COTTONWOOD/WILBERG
ACT/015/019

HYDROLOGIC MONITORING PROGRAM

ANNUAL REPORT FOR 1987

UTAH POWER & LIGHT COMPANY
HYDROLOGIC MONITORING PROGRAM
ANNUAL REPORT FOR 1987

JUNE 1988

Submitted to: United States Department of the Interior
Office of Surface Mining
Minerals Management Service
Utah Division of Oil, Gas and Mining

Prepared and submitted for Utah Power & Light Company by:

Hydrologic Section of the Power Operation Department

and

Technical Services Department of the Mining Division

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OIL, GAS & MINING

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I. INTRODUCTION

The 1987 Water 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 tenth annual hydrologic report submitted by Utah Power & Light Company since the report entitled "Monitoring of the Water Resources in the Mining Areas of East Mountain, Emery County, Utah" was submitted to the U. S. Geological Survey and the Utah Division of Oil, Gas and Mining in December 1977. It addresses flow observations and water quality characteristics of the water resources adjacent to Utah Power & Light Company (UP&L) mining areas in Emery County (see Figures 1a and 1b).

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. By using this outside information, a cooperative effort is realized and duplication of effort and expense is substantially reduced.

The Division of Oil, Gas and Mining reviewed the 1986 report and indicated two areas in which additional clarification was needed; they were: 1) provide a table which shows surface and groundwater

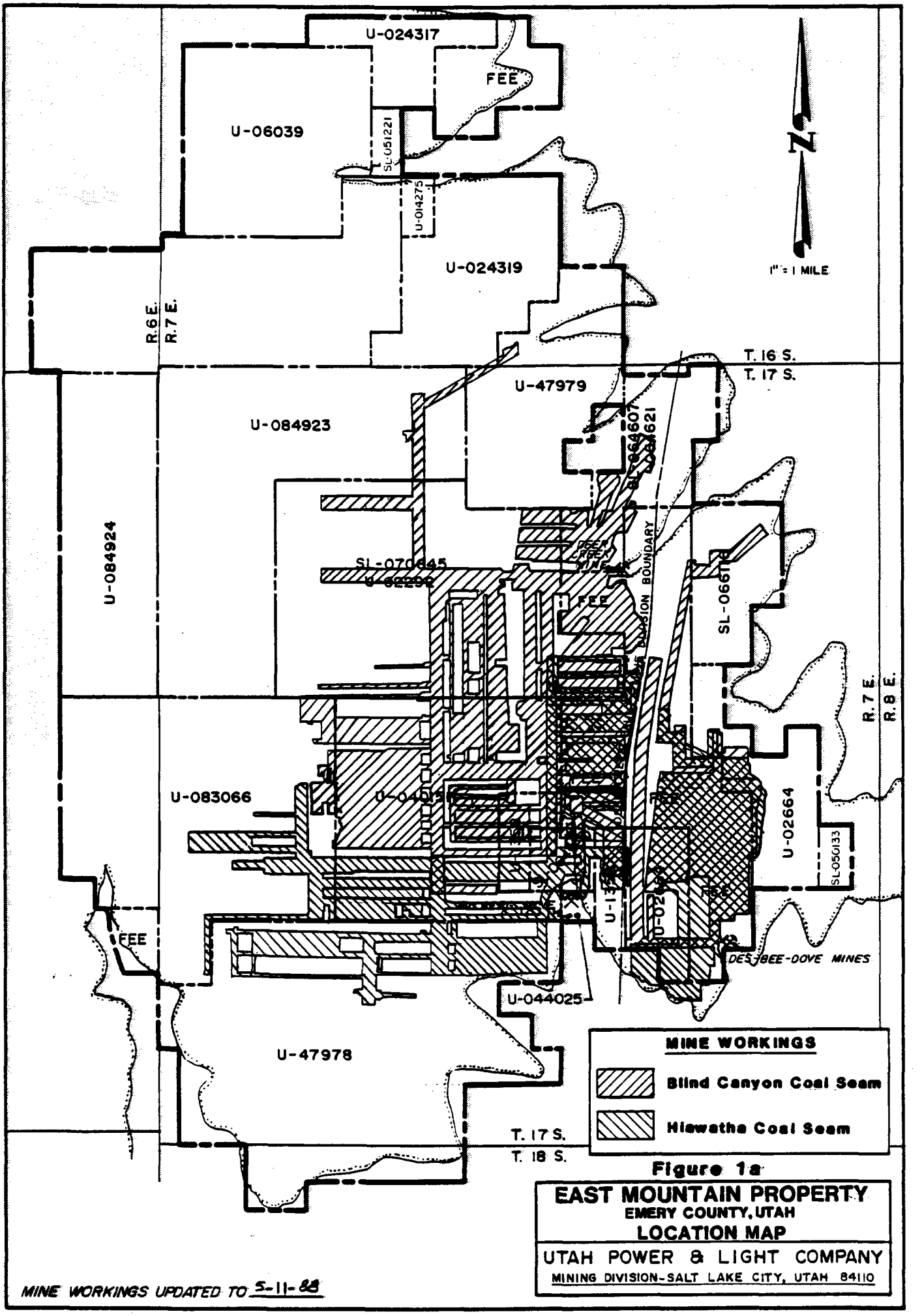
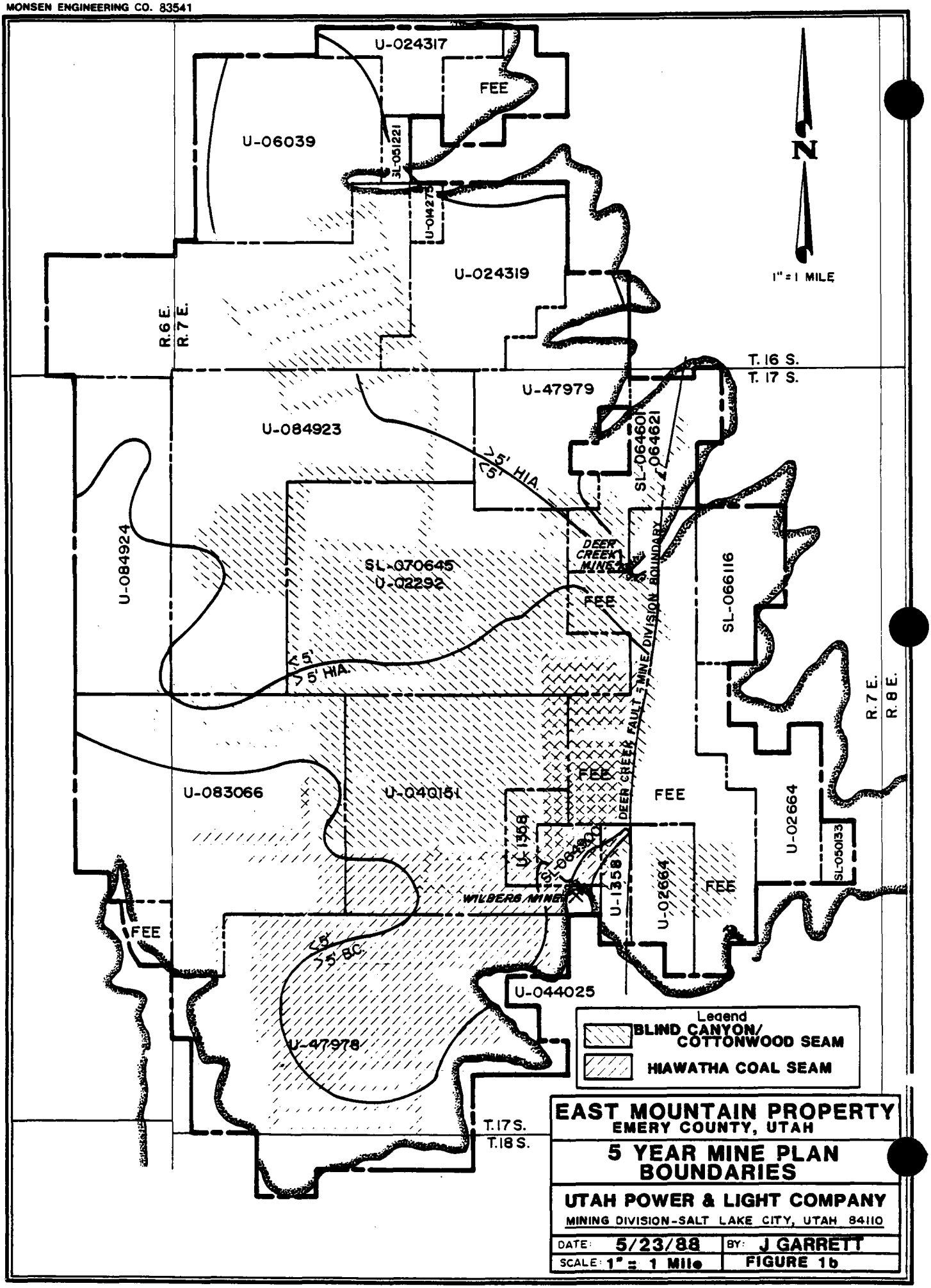


Figure 1a

EAST MOUNTAIN PROPERTY
EMERY COUNTY, UTAH
LOCATION MAP

UTAH POWER & LIGHT COMPANY
MINING DIVISION-SALT LAKE CITY, UTAH 84110

MINE WORKINGS UPDATED TO 5-11-88



EAST MOUNTAIN PROPERTY
EMERY COUNTY, UTAH

5 YEAR MINE PLAN BOUNDARIES

UTAH POWER & LIGHT COMPANY
MINING DIVISION-SALT LAKE CITY, UTAH 84110

DATE: 5/23/88	BY: J GARRETT
SCALE: 1" = 1 Mile	FIGURE 1b

sampling sites and quality parameters tested and the number of years of data that have been collected on each site, and 2) provide an explanation of why in-mine samples for Wilberg Mine 4th East xc-24 (EM-25) show high values for sulfate, TDS, etc.

> 1) Included in Appendix J is a copy of Utah Power & Light's monitoring plan which lists all monitoring sites, the monitoring schedule, and parameters analyzed for each specific site. The number of years for which data have been collected for each site is listed under the historical comparisons throughout this report.
>
> 2) An explanation for the elevated mineral values in the Wilberg Mine 4th East area can be found in the Wilberg In-Mine Quality section, pages 56-59.

II. CLIMATIC OBSERVATIONS

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

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

A. Regional Climatology

From 1982 to 1984 the Western United States, and 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 again changed dramatically with near normal valley precipitation and mountain snowfall much below normal. The resulting 1987 runoff was substantially below normal.

B. Local Climatology

1. Precipitation

Valley precipitation in Emery County during 1987 was near average. The mountains in the San Rafael Basin received light snowfall during the 1986-87 winter, and precipitation at Electric Lake (19.65") was normal but only 53% of 1986.

Precipitation amounts recorded at Hunter Plant, Huntington Plant, Electric Lake, and East Mountain for the 1987 water year (October 1986 to September 1987) 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 1986 and 1987 merits consideration in this study. The intent is to develop a correlation between yearly precipitation and spring discharges on East Mountain. Table 2 is a comparison of the 1986-1987 precipitation levels recorded at the four locations.

TABLE 1: PRECIPITATION IN EMERY COUNTY, UTAH (1987 Water Year)

	Hunter Plant (Elev. 5800')		Huntington Plant (Elev. 6500')		Electric Lake (Elev. 8350')		East Mountain (Elev. 8985')	
Month	Precip. (in.)	% Of Normal	Precip. (in.)	% Of Normal	Precip. (in.)	% Of Normal	Precip. (in.)	% Of Normal
1986								
Oct.	0.92	118	0.38	30	1.86	88	1.57	106
Nov.	0.08	16	0.15	25	1.98	106	0.39	27
Dec.	0.10	19	0.05	11	0.55	19	0.16	15
1987								
Jan.	0.32	74	0.81	153	2.14	106	1.37	132
Feb.	0.45	110	0.66	194	2.07	119	1.37	133
Mar.	0.90	214	0.13	21	2.47	129	1.65	93
Apr.	0.12	28	1.22	222	1.03	61	1.16	145
May	1.38	234	1.48	260	2.93	197	1.77	201
June	1.25	272	1.01	246	0.79	98	0.58	121
July	1.65	284	2.14	225	2.12	181	2.49	153
Aug.	1.27	126	0.65	96	1.22	144	1.16	64
Sept.	0.11	14	0.00	0	0.49	47	0.06	4
TOTALS	8.55	123	8.68	116	19.65	100	13.73	91
Mean Monthly	0.71	--	0.72	--	1.64	--	1.14	--

Table 2: COMPARISON OF 1986 AND 1987 PRECIPITATION (INCHES)

Station	1987 Amount	1987 % of Normal	1986 Amount	1986 % of Normal	1987 As % of 1986
Hunter Plant	8.55	123	7.05	101	122
Huntington Plant	8.68	116	6.71	90	129
Electric Lake	19.65	100	36.93	188	53
East Mountain	13.73	91	14.92	98	92
Average %		108		119	99

Table 2 indicates that 1987 precipitation was higher than 1986 at the Hunter and Huntington stations and lower at the East Mountain and Electric Lake stations. The overall precipitation at the four stations averaged 1% lower in 1987 than 1986.

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. These 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 1987 water year.

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

2. Temperatures

During the 1987 water year temperatures were above normal except for the Electric Lake station. At the Hunter Plant station, temperatures for October and January were below normal while temperatures for the other months were above normal. The Huntington Plant station was cooler than normal during the months of October, March, July, and August while the rest of the year was above normal. At the East Mountain station temperatures were cooler than normal during December through February and July through August while the rest of

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	.13	.25	.19	.02	.40	.00	.89	.84	.03	.31	.08	.70	3.84
76-77	.00	.02	.00	.37	.07	.00	.03	1.28	.07	1.35	.41	.50	4.10
77-78	.01	.18	.00	1.28	1.05	1.74	.34	1.21	.00	.69	1.14	.14	7.78
78-79	.03	2.22	.22	1.43	.53	2.43	.24	.47	.00	.00	.79	.00	8.36
79-80	.00	.00	.41	1.70	1.70	.67	.75	1.11	.00	.02	.51	2.06	8.93
80-81	.66	.06	.02	.00	.07	1.48	.16	.45	.14	.20	.70	2.43	6.37
81-82	.58	.27	.45	.94	.45	.54	.00	.02	.00	.15	1.06	1.23	5.69
82-83	.20	1.25	.45	.54	.41	.84	.37	.51	.00	2.18	1.58	.88	9.21
83-84	.53	.66	1.07	.03	.35	.34	.34	.05	1.09	1.80	1.89	2.35	10.50
84-85	1.69	.06	1.24	.20	.95	1.01	.67	.64	.26	1.50	.03	.86	9.11
85-86	.92	1.40	.42	.10	.97	.40	.31	.00	.31	.55	1.01	.57	7.05
86-87	.92	.08	.10	.32	.45	.90	.12	1.38	1.25	1.65	1.27	.11	8.55
87-88	1.91	1.02	.66	.55	.00								

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	-	-	-	-	-	.08	.29	.16	.11	.57	.63	.43	2.27
71-72	2.26	.59	1.62	.04	.00	.32	.28	.16	.77	.40	.66	1.07	8.17
72-73	4.27	1.28	.34	.49	.80	2.42	.50	.17	.97	1.09	1.94	.12	14.39
73-74	.08	.02	.37	.20	.03	.01	.00	.00	.00	.09	.00	.07	.87
74-75	.68	1.19	.13	1.01	.30	.80	.03	.75	1.44	2.62	.31	.24	9.50
75-76	.23	.95	.03	.20	.23	.00	2.34	.86	.02	.73	.19	.85	6.63
76-77	.56	.00	.00	.35	.00	.00	.00	1.76	.00	2.08	.96	.70	6.41
77-78	.66	.12	.82	1.45	1.00	1.36	.94	.72	.12	.05	.72	.77	8.73
78-79	.02	2.65	.25	1.21	.52	2.50	.00	.84	.05	.09	3.32	.20	11.65
79-80	.17	.14	.15	2.88	3.63	.68	1.13	1.88	.65	.18	.38	2.22	14.09
80-81	1.20	.06	.00	.00	.00	.62	.08	1.75	.48	.00	.58	1.53	6.30
81-82	1.12	.25	1.30	1.63	.20	.73	.00	.17	.00	.08	.71	1.91	8.10
82-83	.20	.60	.67	.16	.65	1.87	.08	.40	.00	1.61	.39	1.15	7.78
83-84	.76	.76	2.13	.10	.15	1.18	.72	.17	1.04	.74	1.39	.46	9.60
84-85	2.07	.34	1.74	.49	.27	.53	.44	1.08	.42	3.21	.04	.81	11.44
85-86	.77	1.28	.64	.01	.98	.28	.43	.10	.17	.42	.55	1.08	6.71
86-87	.38	.15	.05	.81	.66	.13	1.22	1.48	1.01	2.14	.65	.00	8.68
87-88	1.36	1.35	.51	1.77	.00								

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	.36	1.05	.66	.47	.40	2.15	.78	19.88
71-72	3.49	1.69	4.07	3.35	.58	.70	1.02	.28	1.49	.70	.80	2.91	21.08
72-73	4.18	3.43	3.27	.97	2.09	2.74	3.67	1.42	.85	.82	1.23	1.15	25.82
73-74	.79	1.90	3.52	2.70	1.12	1.52	2.49	.20	.13	2.09	.06	.09	16.61
74-75	2.27	.62	1.73	2.10	2.37	3.42	1.23	3.21	1.08	1.93	.49	.25	20.70
75-76	1.31	2.57	.82	1.44	2.23	1.35	1.47	2.00	1.23	1.07	.54	1.19	17.22
76-77	1.00	.25	.14	.76	1.14	2.00	.05	3.00	.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	.30	.10	.24	.77	21.40
78-79	.40	3.18	2.66	2.90	2.18	2.53	.72	1.67	.19	.96	2.29	.32	20.00
79-80	1.55	2.23	.37	4.95	6.01	3.34	1.27	3.09	.12	.37	.38	1.80	25.48
10 Year	1.892	2.032	2.619	2.398	2.212	2.112	1.543	1.671	.666	1.072	.949	1.052	20.218
80-81	1.45	.98	.32	1.30	1.04	3.20	1.45	3.06	.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	.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	.89	3.04	.03	4.35	26.41
85-86	4.40	6.62	1.99	1.81	8.54	2.48	3.79	1.62	.26	1.01	1.68	2.73	36.93
86-87	1.86	1.98	.55	2.14	2.07	2.47	1.03	2.93	.79	2.12	1.22	.49	19.65
87-88	1.39	1.68	3.50	3.06	.72								

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.

NOTE: October, November, and December 70-71 were estimated by correlation with Clear Creek Weather Station.

