	<0.05	34.5	<0.01	<0.5	7.4	1.30	32.6	65.0	358	<0.5	<0.1
MAX	<1.0	359	112.0	<1.0	290	2300	11.0	750	0.06	0.19	114.3	0.03	0.5	7.9	6.61	192.0	450.0	1315	91.0	<0.5
MEAN	<1.0	308.1	73.0	<1.0	135.9	1306.9	10.0	449.9	0.05	0.09	65.0	0.02	0.5	7.7	3.66	104.2	225.0	739	25.7	0.02
1985																				
MIN						630				<0.05		<0.01		7.4				320	4.0	
MAX						2300				0.39		0.08		8.3				1354	258.0	
MEAN						1374.7				0.13		0.02		7.9				690	44.1	
1984																				
MIN						620				0.05		<0.01		7.8				371	0.5	
MAX						2150				0.18		<0.01		8.5				637	141.0	
MEAN						1172.5				0.07		<0.01		8.1				465	29.8	
HISTORICAL 1978-1990																				
MIN	<1.0	244	2.4	<1.0	5.0	420	5.4	284	0.02	0.00	34.5	<0.01	0.0	6.9	1.0	30.9	65.0	273	<0.5	0.0
MAX	90.0	442	191.9	11.0	515.0	2400	11.0	990	1.22	170.00	124.0	0.27	9.0	8.6	8.9	272.8	610.0	1544	20,540.0	2.3
MEAN	7.8	334	94.3	2.2	112.7	1084	7.9	518	0.22	3.15	64.0	0.05	1.4	8.1	4.4	96.7	228.1	657	368.3	0.56
NO. OF ANALYSES	24	24	24	24	25	68	33	24	17	61	24	59	26	69	24	24	26	69	68	32

* Quality parameters are reported as mg/l unless otherwise noted.

(3) Water Quality Sampling:
Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Addendum in Appendix M.) The program was initiated in March 1988 and will continue through 1992, i.e., June, September, and December. Field measurements including pH, specific conductivity, temperature, and dissolved oxygen will be performed monthly in conjunction with quantity measurements.

b. Flow Information

A hydrograph comparing 1991 and 1986-1990 can be found in Appendix C. Peak flow occurred during the month of June at a rate of 713 GPM. Base flow of 0.0 GPM existed during the months of January through May and November and December.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 1991. Baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1986. Table 18 lists the minimum, maximum, and mean values for 1986-1990 along with historical results.

4. Rilda Canyon Creek

Rilda Canyon Creek is a tributary of Huntington Creek and is monitored according to the following schedule (see Appendix M). Rilda Canyon Creek is ephemeral from its headwaters to the western border of Section 28, Township 16 South, Range 7 East, and perennial from that point to the confluence of Huntington Creek.

a. Flow and Sampling Schedule

(1) Locations:
(a) Right Fork of Rilda - RCF1
(b) Left Fork of Rilda - RCL1*

TABLE 18: MEETINGHOUSE CANYON WATER QUALITY *

LEFT FORK

SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
1991																				
6-11	<1.0	232	66.6	<1.0	25.0	300	6.4	237	0.02	<0.02	17.2	0.03	<0.1	8.4	<0.02	4.0	8.0	197	49	<0.5
9-10	<1.0	272	80.4	<1.0	10.0	300	6.8	316	0.10	0.21	28.0	0.08	2.0	8.3	0.28	6.7	18.0	238	175	<0.5
MIN	<1.0	232	66.6	<1.0	10.0	300	6.4	237	<0.02	<0.02	17.2	0.03	<0.1	8.3	<0.02	4.0	8.0	197	49	<0.5
MAX	<1.0	272	80.4	<1.0	25.0	300	6.8	316	0.10	0.21	28.0	0.08	2.0	8.4	0.28	6.7	18.0	238	175	<0.5
MEAN	<1.0	252	66.6	<1.0	17.5	300	6.6	277	0.06	0.11	22.6	0.06	1.1	8.4	0.15	5.4	13.0	218	112	<0.5
1990																				
MIN	<1.0	229	49.8	6.0	20.0	385	6.3	240	<0.02	<0.02	28.2	0.02	4.2	8.5	0.34	37.5	100.0	201	<1.0	<0.5
MAX	<1.0	229	49.8	6.0	20.0	385	6.3	240	<0.02	<0.02	28.2	0.02	4.2	8.5	0.34	37.5	100.0	201	<1.0	<0.5
MEAN	<1.0	229	49.8	6.0	20.0	385	6.3	240	<0.02	<0.02	28.2	0.02	4.2	8.5	0.34	37.5	100.0	201	<1.0	<0.5
1989	NO FLOW																			
1988																				
MIN	<1.0	215	43.2	<1.0	5.0	380	7.1	222	0.04	0.08	22.5	<0.01	<1.0	7.8	0.96	6.9	22.0	268	<1.0	<0.05
MAX	13.0	267	71.1	7.0	15.0	480	7.9	280	0.19	0.27	27.7	<0.01	1.4	8.5	1.50	12.5	100.0	304	26.0	<0.05
MEAN	9.3	241.7	57.3	2.5	6.7	440	7.5	260	0.10	0.15	28.4	<0.01	1.1	8.1	1.32	9.8	69.0	290	15.0	<0.05
1987																				
MIN	0.0	222	2.2	<1.0	3.0	300	5.4	195	0.04	<0.05	24.3	<0.01	<1.0	7.3	0.60	3.8	20.0	190	<1.0	0.1
MAX	49.0	307	55.6	8.0	47.5	420	7.4	267	0.08	0.90	33.0	0.04	10.9	8.6	1.29	10.7	45.0	259	42.0	<1.0
MEAN	10.4	250.2	33.8	3.2	14.1	366	6.4	226	0.10	0.28	29.4	0.02	2.9	7.9	1.02	8.2	30.8	230	15.8	0.5
1986																				
MIN	<1.0	231	38.0	<1.0	3.3	432	8.6	213	<0.05	<0.05	22.6	<0.01	<0.5	7.4	0.9	6.5	25.0	231	<0.5	<0.1
MAX	<1.0	261	52.8	<1.0	7.6	500	10.3	260	<0.05	0.18	36.5	0.02	0.6	8.0	1.6	13.1	85.0	292	74.0	<0.5
MEAN	<1.0	248.7	44.5	<1.0	5.1	450	9.4	233	<0.05	0.10	29.6	0.02	0.5	7.7	1.23	9.5	43.2	253	24.0	0.2
HISTORICAL 1986-90																				
MIN	0.0	215	2.2	1.0	3.0	300	5.4	195	0.04	<0.05	22.5	<0.01	0.1	7.3	0.60	3.8	20.0	190	0.1	0.0
MAX	49.0	307	71.1	8.0	47.5	500	10.3	350	0.30	0.90	36.5	0.04	10.9	8.6	1.62	13.1	100.0	304	74.0	<1.0
MEAN	6.6	248	43.4	2.2	9.0	418	7.9	245	0.08	0.18	29.3	0.02	1.4	7.9	1.20	9.1	44.3	255	19.0	0.15
NO. OF ANALYSES	13	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14

* Quality parameters are reported as mg/l unless otherwise noted.

(c) Rilda Canyon - RCF2*
(d) Rilda Canyon - RCF3
(e) Rilda Canyon - RCW4 (See Map HM-1.)

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:
Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed are those listed in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix M.) The program was initiated in June 1989 except for RCL1, which was initiated in 1990 and will continue through 1992 on a quarterly basis, i.e., March, June, September, December. Field measurements, including pH, specific conductivity, temperature, and dissolved oxygen, will be performed at the perennial stream locations, i.e., RCF3 and RCW4, monthly in conjunction with quantity measurements.

* Flow and field parameters only.

b. Flow Information

Flow information is collected monthly throughout the year with the use of three Parshall flumes and one V-notch weir. (See Map No. 1 for locations.) A hydrograph has been generated for each flume-weir location. (See Appendix D.) Springs utilized by North Emery Water Users Association (NEWUA) for culinary purposes are situated between monitoring locations RCF2 and RCF3. Flow above the spring area is ephemeral and below the stream is perennial. For location RCF1 flow occurred during the months of June through November, with a peak flow of 1755 GPM in June and a base of 0.0 GPM during the months of January through May. For location RCLF1 flow occurred during the months of June and July, measuring 65.0 and 5.5 GPM, respectively. For location RCF2 flow occurred during the months of June through September, with peak flow of 1766 GPM in June and a base flow of 0.0 GPM during the months of January through May and October through December. Below the spring area the stream is perennial and increases in flow from RCF3 to

RCW4. During 1991 the peak flow for RCF3 was 1838 GPM, for RCW4, 1770 GPM. Baseline flow for 1991 at RCF3 and RCW4 was approximately 19 and 105 GPM, respectively. Data suggest that above the NEWUA spring the stream loses water to the alluvium and below the spring area the alluvium recharges the stream causing the flow to increase.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis will be for a two-year period, 1989-90. Thereafter, baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1989; results of the samples collected are presented in Tables 19, 20, and 21. Keeping in mind that this data represents a three-year period, the quality of the water degradates from the upper reaches of Rilda Canyon, i.e., RCF1, to the NEWUA spring area, and from that point to the mouth of the canyon, i.e., RCW4, the water quality is relatively consistent. (See Tables 19, 20, and 21.)

B. Cottonwood Creek Drainage System

The southern portion of East Mountain is intersected by Cottonwood Creek and its associated tributaries, including Cottonwood Canyon Creek and Grimes Wash. The Cottonwood Creek drainage is about equal in size to the Huntington drainage, with total discharge from each drainage about 70,000 acre feet per year. The major cultural feature on Cottonwood Creek is Joe's Valley Reservoir, located about twelve miles west of the town of Orangeville. The 63,000 acre foot reservoir was constructed by the U. S. Bureau of Reclamation and provides storage water for irrigation, industrial, and municipal needs in the Emery County area.

TABLE 19: RILDA CANYON SURFACE WATER QUALITY *

RCF1 - RILDA CANYON FLUME - RIGHT FORK

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	----- SOLIDS ----- TDS	TSS	SETTLEABLE
6-11	<1.0	329	108.6	<1.0	15.5	300	7.6	384	0.09	1.13	27.4	0.04	1.5	8.4	1.78	3.78	7.0	231	160	<0.5
9-10	<1.0	244	58.2	<1.0	15.0	350	7.4	225	<0.02	<0.02	19.4	<0.02	1.9	8.2	0.12	7.48	23.0	242	2	<0.5
MIN	<1.0	244	58.2	<1.0	15.0	300	7.4	225	<0.02	<0.02	19.4	<0.02	1.5	8.2	0.12	3.78	7.0	231	2	<0.5
MAX	<1.0	329	108.6	<1.0	15.5	350	7.6	384	0.09	1.13	27.4	0.04	1.9	8.4	1.78	7.48	23.0	242	160	<0.5
MEAN	<1.0	287	83.4	<1.0	15.3	325	7.5	305	0.06	0.58	23.4	0.03	1.7	8.3	0.95	5.63	15.0	237	81	<0.5
1990																				
MIN	<1.0	245	76.1	4.0	10.0	360	6.9	287	0.02	0.05	23.5	<0.02	1.1	8.3	2.10	4.3	80.0	277	2	<0.05
MAX	<1.0	245	76.1	4.0	10.0	360	6.9	287	0.02	0.05	23.5	<0.02	1.1	8.3	2.10	4.3	80.0	277	2	<0.05
MEAN	<1.0	245	76.1	4.0	10.0	360	6.9	287	0.02	0.05	23.5	<0.02	1.1	8.3	2.10	4.3	80.0	277	2	<0.05
1989																				
MIN	<1.0	227	49.8	<1.0	10.0	300	7.1	201	0.02	0.02	18.6	<0.01	<1.0	8.2	0.60	5.6	23.0	222	12	0.05
MAX	<1.0	227	49.8	<1.0	10.0	300	7.1	201	0.02	0.02	18.6	<0.01	<1.0	8.2	0.60	5.6	23.0	222	12	0.05
MEAN	<1.0	227	49.8	<1.0	10.0	300	7.1	201	0.02	0.02	18.6	<0.01	<1.0	8.2	0.60	5.6	23.0	222	12	0.05

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 20: RILDA CANYON SURFACE WATER QUALITY *

RCF3 - RILDA CANYON FLUME - ABOVE NEWUA SPRINGS

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	----- SOLIDS ----- TDS	TSS	SETTLEABLE
4-8	--	422	99.4	<1.0	50.0	620	7.9	453	<0.02	<0.02	49.8	<0.01	3.5	8.0	0.23	13.52	80.0	487	<1.0	<0.5
6-11	<1.0	340	105.1	<1.0	40.0	380	7.1	365	0.01	2.84	25.0	0.10	0.7	8.3	0.30	5.40	7.0	241	185.0	<0.5
9-10	1.0	376	90.0	<1.0	20.0	410	7.4	410	0.08	0.10	44.9	0.04	3.6	7.8	1.51	12.17	140.0	427	5.0	<0.5
12-18	14.0	391	72.2	0.0	15.0	600	10.0	375	0.14	0.17	47.3	0.00	2.3	7.5	4.57	14.49	70.0	402	3.0	0.0
MIN	<1.0	340	72.2	0.0	15.0	380	7.1	365	0.01	<0.02	25.0	0.00	0.7	7.5	0.23	5.4	7.0	241	<1.0	0.0
MAX	14.0	422	105.1	<1.0	50.0	620	10.0	453	0.14	2.84	49.8	0.10	3.6	8.3	4.57	14.5	140.0	487	185.0	<0.5
MEAN	5.3	382	91.7	0.8	31.3	525	8.1	401	0.06	0.78	41.8	0.04	2.5	7.9	1.65	11.4	74.3	389	48.5	0.4
1990																				
MIN	<1.0	336	79.9	<1.0	5.0	515	4.5	329	0.06	0.03	31.4	0.02	<1.0	7.9	1.80	2.0	60.0	226	<1.0	<0.50
MAX	2.0	425	112.2	<1.0	15.0	720	7.6	499	0.34	0.34	53.2	0.04	1.7	8.1	2.11	7.6	110.0	493	31.0	2.50
MEAN	1.5	394	97.2	<1.0	10.0	595	6.3	420	0.24	0.13	43.1	0.03	1.2	8.0	1.98	3.9	81.7	391	13.7	1.20
1989																				
MIN	<1.0	338	81.7	<1.0	10.0	500	7.0	379	<0.02	0.08	42.5	<0.01	<1.0	7.9	1.7	10.4	70.0	372	4.0	<0.05
MAX	5.0	500	104.3	<1.0	15.0	855	7.6	479	0.41	0.51	53.1	0.04	2.8	8.0	2.5	15.9	150.0	513	23.0	<1.0
MEAN	3.3	432	94.9	<1.0	12.5	726	7.4	442	0.16	0.22	49.7	0.02	1.6	8.0	2.2	13.3	111.2	464	14.5	0.29

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 21: RILDA CANYON SURFACE WATER QUALITY *

RCW4 - RILDA CANYON WEIR - NEAR HIGHWAY 31

1991 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	----- SOLIDS ----- TDS	TSS	SETTLEABLE
4-8	--	395	87.4	<1.0	45.0	690	8.4	457	<0.02	0.30	58.1	<0.01	2.4	8.3	0.95	19.02	100.0	490	3.0	<0.5
6-11	<1.0	298	117.0	<1.0	13.5	400	6.9	443	0.18	2.06	36.7	0.15	1.9	8.3	2.80	7.60	40.0	286	505.0	<0.5
9-10	<1.0	383	72.7	<1.0	20.0	620	7.6	389	<0.02	0.06	50.3	<0.02	<1.0	7.7	2.09	16.94	100.0	445	14.0	<0.5
12-18	10.0	417	81.0	0.0	20.0	700	10.9	444	0.00	0.00	58.7	0.00	1.6	7.7	4.71	17.92	80.0	473	1.0	0.0
MIN	<1.0	298	72.7	0.0	13.5	400	6.9	389	0.00	0.00	36.7	0.00	<1.0	7.7	0.95	7.60	40.0	286	1.0	0.0
MAX	10.0	417	117.0	<1.0	45.0	700	10.9	457	0.18	2.06	58.7	0.15	2.4	8.3	4.71	19.02	100.0	490	505.0	<0.5
MEAN	4.0	373	89.5	0.8	24.6	603	8.5	433	0.06	0.61	51.0	0.05	1.7	8.0	2.64	15.37	80.0	424	131.0	0.4
1990																				
MIN	<1.0	348	91.3	<1.0	12.0	600	5.2	458	<0.02	0.03	40.4	<0.01	<1.0	8.2	0.5	19.1	140.0	300	<1.0	<0.50
MAX	4.0	461	132.7	5.0	20.0	750	7.2	545	0.06	0.04	67.2	0.06	2.1	8.3	2.5	52.0	250.0	538	193.0	<0.50
MEAN	2.0	404.3	113.5	2.3	17.3	683	6.4	503	0.04	0.04	53.2	0.03	1.3	8.2	1.7	34.6	213.3	449	65.3	<0.50
1989																				
MIN	<1.0	320	63.0	<1.0	10.0	450	7.5	336	<0.02	<0.02	43.4	<0.01	<1.0	8.1	1.9	13.9	85.0	413	6.0	<0.05
MAX	<1.0	410	73.2	<1.0	15.0	800	8.7	453	0.10	0.12	65.7	0.02	2.8	8.3	2.8	17.1	150.0	496	7.0	<1.0
MEAN	<1.0	373	69.6	<1.0	13.3	678	7.9	397	0.06	0.05	54.4	0.01	1.8	8.2	2.3	16.0	110.0	462	6.7	0.37

*Quality parameters are reported as mg/l unless otherwise noted.

PacifiCorp monitors two of the tributaries of the Cottonwood Creek drainage system, Cottonwood Canyon Creek and Grimes Wash. (See Map No. 1 in pocket.)

1. Cottonwood Canyon Creek

An extensive baseline study conducted on Cottonwood Canyon Creek to determine water characteristics prior to mining at the proposed Cottonwood Mine began in 1979. A property acquisition in 1981 resulted in mine plan changes; therefore, the baseline study was terminated as of January 1, 1984. As agreed upon in both the Deer Creek Mine and Wilberg Mine permit applications, PacifiCorp will continue to monitor the flow and water quality field measurements at the USGS flume location on a monthly basis. Based on data collected PacifiCorp, Cottonwood Canyon Creek is an ephemeral stream from its headwaters to Section 24, Township 17 South, Range 6 East and intermittent from that point to its confluence with Cottonwood Creek. The majority of water moving through Cottonwood Canyon Creek appears to be through the colluvial valley deposits. The stream becomes intermittent where it crosses the Roans Canyon Fault Trace, possibly caused by intersecting an impermeable obstruction. The hydrograph in Appendix E illustrates the flow information collected during 1991 and compares it to the data collected from 1986 through 1990. It shows a peak flow of 400 GPM in June and a baseline flow of 0.0 GPM during the months of January through March.

2. Grimes Wash

Grimes is an ephemeral tributary of Cottonwood Creek and flows in the same canyon in which the Wilberg/Cottonwood Mine is located. Three permanent runoff sampling sites were established in 1980 and are sampled as listed below (see Hydrologic Monitoring Plan in Appendix M).

a. Flow and Sampling Schedule

(1) Locations: (See Map No. 1 in pocket.)
(a)Right Fork - GWR01
(b)Left Fork - GWR02
(c)Below the Mine - GWR03

(2) Flow: Information is collected during the first or second week of each month.

(3) Water Quality Sampling:
Water samples will be collected and analyzed quarterly (one sample at low flow and high flow) during the first or second week of the quarter. Parameters analyzed will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix M.) The program was initiated in March 1988 and will continue through 1992, i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quantity measurements.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map No. 1 for flume locations.) A hydrograph comparing 1991 to the data collected from 1986 through 1990 has been generated for each flume location. (See Appendix E.) The hydrographs show that both the Right and the Left forks remained dry throughout 1991. Flow at the Below the Mine location continued throughout the year due to the influence of the springs emanating from the Starpoint Sandstone/Mancos Shale formational contact and Wilberg/Cottonwood Mine discharge. Baseline flow averaged approximately 30 GPM.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 1991. Baseline analysis will be repeated once every five (5) years. The results of the 1991 operational quality analysis are listed in Tables 22, 23, and 24. The minimum, maximum, and mean values are given for a five-year period

TABLE 22: GRIMES WASH WATER QUALITY *

RIGHT FORK

SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
No flow during 1989-91																				
1988																				
MIN	39.0	112	43.8	<1.0	26.4	225	9.7	154	0.61	0.78	10.9	0.04	9.0	8.2	5.2	1.9	27.0	196	8.0	<1.0
MAX	39.0	112	43.8	<1.0	26.4	225	9.7	154	0.61	0.78	10.9	0.04	9.0	8.2	5.2	1.9	27.0	196	8.0	<1.0
MEAN	39.0	112	43.8	<1.0	26.4	225	9.7	154	0.61	0.78	10.9	0.04	9.0	8.2	5.2	1.9	27.0	196	8.0	<1.0
1987																				
MIN	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.60	6.3	0.05	---	7.2	7.6	2.0	20.0	115	2000.0	3.3
MAX	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.60	6.3	0.05	---	7.2	7.6	2.0	20.0	115	2000.0	3.3
MEAN	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.60	6.3	0.05	---	7.2	7.6	2.0	20.0	115	2000.0	3.3
1986																				
MIN	<1.0	240	30.0	<1.0	8.3	465	7.6	222	<0.05	<0.05	35.7	<0.01	<0.5	7.5	1.6	3.4	40.0	262	0.5	<0.1
MAX	<1.0	320	52.0	<1.0	11.5	680	9.8	320	<0.05	0.73	46.2	0.05	2.2	8.1	3.3	20.4	120.0	389	257.0	<0.5
MEAN	<1.0	275	41.6	<1.0	10.2	547.6	8.8	268	<0.05	0.24	39.9	0.02	0.74	7.8	2.5	15.7	61.3	316	60.6	0.2
1985																				
MIN						200				<0.05		<0.01		7.4				125	11.0	
MAX						740				2.90		0.08		8.3				430	7116.0	
MEAN						532.3				0.50		0.02		8.0				304	833.8	
1984																				
MIN						470				<0.05		<0.01		7.9				246	7.0	
MAX						750				1.05		0.02		8.7				477	1482.0	
MEAN						593.8				0.26		0.01		8.2				333	207.7	
1983																				
MIN						525				0.08		<0.01		8.1				386	10.5	
MAX						650				2.64		0.18		8.6				280	493.0	
MEAN						610				0.69		0.06		8.3				328	183.3	
HISTORICAL 1979-1990																				
MIN	0.1	104	30.0	<1.0	3.0	190	6.8	112	<0.05	0.01	6.3	<0.01	<0.5	7.2	1.6	1.9	20.0	115	0.5	<0.1
MAX	39.0	320	52.0	<1.0	26.4	750	9.8	320	3.31	20.60	46.2	0.30	9.0	8.7	7.6	20.4	161.7	700	7116.0	3.3
MEAN	5.6	238	41.0	<1.0	11.3	560	8.6	238	0.47	1.36	33.0	0.06	1.9	8.1	3.4	14.1	64.4	342	376.3	0.6
NO. OF ANALYSES	11	9	9	9	11	42	9	9	9	46	9	42	12	46	9	9	13	46	46	9

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 23: GRIMES WASH WATER QUALITY *

LEFT FORK

SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	------ SOLIDS ------ TDS	TSS	SETTLEABLE
No flow during 1989-91																				
1988																				
MIN	34.0	312	71.5	<1.0	10.0	600	7.0	337	<0.02	<0.02	38.5	<0.01	2.0	8.4	1.1	24.2	105.0	428	4.0	<0.05
MAX	34.0	312	71.5	<1.0	10.0	600	7.0	337	<0.02	<0.02	38.5	<0.01	2.0	8.4	1.1	24.2	105.0	428	4.0	<0.05
MEAN	34.0	312	71.5	<1.0	10.0	600	7.0	337	<0.02	<0.02	38.5	<0.01	2.0	8.4	1.1	24.2	105.0	428	4.0	<0.05
1987																				
MIN	<1.0	188	2.3	<1.0	6.0	412	5.0	337	<0.05	<0.05	23.8	<0.01	<0.5	7.6	1.0	11.1	45.0	212	<1.0	0
MAX	<1.0	482	71.1	15.0	156.0	610	7.8	460	0.12	0.62	68.5	0.06	3.5	8.6	2.5	34.0	90.0	382	48.0	0.20
MEAN	<1.0	317	38.1	3.8	56.6	526	7.0	296	0.07	0.17	43.4	0.02	1.7	7.8	1.4	28.5	73.6	307	14.6	0.10
1986																				
MIN	<1.0	281	36.0	<1.0	7.7	410	7.4	252	<0.05	<0.05	37.7	<0.01	<0.5	7.4	1.3	25.2	67.0	293	3.0	<0.10
MAX	<1.0	331	58.0	<1.0	10.9	690	9.6	310	<0.05	0.22	43.8	0.07	0.6	8.0	3.0	34.0	115.0	427	253.0	<0.50
MEAN	<1.0	304	45.5	<1.0	8.8	591	8.6	278	<0.05	0.12	39.9	0.02	0.5	7.7	1.9	29.2	77.9	346	54.1	0.20
1985																				
MIN						473				<0.05		<0.01		7.5				283	<0.5	
MAX						750				0.22		0.08		8.3				438	141.0	
MEAN						628				0.12		0.02		7.9				356	37.1	
1984																				
MIN						600				<0.05		<0.01		7.8				278	<0.5	
MAX						685				0.09		<0.01		8.5				396	76.0	
MEAN						639				0.06		<0.01		8.1				344	17.0	
HISTORICAL 1979-1990																				
MIN	<1.0	188	2.3	<1.0	6.0	410	5.0	196	<0.02	<0.02	23.8	<0.01	0.1	7.3	1.0	11.1	30.4	212	<0.5	<0.05
MAX	34.0	482	71.1	15.0	156.0	790	9.6	460	0.12	0.81	68.5	0.15	3.5	8.7	3.0	34.0	115.0	570	1428.0	<0.50
MEAN	3.4	309	44.6	2.0	19.7	627	7.7	289	0.06	0.15	41.3	0.03	1.1	8.0	1.6	28.5	73.8	363	52.1	0.13
NO. OF ANALYSES	14	14	14	14	14	49	14	14	6	51	14	50	14	51	14	14	15	51	52	13

* Quality parameters are reported as mg/l unless otherwise noted.

TABLE 24: GRIMES WASH WATER QUALITY *

BELOW MINE

1991 SAMPLE	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH (units)	POTASSIUM	SODIUM	SULFATE	------ SOLIDS ------ TDS	TSS	DATES SETTLEABLE
3-13	<1.0	304	143.3	<1.0	120	1300	7.2	658	<0.02	0.09	72.8	0.04	2.3	8.1	2.97	56.3	320	936	3.0	<0.5
4-9	<1.0	300	71.4	<1.0	105	930	8.3	385	<0.02	0.15	50.2	<0.02	1.6	8.2	<0.01	78.4	200	833	51.0	<0.5
6-6	<1.0	295	205.6	<1.0	195	1610	6.1	849	<0.02	0.54	81.6	0.06	0.6	7.7	4.95	120.8	400	1242	6.0	<0.5
9-12	10.0	325	148.7	<1.0	25	710	7.8	482	0.85	0.86	26.9	0.12	<1.0	8.1	2.61	25.7	220	565	247.0	<0.5
12-10	22.0	337	189.5	0.0	735	3000	9.9	770	0.09	0.11	72.0	0.05	1.4	7.6	12.8	460.5	420	2080	15.0	0.0
MIN	<1.0	295	71.4	0.0	25	710	6.9	385	<0.02	0.09	26.9	<0.02	0.6	7.6	<0.01	25.7	200	565	3.0	0.0
MAX	22.0	338	205.6	<1.0	735	3000	9.9	849	0.85	0.86	81.6	0.12	2.3	8.2	12.8	460.5	420	2080	247.0	<0.5
MEAN	7.0	313	151.7	0.8	236	1510	7.9	629	0.20	0.35	60.7	0.06	1.4	7.9	4.67	148.3	312	1131	64.0	0.4
1990																				
MIN	<1.0	366	132.8	<1.0	126	1200	5.5	646	<0.02	0.13	76.4	<0.02	<1.0	8.1	1.3	95.9	250.0	909	<1.0	0.50
MAX	8.0	486	222.9	<1.0	1450	3900	9.0	1043	0.13	0.19	89.4	0.06	1.1	8.2	8.0	780.0	600.0	2827	16.0	2.00
MEAN		391	194.6	<1.0	654	2563	6.6	829	0.06	0.15	83.4	0.04	1.0	8.2	4.5	373.3	417.5	1697	8.3	1.00
1989																				
MIN	<1.0	340	84.9	<1.0	10.0	900	6.3	420	0.09	0.10	50.6	0.01	<1.0	7.7	3.5	19.3	120.0	594	<1.0	<0.05
MAX	6.0	425	184.9	<1.0	515.0	4290	9.5	906	0.33	0.44	115.5	0.90	8.3	8.2	7.1	376.5	580.0	1877	91.0	<0.05
MEAN	3.2	395	146.3	<1.0	202.5	2113	7.5	741	0.16	0.20	91.2	0.26	3.2	7.4	5.4	153.9	450.0	1314	36.2	<0.05
1988																				
MIN	2.0	205	91.5	<1.0	142.0	1200	5.1	356	0.04	0.06	30.9	<0.01	0.6	7.7	0.5	85.1	135.0	673	1.0	<0.05
MAX	114.0	398	274.0	3.0	4531.0	12000	8.9	1165	0.48	0.76	116.8	0.13	27.0	8.3	12.5	3181.0	462.0	7160	36.0	1.00
MEAN	35.8	330	156.9	1.3	1054.1	3783	7.5	702	0.25	0.38	75.3	0.04	8.5	8.0	6.7	717.8	356.2	2375	13.2	0.37
1987																				
MIN	<1.0	117	5.1	<1.0	9.0	295	4.5	146	<0.05	<0.05	10.7	0.04	<0.5	7.1	5.0	9.0	46.0	155	<1.0	<0.10
MAX	127.0	400	191.5	<1.0	154.0	1700	7.8	855	2.25	22.60	102.0	0.17	5.2	8.2	7.8	121.0	593.0	1201	3295.0	4.00
MEAN	22.0	331	99.1	<1.0	67.5	1254	6.5	598	0.43	3.98	75.4	0.10	2.2	7.6	6.6	83.1	340.7	883	552.2	1.05
1986																				
MIN	<1.0	284	72.4	<1.0	36.3	890	7.9	405	<0.05	<0.05	51.1	<0.01	<0.5	7.2	2.6	47.0	150.0	523	<0.5	<0.10
MAX	<1.0	381	150.0	<1.0	141.2	1800	11.4	760	0.13	0.40	87.6	0.08	1.0	8.0	5.8	119.8	320.0	1224	248.0	<0.50
MEAN	<1.0	343	99.0	<1.0	71.4	1239	9.4	545	0.06	0.13	72.2	0.03	0.2	7.6	4.1	68.9	243.3	760	37.1	0.20
1985																				
MIN						220				0.05		0.01		7.4				152	2.0	
MAX						1810				2.70		0.13		8.1				1129	9702.0	
MEAN						1183				0.37		0.04		7.8				733	994.8	
HISTORICAL 1979-1990																				
MIN	0.0	117	5.1	<1.0	10.0	220	4.5	146	0.02	0.01	10.7	<0.01	<0.5	7.1	0.5	9.0	46.0	152	<0.5	<0.10
MAX	127.0	486	274.0	3.0	4531.0	12000	11.4	1165	2.25	18.90	116.8	0.90	27.0	8.5	12.5	3181.0	600.0	7160	9702.0	4.00
MEAN	13.0	347	131.9	1.1	361.9	1491	7.7	659	0.19	0.65	77.8	0.06	2.9	7.9	5.4	266.6	334.0	895	244.0	0.53
NO. OF ANALYSES	31	28	28	28	30	68	30	28	28	70	28	67	30	72	28	28	31	70	70	24

* Quality parameters are reported as mg/l unless otherwise noted.

along with the historical results. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix E.

The Grimes Wash drainage quality is influenced by two factors: 1) Under normal conditions the Right Fork contributes a relatively high amount of suspended solids during spring runoff due to the fact that it is a south facing canyon dominated by argillaceous sediments. 2) Mancos Shale/Starpoint Sandstone interface seeps and springs elevate the TDS at the Below the Mine location.

IV. SPRINGS

A. East Mountain

Between the time PacifiCorp began monitoring springs on East Mountain and 1986 the number of springs measured increased from less than fifty (50) to nearly eighty (80). PacifiCorp believed that more benefit could be realized by concentrating its monitoring to selective springs in the areas that will be undermined within the next five years. (See Map No. 3 in pocket.) A meeting was held on March 25, 1987 with the U. S. Forest Service and the Utah State Division of Oil, Gas and Mining to determine the most effective plan for PacifiCorp's monitoring. A subsequent meeting was held on April 15, 1987 with the State Division of Oil, Gas and Mining to finalize the monitoring plan revisions. In addition to major revisions made in 1987, each year a meeting is held with State and Federal agencies to adjust the monitoring schedule based on field investigations.

During the meetings it was resolved that the following springs will be monitored. Eight additional springs (denoted with a plus [+] symbol below) were added in 1989 after the annual field verification process jointly conducted by DOGM and PacifiCorp.

*	Burnt Tree Springs		79-40
*	Elk Spring		80-41
*	Sheba Springs		80-43
	Ted's Tub	*	80-44
	79-2	*	80-46
*	79-10		80-47
	79-15	+	80-48
*	79-23		82-51
	79-24	*	82-52
*	79-26	*	84-56
+	79-28	+	89-60 (Alpine Spring)
*	79-29	+	89-61
	79-32	+	89-65
	79-34	+	89-66
*	79-35	+	89-67
	79-38	+	89-68

Of these springs, twelve will be monitored on a monthly basis, weather permitting, and have been denoted on the above list with asterisks (*).

1. Flow and Sampling Schedule

a. Flow

All springs on the preceding list are measured during the months of July and October. In addition, a minimum of twelve springs are monitored to establish a discharge recession curve. Generally, measurements are made on a monthly basis during the months of July through October if weather and reasonable access permit; but, when historical data indicate that a spring is short-lived, all efforts are made to measure discharge from that spring at least three times, equally spaced, within its flow period.

b. Quality Samples

All springs listed above are sampled for water quality characteristics during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix M.) In addition, the twelve discharge recession springs denoted by asterisks in the preceding list will be monitored monthly, access permitting, each year between July and October for the following parameters: 1) discharge quantity, 2) specific conductivity [field], 3) temperature [field], 4) pH [field], 5) total hardness, 6) carbonate, and 7) total manganese. Due to the consistency of the samples collected from 1987-91, the 1992 sampling schedule has been updated to reflect monitoring of the springs for field parameters only, except in July and October when operational parameters will be tested.

2. Spring Flow

Both precipitation and spring discharge rates increased slightly from 1990 to 1991, whereas temperature, a critical factor on spring discharge rates, was 1.9 degrees lower in 1991 than the historical average. Table 25, A and B, is a tabulation of the flow data collected during the 1991 monitoring season. To record the season variation, all springs measured in July are measured again in October. The seasonal variation is represented in Table 25, A and B, under the column heading "Seasonal Net Change." The percentage figures represent the amount of change, either positive or negative. The average change reveals a forty-one percent (41%) decrease from the July to the October measurements.

A nine-year comparison of spring discharge is shown in Table 26. The table includes a year by year comparison of springs identified from each mode of occurrence (Table 27). The springs utilized in the comparison are underlined in Table 27. The flow values for the individual springs represent the July measurements. October measurements were not utilized because winter weather conditions caused some springs to be inaccessible.

Table 26 has been compared to East Mountain climatology to see how closely spring discharge rates follow local annual precipitation. Figure 3 reveals good correlation between spring discharge and precipitation between 1982-84, but starting in 1985 spring discharge rates have declined whereas precipitation has leveled off. Along with precipitation, temperature plays a critical role in yearly discharge variations, especially during the early stages of the runoff period. Listed in Table 28 is a comparison of January through June temperature data from surrounding weather

TABLE 25A: EAST MOUNTAIN SPRINGS DISCHARGE
1991

Spring	Date Sampled	Flow (GPM)	Temp. ° F	Date Sampled	Flow (GPM)	Temp. ° F	Seasonal Net Change %
Sheba	07-10-91	10.1	44.1	10-25-91	1.1	44.1	-0.90
Elk Spring	07-10-91	176.0	41.2	10-24-91	51.1	39.4	-0.71
Burnt Tree	07-15-91	2.0	48.4	10-25-91	1.7	43.0	-0.15
Jerk Water							
Pine Springs							
Pine Sp. Trough							
Ted's Tub	07-11-91	21.0	48.6	10-25-91	6.0	41.3	-0.71
79-1							
79-2	07-15-91	2.4	45.8	10-25-91	1.8	41.5	-0.25
79-3							
79-4							
79-5							
79-6							
79-7							
79-8							
79-9							
79-10	07-10-91	12.5	45.7	10-25-91	4.6	44.6	-0.63
79-11							
79-12	07-11-91	dry					
79-13							
79-14							
79-15	07-11-91	5.0	66.2	10-24-91	2.4	42.9	-0.52
79-16							
79-17							
79-18							
79-19							
79-20							
79-21							
79-22							
79-23	07-11-91	damp					
79-24	07-11-91	dry					
79-25							
79-26	07-12-91	damp					
79-27							
79-28	07-12-91	1.7	44.8	10-25-91	1.6	43.6	-0.06
79-29	07-12-91	0.8	44.3	10-25-91	1.0	40.6	0.20
79-30							
79-31							
79-32	07-12-91	standing water		10-25-91	standing water		
79-33		no flow			no flow		
79-34	07-11-91	0.3	65.7	10-24-91	dry		
79-35	07-10-91	4.3	45.4	10-25-91	2.0	41.0	-0.53
79-36							
79-37							
79-38	07-15-91	6.5	46.6	10-25-91	2.6	41.4	-0.60
79-39							
79-40	07-12-91	dry		10-25-91	dry		
80-41	07-12-91	dry		10-25-91	dry		

TABLE 25B: EAST MOUNTAIN SPRINGS DISCHARGE
1991

Spring	Date Sampled	Flow (GPM)	Temp. °F	Date Sampled	Flow (GPM)	Temp. °F	Seasonal Net Change %
80-42							
80-43	07-12-91 dry			10-25-91 dry			
80-44	07-12-91 dry			10-25-91 dry			
80-45							
80-46	07-12-91 dry			10-25-91 dry			
80-47	07-12-91	1.3	63.5	10-25-91	2.3	37.9	0.77
80-48	07-10-91	3.0	39.2	10-24-91	1.5	41.8	-0.52
80-49							
80-50							
82-51	07-15-91 seep	<0.1		10-25-91 damp			
82-52	07-15-91	1.0	44.2	10-25-91	0.2	38.4	-0.76
84-53	07-12-91 seep	<0.1		10-25-91 dry			
84-54							
84-55							
84-56	07-12-91	0.5	44.5	10-25-91	0.5	41.6	-0.04
85-57							
86-58							
86-59							
89-60	07-15-91	1.4	47.4	10-25-91 standing water - no flow			
89-61	07-10-91	61.0	45.4	10-24-91	15.9	39.5	-0.74
89-62							
89-63							
89-64							
89-65	07-10-91	1.0	44.7	10-24-91	0.6	42.1	
89-66	07-11-91 seep	<0.1		10-24-91 standing water - no flow			
89-67	07-10-91	6.0	41.1	10-24-91	2.4	38.9	-0.60
89-68	07-10-91	1.5	47.7	10-24-91	0.7	44.5	-0.55
89-69							
89-70							
89-71							
91-72	07-10-91	4.9	55.6				
				AVERAGE NET CHANGE			-0.41

TABLE 26: YEARLY SPRING DISCHARGE VARIATIONS (GPM)

JULY FLOW DATA

Spring	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Burnt Tree	12.0	30.5	26.6	26.1	17.5	10.2	12.0	6.4	4.1	2.0
Elk Spring	546.0	642.3	427.9	390.5	309.7	217.0	217.4	78.5	130.8	176.0
Sheba	15.0	22.9	19.7	14.4	8.6	11.4	10.4	1.1	8.1	10.1
Ted's Tub	60.0	89.0	48.0	39.1	31.6	69.0	60.0	5.0	13.0	21.0
79-2	12.0	9.1	9.7	5.5	2.9	4.0	2.1	2.7	3.9	2.4
79-10	32.0	57.1	20.0	33.3	26.1	26.1	25.0	7.0	10.2	12.5
79-15	27.5	42.9	26.1	18.2	18.2	14.6	12.7	2.9	3.0	5.0
79-23	3.0	20.0	3.6	6.8	0.6	Damp	Damp	Dry	Dry	Damp
79-24	6.1*	9.3*	6.1*	5.0	4.3	Damp	0.8	Dry	Dry	Dry
79-26	7.5	20.7	20.0	10.9	8.7	1.5	3.3	0.3	Dry	Damp
79-29	4.0	10.0	6.2	6.0	4.7	2.5	2.6	1.1	1.3	1.7
79-32	2.1	3.3	3.1	2.7	1.3*	1.0	0.6	0.5	Damp	Standing Water No Flow
79-34	30.0	56.7	42.9	18.5	16.7	10.5	13.3	Dry	Dry	0.3
79-35	7.6	15.0	10.5	10.5	7.8	6.3	2.7	Dry	1.9	4.3
79-38	10.0	10.9	9.2	4.7	3.6	8.3	10.0	1.1	7.8	6.5
79-40	3.2	15.0	8.3	5.6	4.7	2.0	5.4	Dry	Dry	Dry
80-41	1.0	10.9	15.0	5.8	4.1	2.5	3.9	Dry	Dry	Dry
80-43	10.0	24.0	20.0	6.6	3.1	0.4	1.8	Dry	Dry	Dry
80-44	12.0	24.0	13.1	5.5	2.2	Dry	0.5	Dry	Dry	Dry
80-46	12.0	60.0	28.3	18.2	12.0	4.0	6.7	Dry	Dry	Dry
80-47	12.0	20.0	15.0	12.5	12.2	7.4	9.9	4.6	2.0	1.3
80-51	3.0	10.0	5.9	3.8	2.6	Damp	Damp	Dry	Dry	<0.1
82-52	16.0	80.0	48.0	32.1	23.3	20.1	21.5	2.6	1.3	1.0
84-56	6.3*	9.6*	6.3	4.7	3.7	2.5	2.9	1.6	1.0	0.5
TOTALS	844.0	1,293.2	839.5	687.0	530.2	421.3	425.5	115.4	188.4	244.7

* No measurement - utilized yearly comparison.

TABLE 27: MODES OF OCCURRENCE - EAST MOUNTAIN SPRINGS

Occurrences

Stratigraphic Location	Permeable fluvial channels that intersect the land surface	Flow along permeable strata underlain by impermeable mudstone which intersects the land surface	Contact of permeable beds and the Roans Canyon Fault zone	Mode of occurrence not identified
Base of Flagstaff Limestone		79-6, 79-7, 79-35, 86-58	Sheba Springs, 79-1	
North Horn Formation	Teds Tub, Burnt Tree, 79-2, 79-3, 79-8, 79-9, 79-11, 79-12, 79-13, 79-14, 79-15, 79-16, 79-17, 79-21, 79-22, 79-26, 79-27, 79-28, 79-29, 79-34, 79-39, 80-42, 80-43, 80-46, 80-47, 80-48, 84-53, 84-56, 86-59, 89-62, 89-63, 89-64, 89-65, 89-66, 89-67, 89-68		Elk Springs, 79-10, 79-18, 79-19, 79-20, 84-54, 89-61	
Base of North Horn Formation		79-23, 79-25, 79-32, 79-36, 79-37, 79-38, 84-55	79-30, 79-31	
Other Stratigraphic Locations	Blackhawk Formation 80-50, 84-57, 91-73 Bear Canyon Fault Zone 82-51 (Price River)	Price River Formation 79-24, 79-33, 79-40, 80-41, 80-44, 80-45, 82-52, Jerk Water, 89-60 (Alpine)	80-49 (Price River) 91-72 (Blackhawk)	Flagstaff Limestone 79-4, 79-5, Pine Springs Trough

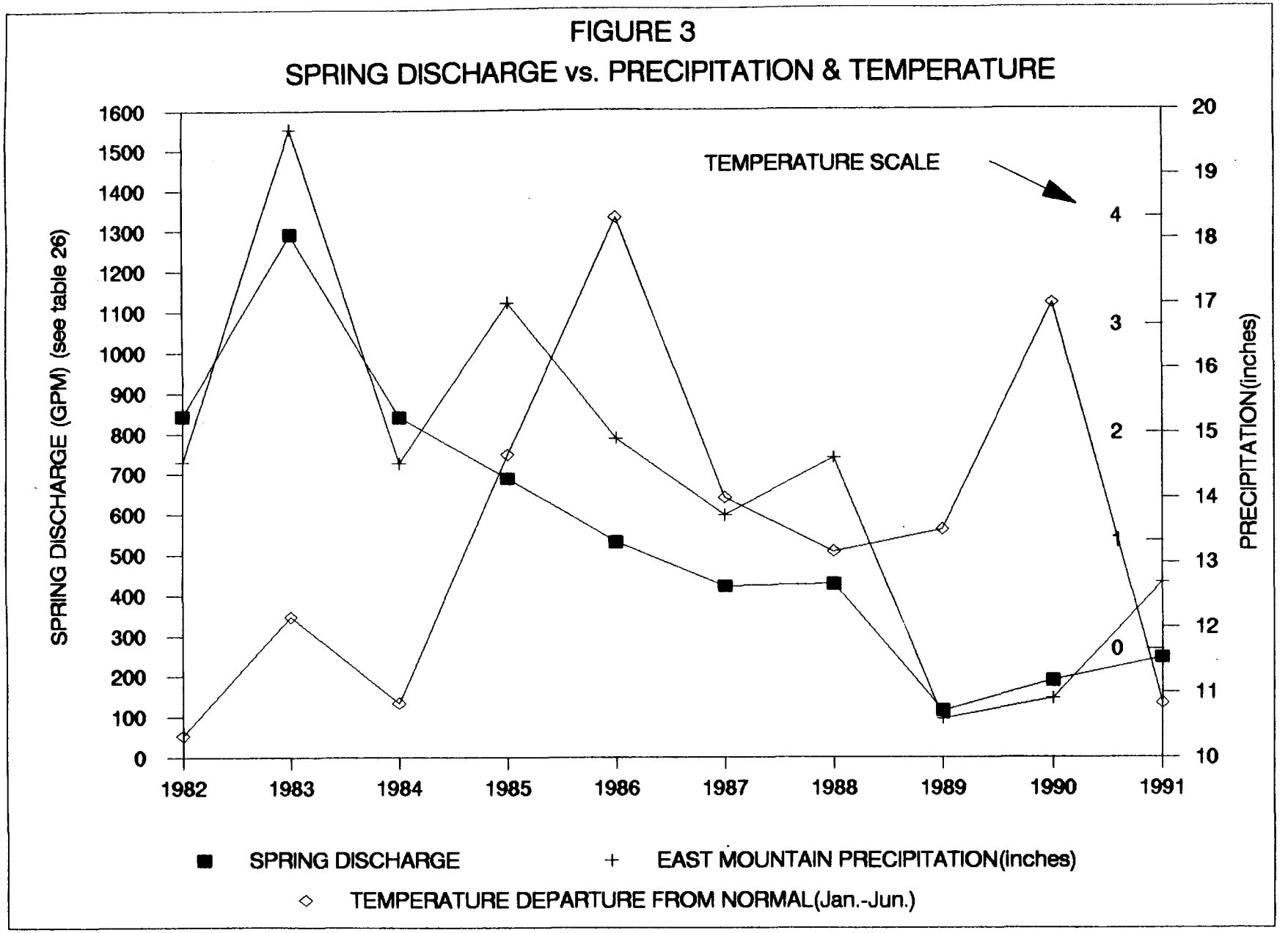


FIGURE 3
SPRING DISCHARGE vs. PRECIPITATION & TEMPERATURE
SPRING DISCHARGE (GPM) (see table 26)
PRECIPITATION(inches)
TEMPERATURE SCALE
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
20
19
18
17
16
15
14
13
12
11
10
4
3
2
1
0
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
SPRING DISCHARGE
EAST MOUNTAIN PRECIPITATION(inches)
TEMPERATURE DEPARTURE FROM NORMAL(Jan.-Jun.)

TABLE 28: TEMPERATURE COMPARISON

MONTH	EAST MOUNTAIN DEPARTURE FROM NORMAL	ELECTRIC LAKE DEPARTURE FROM NORMAL	HUNTER PLANT DEPARTURE FROM NORMAL	HUNTINGTON PLANT DEPARTURE FROM NORMAL
1983				
JAN		+2.1	+2.7	+6.2
FEB	Insufficient	-2.2	+3.2	+2.1
MAR	Historical	+1.3	+4.5	+2.1
APR	Data	+7.6	-0.8	-3.4
MAY		-6.4	+1.9	+0.2
JUN		-3.5	+3.7	-1.1
1984				
JAN		-3.8	-7.6	+2.8
FEB	Insufficient	-5.4	-7.3	-0.3
MAR	Historical	-1.0	+1.4	-0.1
APR	Data	-4.5	+1.5	-1.8
MAY		+3.1	+11.2	+4.0
JUN		-1.6	+3.9	-3.8
1985				
JAN	-1.4	-5.7	-2.8	+2.1
FEB	-2.5	-8.6	-4.5	-5.5
MAR	+1.0	-1.4	+2.2	-0.4
APR	+7.8	+6.6	+8.0	+6.1
MAY	+6.1	+7.6	+8.4	+2.5
JUN	+7.3	+3.0	+6.8	+0.3
1986				
JAN	+5.1	+4.0	+6.2	+6.5
FEB	+3.1	+0.6	+7.9	+3.8
MAR	+7.6	+9.6	+9.5	+5.9
APR	+2.0	+0.8	+3.0	0.0
MAY	-5.6	0.0	+3.4	-0.1
JUN	+5.0	+5.5	+7.7	+3.3
1987				
JAN	-4.2	-4.8	-2.6	+0.8
FEB	-1.4	-6.3	+3.0	+1.7
MAR	-2.2	-2.7	+0.5	-3.1
APR	+7.3	+5.5	+6.2	+5.1
MAY	+5.4	+3.6	+4.4	+0.3
JUN	+5.3	+2.0	+7.7	+1.8
1988				
JAN	-3.7	-4.2	-7.1	-3.1
FEB	+0.7	-3.0	+3.0	+0.7
MAR	-1.8	-3.4	+2.6	-1.5
APR	+2.6	+4.1	+4.5	+2.2
MAY	+4.2	+1.2	+4.9	+0.9
JUN	+3.2	+4.5	+9.6	+2.4
1989				
JAN	-2.1	-4.3	-7.8	-4.8
FEB	-3.5	-6.6	-1.4	-5.7
MAR	+5.7	+8.1	+9.5	+3.8
APR	+6.0	+6.9	+9.5	+5.7
MAY	+4.4	+4.0	+6.8	+0.7
JUN	-4.5	-6.4	+5.0	-1.8
1990				
JAN	-2.4	-0.8	+3.7	+0.9
FEB	-1.1	-4.9	+5.2	-2.0
MAR	+1.9	+7.0	+8.7	+2.6
APR	+2.1	+6.3	+10.9	+4.6
MAY	+0.8	+3.0	+6.8	-1.3
JUN	+3.3	+4.8	+10.9	+1.0
1991				
JAN	-1.9	-2.2	-4.5	-4.4
FEB	+5.8	+0.6	+7.5	+3.7
MAR	-13.3	-2.5	+2.8	-5.8
APR	-5.5	-3.0	+1.9	-3.3
MAY	-0.7	-1.8	+5.1	-5.1
JUN	-1.2	-0.6	+7.7	-2.8

YEAR	EAST MOUNTAIN	ELECTRIC LAKE	HUNTER PLANT	HUNTINGTON PLANT	TOTAL
1982		-2.8	-0.03	+1.2	-0.8
1983		-2.7	2.5	+1.0	+0.3
1984		-2.2	0.5	0.13	-0.5
1985	3.1	0.3	3.0	0.9	+1.8
1986	2.9	3.4	6.3	3.2	+4.0
1987	1.7	-0.5	3.2	1.1	+1.4
1988	-0.2	-0.1	3.5	0.5	+0.9
1989	0.0	-0.1	4.1	0.3	+1.1
1990	2.3	1.8	7.3	1.2	+3.2
1991	-1.9	-1.4	3.8	-2.5	-0.5

stations for the period 1983-91 versus departure from normal. The comparison is vital in determining mining effects on spring discharge versus general changes in annual precipitation.

