ANNUAL HYDROLOGIC MONITORING REPORT
EAST/TRAIL MOUNTAIN PROPERTIES
1997

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PACIFICORP

TECHNICAL SERVICES REPORT

CHARLES A. SEMBORSKI
DENNIS OAKLEY

CENTRAL ENGINEERING

ANNUAL HYDROLOGIC MONITORING REPORT
EAST/TRAIL MOUNTAIN PROPERTIES
1997

ENERGY WEST Mining Co.
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APRIL 1998

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PACIFICORP - FUEL RESOURCES
HYDROLOGIC MONITORING PROGRAM
ANNUAL REPORT FOR 1997

APRIL 1998

Submitted to: United States Department of the Interior
Bureau of Land Management
U.S.D.A. - Forest Service: Manti-LaSal National Forest
Utah Division of Oil, Gas and Mining

Prepared and submitted for PacifiCorp by:

Hydrologic Section of the Power Operations Department

and

Energy West

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I. INTRODUCTION

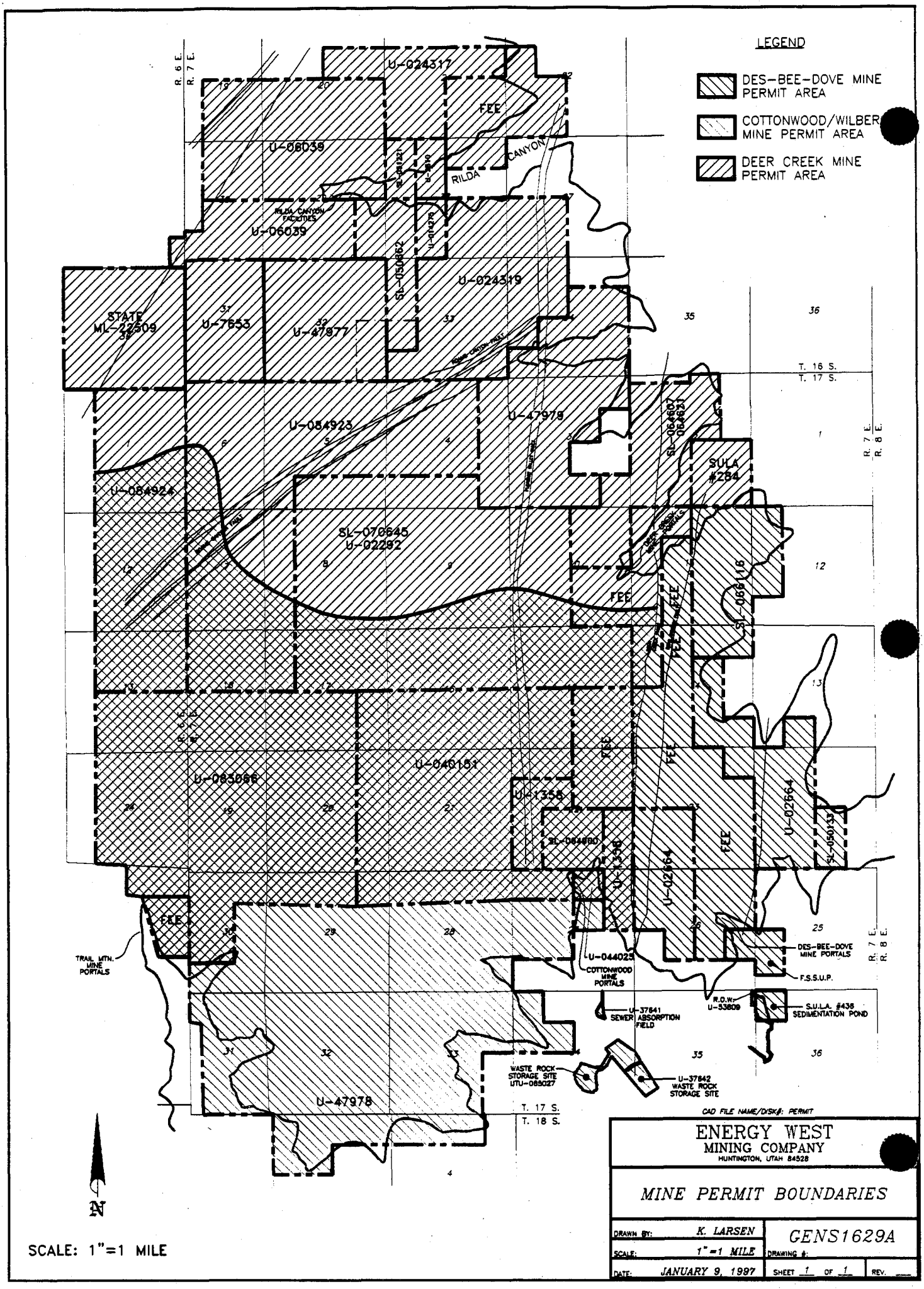
The 1997 Hydrologic Monitoring Report is hereby submitted in accordance with the U. S. Department of Interior, Office of Surface Mining requirements and the Utah State Division of Oil, Gas and Mining guidelines for hydrologic monitoring in areas of and adjacent to coal mining operations.

This is the twentieth annual hydrologic report submitted by PacifiCorp since the report entitled "Monitoring of the Water Resources in the Mining Areas of East/Trail 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, A & B.)

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.


LEGEND
DES-BEE-DOVE MINE PERMIT AREA
COTTONWOOD/WILBER MINE PERMIT AREA
DEER CREEK MINE PERMIT AREA
R. 6 E.
R. 7 E.
R. 8 E.
T. 16 S.
T. 17 S.
T. 18 S.
U-024317
FEE
U-08039
RILDA CANYON
RILDA CANYON FACILITIES
U-06039
U-024319
STATE ML-22509
U-7653
U-47977
U-084923
U-47979
U-084924
SL-070645
U-02292
SULA #284
FEE
U-040151
U-1358
U-02664
U-1358
U-02664
U-044025
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DES-BEE-DOVE MINE PORTALS
F.S.S.U.P.
R.O.W. U-53809
S.U.L.A. #436 SEDIMENTATION POND
U-37641 SEWER ABSORPTION FIELD
WASTE ROCK STORAGE SITE UTU-085027
U-37642 WASTE ROCK STORAGE SITE
TRAIL MTN. MINE PORTALS
U-47978
N
SCALE: 1"=1 MILE
CAD FILE NAME/DISK#: PERMIT
ENERGY WEST MINING COMPANY
HUNTINGTON, UTAH 84528
MINE PERMIT BOUNDARIES
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DATE: JANUARY 9, 1997
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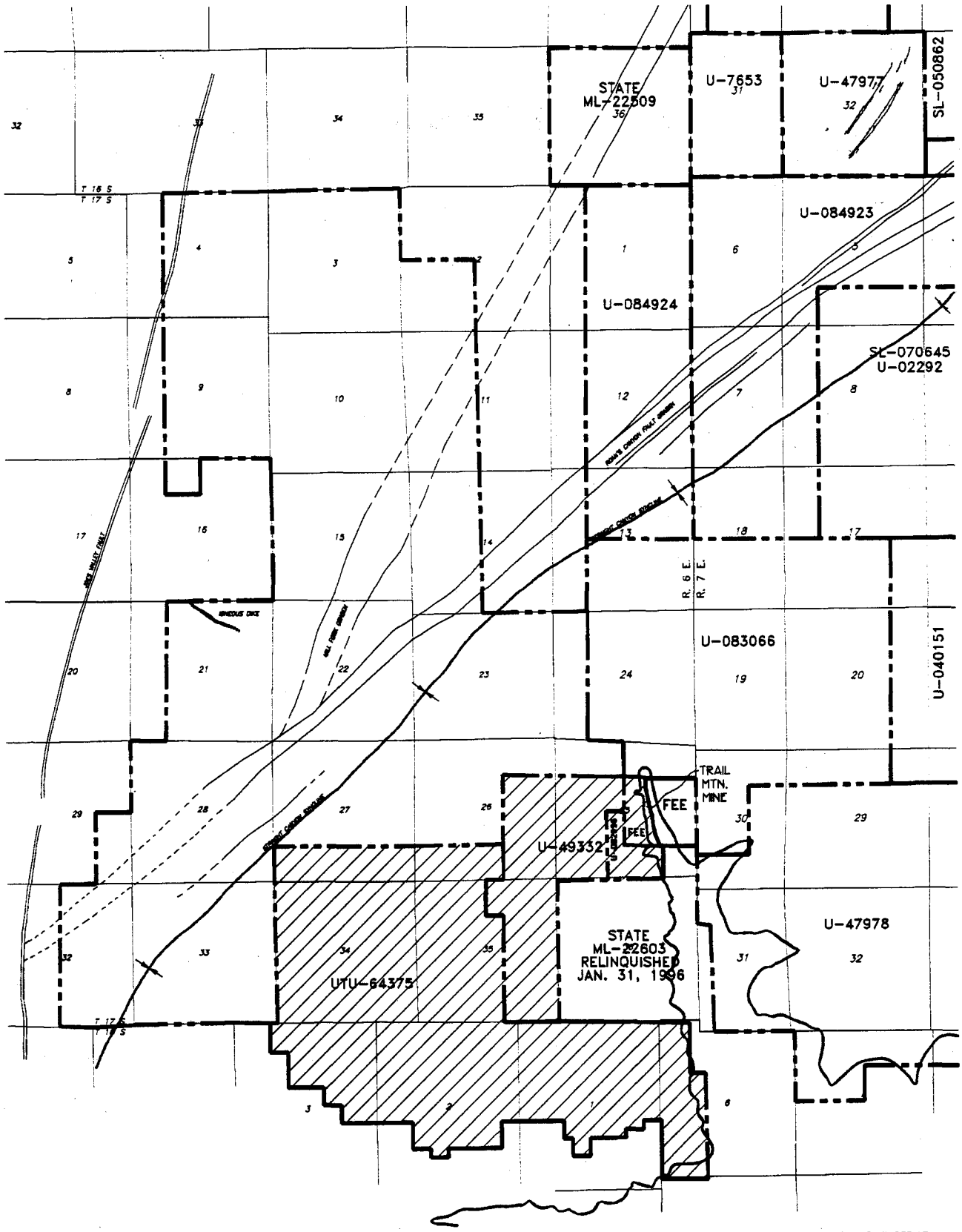

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SCALE: 1"=1 MILE

TRAIL MOUNTAIN MINE PERMIT AREA

CAD FILE NAME/DISK#: TMPERMIT

ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

TRAIL MOUNTAIN MINE
MINE PERMIT BOUNDARY

DRAWN BY: K. LARSEN	FIGURE 1B	
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DATE: APRIL 7, 1997	SHEET 1 OF 1	REV. ___

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/Trail Mountain springs cannot be over-emphasized.

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 from 1988 through 1992 with runoff amounts much below normal for six consecutive years. 1993 runoff improved substantially with above average flow conditions occurring in most river basins. 1994 brought the return of drought conditions throughout the West. 1995 and 1996 water supplies were much improved with above average runoff in Emery County. In 1997 runoff was substantially higher than normal and was the highest since the wet cycle of the mid-1980's.

B. Local Climatology

1. Precipitation

Valley precipitation in Emery County during 1997 was variable. High elevation stations as well as intermediate and lower elevation stations were much above normal for the year except for East Mountain, which was eighty-six percent (86%) of normal..

Precipitation amounts recorded at Hunter Plant, Huntington Plant, Electric Lake, and East Mountain for the 1997 water year (October 1996 to September 1997) 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 1996 and 1997 merits consideration in this study. The intent is to develop a correlation between yearly precipitation and spring discharges on East and Trail mountains. Table 2 is a comparison of the 1996-1997 precipitation levels recorded at the four locations.

TABLE 2: COMPARISON OF 1996 AND 1997 PRECIPITATION (Inches)

Station	1996 Amount	1996 % of Normal	1997 Amount	1997 % of Normal	1997 As % of 1996
Hunter Plant	5.84	84	14.19	204	243
Huntington Plant	10.49	96	15.58	143	149
Electric Lake	26.90	138	25.86	132	96
East Mountain	12.12	87	11.75	86	97
Average %		113		141	146

TABLE 1: PRECIPITATION IN EMERY COUNTY, UTAH (1997 Water Year)

Month	Hunter Plant (Elev. 5800') Precip (in.)	Hunter Plant % Of Normal	Huntington Plant (Elev. 6500') Precip (in.)	Huntington Plant % Of Normal	Electric Lake (Elev. 8350') Precip. (in.)	Electric Lake % Of Normal	East Mountain (Elev. 8985') Precip. (in.)	East Mountain % of Normal
1996								
October	1.04	135	0.69	55	1.43	181	1.50	115
November	2.34	459	1.31	222	2.35	126	1.63	144
December	0.46	87	0.63	196	3.90	358	1.66	178
1997								
January	1.45	337	1.61	137	4.00	200	2.49	200
February	0.03	8	0.05	15	1.31	75	1.56	138
March	0	0	0	0	0.77	41	0	0
April	0.79	198	0.90	164	1.97	117	0.40	39
May	0.50	116	1.11	195	2.03	137	0.91	89
June	1.27	282	1.20	316	1.03	124	0.15	29
July	1.41	252	2.31	269	0.64	54	0.15	15
August	2.17	217	3.28	482	1.98	232	1.30	93
September	2.73	329	2.49	470	4.45	424	2.43	158
TOTALS	14.19	204	15.58	143	25.86	133	11.75	86
Mean Monthly	1.18	---	1.30	---	2.16	---	1.18	---

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 1997 water year.

The correlation of precipitation levels with spring discharges will be discussed in the East/Trail 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
91-92	0.17	0.50	0.14	1.04	2.72	0.87	0.22	1.56	0.34	0.22	1.60	0.52	9.90
92-93	0.81	0.07	0.78	1.44	1.67	1.18	0.50	0.92	0.15	0.05	0.93	0.05	8.55
93-94	1.54	0.51	0.08	Tr.	0.53	0.01	0.67	0.17	0.31	0.09	0.75	1.39	6.05
94-95	1.38	0.22	0.96	0.78	0.10	1.13	2.35	1.12	0.61	0.14	1.89	1.16	11.84
95-96	NA	NA	0.10	0.55	0.25	1.60	0.02	0.68	0.29	0.14	0.16	2.05	-----
96-97	1.04	2.34	0.46	1.45	0.03	0.00	0.79	0.50	1.27	1.41	2.17	2.73	14.19

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
91-92	0.21	0.99	0.37	1.20	1.98	1.55	0.47	1.92	1.97	2.99	1.53	0.60	15.78
92-93	1.93	1.02	1.67	2.32	1.71	1.87	0.46	0.65	0.31	0.08	1.68	0.46	14.16
93-94	2.11	0.88	0.23	0.12	0.88	1.17	1.69	0.53	0.05	Tr.	2.14	1.69	11.49
94-95	1.33	0.26	0.33	1.10	0.26	1.05	2.65	2.67	1.17	0.32	2.81	1.48	15.42
95-96	NA	NA	0.90	1.10	0.86	1.52	0.46	1.41	0.72	1.15	0.19	2.18	-----
96-97	0.69	1.31	0.63	1.61	0.05	0.00	0.90	1.11	1.20	2.31	3.28	2.49	15.58

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
91-92	1.43	2.10	0.87	0.72	2.21	1.95	0.54	1.55	1.01	0.59	1.64	1.02	15.63
92-93	1.51	1.33	3.60	5.01	4.76	2.25	2.49	2.40	1.57	0.48	1.32	0.60	27.32
93-94	2.10	2.19	0.90	1.00	4.00	1.10	2.81	0.99	0.10	0.25	0.75	2.32	18.51
94-95	2.40	4.26	1.60	3.25	1.90	3.84	3.94	5.07	2.04	1.00	2.53	1.95	33.78
95-96	1.54	1.38	3.54	5.84	3.25	3.23	1.75	1.73	0.90	1.09	0.45	2.20	26.90
96-97	1.43	2.35	3.90	4.00	1.31	0.77	1.97	2.03	1.03	0.64	1.98	4.45	25.86

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.

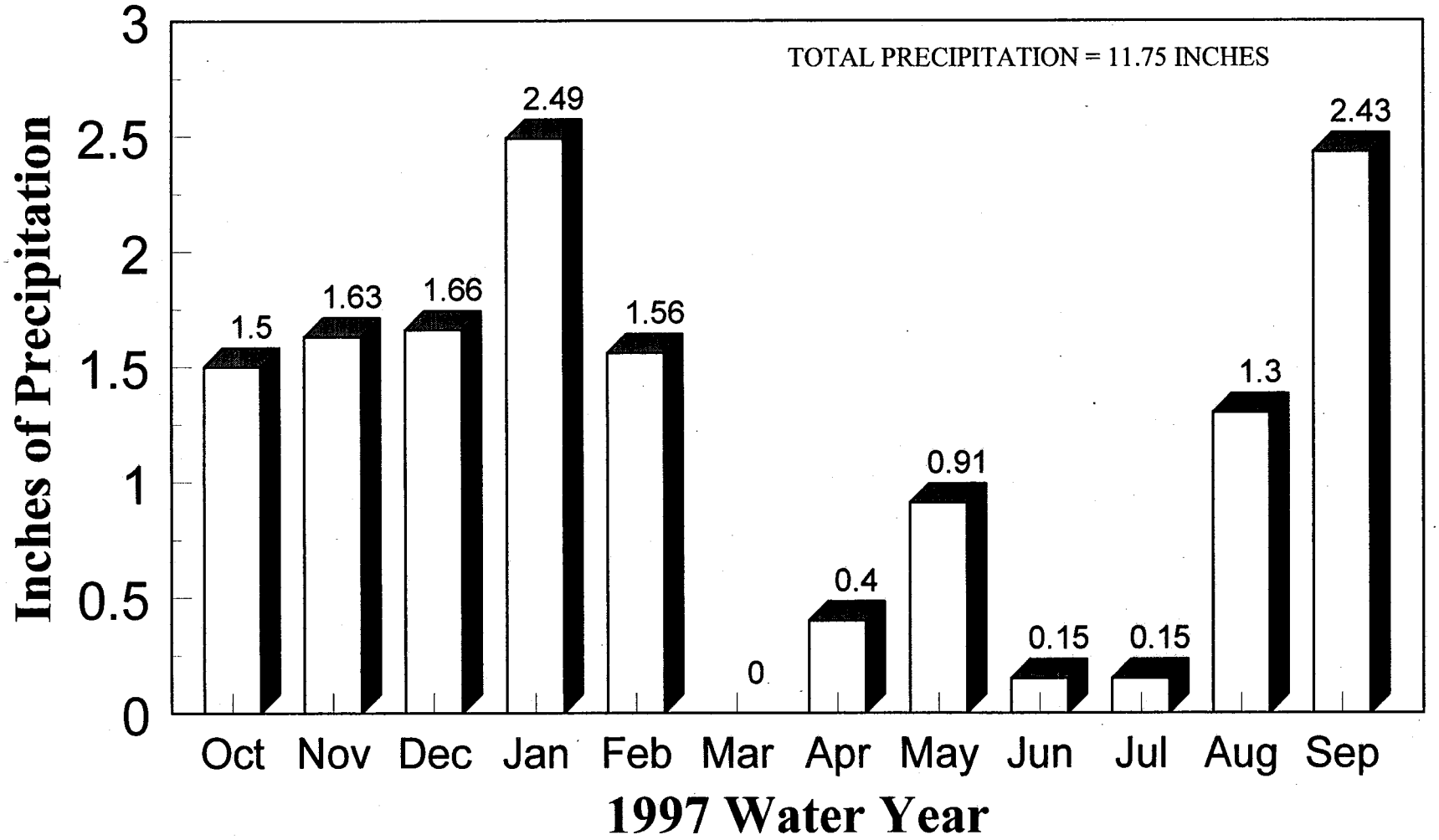
TABLE 6: EAST MOUNTAIN PRECIPITATION

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
91-92	0.49	1.07	0.07	0.61	1.73	2.39	0.56	2.19	0.95	0.85	0.48	0.35	11.74
92-93	1.57	0.57	1.53	4.10	2.34	2.01	0.33	0.72	0.19	0.04	0.82	0.14	14.37
93-94	2.23	1.12	0.14	0.32	1.35	0.34	2.65	0.36	0.39	0.10	0.83	1.49	11.33
94-95	1.86	1.42	0.65	1.37	0.66	0.79	3.75	2.29	1.19	0.34	1.52	0.62	16.46
95-96	0.18	0.46	0.64	1.39	1.18	2.23	0.21	1.14	0.30	0.58	0.35	3.46	12.12
96-97	1.50	1.63	1.66	2.49	1.56	0.00	0.40	0.91	0.15	0.15	1.30	2.43	11.75

FIGURE 2

EAST MOUNTAIN PRECIPITATION
1997 WATER YEAR



2. Temperatures

During the 1997 water year temperatures were above normal at Hunter Plant, East Mountain, and Electric Lake and below normal at Huntington Plant. Temperatures at the Hunter Plant station were above normal for all months except February. At the Huntington Plant station temperatures were below normal for all months except January, March and May. At the East Mountain station temperatures were below normal during January and July, while the rest of the year was above normal. Temperatures at the Electric Lake station were variable during the entire year. (See Table 7.)

A comparison of 1996 and 1997 temperatures for the four stations is addressed since temperatures also influence water supplies from year to year. Table 8 depicts the variation and compares 1996 to 1997.

TABLE 8: COMPARISON OF 1996 AND 1997 TEMPERATURES*

	1996		1997		1997
Station	Average Temp.	Departure From Normal	Average Temp.	Departure From Normal	Departure From 1996
Hunter Plant	NA**	NA**	50.2	+4.4	NA**
Huntington Plant	NA**	NA**	46.4	-1.2	NA**
Electric Lake	36.1	+2.2	35.1	+1.2	-1.0
East Mountain	47.0	+7.2	42.7	+2.8	+4.2
Average Departure From Normal		+4.9**		+1.8	+1.6

* Temperatures reported in degrees Fahrenheit.
** NOTE: Due to missing data for Hunter and Huntington for October and November 1995, no comparisons for 1996 were made.

TABLE 7: TEMPERATURES IN EMERY COUNTY, UTAH (1997 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
1996								
October	50.5	+2.1	46.2	-3.2	36.8	-0.7	41.8	+2.7
November	38.2	+3.0	34.8	-1.2	24.4	-1.3	34.6	+6.7
December	29.9	+3.2	25.4	-2.0	20.9	+5.1	26.4	+5.3
1997								
January	24.2	+0.1	23.9	+0.3	16.2	+1.6	21.0	-0.9
February	26.1	-2.3	26.0	-4.2	13.6	-5.7	25.7	+0.8
March	43.9	+8.1	39.9	+2.2	27.0	+6.2	37.8	+8.8
April	47.8	+3.2	42.0	-3.1	28.0	-0.7	37.9	+1.4
May	62.6	+10.5	58.4	+3.5	43.2	+4.2	44.3	0.0
June	70.3	+8.9	65.2	-0.6	53.5	+4.9	60.6	+4.6
July	73.6	+5.2	68.3	-3.4	53.9	-1.8	62.7	-0.2
August	69.9	+3.5	66.6	-2.8	54.2	+0.4	65.1	+3.0
September	64.9	+13.0	60.2	-0.2	50.0	+2.5	54.1	+1.6
AVERAGE	50.2	+4.4	46.4	-1.2	35.1	+1.2	42.7	+2.8

* 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 HM-1 in pocket.) The drainage boundaries, including minor subdivisions to Cottonwood and Huntington creeks, are designated on the accompanying map. The surface drainage system on Trail Mountain is totally contained within the Cottonwood Creek drainage system, with minor subdivisions flowing to Indian and Cottonwood Canyon creeks. (See Plate 7-2 in pocket.) 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, Mill Fork Canyon, and Rilda Canyon creeks are the only tributaries to Huntington Creek that emanate from within PacifiCorp's coal mine permitted area. Monitoring in Mill Fork Canyon was initiated in 1997 and will be reported in the 1998 water report.

1. Huntington Creek

Flow data are recorded on a continuous basis by PacifiCorp at two locations; one station is located near PacifiCorp's Huntington Plant, the other about 22 miles upstream from the Huntington Plant. Flow records are maintained by

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 1997 water year (October 1996 - September 1997) at the two stations and Electric Lake storage are found in Appendix A.

TABLE 9: HUNTINGTON CREEK WATER FLOWS (1997 Water Year)

	Huntington Creek Below Electric Lake*	Huntington Creek At Plant*	Calc. Natural Flow at Plant
Total Yearly Flow (Acre Feet)	26,257	90,618	100,655
% of Normal	121	133	143
Mean Discharge in Cubic Feet Per Second (CFS)	36	125	
Maximum Discharge (CFS)	117	519	
Date of Maximum Discharge	9/3/97	5/18/97	
Minimum Discharge (CFS)	9	6	
Date of Minimum Discharge	10/12/96	12/2/96	

*Influenced by upstream storage in Electric Lake.

During the 1997 spring runoff period (April through July) 12,812 acre feet of water were impounded behind Electric Lake Dam. During spring runoff the impoundment reached its highest level on July 2. Total storage on that date amounted to 31,008 acre feet, which is full pool. Reservoir releases for fishery, irrigation, flood control, and Huntington Plant needs during the water year totaled 26,257 acre feet.

The total flow of 90,618 acre feet recorded for Huntington Creek at the Huntington Plant is equal to 133% of average.

A comparison of runoff values from 1996 and 1997 is presented in Table 10.

TABLE 10: COMPARISON OF 1996 AND 1997 RUNOFF VALUES

	1997		1996		
	Amount	% Of Normal	Amount	% Of Normal	1996 as a % of 1997
Spring Runoff Stored in Electric Lake (Acre Feet)	12,812	124	9,908	96	77
Calculated Natural Flow at Plant (Acre Feet)	100,655	143	81,492	116	81

During 1997 water quality information on Huntington Creek near the Deer Creek confluence was compiled on a monthly basis. Locations of water quality sampling stations monitored by PacifiCorp-Energy West Mining Company 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 11, 12, and 13. 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.

TABLE 11: HUNTINGTON CREEK WATER QUALITY *

HCC01 - ABOVE POWER PLANT

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
3-97		203	48		14	373	9.6	173	0.3		13			8.4		6	17	17	170	
6-97		208	46	8	5	356	6.5	173	0.1		14			8.5		3	13	17	190	
9-97		174	39		5	303	7.4	139	13.3		10	0.3		8.18		5	14	504	230	
12-97		282	57		10	476	8.4	229			21			8.32	1	7	33		250	
1996**																				
MIN		174	39	8	5	303	6.50	139	0.10		10			8.18	1	3	13	17	170	
MAX		282	57	8	14	476	9.60	229	13.30		21			8.50	1	7	33	504	250	
MEAN		217	48	8	9	377	7.98	179	4.57		15			8.35	1	5	19	179	210	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	9.0	167	46.0	19.0	5.0	304	8.80	164	0.08		12.00		2.0	8.38	1.00	3.00	8.0	5.0	157	
MAX	20.0	246	64.0	24.0	16.0	533	11.60	263	0.60		25.00		2.0	8.54	2.00	11.00	38.0	32.0	272	
MEAN	14.5	200	54.3	22.0	10.5	410.5	10.33	210.25	0.39		18.25		2.0	8.45	1.40	6.75	22.5	17.3	215	
1995																				
MIN	10.0	165	47.0	5.0	4.0	287	3.80	167	0.10	0.10	12.00	0.10	5.0	8.10	1.00	4.00	7.0	5.0	170	0.50
MAX	10.0	255	57.0	15.0	14.0	441	9.20	228	1.40	0.10	22.00	0.10	5.0	8.81	2.00	11.00	29.0	70.0	260	0.50
MEAN	10.0	204	53.3	10.0	9.0	360.5	6.75	203.75	0.58	0.10	17.50	0.10	5.0	8.56	1.25	7.25	18.5	30.0	208	0.50
1994																				
MIN	10.0	173	40.0	1.0	2.0	310	6.2	149	0.10	0.20	11.00	0.10	5.0	8.17	1.00	3.00	2.0	4.0	170	0.50
MAX	10.0	249	57.0	5.0	30.0	484	9.9	235	0.20	0.60	23.00	0.20	7.0	8.88	5.00	11.00	40.0	40.0	280	0.50
MEAN	10.0	211	50.6	2.0	10.6	379	7.8	193	0.19	0.28	16.42	0.14	5.3	8.60	3.00	6.17	19.7	15.9	224	0.50
1993																				
MIN	0.0	159	32.7	0.0	1.0	309	4.3	118	0.05	0.10	9.00	0.00	0.0	7.80	0.00	1.00	3.0	6.0	164	0.50
MAX	3.0	253	76.4	6.0	20.0	640	10.5	275	0.25	1.95	25.60	0.20	5.0	9.17	2.00	19.60	60.0	95.0	330	0.70
MEAN	0.6	210	51.6	1.2	9.7	410	7.1	202	0.14	0.54	17.82	0.60	1.2	8.42	0.71	7.65	26.0	25.9	228	0.33
1992																				
MIN	0.1	189	40.3	0.1	10.0	309	5.8	177	0.01	0.01	11.30	0.01	0.1	8.01	0.01	1.24	5.0	1.0	134	0.01
MAX	17.0	281	80.7	6.0	25.0	475	10.1	289	0.10	0.25	30.00	0.07	3.7	8.90	3.12	23.00	70.0	25.0	269	--
MEAN	2.1	224	60.9	2.4	13.8	385	8.1	234	0.03	0.09	19.80	0.02	0.9	8.58	0.54	8.09	33.7	9.3	210	0.01
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
HISTORICAL 1991-1996																				
MIN	0.1	159	32.7	0.1	1.0	210	3.8	118	0.01	0.01	9.00	0.01	0.1	7.10	0.01	1.00	2.0	1.00	134	0.0
MAX	25.0	400	102.6	24.0	45.0	640	11.6	392	1.95	0.25	44.70	0.20	7.0	8.90	5.00	55.00	130.0	95.00	369	1.0
MEAN	4.8	226	59.3	3.3	14.6	389	8.2	226.7	0.24	0.10	19.15	0.06	2.5	8.39	1.35	7.96	31.5	15.33	230	0.4
No. of Analysis	59	63	63	56	62	73	73	63	58	58	63	56	53	73	55	63	63	73	73	62

.....SOLIDS.....

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 12: HUNTINGTON CREEK WATER QUALITY *

HCC02 - @ POWER PLANT (BELOW DEER CREEK CONFLUENCE)

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE SOLIDS
3-97		207	45		10	377	9.6	166	0.3		13			8.37		6	17	22	180	
6-97		209	47	7	5	359	6.2	171	0.2		13			8.52		4	13	18	210	
9-97		175	40		7	309	7.6	141	11.5		10	0.3		8.2		5	15	490	170	
12-97		292	56		9	491	8.3	230			22			8.31	1	8	35		260	
1997**																				
MIN		175	40	7	5	309	6.20	141	0.20		10			8.20	1	4	13	18	170	
MAX		292	56	7	10	491	9.60	230	11.50		22			8.52	1	8	35	490	260	
MEAN		221	47	7	8	384	7.93	177	4.00		15			8.35	1	6	20	177	205	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	6.0	174	46.0	12.0	6.0	304	7.70	164	0.10		12.00		3.0	8.37	1.30	3.00	8.0	5.0	165	
MAX	26.0	279	64.0	20.0	17.0	522	11.70	267	0.60		26.00		3.0	8.56	2.00	11.00	42.0	32.0	278	
MEAN	16.0	210	54.3	14.7	11.0	407.5	10.00	211.25	0.40		18.50		3.0	8.45	1 65	6.75	23.8	18.3	221	
1995																				
MIN	10.0	160	46.0	5.0	4.0	283	3.80	164	0.10	0.10	12.00	0.10	5.0	7.97	1.00	4.00	10.0	10 0	180	0 50
MAX	10.0	250	64.0	15.0	14.0	442	7.80	230	1.60	0.10	22.00	1.00	5.0	8.89	2.00	11.00	31 0	100.0	260	0 50
MEAN	10.0	201	55.5	10.0	9.5	357	6.43	213	0.63	0.10	17.50	0.33	5.0	8.50	1.50	7.25	20.5	40.0	210	0 50
1994																				
MIN	10.0	176	46.0	1.0	1.0	313	5.0	156	0.10	0.20	10.00	0.10	5.0	8.30	5.00	3.00	10.0	4.0	167	0.50
MAX	10.0	250	58.0	5.0	12.0	490	9.9	240	0.20	0.50	23.00	0.20	5.0	8.98	10.00	12.00	50.0	30.0	290	0.50
MEAN	10.0	212	52.5	2.1	6.7	386	7.5	200	0.19	0.25	16.58	0.14	5.0	8.62	3.36	6.50	23.3	13.5	221	0.50
1993																				
MIN	0.0	151	32.0	0.0	1.3	413	3.1	129	0.05	0.11	8.00	0.00	0.0	8.24	0.00	3.40	4.0	8.0	161	0.00
MAX	1.0	250	78.1	6.0	35.0	535	8.2	288	0.20	2.00	28.00	0.20	5.0	8.96	4.00	23.00	50.0	98.0	361	0.60
MEAN	0.1	206	53.8	1.4	13.3	418	5.9	209	0.11	0.40	18.23	0.07	1.1	8.67	1.08	11.10	28.4	25.8	254	0.30
1992																				
MIN	0.1	195	40.1	0.1	10.0	328	4.9	183	0.01	0.01	8.40	0.01	0.1	7.89	0.01	1.52	14.0	2.0	185	0.01
MAX	33.0	285	82.9	7.0	25.0	604	9.8	334	0.19	0.25	35.30	0.07	2.7	8.97	3.42	21.85	90.0	28.0	371	--
MEAN	4.5	239	63.2	2.1	17.5	456	7.8	255	0.05	0.09	23.54	0.02	0.6	8.64	0.97	11.25	45.6	12.1	252	0.01
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	0.70	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
HISTORICAL 1991-1996																				
MIN	0.1	151	32.0	0.1	1.0	210	3.8	129	0.01	0.01	8.00	0.01	0.1	7.14	0.01	1.52	4.0	1.00	161	0.0
MAX	33.0	310	91.7	20.0	45.0	700	11.7	365	2.00	0.21	39.90	1.00	5.1	8.98	5.00	23.00	150.0	100.00	425	1.0
MEAN	5.4	227	61.7	3.0	15.4	423.8	8.0	239.7	0.26	0.10	20.74	0.08	2.4	8.40	1.72	9.53	41.9	16.63	259	0.4
No. of Analysis	57	62	62	56	61	72	72	62	58	57	62	54	54	72	52	62	62	.71	72	61

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 13: HUNTINGTON CREEK WATER QUALITY *

HCC04 - @ RESEARCH FARM

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
																....SOLIDS....				
3-97		203	46		12	397	9.5	168	0.3		13			8.38		7	22	18	200	
6-97		212	47	5	7	365	6.5	175	0.1		14			8.55		5	17	15	240	
9-97		175	40		8		7.6	145	10.1		11	0.3		8.22		6	22	458	230	
12-97		271	60		20	570	8.5	257			26			8.32	1	14	59		330	
1997**																				
MIN		175	40	5	7	365	6.50	145	0.10		11			8.22	1	5	17	15	200	
MAX		271	60	5	20	570	9.50	257	10.10		26			8.55	1	14	59	458	330	
MEAN		215	48	5	12	444	8.03	186	3.50		16			8.37	1	8	30	164	250	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	9.0	160	47.0	16.0	6.0	318	7.80	167	0.08		12.00		2.0	8.36	1.00	5.00	16.0	5.0	180	
MAX	23.0	271	68.0	33.0	23.0	602	11.80	293	0.70		30.00		2.0	8.44	2.00	15.00	62.0	20.0	325	
MEAN	16.0	200	56.0	23.7	15.0	443.75	9.98	221.5	0.39		20.00		2.0	8.42	1.33	9.75	35.5	15.0	244	
1995																				
MIN	10.0	165	49.0	5.0	6.0	311	4.20	176	0.10	0.10	13.00	0.10	5.0	7.90	1.00	3.00	15.0	5.0	180	0.50
MAX	10.0	250	65.0	15.0	21.0	500	8.50	264	1.70	0.10	27.00	0.10	5.0	8.69	2.00	17.00	71.0	95.0	330	0.50
MEAN	10.0	200	57.5	11.3	13.8	409.25	6.83	225	0.63	0.10	19.75	0.10	5.0	8.47	1.25	10.25	37.0	35.0	230	0.50
1994																				
MIN	10.0	176	40.0	1.0	2.0	324	5.2	150	0.10	0.10	11.00	0.10	5.0	8.11	2.00	4.00	13.0	7.0	180	0.50
MAX	10.0	250	64.0	5.0	30.0	610	9.6	275	0.20	0.80	28.00	0.20	5.0	8.94	5.00	21.00	80.0	33.0	360	0.50
MEAN	10.0	213	54.0	2.1	11.7	432	7.6	213	0.19	0.29	19.00	0.14	5.0	8.61	3.25	9.92	34.5	16.0	255	0.50
1993																				
MIN	0.0	130	35.3	0.0	8.5	297	2.2	149	0.05	0.14	9.90	0.00	0.0	7.82	0.00	4.60	17.0	0.0	170	0.00
MAX	6.0	269	82.3	6.0	61.2	729	7.6	310	0.37	2.46	33.00	0.20	5.0	8.97	5.00	58.60	110.0	80.0	436	0.70
MEAN	0.9	214	57.0	1.8	21.3	462	5.4	235	0.14	0.89	22.67	0.05	0.7	8.66	1.03	16.64	55.8	26.1	285	0.33
1992																				
MIN	0.1	201	42.4	0.1	10.0	354	4.3	194	0.01	0.01	12.80	0.01	0.1	7.35	0.01	3.96	19.0	1.0	197	0.01
MAX	25.0	326	92.0	10.0	30.0	762	9.6	397	0.19	1.12	41.80	0.08	2.8	8.89	3.59	22.35	170.0	37.0	469	---
MEAN	4.0	250	67.2	2.2	19.6	516	7.5	276	0.06	0.18	26.19	0.02	0.6	8.51	0.97	16.61	78.3	15.0	298	0.01
1991																				
MIN	0.0	187	40.6	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	8.50	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	8.20	1.20	12.78	70.8	22.7	309	0.39
HISTORICAL 1991-1996																				
MIN	0.1	130	35.3	0.1	2.0	220	4.2	149	0.01	0.01	9.90	0.01	0.1	7.35	0.01	3.00	13.0	1.00	170	0.0
MAX	25.0	326	108.1	33.0	61.2	762	11.8	397	2.46	0.37	42.00	0.20	5.0	8.94	10.70	58.60	170.0	95.00	469	1.0
MEAN	4.7	231	63.6	3.6	18.5	457	7.9	253.7	0.31	0.10	23.07	0.06	2.4	8.41	1.79	13.22	59.3	17.81	290	0.4
No. of Analysis	57	62	62	56	62	72	72	62	57	56	62	54	48	72	56	62	62	70	72	61

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

**Data: Database input restricted to values greater then laboratory minimum detection limit.

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 Q).

a. Flow and Sampling Schedule

(1) Locations:
(a) Above the Mine - DCR01
(b) @ Permit Boundary - DCR04
(c) Below the Mine - DCR06
(See Map HM-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 Q.) The program was initiated in March 1988 and will continue through 1998; i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph showing all the data collected for 1997 and 1987-1996 has been generated for each location. (See Appendix B.) The hydrographs show that the flow in the Deer Creek drainage occurred from May through October with the peak flow occurring in May at all locations (DCR01 - 1151 GPM, DCR04 - 949 GPM, DCR06 - 950 GPM).

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 1996. Baseline analysis will be repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 14 and 15. 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 Q).

a. Flow and Sampling Schedule

(1) Location: South Fork of Meetinghouse Canyon (See Map HM-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 will be those stated in the DOGM Guidelines for Surface Water Operational Quality. (See Appendix Q.) The program was initiated in March 1988 and will continue through 1998, i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

TABLE 14: DEER CREEK SURFACE WATER QUALITY *

DCR01 - ABOVE THE MINE

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONAT	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
6-97		329	47		6	533	7.3	216			24			8.52		26	30	22	340	
9-97		393	43	16	15	587	7.3	247			30			8.48		41	55		380	
1997**																				
MIN		329	43.0	16.0	6.0	533	7.30	216			24.00			8.48		26.00	30.0	22.0	340	
MAX		393	47.0	16.0	15.0	587	7.30	247			30.00			8.52		41.00	55.0	22.0	380	
MEAN		361	45.0	16.0	10.5	560	7.30	231.5			27.00			8.50		33.50	42.5	22.0	360	
No. of Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1996**																				
MIN		279	44	12	7	518	7	245	0		28			9	1	34	40	19	294	
MAX		288	52	18	9	616	11	262	0		37			9	1	40	66	19	365	
MEAN		284	48	15	8	567	9	254	0		33			9	1	37	53	19	330	
1995																				
MIN	10	280	50	15	6	503	5	240	0	0	25	0	5	7	1	27	26	5	250	1
MAX	10	280	56	15	8	530	8	269	0	0	35	0	5	9	1	43	52	25	360	1
MEAN	10	280	53	15	7	517	6	255	0	0	30	0	5	8	1	35	39	15	305	1
1994																				
MIN	No samples taken in 1994 - No flow.																			
MAX																				
MEAN																				
1993																				
MIN	0.0	241	36.0	0.0	5.6	484	7.2	193	0.05	0.07	19.30	0.03	0.0	8.26	0.94	20.00	36.0	1.0	284	0.50
MAX	2.0	373	94.2	9.0	9.0	580	22.0	343	0.35	8.10	37.00	0.20	1.3	8.73	2.20	45.70	100.0	31.0	377	1.30
MEAN	0.3	307	58.9	1.0	7.6	528	11.2	263	0.18	1.52	28.28	0.08	0.3	8.61	1.59	30.28	54.5	13.0	333	0.60
1992																				
MIN	0.0	335	59.3	0.0	20.0	540	9.1	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325	0.00
MAX	0.0	335	59.3	0.0	20.0	540	9.1	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325	0.00
MEAN	0.0	335	59.3	0.0	20.0	540	9.1	267	0.00	0.00	29.00	0.10	1.2	8.80	0.00	42.95	43.0	2.0	325	0.00
1991																				
MIN	No flow 1991 back to 1989																			
MAX																				
MEAN																				
HISTORICAL 1978-1996																				
MIN	0.1	241	2.2	0.1	3.5	360	4.9	193	0.01	0.01	19.30	0.01	0.1	6.97	0.01	13.40	10.0	0.50	231	0.0
MAX	137.0	397	107.2	18.0	176.0	1580	11.1	599	40.10	0.35	83.90	0.24	5.0	8.81	4.33	111.60	255.0	3592.00	897	1.3
MEAN	11.3	307	58.3	3.8	21.7	594	8.2	298.9	0.84	0.09	36.41	0.04	1.2	7.97	1.26	31.09	66.1	99.21	348	0.3
No. of Analysis	28	30	30	27	31	70	31	30	70	21	30	67	26	71	28	30	32	70	71	26

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 15: DEER CREEK SURFACE WATER QUALITY *

DCR06 - BELOW THE MINE

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONAT	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SOLIDS SETTLEABLE
3-97		320	103		1112	4590	8.6	529	0.2		66			8.52	6	758	128	15	2460	
6-97		301	46		83	806	6.2	243	0.2		31			8.56	1	62	65	32	490	
9-97		295	56	10	205	1321	7	325			45			8.5	3	139	132	6	780	
1997**																				
MIN		295	46	10	83	806	6.20	243	0.20		31			8.50	1	62	65	6	490	
MAX		320	103	10	1112	4590	8.60	529	0.20		66			8.56	6	758	132	32	2460	
MEAN		305	68	10	467	2239	7.27	366	0.20		47			8.53	3	320	108	18	1243	
Analysis	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1996**																				
MIN		244	56	23	132	1022	7	313	0		42			9	2	99	84	13	597	
MAX		244	56	23	132	1022	7	313	0		42			9	2	99	84	13	597	
MEAN		244	56	23	132	1022	7	313	0		42			9	2	99	84	13	597	
1995																				
MIN	10	250	66	20	111	936	4	330	0	0	41	0	5	8	2	79	70	5	490	
MAX	10	255	66	25	279	1270	7	400	0	0	57	0	5	9	3	199	120	30	900	
MEAN	10	253	66	23	195	1103	6	365	0	0	49	0	5	8	3	139	95	18	695	
1994																				
MIN	No samples taken in 1994 - No flow.																			
MAX																				
MEAN																				
1993																				
MIN	0.0	274	38.2	0.0	35.4	724	4.6	260	0.04	0.06	34.00	0.00	0.0	7.75	2.20	34.00	90.0	1.0	413	0.00
MAX	1.0	431	95.3	9.0	205.0	1360	10.2	483	0.30	2.70	65.00	0.10	5.0	8.81	10.30	138.00	190.0	200.0	862	1.00
MEAN	0.1	315	68.3	2.5	85.8	961	6.8	375	0.14	0.46	49.61	0.04	1.0	8.43	4.94	68.91	161.8	30.7	620	0.36
1992																				
MIN	0.1	162	46.1	0.1	20.0	692	5.9	313	0.01	0.01	41.20	0.01	0.1	7.80	2.53	28.19	78.0	3.0	446	0.01
MAX	28.0	356	129.8	6.0	60.0	1340	9.8	703	0.23	0.57	91.90	0.09	1.7	8.94	9.23	77.76	600.0	97.0	1001	0.80
MEAN	6.2	296	82.1	0.9	39.6	889	7.9	429	0.04	0.08	54.41	0.02	0.7	8.56	6.09	50.08	219.0	26.3	581	0.08
1991																				
MIN	<1.0	268	53.5	0.0	25.0	520	5.9	278	0.00	0.00	27.14	0.00	0.0	7.40	2.29	28.13	80.0	2.0	304	0.00
MAX	60.0	456	105.1	6.0	90.0	890	10.8	503	0.25	0.34	62.50	0.05	3.7	8.50	7.36	71.40	230.0	59.0	741	0.50
MEAN	7.3	316	84.2	1.6	43.5	696	8.0	407	0.06	0.12	47.68	0.02	1.5	8.20	4.74	43.52	170.0	23.8	517	0.40
HISTORICAL 1978-1996																				
MIN	0.1	162	2.4	0.1	5.0	420	4.0	260	0.01	0.01	27.14	0.01	0.1	6.92	1.00	28.13	65.0	0.50	273	0.0
MAX	90.0	456	191.9	25.0	515.0	2400	11.0	990	170.00	1.22	124.00	0.27	9.0	8.94	10.30	272.80	610.0	20540.00	1544	2.3
MEAN	6.4	315	84.0	2.4	82.4	994	7.8	446	2.04	0.13	55.40	0.04	1.5	8.17	4.78	72.58	198.0	239.70	625	0.4
No. of Analysis	61	64	63	59	64	109	74	63	98	53	63	94	58	110	63	63	65	109	110	62

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

b. Flow Information

A hydrograph comparing 1997 and 1987-1996 can be found in Appendix C. Peak flow occurred during the month of May at a rate of 2059 GPM. Base flow of 0.0 GPM existed during January through March, November, and December.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 1996. Baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1986. Table 16 lists the minimum, maximum, and mean values for 1992-1997 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 Q). 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 - RCLF1*
- (c) Left Fork of Rilda - RCLF2*
- (d) Rilda Canyon - RCF2*
- (e) Rilda Canyon - RCF3
- (f) 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 Q.) The program was initiated in June 1989 except for RCLF1 and RCLF2,

TABLE 16: MEETINGHOUSE CANYON WATER QUALITY *

MHC01 - LEFT FORK

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS (SOLIDS)	TDS (SOLIDS)	SETTLEABLE (SOLIDS)
6-97		254	43	5	5	424	6.1	202			23			8.52		6	18	9	240	
10-97		240	36	10	8	435	7	197	0.5		26			8.46		8	31	36	280	
1997**																				
MIN		240	36.0	5.0	5.0	424	6.10	197	0.50		23.00			8.46		6.00	18.0	9.0	240	
MAX		254	43.0	10.0	8.0	435	7.00	202	0.50		26.00			8.52		8.00	31.0	36.0	280	
MEAN		247	39.5	7.5	6.5	429.5	6.55	199.5	0.50		24.50			8.49		7.00	24.5	22.5	260	
Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1996**																				
MIN		219	42	7	5	421	8	225	0		23			9	1	7	13	10	229	
MAX		236	52	20	11	423	12	233	1		31			9	1	9	26	31	245	
MEAN		228	47	14	8	422	10	229	0		27			9	1	8	20	21	237	
1995																				
MIN	10	230	46	10	4	399	5	220	0	0	21	0	5	9	1	9	14	10	190	1
MAX	40	240	53	15	5	402	9	234	0	0	29	0	5	9	1	9	28	15	200	1
MEAN	25	235	50	13	5	401	7	227	0	0	25	0	5	9	1	9	21	13	195	1
1994																				
MIN	No samples taken in 1994 - No flow.																			
MAX																				
MEAN																				
1993																				
MIN	0.0	254	39.0	0.0	4.6	394	4.4	217	<0.05	0.10	18.90	<0.03	0.0	8.30	<0.10	4.80	14.0	9.0	219	<0.5
MAX	0.0	256	65.8	<1.0	5.0	395	7.5	242	0.07	0.27	29.00	<0.03	0.1	8.80	<0.10	14.00	26.0	32.0	271	<0.5
MEAN	0.0	255	52.4	0.5	4.8	395	5.9	229	0.06	0.18	23.90	<0.03	0.1	8.50	<0.10	9.40	20.0	20.5	245	<0.5
1992																				
MIN	0.0	195	33.7	0.0	15.0	344	5.1	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183	0.00
MAX	0.0	195	33.7	0.0	15.0	344	5.1	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183	0.00
MEAN	0.0	195	33.7	0.0	15.0	344	5.1	175	0.21	0.28	22.10	0.05	1.2	8.80	0.00	5.40	12.0	30.0	183	0.00
1991																				
MIN	<1.0	232	66.6	<1.0	10.0	300	6.4	237	<0.02	<0.02	17.20	0.03	<0.1	8.30	<0.02	4.00	8.0	49.0	197	<0.5
MAX	<1.0	272	80.4	<1.0	25.0	300	6.8	316	0.10	0.21	28.00	0.08	2.0	8.40	0.28	6.70	18.0	175.0	238	<0.5
MEAN	<1.0	252	66.6	<1.0	17.5	300	6.6	277	0.06	0.11	22.60	0.06	1.1	8.40	0.15	5.40	13.0	112.0	218	<0.5
HISTORICAL 1986-1996																				
MIN	0.1	195	2.2	0.1	3.0	300	4.4	175	0.02	0.01	17.20	0.01	0.1	7.25	0.01	3.80	8.0	0.10	183	0.0
MAX	49.0	307	80.4	20.0	47.5	500	11.8	350	0.90	0.30	36.50	0.10	10.9	8.81	1.62	14.00	100.0	175.00	304	1.0
MEAN	7.3	244	47.2	3.8	9.1	403	7.5	240	0.19	0.09	27.34	0.03	1.7	8.12	0.92	8.52	33.9	28.52	239	0.3
No. of Analysis	19	23	23	22	23	23	23	23	23	21	23	21	20	23	22	23	23	22	23	20

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

**** Data: Database input restricted to values greater then laboratory minimum detection limit.**

which were initiated in 1990 and 1995, respectively, and will continue through 1998 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 quality measurements. Quantity will be monitored monthly.

* 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 HM-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 from May through November with a peak flow estimated at 3,316 in May, decreasing to 60 GPM in November. Location RCF1 was inaccessible from January through April and December. Flow at locations RCLF1 and RCLF2 occurred during the months April through October with a peak flow estimated at 75 GPM. There was no flow at these locations in August. For location RCF2 flow occurred during the months of April through November, with peak flow estimated at 5,000 GPM in May and a base flow of 0.0 GPM during the months of January through March and December. Below the spring area the stream is perennial and increases in flow from RCF3 to RCW4. During 1997 the peak flow for RCF3 was estimated at 5,000 GPM (May); for RCW4, 3,350 GPM (May). Baseline flow for 1997 at RCF3 and RCW4 was approximately 50 and 90 GPM, respectively. Location RCF3 was inaccessible from January through

March. Data suggest that above the NEWUA springs 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 was performed in 1996. 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 17, 18, and 19. It is apparent from the data that 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. Water quality has remained relatively consistent from year to year. (See Tables 17, 18, and 19.)

B. Cottonwood Creek Drainage System

The southern portion of East Mountain and the entire Trail 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.

PacifiCorp monitors two of the tributaries of the Cottonwood Creek drainage system, Cottonwood Canyon Creek and Grimes Wash. (See Map HM-1 in pocket.)

TABLE 17: RILDA CANYON SURFACE WATER QUALITY *

RCF1 - RILDA CANYON FLUME - RIGHT FORK

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
6-97		266	52	5	3	420		204			18			8.39		5	18	6	250	
9-97		275	56	7	4	465	7	222	1.1		20			8.47	1	7	25	56	290	
1997**																				
MIN		266	52.0	5.0	3.0	420	7.00	204	1.10		18.00			8.39	1.00	5.00	18.0	6.0	250	
MAX		275	56.0	7.0	4.0	465	7.00	222	1.10		20.00			8.47	1.00	7.00	25.0	56.0	290	
MEAN		271	54.0	6.0	3.5	442.5	7.00	213	1.10		19.00			8.43	1.00	6.00	21.5	31.0	270	
Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1996**																				
MIN		240	53	12	4	423	8	235	1		21			9	1	5	1	96	245	
MAX		245	68	14	11	451	11	256	1		25			9	1	9	1	96	272	
MEAN		243	61	13	8	437	10	246	1		23			9	1	7	1	96	259	
1995																				
MIN	10	245	60	10	4	384	5	270	2	0	21	0	5	8	1	6	15	120	220	1
MAX	10	260	83	20	5	423	7	290	3	1	30	0	5	9	2	24	47	240	270	1
MEAN	10	253	72	15	5	404	6	280	2	1	26	0	5	8	2	15	31	180	245	1
1994																				
MIN	10.0	239	48.0	1.0	1.0	378	8.90	202	0.20	0.20	20.00	0.10	5.0	8.73	4.00	8.00	19.0	4.0	230	0.50
MAX	10 0	239	48.0	1.0	1.0	378	8.90	202	0.20	0.20	20.00	0.10	5.0	8.73	4.00	8.00	19.0	4.0	230	0.50
MEAN	10.0	239	48.0	1.0	1.0	378	8.9	202	0.20	0.20	20.00	0.10	5.0	8.73	4.00	8.00	19.0	4.0	230	0.50
1993																				
MIN	0.0	254	54.0	0.0	2.5	399	9.9	238	0.05	0.07	19.20	0.03	0.0	8.69	0.10	4.90	17.0	0.0	225	0.50
MAX	0.0	290	63.6	1.0	5.0	915	12.5	250	0.12	0.23	28.00	0.03	0.0	8.99	10.00	12.00	23.0	41.0	266	0.50
MEAN	0.0	272	58.8	0.5	3.7	657	11.2	244	0.08	0.15	23.60	0.03	0.0	8.84	5.05	8.45	20.0	20.0	245	0.50
1992																				
MIN	0.1	262	63.9	0.1	15.0	371	9.4	255	0.07	0.11	23.10	0.14	0.7	8.90	0.00	6.30	17.0	8.0	222	0.00
MAX	0.1	262	63.9	0.1	15.0	371	9.4	255	0.07	0.11	23.10	0.14	0.7	8.90	0.00	6.30	17.0	8.0	222	0 00
MEAN	0.1	262	63.9	0.1	15.0	371	9.4	255	0.07	0.11	23.10	0.14	0.7	8.90	0.00	6.30	17.0	8.0	222	0.00
1991																				
MIN	<1.0	244	58.2	<1.0	15.0	300	7.4	225	<0.02	<0.02	19.40	<0.02	1.5	8.20	0.12	3.78	7.0	2.0	231	<0.5
MAX	<1.0	329	108.6	<1.0	15.5	350	7.6	384	0.09	1.13	27.40	0.04	1.9	8.40	1.78	7.48	23.0	160.0	242	<0.5
MEAN	<1.0	287	83.4	<1.0	15.3	325	7.5	305	0.06	0.58	23.40	0.03	1.7	8.30	0.95	5.63	15.0	81.0	237	<0.5
HISTORICAL 1989-1996																				
MIN	0.1	227	48.0	0.1	1.0	300	4.8	201	0.02	0.02	18.60	0.01	0.7	7.78	0.01	3.78	7.0	2.0	220	0.01
MAX	10.0	329	108.6	20.0	15.0	451	12.5	384	2.50	1.20	30.00	0.14	5.0	8.88	10.00	24.00	80.0	240.0	277	0.50
MEAN	4.2	254	65.7	5.8	8.6	383	8.2	260	0.66	0.20	23.40	0.06	2.7	8.40	2.15	8.31	25.5	71.6	245	0.34
No. of Analysis	8	11	11	11	11	11	11	11	10	9	11	9	8	11	11	11	10	9	11	9

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 18: RILDA CANYON SURFACE WATER QUALITY *

RCF3 - RILDA CANYON FLUME - ABOVE NEWUA SPRINGS

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
6-97		273	59	8	5	468	6.3	246	0.3		24			8.34		6	24	16	290	
9-97		307	61		4	527	6.9	255	1.9		25			8.13	2	9	48	101	300	
1997**																				
MIN		273	59	8	4	468	6.30	246	0.30		24			8.13	2	6	24	16	290	
MAX		307	61	8	5	527	6.90	255	1.90		25			8.34	2	9	48	101	300	
MEAN		290	60	8	5	498	6.60	251	1.10		25			8.24	2	8	36	59	295	
Analysis	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
1996**																				
MIN	9	244	72	15	5	442	7	281	0		24			8	1	6	17	6	258	
MAX	14	406	82	18	14	747	13	397	2		47			9	2	13	91	136	461	
MEAN	12	343	75	17	9	647	10	351	1		40			8	2	11	63	71	379	
1995																				
MIN	10	270	59	5	4	443	5	279	0	0	25	0	5	8	1	7	10	5	260	1
MAX	10	415	90	20	8	710	7	400	3	0	47	0	5	8	3	15	76	250	470	1
MEAN	10	335	77	11	6	564	6	347	1	0	38	0	5	8	2	11	47	79	350	1
1994																				
MIN	10.0	375	72.0	1.0	4.0	631	6.5	335	0.20	0.20	37.00	0.10	5.0	7.86	2.00	11.00	50.0	4.0	380	0.50
MAX	10.0	401	73.0	1.0	6.0	719	7.9	370	0.20	0.40	47.00	0.20	5.0	8.37	5.00	13.00	60.0	6.0	436	0.50
MEAN	10.0	388	72.5	1.0	5.0	675	7.2	352	0.20	0.30	42.00	0.15	5.0	8.12	3.50	12.00	55.0	5.0	408	0.50
1993																				
MIN	0.0	242	67.7	0.0	4.0	437	6.7	265	0.05	0.20	23.30	0.03	1.0	8.34	0.20	11.20	40.0	6.0	254	0.50
MAX	0.0	412	75.0	1.0	5.0	674	7.7	381	0.08	0.31	47.00	0.10	1.2	8.83	2.00	16.00	70.0	39.0	469	0.50
MEAN	0.0	327	71.3	0.5	4.5	555	7.2	323	0.06	0.25	35.15	0.06	1.1	8.59	1.10	13.60	55.0	22.5	361	0.50
1992																				
MIN	0.1	278	58.1	0.1	10.0	476	6.7	268	0.01	0.06	29.90	0.01	0.4	8.16	0.01	8.48	27.0	3.0	273	0.01
MAX	4.0	453	97.6	0.1	20.0	722	9.0	444	0.28	0.34	48.60	0.15	1.1	8.47	1.60	17.55	110.0	18.0	430	--
MEAN	1.4	375	80.1	0.1	13.3	634	7.9	370	0.10	0.19	41.37	0.06	0.7	8.33	0.92	13.86	72.3	8.7	377	0.01
1991																				
MIN	<1.0	340	72.2	0.0	15.0	380	7.1	365	0.01	<0.02	25.00	0.00	0.7	7.50	0.23	5.40	7.0	<1.0	241	0.00
MAX	14.0	422	105.1	<1.0	50.0	620	10.0	453	0.14	2.84	49.80	0.10	3.6	8.30	4.57	14.50	140.0	185.0	487	<0.50
MEAN	5.3	382	91.7	0.8	31.3	525	8.1	401	0.06	0.78	41.80	0.04	2.5	7.90	1.65	11.40	74.3	48.5	389	0.40
HISTORICAL 1989-1996																				
MIN	0.1	242	58.1	0.1	4.0	380	4.5	265	0.02	0.01	23.30	0.01	0.4	7.50	0.01	5.40	7.0	1.0	226	0.01
MAX	14.0	500	112.2	20.0	50.0	855	13.2	499	3.00	0.41	53.20	0.20	5.0	8.83	5.00	17.55	150.0	250.0	513	2.50
MEAN	5.9	373	86.7	3.9	12.5	620	7.6	382	0.52	0.13	41.63	0.06	2.5	8.09	1.86	12.27	71.7	35.7	391	0.46
No. of Analysis	22	26	26	23	26	27	27	26	25	21	26	21	22	27	26	26	26	23	26	21

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 19: RILDA CANYON SURFACE WATER QUALITY *

RCW4 - RILDA CANYON FLUME - NEAR HIGHWAY 31

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONAT	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVE D OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREAS	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS (SOLIDS)	TDS (SOLIDS)	SETTLEABLE (SOLIDS)
3-97		429	65		48	845	8.7	385			54			8.3	3	22	109		500	
6-97		292	59	7	6	507	6.1	267	0.4		29		2	8.36	1	9	34	34	290	
9-97		351	64		5	631	7.3	300	2.1		34			8.32	2	13	15	129	390	
12-97		432	68		11	791	7.9	380			51			7.8	2	20	72		480	
1997**																				
MIN		292	59	7	5	507	6.10	267	0.40		29		2.0	7.80	1	9	15	34	290	
MAX		432	68	7	48	845	8.70	385	2.10		54		2.0	8.36	3	22	109	129	500	
MEAN		376	64	7	18	694	7.50	333	1.25		42		2.0	8.20	2	16	58	82	415	
Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	14	263	69	11	5	478	9	301	2		27			8	1	7	20	5	270	
MAX	14	428	76	18	15	813	15	419	2		58			9	3	24	113	154	527	
MEAN	14	369	73	14	11	720	11	385	2		50			8	2	19	83	80	451	
1995																				
MIN	10	310	65	5	5	476	4	352	0	0	29	0	5	8	1	8	20	5	260	1
MAX	10	420	100	20	13	802	7	424	4	0	58	0	5	9	3	26	110	290	500	1
MEAN	10	355	80	13	11	655	6	384	1	0	45	0	5	8	2	19	75	80	420	1
1994																				
MIN	10.0	416	75.0	1.0	10.0	831	6.80	422	0.20	0.20	57.00	0.10	5.0	8.51	2.00	9.00	130.0	4.0	500	0.50
MAX	10.0	432	76.0	1.0	10.0	840	7.50	440	0.20	0.20	61.00	0.20	5.0	8.57	5.00	22.00	140.0	9.0	510	0.50
MEAN	10.0	424	75.5	1.0	10.0	835	7.1	431	0.20	0.20	59.00	0.10	5.0	8.54	3.50	20.50	135.0	6.5	505	0.50
1993																				
MIN	0.0	317	69.0	0.0	4.8	486	5.5	290	0.05	0.20	28.50	0.03	0.7	8.62	0.20	7.90	37.0	6.0	262	0.50
MAX	0.0	403	79.0	1.0	14.0	707	7.5	453	0.06	0.71	62.00	0.10	1.0	8.73	10.00	20.00	110.0	96.0	642	0.50
MEAN	0.0	360	74.0	0.5	9.4	596	6.5	371	0.05	0.45	45.25	0.06	0.8	8.67	5.10	13.90	73.5	56.0	452	0.50
1992																				
MIN	0.1	374	77.0	0.1	10.0	585	5.9	338	0.01	0.01	35.30	0.01	0.1	8.60	0.01	11.50	40.0	1.0	351	0.01
MAX	10.0	429	83.0	0.1	20.0	719	10.1	448	0.28	0.40	58.50	0.04	1.9	8.90	7.69	23.10	150.0	49.0	437	--
MEAN	3.4	400	79.9	0.1	13.3	665	8.2	383	0.10	0.14	44.60	0.03	0.9	8.80	2.57	15.90	90.0	17.7	380	0.01
1991																				
MIN	<1.0	298	72.7	0.0	13.5	400	6.9	389	0.00	0.00	36.70	0.00	<1.0	7.70	0.95	7.60	40.0	1.0	286	0.00
MAX	10.0	417	117.0	<1.0	45.0	700	10.9	457	0.18	2.06	58.70	0.15	2.4	8.30	4.71	19.00	100.0	505.0	490	<0.5
MEAN	4.0	373	89.5	0.8	24.6	603	8.5	433	0.06	0.61	51.00	0.05	1.7	8.00	2.64	15.40	80.0	131.0	424	0.40
HISTORICAL 1989-1996																				
MIN	0.1	263	63.0	0.1	4.8	400	3.9	290	0.01	0.01	27.00	0.01	0.1	7.70	0.01	7.00	20.0	1.0	260	0.01
MAX	14.0	461	132.7	20.0	700.0	840	15.1	545	3.80	0.28	67.20	0.20	5.0	8.86	10.00	52.00	250.0	505.0	642	1.00
MEAN	5.2	380	82.2	4.6	41.5	675	7.8	410	0.52	0.09	49.82	0.06	2.4	8.32	2.70	19.23	104.2	60.3	439	0.41
No. of Analysis	20	25	25	23	25	26	26	25	21	19	25	20	21	26	25	25	25	23	25	20

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

1. Cottonwood Canyon Creek

Based on data collected by 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. An extensive hydrogeologic investigation was conducted in Cottonwood Canyon Dreek during 1992. Results can be found in Appendix F of the PAP submitted March 31, 1993. Four (4) permanent runoff sampling sites have been established along Cottonwood Canyon Creek and sampled as listed below. (See Hydrologic Monitoring Plan in Appendix Q).

a. Flow and Sampling Schedule

(1) Locations: (See Map HM-1 in pocket.)
(a) Above Mine - SW-1
(b) Below Mine - SW-2
(c) @ USGS Flume - CCC01*
(d) Above Straight Canyon - SW-3

(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 Q.) The program was initiated in December 1992 and will continue through 1998, i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed monthly in conjunction with quality measurements. Quantity will be monitored monthly.