Table 6: EAST MOUNTAIN PRECIPITATION

Elevation 9,005 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	10.9
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							

FIGURE 2

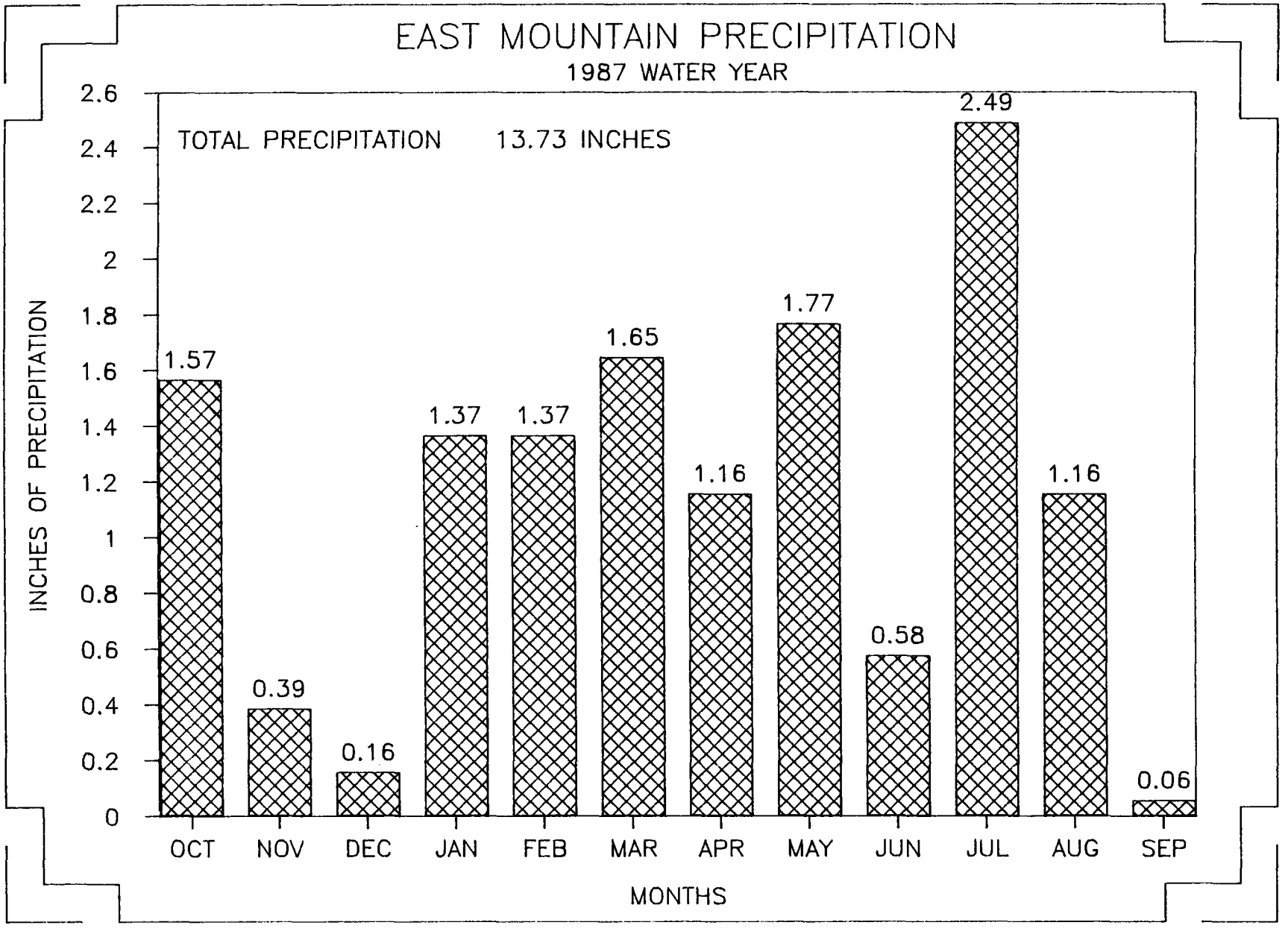

EAST MOUNTAIN PRECIPITATION
1987 WATER YEAR
TOTAL PRECIPITATION 13.73 INCHES
INCHES OF PRECIPITATION
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1.57
0.39
0.16
1.37
1.37
1.65
1.16
1.77
0.58
2.49
1.16
0.06
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
MONTHS

Table 7: TEMPERATURES IN EMERY COUNTY, UTAH (1987 WATER YEAR)

Month	Hunter Plant		Huntington Plant		Electric Lake		East Mountain	
	Average Temp. (°F)	Departure From Normal	Average Temp. (°F)	Departure From Normal	Average Temp. (°F)	Departure From Normal	Average Temp.(°F)	Departure From Normal
1986								
Oct.	30.6	-0.1	47.0	-2.4	36.5	-1.0	37.6	+1.2
Nov.	37.2	+2.0	37.8	+1.8	28.7	+3.0	36.4	+9.2
Dec.	28.9	+2.2	29.3	+1.9	17.1	+1.3	19.6	-3.1
1987								
Jan.	21.5	-2.6	24.4	+0.8	9.8	-4.8	19.5	-3.2
Feb.	31.4	+3.0	31.9	+1.7	13.0	-6.3	22.8	-0.9
Mar.	36.3	+0.5	34.6	-3.1	18.1	-2.7	26.0	+1.8
Apr.	50.8	+6.2	50.2	+5.1	34.2	+5.5	41.3	+13.1
May	56.5	+4.4	55.2	+0.3	42.6	+3.6	45.9	+5.4
June	69.1	+7.7	67.6	+1.8	50.6	+2.0	59.4	+5.3
July	71.9	+3.5	68.0	-3.7	N/A	---	60.3	-1.6
Aug.	71.1	+4.7	68.8	-0.6	55.0	+1.2	57.3	-4.5
Sept	65.1	+6.4	63.0	+2.6	49.6	+2.1	54.7	+4.2
TOTALS	47.5	+3.2	48.2	+0.6	32.3	-1.6	40.1	+1.3

the year was above normal. The Electric Lake station was cooler than normal for October, January, February, March, and July while the rest of the year was above normal. (See Table 7.)

A comparison of 1986 and 1987 temperatures for the four stations is addressed since temperatures also influence water supplies from year to year. Table 8 depicts the variation and compares 1986 to 1987.

TABLE 8: COMPARISON OF 1986 AND 1987 TEMPERATURES

	1986		1987		1987
Station	Average Temp. (°F)	Departure From Normal	Average Temp. (°F)	Departure From Normal	Departure From 1986
Hunter Plant	49.4	+3.3	47.5	+3.2	-1.9
Huntington Plant	48.6	+1.0	48.2	+0.6	-0.4
Electric Lake	35.3	+1.4	32.3	-1.6	-3.0
East Mountain	40.2	+1.9	40.1	+1.3	-0.1
Average Departure From Normal		+1.9		+0.9	-1.4

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 of East Mountain contributes to the Huntington Creek drainage (see Map No. 1 in pocket). The drainage boundaries, including minor subdivisions to Cottonwood and Huntington Creeks, are designated on the accompanying map. Both Huntington and Cottonwood Creeks flow out of the Wasatch Plateau in a southeasterly direction. The creeks merge with Ferron Creek to form the San Rafael River which is a tributary of the Green River.

A. Huntington Creek Drainage System

1. Huntington Creek

Flow data are recorded on a continuous basis by Utah Power & Light at two locations; one station is located near the UP&L Huntington Plant, the other about 22 miles upstream from the Huntington Plant. Flow records are maintained by Utah Power & Light Company 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 1987 water year (October 1986 - September 1987) at the two stations plus the calculated natural flow are found in Appendix A.

TABLE 9: HUNTINGTON CREEK WATER FLOWS (1987 WATER YEAR)

	Huntington Creek Below Electric Lake	Huntington Creek At Plant	Calc. Natural Flow At Plant
Total Yearly Flow (Ac. Ft.)	13,660	55,600	60,641
% Of Normal	63	81	87
Mean Discharge In Cubic Feet Per Second (CFS)	18.9	76.8	
Maximum Discharge (CFS)	50	215	
Date of Maximum Discharge	9/15/87	5/7/87	
Minimum Discharge In CFS	12	31	
Date Of Minimum Discharge	7/2/87	12/18/86	

* Influenced by upstream storage in Electric Lake.

During the 1987 spring runoff period (April through July) approximately 3,000 acre feet of water was impounded behind Electric

Lake Dam. During spring runoff the impoundment reached its highest level on June 11. Total storage on this date amounted to 27,750 acre feet, which is 3,522 acre feet below full. Reservoir releases for the fishery and Huntington Plant needs during the water year totaled 13,660 acre feet. The total flow of 55,600 acre feet recorded for Huntington Creek at the Huntington Plant is equal to 81% of normal.

A comparison of runoff values from 1986 and 1987 is presented in Table 10.

TABLE 10: COMPARISON OF 1986 AND 1987 RUNOFF VALUES

	1986		1987		
	Amount	% Of Normal	Amount	% Of Normal	1987 as a % of 1986
Spring Runoff Stored In Electric Lake (Ac. Ft.)	7,500	74	2,981	29	252
Calculated Natural Flow At Plant (Ac. Ft.)	111,483	160	60,641	87	54

The 1987 water quality information on Huntington Creek was compiled on a monthly basis for stations above and below the Huntington Plant, while samples for Huntington Creek below Electric Lake and the Right Fork were taken quarterly. Utah Power & Light's Environmental Department conducted the sampling program and the analyses were performed by Standard Labs, Huntington, Utah, and Ford Lab, Salt Lake City. The location of water quality sampling stations on Huntington Creek that were considered for this report are listed as follow (refer to Map No. 1 in pocket):

1. Below Electric Lake*
2. Above the Forks*
3. Below the Power Plant Diversion
4. Below the Power Plant

* Not listed on map due to scale.

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

TABLE 11: HUNTINGTON CREEK WATER QUALITY (1987 WATER YEAR)

	Below Electric Lake			Right Fork Above Left Fork			Above Power Plant			Below Power Plant		
Parameter	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.	Ave.	Max.	Min.
pH (N.U.)	8.0	8.6	7.1	8.3	8.9	7.9	8.2	8.8	7.5	8.5	9.0	7.6
Sulfate	11.5	14.0	8.0	17.5	22	11	--	--	--	--	--	--
Susp. Solids	20.0	37.0	3.0	5.5	10	1.0	270	1070	2	155	582	10
Diss. Solids	157	276	108	275	306	148	329	510	186	334	445	225
Spec. Cond. (umhos)	293	344	250	377	463	315	378	420	332	411	475	320
Alkalinity ($CaCO_3$)							185	210	156	184	225	167

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

The comparison of water quality characteristics with the Huntington drainage for 1986 and 1987 is presented in Table 12. This comparison merits consideration in order to evaluate the changes in water quality from year to year. Average values are presented in milligrams per liter unless otherwise noted.

TABLE 12: HUNTINGTON CREEK WATER QUALITY 1986-1987

Parameter	Below Electric Lake 1986	Below Electric Lake 1987	Right Fork Above Left Fork 1986	Right Fork Above Left Fork 1987	Above Power Plant 1986	Above Power Plant 1987	Below Power Plant 1986	Below Power Plant 1987
pH (N.U.)	8.0	8.0	8.4	8.3	8.5	8.2	8.4	8.5
Sulfate	10.4	11.5	24	17.5	44	-	48	-
T. Susp. Solids	4.6	20	19	5.5	24	270*	25	155*
T. Diss. Solids	161	157	201	275	264	329	350	334
Alkalinity (TOT)	-	-	-	-	174	185	274	184

* 2 samples taken during spring runoff period

2. Deer Creek

a. Flow and Sampling Schedule

(1) Locations: a) Above the Mine
b) Below the Mine
(See Map No. 1 in pocket)

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

(3) Water Quality Sampling

(a) 1981-87: Water samples are collected and analyzed during the first or second week of each month throughout the duration of the runoff season. Normal runoff season will be considered from May through October. If runoff persists beyond the month of October, samples will be collected on a quarterly basis until the month of May of the following year.

(b) 1988: 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 J.) This program will be initiated during March and continue through 1988; i.e., June, September, and December. Field measurements including pH, specific conductivity, temperature, and dissolved oxygen will be performed monthly in conjunction with quantity measurements.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of three Parshall flumes (see Map No. 1 for flume locations). A hydrograph showing all the data collected for 1987, 1986, 1985, and 1984 has been generated for each flume location (See Appendix B). During 1987 the hydrographs show a peak flow of approximately 921.2 GPM in May for the "above the mine" and "at permit boundary" locations, whereas flow below the mine was estimated at 1200 GPM during the same period. Base flow for 1987 above and below the mine was 10.0 GPM during December.

c. Quality Information

In accordance with the Deer Creek MRP baseline quality analysis was performed in 1986. Baseline analysis will be repeated once every five (5) years. The results of the 1987 operational quality analysis are listed in Tables 13 and 14. The minimum, maximum, and mean values, along with the historical results, are given for a five-year period. Values are in milligrams per liter unless otherwise noted. Complete raw data can be found in Appendix B. It is apparent from 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. An examination of Tables 13 and 14 reveals that all parameters tested for both locations follow the historical results closely.

TABLE 13: DEER CREEK SURFACE WATER QUALITY
ABOVE THE MINE

1987 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
4-08	<1.0	337	82.0	<1.0	176.0	1580	7.80	550	<0.05	0.13	83.9	<0.01	---	7.7	4.33	111.6	255.0	897	9.0	<0.1
May	Cancelled due to change in lab contractor																			
6-11	<1.0	272	2.2	<1.0	6.3	440	7.65	225	<0.05	0.31	27.9	0.06	0.6	7.8	0.50	16.0	24.0	275	1.0	<0.1
7-07	<1.0	273	38.0	<1.0	8.0	505	8.40	225	<0.05	0.06	31.6	<0.01	0.6	7.2	0.60	18.0	25.0	252	<4.0	<0.1
8-13	<1.0	303	46.0	<1.0	3.5	500	5.70	250	<0.05	<0.05	33.0	0.01	1.0	7.7	0.90	20.42	64.0	312	<4.0	<0.1
9-19	0	328	59.1	6.0	4.0	360	5.30	296	0.02	0.04	36.0	0.01	<1.0	8.4	1.08	27.80	62.0	256		0
10-17	137.0	276	60.9	<1.0	8.4	500	6.80	324	<0.05	<0.05	41.7	<0.01	<1.0	7.0	1.45	23.60	130.0	378	<1.0	<0.1
MIN	0	272	2.2	<1.0	3.5	360	5.3	225	0.02	0.04	27.9	<0.01	0.6	7.0	0.50	16.0	24.0	252		0
MAX	137.0	337	82.0	6.0	176.0	1580	8.4	550	0.05	0.31	83.9	0.06	<1.0	8.4	4.33	111.6	255.0	897		<0.1
MEAN	23.5	298.2	48.0	1.8	34.4	647.5	6.94	311.7	0.05	0.11	42.4	0.02	0.84	7.63	1.48	36.24	93.3	395		0.08
1986																				
MIN	1.0	262	42.0	<1.0	4.5	470	8.2	232	<0.05	<0.05	26.3	<0.01	<0.5	7.3	0.8	13.9	30.0	269	<0.5	<0.1
MAX	1.0	322	62.0	<1.0	10.8	660	10.2	290	<0.05	0.26	40.1	0.03	0.5	7.9	1.12	27.6	90.0	385	130.0	<0.5
MEAN	1.0	299.7	50.7	<1.0	7.29	573.1	9.46	263.9	<0.05	0.08	33.4	0.01	0.5	7.66	1.0	20.0	52.9	317.9	23.9	0.02
1985																				
MIN						439				<0.05		<0.01		7.4				246	1.0	
MAX						685				0.21		0.08		8.0				378	162.0	
MEAN						573.1				0.07		0.02		7.8				317.9	24.3	
1984																				
MIN						480				<0.05		<0.01		7.3				231	<0.5	
MAX						700				<0.05		<0.01		8.3				381	41.5	
MEAN						582.5				<0.05		<0.01		7.9				319.5	11.5	
1983																				
MIN						525				0.03		<0.01		7.7				280	<0.5	
MAX						770				0.74		0.07		8.4				566	164.0	
MEAN						600.6				0.18		0.03		8.1				350.3	31.5	
HISTORICAL 1978-1986																				
MIN	<1.0	262	42.0	<1.0	4.5	360	8.2	232	<0.05	0.03	26.3	<0.01	<0.5	7.0	0.8	13.9	10.0	231	<0.5	<0.1
MAX	12.0	322	62.0	<1.0	12.0	820	10.2	290	<0.05	40.1	40.1	0.24	1.0	8.5	1.12	27.6	90.0	566	3592.0	<0.5
MEAN	2.6	299.7	50.7	<1.0	7.29	572	9.46	263.9	<0.05	1.00	33.4	0.04	0.6	7.89	1.0	20.0	44.1	328.0	134.7	0.02

TABLE 14: DEER CREEK SURFACE WATER QUALITY
BELOW THE MINE

1987 SAMPLE DATES	ALKALINITY ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
4-09	<1.0	305	124	<1.0	420.0	2650	7.45	815	<0.05	0.29	122.8	<0.01	---	7.40	7.31	233.2	500.0	1544	41.0	0.1
May	Cancelled due to change in lab contractor																			
6-16	<1.0	255	2.4	<1.0	48.0	620	7.35	285	0.07	0.13	40.1	0.02	1.2	7.80	1.00	39.0	100.0	429	9.0	0.1
7-16	<1.0	267	46.0	<1.0	88.0	930	8.20	320	<0.05	0.05	49.8	0.01	<0.5	7.35	2.00	63.0	90.0	489	8.0	<0.1
8-18	<1.0	272	78.0	<1.0	34.6	1320	5.40	475	<0.05	<0.05	78.0	<0.01	1.1	7.60	3.30	197.8	280.0	798	<4.0	<0.1
9-22	<1.0	344	76.0	8.0	49.0	1000	5.70	740	<0.05	0.05	76.0	0.01	<1.0	8.50	4.97	111.6	90.0	730	<1.0	<1.0
10-21	90.0	371	102.2	<1.0	73.6	1300	6.60	607	<0.05	<0.05	102.2	<0.01	<1.0	8.27	5.69	119.2	347.0	848	4.0	<1.0
MIN	<1.0	255	2.4	<1.0	34.6	620	5.10	285	<0.05	<0.05	40.1	<0.01	<1.0	7.35	1.00	39.0	90.0	429	<4.0	<0.1
MAX	90.0	371	124.0	8.0	420.0	2650	8.20	815	0.07	0.29	122.8	0.02	1.2	8.50	7.31	233.8	500.0	1544	410	<1.0
MEAN	15.2	302.3	71.4	2.2	118.9	1303.3	6.78	540.3	0.53	0.10	78.2	0.01	0.8	7.82	4.05	127.3	234.5	806.3	11.2	0.40
1986																				
MIN	<1.0	260	46.0	<1.0	30.3	698	9.35	284	<0.05	<0.05	34.5	<0.01	<0.5	7.35	1.20	32.6	65.0	359	<0.5	<0.1
MAX	<1.0	359	112.0	<1.0	290	2300	11.0	750	0.06	0.19	114.3	0.03	0.5	7.90	6.61	192.0	450.0	1315	91.0	<0.5
MEAN	<1.0	308.1	73.0	<1.0	135.9	1306.9	10.0	449.9	0.05	0.09	65.0	0.017	0.5	7.71	3.66	104.2	225.0	739	25.7	0.02
1985																				
MIN						630				<0.05		<0.01		7.4				320	4.0	
MAX						2300				0.39		0.08		8.3				1354	258.0	
MEAN						1374.7				0.13		0.02		7.9				690.6	44.1	
1984																				
MIN						620				0.05		<0.01		7.8				371	0.5	
MAX						2150				0.18		<0.01		8.5				637	141.0	
MEAN						1172.5				0.07		<0.01		8.1				465.5	29.8	
1983																				
MIN						650				0.05		<0.01		8.0				367	6.5	
MAX						1150				2.12		0.15		8.6				868	557.0	
MEAN						830.8				0.55		0.04		8.3				550	129.7	
HISTORICAL 1978-1986																				
MIN	<1.0	260	46	<1.0	22.0	420	8.84	284	---	<0.05	34.5	<0.01	<0.5	6.9	1.3	32.6	65.0	273	<0.5	<0.1
MAX	14.0	359	112	<1.0	290.0	2300	11.00	750	---	170.00	114.3	0.27	1.0	8.6	6.61	192.0	450.0	1448	20,540.0	<0.5
MEAN	2.9	308.1	73	<1.0	121.6	1138	9.80	449.9	---	4.20	65.0	0.05	0.06	7.97	3.66	104.2	203.3	667	557.9	0.02

3. Meetinghouse Canyon Creek

a. Flow and Sampling Schedule

(1) Location: South Fork of Meetinghouse Canyon (See Map No. 1 in pocket.)

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

(3) Water Quality Sampling

(a) 1986-87: Water samples are collected and analyzed during the first or second week of each month throughout the duration of the runoff season. Normal runoff season will be considered from May through October. If runoff persists beyond the month of October, samples will be collected on a quarterly basis until the month of May of the following year.

(b) 1988: 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 J.) This program will be initiated during March and will continue through 1988; i.e., June, September, and December. Field measurements including pH, specific conductivity, temperature, and dissolved oxygen will be performed monthly in conjunction with quantity measurements.

b. Flow Information

A hydrograph comparing 1987, 1986, 1985, and 1984 can be found in Appendix C. The peak flow occurred during the month of May at a rate of 1,153 GPM. A base flow of 0.0 GPM existed during December.

c. Quality Information

In accordance with the Deer Creek MRP baseline quality analysis was performed in 1986. Baseline analysis will be repeated once every five (5) years. Quality sampling was initiated in 1986; results of the 1987 operational analysis are listed in Table 15. The minimum, maximum, and mean values for 1987 are listed in Table 15. Complete raw data can be found in Appendix C.

TABLE 15: MEETINGHOUSE CANYON WATER QUALITY

1987 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
May	Cancelled due to change in lab contractor																			
6-16	<1.0	229	2.2	<1.0	47.5	380	7.35	210	0.30	0.90	24.3	0.02	1.1	7.80	0.6	7.0	20.0	233	42.0	0.2
7-15	<1.0	222	32.0	<1.0	7.0	382	6.70	195	<0.05	0.26	28.0	0.02	<0.5	7.25	0.7	9.0	24.0	216	16.0	0.1
8-18	<1.0	245	38.0	<1.0	3.0	420	5.40	230	0.08	0.13	33.0	0.04	10.9	7.62	1.2	10.62	32.0	250	18.0	0.1
9-22	0.0	307	55.6	8.0	4.0	300	6.00	267	0.04	0.08	31.15	<0.01	<1.0	8.55	1.29	10.74	45.0	190	<1.0	<1.0
10-21	49.0	248	..3	5.0	8.8	350	6.50	228	<0.05	<0.05	30.3	<0.01	<1.0	8.38	1.29	3.80	33.0	259	2.0	<1.0
MIN	0.0	222	2.2	<1.0	3.0	300	5.40	195	0.04	<0.05	24.3	<0.01	<1.0	7.25	0.60	3.80	20.0	190	<1.0	0.1
MAX	49.0	307	55.6	8.0	47.5	420	7.35	267	0.08	0.90	33.0	0.04	10.9	8.55	1.29	10.74	45.0	259	42.0	<1.0
MEAN	10.4	250.2	33.8	3.2	14.1	366.4	6.39	226	0.10	0.28	29.4	0.02	2.9	7.92	1.02	8.23	30.8	229.6	15.8	0.48
1986																				
MIN	<1.0	231	38.0	<1.0	3.3	432	8.6	213	<0.05	<0.05	22.6	<0.01	<0.5	7.35	0.9	6.5	25.0	231	<0.5	<0.1
MAX	<1.0	261	52.8	<1.0	7.6	500	10.3	260	<0.05	0.18	36.5	0.02	0.6	8.0	1.6	13.1	85.0	292	74.0	<0.5
MEAN	<1.0	248.7	44.5	<1.0	5.1	450	9.4	233	<0.05	0.10	29.6	0.02	0.5	7.66	1.23	9.5	43.2	252.7	24.0	0.2

B. Cottonwood Creek Drainage System

Utah Power & Light monitors two of the tributaries of the Cottonwood Creek Drainage system: 1) Cottonwood Canyon Creek and 2) Grimes Wash (see Map No. 1 in pocket).