Table 28 clearly demonstrates near average temperatures between 1982 and 1984, but starting in 1985 and continuing through 1990 positive departure from normal has been significant. Comparison between spring discharge rate and general changes in annual precipitation patterns correlated well in the past due to relatively normal temperatures experienced during the early runoff period (January through June). Figure 3 not only includes a comparison of spring discharge rate and precipitation as in the past but also temperature departure due to critical influence temperature has on peak discharge occurrence.

An additional flow information study was initiated during the summer of 1985. The purpose of the program is to establish flow recession curves for the following springs: (1) Burnt Tree, (2) Elk Springs, (3) Sheba, (4) 79-10, (5) 79-23, (6) 79-26, (7) 79-29, (8) 79-35, (9) 80-44, (10) 80-46, (11) 82-52, (12) 84-56. The flow information collected during 1991 is shown in Table 29; corresponding spring recession curves comparing 1991 to 1986-1990 are located in Appendix F.

TABLE 29: EAST MOUNTAIN REGRESSION STUDY(FLOW*/TEMP.**)

1991

Spring	July	August	September	October
Burnt Tree	2.0/48	2.0/47	1.8/46	1.7/43
Elk Spring	176.0/41	97.0/43	67.1/42	51.1/39
Sheba	10.1/44	3.2/45	2.3/45	1.1/44
79-10	12.5/46	7.5/46	5.2/45	4.6/45
79-23	Damp	Dry	Dry	Dry
79-26	Dry	Dry	Dry	Dry
79-29	0.8/44	0.9/45	0.6/43	1.0/41
79-35	4.3/45	3.6/44	3.7/43	Seep
80-44	Dry	Dry	Dry	Dry
80-46	Dry	Dry	Dry	Dry
82-52	1.0/44	1.0/44	0.9/43	0.2/38
84-56	0.5/45	0.5/49	0.5/44	0.5/42

* All flow given in gallons per minute
** Temperatures reported in degrees Fahrenheit

3. Quality

To more closely identify springs which are related one with another, water samples were analyzed to determine the percentage of cations and anions in solution. The percentages have been graphically represented as cation-anion diagrams. (See Appendix F.) The purpose of the cation-anion diagrams is to identify groups of related springs by water chemistry. To better visualize the concept, the cation-anion diagrams are presented by the geologic formation in which the spring originates. A general pattern for the Flagstaff and Price River formations can be recognized for

each year in which the cations/anions were analyzed. A consistent pattern for the North Horn is less obvious due to the complex geology of the formation itself. One aspect the cation-anion diagrams demonstrate is that, even though the quality varies slightly from individual sites as well as from different formations, seasonal variations do not exist.

The quality of the springs sampled in 1991 reveals an excellent correlation with historical averages. A summary of the water quality analysis for a representative group of East Mountain Springs is presented in Table 30. In the table the mean values for 1991 are compared to the historical results for each respective spring. The raw data regarding all springs sampled is contained in Appendix F.

*Table 30: East Mountain Springs Water Quality (Historical vs. 1991) **

PARAMETER	Burnt Tree Historical	Burnt Tree 1991	Elk Spring Historical	Elk Spring 1991	Sheba Spring Historical	Sheba Spring 1991	79-10 Historical	79-10 1991	79-23 Historical	79-23 1991	79-26 Historical	79-26 1991
Elevation	9260		9350		9740		9350		9035		9310	
Geologic Formation	TKn		TKn		Tf		Kpr		TKn		TKn	
Bicarbonate	330	331	295	288	291	284	317	321	413	no	336	no
Calcium	65.1	56.4	68.8	63.7	90.2	82.2	75.6	68.1	79.6	flow	71.0	flow
Carbonate	<1	<1	0.93	<1	<1	<1	<1	<1	<1	during	<1	during
Chloride	5.5	7.5	5.2	7.5	4.9	10.0	6.3	7.5	11.3	1991	8.2	1991
Cond.(umhos/cm)	506	403	431	398	437	378	470	395	691		520	
Hardness	271	259	255	255	251	246	279	264			286	
Iron	0.20	0.02	0.11	0.12	0.13	0.02	0.10	0.09	0.09		0.20	
Magnesium	26.44	28.70	22.47	23.28	9.86	9.86	21.55	22.83	38.30		26.28	
Mangenese	0.01	0.01	0.01	0.04	0.01	0.02	0.01	0.02	0.01		0.02	
pH(units)	7.50	7.57	7.76	7.65	7.59	7.23	7.66	7.43	7.72		7.94	
Potassium	1.05	1.69	2.44	0.00	1.46	1.48	2.29	1.90	1.54		2.15	
Sodium	13.90	16.10	10.16	6.53	5.39	2.97	5.44	5.06	14.90		16.63	
Sulfate	30.9	5.5	36.0	5.0	32.5	6.5	27.7	5.5	27.2		41.9	
TDS	267	291	257	251	267	238	265	277	364		319	

PARAMETER	79-29 Historical	79-29 1991	79-35 Historical	79-35 1991	80-44 Historical	80-44 1991	80-46 Historical	80-46 1991	82-52 Historical	82-52 1991	84-56 Historical	84-56 1991
Elevation	9410		9585		8980		9350		8995		9335	
Geologic Formation	TKn		Tf		Kpr		TKn		Kpr		TKn	
Bicarbonate	329	310	309	296	451	no	365	no	423	387	352	349
Calcium	52.8	38.9	95.3	82.3	101.6	flow	64.1	flow	79.7	75.7	66.3	64.9
Carbonate	<1	<1	<1	<1	<1	during	<1	during	<1	3.67	<1	<1
Chloride	18.09	25.00	4.21	25.00	11.10	1991	4.90	1991	10.00	17.50	9.08	7.50
Cond.(umhos/cm)	546	450	446	345	876		561		656	518	542	449
Hardness	248	247	285	269	377		304		320	329	304	298
Iron	0.12	0.02	0.15	0.02	0.12		0.27		0.08	0.13	0.04	0.02
Magnesium	32.55	33.85	14.20	15.48	41.48		28.57		33.05	33.98	32.37	33.03
Mangenese	0.02	0.01	0.01	0.02	0.01		0.01		0.01	0.01	0.01	0.01
pH(units)	7.80	7.33	7.68	7.35	7.79		7.43		7.58	7.63	7.54	7.25
Potassium	3.17	2.13	0.82	1.58	2.76		0.83		1.35	1.68	0.73	1.70
Sodium	31.33	35.04	8.47	3.64	35.17		9.90		23.71	21.70	17.74	17.13
Sulfate	58.5	25.0	53.1	6.0	138.7		19.0		43.0	28.0	35.5	21.0
TDS	337	332	274	264	524		311		371	384	329	313

* Quality parameters reported as mg/l unless otherwise noted

B. Rilda Canyon - North Emery Water Users Association (NEWUA)

Of concern to PacifiCorp Fuel Resources is the proximity of proposed mining activities in Rilda Canyon to the Rilda Canyon Springs which currently serve as a culinary water source to the North Emery Water Users Association (NEWUA). The NEWUA spring system consists of a series of collection lines extending westward up Rilda Canyon and southward up a small side drainage (shown on Map HM-8 in Volume 9 of the PAP). The NEWUA spring system is metered at four locations. Meter 1 (Side Canyon Spring) is located at the downstream end of a collection line which enters Rilda Canyon from the South. Meter 2 (Side Canyon Spring plus South Spring) is located near the bottom of the main east-west trending collection line which lies to the south of Rilda Canyon Creek at a point just upstream (west) of the main spring collection box. Meter 2 records combined flows from both the Side Canyon (Meter 1) as well as additional inflows known as South Spring which enter the system below Meter 1. Meter 3 (North Spring) records flows for the east-west central collection line which was constructed through the central portions of the valley near Rilda Canyon Creek. Meter 4 (North Spring) collects data from the north collection line located on the north side of Rilda Canyon Creek.

1. Spring Flow

Through the cooperative efforts of PacifiCorp and NEWUA flow meters were installed in September 1990 to isolate individual spring areas for quantity and quality (see Map HM-8 in Volume 9 of the PAP). Table 31 below lists the individual flow rates for meters 2-4 (flow from Meter 1 is included in Meter 2).

TABLE 31: NEWUA - RILDA CANYON SPRING FLOW (GPM)

DATE	METER 2	METER 3	METER 4	TOTAL
09-06-90	20.0	75.0	120.0	215.0
09-18-90	15.8	78.9	91.0	186.0
11-07-90	13.3	37.5*	20.0	71.0
11-14-90	14.5	67.4	9.3	91.0
11-19-90**	13.6	57.7	6.3	78.0
04-08-91	10.9	56.5	4.7	72.0
06-11-91	10.9	107.0	136.0	253.9
07-17-91	12.5	95.0	160.0	267.5
08-19-91	9.3	95.0	160.0	264.3
09-10-91	9.2	105.0	140.0	254.2
10-21-91	7.5	85.0	55.0	147.5
11-20-91	8.0	80.0	16.2	104.2
04-07-92	8.0	46.0	7.7	61.7

* Flow not stabilized.
** Data collected during pump test.

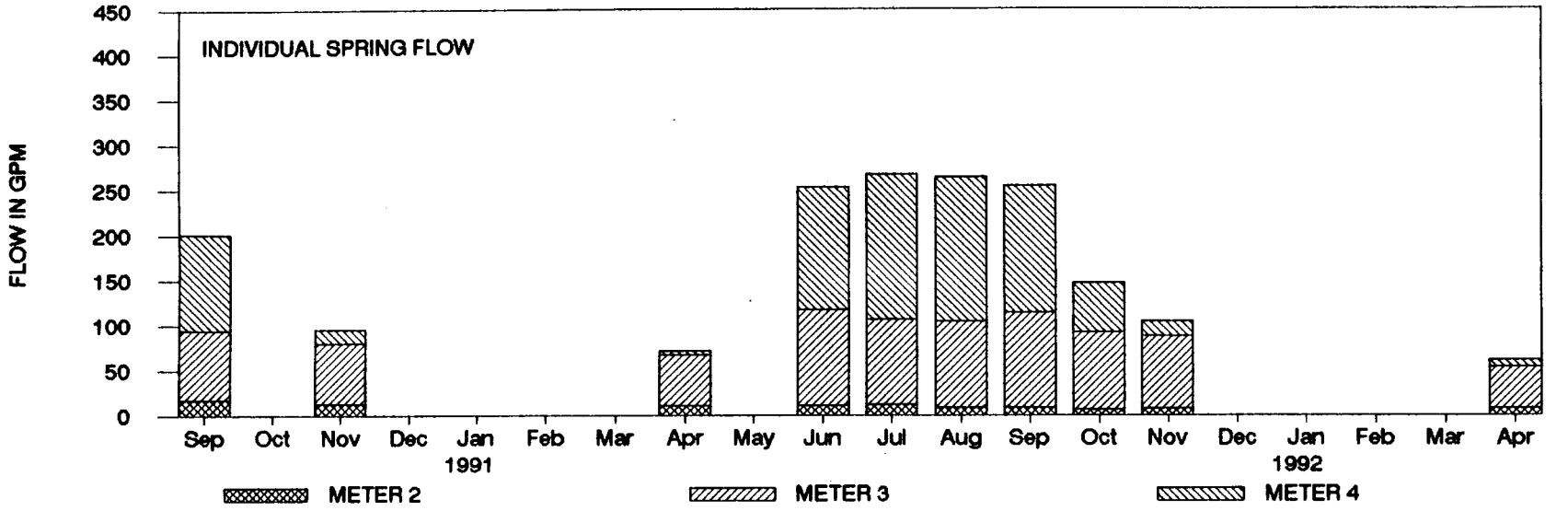
The seasonal variation of the montly average flow from NEWUA's Rilda Canyon Springs is shown in Figure 4. With the installation of flow meters, individuial spring contribution to the total flow can be plotted over time.

2. Quality

Baseline quality sampling of the individual springs was initiated upon completion of the spring meter system in September 1990 and continued quarterly throughout 1991. The minimum, maximum, and mean results of the 1990 compared to 1991 quality analysis are listed in Table 32. The raw data regarding the Rilda Springs sampled are contained in Appendix F. Values are in milligrams per liter unless

FIGURE 4

NORTH EMERY WATER USERS ASSOCIATION
RILDA CANYON SPRING FLOW



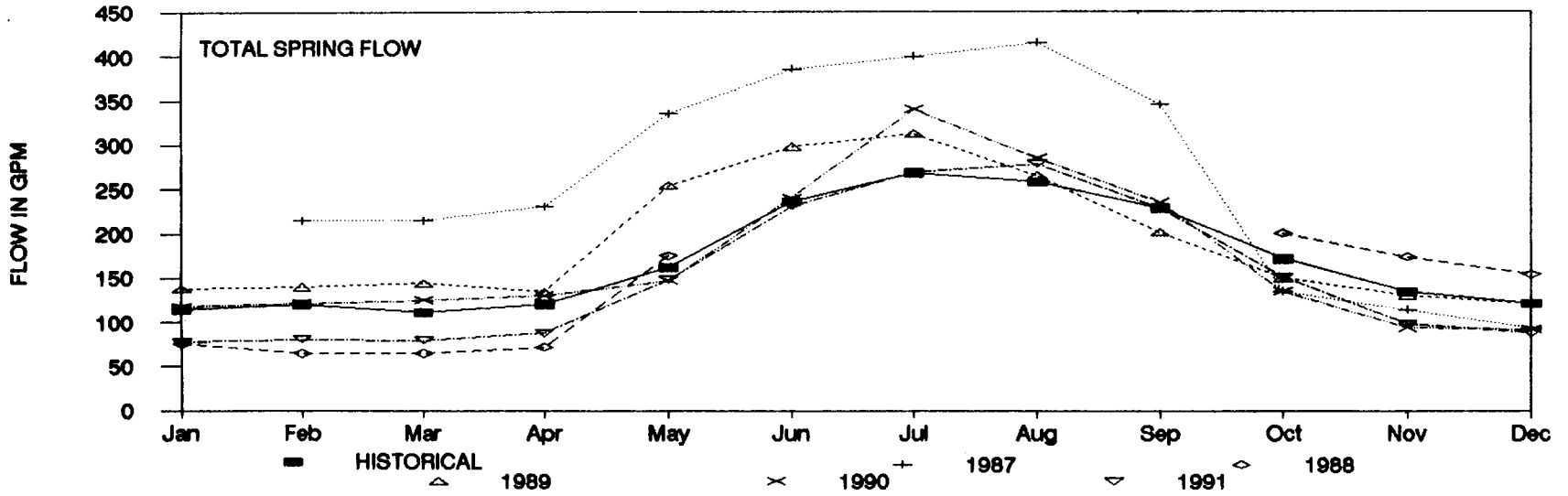


TABLE 32
NEWUA - RILDA CANYON SPRINGS
*AVERAGE WATER QUALITY**

PARAMETER	METER 2		METER 3		METER 4	
	1991	Historical	1991	Historical	1991	Historical
Bicarbonate	426	467	402	409	354	364
Calcium	97.5	93.4	88.3	83.0	74.2	71.9
Carbonate	0.8	0.5	0.8	0.5	0.8	0.5
Chloride	23.8	11.2	25.0	7.4	25.0	12.2
Cond. (umhos/cm)	668	793	520	683	493	535
Hardness	454	444	417	390	373	333
Iron	0.06	0.04	0.09	0.05	0.02	0.02
Magnesium	51.13	51.30	47.58	44.38	45.67	37.40
Mangenese	0.02	0.01	0.02	0.11	0.02	0.12
pH(units)	7.00	7.30	7.18	7.26	7.28	7.48
Potassium	2.23	1.28	1.32	0.57	1.18	0.68
Sodium	13.03	14.49	12.92	12.37	11.47	13.43
Sulfate	93.8	89.0	75.0	79.4	70.8	56.6
TDS	479	468	414	402	386	357

** Quality parameters reported as mg/l unless otherwise noted*

otherwise noted. As stated in Volume 9 of the PAP, differences in the groundwater the quality data reflect differences in the groundwater source or the origin of groundwater for the various springs issuing within the Rilda Springs area. The higher sulfate and TDS concentrations from the Meter 2 samples are characteristic of waters associated with the Blackhawk Formation. Waters issuing from the North Spring collection system (Meters 3 and 4) area are of a better quality than waters from the Side Canyon and South Spring collection areas. Water issuing from the North Spring originates primarily from water moving within the alluvial valley sediments and fracture systems of the Starpoint Sandstone and is not derived from the Blackhawk Formation.

V. MINE HYDROLOGY

A. Groundwater and Surface Water Sources in Relation to Mine Workings

The relationship of the Deer Creek and Wilberg mine workings with the overlying springs is shown in Figures 5 and 6. Beginning in 1979, PacifiCorp has developed an ambitious spring monitoring program with emphasis to detect changes in the East Mountain hydrologic regime as a result of mining. The data collected to date reveal no indication of any mine-related effects on spring discharge or surface flow rates. As expected, there is a direct relationship between annual precipitation, temperature, and spring discharge rates as previously discussed on pages 39 through 49 and shown in Figure 3.

B. Groundwater Quality and Collection Procedures

PacifiCorp began in-mine quality and quantity measurement in 1977 and has continued the measurement through 1991. With the collection of numerous samples throughout the extent of the mine workings the quality has remained relatively constant.

Figure 7 depicts the consistency of the historical versus 1991 groundwater quality for individual locations by the use of cation-anion diagrams.

Collection procedures for groundwater quality consist of two grab samples collected and analyzed per quarter at each of the mines which produces measurable quantities of water. Sampling according to this established plan began in the first quarter of 1982. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality except when new sites are established. In that case baseline information will be collected for two (2) years. (See Appendix M.)

Long-term monitoring locations have been established at each of the mines which produces measurable quantities of water, i.e., Deer Creek and Wilberg mines. (See Maps 3 and 4 in pocket.) Four types of occurrences have been recognized to exist within the current mine workings. (Refer to Figure 8.)

1. Structural rolls with overlying fluvial channels,
2. Fault systems (Pleasant Valley and Roans Canyon),
3. Fractures and joints (lineaments),
4. Roof bolt and in-mine drill holes.

A collection device was installed at each long-term monitoring location. Flow and temperatures collected on a quarterly basis from the long-term sites in both mines were fairly consistent. (See appendices G and I for the Deer Creek and Wilberg In-Mine hydrographs.)

Due to the ever-changing conditions experienced in underground mining one long-term monitoring site in the Deer Creek Mine was eliminated and one new site was established in 1991. The description and reasoning for the site which was eliminated and the location of the new site are as follow.

FIGURE 7
IN-MINE WATER QUALITY CATION-ANION DIAGRAMS

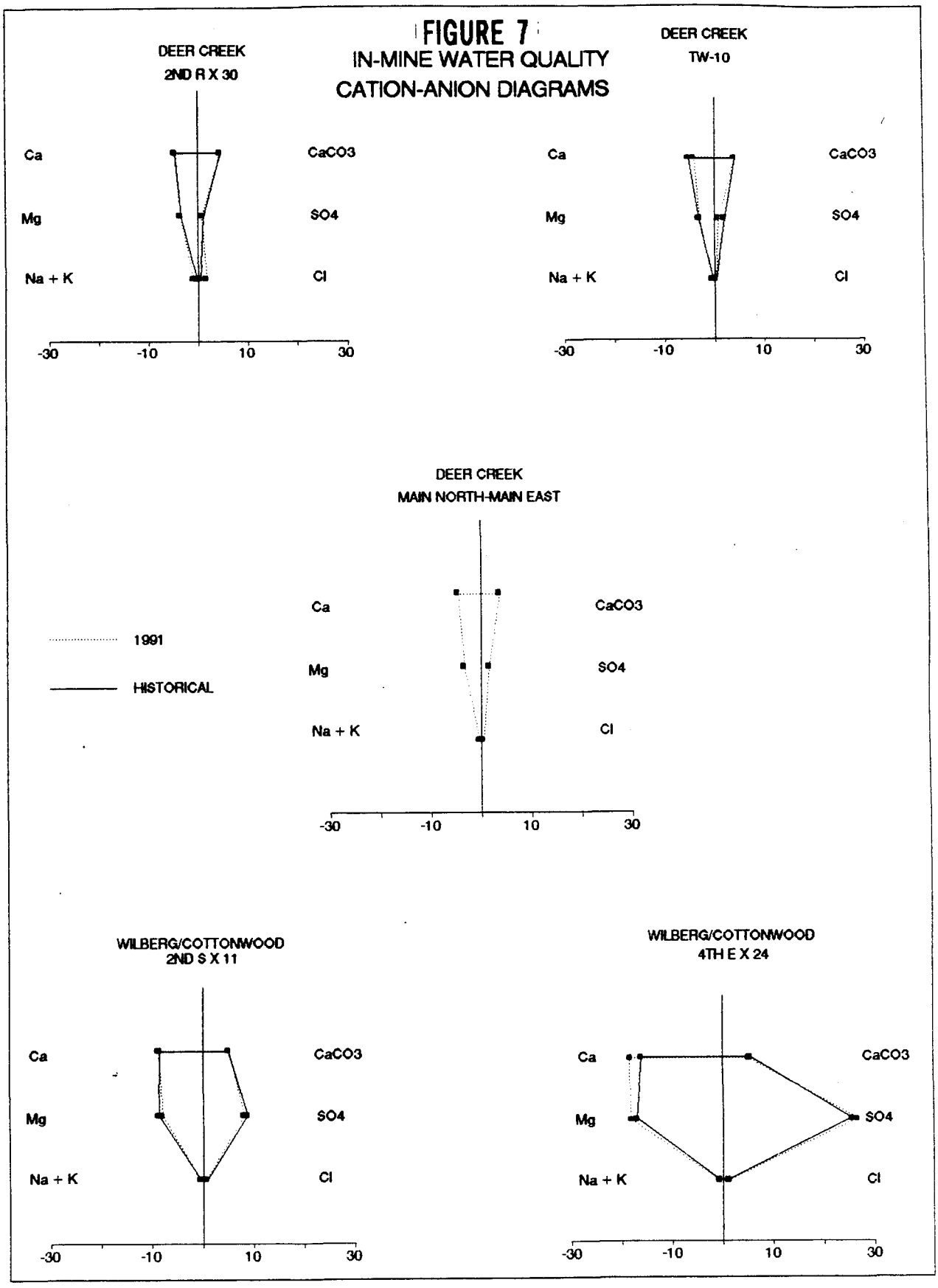
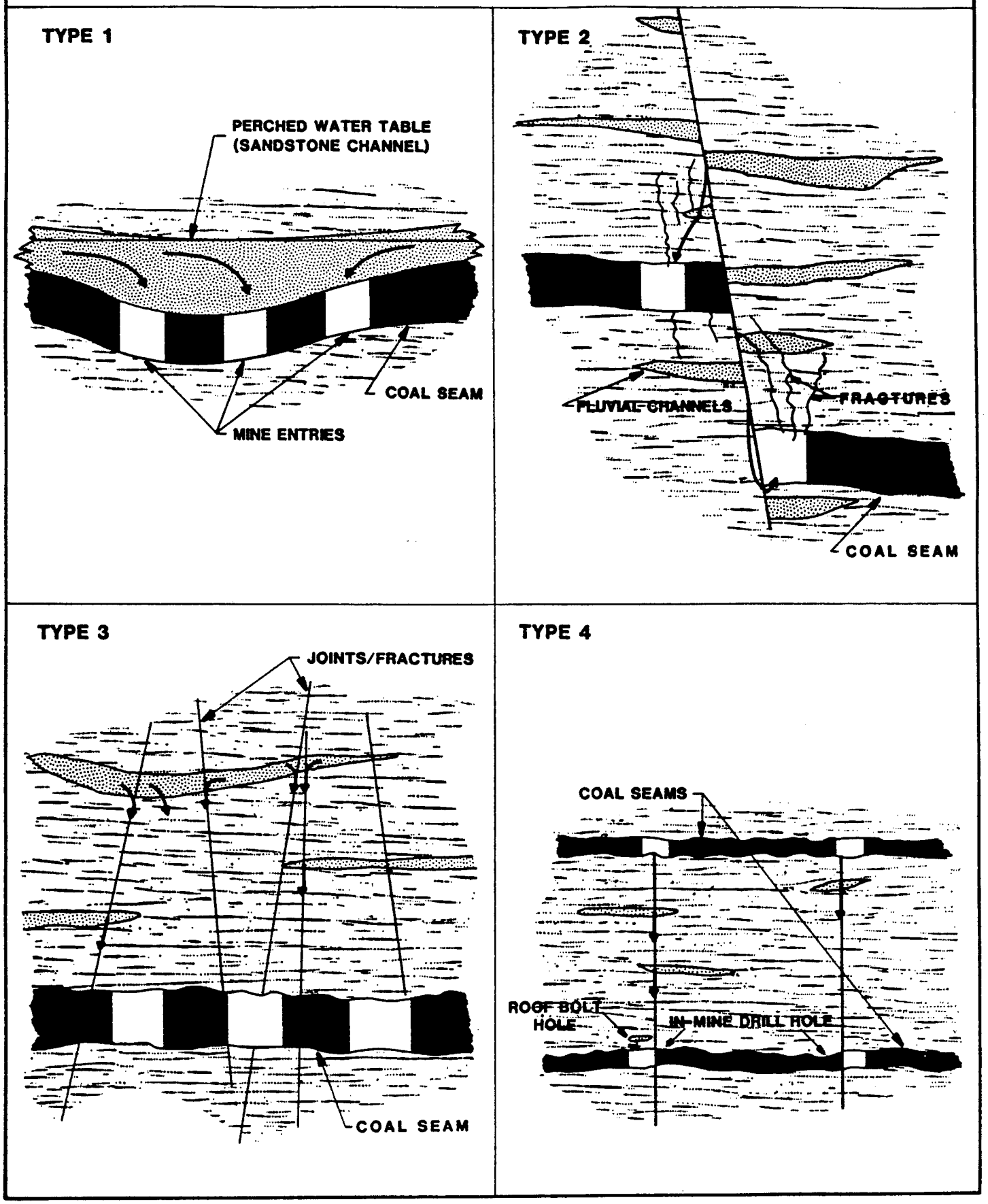


FIGURE 8
LONG TERM WATER SOURCES



DEER CREEK MINE

1990 ID	Terminated Site Location Description	Reason for Termination
1	2nd Right xc-38	Inaccessible

1991 ID	Additional Site Location Description	Water Source Type
1	Main North - Main East	In-mine drill hole

Additional long-term monitoring sites will be added when areas meeting our long-term criteria are opened by mining, i.e., long-term accessibility and water source are such that consistent sampling can be achieved.

C. Mine Water

1. Deer Creek Mine

a. In-Mine Water Production

The best estimate of in-mine water production was arrived at by combining the following values:

Deer Creek Discharge	1,229.2 Million Gallons
Estimated Evaporation*	18.9 Million Gallons
Domestic Usage	7.9 Million Gallons
Total Discharge	1,256.0 Million Gallons

* See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

Nine samples were collected in the Deer Creek Mine in 1991. (See Map No. 4 in pocket for locations.) Parameters analyzed in 1991 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix M.) Table 33 lists the characteristics of the samples collected and compares

the mean, minimum, and maximum results of 1991 to the historical values for each location. It is apparent from Table 33 that the average quality of the in-mine water has remained relatively constant. The consistency was also depicted in the stiff diagrams presented as Figure 7. The complete chemical analysis of samples collected in 1991 can be found in Appendix G.

c. Discharge Quantity

Excess water not utilized in the mining operation or for domestic use was either pumped to storage areas or discharged from the mine. The locations of the main sump areas within the mine are shown in Figure 9. The largest volume of water is stored in the western part of Main West, which has not been actively mined for several years.

In-line flow meters are utilized to record the amount of water discharged from the mine, after which it passes through underground sedimentation sumps. Prior to December 1990 all of the water discharged from Deer Creek was piped directly to PacifiCorp's Huntington Power Plant. As of November 16, 1990, the State of Utah-Department of Health granted PacifiCorp a temporary discharge permit under a bypass agreement. (Refer to 1991 Annual Report for details concerning the Temporary Agreement.)

As part of the agreement a comprehensive hydrologic monitoring program was established to monitor the potential impacts to the receiving streams of Deer Creek and Huntington Creek. The program includes monitoring stream transects, water quality, and macroinvertebrates.

TABLE 33: DEER CREEK IN-MINE WATER QUALITY* - 1991

LOCATION	1991 SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	pH (units)	POTASSIUM	SODIUM	SULFATE	TDS
3N xc-65	03-05	468	86.3	<1.0	10.0	510	367	<0.02	36.9	<0.02	5.42	0.32	55.03	33.0	410
TW-10	06-13	359	91.2	<1.0	10.0	500	377	0.73	36.3	<0.01	7.60	0.00	15.77	36.0	348
	09-04	356	73.9	<1.0	15.0	500	315	0.12	31.8	<0.01	6.80	0.31	16.86	43.0	396
	12-05	415	75.8	0.0	15.0	510	339	0.10	36.4	0.03	6.60	3.70	11.18	35.0	313
	MIN	356	73.9	0.0	10.0	500	315	<0.02	31.8	<0.01	5.42	0.00	11.18	33.0	313
	MAX	468	91.2	<1.0	15.0	510	377	0.73	36.9	0.03	7.60	3.70	55.03	43.0	410
	MEAN	400	81.8	0.8	12.5	505	350	0.24	35.4	0.02	6.61	1.09	24.71	36.8	367
HISTORICAL	MIN	292	62.9	<1.0	5.0	450	292	0.01	28.1	<0.01	7.00	0.10	9.81	27.0	358
(1988-90)	MAX	714	211.0	<1.0	30.0	950	732	1.17	77.1	1.21	7.85	5.00	18.90	350.0	439
	MEAN	410	102.8	<1.0	13.2	627	417	0.23	38.9	0.15	7.43	1.86	15.05	95.9	393
2R xc-30**	03-05	460	90.9	<1.0	65.0	410	399	<0.02	41.7	<0.02	6.70	1.50	58.47	40.0	424
HISTORICAL	MIN	375	79.5	<1.0	15.0	520	354	<0.02	37.8	<0.01	7.30	0.25	11.40	40.0	203
(1990)	MAX	526	105.8	<1.0	20.0	700	429	0.44	44.1	0.02	7.70	1.80	14.22	70.0	408
	MEAN	456	90.1	<1.0	17.5	586	395	0.20	41.2	0.01	7.54	1.07	13.22	50.0	344
MN-ME***	09-04	374	99.4	<1.0	20.0	620	407	<0.02	38.6	<0.01	7.00	1.80	20.17	85.0	410
	12-05	355	86.8	0.0	10.0	600	397	0.07	43.7	0.00	6.90	5.00	17.45	78.0	430
	MIN	355	86.8	0.0	10.0	600	397	<0.02	38.6	<0.01	6.90	1.80	17.45	78.0	410
	MAX	374	99.4	1.0	20.0	620	407	0.07	43.7	0.00	7.00	5.00	20.17	85.0	430
	MEAN	365	93.1	0.6	15.0	610	402	0.05	41.28	0.01	6.95	3.40	18.81	81.5	420
4R xc-26****	03-05	296	65.4	<1.0	80.0	430	291	<0.02	30.9	<0.02	6.35	6.88	35.37	18.0	332
5R xc-38****	06-13	364	86.6	<1.0	13.0	490	381	--	40.1	0.03	7.60	1.35	8.83	27.0	318

** Site eliminated - inaccessible

*** Sample site intiated during 1991.

**** Limited access or site ceased flowing.

* Quality parameters are reported as mg/l unless otherwise noted.

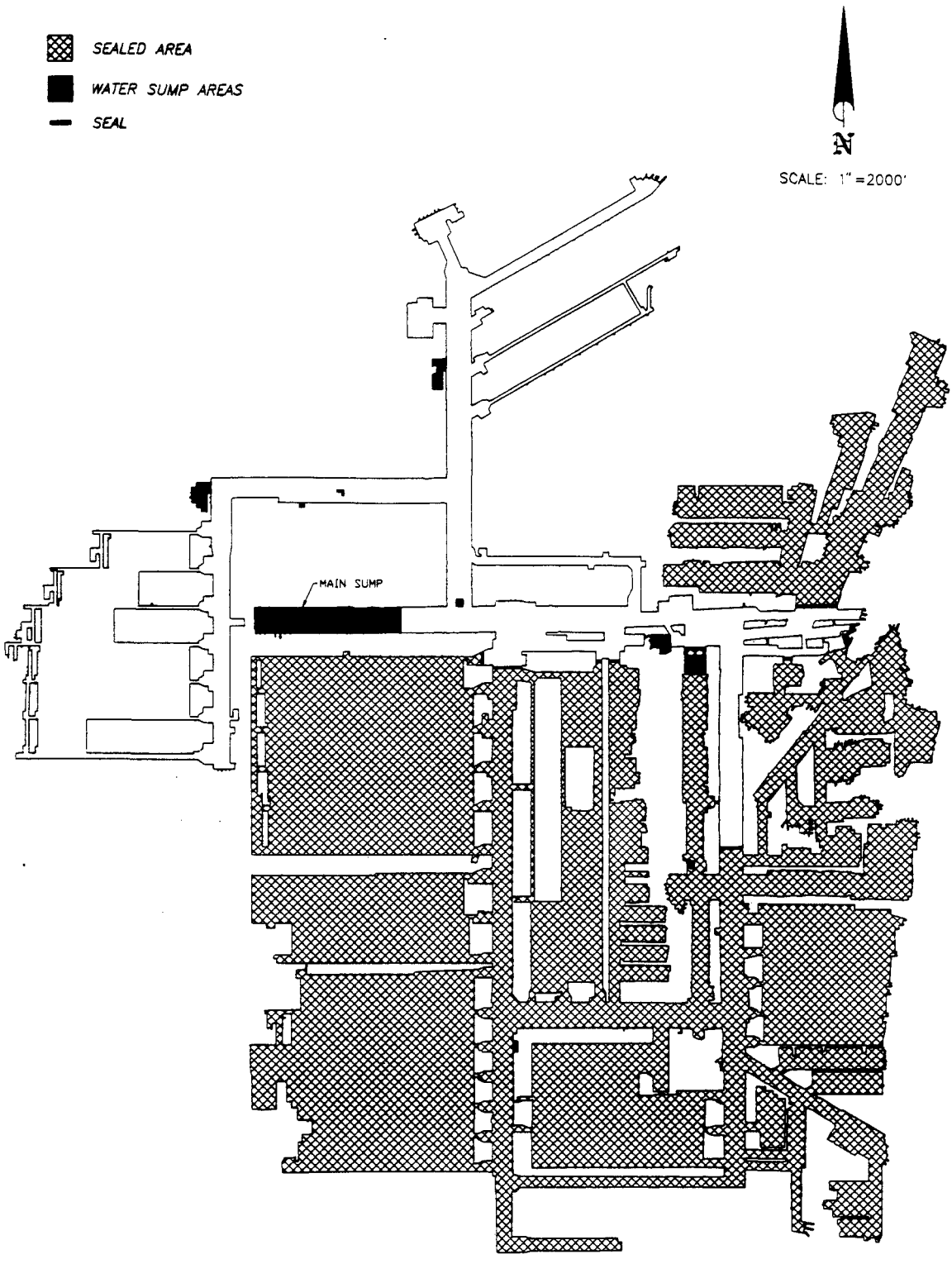


FIGURE 9

DEER CREEK COAL MINE
WATER SUMP AREAS

WORKINGS UPDATED TO FEB. 29, 1992

Initial data collected during the time frame December 1990 through December 1991 indicate the major constituents of water discharged from the mine have had only a minor impact on the receiving stream of Huntington Creek (see Appendices A and B for water quality analysis). Monitoring sites were established along the extent of Deer Creek in addition to sites above and below the confluence of Deer Creek on Huntington Creek. Listed below are the parameters analyzed to determine the potential impact.

Alkalinity (total)	pH
Calcium	Potassium
Chloride	Sodium
Flow	Solids: Settleable/Suspended
Iron (Total)	Sulfate
Magnesium	Temperature
Manganese	Turbidity
Oil & Grease	TDS
Oxygen - Dissolved	

Considering the low flow conditions of Huntington Creek, downstream of the confluence of Deer Creek only the parameters TDS, sodium, and sulfate increased slightly from background.

The total water discharged from the Deer Creek Mine during 1991 was estimated at 3772 acre feet, or 1,229.2 million gallons. The recorded flow of 3772 acre feet during 1991 is a seventeen percent (17%) decrease from the 1990 discharge of 4552 acre feet. The average monthly discharges are shown in Figure 10.

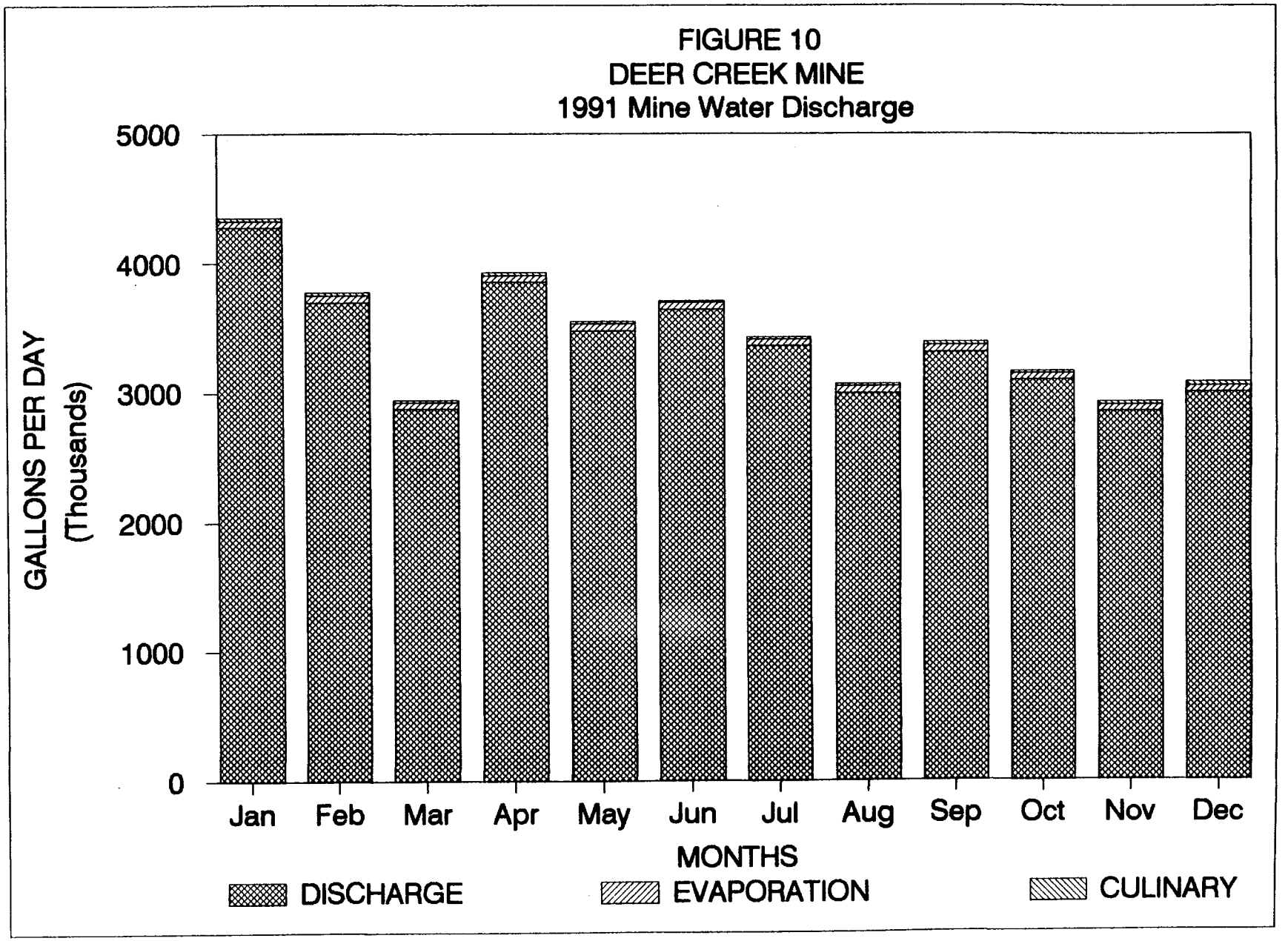


FIGURE 10
DEER CREEK MINE
1991 Mine Water Discharge
GALLONS PER DAY
(Thousands)
5000
4000
3000
2000
1000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
MONTHS
DISCHARGE
EVAPORATION
CULINARY

A graph displaying the historical discharge rates is included as Figure 11. The volume of water discharged from the mine has increased at a significant rate over the past several years due to at least five factors. First, in previous years water discharged was measured with a Stevens Recorder installed in a Parshall flume. It was difficult to maintain calibration of the recorder and, in 1985, in-line flow meters (totalizer and instantaneous flow) were installed, allowing for a more accurate measurement of discharge. Second, mining has progressed into areas largely dominated by sandstone roof. The inflow from those areas is greater per acre of exposed area than areas of mudstone top. Third, mining has progressed into the bottom of the Straight Canyon Syncline, the lowest part of the mine, where a significant amount of water has been intersected. Fourth, mining has intersected the Roans Canyon Fault Graben which has released additional water into the mine workings. Last, prior to 1985 water used in mining was pumped directly from the in-mine sumps. Since that time all water has been pumped from the mine through the metering system. Mining water is then pumped back into the mine through a high-pressure steel line to the mining faces where it is utilized.

d. Discharge Quality

Monthly water quality samples were collected for 1991. Table 34 compares the minimum, maximum, and mean values from an historical standpoint to 1991. An examination of Table 34 shows a slight change in chloride between samples collected in 1991 to the historical results. Individual analysis can be found in Appendix H.

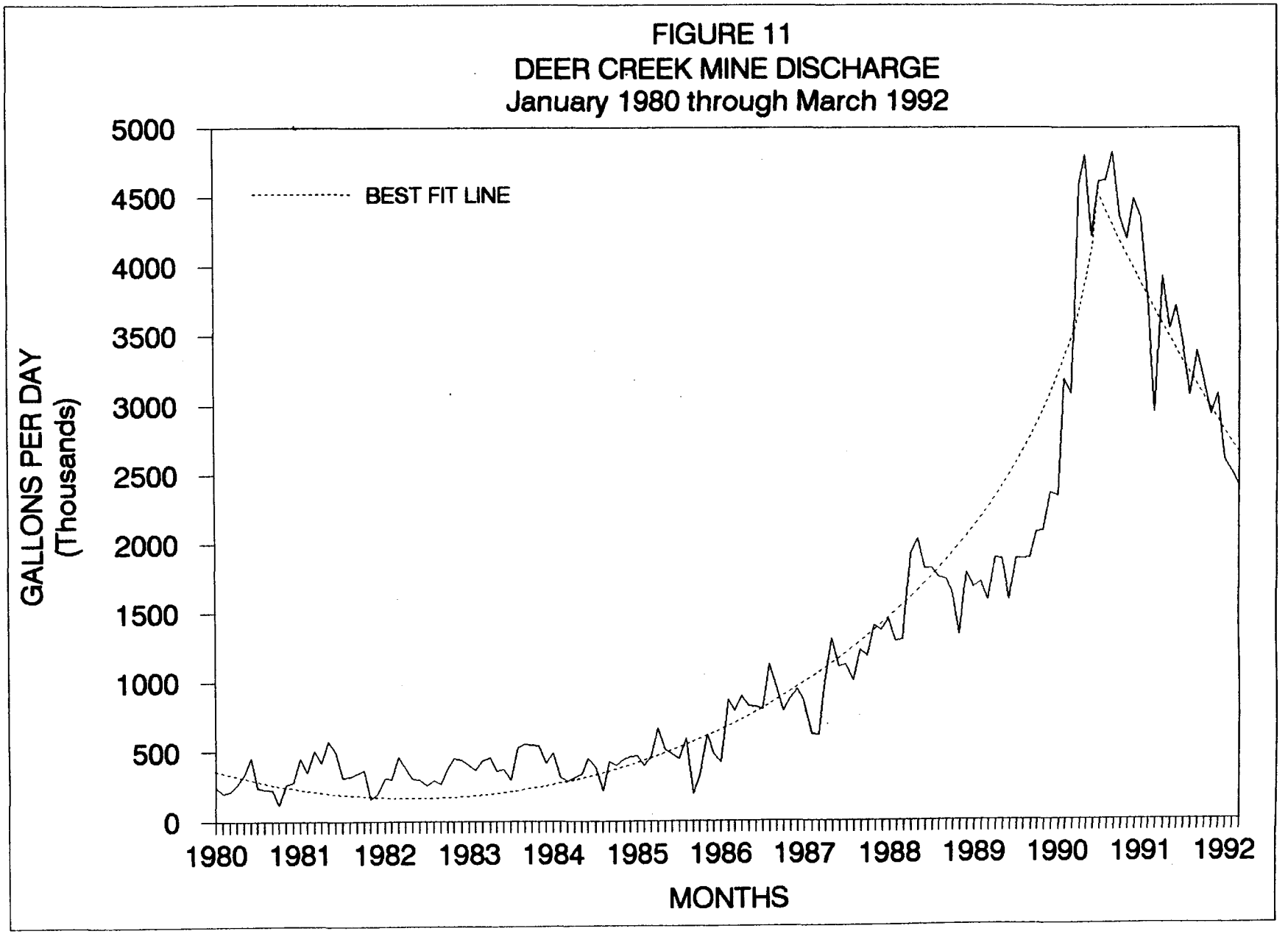


FIGURE 11
DEER CREEK MINE DISCHARGE
January 1980 through March 1992
BEST FIT LINE
GALLONS PER DAY
(Thousands)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
MONTHS

TABLE 34: DEER CREEK MINE - DISCHARGE WATER QUALITY*

Parameters	1991 Minimum	1991 Maximum	1991 Mean	Historical - (1976-1990) Minimum	Historical - (1976-1990) Maximum	Historical - (1976-1990) Mean
pH (units)	6.90	8.3	7.6	6.8	8.2	7.6
Acidity	1.0	49.0	12.4	0.7	97.0	11.9
Alkalinity	244	398	302	207	459	299.7
Chloride	10.0	55.0	23.4	2.4	60.0	16.3
Conductivity (umhos/cm)	488	1900	704	480	1480	917
Iron (Total)	0.00	0.55	0.15	0.02	7.53	0.59
Oil & Grease	0.2	4.0	1.4	0.1	48.8	3.4
Sulfate	13.0	330	144.9	29.8	420	218
TDS	403	878	509	289	938	602
TSS	0.0	41.0	12.84	0.10	2784	83.0

* Quality parameters reported as mg/l unless otherwise noted.

2. Des-Bee-Dove Mine

Production at the Des-Bee-Dove Mine was terminated indefinitely as of February 14, 1987. The portals were sealed and underground hydrologic monitoring was discontinued.

3. Wilberg/Cottonwood Mine

The mine fire which occurred in late 1984 altered normal hydrologic monitoring at the Wilberg Mine. Normal hydrologic monitoring was reinstated in late 1985 and continued through 1991.

a. In-Mine Water Production

In previous reports the in-mine water production was arrived at by combining mine discharge, domestic use, and evaporation. Due to the fire, normal coal production and usage were not experienced. Pre-fire coal production resumed during late 1985. A large part of the mine workings have been sealed since the fire. The locations of the sealed areas and sumps are shown on Figure 12. As reported

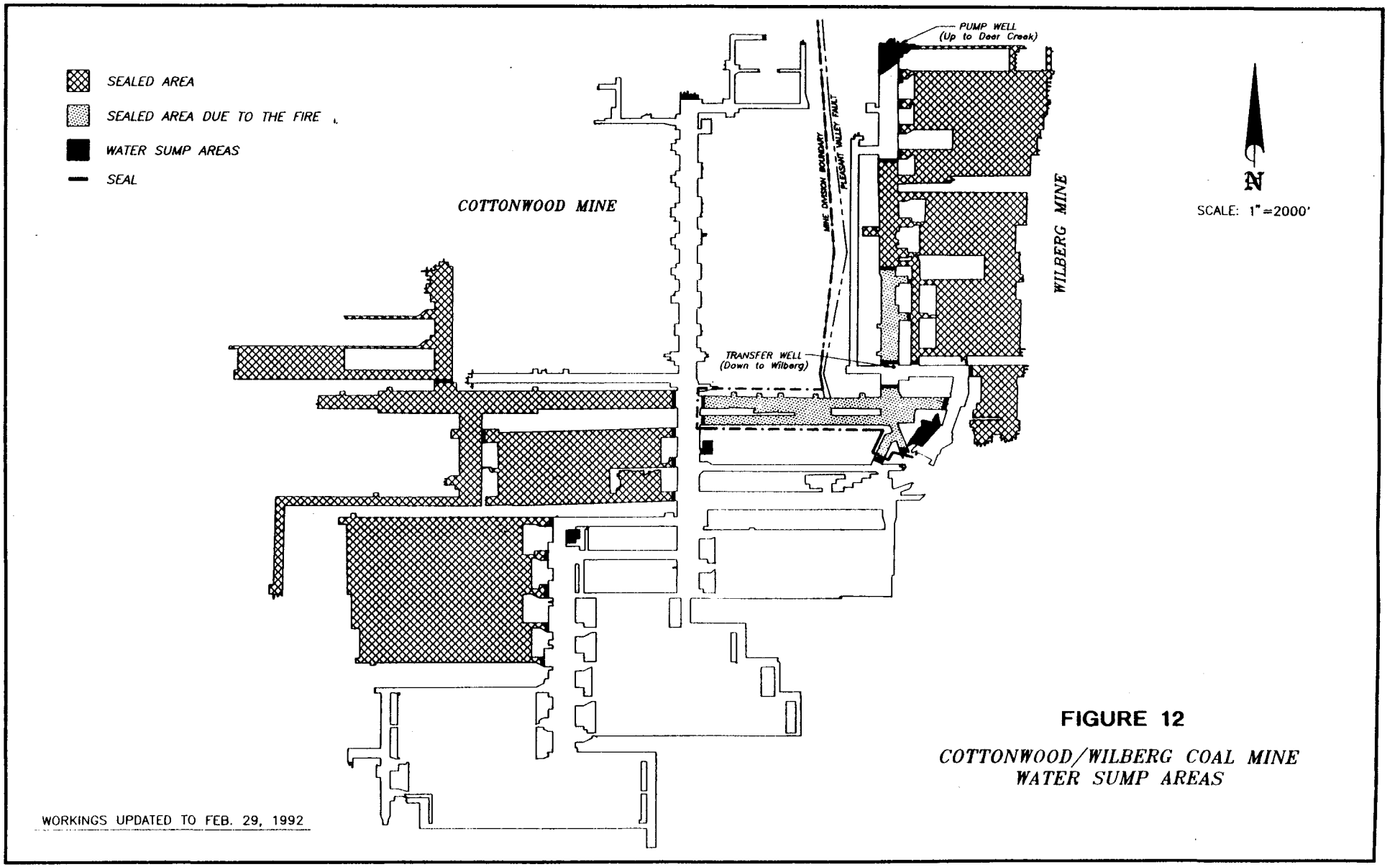


FIGURE 12

COTTONWOOD/WILBERG COAL MINE WATER SUMP AREAS

in the 1984 Annual Report, water discharged from the Wilberg Mine complex (includes the area designated as the Cottonwood Mine) decreased substantially from previous years. (See Figure 13.) The main reason for the large decrease was mining in areas dominated by mudstone roof. Consistent with previous years, the following table lists the factors involved in estimating in-mine water production.