* Flow and field parameters only.

b. Flow Information

As stated above, flow information is collected monthly throughout the year. (See Map HM-1 for flume locations.) A hydrograph for 1997 has been generated for each sampling location. (See Appendix E.) The hydrographs show the intermittent nature of Cottonwood Canyon Creek. Flow at SW-1, when accessible, occurred from February through December with a peak and base flow estimated at 750 and 5 GPM, respectively. Flow at SW-2 occurred from February through December with a peak and base flow estimated at 750 and 10 GPM, respectively. Flow at SW-3 occurred throughout the year with a peak and base flow estimated at 1,000 and 5 GPM, respectively.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan, baseline quality analysis was performed in 1996. Thereafter, baseline analysis will be repeated once every five (5) years. The results of the historical operational quality analysis are listed in Tables 20, 21, and 22. 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. Complete raw data can be found in Appendix E.

The Cottonwood Canyon Creek drainage quality is influenced by the following factors: 1) A relatively high amount of suspended solids during spring runoff from Indian, Roans, Mill, and Marines canyons; 2) Alluvial/colluvial deposit recharge and discharge areas.

TABLE 20: COTTONWOOD CANYON CREEK WATER QUALITY *

SW-1

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS (SOLIDS)	TDS (SOLIDS)	SETTLEABLE (SOLIDS)
3-97		304	54	5	22	528		246	0.8		27			8.47		9	42	78	300	
6-97		304	54	5	22	528		246	0.8		27			8.47		9	42		300	
9-97		314	54		8	534	7.1	254	1		29			8.19	2	10	32	45	300	
12-97		346	58		10	595		281	0.2		33			8.14	1	11	50	6	300	
1997**																				
MIN		304.0	54.0	5.0	8.0	528.0	7.1	246.0	0.2		27.0			8.1	1	9	32	6	300	
MAX		346.0	58.0	5.0	22.0	595.0	7.1	281.0	1.0		33.0			8.5	2	11	50	78	300	
MEAN		317.0	55.0	5.0	15.5	546.3	7.1	256.8	0.7		29.0			8.3	1.5	9.8	41.5	43.0	300.0	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	14	288	63	12	9	537	8	293	0		33			8	1	12	29	36	308	
MAX	27	413	77	12	18	822	11	425	1		56			8	2	23	108	36	518	
MEAN	21	376	70	12	15	729	9	377	0		49			8	2	20	78	36	446	
1995																				
MIN	10	290	6	15	8	502	4	300	0	0	28	0	5	8	1	11	25	5	280	1
MAX	10	395	81	20	27	961	7	520	2	0	78	0	5	8	3	38	170	105	690	1
MEAN	10	352	54	18	17	721	6	405	1	0	52	0	5	8	2	24	95	48	467	1
HISTORICAL 1977-1996																				
MIN	1.0	231	6.0	1.0	0.7	380.0	3.8	210.0	0.02	0.1	2.4	0.0	0.5	7.1	1.0	6.0	20.0	0.5	226.0	0.1
MAX	27.0	433	152.3	20.0	27.0	961.0	10.9	520.0	15.9	0.4	78.0	1.3	358.0	8.7	21.0	60.0	238.7	1298.0	690.0	1.5
MEAN	5.4	339	66.5	5.2	12.9	683.0	7.6	342.5	1.0	0.1	39.4	0.1	11.2	7.9	3.2	21.5	75.2	76.7	379.5	0.4
No. of Analysis	43	66	65	17	66	27	12	33	62	17	66	55	40	61	64	65	66	61	66	15

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 21: COTTONWOOD CANYON CREEK WATER QUALITY *

SW-2

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
																		SOLIDS		
3-97		407	69		179	1344	8.4	460	0.6		65			8.44	3	123	145	10	840	
6-97		308	50		10	531		244	0.9		29			8.61	1	11	35	80	310	
9-97		606	29	85	23	1163	6.6	151	1.4	0.2	19	0.1	39	8.64	4	221	140	148	760	
12-97		457	54		107	1230		295	0.4	0.1	39			8.44	3	144	153	13	690	
1996**																				
MIN		308	29	85	10	531	6.6	151	0.6	0.2	19			8.44	1	11	35	10	310	
MAX		606	69	85	179	1344	8.4	460	1.4	0.2	65			8.64	4	221	145	148	840	
MEAN		440	49	85	71	1013	7.5	285	1.0	0.2	38			8.56	3	118	107	79	637	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1995																				
MIN	10	290	63	10	8	515	3	300	0	0	30	0	5	8	1	12	32	5	350	1
MAX	10	440	74	35	40	955	9	490	1	0	73	0	10	9	4	46	190	85	700	1
MEAN	10	344	71	24	26	749	6	415	1	0	58	0	6	9	3	31	116	36	550	1
HISTORICAL 1977-1996																				
MIN	0.1	233	11.1	1.0	1.5	410	3.00	250	0.05	0.05	2.40	0.01	0.1	7.00	1.00	8.00	19.5	1.0	267	0.10
MAX	22.0	458	136.9	35.0	128.0	1709	10.90	631	16.20	1.25	109.00	1.37	10.0	8.93	25.60	158.00	254.0	1004.0	1170	1.50
MEAN	5	331	67	10	17	781	8	367	1	0.2	42	0.1	2	8	5	27	95	76	413	0.4
No. of Analysis	41	63	63	20	63	24	11	30	61	17	63	56	48	58	62	62	63	61	63	16

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 22: COTTONWOOD CANYON CREEK WATER QUALITY *

SW-3

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFAT	TSS	TDS	SETTLEABLE
3-97		450	115		95	1595	8.2	687			97			8.22	4	108	438		1130	
6-97		350	47		22	795		245	1.1	0.1	31			8.56	2	67	121	108	490	
9-97		569	33	10	26	1201	6.7	181	1.1	0.2	24	0.1	28	8.62	4	215	165	114	790	
12-97		548	32	18	50	1306		203	0.5	0.2	30			8.46	4	220	188	11	780	
1997**																				
MIN		350	32	10	22	795	6.7	181	0.5		24		28	8.2	2	67	121	11	490	
MAX		569	115	18	95	1595	8.2	687	1.1		97		28	8.6	4	220	438	114	1130	
MEAN		479	57	14	48	1224	7.5	329	0.9		46		28	8.5	4	153	228	78	798	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	16	265	55	20	20	651	7	327	1		46		3	8	2	25	100	38	400	
MAX	27	452	111	20	78	1491	11	652	1		95		3	9	4	100	398	38	1052	
MEAN	22	385	91	20	56	1237	9	563	1		82		3	8	3	78	267	38	852	
1995																				
MIN	10	290	71	5	7	506	7	310	0	0	32	0	5	8	1	12	30	5	380	1
MAX	10	420	102	30	56	1184	8	654	1	0	97	0	5	9	4	90	355	95	960	1
MEAN	10	365	90	17	39	956	7	536	1	0	75	0	5	8	3	64	241	35	763	1
HISTORICAL 1977-1996																				
MIN	0.1	253	14.3	0.1	1.7	506	5.20	245	0.04	0.05	2.40	0.01	0.2	7.20	1.00	3.00	22.0	1.0	40	0.10
MAX	27.0	452	159.0	30.0	78.0	1491	10.70	654	19.00	0.43	97.00	2.48	114.0	8.69	30.00	100.00	398.0	5024.0	1052	1.50
MEAN	5.2	343	77.3	5.1	26.6	1115	7.93	471	1.27	0.14	49.95	0.14	4.5	8.00	4.39	42.00	157.8	158.4	527.42	0.39
No. of Analysis	44	67	66	20	66	28	14	34	61	18	67	52	57	62	65	66	67	61	67	16

SOLIDS

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

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 Q).

a. Flow and Sampling Schedule

(1) Locations: (See Map HM-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 Q.) The program was initiated in March 1988 and will continue through 1998 i.e., June, September, and December. Field measurements including pH, specific conductivity, and temperature will be performed in conjunction with quality measurements. Quantity will be monitored monthly.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes. (See Map HM-1 for flume locations.) A hydrograph comparing 1997 to the data collected from 1987 through 1996 has been generated for each flume location. (See Appendix F.) The hydrographs show that flow occurred only during the month of April (15 GPM) in the Right Fork and during the months of June (46 GPM) through December (<0.1) in the Left Fork. 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

emanating from the Starpoint Sandstone/Mancos Shale formational contact and Wilberg/Cottonwood Mine discharge. Peak flow occurred during the month of February at 150 GPM, and baseline flow averaged approximately 30 GPM.

c. Quality Information

In accordance with the Hydrologic Monitoring Plan baseline quality analysis was performed in 1996. Baseline analysis will be repeated once every five (5) years. The results of the 1997 operational quality analysis are listed in Tables 23, 24, and 25. 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. Complete raw data can be found in Appendix F.

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.

TABLE 23: GRIMES WASH WATER QUALITY *

GWR01 - RIGHT FORK

1997 **SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
4-97		240	57		5	419	9	237	2.6		23			8.39	2	6	55	89	280	
1997**																				
MIN		240	57		5	419	9	237	2.60		23			8.39	2	6	55		280	
MAX		240	57		5	419	9	237	2.60		23			8.39	2	6	55		280	
MEAN		240	57		5	419	9	237	2.60		23			8.39	2	6	55		280	
No. of	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
No flow during 1989 - 96																				
1988																				
MIN	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	8.20	5.20	1.90	27.0	8.0	196	<1.0
MAX	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	8.20	5.20	1.90	27.0	8.0	196	<1.0
MEAN	39.0	112	43.8	<1.0	26.4	225	9.70	154	0.61	0.78	10.90	0.04	9.0	8.20	5.20	1.90	27.0	8.0	196	<1.0
1987																				
MIN	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	---	7.20	7.60	2.00	20.0	2000.0	115	3.30
MAX	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	---	7.20	7.60	2.00	20.0	2000.0	115	3.30
MEAN	<1.0	104	34.4	<1.0	3.0	190	6.80	112	3.31	20.60	6.30	0.05	---	7.20	7.60	2.00	20.0	2000.0	115	3.30
1986																				
MIN	<1.0	240	30.0	<1.0	8.3	465	7.6	222	<0.05	<0.05	35.70	<0.01	<0.5	7.50	1.60	3.40	40.0	0.5	262	<1.0
MAX	<1.0	320	52.0	<1.0	11.5	680	9.8	320	<0.05	0.73	46.20	0.05	2.2	8.10	3.30	20.40	120.0	257.0	389	<0.5
MEAN	<1.0	275	41.6	<1.0	10.2	547.6	8.8	268	<0.05	0.24	39.90	0.02	0.7	7.80	2.50	15.70	61.3	60.6	316	0.2
HISTORICAL 1979-1996																				
MIN	0.1	104	30.0	1.0	3.0	190	6.8	112	0.01	0.05	6.30	0.01	0.5	7.20	1.60	1.85	20.0	0.5	115	0.10
MAX	39.0	320	52.0	1.0	26.4	750	9.8	320	20.60	3.31	46.20	0.30	9.0	8.70	7.64	20.44	161.7	7116.0	700	3.30
MEAN	5.5	237	41.0	1.0	11.3	560	8.6	238	1.35	0.47	32.95	0.06	1.8	8.07	3.35	14.09	64.3	376.3	338	0.60
No. of Analysis	11	9	9	9	11	42	9	9	46	9	9	42	12	46	9	9	13	46	46	9

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 24: GRIMES WASH WATER QUALITY *

GWR02 - RIGHT FORK

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS	TDS	SETTLEABLE
6-97		355	73		15	845	9.1	376			47			8.27	1	29	212		540	
9-97		280	47	10	10	637	5.9	286			41			8.56	2	28	98		380	
1997**																				
MIN		280	47		10	637	5.9	286			41			8.27	1	28	98		380	
MAX		355	73		15	845	9.1	376			47			8.56	2	29	212		540	
MEAN		318	60		13	741	7.5	331			44			8.42	1.5	28.5	155		460	
No. of	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4

No flow during 1994 -1996

1993																				
MIN	3.0	276	88.9	0.0	8.9	470	11.70	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366	0.6
MAX	3.0	276	88.9	0.0	8.9	470	11.70	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366	0.6
MEAN	3.0	276	88.9	0.0	8.9	470	11.70	327	0.22	2.52	25.40	0.10	0.6	8.70	1.90	13.20	80.0	294.0	366	0.6

No flow during 1989 - 92

1988																				
MIN	34.0	312	71.5	<1.0	10.0	600	7.00	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428	<0.05
MAX	34.0	312	71.5	<1.0	10.0	600	7.00	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428	<0.05
MEAN	34.0	312	71.5	<1.0	10.0	600	7.00	337	<0.02	<0.02	38.50	<0.01	2.0	8.40	1.10	24.20	105.0	4.0	428	<0.05
1987																				
MIN	<1.0	188	2.3	<1.0	6.0	412	5.00	337	<0.05	<0.05	23.80	<0.01	<0.5	7.60	1.00	11.10	45.0	<1.0	212	0.00
MAX	<1.0	482	71.1	15.0	156.0	610	7.80	460	0.12	0.62	68.50	0.06	3.5	8.60	2.50	34.00	9.0	48.0	382	0.20
MEAN	<1.0	317	38.1	3.8	56.6	526	7.00	296	0.07	0.17	43.40	0.02	1.7	7.80	1.40	28.50	73.6	14.6	307	0.10
1986																				
MIN	<1.0	281	36.0	<1.0	7.7	410	7.40	252	<0.05	<0.05	37.70	<0.01	<0.5	7.40	1.30	25.20	67.0	3.0	293	<0.10
MAX	<1.0	331	58.0	<1.0	10.9	690	9.60	310	<0.05	0.22	43.80	0.07	0.6	8.00	3.00	34.00	115.0	253.0	427	<0.50
MEAN	<1.0	304	45.5	<1.0	8.8	591	8.60	278	<0.05	0.12	39.90	0.02	0.5	7.70	1.90	29.20	77.9	54.1	346	0.20
HISTORICAL 1979-1996																				
MIN	1.0	188	2.3	1.0	6.0	410	5.00	196	0.02	0.02	23.80	0.01	0.1	7.30	1.00	11.10	30.4	0.5	212	0.05
MAX	34.0	482	88.9	15.0	156.0	790	11.70	460	2.52	0.22	68.50	0.15	3.5	8.72	3.00	34.00	115.0	1428.0	570	0.60
MEAN	3.3	307	47.5	2.0	18.9	624	8.00	291	0.19	0.08	40.20	0.03	1.0	7.98	1.61	27.50	74.1	56.6	362	0.16
No. of Analysis	15	15	15	14	15	50	15	15	52	7	15	51	15	52	15	15	16	53	52	14

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

TABLE 25: GRIMES WASH WATER QUALITY *

GWR03 - RIGHT FORK

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONAT	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNES	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANESE	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFATE	TSS (SOLIDS)	TDS (SOLIDS)	SETTLEABLE (SOLIDS)
3-97		374	133		590	3040	7.50	699	0.3		89			8.19	6	443	403	13	1910	
6-97		372	86		108	1362	9.20	487			66			8.45	3	83	274		910	
9-97		335	100		142	1489	7.00	550	0.1		73			8.20	4	96	297	7	1000	
12-97		353	113		178	1709		628			84			8.30	5	107	165		1150	
1997**																				
MIN		335	86		108	1362	7.00	487	0.10		66			8.19	3	83	165	7	910	
MAX		374	133		590	3040	9.20	699	0.30		89			8.45	6	443	403	13	1910	
MEAN		359	108		255	1900	7.90	591	0.20		78			8.29	5	182	285	10	1243	
Analysis	4	4	4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN	13	317	113	12	38	1184	7	599	0		75			8	6	49	304	6	821	
MAX	17	343	125	12	575	3070	11	775	0		113			8	7	447	442	11	1808	
MEAN	15	335	119	12	223	1831	9	663	0		89			8	7	175	346	9	1195	
1995																				
MIN	10	315	86	5	27	970	6	440	0	0	55	0	5	8	6	44	180	5	650	1
MAX	10	375	107	15	94	1128	8	572	1	0	74	0	5	9	8	82	264	10	930	1
MEAN	10	339	94	10	68	1072	7	499	0	0	65	0	5	8	7	72	224	8	798	1
1994																				
MIN	10.0	325	86.0	1.0	19.0	941	5.70	430	0.10	0.20	53.00	0.10	5.0	8.06	8.00	37.00	180.0	4.0	579	0.50
MAX	10.0	398	108.0	5.0	140.0	1560	8.20	607	0.20	1.90	82.00	0.20	5.0	8.81	9.00	114.00	310.0	40.0	980	0.50
MEAN	10.0	358	96.2	2.7	61.5	1199	6.60	498	0.18	0.90	63.00	0.13	5.0	8.42	8.25	73.00	227.5	16.0	754	0.50
1993																				
MIN	0.0	249	95.8	0.0	17.4	590	5.20	364	0.05	0.23	30.40	0.06	0.0	7.76	2.10	27.10	120.0	2.0	444	0.50
MAX	10.0	362	163.0	1.0	103.7	3280	10.30	736	0.22	5.10	93.00	0.10	5.0	8.61	10.00	60.00	370.0	280.0	2109	0.70
MEAN	2.5	320	127.0	0.3	46.2	1640	8.30	578	0.16	1.90	63.35	0.09	1.6	8.28	6.40	42.60	247.0	78.5	1079	0.60
1992																				
MIN	0.1	214	96.0	0.1	25.0	1230	5.30	488	0.01	0.07	60.20	0.04	0.1	8.20	3.41	60.80	340.0	8.0	955	0.01
MAX	50.0	369	190.8	0.1	365.0	2190	9.00	766	0.30	0.34	74.00	0.11	1.1	8.70	10.70	283.70	450.0	58.0	1393	--
MEAN	12.4	313	154.2	0.1	252.6	1754	6.70	665	0.11	0.22	67.86	0.06	0.8	8.42	7.14	207.80	400.0	22.2	1201	0.01
1991																				
MIN	<1.0	295	71.4	0.0	25.0	710	6.90	385	<0.02	0.09	26.90	<0.02	0.6	7.60	<0.01	25.70	200.0	3.0	565	0.00
MAX	22.0	338	205.6	<1.0	735.0	3000	9.90	849	0.85	0.86	81.60	0.12	2.3	8.20	12.80	460.50	420.0	247.0	2080	<0.5
MEAN	7.0	313	151.7	0.8	236.0	1510	7.90	629	0.20	0.35	60.70	0.06	1.4	7.90	4.67	148.30	312.0	64.0	1131	0.40
HISTORICAL 1979-1996																				
MIN	0.1	117	5.1	0.1	10.0	220	4.50	146	0.01	0.01	10.70	0.01	0.1	7.10	0.01	9.00	46.0	0.5	152	0.01
MAX	127.0	486	274.0	15.0	4531.0	12000	11.40	1165	22.60	2.26	116.80	0.90	27.0	8.81	12.80	3181.00	600.0	9702.0	7160	35.00
MEAN	11.5	340	129.0	2.0	266.0	1489	7.62	627	0.85	0.18	72.99	0.07	2.9	8.00	6.01	198.00	317.4	191.1	932	1.25
No. of Analysis	54	54	54	48	56	94	55	54	96	51	54	89	51	98	54	54	57	94	96	44

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

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 HM-5 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		80-50
	79-24		82-51
*	79-26	*	82-52
+	79-28	*	84-56
*	79-29	+	89-60 (Alpine Spring)
	79-32	+	89-61
	79-34	+	89-65
*	79-35	+	89-66
	79-38	+	89-67
		+	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 Q.)

2. Spring Flow

Both precipitation and spring discharge rates decreased from 1996 to 1997, whereas temperature, a critical factor on spring discharge rates, was 1.8 degrees higher in 1997 than the historical average. Table 26, A and B, is a tabulation of the flow data collected during the 1997 monitoring season. To record the season variation, all springs measured in July are measured again in October. The seasonal variation is represented in Table 26, 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-two percent (42%) [sixty-seven percent (67%) by volume] decrease from the July to the October measurements.

A fifteen-year comparison of spring discharge is shown in Table 27. The table includes a year by year comparison of springs identified from each mode of occurrence (Table 28). The springs utilized in the comparison are underlined in Table 28. 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 27 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. Along with precipitation, temperature plays a critical role in yearly discharge variations, especially during the early stages of the runoff period. Listed in Table 29 is a comparison of January through June temperature data from surrounding weather stations for the period 1982-97 versus departure from normal. The comparison is vital in determining mining effects on spring discharge versus general changes in annual precipitation.

Table 29 clearly demonstrates near average temperatures between 1982 and 1984, but starting in 1985 and continuing through 1997 (except for 1991) positive departure from normal has been significant. In 1997 the temperatures were 1.8 degrees above average. 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.

TABLE 26A

EAST MOUNTAIN SPRINGS DISCHARGE

1997

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. F	Seasonal Net Change %
Sheba	7/22/97	4.8	6.9	10/16/97	1.6	6.9	-66.53
Elk Spring	7/21/97	235.0	5.1	10/16/97	73.0	4.6	-68.94
Burnt Tree	7/21/97	8.5	7.8	10/27/97	7.3	6.6	-14.24
Jerk Water							
Pine Springs							
Pine Sp. Trough							
Ted's Tub	7/22/97	46.9	5.4	10/28/97	7.0	3.1	-85.00
79-1							
79-2	7/25/97	2.1	6.6	10/27/97	1.6	5.1	-27.57
79-3							
79-4							
79-5							
79-6							
79-7							
79-8							
79-9							
79-10	7/22/97	14.0	6.5	10/16/97	3.9	6.2	-72.14
79-11							
79-12	7/22/97	DAMP		10/28/97	DRY		
79-13							
79-14							
79-15	7/22/97	13.6	6.7	10/28/97	4.6	5.7	-66.18
79-16							
79-17							
79-18							
79-19							
79-20							
79-21							
79-22							
79-23	7/25/97	DRY		9/22/97	DRY		
79-24	7/25/97	DRY		10/27/97	DRY		
79-25							
79-26	7/24/97	5.0	7.8	10/16/97	1.5	7.8	-71.00
79-27							
79-28	7/24/97	1.1	6.7	10/27/97	1.0	5.2	-8.26
79-29	7/24/97	1.0	5.5	10/16/97	1.6	4.8	55.00
79-30							
79-31							
79-32	7/28/97	1.0	8.0	10/16/97	0.7	8.5	-30.10
79-33							
79-34	7/22/97	5.5	6.4	10/28/97	DAMP		
79-35	7/22/97	13.6	6.7	10/16/97	1.4	6.5	-89.56
79-36							
79-37							
79-38	7/28/97	4.0	5.0	10/28/97	2.0	4.9	-49.00
79-39							
79-40	7/24/97	1.4	6.0	10/28/97	DRY		
80-41	7/24/97	4.5	4.9	10/28/97	0.5	2.3	
80-42							
80-43	7/25/97	Damp		10/27/97	DRY		

TABLE 26B
EAST MOUNTAIN SPRINGS DISCHARGE
1997

Spring	Date Sampled	Flow (GPM)	Temp. C	Date Sampled	Flow (GPM)	Temp. F	Seasonal Net Change %
80-44	7/24/97	0.2	16.2	10/28/97	DAMP		
80-45							
80-46	7/24/97	4.0	6.2	10/27/97	DAMP		
80-47	7/24/97	9.2	5.0	10/27/97	6.0	2.6	-34.99
80-48	7/21/97	4.6	7.7	10/16/97	2.6	5.6	-43.48
80-49							
80-50	7/30/97	3.0	7.8	10/30/97	2.5	7.7	-18.33
82-51	7/25/97	2.0	9.5	10/27/97	0.4	4.3	-82.00
82-52	7/25/97	12.0	4.7	10/27/97	5.5	4.4	-54.58
84-53							
84-54							
84-55							
84-56	7/24/97	0.7	6.4	10/27/97	0.9	5.3	40.30
85-57							
86-58							
86-59							
89-60	7/28/97	1.0	6.4	10/28/97	0.4	5.4	-60.00
89-61	• 7/21/97	115.3	5.1	10/16/97	38.5	4.3	-66.64
89-62							
89-63							
89-64							
89-65	7/21/97	1.0	7.1	10/16/97	0.9	5.8	-8.00
89-66	7/21/97	2.3	6.3	10/16/97	0.4	6.6	-83.04
89-67	7/21/97	6.0	5.0	10/16/97	4.4	4.4	-26.67
89-68	7/21/97	1.7	7.9	10/16/97	1.1	6.8	-35.29
89-69							
89-70							
89-71							
91-72	7/25/97	10.7	8.9	10/30/97	8.6	8.7	-19.91
91-73	7/25/97	1.6	9.1	10/30/97	0.8	6.9	-50.62

TOTAL FLOW FOR JULY **522.0** **171.2**
(W\OUT 80-50, 91-72 & 73)
Net Change - Average -42.10
Net Change - By Volume -67.21

TOTAL FOR JULY 1996 = 573.6 GPM
JULY 1997 9 % LOWER THAN JULY 1996

Table 27: East Mountain Yearly Spring Discharge Variations (GPM)

July Flow Data

Spring	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Burnt Tree	30.5	26.6	26.1	17.5	10.2	12.0	6.4	4.1	2.0	4.0	8.6	7.5	7.5	5.5	8.5
Elk Spring	642.3	427.9	390.5	309.7	217.0	217.4	78.5	130.8	176.0	116.8	369.9	46.2	599.3	309.0	235.0
Sheba	22.9	19.7	14.4	8.6	11.4	10.4	1.1	8.1	10.1	6.3	11.0	0.9	10.6	14.9	4.8
Ted's Tub	89.0	48.0	39.1	31.6	69.0	60.0	5.0	13.0	21.0	13.6	51.0	6.0	76.2	36.7	46.9
79-2	9.1	9.7	5.5	2.9	4.0	2.1	2.7	3.9	2.4	2.3	7.5	1.7	2.6	2.0	2.1
79-10	37.1	20.0	33.3	26.1	26.1	25.0	7.0	10.2	12.5	10.5	30.0	4.0	30.0	17.6	14.0
79-15	42.9	26.1	18.2	18.2	14.6	12.7	2.9	3.0	5.0	4.1	20.7	2.0	33.3	11.0	13.6
79-23	20.0	3.6	6.8	0.6	damp	damp	dry	dry	damp	dry	damp	dry	no flow	dry	dry
79-24	9.3	6.1	5.0	4.3	damp	0.8	dry	dry	dry	dry	damp	dry	0.1	dry	dry
79-26	20.7	20.0	10.9	8.7	1.5	3.3	0.3	dry	damp	damp	10.0	dry	10.0	0.8	5.0
79-29	10.0	6.2	6.0	4.7	2.5	2.6	1.1	1.3	1.7	0.8	2.9	0.7	3.1	1.2	1.0
79-32	3.3	3.1	2.7	1.3	1.0	0.6	0.5	damp	no flow	no flow	1.3	damp	1.0	0.6	1.0
79-34	356.7	42.9	18.5	16.7	10.5	13.3	dry	dry	0.3	damp	13.0	ddry	30.0	7.5	5.5
79-35	15.0	10.5	10.5	7.8	6.3	2.7	dry	1.9	4.3	4.4	8.9	0.5	3.0	4.5	13.6
79-38	10.9	9.2	4.7	3.6	8.3	10.0	1.1	7.8	6.5	2.3	6.4	0.5	10.0	7.5	4.0
79-40	15.0	8.3	5.6	4.7	2.0	5.4	dry	dry	dry	dry	4.0	dry	2.0	0.5	1.4
80-41	10.9	15.0	5.8	4.1	2.5	3.9	dry	dry	dry	dry	4.0	dry	2.4	0.5	4.5
80-43	24.0	20.0	6.6	3.1	0.4	1.8	dry	dry	dry	dry	2.7	dry	1.5	damp	damp
80-44	24.0	13.1	5.5	2.2	dry	0.5	dry	dry	dry	dry	1.4	dry	3.0	damp	0.2
80-46	60.0	28.3	18.2	12.0	4.0	6.7	dry	dry	dry	dry	7.5	dry	5.0	damp	4.0
80-47	20.0	15.0	12.5	12.2	7.4	9.9	4.6	2.0	1.3	3.3	13.3	2.2	12.6	5.0	9.2
82-51	10.0	5.9	3.8	2.6	damp	damp	dry	dry	0.1	damp	3.2	damp	3.0	0.5	2.0
82-52	80.0	48.0	32.1	23.3	20.1	21.5	2.6	1.3	1.0	1.0	16.7	2.0	15.0	7.0	12.0
84-56	9.6	6.3	4.7	3.7	2.5	2.9	1.6	1.0	0.5	0.6	1.0	0.3	1.0	0.3	0.7
Totals	1554.3	839.5	687.0	530.2	421.3	425.5	115.4	188.4	244.7	170.0	595.0	74.5	862.2	432.6	389.0

xx No measurement - utilized yearly comparison.

TABLE 28: MODES OF OCCURRENCE - EAST MOUNTAIN SPRINGS

Occurrences

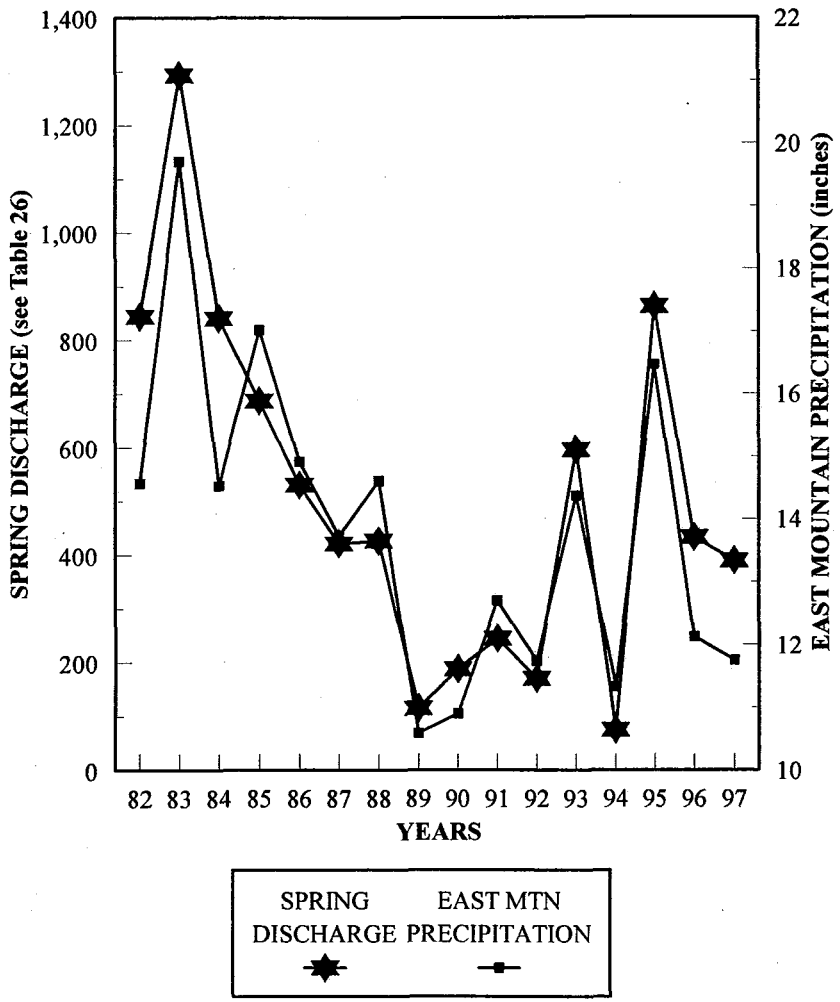
Stratigraphic Location	Permeable fluvial channels that intersect the land surface	Flow along permeable strata underlain by impermeable mudstone which intersects the land surface	Contact of permeable beds and the Roans Canyon Fault zone	Mode of occurrence not identified
Base of Flagstaff Limestone		79-6, 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

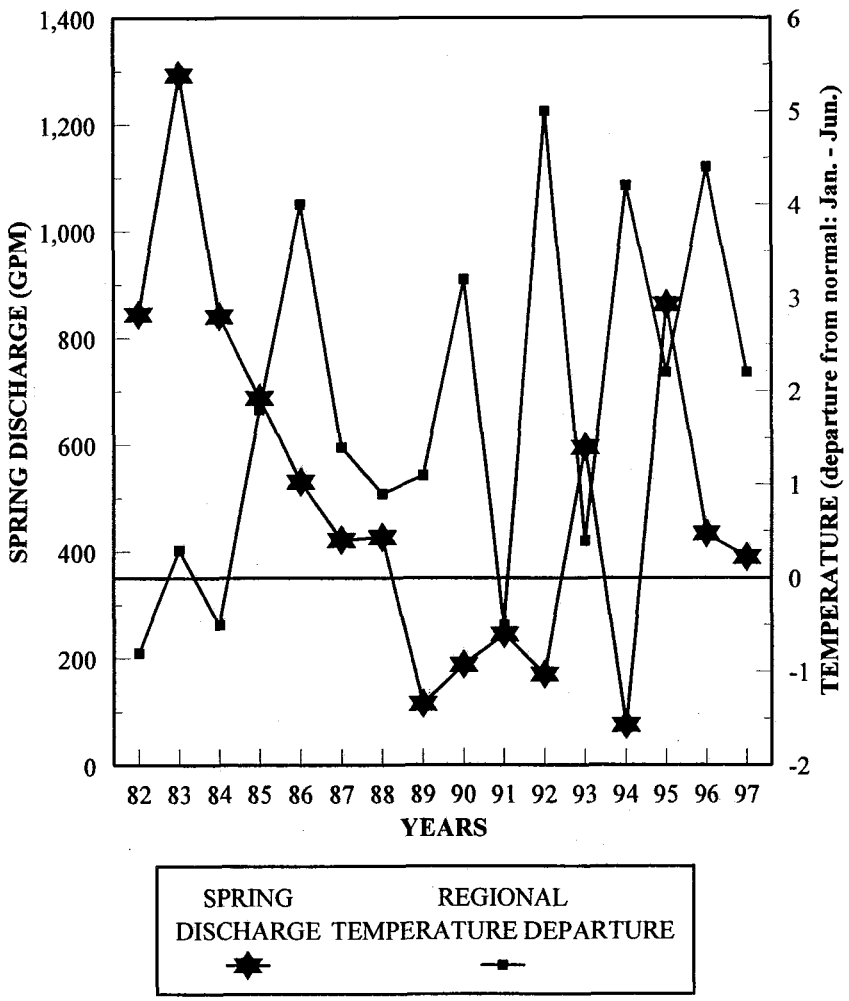
TABLE 29: TEMPERATURE COMPARISON

MONTH	EAST MOUNTAIN DEPARTURE FROM NORMAL	ELECTRIC LAKE DEPARTURE FROM NORMAL	HUNTER PLANT DEPARTURE FROM NORMAL	HUNTINGTON PLANT DEPARTURE FROM NORMAL
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
1992				
JAN	-0.4	+0.8	-6.2	-1.6
FEB	+0.8	+7.8	+5.5	+0.9
MAR	+2.2	+8.0	+8.5	+2.9
APR	+4.9	+11.8	+12.6	+8.6
MAY	+4.5	+7.0	+11.8	+3.3
JUN	-0.5	+3.6	+7.6	-3.3
1993				
JAN	-3.8	+2.7	+0.9	-0.8
FEB	-3.5	-2.9	+0.5	-4.3
MAR	+4.2	-3.6	+7.2	-0.5
APR	-2.2	+0.1	+4.4	-2.0
MAY	+4.1	+2.8	+8.9	+1.6
JUN	-3.9	-2.2	+5.8	-4.1
1994				
JAN	+0.8	+2.3	-1.2	+6.3
FEB	-3.5	+3.2	+1.6	-3.5
MAR	+6.1	+6.6	+10.1	+5.0
APR	0.0	+6.0	+4.7	+0.2
MAY	+4.6	+7.2	+8.9	+2.7
JUN	+9.1	+4.8	+13.4	+5.4
1995				
JAN	+1.4	+1.6	+3.9	+1.5
FEB	+10.3	+5.2	+11.8	+7.4
MAR	+3.1	+2.4	+7.6	+0.1
APR	+3.4	-0.1	+3.4	-2.0
MAY	+2.2	-3.9	+3.4	-5.5
JUN	+1.1	-2.2	+2.5	-6.6
1996				
JAN	+5.1	+2.1	+3.5	+2.4
FEB	+7.7	-0.9	+8.4	+1.6
MAR	+7.5	+0.6	+7.8	+1.5
APR	+3.0	+2.6	+5.4	+1.1
MAY	+8.5	+3.6	+8.0	+2.2
JUN	+8.5	+5.2	+9.6	+1.2
1997				
JAN	-0.9	+1.6	+0.1	+0.3
FEB	+0.8	-5.7	-2.3	-4.2
MAR	+8.8	+6.2	+8.1	+2.2
APR	+1.4	-0.7	+3.2	-3.1
MAY	0.0	+4.2	+10.5	+3.5
JUN	+4.6	+4.9	+8.9	-0.6

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
1992	+1.9	+6.5	+6.6	+1.8	+5.0
1993	-0.9	-0.5	+4.6	-1.7	+0.4
1994	+2.9	+5.0	+6.3	+2.7	+4.2
1995	+3.6	+0.5	+5.4	-0.9	+2.2
1996	+6.7	+2.2	+7.1	+1.7	+4.4
1997	+2.5	+1.8	+4.8	-0.3	+2.2

FIGURE 3
EAST MOUNTAIN
SPRING DISCHARGE vs. PRECIPITATION & TEMPERATURE





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 1997 is shown in Table 30; corresponding spring recession curves comparing 1997 to 1984-1996 are located in Appendix G.

TABLE 30

EAST MOUNTAIN

SPRING DISCHARGE RECESSION STUDY

YEAR 1997

SPRING		JUL	AUG	SEP	OCT
79-10	Flow (GPM)	14.0	7.3	6.0	3.9
	Temp. (C)	6.5	6.9	6.6	6.2
SHEBA SPRINGS	Flow (GPM)	4.8	1.8	1.7	1.6
	Temp. (C)	6.9	7.5	7.5	6.9
ELK SPRING	Flow (GPM)	235.0	110.0	73.0	73.0
	Temp. (C)	5.1	6.1	5.5	4.6
79-35	Flow (GPM)	8.6	2.7	2.5	1.4
	Temp. (C)	6.0	6.8	6.0	6.5
79-26	Flow (GPM)	5.0	3.1	1.3	1.5
	Temp. (C)	7.8	6.2	7.0	7.8
79-29	Flow (GPM)	1.0	1.9	1.9	1.6
	Temp. (C)	5.5	7.5	5.6	4.8
84-56	Flow (GPM)	0.7	0.7	1.0	0.9
	Temp. (C)	6.9	6.5	6.5	5.3
80-44	Flow (GPM)	0.2	DAMP	DAMP	DAMP
	Temp. (C)	16.2			
80-46	Flow (GPM)	4.0	0.3	<.1	DAMP
	Temp. (C)	6.2	6.5		
BURNT TREE	Flow (GPM)	8.5	7.3	7.2	7.3
	Temp. (C)	7.8	7.2	7.1	6.6
79-23	Flow (GPM)	DRY	DRY	DRY	DRY
	Temp. (C)				
82-52	Flow (GPM)	12.0	8.0	7.5	5.5
	Temp. (C)	4.7	6.5	5.5	4.4

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 G.) 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 1997 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 31. In the table the mean values for 1997 are compared to the historical results for each respective spring. The raw data regarding all springs sampled is contained in Appendix G.

Table 31: East Mountain Springs Water Quality (Historical vs. 1997) *

PARAMETER	Burnt Tree Historical	Burnt Tree 1997	Elk Spring Historical	Elk Spring 1997	Sheba Spring Historical	Sheba Spring 1997	79-10 Historical	79-10 1997	79-23 Historical	79-23 1997	79-26 Historical	79-26 1997
Elevation	9260		9350		9740		9350		9035		9310	
Geologic Formation	TKn		TKn		Tf		Kpr		TKn		TKn	
Bicarbonate	332	338	292	302	291	311	319	324	413	no	325	347
Calcium	62.0	49.5	64.7	54.5	85.0	74.5	73.1	65.5	79.6	flow	59.7	40.5
Carbonate	1.70	<5	1.77	<5	1.42	<5	1.53	<5	1.00	during	5.25	<5
Chloride	7.0	3.0	6.3	3.5	6.4	3.0	7.2	4.5	11.3	1997	8.0	6.50
Cond.(umhos/cm)	497	516	431	465	432	464	464	501	691		510	526
Hardness	268	231	250	229	247	229	275	254			274	217
Iron	0.20	<0.1	0.17	<0.1	0.12	<0.1	0.19	<.1	0.09		0.17	<0.1
Magnesium	27.70	26.00	22.48	22.50	10.29	10.50	21.91	22.00	38.28		29.51	28.00
Mangenese	0.05	<0.1	0.05	<0.1	0.05	<0.1	0.05	<0.1	0.01		0.05	<0.1
pH(units)	7.55	7.60	7.78	7.66	7.53	7.55	7.63	7.69	7.72		8.04	8.14
Potassium	1.55	<1	2.45	<1	2.43	<1	2.79	<1	1.54		1.83	<1
Sodium	14.40	15.00	8.13	6.50	4.60	3.50	5.00	5.00	14.87		15.61	21.50
Sulfate	23.2	10.0	23.2	7.5	22.3	6.5	15.9	7.0	27.2		30.0	10.5
TDS	288	285	254	245	258	250	274	260	364		305	260

PARAMETER	79-29 Historical	79-29 1997	79-35 Historical	79-35 1997	80-44 Historical	80-44 1997	80-46 Historical	80-46 1997	82-52 Historical	82-52 1997	84-56 Historical	84-56 1997
Elevation	9410		9585		8980		9350		8995		9335	
Geologic Formation	TKn		Tf		Kpr		TKn		Kpr		TKn	
Bicarbonate	328	339	302	316	445	426	358	334	420	431	348	352
Calcium	47.0	38.0	84.5	68.0	100.1	79.0	62.0	53.0	75.6	67.0	62.6	5.5
Carbonate	1.70	<5	1.64	<5	1.00	<.5	1.80	<.5	1.83	<5	1.70	<5
Chloride	19.35	15.50	6.80	1.50	11.18	8.00	5.03	5.00	11.34	8.00	10.89	8.50
Cond.(umhos/cm)	542	568	430	472	869	807	548	519	648	723	539	584
Hardness	257	235	273	232	387	350	287	235	327	316	295	269
Iron	0.12	0.40	0.13	<0.1	0.11	<0.1	0.25	<0.1	0.10	<0.1	0.17	<.1
Magnesium	34.91	34.00	15.74	15.00	41.60	37.00	28.86	25.00	34.76	36.00	32.83	31.50
Mangenese	1.14	<0.1	0.05	<0.1	0.02	<0.1	0.03	<0.1	0.05	<0.1	0.05	<0.1
pH(units)	7.73	7.64	7.74	7.80	7.84	7.75	7.43	7.37	7.67	7.53	7.50	7.45
Potassium	2.78	1.00	1.46	<0.1	3.90	<0.1	0.84	<0.1	1.73	<0.1	1.51	<1
Sodium	32.51	31.00	5.57	4.00	35.90	27.00	9.79	9.00	25.35	32.50	16.69	16.50
Sulfate	42.2	28.5	28.2	5.0	138.8	110.0	17.6	13.0	39.6	83.0	28.4	26.5
TDS	329	305	269	255	533	500	306	260	380	430	325	325

* Quality parameters reported as mg/l unless otherwise noted

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

Of concern to PacifiCorp Energy West 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. During 1995 flow from the north collection line was combined with the central collection system. As a result Meter 4 was terminated.

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 32 below lists the individual flow rates for meters 2 and 3 (flow from Meter 1 is included in Meter 2).

TABLE 32: NEWUA - RILDA CANYON SPRING FLOW (GPM)

MONTHLY 1997

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
05-18-92	7.5	110.0	140.0	257.5
06-12-92	7.0	100.0	180.0	287.0
07-20-92	7.0	80.0	150.0	237.0
08-14-92	7.1	90.0	110.0	207.1
09-03-92	6.0	35.0	75.0	116.0
10-30-92	5.5	45.0	2.6	53.1
05-13-93	6.0	25.0	13.0	44.0
06-11-93	8.6	90.0	150.0	248.6
07-29-93	6.0	110.0	170.0	286.0
08-27-93	4.0	96.0	170.0	270.0
09-28-93	2.0	60.0	110.0	172.0
10-22-93	3.0	30.0	55.0	88.0
05-24-94	4.6	65.0	75.0	144.6
06-16-94	5.0	100.0	160.0	265.0
07-18-94	5.5	100.0	130.0	235.5
08-24-94	2.0	70.0	80.0	152.0
09-13-94	2.7	30.0	20.0	52.7
10-23-94	2.0	30.0	1.5	33.5
12-14-95	2.0	38.0	***	40.0
06-28-95	8.0	over capacity	***	
07-21-95	2.0	"	***	
08-24-95	4.0	"	***	
09-15-95	2.3	150.0	***	157.3
10-31-95		NEWUA conducting maintenance		
11-30-95	3.3	75.0	***	78.3
04-02-96	8.0	100.0	***	108.0
05-17-96	5.0	175.0	***	180.0
06-11-96	5.5	175.0★	***	180.0
07-23-96	5.5	200.0★	***	205.0
08-21-96	4.5	150.0★	***	154.5
09-16-96	4.5	150.0★	***	154.5
10-23-96	3.8	80.0	***	83.8
11-14-96	4.0	80.0	***	84.0
12-12-96	4.0	100.0	***	104.0

1996 problems: Valve seating affected flow measurements

	METER 2	METER 3	TOTAL	NEWUA METER
04-28-97	5.2	+150.0	+150.0★	94.0★★
05-29-97	6.0	+150.0	+150.0★	230.0
06-25-97	6.0	+150.0	+150.0★	300.0
07-17-97	6.0	+150.0	+150.0★	270.0
08-26-97	5.5	+150.0	+150.0★	270.0
09-15-97	5.5	+150.0	+150.0★	270.0
10-13-97	5.0	+150.0	+150.0★	180.0
11-18-97	3.9	+100.0	+100.0★	160.0
12-04-97	4.0	+100.0	+100.0★	150.0

* Flow not stabilized.
** Data collected during pump test.
*** Diverted through Meter 3.
★ Over capacity
★★ Meter problems

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

2. Quality

Baseline quality sampling of the individual springs was performed in 1997. The minimum, maximum, and mean results of the 1997 spring flow compared to historical quality analysis are listed in Table 33. The raw data regarding the Rilda Springs sampled are contained in Appendix G. Values are in milligrams per liter unless 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.

FIGURE 4 (a)

NORTH EMERY WATER USERS ASSOCIATION
RILDA CANYON SPRINGS

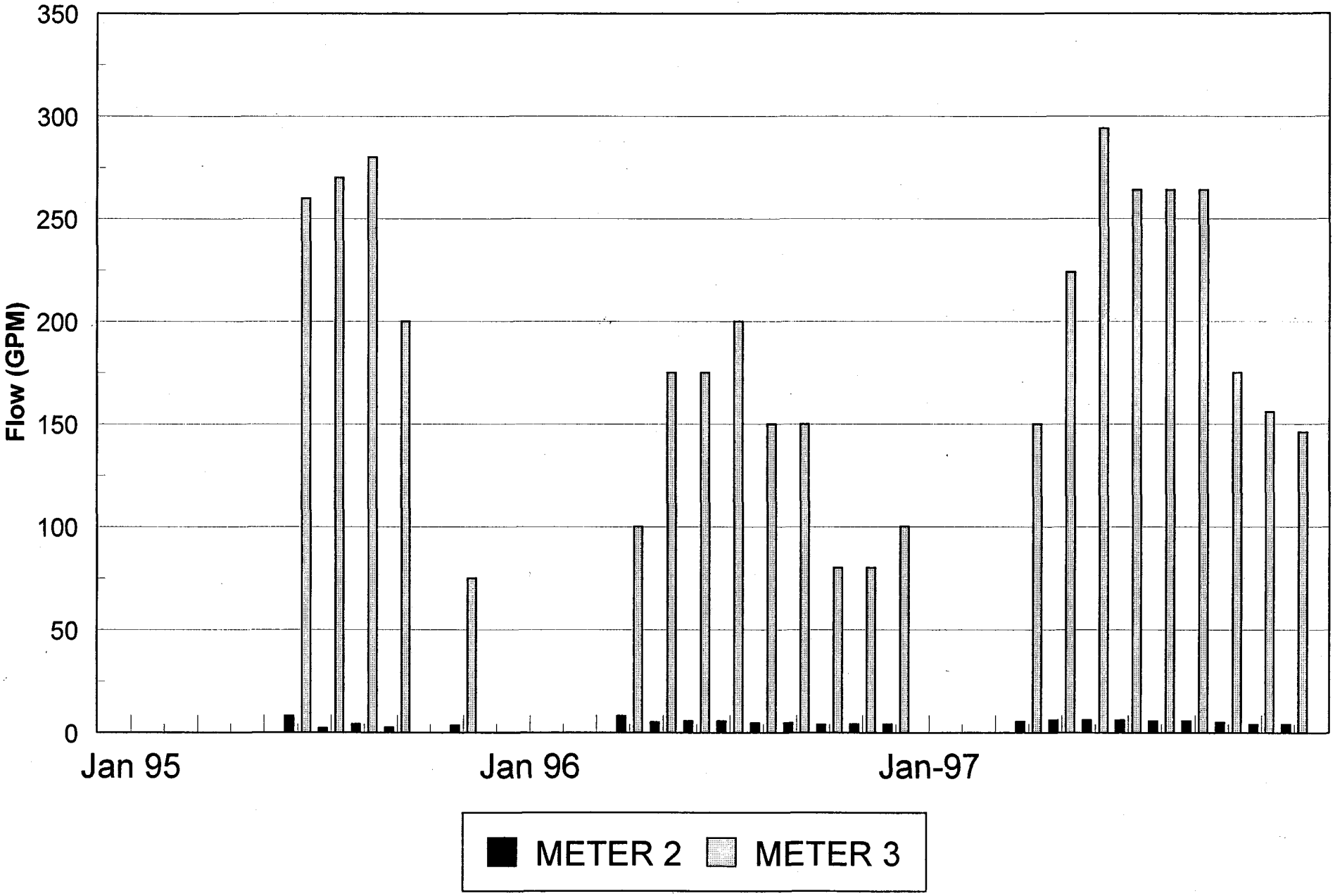
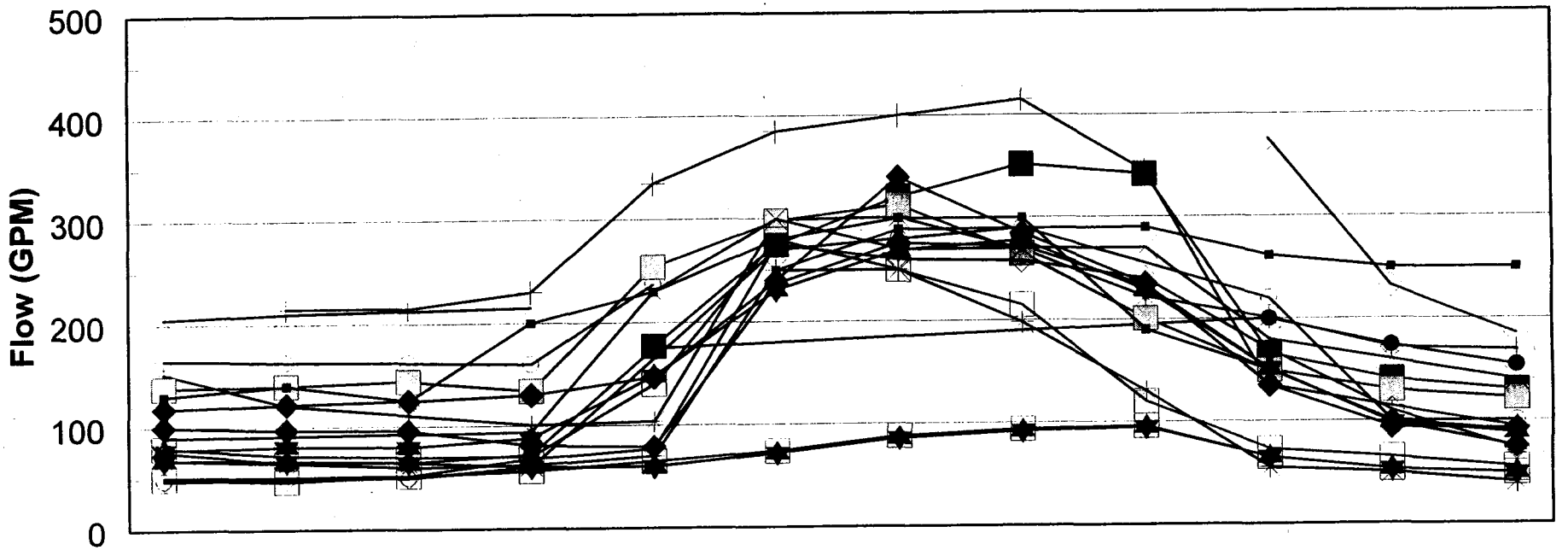


FIGURE 4 (b)

NORTH EMERY WATER USERS ASSOCIATION

RILDA CANYON SPRINGS



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1975					177	275	321	352	342	166	141	130
1976	100	97	96	81	79	237	276	272	233	151	99	75
1977	68	67	65	60	60	72	86	92	95	65	53	49
1978	50	47	52	56	65	74	88	94	96	65	53	49
1980										376	232	185
1981	152	121	111	101	104	299	301	269	222	201	172	169
1982	165	163	162	160	237							
1983						250	289		290	262	250	250
1984	205	210		215								
1987		215	215	230	335	385	400	415	345	135	114	94
1988	76	65	65	72	175					200	174	154
1989	138	140	144	134	254	298	313	265	201	150	130	122
1990	118	122	125	130	147	240	340	285	235	135	94	92
1991	78	81	80	88	148	231	269	278	229	151	98	88
1992	80	72	70	70	140	280	250	215	120	73	65	55
1993	51	51	52	68	77	275	260	258	240	170	110	73
1994	68	65	60	62	70	250	250	198	130	55	50	40
1995	48		50	60		270	280	290		220	100	100
1996	130	140	125	200	230	280	300	300	190	150	100	90
1997	90			94	230	300	270	270	270	180	160	140

TABLE 33
NEWUA - RILDA CANYON SPRINGS
AVERAGE WATER QUALITY*

PARAMETER **	METER 2		METER 3		METER 4	
	1997	Historical	1997	Historical	1997	Historical
Bicarbonate	427	432	401	393	Combined with Meter 3 in 1995	356
Calcium	76.3	90.2	70.7	78.6		70.3
Carbonate	<1	1.8		2.1		0.7
Chloride	7.3	12.6	10.0	11.1		13.1
Cond.(umhos/cm)	774	733	714	636		535
Hardness	380	436	355	384		348
Iron		0.37	0.15	0.15		0.13
Magnesium	46.00	51.10	43.30	45.48		41.90
Mangenese		0.11		0.08		0.08
pH(units)	7.51	7.25	7.62	7.39		7.40
Potassium	2.00	2.65	2.00	1.94		2.13
Sodium	12.67	14.89	12.67	13.20		12.96
Sulfate	76.3	87.9	64.0	71.3		55.4
TDS	457	471	420	411		365

* Quality parameters reported as mg/l unless otherwise noted
** Data: Database input restricted to values greater then laboratory minimum detection limit.
Flow through Meter 4 was combined with Meter 3 in 1995

C. Trail Mountain

PacifiCorp began monitoring springs on Trail Mountain in 1993. Monitoring prior to 1993 was completed by the previous lease holders. The nine (9) springs listed below are monitored.

T-6 (18-2-1)	T-14 (17-25-1)
T-8 (17-21-1)	T-14A (17-26-5)
T-9 (17-22-1)	T-15 (17-35-1)
T-10 (17-26-4)	T-16 (17-35-2)
	TM-23 (17-14-4)

1. Flow and Sampling Schedule

a. Flow

All springs on the preceding list are measured during the months of July through October if weather and reasonable access permit.

b. Quality Samples

All springs listed above are sampled for water quality characteristics during the months of July through October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Operational Quality. (See Appendix Q.)

2. Spring Flow

As indicated early, precipitation decreased but spring discharge rates increased slightly from 1996 to 1997. Table 34 is a tabulation of the flow data collected during the 1997 monitoring season. The seasonal variation is represented in Table 34 under the column heading "Seasonal Net Change %." The percentage figures represent the amount of change, either positive or negative. The average change reveals a twenty-four percent (24%) [twenty-three percent (23%) by volume] decrease from the July to the October measurements (similar to East Mountain, see Table 26).

TABLE 34

TRAIL MOUNTAIN

SPRING DISCHARGE RECESSION STUDY

YEAR 1997

SPRING		JUL	AUG	SEP	OCT	Seasonal Net Change %
T-6	Flow (GPM)	7.5	6.7	4.9	4.3	-42.7
18-2-1	Temp. (C)	9	9	10	8	
T-8	Flow (GPM)	0.9	0.6	0.5	0.6	-40.2
17-21-1	Temp. (C)	7	9	10	7	
T-9	Flow (GPM)	4.8	7.0	12.0	5.0	4.2
17-22-1	Temp. (C)	7	8	9	7	
T-10	Flow (GPM)	0.4	0.3	0.3	0.1	-76.2
17-26-4	Temp. (C)	10	8	9	5	
T-14	Flow (GPM)	1.0	0.3	0.2	0.1	-90.0
17-25-1	Temp. (C)	8	9		7	
T-14A	Flow (GPM)	dry	dry	dry	dry	
17-26-5	Temp. (C)					
T-15	Flow (GPM)	1.0	1.5	1.7	2.0	100.0
17-35-1	Temp. (C)	8	9	9	9	
T-16	Flow (GPM)	dry	dry	dry	dry	
17-35-2	Temp. (C)					
TM-23	Flow (GPM)	dry	dry	dry	dry	
	Temp. (C)					

JULY TOTAL **15.6**

OCTOBER TOTAL **12.1**

Net Change - Average -24.15

Net Change - By Volume -22.95

TOTAL FOR JULY 1996 = 14.4

JULY 1997 8.3% GREATER THAN JULY 1996

A ten-year comparison of spring discharge is shown in Table 35. 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 35: TRAIL MOUNTAIN YEARLY SPRING DISCHARGE VARIATIONS (GPM)

JULY FLOW DATA

Spring	1988	1989	1990	1991	1992	*** 1993	1994	1995	1996	1997
T-6 (18-2-1)	11.0	0.5	0.50	1.20	0.03	6.0	1.6	4.1	3.3	7.5
T-8 (17-21-1)	4.7	0.2	0.25	Dry	0.14	1.7	0.2	1.7	0.6	0.9
T-9 (17-22-1)	8.0	0.2	0.10	Dry	2.50	40.0	4.0	20.0	8.6	4.8
T-10 (17-26-4)	4.7	Dry	0.15	Dry	Dry	0.4	Damp	0.4	0.2	0.4
T-14 (17-25-1)	5.0	Dry	Dry	Dry	Dry	1.6	Damp	2.0	0.9	1.0
T-14A (17-26-5)	10.0	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
T-15 (17-35-1)	2.1	0.2	0.50	0.75	0.33	1.6	0.5	1.2	0.8	1.0
T-16 (17-35-2)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
T-23 (17-14-4)	22**	4.0*	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
TOTAL	67.5	5.1	1.50	1.95	2.67	51.3	6.3	29.4	14.4	15.6

* August measurement
** September measurement
*** First year monitored by PacifiCorp

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 H.) The purpose of the cation-anion diagram 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 geologic 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

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 1997 reveals an excellent correlation with historical averages. A summary of the water quality analysis for springs monitored on Trail Mountain is presented in Table 36. In the table, the mean values for 1997 are compared to the historical results for each respective spring. The raw data regarding all springs sampled are contained in Appendix H.

Table 36: Trail Mountain Springs Water Quality (Historical vs. 1997) *

PARAMETER	18-2-1 Historical	18-2-1 1997	17-21-1 Historical	17-21-1 1997	17-22-1 Historical	17-22-1 1997	17-26-4 Historical	17-26-4 1997	17-25-1 Historical	17-25-1 1997	17-26-5 Historical	17-26-5 1997
Elevation	8395		9320		9210		8880		8155		9080	
Geologic Formation	TKn		TKn		TKn		TKn		Kcg		TKn	
Bicarbonate	402	406	399	397	341	312	392	396	475	511	399	no
Calcium	60.4	57.0	52.2	48.0	49.9	39.0	56.0	49.0	82.4	114.5	77.5	flow
Carbonate	1.48	<5	1.53	<5	3.06	<5	8.33	<5	3.50	<5	<.5	during
Chloride	46.7	42.5	31.6	25.5	11.2	9.5	27.5	28.0	37.0	14.50	20.0	1997
Cond.(umhos/cm)	939	906	708	694	553	490	705	698	1273	844	849	
Hardness	386	350	248	225	272	219	340	283	448	492	429	
Iron	0.18	<0.1	0.11	<0.1	0.12	<0.1	0.13	<0.1	0.13	<0.1	0.45	
Magnesium	56.40	50.50	29.47	25.50	35.83	29.50	47.92	39.00	62.22	50.00	58.68	
Mangenese	0.05	<0.1	0.06	<0.1	0.08	<0.1	0.12	<0.1	0.04	<0.1	0.02	
pH(units)	7.82	7.53	7.68	7.52	7.79	7.63	8.04	8.12	7.79	7.85	7.79	
Potassium	1.70	<1	2.25	1.00	1.92	<1	1.88	2.00	2.88	2.50	1.84	
Sodium	66.78	56.50	61.05	59.00	23.50	15.00	33.30	28.00	89.96	27.50	31.70	
Sulfate	132.7	116.0	18.4	17.5	22.0	15.0	33.3	30.0	254.0	108.0	141.7	
TDS	573	555	395	380	309	275	391	390	777	569	512	

PARAMETER	17-35-1 Historical	17-35-1 1997	17-35-2 Historical	17-35-2 1997	17-14-4 Historical	17-14-4 1997
Elevation	8880		9000		7880	
Geologic Formation	TKn		TKn		Alluvium	
Bicarbonate	380	416	No	No	362	No
Calcium	41.1	43.0	Historical	Flow	65.8	Samples
Carbonate	5.94	<5	Flow	During	0.00	During
Chloride	42.42	38.00		1997	13.90	1997
Cond.(umhos/cm)	761	784			641	
Hardness	256	235			346	
Iron	0.68	<0.1			0.19	
Magnesium	37.67	31.00			43.95	
Mangenese	0.08	<0.1			0.02	
pH(units)	8.05	7.78			7.77	
Potassium	1.61	1.00			1.95	
Sodium	75.04	81.00			15.83	
Sulfate	43.8	44.5			61.8	
TDS	432	450			385	

TRAIL MOUNTAIN SPRINGS
CROSS REFERENCE

ARCO'S	ENERGY WEST
T-6	18-2-1
T-8	17-21-1
T-9	17-22-1
T-10	17-26-4
T-14	17-25-1
T-14A	17-26-5
T-15	17-35-1
T-16	17-35-2
TM-23	17-14-4

* Quality parameters reported as mg/l unless otherwise noted

V. MINE HYDROLOGY

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

The relationship of the Deer Creek, Cottonwood/Wilberg, and Trail Mountain mine workings with the overlying springs is shown in Map HM-5 (in pocket). Beginning in 1979 (Trail Mountain - 1992), PacifiCorp has developed an ambitious spring monitoring program with emphasis to detect changes in the East and Trail 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 42 through 64 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 1997. With the collection of numerous samples throughout the extent of the mine workings the quality has remained relatively constant. (Refer to Cation/Anion dmagrams in Appendices G and H.

Collection procedures for groundwater quality consist of two grab samples (if measurable quantities exist) 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 Q.)

Long-term monitoring locations have been established at each of the mines which produces measurable quantities of water, i.e., Deer Creek, Cottonwood/Wilberg, and

Trail Mountain mines. (See Maps HM-2, HM-3, and Plate 7-3 in pocket.) Four types of occurrences have been recognized to exist within the current mine workings. (Refer to Figure 5.)

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 I, K, and M for the Deer Creek, Cottonwood/Wilberg, and Trail Mountain In-Mine hydrographs.)

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	645.2 Million Gallons
Estimated Evaporation*	18.9 Million Gallons
Domestic Usage	6.6 Million Gallons
Total Discharge	670.7 Million Gallons

* See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

Eight samples were collected in the Deer Creek Mine in 1997. (See Map HM-2 in pocket for locations.) Parameters analyzed in 1997 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix I.)