1. Cottonwood Canyon Creek

An extensive baseline study conducted on Cottonwood Canyon Creek to determine water characteristics prior to mining at the proposed Cottonwood Mine began in 1979. A property acquisition in 1981 has resulted in mine plan changes; therefore, the baseline study was terminated as of January 1, 1984. As agreed upon in both the Deer Creek Mine and Wilberg Mine permit applications, UP&L will continue to monitor the flow and water quality field measurements at the USGS flume location on a monthly basis. The hydrograph in Appendix C illustrates the flow information collected during 1987, 1986, 1985, and 1984. This shows a peak flow of 1,075 GPM in May through June and a baseline flow of approximately 506.7 GPM in December.

2. Grimes Wash

a. Flow and Sampling Schedule

(1) Locations: 1) Right Fork
2) Left Fork
3) Below the Mine
(See Map No. 1 in pocket)

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

(3) Water Quality Sampling

(a) 1981-87: Water samples are collected and analyzed during the first or second week of each month throughout the duration of the runoff season. Normal runoff season will be considered from May through October. If runoff persists beyond the month of October, samples will be collected on a quarterly basis until the month of May of the following year.

(b) 1988: 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 J.) This program will be initiated during March and will continue through 1988; i.e., June, September, and December. Field measuremetns including pH, specific conductivity, temperature, and dissolved oxygen will be performed monthly in conjunction with quantity measurements.

b. Flow Information

As stated above, flow information is collected monthly throughout the year with the use of two Parshall flumes (see Map No. 1 for flume locations). A hydrograph comparing 1987, 1986, 1985, and 1984 has been generated for each flume location (See Appendix C). The hydrographs show that during 1987 the Right and Left Forks and Below the Mine locations reached a peak flow of 2,250, 51.6, and 2,350, respectively, during the month of May. Base flow for the Right Fork was 0.0 GPM during January through March and June through December, and the Left Fork base flow was 0.0 GPM during January through March and October through December.

c. Quality Information

In accordance with the Deer Creek MRP baseline quality analysis was performed in 1986. Baseline analysis will be repeated once every five (5) years. The results of the 1987 operational quality analysis are listed in Tables 16, 17 and 18. 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 D.

TABLE 16: GRIMES WASH SURFACE QUALITY
RIGHT FORK

1987 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	IRON DISSOLVED	IRON TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	SOLIDS TDS	SOLIDS TSS	SOLIDS SETTLEABLE
4-8	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.6	6.3	0.05	---	7.2	7.64	2.0	20.0	115	2000	3.3
May	Cancelled due to change in lab contractor -																			
June	Dry																			
July	"																			
Aug.	"																			
Sept.	"																			
Oct.	"																			
MIN	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.6	6.3	0.05	---	7.2	7.64	2.0	20.0	115	2000	3.3
MAX	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.6	6.3	0.05	---	7.2	7.64	2.0	20.0	115	2000	3.3
MEAN	<1.0	104	34.4	<1.0	3.0	190	6.8	112	3.31	20.6	6.3	0.05	---	7.2	7.64	2.0	20.0	115	2000	3.3
1986																				
MIN	<1.0	240	30.0	<1.0	8.3	465	7.6	222	<0.05	<0.05	35.7	<0.01	<0.5	7.45	1.60	3.40	40.0	262	0.5	<0.1
MAX	<1.0	320	52.0	<1.0	11.5	680	9.8	320	<0.05	0.73	46.2	0.05	2.2	8.10	3.30	20.44	120.0	389	257.0	<0.5
MEAN	<1.0	274.9	41.6	<1.0	10.2	547.6	8.76	268.1	<0.05	0.24	39.9	0.02	0.74	7.77	2.47	15.72	61.3	315.6	60.6	0.2
1985																				
MIN						200				<0.05		<0.01		7.4				125	11.0	
MAX						740				2.90		0.08		8.3				430	7116.0	
MEAN						532.3				0.50		0.02		8.0				304.3	833.8	
1984																				
MIN						470				<0.05		<0.01		7.9				246	7.0	
MAX						750				1.05		0.02		8.7				477	1482.0	
MEAN						593.8				0.26		0.01		8.2				332.6	207.7	
1983																				
MIN						525				0.08		<0.01		8.1				386	10.5	
MAX						650				2.64		0.18		8.6				280	493.0	
MEAN						610				0.69		0.06		8.3				328.2	183.3	
HISTORICAL 1979-1986																				
MIN	0.1	240	30.0	<1.0	8.0	200	7.6	222	<0.05	0.01	35.7	<0.01	<0.5	7.4	1.60	3.4	33.0	125	0.5	
MAX	14.0	320	52.0	<1.0	16.0	750	9.8	320	<0.05	7.20	46.2	0.30	5.2	8.7	3.30	20.44	161.7	700	7116.0	
MEAN	2.3	274.9	41.6	<1.0	10.6	578	8.76	268.1	<0.05	0.93	39.9	0.06	1.2	8.1	2.47	15.72	71.8	347	347.8	

TABLE 17: GRIMES WASH SURFACE QUALITY
LEFT FORK

1987 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	---- IRON ---- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	-------- SOLIDS --------- TDS	TSS	SETTLEABLE
4-4	<1.0	188	39.2	<1.0	6.0	412	7.8	196	0.12	0.62	23.8	<0.01	---	7.60	2.48	11.1	45.0	212	48.0	0.2
May	Cancelled due to change in lab contractor																			
6-16	<1.0	300	2.3	<1.0	9.9	600	7.55	290	0.07	0.08	42.6	0.06	1.2	7.85	1.0	30.0	90.0	382	16.0	<0.1
7-15	<1.0	304	36.0	<1.0	11.0	610	6.65	260	<0.05	<0.05	41.3	<0.01	<0.5	7.30	1.0	34.0	85.0	328	4.0	<0.1
8-11	<1.0	312	42.0	<1.0	156.0	590	7.80	275	<0.05	<0.05	41.0	0.02	3.5	7.80	1.0	69.0	69.0	362	<4.0	<0.1
9-17	<1.0	482	71.1	15.0	10.0	420	5.00	460	0.05	0.07	68.5	<0.01	3.4	8.60	1.37	79.0	79.0	250	<1.0	0
Oct	Damp - no flow																			
MIN	<1.0	188	2.3	<1.0	6.0	412	5.0	196	<0.05	<0.05	23.8	<0.01	<0.5	7.60	1.0	11.1	45.0	212	<1.0	0
MAX	<1.0	482	71.1	15.0	156.0	610	7.8	460	0.12	0.62	68.5	0.06	3.5	8.60	2.48	79.0	90.0	382	48.0	0.2
MEAN	<1.0	317.2	38.1	3.8	56.6	526.4	7.0	296.2	0.07	0.17	43.4	0.02	1.7	7.83	1.37	44.6	73.6	306.8	14.6	0.1
1986																				
MIN	<1.0	281	36	<1.0	7.7	410	7.40	252	<0.05	<0.05	37.7	<0.01	<0.5	7.40	1.30	25.2	67.0	293	3	<0.1
MAX	<1.0	331	58	<1.0	10.9	690	9.60	310	<0.05	0.22	43.8	0.07	0.6	8.00	3.00	34.0	115.0	427	253	<0.5
MEAN	<1.0	304.3	45.5	<1.0	8.8	590.7	8.56	278	<0.05	0.12	39.9	0.02	0.5	7.65	1.90	29.2	77.9	345.6	54.1	0.2
1985																				
MIN						473				<0.05		<0.01		7.5				283	<0.5	
MAX						750				0.22		0.08		8.3				438	141.0	
MEAN						628.2				0.12		0.02		7.9				356	37.1	
1984																				
MIN						600				<0.05		<0.01		7.8				278	<0.5	
MAX						685				0.09		<0.01		8.5				396	76.0	
MEAN						639.3				0.06		<0.01		8.1				343.9	17.0	
1983																				
MIN						720				0.04		<0.01		7.4				295	<0.5	
MAX						650				0.56		0.11		8.3				570	133.0	
MEAN						676.3				0.19		0.03		8.1				388.1	28.6	
HISTORICAL 1979-1986																				
MIN	<1.0	281	36	<1.0	7.7	412	7.4	252	<0.05	0.04	37.7	<0.01	0.1	7.4	1.3	25.2	30.4	278	<0.5	<0.1
MAX	<1.0	331	58	<1.0	10.9	790	9.6	310	<0.05	0.81	43.8	0.15	0.6	8.7	3.0	34.0	115.0	570	253.0	<0.5
MEAN	<1.0	304.3	45.5	<1.0	8.8	641	8.56	278	<0.05	0.16	39.9	0.03	0.5	8.0	1.9	29.2	71.9	369	27.2	0.2

TABLE 18: GRIMES WASH SURFACE QUALITY
BELOW THE MINE

1987 SAMPLE DATES	ACIDITY	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	DISSOLVED OXYGEN	HARDNESS	---- IRON ----- DISSOLVED	TOTAL	MAGNESIUM	MANGANESE	OIL & GREASE	pH	POTASSIUM	SODIUM	SULFATE	-------- SOLIDS --------- TDS	TSS	SETTLEABLE
4-8	<1.0	117	40.8	<1.0	16.0	295	7.15	146	2.25	22.60	10.7	0.04	---	7.20	7.31	9.0	46.0	155	3295.0	4.0
May	Cancelled due to change in lab contractor																			
6-16	<1.0	349	5.1	<1.0	154.0	1470	7.75	625	0.06	0.64	89.9	0.09	0.6	7.70	6.00	104.0	350.00	1033	4.0	<0.1
7-15	<1.0	366	94.0	<1.0	117.0	1440	7.10	585	0.05	0.12	85.1	0.09	<0.5	7.10	5.00	88.0	315.00	943	<4.0	<0.1
8-11	<1.0	400	114.0	<1.0	9.0	1700	6.70	705	0.10	0.23	102.0	0.17	2.5	7.35	6.70	121.0	340.0	1201	5.0	<0.1
9-17	<1.0	378	149.0	<1.0	59.2	1200	4.50	672	0.05	0.26	72.9	0.10	5.2	8.15	6.80	93.6	400.0	885	<1.0	<1.0
10-21	127.0	373	191.5	<1.0	49.6	1420	5.90	855	<0.05	0.05	91.6	0.11	2.4	7.94	7.81	82.9	593.0	1078	4.0	<1.0
MIN	<1.0	117	5.1	<1.0	9.0	295	4.50	146	<0.05	<0.05	10.7	0.04	<0.5	7.10	5.00	9.0	46.0	155	<1.0	<0.1
MAX	127.0	400	191.5	<1.0	154.0	1700	7.75	855	2.25	22.60	102.0	0.17	5.2	8.15	7.81	121.0	593.0	1201	3295.0	4.0
MEAN	22.0	330.5	99.1	<1.0	67.5	1254.2	6.52	598.0	0.43	3.98	75.4	0.10	2.2	7.57	6.60	83.1	340.7	882.5	552.2	1.05
1986																				
MIN	<1.0	284	72.4	<1.0	36.3	890	7.85	405	<0.05	<0.05	51.1	<0.01	<0.5	7.15	2.60	47.0	150.0	523	<0.5	<0.1
MAX	<1.0	381	150	<1.0	141.2	1800	11.45	760	0.13	0.40	87.6	0.03	1.0	7.95	5.80	119.8	320.0	1224	248.0	<0.5
MEAN	<1.0	342.8	99	<1.0	71.4	1238.9	9.38	544.6	0.06	0.13	72.2	0.03	0.17	7.56	4.10	68.9	243.3	760.4	37.1	0.2
1985																				
MIN						220				0.05		0.01		7.4				152	2.0	
MAX						1810				2.70		0.13		8.1				1129	9702.0	
MEAN						1182.6				0.37		0.04		7.8				732.9	994.8	
1984																				
MIN						800				0.05		0.01		7.7				457	1.0	
MAX						1700				0.45		0.07		8.3				923	107.0	
MEAN						1101.3				0.15		0.02		8.1				649.3	24.5	
1983																				
MIN						700				0.05		0.01		7.7				427	1.0	
MAX						1000				1.25		0.06		8.3				643	244.0	
MEAN						851.9				0.28		0.03		8.13				521.9	57.4	
HISTORICAL 1979-1986																				
MIN	<0.1	284	72.4	<1.0	12.0	220	7.85	405	<0.05	0.01	51.1	<0.01	<0.5	7.15	2.60	47.0	66.0	152	<0.5	<0.1
MAX	16.0	381	150	<1.0	141.2	1810	11.45	760	0.13	18.90	87.6	0.30	2.4	8.50	5.80	119.8	550.0	1224	9702.0	<0.5
MEAN	2.4	342.8	99	<1.0	59.7	1048	9.38	544.6	0.06	0.90	72.2	0.05	0.90	7.92	4.10	68.9	245.5	621	270.8	0.2

Grimes Wash drainage quality is greatly affected by the influx of the Right Fork. The Right Fork originates in the North Horn Formation (interbedded shales, siltstones, and sandstones), which is abundant with calcareous material. As a result, the Right Fork contributes a relatively high amount of suspended solids to the Grimes Wash drainage. The greatest factor influencing the suspended solids level in the Right Fork drainage during 1987 was the sudden increase in temperature resulting in a rapid increase in flow which occurred in April.

As reported in 1985, the TDS level increased slightly at the Below the Mine location. Two possible factors stated for the rise were Wilberg Mine Discharge and Mancos Shale seeps. Due to the fact that no water was discharged from the mine during 1985 through 1987 (one exception in August 1986), the second factor, seeps emanating from the Mancos Shale, is thought to have the greatest influence upon the level. Periodic sampling during 1986 and early 1987 confirmed the seeps' contribution to the TDS level. The average for the four samples collected was 1,188 mg/l, representing a nearly 3.3 fold increase over the historical averages for the Right and Left Forks.

IV. EAST MOUNTAIN SPRINGS

Between the time UP&L began monitoring springs on East Mountain and 1986 the number of springs measured had increased from less than 50 to nearly 70. (See Map No. 2 in pocket.) It was felt that more benefit could be realized by concentrating our monitoring to selective springs in the areas that will be undermined within the next five years. (See Map No. 3 in pocket.) A meeting was held on March 25, 1987 with the U.S. Forest Service and the Utah State Division of Oil, Gas and Mining to determine the most effective plan for UP&L's monitoring to follow. A subsequent meeting was held on April 15, 1987 with the State Division of Oil, Gas and Mining to finalize the monitoring plan revisions.

During the meetings it was resolved that the following springs will be monitored.

* Burnt Tree Springs	79-34
* Elk Spring	* 79-35
* Sheba Springs	79-38
Ted's Tub	79-40
79-2	80-41
* 79-10	80-43
79-12	* 80-44
79-15	* 80-46
* 79-23	80-47
79-24	82-51
* 79-26	* 82-52
* 79-29	* 84-56
79-32	

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

A. Flow and Sampling Schedule

1. Flow

All springs listed above 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.

2. 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 J.) In addition, the twelve discharge recession springs denoted by an asterisk in the above list will be monitored monthly, access permitting, each year between July and October for the following parameters: 1) discharge quantity, 2) specific conductivity [field], 3) temperature [field], 4) pH [field], 5) total hardness, 6) carbonate, and 7) total manganese.

B. Spring Flow

Both precipitation and spring discharge rates decreased from 1986 to 1987, whereas temperature, a critical factor on spring discharge rates, was 1.3 degrees higher in 1987 than the historical average. Table 19, A and B, is a tabulation of the flow data collected during the 1987 monitoring season. To record the season variation, all springs

TABLE 19A: EAST MOUNTAIN SPRINGS DISCHARGE

Spring	Date Sampled	Flow (GPM)	Temp. °F	Date Sampled	Flow (GPM)	Temp. °F	Seasonal Net Change %
√Sheba	07-13-87	11.4	42	10-12-87	2.5	46	-0.78
√Elk Spring	07-13-87	217	41	10-12-87	61.6	39	-0.72
√Burnt Tree	07-13-87	10.2	47	10-13-87	10	45	-0.02
Jerk Water							
Pine Springs							
Pine Sp. Trough							
√Ted's Tub	07-13-87	69	40	10-12-87	6.9	47	-0.90
79-1							
√79-2	07-14-87	4	45	10-12-87	2.2	40	-0.45
79-3							
79-4							
79-5							
79-6							
79-7							
79-8							
79-9							
√79-10	07-13-87	26.1	42	10-12-87	6.6	44	-0.75
79-11							
79-12	07-13-87	Damp					
79-13							
79-14							
√79-15	07-13-87	14.6	49	10-12-87	4.9	43	-0.66
79-16							
79-17							
79-18							
79-19							
79-20							
79-21							
79-22							
√79-23	07-14-87	Damp					
√79-24	07-14-87	Damp					
79-25							
√79-26	07-14-87	1.5	52	10-13-87	2	46	0.33
79-27							
79-28							
√79-29	07-14-87	2.5	40	10-13-87	2.2	40	-0.12
79-30							
79-31							
79-32	07-14-87	1	42	Inaccessible			
79-33							
√79-34	07-13-87	10.5	42	10-12-87	Damp		
√79-35	07-13-87	6.3	40	10-12-87	1.7	44	-0.73
79-36							
79-37							
79-38	07-13-87	8.3	40	10-12-87	2.3	49	-0.72
79-39							
79-40	07-14-87	2	48	10-13-87	Dry		
√80-41	07-14-87	2.5	42	10-13-87	Dry		

TABLE 19B: EAST MOUNTAIN SPRINGS DISCHARGE

Spring	Date Sampled	Flow (GPM)	Temp. °F	Date Sampled	Flow (GPM)	Temp. °F	Seasonal Net Change %
80-42							
√ 80-43	07-14-87	0.4	46	10-13-87	Dry		
√ 80-44	07-14-87	Dry					
80-45							
√ 80-46	07-14-87	4	41	10-13-87	1.2	41	-0.70
√ 80-47	07-14-87	7.4	40	10-13-87	7.8	40	0.05
80-48							
80-49							
80-50							
√ 82-51	07-14-87	Damp					
√ 82-52	07-14-87	20.1	39	10-12-87	6.8	41	-0.66
84-53							
84-54							
84-55							
√ 84-56	07-14-87	2.5	41	10-13-87	2.3	42	-0.08
85-57							
86-58							
86-59							

Average Net Change -0.46

measured in July are measured again in October. The seasonal variation is represented in Table 19, 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 -46 percent decrease from the July to the October measurements.

A six-year comparison of spring discharge is shown in Table 20. The table includes a year by year comparison of springs identified from each mode of occurrence (Table 21). The springs utilized in the comparison are underlined in Table 21. 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 20 has been compared to East Mountain climatology to see how closely spring discharge rates follow local annual precipitation. Figure 3 reveals good correlation between spring discharge and precipitation between 1982-84, but starting in 1985 spring discharge rates have declined whereas precipitation has leveled off. Along with precipitation, temperature plays a critical role in yearly discharge variations, especially during the early stages of the runoff period. Listed in Table 22 is a comparison of January through June temperature data from surrounding weather stations for the period 1982-87 versus departure from normal. The comparison is vital in determining mining effects on spring discharge versus general changes in annual precipitation.

TABLE 20: YEARLY SPRING DISCHARGE VARIATIONS (GPM)

Spring	1982	1983	1984	1985	1986	1987
Burnt Tree	12.0	30.5	26.6	26.1	17.5	10.2
Elk Spring	546.0	642.3	427.9	390.5	309.7	217.0
Sheba	15.0	22.9	19.7	14.4	8.6	11.4
Ted's Tub	60.0	89.0	48.0	39.1	31.6	69.0
79-2	12.0	9.1	9.7	5.5	2.9	4.0
79-10	32.0	57.1	20.0	33.3	26.1	26.1
79-12	1.0	1.0	5.5	3.4	2.0	Damp
79-15	27.5	42.9	26.1	18.2	18.2	14.6
79-23	3.0	20.0	3.6	6.8	0.6	Damp
79-24	6.1*	9.3*	6.1*	5.0	4.3	Damp
79-26	7.5	20.7	20.0	10.9	8.7	1.5
79-29	4.0	10.0	6.2	6.0	4.7	2.5
79-32	2.1	3.3	3.1	2.7	1.3*	1.0
79-34	30.0	56.7	42.9	18.5	16.7	10.5
79-35	7.6	15.0	10.5	10.5	7.8	6.3
79-38	10.0	10.9	9.2	4.7	3.6	8.3
79-40	3.2	15.0	8.3	5.6	4.7	2.0
80-41	1.0	10.9	15.0	5.8	4.1	2.5
80-43	10.0	24.0	20.0	6.6	3.1	0.4
80-44	12.0	24.0	13.1	5.5	2.2	Dry
80-46	12.0	60.0	28.3	18.2	12.0	4.0
80-47	12.0	20.0	15.0	12.5	12.2	7.4
80-51	3.0	10.0	5.9	3.8	2.6	Damp
82-52	16.0	80.0	48.0	32.1	23.3	20.1
84-56	6.3*	9.6*	6.3	4.7	3.7	2.5
TOTALS	845.0	1,294.2	845.0	690.4	532.2	421.3

* No measurement - utilized yearly comparison.