Wilberg/Cottonwood Discharge

Grimes Wash	62.4 Million Gallons
Miller Canyon*	9.9 Million Gallons
Estimated Evaporation**	19.0 Million Gallons
Domestic Usage	5.5 Million Gallons
Total Discharge	96.8 Million Gallons

* Sealed ventilation breakout which intermittently discharges.
** See 1981 Hydrologic Monitoring Report.

b. In-Mine Quality

Eight samples were collected in the Wilberg/Cottonwood Mine in 1991. (See Map No. 5 in pocket for locations.) Parameters analyzed in 1991 are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix M.) Table 35 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1991 to the historical values. The average quality by location has remained relatively constant for each individual location. A complete chemical analysis of samples can be found in Appendix I.

The 1986 review performed by DOGM raised questions concerning the elevated mineral levels, specifically sulfate and TDS (DOGM September 28, 1987), found in the 4th East area. PacifiCorp has collected numerous samples throughout the 3rd and 4th East and 2nd South areas (see Map No. 5 in pocket) and all samples

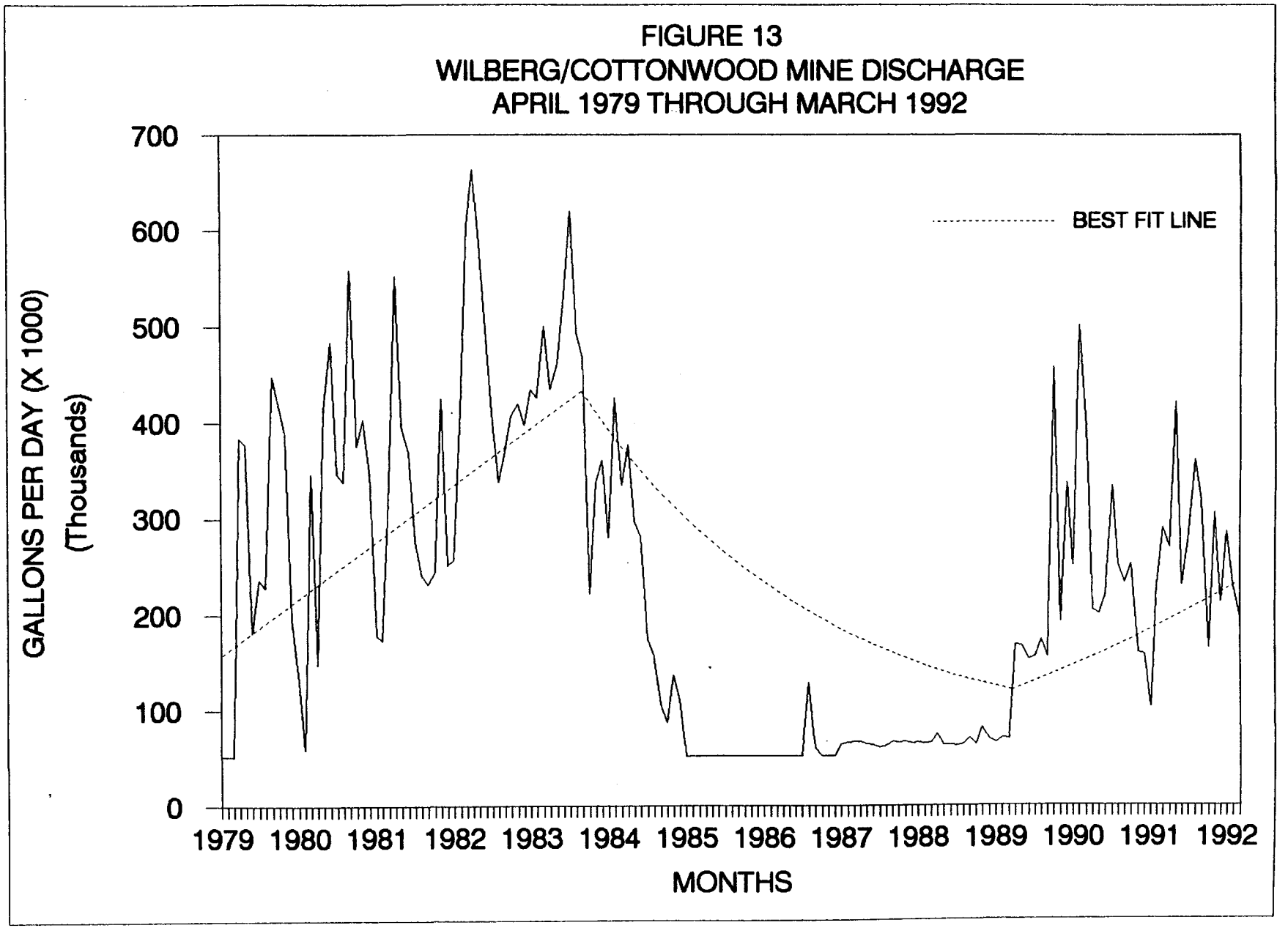


FIGURE 13
WILBERG/COTTONWOOD MINE DISCHARGE
APRIL 1979 THROUGH MARCH 1992
GALLONS PER DAY (X 1000)
(Thousands)
700
600
500
400
300
200
100
0
BEST FIT LINE
1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992
MONTHS

TABLE 35: WILBERG/COTTONWOOD IN-MINE WATER QUALITY* - 1991

LOCATION	SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	pH (units)	POTASSIUM	SODIUM	SULFATE	TDS
2S XC-11	03-27	559	206.5	<1.0	35.0	2100	895	0.11	92.2	<0.01	7.0	3.1	22.4	400	1048
	06-12	548	182.0	<1.0	18.5	1150	889	--	105.6	0.02	7.1	7.0	21.3	393	1051
	09-04	562	146.2	<1.0	10.0	1190	767	0.28	97.5	0.02	7.2	3.3	23.0	380	951
	12-10	430	154.8	1.0	16.0	1420	751	0.23	88.4	0.04	6.5	6.1	19.8	390	1056
	MIN	430	146.2	<1.0	10.0	1150	751	0.11	88.4	<0.01	6.5	3.1	19.8	380	951
	MAX	562	206.5	1.0	35.0	2100	895	0.28	105.6	0.04	7.2	7.0	23.0	400	1056
	MEAN	525	172.4	1.0	19.6	1465	826	0.21	95.9	0.02	7.0	4.9	21.6	391	1027
HISTORICAL (1983-90)	MIN	403	116.0	<1.0	9.6	1000	725	0.01	5.4	0.01	7.0	0.3	6.4	250	664
	MAX	676	330.0	<1.0	160.0	2600	1022	0.27	134.4	0.08	8.1	7.4	36.9	690	1328
	MEAN	517	170.4	<1.0	28.7	1505	874	0.07	105.6	0.03	7.4	4.0	23.8	425	987
4E XC-24	03-27	400	390.2	<1.0	40.0	4000	1822	<0.02	220.3	<0.01	7.9	6.4	44.0	1500	2256
	06-12	566	338.7	<1.0	36.5	2400	1875	<0.02	250.0	<0.01	7.5	15.4	42.4	800	1970
	09-04	586	441.4	<1.0	45.0	2900	1958	<0.02	207.8	0.03	7.3	3.3	23.0	1500	2385
	12-10	453	302.9	0.0	34.7	2720	1604	0.17	205.9	0.03	6.9	8.4	57.0	1300	2446
	MIN	400	302.9	0.0	30.0	2400	1604	<0.02	205.9	<0.01	6.9	3.3	23.0	800	1970
	MAX	586	441.4	<1.0	45.0	4000	1958	0.17	250.0	0.03	7.9	15.4	57.0	1500	2446
	MEAN	501	368.3	0.8	37.9	3005	1830	0.06	221.0	0.02	7.4	8.4	41.6	1275	2264
HISTORICAL (1986-90)	MIN	450	236.0	<1.0	17.6	1250	1170	0.01	106.0	0.01	7.1	4.3	21.7	800	1314
	MAX	636	416.9	<1.0	85.0	5000	2384	0.17	328.9	0.06	8.0	11.3	59.3	1800	2594
	MEAN	537	322.6	<1.0	36.3	2449	1660	0.05	207.5	0.03	7.5	8.9	42.9	1219	1979

* Quality parameters are reported as mg/l unless otherwise noted.

have indicated elevated mineral content. Originally, decreasing quality from north to south was believed to depict the groundwater flow direction, and the quality decreased as a function of the time it traveled through the strata. The time travel component is probably an important factor. In 1985 a surface exploration program identified the existence of an area of residual heat from an ancient burn on the outcrop throughout the southern portion of East Mountain. The high temperature was also explored within the mine and a portion of reserves was lost because of the situation. It is now theorized that the high temperature water dissolved the mineral constituents of the formations, thereby altering the water chemistry. The quality also decreases vertically because of the influence of marine sediments along with the trend of decreasing quality from north to south.

c. Discharge Quantity

Water produced in the Wilberg Mine gravity flows to the northern area of 1st North. At that point it can either be pumped by a vertical turbine located in the Deer Creek Mine which picks up the water and pumps it back to the south and down to the Wilberg Mine main sump or pumped directly to the main sump utilizing submersible pumps. Water produced in the Cottonwood Mine (2nd North area) is transferred to the Wilberg Mine sump. The sump, which functions as a settling basin, effectively removes settleable solids from the water. A portion of the water is redistributed to various areas of the mine to be utilized in the mining operations. Excess water is discharged into the Left Fork of Grimes Wash after it passes through an oil skimmer in accordance with stipulations of the Wilberg Mine Discharge Permit UT-0022896-01. A total of 62.4 million gallons was discharged to Grimes Wash during 1991; and intermittent small quantity discharges did occur at the Miller Canyon

breakouts, which were developed for ventilation purposes but sealed in 1987. (See Figure 14.) Intermittent discharges usually occur throughout the year with a flow rate ranging from 9 to 77 GPM. Discharge from Miller Canyon is monitored in accordance with stipulations of the Wilberg Mine Discharge Permit UT-0022896-04. Approximately 9.9 million gallons were discharged during 1991.

d. Discharge Quality

Samples are collected each month from Grimes Wash and Miller Canyon breakouts whenever discharge occurs. Monthly samples were collected from both the Grimes Wash and Miller Canyon locations during 1991. Table 36 compares the minimum, maximum, and mean values from 1991 to the historical values.

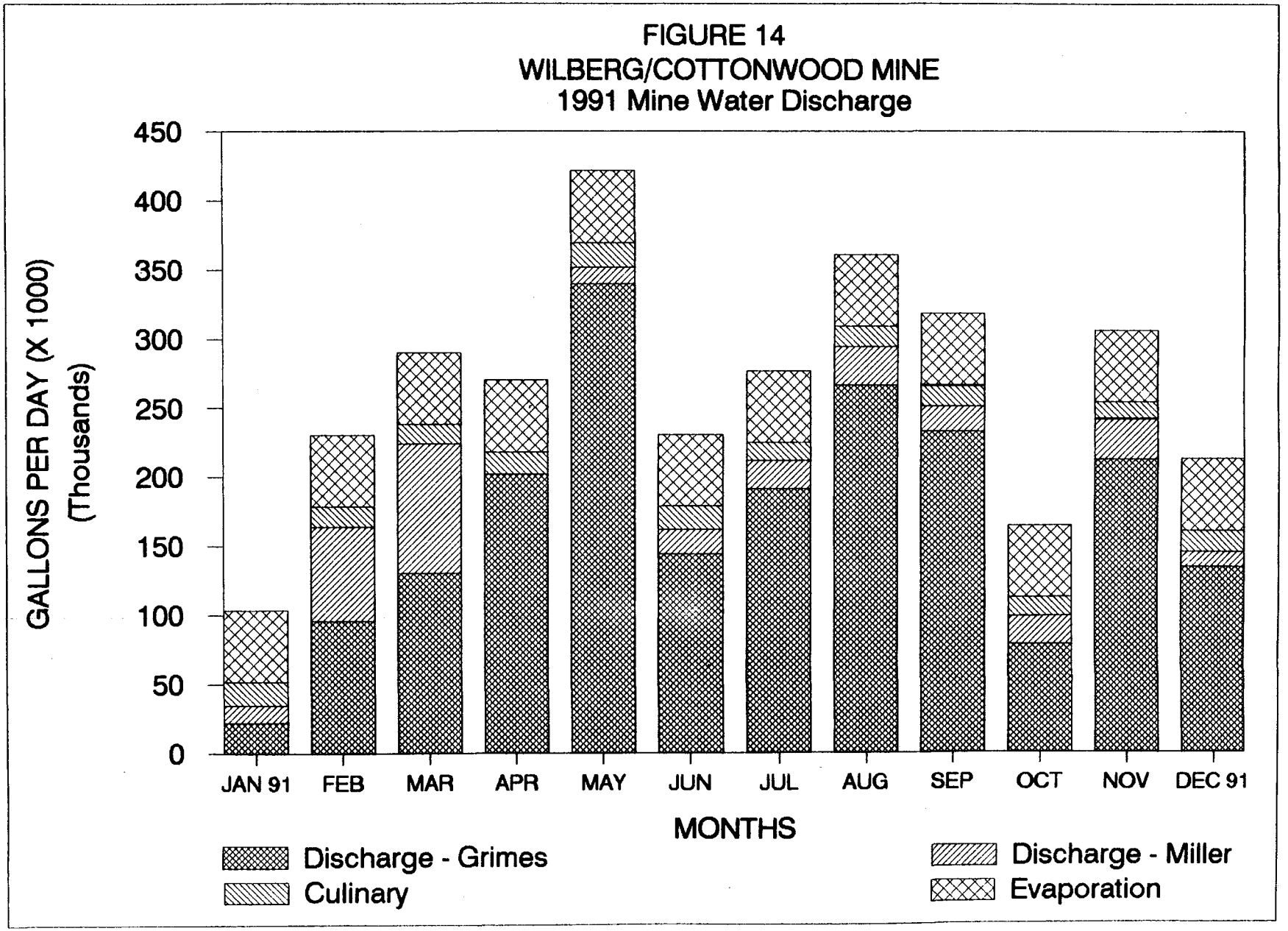


FIGURE 14
WILBERG/COTTONWOOD MINE
1991 Mine Water Discharge
GALLONS PER DAY (X 1000)
(Thousands)
450
400
350
300
250
200
150
100
50
0
JAN 91
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC 91
MONTHS
Discharge - Grimes
Culinary
Discharge - Miller
Evaporation

TABLE 36: WILBERG/COTTONWOOD - DISCHARGE WATER QUALITY*

GRIMES WASH

Parameters	1991 Minimum	1991 Maximum	1991 Mean	Historical - (1976-1990) Minimum	Historical - (1976-1990) Maximum	Historical - (1976-1990) Mean
pH (units)	7.3	8.2	7.69	6.9	8.2	7.63
Acidity	1.0	25.0	5.6	0.1	62.0	7.5
Alkalinity	209	370	265.6	216	377	278.3
Chloride	15.0	80.0	26.8	2.7	63.3	14.9
Conductivity (umhos/cm)	490	1100	755	620	1390	979
Iron	0.01	0.34	0.08	0.01	3.0	0.3
Oil & Grease	0.1	2.6	1.1	0.2	23.8	2.1
Sulfate	170	400	238.7	29.2	430	218.4
TDS	407	689	524	424	1047	578
TSS	1.0	69.0	7.4	<0.5	222	7.8

MILLER CANYON

Parameters	1990 Minimum	1990 Maximum	1990 Mean	Historical - (1986-1989) Minimum	Historical - (1986-1989) Maximum	Historical - (1986-1989) Mean
pH (units)	6.4	7.7	6.95	6.7	8.4	7.20
Acidity	1.0	47	17.8	<1.0	57	25.2
Alkalinity	269	363	337.3	225	445	353.2
Chloride	10	155	44.1	0	70	21.5
Conductivity (umhos/cm)	990	1350	1132	650	1900	1216
Iron	<0.02	0.50	0.15	0.02	1.38	0.32
Oil & Grease	0.2	4.8	1.4	0.5	5.8	1.60
Sulfate	340	460	415.5	250	650	418.9
TDS	783	1163	941	413	1182	901
TSS	1.0	9.0	3.7	0.1	32	4.5

* Quality parameters reported as mg/l unless otherwise noted.

VI. PIEZOMETRIC GRADIENT INFORMATION

A. Surface

1. EM-31 and EM-47

Two surface exploration drill holes which were developed into permanent water monitoring stations in 1978 continued to be monitored on a monthly basis, as access permitted. (See Map HM-1.)

Drill hole EM-31 in Cottonwood Creek Canyon was monitored monthly throughout 1991. (See Map HM-1 in pocket.) The water level in the hole was at its highest point, -46.6 feet, during the month of January and at its lowest point, -53.0 feet, during the month of September . Drill hole EM-47 in Rilda Canyon was accessible only during the months of May through October. During this time frame the water was at its highest, -208.0 feet, in July and its lowest, -224.0 feet, during the month of May. Hydrographs of 1986-1991 data collected are shown in Figure 15.

2. Rilda Canyon Study Area

Water elevations from five existing piezometers and two monitoring wells completed in November 1990 were collected on a monthly basis throughout the year when accessible. Information collected during 1991 correlated well with historical information. (See Figure 16.)

B. In-Mine

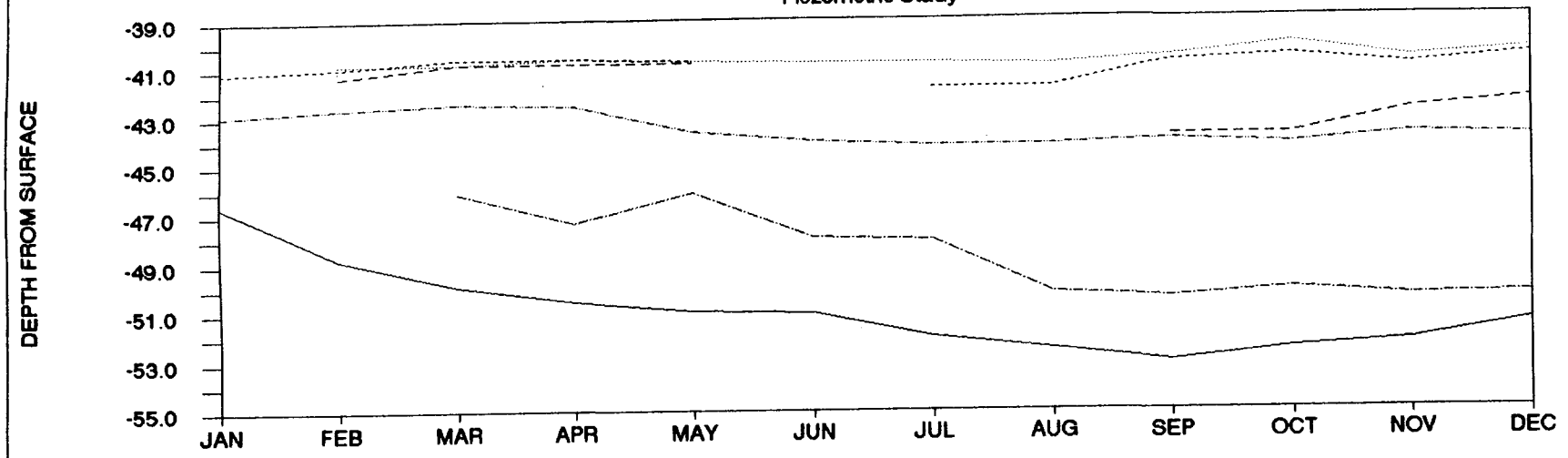
1. Deer Creek

Four (4) long-term monitoring wells were completed during 1989, and data collection was initiated in December. (See Map HM-2 for well locations.) As Figure 17 reveals, the water level decreased during 1991, possibly the result of mine

FIGURE 15

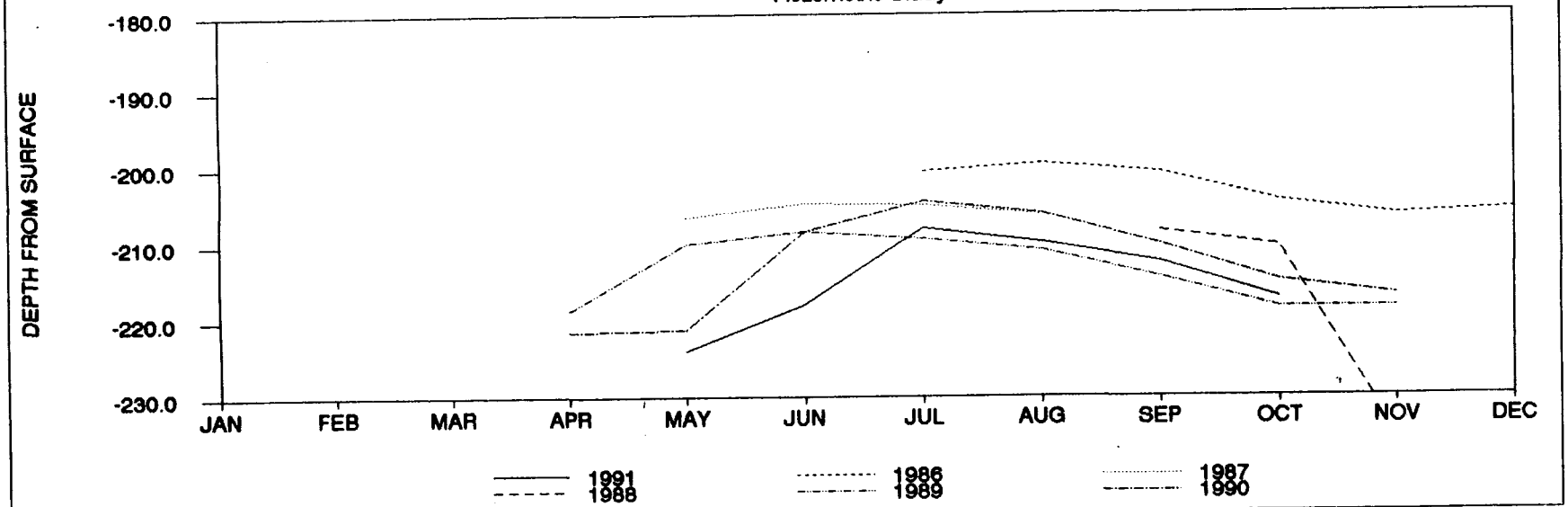
MONITORING WELL EM-31

Piezometric Study



MONITORING WELL EM-47

Piezometric Study



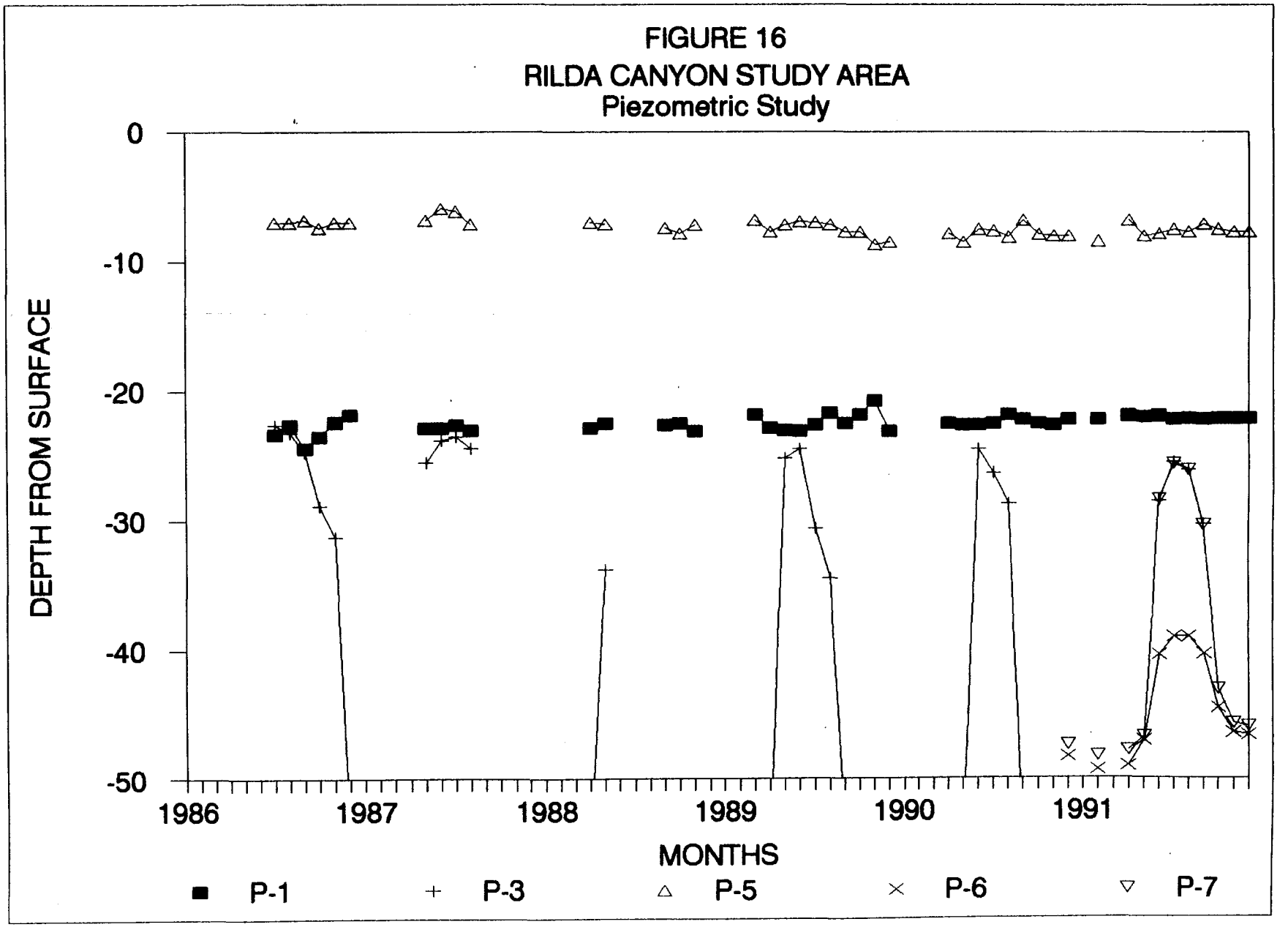


FIGURE 16
RILDA CANYON STUDY AREA
Piezometric Study
DEPTH FROM SURFACE
0
-10
-20
-30
-40
-50
1986
1987
1988
1989
1990
1991
MONTHS
P-1
P-3
P-5
P-6
P-7

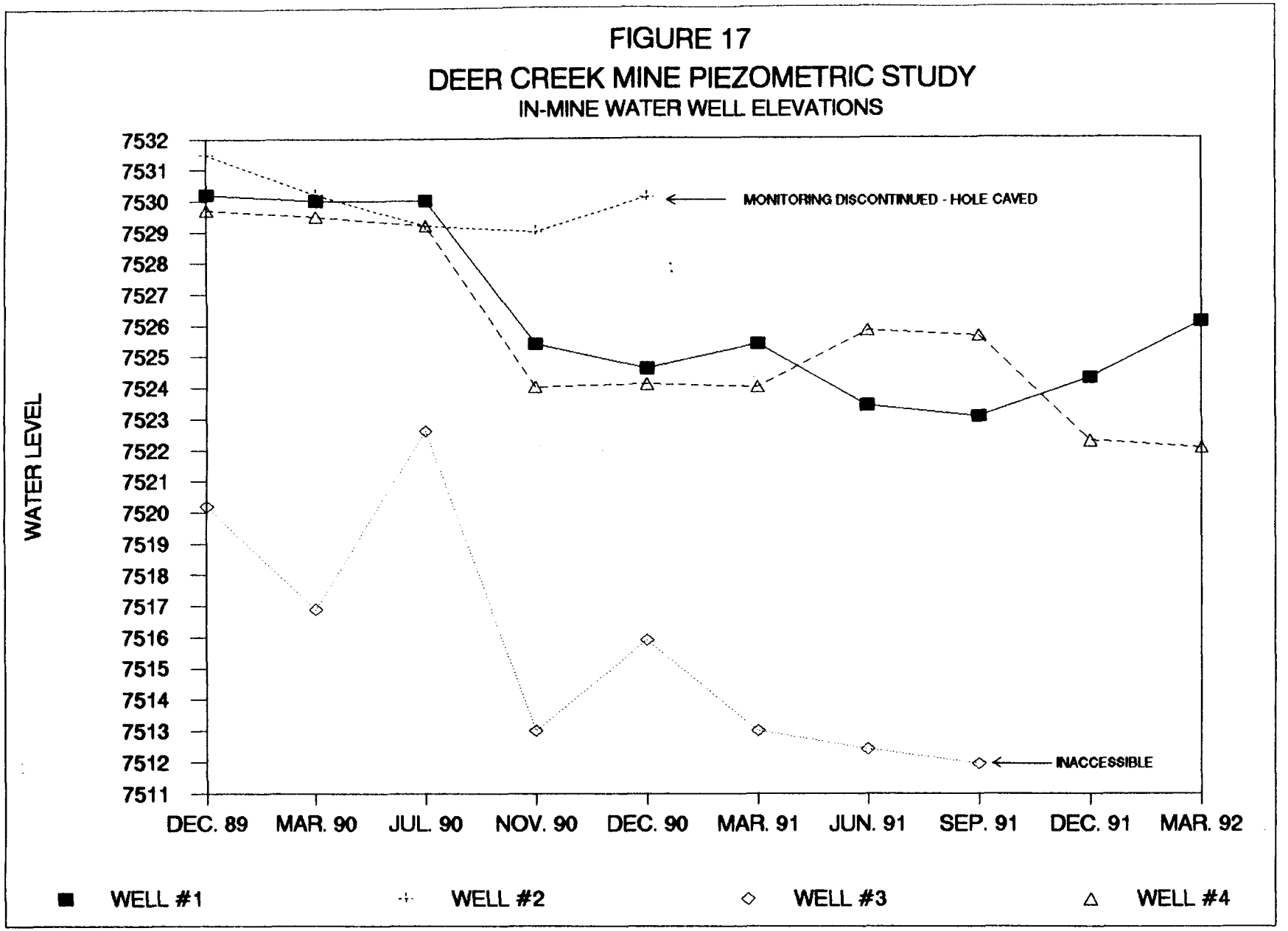


FIGURE 17
DEER CREEK MINE PIEZOMETRIC STUDY
IN-MINE WATER WELL ELEVATIONS
WATER LEVEL
7532
7531
7530
7529
7528
7527
7526
7525
7524
7523
7522
7521
7520
7519
7518
7517
7516
7515
7514
7513
7512
7511
MONITORING DISCONTINUED - HOLE CAVED
INACCESSIBLE
DEC. 89
MAR. 90
JUL. 90
NOV. 90
DEC. 90
MAR. 91
JUN. 91
SEP. 91
DEC. 91
MAR. 92
WELL #1
WELL #2
WELL #3
WELL #4

dewatering. Two of the wells were discontinued during 1991, the first (well DCP-2) due to hole caving below cased interval and the second (well DCP-3) due to construction activity-development of 8th East. Following water reports will graphically display groundwater level elevation trends.

2. Cottonwood Mine

During 1989 four holes were drilled in the Cottonwood Mine. Three are considered long-term and one a short-term study well. (See Map HM-3.) Data from the wells are shown in Figure 18. The short-term well was completed in a longwall development entry to study the effect longwall mining has upon the level of groundwater. Monitoring of the groundwater level was collected on a daily basis until the longwall had retreated past the well and access was restricted (October 27, 1989). As Figure 18 reveals, the groundwater elevation in short-term well WCP-4, as well as in the long-term locations, remained constant during extraction of the 9th East longwall panel (September-December 1989). Monitoring of the long-term wells, WCP 1-3, will continue through 1992 as long as access permits.

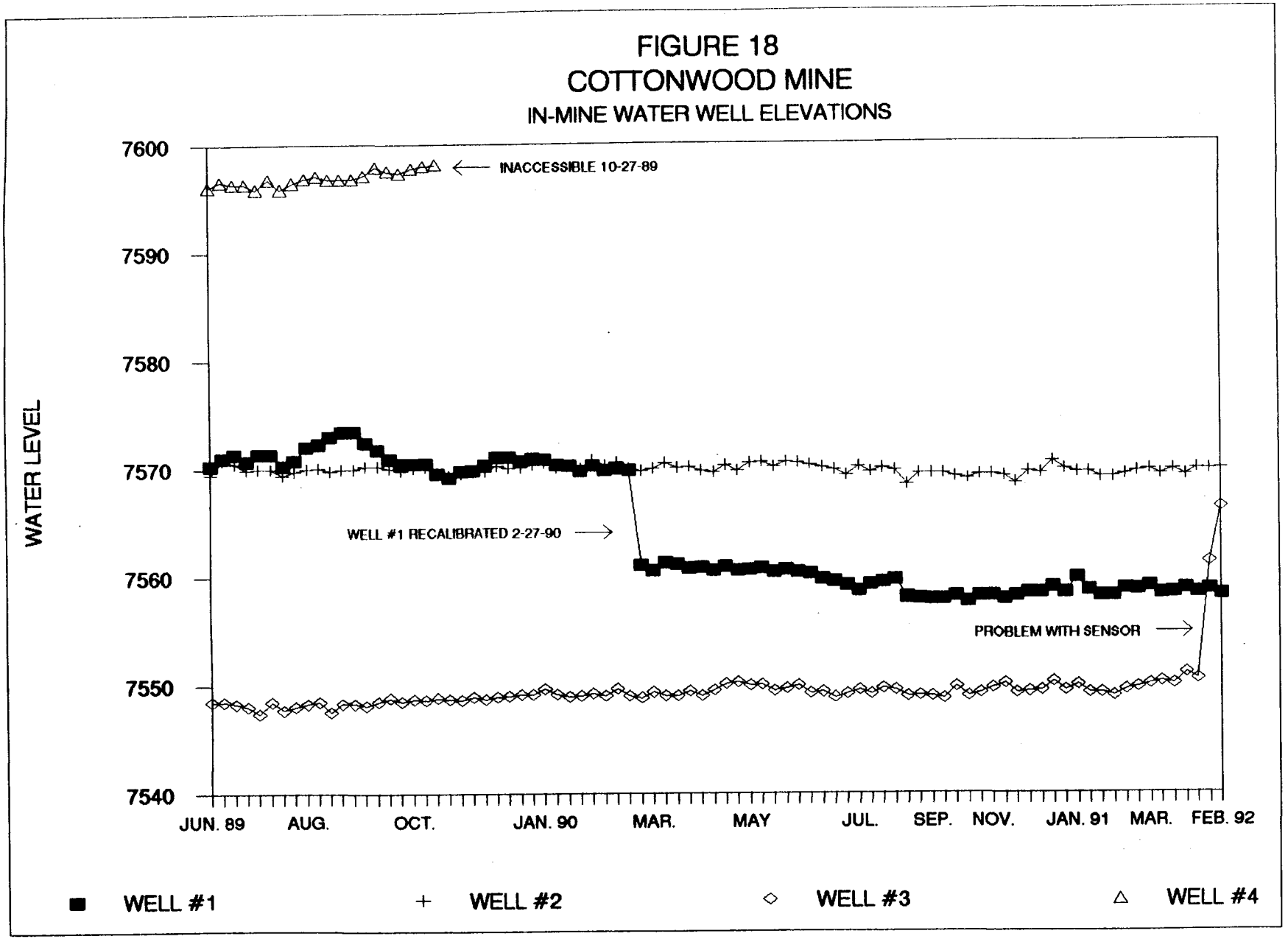


FIGURE 18
COTTONWOOD MINE
IN-MINE WATER WELL ELEVATIONS
WATER LEVEL
7600
7590
7580
7570
7560
7550
7540
INACCESSIBLE 10-27-89
WELL #1 RECALIBRATED 2-27-90
PROBLEM WITH SENSOR
JUN. 89
AUG.
OCT.
JAN. 90
MAR.
MAY
JUL.
SEP.
NOV.
JAN. 91
MAR.
FEB. 92
WELL #1
WELL #2
WELL #3
WELL #4

VII. WASTE ROCK WELLS

A. Deer Creek Mine - Waste Rock Storage Facility

The Deer Creek Waste Rock Storage Facility is located on the northeast side of State Highway 31 approximately six (6) miles west of Huntington, Utah.

The geology of the Deer Creek Waste Rock Storage Facility is fairly simple and straightforward. The site is located on the southern flanks of Gentry Mountain in the area just south of Wild Horse Ridge. Rocks exposed in the area are marine-derived mudstones in the lower portion of the Masuk member of the Mancos Shale. The Masuk Shale on the bench which adjoins the proposed site on the east and west is covered by a five- to twenty-foot thick layer of terrace gravel of Quaternary age. North-south trending normal faults have disrupted the strata in the region; however, no faults are known to exist within the area of the proposed Deer Creek Waste Rock Storage Facility.

The test wells completed prior to construction identified the existence of a limited quantity of groundwater locally in the Masuk Shale. The water is most likely flowing along fractures in the strata. The rate of water migration has been shown to be extremely slow (< 100 feet per year); therefore, the proposed operations to be conducted at the waste rock site should not impact the hydrology of the area. The weathered Masuk Shale present on and near the ground surface will act as an effective barrier to prevent the surface waters from migrating to depths and intersecting groundwater.

The groundwater present in the terrace gravels should not be impacted by the waste rock site because it is located at a higher elevation than the proposed site.

In order to identify the groundwater quality characteristics of the waste rock storage facility one of the test wells completed prior to the construction of the site was developed into a long-term water monitoring well. (See Map HM-1 for location.)

Four samples were collected in 1991. The analysis, along with water depth, is listed in Table 37. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix K. It is a well known fact that the Mancos Shale typically contains large quantities of soluble minerals such as gypsum; therefore, any water passing through it will be naturally high in dissolved solids. Samples at the waste rock well verify this condition.

B. Cottonwood/Wilberg Mines - Waste Rock Storage Facility

The Cottonwood/Wilberg Waste Rock Storage Facility is located on the west side of the Wilberg Mine road approximately 1.5 miles south of the Wilberg Mine.

The geology of the proposed waste rock site is fairly simple and straightforward. The site is located on the southern flank of East Mountain to the south of Newberry Canyon. Rocks exposed in the area are marine-derived mudstones in the lower portion of the Masuk member of the Mancos Shale. The Masuk Shale on the bench which adjoins the proposed site on the north and east is covered by a five- to twenty-foot thick layer of terrace gravel of Quaternary age. North-south trending normal faults have disrupted the strata in the region; however, no faults are known to exist within the area of the proposed waste rock site.

In order to identify the groundwater quality characteristics of the waste rock storage facility one of the test wells completed prior to the construction of the site was developed into a long-term water monitoring well. (See Map HM-1 for location.)

TABLE 37: WASTE ROCK STORAGE FACILITIES - WATER QUALITY* - 1991

SAMPLE DATES	WATER DEPTH (ft.)	BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	pH (units)	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS
								DEER CREEK - DCWR-1									
03-28	-5.4	773	263.0	<1.0	835	45,000	2102	----	2.64	351.0	<0.01	7.5	27.4	7800	15,000	23,845	175
06-11	-6.4	733	318.8	<1.0	900	19,000	2147	----	1.32	328.0	0.06	7.5	37.8	9978	6,000	13,000	139
09-10	-7.5	758	880.1	<1.0	895	39,000	3351	----	2.13	280.0	0.03	7.7	27.2	7642	18,000	23,040	126
12-12	-5.6	744	292.3	0.0	1000	31,100	1871	----	1.26	277.2	0.02	7.3	23.0	7139	13,000	20,210	155
MIN	-5.4	733	263.0	0.0	835	19,000	1871	----	1.26	277.2	<0.01	7.3	23.0	7139	6,000	13,000	126
MAX	-7.5	773	880.1	<1.0	1000	45,000	3351	----	2.64	351.0	0.06	7.7	37.8	9978	18,000	23,845	175
MEAN	-6.2	752	438.6	0.8	908	33,525	2368	----	1.84	309.1	0.03	7.5	28.9	8140	13,000	20,024	149
1990																	
MIN	-4.0	731	194.1	<1.0	915	18,900	1127	0.06	0.17	57.0	0.02	7.4	19.2	5165	10,000	11,466	24
MAX	-5.2	935	539.0	<1.0	1140	24,500	1581	1.10	2.52	286.0	0.09	8.2	30.8	6440	12,800	24,189	227
MEAN	-4.6	831	307.9	<1.0	1037	21,850	1486	0.47	0.88	174.0	0.06	7.9	24.9	5709	11,075	19,058	123
1989																	
MIN	-5.1	698	142.2	<1.0	645	22,000	951	0.08	0.08	144.6	0.02	7.5	22.6	5220	10,250	20,492	4
MAX	-5.9	712	211.5	<1.0	770	26,000	1343	0.33	0.33	197.8	0.05	8.4	43.8	7830	15,900	21,671	54
MEAN	-5.6	704	179.2	<1.0	696	23,000	1122	0.17	0.19	164.4	0.04	8.0	29.2	6337.5	12,538	21,049	27
								WILBERG/COTTONWOOD - WCWR-1									
03-28	-59.3	615	471.1	<1.0	590	30,000	3532	----	0.84	572.0	0.65	7.8	26.2	4015	11,000	14,556	151
06-06	-59.1	633	512.8	----	565	35,000	1629	0.45	6.57	847.0	0.68	7.8	38.5	3720	750	14,466	408
09-25	-58.5	893	725.6	<1.0	615	120,000	3350	----	6.36	373.6	0.98	7.4	66.1	6594	17,000	25,645	2489
12-10	-58.5	472	620.9	0.0	595	40,000	7221	----	1.04	1377.0	0.24	6.9	64.8	5891	18,000	24,400	168
MIN	-58.5	472	471.1	0.0	590	30,000	1629	0.45	0.84	572.0	0.24	6.9	26.2	3720	750	14,466	151
MAX	-59.3	893	725.6	<1.0	615	120,000	3532	0.45	6.57	1377.0	0.98	7.8	66.1	6594	18,000	25,645	2489
MEAN	-58.9	653	582.6	0.7	591.3	56,250	3933	0.45	3.70	792.4	0.64	7.5	48.9	5055	11,688	19,767	804
1990																	
MIN	-58.9	534	266.4	<1.0	425	13,900	2345	0.10	0.21	408.0	0.02	7.2	18.0	2300	5,900	10,170	220
MAX	-60.0	781	522.0	<1.0	730	18,000	5043	2.16	6.59	908.0	1.09	7.9	55.7	4934	13,000	14,798	11064
MEAN	-59.3	813	407.6	<1.0	611	15,640	3335	1.29	3.09	562.8	0.42	7.6	31.7	3442	9,000	12,882	5879
1989																	
MIN	-59.5	414	563.0	<1.0	280	10,000	3354	9.0	5.01	292.0	0.89	7.7	41.6	851	4,300	8,714	8000
MAX	-59.5	798	1135.0	<1.0	815	32,000	4037	9.0	11.30	473.0	2.48	7.9	119.1	1905	6,200	9,316	15754
MEAN	-59.5	606	858.0	<1.0	548	21,000	3696	9.0	8.16	382.5	1.69	7.8	80.4	1378	5,250	9,015	11877

* Quality parameters are reported as mg/l unless otherwise noted.

Four samples were collected in 1991. The analysis, along with water depth, is listed in Table 37. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix K. It is a well known fact that the Mancos Shale typically contains large quantities of soluble minerals such as gypsum; therefore, any water passing through it will be naturally high in dissolved solids. Samples at the waste rock well verify this condition.

VIII. EFFECTS OF MINING AND SUBSIDENCE ON HYDROLOGY

Since the development of the PacifiCorp mining complex on East Mountain, coal has been extracted causing the partial collapse of the immediate overburden strata and, ultimately, surface subsidence. This occurs in areas of retreat mining in room and pillar sections and in areas of longwall mining. All areas with potential for subsidence are monitored annually. (See annual Subsidence Monitoring reports.)

The springs and surface waters above all areas of mine workings are being monitored closely to measure the effects of mining. No mining-related changes to the springs or surface waters have been identified in the data collected. The water flowing into the mine workings, although temporarily diverted or detained, has not had an impact on the surface waters of East Mountain or the surrounding area.

IX. SUMMARY

PacifiCorp has been conducting a water monitoring program in the area of its underground coal mines in Emery County, Utah in accordance with federal and state regulations. The program has been in existence since 1977, and this is the thirteenth annual report submitted concerning the hydrology.

From 1982 to 1984 the Western United States, especially Utah, experienced an unprecedented wet cycle of precipitation. The pattern changed in 1985 with conditions returning to slightly above normal. During the 1986 water year the extremely wet trend returned, and the upper Colorado River Basin experienced above average precipitation. The 1987 weather pattern changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal. The drought continued into 1988, 1989, 1990, and 1991 with runoff amounts slightly higher in 1991 than in 1990.

Runoff for drainages surrounding East Mountain were similar to 1989. The combined effect of lower precipitation received by East Mountain and above normal temperatures resulted in greater soil absorption and lower flow levels.

During 1984 an East Mountain Spring Recession Study was initiated. The program continued through 1991 with similar discharge patterns being recorded. Several of the springs show a possible double porosity feature, i.e., the spring's discharge rate drops rapidly due to the snow pack runoff and the flow rate stabilizes at a lower value, which could be considered the formation porosity. Subsequent years of data will help in distinguishing this form.

The data collected in 1991 continued to show the relationship between the variation in surface water quantity and precipitation, but the hydrologic monitoring completed on East Mountain to date has failed to identify any change in the quantity or quality of ground or surface water which can be attributed to mining present on the East Mountain property.

APPENDIX A

APPENDIX A

HUNTINGTON CREEK WATER QUALITY

Parameter	Below Electric Lake UP-3	Right Fork Above Left Fork UP-2
June 5, 1991		
pH	7.23	8.05
SS	5.60	22
TDS	162	189
Spec. Cond.	276	319
August 27, 1991		
pH	7.89	7.99
SS	17	17
TDS	164	197
Spec. Cond.	235	277
September 23, 1991		
pH	7.62	7.87
SS	1.0	1.0
TDS	164	197
Spec. Cond.	170	210
October 7, 1991		
pH	7.33	7.68
SS	49	----
TDS	157	----
Spec. Cond.	279	370

POWER & LIGHT COMPANY

RDS

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DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	16.00	12.00	14.00	11.0	12.00	12.00	19.00	18.00	16.00	29.00	46.00		1
2	13.00	13.00	14.00	11.0	12.00	11.00	19.00	18.00	17.00	29.00	45.00		2
3	9.30	13.00	14.00	12.0	12.00	11.00	19.00	19.00	17.00	29.00	46.00		3
4	10.00	13.00	14.00	12.0	12.00	12.00	19.00	19.00	17.00	29.00	46.00		4
5	10.00	13.00	14.00	12.0	12.00	12.00	19.00	19.00	17.00	29.00	45.00		5
6	11.00	14.00	14.00	12.0	12.00	13.00	18.00	19.00	17.00	32.00	44.00		6
7	11.00	14.00	14.00	11.0	12.00	12.00	18.00	19.00	17.00	35.00	44.00		7
8	11.00	13.00	14.00	12.0	12.00	12.00	18.00	19.00	17.00	35.00	42.00		8
9	11.00	13.00	14.00	12.0	12.00	11.00	19.00	19.00	18.00	35.00	42.00		9
10	11.00	13.00	14.00	12.0	12.00	11.00	19.00	19.00	19.00	35.00	36.00		10
11	11.00	13.00	14.00	12.0	12.00	11.00	18.00	19.00	19.00	34.00	30.00		11
12	11.00	13.00	14.00	12.0	12.00	11.00	18.00	18.00	19.00	34.00	30.00		12
13	11.00	13.00	13.00	12.0	12.00	11.00	18.00	18.00	20.00	39.00	29.00		13
14	11.00	13.00	12.00	13.0	12.00	10.00	18.00	18.00	20.00	44.00	29.00		14
15	11.00	12.00	12.00	13.0	12.00	10.00	17.00	18.00	19.00	44.00	27.00		15
16	11.00	12.00	12.00	13.0	12.00	10.00	18.00	18.00	17.00	44.00	27.00		16
17	11.00	13.00	12.00	13.0	12.00	10.00	18.00	18.00	17.00	44.00	21.00		17
18	11.00	12.00	12.00	13.0	12.00	10.00	18.00	18.00	20.00	44.00	15.00		18
19	11.00	13.00	12.00	13.0	12.00	11.00	18.00	16.00	20.00	44.00	15.00		19
20	12.00	13.00	12.00	13.0	11.00	12.00	18.00	16.00	20.00	43.00	15.00		20
21	12.00	13.00	12.00	13.0	10.00	12.00	17.00	16.00	20.00	47.00	15.00		21
22	12.00	13.00	12.00	13.0	11.00	12.00	17.00	16.00	19.00	48.00	15.00		22
23	12.00	13.00	11.00	13.0	11.00	12.00	17.00	16.00	19.00	46.00	15.00		23
24	12.00	13.00	11.00	14.0	11.00	12.00	17.00	16.00	19.00	46.00	15.00		24
25	12.00	13.00	11.00	13.0	11.00	12.00	18.00	16.00	19.00	46.00	15.00		25
26	12.00	14.00	11.00	11.0	11.00	12.00	17.00	16.00	19.00	46.00	15.00		26
27	12.00	14.00	11.00	11.0	11.00	12.00	16.00	17.00	19.00	46.00	15.00		27
28	12.00	14.00	11.00	11.0	11.00	12.00	17.00	17.00	19.00	45.00	15.00		28
29	13.00	14.00	11.00	11.0	11.00	12.00	17.00	16.00	19.00	46.00	15.00		29
30	13.00	14.00	11.00	11.0	11.00	16.00	17.00	16.00	24.00	46.00	14.00		30
31	11.00	0.00	11.00	12.0	11.00	0.00	17.00	0.00	29.00	46.00	0.00		31
MONTHLY													
TOT	357.30	394.00	388.00	377.0	69.00	347.00	553.00	527.00	588.00	1239.00	823.00		
MEA	11.50	13.10	12.50	12.2	11.60	11.60	17.80	17.60	19.00	40.00	27.40		
MAX	16.00	14.00	14.00	14.0	12.00	16.00	19.00	19.00	29.00	48.00	46.00		

UTAH POWER & LIGHT COMPANY
STREAM DISCHARGE RECORDS

DAILY DISCHARGE (CFS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	45.00	22.00	19.00	14.00	9.80	13.00	16.00	50.00	156.00	178.00	64.00	71.00	1
2	46.00	25.00	18.00	15.00	8.50	13.00	18.00	52.00	132.00	170.00	73.00	70.00	2
3	32.00	24.00	16.00	13.00	10.00	15.00	21.00	51.00	135.00	82.00	87.00	69.00	3
4	30.00	24.00	19.00	14.00	8.90	14.00	22.00	48.00	152.00	112.00	102.00	69.00	4
5	31.00	25.00	21.00	14.00	7.30	20.00	23.00	48.00	182.00	109.00	99.00	60.00	5
6	34.00	24.00	20.00	13.00	7.90	16.00	25.00	51.00	173.00	106.00	82.00	86.00	6
7	36.00	23.00	18.00	15.00	7.40	18.00	26.00	58.00	192.00	107.00	67.00	76.00	7
8	34.00	25.00	19.00	16.00	8.20	18.00	25.00	75.00	209.00	111.00	62.00	68.00	8
9	34.00	23.00	22.00	17.00	8.30	17.00	24.00	88.00	221.00	109.00	60.00	61.00	9
10	37.00	22.00	22.00	18.00	9.20	20.00	27.00	86.00	223.00	105.00	58.00	57.00	10
11	37.00	22.00	22.00	18.00	8.30	16.00	26.00	62.00	234.00	85.00	59.00	55.00	11
12	37.00	21.00	24.00	16.00	11.00	22.00	27.00	57.00	231.00	77.00	64.00	51.00	12
13	38.00	22.00	23.00	19.00	11.00	19.00	28.00	64.00	232.00	87.00	59.00	56.00	13
14	38.00	22.00	18.00	18.00	12.00	18.00	29.00	100.00	213.00	90.00	65.00	48.00	14
15	39.00	21.00	14.00	17.00	14.00	16.00	30.00	125.00	181.00	85.00	69.00	43.00	15
16	47.00	22.00	19.00	13.00	13.00	17.00	31.00	131.00	167.00	83.00	59.00	41.00	16
17	50.00	24.00	18.00	11.00	12.00	16.00	32.00	169.00	151.00	91.00	56.00	46.00	17
18	51.00	24.00	18.00	13.00	12.00	19.00	33.00	154.00	134.00	80.00	56.00	60.00	18
19	60.00	30.00	18.00	11.00	11.00	19.00	34.00	148.00	150.00	86.00	56.00	45.00	19
20	54.00	30.00	14.00	8.90	16.00	17.00	36.00	168.00	177.00	81.00	55.00	44.00	20
21	54.00	26.00	13.00	9.60	12.00	17.00	37.00	176.00	194.00	79.00	55.00	43.00	21
22	73.00	27.00	13.00	10.00	15.00	16.00	38.00	185.00	229.00	75.00	58.00	42.00	22
23	65.00	22.00	14.00	13.00	13.00	15.00	39.00	160.00	223.00	77.00	48.00	58.00	23
24	47.00	21.00	14.00	13.00	14.00	15.00	40.00	153.00	210.00	80.00	57.00	109.00	24
25	55.00	21.00	15.00	13.00	10.00	16.00	41.00	156.00	196.00	78.00	71.00	97.00	25
26	54.00	22.00	15.00	9.30	13.00	14.00	43.00	164.00	197.00	74.00	70.00	87.00	26
27	53.00	17.00	14.00	12.00	22.00	14.00	44.00	175.00	198.00	74.00	67.00	85.00	27
28	53.00	16.00	13.00	15.00	15.00	15.00	46.00	161.00	186.00	72.00	66.00	89.00	28
29	53.00	13.00	13.00	16.00	0.00	14.00	47.00	152.00	175.00	71.00	63.00	90.00	29
30	51.00	16.00	12.00	11.00	0.00	16.00	49.00	153.00	174.00	70.00	65.00	89.00	30
31	25.00	0.00	14.00	10.00	0.00	17.00	0.00	160.00	0.00	64.00	66.00	0.00	31
MONTHLY													
TOT	1393.00	676.00	532.00	425.80	319.80	512.00	957.00	3580.00	5627.00	2848.00	2038.00	1965.00	
MEA	44.90	22.50	17.20	13.70	11.40	16.50	31.90	115.00	188.00	91.90	65.70	65.50	
MAX	73.00	30.00	24.00	19.00	22.00	22.00	49.00	185.00	234.00	178.00	102.00	109.00	
MIN	25.00	13.00	12.00	8.90	7.30	13.00	16.00	48.00	132.00	64.00	48.00	41.00	
ACR FT	2760.00	1340.00	1060.00	845.00	634.00	1020.00	1900.00	7100.00	11160.00	5650.00	4040.00	3900.00	

OCT90-SEPT91 TOTAL 20873.60 MEAN 57.20 MAX 234.00 MIN 7.30 TOT ACR FT 41400.00
TOTAL MEAN MAX MIN TOT ACR FT

MAX UNIT DISCHARGE 283.00 CFS (3.60 FT) DATE JUN 11 MIN UNIT DISCHARGE 1.20 CFS DATE JAN 21

REMARKS:

Note: Starting Nov. 4, 1990, ice conditions exist at the Huntington Plant guaging station. By April 1st. the river is free of ice. May 2nd installed a new clock on the recorder.