FIGURE 5

LONG TERM WATER SOURCES

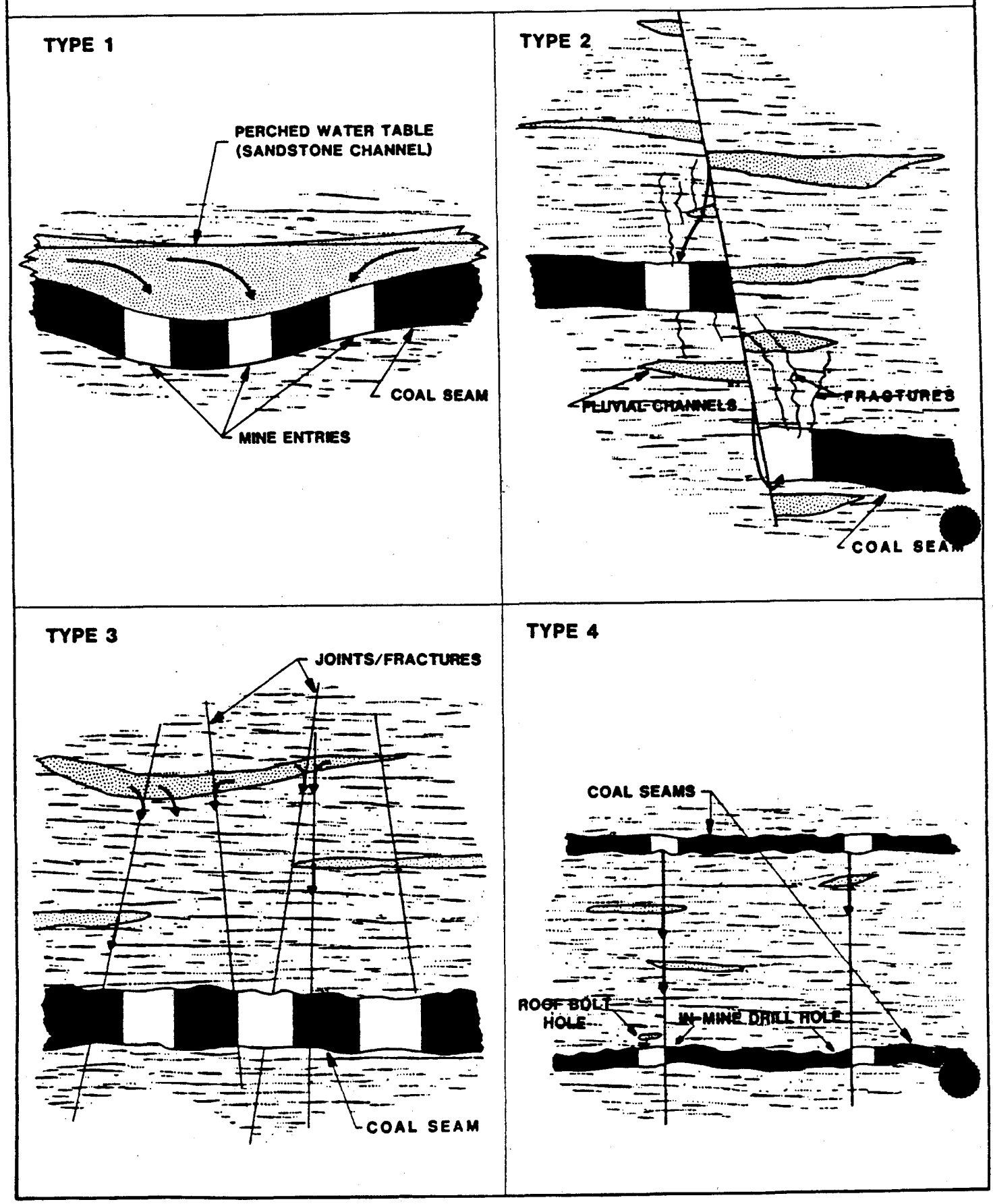


Table 37 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1997 to the historical values for each location. It is apparent from Table 37 that the average quality of the in-mine water has remained relatively constant. (Refer to Cation/Anion diagrams in Appendix I.) The complete chemical analysis of samples collected in 1997 can be found in Appendix I.

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 6. 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. Discharge from Deer Creek is either shipped directly to Huntington Power Plant or to the Deer Creek drainage in accordance with stipulations of the Deer Creek Discharge Permit UT-0023604-002.

The total water discharged from the Deer Creek Mine during 1997 was estimated at 1,975 acre feet, or 645.2 million gallons. The recorded flow of 1,975 acre feet during 1997 is a thirty-nine percent (39%) increase from the 1996 discharge of 1,416 acre feet. The average monthly discharges are shown in Figure 7.

TABLE 37: DEER CREEK IN-MINE WATER QUALITY *

1997*** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
TW-10														
3-97	387	63		6	616	297		34		7.45	1	13	41	370
6-97	376	70		5	625	319		35		7.49	1	15	47	410
9-97	379	68		7	633	310		34		7.25	1	14	41	360
12-97	375	68		6	640	332		37		7.77	1	13	47	360
1997***														
MIN	375	63		5	616	297		34		7.25	1	13	41	360
MAX	387	70		7	640	332		37		7.77	1	15	47	410
MEAN	379	67		6	629	315		35		7.49	1	14	44	375
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1988-1996														
MIN	279	61.3	0.1	0.4	450	279	0.01	18.70	0.01	6.60	0.01	9.81	27.00	313
MAX	714	211.0	5.0	30.0	950	732	1.17	77.10	1.21	8.40	5.00	55.03	350.00	505
MEAN	385	84.7	1.6	10.2	608	372	0.17	36.40	0.09	7.45	1.63	16.52	57.00	377
No. of Analysis	35	35	35	34	35	35	29	35	30	33	33	35	35	35
MN-ME**														
3-97	432	85		8	762	398		44		7.73	3	17	90	490
6-97	418	81		7	741	375		42		7.81	2	18	110	520
9-97	437	86		7	796	392		43		7.64	3	17	93	500
12-97	441	86		7	804	404		46		7.73	3	16	98	480
1997														
MIN	418	81		7	741	375		42		7.64	2	16	90	480
MAX	441	86		8	804	404		46		7.81	3	18	110	520
MEAN	432	85		7	776	392		44		7.73	3	17	98	498
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1991-1996														
MIN	355	69.0	0.1	4.0	500	329	0.01	38.00	0.01	6.90	0.74	15.00	40.0	240
MAX	442	100.0	5.0	25.0	897	432	2.81	49.60	0.20	7.99	14.00	37.16	110.0	484
MEAN	408	85.4	2.0	10.6	715	388.68	0.26	42.65	0.07	7.43	3.43	19.84	76.9	433
No. of Analysis	22	22	15	22	22	22	17	22	17	21	22	22	22	22

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

** Sample site intiated during 1991.

*** 1997 Data: Database input restricted to values greater then laboratory minimum detection limit.

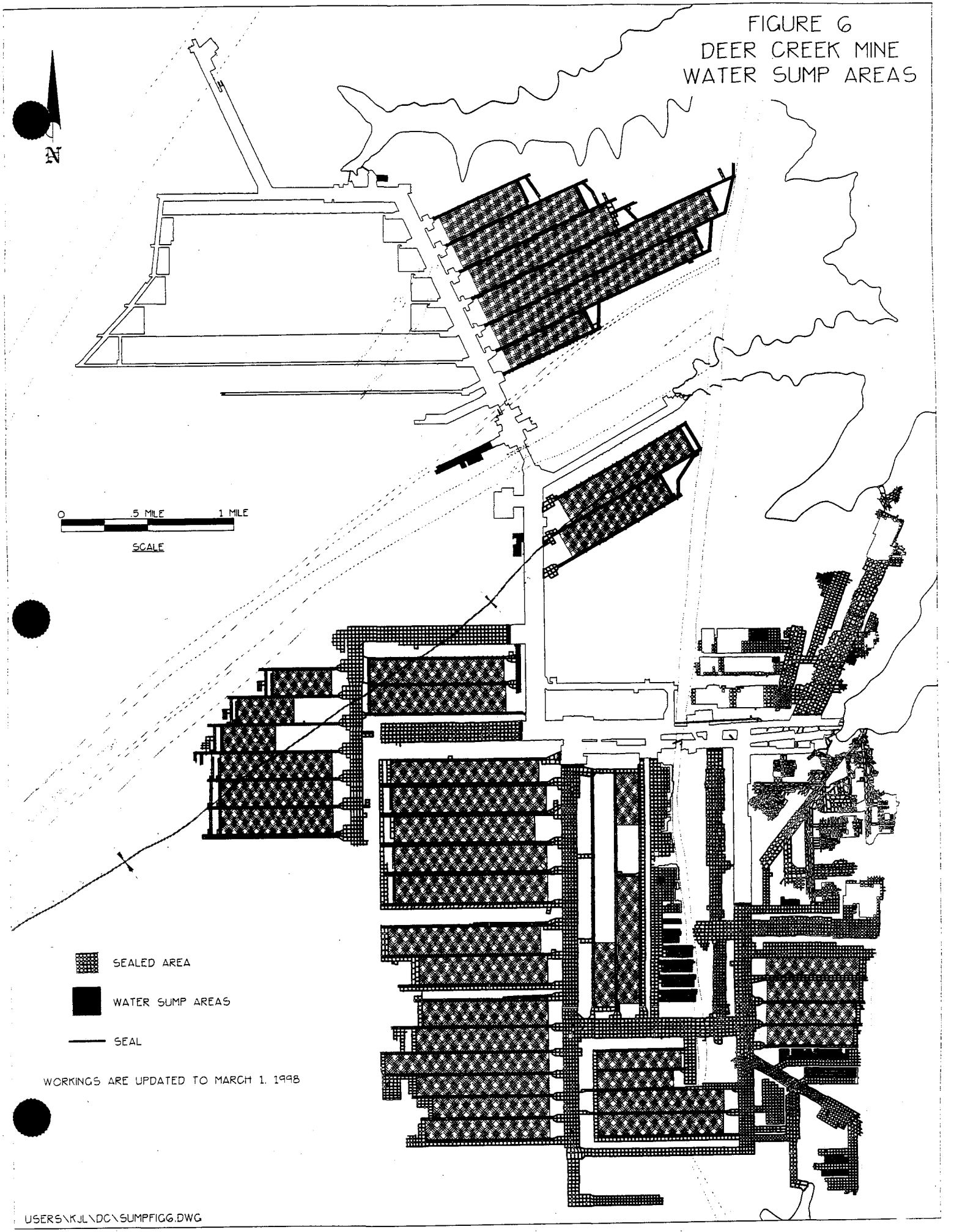
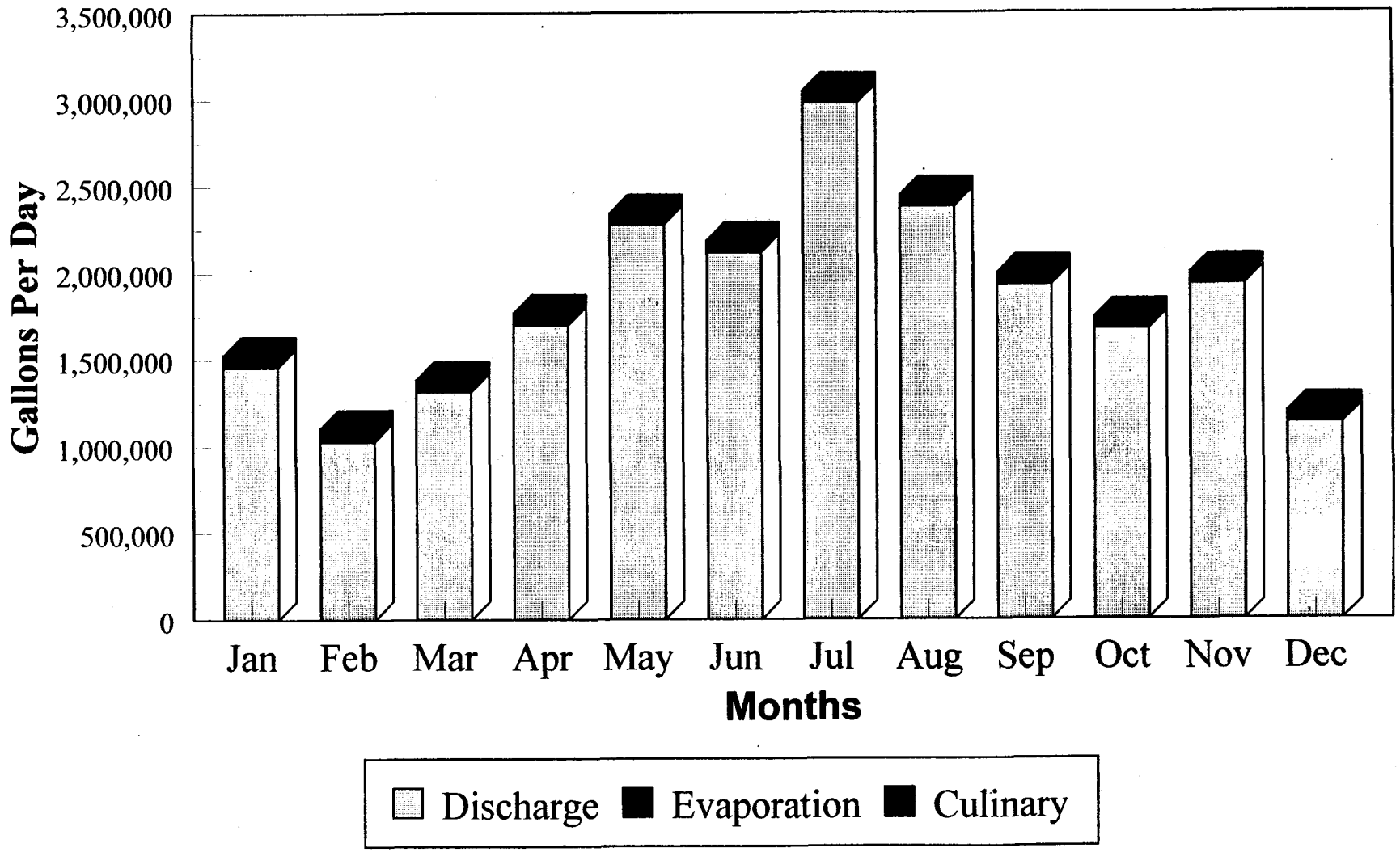


FIGURE 6
DEER CREEK MINE
WATER SUMP AREAS
N
0
.5 MILE
1 MILE
SCALE
SEALED AREA
WATER SUMP AREAS
SEAL
WORKINGS ARE UPDATED TO MARCH 1, 1998
USERS\KJL\DC\SUMPFIG6.DWG

FIGURE 7

DEER CREEK MINE

1997 MINE WATER DISCHARGE



A graph displaying the historical discharge rates is included as Figure 8. The volume of water discharged from the mine has increased at a significant rate from 1988 through 1991 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. Water production decreased significantly in 1992 with the sealing of the 4th South area.

d. Discharge Quality

Monthly water quality samples were collected for 1997. Table 38 compares the minimum, maximum, and mean values from an historical standpoint to 1997. An examination of Table 38 reveals excellent correlation with historical results. Individual analysis can be found in Appendix J.

FIGURE 8

DEER CREEK MINE DISCHARGE

@ Deer Creek (UPDES UT-0023604)

January 1980 through February 1998

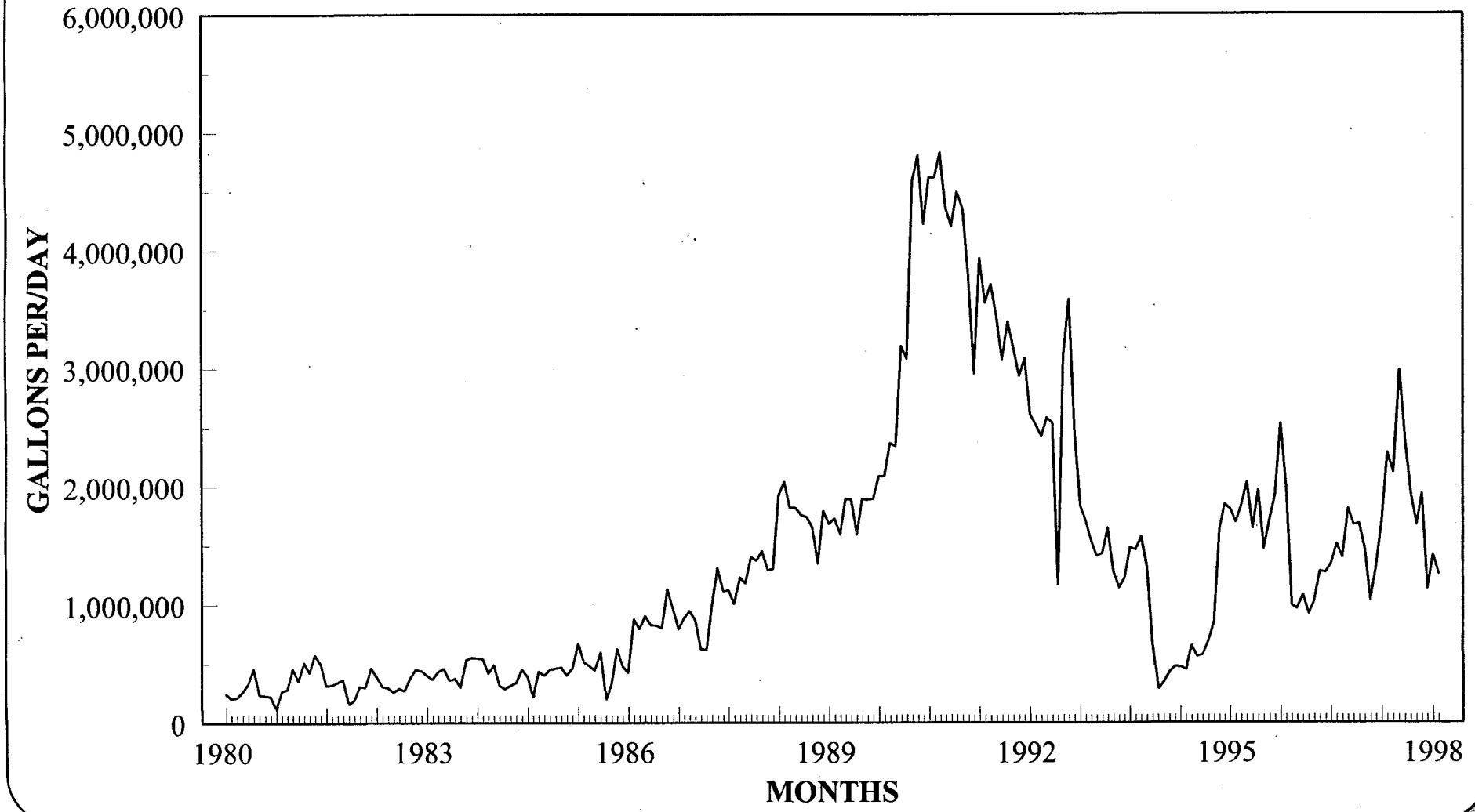


TABLE 38: DEER CREEK MINE - DISCHARGE WATER QUALITY*

Parameters	1997** Minimum	Maximum	Mean	No. of Analysis	Historical - (1976-1996) Minimum	Maximum	Mean	No. of Analysis
pH (units)	7.15	7.64	7.42	12	6.76	8.51	7.58	263
Acidity	15	40	24.5		0.1	97	12.6	239
Chloride	12	63	30.67	12	0.7	60	17.5	248
Conductivity (umhos/cm)	1530	1019	1201	12	480	1900	899	256
Iron	0.6	3.7	1.15	12	0.01	7.53	0.55	252
Oil & Grease	7	3	4.33	3	0.1	48.8	3.18	236
Sulfate	197	419	303.1	12	13	518	205.7	256
TDS	380	980	742	12	289	1111	600	262
TSS	11	334	74.5	11	0.1	2784	61.9	264

* Quality parameters reported as mg/l unless otherwise noted.
** Data: Database input restricted to values greater than laboratory minimum detection limit.

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.

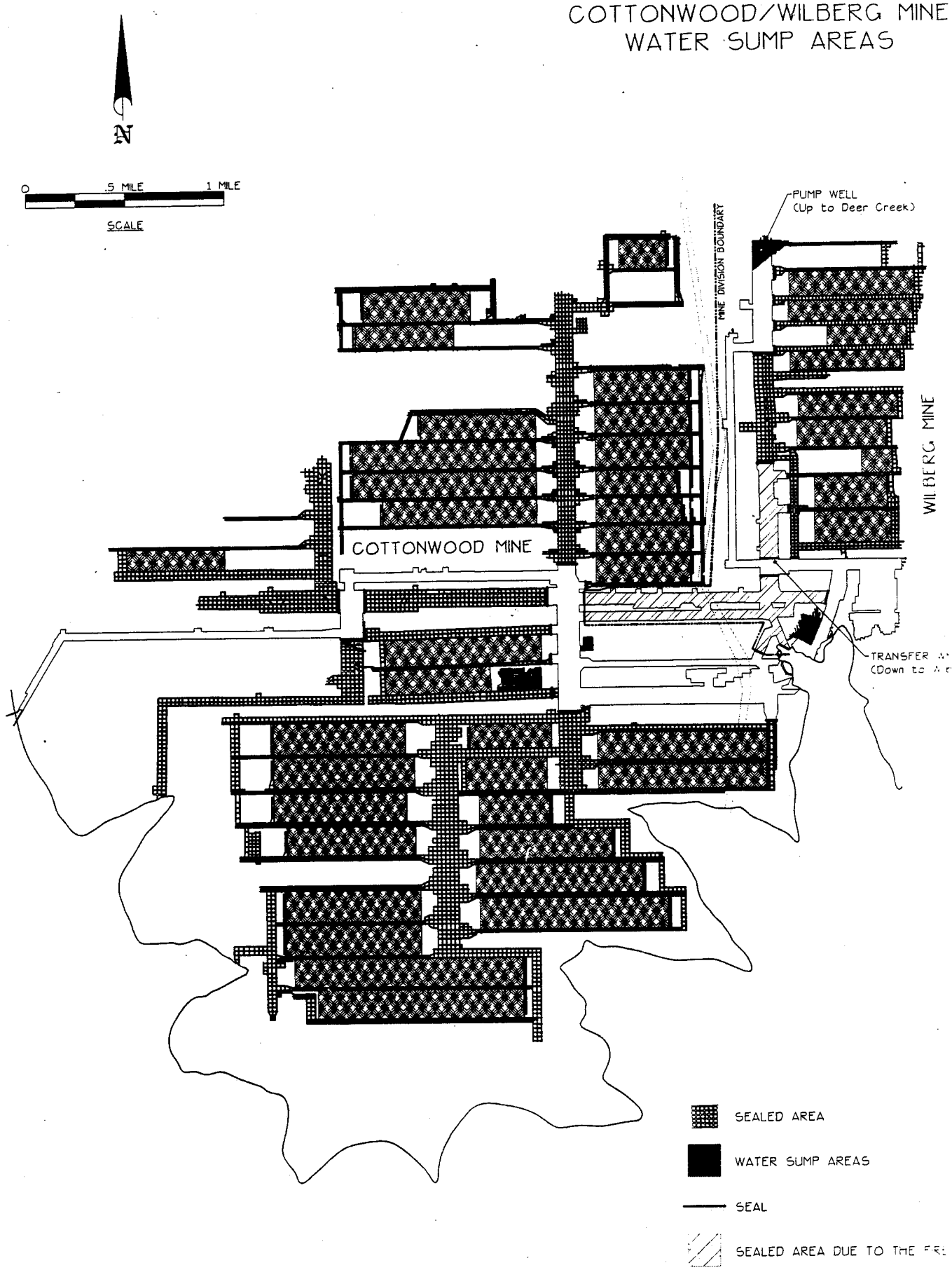
3. Wilberg/Cottonwood Mine

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 1994.

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

FIGURE 9
COTTONWOOD/WILBERG MINE
WATER SUMP AREAS



WORKINGS ARE UPDATED TO MARCH 1

USERS\KJL\CW\SUMPFIG9.DWG

locations of the sealed areas and sumps are shown on Figure 9. As reported in the 1984 Annual Report, water discharged from the Wilberg Mine complex includes the area designated as the Cottonwood Mine. (See Figure 10.) Consistent with previous years, the following table lists the factors involved in estimating in-mine water production.

Wilberg/Cottonwood Discharge

Grimes Wash	66.8 Million Gallons
Miller Canyon*	0.0 Million Gallons
Estimated Evaporation**	19.0 Million Gallons
Domestic Usage	0.7 Million Gallons
Total Discharge	67.5 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 1997. (See Map HM-5 in pocket for locations.) Parameters analyzed in 1997 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix Q.) Table 39 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1997 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 K.

FIGURE 10

WILBERG/COTTONWOOD MINE DISCHARGE

@ Grimes Wash (UPDES UT-0022986)

April 1979 through February 1998

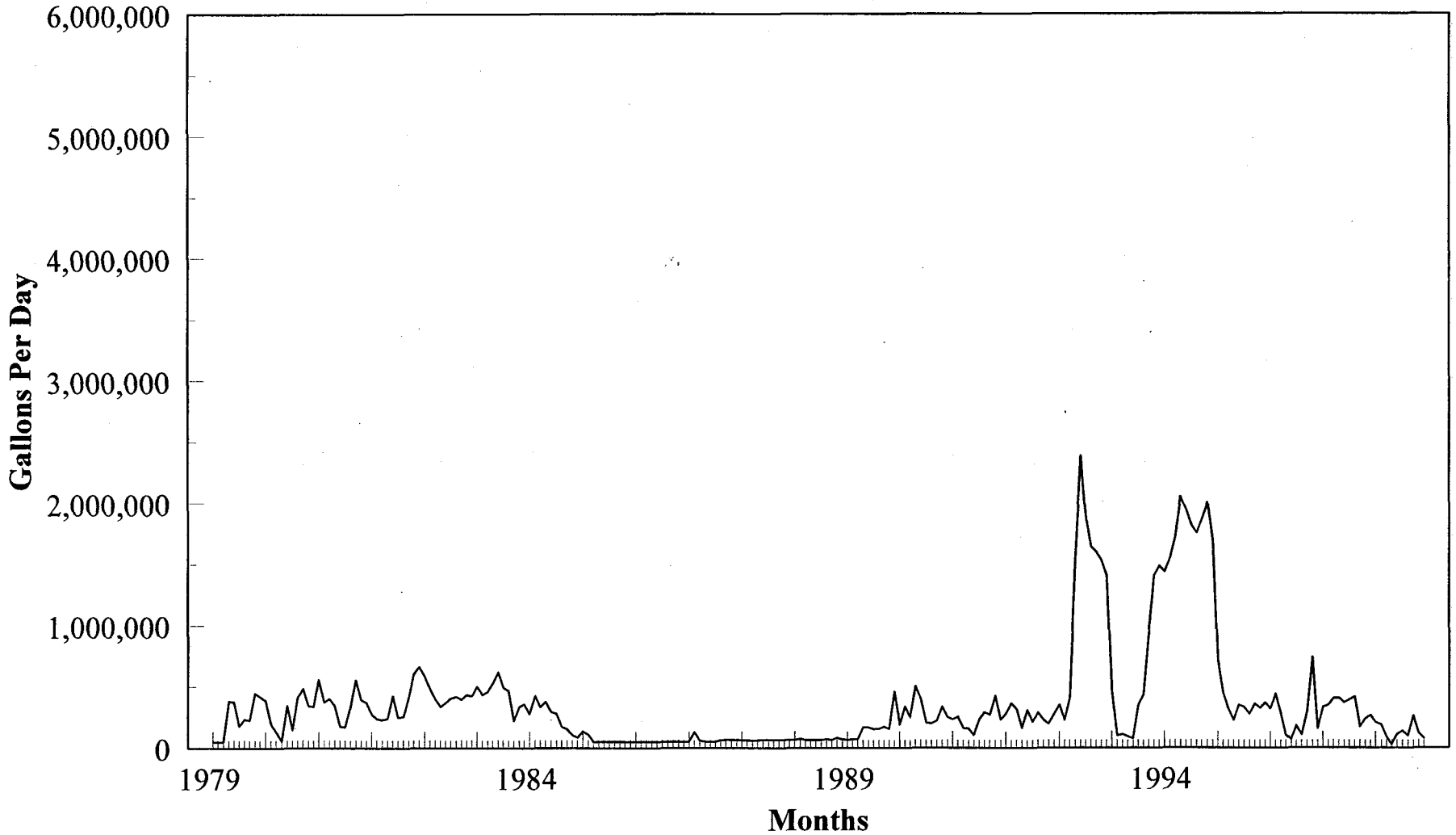


TABLE 39: WILBERG/COTTONWOOD IN-MINE WATER QUALITY *

1997** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
2S XC-11														
3-97	620	164		16	1641	830		102		7.07	4	20	426	1070
6-97	603	168		15	1487	860		107		7.28	4	30	464	1090
9-97	609	160		12	1501	803		98		6.90	4	22	372	1100
12-97	613	148		6	1512	781		100		7.12	3	20	436	1100
1997**														
MIN	603	148		6	1487	781		98		6.90	3	20	372	1070
MAX	620	168		16	1641	860		107		7.28	4	30	464	1100
MEAN	611	160		12	1535	819		102		7.09	4	23	425	1090
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1983-1996														
MIN	403	116.0	0.1	9.6	1000	725	0.01	5.40	0.01	6.50	0.30	5.80	250.0	664
MAX	676	330.0	5.0	160.0	2600	1022	0.30	134.40	0.20	8.05	7.40	36.90	690.0	1328
MEAN	545	173.4	1.6	23.2	1474.3	876.39	0.10	105.89	0.05	7.28	4.20	22.65	412.8	1025
No. of Analysis	41	44	33	43	44	41	36	44	37	43	43	44	44	44
TMA XC-32														
3-97	449	114		13	1332	581	0	72		7.28	6	42	369	860
6-97	439	125		12	1265	629	0	77		7.37	7	42	439	920
9-97	437	126		9	1321	632	0.2	77		7.10	7	40	491	970
12-97	434	126		7	1352	623	0	75		7.23	6	37	428	970
1997**														
MIN	434	114		7	1265	581	0.0	72		7.10	6	37	369	860
MAX	449	126		13	1352	632	0.2	77		7.37	7	42	491	970
MEAN	440	123		10	1318	616	0.1	75		7.25	6.5	40	432	930
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1983-1996														
MIN	379	116	1	12	1203	614	0.10	76	0.10	7.13	6	33	327	825
MAX	467	133	5	17	1334	688	0.20	90	0.20	8.20	8	44	410	960
MEAN	421	125	4	15	1278	644	0.14	81	0.11	7.52	7	37	362	896
No. of Analysis	12	12	8	12	12	12	8	12	8	12	12	12	12	12

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

** 1997 Data: Database input restricted to values greater then laboratory minimum detection limit.

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. A total of 66.8 million gallons was discharged to Grimes Wash during 1997. No discharge occurred in 1997 at the Miller Canyon breakouts, which were developed for ventilation purposes but sealed in 1987. (See Figure 11.) Discharge from Cottonwood Mine is monitored in accordance with stipulations of the Wilberg Mine Discharge Permit UT-0022896.

d. Discharge Quality

Samples are collected each month from Grimes Wash and Miller Canyon breakouts whenever discharge occurs. Monthly samples were collected from the Grimes Wash location during 1997. Table 40 compares the minimum, maximum, and mean values from 1997 to the historical values.

TABLE 40: WILBERG/COTTONWOOD - DISCHARGE WATER QUALITY*

GRIMES WASH

	1997**				Historical - (1976-1996)			
Parameters	Minimum	Maximum	Mean	No. of Analysis	Minimum	Maximum	Mean	No. of Analysis
pH (units)	7.42	8.05	7.83	14	6.9	8.47	7.68	216
Aciity	12	30	18.83		0.1	62	9.98	181
Chloride	15	35	20.70	14	0.6	80	16.39	194
Conductivity (umhos/cm)	1058	1309	1164	14	490	1590	971	148
Iron	0.1	0.5	0.29	7	0.01	3.0	0.32	215
Oil & Grease					0.1	23.8	2.2	196
Sulfate	32	546	353	14	29.2	600	233.6	197
TDS	750	920	832.6	14	407	1287	620.6	217
TSS					0.1	222	7.41	242

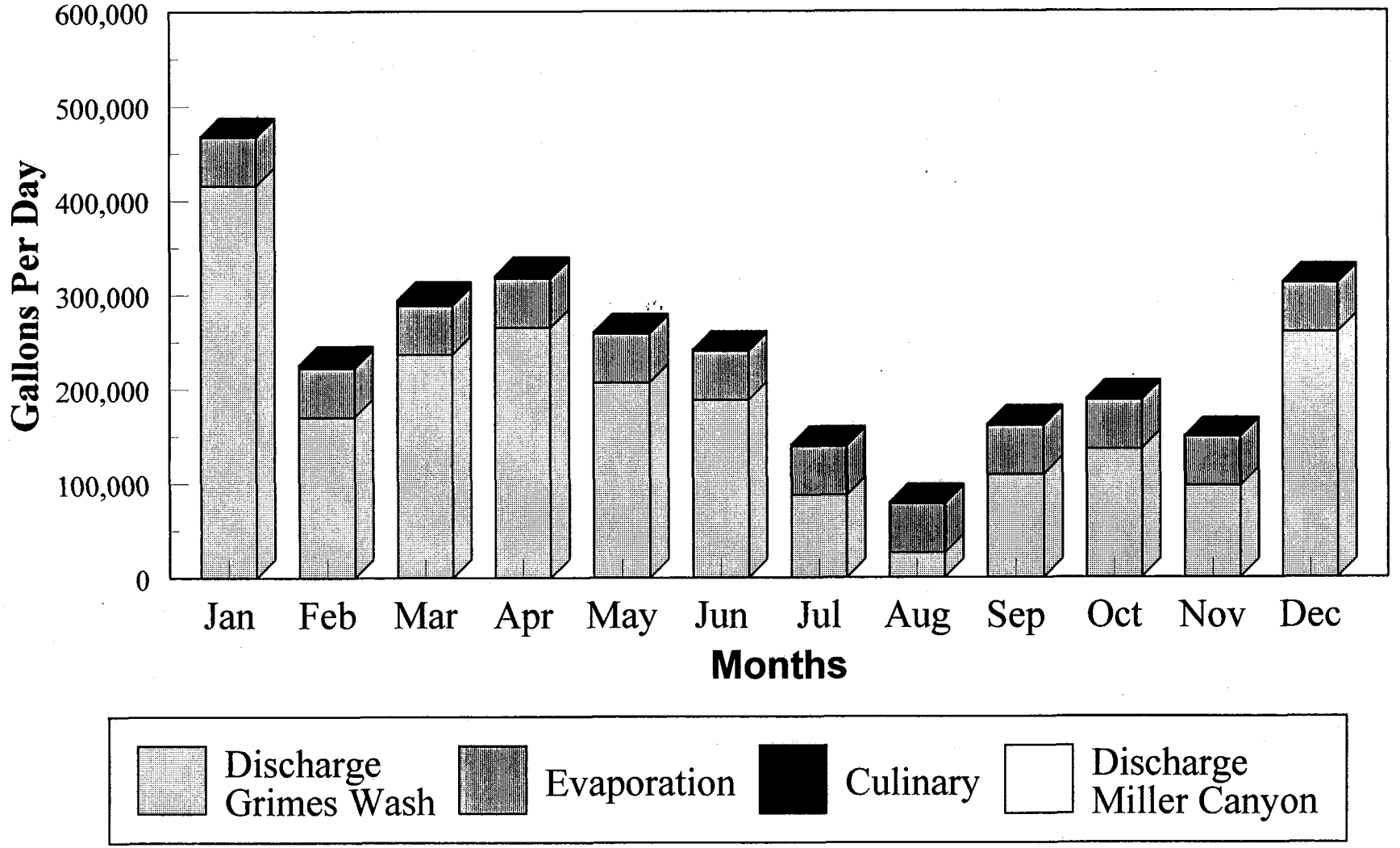
MILLER CANYON - No discharge in 1997

	1997**				Historical - (1976-1996)			
Parameters	Minimum	Maximum	Mean	No. of Analysis	Minimum	Maximum	Mean	No. of Analysis
pH (units)					6.4	8.83	7.29	83
Acidity					0.1	100	22.28	73
Chloride					10	155	22.27	79
Conductivity (umhos/cm)					480	1900	1220	83
Iron					0.01	1.38	0.23	81
Oil & Grease					0.1	7.2	2.17	72
Sulfate					200	680	416.9	81
TDS					413	1182	926.6	83
TSS					0.1	32	4.75	111

* Quality parameters reported as mg/l unless otherwise noted.
** Data: Database input restricted to values greater than laboratory minimum detection limit.

FIGURE 11

WILBERG/COTTONWOOD
1997 MINE WATER DISCHARGE



4. Trail Mountain Mine

a. In-Mine Water Production

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

Trail Mountain Discharge	37.7 Million Gallons
Estimated Evaporation	7.8 Million Gallons
Domestic Usage	3.7 Million Gallons
Total Discharge	49.2 Million Gallons

b. In-Mine Quality

Four samples were collected in the Trail Mountain Mine in 1997. (See Map 6 in pocket for locations.) Site UG-2 was terminated in 1995 due to insufficient flow. Parameters analyzed in 1997 are those listed in the DOGM Guidelines for Groundwater Baseline or Operational Quality. (See Appendix Q.) Table 41 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1997 to the historical values for each location. It is apparent from Table 41 that the average quality of the in-mine water has remained relatively constant. (Refer to Cation/Anion diagrams in Appendix M.)

TABLE 41: TRAIL MOUNTAIN IN-MINE WATER QUALITY *

1997** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
UG-3														
3-97	320	35		16	636	207		29		8.14	3	46	35	320
6-97	311	32		10	521	187		26		8.18	4	44	27	300
9-97	308	30		5	522	174		24		8.04	3	40	26	300
12-97	316	34		5	550	196		27		8.1	3	41	28	310
1997**														
MIN	308	30.0		5	521	174		24		8.04	3	40	26	300
MAX	320	35.0		16	636	207		29		8.18	4	46	35	320
MEAN	314	32.8		9	557	191		27		8.12	3	43	29	308
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1985 - 96														
MIN	260	26.0	0.1	2	380	151	0.03	20	0.03	7.41	2	42	15	252
MAX	344	49.3	25.0	15	696	222	0.20	29	0.20	8.48	5	61	130	424
MEAN	298	34.8	7.3	9	541	186	0.12	24	0.10	8.06	4	50	38	311
No. of Analysis	24	24	13	24	24	24	13	24	11	24	24	24	24	24

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

** 1997 Data: Database input restricted to values greater then laboratory minimum detection limit.

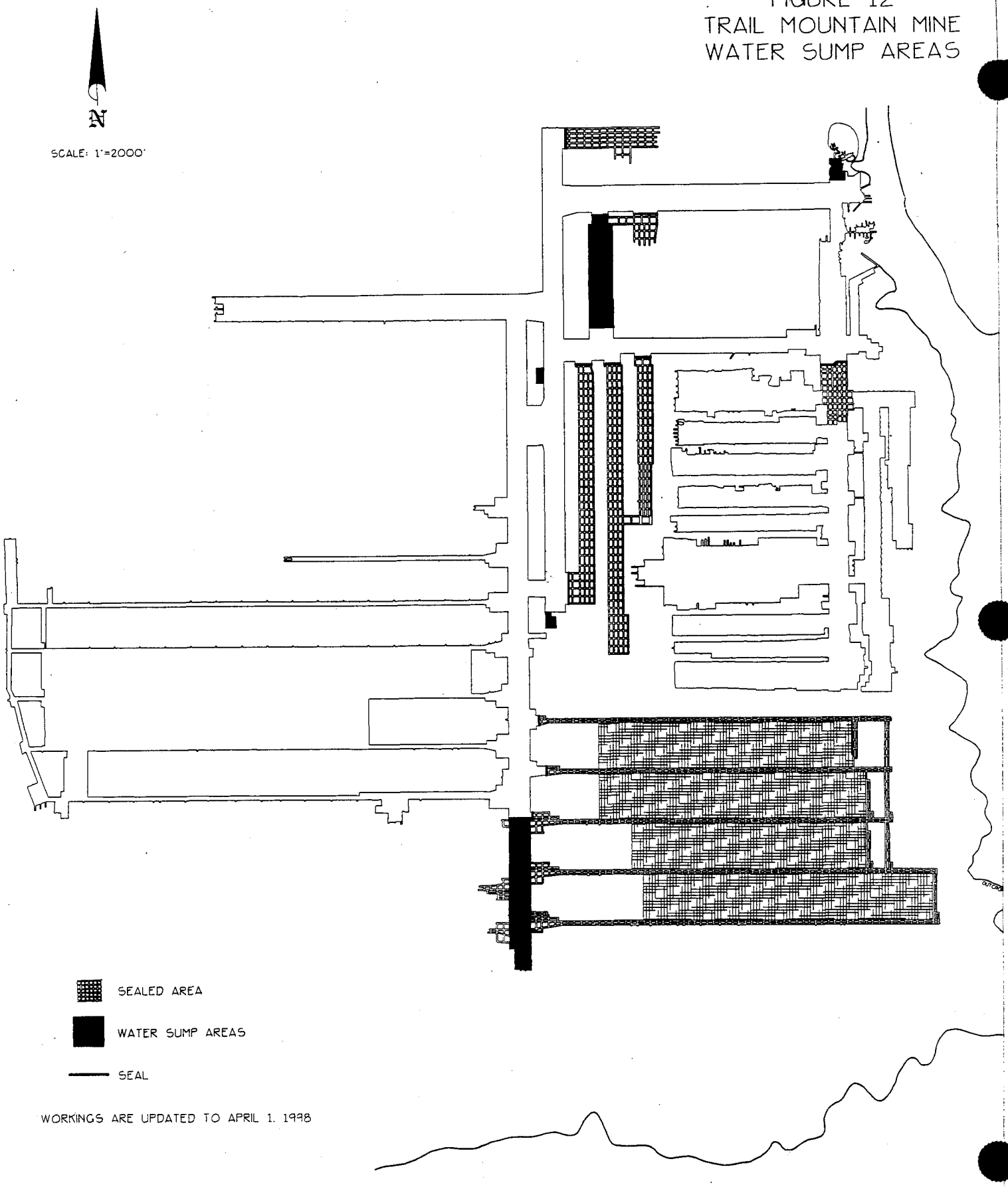
c. Discharge Quantity

Water produced in the Trail Mountain Mine either is pumped or gravity flows to a sump located in 4th Left, 5th Left, and 3rd South. (See Figure 12.) A portion of the water is redistribruted to various areas of the mine to be utilized in the mining operations. Excess water not used in the mining operations is stored in sealed areas of the mine or discharged to Cottonwood Canyon Creek. A total of 37.7 million gallons was discharged to Cottonwood Canyon Creek during 1997. (See Figure 13.) Discharge from Trail Mountain is monitored in accordance with stipulations of the Trail Mountain Mine Discharge Permit UTG040003-002.

d. Discharge Quality

Samples are collected each month from Trail Mountain Mine whenever discharge occurs. Appendix N includes monitoring completed at Trail Mountain and at the sealed Oliphant Mine portals.

FIGURE 12
TRAIL MOUNTAIN MINE
WATER SUMP AREAS



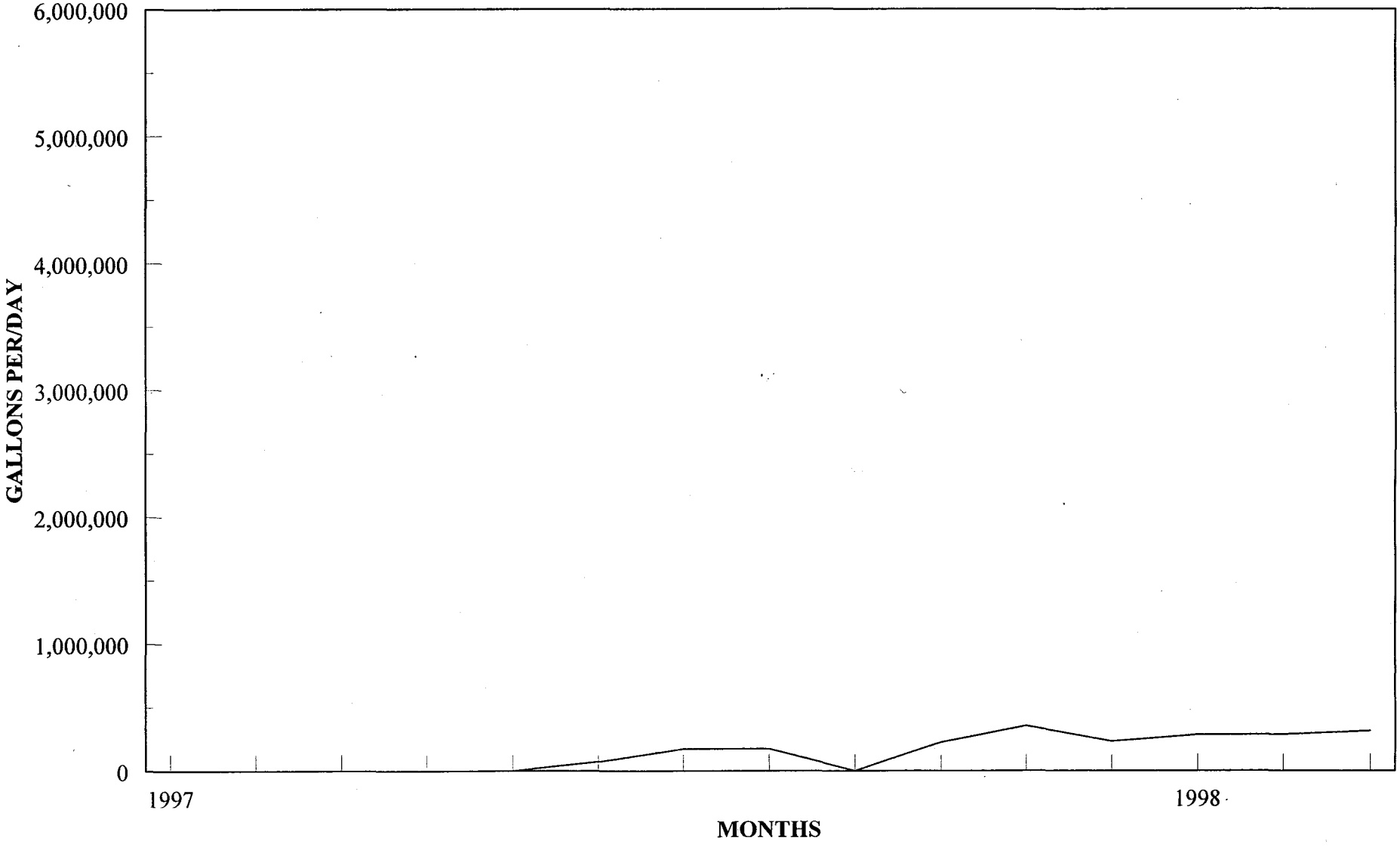
USERS\KJL\TRAIL\SUMP12.DWG

FIGURE 13

Trail Moutain Mine

@ Cottonwood Canyon Creek (UPDES UTG040003)

January 1997 through March 1998



VI. PIEZOMETRIC GRADIENT INFORMATION

A. Surface

1. Cottonwood Canyon Creek

Eight (8) wells located along the extent of Cottonwood Canyon Creek are monitored monthly. The following table lists the zone isolated with each well.

Well I.D.	Monitoring Zone
CCCW-1A	Alluvial Deposits
CCCW-1S	Starpoint Sandstone
CCCW-2A	Alluvial Deposits
CCCW-3A	Alluvial Deposits
CCCW-3S U	Blackhawk - Fluvial Sandstone
CCCW-3S L	Starpoint Sandstone
EM-31	Lower Blackhawk/Starpoint Sandstone
TM-1B	Starpoint Sandstone
TM-3	Starpoint Sandstone (Straight Canyon)

Hydrographs of the surface wells can be found in Appendix O.

2. Rilda Canyon

Six (6) wells located in Rilda Canyon are monitored monthly when accessible. The following table lists the zone isolated with each well.

Well I.D.	Monitoring Zone
P-1	Alluvial Deposits
P-4	Alluvial Deposits
P-5	Alluvial Deposits
P-6	Alluvial Deposits
P-7	Alluvial Deposits
EM-47	Lower Blackhawk/Starpoint Sandstone

Information collected during 1997 correlated well with historical information. As a result of mining in the western portion of the Trail Mountani Mine Well TM-3 in Straight Canyon decreased in level due to depressurization of the Star Point sandstone. Hydrographs for the individual wells can be found in Appendix O.

B. In-Mine

1. Deer Creek

Four (4) long-term monitoring wells were completed during 1989. (See Map HM-2 for well locations.) Due to changes in the mine layout only one well remained active during 1997. Water levels remained relatively constant during 1997. (See Appendix I.)

2. Cottonwood Mine

During 1989 four holes were drilled in the Cottonwood Mine. Monitoring of the long-term wells, WCP 1-3, was discontinued in 1992 due to the sealing of the 3rd South area.

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 1997. The analysis, along with water depth, is listed in Table 42. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix O. 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 42: WELLS - WATER QUALITY *

1997** SAMPLE DATES	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	PH (units)	POTASSIUM	SODIUM	SULFATE	TDS
DEER CREEK - DCWR-1														
3-97	770	163		620	23000	1396		240		8	14	7040	13123	21406
6-97	827	151		846	23200	1324		230		8	13	7170	13249	21506
9-97	830	141		80	22300	546		47		8	15	7100	13959	879
12-97	684	151		810	22700	1308		210		8	15	7170	14898	20818
1997**														
MIN	684	141		80	22300	546		47		8	13	7040	13123	879
MAX	830	163		846	23200	1396		240		8	15	7170	14898	21506
MEAN	778	152		589	22800	1144		182		8	14	7120	13807	16152
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1989-1996:														
MIN	626	141	0	80	17300	546	0	47	0	7	13	5165	6000	11466
MAX	935	880	15	1140	45000	3351	2	351	0	8	44	9978	18000	24189
MEAN	760	238	2	797	25059	1555	0	232	0	8	22	7032	13335	21324
No. of Analysis	31	32	28	32	32	32	24	32	28	32	32	32	32	31
WILBERG/COTTONWOOD - WCWR-1														
3-97	326	172		2820	19000	2390		476		8	18	4120	7783	14320
6-97	284	151		1997	13580	1946		381	0	8	20	3210	6561	11175
9-97	264	153		2325	13490	1951		381	0	8	21	3080	5542	11020
12-97	864	198			14860	2455		476		8	16	2760	6088	10860
1997**														
MIN	264	151		1997	13490	1946		381	0	8	16	2760	5542	10860
MAX	864	198		2820	19000	2455		476	0	8	21	4120	7783	14320
MEAN	435	169		2381	15233	2186		429	0	8	19	3293	6494	11844
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1989-1996:														
MIN	305	132	0	280	10666	1629	0	138	0	7	8	851	750	8714
MAX	863	1135	10	4020	120000	8327	9	1717	2	8	119	8812	24000	30440
MEAN	469	418	2	1857	30574	4282	1	770	0	8	45	5215	11756	19706
No. of Analysis	28	28	26	28	28	28	23	28	28	28	28	28	28	28
TRAIL MOUNTAIN TM-1B														
3-97	1004	3		155	2120	7				9	1	520	11	1160
6-97	944	3		148	2010	16		2		9	1	620	22	1200
9-97	438	11		16	798	60		8		8	3	178	21	450
12-97	452	11		22	805	65		9		8	5	171	23	470
1997**														
MIN	438	3		16	798	7		2		8	1	171	11	450
MAX	1004	11		155	2120	65		9		9	5	620	23	1200
MEAN	710	7		85	1433	37		6		8	3	372	19	820
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4
HISTORICAL 1985-1996:														
MIN	304	2	1	69	1050	14	0	1	0	9	1	5	2	632
MAX	1051	14	164	717	4580	72	0	11	0	10	16	1316	664	3290
MEAN	791	5	65	194	2188	29	0	4	0	9	5	487	90	1283
No. of Analysis	9	9	8	9	8	8	4	9	5	9	9	9	9	9

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

**** Data: Database input restricted to values greater than laboratory minimum detection limit.**

Four samples were collected in 1997. The analysis, along with water depth, is listed in Table 42. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix O. 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 and Trail mountains, 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 and Trail mountains 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 nineteenth 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 from 1988 through 1992 and returned in 1994. Runoff improved substantially in 1993 and 1995 through 1997 with above average flow conditions occurring in most drainages.

The data collected in 1997 continued to show the relationship between the variation in surface water quantity and precipitation, but the hydrologic monitoring completed on East and Trail mountains 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 and Trail Mountain properties.

APPENDIX A

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	23378.00	22975.00	22967.00	22223.00	21979.00	21751.00	18196.00	16655.00	28079.00	30970.00	29062.00	26472.00	1
2	23319.00	22967.00	22953.00	22205.00	21979.00	21740.00	18058.00	16731.00	28501.00	31008.00	28899.00	26342.00	2
3	23293.00	22956.00	22595.00	22219.00	21979.00	21740.00	17948.00	16782.00	28689.00	31003.00	28811.00	26192.00	3
4	23267.00	22949.00	22580.00	22212.00	21968.00	21650.00	17832.00	16838.00	29018.00	30999.00	28741.00	26007.00	4
5	23245.00	22949.00	22577.00	22209.00	21961.00	21556.00	17723.00	16966.00	29307.00	30994.00	28667.00	25708.00	5
6	23219.00	22924.00	22577.00	22202.00	21951.00	21466.00	17603.00	17160.00	29562.00	30985.00	28580.00	25538.00	6
7	23197.00	22906.00	22562.00	22202.00	21944.00	21376.00	17480.00	17431.00	29778.00	30970.00	28493.00	25360.00	7
8	23183.00	22887.00	22544.00	22198.00	21933.00	21283.00	17364.00	17764.00	29978.00	30961.00	28406.00	25192.00	8
9	23168.00	22866.00	22530.00	22191.00	21926.00	21193.00	17246.00	18103.00	30157.00	30952.00	28328.00	25028.00	9
10	23150.00	22847.00	22523.00	22191.00	21916.00	21105.00	17117.00	18501.00	30193.00	30942.00	28255.00	24854.00	10
11	23132.00	22829.00	22523.00	22152.00	21909.00	21016.00	17008.00	18965.00	30230.00	30923.00	28169.00	24688.00	11
12	23121.00	22808.00	22516.00	22149.00	21898.00	20924.00	16878.00	19348.00	30267.00	30909.00	28083.00	24519.00	12
13	23110.00	22786.00	22498.00	22149.00	21891.00	20836.00	16852.00	19740.00	30304.00	30890.00	28002.00	24363.00	13
14	23106.00	22768.00	22480.00	22149.00	21881.00	20826.00	16832.00	20201.00	30341.00	30876.00	27933.00	24196.00	14
15	23095.00	22750.00	22469.00	22145.00	21873.00	20385.00	16813.00	20698.00	30378.00	30834.00	27874.00	24045.00	15
16	23088.00	22732.00	22462.00	22141.00	21863.00	20217.00	16796.00	21173.00	30415.00	30726.00	27814.00	23936.00	16
17	23073.00	22728.00	22448.00	22138.00	21856.00	20083.00	16776.00	21719.00	30452.00	30619.00	27755.00	23902.00	17
18	23058.00	22739.00	22440.00	22138.00	21845.00	19943.00	16756.00	22262.00	30489.00	30512.00	27700.00	23932.00	18
19	23062.00	22732.00	22433.00	22131.00	21838.00	19836.00	16737.00	22775.00	30526.00	30410.00	27611.00	23936.00	19
20	23058.00	22721.00	22412.00	22092.00	21828.00	19685.00	16717.00	23278.00	30563.00	30313.00	27497.00	23913.00	20
21	23044.00	22721.00	22380.00	22060.00	21821.00	19554.00	16697.00	23730.00	30596.00	30207.00	27384.00	23872.00	21
22	23029.00	22724.00	22369.00	22053.00	21810.00	19411.00	16680.00	24151.00	30633.00	30106.00	27267.00	23842.00	22
23	23018.00	22732.00	22369.00	22046.00	21803.00	19285.00	16661.00	24615.00	30670.00	30015.00	27192.00	23820.00	23
24	23011.00	22717.00	22362.00	22042.00	21793.00	19159.00	16641.00	25052.00	30708.00	29906.00	27080.00	23812.00	24
25	23022.00	22703.00	22348.00	22035.00	21786.00	19028.00	16621.00	25486.00	30745.00	29801.00	26968.00	23801.00	25
26	23018.00	22681.00	22333.00	22035.00	21775.00	18885.00	16602.00	25851.00	30782.00	29693.00	26877.00	23808.00	26
27	23011.00	22659.00	22312.00	22032.00	21768.00	18764.00	16582.00	26132.00	30820.00	29584.00	26807.00	23808.00	27
28	23000.00	22645.00	22308.00	22025.00	21758.00	18654.00	16566.00	26366.00	30858.00	29490.00	26741.00	23808.00	28
29	22996.00	22641.00	22291.00	22014.00	0.00	18547.00	16546.00	26590.00	30895.00	29387.00	26668.00	23801.00	29
30	22989.00	22620.00	22276.00	22011.00	0.00	18413.00	16527.00	27229.00	30933.00	29275.00	26598.00	23797.00	30
31	22986.00	0.00	22244.00	21997.00	0.00	18316.00	0.00	27657.00	0.00	29186.00	26537.00	0.00	31
MONTHLY CHANGE	421 0.	-366.	-376.	-247.	-239.	-3442.	-1789.	11130.	3276.	-1747.	-2649.	-2740.	

OCT96-SEPT97 TOTAL CHANGE 811. MAX CONTENTS 31008. AC FT JUL 2 MIN CONTENTS 16527. AC FT APR 30

TOTAL CHANGE MAX CONTENTS MIN CONTENTS

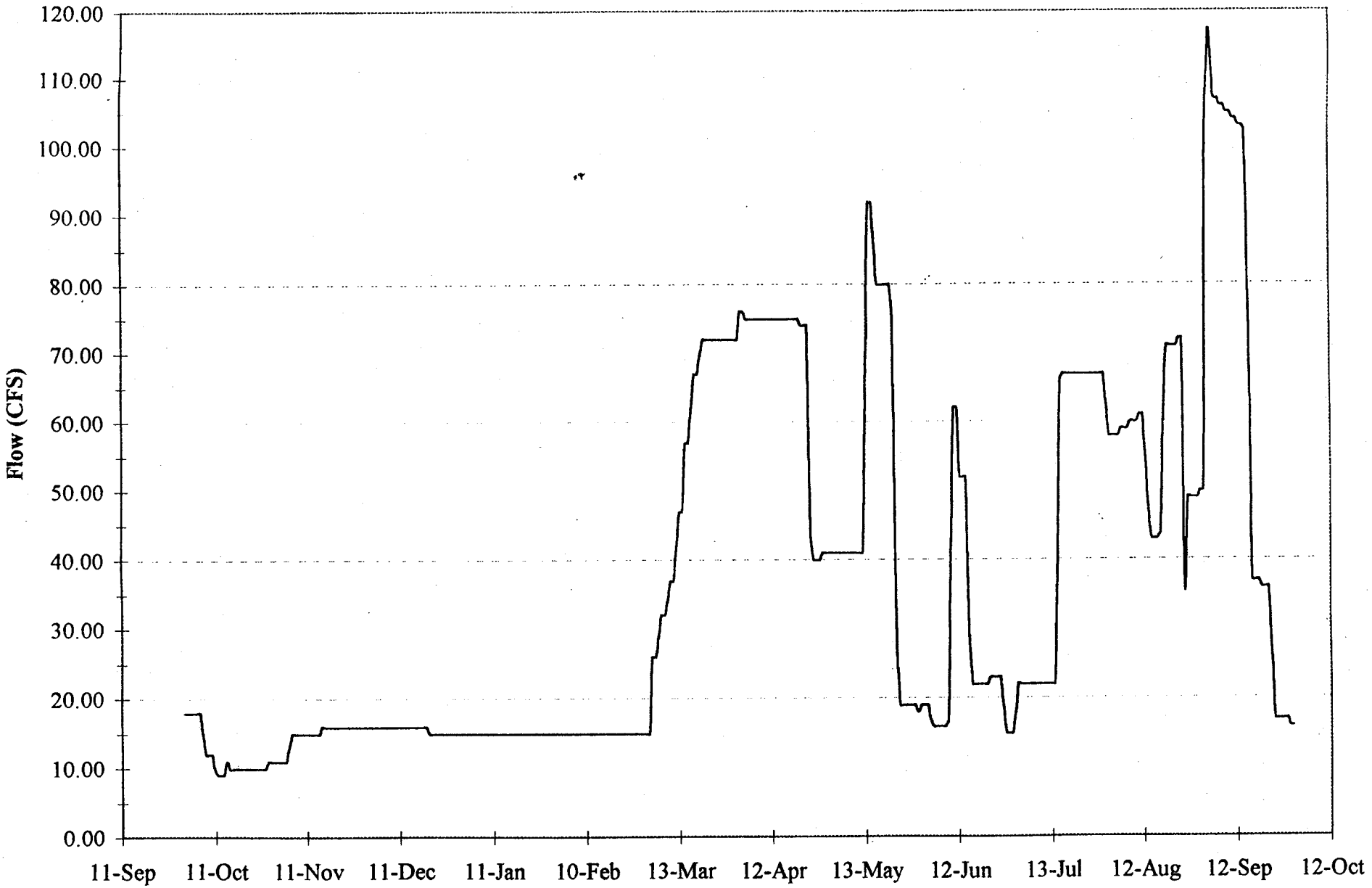
REMARKS:

The low elevation of 8534.70 was recorderd on 4/30/97.The high elevation of 8574.46 was recorderd on 7/2/97.

Utah Power & Light Company
Stream Discharge Records
Below Electric Lake Dam 1996-1997
Daily Discharge (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Day
1	18	11	16	15	15	15	72	41	19	18	58	50	1
2	18	11	16	15	15	15	76	41	19	22	58	99	2
3	18	11	16	15	15	15	76	41	17	22	58	117	3
4	18	11	16	15	15	26	75	41	16	22	58	111	4
5	18	13	16	15	15	26	75	41	16	22	59	107	5
6	18	15	16	15	15	29	75	41	16	22	59	107	6
7	15	15	16	15	15	32	75	41	16	22	59	106	7
8	12	15	16	15	15	32	75	41	16	22	60	106	8
9	12	15	16	15	15	34	75	41	17	22	60	105	9
10	12	15	16	15	15	37	75	41	40	22	60	105	10
11	10	15	16	15	15	37	75	41	62	22	61	104	11
12	9.1	15	16	15	15	42	75	41	62	22	61	104	12
13	9.1	15	16	15	15	47	75	65	52	22	55	103	13
14	9.1	15	16	15	15	47	75	92	52	22	48	103	14
15	11	15	16	15	15	57	75	92	52	42	43	102	15
16	9.9	16	16	15	15	57	75	86	29	66	43	70	16
17	9.9	16	16	15	15	62	75	80	22	67	43	37	17
18	10	16	16	15	15	67	75	80	22	67	44	37	18
19	10	16	16	15	15	67	75	80	22	67	62	37	19
20	10	16	16	15	15	70	75	80	22	67	71	36	20
21	10	16	15	15	15	72	75	80	22	67	71	36	21
22	10	16	15	15	15	72	74	73	22	67	71	36	22
23	10	16	15	15	15	72	74	30	23	67	71	26	23
24	10	16	15	15	15	72	74	19	23	67	72	17	24
25	10	16	15	15	15	72	44	19	23	67	72	17	25
26	10	16	15	15	15	72	40	19	23	67	36	17	26
27	10	16	15	15	15	72	40	19	19	67	49	17	27
28	10	16	15	15	15	72	40	19	15	67	49	17	28
29	11	16	15	15		72	41	19	15	67	49	16	29
30	11	16	15	15		72	41	18	15	67	49	16	30
31	11		15	15		72		19		63	50		31
	Monthly Totals												**Yearly Totals**
Total	370.10	447.00	485.00	465.00	420.00	1,606.00	2,042.00	1,481.00	789.00	1,413.00	1,759.00	1,961.00	13,238
Daily Mean	11.94	14.90	15.65	15.00	15.00	51.81	68.07	47.77	26.30	45.58	56.74	65.37	36
Daily Min	9.10	11.00	15.00	15.00	15.00	15.00	40.00	18.00	15.00	18.00	36.00	16.00	9
Daily Max	18.00	16.00	16.00	15.00	15.00	72.00	76.00	92.00	62.00	67.00	72.00	117.00	117
Acre Ft	734	887	962	922	833	3,185	4,050	2,938	1,565	2,803	3,489	3,890	26,257

BELOW ELECTIC LAKE DAM HYDRO GRAPH



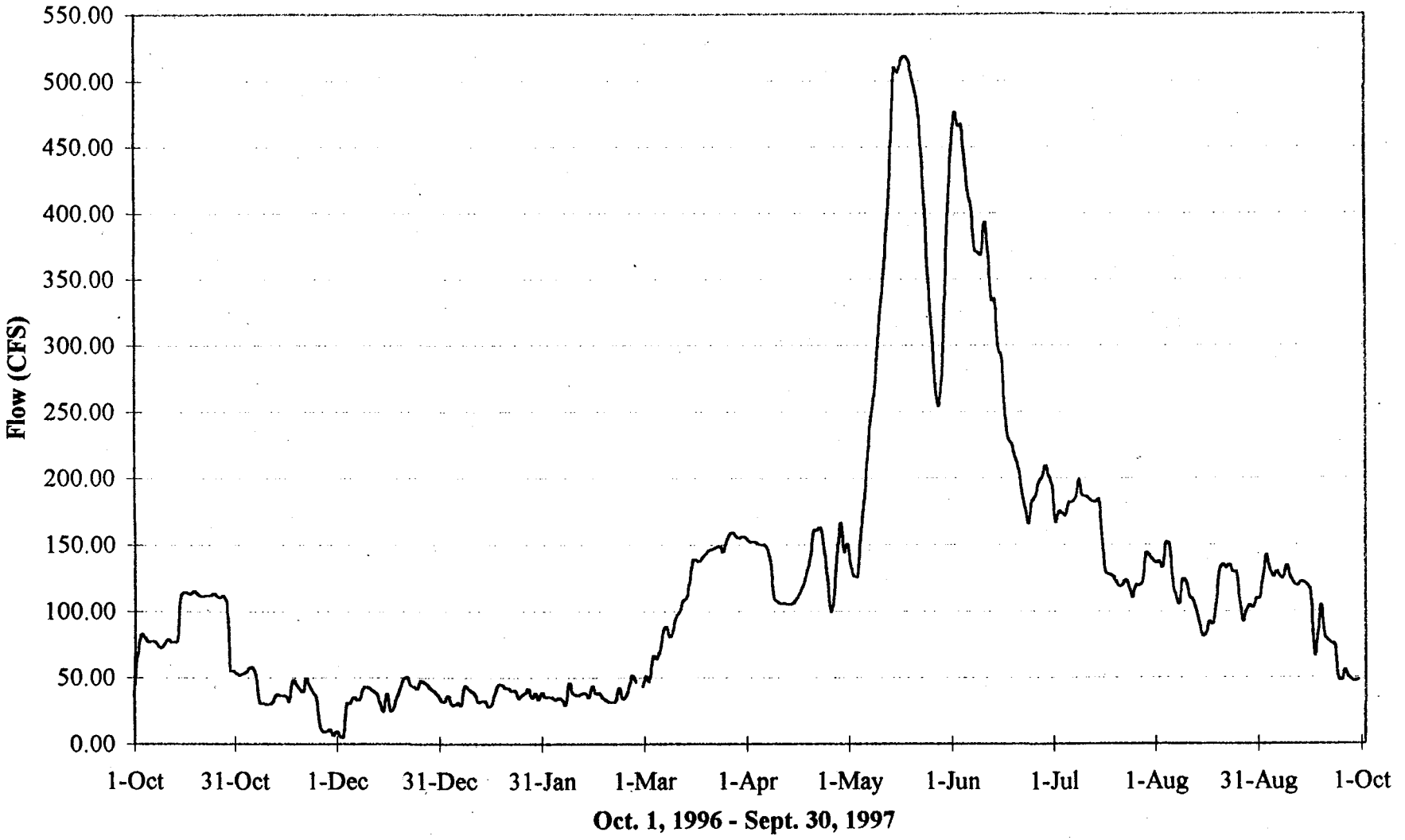
Oct. 1, 1996 - Sept. 30, 1997

Utah Power & Light Company
Stream Discharge Records
Huntington Creek 1996-1997
Daily Discharge (CFS)

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Day
1	36.9	53.4	9.48	32.5	35.7	43.7	154	150	452	194	136	110	1
2	69.4	52.2	6	32.1	35.7	51.1	152	134	475	168	137	127	2
3	82.7	53.4	5.33	36.4	35.3	47.4	152	126	466	175	133	142	3
4	80.5	54.5	30.7	30.4	33.5	66.4	151	126	467	174	152	131	4
5	76.7	57.4	30.7	29.6	34.9	64.2	150	157	441	172	150	126	5
6	77.6	57.4	35.3	31.5	33.5	69.2	150	184	415	182	121	130	6
7	76.9	50.6	33.5	29.3	29.8	84.5	147	214	404	182	111	126	7
8	74.1	31.6	34.4	43.8	45.8	88.5	138	247	372	186	106	125	8
9	72.8	31.1	42.2	41.8	38.7	80.8	110	266	370	199	124	134	9
10	75.1	30.2	43.2	39.9	37.3	85.4	108	298	368	187	122	125	10
11	79	30.2	41.7	37	36.8	96.5	106	333	393	187	111	121	11
12	76.9	31.6	39.7	31.9	38.2	100	106	358	370	185	108	119	12
13	77	37.3	37.7	32.4	38.2	108	105	398	334	183	101	122	13
14	77.9	36.8	30.2	32	35.3	110	105	454	335	182	91.5	122	14
15	110	36.8	25	28.5	43.7	121	106	509	297	184	81.4	119	15
16	115	35.8	37.7	29.9	37.7	138	110	506	290	150	83.7	115	16
17	114	32.5	25.4	37.5	38.7	138	115	517	252	129	92.2	67.2	17
18	113	47.9	27.1	44.5	34.9	138	121	519	230	128	90.3	84.1	18
19	115	44.8	35.8	44.6	33.5	141	131	515	226	126	106	104	19
20	113	41.7	42.2	42.7	31.6	144	141	506	216	123	131	81	20
21	111	39.7	49	42.2	31.6	146	161	494	206	119	135	78	21
22	111	49.5	50.1	40.3	33	147	161	479	191	120	132	75.8	22
23	112	43.2	44.3	40.4	42.2	148	163	449	177	123	135	73.7	23
24	112	38.7	43.2	34.6	34.4	149	146	403	166	117	129	49.2	24
25	113	35.3	41.7	36.6	35.8	144	127	353	182	110	129	47.7	25
26	111	14.3	47.9	38.6	44.3	153	99.4	313	186	119	106	55.4	26
27	110	9.48	46.3	41.7	51.7	158	109	271	196	119	92.3	50.4	27
28	112	9.48	44.3	34.9	46.9	159	144	254	201	123	101	47.8	28
29	106	11.2	41.2	38.4		156	166	275	209	144	105	47.3	29
30	55.4	6.34	39.7	33.6		155	145	336	202	142	103	48.4	30
31	55.5		36.8	38.5		156		408		139	110		31
						Monthly Totals							**Yearly Totals**
Total	2,822	1,104	1,098	1,128	1,049	3,587	3,979	10,552	9,089	4,771	3,565	2,904	45,649
Daily Mean	91	37	35	36	37	116	133	340	303	154	115	97	125
Daily Min	37	6	5	29	30	44	99	126	166	110	81	47	5
Daily Max	115	57	50	45	52	159	166	519	475	199	152	142	519
Ins. Min	21	5	5	24	25	25	92	115	158	94	81	0	0
Ins. Max	154	72	52	60	99	193	198	580	522	222	152	188	580
Acre Ft	5,598	2,191	2,177	2,238	2,154	7,114	7,893	20,930	18,028	9,463	7,072	5,760	90,618

Notes: On 11/26/96, the water level in the river dropped below the lower intake pipe until 12/03/96. Flows will be estimated for that period of time. Ice period lasted from 12/01/96 to 3/3/97. The sutron went dead on 8/1/97 due to a lightning strike. All flows for August will be estimated from the flow chart . A new sutron was installed on 9/3/97. No maximum or minimun instantaneous flows will shown for 9/1/97 to 9/3/97.