TABLE 21: 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		Elk Springs, 79-10, 79-18, 79-19, 79-20, 84-54	
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 Horizons	Blackhawk Formation 80-50, 84-57		80-49 (Price River) Bear Canyon Fault Zone 82-51 (Price River)	Flagstaff Limestone 79-4, 79-5, Pine Springs Trough, Price River Formation 79-24, 79-33, 79-40, 80-41, 80-44, 80-45, 82-52, Jerk Water

TABLE 22

TEMPERATURE COMPARISON

MONTH	EAST MOUNTAIN DEPARTURE FROM NORMAL	ELECTRIC LAKE DEPARTURE FROM NORMAL	HUNTER PLANT DEPARTURE FROM NORMAL	HUNTINGTON PLANT DEPARTURE FROM NORMAL
1982				
JAN		-3.0	-9.6	+1.2
FEB	Insufficient	-6.9	-2.4	-1.5
MAR	Historical	0.0	+2.6	+2.1
APR	Data	-3.0	+0.5	+1.0
MAY		-3.4	+4.0	+2.6
JUN		-1.7	+2.4	+0.7
1983				
JAN		+2.1	+2.7	+6.2
FEB	Insufficient	-2.2	+3.2	+2.1
MAR	Historical	+1.3	+4.5	+2.1
APR	Data	+7.6	-0.8	-3.4
MAY		-6.4	+1.9	+0.2
JUN		-3.5	+3.7	-1.1
1984				
JAN		-3.8	-7.6	+2.8
FEB	Insufficient	-5.4	-7.3	-0.3
MAR	Historical	-1.0	+1.4	-0.1
APR	Data	-4.5	+1.5	-1.8
MAY		+3.1	+11.2	+4.0
JUN		-1.6	+3.9	-3.8
1985				
JAN	-1.4	-5.7	-2.8	+2.1
FEB	-2.5	-8.6	-4.5	-5.5
MAR	+1.0	-1.4	+2.2	-0.4
APR	+7.8	+6.6	+8.0	+6.1
MAY	+6.1	+7.6	+8.4	+2.5
JUN	+7.3	+3.0	+6.8	+0.3
1986				
JAN	+5.1	+4.0	+6.2	+6.5
FEB	+3.1	+0.6	+7.9	+3.8
MAR	+7.6	+9.6	+9.5	+5.9
APR	+2.0	+0.8	+3.0	0.0
MAY	-5.6	0.0	+3.4	-0.1
JUN	+5.0	+5.5	+7.7	+3.3
1987				
JAN	-4.2	-4.8	-2.6	+0.8
FEB	-1.4	-6.3	+3.0	+1.7
MAR	-2.2	-2.7	+0.5	-3.1
APR	+7.3	+5.5	+6.2	+5.1
MAY	+5.4	+3.6	+4.4	+0.3
JUN	+5.3	+2.0	+7.7	+1.8

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	0.90	+1.8
1986	2.9	3.4	6.3	3.2	+4.0
1987	1.7	-0.5	3.2	1.1	+1.4

Table 22 clearly demonstrates near average temperatures between 1982 and 1984, but starting in 1985 positive departure from normal has been significant. Comparison between spring discharge rate and general changes in annual precipitation patterns correlated well in the past due to relatively normal temperatures experienced during the early runoff period (January through June). Figure 3 not only includes a comparison of spring discharge rate and precipitation as in the past but also temperature departure due to its critical influence on peak discharge occurrence.

An additional flow information study was initiated during the summer of 1985. The purpose of the program is to establish flow recession curves for the following springs: (1) Burnt Tree, (2) Elk Springs, (3) Sheba, (4) 79-10, (5) 79-23, (6) 79-26, (7) 79-29 replaced 79-32 during 1986, (8) 79-35, (9) 80-44, (10) 80-46, (11) 82-52, (12) 84-56. The flow information collected during 1987 is shown in Table 23; corresponding spring recession curves comparing 1987, 1986, 1985, and 1984 are located in Appendix E.

FIGURE 3

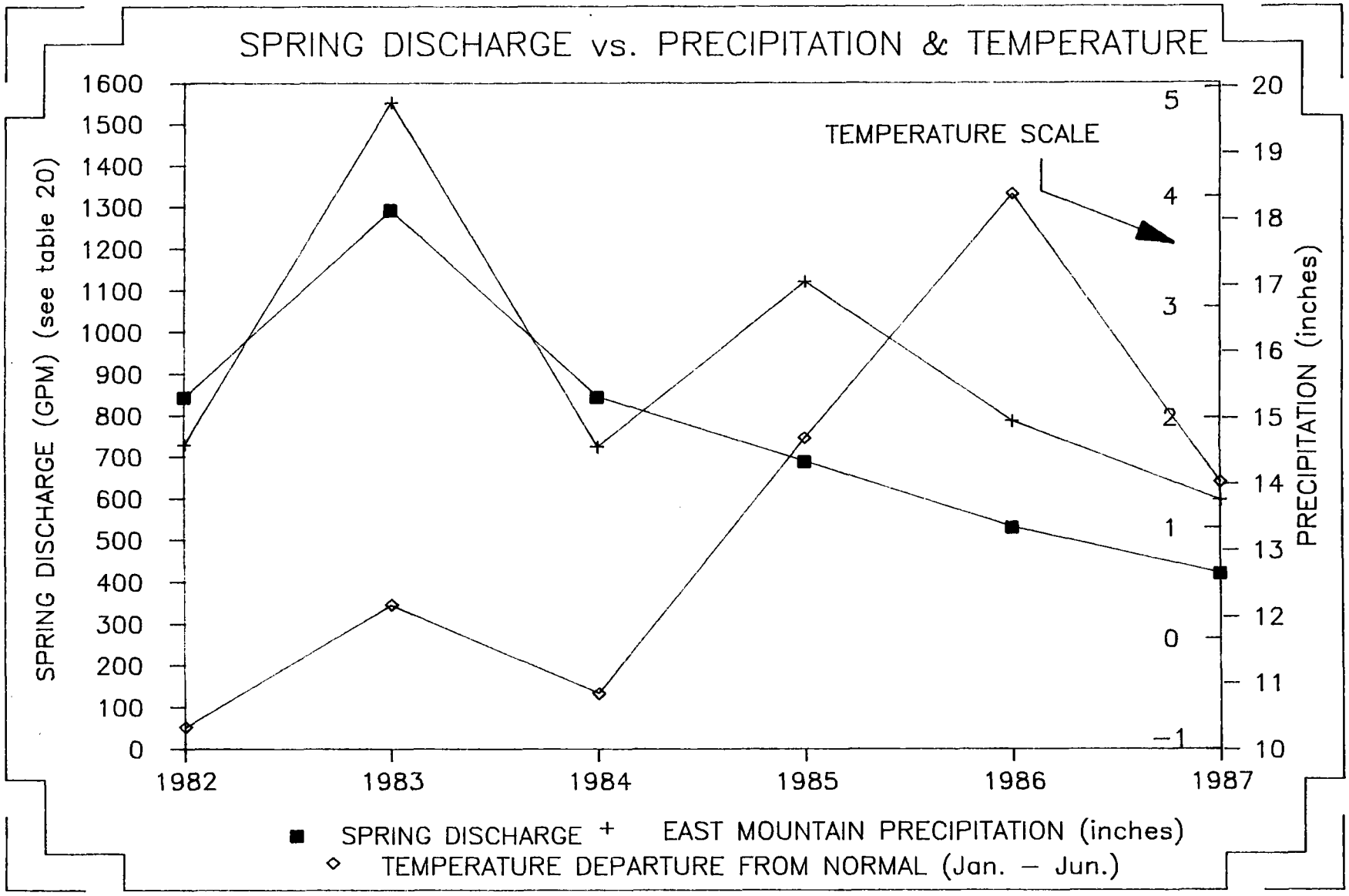

SPRING DISCHARGE vs. PRECIPITATION & TEMPERATURE
SPRING DISCHARGE (GPM) (see table 20)
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
TEMPERATURE SCALE
5
4
3
2
1
0
−1
PRECIPITATION (inches)
20
19
18
17
16
15
14
13
12
11
10
1982
1983
1984
1985
1986
1987
SPRING DISCHARGE
EAST MOUNTAIN PRECIPITATION (inches)
TEMPERATURE DEPARTURE FROM NORMAL (Jan. – Jun.)

TABLE 23: EAST MOUNTAIN REGRESSION STUDY (FLOW*/TEMP.)

1987

Spring	June	July	August	September	October	November	December
Burnt Tree	9.5/46°	10.2/47°	8.1/44°	4.0/41°	10.0/45°	I	10.4/43°
Elk Springs	329.0/41°	217.0/41°	110.1/42°	78.5/38°	61.6/39°	N	No access
Sheba	23.2/50°	11.4/42°	6.0/45°	3.6/44°	2.5/46°	A	1.8/40°
79-10	37.5/43°	26.1/42°	13.3/44°	10.7/45°	6.6/44°	C	6.1/39°
79-23	0.7/56°	DRY	DRY	DRY	DRY	C	---
79-26	1.0/48°	1.5/52°	1.9/64°	1.7/50°	2.0/46°	E	1.5/35°
79-29	2.0/40°	2.5/40°	2.7/46°	2.3/42°	2.2/40°	S	1.4/39°
79-35	8.4/41°	6.3/40°	4.0/40°	2.6/42°	1.7/44°	S	0.34/39°
80-44	1.2/50°	DRY	DRY	DRY	DRY	I	---
80-46	2.0/39°	4.0/41°	2.2/47°	1.3/41°	1.2/41°	B	Frozen
82-52	25.0/40°	20.1/39°	15.8/42°	11.0/41°	6.8/41°	L	No access
84-56	3.0/41°	2.5/41°	2.4/44°	2.4/42°	2.3/42°	E	2.2/39°

*All flow given in gallons per minute

C. Quality

To more closely identify springs which are related one with another, samples of their water were analyzed to determine the percentage of cations and anions in solution. The percentages have been graphically represented as cation-anion diagrams (see Appendix E). The purpose of the cation-anion diagrams is to identify groups of related springs by water chemistry. The diagrams clearly show the similarity of water quality of springs originating in the same geologic formation. To better visualize this concept, the cation/anion diagrams are presented by the geologic formation in which it originates.

The quality of the springs sampled in 1987 reveals an excellent correlation with historical averages. The sulfate content, which showed an unexplainable increase from 1981 through 1982, declined to levels experienced in 1979-80 and 1983-86. A summary of the water quality analysis for a representative group of East Mountain Springs is presented in Table 24. In the table the mean values for 1987 are compared

Table 24: East Mountain Springs Water Quality (Historical vs. 1987)

Parameter	Burnt Tree Historical	Burnt Tree 1987	Elk Spring Historical	Elk Spring 1987	Sheba Spring Historical	Sheba Spring 1987	79-10 Historical	79-10 1987	79-23 Historical	79-23 1987	79-26 Historical	79-26 1987
Elevation	9260		9350		9740		9350		9035		9310	
Geologic Formation	TKn		TKn		Tf		Kpr		TKn		TKn	
Bicarbonate	335.60	323.50	297.00	289.00	296.00	267.00	313.00	315.00	413.00	no	339.00	333.00
Calcium	69.10	63.40	76.30	63.80	97.50	85.80	81.00	81.10	79.60	flow	90.20	56.10
Carbonate	<1	<1	<1	<1	<1	<1	<1	<1	1.00	during	<1	<1
Chloride	4.80	4.80	3.70	3.80	3.20	3.80	5.10	4.70	11.30	July	8.00	2.40
Conductivity	515.00	417.50	459.00	356.00	472.00	319.00	507.00	438.50	691.00		488.00	470.00
Hardness		267.50		254.00		257.30		299.50				285.30
Iron	0.27	0.05	0.16	0.05	0.17	<.05	0.24	<.05	0.09		0.27	<.05
Magnesium	24.60	26.60	21.10	22.70	10.10	8.40	21.80	22.90	38.30		18.40	35.70
Mangenese	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.02	<.01
pH	7.49	7.36	7.65	7.65	7.55	7.49	7.74	7.50	7.72		7.99	7.89
Potassium	1.40	0.63	3.44	0.63	2.35	0.34	3.67	0.65	1.54		3.57	0.64
Sodium	14.30	12.40	12.10	6.50	7.37	3.00	8.53	4.70	14.90		18.90	14.60
Sulfate	33.50	18.00	46.70	17.00	97.80	10.50	47.00	13.00	27.20		64.00	22.50
TDS	292.00	274.00	263.00	203.50	275.00	238.00	272.00	270.50	364.00		290.00	273.50

Parameter	79-29 Historical	79-29 1987	79-35 Historical	79-35 1987	80-44 Historical	80-44 1987	80-46 Historical	80-46 1987	82-52 Historical	82-52 1987	84-56 Historical	84-56 1987
Elevation	9410		9585		8980		9350		8995		9335	
Geologic Formation	TKn		Tf		Kpr		TKn		Kpr		TKn	
Bicarbonate	338.60	309.50	315.00	284.50	455.00	no	335.50	336.00	415.00	390.00	341.00	348.50
Calcium	76.80	45.00	102.90	84.00	104.90	flow	60.90	62.40	86.00	71.00	59.70	70.50
Carbonate	<1	<1	<1	<1	<1	during	<1	<1	<1	<1	<1	<1
Chloride	19.60	15.60	3.50	3.70	11.30	July	4.80	4.60	10.00	7.20	9.60	8.00
Conductivity	576.00	495.00	468.00	396.00	904.00		572.00	475.00	704.00	510.50	604.00	500.00
Hardness		267.80		267.50				308.30		294.30		301.80
Iron	0.19	<.05	0.19	<.05	0.13		<.05	<.05	0.08	<.05	<.05	<.05
Magnesium	33.90	35.70	14.00	14.10	41.10		28.30	31.10	33.60	33.80	34.70	27.80
Mangenese	0.01	0.05	0.01	<.01	<.01		<.01	<.01	0.01	0.01	<.01	<.01
pH	7.81	7.69	7.65	7.51	7.75		7.22	7.27	7.38	7.38	7.58	7.35
Potassium	5.94	1.25	1.33	0.36	3.05		0.88	0.85	1.93	0.81	0.93	0.84
Sodium	28.90	31.20	13.10	3.06	34.30		10.05	10.20	23.10	23.90	18.10	16.90
Sulfate	98.40	31.50	68.70	13.00	145.70		22.50	22.50	57.40	25.50	28.70	27.00
TDS	352.00	309.50	283.00	253.50	523.00		288.00	287.50	386.00	353.50	329.00	300.00

to the historical results for each respective spring. The raw data regarding all springs sampled is contained in Appendix D.

V. MINE HYDROLOGY

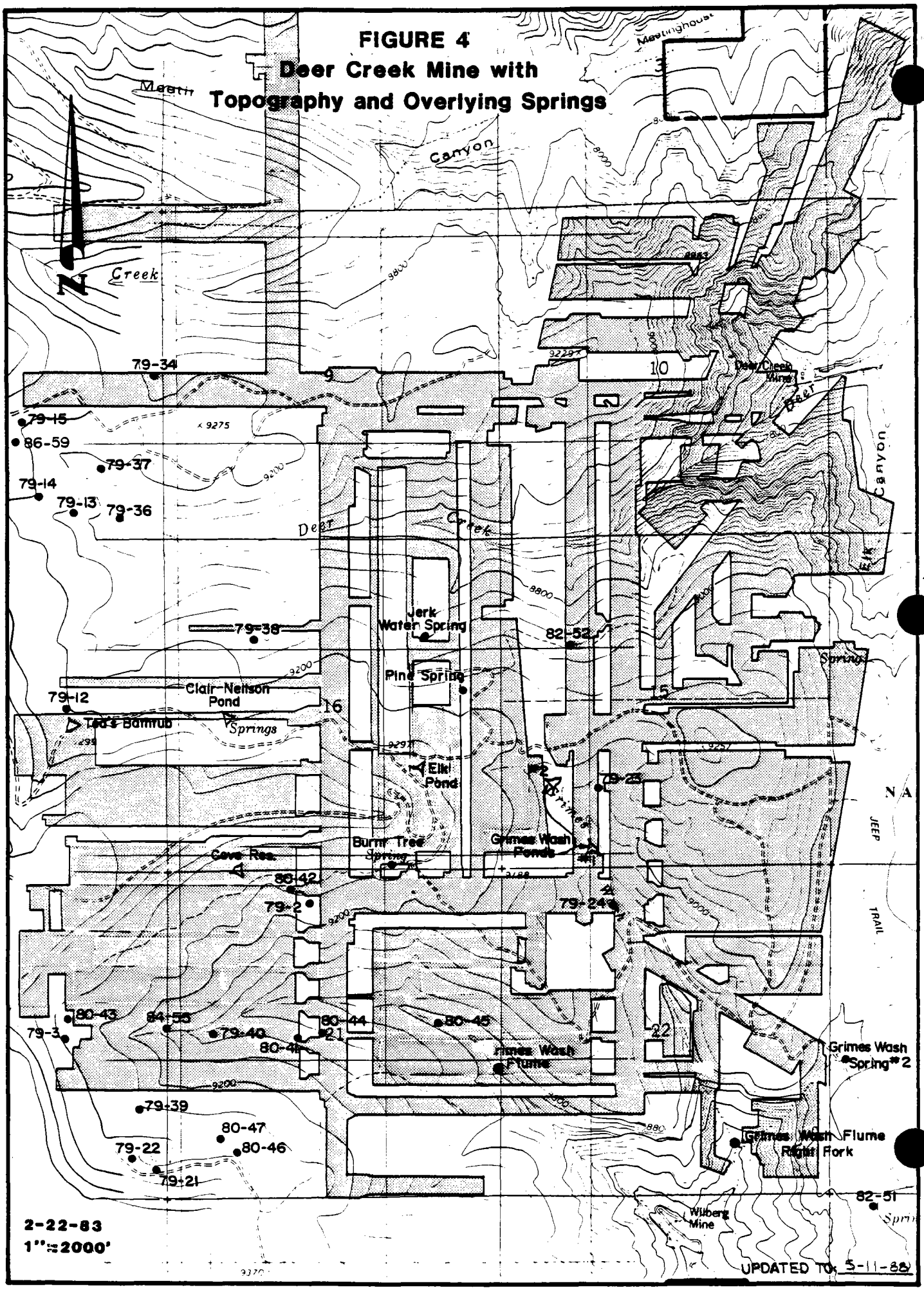
A. Surface Water Sources in Relation to Mine Workings

The relationship of the Deer Creek and Wilberg Mine workings with the overlying springs is shown in Figures 4 and 5. Beginning in 1979, UP&L has developed an ambitious spring monitoring program with emphasis to detect changes in the East Mountain hydrologic regime as a result of mining. With the data collected to date, there is no indication of any mine related effects on spring discharge rates. As expected, there is a direct relationship between annual precipitation, temperature, and spring discharge rates as previously discussed on pages 31 and 38 and shown in Figure 3.

B. Groundwater Quality and Collection Procedures

UP&L began in-mine quality and quantity measurement in 1977 and has continued the measurement through 1987. With the collection of numerous samples throughout the extent of the mine workings the quality has remained relatively constant. Figure 6 depicts the consistency of the groundwater quality by the use of cation and anion diagrams. Wilberg 1987 versus Historical does not correlate due to the number of sites rendered inaccessible by the 1984 mine fire. The two sites presently monitored bias the magnesium and sulfate portions of the graph. In the future this will also affect the similarity between Wilberg and Deer Creek in the same manner.