UTAH POWER & LIGHT COMPANY

INFLOW AND UTILIZATION RECORDS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	42.44	26.32	21.47	28.40	24.47	38.58	27.83	62.84	284.04	187.95	63.20	49.09	1
2	45.68	28.51	21.52	29.46	22.20	32.01	28.29	61.84	261.27	184.11	72.58	49.22	2
3	35.26	23.46	19.64	28.75	24.90	35.28	29.86	62.97	264.63	92.85	85.03	62.82	3
4	32.76	24.40	21.26	35.30	22.67	35.74	33.24	59.18	290.95	120.43	96.18	68.23	4
5	35.74	27.02	23.01	35.50	20.93	39.16	35.18	52.00	314.14	116.42	85.92	47.28	5
6	39.05	26.45	23.97	26.96	25.35	36.34	41.83	57.62	291.07	111.56	70.45	78.05	6
7	37.36	23.12	22.74	27.67	23.27	32.58	42.29	70.54	307.88	113.67	55.32	71.38	7
8	41.10	23.81	25.81	29.30	25.84	28.82	46.13	98.84	328.46	119.75	49.43	64.08	8
9	40.67	24.34	27.42	30.93	26.62	28.38	35.61	128.37	336.04	116.35	49.92	49.25	9
10	43.03	23.82	29.10	29.77	27.78	32.54	39.53	132.69	326.99	112.92	49.80	51.13	10
11	41.06	23.98	28.16	31.48	23.79	30.53	36.80	98.41	331.05	89.41	50.74	61.31	11
12	40.57	24.16	30.88	22.43	27.68	36.78	35.51	84.52	321.63	84.09	56.52	59.28	12
13	42.29	24.18	32.96	26.51	29.09	30.75	37.44	96.45	316.22	93.67	45.37	64.48	13
14	44.07	25.08	35.49	27.48	28.35	29.95	38.68	145.41	288.28	93.71	45.82	53.65	14
15	43.73	25.82	29.51	28.27	29.26	28.20	40.43	170.66	244.94	88.64	40.11	44.91	15
16	51.30	26.27	28.94	28.47	28.80	27.94	42.26	184.93	218.54	88.66	35.44	44.35	16
17	53.28	24.00	29.38	27.60	31.39	26.66	44.42	253.23	193.60	96.20	37.75	50.21	17
18	55.41	23.64	31.39	26.42	30.83	28.47	45.73	255.29	180.31	87.30	34.39	72.08	18
19	75.14	26.83	34.11	25.38	26.02	29.11	46.89	248.64	190.35	96.47	34.40	58.79	19
20	64.18	31.89	31.32	23.35	28.79	30.04	47.92	279.90	214.31	94.63	29.81	56.49	20
21	55.30	25.32	29.36	21.51	26.31	30.11	51.03	310.50	226.85	88.22	24.71	56.94	21
22	75.42	20.78	28.97	23.89	29.15	28.64	53.43	325.75	260.23	84.08	24.64	53.46	22
23	65.12	16.00	25.29	26.67	27.06	26.35	53.99	253.48	248.36	85.09	22.97	69.86	23
24	46.67	22.55	29.89	25.82	27.21	26.73	54.19	234.96	235.86	84.87	34.42	120.04	24
25	59.78	22.06	32.13	27.36	23.20	25.02	58.73	274.80	219.02	84.99	49.64	107.46	25
26	53.79	25.32	32.00	24.90	24.61	29.88	60.88	284.33	221.12	82.56	47.61	99.04	26
27	52.90	20.48	28.71	26.05	29.85	30.83	59.18	296.03	215.88	81.04	45.43	96.26	27
28	56.35	16.90	31.99	26.34	24.19	28.74	60.36	281.10	199.15	77.93	42.37	105.59	28
29	55.02	13.60	34.79	25.49	0.00	25.37	60.74	273.38	185.57	79.60	42.07	108.54	29
30	52.94	18.28	30.53	18.16	0.00	26.24	61.58	275.00	183.81	73.11	51.19	90.77	30
31	28.20	0.00	31.71	24.32	0.00	28.04	0.00	283.73	0.00	60.17	49.56	0.00	31
MONTHLY													
TOT	1499.58	712.35	881.44	839.93	739.82	943.90	1354.00	5697.39	7700.55	3070.43	1522.79	2063.99	
MEA	48.37	23.74	28.43	27.09	26.42	30.45	45.13	183.79	256.68	99.05	49.12	68.80	
MAX	75.42	31.89	35.49	35.50	31.39	39.16	61.58	325.75	336.04	187.95	96.18	120.04	
MIN	28.20	13.60	19.64	18.16	20.93	25.02	27.83	52.00	180.31	60.17	22.97	44.35	

OCT90-SEPT91 TOTAL 27026. MEAN 74. MAX 336. MIN 14.

TOTAL MEAN MAX MIN

REMARKS:

UTAH POWER & LIGHT COMPANY

RESERVOIR RECORDS

DAILY CONTENTS (ACRE FEET)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	14718.00	14305.00	13898.00	13581.00	13315.00	13096.00	12923.00	13005.00	16926.00	19989.00	19382.00	17220.00	1
2	14702.00	14287.00	13888.00	13574.00	13308.00	13096.00	12916.00	13001.00	17171.00	19989.00	19348.00	17137.00	2
3	14687.00	14270.00	13874.00	13564.00	13303.00	13091.00	12913.00	12998.00	17419.00	19982.00	19307.00	17107.00	3
4	14672.00	14250.00	13859.00	13559.00	13291.00	13088.00	12911.00	12986.00	17694.00	19972.00	19269.00	17043.00	4
5	14656.00	14242.00	13844.00	13547.00	13282.00	13096.00	12911.00	12968.00	17918.00	19963.00	19222.00	16966.00	5
6	14641.00	14225.00	13830.00	13537.00	13275.00	13096.00	12918.00	12958.00	18136.00	19950.00	19168.00	16920.00	6
7	14621.00	14207.00	13815.00	13523.00	13267.00	13088.00	12939.00	12963.00	18352.00	19940.00	19106.00	16866.00	7
8	14613.00	14195.00	13800.00	13520.00	13263.00	13081.00	12946.00	13003.00	18580.00	19933.00	19046.00	16810.00	8
9	14598.00	14178.00	13788.00	13508.00	13258.00	13072.00	12946.00	13065.00	18780.00	19924.00	18990.00	16739.00	9
10	14585.00	14163.00	13776.00	13499.00	13253.00	13065.00	12958.00	13131.00	18965.00	19911.00	18934.00	16700.00	10
11	14567.00	14148.00	13763.00	13486.00	13248.00	13060.00	12958.00	13160.00	19137.00	19898.00	18882.00	16672.00	11
12	14550.00	14133.00	13751.00	13477.00	13239.00	13058.00	12958.00	13181.00	19294.00	19882.00	18826.00	16641.00	12
13	14537.00	14115.00	13749.00	13472.00	13236.00	13046.00	12960.00	13232.00	19439.00	19859.00	18758.00	16613.00	13
14	14522.00	14105.00	13759.00	13460.00	13227.00	13036.00	12960.00	13303.00	19560.00	19833.00	18678.00	16577.00	14
15	14507.00	14096.00	13746.00	13465.00	13220.00	13031.00	12960.00	13363.00	19659.00	19810.00	18593.00	16535.00	15
16	14489.00	14083.00	13739.00	13457.00	13215.00	13020.00	12960.00	13462.00	19733.00	19791.00	18535.00	16499.00	16
17	14471.00	14068.00	13727.00	13445.00	13215.00	13015.00	12960.00	13642.00	19794.00	19769.00	18465.00	16471.00	17
18	14458.00	14056.00	13720.00	13433.00	13212.00	13003.00	12960.00	13817.00	19846.00	19743.00	18395.00	16451.00	18
19	14474.00	14041.00	13715.00	13426.00	13203.00	12996.00	12960.00	13997.00	19895.00	19736.00	18322.00	16435.00	19
20	14458.00	14048.00	13707.00	13416.00	13191.00	12994.00	12960.00	14220.00	19930.00	19720.00	18238.00	16415.00	20
21	14443.00	14034.00	13695.00	13407.00	13179.00	12989.00	12968.00	14481.00	19963.00	19695.00	18151.00	16393.00	21
22	14431.00	14019.00	13685.00	13395.00	13167.00	12984.00	12975.00	14751.00	19992.00	19669.00	18064.00	16374.00	22
23	14418.00	14004.00	13671.00	13385.00	13155.00	12975.00	12977.00	14828.00	20011.00	19643.00	17978.00	16354.00	23
24	14405.00	13987.00	13661.00	13373.00	13143.00	12965.00	12979.00	15051.00	20024.00	19618.00	17894.00	16332.00	24
25	14395.00	13974.00	13654.00	13366.00	13134.00	12960.00	13001.00	15276.00	20037.00	19592.00	17809.00	16313.00	25
26	14380.00	13970.00	13642.00	13359.00	13124.00	12958.00	13003.00	15506.00	20047.00	19573.00	17723.00	16294.00	26
27	14368.00	13955.00	13627.00	13351.00	13110.00	12958.00	13012.00	15736.00	20054.00	19544.00	17638.00	16272.00	27
28	14353.00	13940.00	13622.00	13347.00	13103.00	12951.00	13012.00	15968.00	20037.00	19519.00	17553.00	16255.00	28
29	14338.00	13926.00	13615.00	13342.00	0.00	12944.00	13015.00	16203.00	20021.00	19500.00	17469.00	16241.00	29
30	14326.00	13913.00	13603.00	13330.00	0.00	12939.00	13012.00	16440.00	20005.00	19465.00	17388.00	16219.00	30
31	14310.00	0.00	13593.00	13323.00	0.00	12930.00	0.00	16680.00	0.00	19420.00	17304.00	0.00	31
MONTHLY CHANGE	-436.	-397.	-320.	-270.	-220.	-173.	82.	3668.	3325.	-585.	-2116.	-1085.	

OCT90-SEPT91 TOTAL CHANGE 1473. MAX CONTENTS 20054. AC FT JUN 27 MIN CONTENTS 12911. AC FT APR 4

TOTAL CHANGE MAX CONTENTS MIN CONTENTS

REMARKS:

COMMERCIAL TESTING & ENGINEERING CO.
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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 16, 1991

Job No.: 59 10893

Date Rec'd: January 2, 1991

Date Sampled: January 2, 1991

Sampled By: UP&L

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

Sample ID: Utah Power and Light Co.

HUNTINGTON CANYON CREEK HCC01
TEMPERATURE 33.8 DEGREES
Rec'd 1630 hr.
Sampled 1505 hr.

FIELD MEASUREMENTS

pH	7.88
Conductivity	460
Turbidity	10
Dissolved Oxygen	10.6

WATER ANALYSIS

Conductivity	460	umhos/cm	Solids, Dissolved	369.0	mg/l
01-02-91	0800 hr.		01-04-91	1100 hr.	
Oxygen, Dissolved	8.8	mg/l	Solids, Settleable	.5<	mg/l
01-02-91	1640 hr.		01-03-91	1000 hr.	
pH	8.30	Units	Solids, Suspended	6.0	mg/l
01-02-91	1645 hr.		01-04-91	1100 hr.	
			Turbidity	0.1	NTU
			01-03-91	1000 hr.	

ANALYST: Lois Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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FAX: (801) 653-2479

February 20, 1991

Job. No.: 59-10956

Sample ID:

Date Rec'd: February 4, 1991

Date Sampled: February 4, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCC01
Temperature 33.1 Degrees
Rec'd 1000 hr.
Sampled 0800 hr.

FIELD MEASUREMENTS

pH	8.00
Conductivity	474
DO	10.9
Turbidity	7.4

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	02-07-91	1330 hr.
Alkalinity, bicarbonate	245 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	5 mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	206 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	5.67 meq/l		
Calcium	77.9 mg/l	02-07-91	1300 hr.
Cations, total	6.01 meq/l		
Chloride	20.0 mg/l	02-07-91	1053 hr.
Conductivity	325 umhos/cm	02-05-91	1445 hr.
Hardness, total	288 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	0.04 mg/l	02-07-91	1350 hr.
Iron, dissolved	<0.02 mg/l	02-07-91	1350 hr.
Magnesium	22.60 mg/l	02-07-91	1350 hr.
Manganese	0.04 mg/l	02-07-91	1350 hr.
Oil and Grease	1.6 mg/l	02-07-91	1000 hr.
Oxygen, dissolved	9.9 mg/l	02-04-91	1400 hr.
pH	8.40 units	02-04-91	1400 hr.
Potassium	1.02 mg/l	02-07-91	1300 hr.
Sodium	5.57 mg/l	02-07-91	1300 hr.
Solids, dissolved	241.0 mg/l	02-07-91	1000 hr.
Solids, suspended	4.0 mg/l	02-07-91	1000 hr.
Sulfate	52.0 mg/l	02-07-91	0830 hr.
Turbidity	.53 NTU	02-15-91	1050 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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FAX: (801) 653-2479

February 28, 1991

Job. No.: 59-10982

Date Rec'd: February 19, 1991

Date Sampled: February 19, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 37.5 Degrees
Rec'd 1430 hr.
Sampled 1245 hr.

FIELD MEASUREMENTS	
pH	8.35
Conductivity	441
DO	10.9
Turbidity	9.4

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, bicarbonate	270 mg/l HCO_3	02-21-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, total	222 mg/l $CaCO_3$	02-21-91	1330 hr.
Anions, total	5.79 meq/l		
Calcium	73.7 mg/l	02-20-91	1330 hr.
Cations, total	5.78 meq/l		
Chloride	20.0 mg/l	02-21-91	1100 hr.
Conductivity	400 umhos/cm	02-19-91	1530 hr.
Hardness, total	273 mg/l $CaCO_3$	02-20-91	1330 hr.
Iron, total	0.02<mg/l	02-20-91	1330 hr.
Iron, dissolved	0.02<mg/l	02-20-91	1330 hr.
Magnesium	21.62 mg/l	02-20-91	1330 hr.
Manganese	0.03<mg/l	02-20-91	1330 hr.
Oil and Grease	0.4 mg/l	02-19-91	0800 hr.
Oxygen, dissolved	9.7 mg/l	02-19-91	1430 hr.
pH	8.30 units	02-19-91	1430 hr.
Potassium	1.25 mg/l	02-20-91	1330 hr.
Sodium	6.85 mg/l	02-20-91	1330 hr.
Solids, dissolved	278.0 mg/l	02-20-91	1330 hr.
Solids, settleable	0.5<mg/l	02-20-91	0900 hr.
Solids, suspended	7.0 mg/l	02-20-91	1330 hr.
Sulfate	43.0 mg/l	02-20-91	0945 hr.
Turbidity	1.8 NTU	02-19-91	1530 hr.

ANALYST: Lois Stafle

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Respectfully submitted,
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February 28, 1991

Job No.: 59 11002

Sample ID: PacificCorp Field Office

Date Rec'd: February 26, 1991

Date Sampled: February 25, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCC01
Temperature 41.5
Rec'd 0800 hr.
Sampled ~~1610~~ hr. 1550

PacificCorp Field Office
P.O. Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	7.91
Conductivity	473
DO	10.8
Turbidity	3.8

WATER ANALYSIS

Conductivity	450	umhos/cm
02-27-91	1100 hr.	
Oxygen, Dissolved	8.2	mg/l
02-26-91	0900 hr.	
pH	8.10	Units
02-26-91	0830 hr.	
Solids, Dissolved	296.0	mg/l
02-26-91	1100 hr.	
Solids, Settleable	.5<	mg/l
02-27-91	0900 hr.	
Solids, Suspended	4.0	mg/l
02-26-91	1100 hr.	
Turbidity	5.0	NTU
02-27-91	1300 hr.	

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ANALYST: Lois Stafko

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D

March 18, 1991

Job. No.: 59-11030

Date Rec'd: March 6, 1991

Date Sampled: March 5, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 37.2 Degrees
Rec'd 1000 hr.
Sampled 1530 hr.

FIELD MEASUREMENTS

pH	8.44
Conductivity	446
Turbidity	24
D.O.	11.8

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, bicarbonate	276 mg/l HCO_3	03-12-91	0750 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, total	226 mg/l $CaCO_3$	03-12-91	0750 hr.
Anions, total	6.53 meq/l		
Calcium	72.8 mg/l	03-15-91	1300 hr.
Cations, total	6.09 meq/l		
Chloride	30.0 mg/l	03-08-91	0810 hr.
Conductivity	410 umhos/cm	03-06-91	1620 hr.
Hardness, total	285 mg/l $CaCO_3$	03-15-91	1300 hr.
Iron, total	0.22 mg/l	03-15-91	1300 hr.
Iron, dissolved	0.20 mg/l	03-15-91	1300 hr.
Magnesium	25.00 mg/l	03-15-91	1300 hr.
Manganese	0.02<mg/l	03-15-91	1300 hr.
Oil and Grease	1.0<mg/l	03-11-91	1030 hr.
Oxygen, dissolved	8.5 mg/l	03-06-91	1530 hr.
pH	7.90 units	03-06-91	1530 hr.
Potassium	0.37 mg/l	03-15-91	1300 hr.
Sodium	9.03 mg/l	03-15-91	1300 hr.
Solids, dissolved	264.0 mg/l	03-07-91	1000 hr.
Solids, settleable	0.5<mg/l	03-11-91	0930 hr.
Solids, suspended	9.0 mg/l	03-07-91	1000 hr.
Sulfate	61.0 mg/l	03-11-91	1040 hr.
Turbidity	5.0 NTU	03-11-91	1100 hr.

ANALYST: Lois Stoffes

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11113

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 44.7 Degrees
Rec'd 1545 hr.
Sampled 1400 hr.

FIELD MEASUREMENTS	
pH	8.48
Conductivity	458
DO	7.1
Turbidity	11

WATER ANALYSIS

Alkalinity, bicarbonate	234 mg/l HCO_3	04-10-91	1000 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	1000 hr.
Alkalinity, total	192 mg/l $CaCO_3$	04-10-91	1000 hr.
Aluminum	0.50<mg/l	04-16-91	1230 hr.
Anions, total	5.35 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.03<mg/l	04-16-91	1230 hr.
Boron	0.17 mg/l	04-24-91	1300 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	60.6 mg/l	04-16-91	0910 hr.
Cations, total	5.14 meq/l		
Chloride	25.0 mg/l	04-24-91	1320 hr.
Chromium	0.07 mg/l	04-16-91	1230 hr.
Conductivity	330 umhos/cm	04-11-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.18 mg/l	04-18-91	0830 hr.
Hardness, total	241 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.02<mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	0910 hr.
Magnesium	21.80 mg/l	04-16-91	

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ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11113

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 44.7 Degrees
Rec'd 1545 hr.
Sampled 1400 hr.

FIELD MEASUREMENTS	
pH	8.48
Conductivity	458
DO	7.1
Turbidity	11

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.04 mg/l	04-16-91	1230 hr.
Nickel	0.31 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.36 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	3.9 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.9 mg/l	04-08-91	1555 hr.
pH	8.40 mg/l	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	0.24 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	7.30 mg/l	04-16-91	0910 hr.
Solids, dissolved	277.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	15.0 mg/l	04-10-91	1400 hr.
Sulfate	43.0 mg/l	04-12-91	0715 hr.
Sulfide	10.50 mg/l	04-08-91	1645 hr.
Turbidity	3.8 NTU	04-10-91	1100 hr.
Zinc	0.01 mg/l	04-16-91	[illegible]

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ANALYST: Rio Stafko

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 6, 1991

Job. No.: 59-11144

Date Rec'd: April 24, 1991

Date Sampled: April 24, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CREEK
HCC01
Temperature 45.6 Degrees
Rec'd 1430 hr.
Sampled 1400 hr.

FIELD MEASUREMENTS	
pH	8.56
Conductivity	379
DO	6.7

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	05-01-91	1400 hr.
Alkalinity, bicarbonate	248 mg/l HCO_3	05-01-91	1400 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	05-01-91	1400 hr.
Alkalinity, total	203 mg/l $CaCO_3$	05-01-91	1400 hr.
Anions, total	4.79 meq/l		
Calcium	56.2 mg/l	04-25-91	1145 hr.
Cations, total	4.56 meq/l		
Chloride	5.0 mg/l	05-01-91	1530 hr.
Conductivity	275 umhos/cm	04-30-91	1430 hr.
Hardness, total	220 mg/l $CaCO_3$	04-25-91	1145 hr.
Iron, total	0.24 mg/l	04-25-91	1145 hr.
Iron, dissolved	0.06 mg/l	04-25-91	1145 hr.
Magnesium	19.23 mg/l	04-25-91	1145 hr.
Manganese	0.04 mg/l	04-25-91	1145 hr.
Oil and Grease	3.4 mg/l	05-01-91	0825 hr.
Oxygen, dissolved	8.7 mg/l	04-24-91	1545 hr.
pH	7.60 units	04-24-91	1500 hr.
Potassium	0.01 mg/l	04-25-91	1145 hr.
Sodium	4.07 mg/l	04-25-91	1145 hr.
Solids, dissolved	227.0 mg/l	04-30-91	1000 hr.
Solids, settleable	0.5< mg/l	04-25-91	1000 hr.
Solids, suspended	28.0 mg/l	04-25-91	1000 hr.
Sulfate	33.0 mg/l	04-26-91	0800 hr.
Turbidity	8.0 NTU	04-25-91	0900 hr.

ANALYST: Lois Stoffels

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

May 21, 1991

Job. No.: 59-11175

Sample ID:

Date Rec'd: May 14, 1991

Date Sampled: May 14, 1991

Sampled By: PacifiCorp

HUNTINGTON CREEK HCC01
Temperature 44.8 Degrees
Flow N/A
Rec'd 1320 hr.
Sampled 1230 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	8.04
DO	7.2
Conductivity	341
TURBIDITY	28

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, bicarbonate	195 mg/l HCO_3	05-15-91	1100 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, total	160 mg/l $CaCO_3$	05-15-91	1100 hr.
Anions, total	4.82 meq/l		
Calcium	76.8 mg/l	05-17-91	1340 hr.
Cations, total	5.08 meq/l		
Chloride	45.0 mg/l	05-17-91	0900 hr.
Conductivity	310 umhos/cm	05-14-91	1445 hr.
Hardness, total	247 mg/l $CaCO_3$	05-17-91	1340 hr.
Iron, total	0.17 mg/l	05-17-91	1340 hr.
Iron, dissolved	0.02< mg/l	05-17-91	1340 hr.
Magnesium	13.30 mg/l	05-17-91	1340 hr.
Manganese	0.06 mg/l	05-17-91	1340 hr.
Oil and Grease	1.0< mg/l	05-20-91	1300 hr.
Oxygen, dissolved	8.8 mg/l	05-14-91	1400 hr.
pH	8.30 units	05-14-91	1345 hr.
Potassium	0.07 mg/l	05-17-91	1340 hr.
Sodium	3.32 mg/l	05-17-91	1340 hr.
Solids, dissolved	204.0 mg/l	05-15-91	1030 hr.
Solids, settleable	0.5< mg/l	05-15-91	0800 hr.
Solids, suspended	21.0 mg/l	05-15-91	1030 hr.
Sulfate	21.0 mg/l	05-20-91	0810 hr.
Turbidity	26.0 NTU	05-14-91	1450 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11264

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 56.5 Degrees
Rec'd 1645 hr.
Sampled 1540 hr.

FIELD MEASUREMENTS	
pH	8.44
Conductivity	309
DO	6.4

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	188 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	154 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	1.11 mg/l	07-11-91	1500 hr.
Anions, total	4.50 meq/l		
Arsenic	0.002<mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.020 mg/l	07-11-91	1500 hr.
Calcium	46.7 mg/l	06-20-91	1400 hr.
Cations, total	5.30 meq/l		
Chloride	40.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	290 umhos/cm	06-12-91	0900 hr.
Copper	0.010<mg/l	07-11-91	1500 hr.
Fluoride	0.09 mg/l	06-13-91	1300 hr.
Hardness, total	263 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	0.33 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.14 mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	35.50 mg/l	06-20-91	1400 hr.

ANALYST: Leo Stoffer

2BL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11264

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO1
Temperature 56.5 Degrees
Rec'd 1645 hr.
Sampled 1540 hr.

FIELD MEASUREMENTS	
pH	8.44
Conductivity	309
DO	6.4

WATER ANALYSIS page 2

Manganese	0.02<mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.13 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.02 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	1.0<mg/l	06-17-91	0900 hr.
Oxygen, dissolved	7.1 mg/l	06-11-91	1700 hr.
pH	8.40 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	0.02<mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	1.20 mg/l	06-20-91	1400 hr.
Solids, dissolved	170.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	85.0 mg/l	06-13-91	1100 hr.
Sulfate	18.0 mg/l	06-25-91	1100 hr.
Sulfide	6.40 mg/l	06-13-91	0900 hr.
Turbidity	4.0 NTU	06-12-91	1000 hr.
Zinc	0.08 mg/l	07-11-91	1500 hr.

ANALYST: [signature]

1BL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

[signature]

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 21, 1991

Job. No.: 59-11370

Sample ID:

Date Rec'd: July 18, 1991

Date Sampled: July 18, 1991

Sampled By: PacifiCorp

HUNTINGTON CANYON CREEK HCC01
Temperature 55.1 Degrees
Rec'd 1300 hr.
Sampled 1030 hr.

FIELD MEASUREMENTS

pH	8.40
Conductivity	322
DO	8.4
Turbidity	15.0

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	7 mg/l $CaCO_3$	07-22-91	0800 hr.
Alkalinity, bicarbonate	191 mg/l HCO_3	07-23-91	0900 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	07-23-91	0900 hr.
Alkalinity, total	157 mg/l $CaCO_3$	07-23-91	0900 hr.
Anions, total	4.26 meq/l		
Calcium	71.2 mg/l	08-02-91	0810 hr.
Cations, total	4.89 meq/l		
Chloride	30.0 mg/l	07-18-91	1620 hr.
Conductivity	290 umhos/cm	07-19-91	1000 hr.
Hardness, total	238 mg/l $CaCO_3$	08-02-91	0810 hr.
Iron, total	0.08 mg/l	08-02-91	0810 hr.
Iron, dissolved	0.06 mg/l	08-02-91	0810 hr.
Magnesium	14.70 mg/l	08-02-91	0810 hr.
Manganese	0.02 mg/l	08-02-91	0810 hr.
Oil and Grease	0.6 mg/l	07-22-91	1400 hr.
Oxygen, dissolved	7.6 mg/l	07-18-91	1330 hr.
pH	8.40 units	07-18-91	1330 hr.
Potassium	0.00 mg/l	08-02-91	0810 hr.
Sodium	2.98 mg/l	08-02-91	0810 hr.
Solids, dissolved	270.0 mg/l	07-22-91	1300 hr.
Solids, settleable	0.5< mg/l	07-19-91	1300 hr.
Solids, suspended	15.0 mg/l	07-22-91	1300 hr.
Sulfate	17.0 mg/l	07-18-91	0920 hr.
Turbidity	5.5 NTU	07-19-91	1100 hr.

ANALYST: Rio Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

3MD

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11461

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC01
Temperature 58.5 Degrees
Rec'd 1000 hr.
Sampled 1600 hr.

FIELD MEASUREMENTS

pH	8.51
Conductivity	320
Turbidity	17
DO	7.2

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	187 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	153 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	3.62 meq/l		
Calcium	57.4 mg/l	09-03-91	0800 hr.
Cations, total	4.22 meq/l		
Chloride	10.0 mg/l	09-04-91	1300 hr.
Conductivity	300 umhos/cm	08-27-91	0900 hr.
Hardness, total	202 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.20 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.03 mg/l	09-03-91	0800 hr.
Magnesium	14.20 mg/l	09-03-91	0800 hr.
Manganese	0.04 mg/l	09-03-91	0800 hr.
Oil and Grease	0.2 mg/l	08-22-91	0920 hr.
Oxygen, dissolved	7.7 mg/l	08-20-91	1030 hr.
pH	8.20 units	08-20-91	1030 hr.
Potassium	0.25 mg/l	09-03-91	0800 hr.
Sodium	4.07 mg/l	09-03-91	0800 hr.
Solids, dissolved	208.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5< mg/l	08-20-91	1100 hr.
Solids, suspended	31.0 mg/l	08-23-91	1300 hr.
Sulfate	17.0 mg/l	09-04-91	1400 hr.
Turbidity	6.0 NTU	08-21-91	1000 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11515

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

Sample ID:

HUNTINGTON CANYON HCC01
Temperature 52.3 Degrees
Rec'd 1620 hr.
Sampled 1450 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	8.61
Conductivity	314
DO	4.0
Turbidity	22

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	183 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	150 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	4.33 meq/l		
Calcium	55.4 mg/l	09-18-91	1440 hr.
Cations, total	3.90 meq/l		
Chloride	30.0 mg/l	09-12-91	0900 hr.
Conductivity	250 umhos/cm	09-13-91	1330 hr.
Hardness, total	189 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.17 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.08 mg/l	09-18-91	1440 hr.
Magnesium	12.30 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	1.6 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.8 mg/l	09-10-91	1640 hr.
pH	8.20 units	09-10-91	1640 hr.
Potassium	0.09 mg/l	09-18-91	1440 hr.
Sodium	2.77 mg/l	09-18-91	1440 hr.
Solids, dissolved	181.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	1140 hr.
Solids, suspended	23.0 mg/l	09-12-91	1400 hr.
Sulfate	27.0 mg/l	09-19-91	1045 hr.
Turbidity	10.0 NTU	09-11-91	1200 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Cornell
Manager, Huntington Laboratory

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES
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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 5, 1991

Job. No.: 59-11635

Date Rec'd: October 22, 1991

Date Sampled: October 21, 1991

Sampled By: PacifiCorp

PACIFICORP FIELD OFFICE
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CREEK HCCO1
Temperature 48.6°F
Rec'd 1015 hr.
Sampled 1720 hr.

FIELD MEASUREMENTS	
pH	8.86
Conductivity	298
DO	7.5
Turbidity	8.2

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	10-29-91	1500 hr.
Alkalinity, bicarbonate	186 mg/l HCO_3	10-29-91	0800 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	10-29-91	0800 hr.
Alkalinity, total	153 mg/l $CaCO_3$	10-29-91	0800 hr.
Anions, total	4.94 meq/l		
Calcium	58.8 mg/l	10-31-91	0900 hr.
Cations, total	4.57 meq/l		
Chloride	10.0 mg/l	10-28-91	1100 hr.
Conductivity	210 umhos/cm	10-24-91	1500 hr.
Hardness, total	224 mg/l $CaCO_3$	10-31-91	0900 hr.
Iron, total	0.11 mg/l	10-31-91	0900 hr.
Iron, dissolved	0.02< mg/l	10-31-91	0900 hr.
Magnesium	18.70 mg/l	10-31-91	0900 hr.
Manganese	0.05 mg/l	10-31-91	0900 hr.
Oil and Grease	1.4 mg/l	10-28-91	1055 hr.
Oxygen, dissolved	8.0 mg/l	10-22-91	1100 hr.
pH	7.80 units	10-22-91	1100 hr.
Potassium	0.73 mg/l	10-31-91	0900 hr.
Sodium	1.92 mg/l	10-31-91	0900 hr.
Solids, dissolved	178.0 mg/l	10-23-91	1400 hr.
Solids, settleable	0.5< mg/l	10-22-91	1300 hr.
Solids, suspended	10.0 mg/l	10-23-91	1400 hr.
Sulfate	80.0 mg/l	10-29-91	1500 hr.
Turbidity	8.6 NTU	10-23-91	0900 hr.

ANALYST: Lou Stoffo

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

RECEIVED NOV 05 1991

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 26, 1991

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us

Sample taken at

Sample taken by PacifiCorp

Date sampled November 13, 1991

Date received November 13, 1991

HUNTINGTON CREEK HCC01
Temperature 40.7°F
Rec'd 1530 hr.
Sampled 1445 hr.

FIELD MEASUREMENTS	
pH	8.90
Conductivity	409
DO	8.1
Turbidity	4.8

Analysis report no. 59-11697

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	25	1	mg/l $CaCO_3$	EPA 305.1	11-14-1991 13:15 LM
Alkalinity, Bicarbonate	287	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Total	236	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Anions	5.53	----	meq/l	---------	---------- ----- --
Calcium	70.2	.1	mg/l	EPA 215.1	11-18-1991 14:00 LM
Cations	5.53	----	meq/l	---------	---------- ----- --
Chloride	10.0	.1	mg/l	EPA 325.3	11-14-1991 09:00 LM
Conductivity	390	2	umhos/cm	EPA 120.1	11-15-1991 09:00 LS
Hardness, Total	261	1	mg/l $CaCO_3$	---------	11-18-1991 14:00 JS
Iron	0.00	.02	mg/l	EPA 236.1	11-14-1991 14:00 JS
Iron, Dissolved	0.00	.02	mg/l	EPA 236.1	11-14-1991 14:00 JS
Magnesium	20.70	.01	mg/l	EPA 242.1	11-14-1991 14:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	11-14-1991 10:15 LS
Oil & Grease	0.0	1	mg/l	EPA 413.1	11-15-1991 15:45 LS
Oxygen, Dissolved	10.5	.01	mg/l	EPA 360.1	11-13-1991 15:45 LS
pH	8.10	----	Units	EPA 150.1	11-13-1991 14:00 JS
Potassium	3.30	.01	mg/l	EPA 258.1	11-14-1991 14:00 JS
Sodium	5.46	.01	mg/l	EPA 273.1	11-14-1991 07:00 LS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	11-13-1991 10:30 LM
Solids, Total Dissolved	256.0	.5	mg/l	EPA 160.1	11-14-1991 10:30 LM
Solids, Total Suspended	0.0	.5	mg/l	EPA 160.2	11-14-1991 13:20 LS
Sulfate	31.0	.1	mg/l	EPA 375.4	11-15-1991 08:00 LS
Turbidity	4.0	.1	NTU	EPA 180.1	11-14-1991 99:99 LS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Caldwell

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us: Water

Sample taken at: Huntington

Sample taken by: PacifiCorp

Date sampled: December 12, 1991

Date received: December 12, 1991

HUNTINGTON CANYON CREEK HCC01
Temperature 34.8°F
Rec'd 1330 hr.
Sampled 1130 hr.

FIELD MEASUREMENTS	
pH	8.30
Conductivity	431
DO	9.9
Turbidity	5.8

Analysis report no. 59-11751

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	16	1	mg/l $CaCO_3$	EPA 305.1	12-19-1991 13:00 LS
Alkalinity, Bicarbonate	246	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Total	202	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Aluminum	0.00	.5	mg/l	EPA 202.1	12-19-1991 14:00 LS
Anions	5.09	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	12-19-1991 14:00 JS
Barium	0.26	.03	mg/l	EPA 208.1	12-19-1991 14:00 JS
Boron	0.00	.01	mg/l	EPA 212.3	12-16-1991 13:00 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-19-1991 14:00 JS
Calcium	65.6	.1	mg/l	EPA 215.1	12-31-1991 15:00 JS
Cations	5.30	----	meq/l	---------	---------- ----- --
Chloride	15.0	.1	mg/l	EPA 325.3	12-16-1991 14:30 LS
Chromium	0.05	.02	mg/l	EPA 218.1	12-31-1991 14:00 JS
Conductivity	420	2	umhos/cm	EPA 120.1	12-13-1991 13:00 LS
Copper	0.000	.01	mg/l	EPA 220.1	12-19-1991 14:00 JS
Fluoride	0.09	.01	mg/l	EPA 340.2	12-17-1991 10:50 LS
Hardness, Total	249	1	mg/l $CaCO_3$	---------	12-31-1991 15:00 JS
Iron	0.17	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Iron, Dissolved	0.10	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-19-1991 14:00 JS
Magnesium	20.70	.01	mg/l	EPA 242.1	12-31-1991 15:00 JS
Manganese	0.02	.01	mg/l	EPA 243.1	12-31-1991 15:00 JS
Mercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 JS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us: Water

Sample taken at: HUNTINGTON

Sample taken by: PacifiCorp

Date sampled: December 12, 1991

Date received: December 12, 1991

HUNTINGTON CANYON CREEK HCC01
Temperature 34.8°F
Rec'd 1330 hr.
Sampled 1130 hr.

FIELD MEASUREMENTS

pH	8.30
Conductivity	431
DO	9.9
Turbidity	5.8

Analysis report no. 59-11751

rameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
,lybdenum	0.00	.1	mg/l	EPA 246.1	12-19-1991 14:00 JS
Nickel	0.00	.02	mg/l	EPA 249.1	12-19-1991 14:00 JS
Nitrogen, Ammonia	0.24	.01	mg/l	EPA 350.3	12-17-1991 14:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-13-1991 08:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-13-1991 08:00 JK
Oil & Grease	0.0	1	mg/l	EPA 413.1	12-12-1991 14:00 LM
Oxygen, Dissolved	10.1	.01	mg/l	EPA 360.1	12-12-1991 14:00 LS
pH	7.10	----	Units	EPA 150.1	12-12-1991 14:00 LS
Phosphorus, Total	0.00	.01	mg/l	EPA 365.2	12-18-1991 089009:99 LM reh
Potassium	4.52	.01	mg/l	EPA 258.1	12-31-1991 159009:99 LS reh
Selenium	0.000	.002	ug/l	EPA 270.3	12-19-1991 149009:99 JS reh
Sodium	4.88	.01	mg/l	EPA 273.1	12-31-1991 15:00 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-13-1991 08:00 LS
Solids, Total Dissolved	231.0	.5	mg/l	EPA 160.1	12-12-1991 15:00 LM
Solids, Total Suspended	8.0	.5	mg/l	EPA 160.2	12-12-1991 15:00 LS
Sulfate	35.0	.1	mg/l	EPA 375.4	12-16-1991 10:00 LS
Sulfide	4.00	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	3.0	.1	NTU	EPA 180.1	12-13-1991 09:00 LS
Zinc	0.05	.01	mg/l	EPA 289.1	12-19-1991 14:00 JS

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 17, 1991

Job No.: 59 10894

Sample ID: Utah Power and Light Co.

Date Rec'd: January 2, 1991

Date Sampled: January 2, 1991

Sampled By: UP&L

HUNTINGTON CANYON CREEK HCCO2
TEMPERATURE 35.8 DEGREES
Rec'd 1630 hr.
Sampled 1515 hr.

FIELD MEASUREMENTS

pH	7.85
Conductivity	569
Turbidity	19
Dissolved Oxygen	8.7

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

WATER ANALYSIS

Conductivity 01-02-91	0800 hr.	480 umhos/cm	Solids, Dissolved 01-04-91	1100 hr.	335.0 mg/l
Oxygen, Dissolved 01-02-91	1640 hr.	8.6 mg/l	Solids, Settleable 01-03-91	1000 hr.	.5 mg/l
pH 01-02-91	1645 hr.	8.30 Units	Solids, Suspended 01-04-91	1100 hr.	3.0 mg/l
			Turbidity 01-03-91	1000 hr.	2.7 NTU

ANALYST: Lois Staples

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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FAX: (801) 653-2479

February 20, 1991

Job. No.: 59-10957

Sample ID:

Date Rec'd: February 4, 1991

Date Sampled: February 4, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCCO2
Temperature 35.8 Degrees
Rec'd 1000 hr.
Sampled 0810 hr.

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.15
Conductivity	605
DO	10.9
Turbidity	13

WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	02-07-91	1330 hr.
Alkalinity, bicarbonate	262 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	5 mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	220 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	5.94 meq/l		
Calcium	78.7 mg/l	02-07-91	1300 hr.
Cations, total	7.39 meq/l		
Chloride	10.0 mg/l	02-07-91	1053 hr.
Conductivity	420 umhos/cm	02-05-91	1445 hr.
Hardness, total	324 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	<0.02 mg/l	02-07-91	1350 hr.
Iron, dissolved	<0.02 mg/l	02-07-91	1350 hr.
Magnesium	30.90 mg/l	02-07-91	1350 hr.
Manganese	0.02 mg/l	02-07-91	1350 hr.
Oil and Grease	4.3 mg/l	02-07-91	1000 hr.
Oxygen, dissolved	10.3 mg/l	02-04-91	1400 hr.
pH	8.40 units	02-04-91	1400 hr.
Potassium	2.48 mg/l	02-07-91	1300 hr.
Sodium	20.03 mg/l	02-08-91	0830 hr.
Solids, dissolved	337.0 mg/l	02-07-91	1000 hr.
Solids, suspended	12.0 mg/l	02-07-91	1000 hr.
Sulfate	65.0 mg/l	02-08-91	0830 hr.
Turbidity	.45 NTU	02-15-91	1050 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
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FAX: (801) 653-2479

February 26, 1991

Job. No.: 59-10983

Date Rec'd: February 19, 1991

Date Sampled: February 19, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 42.2 Degrees
Rec'd 1430 hr.
Sampled 1255 hr.

FIELD MEASUREMENTS	
pH	8.36
Conductivity	644
DO	10.3
Turbidity	11

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, bicarbonate	300 mg/l HCO_3	02-21-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, total	246 mg/l $CaCO_3$	02-21-91	1330 hr.
Anions, total	8.51 meq/l		
Calcium	83.1 mg/l	02-20-91	1330 hr.
Cations, total	8.06 meq/l		
Chloride	35.0 mg/l	02-21-91	1100 hr.
Conductivity	590 umhos/cm	02-19-91	1530 hr.
Hardness, total	353 mg/l $CaCO_3$	02-20-91	1330 hr.
Iron, total	0.02<mg/l	02-20-91	1330 hr.
Iron, dissolved	0.02<mg/l	02-20-91	1330 hr.
Magnesium	35.30 mg/l	02-20-91	1330 hr.
Manganese	0.02<mg/l	02-20-91	1330 hr.
Oil and Grease	1.0<mg/l	02-19-91	1430 hr.
Oxygen, dissolved	8.8 mg/l	02-19-91	1430 hr.
pH	8.30 units	02-19-91	1430 hr.
Potassium	0.78 mg/l	02-20-91	1330 hr.
Sodium	22.94 mg/l	02-20-91	1330 hr.
Solids, dissolved	425.0 mg/l	02-20-91	1330 hr.
Solids, settleable	0.5<mg/l	02-20-91	0900 hr.
Solids, suspended	16.0 mg/l	02-20-91	1330 hr.
Sulfate	130.0 mg/l	02-20-91	0945 hr.
Turbidity	4.3 NTU	02-19-91	1530 hr.

ANALYST: Lois Stafko

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FAX: (801) 653-2479

February 28, 1991

Job No.: 59 11006

Sample ID: PacificCorp Field Office

Date Rec'd: February 26, 1991

Date Sampled: February 25, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCCO2
Temperature 45.9
Rec'd 0800 hr.
Sampled 1555 hr.

PacificCorp Field Office
P.O. Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	8.15
Conductivity	680
DO	10.5
Turbidity	13

WATER ANALYSIS

Conductivity 02-27-91	610 umhos/cm	1100 hr.
Oxygen, Dissolved 02-26-91	7.5 mg/l	0900 hr.
pH 02-26-91	8.20 Units	0830 hr.
Solids, Dissolved 02-26-91	417.0 mg/l	1100 hr.
Solids, Settleable 02-27-91	<.5 mg/l	0900 hr.
Solids, Suspended 02-26-91	23.0 mg/l	1100 hr.
Turbidity 02-27-91	14.0 NTU	1300 hr.

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ANALYST: Lois Stafko

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March 19, 1991

Job. No.: 59-11031

Date Rec'd: March 6, 1991

Date Sampled: March 5, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCC02
Temperature 39.4 Degrees
Rec'd 1000 hr.
Sampled 1540 hr.

FIELD MEASUREMENTS

pH	8.28
Conductivity	551
Turbidity	28
DO	11.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, bicarbonate	236 mg/l HCO_3	03-12-91	0750 hr.
Alkalinity, carbonate	4 mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, total	197 mg/l $CaCO_3$	03-12-91	0750 hr.
Anions, total	6.92 meq/l		
Calcium	67.8 mg/l	03-15-91	1300 hr.
Cations, total	7.06 meq/l		
Chloride	35.0 mg/l	03-08-91	0810 hr.
Conductivity	450 umhos/cm	03-06-91	1620 hr.
Hardness, total	313 mg/l $CaCO_3$	03-15-91	1300 hr.
Iron, total	0.26 mg/l	03-15-91	1300 hr.
Iron, dissolved	0.21 mg/l	03-15-91	1300 hr.
Magnesium	34.80 mg/l	03-15-91	1300 hr.
Manganese	0.02<mg/l	03-15-91	1300 hr.
Oil and Grease	1.0<mg/l	03-11-91	1030 hr.
Oxygen, dissolved	9.0 mg/l	03-06-91	1530 hr.
pH	8.40 units	03-06-91	1530 hr.
Potassium	1.54 mg/l	03-15-91	1300 hr.
Sodium	17.97 mg/l	03-15-91	1300 hr.
Solids, dissolved	323.0 mg/l	03-07-91	1000 hr.
Solids, settleable <0.5	~~5.0~~<mg/l	03-11-91	0930 hr.
Solids, suspended	9.0 mg/l	03-07-91	1000 hr.
Sulfate	100.0 mg/l	03-11-91	1040 hr.
Turbidity	7.0 NTU	03-11-91	1100 hr.

ANALYST: Lois Stafko

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May 1, 1991

Job. No.: 59-11112

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 47.7 Degrees
Rec'd 1545 hr.
Sampled 1410 hr.

FIELD MEASUREMENTS	
pH	8.38
Conductivity	509
DO	7.5
Turbidity	12

(AMENDED TIME SAMPLED)

WATER ANALYSIS

Alkalinity, bicarbonate	228 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	187 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.50<mg/l	04-16-91	1230 hr.
Anions, total	5.75 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.01 mg/l	04-16-91	1230 hr.
Boron	0.06 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	66.1 mg/l	04-16-91	0910 hr.
Cations, total	5.29 meq/l		
Chloride	30.0 mg/l	04-24-91	1320 hr.
Chromium	0.11 mg/l	04-16-91	1230 hr.
Conductivity	350 umhos/cm	04-10-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.17 mg/l	04-18-91	0830 hr.
Hardness, total	232 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.02<mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	1230 hr.
Magnesium	16.30 mg/l	04-16-91	0910 hr.

ANALYST: Lois Staples

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FAX: (801) 653-2479

May 1, 1991

Job. No.: 59-11112

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
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Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 47.7 Degrees
Rec'd 1545 hr.
Sampled 1410 hr.

FIELD MEASUREMENTS	
pH	8.38
Conductivity	509
DO	7.5
Turbidity	12

(AMENDED TIME SAMPLED)

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.12 mg/l	04-16-91	1230 hr.
Nickel	0.10 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.44 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	5.1 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.8 mg/l	04-08-91	1555 hr.
pH	8.30 mg/l	04-08-91	1550 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	1.04 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	14.55 mg/l	04-16-91	0910 hr.
Solids, dissolved	274.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	18.0 mg/l	04-10-91	1400 hr.
Sulfate	60.0 mg/l	04-12-91	0715 hr.
Sulfide	11.00 mg/l	04-08-91	1645 hr.
Turbidity	3.3 NTU	04-10-91	1100 hr.
Zinc	0.03 mg/l	04-16-91	1230 hr.

ANALYST: Lois Stafko

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
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TELEPHONE: (801) 653-2311

May 21, 1991

Job. No.: 59-11176

Sample ID:

Date Rec'd: May 14, 1991

Date Sampled: May 14, 1991

Sampled By: PacifiCorp

HUNTINGTON CREEK HCCO2
Temperature 44.9 Degrees
Rec'd 1320 hr.
Sampled 1240 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
Ph	8.55
DO	7.1
Conductivity	358
TURBIDITY	28

WATER ANALYSIS

Acidity	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, bicarbonate	204 mg/l HCO_3	05-15-91	1100 hr.
Alkalinity, carbonate	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, total	168 mg/l $CaCO_3$	05-15-91	1100 hr.
Anions, total	4.92 meq/l		
Calcium	77.2 mg/l	05-17-91	1340 hr.
Cations, total	5.30 meq/l		
Chloride	40.0 mg/l	05-17-91	0900 hr.
Conductivity	330 umhos/cm	05-14-91	1445 hr.
Hardness, total	256 mg/l $CaCO_3$	05-17-91	1340 hr.
Iron, total	0.16 mg/l	05-17-91	1340 hr.
Iron, dissolved	0.02 mg/l	05-17-91	1340 hr.
Magnesium	15.30 mg/l	05-17-91	1340 hr.
Manganese	0.06 mg/l	05-17-91	1340 hr.
Oil and Grease	1.0 mg/l	05-20-91	1300 hr.
Oxygen, dissolved	8.6 mg/l	05-14-91	1400 hr.
pH	8.30 units	05-14-91	1345 hr.
Potassium	0.18 mg/l	05-17-91	1340 hr.
Sodium	4.13 mg/l	05-17-91	1340 hr.
Solids, dissolved	206.0 mg/l	05-15-91	1030 hr.
Solids, settleable	0.5 mg/l	05-15-91	0800 hr.
Solids, suspended	25.0 mg/l	05-15-91	1030 hr.
Sulfate	25.0 mg/l	05-20-91	0810 hr.
Turbidity	24.0 NTU	05-14-91	1450 hr.