HUNTINGTON CREEK HYDRO GRAPH



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FAX: (801) 653-2436

March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

HCC01

Kind of sample reported to us Water

Rec'd 1400 hr.
Sampled 1106 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.53
DO	9.6
Conductivity	315
Temperature	4.2°C

Analysis report no. 59-17052

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630 SW
Alkalinity, Bicarbonate	203	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Total	167	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930 SW
Anions	4.1	----	meq/l	---------	03-27-1997 1600 RJ
Calcium, Dissolved	48	1	mg/l	EPA 215.1	03-27-1997 1115 MK
Cations	3.7	----	meq/l	---------	03-27-1997 1600 RJ
Chloride	14	1	mg/l	SM4500-Cl-B	03-25-1997 1300 SW
Conductivity	373	1	umhos/cm	SM2510-B	03-27-1997 1330 MK
Hardness, Total	173	----	mg/l as $CaCO_3$	SM2340-B	03-27-1997 1600 RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Magnesium, Dissolved	13	1	mg/l	EPA 242.1	03-27-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-21-1997 0700 JC
Oxygen, Dissolved	6.1	----	mg/l	EPA 360.1	03-19-1997 1445 SW
pH	8.40	----	pH units	EPA 150.1	03-19-1997 1500 SW
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	03-27-1997 0930 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	03-27-1997 1030 MK
Solids, Total Dissolved	170	10	mg/l	EPA 160.1	03-24-1997 0700 JC
Solids, Total Suspended	17	5	mg/l	EPA 160.2	03-24-1997 0700 JC
Sulfate	17	5	mg/l	EPA 375.4	03-26-1997 0700 SW
Cation/Anion Balance	-4.5	----	%		03-27-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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March 28, 1997

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

PACIFICORP
MAR 2 3
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

HCC02

Kind of sample reported to us Water

Rec'd 1400 hr.
Sampled 1115 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.51
DO	9.6
Conductivity	318
Temperature	4.8°C

Analysis report no. 59-17053

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630 SW
Alkalinity, Bicarbonate	207	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930 [illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Total	170	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930 SW
Anions	4.0	----	meq/l	---------	03-27-1997 1600 RJ
Calcium, Dissolved	45	1	mg/l	EPA 215.1	03-27-1997 1115 MK
Cations	3.4	----	meq/l	---------	03-27-1997 1600 RJ
Chloride	10	1	mg/l	SM4500-Cl-B	03-25-1997 1300 SW
Conductivity	377	1	umhos/cm	SM2510-B	03-27-1997 1330 MK
Hardness, Total	166	----	mg/l as $CaCO_3$	SM2340-B	03-27-1997 1600 RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Magnesium, Dissolved	13	1	mg/l	EPA 242.1	03-27-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-21-1997 0700 JC
Oxygen, Dissolved	6.3	----	mg/l	EPA 360.1	03-19-1997 1445 SW
pH	8.37	----	pH units	EPA 150.1	03-19-1997 1500 SW
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	03-27-1997 0930 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	03-27-1997 1030 MK
Solids, Total Dissolved	180	10	mg/l	EPA 160.1	03-24-1997 0700 JC
Solids, Total Suspended	22	5	mg/l	EPA 160.2	03-24-1997 0700 JC
Sulfate	17	5	mg/l	EPA 375.4	03-26-1997 0700 SW
Cation/Anion Balance	-7.8	----	%		03-27-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

Kind of sample reported to us Water

HCC04

Rec'd 1400 hr.
Sampled 1125 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.54
DO	9.5
Conductivity	342
Temperature	5.2°C

Analysis report no. 59-17054

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630	SW
Alkalinity, Bicarbonate	203	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930	SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930	SW
Alkalinity, Total	167	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930	SW
Anions	4.1	----	meq/l	---------	03-27-1997 1600	RJ
Calcium, Dissolved	46	1	mg/l	EPA 215.1	03-27-1997 1115	MK
Cations	3.7	----	meq/l	---------	03-27-1997 1600	RJ
Chloride	12	1	mg/l	SM4500-Cl-B	03-25-1997 1300	SW
Conductivity	397	1	umhos/cm	SM2510-B	03-27-1997 1330	MK
Hardness, Total	168	----	mg/l as $CaCO_3$	SM2340-B	03-27-1997 1600	RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	03-27-1997 0730	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730	MK
Magnesium, Dissolved	13	1	mg/l	EPA 242.1	03-27-1997 1130	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815	MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-21-1997 0700	JC
Oxygen, Dissolved	6.4	----	mg/l	EPA 360.1	03-19-1997 1445	SW
pH	8.38	----	pH units	EPA 150.1	03-19-1997 0500	SW
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	03-27-1997 0930	MK
Sodium, Dissolved	7	1	mg/l	EPA 273.1	03-27-1997 1030	MK
Solids, Total Dissolved	200	10	mg/l	EPA 160.1	03-24-1997 0700	JC
Solids, Total Suspended	18	5	mg/l	EPA 160.2	03-24-1997 0700	JC
Sulfate	22	5	mg/l	EPA 375.4	03-26-1997 0700	SW
Cation/Anion Balance	-5.8	----	%		03-27-1997 1600	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

COMMERCIAL TESTING & ENGINEERING CO.

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July 10, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

HCC-01

Kind of sample reported to us Water

Rec'd 1004 hr.
Sampled 0921 hr.

Sample taken at EAST MT. HUNTINGTON CANYON CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.52
DO	6.5
Conductivity	316
Temperature	9.9°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17355

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Turbidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	208	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	8	5	mg/l as CO_3	SM2320-B	06-28-1997 1330
Alkalinity, Total	183	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Cations	4.1	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	46	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Anions	3.6	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	07-02-1997 1240 RJ
Conductivity	356	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	173	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	14	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
Oxygen, Dissolved	5.1	----	mg/l	EPA 360.1	06-25-1997 0700 RJ
pH	8.50	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	3	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	190	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	17	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	13	1	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.6	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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July 17, 1997

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

FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

HCC02

Kind of sample reported to us Water

Rec'd 1004 hr.
Sampled 0930 hr.

Sample taken at EAST MT. HUNTINTON CANYON CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.52
DO	6.2
Flow	NA
Conductivity	309
Temperature	10°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17356

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	209	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	7	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	182	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	4.1	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	3.6	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	07-02-1997 1240 RJ
Conductivity	359	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness Total	171	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	0.2	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	13	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
Oxygen, Dissolved	5.3	----	mg/l	EPA 360.1	06-25-1997 0700 RJ
pH	8.52	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	4	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	210	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	18	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	13	1	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	4.1	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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July 17, 1997

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

FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

HCC04

Kind of sample reported to us Water

Rec'd 1004 hr.
Sampled 0939 hr.

Sample taken at EAST MT. HUNTINTON CANYON CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.50
DO	6.5
Flow	NA
Conductivity	329
Temperature	10.4°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17357

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115	RJ
Alkalinity, Bicarbonate	212	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330	RJ
Alkalinity, Carbonate	5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330	
Alkalinity, Total	182	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330	RJ
Anions	4.2	----	meq/l	---------	07-15-1997 1500	RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	07-08-1997 1045	MK
Cations	3.7	----	meq/l	---------	07-15-1997 1500	RJ
Chloride	7	1	mg/l	SM4500-Cl-B	07-02-1997 1240	RJ
Conductivity	365	1	umhos/cm	SM2510-B	06-30-1997 0455	RJ
Hardness, Total	175	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500	RJ
Iron, Total	0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Magnesium, Dissolved	14	1	mg/l	EPA 242.1	07-08-1997 1100	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700	JC
Oxygen, Dissolved	5.7	----	mg/l	EPA 360.1	06-25-1997 0700	RJ
pH	8.55	----	pH units	EPA 150.1	06-24-1997 1440	SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900	MK
Sodium, Dissolved	5	1	mg/l	EPA 273.1	07-08-1997 0930	MK
Solids, Total Dissolved	240	10	mg/l	EPA 160.1	06-26-1997 0700	JC
Solids, Total Suspended	15	5	mg/l	EPA 160.2	06-26-1997 0700	JC
Sulfate	17	1	mg/l	EPA 375.4	07-07-1997 0750	SC
Cation/Anion Balance	4.2	----	%		07-15-1997 1500	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2436

October 9, 1997

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

OCT 13 1997

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK HCC01

Rec'd 1430 hr.
Sampled 0923 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled September 16, 1997

Date received September 16, 1997

FIELD MEASUREMENTS

pH	8.43
DO	7.4
Conductivity	283
Temperature	10.2°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17788

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800	SC
Alkalinity, Bicarbonate	174	5	mg/l as HCO_3	SM2320-B	09-30-1997 0900	SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-30-1997 0900	SC
Alkalinity, Total	144	5	mg/l as $CaCO_3$	EPA 310.1	09-30-1997 0900	SC
Anions	3.3	----	meq/l	---------	10-08-1997 0900	RJ
Calcium, Dissolved	39	1	mg/l	EPA 215.1	09-17-1997 1715	RJ
Cations	3.0	----	meq/l	---------	10-08-1997 0900	RJ
Chloride	5	1	mg/l	SM4500-Cl-B	10-02-1997 1305	SC
Conductivity	303	1	umhos/cm	SM2510-B	09-22-1997 1230	SC
Hardness, Total	139	----	mg/l as $CaCO_3$	SM2340-B	10-08-1997 0900	RJ
Iron, Total	13.3	.5	mg/l	EPA 236.1	09-17-1997 1815	RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815	RJ
Magnesium, Dissolved	10	1	mg/l	EPA 242.1	09-17-1997 1730	RJ
Manganese, Total	0.3	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Oil & Grease	<2	2	mg/l	SM5520-B	10-02-1997 0700	JC
Oxygen, Dissolved	6.7	----	mg/l	EPA 360.1	09-17-1997 0830	SC
pH	8.18	----	pH units	EPA 150.1	09-17-1997 0830	SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	09-17-1997 1900	RJ
Sodium, Dissolved	5	1	mg/l	EPA 273.1	09-17-1997 1930	RJ
Solids, Total Dissolved	230	10	mg/l	EPA 160.1	09-22-1997 0700	JC
Solids, Total Suspended	504	5	mg/l	EPA 160.2	09-17-1997 0700	JC
Sulfate	14	5	mg/l	EPA 375.4	09-30-1997 1130	SC
Cation/Anion Balance	4.8	----	%		10-08-1997 0900	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

October 9, 1997

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

OCT 13 1997

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK HCC02

Kind of sample reported to us Water

Rec'd 1430 hr.
Sampled 0934 hr.

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled September 16, 1997

Date received September 16, 1997

FIELD MEASUREMENTS

pH	8.37
DO	7.6
Conductivity	284
Temperature	9.4°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17789

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800	SC
Alkalinity, Bicarbonate	175	5	mg/l as HCO_3	SM2320-B	09-30-1997 0900	
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-30-1997 0900	
Alkalinity, Total	143	5	mg/l as $CaCO_3$	EPA 310.1	09-30-1997 0900	SC
Anions	3.6	----	meq/l	---------	10-08-1997 0900	RJ
Calcium, Dissolved	40	1	mg/l	EPA 215.1	09-17-1997 1715	RJ
Cations	3.0	----	meq/l	---------	10-08-1997 0900	RJ
Chloride	7	1	mg/l	SM4500-Cl-B	10-02-1997 1305	SC
Conductivity	309	1	umhos/cm	SM2510-B	09-22-1997 1230	SC
Hardness, Total	141	----	mg/l as $CaCO_3$	SM2340-B	10-08-1997 0900	RJ
Iron, Total	11.5	.5	mg/l	EPA 236.1	09-17-1997 1815	RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815	RJ
Magnesium, Dissolved	10	1	mg/l	EPA 242.1	09-17-1997 1730	RJ
Manganese, Total	0.3	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Oil & Grease	<2	2	mg/l	SM5520-B	10-02-1997 0700	JC
Oxygen, Dissolved	6.6	----	mg/l	EPA 360.1	09-17-1997 0830	SC
pH	8.20	----	pH units	EPA 150.1	09-17-1997 0830	SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	09-17-1997 1900	RJ
Sodium, Dissolved	5	1	mg/l	EPA 273.1	09-17-1997 1930	RJ
Solids, Total Dissolved	170	10	mg/l	EPA 160.1	09-22-1997 0700	JC
Solids, Total Suspended	490	5	mg/l	EPA 160.2	09-17-1997 0700	JC
Sulfate	15	5	mg/l	EPA 375.4	09-30-1997 1130	SC
Cation/Anion Balance	5.3	----	%		10-08-1997 0900	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

October 9, 1997

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

OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK HCC04

Rec'd 1430 hr.
Sampled 0946 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled September 16, 1997

Date received September 16, 1997

FIELD MEASUREMENTS

pH	8.38
DO	7.6
Conductivity	303
Temperature	9.7°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17790

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	175	5	mg/l as HCO_3	SM2320-B	09-30-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-30-1997 0900 SC
Alkalinity, Total	143	5	mg/l as $CaCO_3$	EPA 310.1	09-30-1997 0900 SC
Anions	3.6	----	meq/l	---------	10-08-1997 0900 RJ
Calcium, Dissolved	40	1	mg/l	EPA 215.1	09-17-1997 1715 RJ
Cations	3.2	----	meq/l	---------	10-08-1997 0900 RJ
Chloride	8	1	mg/l	SM4500-Cl-B	10-02-1997 1305 SC
Conductivity	324	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	145	----	mg/l as $CaCO_3$	SM2340-B	10-08-1997 0900 RJ
Iron, Total	10.1	.5	mg/l	EPA 236.1	09-17-1997 1815 RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
Magnesium, Dissolved	11	1	mg/l	EPA 242.1	09-17-1997 1730 RJ
Manganese, Total	0.3	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
Oil & Grease	<2	2	mg/l	SM5520-B	10-02-1997 0700 JC
Oxygen, Dissolved	6.7	----	mg/l	EPA 360.1	09-17-1997 0830 SC
pH	8.22	----	pH units	EPA 150.1	09-17-1997 0830 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	09-17-1997 1900 RJ
Sodium, Dissolved	6	1	mg/l	EPA 273.1	09-17-1997 1930 RJ
Solids, Total Dissolved	230	10	mg/l	EPA 160.1	09-22-1997 0700 JC
Solids, Total Suspended	458	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	22	5	mg/l	EPA 375.4	09-30-1997 1130 SC
Cation/Anion Balance	5.8	----	%		10-08-1997 0900 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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December 17, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK
HCC01
Rec'd 1430 hr.
Sampled 0947 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	8.97
DO	8.4
Conductivity	431
Temperature	1.6°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18141

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	282	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	234	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	5.6	----	meq/l	---------	12-11-1997 1100 RJ
Calcium, Dissolved	57	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	4.9	----	meq/l	---------	12-11-1997 1100 RJ
Chloride	10	1	mg/l	SM4500-Cl-B	12-05-1997 1300 SC
Conductivity	476	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	229	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	21	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
Oxygen, Dissolved	8.4	----	mg/l	EPA 360.1	12-04-1997 2200 MK
pH	8.32	----	pH units	EPA 150.1	12-04-1997 2230 MK
Potassium, Dissolved	1	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	7	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	250	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	33	10	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-6.6	----	%		12-11-1997 1100 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

December 17, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK
HCC02
Rec'd 1430 hr.
Sampled 0956 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	8.65
DO	8.3
Conductivity	433
Temperature	0.8°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18142

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800	SC
Alkalinity, Bicarbonate	292	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900	SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900	SC
Alkalinity, Total	239	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900	SC
Anions	5.8	----	meq/l	---------	12-11-1997 1100	RJ
Calcium, Dissolved	56	1	mg/l	EPA 215.1	12-08-1997 1445	MK
Cations	5.0	----	meq/l	---------	12-11-1997 1100	RJ
Chloride	9	1	mg/l	SM4500-Cl-B	12-05-1997 1300	SC
Conductivity	491	1	umhos/cm	SM2510-B	12-15-1997 1100	JC
Hardness, Total	230	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200	MK
Magnesium, Dissolved	22	1	mg/l	EPA 242.1	12-08-1997 1515	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215	MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700	JC
Oxygen, Dissolved	8.3	----	mg/l	EPA 360.1	12-04-1997 2200	MK
pH	8.31	----	pH units	EPA 150.1	12-04-1997 2230	MK
Potassium, Dissolved	1	1	mg/l	EPA 258.1	12-08-1997 1245	MK
Sodium, Dissolved	8	1	mg/l	EPA 273.1	12-08-1997 1300	MK
Solids, Total Dissolved	260	10	mg/l	EPA 160.1	12-08-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700	JC
Sulfate	35	10	mg/l	EPA 375.4	12-10-1997 0800	SC
Cation/Anion Balance	-7.4	----	%		12-11-1997 1100	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

December 17, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
HUNTINGTON CANYON CREEK
HCC04
Rec'd 1430 hr.
Sampled 1009 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	8.79
DO	8.5
Conductivity	523
Temperature	0.8°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18143

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	271	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 [illegible]
Alkalinity, Total	227	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 [illegible]
Anions	6.2	----	meq/l	---------	12-11-1997 1100 RJ
Calcium, Dissolved	60	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	5.8	----	meq/l	---------	12-11-1997 1100 RJ
Chloride	20	1	mg/l	SM4500-Cl-B	12-05-1997 1300 SC
Conductivity	570	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	257	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	26	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
Oxygen, Dissolved	8.5	----	mg/l	EPA 360.1	12-04-1997 2200 MK
pH	8.32	----	pH units	EPA 150.1	12-04-1997 2230 MK
Potassium, Dissolved	1	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	14	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	330	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	59	10	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-3.9	----	%		12-11-1997 1100 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

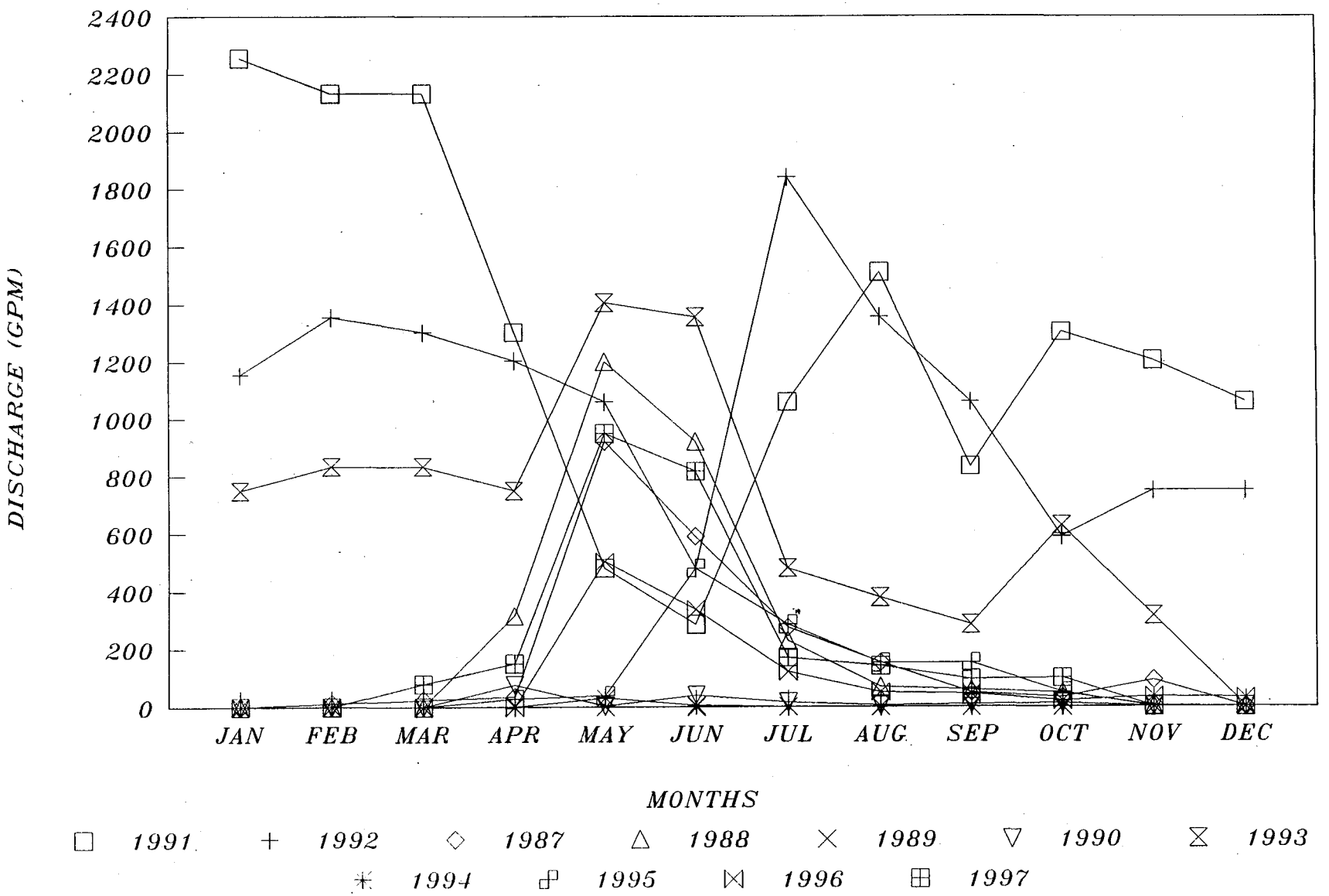
Huntington Laboratory

MEMBER ACIL

APPENDIX B

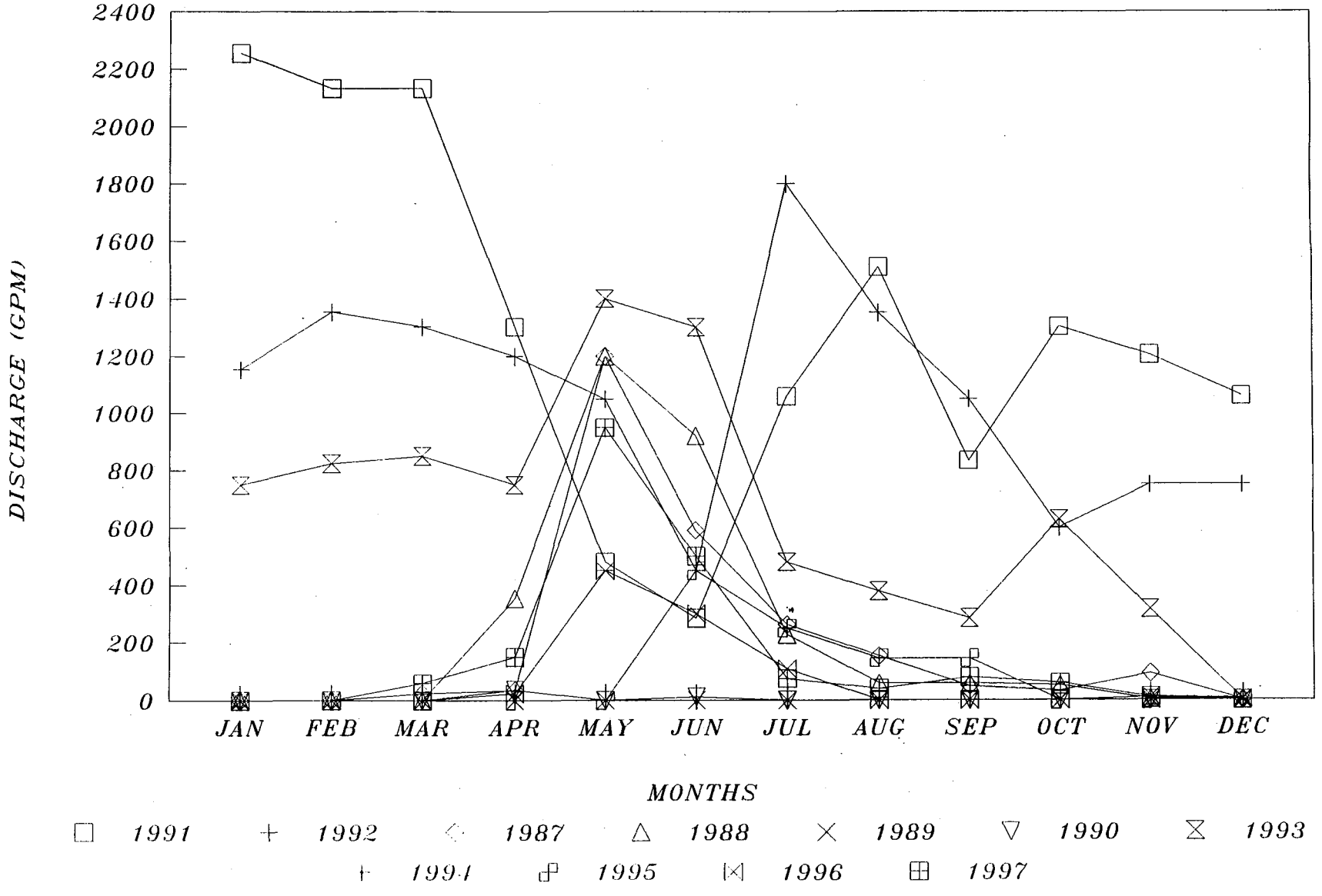
DEER CREEK – @ PERMIT BOUNDARY

Drainage Recession Curve Study



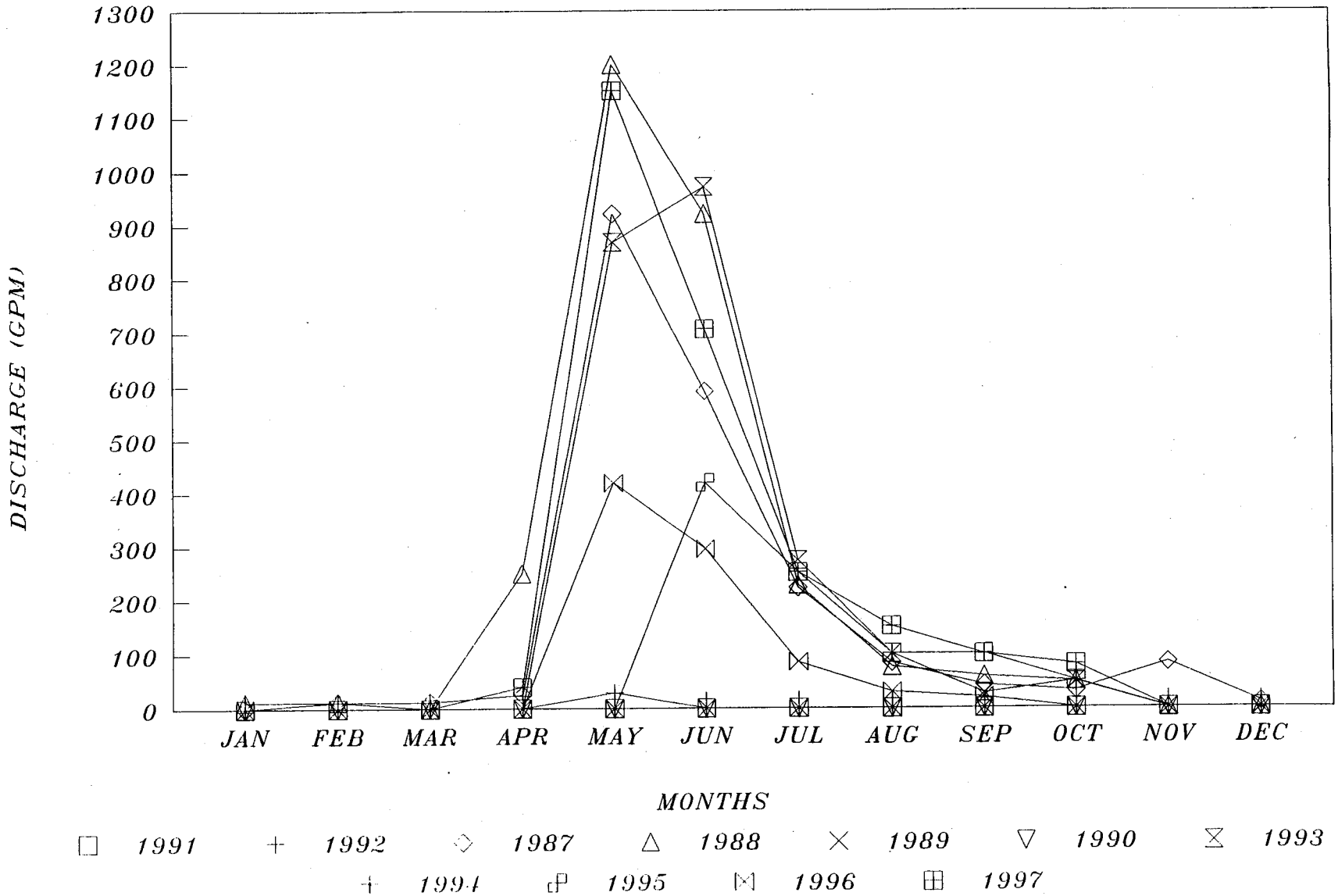
DEER CREEK – BELOW MINE

Drainage Recession Curve Study



DEER CREEK – ABOVE MINE

Drainage Recession Curve Study



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March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

DCR04

Kind of sample Water
reported to us

Rec'd 1400 hr.
Sampled 1030 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.41
DO	9.2
Flow	80 gpm
Conductivity	3530
Temperature	4.0°C

Analysis report no. 59-17050

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630 SW
Alkalinity, Bicarbonate	274	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Total	225	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930 SW
Anions	38.6	----	meq/l	---------	03-27-1997 1600 RJ
Calcium, Dissolved	96	1	mg/l	EPA 215.1	03-27-1997 1115 MK
Cations	40.9	----	meq/l	---------	03-27-1997 1600 RJ
Chloride	1093	1	mg/l	SM4500-Cl-B	03-25-1997 1300 SW
Conductivity	4480	1	umhos/cm	SM2510-B	03-27-1997 1330 MK
Hardness, Total	454	----	m/l as $CaCO_3$	SM2340-B	03-27-1997 1600 RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Magnesium, Dissolved	52	1	mg/l	EPA 242.1	03-27-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-21-1997 0700 JC
pH	8.33	----	pH units	EPA 150.1	03-19-1997 1500 SW
Potassium, Dissolved	6	1	mg/l	EPA 258.1	03-27-1997 0930 MK
Sodium, Dissolved	728	10	mg/l	EPA 273.1	03-27-1997 1030 MK
Solids, Total Dissolved	2340	10	mg/l	EPA 160.1	03-24-1997 0700 JC
Solids, Total Suspended	25	5	mg/l	EPA 160.2	03-24-1997 0700 JC
Sulfate	155	25	mg/l	EPA 375.4	03-26-1997 0700 SW
Cation/Anion Balance	2.9	----	%		03-27-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

DCR06

Kind of sample reported to us Water

Rec'd 1400 hr.
Sampled 1057 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.59
DO	8.6
Flow	60 gpm
Conductivity	3750
Temperature	7.5°C

Analysis report no. 59-17051

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630	SW
Alkalinity, Bicarbonate	320	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930	[illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930	[illegible]
Alkalinity, Total	262	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930	SW
Anions	39.3	----	meq/l	---------	03-27-1997 1600	RJ
Calcium, Dissolved	103	1	mg/l	EPA 215.1	03-27-1997 1115	MK
Cations	43.7	----	meq/l	---------	03-27-1997 1600	RJ
Chloride	1112	1	mg/l	SM4500-Cl-B	03-25-1997 1300	SW
Conductivity	4590	1	umhos/cm	SM2510-B	03-27-1997 1330	MK
Hardness, Total	529	----	mg/l as $CaCO_3$	SM2340-B	03-27-1997 1600	RJ
Iron, Total	0.2	0.1	mg/l	EPA 236.1	03-27-1997 0730	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730	MK
Magnesium, Dissolved	66	1	mg/l	EPA 242.1	03-27-1997 1130	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815	MK
Manganese, Dissolved	<0.1	.1	mg/l	EPA 243.1	03-27-1997 0815	MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-21-1997 0700	JC
pH	8.52	----	pH units	EPA 150.1	03-19-1997 1500	SW
Potassium, Dissolved	6	1	mg/l	EPA 258.1	03-27-1997 0930	MK
Sodium, Dissolved	758	10	mg/l	EPA 273.1	03-27-1997 1030	MK
Solids, Total Dissolved	2460	10	mg/l	EPA 160.1	03-24-1997 0700	JC
Solids, Total Suspended	15	5	mg/l	EPA 160.2	03-24-1997 0700	JC
Sulfate	128	25	mg/l	EPA 375.4	03-26-1997 0700	SW
Cation/Anion Balance	5.3	----	%		03-27-1997 1600	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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July 10, 1997

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

JUL 10 '97
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

DCR01

Rec'd 1040 hr.
Sampled 0804 hr.

Kind of sample reported to us Water

Sample taken at EAST MT. BEAR CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.46
DO	7.3
Flow	706 gpm
Conductivity	477
Temperature	8°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17352

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	329	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	270	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	6.2	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	5.5	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	6	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	533	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	216	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	24	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.52	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	26	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	340	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	22	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	30	10	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.3	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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July 10, 1997

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

JUL 10
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

DCR04

Rec'd 1040 hr.
Sampled 0827 hr.

Kind of sample reported to us Water

Sample taken at EAST MT. DEER CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.48
DO	6.3
Flow	817 gpm
Conductivity	538
Temperature	8.9°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17353

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	313	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	257	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	6.9	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	6.0	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	27	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	614	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	224	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	26	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.56	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	34	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	370	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	28	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	47	10	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.8	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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July 10, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

DCR06

Kind of sample reported to us Water

Rec'd 1040 hr.
Sampled 0843 hr.

Sample taken at EAST MT. DEER CR.

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.56
DO	6.2
Flow	500 gpm
Conductivity	721
Temperature	10.2°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17354

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	301	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	247	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	8.6	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	46	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	7.6	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	83	1	mg/l	SM4500-Cl-B	07-02-1997 1240 RJ
Conductivity	816	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	243	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	0.2	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	31	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.56	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	62	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	490	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	32	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	65	25	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.5	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 9, 1997

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

OCT 13 1997

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
DEER CREEK DCR01
Rec'd 1500 hr.
Sampled 0950 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Deer Creek

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	8.51
DO	7.3
Flow	100 gpm
Conductivity	547
Temperature	9.9°C

NOTE: DISSOLVED METALS FILTERED AT LAB!
NOTE: CHARGE BALANCE >10

Analysis report no. 59-17772

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800	
Alkalinity, Bicarbonate	393	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300	
Alkalinity, Carbonate	16	5	mg/l as CO_3	SM2320-B	09-16-1997 1300	SC
Alkalinity, Total	349	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300	SC
Anions	8.5	----	meq/l	---------	10-08-1997 1715	RJ
Calcium, Dissolved	43	1	mg/l	EPA 215.1	09-17-1997 0530	MK
Cations	6.8	----	meq/l	---------	10-08-1997 1715	RJ
Chloride	15	1	mg/l	SM4500-Cl-B	09-17-1997 1230	SC
Conductivity	587	1	umhos/cm	SM2510-B	09-22-1997 1230	SC
Hardness, Total	247	----	mg/l as $CaCO_3$	SM2340-B	10-08-1997 1715	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300	MK
Magnesium, Dissolved	30	1	mg/l	EPA 242.1	09-17-1997 0600	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315	MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-19-1997 0700	JC
pH	8.48	----	pH units	EPA 150.1	09-16-1997 0730	SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	09-17-1997 0345	MK
Sodium, Dissolved	41	1	mg/l	EPA 273.1	09-17-1997 0430	MK
Solids, Total Dissolved	380	10	mg/l	EPA 160.1	09-17-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	09-17-1997 0700	JC
Sulfate	55	10	mg/l	EPA 375.4	09-24-1997 0830	SC
Cation/Anion Balance	11.1	----	%		10-08-1997 1715	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
DEER CREEK DCR04

Rec'd 1500 hr.
Sampled 1007 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Deer Creek

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	8.65
DO	7.2
Flow	95 gpm
Conductivity	697
Temperature	11.7°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17773

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	279	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Carbonate	14	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	251	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	8.8	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	45	1	mg/l	EPA 215.1	09-17-1997 0530 MK
Cations	7.9	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	52	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	764	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	284	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Magnesium, Dissolved	33	1	mg/l	EPA 242.1	09-17-1997 0600 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-19-1997 0700 JC
pH	8.49	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-17-1997 0345 MK
Sodium, Dissolved	66	1	mg/l	EPA 273.1	09-17-1997 0430 MK
Solids, Total Dissolved	480	10	mg/l	EPA 160.1	09-17-1997 0700 JC
Solids, Total Suspended	10	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	112	25	mg/l	EPA 375.4	09-24-1997 0830 SC
Cation/Anion Balance	5.7	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

MEMBER ACIL

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FAX: (801) 653-2436

October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
DEER CREEK DCR06
Rec'd 1500 hr.
Sampled 1028 hr.

FIELD MEASUREMENTS	
pH	8.67
DO	7.0
Flow	80 gpm
Conductivity	1173
Temperature	14.1°C

Kind of sample reported to us Water

Sample taken at East Mountain/Deer Creek

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17774

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800
Alkalinity, Bicarbonate	295	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300
Alkalinity, Carbonate	10	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	259	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	13.7	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	56	1	mg/l	EPA 215.1	09-17-1997 0530 MK
Cations	12.6	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	205	2	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	1321	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	325	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Magnesium, Dissolved	45	1	mg/l	EPA 242.1	09-17-1997 0600 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Oil & Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700 JC
pH	8.50	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	3	1	mg/l	EPA 258.1	09-17-1997 0345 MK
Sodium, Dissolved	139	2	mg/l	EPA 273.1	09-17-1997 0430 MK
Solids, Total Dissolved	780	10	mg/l	EPA 160.1	09-17-1997 0700 JC
Solids, Total Suspended	6	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	132	25	mg/l	EPA 375.4	09-24-1997 0830 SC
Cation/Anion Balance	4.1	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

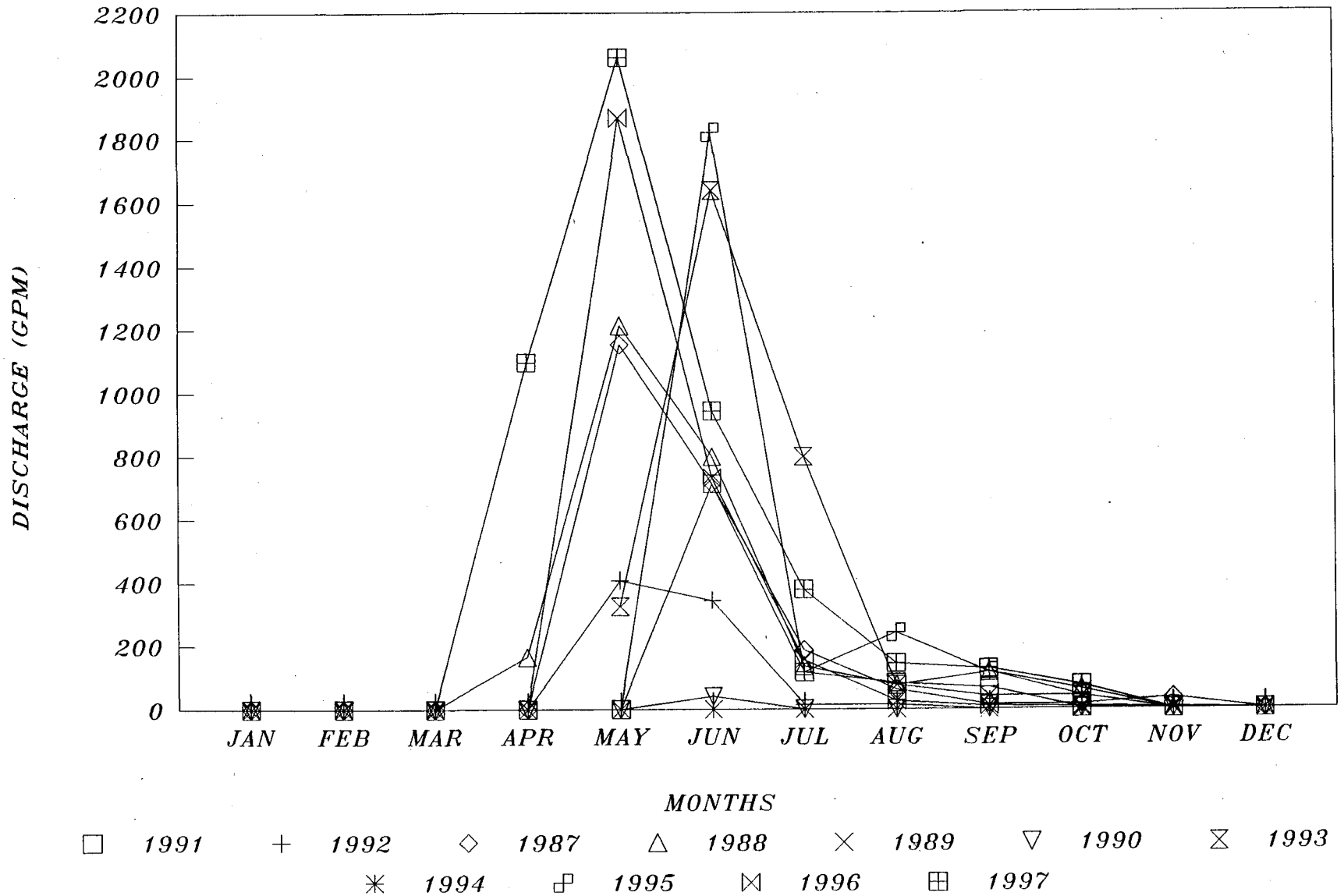
Huntington Laboratory

MEMBER ACIL

APPENDIX C

MEETINGHOUSE CANYON – LEFT FORK

Drainage Recession Curve Study



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FAX: (801) 653-2436

July 17, 1997

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

PACIFICORP
JUL 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

MHC01

Kind of sample reported to us Water

Rec'd 1004 hr.
Sampled 0859 hr.

Sample taken at EAST MT. MEETING HOUSE CANYON

Sample taken by Energy West/M.D.

Date sampled June 24, 1997

Date received June 24, 1997

FIELD MEASUREMENTS

pH	8.47
DO	6.1
Flow	942 gpm
Conductivity	387
Temperature	8.7°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17358

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	254	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	217	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	4.8	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	43	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	4.3	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	07-02-1997 1240 RJ
Conductivity	424	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	202	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	23	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
pH	8.52	----	pH units	EPA 150.1	06-24-1997 1440 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	240	10	mg/l	EPA 160.1	06-26-1997 0700 JC
Solids, Total Suspended	9	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	18	42	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	4.8	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
MEETINGHOUSE CANYON MHC01

Rec'd 1500 hr.
Sampled 1050 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Meeting House

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	8.56
DO	7.0
Flow	127 gpm
Conductivity	392
Temperature	12.9°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17775

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
[illegible]lity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800	SC
[illegible]alinity, Bicarbonate	240	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300	S[illegible]
[illegible]alinity, Carbonate	10	5	mg/l as CO_3	SM2320-B	09-16-1997 1300	SC
[illegible]alinity, Total	214	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300	SC
[illegible]ions	5.1	----	meq/l	---------	10-02-1997 1400	RJ
[illegible]alcium, Dissolved	36	1	mg/l	EPA 215.1	09-17-1997 0530	MK
[illegible]ations	4.3	----	meq/l	---------	10-02-1997 1400	RJ
[illegible]hloride	8	1	mg/l	SM4500-Cl-B	09-17-1997 1230	SC
[illegible]onductivity	435	1	umhos/cm	SM2510-B	09-22-1997 1230	SC
[illegible]ardness, Total	197	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400	RJ
[illegible]ron, Total	0.5	0.1	mg/l	EPA 236.1	09-17-1997 0300	MK
[illegible]ron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300	MK
[illegible]agnesium, Dissolved	26	1	mg/l	EPA 242.1	09-17-1997 0600	MK
[illegible]anganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315	MK
[illegible]anganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315	MK
[illegible] Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700	JC
[illegible]	8.46	----	pH units	EPA 150.1	09-16-1997 0730	SC
[illegible]otassium, Dissolved	<1	1	mg/l	EPA 258.1	09-17-1997 0345	MK
[illegible]odium, Dissolved	8	1	mg/l	EPA 273.1	09-17-1997 0430	MK
[illegible]olids, Total Dissolved	280	10	mg/l	EPA 160.1	09-17-1997 0700	JC
[illegible]olids, Total Suspended	36	5	mg/l	EPA 160.2	09-17-1997 0700	JC
[illegible]ulfate	31	5	mg/l	EPA 375.4	09-24-1997 0830	SC
[illegible]ation/Anion Balance	9.1	----	%		10-02-1997 1400	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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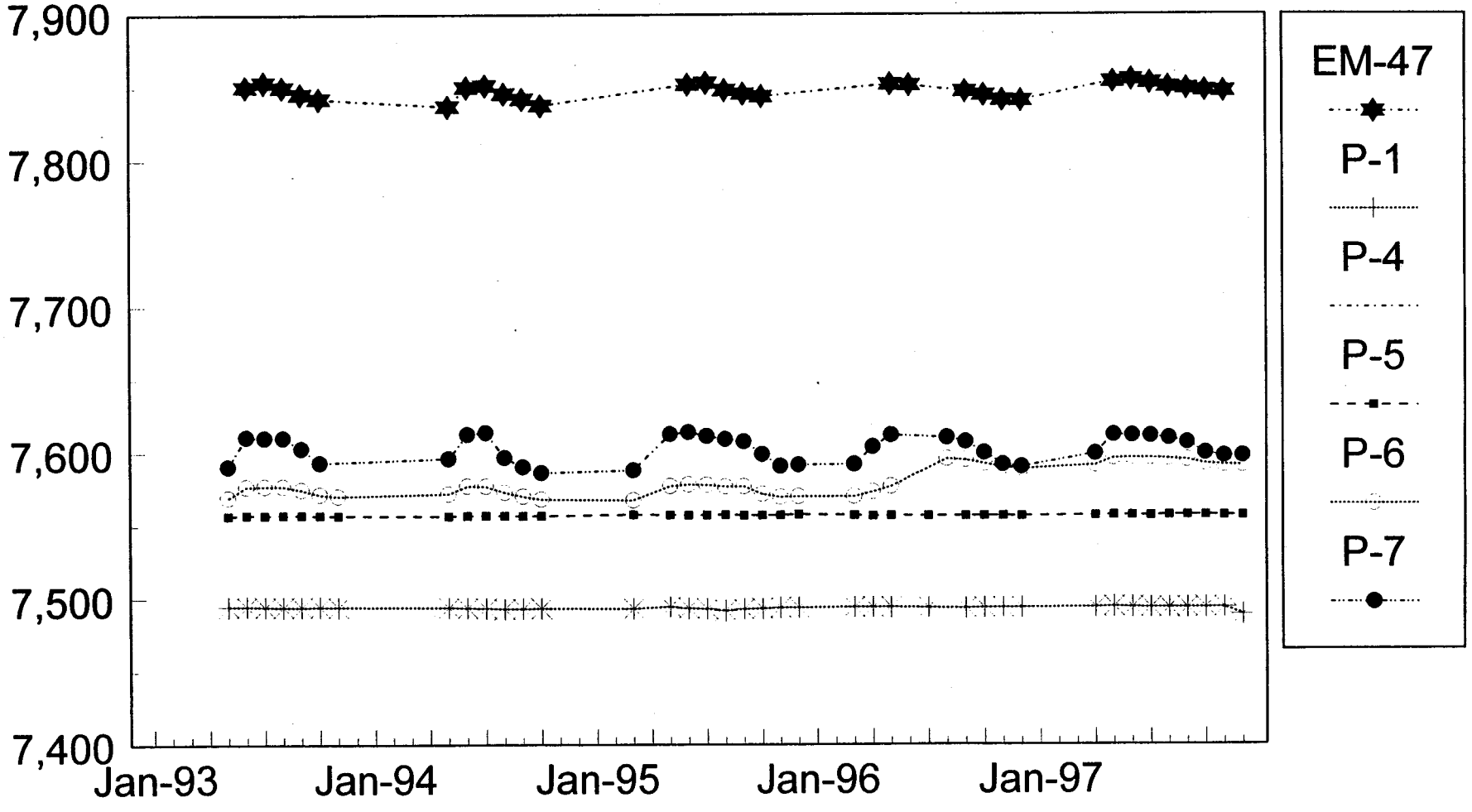
APPENDIX D

RILDA CANYON

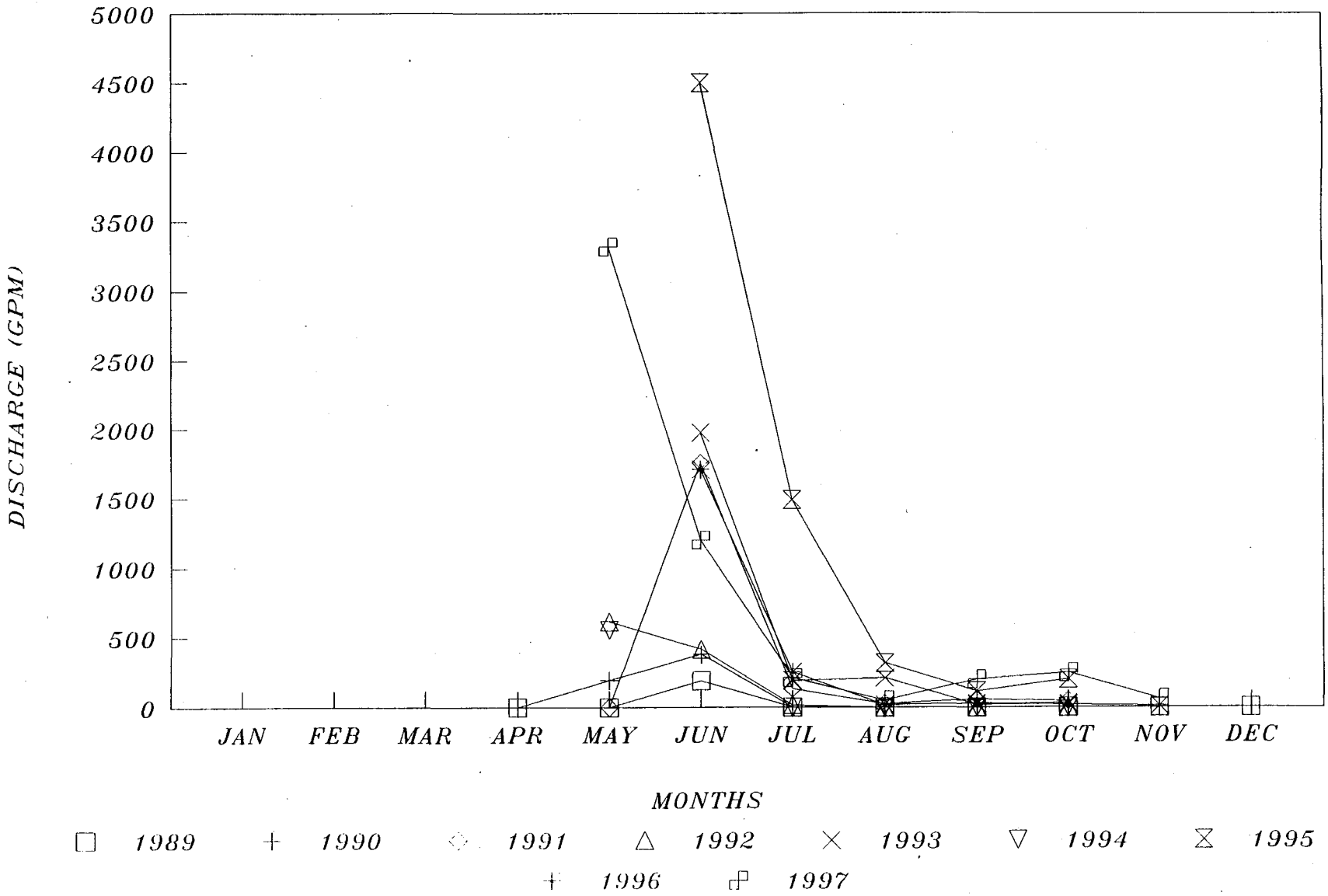
MONITORING WELLS

PIEZOMETRIC DATA



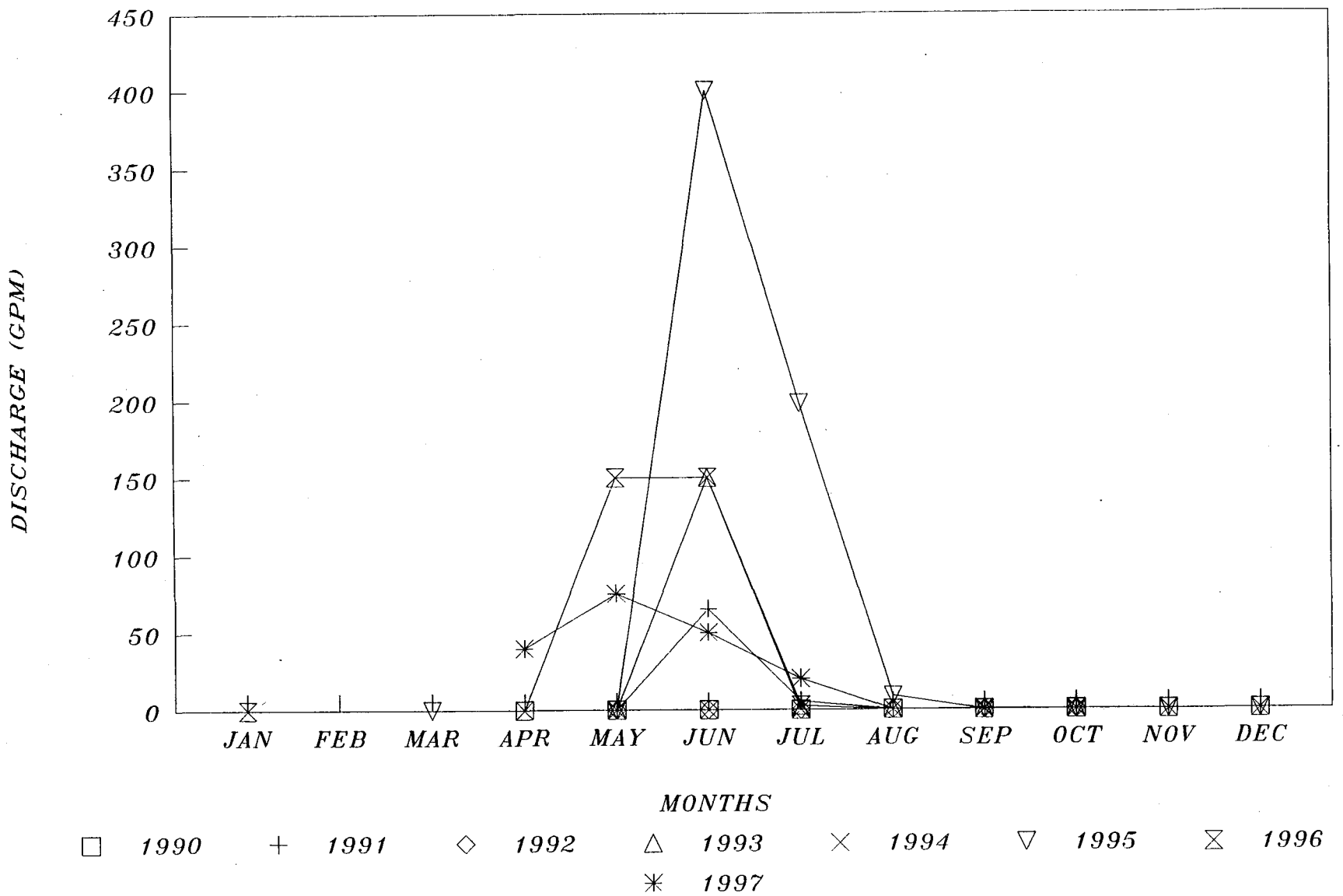
RILDA CANYON – RIGHT FORK(RCF1)

Drainage Recession Curve Study



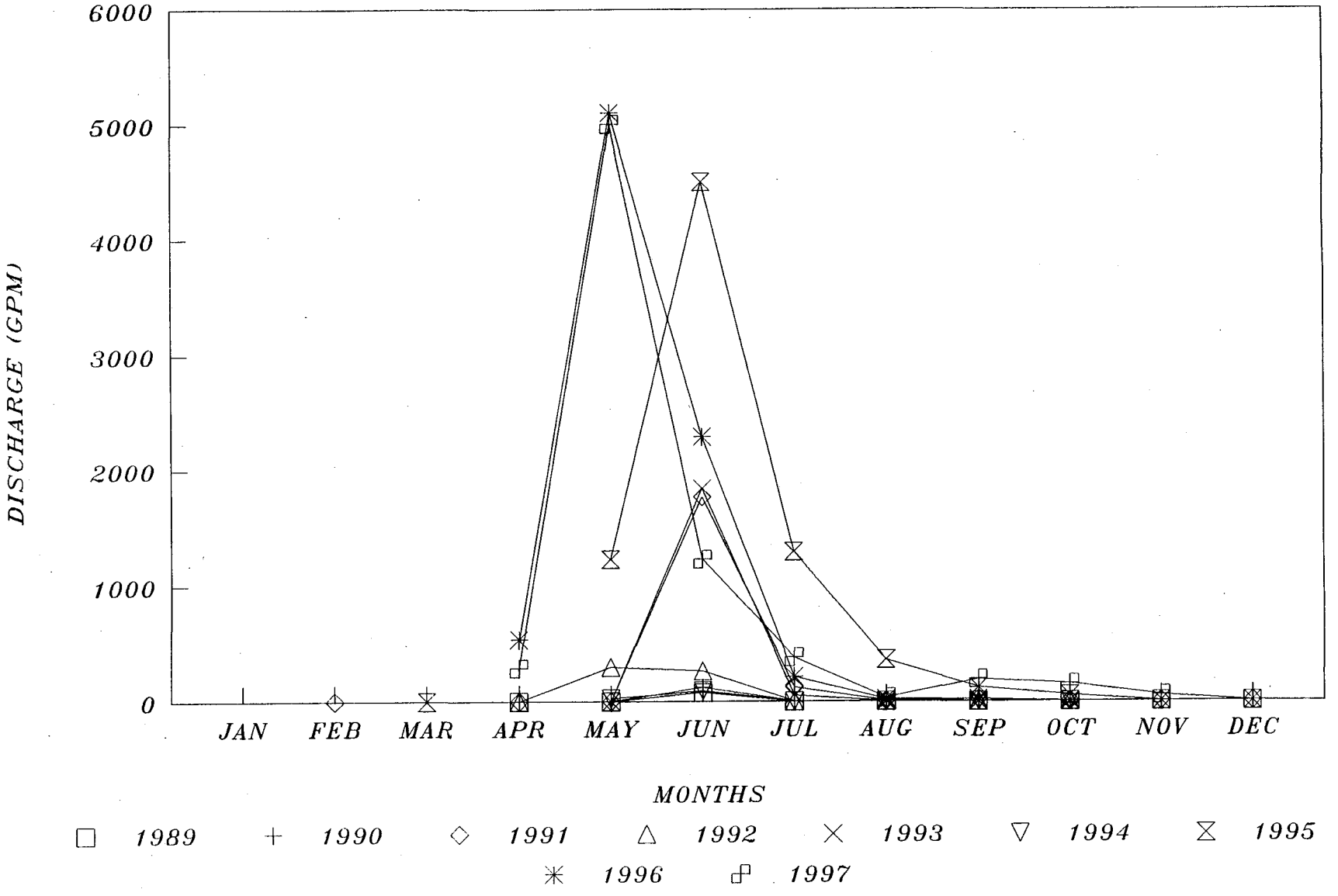
RILDA CANYON – LEFT FORK(RCLF1)

Drainage Recession Curve Study



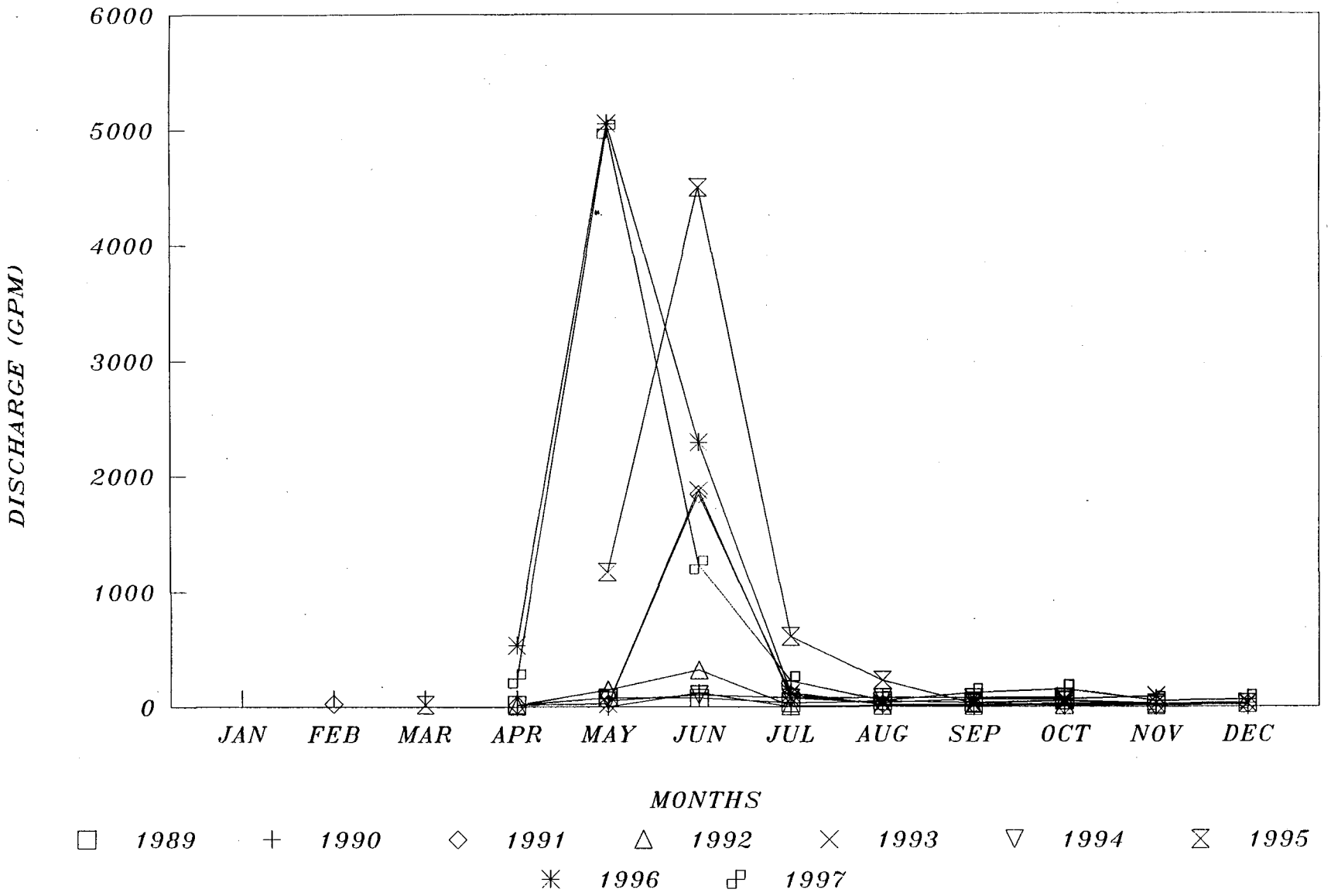
RILDA CANYON – ABOVE NEWUA(RCF2)