FIGURE 4
Deer Creek Mine with Topography and Overlying Springs



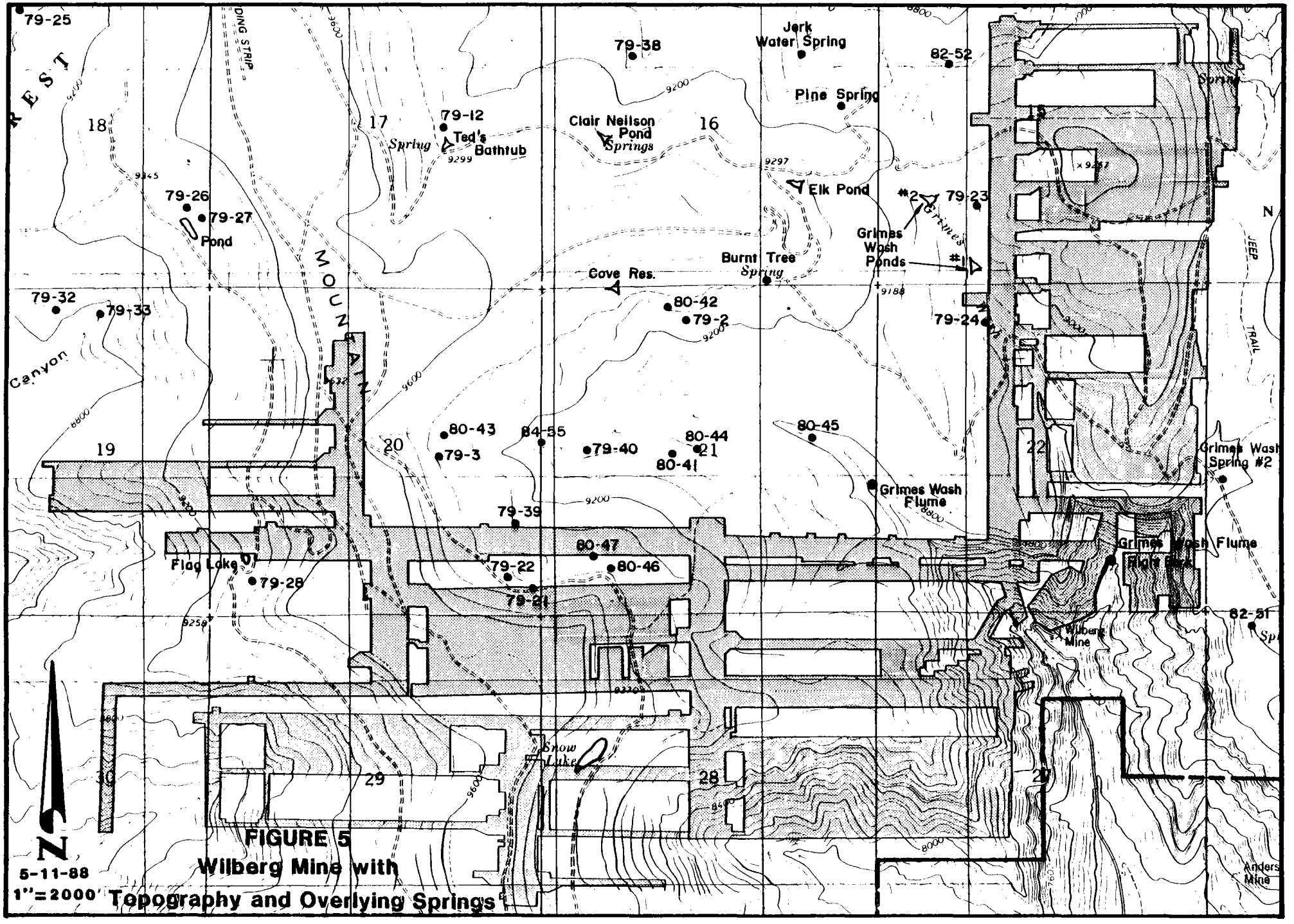
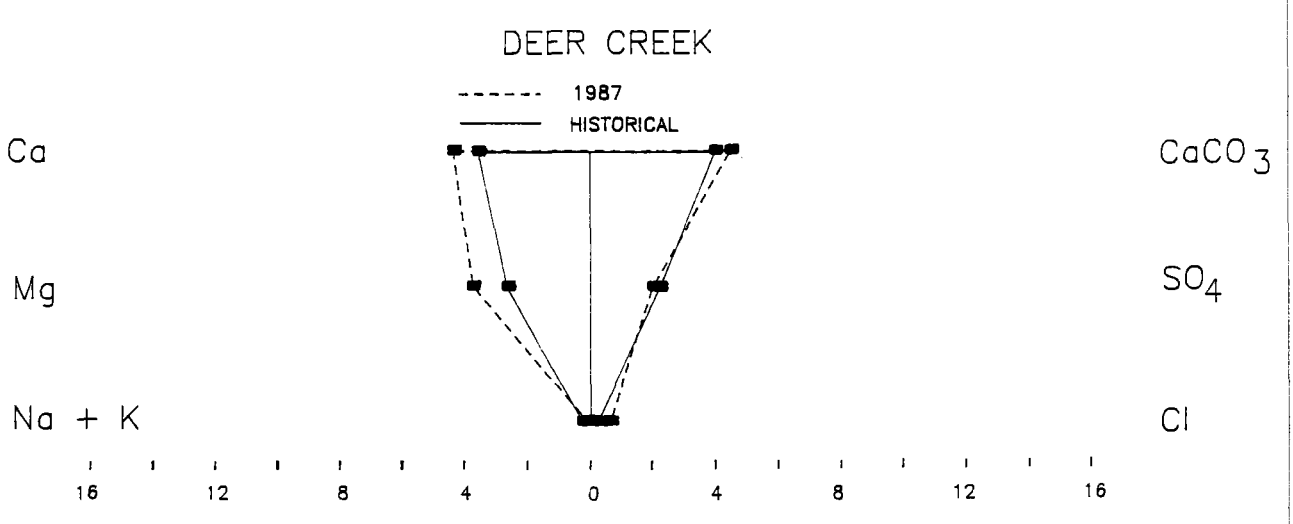
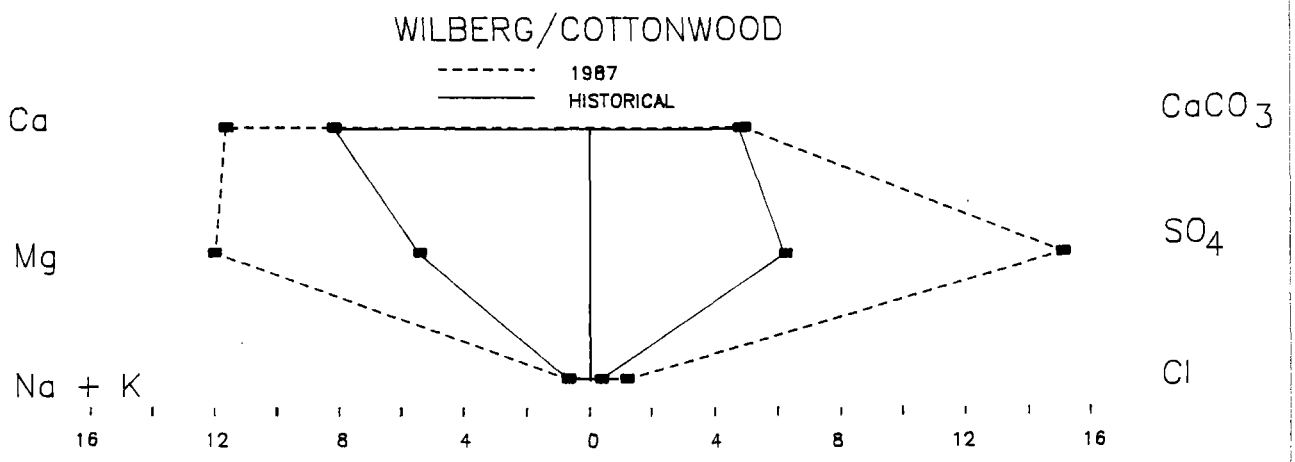
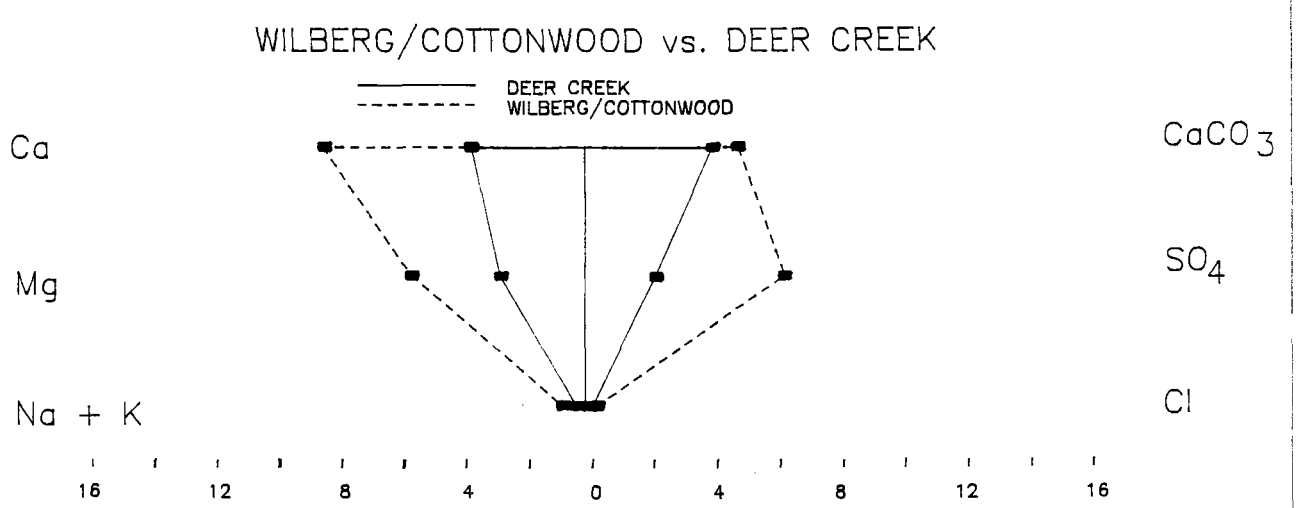


FIGURE 5
Wilberg Mine with Topography and Overlying Springs

FIGURE 6
IN-MINE WATER QUALITY CATION-ANION DIAGRAMS







Collection procedures for ground water quality consist of two grab samples collected and analyzed per quarter at each of the mines which produce 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. (See Appendix J.)

Long-term monitoring locations have been established at each of the mines which produce measurable quantities of water, i.e., Deer Creek and Wilberg Mines (see Maps 3 and 4 in pocket). Four types of occurrences have been recognized to exist within the current mine workings (refer to Figure 7).

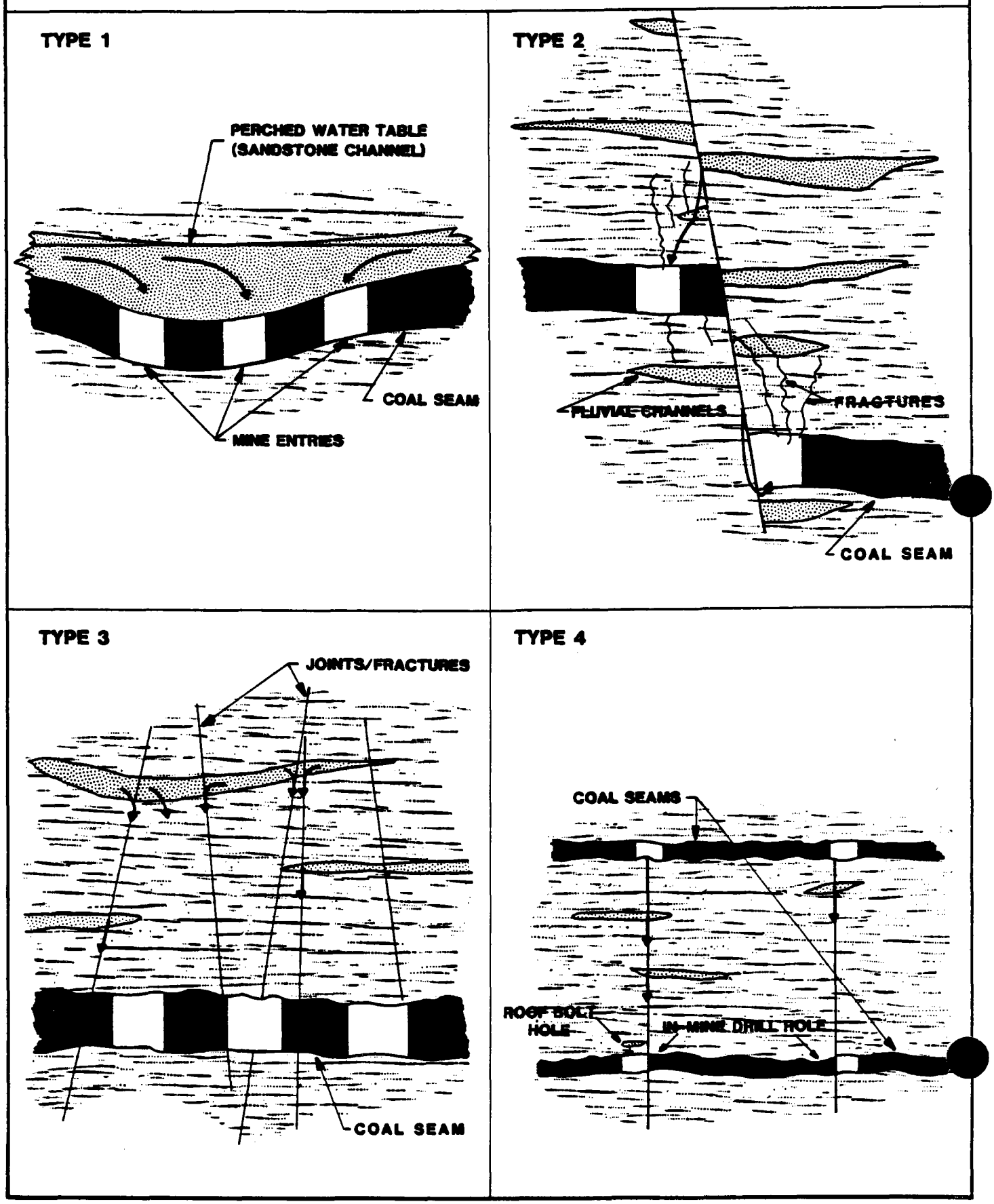
They include:

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 F and H for the Deer Creek and Wilberg In-Mine hydrographs.) Additional long-term monitoring sites will be added when areas meeting our long-term criteria are exposed by mining; i.e., long-term accessibility and water source is such that consistent sampling can be achieved.

FIGURE 7

LONG TERM WATER SOURCES



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*	336.8 Million Gallons
Estimated Evaporation**	19.0 Million Gallons
Domestic Usage	6.4 Million Gallons
Total Discharge	362.2 Million Gallons

* Alterations in the Deer Creek water systems, along with in-line meter failures, resulted in quantity estimates made in January through March 1987.

** See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

Eight samples were collected in the Deer Creek Mine in 1987. (See Map No. 3 in pocket for locations.) Parameters analyzed in 1987 are those listed in the DOGM Guidelines for Groundwater Operational Quality. Table 25 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1987 to the historical values. It is apparent from Table 25 that the average quality of the in-mine water has remained relatively constant. The consistency was also depicted in the stiff diagrams presented as Figure 6. The complete chemical analysis of samples collected in 1987 can be found in Appendix F.

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 location of the main sump areas within the mine are shown in Figure 8. The largest volume of water is stored in the western part

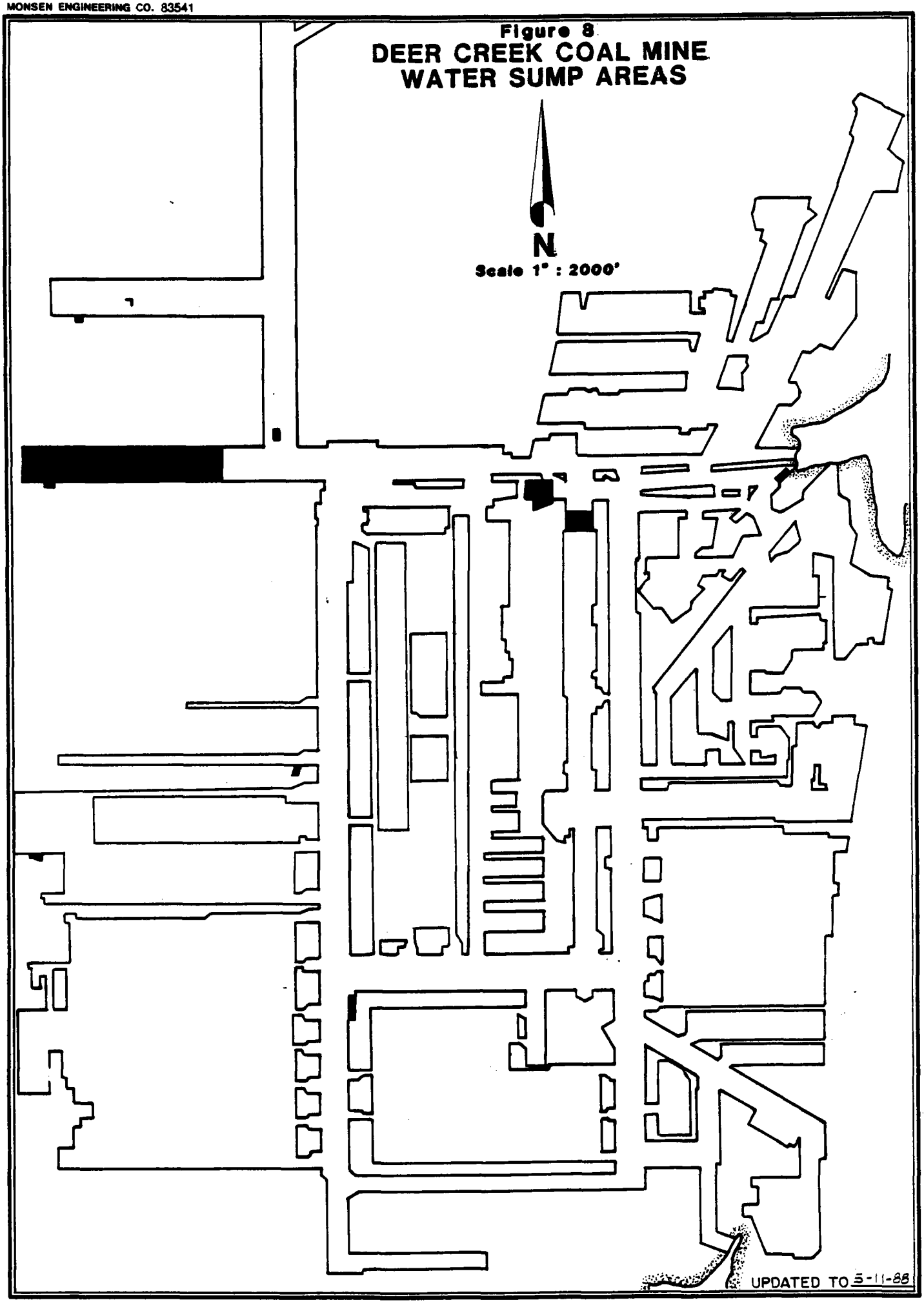
TABLE 25: DEER CREEK IN-MINE WATER QUALITY

LOCATION	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	pH	POTASSIUM	SODIUM	SULFATE	TDS
EM-3	401	10.0	0	9.6	1000	468	<0.05	53.0	0.01	7.31	2.0	17.0	80	576
3N XC-41	314	67.0	0	4.0	610	311	<0.05	35.0	0.01	7.33	1.0	15.0	28	324
3SB XC-21	355	100.0	<1.0	10.0	900	475	0.07	55.0	0.02	7.05	1.9	19.0	120	533
EM-3	377	116.0	<1.0	10.0	990	530	0.22	58.0	0.02	7.10	1.9	18.0	130	586
3N XC-41	279	69.1	<1.0	6.0	500	299	<0.05	30.4	0.01	7.30	2.41	12.84	27	256
EM-3	405	118.8	<1.0	8.4	800	448	<0.05	36.7	0.02	6.90	3.25	14.98	200	426
EM-3	388	123.9	<1.0	16.0	890	529	0.21	53.4	<0.01	7.55	2.49	18.40	143	411
3SB XC-21	368	110.4	<1.0	14.0	800	497	<0.05	53.7	<0.01	7.52	2.88	21.20	102	265
1987														
MIN	340	10.0	0	4.0	500	299	<0.05	35.0	<0.01	6.9	1.0	14.98	27	265
MAX	494	123.9	<1.0	16.0	1000	530	0.22	58.0	0.02	7.55	3.25	21.20	200	586
MEAN	440.3	89.4	<1.0	9.8	811	444.6	0.09	46.9	0.01	7.26	2.23	12.93	91	422
HISTORICAL 1977-1986														
MIN	261.9	60.8		3.9	470			4.4		6.8	2.2	10.2	40.0	263
MAX	676.4	245.0		13.2	1700			79.5		7.9	10.0	66.0	915.2	982
MEAN	393.2	72.7		6.8	662			32.9		7.04	2.23	17.1	103.8	525

MONSEN ENGINEERING CO. 83541

Figure 8

DEER CREEK COAL MINE WATER SUMP AREAS



of Main West, an area that has not been actively mined for several years.

In-line water meters are utilized to record the amount of water that is discharged from the mine, after which the water passes through an oil skimmer before being piped to UP&L's Huntington Power Plant. None of the discharge water leaving the mine enters any of the natural streams in the region but instead is used in the cooling towers at the power plant.