ANALYST: Lois Stofko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 15, 1991

Job. No.: 59-11263

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 56.8 Degrees
Rec'd 1645 hr.
Sampled 1555 hr.

FIELD MEASUREMENTS	
pH	8.71
Conductivity	313
DO	6.0

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	201 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	165 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	41.40 mg/l	07-11-91	1500 hr.
Anions, total	4.86 meq/l		
Arsenic	0.005 mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.026 mg/l	07-11-91	1500 hr.
Calcium	64.1 mg/l	06-20-91	1400 hr.
Cations, total	4.45 meq/l		
Chloride	45.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	300 umhos/cm	06-12-91	0900 hr.
Copper	0.009 mg/l	07-11-91	1500 hr.
Fluoride	0.09 mg/l	06-13-91	1300 hr.
Hardness, total	218 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	0.27 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.01 mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	14.09 mg/l	06-20-91	1400 hr.

ANALYST: Lois Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11263

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 56.8 Degrees
Rec'd 1645 hr.
Sampled 1555 hr.

FIELD MEASUREMENTS

pH	8.71
Conductivity	313
DO	6.0

WATER ANALYSIS page 2

Manganese	0.01<mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.12 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	1.3 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	7.0 mg/l	06-11-91	1700 hr.
pH	8.50 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	0.02<mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	2.00 mg/l	06-20-91	1400 hr.
Solids, dissolved	195.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	77.0 mg/l	06-13-91	1100 hr.
Sulfate	18.0 mg/l	06-25-91	1100 hr.
Sulfide	6.60 mg/l	06-13-91	0900 hr.
Turbidity	4.0 NTU	06-12-91	1000 hr.
Zinc	0.01<mg/l	07-11-91	1500 hr.

ANALYST: Lois Stafko

1BL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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FIELD OFFICE

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 20, 1991

Job. No.: 59-11369

Sample ID:

Date Rec'd: July 18, 1991

Date Sampled: July 18, 1991

Sampled By: PacifiCorp

HUNTINGTON CANYON CREEK HCC02
Temperature 55.9 Degrees
Rec'd 1300 hr.
Sampled 1040 hr.

FIELD MEASUREMENTS

pH	8.44
Conductivity	325
DO	8.1
Turbidity	15.0

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	07-22-91	0800 hr.
Alkalinity, bicarbonate	266 mg/l HCO_3	07-23-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	07-23-91	0900 hr.
Alkalinity, total	186 mg/l $CaCO_3$	07-23-91	0900 hr.
Anions, total	4.26 meq/l		
Calcium	75.9 mg/l	08-02-91	0810 hr.
Cations, total	5.39 meq/l		
Chloride	10.0 mg/l	07-18-91	1620 hr.
Conductivity	210 umhos/cm	07-19-91	1000 hr.
Hardness, total	257 mg/l $CaCO_3$	08-02-91	0810 hr.
Iron, total	0.07 mg/l	08-02-91	0810 hr.
Iron, dissolved	0.02<mg/l	08-02-91	0810 hr.
Magnesium	16.40 mg/l	08-02-91	0810 hr.
Manganese	0.03 mg/l	08-02-91	0810 hr.
Oil and Grease	0.6 mg/l	07-22-91	1400 hr.
Oxygen, dissolved	5.8 mg/l	07-18-91	1330 hr.
pH	7.50 units	07-18-91	1330 hr.
Potassium	2.11 mg/l	08-02-91	0810 hr.
Sodium	4.49 mg/l	08-02-91	0810 hr.
Solids, dissolved	199.0 mg/l	07-22-91	1300 hr.
Solids, settleable	0.5<mg/l	07-19-91	1300 hr.
Solids, suspended	12.0 mg/l	07-22-91	1300 hr.
Sulfate	17.0 mg/l	07-18-91	0920 hr.
Turbidity	5.0 NTU	07-19-91	1100 hr.

ANALYST: Lois Stoffer

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11460

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO2
Temperature 58.7 Degrees
Rec'd 1000 hr.
Sampled 1605 hr.

FIELD MEASUREMENTS

pH	8.50
Conductivity	345
Turbidity	16
DO	7.1

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	210 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	172 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	4.22 meq/l		
Calcium	63.6 mg/l	09-03-91	0800 hr.
Cations, total	4.72 meq/l		
Chloride	10.0 mg/l	09-04-91	1300 hr.
Conductivity	310 umhos/cm	08-27-91	0900 hr.
Hardness, total	224 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.32 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.06 mg/l	09-03-91	0800 hr.
Magnesium	15.80 mg/l	09-03-91	0800 hr.
Manganese	0.03 mg/l	09-03-91	0800 hr.
Oil and Grease	1.0<mg/l	08-22-91	0920 hr.
Oxygen, dissolved	9.0 mg/l	08-20-91	1030 hr.
pH	7.70 units	08-20-91	1030 hr.
Potassium	0.40 mg/l	09-03-91	0800 hr.
Sodium	5.49 mg/l	09-03-91	0800 hr.
Solids, dissolved	236.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5<mg/l	08-20-91	1100 hr.
Solids, suspended	31.0 mg/l	08-23-91	1300 hr.
Sulfate	28.0 mg/l	09-04-91	1400 hr.
Turbidity	11.0 NTU	08-21-91	1000 hr.

ANALYST: Lois Stofko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11517

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON HCCO2
Temperature 54.3 Degrees
Rec'd 1620 hr.
Sampled 1500 hr.

FIELD MEASUREMENTS

pH	8.81
Conductivity	356
DO	4.2
Turbidity	21

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	191 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	157 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	4.81 meq/l		
Calcium	61.0 mg/l	09-18-91	1440 hr.
Cations, total	4.60 meq/l		
Chloride	25.0 mg/l	09-12-91	0900 hr.
Conductivity	290 umhos/cm	09-13-91	1330 hr.
Hardness, total	214 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.11 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.04 mg/l	09-18-91	1440 hr.
Magnesium	15.10 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	0.4 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.5 mg/l	09-10-91	1640 hr.
pH	8.30 units	09-10-91	1640 hr.
Potassium	0.42 mg/l	09-18-91	1440 hr.
Sodium	7.08 mg/l	09-18-91	1440 hr.
Solids, dissolved	222.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	1140 hr.
Solids, suspended	26.0 mg/l	09-12-91	1400 hr.
Sulfate	50.0 mg/l	09-19-91	1045 hr.
Turbidity	16.0 NTU	09-11-91	1200 hr.

ANALYST: Lou Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Connell

Manager, Huntington Laboratory

FIELD OF

COMMERCIAL TESTING & ENGINEERING CO.
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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 5, 1991

Job. No.: 59-11636

Date Rec'd: October 22, 1991

Date Sampled: October 21, 1991

Sampled By: PacifiCorp

PACIFICORP FIELD OFFICE
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK - HCC02
Temperature 48.6°F
Rec'd 1015 hr.
Sampled 1730 hr.

FIELD MEASUREMENTS	
pH	8.42
Conductivity	312
DO	7.8
Turbidity	7.9

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	10-29-91	1500 hr.
Alkalinity, bicarbonate	183 mg/l HCO_3	10-29-91	0800 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	10-29-91	0800 hr.
Alkalinity, total	150 mg/l $CaCO_3$	10-29-91	0800 hr.
Anions, total	3.52 meq/l		
Calcium	49.1 mg/l	10-31-91	0900 hr.
Cations, total	3.70 meq/l		
Chloride	10.0 mg/l	10-28-91	1100 hr.
Conductivity	220 umhos/cm	10-24-91	1500 hr.
Hardness, total	179 mg/l $CaCO_3$	10-31-91	0900 hr.
Iron, total	0.19 mg/l	10-31-91	0900 hr.
Iron, dissolved	0.02<mg/l	10-31-91	0900 hr.
Magnesium	13.76 mg/l	10-31-91	0900 hr.
Manganese	0.07 mg/l	10-31-91	0900 hr.
Oil and Grease	1.0<mg/l	10-28-91	1055 hr.
Oxygen, dissolved	7.9 mg/l	10-22-91	1100 hr.
pH	7.80 units	10-22-91	1100 hr.
Potassium	0.00 mg/l	10-31-91	0900 hr.
Sodium	2.73 mg/l	10-31-91	0900 hr.
Solids, dissolved	174.0 mg/l	10-23-91	1400 hr.
Solids, settleable	0.5<mg/l	10-22-91	1300 hr.
Solids, suspended	14.0 mg/l	10-23-91	1400 hr.
Sulfate	15.0 mg/l	10-29-91	1500 hr.
Turbidity	9.3 NTU	10-23-91	0900 hr.

ANALYST: Lois Stafford

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

December 3, 1991

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us HUNTINGTON CREEK HCCO2
Temperature 43.0°F
Rec'd 1500 hr.
Sampled 1455 hr.

FIELD MEASUREMENTS

pH	8.74
Conductivity	478
DO	6.8
Turbidity	7.8

Sample taken at

Sample taken by PacifiCorp

Date sampled November 13, 1991

Date received November 13, 1991

(AMENDED ID)

Analysis report no. 59-11698

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	0	1	mg/l $CaCO_3$	EPA 305.1	11-14-1991 13:15 LM
Alkalinity, Bicarbonate	278	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Total	228	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Anions	6.52	----	meq/l	---------	---------- ----- --
Calcium	74.5	.1	mg/l	EPA 215.1	11-18-1991 16:00 LM
Cations	6.40	----	meq/l	---------	---------- ----- --
Chloride	35.0	.1	mg/l	EPA 325.3	11-14-1991 14:00 LM
Conductivity	430	2	umhos/cm	EPA 120.1	11-14-1991 09:00 LS
Hardness, Total	295	1	mg/l $CaCO_3$	---------	11-18-1991 16:00 JS
Iron	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 JS
Iron, Dissolved	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 JS
Magnesium	26.50	.01	mg/l	EPA 242.1	11-18-1991 16:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	11-18-1991 10:15 LS
Oil & Grease	0.0	1	mg/l	EPA 413.1	11-15-1991 15:20 LS
Oxygen, Dissolved	9.8	.01	mg/l	EPA 360.1	11-13-1991 15:20 LS
pH	8.10	----	Units	EPA 150.1	11-13-1991 16:00 JS
Potassium	3.37	.01	mg/l	EPA 258.1	11-18-1991 16:00 JS
Sodium	9.68	.01	mg/l	EPA 273.1	11-18-1991 07:00 LS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	11-13-1991 10:30 LM
Solids, Total Dissolved	292.0	.5	mg/l	EPA 160.1	11-14-1991 10:30 LM
Solids, Total Suspended	3.0	.5	mg/l	EPA 160.2	11-14-1991 13:00 LS
Sulfate	52.0	.1	mg/l	EPA 375.4	11-15-1991 08:00 LS
Turbidity	7.0	.1	NTU	EPA 180.1	11-14-1991 09:00 LS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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DEC 1991

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at HUNTINGTON

Sample taken by PacifiCorp

Date sampled December 12, 1991

Date received December 12, 1991

HUNTINGTON CANYON CREEK HCC02
Temperature 36.7°F
Rec'd 1330 hr.
Sampled 1145 hr.

FIELD MEASUREMENTS

pH	8.90
Conductivity	486
DO	9.6
TURBIDITY	5.7

Analysis report no. 59-11750

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	14	1	mg/l $CaCO_3$	EPA 305.1	12-19-1991 13:00 LS
Alkalinity, Bicarbonate	263	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Total	216	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Aluminum	0.00	.5	mg/l	EPA 202.1	12-19-1991 14:00 LS
Anions	6.73	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	12-19-1991 14:00 JS
Barium	0.24	.03	mg/l	EPA 208.1	12-19-1991 14:00 JS
Boron	0.00	.01	mg/l	EPA 212.3	12-13-1991 13:00 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-19-1991 14:00 JS
Calcium	74.5	.1	mg/l	EPA 215.1	12-31-1991 15:00 JS
Cations	6.24	----	meq/l	---------	---------- ----- --
Chloride	15.0	.1	mg/l	EPA 325.3	12-16-1991 14:30 LS
Chromium	0.00	.02	mg/l	EPA 218.1	12-31-1991 14:00 JS
Conductivity	700	2	umhos/cm	EPA 120.1	12-13-1991 13:00 LS
Copper	0.000	.01	mg/l	EPA 220.1	12-19-1991 14:00 JS
Fluoride	0.11	.01	mg/l	EPA 340.2	12-17-1991 10:50 LS
Hardness, Total	287	1	mg/l $CaCO_3$	---------	12-31-1991 15:00 JS
Iron	0.13	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Iron, Dissolved	0.04	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-19-1991 14:00 JS
Magnesium	24.40	.01	mg/l	EPA 242.1	12-31-1991 15:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	12-31-1991 15:00 JS
Mercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 LM

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT 8
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at HUNTINGTON

Sample taken by PacifiCorp

Date sampled December 12, 1991

Date received December 12, 1991

HUNTINGTON CANYON CREEK HCC02
Temperature 36.7°F
Rec'd 1330 hr.
Sampled 1145 hr.

FIELD MEASUREMENTS

pH	8.90
Conductivity	486
DO	9.6

Analysis report no. 59-11750

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum	0.00	.1	mg/l	EPA 246.1	12-19-1991 14:00 JS
Nickel	0.00	.02	mg/l	EPA 249.1	12-19-1991 14:00 JS
Nitrogen, Ammonia	0.25	.01	mg/l	EPA 350.3	12-17-1991 14:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-13-1991 08:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-13-1991 08:00 JK
Oil & Grease	1.1	1	mg/l	EPA 413.1	12-12-1991 14:00 LM
Oxygen, Dissolved	9.7	.01	mg/l	EPA 360.1	12-12-1991 14:00 LS
pH	7.70	----	Units	EPA 150.1	12-12-1991 14:00 LS
Phosphorus, Total	0.00	.01	mg/l	EPA 365.2	12-18-1991 08:00 LM
Potassium	4.90	.01	mg/l	EPA 258.1	12-31-1991 15:00 JS
Selenium	0.000	.002	ug/l	EPA 270.3	12-19-1991 14:00 JS
Sodium	8.93	.01	mg/l	EPA 273.1	12-31-1991 15:00 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-13-1991 08:00 LS
Solids, Total Dissolved	256.0	.5	mg/l	EPA 160.1	12-12-1991 15:00 LM
Solids, Total Suspended	6.0	.5	mg/l	EPA 160.2	12-12-1991 15:00 LS
Sulfate	100.0	.1	mg/l	EPA 375.4	12-16-1991 10:00 LS
Sulfide	3.00	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	3.0	.1	NTU	EPA 180.1	12-13-1991 09:00 LS
Zinc	0.03	.01	mg/l	EPA 289.1	12-19-1991 14:00 JS

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FIELD OFFICE

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 30, 1991

Job No.: 59 10896

Sample ID: Utah Power and Light Co.

Date Rec'd: January 2, 1991

Date Sampled: January 2, 1991

Sampled By: UP&L

HUNTINGTON CANYON CREEK HCCO4
TEMPERATURE 35.7 DEGREES
Rec'd 1630 hr.
Sampled 1530 hr.

FIELD MEASUREMENTS

pH	7.83
Conductivity	611
Turbidity	16
Dissolved Oxygen	4.8

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

WATER ANALYSIS

Conductivity	350	umhos/cm	Solids, Dissolved	343.0	mg/l
01-02-91		0800 hr.	01-04-91		1100 hr.
Oxygen, Dissolved	8.8	mg/l	Solids, Settleable	.5 <	mg/l
01-02-91		1640 hr.	01-03-91		1000 hr.
pH	8.30	Units	Solids, Suspended	2.0	mg/l
01-02-91		1645 hr.	01-04-91		1100 hr.
			Turbidity	2.6	NTU
			01-03-91		1000 hr.

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ANALYST: Lois Stafko

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 20, 1991

Job. No.: 59-10959

Sample ID:

Date Rec'd: February 4, 1991

Date Sampled: February 4, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCCO4
Temperature 34.3 Degrees
Rec'd 1000 hr.
Sampled 0830 hr.

FIELD MEASUREMENTS

pH	8.03
Conductivity	655
DO	10.9
Turbidity	42

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WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	02-27-91	1330 hr.
Alkalinity, bicarbonate	262 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	6 mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	221 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	6.53 meq/l		
Calcium	87.9 mg/l	02-07-91	1300 hr.
Cations, total	8.35 meq/l		
Chloride	20.0 mg/l	02-07-91	1053 hr.
Conductivity	460 umhos/cm	02-05-91	1445 hr.
Hardness, total	367 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	0.07 mg/l	02-07-91	1350 hr.
Iron, dissolved	0.02 mg/l	02-07-91	1350 hr.
Magnesium	35.90 mg/l	02-07-91	1350 hr.
Manganese	0.03 mg/l	02-07-91	1350 hr.
Oil and Grease	1.8 mg/l	02-07-91	1000 hr.
Oxygen, dissolved	10.0 mg/l	02-04-91	1400 hr.
pH	8.50 units	02-04-91	1400 hr.
Potassium	1.42 mg/l	02-07-91	1300 hr.
Sodium	22.58 mg/l	02-07-91	1300 hr.
Solids, dissolved	380.0 mg/l	02-07-91	1000 hr.
Solids, suspended	10.0 mg/l	02-07-91	1000 hr.
Sulfate	79.0 mg/l	02-08-91	0830 hr.
Turbidity	2.7 NTU	02-15-91	1050 hr.

ANALYST: Lois Stoppo

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Respectfully submitted,
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Manager, Huntington Laboratory

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D

February 26, 1991

Job. No.: 59-10985

Date Rec'd: February 19, 1991

Date Sampled: February 19, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 45.5 Degrees
Rec'd 1430 hr.
Sampled 1315 hr.

FIELD MEASUREMENTS

pH	7.98
Conductivity	735
DO	10.1
Turbidity	17

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, bicarbonate	317 mg/l HCO_3	02-21-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, total	260 mg/l $CaCO_3$	02-21-91	1330 hr.
Anions, total	9.62 meq/l		
Calcium	88.3 mg/l	02-20-91	1330 hr.
Cations, total	9.13 meq/l		
Chloride	35.0 mg/l	02-21-91	1100 hr.
Conductivity	640 umhos/cm	02-19-91	1530 hr.
Hardness, total	393 mg/l $CaCO_3$	02-20-91	1330 hr.
Iron, total	0.02<mg/l	02-20-91	1330 hr.
Iron, dissolved	0.02<mg/l	02-20-91	1330 hr.
Magnesium	42.00 mg/l	02-20-91	1330 hr.
Manganese	0.02<mg/l	02-20-91	1330 hr.
Oil and Grease	1.0<mg/l	02-19-91	1430 hr.
Oxygen, dissolved	8.3 mg/l	02-19-91	1430 hr.
pH	8.40 units	02-19-91	1430 hr.
Potassium	1.37 mg/l	02-20-91	1330 hr.
Sodium	28.78 mg/l	02-20-91	1330 hr.
Solids, dissolved	469.0 mg/l	02-20-91	1330 hr.
Solids, settleable	0.5<mg/l	02-20-91	0900 hr.
Solids, suspended	14.0 mg/l	02-20-91	1330 hr.
Sulfate	170.0 mg/l	02-20-91	0945 hr.
Turbidity	4.3 NTU	02-19-91	1530 hr.

ANALYST: Lois Stafko

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FAX: (801) 653-2479

February 28, 1991

Job No.: 59 11000

Sample ID: PacificCorp Field Office

Date Rec'd: February 26, 1991

Date Sampled: February 25, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCCO4
Temperature 46.2
Rec'd 0800 hr.
Sampled 1615 hr.

FIELD MEASUREMENTS

pH	8.26
Conductivity	733
DO	10.9
Turbidity	8

PacificCorp Field Office
P.O. Box 1005
Huntington UT 84528

WATER ANALYSIS

Conductivity 02-27-91	620	umhos/cm	Solids, Dissolved 02-26-91	465.0	mg/l
	1100 hr.			1100 hr.	
Oxygen, Dissolved 02-26-91	8.3	mg/l	Solids, Settleable 02-27-91	.5<	mg/l
	0900 hr.			0900 hr.	
pH 02-26-91	8.40	Units	Solids, Suspended 02-26-91	11.0	mg/l
	0830 hr.			1100 hr.	
			Turbidity 02-27-91	12.0	NTU
				1300 hr.	

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ANALYST: Rio Stafko

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March 18, 1991

Job. No.: 59-11033

Sample ID:

Date Rec'd: March 6, 1991

Date Sampled: March 5, 1991

Sampled By: PacificCorp

HUNTINGTON CANYON CREEK HCC04
Temperature 40.1 Degrees
Rec'd 1000 hr.
Sampled 1610 hr.

FIELD MEASUREMENTS

pH	8.42
Conductivity	591
Turbidity	31

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P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, bicarbonate	249 mg/l HCO_3	03-12-91	0750 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, total	204 mg/l $CaCO_3$	03-12-91	0750 hr.
Anions, total	7.97 meq/l		
Calcium	78.5 mg/l	03-15-91	1300 hr.
Cations, total	7.79 meq/l		
Chloride	45.0 mg/l	03-08-91	1300 hr.
Conductivity	480 umhos/cm	03-06-91	1620 hr.
Hardness, total	341 mg/l $CaCO_3$	03-15-91	1300 hr.
Iron, total	0.18 mg/l	03-15-91	1300 hr.
Iron, dissolved	0.15 mg/l	03-15-91	1300 hr.
Magnesium	35.10 mg/l	03-15-91	1300 hr.
Manganese	0.02< mg/l	03-15-91	1300 hr.
Oil and Grease	1.2 mg/l	03-11-91	1030 hr.
Oxygen, dissolved	8.7 mg/l	03-06-91	1530 hr.
pH	8.20 units	03-06-91	1530 hr.
Potassium	1.13 mg/l	03-15-91	1300 hr.
Sodium	22.28 mg/l	03-15-91	1300 hr.
Solids, dissolved	350.0 mg/l	03-07-91	1000 hr.
Solids, settleable	0.5< mg/l	03-11-91	0930 hr.
Solids, suspended	22.0 mg/l	03-07-91	1000 hr.
Sulfate	130.0 mg/l	03-11-91	1040 hr.
Turbidity	8.0 NTU	03-11-91	1100 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
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May 2, 1991

Job. No.: 59-11111

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 49.9 Degrees
Rec'd 1545 hr.
Sampled 1425 hr.

FIELD MEASUREMENTS

pH	8.57
Conductivity	548
DO	8.8
Turbidity	13

OIL & GREASE CONTAMINATED

WATER ANALYSIS

Alkalinity, bicarbonate	228 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	187 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.27 mg/l	04-16-91	1230 hr.
Anions, total	5.92 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.03<mg/l	04-16-91	1230 hr.
Boron	0.08 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	65.1 mg/l	04-16-91	0910 hr.
Cations, total	5.70 meq/l		
Chloride	25.0 mg/l	04-24-91	1320 hr.
Chromium	0.11 mg/l	04-16-91	1230 hr.
Conductivity	400 umhos/cm	04-11-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.18 mg/l	04-18-91	0830 hr.
Hardness, total	252 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.08 mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	1230 hr.
Magnesium	21.70 mg/l	04-16-91	0910 hr.

ANALYST: Lois Stoffer

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Campbell

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

May 2, 1991

Job. No.: 59-11111

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 49.9 Degrees
Rec'd 1545 hr.
Sampled 1425 hr.

FIELD MEASUREMENTS	
pH	8.57
Conductivity	548
DO	8.8
Turbidity	13

OIL & GREASE CONTAMINATED

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.15 mg/l	04-16-91	1230 hr.
Nickel	0.09 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.48 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	XXXXXXX mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.9 mg/l	04-08-91	1555 hr.
pH	8.50 mg/l	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	0.97 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	14.93 mg/l	04-16-91	0910 hr.
Solids, dissolved	320.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	15.0 mg/l	04-10-91	1400 hr.
Sulfate	75.0 mg/l	04-12-91	0715 hr.
Sulfide	10.20 mg/l	04-08-91	1645 hr.
Turbidity	3.7 NTU	04-10-91	1100 hr.
Zinc	0.07 mg/l	04-16-91	1230 hr.

ANALYST: Lois Staples

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Dave Caywood

Manager, Huntington Laboratory

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May 21, 1991

Job. No.: 59-11171

Sample ID:

Date Rec'd: May 14, 1991

Date Sampled: May 14, 1991

Sampled By: PacifiCorp

HUNTINGTON CREEK HCCO4
Temperature 46.1 Degrees
Rec'd 1320 hr.
Sampled 1250 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	7.90
Conductivity	382
DO	7.1
TURBIDITY	29

WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, bicarbonate	200 mg/l HCO_3	05-15-91	1100 hr.
Alkalinity, carbonate	<1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, total	164 mg/l $CaCO_3$	05-15-91	1100 hr.
Anions, total	4.99 meq/l		
Calcium	80.5 mg/l	05-17-91	1340 hr.
Cations, total	5.44 meq/l		
Chloride	40.0 mg/l	05-17-91	0900 hr.
Conductivity	332 umhos/cm	05-14-91	1445 hr.
Hardness, total	261 mg/l $CaCO_3$	05-17-91	1340 hr.
Iron, total	0.18 mg/l	05-17-91	1340 hr.
Iron, dissolved	<0.02 mg/l	05-17-91	1340 hr.
Magnesium	14.50 mg/l	05-17-91	1340 hr.
Manganese	0.04 mg/l	05-17-91	1340 hr.
Oil and Grease	<1.0 mg/l	05-20-91	1300 hr.
Oxygen, dissolved	8.1 mg/l	05-14-91	1400 hr.
pH	8.10 units	05-14-91	1345 hr.
Potassium	0.34 mg/l	05-17-91	1340 hr.
Sodium	5.10 mg/l	05-17-91	1340 hr.
Solids, dissolved	231.0 mg/l	05-15-91	1030 hr.
Solids, settleable	<0.5 mg/l	05-15-91	0800 hr.
Solids, suspended	21.0 mg/l	05-15-91	1030 hr.
Sulfate	32.0 mg/l	05-20-91	0810 hr.
Turbidity	18.0 NTU	05-14-91	1450 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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July 16, 1991

Job. No.: 59-11265

Sample ID:

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

HUNTINGTON CANYON CREEK HCCO4
Temperature 57.4 Degrees
Rec'd 1645 hr.
Sampled 1605 hr.

FIELD MEASUREMENTS	
pH	8.56
Conductivity	323
DO	5.5

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	187 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	153 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	1.32 mg/l	07-11-91	1500 hr.
Anions, total	4.04 meq/l		
Arsenic	0.006 mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.034 mg/l	07-11-91	0730 hr.
Calcium	61.5 mg/l	06-20-91	1400 hr.
Cations, total	4.44 meq/l		
Chloride	25.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	300 umhos/cm	06-12-91	0900 hr.
Copper	0.010<mg/l	07-11-91	1500 hr.
Fluoride	0.09<mg/l	06 13-91	1300 hr.
Hardness, total	210 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	0.13 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.02<mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	13.70 mg/l	06-20-91	1400 hr.

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ANALYST: Lois Stafko

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FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11265

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 57.4 Degrees
Rec'd 1645 hr.
Sampled 1605 hr.

FIELD MEASUREMENTS

pH	8.56
Conductivity	323
DO	5.5

WATER ANALYSIS page 2

Manganese	0.01<mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.02 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00<mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	0.1 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	6.7 mg/l	06-11-91	1700 hr.
pH	8.50 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00<mg/l	06-28-91	1100 hr.
Potassium	0.01<mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	5.50 mg/l	06-20-91	1400 hr.
Solids, dissolved	182.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	82.0 mg/l	06-13-91	1100 hr.
Sulfate	17.0 mg/l	06-25-91	1100 hr.
Sulfide	7.00 mg/l	06-13-91	0900 hr.
Turbidity	3.0 NTU	06-12-91	1000 hr.
Zinc	0.00<mg/l	07-11-91	1500 hr.

ANALYST: Lois Stafko

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COMMERCIAL TESTING & ENGINEERING CO.

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 4, 1991

Job. No.: 59-11371

Date Rec'd: July 18, 1991

Date Sampled: July 18, 1991

Sampled By: PacifiCorp

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 56.5 Degrees
Rec'd 1300
Sampled 1055 hr.

FIELD MEASUREMENTS	
pH	8.60
Conductivity	347
Turbidity	18
DO	8.0

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	07-22-91	0800 hr.
Alkalinity, bicarbonate	205 mg/l HCO_3	08-06-91	1400 hr.
Alkalinity, total	168 mg/l $CaCO_3$	08-06-91	1400 hr.
Anions, total	4.16 meq/l		
Calcium	73.1 mg/l	09-03-91	0800 hr.
Cations, total	5.12 meq/l		
Chloride	15.0 mg/l	07-18-91	1620 hr.
Conductivity	280 umhos/cm	07-19-91	1000 hr.
Hardness, total	245 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.07 mg/l	08-02-91	0810 hr.
Iron, dissolved	0.02<mg/l	08-02-91	0810 hr.
Magnesium	15.10 mg/l	09-03-91	0800 hr.
Manganese	0.02 mg/l	08-02-91	0810 hr.
Oil and Grease	1.2 mg/l	07-22-91	1400 hr.
Oxygen, dissolved	6.9 mg/l	07-18-91	1330 hr.
pH	8.30 units	07-18-91	1330 hr.
Potassium	0.00 mg/l	08-02-91	0810 hr.
Sodium	5.16 mg/l	09-03-91	0800 hr.
Solids, dissolved	216.0 mg/l	07-22-91	1300 hr.
Solids, settleable	0.5<mg/l	07-19-91	1300 hr.
Solids, suspended	40.0 mg/l	07-22-91	1300 hr.
Sulfate	22.0 mg/l	07-19-91	0920 hr.
Turbidity	5.0 NTU	07-19-91	1100 hr.

ANALYST: M M

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

M M

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11459

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

HUNTINGTON CANYON CREEK HCCO4
Temperature 59.6 Degrees
Rec'd 1000 hr.
Sampled 1615 hr.

FIELD MEASUREMENTS

pH	8.69
Conductivity	372
Turbidity	15
DO	7.0

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	249 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	204 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	4.91 meq/l		
Calcium	59.4 mg/l	09-03-91	0800 hr.
Cations, total	4.73 meq/l		
Chloride	10.0 mg/l	09-04-91	1300 hr.
Conductivity	350 umhos/cm	08-27-91	0900 hr.
Hardness, total	221 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.25 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.02<mg/l	09-03-91	0800 hr.
Magnesium	17.60 mg/l	09-03-91	0800 hr.
Manganese	0.01<mg/l	09-03-91	0800 hr.
Oil and Grease	1.0<mg/l	08-22-91	0920 hr.
Oxygen, dissolved	6.6 mg/l	08-20-91	1030 hr.
pH	7.90 units	08-20-91	1030 hr.
Potassium	0.30 mg/l	09-03-91	0800 hr.
Sodium	7.24 mg/l	09-03-91	0800 hr.
Solids, dissolved	235.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5<mg/l	08-20-91	1100 hr.
Solids, suspended	52.0 mg/l	08-23-91	1300 hr.
Sulfate	31.0 mg/l	09-04-91	1400 hr.
Turbidity	16.0 NTU	08-21-91	1000 hr.

ANALYST: Lois Stofko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

ER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS AND RIVER LOADING FACILITIES

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11516

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

Sample ID:

HUNTINGTON CANYON HCCO4
Temperature 54.6 Degrees
Rec'd 1620 hr.
Sampled 1510 hr.

FIELD MEASUREMENTS	
pH	8.47
Conductivity	384
DO	4.8
Turbidity	23

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	181 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	154 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	4.60 meq/l		
Calcium	64.3 mg/l	09-18-91	1440 hr.
Cations, total	4.94 meq/l		
Chloride	30.0 mg/l	09-12-91	0900 hr.
Conductivity	300 umhos/cm	09-13-91	1330 hr.
Hardness, total	228 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	10.00 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.04 mg/l	09-18-91	1440 hr.
Magnesium	16.40 mg/l	09-18-91	1440 hr.
Manganese	0.02< mg/l	09-18-91	1440 hr.
Oil and Grease	0.3 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.2 mg/l	09-10-91	1640 hr.
pH	8.30 units	09-10-91	1640 hr.
Potassium	0.49 mg/l	09-18-91	1440 hr.
Sodium	8.52 mg/l	09-18-91	1440 hr.
Solids, dissolved	239.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5< mg/l	09-11-91	1140 hr.
Solids, suspended	30.0 mg/l	09-12-91	1400 hr.
Sulfate	36.0 mg/l	09-19-91	1045 hr.
Turbidity	15.0 NTU	09-11-91	1200 hr.

ANALYST: Rio Stefko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council

Manager, Huntington Laboratory

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 7, 1991

Job. No.: 59-11637

Sample ID:

Date Rec'd: October 22, 1991

Date Sampled: October 21, 1991

Sampled By: PacifiCorp

HUNTINGTON CREEK HCCO4
Temperature 48.9°F
Rec'd 1015 hr.
Sampled 1745 hr.

FIELD MEASUREMENTS

pH	8.36
Conductivity	329
DO	8.0
Turbidity	8.0

PACIFICORP FIELD OFFICE
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	13 mg/l $CaCO_3$	10-29-91	1500 hr.
Alkalinity, bicarbonate	191 mg/l HCO_3	10-29-91	0800 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	10-29-91	0800 hr.
Alkalinity, total	157 mg/l $CaCO_3$	10-29-91	0800 hr.
Anions, total	3.72 meq/l		
Calcium	40.4 mg/l	10-31-91	0900 hr.
Cations, total	3.42 meq/l		
Chloride	10.0 mg/l	10-28-91	1100 hr.
Conductivity	220 umhos/cm	10-24-91	1500 hr.
Hardness, total	163 mg/l $CaCO_3$	10-31-91	0900 hr.
Iron, total	0.17 mg/l	10-31-91	0900 hr.
Iron, dissolved	0.02<mg/l	10-31-91	0900 hr.
Magnesium	15.10 mg/l	10-31-91	0900 hr.
Manganese	0.08 mg/l	10-31-91	0900 hr.
Oil and Grease	1.0<mg/l	10-28-91	1055 hr.
Oxygen, dissolved	8.1 mg/l	10-25-91	0800 hr.
pH	7.90 units	10-25-91	0800 hr.
Potassium	0.00 mg/l	10-31-91	0900 hr.
Sodium	3.79 mg/l	10-31-91	0900 hr.
Solids, dissolved	196.0 mg/l	10-23-91	1400 hr.
Solids, settleable	0.5<mg/l	10-22-91	1300 hr.
Solids, suspended	11.0 mg/l	10-23-91	1400 hr.
Sulfate	18.0 mg/l	10-29-91	1500 hr.
Turbidity	9.0 NTU	10-23-91	0900 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 26, 1991

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us: HUNTINGTON CREEK HCCO4
Temperature 44.1°F
Rec'd 1500 hr.
Sampled 1510 hr.

Sample taken at

Sample taken by: PacifiCorp

Date sampled: November 13, 1991

Date received: November 13, 1991

FIELD MEASUREMENTS

pH	8.25
Conductivity	580
DO	6.5
Turbidity	4.8

Analysis report no. 59-11699

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	0	1	mg/l $CaCO_3$	EPA 305.1	11-14-1991 13:15 LM
Alkalinity, Bicarbonate	261	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Alkalinity, Total	214	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LM
Anions	7.74	----	meq/l	---------	---------- ----- --
Calcium	78.1	.1	mg/l	EPA 215.1	11-18-1991 16:00 LM
Cations	7.97	----	meq/l	---------	---------- ----- --
Chloride	30.0	.1	mg/l	EPA 325.3	11-14-1991 14:00 LM
Conductivity	510	2	umhos/cm	EPA 120.1	11-14-1991 09:00 LS
Hardness, Total	358	1	mg/l $CaCO_3$	---------	11-18-1991 16:00 JS
Iron	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 JS
Iron, Dissolved	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 JS
Magnesium	39.60	.01	mg/l	EPA 242.1	11-18-1991 16:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	11-18-1991 10:15 LS
Oil & Grease	0.0	1	mg/l	EPA 413.1	11-15-1991 15:20 LS
Oxygen, Dissolved	9.6	.01	mg/l	EPA 360.1	11-13-1991 15:20 LS
pH	8.20	----	Units	EPA 150.1	11-13-1991 16:00 JS
Potassium	3.71	.01	mg/l	EPA 258.1	11-18-1991 16:00 JS
Sodium	16.86	.01	mg/l	EPA 273.1	11-18-1991 07:00 LS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	11-13-1991 10:30 LM
Solids, Total Dissolved	374.0	.5	mg/l	EPA 160.1	11-14-1991 10:30 LM
Solids, Total Suspended	3.0	.5	mg/l	EPA 160.2	11-14-1991 13:00 LS
Sulfate	130.0	.1	mg/l	EPA 375.4	11-15-1991 08:00 LS
Turbidity	6.0	.1	NTU	EPA 180.1	11-14-1991 99:99 LS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Counsell
Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT 8
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at Huntington

Sample taken by PacifiCorp

Date sampled December 12, 1991

Date received December 12, 1991

HUNTINGTON CANYON CREEK HCC04
Temperature 37.9°F
Rec'd 1330 hr.
Sampled 1205 hr.

FIELD MEASUREMENTS	
pH	8.24
Conductivity	540
DO	9.9
Turbidity	5.8

Analysis report no. 59-11749

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	8	1	mg/l $CaCO_3$	EPA 305.1	12-19-1991 13:00 LS
Alkalinity, Bicarbonate	253	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Total	208	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Aluminum	0.00	.5	mg/l	EPA 202.1	12-19-1991 14:00 JS
Anions	6.93	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	12-19-1991 14:00 JS
Barium	0.32	.03	mg/l	EPA 208.1	12-19-1991 14:00 JS
Boron	0.21	.01	mg/l	EPA 212.3	12-16-1991 13:00 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-19-1991 14:00 JS
Calcium	76.7	.1	mg/l	EPA 215.1	12-31-1991 15:00 JS
Cations	6.67	----	meq/l	---------	---------- ----- --
Chloride	20.0	.1	mg/l	EPA 325.3	12-16-1991 14:30 LS
Chromium	0.00	.02	mg/l	EPA 218.1	12-31-1991 14:00 JS
Conductivity	500	2	umhos/cm	EPA 120.1	12-13-1991 13:00 LS
Copper	0.000	.01	mg/l	EPA 220.1	12-19-1991 14:00 JS
Fluoride	0.12	.01	mg/l	EPA 340.2	12-17-1991 10:50 LS
Hardness, Total	300	1	mg/l $CaCO_3$	---------	12-31-1991 15:00 JS
Iron	0.14	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Iron, Dissolved	0.10	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-19-1991 14:00 JS
Magnesium	26.40	.01	mg/l	EPA 242.1	12-31-1991 15:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	12-31-1991 15:00 JS
Mercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 LM

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

FIELD OFFICE

COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us: Water

Sample taken at: Huntington

Sample taken by: PacifiCorp

Date sampled: December 12, 1991

Date received: December 12, 1991

HUNTINGTON CANYON CREEK HCC04
Temperature 37.9°F
Rec'd 1330 hr.
Sampled 1205 hr.

FIELD MEASUREMENTS	
pH	8.24
Conductivity	540
DO	9.9
Turbidity	5.8

Analysis report no. 59-11749

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum	0.00	.1	mg/l	EPA 246.1	12-19-1991 14:00 JS
Nickel	0.03	.02	mg/l	EPA 249.1	12-19-1991 14:00 JS
Nitrogen, Ammonia	0.27	.01	mg/l	EPA 350.3	12-17-1991 14:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-13-1991 08:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-13-1991 08:00 JK
Oil & Grease	1.4	1	mg/l	EPA 413.1	12-12-1991 14:00 LM
Oxygen, Dissolved	8.7	.01	mg/l	EPA 360.1	12-12-1991 14:00 LS
pH	7.70	----	Units	EPA 150.1	12-12-1991 14:00 LS
Phosphorus, Total	0.06	.01	mg/l	EPA 365.2	12-18-1991 08:00 LM
Potassium	4.70	.01	mg/l	EPA 258.1	12-31-1991 15:00 JS
Selenium	0.000	.002	ug/l	EPA 270.3	12-19-1991 14:00 JS
Sodium	12.63	.01	mg/l	EPA 273.1	12-31-1991 15:00 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-13-1991 08:00 LS
Solids, Total Dissolved	323.0	.5	mg/l	EPA 160.1	12-12-1991 15:00 LM
Solids, Total Suspended	5.0	.5	mg/l	EPA 160.2	12-12-1991 15:00 LM
Sulfate	110.0	.1	mg/l	EPA 375.4	12-16-1991 10:00 LS
Sulfide	4.60	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	3.0	.1	NTU	EPA 180.1	12-13-1991 09:00 LS
Zinc	0.05	.01	mg/l	EPA 289.1	12-19-1991 14:00 LS

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory FIELD OFFICE

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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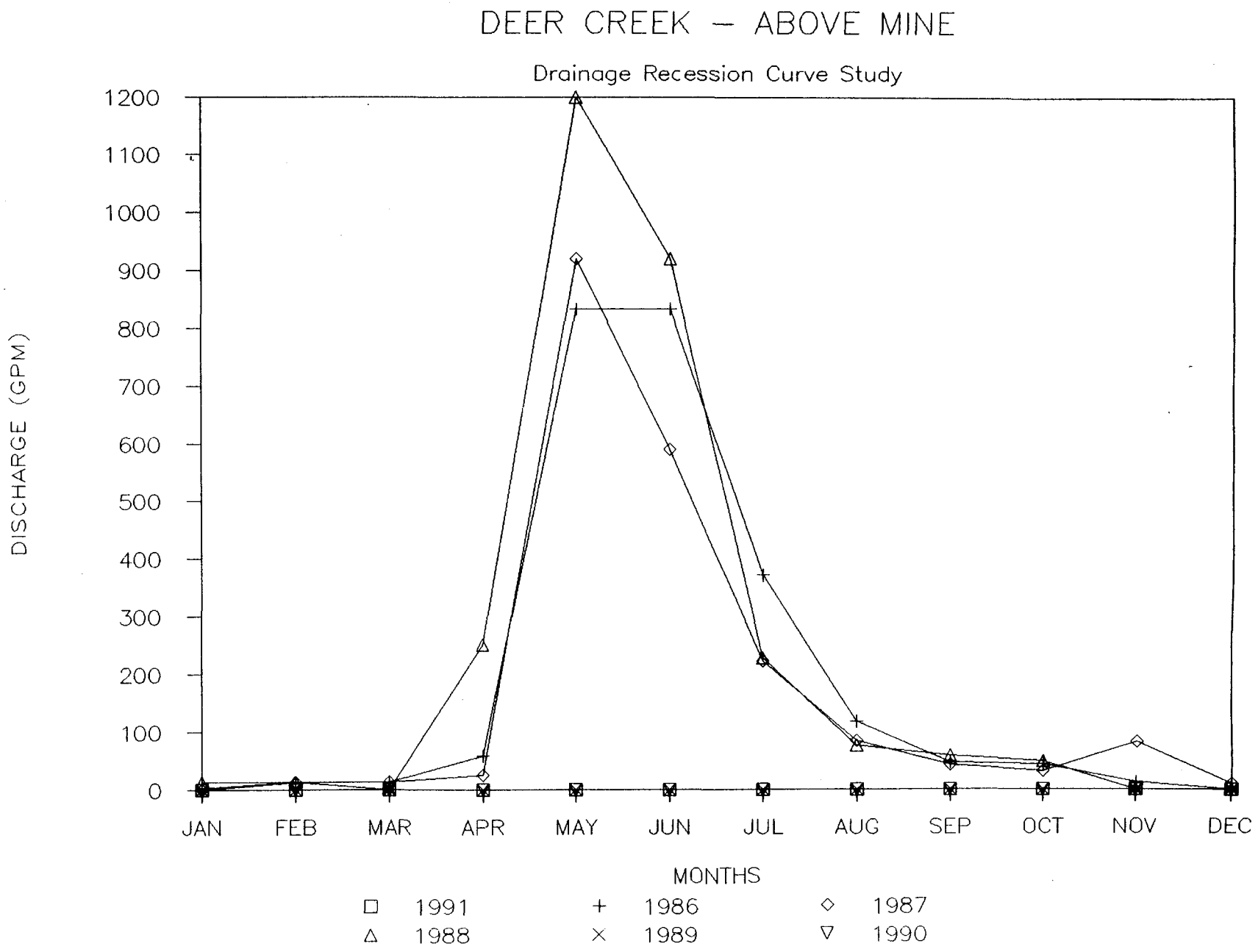
TERMS AND CONDITIONS ON REVERSE

APPENDIX B


DEER CREEK – ABOVE MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
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AUG
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DEC
MONTHS
1991
1986
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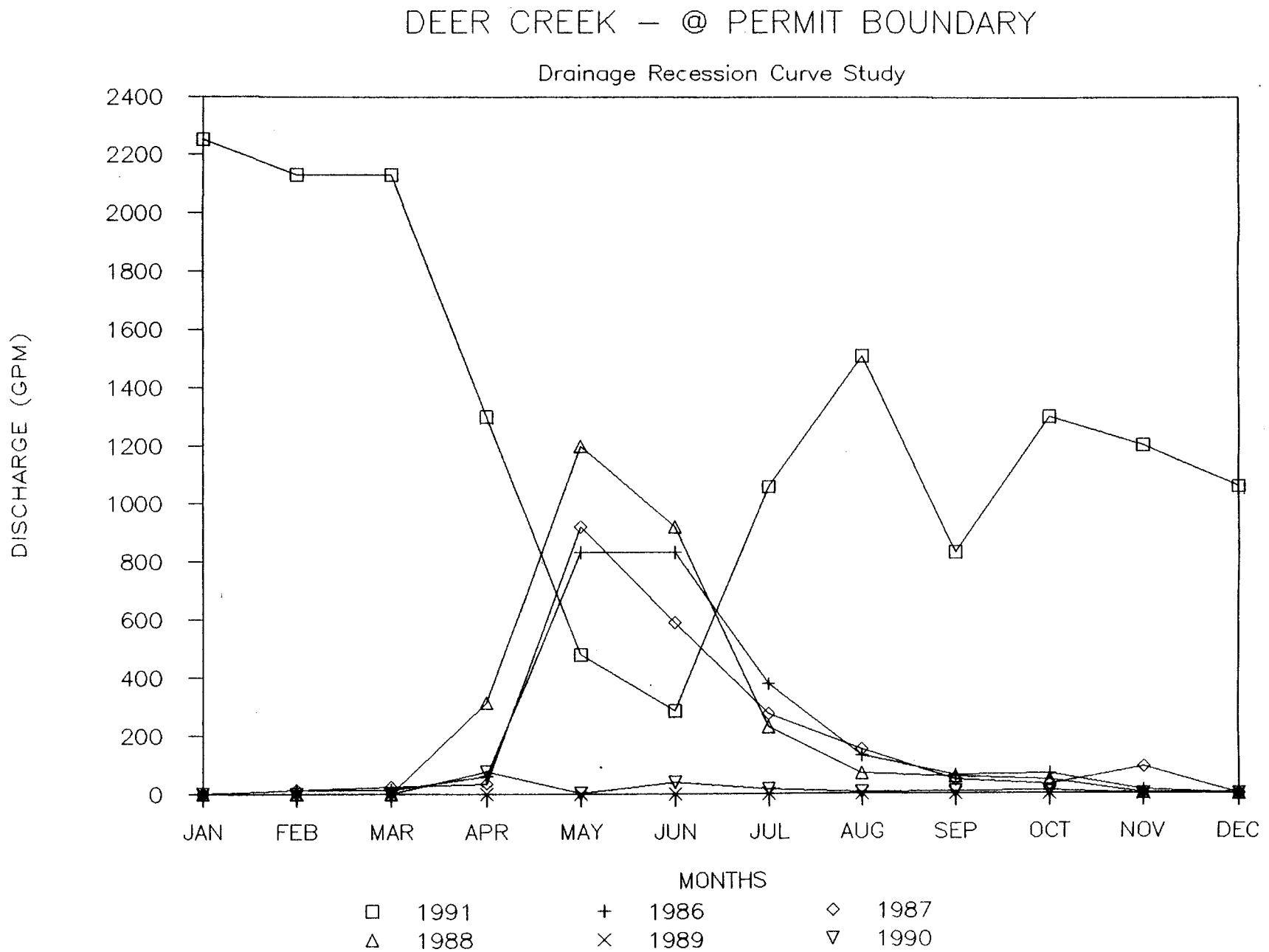
1990


DEER CREEK – @ PERMIT BOUNDARY
Drainage Recession Curve Study
DISCHARGE (GPM)
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
JAN
FEB
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MONTHS
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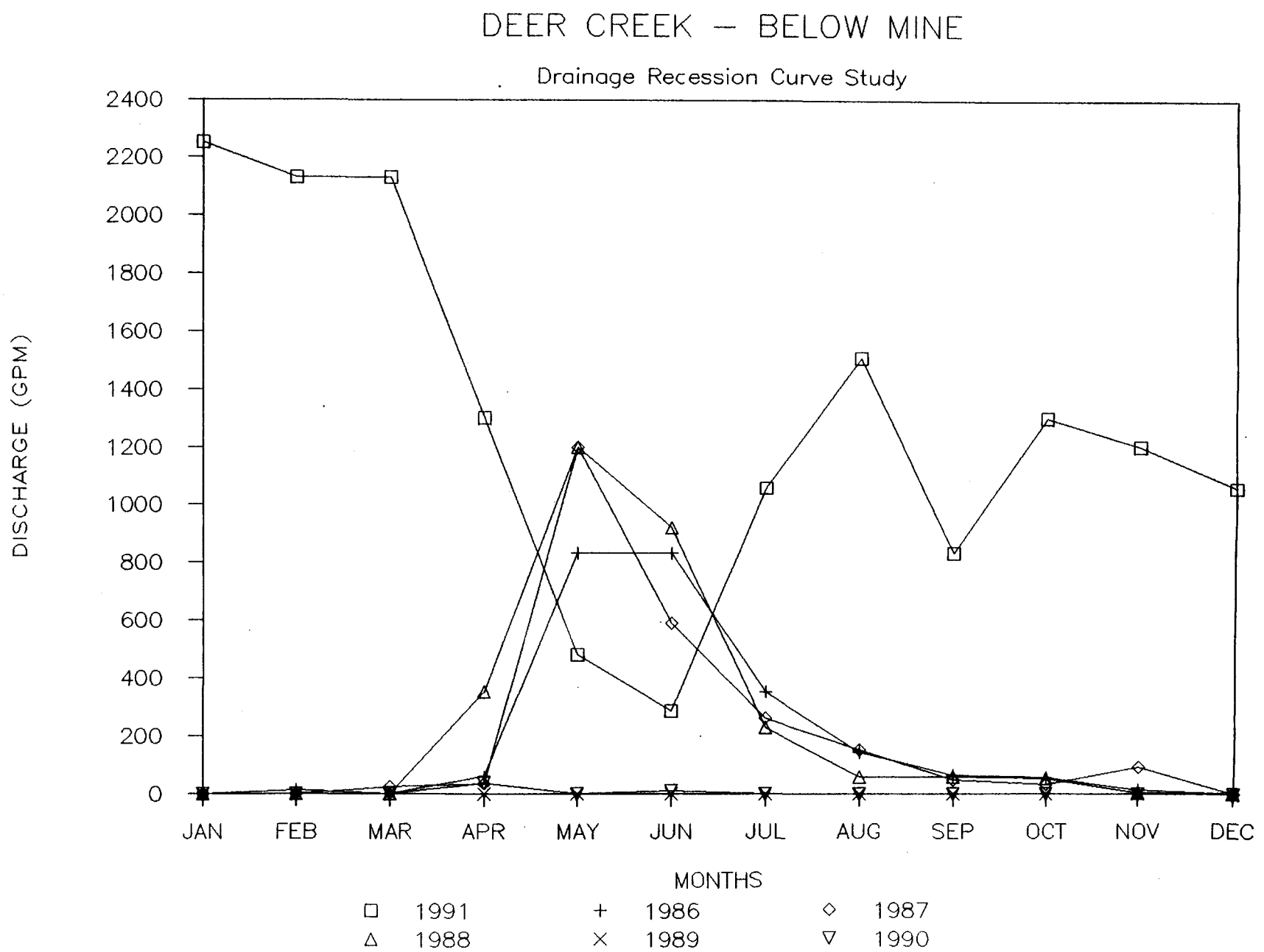
1990


DEER CREEK – BELOW MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
2400
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 18, 1991

Job No.: 59 10900

Sample ID:

Date Rec'd: January 2, 1991

Date Sampled: January 2, 1991

Sampled By: UP&L

DEER CREEK RUNOFF PERMIT
DCRO4
Temperature 51.6 Degrees
Flow 2377.7 gpm 5.3 CFS
Rec'd 1630 hr.
Sampled 1430 hr.