Drainage Recession Curve Study



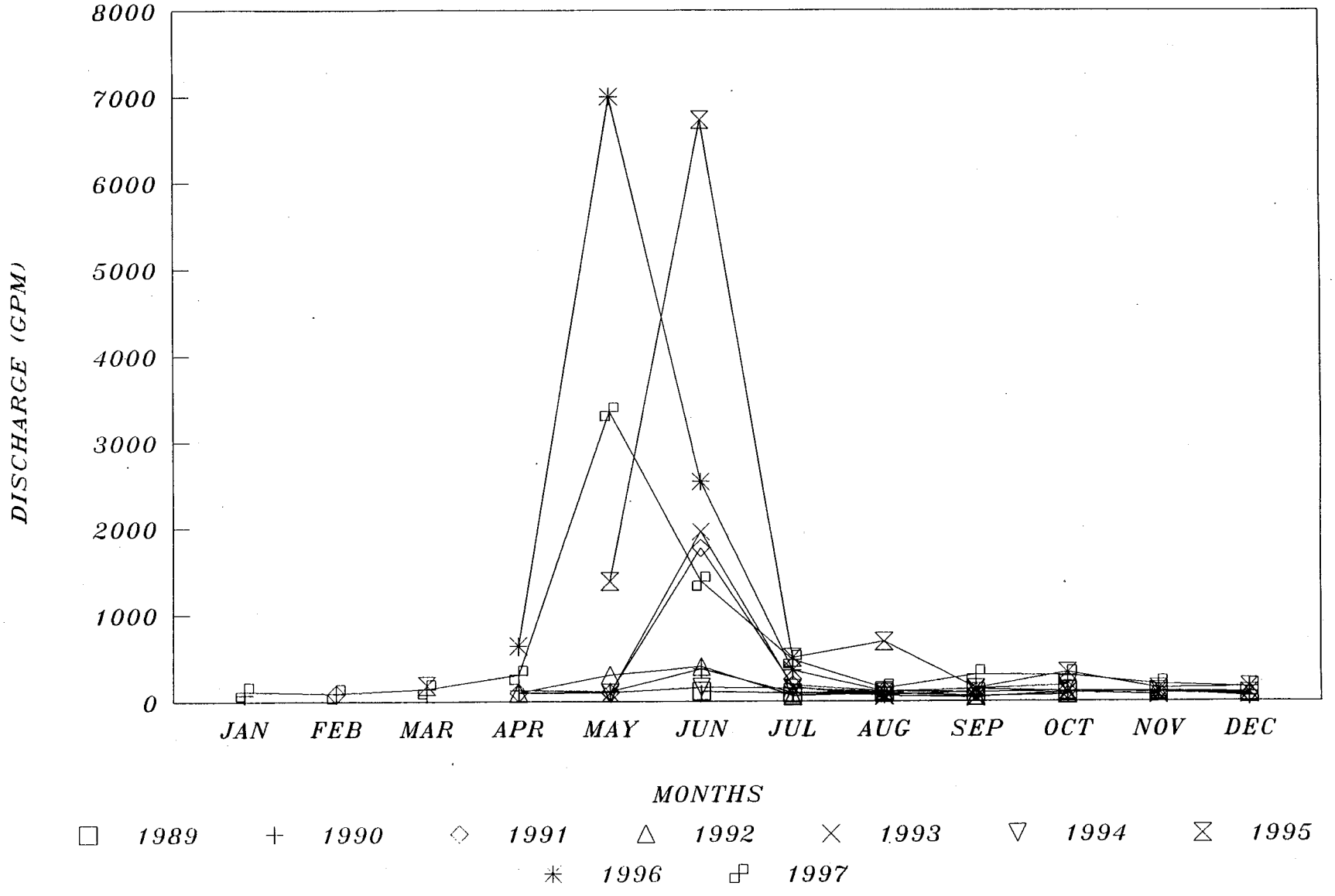
RILDA CANYON – BELOW NEWU(RCF3)

Drainage Recession Curve Study



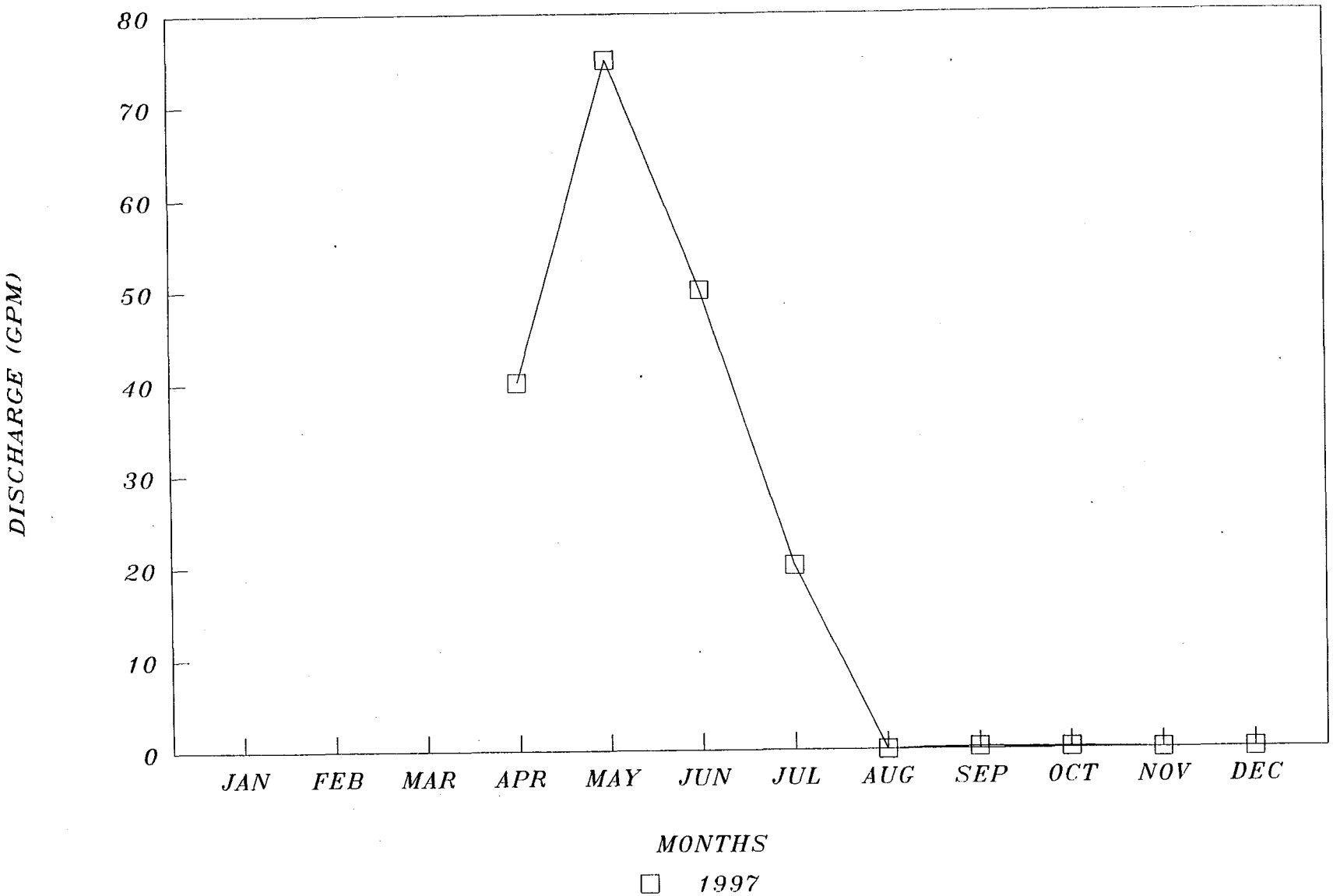
RILDA CANYON – NEAR HWY 31(RCW4)

Drainage Recession Curve Study



RILDA CANYON – LEFT FORK(RCLF2)

Drainage Recession Curve Study



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April 4, 1997

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

PACIFICORP
APR 7 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

RCW4

Rec'd 1400 hr.
Sampled 1230 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 19, 1997

Date received March 19, 1997

FIELD MEASUREMENTS

pH	8.41
DO	8.7
Flow	140.5 gpm
Conductivity	731
Temperature	6.6°C

Analysis report no. 59-17055

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630 SW
Alkalinity, Bicarbonate	429	5	mg/l as HCO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-25-1997 0930 SW
Alkalinity, Total	352	5	mg/l as $CaCO_3$	EPA 310.1	03-25-1997 0930 SW
Anions	10.7	----	meq/l	---------	04-01-1997 1300 RJ
Calcium, Dissolved	65	1	mg/l	EPA 215.1	03-27-1997 1115 MK
Cations	8.7	----	meq/l	---------	04-01-1997 1300 RJ
Chloride	48	1	mg/l	SM4500-Cl-B	03-25-1997 1300 SW
Conductivity	845	1	umhos/cm	SM2510-B	03-27-1997 1330 MK
Hardness, Total	385	----	mg/l as $CaCO_3$	SM2340-B	04-01-1997 1300 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Magnesium, Dissolved	54	1	mg/l	EPA 242.1	03-27-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	04-01-1997 0700 JC
Oxygen, Dissolved	6.3	----	mg/l	EPA 360.1	03-19-1997 1445 SW
pH	8.30	----	pH units	EPA 150.1	03-19-1997 1500 SW
Potassium, Dissolved	3	1	mg/l	EPA 258.1	03-27-1997 0930 MK
Sodium, Dissolved	22	1	mg/l	EPA 273.1	03-27-1997 1030 MK
Solids, Total Dissolved	500	10	mg/l	EPA 160.1	03-24-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	03-24-1997 0700 JC
Sulfate	109	25	mg/l	EPA 375.4	03-26-1997 0700 SW
Cation/Anion Balance	-10.0	----	%		04-01-1997 1300 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Grout

Huntington Laboratory RJ

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July 17, 1997

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

PACIFICORP
JUL 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

RCF1

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0740 hr.

Sample taken at EAST MT. RILDA CANYON-RT FORK

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	8.01
DO	NA
Flow	1200 gpm
Conductivity	392
Turbidity	NA
Temperature	6°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17376

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	266	5	mg/l as HCO_3	SM2320-B	06-28-1997 1530 [illegible]
Alkalinity, Carbonate	5	5	mg/l as CO_3	SM2320-B	06-28-1997 1530 RJ
Alkalinity, Total	223	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1530 RJ
Anions	5.0	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	52	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	4.3	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	3	1	mg/l	SM4500-Cl-B	07-02-1997 1400 RJ
Conductivity	420	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	204	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	18	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
pH	8.39	----	pH units	EPA 150.1	06-25-1997 1315 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	5	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	250	10	mg/l	EPA 160.1	06-30-1997 0730 JC
Solids, Total Suspended	6	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	18	42	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	5.0	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

July 17, 1997

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

PACIFICORP
JUL 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

RCF2

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0909 hr.

Sample taken at E MT. RILDA CN ABOVE NEWUA SP.

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	8.31
DO	NA
Flow	1227 gpm
Conductivity	411
Turbidity	NA
Temperature	6.5°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17377

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	261	5	mg/l as HCO_3	SM2320-B	06-28-1997 1530 RJ
Alkalinity, Carbonate	5	5	mg/l as CO_3	SM2320-B	06-28-1997 1530 RJ
Alkalinity, Total	230	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1530 RJ
Anions	5.0	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	57	1	mg/l	EPA 215.1	07-09-1997 1030 MK
Cations	4.9	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	4	1	mg/l	SM4500-Cl-B	07-02-1997 1400 RJ
Conductivity	455	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	233	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Magnesium, Dissolved	22	1	mg/l	EPA 242.1	07-09-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
pH	8.35	----	pH units	EPA 150.1	06-25-1997 1315 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-09-1997 0845 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	07-09-1997 0930 MK
Solids, Total Dissolved	270	10	mg/l	EPA 160.1	06-30-1997 0730 JC
Solids, Total Suspended	16	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	23	42	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	5.0	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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July 17, 1997

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

PACIFICORP
18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

RCF3

Rec'd 1130 hr.
Sampled 0928 hr.

Kind of sample reported to us Water

Sample taken at E MT. RILDA CN ABOVE NEWUA SP.

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	8.29
DO	NA
Flow	1227 gpm
Conductivity	410
Turbidity	NA
Temperature	6.5°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17378

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	273	5	mg/l as HCO_3	SM2320-B	06-28-1997 1530 [illegible]
Alkalinity, Carbonate	8	5	mg/l as CO_3	SM2320-B	06-28-1997 1530 [illegible]
Alkalinity, Total	237	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1530 RJ
Anions	5.4	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	59	1	mg/l	EPA 215.1	07-09-1997 1030 MK
Cations	5.2	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	07-02-1997 1400 RJ
Conductivity	468	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	246	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	0.3	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Magnesium, Dissolved	24	1	mg/l	EPA 242.1	07-09-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	07-08-1997 0700 JC
Oxygen, Dissolved	6.3	----	mg/l	EPA 360.1	06-25-1997 1300 MK
pH	8.34	----	pH units	EPA 150.1	06-25-1997 1315 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-09-1997 0845 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	07-09-1997 0930 MK
Solids, Total Dissolved	290	10	mg/l	EPA 160.1	06-30-1997 0730 JC
Solids, Total Suspended	16	5	mg/l	EPA 160.2	06-26-1997 0700 JC
Sulfate	24	1	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	5.4	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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July 17, 1997

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

PACIFICORP
JUL 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

~~RCWR~~ RCW4

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 1000 hr.

Sample taken at E MT. RILDA CANYON NEAR HTG CN

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	8.40
DO	NA
Flow	1388 gpm
Conductivity	450
Turbidity	NA
Temperature	7.8°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17381

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2235	RJ
Alkalinity, Bicarbonate	292	5	mg/l as HCO_3	SM2320-B	06-28-1997 1715	RJ
Alkalinity, Carbonate	7	5	mg/l as CO_3	SM2320-B	06-28-1997 1715	RJ
Alkalinity, Total	250	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1715	JC
Anions	5.9	----	meq/l	---------	07-15-1997 1500	RJ
Calcium, Dissolved	59	1	mg/l	EPA 215.1	07-09-1997 1030	MK
Cations	5.7	----	meq/l	---------	07-15-1997 1500	RJ
Chloride	6	1	mg/l	SM4500-Cl-B	07-02-1997 1400	RJ
Conductivity	507	1	umhos/cm	SM2510-B	06-30-1997 0455	RJ
Hardness, Total	267	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500	RJ
Iron, Total	0.4	0.1	mg/l	EPA 236.1	07-09-1997 0745	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745	MK
Magnesium, Dissolved	29	1	mg/l	EPA 242.1	07-09-1997 1045	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815	MK
Oil & Grease	2	2	mg/l	SM5520-B	07-08-1997 0700	JC
Oxygen, Dissolved	6.1	----	mg/l	EPA 360.1	06-25-1997 1300	MK
pH	8.36	----	pH units	EPA 150.1	06-25-1997 1315	MK
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-09-1997 0845	MK
Sodium, Dissolved	9	1	mg/l	EPA 273.1	07-09-1997 0930	MK
Solids, Total Dissolved	290	10	mg/l	EPA 160.1	06-30-1997 0730	JC
Solids, Total Suspended	34	5	mg/l	EPA 160.2	06-30-1997 0730	JC
Sulfate	34	1	mg/l	EPA 375.4	07-07-1997 0750	SC
Cation/Anion Balance	5.9	----	%		07-15-1997 1500	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-RIGHT FORK RCF1

Rec'd 1500 hr.
Sampled 1148 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Rilda Canyon

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	8.57
DO	7.0
Flow	200 gpm
Conductivity	412
Temperature	10.7°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17776

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	275	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300 [illegible]
Alkalinity, Carbonate	7	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	237	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	5.4	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	56	1	mg/l	EPA 215.1	09-17-1997 0530 MK
Cations	4.8	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	4	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	465	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	222	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	1.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Magnesium, Dissolved	20	1	mg/l	EPA 242.1	09-17-1997 0600 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Oil & Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700 JC
pH	8.47	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	09-17-1997 0345 MK
Sodium, Dissolved	7	1	mg/l	EPA 273.1	09-17-1997 0430 MK
Solids, Total Dissolved	290	10	mg/l	EPA 160.1	09-17-1997 0700 JC
Solids, Total Suspended	56	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	25	5	mg/l	EPA 375.4	09-24-1997 0830 SC
Cation/Anion Balance	6.0	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-ABOVE NEWUA SPRINGS RCF2

Kind of sample reported to us Water

Sample taken at East Mountain/Rilda Canyon

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

Rec'd 1500 hr.
Sampled 1252 hr.

FIELD MEASUREMENTS

pH	8.59
DO	6.9
Flow	193 gpm
Conductivity	414
Temperature	11.3°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17777

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	272	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Carbonate	7	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	235	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	5.5	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	55	1	mg/l	EPA 215.1	09-17-1997 0530 MK
Cations	4.7	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	4	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	462	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	220	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	1.5	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 0300 MK
Magnesium, Dissolved	20	1	mg/l	EPA 242.1	09-17-1997 0600 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 0315 MK
Oil & Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700 JC
pH	8.35	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	09-17-1997 0345 MK
Sodium, Dissolved	7	1	mg/l	EPA 273.1	09-17-1997 0430 MK
Solids, Total Dissolved	280	10	mg/l	EPA 160.1	09-17-1997 0700 JC
Solids, Total Suspended	126	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	32	10	mg/l	EPA 375.4	09-24-1997 0830 SC
Cation/Anion Balance	7.4	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-BELOW NEWUA SPRINGS
RCF3
Rec'd 1500 hr.
Sampled 1310 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Rilda Canyon

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	8.23
DO	6.9
Flow	117 gpm
Conductivity	472
Temperature	11.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17778

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800	
Alkalinity, Bicarbonate	307	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300	
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 1300	SC
Alkalinity, Total	252	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300	SC
Anions	6.1	----	meq/l	---------	10-02-1997 1400	RJ
Calcium, Dissolved	61	1	mg/l	EPA 215.1	09-17-1997 1715	RJ
Cations	5.5	----	meq/l	---------	10-02-1997 1400	RJ
Chloride	4	1	mg/l	SM4500-Cl-B	09-17-1997 1230	SC
Conductivity	527	1	umhos/cm	SM2510-B	09-22-1997 1230	SC
Hardness, Total	255	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400	RJ
Iron, Total	1.9	0.1	mg/l	EPA 236.1	09-17-1997 1815	RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815	RJ
Magnesium, Dissolved	25	1	mg/l	EPA 242.1	09-17-1997 1730	RJ
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845	RJ
Oil & Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700	JC
Oxygen, Dissolved	4.7	----	mg/l	EPA 360.1	09-16-1997 0745	RJ
pH	8.13	----	pH units	EPA 150.1	09-16-1997 0730	SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-17-1997 1900	RJ
Sodium, Dissolved	9	1	mg/l	EPA 273.1	09-17-1997 1930	RJ
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	09-17-1997 0700	JC
Solids, Total Suspended	101	5	mg/l	EPA 160.2	09-17-1997 0700	JC
Sulfate	48	10	mg/l	EPA 375.4	09-24-1997 0830	SC
Cation/Anion Balance	5.1	----	%		10-02-1997 1400	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-NEAR HUNTINGTON CANYON RCW4

Kind of sample reported to us Water

Sample taken at East Mountain/Rilda Canyon

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

Rec'd 1500 hr.
Sampled 1342 hr.

FIELD MEASUREMENTS

pH	8.41
DO	7.3
Flow	305 gpm
Conductivity	~~560~~ 560
Temperature	11°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17781

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	351	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	294	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	6.2	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	64	1	mg/l	EPA 215.1	09-17-1997 1715 RJ
Cations	6.6	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	631	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	300	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	2.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
Magnesium, Dissolved	34	1	mg/l	EPA 242.1	09-17-1997 1730 RJ
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
Oil & Grease	<2	2	mg/l	SM5520-B	10-01-1997 0700 JC
Oxygen, Dissolved	5.3	----	mg/l	EPA 360.1	09-16-1997 0745 RJ
pH	8.32	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-17-1997 1900 RJ
Sodium, Dissolved	13	1	mg/l	EPA 273.1	09-17-1997 1930 RJ
Solids, Total Dissolved	390	10	mg/l	EPA 160.1	09-22-1997 0700 JC
Solids, Total Suspended	129	5	mg/l	EPA 160.2	09-17-1997 0700 JC
Sulfate	15	25	mg/l	EPA 375.4	09-30-1997 1130 SC
Cation/Anion Balance	3.1	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

December 17, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-BELOW NEWUA SPRINGS
RCF-3
Rec'd 1430 hr.
Sampled 1158 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	8.57
DO	7.5
Flow	60 gpm
Conductivity	671
Temperature	4.9°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18139

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800	SC
Alkalinity, Bicarbonate	417	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900	
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900	
Alkalinity, Total	342	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900	SC
Anions	9.1	----	meq/l	---------	12-11-1997 1100	RJ
Calcium, Dissolved	79	1	mg/l	EPA 215.1	12-08-1997 1445	MK
Cations	8.5	----	meq/l	---------	12-11-1997 1100	RJ
Chloride	8	1	mg/l	SM4500-Cl-B	12-05-1997 1300	SC
Conductivity	748	1	umhos/cm	SM2510-B	12-15-1997 1100	JC
Hardness, Total	391	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100	RJ
Iron, Total	0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200	MK
Magnesium, Dissolved	47	1	mg/l	EPA 242.1	12-08-1997 1515	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215	MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700	JC
Oxygen, Dissolved	7.4	----	mg/l	EPA 360.1	12-04-1997 2200	MK
pH	8.06	----	pH units	EPA 150.1	12-04-1997 2230	MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	12-08-1997 1245	MK
Sodium, Dissolved	15	1	mg/l	EPA 273.1	12-08-1997 1300	MK
Solids, Total Dissolved	450	10	mg/l	EPA 160.1	12-08-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700	JC
Sulfate	98	25	mg/l	EPA 375.4	12-10-1997 0800	SC
Cation/Anion Balance	-3.3	----	%		12-11-1997 1100	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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December 17, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
RILDA CANYON-NEAR HUNTINGTON CANYON
RCW-4
Rec'd 1430 hr.
Sampled 1235 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	8.93
DO	7.9
Flow	157 gpm
Conductivity	714
Temperature	1°C

NOTE: Dissolved metals filtered at lab

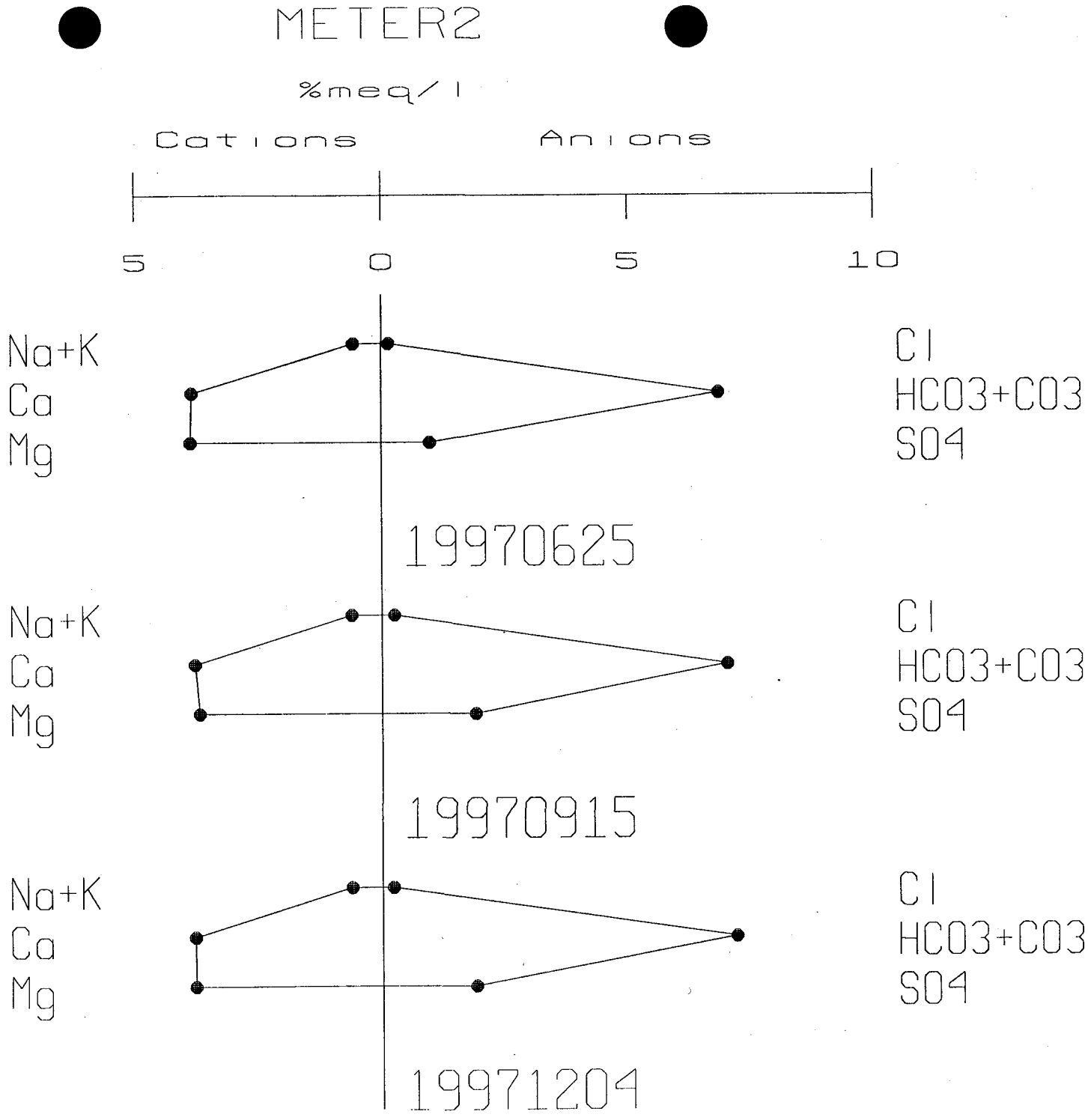
Analysis report no. 59-18140

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	432	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	354	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	8.9	----	meq/l	---------	12-11-1997 1100 RJ
Calcium, Dissolved	68	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	8.5	----	meq/l	---------	12-11-1997 1100 RJ
Chloride	11	1	mg/l	SM4500-Cl-B	12-05-1997 1300 SC
Conductivity	791	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	380	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	51	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
Oxygen, Dissolved	7.8	----	mg/l	EPA 360.1	12-04-1997 2200 MK
pH	8.25	----	pH units	EPA 150.1	12-04-1997 2230 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	20	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	480	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	72	25	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-2.2	----	%		12-11-1997 1100 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

MEMBER ACIL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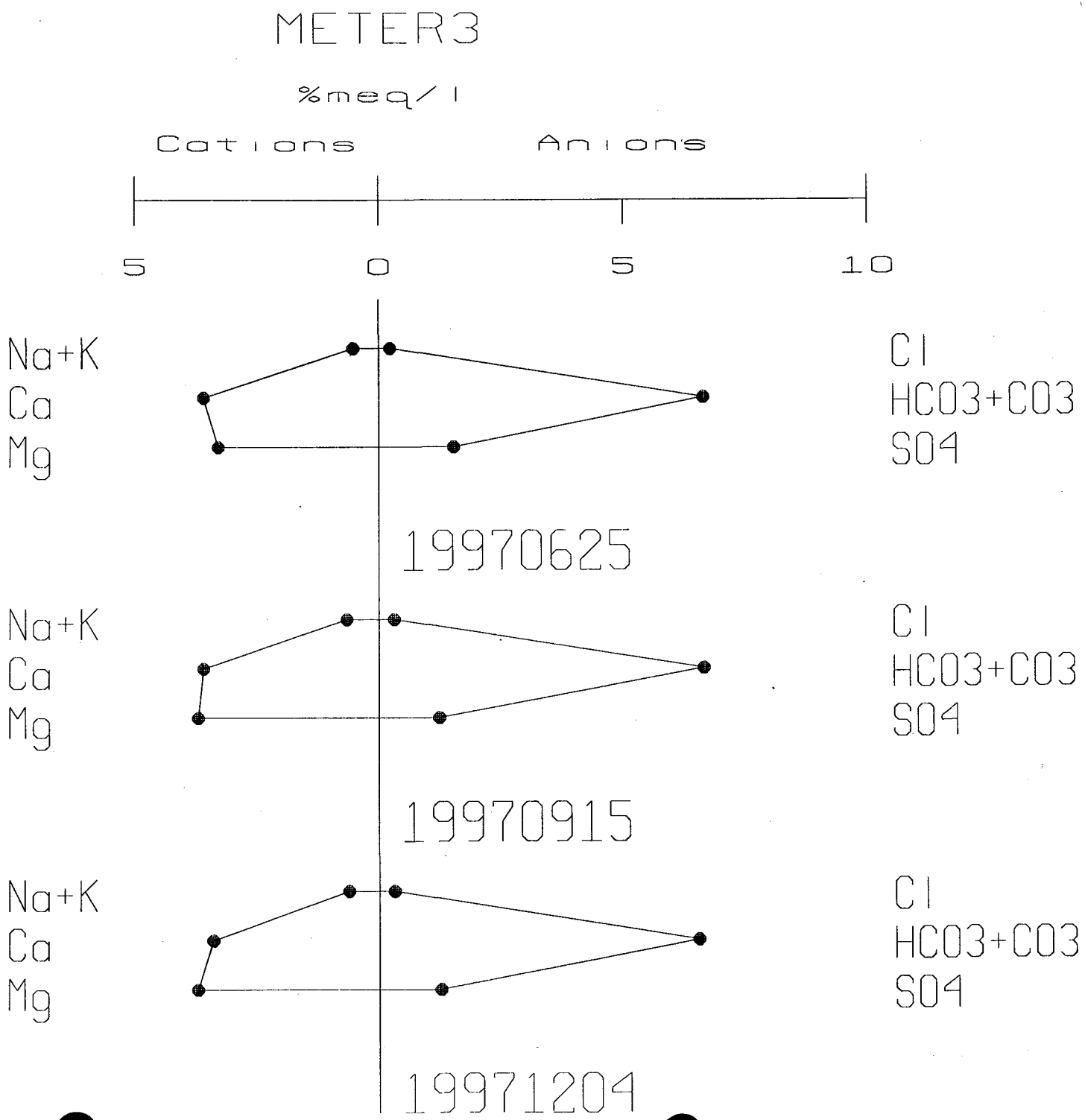
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SO4
19970915
Na+K
Ca
Mg
Cl
HCO3+CO3
SO4
19971204

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July 17, 1997

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

PACIFICORP

Sample identification by
PACIFICORP FIELD OFFICE

METER #2

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0937 hr.

Sample taken at E MT. SPRINGS NEWUA

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	7.22
DO	NA
Flow	6 gpm
Conductivity	670
Turbidity	NA
Temperature	8.3°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17379*

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	23	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2235 RJ
Alkalinity, Bicarbonate	417	5	mg/l as HCO_3	SM2320-B	06-28-1997 1715 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1715 RJ
Alkalinity, Total	342	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1715 JC
Anions	8.0	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	77	1	mg/l	EPA 215.1	07-09-1997 1030 MK
Cations	8.3	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	07-02-1997 1400 RJ
Conductivity	749	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	386	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Magnesium, Dissolved	47	1	mg/l	EPA 242.1	07-09-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
pH	7.44	----	pH units	EPA 150.1	06-25-1997 1315 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	07-09-1997 0845 MK
Sodium, Dissolved	12	1	mg/l	EPA 273.1	07-09-1997 0930 MK
Solids, Total Dissolved	450	10	mg/l	EPA 160.1	06-30-1997 0730 JC
Sulfate	47	1	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	8.0	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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July 17, 1997

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

PACIFICORP
FIELD

Sample identification by
PACIFICORP FIELD OFFICE

METER #3

Rec'd 1130 hr.
Sampled 0945 hr.

Kind of sample reported to us Water

Sample taken at E MT. SPRINGS NEWUA

Sample taken by Energy West/Mike

Date sampled June 25, 1997

Date received June 25, 1997

FIELD MEASUREMENTS

pH	7.30
DO	NA
Flow	100+ gpm
Conductivity	636
Turbidity	NA
Temperature	7.3°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17380

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	22	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2235 RJ
Alkalinity, Bicarbonate	404	5	mg/l as HCO_3	SM2320-B	06-28-1997 1715
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1715 RJ
Alkalinity, Total	331	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1715 JC
Cations	8.4	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	72	1	mg/l	EPA 215.1	07-09-1997 1030 MK
Anions	7.4	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	8	1	mg/l	SM4500-Cl-B	07-02-1997 1400 RJ
Conductivity	711	1	umhos/cm	SM2510-B	06-30-1997 0455 RJ
Hardness, Total	345	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	0.2	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-09-1997 0745 MK
Magnesium, Dissolved	40	1	mg/l	EPA 242.1	07-09-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-09-1997 0815 MK
pH	7.59	----	pH units	EPA 150.1	06-25-1997 1315 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	07-09-1997 0845 MK
Sodium, Dissolved	11	1	mg/l	EPA 273.1	07-09-1997 0930 MK
Solids, Total Dissolved	430	10	mg/l	EPA 160.1	06-30-1997 0730 JC
Sulfate	73	1	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	8.4	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
NEWUA-METER #2

Rec'd 1500 hr.
Sampled 1318 hr.

Kind of sample reported to us Water

Sample taken at East Mountain/Newua-Meter #2

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	7.17
DO	3.5
Flow	5.45 gpm
Conductivity	698
Temperature	9.8°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17779

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	21	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800 SC
Alkalinity, Bicarbonate	427	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
Alkalinity, Total	350	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
Anions	9.1	----	meq/l	---------	10-02-1997 1400 RJ
Calcium, Dissolved	76	1	mg/l	EPA 215.1	09-17-1997 1715 RJ
Cations	8.1	----	meq/l	---------	10-02-1997 1400 RJ
Chloride	9	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
Conductivity	788	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
Hardness, Total	375	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
Magnesium, Dissolved	45	1	mg/l	EPA 242.1	09-17-1997 1730 RJ
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
pH	7.49	----	pH units	EPA 150.1	09-16-1997 0730 SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-17-1997 1900 RJ
Sodium, Dissolved	13	1	mg/l	EPA 273.1	09-17-1997 1930 RJ
Solids, Total Dissolved	480	10	mg/l	EPA 160.1	09-17-1997 0700 JC
Sulfate	91	100	mg/l	EPA 375.4	09-30-1997 1130 SC
Cation/Anion Balance	5.8	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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ctober 6, 1997

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

PACIFICORP
OCT - 6 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
NEWUA-METER #3

Kind of sample reported to us Water

Rec'd 1500 hr.
Sampled 1326 hr.

Sample taken at East Mountain/Newua-Meter #2

Sample taken by Energy West/MBD

Date sampled September 15, 1997

Date received September 15, 1997

FIELD MEASUREMENTS

pH	7.24
DO	5.5
Flow	100+ gpm
Conductivity	663
Temperature	8.2°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17780

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
idity	<10	10	mg/l as $CaCO_3$	D1067-92	09-19-1997 0800
alinity, Bicarbonate	404	5	mg/l as HCO_3	SM2320-B	09-16-1997 1300
alinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 1300 SC
alinity, Total	331	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 1300 SC
ions	8.2	----	meq/l	---------	10-02-1997 1400 RJ
lcium, Dissolved	72	1	mg/l	EPA 215.1	09-17-1997 1715 RJ
ions	8.0	----	meq/l	---------	10-02-1997 1400 RJ
hloride	11	1	mg/l	SM4500-Cl-B	09-17-1997 1230 SC
nductivity	717	1	umhos/cm	SM2510-B	09-22-1997 1230 SC
rdness, Total	365	----	mg/l as $CaCO_3$	SM2340-B	10-02-1997 1400 RJ
on, Total	0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
n, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-17-1997 1815 RJ
gnesium, Dissolved	45	1	mg/l	EPA 242.1	09-17-1997 1730 RJ
anese, Total	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
anese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-17-1997 1845 RJ
	7.59	----	pH units	EPA 150.1	09-16-1997 0730 SC
assium, Dissolved	2	1	mg/l	EPA 258.1	09-17-1997 1900 RJ
ium, Dissolved	14	1	mg/l	EPA 273.1	09-17-1997 1930 RJ
lids, Total Dissolved	430	10	mg/l	EPA 160.1	09-17-1997 0700 JC
lfate	59	25	mg/l	EPA 375.4	09-30-1997 1130 SC
tion/Anion Balance	1.3	----	%		10-02-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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December 18, 1997

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

DEC 19 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
NEWUA-METER #2

Kind of sample reported to us Water

Rec'd 1430 hr.
Sampled 1207 hr.

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	7.60
Flow	4 gpm
Conductivity	705
Temperature	6.3°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18145

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	18	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	438	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	359	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	9.3	----	meq/l	---------	12-11-1997 1100 RJ
Calcium, Dissolved	76	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	8.2	----	meq/l	---------	12-11-1997 1100 RJ
Chloride	8	1	mg/l	SM4500-Cl-B	12-05-1997 1300 SC
Conductivity	785	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	379	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	46	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
pH	7.61	----	pH units	EPA 150.1	12-04-1997 2230 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	13	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	440	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	91	25	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-6.3	----	%		12-11-1997 1100 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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December 18, 1997

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

DEC 19 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
NEWUA-METER #3

Rec'd 1430 hr.
Sampled 1218 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 4, 1997

Date received December 4, 1997

FIELD MEASUREMENTS

pH	7.91
Flow	100+ gpm
Conductivity	651
Temperature	6.4°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18146

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	15	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	396	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	325	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	8.0	----	meq/l	---------	12-11-1997 1100 RJ
Calcium, Dissolved	68	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	7.7	----	meq/l	---------	12-11-1997 1100 RJ
Chloride	11	1	mg/l	SM4500-Cl-B	12-05-1997 1300 SC
Conductivity	715	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	355	----	mg/l as $CaCO_3$	SM2340-B	12-11-1997 1100 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	45	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
pH	7.68	----	pH units	EPA 150.1	12-04-1997 2230 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	13	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	400	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	60	10	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-2.1	----	%		12-11-1997 1100 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

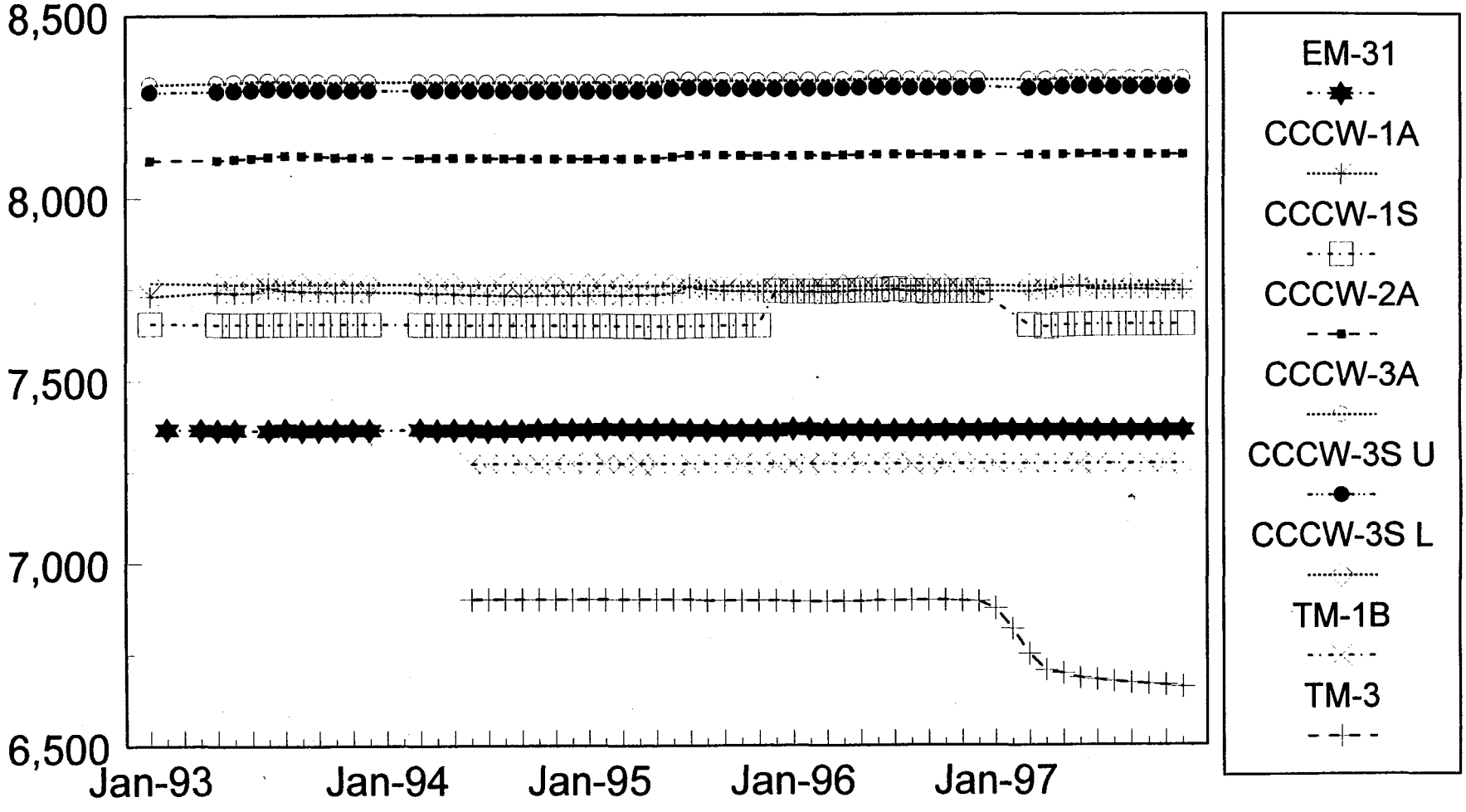
MEMBER ACIL

APPENDIX E

COTTONWOOD CANYON

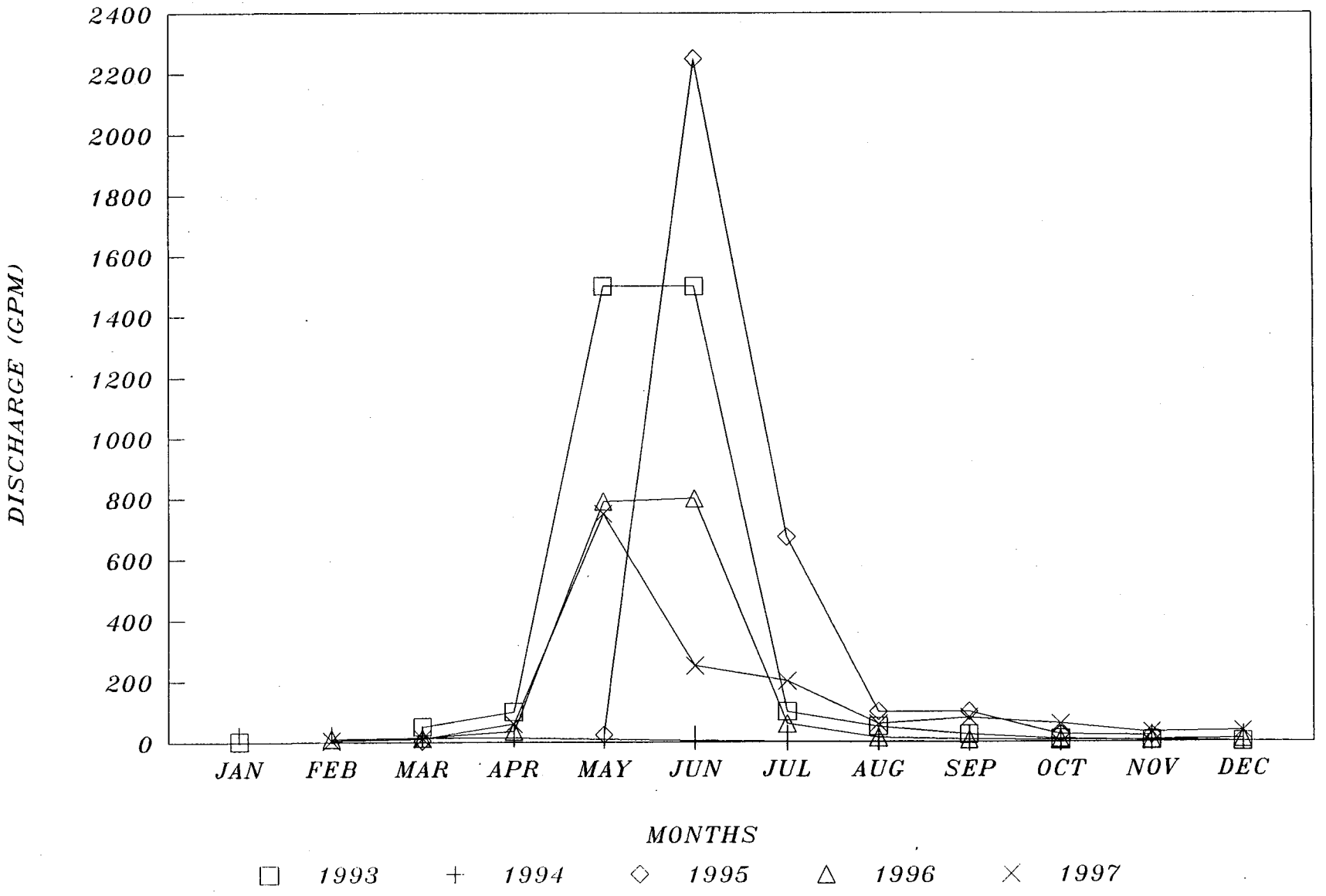
MONITORING WELLS

PIEZOMETRIC DATA



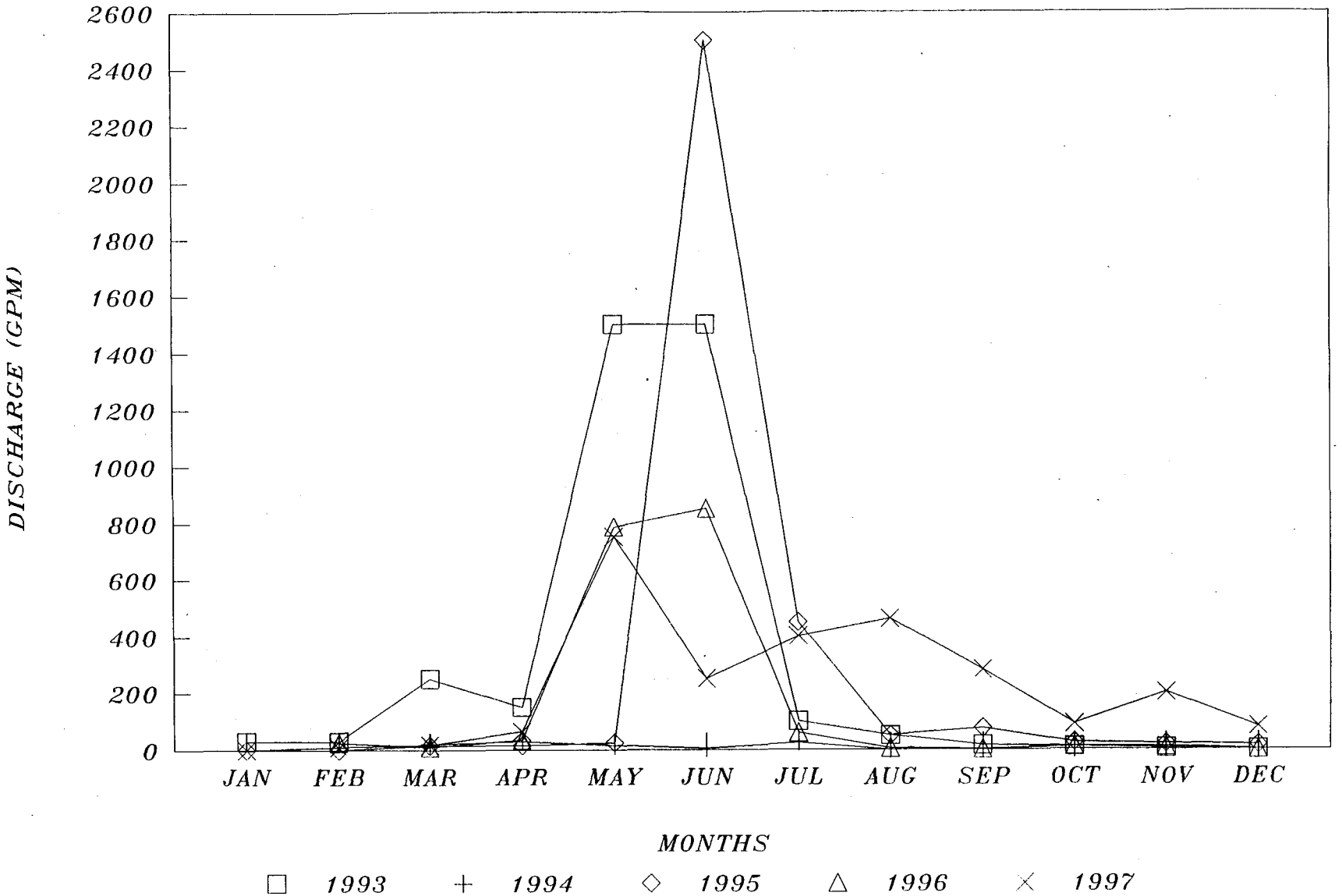
COTTONWOOD CANYON CREEK: SW-1

Drainage Recession Curve Study



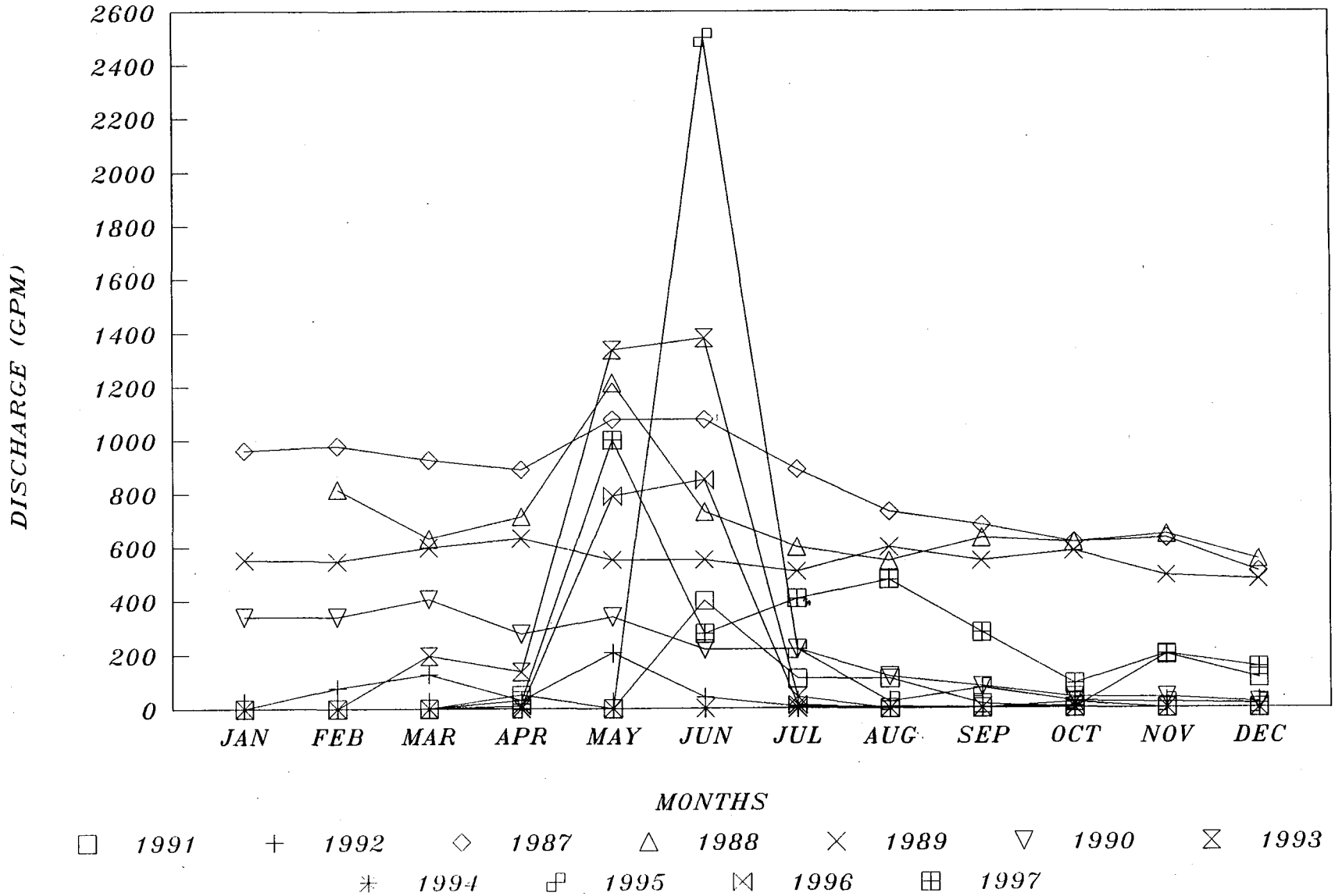
COTTONWOOD CANYON CREEK: SW-2

Drainage Recession Curve Study



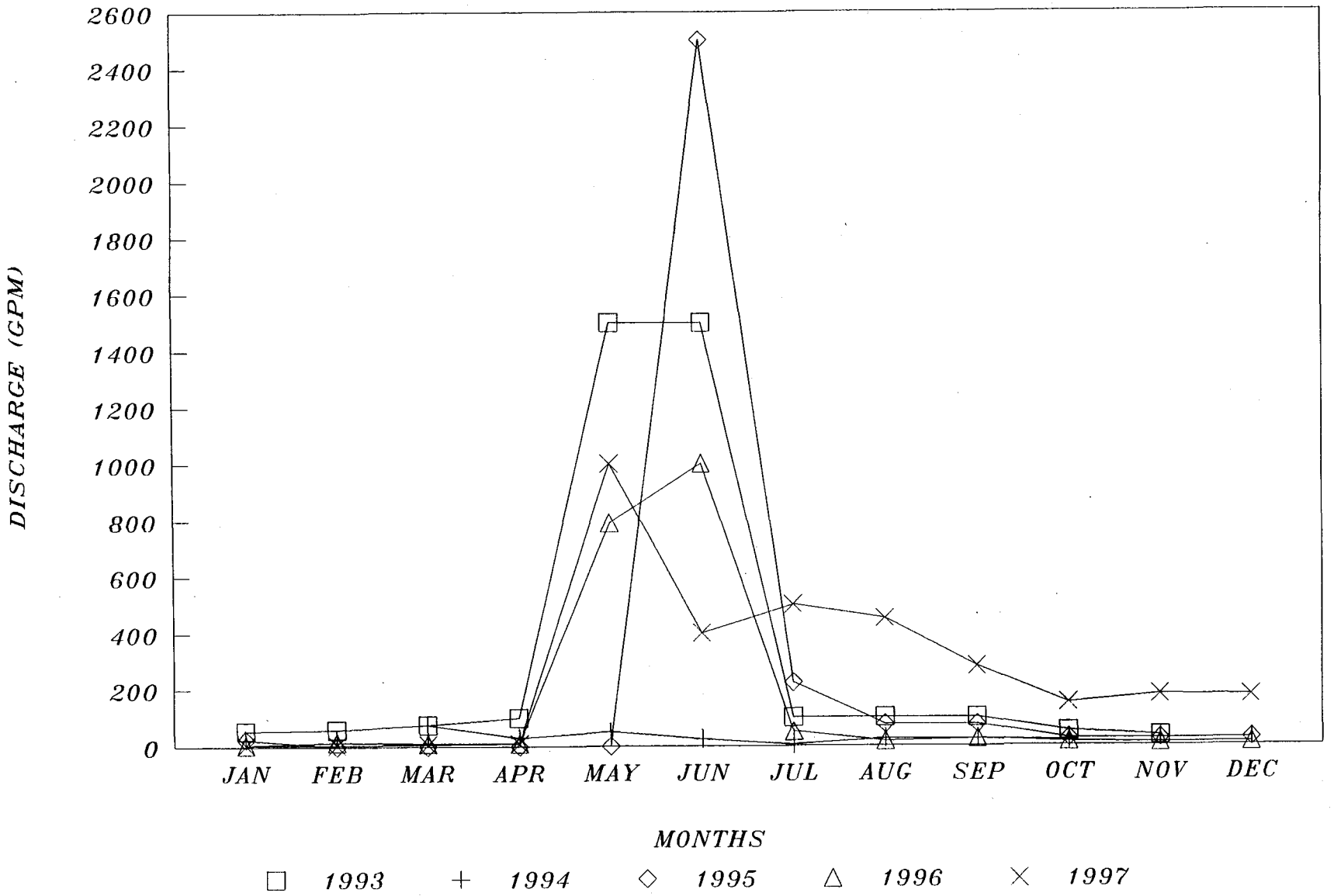
COTTONWOOD CANYON CREEK @ USGS FLUME

Drainage Recession Curve Study



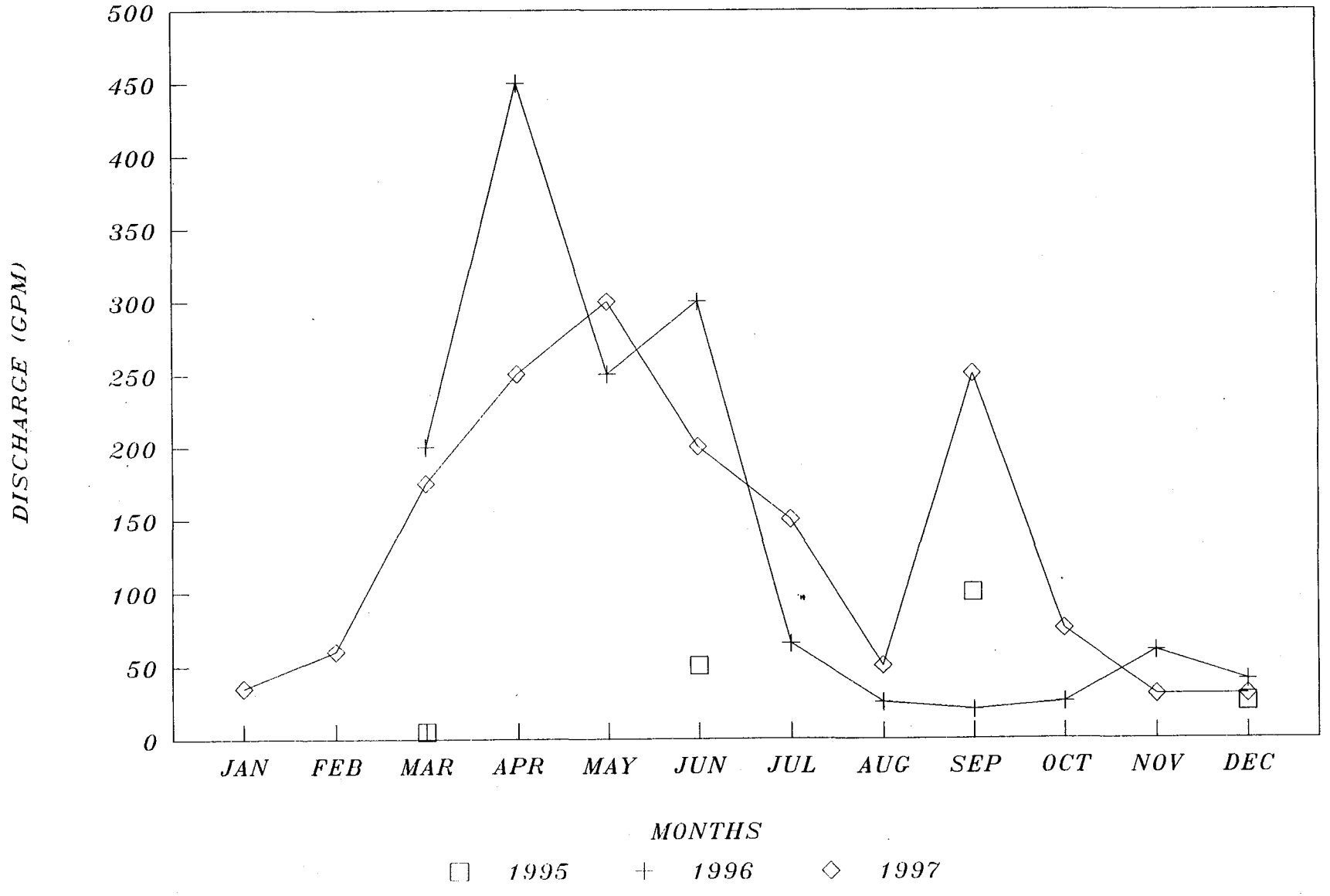
COTTONWOOD CANYON CREEK: SW-3

Drainage Recession Curve Study



STRAIGHT CANYON: T-19

Drainage Recession Curve Study



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FAX: (801) 653-2436

March 28, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-1
Rec'd 1400 hr.
Sampled 1115 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.08
DO	7.7
Flow	11 gpm
Conductivity	723
Temperature	9.1°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17028

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	9	10	mg/l as $CaCO_3$	D1067-92	03-12-1997 0830 SW
Alkalinity, Bicarbonate	422	5	mg/l HCO_3	SM2320-B	03-12-1997 1300 SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	03-12-1997 1300 SW
Alkalinity, Total	347	5	mg/l as $CaCO_3$	EPA 310.1	03-12-1997 1300 SW
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	03-18-1997 1345 MK
Anions	9.7	----	meq/l	---------	03-27-1997 1545 RJ
Arsenic, Dissolved	<0.01	0.01	mg/l	EPA 206.2	03-13-1997 0800 MK
Boron, Dissolved	0.2	0.1	mg/l	EPA 212.3	03-14-1997 0700 MK
Cadmium, Dissolved	<0.01	0.01	mg/l	EPA 213.1	03-18-1997 0915 MK
Calcium, Total	77	1	mg/l	EPA 215.1	03-18-1997 1215 MK
Calcium, Dissolved	74	1	mg/l	EPA 215.1	03-18-1997 1215 MK
Cations	9.4	----	meq/l	---------	03-27-1997 1545 RJ
Chloride	16	1	mg/l	SM4500-Cl-B	03-27-1997 1400 RJ
Chromium, Dissolved	<0.1	0.1	mg/l	EPA 218.1	03-18-1997 1400 MK
Conductivity	802	1	umhos/cm	SM2510-B	03-11-1997 0730 SW
Copper, Dissolved	<0.1	0.1	mg/l	EPA 220.1	03-18-1997 0830 MK
Hardness, Total	419	----	mg/l as $CaCO_3$	SM2340-B	03-27-1997 1545 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	03-18-1997 1000 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-18-1997 1000 MK
Lead, Dissolved	<0.1	0.1	mg/l	EPA 239.1	03-18-1997 0930 MK
Magnesium, Total	55	1	mg/l	EPA 242.1	03-18-1997 1230 MK
Magnesium, Dissolved	53	1	mg/l	EPA 242.1	03-18-1997 1230 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-18-1997 1030 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-18-1997 1030 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Scott

Huntington Laboratory RJ

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FAX: (801) 653-2436

March 28, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-1
Rec'd 1400 hr.
Sampled 1115 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.08
DO	7.7
Flow	11 gpm
Conductivity	723
Temperature	9.1°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17028

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum, Dissolved	<0.1	0.1	mg/l	EPA 246.1	03-18-1997 1430 M
Oil & Grease	<2	2	mg/l	SM5520-B	03-13-1997 0700
pH	8.12	----	pH units	EPA 150.1	03-11-1997 1100 JC
Potassium, Total	2	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Potassium, Dissolved	2	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	03-13-1997 1100 MK
Sodium, Total	23	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Sodium, Dissolved	23	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Solids, Total Dissolved	500	10	mg/l	EPA 160.1	03-11-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	03-11-1997 0700 JC
Sulfate	110	63	mg/l	EPA 375.4	03-26-1997 0700 SW
Zinc, Dissolved	0.02	0.01	mg/l	EPA 289.1	03-18-1997 0845 MK
Cation/Anion Balance	-1.2	----	%		03-27-1997 1545 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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July 17, 1997

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

PACIFICORP
JUL 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

SW-1

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0759 hr.

Sample taken at TRAIL MT. COTTONWOOD CANYON CR

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

FIELD MEASUREMENTS

pH	8.41
DO	NA
Flow	250 gpm
Conductivity	480
Temperature	8.1°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17344

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	304	5	mg/l as HCO_3	SM2320-B	06-27-1997 1300 RJ
Alkalinity, Carbonate	5	5	mg/l as CO_3	SM2320-B	06-27-1997 1300 RJ
Alkalinity, Total	258	5	mg/l as $CaCO_3$	EPA 310.1	06-27-1997 1300 RJ
Anions	6.4	----	meq/l	---------	07-15-1997 1500 RJ
Calcium, Dissolved	54	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	5.3	----	meq/l	---------	07-15-1997 1500 RJ
Chloride	22	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	528	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	246	----	mg/l as $CaCO_3$	SM2340-B	07-15-1997 1500 RJ
Iron, Total	0.8	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	27	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.47	----	pH units	EPA 150.1	06-23-1997 1200 JC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	9	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	06-24-1997 0700 JC
Solids, Total Suspended	78	5	mg/l	EPA 160.2	06-24-1997 0700 JC
Sulfate	42	42	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.4	----	%		07-15-1997 1500 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

October 9, 1997

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

OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK SW-1

Rec'd 1445 hr.
Sampled 0956 hr.