The total water discharged from the Deer Creek Mine during 1987 was estimated at 1,034 acre feet, or 336.8 million gallons. The recorded flow of 1,034 acre feet during 1987 is a 42% increase from the 1986 discharge of 730 acre feet. The average monthly discharges are shown in Figure 9. A graph displaying the historical discharge rates is included as Figure 10. The rapid variations from month to month could be the result of several factors which include: (1) changes in coal production, (2) increase in the labor force (higher culinary use), (3) improved pumping techniques or changes made to sump capacities, and (4) near portal groundwater sources freezing during the winter months resulting in an overall decrease in discharge rates during the period. It is thought that the factor of greatest influence on groundwater is the increase in the annual coal production, especially in areas overlain by sandstone channels (perched aquifers).

d. Discharge Quality

Monthly water quality samples were collected for 1987. Table 26 compares the minimum, maximum, and mean values from an historical standpoint to 1987. An examination of Table 26 shows a slight change in acidity, chloride, and sulfate between samples collected

FIGURE 9

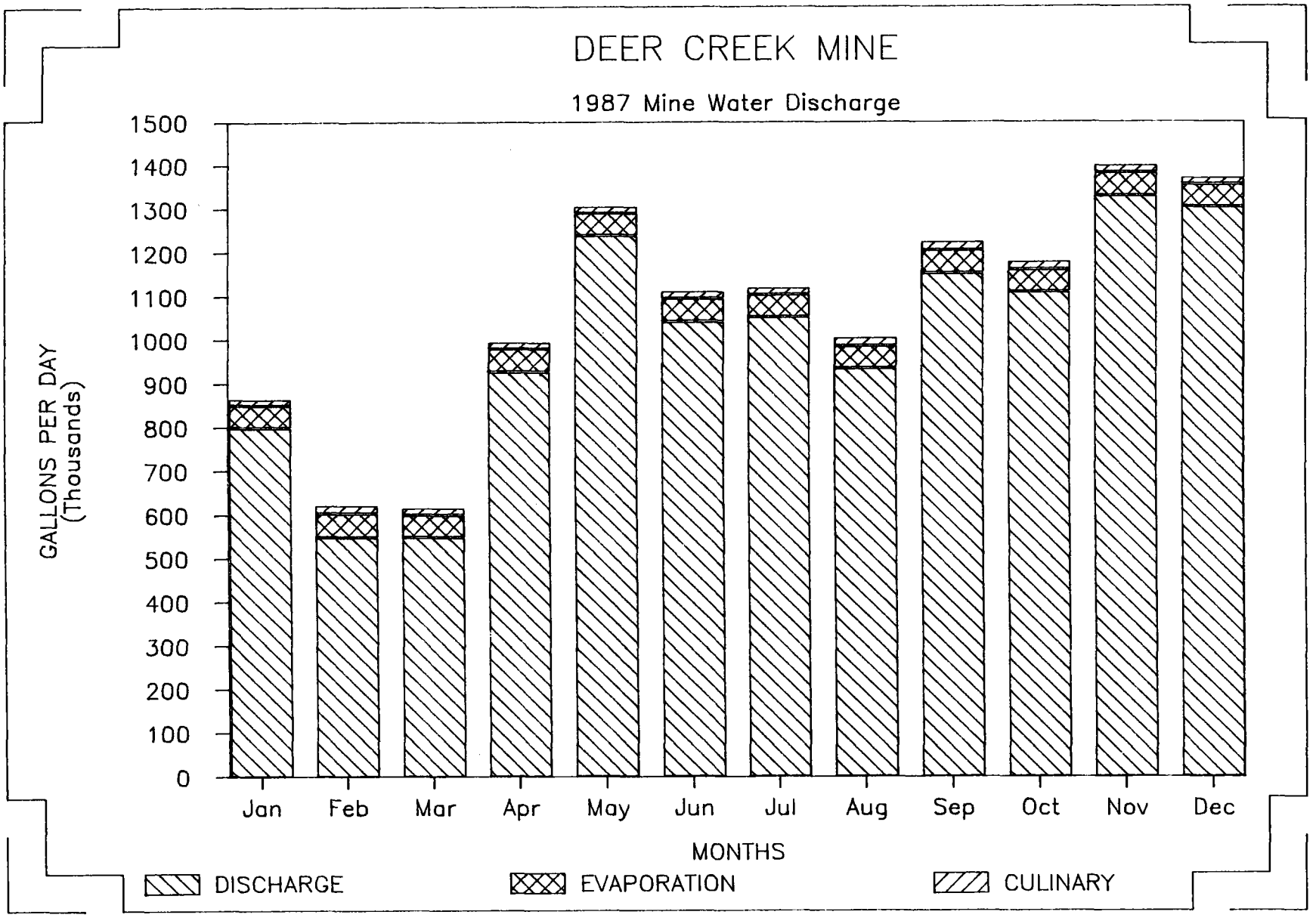
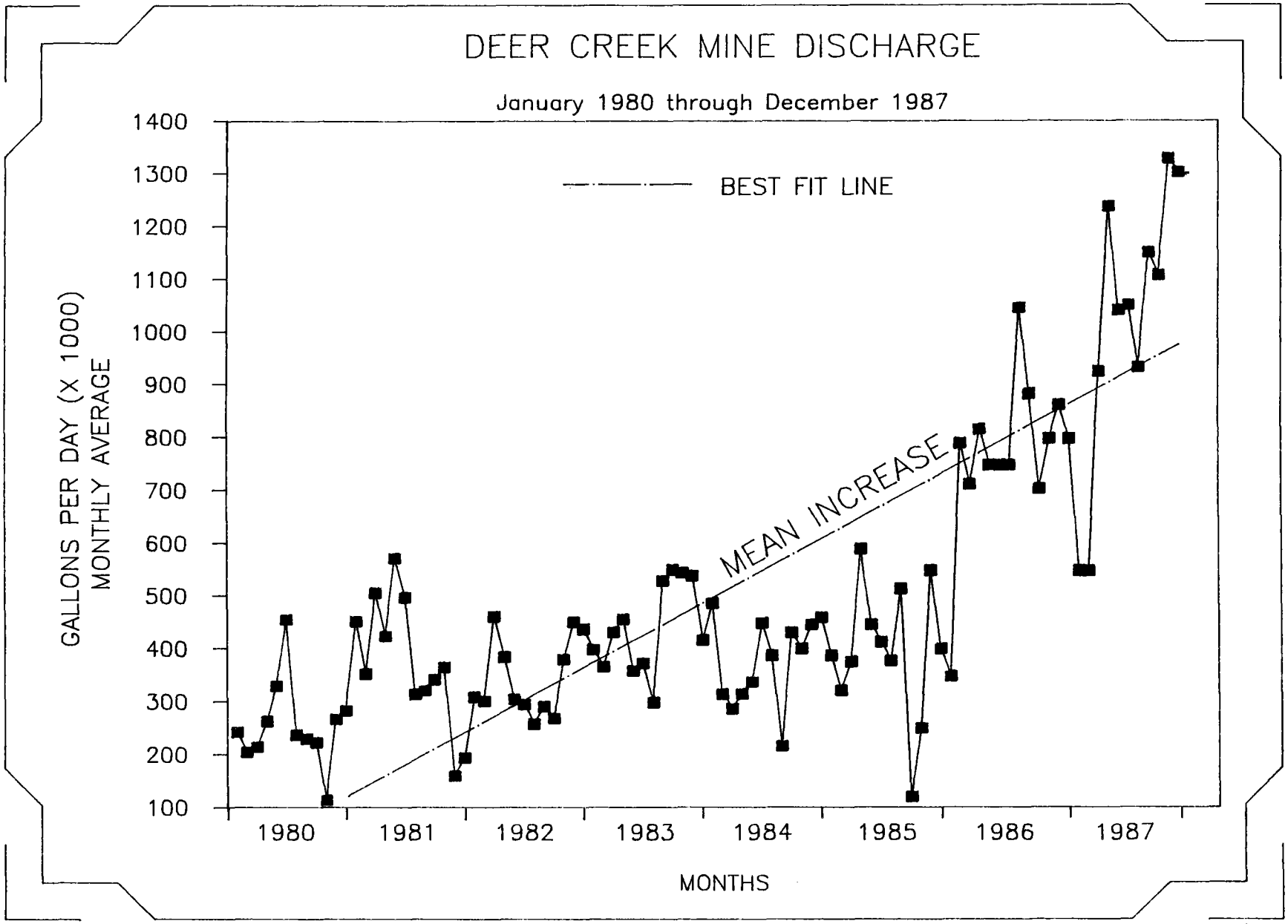

DEER CREEK MINE
1987 Mine Water Discharge
GALLONS PER DAY
(Thousands)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
MONTHS
DISCHARGE
EVAPORATION
CULINARY

FIGURE 10


DEER CREEK MINE DISCHARGE
January 1980 through December 1987
BEST FIT LINE
MEAN INCREASE
GALLONS PER DAY (X 1000)
MONTHLY AVERAGE
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
1980
1981
1982
1983
1984
1985
1986
1987
MONTHS

in 1987 to the historical results. Individual analysis can be found in Appendix G.

TABLE 26: DEER CREEK MINE - DISCHARGE* WATER QUALITY

Parameters	1987 Minimum	1987 Maximum	1987 Mean	Historical - (1976-1986) Minimum	Historical - (1976-1986) Maximum	Historical - (1976-1986) Mean
pH	7.3	8.04	7.7	6.8	8.1	7.49
Acidity	1.0	1.0	27.6	0.0	86.0	6.7
Alkalinity	223	330	265.4	207	414	292.4
Chloride	5.8	39.0	14.6	2.4	2700	77.3
Conductivity	650	1250	951.0	480	10,000	1227.0
Iron	<0.5	4.4	0.59	0.0	7.53	0.69
Oil & Grease	0.5	11.1	2.8	0.01	19.9	2.0
Sulfate	90	420	262.2	29.8	497.0	222.3
TDS	581	764	685.9	320	5100	729.0
TSS	<0.5	556	70.8	0.5	2019	71.0

* Used only in the power plant cooling system.

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 1987.

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. Much of the mine workings have been sealed since the fire. The location of the sealed areas and sumps are shown on Figure 11. As reported in the 1984 Annual Report, water discharged from the Wilberg Mine complex

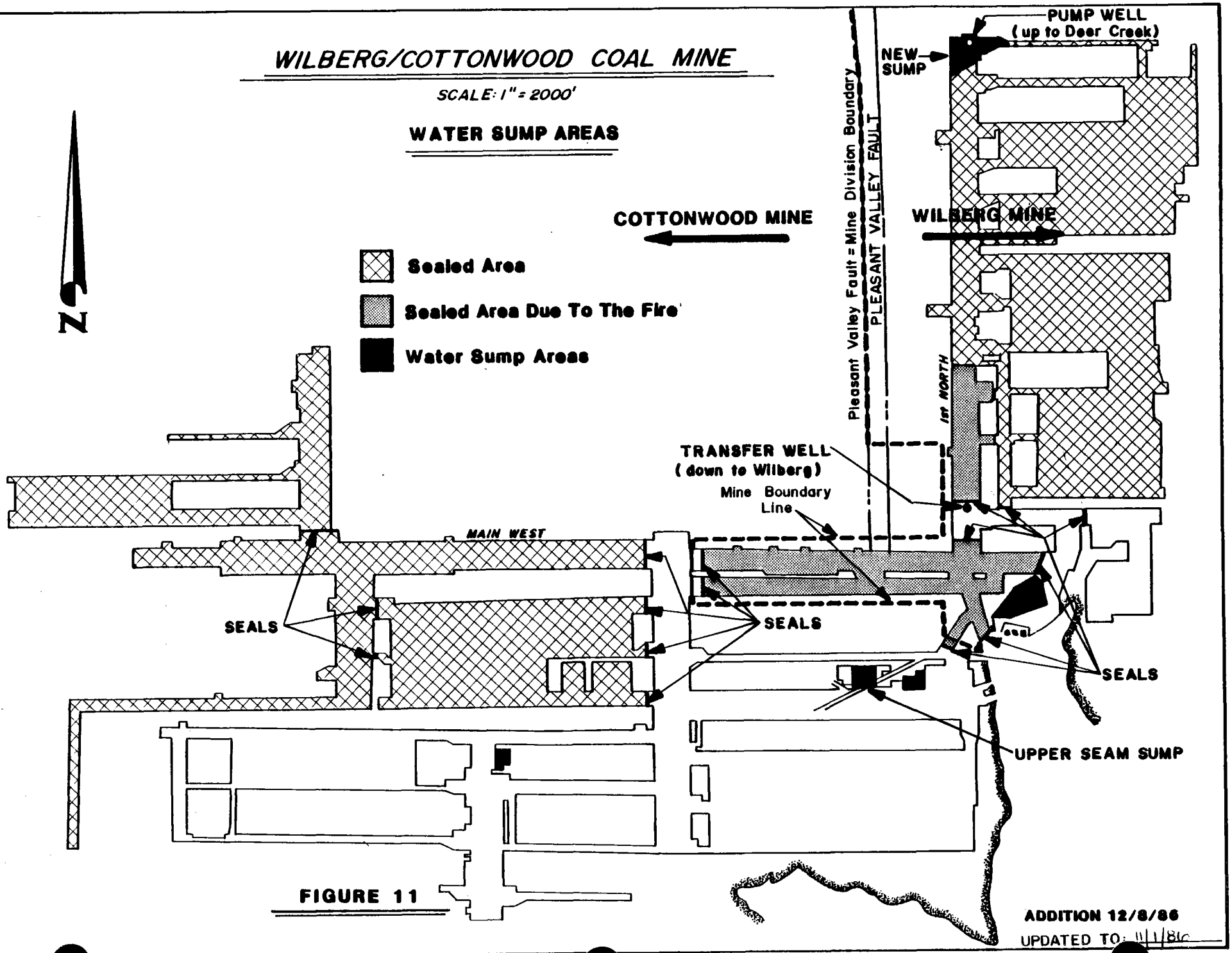

WILBERG/COTTONWOOD COAL MINE
SCALE: 1" = 2000'
WATER SUMP AREAS
N
Sealed Area
Sealed Area Due To The Fire
Water Sump Areas
COTTONWOOD MINE
WILBERG MINE
PUMP WELL
(up to Deer Creek)
NEW SUMP
Pleasant Valley Fault = Mine Division Boundary
PLEASANT VALLEY FAULT
1ST NORTH
TRANSFER WELL
(down to Wilberg)
Mine Boundary Line
MAIN WEST
SEALS
SEALS
SEALS
UPPER SEAM SUMP
ADDITION 12/8/86
UPDATED TO: 11/1/86

FIGURE 11

(includes the area designated as the Cottonwood Mine) decreased substantially from previous years (see Figure 12). The main reason for the large decrease was mining in areas dominated by mudstone roof. Future mining (next 10-15 years) will be centered in the southern reserves which, from surface and drill hole information, will continue the trend of lower in-mine water production. Consistent with previous years, the table below lists the factors involved in estimating in-mine water production:

Wilberg Mine Discharge	0.0 Million Gallons
Des-Bee-Dove Mine Transfer	1.1 Million Gallons
Estimated Evaporation*	19.0 Million Gallons
Domestic Usage	4.7 Million Gallons
Total Discharge	24.8 Million Gallons

* See 1981 Hydrologic Monitoring Report

b. In-Mine Quality

Eight samples were collected in the Wilberg/Cottonwood Mine in 1987. (See Map No. 5 in pocket for locations.) Parameters analyzed in 1987 are those listed in the DOGM Guidelines for Groundwater Operational Quality. Table 27 lists the characteristics of the samples collected and compares the mean, minimum, and maximum results of 1987 to the historical values. The average quality by location has remained relatively constant (refer to past water report for comparison of the individual sites). However, due to the elimination of five sites, the overall yearly averages do not correlate with the historical results (see Table 27). A complete chemical analysis of samples can be found in Appendix H.

The 1986 review performed by DOGM raised questions concerning the elevated mineral levels found in the 4th East area, specifically sulfate and TDS (DOGM Sept. 28, 1987). UP&L has collected numerous samples throughout the 3rd, 4th East and 2nd South

FIGURE 12

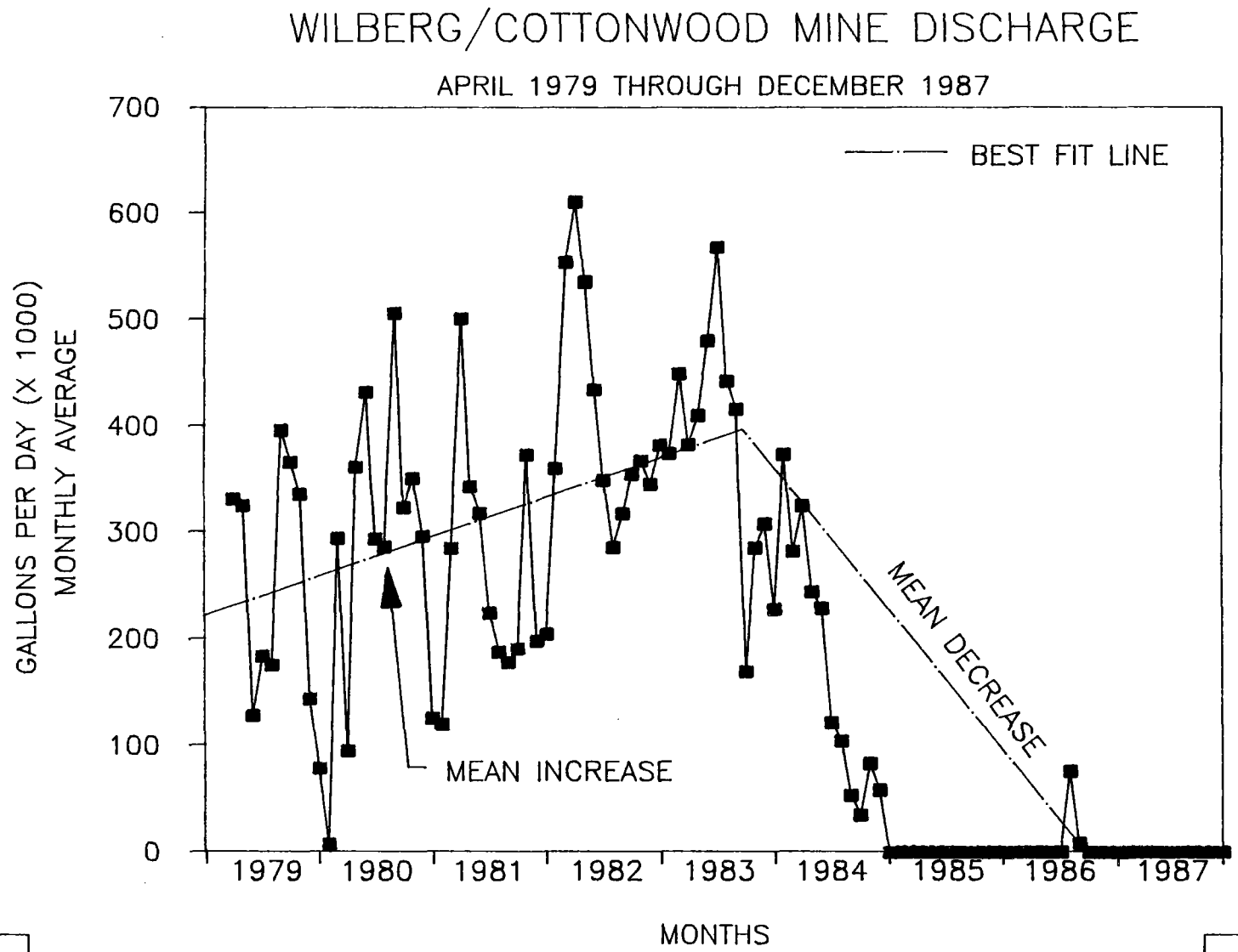

WILBERG/COTTONWOOD MINE DISCHARGE
APRIL 1979 THROUGH DECEMBER 1987
BEST FIT LINE
GALLONS PER DAY (X 1000)
MONTHLY AVERAGE
700
600
500
400
300
200
100
0
MEAN INCREASE
MEAN DECREASE
1979
1980
1981
1982
1983
1984
1985
1986
1987
MONTHS

TABLE 27: WILBERG/COTTONWOOD IN-MINE WATER QUALITY

LOCATION	ALKALINITY BICARBONATE	CALCIUM	CARBONATE	CHLORIDE	CONDUCTIVITY	HARDNESS	IRON DISSOLVED	MAGNESIUM	MANGANESE	pH	POTASSIUM	SODIUM	SULFATE	TDS
2S XC-11	443	119	0	13.3	1380	725	<0.05	104.0	0.01	7.66	4.0	23.0	380	908
4E XC-24	534	279	0	27.1	2400	1482	<0.05	191.0	<0.01	7.60	9.0	47.0	1040	1848
2S XC-11	458	122	<1.0	15.0	1320	750	0.05	108.0	0.02	7.50	3.4	25.0	410	926
4E XC-24	503	282	<1.0	30.0	2375	1585	0.08	212.0	0.03	7.30	8.8	45.0	1100	2111
2S XC-11	543	222	<1.0	9.6	1000	983	<0.05	104.2	<0.01	7.95	6.16	36.9	340	722
4E XC-24	604	294	<1.0	17.6	1800	1171	0.05	106.0	<0.01	7.40	8.33	39.1	900	1472
2S XC-11	403	167.6	<1.0	130.0	2500	895	<0.02	115.6	<0.01	7.86	3.72	27.7	421	664
4E XC-24	450	383.9	<1.0	85.0	1250	1896	0.03	227.6	0.01	7.53	8.66	59.3	1202	1770
1987														
MIN	403.0	119	0	9.6	1000	725	<0.02	104.0	<0.01	7.30	3.4	23.0	400	664
MAX	604.0	383.9	<1.0	130.0	2500	1896	0.08	227.6	0.03	7.95	9.0	59.3	1202	2111
MEAN	492.3	233.7	<1.0	41.0	1753	1185.9	0.05	146.1	0.01	7.60	6.5	37.9	724.1	1303
HISTORICAL 1977-1986														
MIN	206.2	11.2		0.89	620			4.9		6.60	1.0	16.6	78	419
MAX	690.5	383.9		200.00	2600			189.7		8.50	21.0	183.8	980	1898
MEAN	475.8	164.6		11.50	1290			66.6		7.36	6.54	39.97	297.9	759

areas (see Map No. 4 in pocket) and all samples have indicated elevated mineral content, especially sample sites near the Pleasant Valley Fault system. UP&L feels that water percolating down through the Blackhawk Formation encounters burn-oxidized zones along the Pleasant Valley Fault system; thus, the leaching effect of the water creates an increase in the mineral content of the water. In support of this theory, samples have indicated this condition only exists in close proximity to the Grimes Wash outcrop.

c. Discharge Quantity

Under normal conditions water produced in the Wilberg Mine is pumped to a primary sump location within the Wilberg Mine workings by a complex pumping and piping system. The sump, which functions as a settling basis, 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. Water from the sump is also used to supply the water treatment plant at the Wilberg Mine and the Des-Bee-Dove (January and February 1987) mining complex. Excess water is discharged into the Left Fork of Grimes Wash after passing through an oil skimmer in accordance with stipulations of the Wilberg Mine Discharge Permit UT-0022896. No water was discharged during 1987.