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	7.93
Conductivity	780
Turbidity	43
DO	9.0

WATER ANALYSIS

Conductivity	650	umhos/cm	Solids, Dissolved	442.0	mg/l
01-03-91	0800 hr.		01-04-91	1100 hr.	
Oxygen, Dissolved	7.2	mg/l	Solids, Settleable	0.5 <	mg/l
01-02-91	1640 hr.		01-03-91	1000 hr.	
pH	8.00	Units	Solids, Suspended	7.0	mg/l
01-02-91	1645 hr.		01-04-91	1100 hr.	
			Turbidity	4.7	NTU
			01-03-91	1000 hr.	

ANALYST: Lou Stoffer

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council

Manager, Huntington Laboratory

VER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 20, 1991

Job. No.: 59-10954

Date Rec'd: February 4, 1991

Date Sampled: February 4, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF PERMIT BOUNDARY DCRO4
Temperature 51.1 Degrees
Rec'd 1000 hr.
Sampled 0740 hr.

FIELD MEASUREMENTS	
pH	8.22
Conductivity	790
DO	9.2
Turbidity	21

WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	02-07-91	1330 hr.
Alkalinity, bicarbonate	338 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	7 mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	284 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	8.69 meq/l		
Calcium	103.8 mg/l	02-07-91	1300 hr.
Cations, total	10.48 meq/l		
Chloride	15.0 mg/l	02-07-91	1053 hr.
Conductivity	520 umhos/cm	02-05-91	1445 hr.
Hardness, total	447 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	0.16 mg/l	02-07-91	1350 hr.
Iron, dissolved	0.09 mg/l	02-07-91	1350 hr.
Magnesium	45.70 mg/l	02-07-91	1350 hr.
Manganese	0.02 mg/l	02-07-91	1350 hr.
Oil and Grease	<1.0 mg/l	02-07-91	1000 hr.
Oxygen, dissolved	8.9 mg/l	02-04-91	1400 hr.
pH	8.40 units	02-04-91	1400 hr.
Potassium	4.19 mg/l	02-07-91	1300 hr.
Sodium	33.42 mg/l	02-07-91	1300 hr.
Solids, dissolved	465.0 mg/l	02-07-91	1000 hr.
Solids, suspended	7.0 mg/l	02-07-91	1000 hr.
Sulfate	130.0 mg/l	02-08-91	0830 hr.
Turbidity	.39 NTU	02-15-91	1050 hr.

ANALYST: [illegible]

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 27, 1991

Job. No.: 59-10978

Date Rec'd: February 19, 1991

Date Sampled: February 19, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF PERMIT BOUNDARY DCRO4
Temperature 53.0 Degrees
Rec'd 1430 hr.
Sampled 1225 hr.

FIELD MEASUREMENTS

pH	7.93
Conductivity	737
DO	9.6
Turbidity	37

WATER ANALYSIS

Acidity	10 mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, bicarbonate	334 mg/l HCO_3	02-21-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, total	274 mg/l $CaCO_3$	02-21-91	1330 hr.
Anions, total	8.98 meq/l		
Calcium	97.4 mg/l	02-20-91	1330 hr.
Cations, total	9.98 meq/l		
Chloride	25.0 mg/l	02-21-91	1100 hr.
Conductivity	700 umhos/cm	02-19-91	1530 hr.
Hardness, total	422 mg/l $CaCO_3$	02-20-91	1330 hr.
Iron, total	0.02<mg/l	02-20-91	1330 hr.
Iron, dissolved	0.02<mg/l	02-20-91	1330 hr.
Magnesium	43.30 mg/l	02-20-91	1330 hr.
Manganese	0.01 mg/l	02-20-91	1330 hr.
Oil and Grease	1.3 mg/l	02-19-91	0800 hr.
Oxygen, dissolved	8.0 mg/l	02-19-91	1430 hr.
pH	7.90 units	02-19-91	1430 hr.
Potassium	3.51 mg/l	02-20-91	1330 hr.
Sodium	34.07 mg/l	02-20-91	1330 hr.
Solids, dissolved	508.0 mg/l	02-20-91	1330 hr.
Solids, settleable	0.5<mg/l	02-20-91	0900 hr.
Solids, suspended	35.0 mg/l	02-20-91	1300 hr.
Sulfate	140.0 mg/l	02-20-91	0945 hr.
Turbidity	17.0 NTU	02-19-91	1530 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 28, 1991

Job No.: 59 10999

Sample ID: PacificCorp Field Office

Date Rec'd: February 26, 1991

Date Sampled: February 25, 1991

Sampled By: PacificCorp

DEER CREEK RUN-OFF
PERMIT BOUNDARY DCRO4
Temperature 52.9 Degrees
Rec'd 0800 hr.
Sampled 1530 hr.

PacificCorp Field Office
P.O. Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.22
Conductivty	777
DO	7.9
Turbidity	20

WATER ANALYSIS

Conductivity	690	umhos/cm
02-27-91	1100 hr.	
Oxygen, Dissolved	7.3	mg/l
02-26-91	0900 hr.	
pH	8.40	Units
02-26-91	0830 hr.	
Solids, Dissolved	534.0	mg/l
02-26-91	1100 hr.	
Solids, Settleable	.5<	mg/l
02-27-91	0900 hr.	
Solids, Suspended	36.0	mg/l
02-26-91	1100 hr.	
Turbidity	23.0	NTU
02-27-91	1300 hr.	

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ANALYST: Lois Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

March 19, 1991

Job. No.: 59-11037

Date Rec'd: March 6, 1991

Date Sampled: March 5, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF PERMIT BOUNDARY DCRO-
Temperature 51.9 Degrees
Rec'd 1000 hr.
Sampled 1510 hr.

FIELD MEASUREMENTS

pH	8.52
Conductivity	838
Turbidity	17
DO	10.1
FLOW	4.75 CFS

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, bicarbonate	312 mg/l HCO_3	03-12-91	0750 hr.
Alkalinity, carbonate	5 mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, total	261 mg/l $CaCO_3$	03-12-91	0750 hr.
Anions, total	10.76 meq/l		
Calcium	92.3 mg/l	03-15-91	1300 hr.
Cations, total	10.81 meq/l		
Chloride	30.0 mg/l	03-08-91	0810 hr.
Conductivity	680 umhos/cm	03-06-91	1620 hr.
Hardness, total	458 mg/l $CaCO_3$	03-15-91	1300 hr.
Iron, total	0.08 mg/l	03-15-91	1300 hr.
Iron, dissolved	0.06 mg/l	03-15-91	1300 hr.
Magnesium	55.30 mg/l	03-15-91	1300 hr.
Manganese	0.02< mg/l	03-15-91	1300 hr.
Oil and Grease	1.0< mg/l	03-11-91	1030 hr.
Oxygen, dissolved	7.9 mg/l	03-06-91	1530 hr.
pH	8.30 units	03-06-91	1530 hr.
Potassium	5.14 mg/l	03-15-91	1300 hr.
Sodium	35.40 mg/l	03-15-91	1300 hr.
Solids, dissolved	519.0 mg/l	03-07-91	1000 hr.
Solids, settleable	0.5< mg/l	03-11-91	0930 hr.
Solids, suspended	4.0 mg/l	03-07-91	1000 hr.
Sulfate	230.0 mg/l	03-11-91	1040 hr.
Turbidity	1.3 NTU	03-11-91	1100 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11115

Sample ID:

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

DEER CREEK RUN-OFF PERMIT BOUNDARY
Temperature 53.5 Degrees DCR04
Rec'd 1545 hr.
Sampled 1330 hr.

FIELD MEASUREMENTS

pH	8.26
Conductivity	804
DO	6.9
TURBIDITY	28

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Alkalinity, bicarbonate	323 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	265 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.37 mg/l	04-16-91	1230 hr.
Anions, total	9.37 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.03<mg/l	04-16-91	1230 hr.
Boron	0.14 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	85.6 mg/l	04-16-91	0910 hr.
Cations, total	9.98 meq/l		
Chloride	75.0 mg/l	04-24-91	1320 hr.
Chromium	0.05 mg/l	04-16-91	1230 hr.
Conductivity	510 umhos/cm	04-10-91	1000 hr.
Copper	0.010<mg/l	04-16-91	0910 hr.
Fluoride	0.26 mg/l	04-18-91	0830 hr.
Hardness, total	420 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.10 mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	1230 hr.
Magnesium	50.00 mg/l	04-16-91	0910 hr.

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ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11115

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF PERMIT BOUNDARY
Temperature 53.5 Degrees DCR 04
Rec'd 1545 hr.
Sampled 1330 hr.

FIELD MEASUREMENTS

pH	8.26
Conductivity	804
DO	6.9
TURBIDITY	28

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.08 mg/l	04-16-91	1230 hr.
Nickel	0.16 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.34 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	2.1 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.1 mg/l	04-08-91	1555 hr.
pH	8.40 mg/l	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	1.82 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	36.19 mg/l	04-16-91	0910 hr.
Solids, dissolved	483.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	46.0 mg/l	04-10-91	1400 hr.
Sulfate	100.0 mg/l	04-12-91	0715 hr.
Sulfide	10.70 mg/l	04-08-91	1645 hr.
Turbidity	10.7 NTU	04-10-91	1100 hr.
Zinc	0.05 mg/l	04-16-91	1230 hr.

ANALYST: Lois Stefko

1BL

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Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
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TELEPHONE: (801) 653-2311

May 21, 1991

Job. No.: 59-11174

Sample ID:

Date Rec'd: May 14, 1991

Date Sampled: May 14, 1991

Sampled By: PacifiCorp

DEER CREEK RUN-OFF DCRO4
Temperature 54.0 Degrees
Flow 480 GPM
Rec'd 1320 hr.
Sampled 1155 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.21
DO	6.1
Conductivity	825
TURBIDITY	12

WATER ANALYSIS

Acidity	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, bicarbonate	334 mg/l HCO_3	05-15-91	1100 hr.
Alkalinity, carbonate	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, total	274 mg/l $CaCO_3$	05-15-91	1100 hr.
Anions, total	9.89 meq/l		
Calcium	110.7 mg/l	05-17-91	1340 hr.
Cations, total	10.82 meq/l		
Chloride	35.0 mg/l	05-17-91	0900 hr.
Conductivity	750 umhos/cm	05-14-91	1445 hr.
Hardness, total	471 mg/l $CaCO_3$	05-17-91	1340 hr.
Iron, total	0.02 mg/l	05-17-91	1340 hr.
Iron, dissolved	0.02 mg/l	05-17-91	1340 hr.
Magnesium	47.20 mg/l	05-17-91	1340 hr.
Manganese	0.02 mg/l	05-17-91	1340 hr.
Oil and Grease	1.0 mg/l	05-20-91	1300 hr.
Oxygen, dissolved	7.7 mg/l	05-14-91	1400 hr.
pH	8.30 units	05-14-91	1345 hr.
Potassium	5.61 mg/l	05-17-91	1340 hr.
Sodium	29.45 mg/l	05-17-91	1340 hr.
Solids, dissolved	548.0 mg/l	05-15-91	1030 hr.
Solids, settleable	0.5 mg/l	05-15-91	0800 hr.
Solids, suspended	18.0 mg/l	05-15-91	1030 hr.
Sulfate	170.0 mg/l	05-20-91	0810 hr.
Turbidity	12.0 NTU	05-14-91	1450 hr.

ANALYST: Rois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11261

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF @
PERMIT BOUNDARY DCRO4
Temperature 63.9 Degrees
Flow 0.15/285 GPM
Rec'd 1645 hr.
Sampled 1510 hr.

FIELD MEASUREMENTS

pH	8.68
Conductivity	1080
DO	6.1

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	294 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	241 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	0.50<mg/l	07-11-91	1500 hr.
Anions, total	11.94 meq/l		
Arsenic	0.002<mg/l	07-11-91	1500 hr.
Barium	0.17 mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.029 mg/l	07-11-91	1500 hr.
Calcium	95.9 mg/l	06-20-91	1400 hr.
Cations, total	10.93 meq/l		
Chloride	90.0 mg/l	06-12-91	1510 hr.
Chromium	0.02 mg/l	07-11-91	1500 hr.
Conductivity	950 umhos/cm	06-12-91	0900 hr.
Copper	0.018 mg/l	07-11-91	1500 hr.
Fluoride	0.25 mg/l	06-13-91	1300 hr.
Hardness, total	502 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	0.04 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.02<mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	63.70 mg/l	06-20-91	1400 hr.

ANALYST: Rio Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11261

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF @
PERMIT BOUNDARY DCRO4
Temperature 63.9 Degrees
Flow 0.15/285 GPM
Rec'd 1645 hr.
Sampled 1510 hr.

FIELD MEASUREMENTS

pH	8.68
Conductivity	1080
DO	6.1

WATER ANALYSIS page 2

Manganese	0.01<mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.13 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	0.6 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	5.9 mg/l	06-11-91	1700 hr.
pH	7.50 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	4.50 mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	18.54 mg/l	06-20-91	1400 hr.
Solids, dissolved	702.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	1.0 mg/l	06-13-91	1100 hr.
Sulfate	225.0 mg/l	06-25-91	1100 hr.
Sulfide	4.80 mg/l	06-13-91	0900 hr.
Turbidity	2.0 NTU	06-12-91	1000 hr.
Zinc	0.04 mg/l	07-11-91	1500 hr.

ANALYST: Lois Stafko

1BL

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FIELD OFFICE

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 20, 1991

Job. No.: 59-11373

Date Rec'd: July 18, 1991

Date Sampled: July 18, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCR04
Temperature 58.0 Degrees
Flow 0.35/1059 GPM
Rec'd 1300 hr.
Sampled 0950 hr.

FIELD MEASUREMENTS	
pH	8.50
Conductivity	757
DO	7.3
Turbidity	4.0

WATER ANALYSIS

Acidity	10 mg/l $CaCO_3$	07-22-91	0800 hr.
Alkalinity, bicarbonate	318 mg/l HCO_3	07-23-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	07-23-91	0900 hr.
Alkalinity, total	261 mg/l $CaCO_3$	07-23-91	0900 hr.
Anions, total	10.97 meq/l		
Calcium	93.2 mg/l	08-02-91	0810 hr.
Cations, total	10.31 meq/l		
Chloride	30.0 mg/l	07-18-91	1620 hr.
Conductivity	620 umhos/cm	07-19-91	1000 hr.
Hardness, total	435 mg/l $CaCO_3$	08-02-91	0810 hr.
Iron, total	0.02<mg/l	08-02-91	0810 hr.
Iron, dissolved	0.02<mg/l	08-02-91	0810 hr.
Magnesium	49.10 mg/l	08-02-91	0810 hr.
Manganese	0.01 mg/l	08-02-91	0810 hr.
Oil and Grease	0.7 mg/l	07-22-91	1400 hr.
Oxygen, dissolved	6.4 mg/l	07-18-91	1330 hr.
pH	8.40 units	07-18-91	1300 hr.
Potassium	3.38 mg/l	08-02-91	0810 hr.
Sodium	35.75 mg/l	08-02-91	0810 hr.
Solids, dissolved	331.0 mg/l	07-22-91	1300 hr.
Solids, settleable	0.5<mg/l	07-19-91	1300 hr.
Solids, suspended	3.0 mg/l	07-22-91	1300 hr.
Sulfate	240.0 mg/l	07-18-91	0920 hr.
Turbidity	3.0 NTU	07-19-91	1100 hr.

ANALYST: Lois Stofko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

FIELD OFFICE

COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11463

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO4
Temperature 58.7 Degrees/Flow 0.44/1509 GPM
Rec'd 1000 hr.
Sampled 1550 hr.

FIELD MEASUREMENTS

pH	8.21
Conductivity	727
Turbidity	13
DO	7.1

WATER ANALYSIS

Acidity	9 mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	322 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	264 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	8.86 meq/l		
Calcium	93.2 mg/l	09-03-91	0800 hr.
Cations, total	9.32 meq/l		
Chloride	20.0 mg/l	09-04-91	1300 hr.
Conductivity	700 umhos/cm	08-27-91	0900 hr.
Hardness, total	411 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.16 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.13 mg/l	09-03-91	0800 hr.
Magnesium	43.30 mg/l	09-03-91	0800 hr.
Manganese	0.03 mg/l	09-03-91	0800 hr.
Oil and Grease	1.0< mg/l	08-22-91	0920 hr.
Oxygen, dissolved	7.8 mg/l	08-20-91	1030 hr.
pH	7.90 units	08-20-91	1030 hr.
Potassium	3.84 mg/l	09-03-91	0800 hr.
Sodium	23.42 mg/l	09-03-91	0800 hr.
Solids, dissolved	495.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5< mg/l	08-20-91	1100 hr.
Solids, suspended	18.0 mg/l	08-23-91	1300 hr.
Sulfate	150.0 mg/l	09-04-91	1400 hr.
Turbidity	5.0 NTU	08-21-91	1000 hr.

ANALYST Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11520

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO4
Temperature 56.8 Degrees
Flow 833.6 GPM
Rec'd 1620 hr.
Sampled 1420 hr.

FIELD MEASUREMENTS	
pH	8.56
Conductivity	805
DO	5.1
Turbidity	48

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	298 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	245 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	9.12 meq/l		
Calcium	91.6 mg/l	09-18-91	1440 hr.
Cations, total	9.97 meq/l		
Chloride	20.0 mg/l	09-12-91	0900 hr.
Conductivity	620 umhos/cm	09-13-91	1330 hr.
Hardness, total	417 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.43 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.11 mg/l	09-18-91	1440 hr.
Magnesium	45.60 mg/l	09-18-91	1440 hr.
Manganese	0.02< mg/l	09-18-91	1440 hr.
Oil and Grease	2.0 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	6.8 mg/l	09-10-91	1640 hr.
pH	8.10 units	09-10-91	1640 hr.
Potassium	5.51 mg/l	09-18-91	1440 hr.
Sodium	35.05 mg/l	09-18-91	1440 hr.
Solids, dissolved	530.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5< mg/l	09-11-91	1140 hr.
Solids, suspended	76.0 mg/l	09-12-91	1400 hr.
Sulfate	180.0 mg/l	09-19-91	1045 hr.
Turbidity	68.0 NTU	09-11-91	1200 hr.

ANALYST: Lois Stofles

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 5, 1991

Job. No.: 59-11633

Date Rec'd: October 22, 1991

Date Sampled: October 21, 1991

Sampled By: PacifiCorp

PACIFICORP FIELD OFFICE
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO4
Temperature 54.7°F
Flow 1302 GPM
Rec'd 1015 hr.
Sampled 1700 hr.

FIELD MEASUREMENTS	
pH	8.38
Conductivity	678
DO	7.1
Turbidity	4.8

WATER ANALYSIS

Acidity	10 mg/l $CaCO_3$	10-29-91	1500 hr.
Alkalinity, bicarbonate	362 mg/l HCO_3	10-29-91	0800 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	10-29-91	0800 hr.
Alkalinity, total	297 mg/l $CaCO_3$	10-29-91	0800 hr.
Anions, total	9.43 meq/l		
Calcium	88.0 mg/l	10-31-91	0900 hr.
Cations, total	9.04 meq/l		
Chloride	10.0 mg/l	10-28-91	1100 hr.
Conductivity	490 umhos/cm	10-24-91	1500 hr.
Hardness, total	399 mg/l $CaCO_3$	10-31-91	0900 hr.
Iron, total	0.18 mg/l	10-31-91	0900 hr.
Iron, dissolved	0.02<mg/l	10-31-91	0900 hr.
Magnesium	43.60 mg/l	10-31-91	0900 hr.
Manganese	0.05 mg/l	10-31-91	0900 hr.
Oil and Grease	1.0<mg/l	10-28-91	1055 hr.
Oxygen, dissolved	7.4 mg/l	10-22-91	1100 hr.
pH	7.80 units	10-22-91	1100 hr.
Potassium	4.61 mg/l	10-31-91	0900 hr.
Sodium	21.86 mg/l	10-31-91	0900 hr.
Solids, dissolved	425.0 mg/l	10-23-91	1400 hr.
Solids, settleable	0.5<mg/l	10-22-91	1300 hr.
Solids, suspended	5.0 mg/l	10-23-91	1400 hr.
Sulfate	160.0 mg/l	10-29-91	1500 hr.
Turbidity	4.6 NTU	10-23-91	0900 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT 8
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 25, 1991

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us DEER CREEK RUN-OFF DCRO4
Temperature 54.0°F
Flow 0.38/1202 GPM
Rec'd 1500 hr.
Sampled 1420 hr.

Sample taken at

Sample taken by PacifiCorp

Date sampled November 13, 1991

Date received November 13, 1991

FIELD MEASUREMENTS

pH	8.70
Conductivity	676
DO	7.4
Turbidity	12

Analysis report no. 59-11695

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	4	1	mg/l $CaCO_3$	EPA 305.1	11-14-1991 13:15 LS
Alkalinity, Bicarbonate	342	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Alkalinity, Total	281	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Anions	9.12	----	meq/l	---------	---------- ----- --
Calcium	88.6	.1	mg/l	EPA 215.1	11-18-1991 16:00 LS
Cations	8.74	----	meq/l	---------	---------- ----- --
Chloride	10.0	.1	mg/l	EPA 325.3	11-14-1991 14:00 LS
Conductivity	600	2	umhos/cm	EPA 120.1	11-14-1991 09:00 LS
Hardness, Total	387	1	mg/l $CaCO_3$	---------	11-18-1991 16:00 LS
Iron	0.06	.02	mg/l	EPA 236.1	11-18-1991 16:00 LS
Iron, Dissolved	0.03	.02	mg/l	EPA 236.1	11-18-1991 16:00 LS
Magnesium	40.30	.01	mg/l	EPA 242.1	11-18-1991 16:00 LS
Manganese	0.02	.01	mg/l	EPA 243.1	11-18-1991 16:00 LS
Oil & Grease	1.4	1	mg/l	EPA 413.1	11-15-1991 10:15 LS
Oxygen, Dissolved	8.2	.01	mg/l	EPA 360.1	11-13-1991 15:20 LS
pH	8.10	----	Units	EPA 150.1	11-13-1991 15:20 LS
Potassium	6.35	.01	mg/l	EPA 258.1	11-18-1991 16:00 LS
Sodium	19.55	.01	mg/l	EPA 273.1	11-18-1991 16:00 LS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	11-13-1991 07:00 LS
Solids, Total Dissolved	421.0	.5	mg/l	EPA 160.1	11-14-1991 10:30 LS
Solids, Total Suspended	12.0	.5	mg/l	EPA 160.2	11-14-1991 10:30 LS
Sulfate	160.0	.1	mg/l	EPA 375.4	11-15-1991 13:00 LS
Turbidity	15.0	.1	NTU	EPA 180.1	11-14-1991 08:00 LS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at DEER CREEK RUN-OFF DCR04
Temperature 49.8°F
Flow 1059 GPM
Rec'd 1330 hr.
Sampled 1105 hr.

Sample taken by PacifiCorp

Date sampled December 12, 1991

Date received December 12, 1991

FIELD MEASUREMENTS

pH	8.59
Conductivity	694
DO	7.9
Turbidity	11

Analysis report no. 59-11747

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	14	1	mg/l $CaCO_3$	EPA 305.1	12-19-1991 13:00 LS
Alkalinity, Bicarbonate	441	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Alkalinity, Total	366	1	mg/l $CaCO_3$	EPA 310.1	12-16-1991 12:15 LS
Aluminum	0.00	.5	mg/l	EPA 202.1	12-19-1991 14:00 LS
Anions	9.73	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	12-19-1991 14:00 JS
Barium	0.12	.03	mg/l	EPA 208.1	12-19-1991 14:00 JS
Boron	0.05	.01	mg/l	EPA 212.3	12-16-1991 13:00 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-19-1991 14:00 JS
Calcium	97.7	.1	mg/l	EPA 215.1	12-31-1991 15:00 JS
Cations	9.48	----	meq/l	---------	---------- ----- --
Chloride	10.0	.1	mg/l	EPA 325.3	12-16-1991 14:30 LS
Chromium	0.03	.02	mg/l	EPA 218.1	12-31-1991 14:00 JS
Conductivity	530	2	umhos/cm	EPA 120.1	12-13-1991 13:00 LS
Copper	0.000	.01	mg/l	EPA 220.1	12-19-1991 14:00 JS
Fluoride	0.34	.01	mg/l	EPA 340.2	12-17-1991 10:50 LS
Hardness, Total	419	1	mg/l $CaCO_3$	---------	12-31-1991 15:00 JS
Iron	0.15	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Iron, Dissolved	0.15	.02	mg/l	EPA 236.1	12-31-1991 15:00 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-19-1991 14:00 JS
Magnesium	42.50	.01	mg/l	EPA 242.1	12-31-1991 15:00 JS
Manganese	0.00	.01	mg/l	EPA 243.1	12-31-1991 15:00 JS
Mercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 LM

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020, HUNTINGTON, UT 8
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 7, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at

Sample taken by PacifiCorp

Date sampled December 12, 1991

Date received December 12, 1991

DEER CREEK RUN-OFF DCR04
Temperature 49.8°F
Flow 1059 GPM
Rec'd 1330 hr.
Sampled 1105 hr.

FIELD MEASUREMENTS	
pH	8.59
Conductivity	694
DO	7.9
Turbidity	11

Analysis report no. 59-11747

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum	0.00	.1	mg/l	EPA 246.1	12-19-1991 14:00 JS
Nickel	0.00	.02	mg/l	EPA 249.1	12-19-1991 14:00 JS
Nitrogen, Ammonia	0.33	.01	mg/l	EPA 350.3	12-17-1991 14:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-13-1991 08:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-13-1991 08:00 JK
Oil & Grease	2.3	1	mg/l	EPA 413.1	12-12-1991 14:00 LM
Oxygen, Dissolved	7.8	.01	mg/l	EPA 360.1	12-12-1991 14:00 LS
pH	7.70	----	Units	EPA 150.1	12-12-1991 14:00 LS
Phosphorus, Total	0.01	.01	mg/l	EPA 365.2	12-18-1991 08:00 LM
Potassium	8.73	.01	mg/l	EPA 258.1	12-31-1991 15:00 JS
Selenium	0.000	.002	ug/l	EPA 270.3	12-19-1991 14:00 JS
Sodium	20.57	.01	mg/l	EPA 273.1	12-31-1991 15:00 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-13-1991 08:00 LS
Solids, Total Dissolved	399.0	.5	mg/l	EPA 160.1	12-12-1991 15:00 LM
Solids, Total Suspended	13.0	.5	mg/l	EPA 160.2	12-12-1991 15:00 LM
Sulfate	110.0	.1	mg/l	EPA 375.4	12-16-1991 10:00 LS
Sulfide	2.20	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	21.0	.1	NTU	EPA 180.1	12-13-1991 09:00 LS
Zinc	0.05	.01	mg/l	EPA 289.1	12-19-1991 14:00 JS

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 18, 1991

Job No.: 59 10901

Date Rec'd: January 2, 1991

Date Sampled: January 2, 1991

Sampled By: UP&L

Utah Power and Light Co.
P.O. Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUNOFF BELOW MINE
DCR05
Temperature 47.3 Degrees
Rec'd 1630 hr.
Sampled 1500 hr.

FIELD MEASUREMENTS

pH	7.86
Conductivity	814
Turbidity	38
DO	9.7

WATER ANALYSIS

Conductivity	700	umhos/cm	Solids, Dissolved	408.0	mg/l
01-03-91	0800 hr.		01-04-91	1100 hr.	
Oxygen, Dissolved	7.7	mg/l	Solids, Settleable	0.5 <	mg/l
01-02-91	1640 hr.		01-03-91	1000 hr.	
pH	8.20	Units	Solids, Suspended	6.0	mg/l
01-02-91	1645 hr.		01-04-91	1100 hr.	
			Turbidity	6.1	NTU
			01-03-91	1000 hr.	

ANALYST: Rob Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Connell

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 6, 1991

Job. No.: 59-10937

Date Rec'd: January 28, 1991

Date Sampled: January 28, 1991

Sampled By:

Utah Power and Light Co.
P.O.Box 1005
Huntington UT 84528

Sample ID:

Biomonitoring Sample

DEER CREEK RUN-OFF DCRO5
Temperature 47.1 Degrees
Flow 4.75 CFS
Rec'd 1400 hr.
Sampled 1305 hr.

FIELD MEASUREMENTS	
pH	7.92
Conductivity	944
Turbidity	23
DO	9.2

WATER ANALYSIS

Acidity	60 mg/l $CaCO_3$	01-30-91	1330 hr.
Alkalinity, bicarbonate	331 mg/l HCO_3	01-30-91	1300 hr.
Alkalinity, carbonate	<1 mg/l $CaCO_3$	01-30-91	1300 hr.
Alkalinity, total	271 mg/l $CaCO_3$	01-30-91	1300 hr.
Anions, total	10.39 meq/l		
Calcium	105.1 mg/l	01-29-91	1400 hr.
Cations, total	12.33 meq/l		
Chloride	55.0 mg/l	01-30-91	1030 hr.
Conductivity	750 umhos/cm	02-01-91	0900 hr.
Hardness, total	485 mg/l $CaCO_3$	01-29-91	1400 hr.
Iron, total	0.22 mg/l	01-29-91	1400 hr.
Iron, dissolved	0.18 mg/l	01-29-91	1400 hr.
Magnesium	54.10 mg/l	01-29-91	1400 hr.
Manganese	0.01 mg/l	01-29-91	1400 hr.
Oil and Grease	1.1 mg/l	01-28-91	1500 hr.
Oxygen, dissolved	10.8 mg/l	01-28-91	1515 hr.
pH	8.10 units	01-28-91	1515 hr.
Potassium	5.28 mg/l	01-29-91	1400 hr.
Sodium	58.23 mg/l	01-29-91	1400 hr.
Solids, dissolved	629.0 mg/l	02-01-91	1000 hr.
Solids, suspended	7.0 mg/l	02-01-91	1000 hr.
Sulfate	170.0 mg/l	01-30-91	0825 hr.

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3MD Lois Stafko

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DEER CREEK RUN-OFF
DCR05

PLEASE ADDRESS ALL CORRESPONDENCE TO:
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TELEPHONE: (801) 653-2311

REGION VIII GUIDANCE FOR ACUTE WHOLE EFFLUENT REPORTING

PERMITTEE NAME UTAH POWER & LIGHT CO. **NPDES NO** ____

50% MORTALITY TEST: X **pass** ___ **fail** **LC50** ____ % **OUTFALL NO** ____

TEST ANIMAL & AGE Pimephales 4d SAMPLE TYPE, TIME & DATE 13:05 1/28/91

Analysis Time & Date: Begin 09:00 1/29/91 End 09:00 2/2/91

Measurements	Dilutions (% Effluent)* 0%	6%	12.5%	25%	50%	75%	100%
No @ Start of Test	20		20	10	20	20	20
No live after 24 hrs	20		20	19	20	20	19
No live after 48 hrs	20		20	19	20	20	17
No live after 72 hrs	20		20	18	19	20	17
No live after 96 hrs	20		19	18	19	20	17
Initial DO: mg/l	8.5		9.4	9.5	9.3	9.1	8.7
DO; 24 hrs: old/new	7.0/7.6	/	6.0/6.1	5.9/6.3	8.0/8.1	7.8/8.1	7.8/8.1
DO; 48 hrs: old/new	6.4/8.4	/	7.7/8.1	7.6/7.8	6.6/8.2	7.6/8.3	8.2/8.3
DO; 72 hrs: old/new	5.0/8.3	/	6.1/8.2	4.8/8.7	7.5/8.6	8.2/8.4	8.0/8.2
DO; 96 hrs:	4.2		5.0	5.2	5.2	5.5	6.0
Initial temp: °C	24		24	24	24	24	24
Temp; 24 hrs: old/new	24/24	/	24/24	24/24	24/24	24/24	24/24
Temp; 48 hrs: old/new	24/24	/	24/24	24/24	24/24	24/24	24/24
Temp; 72 hrs: old/new	24/24	/	24/24	24/24	24/24	24/24	24/24
Temp; 96 hrs:	24		24	24	24	24	24

Hardness: Receiving Water 241 Effluent 485 Recon. Water (if used) ____

Init. Total Residual Cl_2: 100% 0 Init. pH: cntrl 8.1 100% 8.1

Init. NH_3 as N: 100% 0 Final NH_3 as N: 100% 0

Final pH: cntrl 8.3 100% 8.3 **ANALYST'S NAME** Lois Stofko

LABORATORY CTE-Huntington **SIGNATURE/DATE** [signature] 2/8/91

* normally, a minimum of five plus control (0%)

10/5/89

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DEER CREEK RUN-OFF
DCR05

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TELEPHONE: (801) 653-2311

REGION VIII GUIDANCE FOR ACUTE WHOLE EFFLUENT REPORTING

PERMITTEE NAME UTAH POWER & LIGHT CO. **NPDES NO** _____

50% MORTALITY TEST: X **pass** ___ **fail** **LC50** ____ % **OUTFALL NO** _____

TEST ANIMAL & AGE Ceriodaphnia 24h SAMPLE TYPE, TIME & DATE 13:05 1/28/91

Analysis Time & Date: Begin 09:00 1/29/91 End 09:00 1/31/91

Measurements	Dilutions (% Effluent)* 0%	6%	12.5%	25%	50%	75%	100%
No @ Start of Test	20		20	20	20	20	20
No live after 24 hrs	20		20	20	20	20	20
No live after 48 hrs	20		20	20	20	20	20
No live after 72 hrs							
No live after 96 hrs							
Initial DO: mg/l	8.5		9.4	9.5	9.3	9.1	8.7
DO; 24 hrs: old/new	7.2/7.6	/	7.1/6.1	7.4/6.3	7.8/8.1	7.5/8.1	7.7/8.1
DO; 48 hrs: old/new	7.6/	/	7.4/	7.4/	7.1/	7.1/	7.3/
DO; 72 hrs: old/new	/	/	/	/	/	/	/
DO; 96 hrs:							
Initial temp: °C	24		24	24	24	24	24
Temp; 24 hrs: old/new	24/24	/	24/24	24/24	24/24	24/24	24/24
Temp; 48 hrs: old/new	24/	/	24/	24/	24/	24/	24/
Temp; 72 hrs: old/new	/	/	/	/	/	/	/
Temp; 96 hrs:							

Hardness: Receiving Water 241 Effluent 485 Recon. Water (if used) ____

Init. Total Residual Cl_2: 100% 0 Init. pH: cntrl 8.1 100% 8.1

Init. NH_3 as N: 100% 0 Final NH_3 as N: 100% 0

Final pH: cntrl 8.3 100% 8.4 **ANALYST'S NAME** Lois Stofko

LABORATORY Huntington 5900 **SIGNATURE/DATE** [signature]

* normally, a minimum of five plus control (0%)

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 20, 1991

Job. No.: 59-10955

Sample ID:

Date Rec'd: February 4, 1991

Date Sampled: February 4, 1991

Sampled By: PacificCorp

DEER CREEK RUN-OFF BELOW MINE DCR05
Temperature 45.3 Degrees
Rec'd 1000 hr.
Sampled 0750 hr.

FIELD MEASUREMENTS

pH	8.09
Conductivity	904
DO	9.3
Turbidity	26

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P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	<1 mg/l $CaCO_3$	02-07-91	1330 hr.
Alkalinity, bicarbonate	316 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	6 mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	265 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	10.49 meq/l		
Calcium	93.5 mg/l	02-07-91	1300 hr.
Cations, total	11.55 meq/l		
Chloride	70.0 mg/l	02-07-91	1053 hr.
Conductivity	620 umhos/cm	02-05-91	1445 hr.
Hardness, total	452 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	0.11 mg/l	02-07-91	1350 hr.
Iron, dissolved	<0.02 mg/l	02-07-91	1350 hr.
Magnesium	53.00 mg/l	02-07-91	1350 hr.
Manganese	0.02 mg/l	02-07-91	1350 hr.
Oil and Grease	3.0 mg/l	02-07-91	1000 hr.
Oxygen, dissolved	9.4 mg/l	02-04-91	1400 hr.
pH	8.40 units	02-04-91	1400 hr.
Potassium	2.47 mg/l	02-07-91	1300 hr.
Sodium	57.33 mg/l	02-07-91	1300 hr.
Solids, dissolved	528.0 mg/l	02-07-91	1000 hr.
Solids, suspended	3.0 mg/l	02-07-91	1000 hr.
Sulfate	160.0 mg/l	02-08-91	0830 hr.
Turbidity	.44 NTU	02-15-91	1050 hr.

ANALYST: Lois Stalpe

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

February 26, 1991

Job. No.: 59-10977

Date Rec'd: February 19, 1991

Date Sampled: February 19, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF BELOW MINE DCRO5
Temperature 50.0 Degrees
Rec'd 1430 hr.
Sampled 1235 hr.

FIELD MEASUREMENTS	
pH	8.47
Conductivity	861
DO	9.9
Turbidity	46

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, bicarbonate	456 mg/l HCO_3	02-21-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-21-91	1330 hr.
Alkalinity, total	374 mg/l $CaCO_3$	02-21-91	1330 hr.
Anions, total	12.12 meq/l		
Calcium	98.3 mg/l	02-20-91	1330 hr.
Cations, total	12.31 meq/l		
Chloride	45.0 mg/l	02-21-91	1100 hr.
Conductivity	820 umhos/cm	02-19-91	1530 hr.
Hardness, total	503 mg/l $CaCO_3$	02-20-91	1330 hr.
Iron, total	0.02<mg/l	02-20-91	1330 hr.
Iron, dissolved	0.02<mg/l	02-20-91	1300 hr.
Magnesium	62.50 mg/l	02-20-91	1330 hr.
Manganese	0.03 mg/l	02-20-91	1330 hr.
Oil and Grease	2.3 mg/l	02-19-91	0800 hr.
Oxygen, dissolved	7.8 mg/l	02-19-91	1430 hr.
pH	8.40 units	02-19-91	1430 hr.
Potassium	3.73 mg/l	02-20-91	1330 hr.
Sodium	50.55 mg/l	02-20-91	1330 hr.
Solids, dissolved	549.0 mg/l	02-20-91	1330 hr.
Solids, settleable	0.5<mg/l	02-20-91	0900 hr.
Solids, suspended	53.0 mg/l	02-20-91	1300 hr.
Sulfate	170.0 mg/l	02-20-91	0945 hr.
Turbidity	13.0 NTU	02-19-91	1530 hr.

ANALYST: Lora Staples

3MD

Respectfully submitted,
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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

D

February 28, 1991

Job No.: 59 11003

Sample ID: PacificCorp Field Office

Date Rec'd: February 26, 1991

Date Sampled: February 25, 1991

Sampled By: PacificCorp

DEER CREEK RUN-OFF BELOW MINE DCRO5
Temperature 51.5
Rec'd 0800 hr.
Sampled 1540 hr.

PacificCorp Field Office
P.O. Box 1005
Huntington UT 84528

FIELD MEASUREMENTS

pH	8.32
Conductivity	892
DO	8.8
Turbidity	17

WATER ANALYSIS

Conductivity 02-27-91	730 1100 hr.	umhos/cm	Solids, Dissolved 02-26-91	573.0 1100 hr.	mg/l
Oxygen, Dissolved 02-26-91	8.4 0900 hr.	mg/l	Solids, Settleable 02-27-91	.5< 0900 hr.	mg/l
pH 02-26-91	8.40 0830 hr.	Units	Solids, Suspended 02-26-91	37.0 1100 hr.	mg/l
			Turbidity 02-27-91	15.0 1300 hr.	NTU

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ANALYST: Lois Stafko

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

March 19, 1991

Job. No.: 59-11038

Date Rec'd: March 6, 1991

Date Sampled: March 5, 1991

Sampled By: PacificCorp

PacificCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF BELOW MINE DCR05
Temperature 48.2 Degrees
Rec'd 1000 hr.
Sampled 1515 hr.

FIELD MEASUREMENTS

pH	8.20
Conductivity	913
Turbidity	42
DO	10.1

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, bicarbonate	300 mg/l HCO_3	03-12-91	0750 hr.
Alkalinity, carbonate	6 mg/l $CaCO_3$	03-12-91	0750 hr.
Alkalinity, total	252 mg/l $CaCO_3$	03-12-91	0750 hr.
Anions, total	11.28 meq/l		
Calcium	90.6 mg/l	03-15-91	1300 hr.
Cations, total	11.50 meq/l		
Chloride	55.0 mg/l	03-08-91	0810 hr.
Conductivity	750 umhos/cm	03-06-91	1620 hr.
Hardness, total	460 mg/l $CaCO_3$	03-15-91	1300 hr.
Iron, total	0.34 mg/l	03-15-91	1300 hr.
Iron, dissolved	0.25 mg/l	03-15-91	1300 hr.
Magnesium	56.80 mg/l	03-15-91	1300 hr.
Manganese	0.02< mg/l	03-15-91	1300 hr.
Oil and Grease	1.0< mg/l	03-11-91	1030 hr.
Oxygen, dissolved	7.4 mg/l	03-06-91	1530 hr.
pH	8.40 units	03-06-91	1530 hr.
Potassium	5.10 mg/l	03-15-91	1300 hr.
Sodium	50.63 mg/l	03-15-91	1300 hr.
Solids, dissolved	539.0 mg/l	03-07-91	1000 hr.
Solids, settleable	0.5< mg/l	03-11-91	0930 hr.
Solids, suspended	49.0 mg/l	03-07-91	1000 hr.
Sulfate	230.0 mg/l	03-11-91	1040 hr.
Turbidity	2.0 NTU	03-11-91	1100 hr.

ANALYST: Lois Stokes

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 2, 1991

Job. No.: 59-11114

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF AT HUNTINGTON CREEK CONFLUENCE DCRO6
Temperature 53.3 Degrees
Rec'd 1545 hr.
Sampled 1350 hr.

FIELD MEASUREMENTS

pH	8.35
Conductivity	83[illegible]
DO	6.3
Turbidity	18

WATER ANALYSIS

Alkalinity, bicarbonate	309 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	253 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.27 mg/l	04-16-91	1230 hr.
Anions, total	8.15 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.08 mg/l	04-16-91	1230 hr.
Boron	0.04 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	53.5 mg/l	04-16-91	0910 hr.
Cations, total	7.76 meq/l		
Chloride	55.0 mg/l	04-24-91	1320 hr.
Chromium	0.01<mg/l	04-16-91	1230 hr.
Conductivity	530 umhos/cm	04-11-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.24 mg/l	04-18-91	0830 hr.
Hardness, total	278 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.02<mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.000 mg/l	04-16-91	1230 hr.
Magnesium	35.10 mg/l	04-16-91	0910 hr.

ANALYST: Lois Stafko

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 2, 1991

Job. No.: 59-11114

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF AT HUNTINGTON
CREEK CONFLUENCE DCRO6
Temperature 53.3 Degrees
Rec'd 1545 hr.
Sampled 1350 hr.

FIELD MEASUREMENTS

pH	8.35
Conductivity	838
DO	6.3
Turbidity	18

WATER ANALYSIS page 2

Manganese	0.02<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.04 mg/l	04-16-91	1230 hr.
Nickel	0.31 mg/l	04-16-91	1220 hr.
Nitrogen, ammonia	0.36 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	2.3 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.7 mg/l	04-08-91	1555 hr.
pH	8.50 mg/l	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	4.81 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	48.41 mg/l	04-16-91	0910 hr.
Solids, dissolved	459.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	36.0 mg/l	04-10-91	1400 hr.
Sulfate	80.0 mg/l	04-12-91	0715 hr.
Sulfide	9.60 mg/l	04-08-91	1645 hr.
Turbidity	3.9 NTU	04-10-91	1100 hr.
Zinc	0.03 mg/l	04-16-91	1230 hr.

ANALYST: [signature]

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[signature]
Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 21, 1991

Job. No.: 59-11173

Sample ID:

Date Rec'd: May 14, 1991

Date Sampled: May 14, 1991

Sampled By: PacifiCorp

DEER CREEK RUN-OFF DCRO6
Temperature 58.2 Degrees
Flow 480 GPM
Rec'd 1320 hr.
Sampled 1220 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.48
DO	6.5
CONDUCTIVITY	833
TURBIDITY	18

WATER ANALYSIS

Acidity	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, bicarbonate	294 mg/l HCO_3	05-15-91	1100 hr.
Alkalinity, carbonate	1 mg/l $CaCO_3$	05-15-91	1100 hr.
Alkalinity, total	241 mg/l $CaCO_3$	05-15-91	1100 hr.
Anions, total	10.23 meq/l		
Calcium	91.0 mg/l	05-17-91	1340 hr.
Cations, total	9.92 meq/l		
Chloride	40.0 mg/l	05-17-91	0900 hr.
Conductivity	780 umhos/cm	05-14-91	1445 hr.
Hardness, total	414 mg/l $CaCO_3$	05-17-91	1340 hr.
Iron, total	0.02 mg/l	05-17-91	1340 hr.
Iron, dissolved	0.02 mg/l	05-17-91	1340 hr.
Magnesium	45.40 mg/l	05-17-91	1340 hr.
Manganese	0.02 mg/l	05-17-91	1340 hr.
Oil and Grease	1.0 mg/l	05-20-91	1300 hr.
Oxygen, dissolved	7.7 mg/l	05-14-91	1400 hr.
pH	8.30 units	05-14-91	1345 hr.
Potassium	5.64 mg/l	05-17-91	1340 hr.
Sodium	34.83 mg/l	05-17-91	1340 hr.
Solids, dissolved	536.0 mg/l	05-15-91	1030 hr.
Solids, settleable	0.5 mg/l	05-15-91	0800 hr.
Solids, suspended	14.0 mg/l	05-15-91	1030 hr.
Sulfate	210.0 mg/l	05-20-91	0810 hr.
Turbidity	13.0 NTU	05-14-91	1450 hr.

ANALYST: Lois Stoffo

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 15, 1991

Job. No.: 59-11262

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 76.3 Degrees
Rec'd 1645 hr.
Sampled 1520 hr.

FIELD MEASUREMENTS	
pH	8.62
Conductivity	1040
DO	5.1

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	277 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	227 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	0.08 mg/l	07-11-91	1500 hr.
Anions, total	11.78 meq/l		
Arsenic	0.040 mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.053 mg/l	07-11-91	1500 hr.
Calcium	71.6 mg/l	06-20-91	1400 hr.
Cations, total	11.69 meq/l		
Chloride	90.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	890 umhos/cm	06-12-91	0900 hr.
Copper	0.017 mg/l	07-11-91	1500 hr.
Fluoride	0.23 mg/l	06-13-91	1300 hr.
Hardness, total	424 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	0.02<mg/l	06-20-91	1400 hr.
Iron, dissolved	0.02<mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	59.60 mg/l	06-20-91	1400 hr.

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ANALYST: Lois Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

2BL

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11262

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 76.3 Degrees
Rec'd 1645 hr.
Sampled 1520 hr.

FIELD MEASUREMENTS	
pH	8.62
Conductivity	1040
DO	5.1

WATER ANALYSIS page 2

Manganese	0.02<mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.18 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	1.9 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	5.9 mg/l	06-11-91	1700 hr.
pH	8.50 mg/l	06-11-91	1100 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	5.70 mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	71.40 mg/l	06-20-91	1400 hr.
Solids, dissolved	678.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	2.0 mg/l	06-13-91	1100 hr.
Sulfate	230.0 mg/l	06-25-91	1100 hr.
Sulfide	6.00 mg/l	06-13-91	0900 hr.
Turbidity	1.3 NTU	06-12-91	1000 hr.
Zinc	0.02 mg/l	07-11-91	1500 hr.

ANALYST: Lois Stafford

1BL

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 30, 1991

Job. No.: 59-11372

Date Rec'd: July 18, 1991

Date Sampled: July 18, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 60.8 Degrees
Flow 1000 GPM/EST
Rec'd 1300 hr.
Sampled 1015 hr.

FIELD MEASUREMENTS	
pH	8.59
Conductivity	738
Turbidity	6.4
DO	7.2

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	07-22-91	0800 hr.
Alkalinity, bicarbonate	268 mg/l HCO_3	07-23-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	07-23-91	0900 hr.
Alkalinity, total	220 mg/l $CaCO_3$	07-23-91	0900 hr.
Anions, total	8.70 meq/l		
Calcium	82.6 mg/l	08-02-91	0810 hr.
Cations, total	9.46 meq/l		
Chloride	30.0 mg/l	07-18-91	1620 hr.
Conductivity	530 umhos/cm	07-19-91	1000 hr.
Hardness, total	386 mg/l $CaCO_3$	08-02-91	0810 hr.
Iron, total	0.01 mg/l	08-02-91	0810 hr.
Iron, dissolved	0.00<mg/l	08-02-91	0810 hr.
Magnesium	43.54 mg/l	08-02-91	0810 hr.
Manganese	0.02 mg/l	08-02-91	0810 hr.
Oil and Grease	0.6 mg/l	07-22-91	1400 hr.
Oxygen, dissolved	7.2 mg/l	07-18-91	1330 hr.
pH	7.40 units	07-18-91	1330 hr.
Potassium	2.29 mg/l	08-02-91	0810 hr.
Sodium	39.43 mg/l	08-02-91	0810 hr.
Solids, dissolved	304.0 mg/l	07-22-91	1300 hr.
Solids, settleable	0.5<mg/l	07-19-91	1300 hr.
Solids, suspended	5.0 mg/l	07-22-91	1300 hr.
Sulfate	170.0 mg/l	07-18-91	0920 hr.
Turbidity	3.5 NTU	07-19-91	1100 hr.

ANALYST: [illegible]

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

[illegible]

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11462

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 63.9 Degrees
Rec'd 1000 hr.
Sampled 1550 hr.