Kind of sample reported to us Water

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.27
DO	7.1
Flow	80 gpm
Conductivity	484
Temperature	12.1°C

Dissolved metals filtered at lab!

Analysis report no. 59-17708

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900	
Alkalinity, Bicarbonate	314	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730	
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 0730	SC
Alkalinity, Total	258	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730	SC
Anions	6.0	----	meq/l	---------	09-18-1997 1200	RJ
Calcium, Dissolved	54	1	mg/l	EPA 215.1	09-11-1997 0330	MK
Cations	5.6	----	meq/l	---------	09-18-1997 1200	RJ
Chloride	8	1	mg/l	SM4500-Cl-B	09-17-1997 1030	SC
Conductivity	534	1	umhos/cm	SM2510-B	09-22-1997 1000	SC
Hardness, Total	254	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200	RJ
Iron, Total	1.0	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Magnesium, Dissolved	29	1	mg/l	EPA 242.1	09-11-1997 0400	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-09-1997 0700	JC
pH	8.19	----	pH units	EPA 150.1	09-08-1997 1530	SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-11-1997 0200	MK
Sodium, Dissolved	10	1	mg/l	EPA 273.1	09-11-1997 0245	MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	09-11-1997 0700	JC
Solids, Total Suspended	45	5	mg/l	EPA 160.2	09-11-1997 0700	JC
Sulfate	32	10	mg/l	EPA 375.4	09-15-1997 0900	SC
Cation/Anion Balance	4.1	----	%		09-18-1997 1200	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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December 18, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK
SW-1
Rec'd 1330 hr.
Sampled 1117 hr.

Kind of sample reported to us Water

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled December 5, 1997

Date received December 5, 1997

FIELD MEASUREMENTS

pH	8.55
Flow	35 gpm
Conductivity	535
Temperature	1.8°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18149

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	346	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	284	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	7.0	----	meq/l	---------	12-17-1997 1600 MK
Calcium, Dissolved	58	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	6.1	----	meq/l	---------	12-17-1997 1600 MK
Chloride	10	1	mg/l	SM4500-Cl-B	12-12-1997 1200 SC
Conductivity	595	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	281	----	mg/l as $CaCO_3$	SM2340-B	12-17-1997 1600 MK
Iron, Total	0.2	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	33	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
pH	8.14	----	pH units	EPA 150.1	12-05-1997 1600 RJ
Potassium, Dissolved	1	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	11	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	6	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	50	25	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-6.7	----	%		12-17-1997 1600 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-2
Rec'd 1400 hr.
Sampled 1128 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.48
DO	8.4
Flow	18 gpm
Conductivity	1217
Temperature	4.6°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17030

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l	as $CaCO_3$	D1067-92	03-12-1997 0830	
Alkalinity, Bicarbonate	407	5	ag/l	as HCO_3	SM2320-B	03-12-1997 1300	
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	03-12-1997 1300	SW
Alkalinity, Total	333	5	mg/l	as $CaCO_3$	EPA 310.1	03-12-1997 1300	SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	03-18-1997 1345	MK
Anions	14.7	----	meq/l		---------	03-27-1997 1545	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	03-13-1997 0800	MK
Boron, Dissolved	0.2	0.1	mg/l		EPA 212.3	03-14-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	03-18-1997 0915	MK
Calcium, Total	77	1	mg/l		EPA 215.1	03-18-1997 1215	MK
Calcium, Dissolved	69	1	mg/l		EPA 215.1	03-18-1997 1215	MK
Cations	14.6	----	meq/l		---------	03-27-1997 1545	RJ
Chloride	179	1	mg/l		SM4500-Cl-B	03-27-1997 1400	RJ
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	03-18-1997 1400	MK
Conductivity	1344	1	umhos/cm		SM2510-B	03-11-1997 0730	SW
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	03-18-1997 0830	MK
Hardness, Total	460	----	mg/l	as $CaCO_3$	SM2340-B	03-27-1997 1545	RJ
Iron, Total	0.6	0.1	mg/l		EPA 236.1	03-18-1997 1000	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	03-18-1997 1000	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	03-18-1997 0930	MK
Magnesium, Total	65	1	mg/l		EPA 242.1	03-18-1997 1230	MK
Magnesium, Dissolved	58	1	mg/l		EPA 242.1	03-18-1997 1230	MK
Manganese, Total	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.
Larry Stout

Huntington Laboratory RJ

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FAX: (801) 653-2436

March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-2
Rec'd 1400 hr.
Sampled 1128 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.48
DO	8.4
Flow	18 gpm
Conductivity	1217
Temperature	4.6°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17030

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum, Dissolved	<0.1	0.1	mg/l	EPA 246.1	03-18-1997 1430 MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-13-1997 0700 JC
pH	8.44	----	pH units	EPA 150.1	03-11-1997 1100 JC
Potassium, Total	3	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Potassium, Dissolved	3	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	03-13-1997 1100 MK
Sodium, Total	123	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Sodium, Dissolved	115	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Solids, Total Dissolved	840	10	mg/l	EPA 160.1	03-11-1997 0700 JC
Solids, Total Suspended	10	5	mg/l	EPA 160.2	03-11-1997 0700 JC
Sulfate	145	83	mg/l	EPA 375.4	03-26-1997 0700 SW
Zinc, Dissolved	0.04	0.01	mg/l	EPA 289.1	03-18-1997 0845 MK
Cation/Anion Balance	-0.4	----	%		03-27-1997 1545 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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FAX: (801) 653-2436

July 10, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN COTTONWOOD CANYON CREEK
SW-2

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0834 hr.

Sample taken at TRAIL MT. COTTONWOOD CANYON CR

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

FIELD MEASUREMENTS

pH	8.50
Flow	250 gpm
Conductivity	479
Temperature	8.9°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17345

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	308	5	mg/l as HCO_3	SM2320-B	06-27-1997 1300 [illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-27-1997 1300 RJ
Alkalinity, Total	252	5	mg/l as $CaCO_3$	EPA 310.1	06-27-1997 1300 RJ
Anions	6.1	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	50	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	5.4	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	10	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	531	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	244	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	0.9	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	29	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.61	----	pH units	EPA 150.1	06-23-1997 1200 JC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	11	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	310	10	mg/l	EPA 160.1	06-24-1997 0700 JC
Solids, Total Suspended	80	5	mg/l	EPA 160.2	06-24-1997 0700 JC
Sulfate	35	10	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	5.9	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 9, 1997

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

PACIFICORP
OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK SW-2

Kind of sample reported to us Water

Rec'd 1445 hr.
Sampled 1044 hr.

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.77
DO	6.6
Flow	280 gpm
Conductivity	1024
Temperature	16°C

Dissolved metals filtered at lab!

*HIGH SUSPENDED SOLIDS → PREC. EVENT & SEDIMENT POND DIS RUNOFF

Analysis report no. 59-17709

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900 RJ
Alkalinity, Bicarbonate	606	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730 SC
Alkalinity, Carbonate	85	5	mg/l as CO_3	SM2320-B	09-16-1997 0730 SC
Alkalinity, Total	510	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730 SC
Anions	13.8	----	meq/l	---------	09-18-1997 1200 RJ
Calcium, Dissolved	29	1	mg/l	EPA 215.1	09-11-1997 0330 MK
Cations	12.7	----	meq/l	---------	09-18-1997 1200 RJ
Chloride	23	1	mg/l	SM4500-Cl-B	09-17-1997 1030 SC
Conductivity	1163	1	umhos/cm	SM2510-B	09-22-1997 1000 SC
Hardness, Total	151	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200 RJ
* Iron, Total	1.4	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Iron, Dissolved	0.2	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Magnesium, Dissolved	19	1	mg/l	EPA 242.1	09-11-1997 0400 MK
Manganese, Total	0.3	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
Manganese, Dissolved	0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
* Oil & Grease	39	2	mg/l	SM5520-B	09-09-1997 0700 JC
pH	8.64	----	pH units	EPA 150.1	09-08-1997 1530 SC
Potassium, Dissolved	4	1	mg/l	EPA 258.1	09-11-1997 0200 MK
Sodium, Dissolved	221	2	mg/l	EPA 273.1	09-11-1997 0245 MK
Solids, Total Dissolved	760	10	mg/l	EPA 160.1	09-11-1997 0700 JC
* Solids, Total Suspended	148	5	mg/l	EPA 160.2	09-11-1997 0700 JC
Sulfate	140	50	mg/l	EPA 375.4	09-15-1997 0900 SC
Cation/Anion Balance	3.9	----	%		09-18-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

MEMBER ACIL

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FAX: (801) 653-2436

December 18, 1997

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

Kind of sample reported to us Water

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled December 5, 1997

Date received December 5, 1997

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK
SW-2
Rec'd 1330 hr.
Sampled 1130 hr.

FIELD MEASUREMENTS

pH	8.92
Flow	80 gpm
Conductivity	1101
Temperature	4.5°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18151

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	467	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 [illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 [illegible]
Alkalinity, Total	383	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	13.9	----	meq/l	---------	12-17-1997 1600 MK
Calcium, Dissolved	54	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	12.2	----	meq/l	---------	12-17-1997 1600 MK
Chloride	107	1	mg/l	SM4500-Cl-B	12-12-1997 1200 SC
Conductivity	1230	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	295	----	mg/l as $CaCO_3$	SM2340-B	12-17-1997 1600 MK
Iron, Total	0.4	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	39	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-11-1997 0700 JC
pH	8.44	----	pH units	EPA 150.1	12-05-1997 1600 RJ
Potassium, Dissolved	3	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	144	5	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	690	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	13	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	153	50	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-6.2	----	%		12-17-1997 1600 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

MEMBER ACIL

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March 28, 1997

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

MAR 28
FIELD

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-3
Rec'd 1400 hr.
Sampled 1150 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.32
DO	8.2
Flow	6.67 gpm
Conductivity	1386
Temperature	9.8°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17029

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l	as $CaCO_3$	D1067-92	03-12-1997 0830	SW
Alkalinity, Bicarbonate	450	5	mg/l	as HCO_3	SM2320-B	03-12-1997 1300	SW
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	03-12-1997 1300	SW
Alkalinity, Total	369	5	mg/l	as $CaCO_3$	EPA 310.1	03-12-1997 1300	SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	03-18-1997 1345	MK
Anions	19.2	----	mg/l		---------	03-27-1997 1545	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	03-13-1997 0800	MK
Boron, Dissolved	0.3	0.1	mg/l		EPA 212.3	03-14-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	03-18-1997 0915	MK
Calcium, Total	115	1	mg/l		EPA 215.1	03-18-1997 1215	MK
Calcium, Dissolved	111	1	mg/l		EPA 215.1	03-18-1997 1215	MK
Cations	18.5	----	meq/l		---------	03-27-1997 1545	RJ
Chloride	95	1	mg/l		SM4500-Cl-B	03-27-1997 1400	RJ
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	03-18-1997 1400	MK
Conductivity	1595	1	umhos/cm		SM2510-B	03-11-1997 0730	SW
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	03-18-1997 0830	MK
Hardness, Total	687	----	mg/l	as $CaCO_3$	SM2340-B	03-27-1997 1545	RJ
Iron, Total	<0.1	0.1	mg/l		EPA 236.1	03-18-1997 1000	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	03-18-1997 1000	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	03-18-1997 0930	MK
Magnesium, Total	97	1	mg/l		EPA 242.1	03-18-1997 1230	MK
Magnesium, Dissolved	96	1	mg/l		EPA 242.1	03-18-1997 1230	MK
Manganese, Total	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.
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March 28, 1997

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

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

Sample identification by
PACIFICORP FIELD OFFICE

Trail Mountain
Cottonwood Canyon Creek
SW-3
Rec'd 1400 hr.
Sampled 1150 hr.

FIELD MEASUREMENTS

pH	8.32
DO	8.2
Flow	6.67 gpm
Conductivity	1386
Temperature	9.8°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17029

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum, Dissolved	<0.1	0.1	mg/l	EPA 246.1	03-18-1997 1430
Oil & Grease	<2	2	mg/l	SM5520-B	03-13-1997 0700
pH	8.22	----	pH units	EPA 150.1	03-11-1997 1100 JC
Potassium, Total	4	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Potassium, Dissolved	4	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	03-13-1997 1100 MK
Sodium, Total	108	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Sodium, Dissolved	107	1	mg/l	EPA 273.1	03-18-1997 1130 MK
Solids, Total Dissolved	1130	10	mg/l	EPA 160.1	03-11-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	03-11-1997 0700 JC
Sulfate	438	83	mg/l	EPA 375.4	03-26-1997 0700 SW
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	03-18-1997 0845 MK
Cation/Anion Balance	-1.7	----	%		03-27-1997 1545 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stone

Huntington Laboratory RJ

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FAX: (801) 653-2436

July 10, 1997

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

FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN COTTONWOOD CANYON CREEK
SW-3

Rec'd 1130 hr.
Sampled 0922 hr.

Kind of sample reported to us Water

Sample taken at TRAIL MT. COTTONWOOD CANYON CR

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

FIELD MEASUREMENTS

pH	8.55
Flow	400 gpm
Conductivity	710
Temperature	11.6°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17346

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	350	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	288	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	8.9	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	7.9	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	22	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	795	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	245	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	1.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	31	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.56	----	pH units	EPA 150.1	06-23-1997 1200 JC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	67	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	490	10	mg/l	EPA 160.1	06-24-1997 0700 JC
Solids, Total Suspended	108	5	mg/l	EPA 160.2	06-24-1997 0700 JC
Sulfate	121	25	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	6.1	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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FAX: (801) 653-2436

October 9, 1997

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

PACIFICORP
OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK SW-3

Kind of sample reported to us Water

Rec'd 1445 hr.
Sampled 1103 hr.

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.66
DO	6.7
Flow	280 gpm
Conductivity	1071
Temperature	16.6°C

Dissolved metals filtered at lab!

*HIGH SUSPENDED SOLIDS → PREC. EVENT & SEDIMENT POND DIS. RUNOFF

Analysis report no. 59-17710

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900	RJ
Alkalinity, Bicarbonate	569	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730	[illegible]
Alkalinity, Carbonate	10	5	mg/l as CO_3	SM2320-B	09-16-1997 0730	SC
Alkalinity, Total	483	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730	SC
Anions	13.8	----	meq/l	---------	09-18-1997 1200	RJ
Calcium, Dissolved	33	1	mg/l	EPA 215.1	09-11-1997 0330	MK
Cations	13.1	----	meq/l	---------	09-18-1997 1200	RJ
Chloride	26	1	mg/l	SM4500-Cl-B	09-17-1997 1030	SC
Conductivity	1201	1	umhos/cm	SM2510-B	09-22-1997 1000	SC
Hardness, Total	181	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200	RJ
* Iron, Total	1.1	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Iron, Dissolved	0.2	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Magnesium, Dissolved	24	1	mg/l	EPA 242.1	09-11-1997 0400	MK
Manganese, Total	0.2	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
Manganese, Dissolved	0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
* Oil & Grease	28	2	mg/l	SM5520-B	09-09-1997 0700	JC
pH	8.62	----	pH units	EPA 150.1	09-08-1997 1530	SC
Potassium, Dissolved	4	1	mg/l	EPA 258.1	09-11-1997 0200	MK
Sodium, Dissolved	215	5	mg/l	EPA 273.1	09-11-1997 0245	MK
Solids, Total Dissolved	790	10	mg/l	EPA 160.1	09-11-1997 0700	JC
* Solids, Total Suspended	114	5	mg/l	EPA 160.2	09-11-1997 0700	JC
Sulfate	165	50	mg/l	EPA 375.4	09-15-1997 0900	SC
Cation/Anion Balance	2.8	----	%		09-18-1997 1200	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

MEMBER ACIL

Huntington Laboratory

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December 18, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
COTTONWOOD CANYON CREEK
SW-3
Rec'd 1330 hr.
Sampled 1148 hr.

Kind of sample reported to us Water

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled December 5, 1997

Date received December 5, 1997

FIELD MEASUREMENTS

pH	8.70
Flow	175 gpm
Conductivity	1177
Temperature	1.6°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18148*

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	548	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	18	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	479	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	14.9	----	meq/l	---------	12-17-1997 1600 MK
Calcium, Dissolved	32	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	13.7	----	meq/l	---------	12-17-1997 1600 MK
Chloride	50	1	mg/l	SM4500-Cl-B	12-12-1997 1200 SC
Conductivity	1306	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	203	----	mg/l as $CaCO_3$	SM2340-B	12-17-1997 1600 MK
Iron, Total	0.5	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	0.2	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	30	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
pH	8.46	----	pH units	EPA 150.1	12-05-1997 1600 RJ
Potassium, Dissolved	4	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	220	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	780	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	11	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	188	50	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	-4.1	----	%		12-17-1997 1600 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

MEMBER ACIL

STRAIGHT CANYON WATER QUALITY *

T-19

1997** SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY (umhos/cm)	DISSOLVED OXYGEN	HARDNESS	IRON TOTAL	IRON DISSOLVED	MAGNESIUM	MANGANES	OIL & GREASE	PH (units)	POTASSIUM	SODIUM	SULFAT	SOLIDS TSS	SOLIDS TDS	SOLIDS SETTLEABLE
3-97		346	46		33	859	10.2	300	2		45			8.46	1	57	125	321	510	
6-97		337	34	9	26	657		246	1		39			8.73	1	37	53	79	380	
9-97		303	34		20	596	6.8	241	0.8		38			8.61	1	34	55	93	340	
12-97		420	48	6	35	912		350	0.3		56			8.38	1	62	99	36	540	
1997**																				
MIN		303	34	6	20	596	6.8	241	0.3		38			8.4	1	34	53	36	340	
MAX		420	48	9	35	912	10.2	350	2.0		56			8.7	1	62	125	321	540	
MEAN		352	41	8	29	756	8.5	284	1.0		45			8.5	1	48	83	132	443	
No. of Analysis	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1996**																				
MIN		190	39	34	22	631	7	299	0		43	0		8	2	37	50	40	388	
MAX		437	74	78	30	776	12	406	4		54	0		9	3	54	84	269	500	
MEAN		303	53	56	26	685	10	331	1		48	0		9	2	45	65	122	427	
1995																				
MIN	10.00	275.00	50.00	10.00	21.00	614.00	6.00	300.00	0.50	0.10	41.00	0.10	5.00	7.99	1.00	34.00	39.00	35.00	360.00	0.50
MAX	10.00	340.00	60.00	20.00	41.00	1062.00	10.40	430.00	1.20	0.10	70.00	0.10	5.00	8.87	4.00	84.00	160.00	115.00	680.00	0.50
MEAN	10.00	312.50	55.00	17.50	28.00	821.30	7.80	366.50	0.80	0.10	55.80	0.10	5.00	8.40	2.30	53.50	94.80	63.80	515.00	0.50
HISTORICAL 1977-1996																				
MIN	0.1	190	14.3	1.0	20.1	581	5.40	178	0.05	0.03	24.00	0.01	1.0	7.44	0.70	12.00	39.0	1.0	360	0.50
MAX	10.0	437	92.0	78.0	67.9	1380	11.70	476	5.10	0.38	85.00	0.20	5.0	8.87	30.20	125.20	336.0	420.0	910	0.50
MEAN	6.3	344	46.5	18.2	37.8	893	8.61	355	0.74	0.16	58.19	0.06	4.2	8.38	3.85	70.96	150.3	73.4	554.1	0.50
No. of Analysis	12	30	26	19	30	26	10	30	25	13	30	18	9	29	29	30	30	24	30	7

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

** Data: Database input restricted to values greater then laboratory minimum detection limit.

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TEL: (801) 653-2311
FAX: (801) 653-2436

April 8, 1997

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

PACIFICORP
APR 10 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
STRAIGHT CANYON T-19

Kind of sample reported to us Water

Rec'd 1200 hr.
Sampled 1032 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 21, 1997

Date received March 21, 1997

FIELD MEASUREMENTS

pH	8.55
DO	10.2
Flow	175 gpm
Conductivity	727
Temperature	3.8°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17061

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	03-25-1997 0630 SW
Alkalinity, Bicarbonate	346	5	mg/l as HCO_3	SM2320-B	04-08-1997 1000 [illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	04-08-1997 1000 SW
Alkalinity, Total	284	5	mg/l as $CaCO_3$	EPA 310.1	04-08-1997 1000 SW
Anions	9.2	----	meq/l	---------	04-08-1997 1120 RJ
Calcium, Dissolved	46	1	mg/l	EPA 215.1	03-27-1997 1115 MK
Cations	8.5	----	meq/l	---------	04-08-1997 1120 RJ
Chloride	33	1	mg/l	SM4500-Cl-B	03-25-1997 1300 SW
Conductivity	859	1	umhos/cm	SM2510-B	03-27-1997 1330 MK
Hardness, Total	300	----	mg/l as $CaCO_3$	SM2340-B	04-08-1997 1120 RJ
Iron, Total	2.0	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	03-27-1997 0730 MK
Magnesium, Dissolved	45	1	mg/l	EPA 242.1	03-27-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	03-27-1997 0815 MK
Oil & Grease	<2	2	mg/l	SM5520-B	04-01-1997 0700 JC
pH	8.46	----	pH units	EPA 150.1	03-21-1997 1345 JC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	03-27-1997 0930 MK
Sodium, Dissolved	57	1	mg/l	EPA 273.1	03-27-1997 1030 MK
Solids, Total Dissolved	510	10	mg/l	EPA 160.1	03-24-1997 0700 JC
Solids, Total Suspended	321	5	mg/l	EPA 160.2	03-24-1997 0700 JC
Sulfate	125	31	mg/l	EPA 375.4	04-02-1997 0700 SW
Cation/Anion Balance	-4.0	----	%		04-08-1997 1120 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

COMMERCIAL TESTING & ENGINEERING CO.

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July 10, 1997

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

RECEIVED
JUL 10 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

T-19

Kind of sample Water
reported to us

Rec'd 1130 hr.
Sampled 0941 hr.

Sample taken at TRAIL MT. STRAIGHT CANYON

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

FIELD MEASUREMENTS

pH	8.73
Flow	200 gpm
Conductivity	585
Temperature	10°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17347

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115 RJ
Alkalinity, Bicarbonate	337	5	mg/l as HCO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Carbonate	9	5	mg/l as CO_3	SM2320-B	06-28-1997 1330 RJ
Alkalinity, Total	292	5	mg/l as $CaCO_3$	EPA 310.1	06-28-1997 1330 RJ
Anions	7.7	----	meq/l	---------	07-08-1997 1600 RJ
Calcium, Dissolved	34	1	mg/l	EPA 215.1	07-08-1997 1045 MK
Cations	6.5	----	meq/l	---------	07-08-1997 1600 RJ
Chloride	26	1	mg/l	SM4500-Cl-B	07-02-1997 0930 RJ
Conductivity	657	1	umhos/cm	SM2510-B	06-30-1997 0340 RJ
Hardness, Total	246	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600 RJ
Iron, Total	1.0	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800 MK
Magnesium, Dissolved	39	1	mg/l	EPA 242.1	07-08-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830 MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800 MK
pH	8.73	----	pH units	EPA 150.1	06-23-1997 1200 JC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-08-1997 0900 MK
Sodium, Dissolved	37	1	mg/l	EPA 273.1	07-08-1997 0930 MK
Solids, Total Dissolved	380	10	mg/l	EPA 160.1	06-24-1997 0700 JC
Solids, Total Suspended	79	5	mg/l	EPA 160.2	06-24-1997 0700 JC
Sulfate	53	10	mg/l	EPA 375.4	07-07-1997 0750 SC
Cation/Anion Balance	7.9	----	%		07-08-1997 1600 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 9, 1997

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

RECEIVED
OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
STRAIGHT CANYON T-19

Rec'd 1445 hr.
Sampled 1141 hr.

Kind of sample reported to us Water

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.68
DO	6.8
Flow	250 gpm
Conductivity	558
Temperature	15.7°C

Dissolved metals filtered at lab!

Analysis report no. 59-17711

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900
Alkalinity, Bicarbonate	303	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730 [illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 0730 SC
Alkalinity, Total	249	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730 SC
Anions	6.7	----	meq/l	---------	09-18-1997 1200 RJ
Calcium, Dissolved	34	1	mg/l	EPA 215.1	09-11-1997 0330 MK
Cations	6.3	----	meq/l	---------	09-18-1997 1200 RJ
Chloride	20	1	mg/l	SM4500-Cl-B	09-17-1997 1030 SC
Conductivity	596	1	umhos/cm	SM2510-B	09-22-1997 1000 SC
Hardness, Total	241	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200 RJ
Iron, Total	0.8	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Magnesium, Dissolved	38	1	mg/l	EPA 242.1	09-11-1997 0400 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-09-1997 0700 JC
pH	8.61	----	pH units	EPA 150.1	09-08-1997 1530 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	09-11-1997 0200 MK
Sodium, Dissolved	34	1	mg/l	EPA 273.1	09-11-1997 0245 MK
Solids, Total Dissolved	340	10	mg/l	EPA 160.1	09-11-1997 0700 JC
Solids, Total Suspended	93	5	mg/l	EPA 160.2	09-11-1997 0700 JC
Sulfate	55	25	mg/l	EPA 375.4	09-15-1997 0900 SC
Cation/Anion Balance	2.7	----	%		09-18-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

MEMBER ACIL

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December 18, 1997

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

DEC 19 1997

Sample identification by
PACIFICORP FIELD OFFICE

TRAIL MOUNTAIN
STRAIGHT MOUNTAIN T-19

Kind of sample reported to us Water

Rec'd 1330 hr.
Sampled 1048 hr.

Sample taken at Trail Mountain

Sample taken by Energy West/MBD

Date sampled December 5, 1997

Date received December 5, 1997

FIELD MEASUREMENTS

pH	9.16
Flow	30 gpm
Conductivity	820
Temperature	1.4°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18147

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Turbidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	420	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	6	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Total	369	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 SC
Anions	9.5	----	meq/l	---------	12-17-1997 1600 MK
Calcium, Dissolved	48	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	9.7	----	meq/l	---------	12-17-1997 1600 MK
Chloride	35	1	mg/l	SM4500-Cl-B	12-12-1997 1200 SC
Conductivity	912	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	350	----	mg/l as $CaCO_3$	SM2340-B	12-17-1997 1600 MK
Iron, Total	0.3	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	56	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-10-1997 0700 JC
pH	8.38	----	pH units	EPA 150.1	12-05-1997 1600 RJ
Potassium, Dissolved	1	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	62	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	540	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	36	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	99	50	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	1.1	----	%		12-17-1997 1600 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

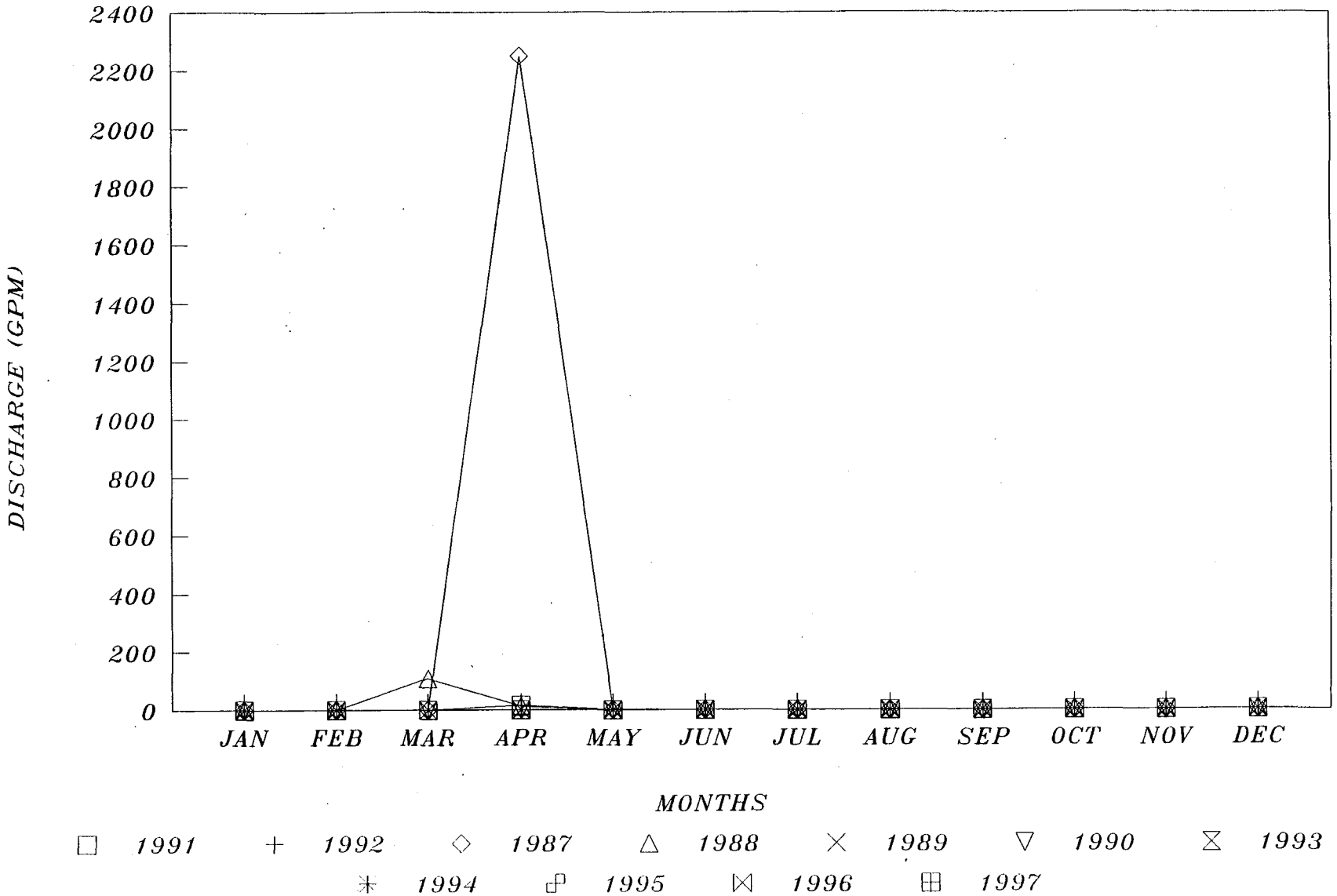
Huntington Laboratory

MEMBER ACIL

APPENDIX F

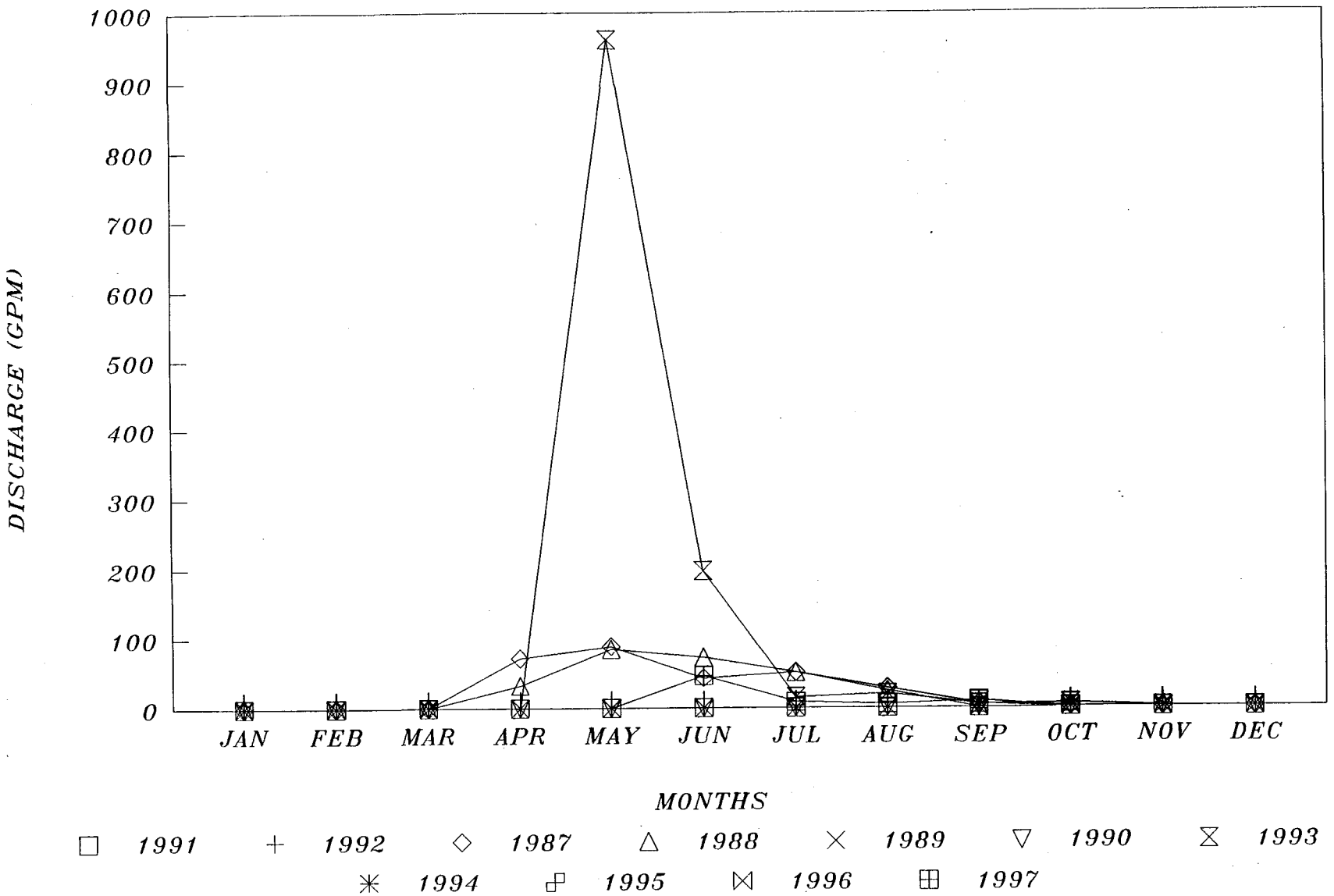
GRIMES WASH – RIGHT FORK ABOVE MINE

Drainage Recession Curve Study



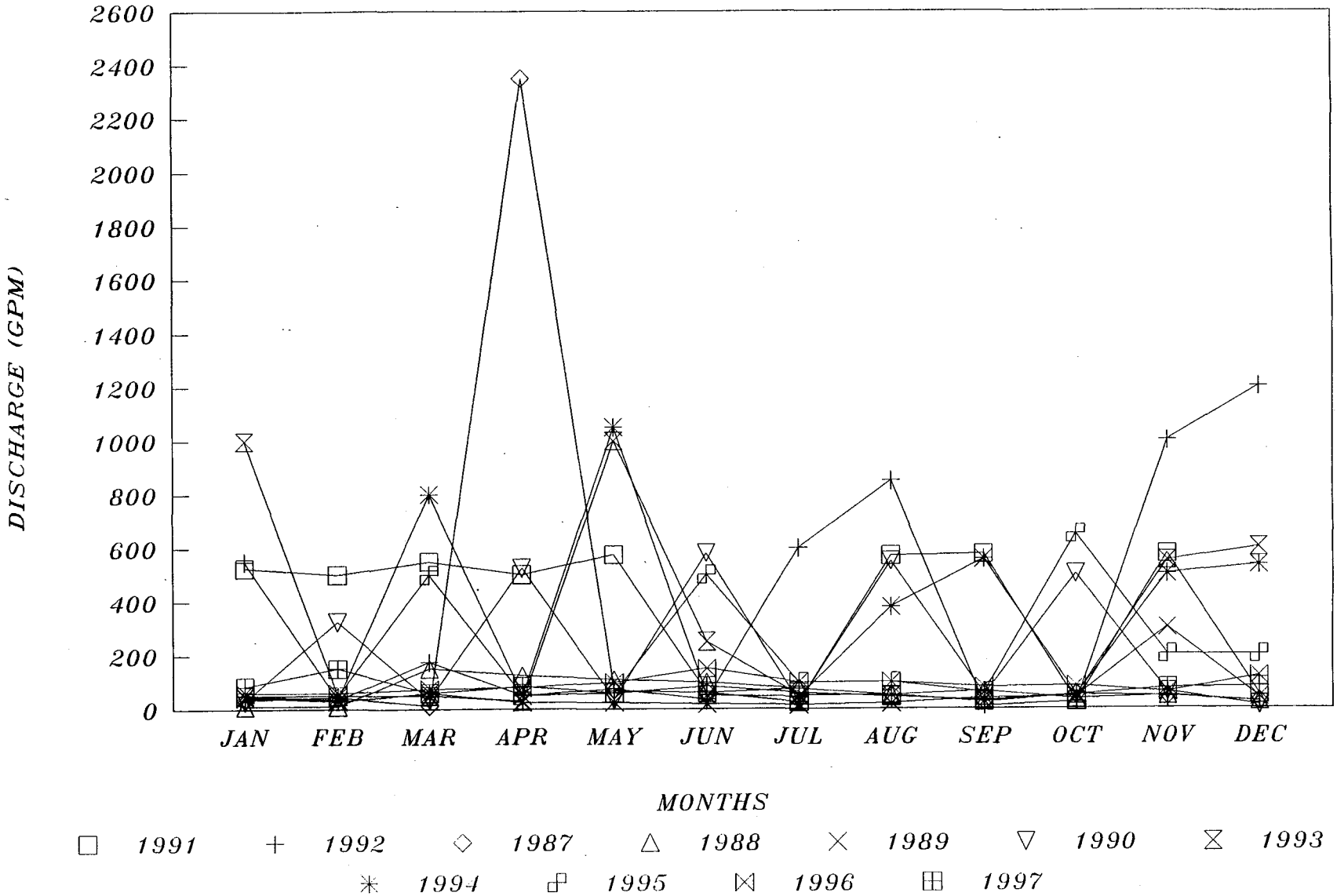
GRIMES WASH – LEFT FORK ABOVE MINE

Drainage Recession Curve Study



GRIMES WASH – BELOW MINE

Drainage Recession Curve Study



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May 13, 1997

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

PACIFICORP
MAY 14 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN GRIMES WASH GWR01

Kind of sample reported to us Water

Rec'd 1515 hr.
Sampled 1320 hr.

Sample taken at

Sample taken by Energy West/M.D.

Date sampled April 30, 1997

Date received April 30, 1997

FIELD MEASUREMENTS

pH	7.99
DO	9.0
Flow	15 gpm
Conductivity	407
Temperature	12.7°C

Dissolved metals filtered at lab!

Analysis report no. 59-17123

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	05-06-1997 0700	SW
Alkalinity, Bicarbonate	240	5	mg/l as HCO_3	SM2320-B	05-06-1997 0900	SW
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	05-06-1997 0900	SW
Alkalinity, Total	197	5	mg/l as $CaCO_3$	EPA 310.1	05-06-1997 0900	SW
Anions	5.2	----	meq/l	---------	05-13-1997 1230	RJ
Calcium, Dissolved	57	1	mg/l	EPA 215.1	05-08-1997 1130	MK
Cations	5.0	----	meq/l	---------	05-13-1997 1230	RJ
Chloride	5	1	mg/l	SM4500-Cl-B	05-06-1997 1330	SW
Conductivity	419	1	umhos/cm	SM2510-B	05-06-1997 1430	SW
Hardness, Total	237	----	mg/l as $CaCO_3$	SM2340-B	05-13-1997 1230	RJ
Iron, Total	2.6	0.1	mg/l	EPA 236.1	05-08-1997 0815	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	05-08-1997 0815	MK
Magnesium, Dissolved	23	1	mg/l	EPA 242.1	05-08-1997 1145	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	05-08-1997 0915	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	05-08-1997 0915	MK
Oil & Grease	<2	2	mg/l	SM5520-B	05-07-1997 0800	JC
pH	8.39	----	pH units	EPA 150.1	05-01-1997 1015	JC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	05-08-1997 1030	MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	05-08-1997 1045	MK
Solids, Total Dissolved	280	10	mg/l	EPA 160.1	05-05-1997 0700	JC
Solids, Total Suspended	89	5	mg/l	EPA 160.2	05-01-1997 1100	JC
Sulfate	55	10	mg/l	EPA 375.4	05-12-1997 0900	RJ
Cation/Anion Balance	-1.7	----	%		05-13-1997 1230	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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August 6, 1997

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

AUG - 6 1997
FIELD OFFICE

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN GRIMES WASH
GWR02
Rec'd 1130 hr.
Sampled 0713 hr.

FIELD MEASUREMENTS

pH	7.9
DO	9.1
Flow	46 gpm
Conductivity	759
Temperature	8.3°C

NOTE:DISSOLVED METALS FILTERED AT LAB!
NOTE:ALKALINITY EXPIRED WHEN REANALZED FOR BALANCE PURPOSES!

Analysis report no. 59-17342

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115	RJ
Alkalinity, Bicarbonate	355	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730	SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-27-1997 1300	[illegible]
Alkalinity, Total	291	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730	SC
Anions	10.7	----	meq/l	---------	07-31-1997 1100	RJ
Calcium, Dissolved	73	1	mg/l	EPA 215.1	07-08-1997 1045	MK
Cations	8.8	----	meq/l	---------	07-31-1997 1100	RJ
Chloride	15	1	mg/l	SM4500-Cl-B	07-02-1997 0930	RJ
Conductivity	845	1	umhos/cm	SM2510-B	06-30-1997 0340	RJ
Hardness, Total	376	----	mg/l as $CaCO_3$	SM2340-B	07-31-1997 1100	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Magnesium, Dissolved	47	1	mg/l	EPA 242.1	07-08-1997 1100	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800	MK
pH	8.27	----	pH units	EPA 150.1	06-23-1997 1200	JC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	07-08-1997 0900	MK
Sodium, Dissolved	29	1	mg/l	EPA 273.1	07-08-1997 0930	MK
Solids, Total Dissolved	540	10	mg/l	EPA 160.1	06-24-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	06-24-1997 0700	JC
Sulfate	212	250	mg/l	EPA 375.4	07-02-1997 0715	SC
Cation/Anion Balance	9.6	----	%		07-31-1997 1100	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

East Mountain
Grimes Wash
GWR03
Rec'd 1400 hr.
Sampled 1259 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.20
DO	7.5
Flow	60 gpm
Conductivity	2680
Temperature	9.4°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17032

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l	as $CaCO_3$	D1067-92	03-12-1997 0830 SW
Alkalinity, Bicarbonate	374	5	mg/l	as HCO_3	SM2320-B	03-12-1997 1300 SW
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	03-12-1997 1300 SW
Alkalinity, Total	306	5	mg/l	as $CaCO_3$	EPA 310.1	03-12-1997 1300 SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	03-18-1997 1345 MK
Anions	31.2	----	meq/l		---------	03-27-1997 1545 RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	03-13-1997 0800 MK
Boron, Dissolved	0.5	0.1	mg/l		EPA 212.3	03-14-1997 0700 MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	03-18-1997 0915 MK
Calcium, Total	133	1	mg/l		EPA 215.1	03-18-1997 1215 MK
Calcium, Dissolved	118	1	mg/l		EPA 215.1	03-18-1997 1215 MK
Cations	33.4	----	meq/l		---------	03-27-1997 1545 RJ
Chloride	590	10	mg/l		SM4500-Cl-B	03-27-1997 1400 RJ
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	03-18-1997 1400 MK
Conductivity	3040	1	umhos/cm		SM2510-B	03-11-1997 0730 SW
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	03-18-1997 0830 MK
Hardness, Total	699	----	mg/l	as $CaCO_3$	SM2340-B	03-27-1997 1545 RJ
Iron, Total	0.3	0.1	mg/l		EPA 236.1	03-18-1997 1000 MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	03-18-1997 1000 MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	03-18-1997 0930 MK
Magnesium, Total	89	5	mg/l		EPA 242.1	03-18-1997 1230 MK
Magnesium, Dissolved	81	1	mg/l		EPA 242.1	03-18-1997 1230 MK
Manganese, Total	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030 MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	03-18-1997 1030 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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March 28, 1997

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

PACIFICORP
MAR 28 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

East Mountain
Grimes Wash
GWR03
Rec'd 1400 hr.
Sampled 1259 hr.

Kind of sample reported to us Water

Sample taken at

Sample taken by Energy West/M.D.

Date sampled March 10, 1997

Date received March 10, 1997

FIELD MEASUREMENTS

pH	8.20
DO	7.5
Flow	60 gpm
Conductivity	2680
Temperature	9.4°C

NOTE: Dissolved metals filtered at lab!

Analysis report no. 59-17032

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Molybdenum, Dissolved	<0.1	0.1	mg/l	EPA 246.1	03-18-1997 1430 MK
Oil & Grease	<2	2	mg/l	SM5520-B	03-13-1997 0700 JC
pH	8.19	----	pH units	EPA 150.1	03-11-1997 1100 [illegible]
Potassium, Total	6	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Potassium, Dissolved	6	1	mg/l	EPA 258.1	03-18-1997 1100 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	03-13-1997 1100 MK
Sodium, Total	443	5	mg/l	EPA 273.1	03-18-1997 1130 MK
Sodium, Dissolved	402	5	mg/l	EPA 273.1	03-18-1997 1130 MK
Solids, Total Dissolved	1910	10	mg/l	EPA 160.1	03-11-1997 0700 JC
Solids, Total Suspended	13	5	mg/l	EPA 160.2	03-11-1997 0700 JC
Sulfate	403	250	mg/l	EPA 375.4	03-26-1997 0700 SW
Zinc, Dissolved	0.02	0.01	mg/l	EPA 289.1	03-18-1997 0845 MK
Cation/Anion Balance	3.4	----	%		03-27-1997 1545 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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July 10, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

GWR03

Kind of sample reported to us Water

Rec'd 1130 hr.
Sampled 0723 hr.

Sample taken at EAST MOUNTAIN GRIMES WASH

Sample taken by Energy West/M.D.

Date sampled June 23, 1997

Date received June 23, 1997

FIELD MEASUREMENTS

pH	8.46
DO	9.2
Flow	85 gpm
Conductivity	1221
Temperature	10.1°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17343

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	06-28-1997 2115	RJ
Alkalinity, Bicarbonate	372	5	mg/l as HCO_3	SM2320-B	06-27-1997 1300	RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	06-27-1997 1300	RJ
Alkalinity, Total	305	5	mg/l as $CaCO_3$	EPA 310.1	06-27-1997 1300	RJ
Anions	14.8	----	meq/l	---------	07-08-1997 1600	RJ
Calcium, Dissolved	86	1	mg/l	EPA 215.1	07-08-1997 1045	MK
Cations	13.4	----	meq/l	---------	07-08-1997 1600	RJ
Chloride	108	1	mg/l	SM4500-Cl-B	07-02-1997 0930	RJ
Conductivity	1362	1	umhos/cm	SM2510-B	06-30-1997 0340	RJ
Hardness, Total	487	----	mg/l as $CaCO_3$	SM2340-B	07-08-1997 1600	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	07-08-1997 0800	MK
Magnesium, Dissolved	66	1	mg/l	EPA 242.1	07-08-1997 1100	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	07-08-1997 0830	MK
Oil & Grease	<2	2	mg/l	SM5520-B	06-30-1997 0800	MK
pH	8.45	----	pH units	EPA 150.1	06-23-1997 1200	JC
Potassium, Dissolved	3	1	mg/l	EPA 258.1	07-08-1997 0900	MK
Sodium, Dissolved	83	1	mg/l	EPA 273.1	07-08-1997 0930	MK
Solids, Total Dissolved	910	10	mg/l	EPA 160.1	06-24-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	06-24-1997 0700	JC
Sulfate	274	125	mg/l	EPA 375.4	07-05-1997 1000	RJ
Cation/Anion Balance	5.1	----	%		07-08-1997 1600	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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October 9, 1997

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

RECEIVED
OCT 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
GRIMES WASH GWR02

Rec'd 1445 hr.
Sampled 1301 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.52
DO	5.9
Flow	10 gpm
Conductivity	593
Temperature	22.2°C

Dissolved metals filtered at lab!

Analysis report no. 59-17712

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900	RJ
Alkalinity, Bicarbonate	280	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730	SC
Alkalinity, Carbonate	10	5	mg/l as CO_3	SM2320-B	09-16-1997 0730	SC
Alkalinity, Total	246	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730	SC
Anions	7.2	----	meq/l	---------	09-18-1997 1200	RJ
Calcium, Dissolved	47	1	mg/l	EPA 215.1	09-11-1997 0330	MK
Cations	7.0	----	meq/l	---------	09-18-1997 1200	RJ
Chloride	10	1	mg/l	SM4500-Cl-B	09-17-1997 1030	SC
Conductivity	637	1	umhos/cm	SM2510-B	09-22-1997 1000	SC
Hardness, Total	286	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115	MK
Magnesium, Dissolved	41	1	mg/l	EPA 242.1	09-11-1997 0400	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145	MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-09-1997 0700	JC
pH	8.56	----	pH units	EPA 150.1	09-08-1997 1530	SC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	09-11-1997 0200	MK
Sodium, Dissolved	28	1	mg/l	EPA 273.1	09-11-1997 0245	MK
Solids, Total Dissolved	380	10	mg/l	EPA 160.1	09-11-1997 0700	JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	09-11-1997 0700	JC
Sulfate	98	50	mg/l	EPA 375.4	09-15-1997 0900	SC
Cation/Anion Balance	1.8	----	%		09-18-1997 1200	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

MEMBER ACIL

Huntington Laboratory

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October 9, 1997

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

PACIFICORP
OCT
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
GRIMES WASH GWR03

Rec'd 1445 hr.
Sampled 1312 hr.

Kind of sample reported to us Water

Sample taken at East ~~Mountain~~

Sample taken by Energy West/MBD

Date sampled September 8, 1997

Date received September 8, 1997

FIELD MEASUREMENTS

pH	8.14
DO	7.0
Flow	30 gpm
Conductivity	1290
Temperature	16.5°C

Dissolved metals filtered at lab!

Analysis report no. 59-17713

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	09-10-1997 0900 RJ
Alkalinity, Bicarbonate	335	5	mg/l as HCO_3	SM2320-B	09-16-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	09-16-1997 0730 SC
Alkalinity, Total	275	5	mg/l as $CaCO_3$	EPA 310.1	09-16-1997 0730 SC
Anions	15.7	----	meq/l	---------	09-18-1997 1200 RJ
Calcium, Dissolved	100	1	mg/l	EPA 215.1	09-11-1997 0330 MK
Cations	15.3	----	meq/l	---------	09-18-1997 1200 RJ
Chloride	142	1	mg/l	SM4500-Cl-B	09-17-1997 1030 SC
Conductivity	1489	1	umhos/cm	SM2510-B	09-24-1997 1430 SC
Hardness, Total	550	----	mg/l as $CaCO_3$	SM2340-B	09-18-1997 1200 RJ
Iron, Total	0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	09-11-1997 0115 MK
Magnesium, Dissolved	73	1	mg/l	EPA 242.1	09-11-1997 0400 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	09-11-1997 0145 MK
Oil & Grease	<2	2	mg/l	SM5520-B	09-10-1997 0700 JC
pH	8.20	----	pH units	EPA 150.1	09-08-1997 1530 SC
Potassium, Dissolved	4	1	mg/l	EPA 258.1	09-11-1997 0200 MK
Sodium, Dissolved	96	1	mg/l	EPA 273.1	09-11-1997 0245 MK
Solids, Total Dissolved	1000	10	mg/l	EPA 160.1	09-11-1997 0700 JC
Solids, Total Suspended	7	5	mg/l	EPA 160.2	09-11-1997 0700 JC
Sulfate	297	50	mg/l	EPA 375.4	09-15-1997 0900 SC
Cation/Anion Balance	1.3	----	%		09-18-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

MEMBER ACIL

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 10
HUNTINGTON, UT 84528
TEL: (801) 653-2311
FAX: (801) 653-2436

December 18, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN
GRIMES WASH
GWR03
Rec'd 1330 hr.
Sampled 1215 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled December 5, 1997

Date received December 5, 1997

FIELD MEASUREMENTS

pH	8.64
Flow	80 gpm
Conductivity	1513
Temperature	4.3°C

NOTE: Dissolved metals filtered at lab

Analysis report no. 59-18150

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	<10	10	mg/l as $CaCO_3$	D1067-92	12-08-1997 0800 SC
Alkalinity, Bicarbonate	353	5	mg/l as HCO_3	SM2320-B	12-08-1997 0900 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	12-08-1997 0900 [illegible]
Alkalinity, Total	289	5	mg/l as $CaCO_3$	EPA 310.1	12-08-1997 0900 [illegible]
Anions	14.2	----	meq/l	---------	12-17-1997 1600 MK
Calcium, Dissolved	113	1	mg/l	EPA 215.1	12-08-1997 1445 MK
Cations	17.3	----	meq/l	---------	12-17-1997 1600 MK
Chloride	178	1	mg/l	SM4500-Cl-B	12-12-1997 1200 SC
Conductivity	1709	1	umhos/cm	SM2510-B	12-15-1997 1100 JC
Hardness, Total	628	----	mg/l as $CaCO_3$	SM2340-B	12-17-1997 1600 MK
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	12-08-1997 1200 MK
Magnesium, Dissolved	84	1	mg/l	EPA 242.1	12-08-1997 1515 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	12-08-1997 1215 MK
Oil & Grease	<2	2	mg/l	SM5520-B	12-11-1997 0700 JC
pH	8.30	----	pH units	EPA 150.1	12-05-1997 1600 RJ
Potassium, Dissolved	5	1	mg/l	EPA 258.1	12-08-1997 1245 MK
Sodium, Dissolved	107	1	mg/l	EPA 273.1	12-08-1997 1300 MK
Solids, Total Dissolved	1150	10	mg/l	EPA 160.1	12-08-1997 0700 JC
Solids, Total Suspended	<5	5	mg/l	EPA 160.2	12-08-1997 0700 JC
Sulfate	165	50	mg/l	EPA 375.4	12-10-1997 0800 SC
Cation/Anion Balance	9.8	----	%		12-17-1997 1600 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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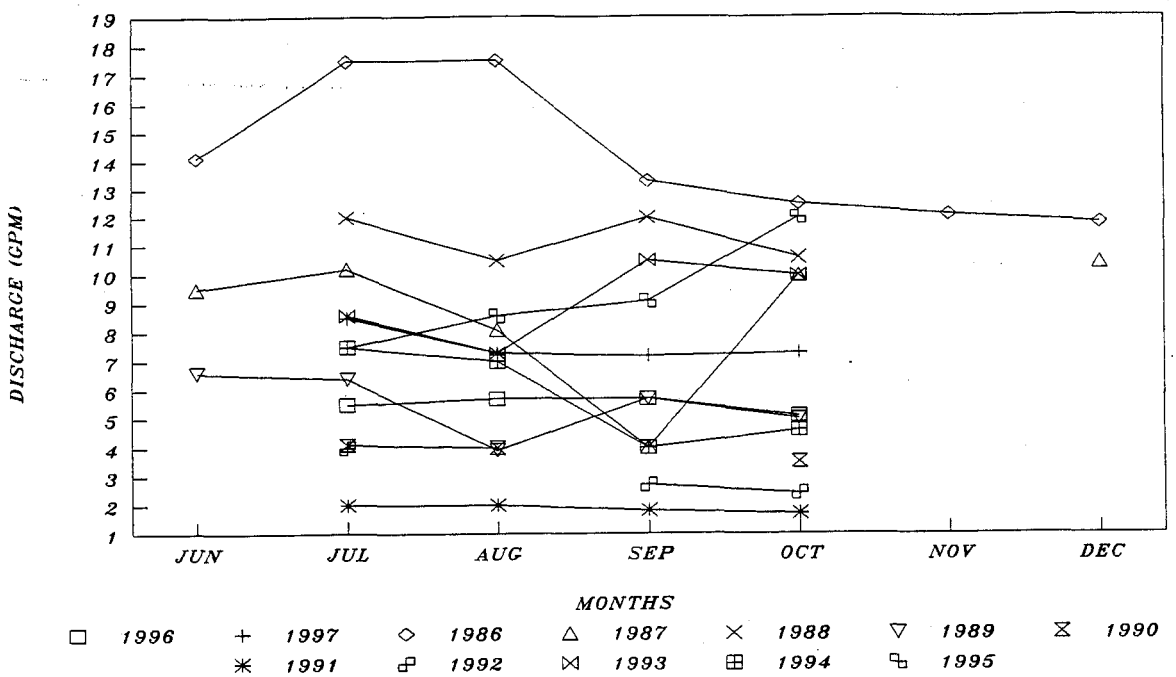
TERMS AND CONDITIONS ON REVERSE

APPENDIX G

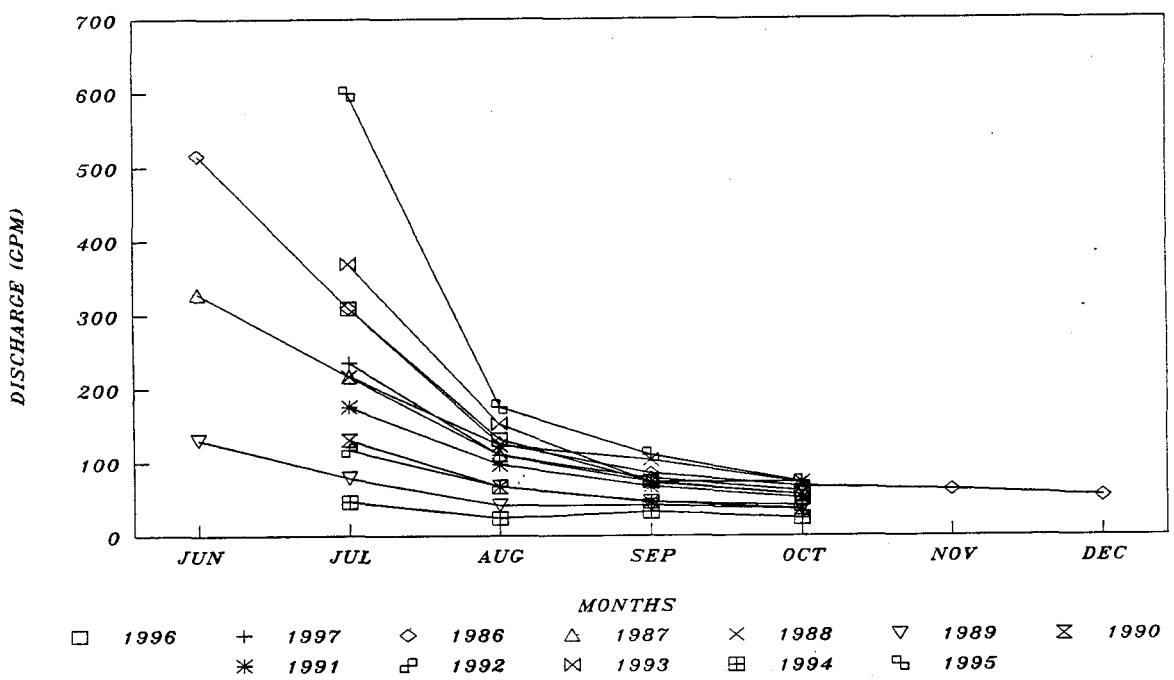
BURNT TREE

Discharge Recession Study



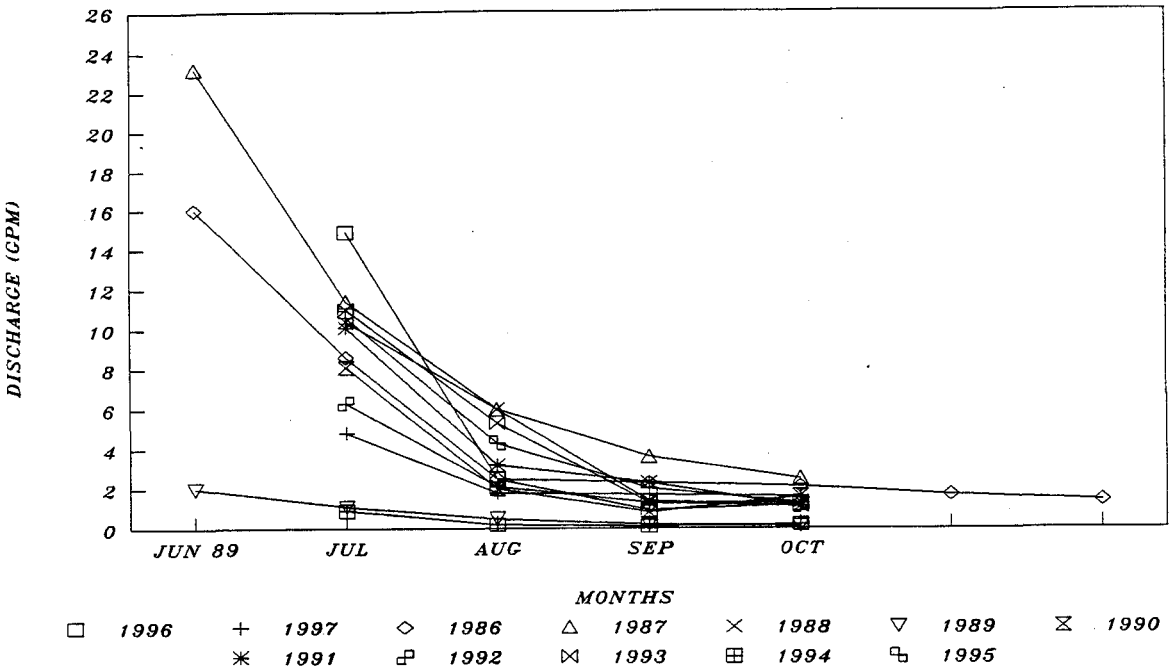
ELK SPRING

Discharge Recession Study



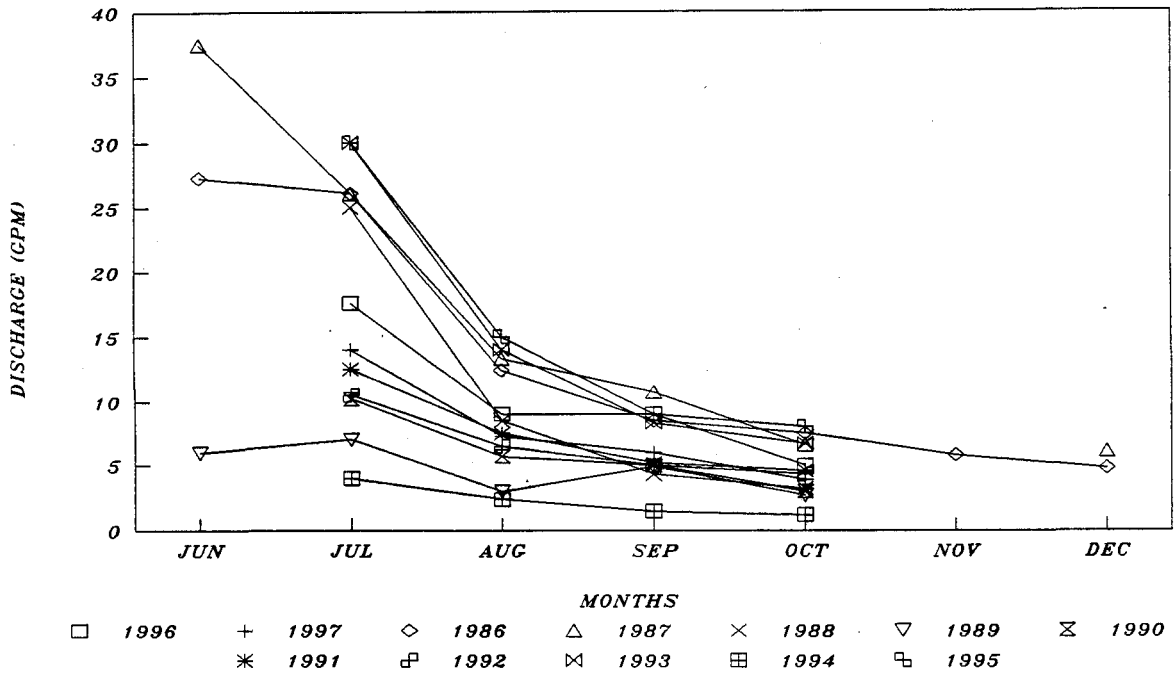
SHEBA SPRINGS

Discharge Recession Study



79-10

Discharge Recession Study



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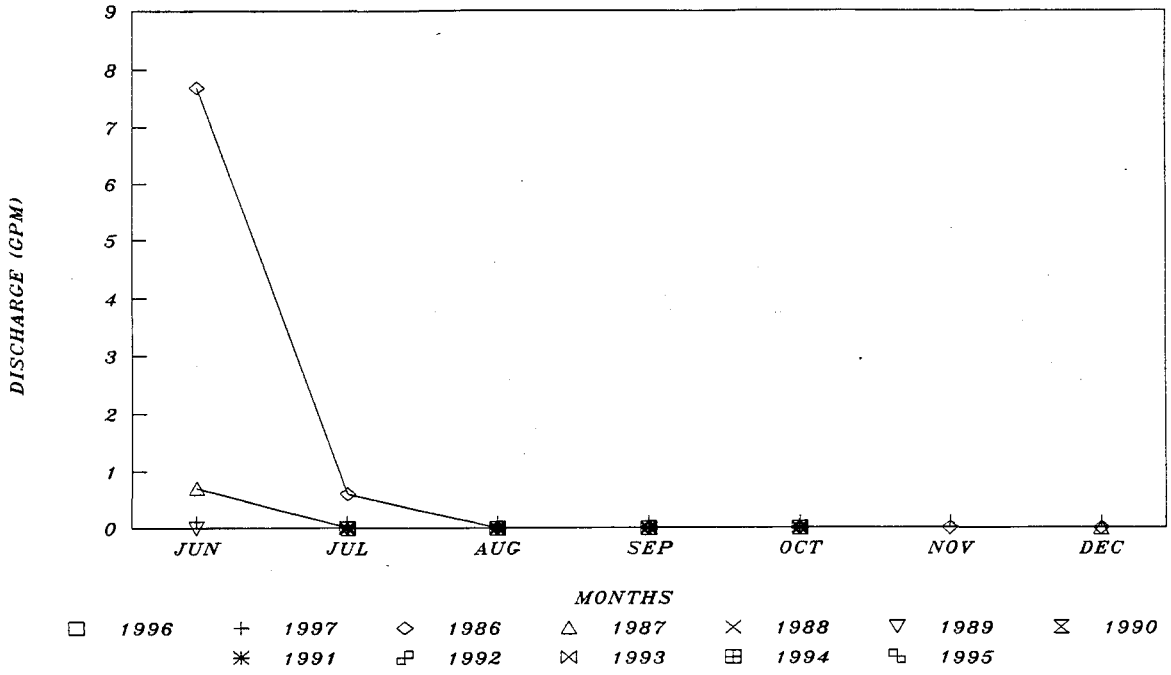
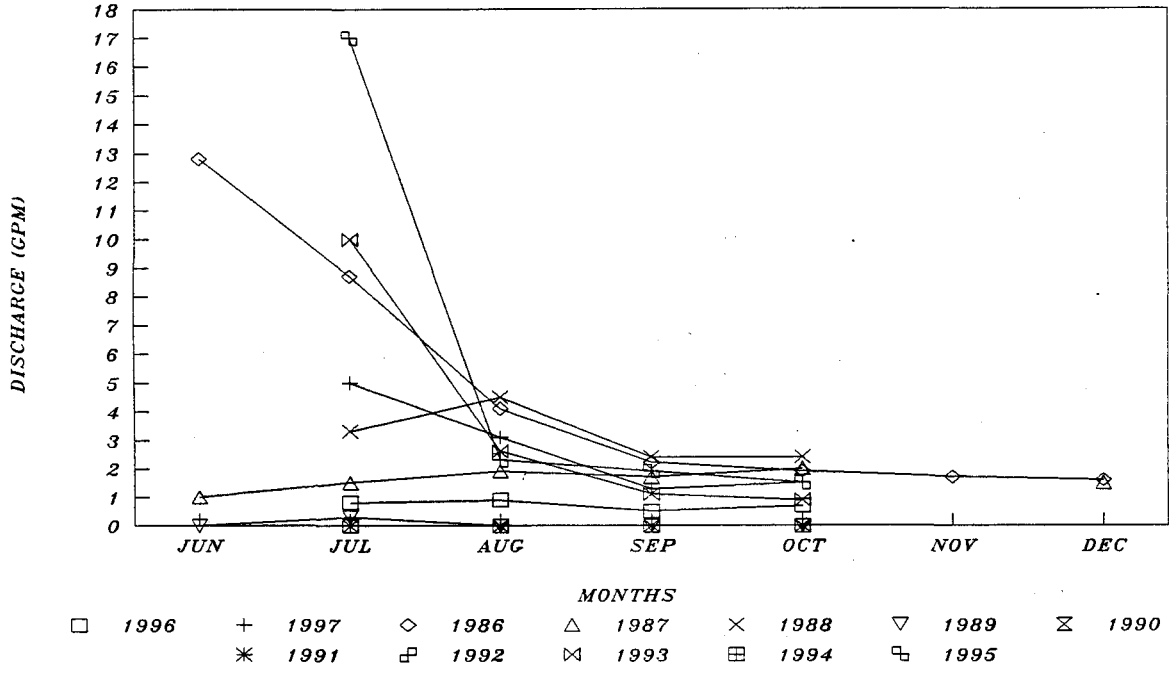
Discharge Recession Study