VI. PIEZOMETRIC GRADIENT INFORMATION

A. Surface

1. EM-31 and EM-47

Two surface exploration drill holes which were developed into permanent water monitoring stations in 1978 continued to be monitored on a monthly basis, as access permitted (see Map No. 1).

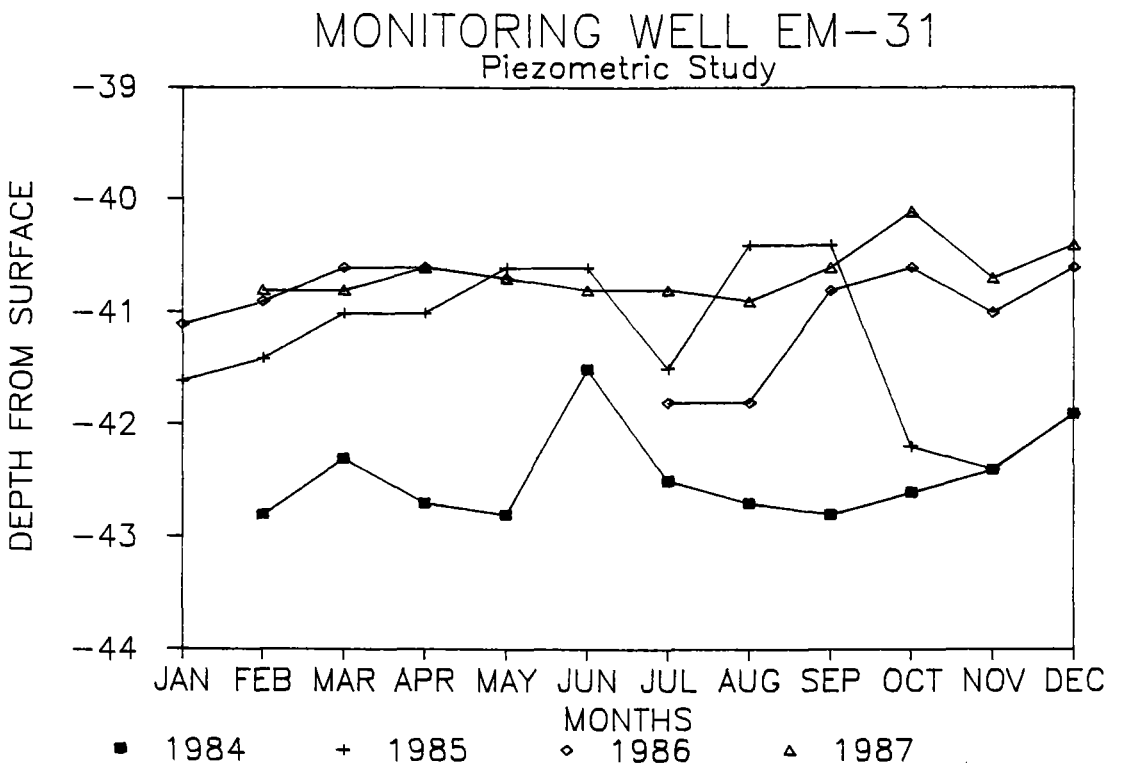
Drill hole EM-31 in Cottonwood Creek Canyon was monitored monthly throughout 1987. (See Map No. 1 in pocket.) The water level in the hole was at its highest point, -40.1 feet, during the month of October and at its lowest point, -40.9 feet, in August. Drill hole EM-47 in Rilda Canyon was accessible only during the months of May through August due to winter weather conditions and bridge replacement. During this time frame the water was at its highest, -204.8 feet, in June and lowest, -206.5 feet, in May. Hydrographs of 1984, 1985, 1986, and 1987 data collected are shown in Figure 13.

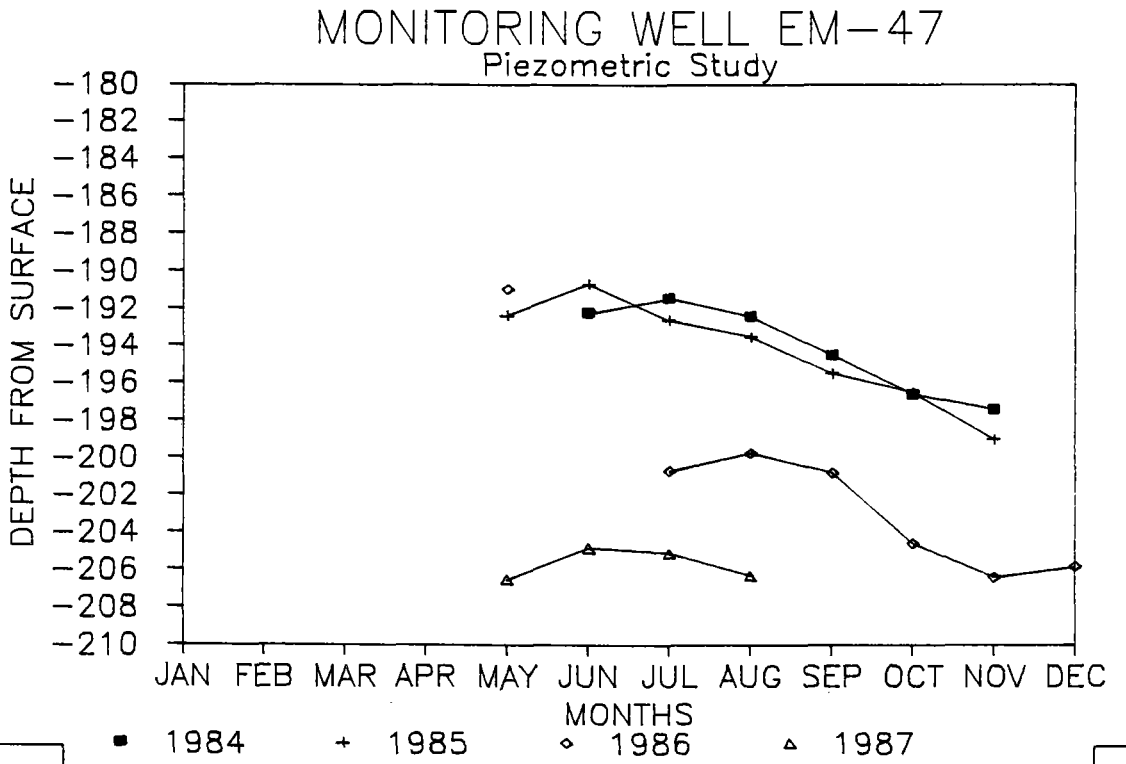
2. Rilda Canyon Study Area

Five wells drilled and developed by West Appa Coal Co. were acquired by UP&L through a coal lease purchase agreement. The wells are located on the northeastern side of East Mountain adjacent to the abandoned Helco Mine. West Appa Coal Company's primary concern was the close proximity of proposed mining activities in Rilda Canyon to the springs, which are currently utilized as a culinary water source by North Emery Water Users Association (NEWUA). UP&L echoes the same concerns expressed by West Appa Coal Company due to the fact that both the Hiawatha and Blind Canyon Seams are mineable in the region surrounding the NEWUA springs.

A study performed by Vaughn Hansen Associates indicated the Rilda Canyon Springs lie directly in line with a north-south trending side canyon on the south as well as one to the north. From examination of topographic features it appears that the linear relationship of side drainage channels (or lineament) can be traced on through Mill Fork Canyon to the north, intersecting the northeast-southwest trending graben (encounter by Beaver Creek Coal) near the northern ridge

FIGURE 13


MONITORING WELL EM-31
Piezometric Study
DEPTH FROM SURFACE
-39
-40
-41
-42
-43
-44
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTHS
1984
1985
1986
1987


MONITORING WELL EM-47
Piezometric Study
DEPTH FROM SURFACE
-180
-182
-184
-186
-188
-190
-192
-194
-196
-198
-200
-202
-204
-206
-208
-210
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTHS
1984
1985
1986
1987

of Mill Fork Canyon. Said lineament could indicate the existence of a fracture system in the Star Point Sandstone extending into Rilda Canyon.

To verify the existence of a fracture zone in line with the lineament traced from Rilda Canyon into Mill Fork Canyon, a subsurface geotechnical technique known as Very Low Frequency analysis (VLF) was used. Two transects were run in an east-west direction across the Rilda Springs area, one along the northern road which bypasses the springs and the other along the road bypassing the springs to the south. In both transects a significant subsurface anomalous condition was encountered in the vicinity of the springs and directly in line with the north and south side canyons.

Evidenced by the location of the principal spring, the positioning of the concrete cutoff wall, the positioning of the performated pipe collection system behind the cutoff wall, and water quality data which will be subsequently discussed, the source of water for the principal spring is from the north. The principal spring is directly in line with the north-south trending fracture zone identified by the VLF analysis. Therefore, the primary source of water for the Rilda Springs area is from the north via the fractured zone of the Star Point sandstone.

Water elevations from the five existing piezometers were collected on a monthly basis from May through August. Information collected during 1987 correlated well with the data Vaughn Hansen's utilized to construct the piezometric contour of the Rilda Springs area. The Vaughn Hansen study made several significant points concerning Rilda Creek in the vicinity of the springs. In general, one would expect groundwater to be flowing toward and recharging creek flows

along its entire reach. However, above the spring area the stream is actually losing water to the groundwater system as evidenced by the fact that the water surface elevation at piezometer P-3 is some eleven (11) feet below the stream bed at its nearest point. This phenomenon is due either to the existence of a fracture zone beneath the creek or a significant highly permeable gravel bed beneath the creek which is able to drain inflowing water from either the creek or groundwater system fast enough to prevent complete saturation of the overlying alluvial deposits. In this situation it is felt that the latter possibility is the case since subsequent VLF work revealed no significant anomalous subsurface conditions parallel to the stream and since a coarse water-bearing gravel bed was encountered at a depth of from 35 to 40 feet below ground surface (23 to 28 feet below the stream channel bottom) at piezometer P-3.

As the intersection of the north-south trending fracture system with the Rilda Creek channel is approached, the groundwater surface elevation gradually approaches the stream channel elevation. At the intersection of the fracture system with the stream channel, which is the location of the principal producing spring area, the groundwater surface elevation has intersected the stream channel with the creek receiving rather than losing water through this reach. Surfacing of the groundwater at this point could be due to one of two possible conditions: 1) the large inflow from the north may be too great for the gravel drain to handle, creating in essence a condition where the "groundwater reservoir" overflows simply because more water has been poured into the system than the system can handle, or 2) a physical disruption in the gravel drain may be present as the result of the fracture system at this location. This physical disruption may create a

barrier or dyke to subsurface flow through the gravel bed, forcing the water to surface.

Below the spring area the stream again loses water to the gravel drain beneath. At piezometer P-1 below the spring area the water surface elevation is some four feet below the nearest stream channel bottom elevation.

Flow within the coarse gravel drain below the stream channel is directly tied into surface stream flow. Between September 24, 1982 and October 15, 1982 the water surface elevation in piezometer P-3 dropped only 0.7 feet with the creek still flowing on October 15. By December 6, 1982 the creek had dried up above the springs and the water level had fallen in piezometer P-3 below the bottom of the piezometer (a fall of at least 7 feet between October 15 and December 6). Below the springs the creek is perennial and between October 15, and December 6, 1982 piezometer P-1 dropped only 0.04 feet.

Data collected by UP&L during 1986 and 1987 revealed similar trends in both P-1 and P-3 (Figure 14). On December 9, 1986 the stream above P-3 was dry and the water level had fallen below the bottom of the piezometer whereas the level in P-1 dropped only 0.6 feet. Figure 15 compares the data collected during 1982, 1986, and 1987.

Further study is needed in defining the actual direction of the major groundwater influx. Utah Power & Light is currently considering performing a pump test, with permission granted by NEWUA, or geophysical alternatives to better define the actual direction of waterflow.

FIGURE 14

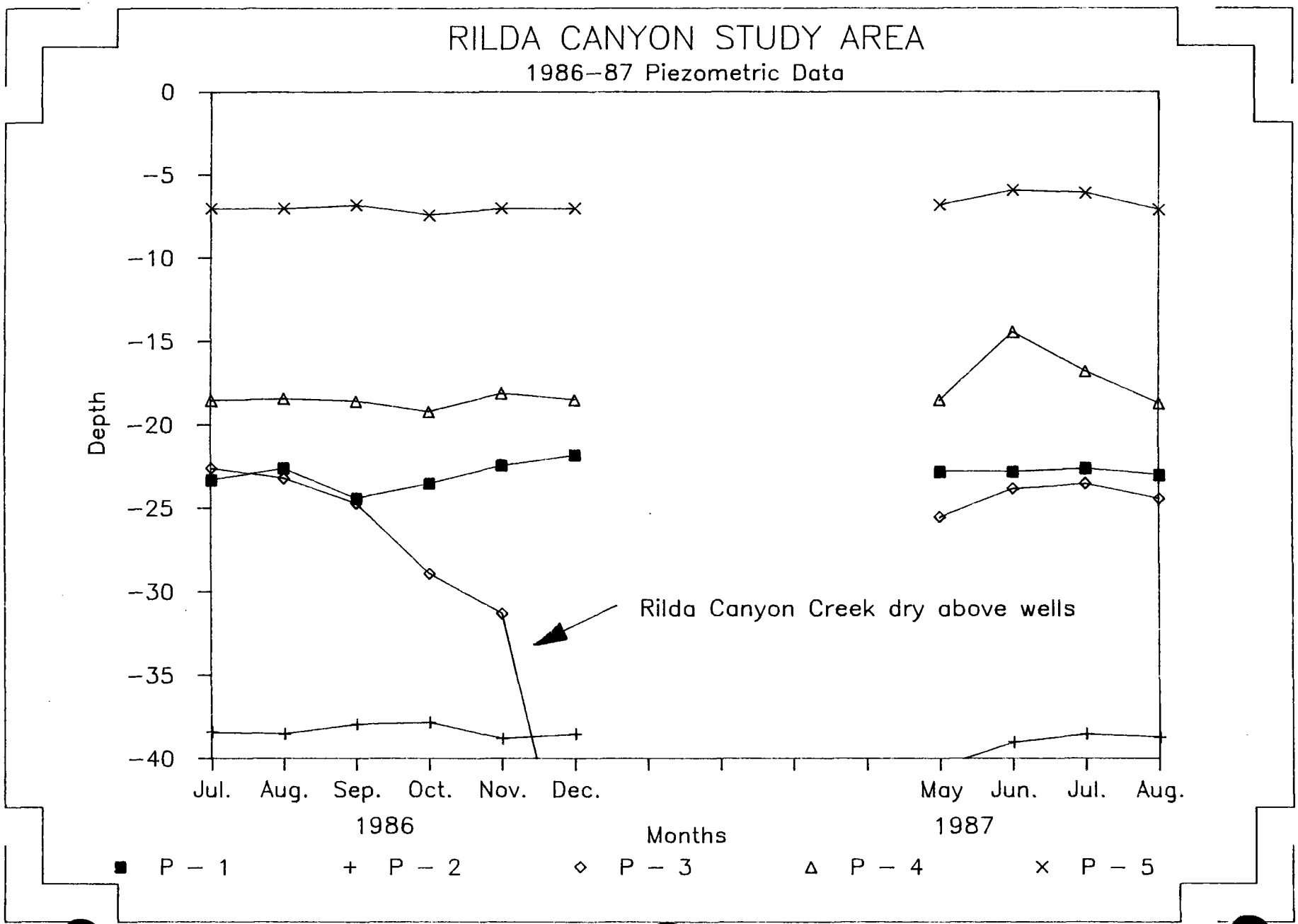
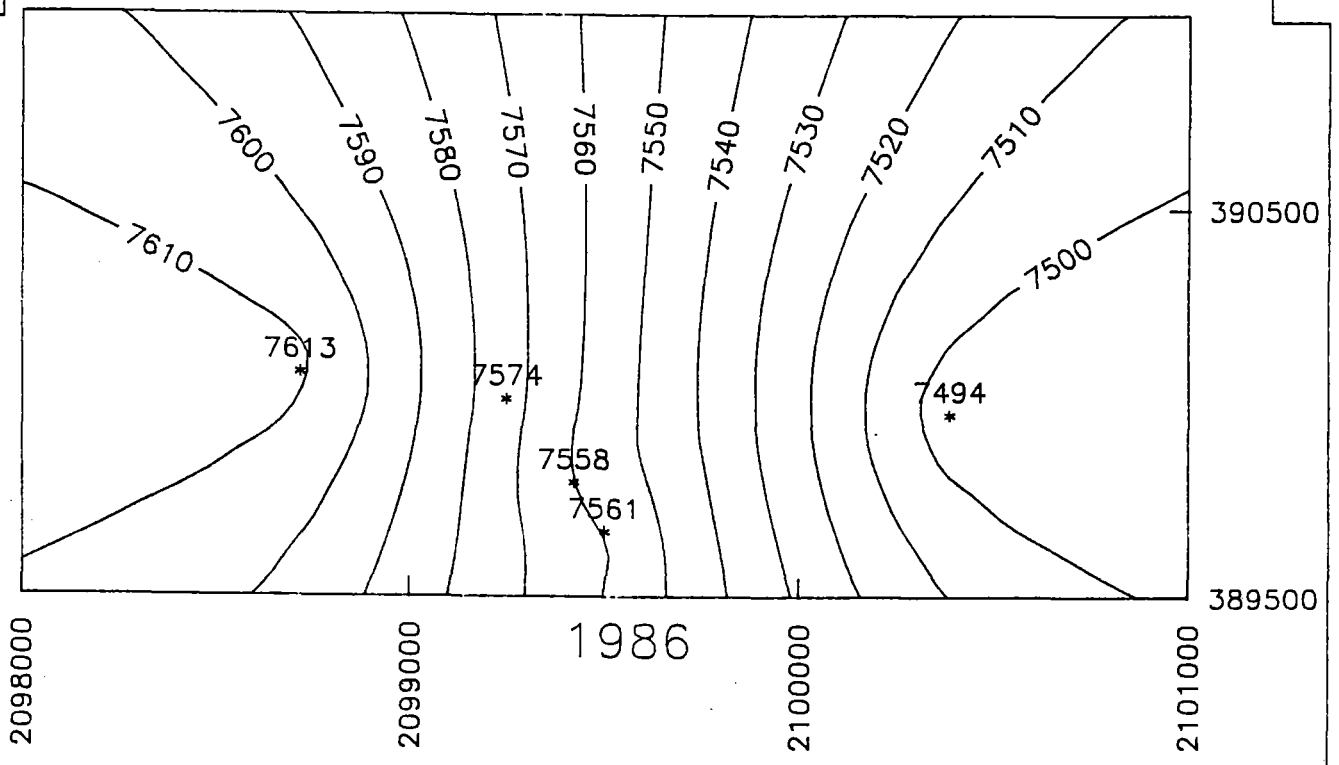
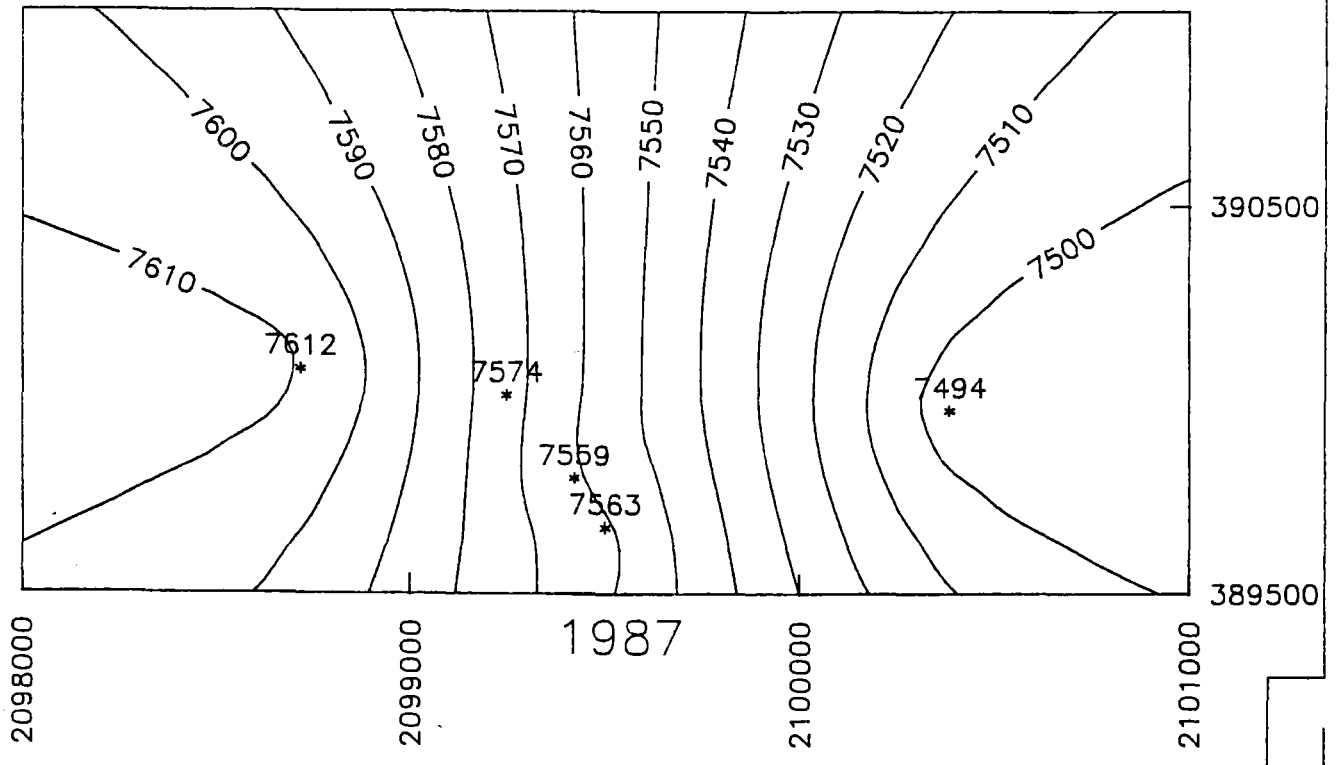

RILDA CANYON STUDY AREA
1986–87 Piezometric Data
Depth
0
−5
−10
−15
−20
−25
−30
−35
−40
Rilda Canyon Creek dry above wells
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
May
Jun.
Jul.
Aug.
1986
1987
Months
P − 1
P − 2
P − 3
P − 4
P − 5

FIGURE 15

RILDA CANYON STUDY AREA
1986 – 1987 JULY MEASUREMENT COMPARISON





B. In-Mine

All remaining in-mine drill holes located in the Deer Creek Mine were destroyed by mining activities, primarily a diesel roadway construction project. New holes are tentatively scheduled to be drilled in 1988.