FIELD MEASUREMENTS

pH	8.57
Conductivity	720
Turbidity	19
DO	6.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	303 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	248 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	8.90 meq/l		
Calcium	78.3 mg/l	09-03-91	0800 hr.
Cations, total	9.03 meq/l		
Chloride	25.0 mg/l	09-04-91	1300 hr.
Conductivity	700 umhos/cm	08-27-91	0900 hr.
Hardness, total	382 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.19 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.10 mg/l	09-03-91	0800 hr.
Magnesium	45.40 mg/l	09-03-91	0800 hr.
Manganese	0.03 mg/l	09-03-91	0800 hr.
Oil and Grease	0.5 mg/l	08-22-91	0920 hr.
Oxygen, dissolved	8.3 mg/l	08-20-91	1030 hr.
pH	8.10 units	08-20-91	1030 hr.
Potassium	3.91 mg/l	09-03-91	0800 hr.
Sodium	29.98 mg/l	09-03-91	0800 hr.
Solids, dissolved	460.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5<mg/l	08-20-91	1100 hr.
Solids, suspended	56.0 mg/l	08-23-91	1300 hr.
Sulfate	160.0 mg/l	09-04-91	1400 hr.
Turbidity	10.0 NTU	08-21-91	1000 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

October 2, 1991

Job. No.: 59-11519

Sample ID:

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

DEER CREEK RUN-OFF DCRO6
Temperature 58.1 Degrees
Flow 1000 GPM EST.
Rec'd 1620 hr.
Sampled 1440 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.69
Conductivity	770
DO	4.8
Turbidity	3 6

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	290 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	238 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	9.12 meq/l		
Calcium	96.6 mg/l	09-18-91	1440 hr.
Cations, total	8.84 meq/l		
Chloride	25.0 mg/l	09-12-91	0900 hr.
Conductivity	830 umhos/cm	09-13-91	1330 hr.
Hardness, total	353 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.19 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.02<mg/l	09-18-91	1440 hr.
Magnesium	27.14 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	0.7 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	6.9 mg/l	09-10-91	1640 hr.
pH	8.30 units	09-10-91	1640 hr.
Potassium	4.32 mg/l	09-18-91	1440 hr.
Sodium	38.99 mg/l	09-18-91	1440 hr.
Solids, dissolved	741.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	0800 hr.
Solids, suspended	59.0 mg/l	09-12-91	1400 hr.
Sulfate	180.0 mg/l	09-19-91	1045 hr.
Turbidity	37.0 NTU	09-11-91	0900 hr.

ANALYST: Rob Stoffo

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Cannell

Manager, Huntington Laboratory JK

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 12, 1991

Job. No.: 59-11462

Date Rec'd: August 20, 1991

Date Sampled: August 19, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 63.9 Degrees
Rec'd 1000 hr.
Sampled 1550 hr.

FIELD MEASUREMENTS

pH	8.57
Conductivity	720
Turbidity	19
DO	6.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	08-27-91	1000 hr.
Alkalinity, bicarbonate	303 mg/l HCO_3	08-28-91	1200 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	08-28-91	1200 hr.
Alkalinity, total	248 mg/l $CaCO_3$	08-28-91	1200 hr.
Anions, total	8.90 meq/l		
Calcium	78.3 mg/l	09-03-91	0800 hr.
Cations, total	9.03 meq/l		
Chloride	25.0 mg/l	09-04-91	1300 hr.
Conductivity	700 umhos/cm	08-27-91	0900 hr.
Hardness, total	382 mg/l $CaCO_3$	09-03-91	0800 hr.
Iron, total	0.19 mg/l	09-03-91	0800 hr.
Iron, dissolved	0.10 mg/l	09-03-91	0800 hr.
Magnesium	45.40 mg/l	09-03-91	0800 hr.
Manganese	0.03 mg/l	09-03-91	0800 hr.
Oil and Grease	0.5 mg/l	08-22-91	0920 hr.
Oxygen, dissolved	8.3 mg/l	08-20-91	1030 hr.
pH	8.10 units	08-20-91	1030 hr.
Potassium	3.91 mg/l	09-03-91	0800 hr.
Sodium	29.98 mg/l	09-03-91	0800 hr.
Solids, dissolved	460.0 mg/l	08-23-91	1300 hr.
Solids, settleable	0.5<mg/l	08-20-91	1100 hr.
Solids, suspended	56.0 mg/l	08-23-91	1300 hr.
Sulfate	160.0 mg/l	09-04-91	1400 hr.
Turbidity	10.0 NTU	08-21-91	1000 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

October 2, 1991

Job. No.: 59-11519

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 58.1 Degrees
Flow 1000 GPM EST.
Rec'd 1620 hr.
Sampled 1440 hr.

FIELD MEASUREMENTS

pH	8.69
Conductivity	770
DO	4.8
Turbidity	3 6

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	290 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	238 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	9.12 meq/l		
Calcium	96.6 mg/l	09-18-91	1440 hr.
Cations, total	8.84 meq/l		
Chloride	25.0 mg/l	09-12-91	0900 hr.
Conductivity	830 umhos/cm	09-13-91	1330 hr.
Hardness, total	353 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.19 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.02<mg/l	09-18-91	1440 hr.
Magnesium	27.14 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	0.7 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	6.9 mg/l	09-10-91	1640 hr.
pH	8.30 units	09-10-91	1640 hr.
Potassium	4.32 mg/l	09-18-91	1440 hr.
Sodium	38.99 mg/l	09-18-91	1440 hr.
Solids, dissolved	741.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	0800 hr.
Solids, suspended	59.0 mg/l	09-12-91	1400 hr.
Sulfate	180.0 mg/l	09-19-91	1045 hr.
Turbidity	37.0 NTU	09-11-91	0900 hr.

ANALYST: Rob Stoffo

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Caunitt

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 5, 1991

Job. No.: 59-11634

Date Rec'd: October 22, 1991

Date Sampled: October 21, 1991

Sampled By: PacifiCorp

PACIFICORP FIELD OFFICE
P.O.Box 1005
Huntington UT 84528

Sample ID:

DEER CREEK RUN-OFF DCRO6
Temperature 54.1°F
Flow 13[illegible] GPM
Rec'd 1015 hr.
Sampled 1710 hr.

FIELD MEASUREMENTS	
pH	8.73
Turbidity	3.6
COND	693
DO	7.6

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	10-29-91	1500 hr.
Alkalinity, bicarbonate	325 mg/l HCO_3	10-29-91	0800 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	10-29-91	0800 hr.
Alkalinity, total	267 mg/l $CaCO_3$	10-29-91	0800 hr.
Anions, total	9.69 meq/l		
Calcium	75.9 mg/l	10-31-91	0900 hr.
Cations, total	8.86 meq/l		
Chloride	25.0 mg/l	10-28-91	1100 hr.
Conductivity	520 umhos/cm	10-24-91	1500 hr.
Hardness, total	374 mg/l $CaCO_3$	10-31-91	0900 hr.
Iron, total	0.25 mg/l	10-31-91	0900 hr.
Iron, dissolved	0.03 mg/l	10-31-91	0900 hr.
Magnesium	44.80 mg/l	10-31-91	0900 hr.
Manganese	0.05 mg/l	10-31-91	0900 hr.
Oil and Grease	1.0< mg/l	10-28-91	1055 hr.
Oxygen, dissolved	7.5 mg/l	10-22-91	1100 hr.
pH	8.00 units	10-22-91	1100 hr.
Potassium	4.39 mg/l	10-31-91	0900 hr.
Sodium	29.77 mg/l	10-31-91	0900 hr.
Solids, dissolved	452.0 mg/l	10-23-91	1400 hr.
Solids, settleable	0.5< mg/l	10-22-91	1300 hr.
Solids, suspended	4.0 mg/l	10-23-91	1400 hr.
Sulfate	180.0 mg/l	10-29-91	1500 hr.
Turbidity	4.5 NTU	10-23-91	0900 hr.

ANALYST: Ron Stafford

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

November 25, 1991

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us DEER CREEK RUN-OFF DCRO6
Temperature 50.2°F
Flow 1200 GPM EST.
Rec'd 1500 hr.
Sampled 1430 hr.

Sample taken at

Sample taken by PacifiCorp

Date sampled November 13, 1991

Date received November 13, 1991

FIELD MEASUREMENTS

pH	8.31
Conductivity	705
DO	7.9
Turbidity	16

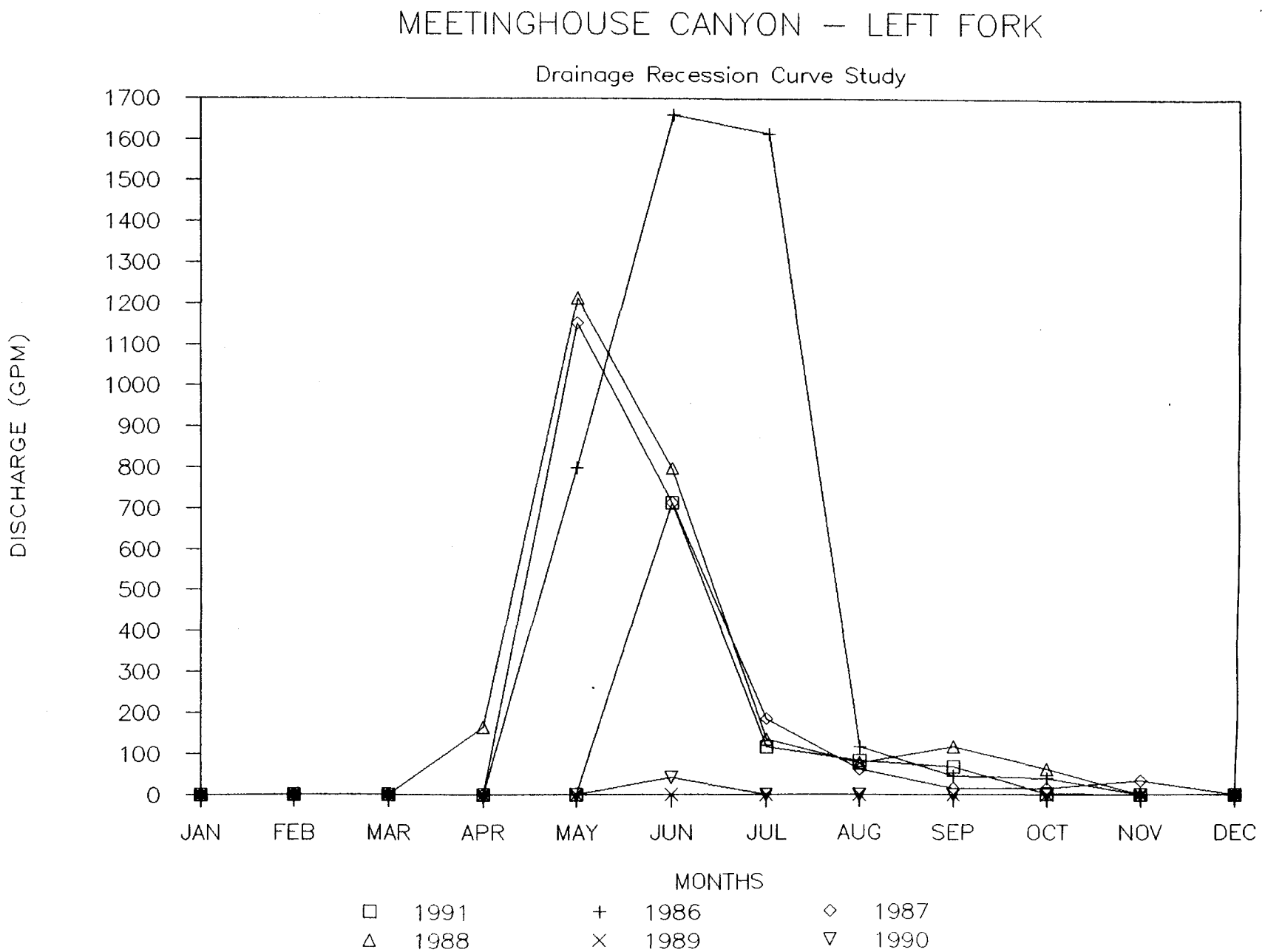
Analysis report no. 59-11696

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	3	1	mg/l $CaCO_3$	EPA 305.1	11-14-1991 13:15 LS
Alkalinity, Bicarbonate	323	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Alkalinity, Total	265	1	mg/l $CaCO_3$	EPA 310.1	11-14-1991 09:30 LS
Anions	8.81	----	meq/l	---------	---------- ----- --
Calcium	83.7	.1	mg/l	EPA 215.1	11-18-1991 16:00 LS
Cations	9.18	----	meq/l	---------	---------- ----- --
Chloride	25.0	.1	mg/l	EPA 325.3	11-14-1991 14:00 LS
Conductivity	680	2	umhos/cm	EPA 120.1	11-14-1991 09:00 LS
Hardness, Total	390	1	mg/l $CaCO_3$	---------	11-18-1991 16:00 LS
Iron	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 LS
Iron, Dissolved	0.00	.02	mg/l	EPA 236.1	11-18-1991 16:00 LS
Magnesium	44.00	.01	mg/l	EPA 242.1	11-18-1991 16:00 LS
Manganese	0.00	.01	mg/l	EPA 243.1	11-18-1991 16:00 LS
Oil & Grease	0.0	1	mg/l	EPA 413.1	11-15-1991 10:15 LS
Oxygen, Dissolved	8.5	.01	mg/l	EPA 360.1	11-13-1991 15:20 LS
pH	8.20	----	Units	EPA 150.1	11-13-1991 15:20 LS
Potassium	6.64	.01	mg/l	EPA 258.1	11-18-1991 16:00 LS
Sodium	28.13	.01	mg/l	EPA 273.1	11-18-1991 16:00 LS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	11-13-1991 07:00 LS
Solids, Total Dissolved	455.0	.5	mg/l	EPA 160.1	11-14-1991 10:30 LS
Solids, Total Suspended	16.0	.5	mg/l	EPA 160.2	11-14-1991 10:30 LS
Sulfate	140.0	.1	mg/l	EPA 375.4	11-15-1991 13:00 LS
Turbidity	16.0	.1	NTU	EPA 180.1	11-14-1991 08:00 LS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

APPENDIX C


MEETINGHOUSE CANYON – LEFT FORK
Drainage Recession Curve Study
DISCHARGE (GPM)
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
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DEC
MONTHS
1991
1986
1987
1988
1989
1990

COMMERCIAL TESTING &
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B
ICE 1908 Member of the SGS Group (Societe Ger

Job. No.: 59-11273

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALY

Acidity	1<mg/l $CaCO_3$
Alkalinity, bicarbonate	232 mg/l HCO_3
Alkalinity, carbonate	1<mg/l $CaCO_3$
Alkalinity, total	190 mg/l $CaCO_3$
Aluminum	1.17 mg/l
Anions, total	4.57 meq/l
Arsenic	0.002<mg/l
Conductivity	300 umhos/cm
Copper	0.017 mg/l
Fluoride	0.14 mg/l
Hardness, total	237 mg/l $CaCO_3$
Iron, total	0.02<mg/l
Iron, dissolved	0.02<mg/l
Lead	0.050<mg/l
Magnesium	17.20 mg/l

ANALYST: Lois Stafko

2BL

'ER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AR
Watermarked For Your Protection TERMS AND CONDITIONS ON

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

CK

July 25, 1991

Job. No.: 59-11273

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

MHC01
MCH1 MEETING HOUSE CANYON LEFT FORK
Temperature 62.4 Degrees
Flow 0.65/713 GPM
Rec'd 1645
Sampled 1350 hr.

FIELD MEASUREMENTS	
pH	8.63
Conductivity	353
DO	6.4

WATER ANALYSIS page 2

Manganese	0.03 mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.04 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	0.1<mg/l	06-17-91	0900 hr.
Oxygen, dissolved	6.4 mg/l	06-11-91	1700 hr.
pH	8.40 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	0.02<mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	4.00 mg/l	06-20-91	1400 hr.
Solids, dissolved	197.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	49.0 mg/l	06-13-91	1100 hr.
Sulfate	8.0 mg/l	06-25-91	1100 hr.
Sulfide	7.00 mg/l	06-13-91	0900 hr.
Turbidity	10.0 NTU	06-12-91	1000 hr.
Zinc	0.02 mg/l	07-11-91	1500 hr.

ANALYST: Lois Stafko

1BL

RECEIVED
JUL 26 1991
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

October 2, 1991

Job. No.: 59-11513

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

MHC01

MEETING HOUSE CANYON MCHOI
Temperature 54.5 Degrees
Flow 0.14/6804
Rec'd 1620 hr.
Sampled 1330 hr.

FIELD MEASUREMENTS

pH	8.78
Conductivity	326
DO	4.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	272 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	223 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	5.01 meq/l		
Calcium	80.4 mg/l	09-18-91	1440 hr.
Cations, total	6.61 meq/l		
Chloride	10.0 mg/l	09-12-91	0900 hr.
Conductivity	300 umhos/cm	09-13-91	1330 hr.
Hardness, total	316 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.21 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.10 mg/l	09-18-91	1440 hr.
Magnesium	28.00 mg/l	09-18-91	1440 hr.
Manganese	0.08 mg/l	09-18-91	1440 hr.
Oil and Grease	2.0 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	6.8 mg/l	09-10-91	1640 hr.
pH	8.30 units	09-10-91	1640 hr.
Potassium	0.28 mg/l	09-18-91	1440 hr.
Sodium	6.70 mg/l	09-18-91	1440 hr.
Solids, dissolved	238.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	0800 hr.
Solids, suspended	175.0 mg/l	09-12-91	1400 hr.
Sulfate	18.0 mg/l	09-19-91	1045 hr.
Turbidity	55.0 NTU	09-11-91	0900 hr.

ANALYST: M W

3MD

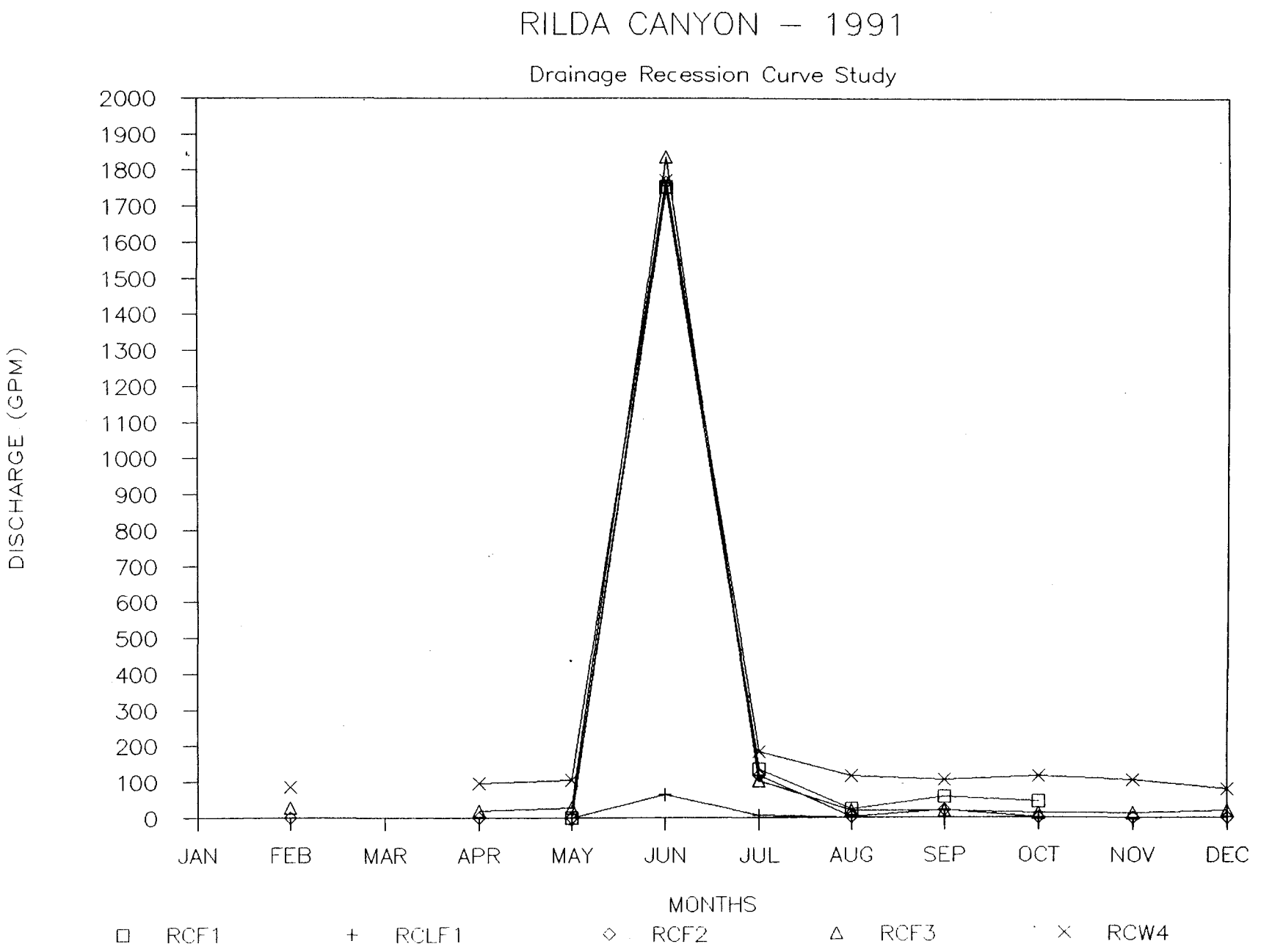
Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

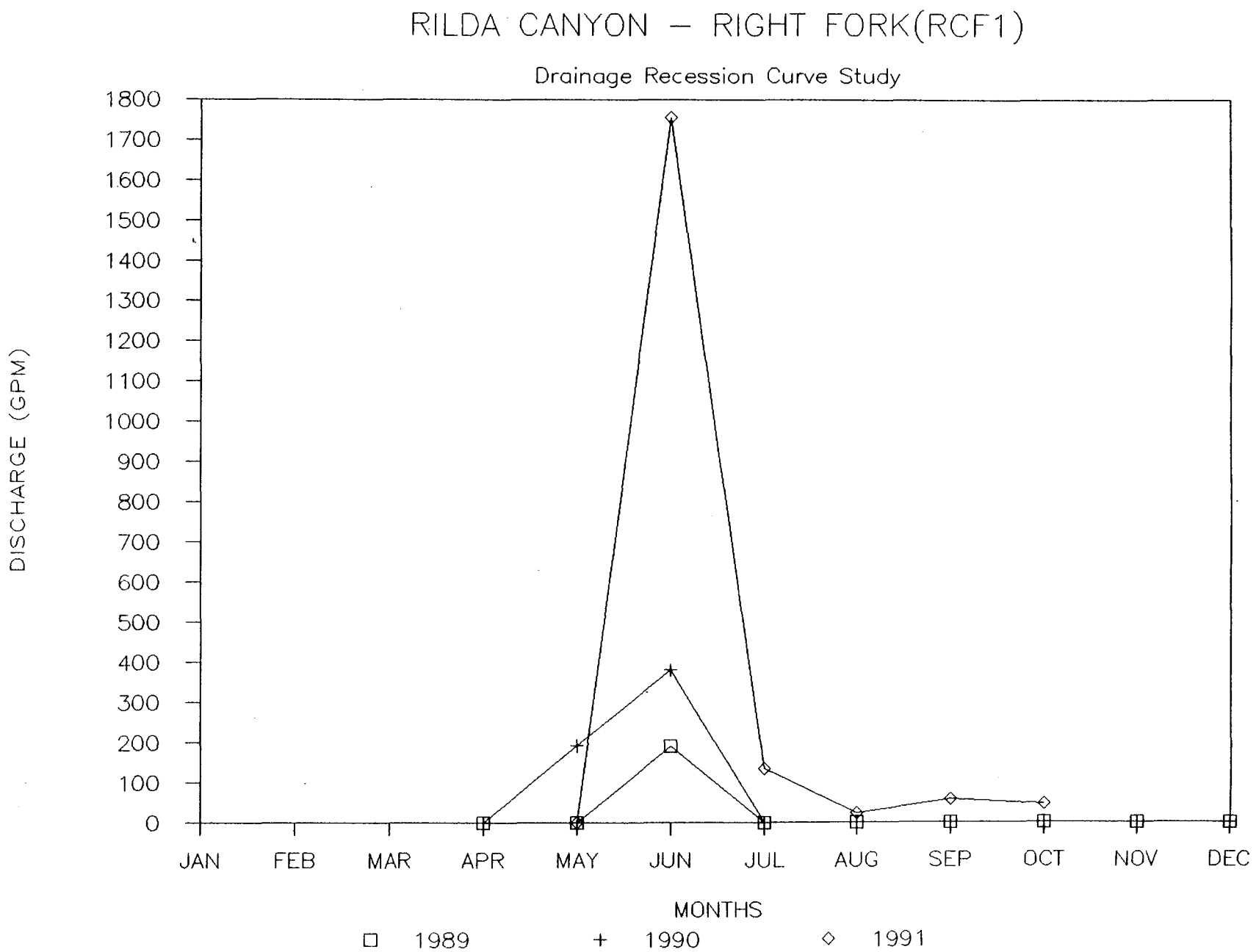
M W

Manager, Huntington Laboratory

FIELD OFFICE

APPENDIX D


RILDA CANYON – 1991
Drainage Recession Curve Study
DISCHARGE (GPM)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
RCF1
RCLF1
RCF2
RCF3
RCW4


RILDA CANYON – RIGHT FORK(RCF1)
Drainage Recession Curve Study
DISCHARGE (GPM)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
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100
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JAN
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MAY
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JUL
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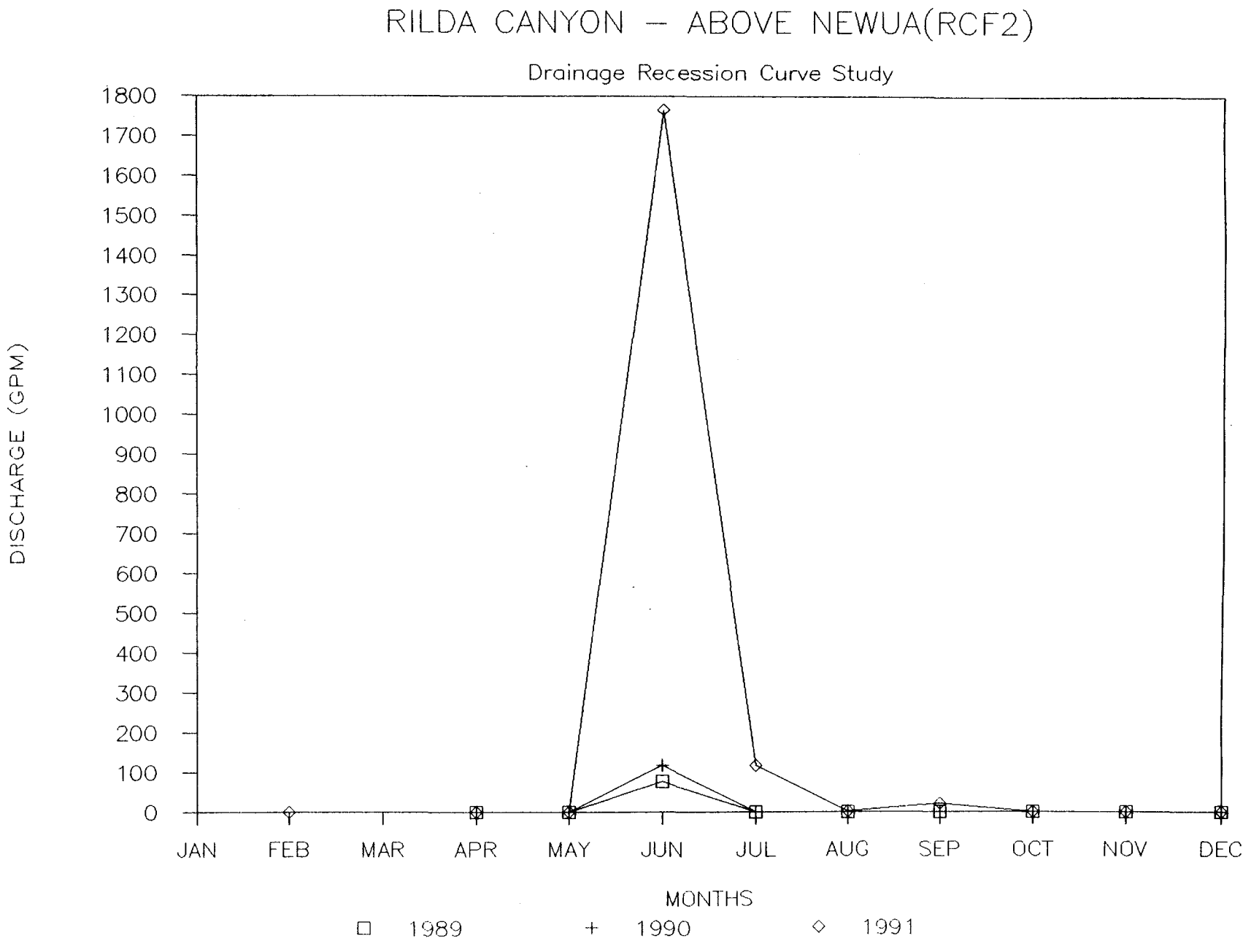
SEP
OCT
NOV
DEC
MONTHS
1989
1990
1991


RILDA CANYON – ABOVE NEWUA(RCF2)
Drainage Recession Curve Study
DISCHARGE (GPM)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
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JAN
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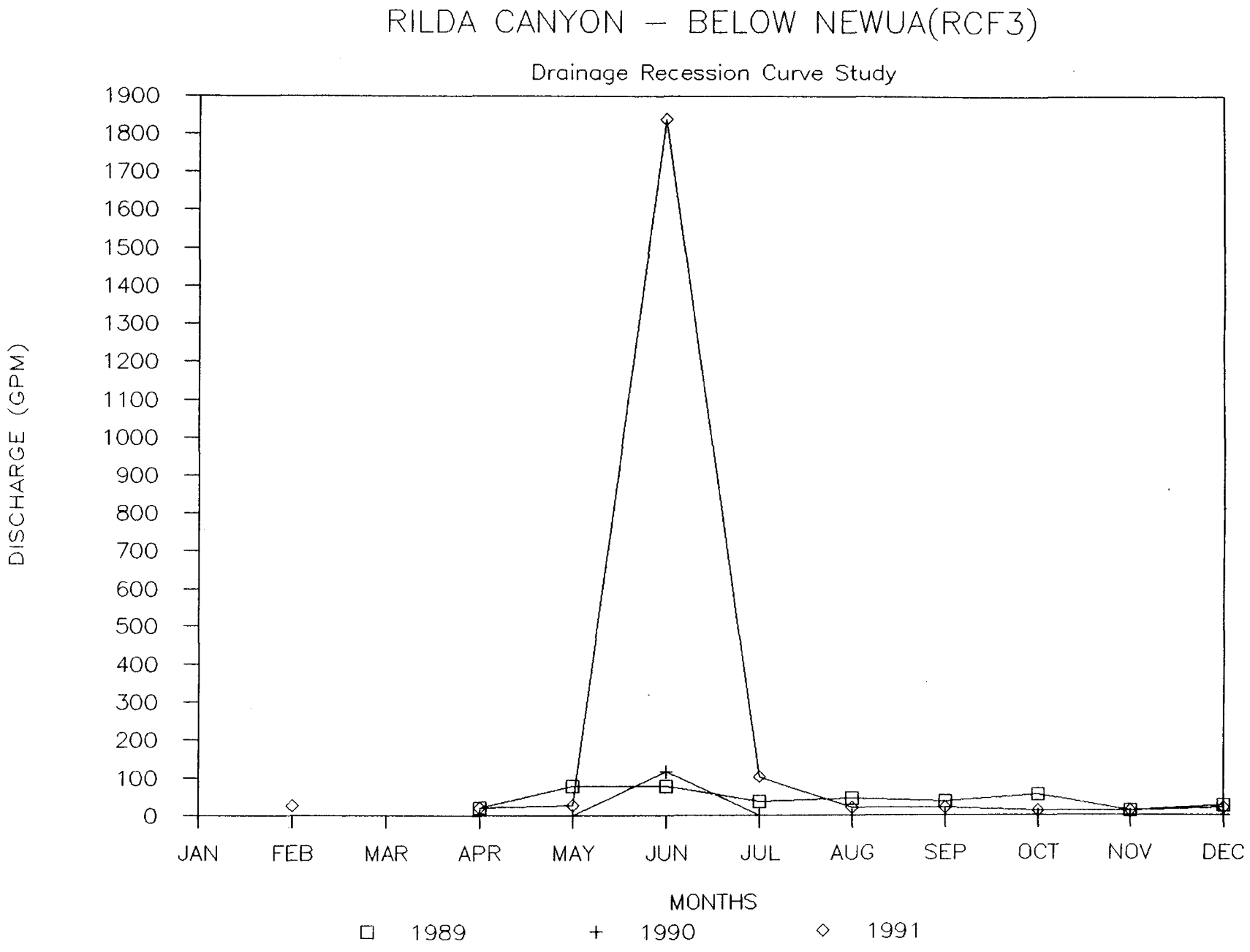
NOV
DEC
MONTHS
1989
1990
1991


RILDA CANYON – BELOW NEWUA(RCF3)
Drainage Recession Curve Study
DISCHARGE (GPM)
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
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JAN
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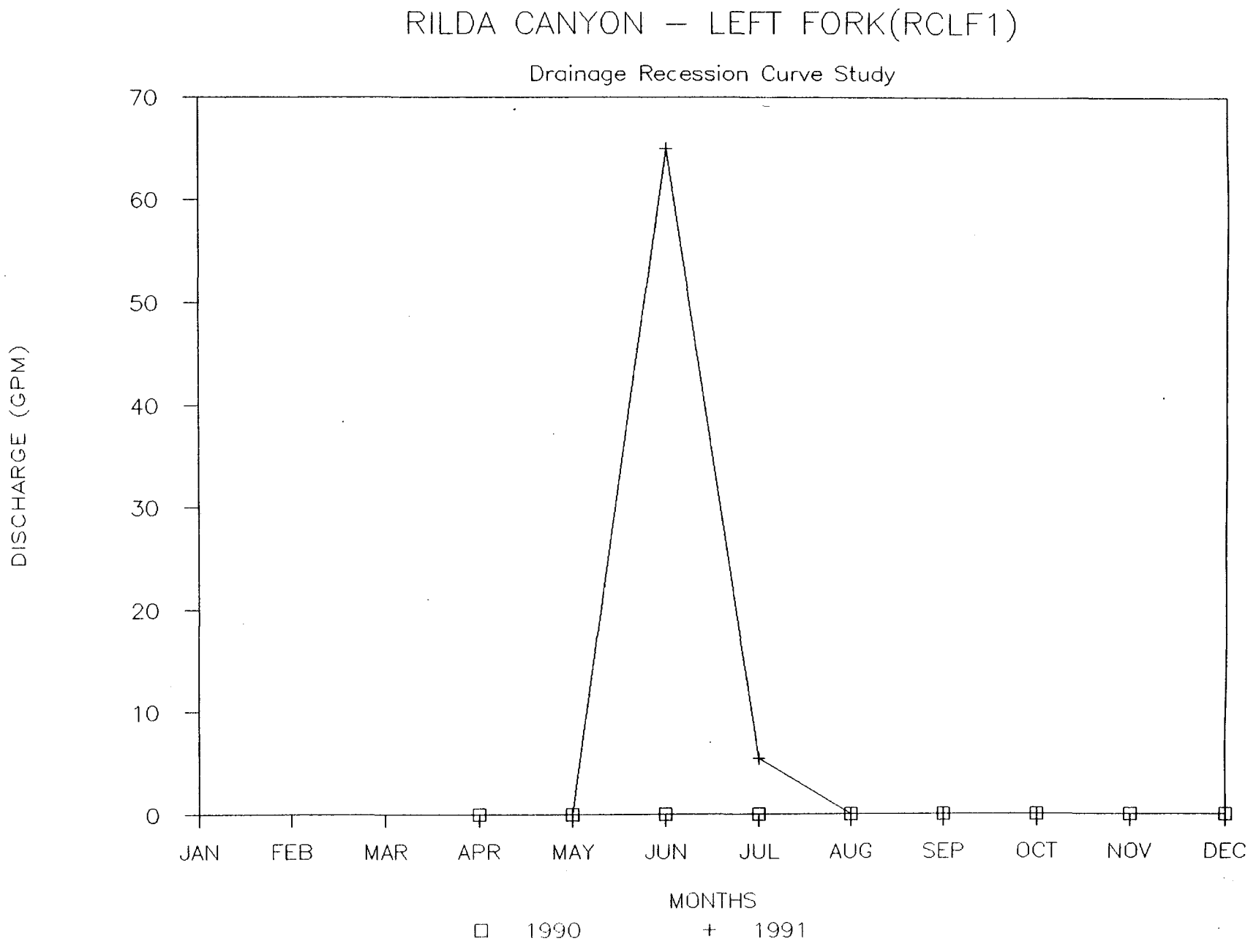
MONTHS
1989
1990
1991


RILDA CANYON – LEFT FORK(RCLF1)
Drainage Recession Curve Study
DISCHARGE (GPM)
70
60
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
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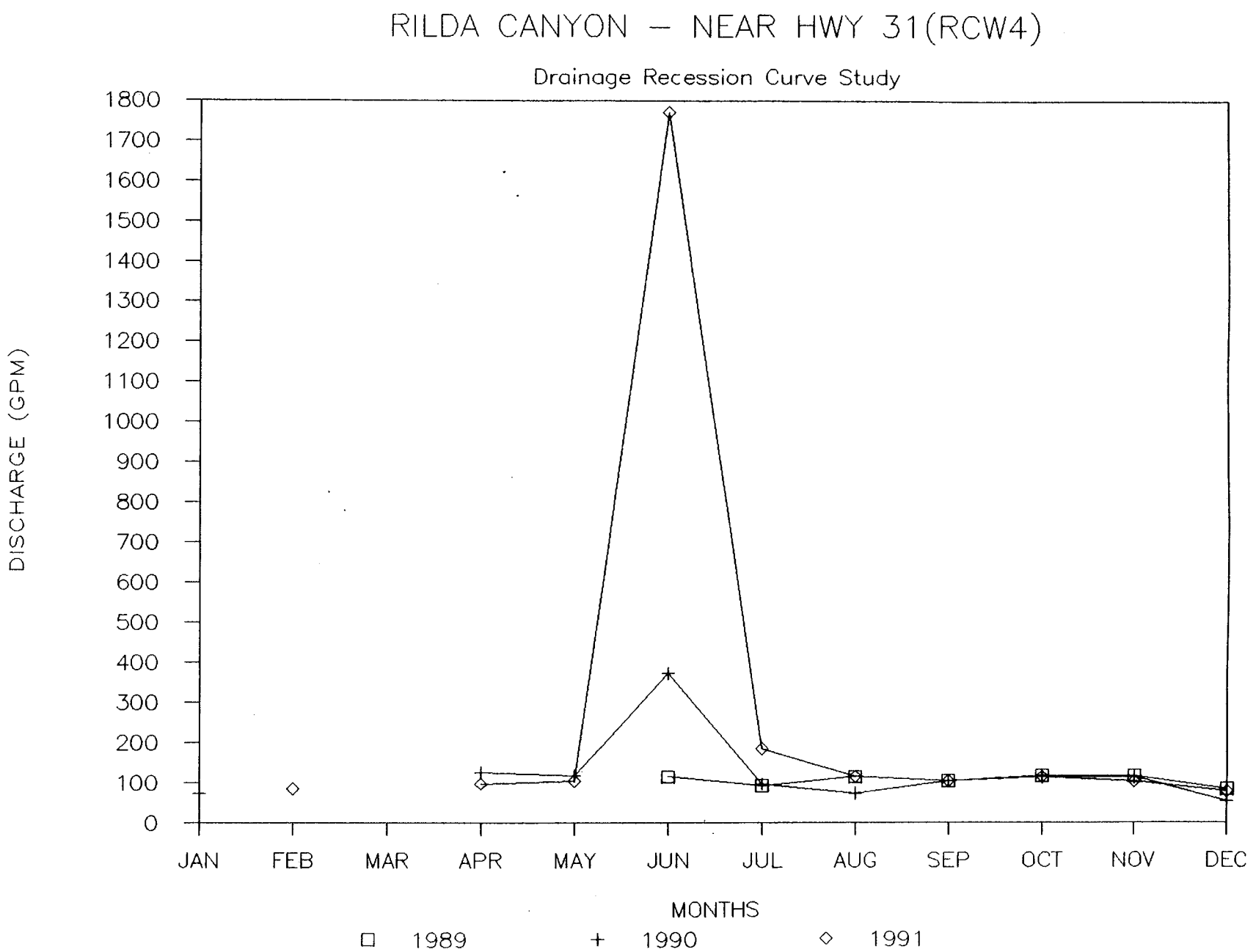
DEC
MONTHS
1990
1991


RILDA CANYON – NEAR HWY 31(RCW4)
Drainage Recession Curve Study
DISCHARGE (GPM)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1989
1990
1991

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 26, 1991

Job. No.: 59-11270

Sample ID:

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

RILDA CANYON RCF1
Temperature 44.2 Degrees
Flow 0.63/1755
Rec'd 1645 hr.
Sampled 1005 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
Ph	8.10
Conductivity	386
DO	8.70

* Higher than historical average.
Lab unable to run duplicate sample.

WATER ANALYSIS

Acidity	1< mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	254 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	270 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	0.50< mg/l	07-19-91	1300 hr.
Anions, total	9.75 meq/l		
Arsenic	0.002< mg/l	07-19-91	1300 hr.
Barium	0.03< mg/l	07-19-91	1300 hr.
Boron	0.01< mg/l	06-25-91	1100 hr.
Cadmium	0.046 mg/l	07-09-91	1300 hr.
Calcium	108.6 mg/l	06-25-91	1400 hr.
Cations, total	7.89 meq/l		
*Chloride	15.5 ~~155~~.0 mg/l	06-26-91	1300 hr.
Chromium	0.02< mg/l	07-09-91	1300 hr.
Conductivity	300 umhos/cm	06-12-91	1000 hr.
Copper	0.010< mg/l	07-09-91	1300 hr.
Fluoride	0.12 mg/l	07-02-91	07-02-91
Hardness, total	384 mg/l $CaCO_3$	06-25-91	1400 hr.
Iron, total	1.13 mg/l	06-25-91	1400 hr.
Iron, dissolved	0.09 mg/l	06-25-91	1400 hr.
Lead	0.200 mg/l	07-09-91	1300 hr.
Magnesium	27.40 mg/l	06-25-91	1400 hr.

ANALYST: M M

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

M M

Manager, Huntington Laboratory

JUL 31 1991

2BL

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CK

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 26, 1991

Job. No.: 59-11270

Sample ID:

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

RILDA CANYON RCF1
Temperature 44.2 Degrees
Flow 0.63/1755
Rec'd 1645 hr.
Sampled 1005 hr.

FIELD MEASUREMENTS

Ph	8.10
Conductivity	386
DO	8.70

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS page 2

Manganese	0.04 mg/l	06-25-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-09-91	1300 hr.
Nickel	0.02<mg/l	07-09-91	1300 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	1.5 mg/l	06-14-91	1500 hr.
Oxygen, dissolved	7.6 mg/l	06-11-91	1700 hr.
pH	8.40 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-12-91	1500 hr.
Potassium	1.78 mg/l	06-25-91	1400 hr.
Selenium	0.002<mg/l	07-09-91	1300 hr.
Sodium	3.78 mg/l	06-25-91	1400 hr.
Solids, dissolved	231.0 mg/l	06-17-91	1300 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	160.0 mg/l	06-17-91	1300 hr.
Sulfate	7.0 mg/l	06-25-91	1100 hr.
Sulfide	5.40 mg/l	06-17-91	0800 hr.
Turbidity	15.0 NTU	06-12-91	1000 hr.
Zinc	0.01<mg/l	07-09-91	1300 hr.

ANALYST: W W

1BL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

W W JUL 31 1991

Manager, Huntington Laboratory

FIELD OFFICE

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Member of the SGS Group (Societe Generale de Surveillance)

CK

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11509

Sample ID:

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

RILDA CANYON RC-F-1
Temperature 47.4 Degrees
Flow 0.07/ 58.3 GPM
Rec'd 1620 hr.
Sampled 1040 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.35
Conductivity	370
DO	6.4

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	244 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	200 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	4.80 meq/l		
Calcium	58.2 mg/l	09-18-91	1440 hr.
Cations, total	4.83 meq/l		
Chloride	15.0 mg/l	09-12-91	0900 hr.
Conductivity	350 umhos/cm	09-13-91	1330 hr.
Hardness, total	225 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.02<mg/l	09-18-91	1440 hr.
Iron, dissolved	0.02<mg/l	09-18-91	1440 hr.
Magnesium	19.40 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	1.9 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.4 mg/l	09-10-91	1640 hr.
pH	8.20 units	09-10-91	1640 hr.
Potassium	0.12 mg/l	09-18-91	1440 hr.
Sodium	7.48 mg/l	09-18-91	1440 hr.
Solids, dissolved	242.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	1140 hr.
Solids, suspended	2.0 mg/l	09-12-91	1400 hr.
Sulfate	23.0 mg/l	09-19-91	1045 hr.
Turbidity	5.0 NTU	09-11-91	1200 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Counsell

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300

SINCE 1908

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

May 1, 1991

Job. No.: 59-11118

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA CANYON RCF3
Temperature 42.5 Degrees
Flow 0.04/19 GPM
Rec'd 1545 hr.
Sampled 1145 hr.

FIELD MEASUREMENTS	
pH	8.15
Conductivity	761
DO	5.5

(AMENDED GPM & OIL & GREASE)

WATER ANALYSIS

Alkalinity, bicarbonate	422 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	346 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.50<mg/l	04-16-91	1230 hr.
Anions, total	8.44 meq/l		
Arsenic	0.002<mg/l	04-16-91	1230 hr.
Barium	0.03<mg/l	04-16-91	1230 hr.
Boron	0.10 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	99.4 mg/l	04-16-91	1230 hr.
Cations, total	9.64 meq/l		
Chloride	50.0mg/l	04-24-91	1320 hr.
Chromium	0.05 mg/l	04-16-91	1230 hr.
Conductivity	620 umhos/cm	04-10-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.17 mg/l	04-18-91	0830 hr.
Hardness, total	453 mg/l $CaCO_3$	04-16-91	1230 hr.
Iron, total	0.02<mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	1230 hr.
Magnesium	49.80 mg/l	04-16-91	0910 hr.

ANALYST: Lois Stafko

1BL

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MAY 01 1991
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (708) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

1)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

May 1, 1991

Job. No.: 59-11118

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA CANYON RCF3
Temperature 42.5 Degrees
Flow 0.04/19 GPM
Rec'd 1545 hr.
Sampled 1145 hr.

FIELD MEASUREMENTS	
pH	8.15
Conductivity	761
DO	5.5

(AMENDED GPM & OIL & GREASE)

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.03<mg/l	04-16-91	1230 hr.
Nickel	0.12 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.24 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	3.5 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	7.9 mg/l	04-08-91	1555 hr.
pH	8.00 units	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	0.23 mg/l	04-16-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	13.52 mg/l	04-16-91	0910 hr.
Solids, dissolved	487.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	1.0<mg/l	04-10-91	1400 hr.
Sulfate	80.0 mg/l	04-12-91	0715 hr.
Sulfide	11.10 mg/l	04-08-91	1645 hr.
Turbidity	1.1 NTU	04-10-91	1100 hr.
Zinc	0.04 mg/l	04-16-91	1230 hr.

ANALYST: Lois Stafko

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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MAY 01 1991
FIELD OFFICE

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11267

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RCF 3 RILDA CANYON
Temperature 46.6 Degrees
Flow 0.78/1838 GPM
Rec'd 1645
Sampled 1140 hr.

FIELD MEASUREMENTS	
pH	8.69
Conductivity	405
DO	8.4

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	340 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	279 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	4.72 mg/l	07-11-91	1500 hr.
Anions, total	6.71 meq/l		
Arsenic	0.002<mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.071 mg/l	07-11-91	1500 hr.
Calcium	105.1 mg/l	06-20-91	1400 hr.
Cations, total	7.55 meq/l		
Chloride	40.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	380 umhos/cm	06-12-91	0900 hr.
Copper	0.010 mg/l	07-11-91	1500 hr.
Fluoride	0.11 mg/l	06-13-91	1300 hr.
Hardness, total	365 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	2.84 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.01 mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	25.00 mg/l	06-20-91	1400 hr.

RECEIVED JUL 19 1991

ANALYST: Lois Stapp

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FIELD OFFICE

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11267

Sample ID:

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

RCF 3 RILDA CANYON
Temperature 46.6 Degrees
Flow 0.78/1838 GPM
Rec'd 1645
Sampled 1140 hr.

FIELD MEASUREMENTS

pH	8.69
Conductivity	405
DO	8.4

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS page 2

Manganese	0.10 mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.16 mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.02 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	0.7 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	7.1 mg/l	06-11-91	1700 hr.
pH	8.30 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	0.30 mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	5.40 mg/l	06-20-91	1400 hr.
Solids, dissolved	241.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0800 hr.
Solids, suspended	185.0 mg/l	06-13-91	1100 hr.
Sulfate	7.0 mg/l	06-25-91	1100 hr.
Sulfide	6.80 mg/l	06-13-91	0900 hr.
Turbidity	40.0 NTU	06-12-91	1000 hr.
Zinc	0.02 mg/l	07-11-91	1500 hr.

ANALYST: Lois Stokes

1BL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11508

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA CANYON RC-F-3
Temperature 50.8 Degrees
Flow 0.04/19.1 GPM
Rec'd 1620 hr.
Sampled 1208 hr.

FIELD MEASUREMENTS

pH	7.92
Conductivity	648
DO	5.8

WATER ANALYSIS

Acidity	1 mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	376 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	308 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	9.51 meq/l		
Calcium	90.0 mg/l	09-18-91	1440 hr.
Cations, total	8.74 meq/l		
Chloride	20.0 mg/l	09-12-91	0900 hr.
Conductivity	500 umhos/cm	09-13-91	1330 hr.
Hardness, total	410 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.10 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.08 mg/l	09-18-91	1440 hr.
Magnesium	44.90 mg/l	09-18-91	1440 hr.
Manganese	0.04 mg/l	09-18-91	1440 hr.
Oil and Grease	3.6 mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.4 mg/l	09-10-91	1640 hr.
pH	7.80 units	09-10-91	1640 hr.
Potassium	1.51 mg/l	09-18-91	1440 hr.
Sodium	12.17 mg/l	09-18-91	1440 hr.
Solids, dissolved	427.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	1440 hr.
Solids, suspended	5.0 mg/l	09-12-91	1400 hr.
Sulfate	140.0 mg/l	09-19-91	1045 hr.
Turbidity	8.0 NTU	09-11-91	1200 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Connell SEP 24 1991

Manager, Huntington Laboratory

ER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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COMMERCIAL TESTING & ENGINEERING CO.
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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 8, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at Rilda Canyon

Sample taken by PacifiCorp

Date sampled December 18, 1991

Date received December 18, 1991

RCF-3 RILDA CANYON
Temperature 42.5°F
Flow 0.04/19.1 GPM
Rec'd 1530 hr.
Sampled 1400 hr.

FIELD MEASUREMENTS

pH	8.04
Conductivity	712
DO	9.6

Analysis report no. 59-11762

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	14	1	mg/l $CaCO_3$	EPA 305.1	12-30-1991 09:00 LM
Alkalinity, Bicarbonate	391	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
Alkalinity, Total	321	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
Aluminum	0.00	.5	mg/l	EPA 202.1	12-31-1991 10:00 JS
Anions	8.15	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	01-02-1992 12:00 JS
Barium	0.00	.03	mg/l	EPA 208.1	12-31-1991 10:00 JS
Boron	0.14	.01	mg/l	EPA 212.3	01-02-1992 13:10 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-31-1991 10:00 JS
Calcium	72.2	.1	mg/l	EPA 215.1	01-07-1992 09:20 JS
Cations	8.23	----	meq/l	---------	---------- ----- --
Chloride	15.0	.1	mg/l	EPA 325.3	01-07-1992 11:30 LS
Chromium	0.00	.02	mg/l	EPA 218.1	12-31-1991 10:00 JS
Conductivity	600	2	umhos/cm	EPA 120.1	12-30-1991 14:00 LM
Copper	0.000	.01	mg/l	EPA 220.1	12-31-1991 10:00 JS
Fluoride	0.21	.01	mg/l	EPA 340.2	12-30-1991 13:00 LS
Hardness, Total	375	1	mg/l $CaCO_3$	---------	01-07-1992 09:20 JS
Iron	0.17	.02	mg/l	EPA 236.1	01-07-1992 09:20 JS
Iron, Dissolved	0.14	.02	mg/l	EPA 236.1	01-07-1992 09:20 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-31-1991 10:00 JS
Magnesium	47.30	.01	mg/l	EPA 242.1	01-07-1992 09:20 JS
Manganese	0.00	.01	mg/l	EPA 243.1	01-07-1992 09:20 JS
Mercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 JS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

F-465
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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 8, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at Rilda Canyon

Sample taken by PacifiCorp

Date sampled December 18, 1991

Date received December 18, 1991

RCF-3 RILDA CANYON
Temperature 42.5°F
Flow 0.04/19.1 GPM
Rec'd 1530 hr.
Sampled 1400 hr.