79-26

Discharge Recession Study



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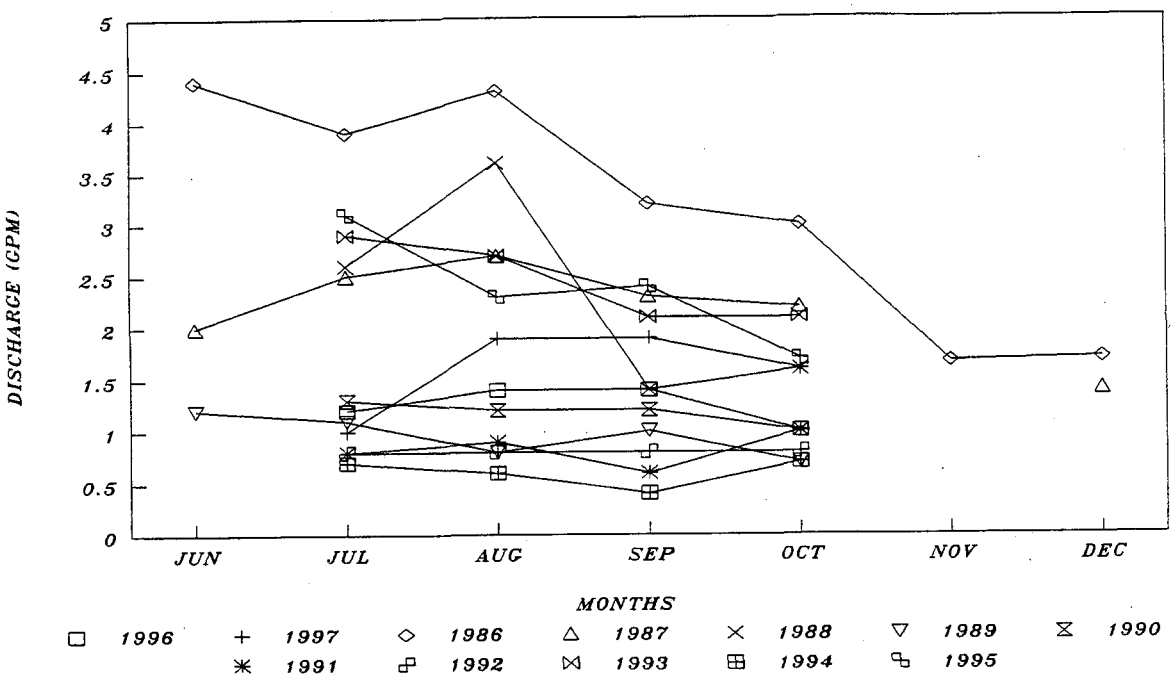
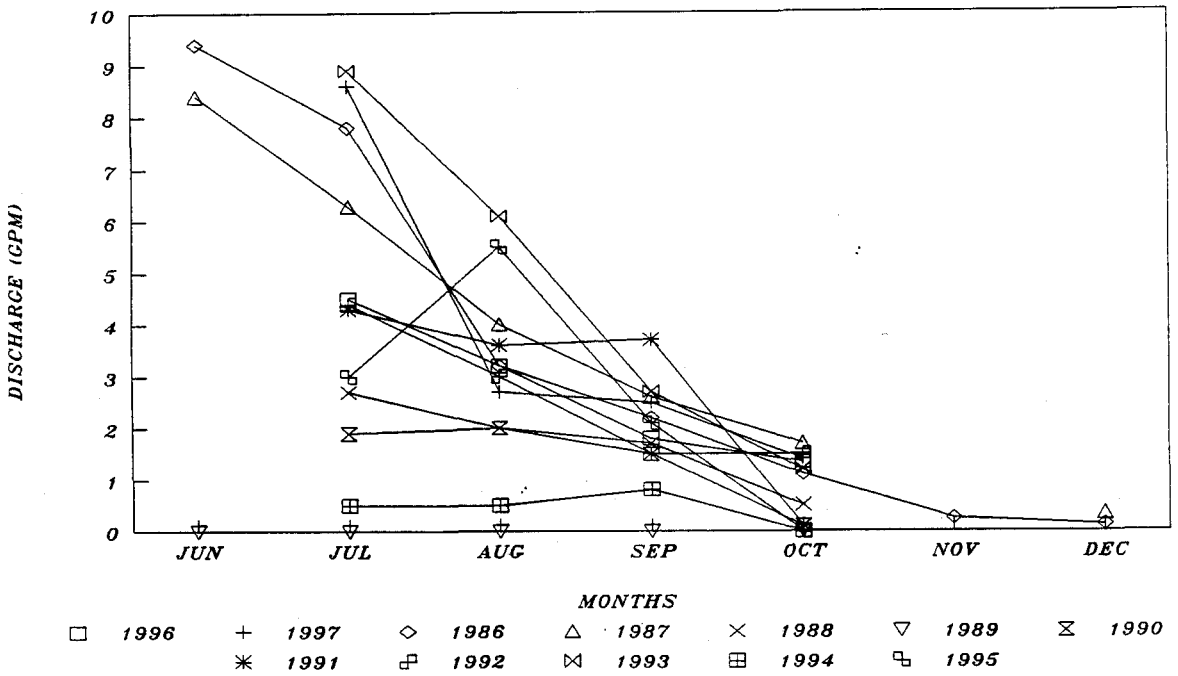
Discharge Recession Study



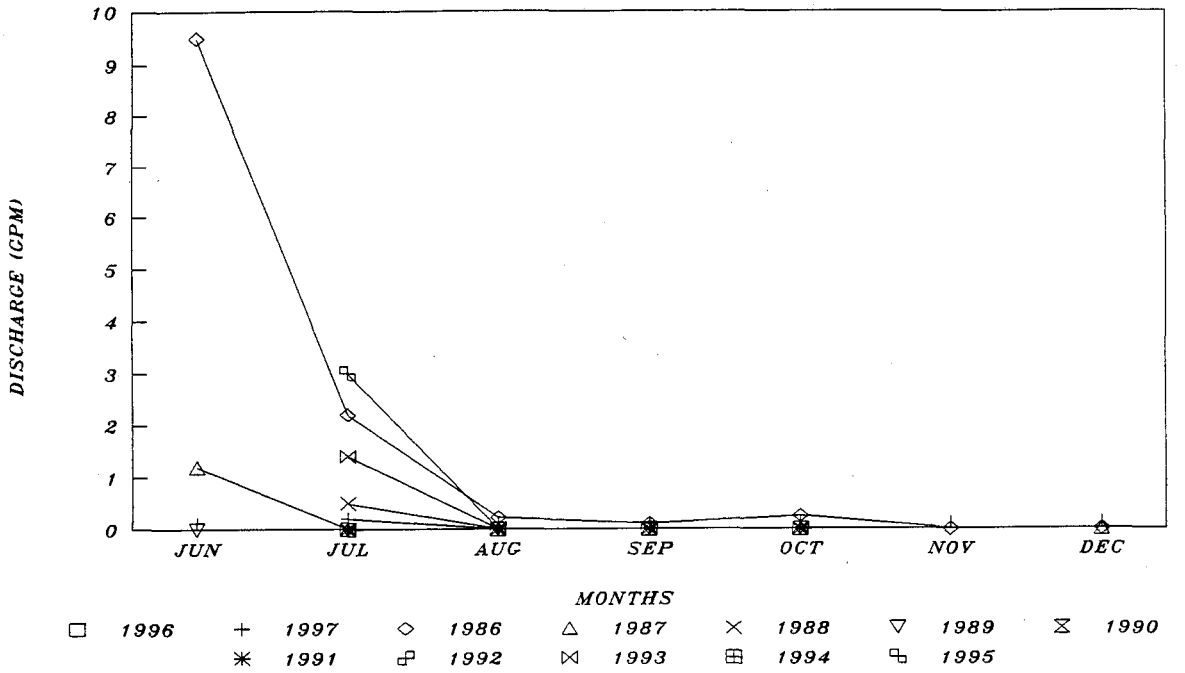
79-35

Discharge Recession Study



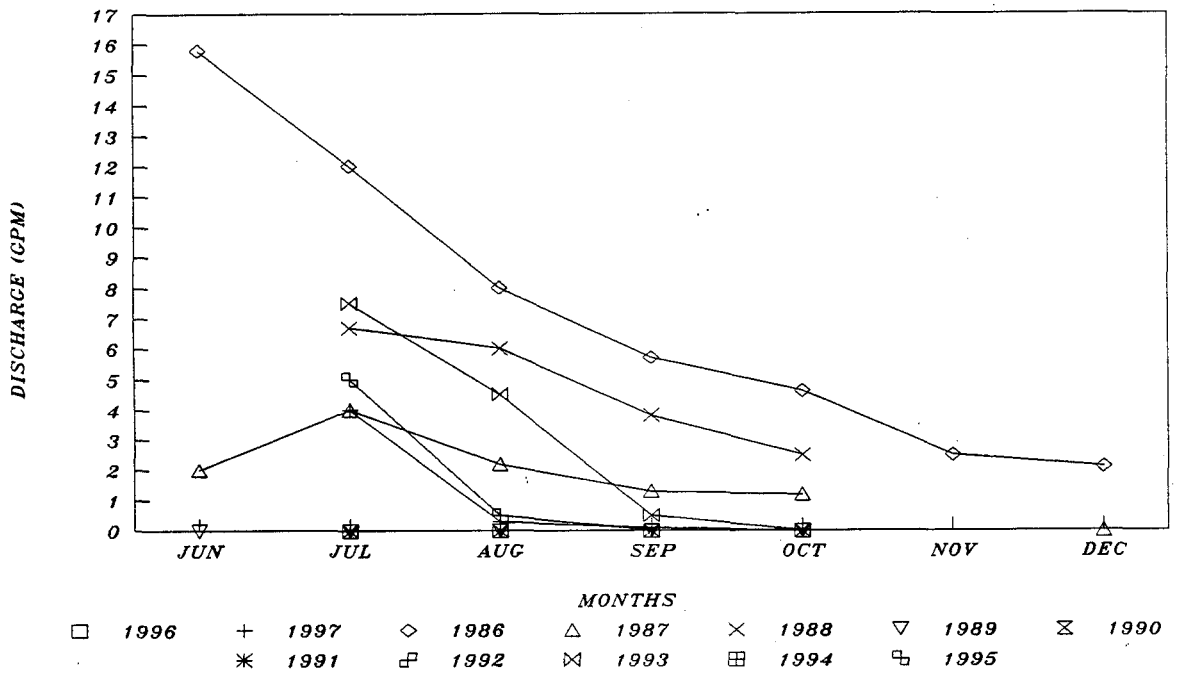
80-44

Discharge Recession Study



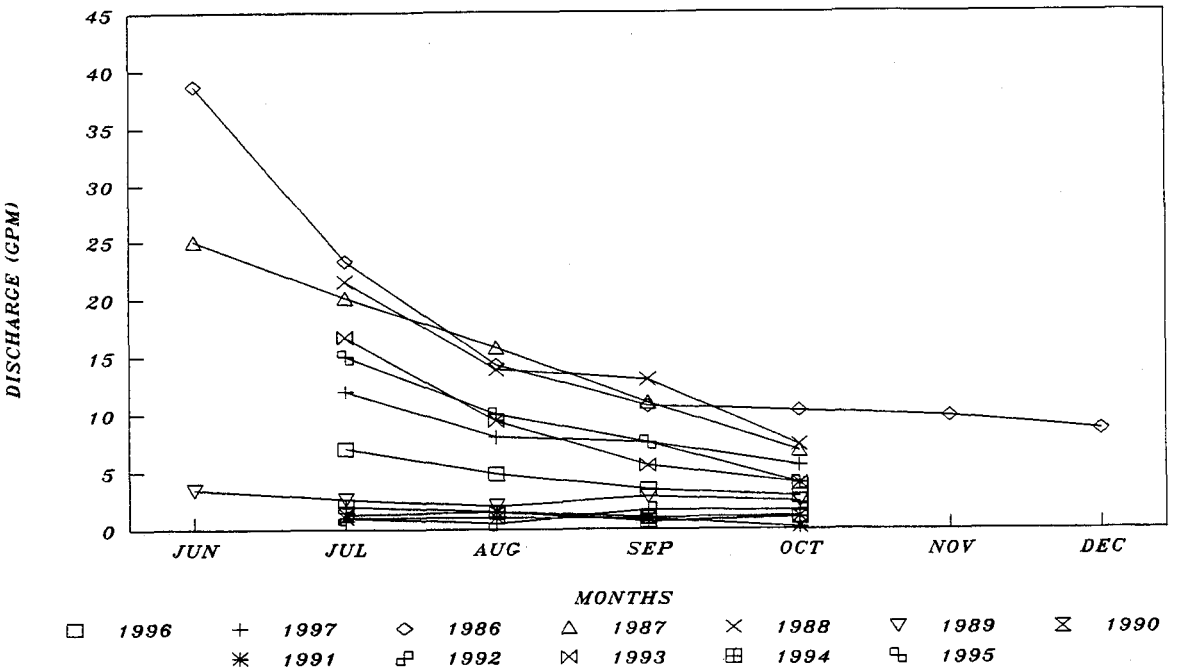
80-46

Discharge Recession Study



82-52

Discharge Recession Study



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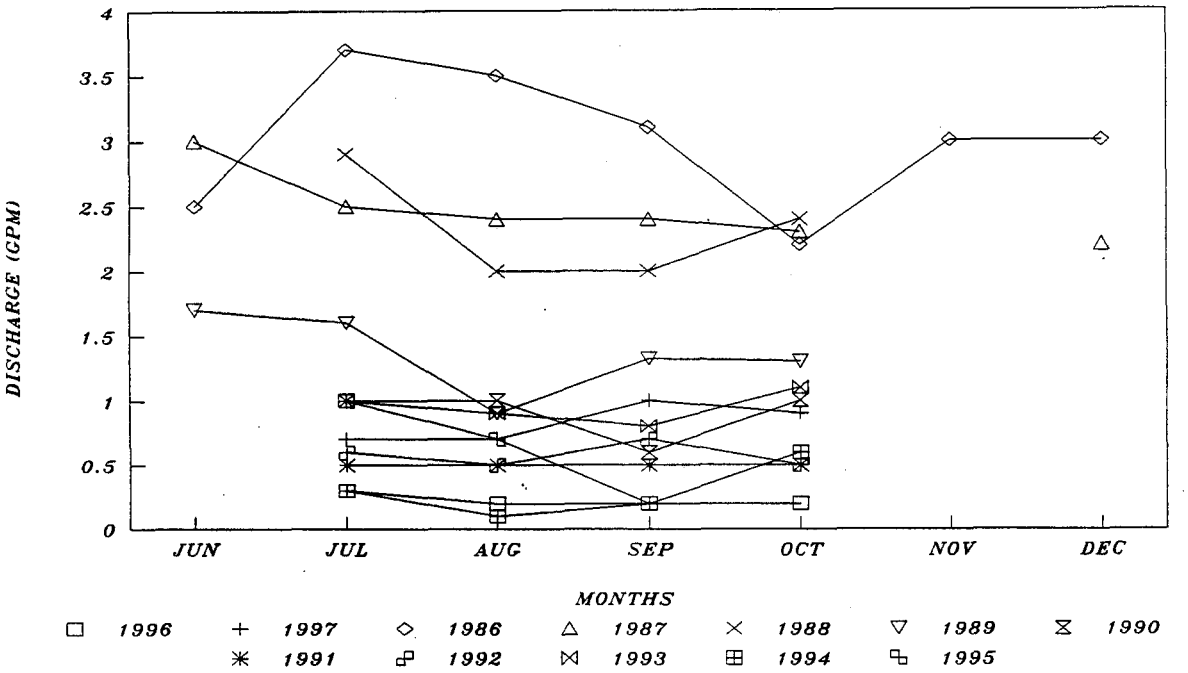
Discharge Recession Study

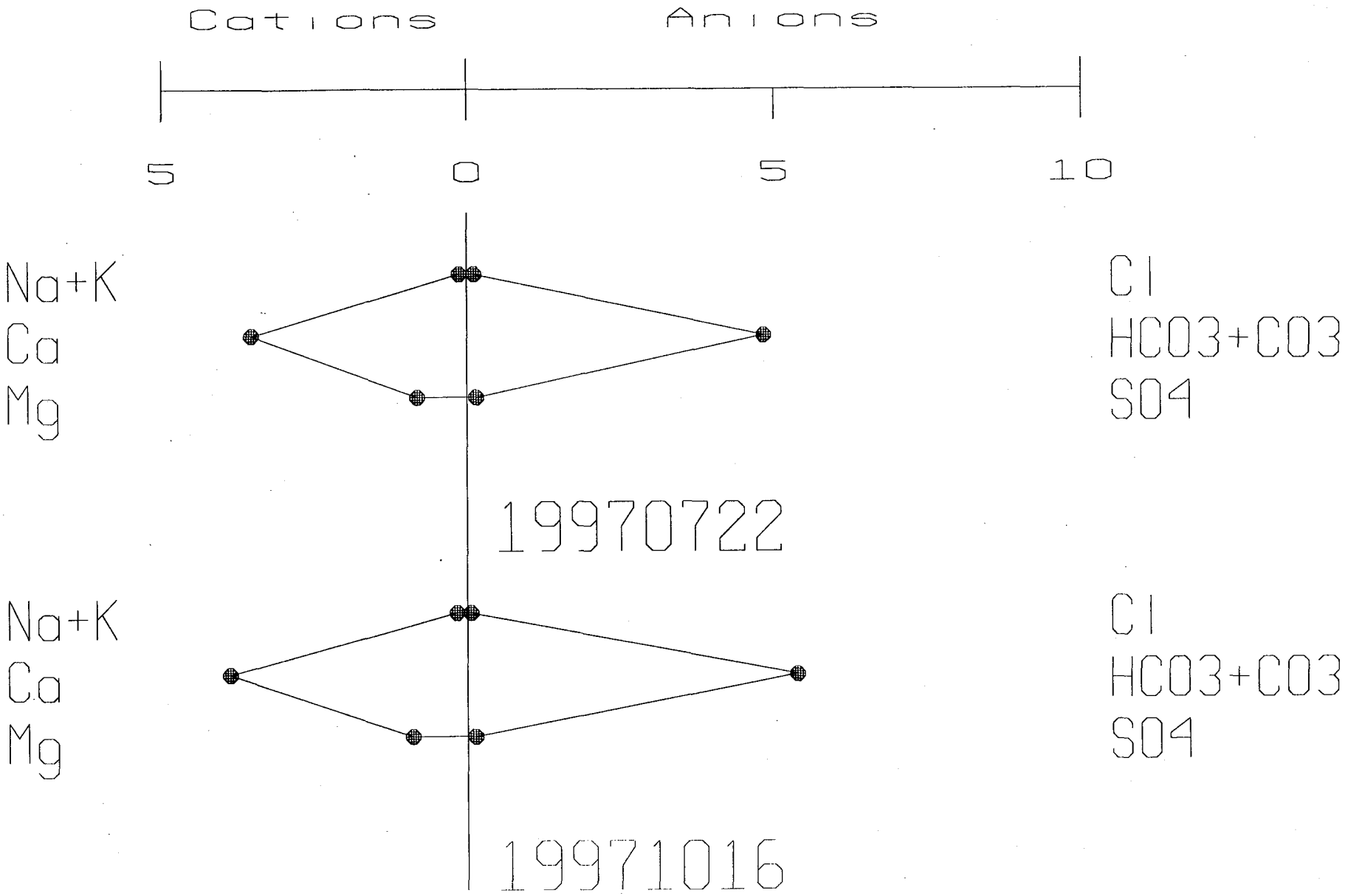


EAST MOUNTAIN SPRINGS STIFF DIAGRAMS

FLAGSTAFF LIMESTONE

SHEBA

%meq/l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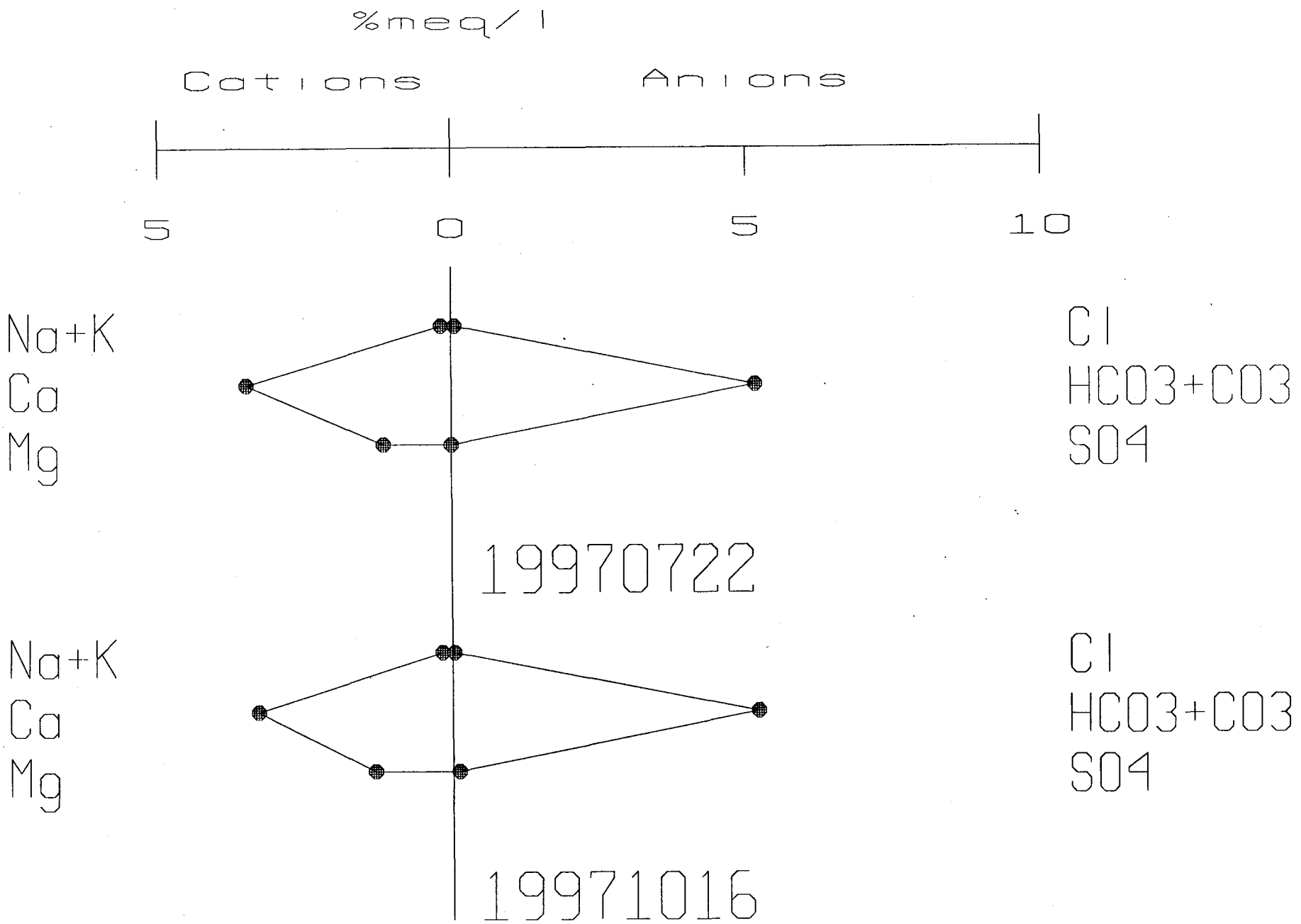
SO4
19971016

EMS79-35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Mg
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SO4
19970722
Na+K
Ca
Mg
Cl
HCO3+CO3
SO4
19971016

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P.O. BOX 1020
HUNTINGTON, UT 84528
TEL: (801) 653-2311
FAX: (801) 653-2436

August 13, 1997

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

FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
SHEBA SPRING

Rec'd 0815 hr.
Sampled 1114 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.26
DO	7.2
Flow	4.78 gpm
Conductivity	404
Temperature	6.9°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17509

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	28	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	294	5	3g/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	241	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	5.1	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	71	1	mg/l	EPA 215.1	08-12-1997 1030 MK
Cations	4.5	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	4	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	435	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	218	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Magnesium, Dissolved	10	1	mg/l	EPA 242.1	08-12-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
pH	7.64	----	pH units	EPA 150.1	07-23-1997 0900 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915 MK
Sodium, Dissolved	3	1	mg/l	EPA 273.1	08-12-1997 0930 MK
Solids, Total Dissolved	240	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	7	5	mg/l	EPA 375.4	08-06-1997 1300 SC
Cation/Anion Balance	-6.1	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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August 13, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-35

Kind of sample reported to us Water

Rec'd 0815 hr.
Sampled 1203 hr.

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.52
DO	7.7
Flow	8.57 gpm
Conductivity	415
Temperature	6°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17514

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	19	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	314	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 S
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 S
Alkalinity, Total	258	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	5.2	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	70	1	mg/l	EPA 215.1	08-12-1997 1030 MK
Cations	4.8	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	2	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	470	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	232	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Magnesium, Dissolved	14	1	mg/l	EPA 242.1	08-12-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
pH	7.91	----	pH units	EPA 150.1	07-23-1997 0900 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915 MK
Sodium, Dissolved	4	1	mg/l	EPA 273.1	08-12-1997 0930 MK
Solids, Total Dissolved	270	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	<5	5	mg/l	EPA 375.4	08-08-1997 0830 SC
Cation/Anion Balance	-3.8	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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FAX: (801) 653-2436

November 5, 1997

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

NOV 5 1997
FIELD

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
SHEBA SPRING

Rec'd 1630 hr.
Sampled 1259 hr.

Kind of sample reported to us Water

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled October 16, 1997

Date received October 16, 1997

FIELD MEASUREMENTS

pH	7.34
DO	6.4
Flow	1.6 GPM
Conductivity	451
Temperature	6.9°C

NOTE:Dissolved metals filtered at lab!

Analysis report no. 59-17965

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	13	10	mg/l as $CaCO_3$	D1067-92	10-23-1997 1930 RJ
Alkalinity, Bicarbonate	328	5	mg/l as HCO_3	SM2320-B	10-23-1997 2240 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	10-23-1997 2240 RJ
Alkalinity, Total	269	5	mg/l as $CaCO_3$	EPA 310.1	10-23-1997 2240 RJ
Anions	5.6	----	meq/l	---------	11-03-1997 0930 RJ
Calcium, Dissolved	78	1	mg/l	EPA 215.1	10-24-1997 1130 MK
Cations	5.0	----	meq/l	---------	11-03-1997 0930 RJ
Chloride	2	1	mg/l	SM4500-Cl-B	10-30-1997 1400 SC
Conductivity	493	1	umhos/cm	SM2510-B	10-28-1997 2215 MK
Hardness, Total	240	----	mg/l as $CaCO_3$	SM2340-B	11-03-1997 0930 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	10-24-1997 0930 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	10-24-1997 0930 MK
Magnesium, Dissolved	11	1	mg/l	EPA 242.1	10-24-1997 1145 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	10-24-1997 0945 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	10-24-1997 0945 MK
pH	7.45	----	pH units	EPA 150.1	10-17-1997 0815 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	10-24-1997 1015 MK
Sodium, Dissolved	4	1	mg/l	EPA 273.1	10-24-1997 1045 MK
Solids, Total Dissolved	260	10	mg/l	EPA 160.1	10-21-1997 0700 JC
Sulfate	6	5	mg/l	EPA 375.4	10-27-1997 1330 SC
Cation/Anion Balance	-5.6	----	%		11-03-1997 0930 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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November 5, 1997

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

NOV 5 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-35

Kind of sample reported to us Water

Rec'd 1630 hr.
Sampled 1223 hr.

Sample taken at East Mountain

Sample taken by Energy West/MBD

Date sampled October 16, 1997

Date received October 16, 1997

FIELD MEASUREMENTS

pH	7.67
DO	6.8
Flow	1.42 GPM
Conductivity	430
Temperature	6.5°C

NOTE:Dissolved metals filtered at lab

Analysis report no. 59-17963

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	10	10	mg/l as $CaCO_3$	D1067-92	10-23-1997 1930 RJ
Alkalinity, Bicarbonate	317	5	mg/l as HCO_3	SM2320-B	10-27-1997 2020 RJ
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	10-27-1997 2020 RJ
Alkalinity, Total	260	5	mg/l as $CaCO_3$	EPA 310.1	10-27-1997 2020 RJ
Anions	5.3	----	meq/l	---------	11-03-1997 0930 RJ
Calcium, Dissolved	66	1	mg/l	EPA 215.1	10-24-1997 1130 MK
Cations	4.8	----	meq/l	---------	11-03-1997 0930 RJ
Chloride	1	1	mg/l	SM4500-Cl-B	10-30-1997 1400 SC
Conductivity	474	1	umhos/cm	SM2510-B	10-28-1997 2215 MK
Hardness, Total	231	----	mg/l as $CaCO_3$	SM2340-B	11-03-1997 0930 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	10-24-1997 0930 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	10-24-1997 0930 MK
Magnesium, Dissolved	16	1	mg/l	EPA 242.1	10-24-1997 1145 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	10-24-1997 0945 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	10-24-1997 0945 MK
pH	7.69	----	pH units	EPA 150.1	10-17-1997 0815 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	10-24-1997 1015 MK
Sodium, Dissolved	4	1	mg/l	EPA 273.1	10-24-1997 1045 MK
Solids, Total Dissolved	240	10	mg/l	EPA 160.1	10-21-1997 0700 JC
Sulfate	5	5	mg/l	EPA 375.4	10-27-1997 1330 SC
Cation/Anion Balance	-5.4	----	%		11-03-1997 0930 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

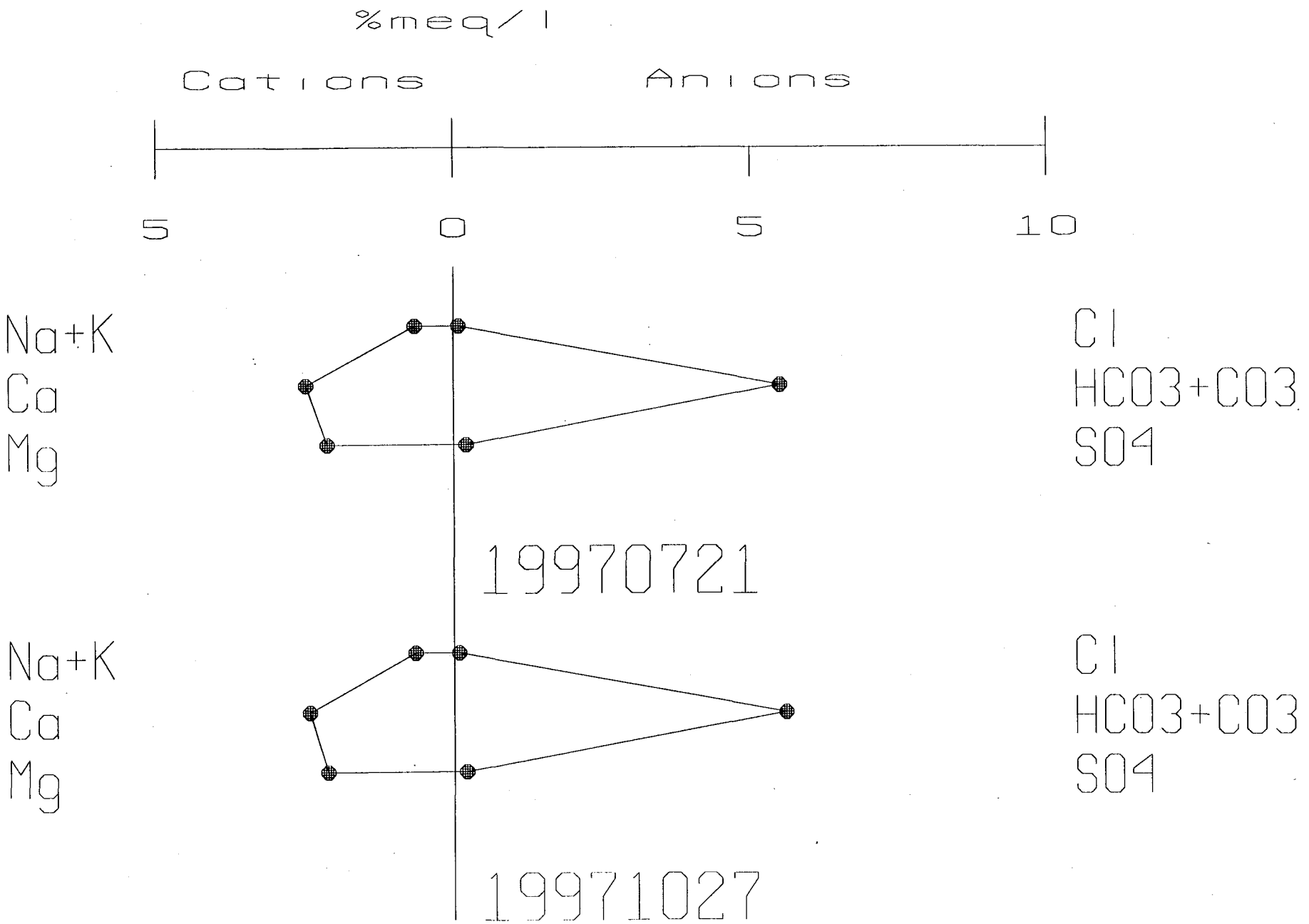
Huntington Laboratory

MEMBER ACIL

EAST MOUNTAIN SPRINGS STIFF DIAGRAMS

NORTHHORN FORMATION

BURNT TREE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Cl
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SO4
19970721
Na+K
Ca
Mg
Cl
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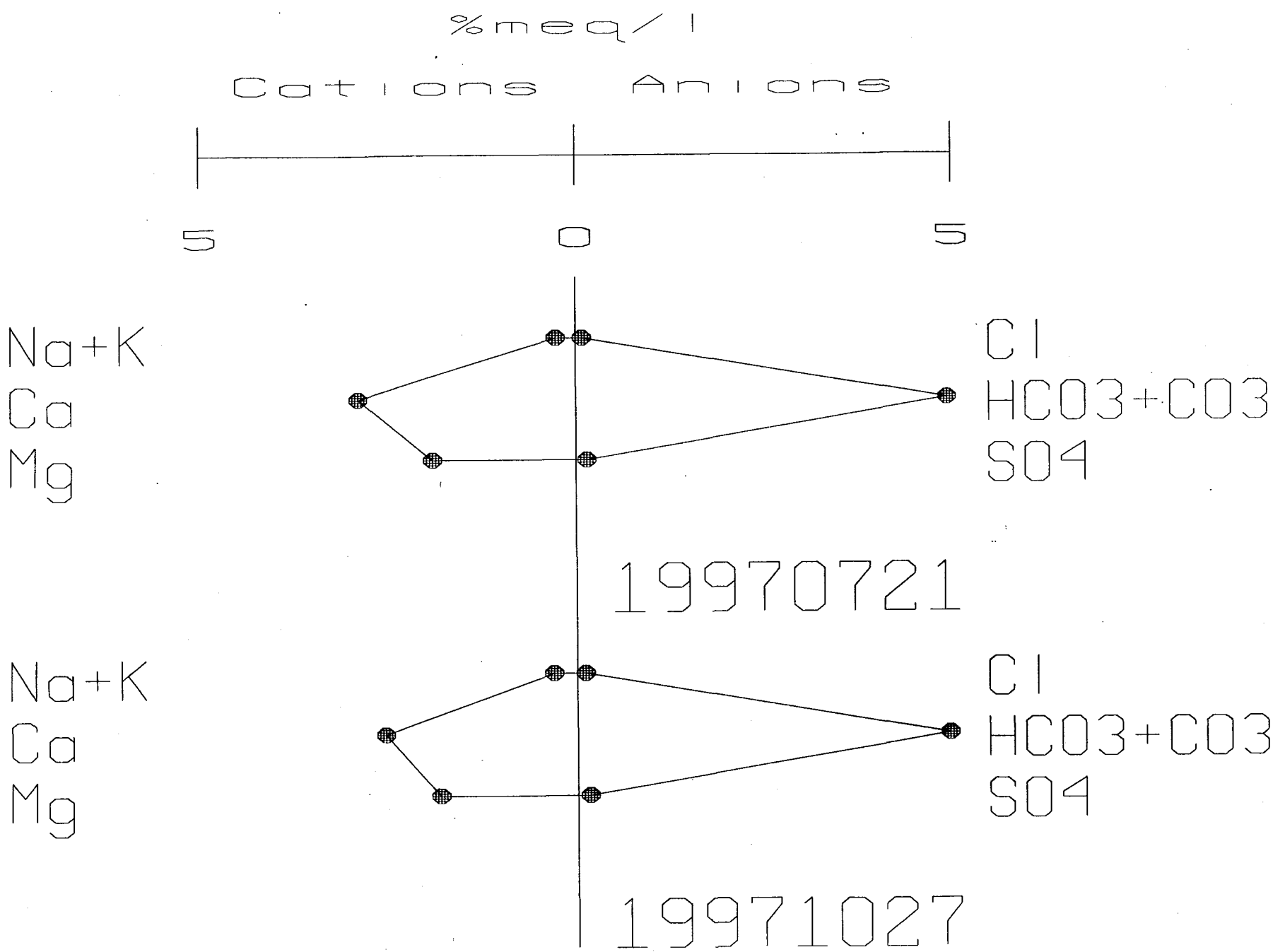
SO4
19971027

ELK SPRINGS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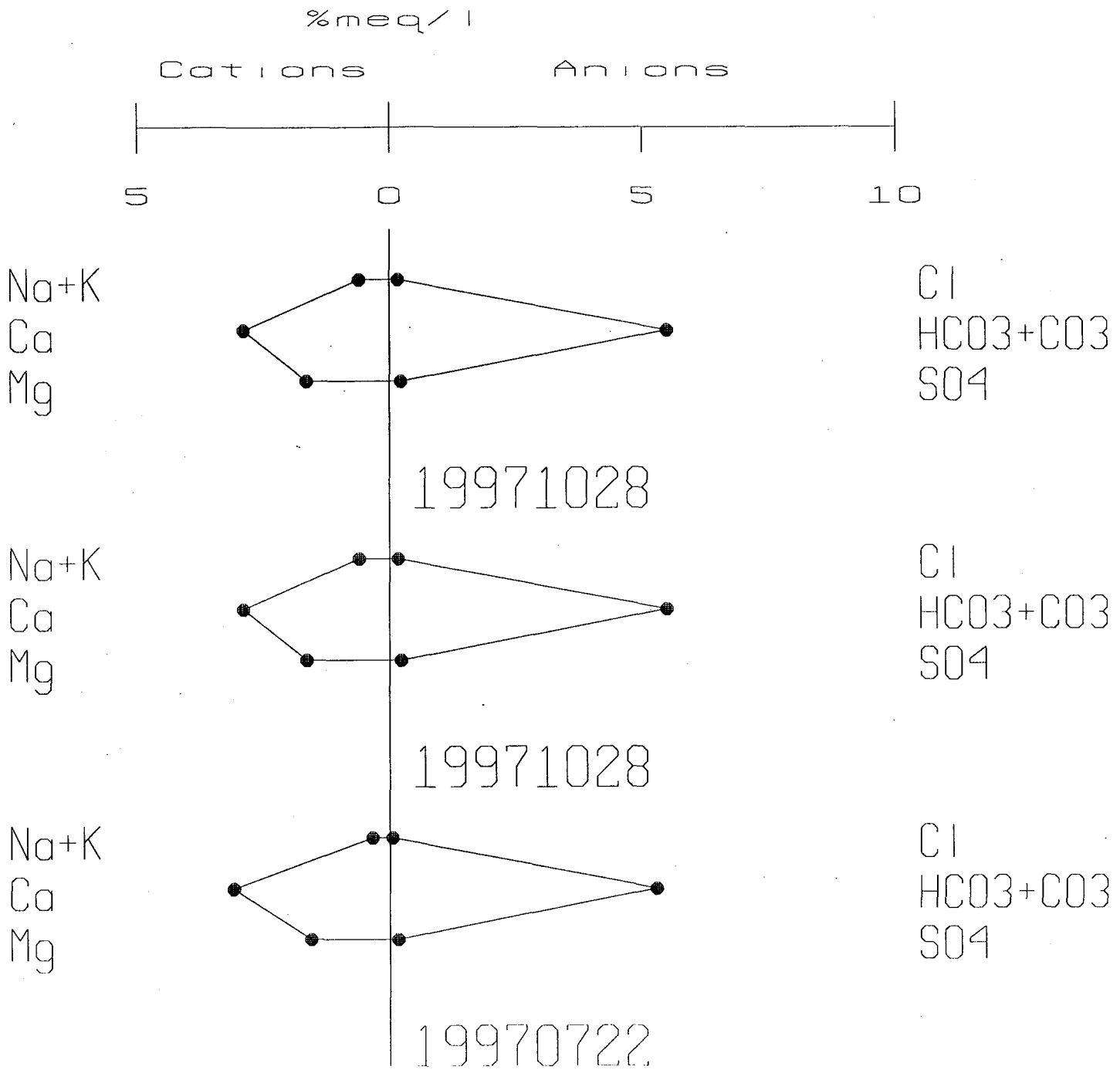
19971027

TED'S TUB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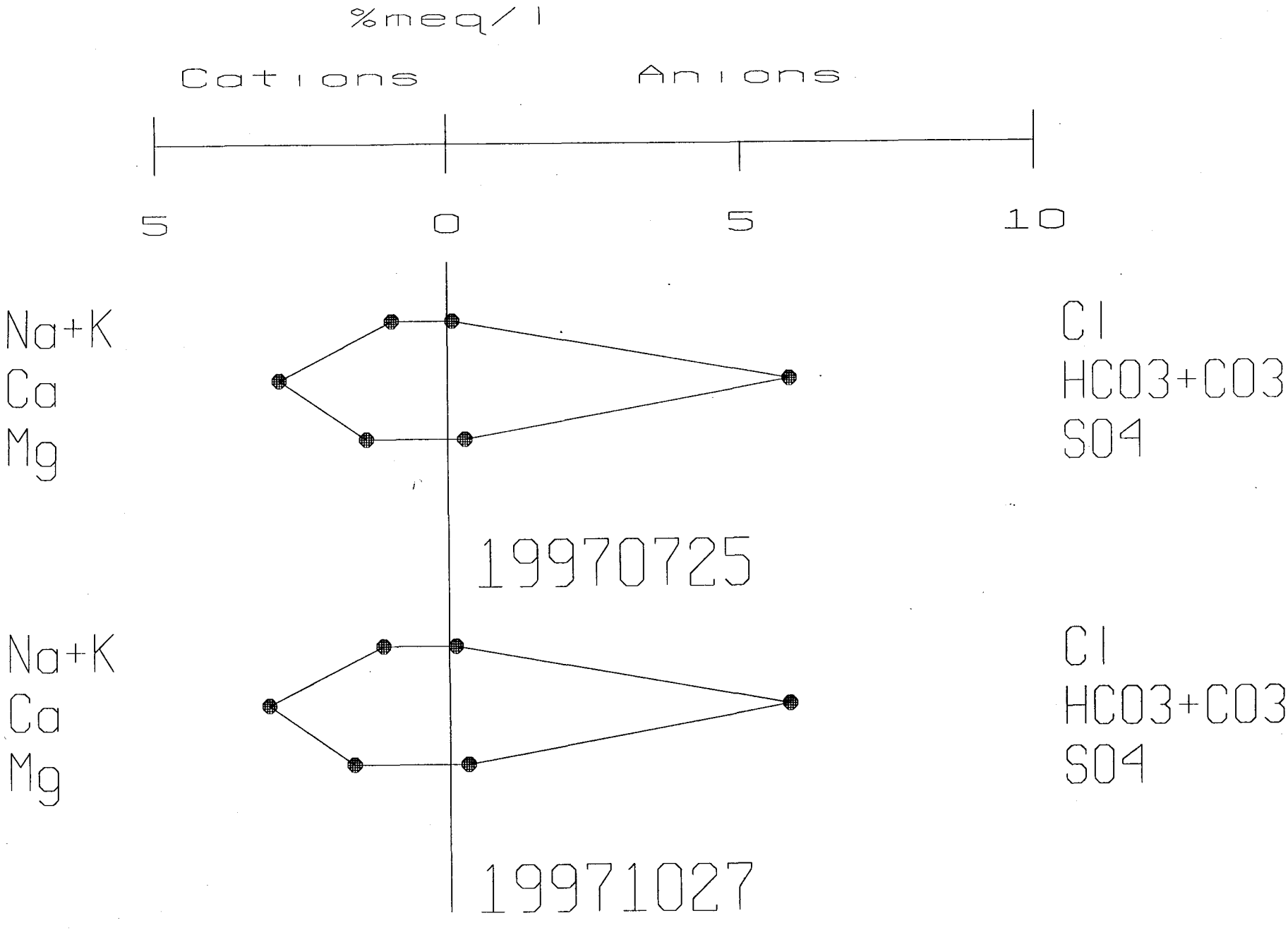
EMS79-02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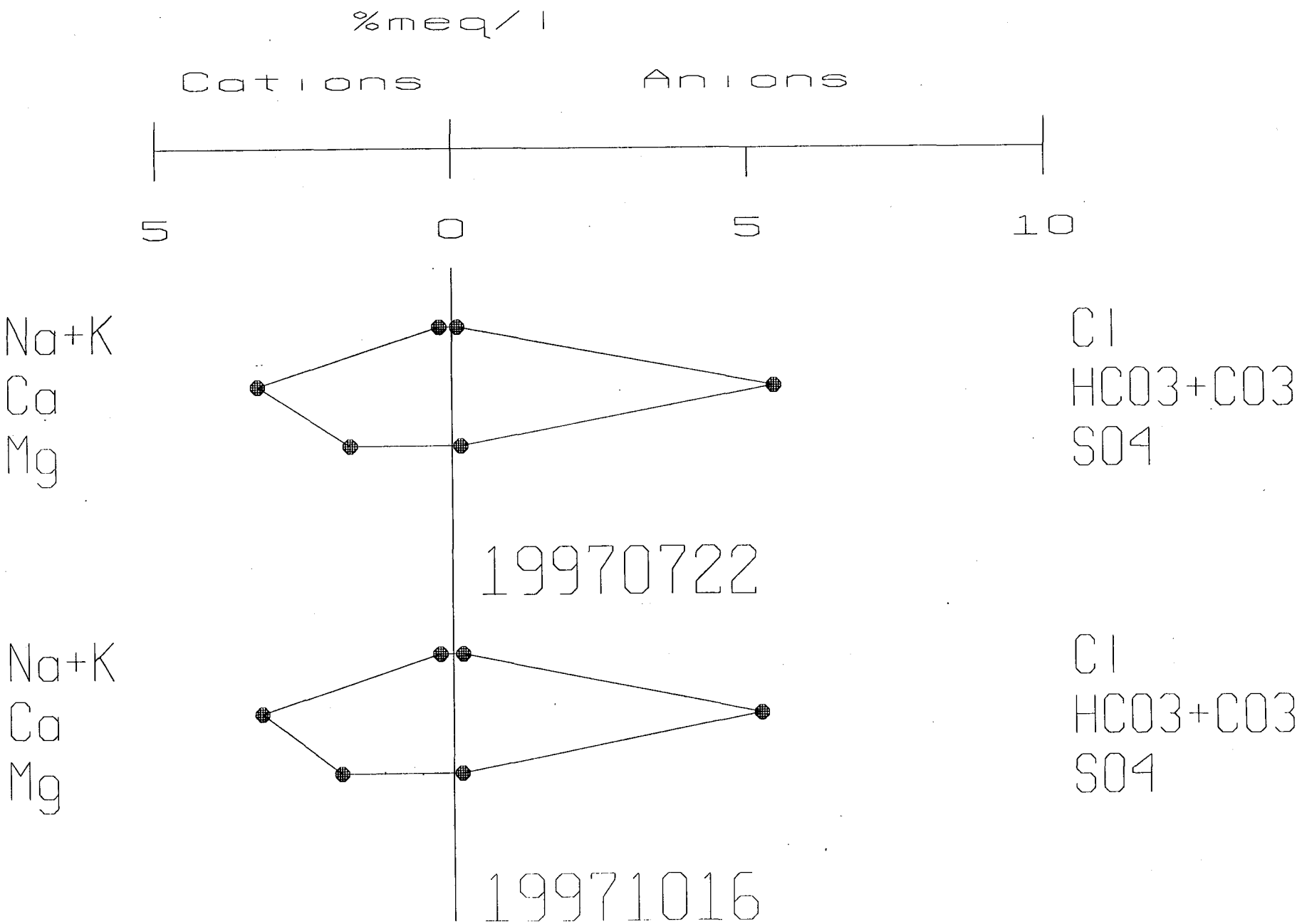
19971027

EMS79-10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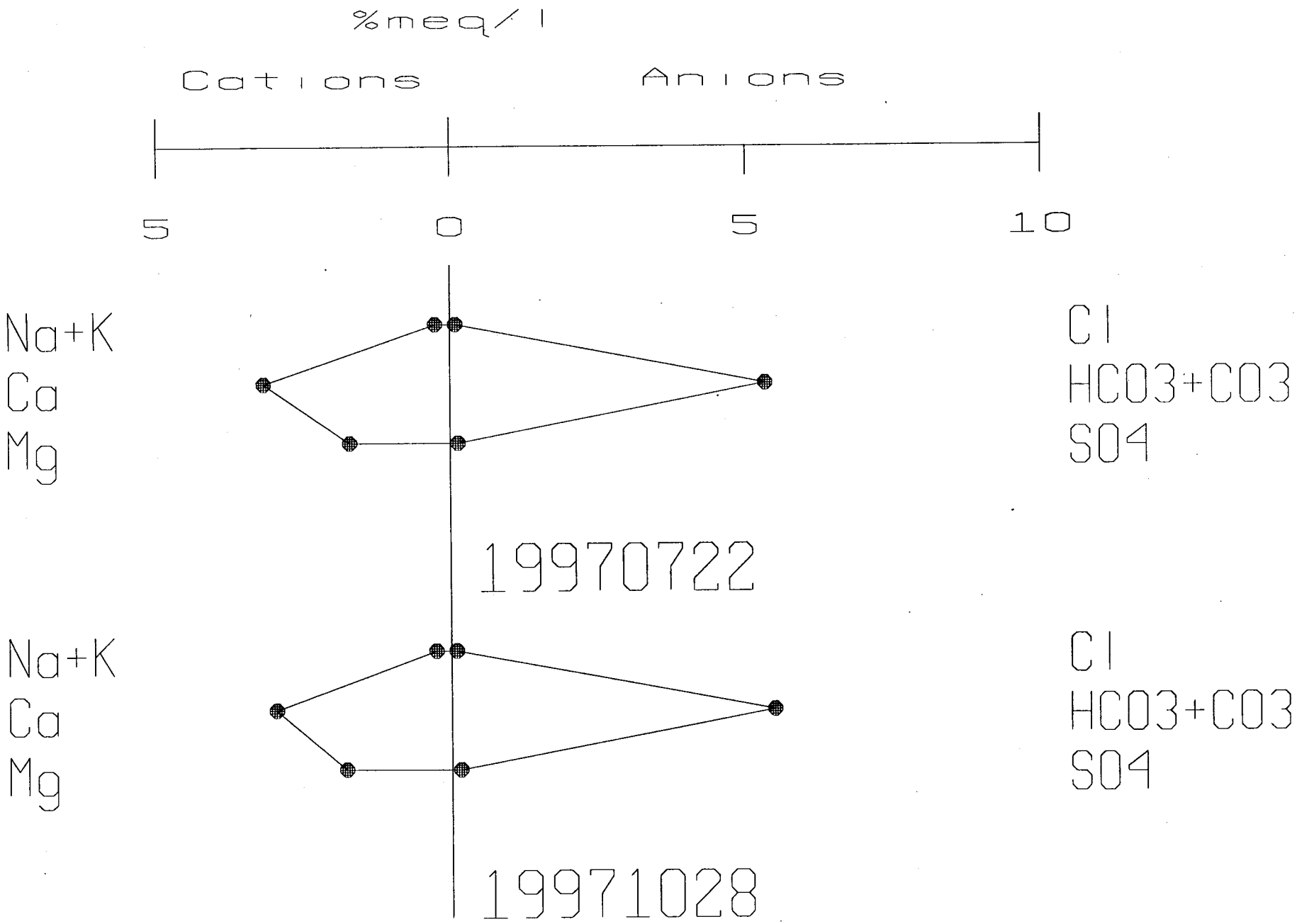
EMS79-15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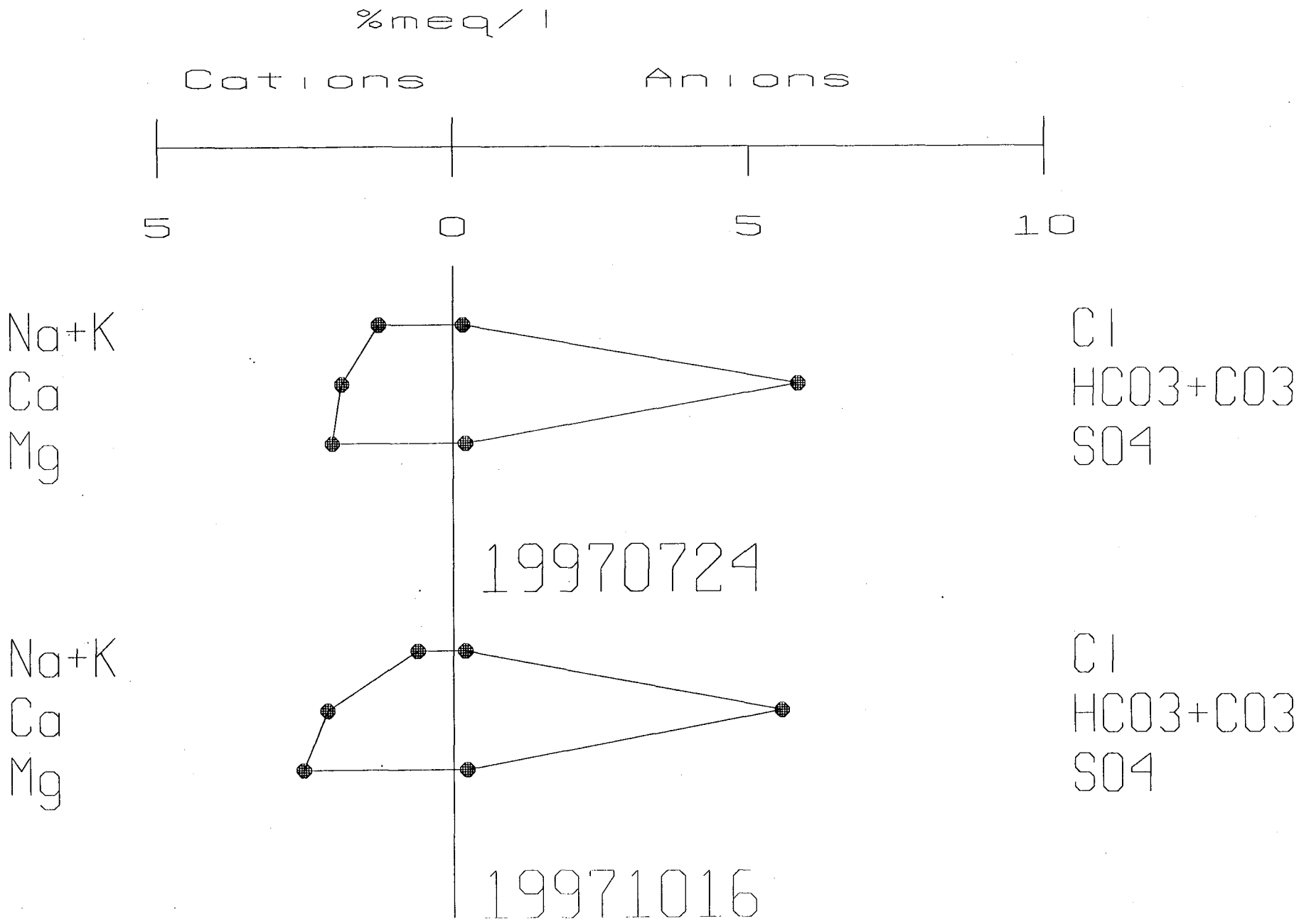
EMS79-26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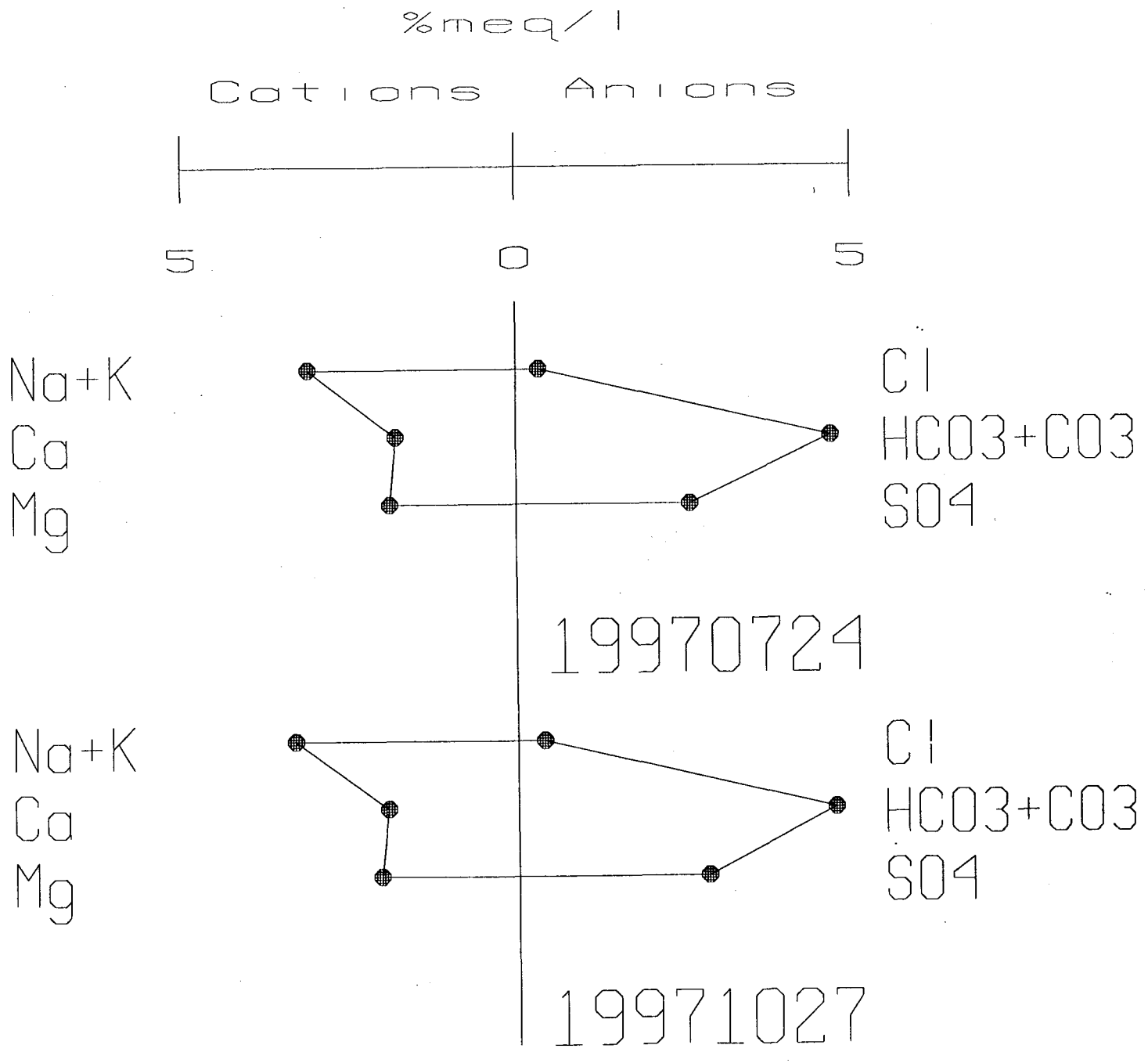
EMS79-28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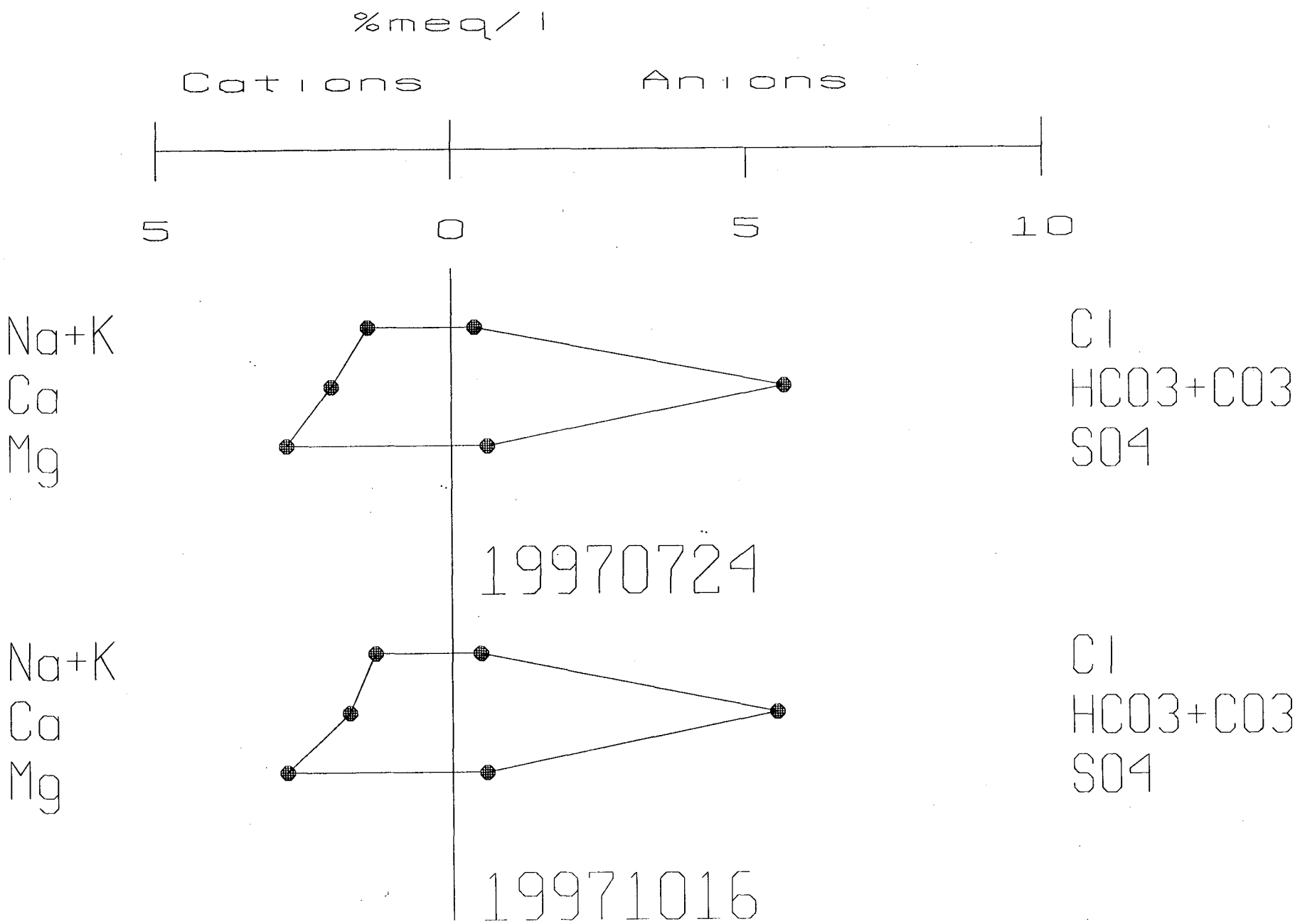
SO4
19971027

EMS79-29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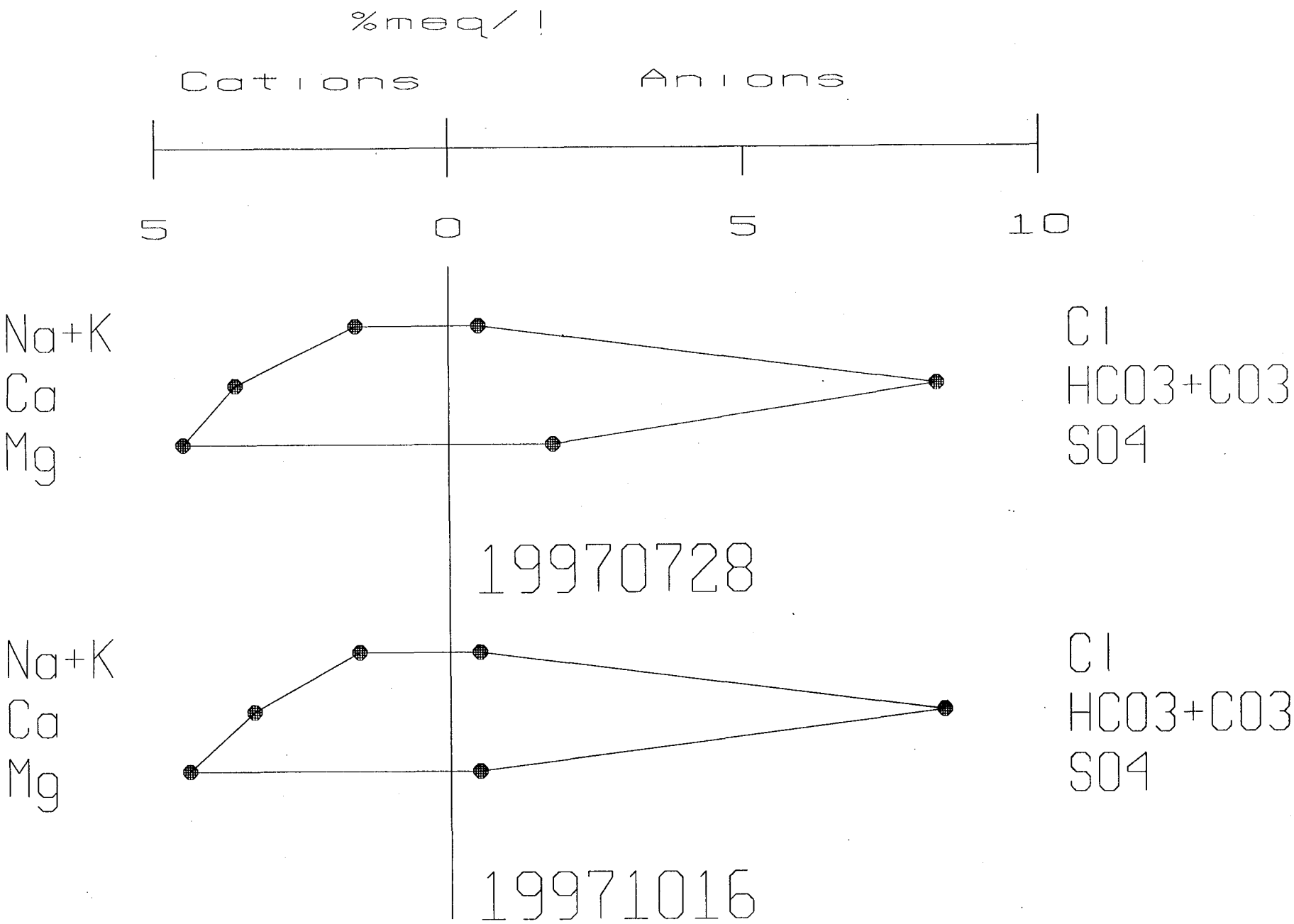
SO4
19971016

EMS79-32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19971016

EMS79-34

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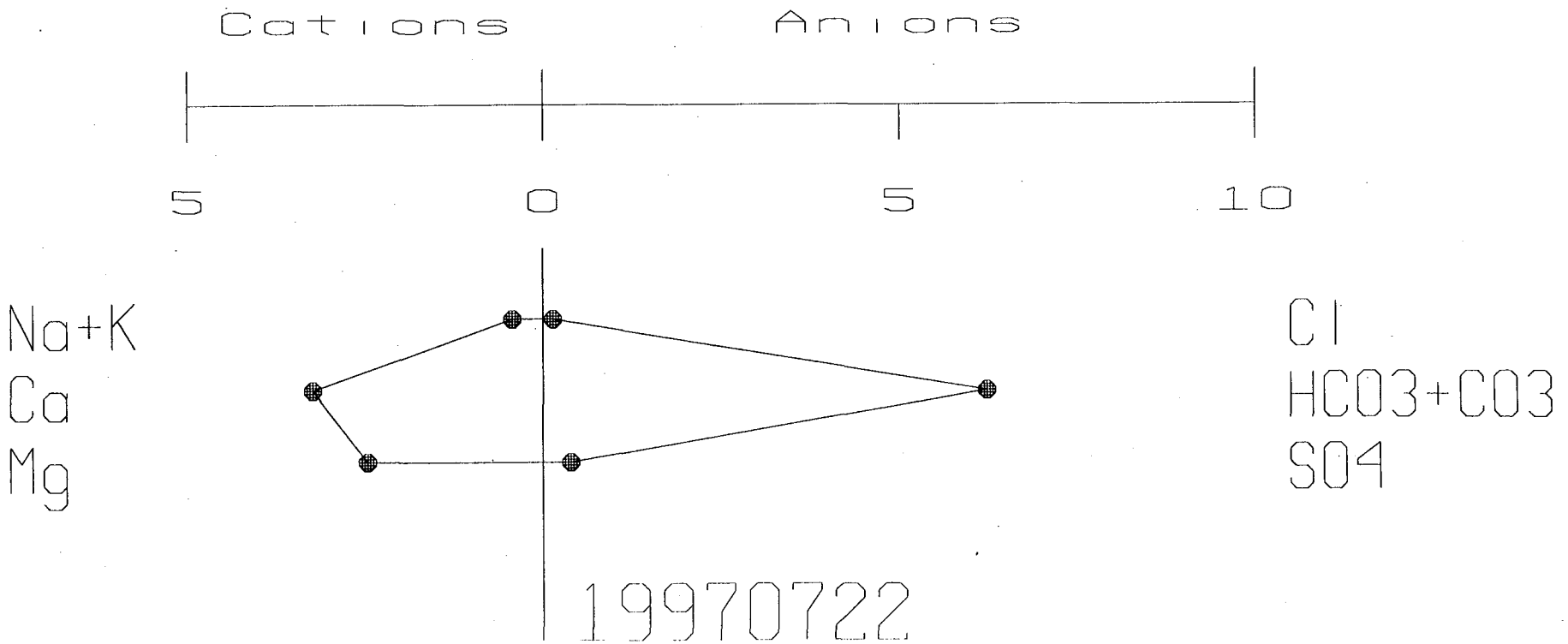

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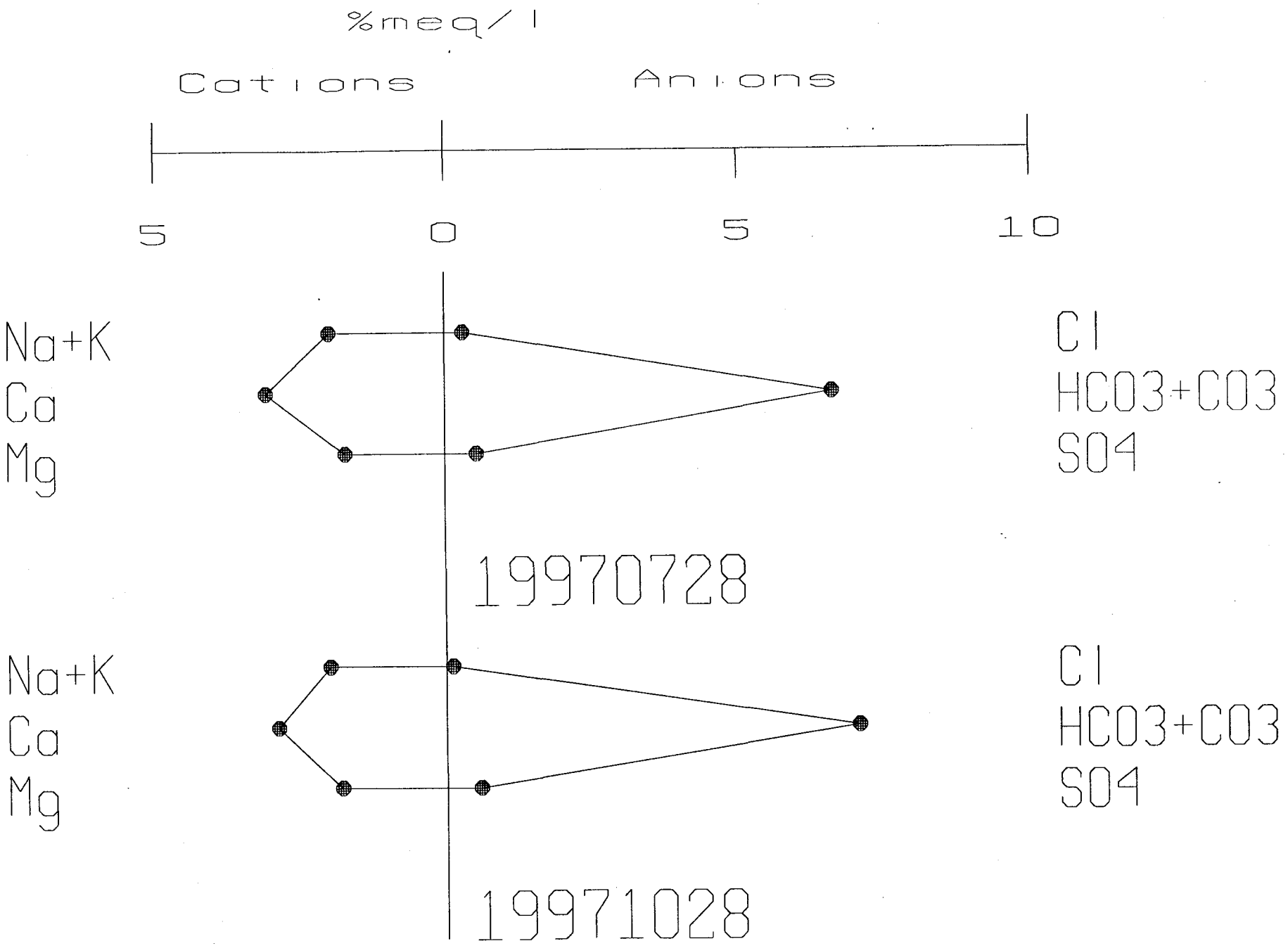
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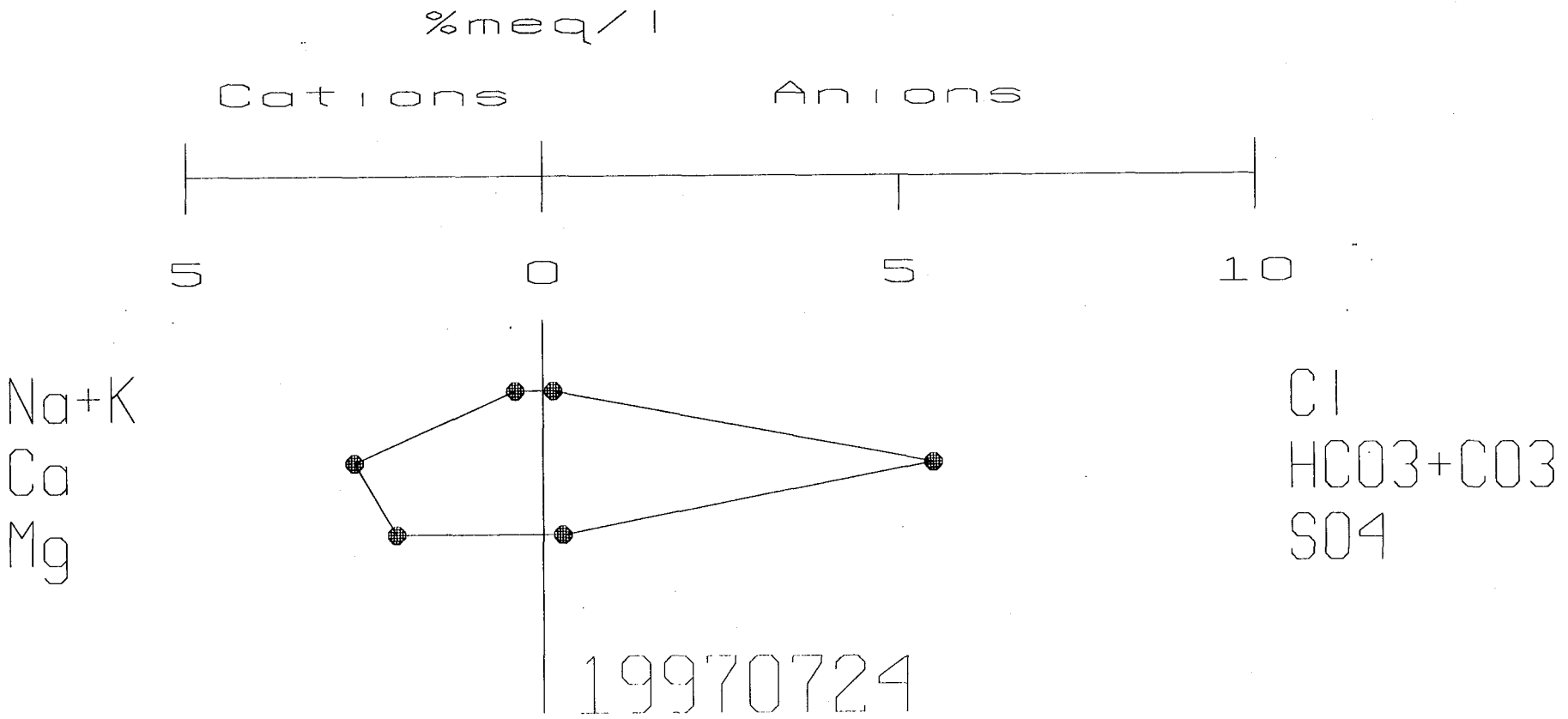
HCO3+CO3
SO4
19971028

EMS80-46



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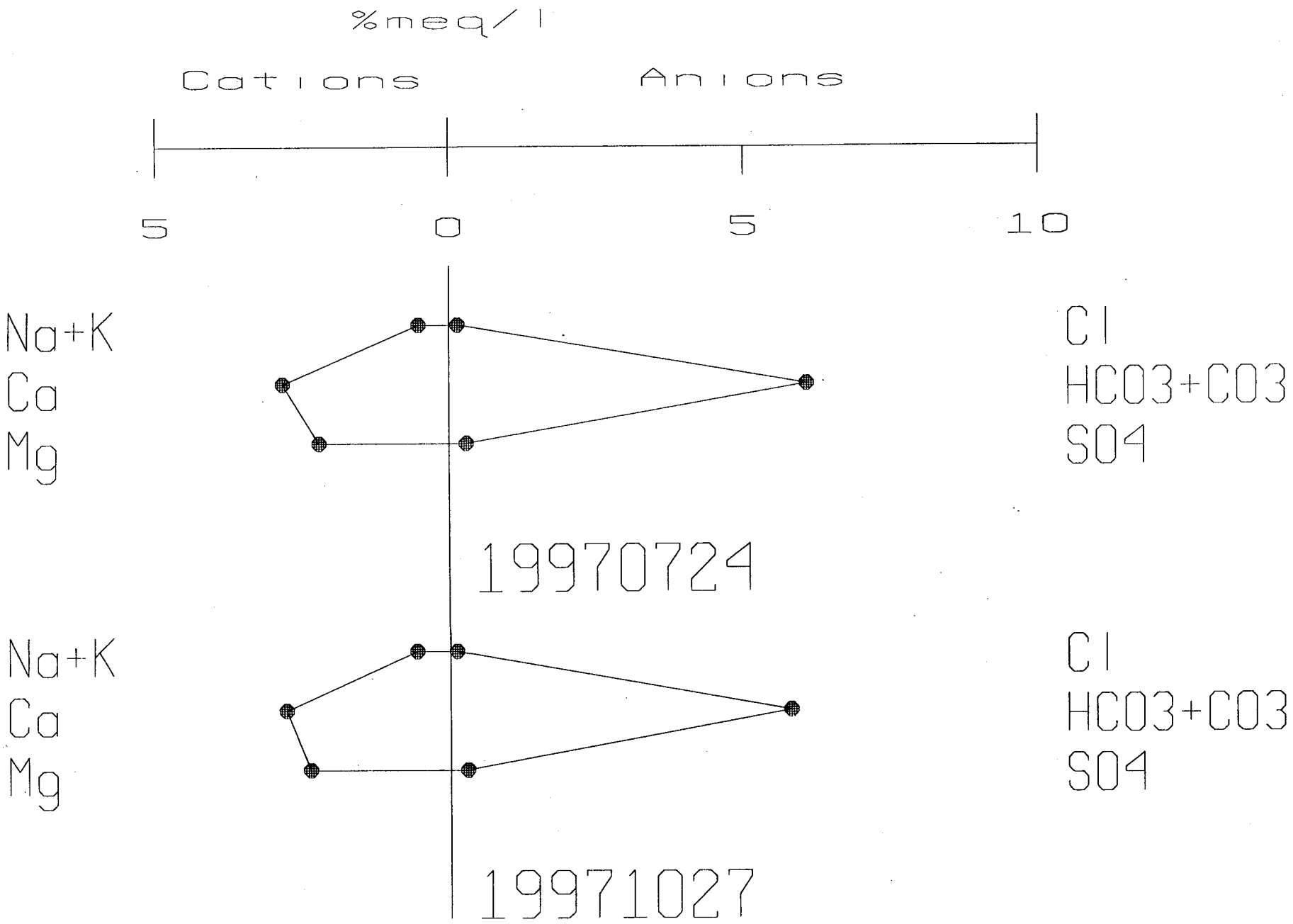
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HCO3+CO3
SO4
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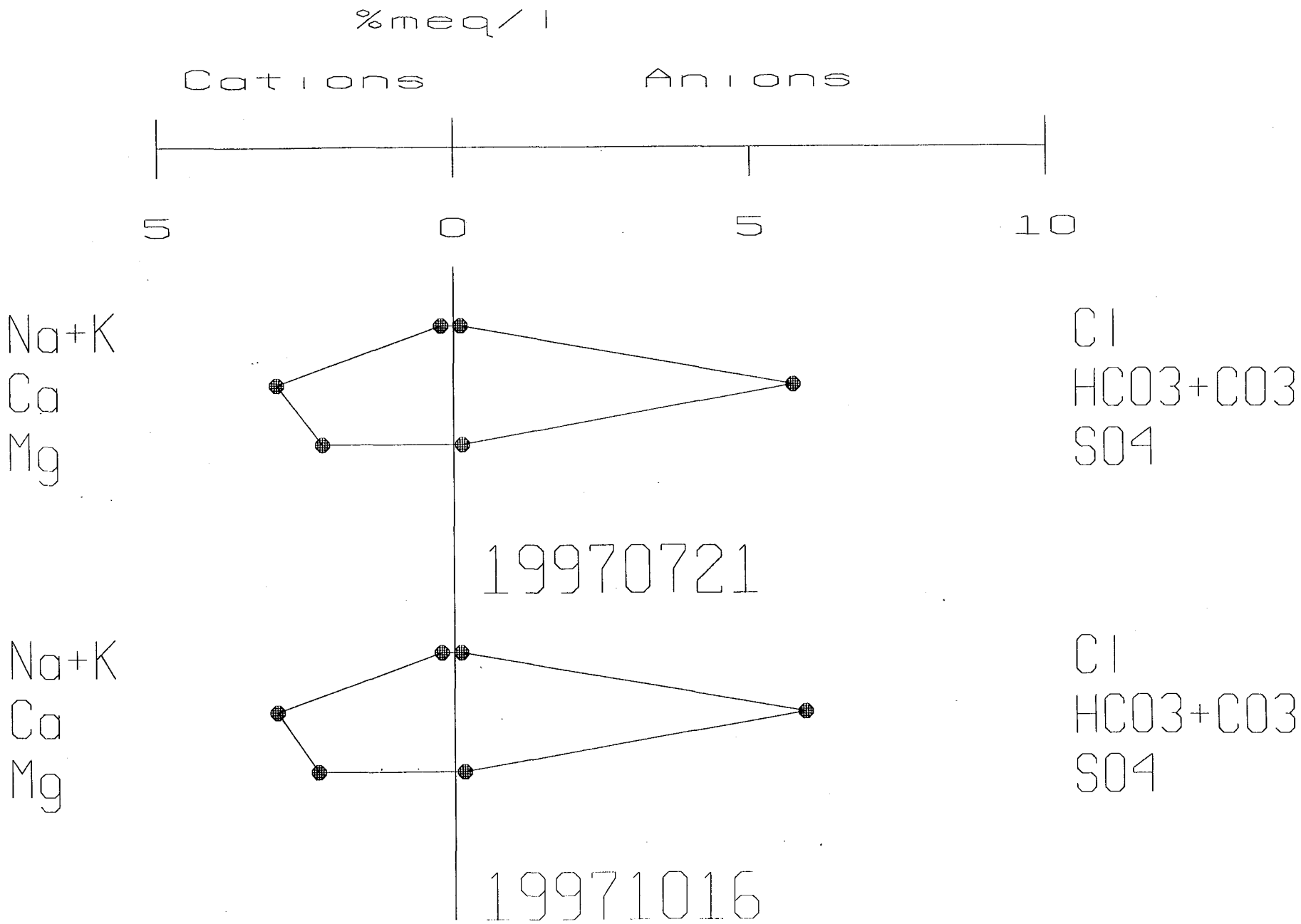
EMS80-48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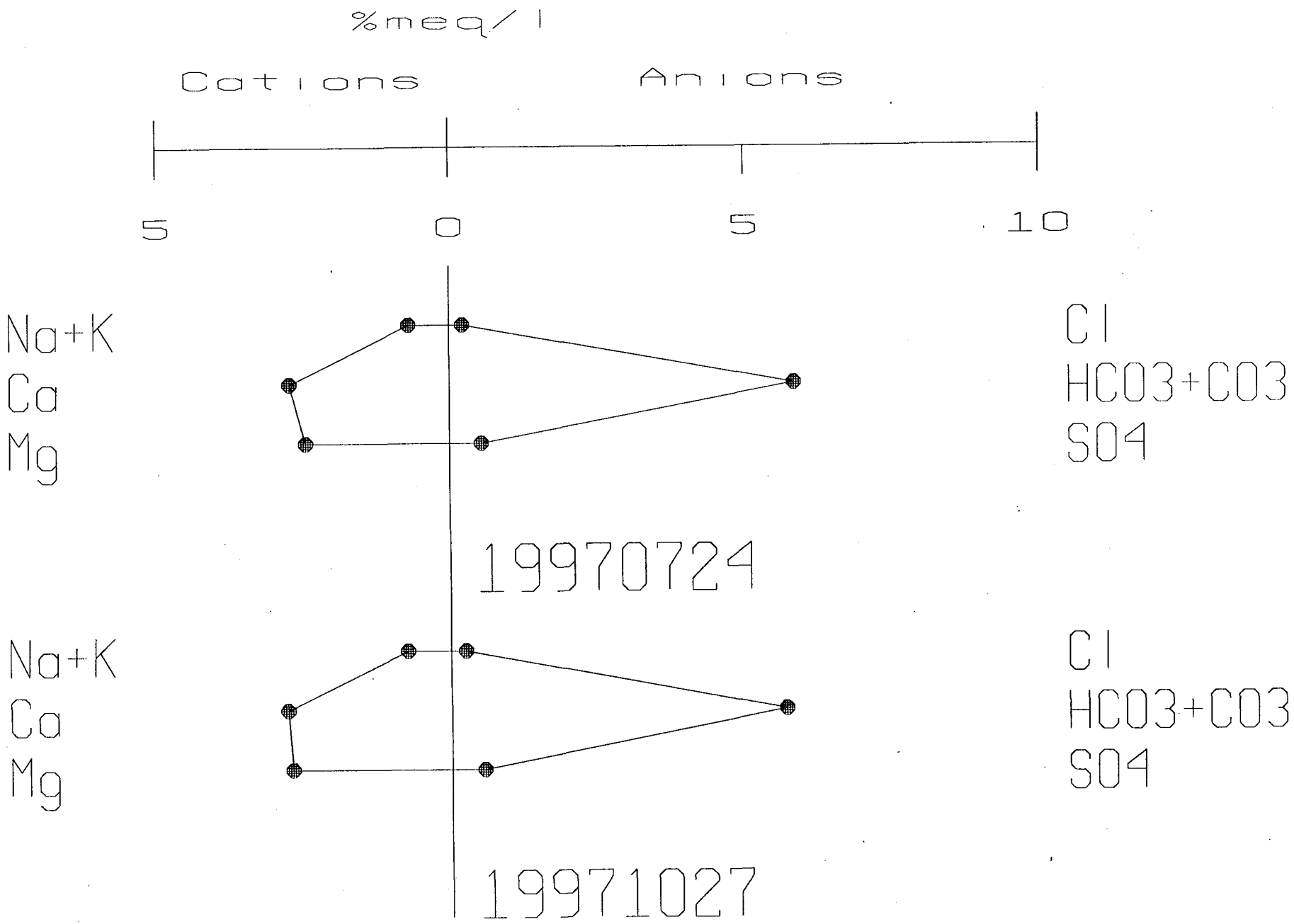
EMS84-56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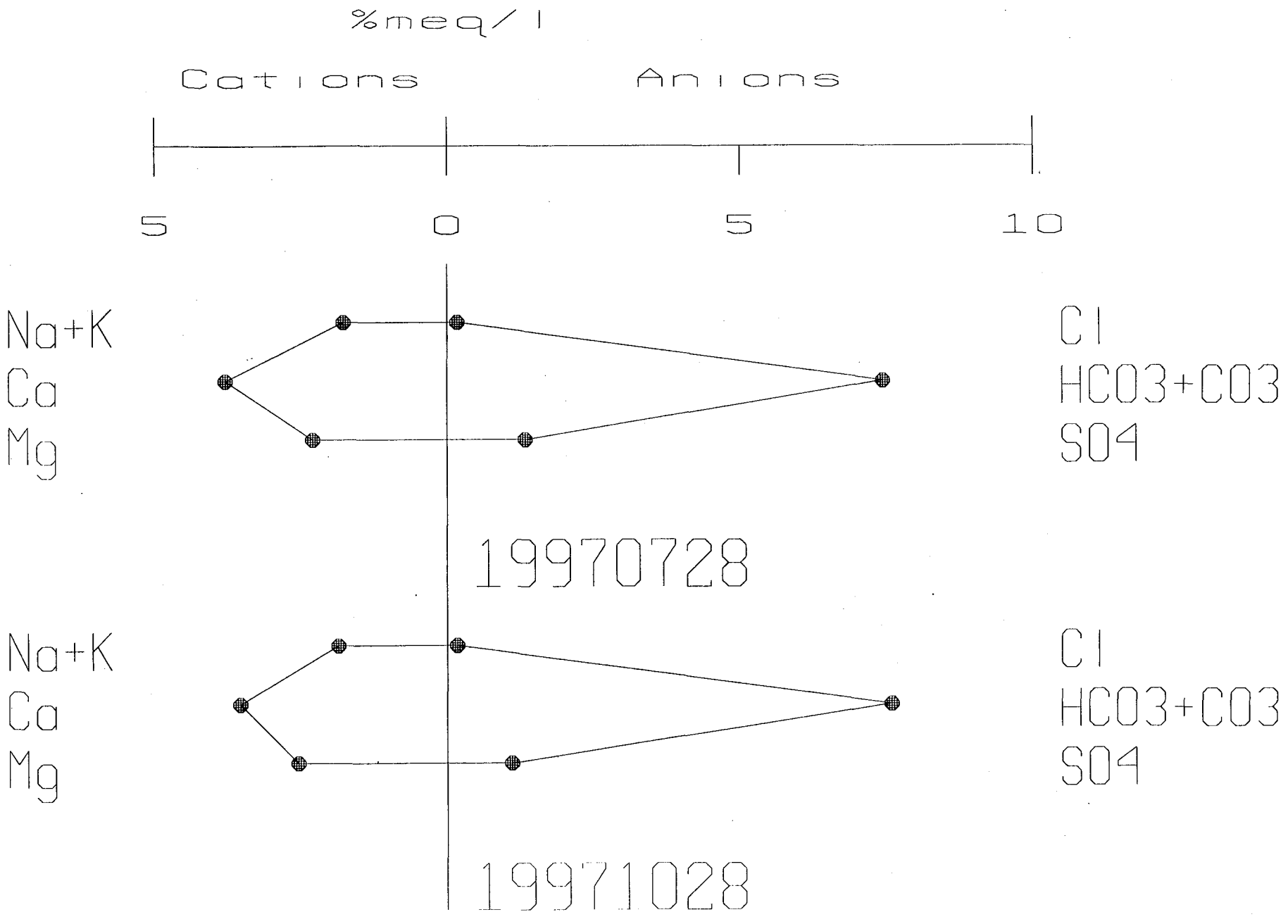
EMS89-60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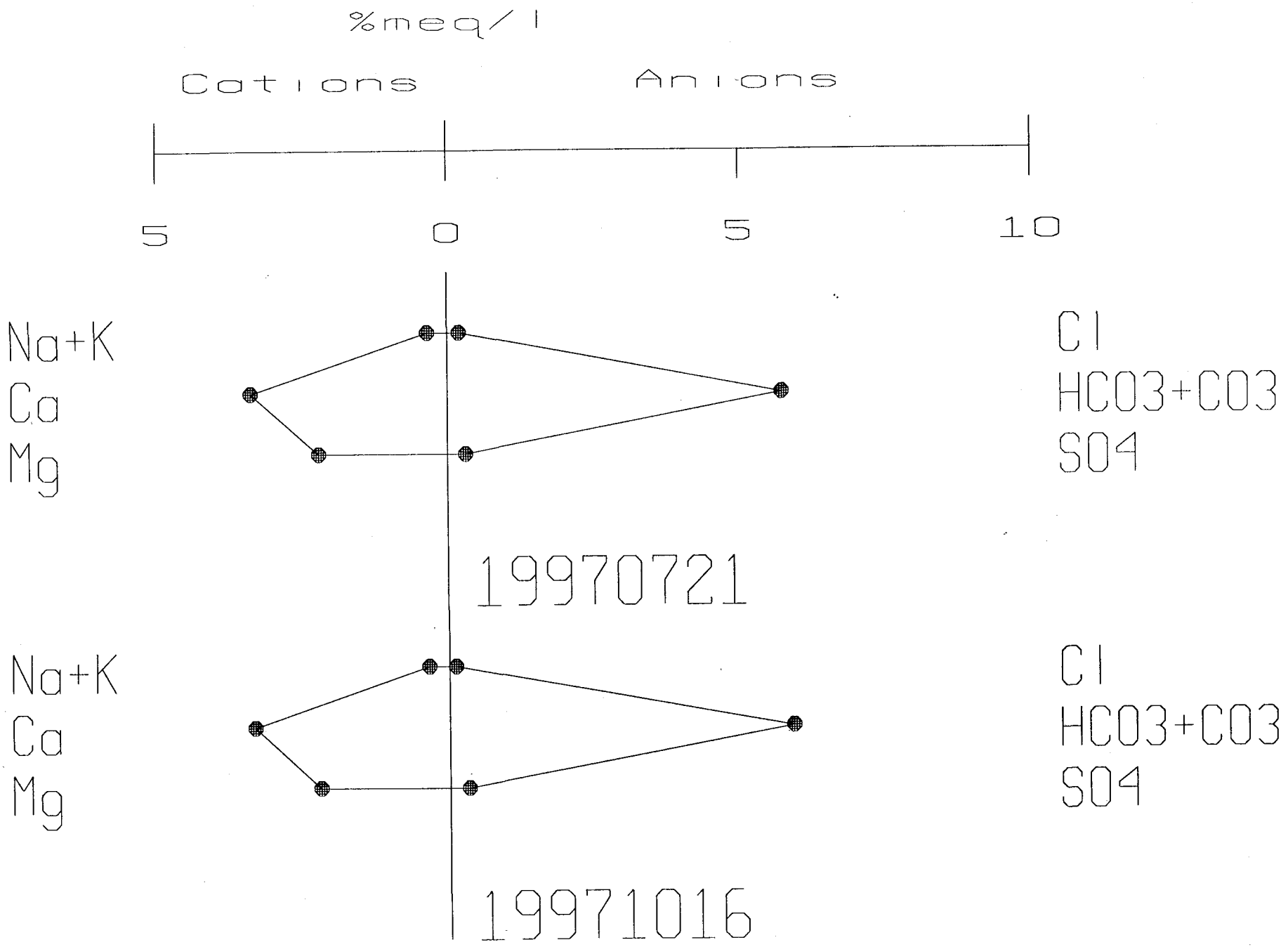
EMS89-61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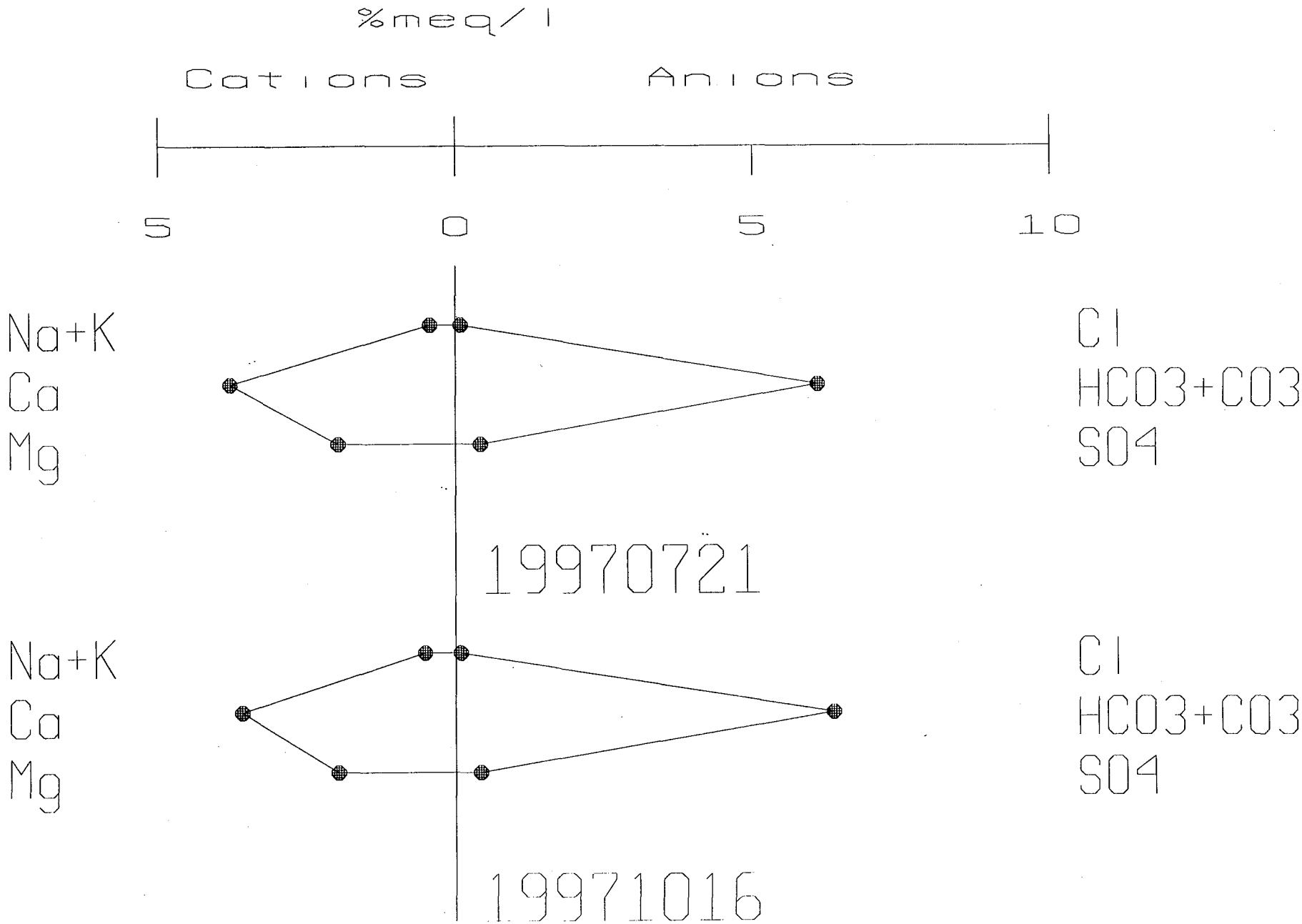
EMS89-65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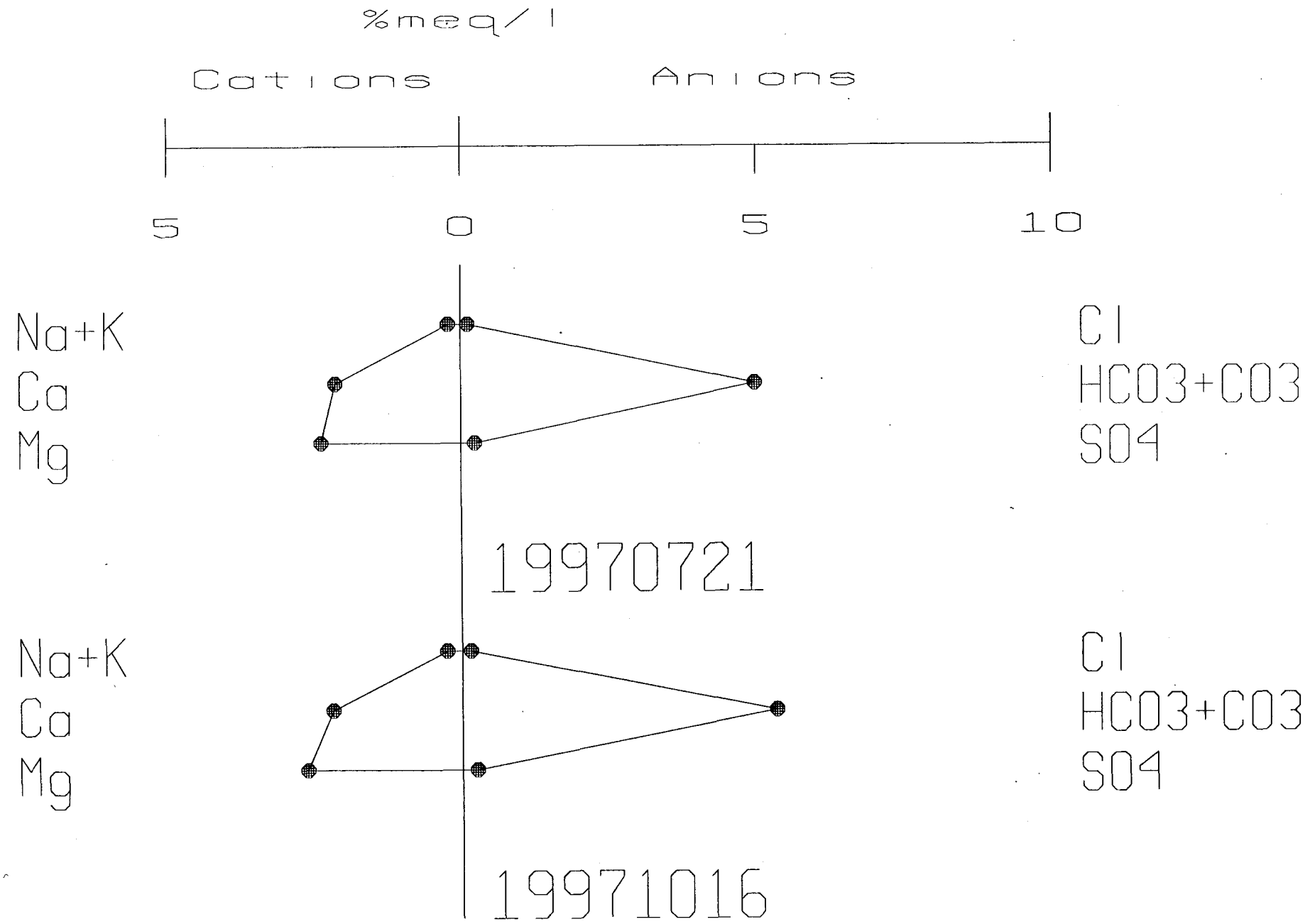
EMS89-66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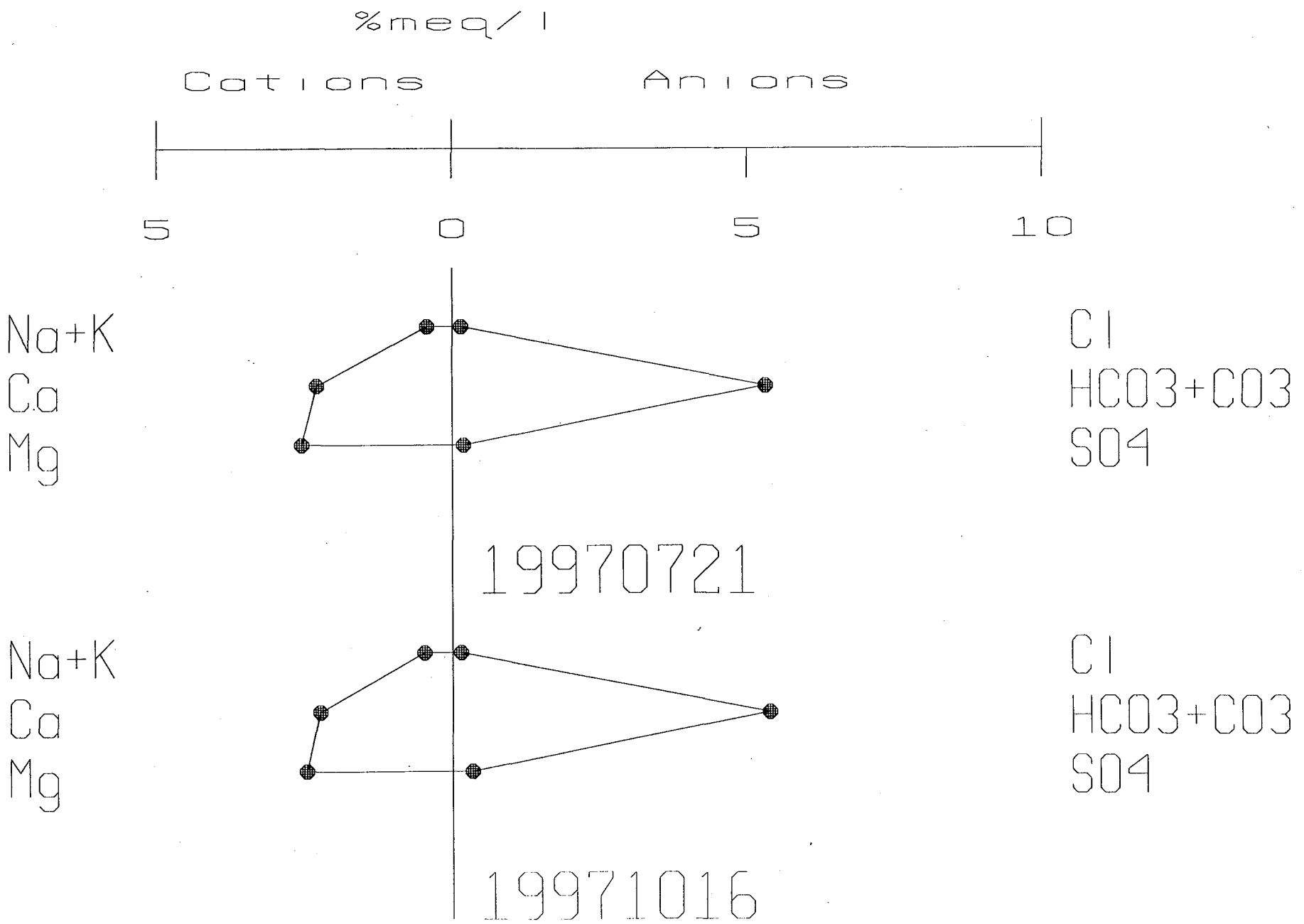
EMS89-67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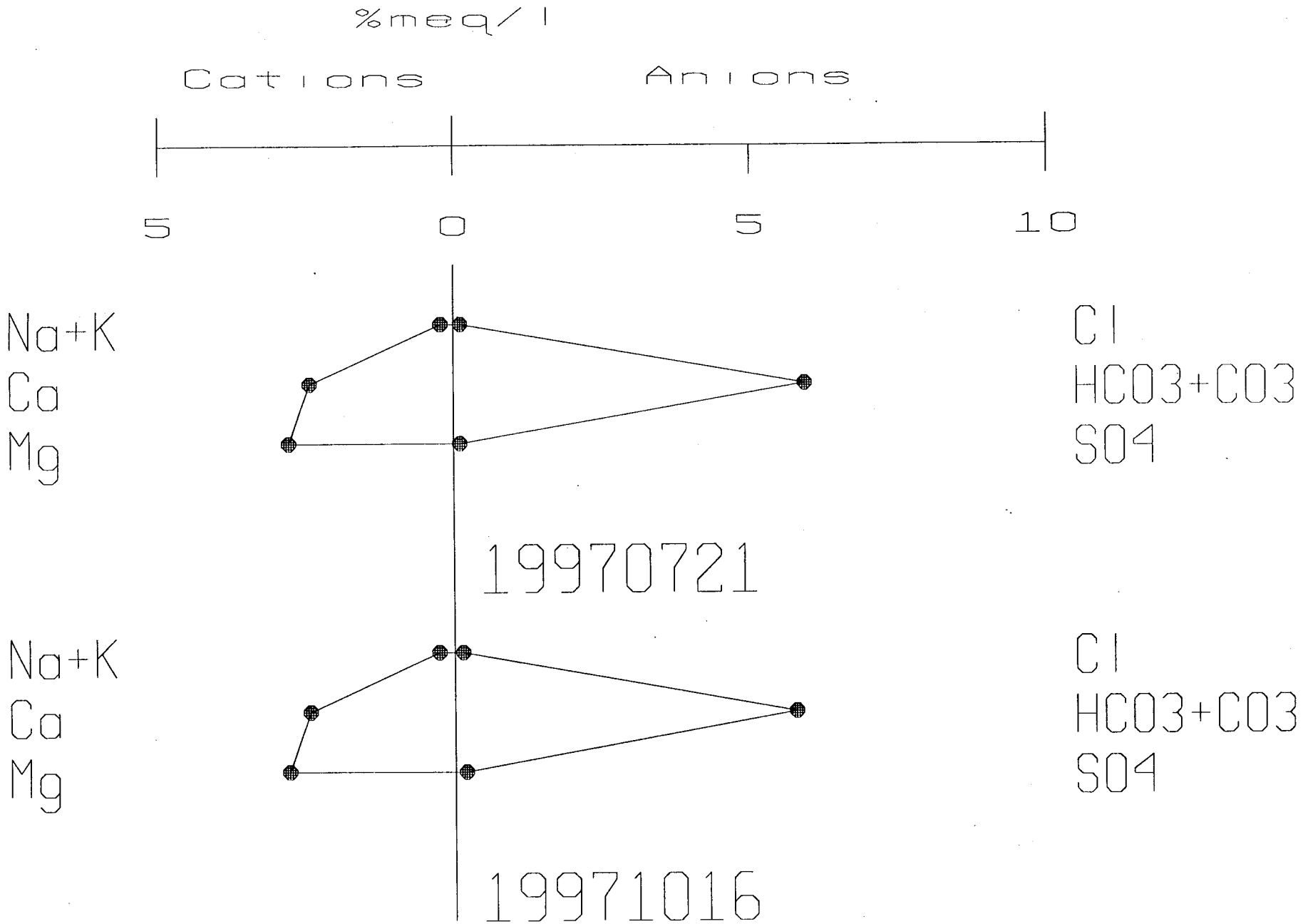
EMS89-68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Mg
Cl
HCO3+CO3
SO4
19971016

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306

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TEL: (801) 653-2311
FAX: (801) 653-2436

August 14, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
BURNT TREE

Kind of sample reported to us Water

Rec'd 0300 hr.
Sampled 0830 hr.

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 21, 1997

Date received July 22, 1997

FIELD MEASUREMENTS

pH	7.29
DO	7.4
Flow	8.5 gpm
Conductivity	453
Temperature	7.8°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17500

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	20	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 0740 SC
Alkalinity, Bicarbonate	335	5	mg/l as HCO_3	SM2320-B	07-25-1997 1100 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-25-1997 1100 SC
Alkalinity, Total	274	5	mg/l as $CaCO_3$	EPA 310.1	07-25-1997 1100 SC
Anions	5.8	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	50	1	mg/l	EPA 215.1	08-12-1997 1030 MK
Cations	5.3	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	3	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	507	1	umhos/cm	SM2510-B	07-22-1997 1230 MK
Hardness, Total	232	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Magnesium, Dissolved	26	1	mg/l	EPA 242.1	08-12-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
pH	7.72	----	pH units	EPA 150.1	07-22-1997 0800 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915 MK
Sodium, Dissolved	15	1	mg/l	EPA 273.1	08-12-1997 0930 MK
Solids, Total Dissolved	270	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	10	5	mg/l	EPA 375.4	08-06-1997 0800 SC
Cation/Anion Balance	-4.5	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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

F-465
Original Watermarked For Your Protection

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FAX: (801) 653-2436

August 13, 1997

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

AUG 13
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
ELK SPRING

Rec'd 0300 hr.
Sampled 1540 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 21, 1997

Date received July 22, 1997

FIELD MEASUREMENTS

pH	7.42
DO	8.0
Flow	235 gpm
Conductivity	414
Temperature	5.1°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17499

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	15	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 0740 SC
Alkalinity, Bicarbonate	301	5	mg/l as HCO_3	SM2320-B	07-25-1997 1100 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-25-1997 1100 SC
Alkalinity, Total	247	5	mg/l as $CaCO_3$	EPA 310.1	07-25-1997 1100 SC
Anions	5.2	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	58	1	mg/l	EPA 215.1	08-07-1997 1100 MK
Cations	5.0	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	3	1	mg/l	SM4500-Cl-B	08-01-1997 0720 SC
Conductivity	467	1	umhos/cm	SM2510-B	07-22-1997 1230 MK
Hardness, Total	240	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-07-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-07-1997 0800 MK
Magnesium, Dissolved	23	1	mg/l	EPA 242.1	08-07-1997 1130 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-07-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-07-1997 0830 MK
pH	7.78	----	pH units	EPA 150.1	07-22-1997 0800 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-07-1997 0900 MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	08-07-1997 1000 MK
Solids, Total Dissolved	240	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	7	5	mg/l	EPA 375.4	08-06-1997 0800 SC
Cation/Anion Balance	-1.1	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

MEMBER ACIL

COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2436

August 13, 1997

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

13
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
TEDS TUB

Rec'd 0815 hr.
Sampled 1510 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.58
DO	8.5
Flow	42.86 gpm
Conductivity	442
Temperature	5.4°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17510

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	22	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030	SC
Alkalinity, Bicarbonate	322	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730	SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730	SC
Alkalinity, Total	264	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730	SC
Anions	5.5	----	meq/l	---------	08-12-1997 1400	RJ
Calcium, Dissolved	62	1	mg/l	EPA 215.1	08-12-1997 1030	MK
Cations	5.0	----	meq/l	---------	08-12-1997 1400	RJ
Chloride	2	1	mg/l	SM4500-Cl-B	08-01-1997 1010	SC
Conductivity	485	1	umhos/cm	SM2510-B	08-11-1997 0800	JC
Hardness, Total	233	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815	MK
Magnesium, Dissolved	19	1	mg/l	EPA 242.1	08-12-1997 1100	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845	MK
pH	7.79	----	pH units	EPA 150.1	07-23-1997 0900	MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915	MK
Sodium, Dissolved	8	1	mg/l	EPA 273.1	08-12-1997 0930	MK
Solids, Total Dissolved	260	10	mg/l	EPA 160.1	07-28-1997 0700	JC
Sulfate	8	5	mg/l	EPA 375.4	08-06-1997 1300	SC
Cation/Anion Balance	-4.7	----	%		08-12-1997 1400	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2436

August 13, 1997

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

FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-2

Rec'd 1500 hr.
Sampled 0950 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 25, 1997

Date received July 25, 1997

FIELD MEASUREMENTS

pH	7.19
DO	6.2
Flow	2.14 gpm
Conductivity	503
Temperature	6.6°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17532

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	26	10	mg/l as $CaCO_3$	D1067-92	08-07-1997 1030 SC
Alkalinity, Bicarbonate	355	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	291	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	6.2	----	meq/l	---------	08-13-1997 1200 RJ
Calcium, Dissolved	58	1	mg/l	EPA 215.1	08-13-1997 1030 MK
Cations	5.3	----	meq/l	---------	08-13-1997 1200 RJ
Chloride	3	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	532	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	215	----	mg/l as $CaCO_3$	SM2340-B	08-13-1997 1200 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Magnesium, Dissolved	17	1	mg/l	EPA 242.1	08-13-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
pH	7.39	----	pH units	EPA 150.1	07-25-1997 1530 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-13-1997 0845 MK
Sodium, Dissolved	22	1	mg/l	EPA 273.1	08-13-1997 0900 MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	07-30-1997 0700 JC
Sulfate	14	5	mg/l	EPA 375.4	08-08-1997 1215 SC
Cation/Anion Balance	-8.2	----	%		08-13-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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FAX: (801) 653-2436

August 13, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-10

Rec'd 0815 hr.
Sampled 0951 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.46
DO	7.6
Flow	14 gpm
Conductivity	434
Temperature	6.5°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17511

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	24	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	331	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	271	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	5.7	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	66	1	mg/l	EPA 215.1	08-12-1997 1030 MK
Cations	5.2	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	3	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	500	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	251	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Magnesium, Dissolved	21	1	mg/l	EPA 242.1	08-12-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
pH	7.74	----	pH units	EPA 150.1	07-23-1997 0900 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915 MK
Sodium, Dissolved	5	1	mg/l	EPA 273.1	08-12-1997 0930 MK
Solids, Total Dissolved	270	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	7	5	mg/l	EPA 375.4	08-06-1997 1300 SC
Cation/Anion Balance	-3.8	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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FAX: (801) 653-2436

August 13, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-15

Kind of sample reported to us Water

Rec'd 0815 hr.
Sampled 1411 hr.

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.90
DO	7.0
Flow	13.6 gpm
Conductivity	453
Temperature	6.7°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17512

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
Acidity	15	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030	SC
Alkalinity, Bicarbonate	325	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730	S
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730	
Alkalinity, Total	266	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730	SC
Anions	5.5	----	meq/l	---------	08-12-1997 1400	RJ
Calcium, Dissolved	64	1	mg/l	EPA 215.1	08-12-1997 1030	MK
Cations	5.2	----	meq/l	---------	08-12-1997 1400	RJ
Chloride	3	1	mg/l	SM4500-Cl-B	08-01-1997 1010	SC
Conductivity	491	1	umhos/cm	SM2510-B	08-11-1997 0800	JC
Hardness, Total	246	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400	RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815	MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815	MK
Magnesium, Dissolved	21	1	mg/l	EPA 242.1	08-12-1997 1100	MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845	MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845	MK
pH	7.81	----	pH units	EPA 150.1	07-23-1997 0900	MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915	MK
Sodium, Dissolved	6	1	mg/l	EPA 273.1	08-12-1997 0930	MK
Solids, Total Dissolved	280	10	mg/l	EPA 160.1	07-28-1997 0700	JC
Sulfate	6	5	mg/l	EPA 375.4	08-06-1997 1300	SC
Cation/Anion Balance	-3.3	----	%		08-12-1997 1400	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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August 13, 1997

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

AUG 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-26

Rec'd 0700 hr.
Sampled 0930 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 24, 1997

Date received July 25, 1997

FIELD MEASUREMENTS

pH	8.17
DO	7.0
Flow	5 gpm
Conductivity	487
Temperature	7.8°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17522

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	16	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	355	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	291	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	6.2	----	meq/l	---------	08-13-1997 1200 RJ
Calcium, Dissolved	38	1	mg/l	EPA 215.1	08-13-1997 1030 MK
Cations	5.2	----	meq/l	---------	08-13-1997 1200 RJ
Chloride	6	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	534	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	198	----	mg/l as $CaCO_3$	SM2340-B	08-13-1997 1200 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Magnesium, Dissolved	25	1	mg/l	EPA 242.1	08-13-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
pH	8.11	----	pH units	EPA 150.1	07-25-1997 0900 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-13-1997 0845 MK
Sodium, Dissolved	29	1	mg/l	EPA 273.1	08-13-1997 0900 MK
Solids, Total Dissolved	260	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	10	5	mg/l	EPA 375.4	08-08-1997 0830 SC
Cation/Anion Balance	-8.6	----	%		08-13-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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August 13, 1997

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

3
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-28

Rec'd 0700 hr.
Sampled 1013 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 24, 1997

Date received July 25, 1997

FIELD MEASUREMENTS

pH	7.34
DO	5.4
Flow	1.09 gpm
Conductivity	633
Temperature	6.7°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17523

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	17	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	286	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	234	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	7.6	----	meq/l	---------	08-13-1997 1200 RJ
Calcium, Dissolved	36	1	mg/l	EPA 215.1	08-13-1997 1030 MK
Cations	6.8	----	meq/l	---------	08-13-1997 1200 RJ
Chloride	12	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	704	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	185	----	mg/l as $CaCO_3$	SM2340-B	08-13-1997 1200 RJ
Iron, Total	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Magnesium, Dissolved	23	1	mg/l	EPA 242.1	08-13-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
pH	7.45	----	pH units	EPA 150.1	07-25-1997 0900 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	08-13-1997 0845 MK
Sodium, Dissolved	71	1	mg/l	EPA 273.1	08-13-1997 0900 MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	07-30-1997 0700 JC
Sulfate	124	50	mg/l	EPA 375.4	08-08-1997 0830 SC
Cation/Anion Balance	-5.6	----	%		08-13-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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August 13, 1997

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

PACIFICORP
AUG 13 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-29

Rec'd 0700 hr.
Sampled 0920 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 24, 1997

Date received July 25, 1997

FIELD MEASUREMENTS

pH	7.49
DO	5.0
Flow	1 gpm
Conductivity	530
Temperature	5.5°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17521

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	17	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	343	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	281	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	6.6	----	meq/l	---------	08-13-1997 1200 RJ
Calcium, Dissolved	41	1	mg/l	EPA 215.1	08-13-1997 1030 MK
Cations	6.3	----	meq/l	---------	08-13-1997 1200 RJ
Chloride	14	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	575	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	242	----	mg/l as $CaCO_3$	SM2340-B	08-13-1997 1200 RJ
Iron, Total	0.4	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-13-1997 0800 MK
Magnesium, Dissolved	34	1	mg/l	EPA 242.1	08-13-1997 1045 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-13-1997 0815 MK
pH	7.60	----	pH units	EPA 150.1	07-25-1997 0900 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	08-13-1997 0845 MK
Sodium, Dissolved	32	1	mg/l	EPA 273.1	08-13-1997 0900 MK
Solids, Total Dissolved	300	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	29	5	mg/l	EPA 375.4	08-08-1997 0830 SC
Cation/Anion Balance	-2.8	----	%		08-13-1997 1200 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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August 18, 1997

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

PACIFICORP
AUG 19 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-32

Kind of sample reported to us Water

Rec'd 1300 hr.
Sampled 0933 hr.

Sample taken at EAST MOUNTAIN SPINGS

Sample taken by Energy West/MBD

Date sampled July 28, 1997

Date received July 28, 1997

FIELD MEASUREMENTS

pH	7.43
DO	~~5.68~~ 5.8
Flow	1.03 gpm
Conductivity	798
Temperature	8°C

NOTE:DISSOLVED METALS FILTERED AT LAB

Analysis report no. 59-17535

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	31	10	mg/l as $CaCO_3$	D1067-92	08-07-1997 1030 SC
Alkalinity, Bicarbonate	503	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	412	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	10.5	----	meq/l	---------	08-14-1997 1330 RJ
Calcium, Dissolved	73	1	mg/l	EPA 215.1	08-15-1997 1015 MK
Cations	9.8	----	meq/l	---------	08-14-1997 1330 RJ
Chloride	18	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	878	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	409	----	mg/l as $CaCO_3$	SM2340-B	08-14-1997 1330 RJ
Iron, Total	0.4	0.1	mg/l	EPA 236.1	08-14-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-14-1997 0745 MK
Magnesium, Dissolved	55	1	mg/l	EPA 242.1	08-14-1997 1030 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-14-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-14-1997 0830 MK
pH	7.72	----	pH units	EPA 150.1	07-28-1997 1530 SC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	08-14-1997 0900 MK
Sodium, Dissolved	36	1	mg/l	EPA 273.1	08-14-1997 0930 MK
Solids, Total Dissolved	540	10	mg/l	EPA 160.1	07-30-1997 0700 JC
Sulfate	84	25	mg/l	EPA 375.4	08-12-1997 0900 SC
Cation/Anion Balance	-3.7	----	%		08-14-1997 1330 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Scott

Huntington Laboratory RJ

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August 13, 1997

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

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-34

Kind of sample reported to us Water

Rec'd 0815 hr.
Sampled 1315 hr.

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by ENERGY WEST/MBD

Date sampled July 22, 1997

Date received July 23, 1997

FIELD MEASUREMENTS

pH	7.58
DO	7.3
Flow	5.5 gpm
Conductivity	526
Temperature	6.4°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17513

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	23	10	mg/l as $CaCO_3$	D1067-92	07-28-1997 1030 SC
Alkalinity, Bicarbonate	380	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 SC
Alkalinity, Total	312	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	6.8	----	meq/l	---------	08-12-1997 1400 RJ
Calcium, Dissolved	65	1	mg/l	EPA 215.1	08-12-1997 1030 MK
Cations	6.1	----	meq/l	---------	08-12-1997 1400 RJ
Chloride	5	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	594	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	286	----	mg/l as $CaCO_3$	SM2340-B	08-12-1997 1400 RJ
Iron, Total	0.6	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-12-1997 0815 MK
Magnesium, Dissolved	30	1	mg/l	EPA 242.1	08-12-1997 1100 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-12-1997 0845 MK
pH	7.90	----	pH units	EPA 150.1	07-23-1997 0900 MK
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-12-1997 0915 MK
Sodium, Dissolved	10	1	mg/l	EPA 273.1	08-12-1997 0930 MK
Solids, Total Dissolved	330	10	mg/l	EPA 160.1	07-28-1997 0700 JC
Sulfate	19	5	mg/l	EPA 375.4	08-06-1997 1300 SC
Cation/Anion Balance	-4.8	----	%		08-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

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August 18, 1997

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

PACIFICORP
AUG 18 1997
FIELD OFFICE

Sample identification by
PACIFICORP FIELD OFFICE

EAST MOUNTAIN SPRINGS
79-38

Rec'd 1300 hr.
Sampled 0825 hr.

Kind of sample reported to us Water

Sample taken at EAST MOUNTAIN SPRINGS

Sample taken by Energy West/MBD

Date sampled July 28, 1997

Date received July 28, 1997

FIELD MEASUREMENTS

pH	7.49
DO	6.0
Flow	4 gpm
Conductivity	571
Temperature	5°C

NOTE: DISSOLVED METALS FILTERED AT LAB

Analysis report no. 59-17536

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Acidity	21	10	mg/l as $CaCO_3$	D1067-92	08-07-1997 1030 SC
Alkalinity, Bicarbonate	403	5	mg/l as HCO_3	SM2320-B	07-30-1997 0730 S[illegible]
Alkalinity, Carbonate	<5	5	mg/l as CO_3	SM2320-B	07-30-1997 0730 S[illegible]
Alkalinity, Total	330	5	mg/l as $CaCO_3$	EPA 310.1	07-30-1997 0730 SC
Anions	7.5	----	meq/l	---------	08-14-1997 1330 RJ
Calcium, Dissolved	62	1	mg/l	EPA 215.1	08-15-1997 1015 MK
Cations	6.8	----	meq/l	---------	08-14-1997 1330 RJ
Chloride	11	1	mg/l	SM4500-Cl-B	08-01-1997 1010 SC
Conductivity	624	1	umhos/cm	SM2510-B	08-11-1997 0800 JC
Hardness, Total	241	----	mg/l as $CaCO_3$	SM2340-B	08-14-1997 1330 RJ
Iron, Total	0.2	0.1	mg/l	EPA 236.1	08-14-1997 0745 MK
Iron, Dissolved	<0.1	0.1	mg/l	EPA 236.1	08-14-1997 0745 MK
Magnesium, Dissolved	21	1	mg/l	EPA 242.1	08-14-1997 1030 MK
Manganese, Total	<0.1	0.1	mg/l	EPA 243.1	08-14-1997 0830 MK
Manganese, Dissolved	<0.1	0.1	mg/l	EPA 243.1	08-14-1997 0830 MK
pH	7.65	----	pH units	EPA 150.1	07-28-1997 1530 SC
Potassium, Dissolved	<1	1	mg/l	EPA 258.1	08-14-1997 0900 MK
Sodium, Dissolved	46	1	mg/l	EPA 273.1	08-14-1997 0930 MK
Solids, Total Dissolved	360	10	mg/l	EPA 160.1	07-30-1997 0700 JC
Sulfate	26	5	mg/l	EPA 375.4	08-12-1997 0900 SC
Cation/Anion Balance	4.4	----	%		08-14-1997 1330 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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