FIELD MEASUREMENTS

pH	8.04
Conductivity	712
DO	9.6

Analysis report no. 59-11762

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum	0.00	.1	mg/l	EPA 246.1	12-31-1991 10:00 JS
Nickel	0.02	.02	mg/l	EPA 249.1	12-31-1991 10:00 JS
Nitrogen, Ammonia	0.22	.01	mg/l	EPA 350.3	01-06-1992 13:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-19-1991 07:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-19-1991 07:00 JK
Oil & Grease	2.3	1	mg/l	EPA 413.1	12-30-1991 09:45 LM
Oxygen, Dissolved	10.0	.01	mg/l	EPA 360.1	12-18-1991 16:00 LS
pH	7.50	----	Units	EPA 150.1	12-18-1991 16:00 LS
Phosphorus, Total	0.00	.01	mg/l	EPA 365.2	01-06-1992 10:00 LM
Potassium	4.57	.01	mg/l	EPA 258.1	01-07-1992 09:20 JS
Selenium	0.000	.002	ug/l	EPA 270.3	01-02-1992 12:00 JS
Sodium	14.49	.01	mg/l	EPA 273.1	01-07-1992 09:20 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-19-1991 07:30 LS
Solids, Total Dissolved	402.0	.5	mg/l	EPA 160.1	12-20-1991 11:00 LM
Solids, Total Suspended	3.0	.5	mg/l	EPA 160.2	12-20-1991 11:00 LM
Sulfate	70.0	.1	mg/l	EPA 375.4	01-02-1992 10 30 LS
Sulfide	5.00	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	2.5	.1	NTU	EPA 180.1	12-19-1991 10:00 LS
Zinc	0.00	.01	mg/l	EPA 289.1	12-31-1991 10:00 JS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FIELD OFFICE

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11117

Sample ID:

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

RILDA R CW-4
Temperature 40.9 Degrees
Flow 0.38/97.4 GPM
Rec'd 1545 hr.
Sampled 1215 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.39
Conductivity	769
DO	6.2

WATER ANALYSIS

Alkalinity, bicarbonate	395 mg/l HCO_3	04-10-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-10-91	0900 hr.
Alkalinity, total	324 mg/l $CaCO_3$	04-10-91	0900 hr.
Aluminum	0.50<mg/l	04-16-91	1230 hr.
Anions, total	9.68 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.03<mg/l	04-16-91	1230 hr.
Boron	0.26 mg/l	04-24-91	1320 hr.
Cadmium	0.005<mg/l	04-16-91	1230 hr.
Calcium	87.4 mg/l	04-16-91	0910 hr.
Cations, total	9.98 meq/l		
Chloride	45.0 mg/l	04-24-91	1320 hr.
Chromium	0.03 mg/l	04-16-91	1230 hr.
Conductivity	690 umhos/cm	04-10-91	1000 hr.
Copper	0.010<mg/l	04-16-91	1230 hr.
Fluoride	0.18 mg/l	04-18-91	0830 hr.
Hardness, total	457 mg/l $CaCO_3$	04-16-91	0910 hr.
Iron, total	0.30 mg/l	04-16-91	0910 hr.
Iron, dissolved	0.02<mg/l	04-16-91	0910 hr.
Lead	0.020<mg/l	04-16-91	1230 hr.
Magnesium	58.10 mg/l	04-16-91	0910 hr.

ANALYST: Lois Stapko

1BL

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MAY 30 1991
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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 30, 1991

Job. No.: 59-11117

Date Rec'd: April 8, 1991

Date Sampled: April 8, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA R CW-4
Temperature 40.9 Degrees
Flow 0.38/97.4 GPM
Rec'd 1545 hr.
Sampled 1215 hr.

FIELD MEASUREMENTS	
pH	8.39
Conductivity	769
DO	6.2

WATER ANALYSIS page 2

Manganese	0.01<mg/l	04-16-91	0910 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.09 mg/l	04-16-91	1230 hr.
Nickel	0.12 mg/l	04-16-91	1230 hr.
Nitrogen, ammonia	0.25 mg/l	04-17-91	0900 hr.
Nitrogen, nitrate	0.01<mg/l	04-09-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-09-91	1100 hr.
Oil and grease	2.4 mg/l	04-09-91	0915 hr.
Oxygen, dissolved	8.4 mg/l	04-08-91	1555 hr.
pH	8.30 mg/l	04-08-91	1555 hr.
Phosphorous, total	0.01<mg/l	04-09-91	1300 hr.
Potassium	0.95 mg/l	04-06-91	0910 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	19.02 mg/l	04-16-91	0910 hr.
Solids, dissolved	490.0 mg/l	04-10-91	1400 hr.
Solids, settleable	0.5<mg/l	04-09-91	1300 hr.
Solids, suspended	3.0 mg/l	04-10-91	1400 hr.
Sulfate	100.0 mg/l	04-12-91	0715 hr.
Sulfide	10.70 mg/l	04-08-91	1645 hr.
Turbidity	1.0 NTU	04-10-91	1100 hr.
Zinc	0.02 mg/l	04-16-91	1230 hr.

ANALYST: Lois Stafko

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RECEIVED
APR 30 1991
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 2, 1991

Job. No.: 59-11274

Sample ID:

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

RILDA CANYON RCW-4
Temperature 50.3 Degrees
Flow 1770 GPM
Rec'd 1645 hr.
Sampled 1320 hr.

FIELD MEASUREMENTS

pH	8.24
Conductivity	456
DO	7.5

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

*** Higher than historical average.**
Lab unable to run duplicate sample.

WATER ANALYSIS

Acidity	1 mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	298 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1 mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	244 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	3.61 mg/l	07-09-91	1300 hr.
Anions, total	9.38 meq/l		
Arsenic	0.002 mg/l	07-09-91	1300 hr.
Barium	0.28 mg/l	07-09-91	1300 hr.
Boron	0.01 mg/l	06-14-91	0730 hr.
Cadmium	0.012 mg/l	07-09-91	1300 hr.
Calcium	117.0 mg/l	06-20-91	1400 hr.
Cations, total	9.26 meq/l		
*Chloride	135.0 mg/l	06-12-91	1510 hr.
Chromium	0.02 mg/l	07-09-91	1300 hr.
Conductivity	400 umhos/cm	06-12-91	0900 hr.
Copper	0.042 mg/l	07-09-91	1300 hr.
Fluoride	0.13 mg/l	06-13-91	1100 hr.
Hardness, total	443 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	2.06 mg/l	06-20-91	1400 hr.
Iron, dissolved	0.18 mg/l	06-20-91	1400 hr.
Lead	0.050 mg/l	07-09-91	1300 hr.
Magnesium	36.70 mg/l	06-20-91	1400 hr.

ANALYST: Lois Stafko

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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AUG 2 1991

Dave Cassidy
Manager, Huntington Laboratory

2BL

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COMMERCIAL TESTING & ENGINEERING CO.
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

August 2, 1991

Job. No.: 59-11274

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA CANYON RCW-4
Temperature 50.3 Degrees
Flow 1770 GPM
Rec'd 1645 hr.
Sampled 1320 hr.

FIELD MEASUREMENTS	
pH	8.24
Conductivity	456
DO	7.5

WATER ANALYSIS page 2

Manganese	0.15 mg/l	06-20-91	1400 hr.
Mercury	0.002 mg/l	06-20-91	0840 hr.
Molybdenum	0.10 mg/l	07-09-91	1300 hr.
Nickel	0.08 mg/l	07-09-91	1300 hr.
Nitrogen, ammonia	0.02 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-20-91	1510 hr.
Nitrogen, nitrite	0.00 mg/l	06-20-91	1510 hr.
Oil and grease	1.9 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	6.9 mg/l	06-11-91	1700 hr.
pH	8.30 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	2.80 mg/l	06-20-91	1400 hr.
Selenium	0.002 mg/l	07-09-91	1300 hr.
Sodium	7.60 mg/l	06-20-91	1400 hr.
Solids, dissolved	286.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5 mg/l	06-12-91	0900 hr.
Solids, suspended	505.0 mg/l	06-13-91	1100 hr.
Sulfate	40.0 mg/l	06-25-91	1100 hr.
Sulfide	6.00 mg/l	06-13-91	0900 hr.
Turbidity	90.0 NTU	06-12-91	1000 hr.
Zinc	0.03 mg/l	07-09-91	1300 hr.

ANALYST: Lois Stoffo

1BL

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AUG 02 1991
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council
Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

September 24, 1991

Job. No.: 59-11507

Date Rec'd: September 10, 1991

Date Sampled: September 10, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RILDA CANYON RC-W-4
Temperature 49.7 Degrees
Flow 0.39/103.9 GPM
Rec'd 1620 hr.
Sampled 1255 hr.

FIELD MEASUREMENTS

pH	8.58
Conductivity	678
DO	5.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, bicarbonate	383 mg/l HCO_3	09-13-91	1330 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	09-13-91	1330 hr.
Alkalinity, total	314 mg/l $CaCO_3$	09-13-91	1330 hr.
Anions, total	8.78 meq/l		
Calcium	72.7 mg/l	09-18-91	1440 hr.
Cations, total	8.54 meq/l		
Chloride	20.0 mg/l	09-12-91	0900 hr.
Conductivity	620 umhos/cm	09-13-91	1330 hr.
Hardness, total	389 mg/l $CaCO_3$	09-18-91	1440 hr.
Iron, total	0.06 mg/l	09-18-91	1440 hr.
Iron, dissolved	0.02<mg/l	09-18-91	1440 hr.
Magnesium	50.30 mg/l	09-18-91	1440 hr.
Manganese	0.02<mg/l	09-18-91	1440 hr.
Oil and Grease	1.0<mg/l	09-11-91	1030 hr.
Oxygen, dissolved	7.6 mg/l	09-10-91	1640 hr.
pH	7.70 units	09-10-91	1640 hr.
Potassium	2.09 mg/l	09-18-91	1440 hr.
Sodium	16.94 mg/l	09-18-91	1440 hr.
Solids, dissolved	445.0 mg/l	09-12-91	1400 hr.
Solids, settleable	0.5<mg/l	09-11-91	1140 hr.
Solids, suspended	14.0 mg/l	09-12-91	1400 hr.
Sulfate	100.0 mg/l	09-19-91	1045 hr.
Turbidity	12.0 NTU	09-11-91	1200 hr.

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council SEP 1991

Manager, Huntington Laboratory JK

FIELD OFFICE

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FAX: (801) 653-2479

January 8, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

Sample taken at Rilda Canyon

Sample taken by PacifiCorp

Date sampled December 18, 1991

Date received December 18, 1991

RCW-4 RILDA CANYON
Temperature 36.5°F
Flow 0.35/79.3 GPM
Rec'd 1530 hr.
Sampled 1455 hr.

FIELD MEASUREMENTS

pH	8.10
Conductivity	765
DO	9.9

Analysis report no. 59-11763

arameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
cidity	10	1	mg/l $CaCO_3$	EPA 305.1	12-30-1991 09:00 LM
lkalinity, Bicarbonate	417	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
lkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
lkalinity, Total	342	1	mg/l $CaCO_3$	EPA 310.1	12-30-1991 08:30 LM
luminum	0.00	.5	mg/l	EPA 202.1	12-31-1991 10:00 JS
nions	8.91	----	meq/l	---------	---------- ----- --
senic	0.000	.002	ug/l	EPA 206.3	01-02-1992 12:00 JS
ium	0.00	.03	mg/l	EPA 208.1	12-31-1991 10:00 JS
ron	0.17	.01	mg/l	EPA 212.3	01-02-1992 13:10 LM
dmium	0.000	.005	mg/l	EPA 213.1	12-31-1991 10:00 JS
lcium	81.0	.1	mg/l	EPA 215.1	01-07-1992 09:20 JS
ations	9.76	----	meq/l	---------	---------- ----- --
loride	20.0	.1	mg/l	EPA 325.3	01-07-1992 11:30 LS
hromium	0.00	.02	mg/l	EPA 218.1	12-31-1991 10:00 JS
onductivity	700	2	umhos/cm	EPA 120.1	12-30-1991 14:00 LM
opper	0.000	.01	mg/l	EPA 220.1	12-31-1991 10:00 JS
luoride	0.21	.01	mg/l	EPA 340.2	12-30-1991 13:00 LS
ardness, Total	444	1	mg/l $CaCO_3$	---------	01-07-1992 09:20 JS
ron	0.00	.02	mg/l	EPA 236.1	01-07-1992 09:20 JS
ron, Dissolved	0.00	.02	mg/l	EPA 236.1	01-07-1992 09:20 JS
ead	0.000	.05	mg/l	EPA 239.1	12-31-1991 10:00 JS
agnesium	58.70	.01	mg/l	EPA 242.1	01-07-1992 09:20 JS
anganese	0.00	.01	mg/l	EPA 243.1	01-07-1992 09:20 JS
ercury	0.000	.002	mg/l	EPA 245.1	01-03-1992 15:00 JS

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

FIELD OFFICE

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

January 8, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us: Water

Sample taken at: Rilda Canyon

Sample taken by: PacifiCorp

Date sampled: December 18, 1991

Date received: December 18, 1991

RCW-4 RILDA CANYON
Temperature 36.5°F
Flow 0.35/79.3 GPM
Rec'd 1530 hr.
Sampled 1455 hr.

FIELD MEASUREMENTS

pH	8.10
Conductivity	765
DO	9.9

Analysis report no. 59-11763

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum	0.00	.1	mg/l	EPA 246.1	12-31-1991 10:00 JS
Nickel	0.02	.02	mg/l	EPA 249.1	12-31-1991 10:00 JS
Nitrogen, Ammonia	0.17	.01	mg/l	EPA 350.3	01-06-1992 13:00 LS
Nitrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-19-1991 07:00 JK
Nitrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-19-1991 07:00 JK
Oil & Grease	1.6	1	mg/l	EPA 413.1	12-30-1991 09:45 LM
Oxygen, Dissolved	10.9	.01	mg/l	EPA 360.1	12-18-1991 16:00 LS
pH	7.70	----	Units	EPA 150.1	12-18-1991 16:00 LS
Phosphorus, Total	0.00	.01	mg/l	EPA 365.2	01-06-1992 10:00 LM
Potassium	4.71	.01	mg/l	EPA 258.1	01-07-1992 09:20 JS
Selenium	0.000	.002	ug/l	EPA 270.3	01-02-1992 12:00 JS
Sodium	17.92	.01	mg/l	EPA 273.1	01-07-1992 09:20 JS
Solids, Settleable	0.0	.5	mg/l	EPA 160.5	12-19-1991 07:30 LS
Solids, Total Dissolved	473.0	.5	mg/l	EPA 160.1	12-20-1991 11:00 LM
Solids, Total Suspended	1.0	.5	mg/l	EPA 160.2	12-20-1991 11:00 LM
Sulfate	80.0	.1	mg/l	EPA 375.4	01-02-1992 10:30 LS
Sulfide	4.60	.1	mg/l	EPA 376.1	12-17-1991 11:00 LS
Turbidity	1.1	.1	NTU	EPA 180.1	12-19-1991 10:00 LS
Zinc	0.00	.01	mg/l	EPA 289.1	12-31-1991 10:00 JS

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11271

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RCLF1 RILDA CANYON
Temperature 49.7 Degrees
Flow 65 GPM
Rec'd 1645
Sampled 1030 hr.

FIELD MEASUREMENTS	
pH	8.57
Conductivity	539
DO	8.0

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-12-91	0900 hr
Alkalinity, bicarbonate	586 mg/l HCO_3	06-12-91	0900 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	0900 hr.
Alkalinity, total	480 mg/l $CaCO_3$	06-12-91	0900 hr.
Aluminum	4.65 mg/l	07-11-91	1500 hr.
Anions, total	15.45 meq/l		
Arsenic	0.006 mg/l	07-11-91	1500 hr.
Barium	0.03<mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-14-91	0730 hr.
Cadmium	0.037 mg/l	07-11-91	1500 hr.
Calcium	184.0 mg/l	06-20-91	1400 hr.
Cations, total	14.70 meq/l		
Chloride	180.0 mg/l	06-12-91	1510 hr.
Chromium	0.02<mg/l	07-11-91	1500 hr.
Conductivity	450 umhos/cm	06-12-91	0900 hr.
Copper	0.027 mg/l	07-11-91	1500 hr.
Fluoride	0.14 mg/l	06-13-91	1300 hr.
Hardness, total	707 mg/l $CaCO_3$	06-20-91	1400 hr.
Iron, total	4.63 mg/l	06-20-91	1400 hr.
Iron, dissolved	1.09 mg/l	06-20-91	1400 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	60.20 mg/l	06-20-91	1400 hr.

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JUL 19 1991
FIELD OFFICE

ANALYST: Lois Stoffo

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11271

Date Rec'd: June 11, 1991

Date Sampled: June 11, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

RCLF1 RILDA CANYON
Temperature 49.7 Degrees
Flow 65 GPM
Rec'd 1645
Sampled 1030 hr.

FIELD MEASUREMENTS	
pH	8.57
Conductivity	539
DO	8.0

WATER ANALYSIS page 2

Manganese	0.24 mg/l	06-20-91	1400 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.10<mg/l	07-11-91	1500 hr.
Nickel	0.02<mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.00 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-12-91	0800 hr.
Nitrogen, nitrite	0.00 mg/l	06-12-91	0800 hr.
Oil and grease	0.9 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	6.9 mg/l	06-11-91	1700 hr.
pH	8.30 mg/l	06-11-91	1700 hr.
Phosphorous, total	0.00 mg/l	06-28-91	1100 hr.
Potassium	5.20 mg/l	06-20-91	1400 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	9.90 mg/l	06-20-91	1400 hr.
Solids, dissolved	328.0 mg/l	06-13-91	1100 hr.
Solids, settleable	0.5<mg/l	06-12-91	0900 hr.
Solids, suspended	109.0 mg/l	06-13-91	1100 hr.
Sulfate	50.0 mg/l	06-25-91	1100 hr.
Sulfide	6.00 mg/l	06-13-91	1100 hr.
Turbidity	51.0 NTU	06-12-91	1000 hr.
Zinc	0.08 mg/l	07-11-91	1500 hr.

ANALYST: Rio Stoffo

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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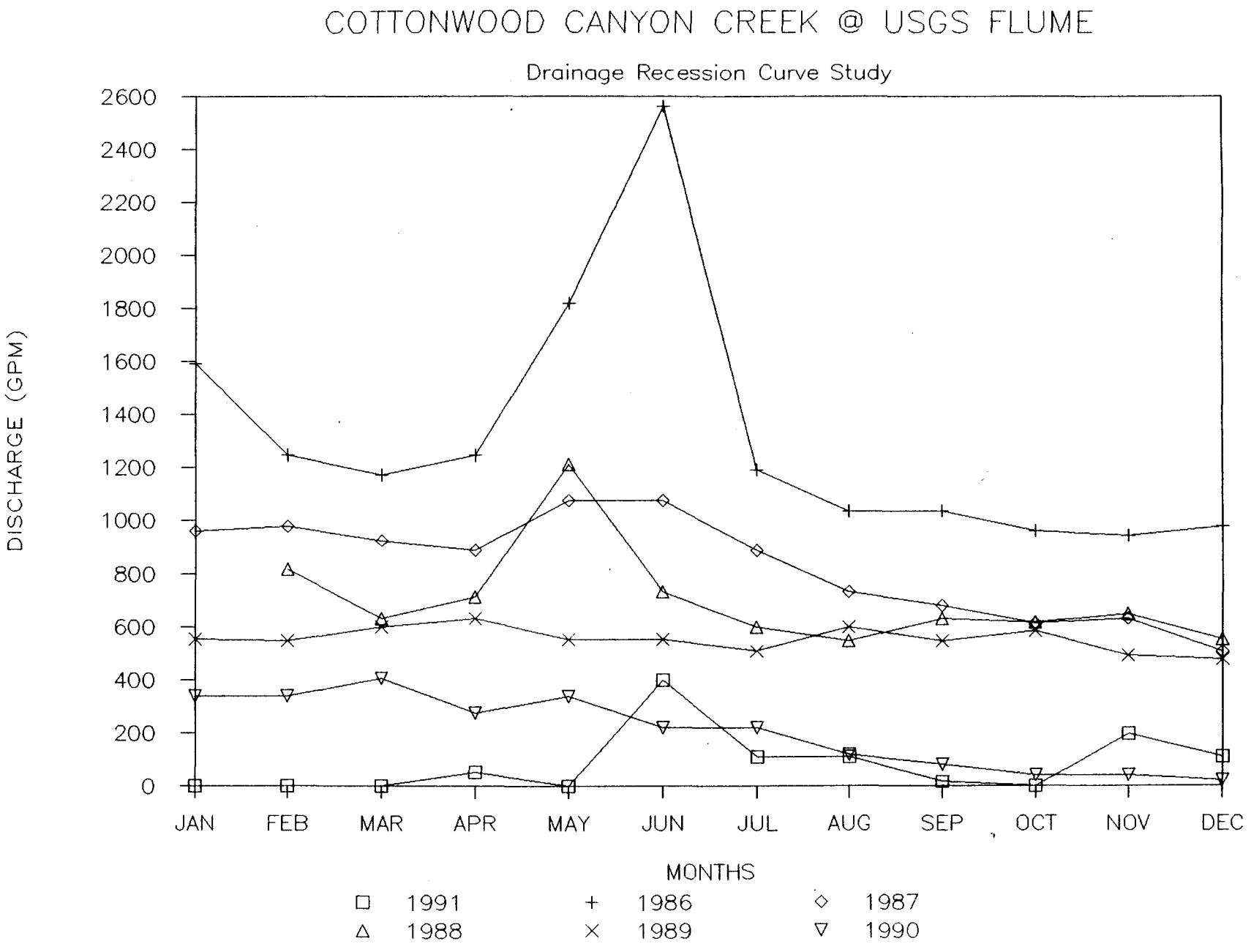
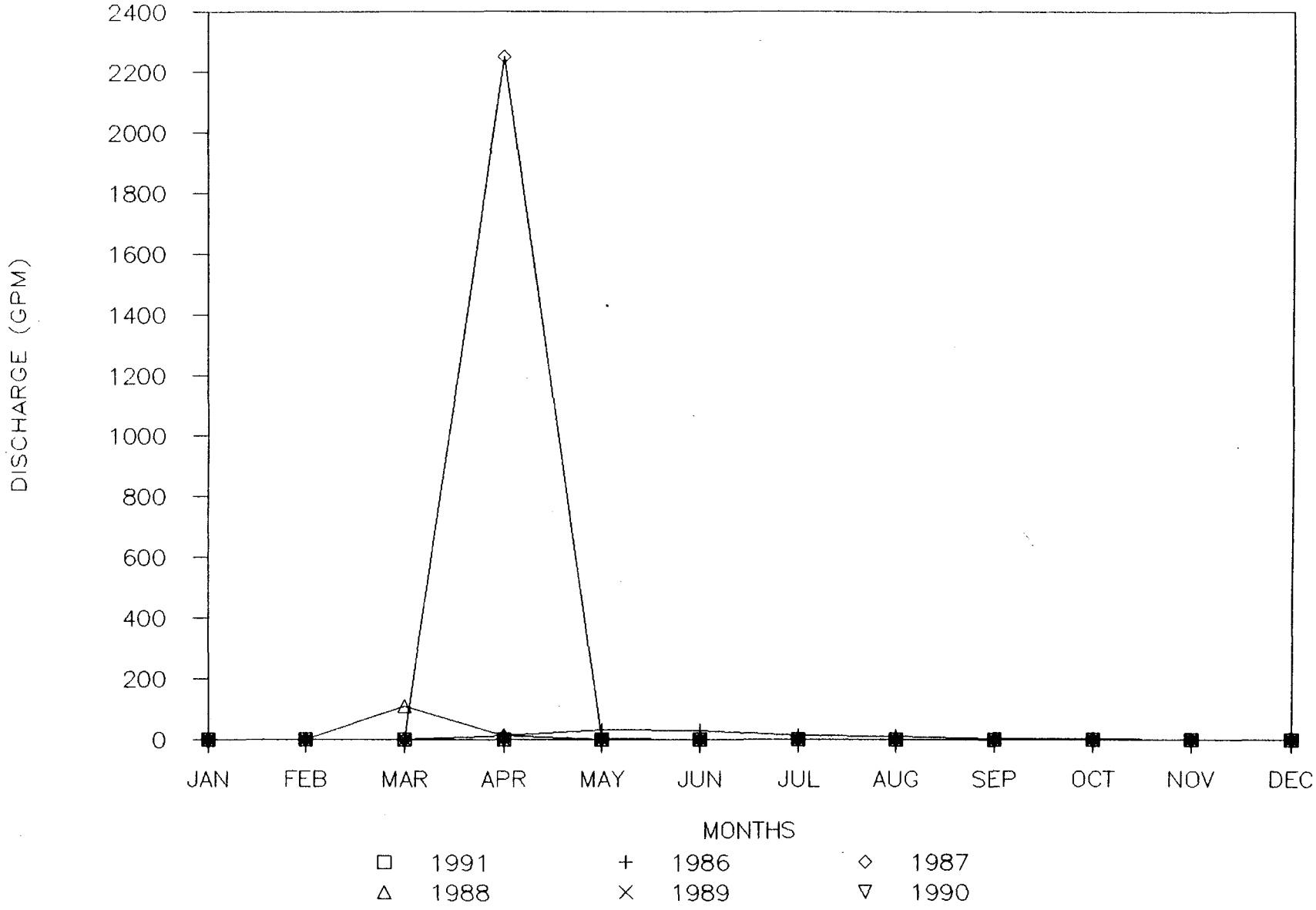
TERMS AND CONDITIONS ON REVERSE

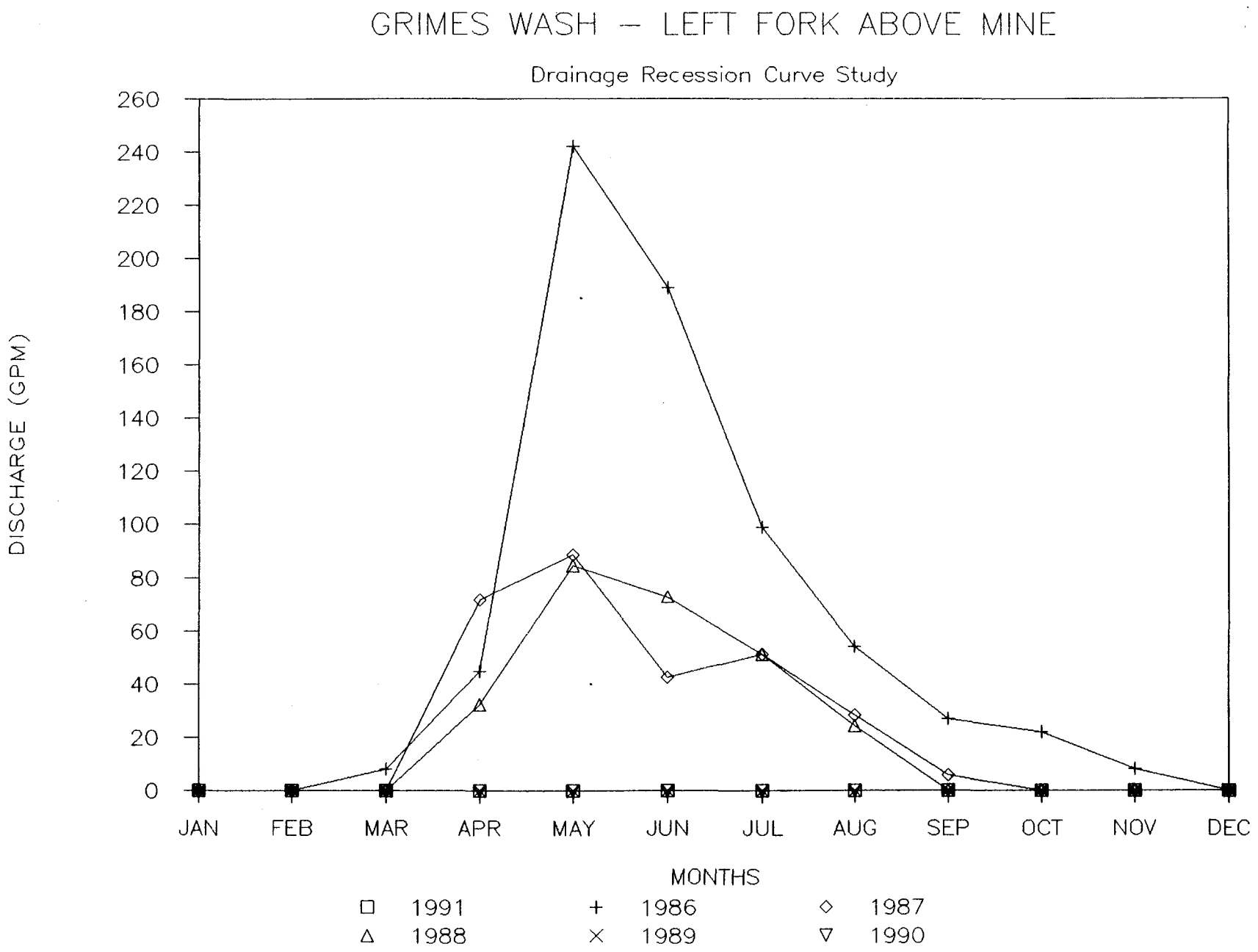
APPENDIX E


COTTONWOOD CANYON CREEK @ USGS FLUME
Drainage Recession Curve Study
DISCHARGE (GPM)
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1991
1986
1987
1988
1989
1990

GRIMES WASH - RIGHT FORK ABOVE MINE

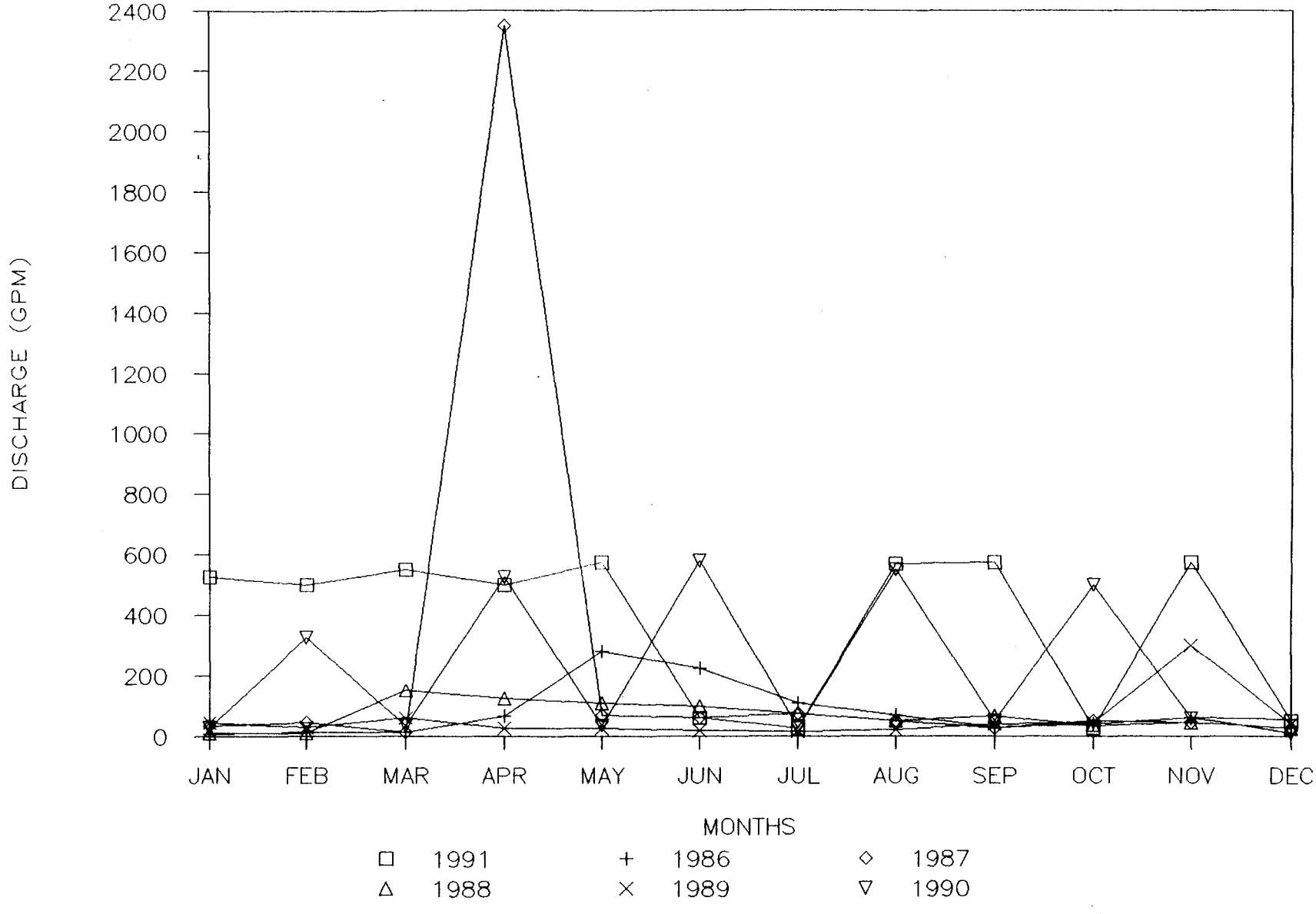
Drainage Recession Curve Study




GRIMES WASH – LEFT FORK ABOVE MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
260
240
220
200
180
160
140
120
100
80
60
40
20
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1991
1986
1987
1988
1989
1990

GRIME WASH – BELOW MINE

Drainage Recession Curve Study



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Member of the SGS Group (Société Générale de Surveillance)

PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

April 12, 1991

Job. No.: 59-11060

Date Rec'd: March 13, 1991

Date Sampled: March 13, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

WILBERG MINE RUN-OFF ~~WMRO3~~ GWR03
Temperature 39.4 Degrees
Flow 30 GPM
Rec'd 1300 hr.
Sampled 1100 hr.

FIELD MEASUREMENTS	
pH	8.39
Conductivity	1330
DO	8.8

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	03-18-91	1340 hr.
Alkalinity, bicarbonate	304 mg/l HCO_3	02-07-91	1300 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	02-07-91	1300 hr.
Alkalinity, total	249 mg/l $CaCO_3$	02-07-91	1300 hr.
Anions, total	14.94 meq/l		
Calcium	143.4 mg/l	02-07-91	1300 hr.
Cations, total	15.64 meq/l		
Chloride	120.0 mg/l	03-19-91	1100 hr.
Conductivity	1300 umhos/cm	02-05-91	1445 hr.
Hardness, total	658 mg/l $CaCO_3$	02-07-91	1300 hr.
Iron, total	0.09 mg/l	02-07-91	1300 hr.
Iron, dissolved	0.02<mg/l	02-07-91	1300 hr.
Magnesium	72.80 mg/l	02-07-91	1300 hr.
Manganese	0.04 mg/l	02-07-91	1300 hr.
Oil and Grease	2.3 mg/l	03-11-91	1030 hr.
Oxygen, dissolved	7.2 mg/l	03-13-91	1340 hr.
pH	8.10 units	03-13-91	1130 hr.
Potassium	2.97 mg/l	02-07-91	1300 hr.
Sodium	56.30 mg/l	02-07-91	1300 hr.
Solids, dissolved	936.0 mg/l	03-15-91	0900 hr.
Solids, settleable	0.5<mg/l	03-14-91	0900 hr.
Solids, suspended	3.0 mg/l	03-15-91	0900 hr.
Sulfate	320.0 mg/l	03-19-91	1130 hr.
Turbidity	0.5 NTU	03-14-91	

ANALYST: Lois Stafko

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

May 6, 1991

Job. No.: 59-11125

Sample ID:

Date Rec'd: April 10, 1991

Date Sampled: April 9, 1991

Sampled By: PacifiCorp

GRIMES WASH BELOW MINE GWRO3
Temperature 46.4 Degrees
Flow 500 GPM EST.
Rec'd 1030 hr.
Sampled 1645 hr.

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

FIELD MEASUREMENTS	
pH	8.57
Conductivity	1080
DO	6.7

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	04-11-91	1430 hr
Alkalinity, bicarbonate	300 mg/l HCO_3	04-11-91	1430 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	04-11-91	1430 hr.
Alkalinity, total	246 mg/l $CaCO_3$	04-11-91	1430 hr.
Aluminum	0.50<mg/l	04-17-91	1730 hr.
Anions, total	11.94 meq/l		
Arsenic	0.002<mg/l	04-17-91	1730 hr.
Barium	0.03<mg/l	04-17-91	1730 hr.
Boron	0.09 mg/l	04-22-91	1450 hr.
Cadmium	0.005<mg/l	04-17-91	1730 hr.
Calcium	71.4 mg/l	04-22-91	1100 hr.
Cations, total	11.06 meq/l		
Chloride	105.0 mg/l	04-19-91	1300 hr.
Chromium	0.11 mg/l	04-17-91	1730 hr.
Conductivity	930 umhos/cm	04-11-91	1000 hr.
Copper	0.010<mg/l	04-17-91	1730 hr.
Fluoride	0.18 mg/l	04-18-91	0830 hr.
Hardness, total	385 mg/l $CaCO_3$	04-22-91	1100 hr.
Iron, total	0.15 mg/l	04-22-91	1100 hr.
Iron, dissolved	0.02<mg/l	04-22-91	1100 hr.
Lead	0.020,mg/l	04-17-91	1730 hr.
Magnesium	50.20 mg/l	04-22-91	1100 hr.

ANALYST: Lois Stafford

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

May 6, 1991

Job. No.: 59-11125

Sample ID:

Date Rec'd: April 10, 1991

Date Sampled: April 9, 1991

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Temperature 46.4 Degrees
Flow 500 GPM EST.
Rec'd 1030 hr.
Sampled 1645 hr.

FIELD MEASUREMENTS	
pH	8.57
Conductivity	1080
DO	6.7

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Huntington UT 84528

WATER ANALYSIS page 2

Manganese	0.02<mg/l	04-22-91	1100 hr.
Mercury	0.002<mg/l	04-17-91	0830 hr.
Molybdenum	0.10 mg/l	04-17-91	1730 hr.
Nickel	0.13 mg/l	04-17-91	1730 hr.
Nitrogen, ammonia	0.64 mg/l	04-17-91	0800 hr.
Nitrogen, nitrate	0.01<mg/l	04-11-91	1100 hr.
Nitrogen, nitrite	0.01<mg/l	04-11-91	1100 hr.
Oil and grease	1.6 mg/l	04-19-91	1225 hr.
Oxygen, dissolved	8.3 mg/l	04-10-91	1100 hr.
pH	8.20 mg/l	04-10-91	1115 hr.
Phosphorous, total	0.01<mg/l	04-11-91	1300 hr.
Potassium	0.01<mg/l	04-22-91	1100 hr.
Selenium	0.002<mg/l	04-17-91	1730 hr.
Sodium	78.37 mg/l	04-22-91	1100 hr.
Solids, dissolved	833.0 mg/l	04-16-91	1000 hr.
Solids, settleable	0.5<mg/l	04-10-91	1300 hr.
Solids, suspended	51.0 mg/l	04-16-91	1000 hr.
Sulfate	200.0 mg/l	04-12-91	0715 hr.
Sulfide	18.80 mg/l	04-22-91	1515 hr.
Turbidity	3.0 NTU	04-11-91	1100 hr.
Zinc	0.05 mg/l	04-22-91	1100 hr.

ANALYST: Lois Staples

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P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

July 16, 1991

Job. No.: 59-11246

Date Rec'd: June 6, 1991

Date Sampled: June 6, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

GRIMES WASH RUN-OFF BELOW MINE GWRO3
Temperature 56.5 Degrees
Flow 60.0 GPM
Rec'd 1630 hr.
Sampled 1420 hr.

FIELD MEASUREMENTS	
pH	7.53
Conductivity	1620
DO	7.9

WATER ANALYSIS

Acidity	1<mg/l $CaCO_3$	06-07-91	0900 hr
Alkalinity, bicarbonate	295 mg/l HCO_3	06-12-91	1000 hr.
Alkalinity, carbonate	1<mg/l $CaCO_3$	06-12-91	1000 hr.
Alkalinity, total	242 mg/l $CaCO_3$	06-12-91	1000 hr.
Aluminum	0.10 mg/l	07-11-91	1500 hr.
Anions, total	18.58 meq/l		
Arsenic	0.003 mg/l	07-11-91	1500 hr.
Barium	0.39 mg/l	07-11-91	1500 hr.
Boron	0.01<mg/l	06-11-91	1000 hr.
Cadmium	0.035 mg/l	07-11-91	1500 hr.
Calcium	205.6 mg/l	06-12-91	1300 hr.
Cations, total	22.29 meq/l		
Chloride	195.0 mg/l	06-11-91	1510 hr.
Chromium	0.01<mg/l	07-11-91	1500 hr.
Conductivity	1610 umhos/cm	06-07-91	1000 hr.
Copper	0.007 mg/l	07-11-91	1500 hr.
Fluoride	0.19 mg/l	06-13-91	1300 hr.
Hardness, total	849 mg/l $CaCO_3$	06-12-91	1300 hr.
Iron, total	0.54 mg/l	06-12-91	1300 hr.
Iron, dissolved	0.02<mg/l	06-12-91	1300 hr.
Lead	0.050<mg/l	07-11-91	1500 hr.
Magnesium	81.60 mg/l	06-12-91	1300 hr.

ANALYST: Lois Stoffo

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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July 16, 1991

Job. No.: 59-11246

Date Rec'd: June 6, 1991

Date Sampled: June 6, 1991

Sampled By: PacifiCorp

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

Sample ID:

GRIMES WASH RUN-OFF BELOW MINE GWRO3
Temperature 56.5 Degrees
Flow 60.0 GPM
Rec'd 1630 hr.
Sampled 1420 hr.

FIELD MEASUREMENTS

pH	7.53
Conductivity	1620
DO	7.9

WATER ANALYSIS page 2

Manganese	0.06 mg/l	06-12-91	1300 hr.
Mercury	0.002<mg/l	06-20-91	0840 hr.
Molybdenum	0.01<mg/l	07-11-91	1500 hr.
Nickel	0.01<mg/l	07-11-91	1500 hr.
Nitrogen, ammonia	0.12 mg/l	06-14-91	1100 hr.
Nitrogen, nitrate	0.00 mg/l	06-07-91	1400 hr.
Nitrogen, nitrite	0.00 mg/l	06-07-91	1400 hr.
Oil and grease	0.6 mg/l	06-17-91	0900 hr.
Oxygen, dissolved	6.1 mg/l	06-06-91	1650 hr.
pH	7.70 mg/l	06-06-91	1640 hr.
Phosphorous, total	0.00 mg/l	06-28-91	0900 hr.
Potassium	4.95 mg/l	06-12-91	1300 hr.
Selenium	0.002<mg/l	07-11-91	1500 hr.
Sodium	120.80 mg/l	06-12-91	1300 hr.
Solids, dissolved	1242.0 mg/l	06-12-91	0800 hr.
Solids, settleable	0.5<mg/l	06-07-91	0900 hr.
Solids, suspended	6.0 mg/l	06-12-91	0800 hr.
Sulfate	400.0 mg/l	06-11-91	1000 hr.
Sulfide	6.80 mg/l	06-13-91	0900 hr.
Turbidity	3.0 NTU	06-11-91	0800 hr.
Zinc	0.01<mg/l	07-11-91	1500 hr.

ANALYST: Lois Stoffer

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COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311
FAX: (801) 653-2479

October 2, 1991

Job. No.: 59-11533

Sample ID:

Date Rec'd: September 12, 1991

Date Sampled: September 12, 1991

Sampled By: PacifiCorp

GRIMES WASH RUN-OFF BELOW MINE - GWR03
Temperature 57.2 Degrees
Flow 575 GPM
Rec'd 1600 hr.
Sampled 1130 hr.

FIELD MEASUREMENTS

pH	8.38
Conductivity	837
DO	7.7

PacifiCorp Field Office
P.O.Box 1005
Huntington UT 84528

WATER ANALYSIS

Acidity	10 mg/l $CaCO_3$	09-18-91	0945 hr.
Alkalinity, bicarbonate	325 mg/l HCO_3	09-18-91	0945 hr.
Alkalinity, carbonate	1< mg/l $CaCO_3$	09-18-91	0945 hr.
Alkalinity, total	267 mg/l $CaCO_3$	09-18-91	0945 hr.
Anions, total	10.53 meq/l		
Calcium	148.7 mg/l	09-19-91	1400 hr.
Cations, total	10.81 meq/l		
Chloride	25.0 mg/l	09-24-91	1300 hr.
Conductivity	710 umhos/cm	09-18-91	0945 hr.
Hardness, total	482 mg/l $CaCO_3$	09-19-91	1400 hr.
Iron, total	0.86 mg/l	09-19-91	1400 hr.
Iron, dissolved	0.85 mg/l	09-19-91	1400 hr.
Magnesium	26.85 mg/l	09-19-91	1400 hr.
Manganese	0.12 mg/l	09-19-91	1400 hr.
Oil and Grease	1.0< mg/l	09-12-91	1600 hr.
Oxygen, dissolved	7.8 mg/l	09-12-91	1620 hr.
pH	8.10 units	09-12-91	1620 hr.
Potassium	2.61 mg/l	09-19-91	1400 hr.
Sodium	25.68 mg/l	09-19-91	1400 hr.
Solids, dissolved	565.0 mg/l	09-16-91	1100 hr.
Solids, settleable	0.5< mg/l	09-13-91	0800 hr.
Solids, suspended	247.0 mg/l	09-16-91	1100 hr.
Sulfate	220.0 mg/l	09-23-91	1300 hr.
Turbidity	125.0 NTU	09-13-91	0830 hr.

ANALYST: [illegible]

3MD

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

[illegible] - 08 1991

Manager, Huntington Laboratory

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FAX: (801) 653-2479

January 2, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

(AMENDED ID)

Kind of sample reported to us: Water

Sample taken at: Grimes Wash

Sample taken by: PacifiCorp

Date sampled: December 10, 1991

Date received: December 10, 1991

GRIMES WASH RUN-OFF GWRO3-Below Mine
Rec'd 1600 hr.
Sampled 1400 hr.
Temperature 40.2°F
Flow 50 GPM

FIELD MEASUREMENTS	
pH	7.8
Conductivity	3380
DO	9.7

Analysis report no. 59-11739

Parameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
Acidity	22	1	mg/l $CaCO_3$	EPA 305.1	12-13-1991 08:45 LS
Alkalinity, Bicarbonate	337	1	mg/l $CaCO_3$	EPA 310.1	12-11-1991 15:30 LM
Alkalinity, Carbonate	0	1	mg/l $CaCO_3$	EPA 310.1	12-11-1991 15:30 LM
Alkalinity, Total	277	1	mg/l $CaCO_3$	EPA 310.1	12-11-1991 15:30 LM
Aluminum	0.00	.5	mg/l	EPA 202.1	12-19-1991 14:00 JS
Anions	34.80	----	meq/l	---------	---------- ----- --
Arsenic	0.000	.002	ug/l	EPA 206.3	12-17-1991 13:00 JS
Barium	0.26	.03	mg/l	EPA 208.1	12-19-1991 14:00 JS
Boron	0.47	.01	mg/l	EPA 212.3	12-13-1991 12:30 LM
Cadmium	0.000	.005	mg/l	EPA 213.1	12-19-1991 14:00 JS
Calcium	189.5	.1	mg/l	EPA 215.1	12-20-1991 11:40 JS
Cations	35.51	----	meq/l	---------	---------- ----- --
Chloride	735.0	.1	mg/l	EPA 325.3	12-12-1991 12:30 LS
Chromium	0.07	.02	mg/l	EPA 218.1	12-19-1991 14:00 JS
Conductivity	3000	2	umhos/cm	EPA 120.1	12-13-1991 13:00 LS
Copper	0.000	.01	mg/l	EPA 220.1	12-19-1991 14:00 JS
Fluoride	0.39	.01	mg/l	EPA 340.2	12-11-1991 08:30 LS
Hardness, Total	770	1	mg/l $CaCO_3$	---------	12-20-1991 11:40 JS
Iron	0.11	.02	mg/l	EPA 236.1	12-19-1991 11:00 JS
Iron, Dissolved	0.09	.02	mg/l	EPA 236.1	12-19-1991 11:00 JS
Lead	0.000	.05	mg/l	EPA 239.1	12-19-1991 14:00 JS
Magnesium	72.00	.01	mg/l	EPA 242.1	12-20-1991 11:40 JS
Manganese	0.05	.01	mg/l	EPA 243.1	12-19-1991 11:00 JS
Mercury	0.000	.002	mg/l	EPA 245.1	12-17-1991 13:00 LM

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Dave Council

Manager, Huntington Laboratory

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January 2, 1992

PACIFICORP FIELD OFFICE
P.O. Box 1005
Huntington UT 84528

Sample identification by
PACIFICORP FIELD OFFICE

(AMENDED ID)

Kind of sample reported to us Water

Sample taken at Grimes Wash

Sample taken by PacifiCorp

Date sampled December 10, 1991

Date received December 10, 1991

GRIMES WASH RUN-OFF GWRO3-Below Mine
Rec'd 1600 hr.
Sampled 1400 hr.
Temperature 40.2°F
Flow 50 GPM

FIELD MEASUREMENTS

pH	7.8
Conductivity	3380
DO	9.7

Analysis report no. 59-11739

arameter	Result	MDL	Units	Method	Analyzed Date/Time/Analyst
olybdenum	0.00	.1	mg/l	EPA 246.1	12-19-1991 14:00 JS
ickel	0.00	.02	mg/l	EPA 249.1	12-19-1991 14:00 JS
itrogen, Ammonia	0.13	.01	mg/l	EPA 350.3	12-11-1991 12:30 LS
itrogen, Nitrate	0.00	.01	mg/l	EPA 353.3	12-11-1991 15:00 JK
itrogen, Nitrite	0.00	.01	mg/l	EPA 354.1	12-11-1991 15:00 JK
il & Grease	1.4	1	mg/l	EPA 413.1	12-12-1991 14:00 LM
xygen, Dissolved	9.9	.01	mg/l	EPA 360.1	12-10-1991 16:10 LS
	7.60	----	Units	EPA 150.1	12-10-1991 16:10 LS
osphorus, Total	0.00	.01	mg/l	EPA 365.2	12-13-1991 15:20 LM
assium	12.80	.01	mg/l	EPA 258.1	12-20-1991 11:40 JS
enium	0.000	.002	ug/l	EPA 270.3	12-17-1991 08:30 JS
dium	460.50	.01	mg/l	EPA 273.1	12-20-1991 11:40 JS
lids, Settleable	0.0	.5	mg/l	EPA 160.5	12-12-1991 08:15 LS
olids, Total Dissolved	2080.0	.5	mg/l	EPA 160.1	12-11-1991 10:15 LM
olids, Total Suspended	15.0	.5	mg/l	EPA 160.2	12-11-1991 10:15 LM
ulfate	420.0	.1	mg/l	EPA 375.4	12-23-1991 11:00 LS
ulfide	3.60	.1	mg/l	EPA 376.1	12-10-1991 10:30 LS
urbidity	30.0	.1	NTU	EPA 180.1	12-11-1991 08:00 LS
inc	0.10	.01	mg/l	EPA 289.1	12-19-1991 14:00 JS

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Dave Council

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