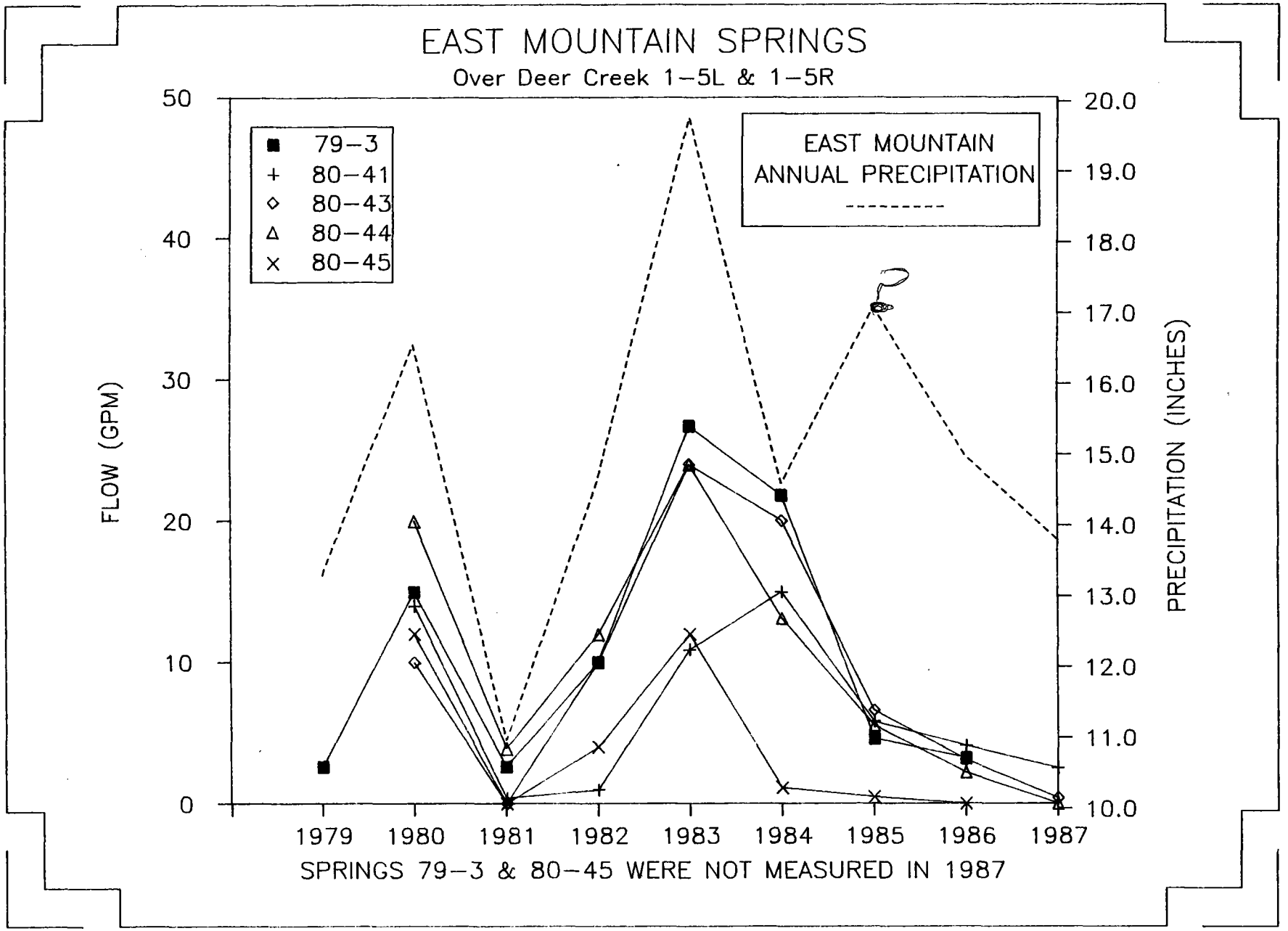
VI. EFFECTS OF MINING AND SUBSIDENCE ON HYDROLOGY

Since the development of the UP&L mining complex on East Mountain, coal has been extracted causing the partial collapse of the immediate overburden strata and, ultimately, surface subsidence. This occurs in areas of retreat mining in room and pillar sections and in areas of longwall mining. All areas with potential for subsidence are monitored annually. (See 1987 Subsidence Monitoring Report.)

Figure 16 shows a comparison of annual precipitation with flow rates for springs located near one area of subsidence. The correlation is good through 1984 but starting in 1985 and continuing through 1987 spring discharge rates have declined whereas precipitation has stabilized. As explained early, temperature plays a critical role in quantity and peak flow timing. Table 22 revealed that positive departure from normal for January through June, 1985 through 1987, has been significant. In the future comparisons between spring discharge rate and precipitation will also include temperature.

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

FIGURE 16


EAST MOUNTAIN SPRINGS
Over Deer Creek 1-5L & 1-5R
79-3
80-41
80-43
80-44
80-45
EAST MOUNTAIN
ANNUAL PRECIPITATION
FLOW (GPM)
PRECIPITATION (INCHES)
0
10
20
30
40
50
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
1979
1980
1981
1982
1983
1984
1985
1986
1987
SPRINGS 79-3 & 80-45 WERE NOT MEASURED IN 1987

identified in the data collected. The water flowing into the mine workings, although temporarily diverted or detained, has not had an impact on the surface waters of East Mountain or the surrounding area.

VIII. SUMMARY

Utah Power & Light Company 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 tenth annual report submitted concerning the hydrology.

Unusually high precipitation throughout 1982, 1983, and 1984 caused record level runoff and spring discharge rates for that period. A downtrend in the precipitation pattern began in 1985 and continued through 1987.

Runoff in 1987 for drainages surrounding East Mountain did not reach the peak flow levels recorded for previous years. The combined effect of lower precipitation received by East Mountain and above normal temperatures resulted in greater soil absorption and lower flow levels.

During 1984 an East Mountain Spring Recession Study was initiated. This program continued monthly through 1987 with similar discharge patterns being recorded each year. Several of the springs show a possible double porosity feature, meaning the springs discharge rate drops rapidly due to the snow pack runoff and the flow rate stabilizes at a lower value, which could be considered the formation porosity. Subsequent years of data will help in distinguishing this form.

The most important factor influencing the collection of hydrologic data pertaining to the mines was the 1984 Wilberg Mine fire. Due to

the fire and rescue efforts, in-mine monitoring at Wilberg Mine was temporarily suspended until the fourth quarter of 1985. Also, since the fire, average in-mine quality data will not correlate with the historical data due to the elimination of five monitoring sites when portions of the mine were sealed after the fire. All other data pertaining to the mines remained relatively constant.

The data collected in 1987 continued to show the relationship between the variation in surface water quantity and precipitation, but the hydrologic monitoring completed on East Mountain to date has failed to identify any change in the quantity or quality of ground or surface water which can be attributed to mining completed on the East Mountain property.

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	28419.00	27674.00	27026.00	26023.00	25258.00	24650.00	24026.00	24970.00	27602.00	27543.00	27009.00	25676.00	1
2	28436.00	27695.00	27009.00	26003.00	25239.00	24634.00	24011.00	25036.00	27615.00	27531.00	26993.00	25629.00	2
3	28423.00	27678.00	26960.00	25967.00	25200.00	24608.00	23988.00	25106.00	27636.00	27531.00	26972.00	25625.00	3
4	28397.00	27602.00	26918.00	25943.00	25192.00	24581.00	23966.00	25126.00	27649.00	27514.00	26955.00	25581.00	4
5	28376.00	27573.00	26898.00	25931.00	25145.00	24558.00	23943.00	25266.00	27662.00	27493.00	26939.00	25534.00	5
6	28358.00	27565.00	26869.00	25915.00	25114.00	24539.00	23921.00	25380.00	27674.00	27476.00	26922.00	25490.00	6
7	28337.00	27548.00	26832.00	25903.00	25094.00	24516.00	23902.00	25498.00	27708.00	27459.00	26902.00	25451.00	7
8	28315.00	27543.00	26807.00	25859.00	25063.00	24500.00	23880.00	25605.00	27721.00	27438.00	26885.00	25384.00	8
9	28255.00	27527.00	26791.00	25831.00	25036.00	24481.00	23857.00	25708.00	27734.00	27422.00	26852.00	25286.00	9
10	28233.00	27501.00	26737.00	25803.00	25021.00	24454.00	23835.00	25811.00	27742.00	27405.00	26828.00	25188.00	10
11	28216.00	27480.00	26704.00	25780.00	24986.00	24439.00	23868.00	25915.00	27750.00	27388.00	26795.00	25094.00	11
12	28194.00	27459.00	26668.00	25748.00	24978.00	24416.00	23891.00	26039.00	27750.00	27367.00	26754.00	24997.00	12
13	28169.00	27434.00	26655.00	25740.00	24974.00	24413.00	23932.00	26192.00	27750.00	27350.00	26717.00	24900.00	13
14	28147.00	27409.00	26602.00	25692.00	24974.00	24386.00	23981.00	26346.00	27738.00	27334.00	26680.00	24808.00	14
15	28121.00	27388.00	26569.00	25668.00	24947.00	24382.00	24041.00	26459.00	27729.00	27313.00	26647.00	24715.00	15
16	28096.00	27371.00	26541.00	25660.00	24920.00	24367.00	24083.00	26578.00	27712.00	27296.00	26602.00	24623.00	16
17	28070.00	27334.00	26516.00	25629.00	24900.00	24348.00	24109.00	26700.00	27704.00	27279.00	26565.00	24527.00	17
18	28061.00	27317.00	26476.00	25605.00	24881.00	24340.00	24113.00	26832.00	27691.00	27258.00	26512.00	24432.00	18
19	28044.00	27329.00	26468.00	25577.00	24858.00	24329.00	24132.00	26947.00	27683.00	27242.00	26435.00	24329.00	19
20	28019.00	27296.00	26431.00	25553.00	24831.00	24310.00	24166.00	27055.00	27662.00	27225.00	26358.00	24238.00	20
21	27993.00	27292.00	26382.00	25522.00	24804.00	24283.00	24223.00	27150.00	27653.00	27204.00	26281.00	24143.00	21
22	27963.00	27271.00	26354.00	25498.00	24784.00	24260.00	24272.00	27196.00	27640.00	27188.00	26212.00	24079.00	22
23	27942.00	27242.00	26317.00	25478.00	24773.00	24234.00	24317.00	27254.00	27619.00	27171.00	26144.00	24049.00	23
24	27912.00	27221.00	26277.00	25455.00	24773.00	24207.00	24363.00	27304.00	27602.00	27154.00	26075.00	24019.00	24
25	27891.00	27200.00	26249.00	25427.00	24765.00	24181.00	24416.00	27313.00	27586.00	27134.00	26003.00	24004.00	25
26	27865.00	27175.00	26208.00	25396.00	24727.00	24162.00	24504.00	27417.00	27573.00	27117.00	25931.00	23992.00	26
27	27835.00	27138.00	26176.00	25368.00	24704.00	24147.00	24588.00	27464.00	27560.00	27100.00	25871.00	23962.00	27
28	27814.00	27113.00	26148.00	25364.00	24677.00	24120.00	24677.00	27506.00	27543.00	27080.00	25835.00	23943.00	28
29	27789.00	27092.00	26116.00	25333.00	0.00	24101.00	24757.00	27535.00	27556.00	27063.00	25795.00	23917.00	29
30	27772.00	27059.00	26079.00	25313.00	0.00	24071.00	24838.00	27565.00	27560.00	27046.00	25776.00	23887.00	30
31	27746.00	0.00	26043.00	25286.00	0.00	24045.00	0.00	27594.00	0.00	27026.00	25716.00	0.00	31
MONTHLY CHANGE	-695.	-687.	-1016.	-757.	-609.	-632.	793.	2756.	-34.	-534.	-1310.	-1829.	

OCT86-SEPT87 TOTAL CHANGE -4554. MAX CONTENTS 28462. AC FT SEP 29 MIN CONTENTS 23835. AC FT APR 10

TOTAL CHANGE MAX CONTENTS MIN CONTENTS

REMARKS:

* Note: Between 4/3 to 4/11/87, the recorder stopped. Elevations are estimated for this period of time. From 7/3 to 8/8/87, the wind-up gear did not disengage from the clock gear ; will straight line elevation from 8566.65 to 8565.10.

UTAH POWER & LIGHT COMPANY

STREAM DISCHARGE RECORDS

DAILY DISCHARGE (CFS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	21.00	21.00	24.00	20.00	16.00	15.00	17.00	14.00	15.00	13.00	15.00	23.00	1
2	22.00	21.00	24.00	21.00	16.00	15.00	17.00	14.00	15.00	12.00	15.00	24.00	2
3	21.00	21.00	24.00	22.00	16.00	15.00	17.00	14.00	15.00	13.00	15.00	23.00	3
4	18.00	21.00	26.00	23.00	16.00	15.00	17.00	14.00	14.00	13.00	15.00	23.00	4
5	19.00	20.00	21.00	20.00	16.00	15.00	17.00	14.00	14.00	13.00	15.00	23.00	5
6	18.00	19.00	21.00	18.00	16.00	15.00	17.00	13.00	14.00	14.00	14.00	23.00	6
7	18.00	17.00	21.00	18.00	16.00	15.00	16.00	14.00	14.00	14.00	14.00	23.00	7
8	18.00	17.00	21.00	18.00	16.00	15.00	16.00	14.00	14.00	14.00	14.00	37.00	8
9	17.00	17.00	21.00	18.00	16.00	15.00	16.00	14.00	14.00	16.00	14.00	49.00	9
10	18.00	17.00	21.00	18.00	16.00	15.00	16.00	14.00	14.00	16.00	14.00	47.00	10
11	18.00	17.00	20.00	19.00	16.00	15.00	16.00	14.00	15.00	15.00	14.00	49.00	11
12	18.00	18.00	20.00	19.00	15.00	15.00	16.00	14.00	16.00	15.00	20.00	49.00	12
13	18.00	19.00	20.00	18.00	15.00	15.00	16.00	14.00	15.00	14.00	23.00	49.00	13
14	18.00	21.00	19.00	17.00	15.00	15.00	16.00	14.00	15.00	15.00	35.00	49.00	14
15	18.00	21.00	19.00	17.00	15.00	15.00	16.00	14.00	14.00	15.00	43.00	50.00	15
16	18.00	21.00	19.00	17.00	15.00	16.00	15.00	14.00	15.00	14.00	43.00	48.00	16
17	21.00	21.00	19.00	17.00	15.00	16.00	15.00	14.00	14.00	14.00	43.00	47.00	17
18	20.00	21.00	18.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	49.00	18
19	20.00	21.00	19.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	49.00	19
20	20.00	18.00	21.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	49.00	20
21	20.00	17.00	21.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	49.00	21
22	20.00	17.00	21.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	33.00	22
23	20.00	17.00	21.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	43.00	16.00	23
24	19.00	17.00	19.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	41.00	16.00	24
25	20.00	17.00	19.00	17.00	15.00	16.00	15.00	15.00	13.00	14.00	33.00	14.00	25
26	20.00	21.00	19.00	16.00	15.00	16.00	14.00	15.00	13.00	13.00	23.00	13.00	26
27	20.00	25.00	19.00	16.00	15.00	17.00	14.00	15.00	13.00	16.00	23.00	13.00	27
28	20.00	25.00	19.00	16.00	15.00	17.00	14.00	15.00	13.00	16.00	23.00	13.00	28
29	21.00	25.00	19.00	16.00	0.00	17.00	14.00	15.00	13.00	16.00	23.00	15.00	29
30	21.00	24.00	19.00	16.00	0.00	17.00	14.00	15.00	13.00	16.00	23.00	15.00	30
31	21.00	0.00	19.00	16.00	0.00	17.00	0.00	15.00	0.00	16.00	23.00	0.00	31
MONTHLY													
TOT	601.00	594.00	633.00	552.00	431.00	486.00	466.00	447.00	416.00	445.00	836.00	980.00	
MEA	19.40	19.80	20.40	17.80	15.40	15.70	15.50	14.40	13.90	14.40	27.00	32.70	
MAX	22.00	25.00	26.00	23.00	16.00	17.00	17.00	15.00	16.00	16.00	43.00	50.00	
MIN	17.00	17.00	[illegible].00	16.00	15.00	15.00	14.00	13.00	13.00	12.00	14.00	13.00	
ACR FT	1190.00	1180.00	1260.00	1090.00	855.00	964.00	924.00	887.00	825.00	883.00	1660.00	1940.00	

OCT86-SEPT87 TOTAL 6887.00 MEAN 18.90 MAX 50.00 MIN 12.00 TOT ACR FT 13660.00

TOTAL MEAN MAX MIN TOT ACR FT

MAX UNIT DISCHARGE 123.00 CFS DATE DEC 4 MIN UNIT DISCHARGE 0.00 CFS DATE SEP 30
(2.29 FT)

REMARKS:

* Note: From 3/2/ to 4/1/87, the chart ran six days slow.From 4/3 to 5/4/87, the chart came off of roller; Straight lined the chart between a guage height of 1.38 to 1.31. From 7/2 to 8/7/87, the clock ran 15 days slow.From 8/8 to 9/2/87, the clock ran 5 days slow; Installed new clock.

UTAH POWER & LIGHT COMPANY

STREAM DISCHARGE RECORDS

DAILY DISCHARGE (CFS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	124.00	44.00	44.00	46.00	49.00	52.00	53.00	183.00	153.00	105.00	94.00	64.00	1
2	115.00	43.00	48.00	48.00	49.00	51.00	57.00	164.00	147.00	100.00	90.00	60.00	2
3	101.00	43.00	48.00	45.00	50.00	51.00	60.00	123.00	132.00	95.00	92.00	58.00	3
4	98.00	43.00	48.00	49.00	49.00	52.00	63.00	127.00	131.00	94.00	86.00	57.00	4
5	76.00	43.00	46.00	50.00	50.00	52.00	57.00	135.00	132.00	99.00	57.00	57.00	5
6	71.00	42.00	46.00	46.00	50.00	51.00	55.00	187.00	136.00	98.00	48.00	57.00	6
7	58.00	40.00	45.00	44.00	49.00	50.00	59.00	215.00	149.00	91.00	51.00	65.00	7
8	51.00	39.00	44.00	41.00	50.00	50.00	62.00	205.00	149.00	81.00	46.00	61.00	8
9	56.00	41.00	40.00	36.00	51.00	50.00	63.00	190.00	144.00	80.00	45.00	81.00	9
10	57.00	42.00	46.00	40.00	51.00	46.00	64.00	178.00	133.00	81.00	54.00	82.00	10
11	57.00	41.00	49.00	44.00	50.00	44.00	66.00	172.00	131.00	93.00	56.00	84.00	11
12	57.00	42.00	48.00	43.00	50.00	44.00	61.00	175.00	133.00	97.00	61.00	86.00	12
13	54.00	42.00	49.00	39.00	50.00	45.00	60.00	195.00	133.00	75.00	81.00	84.00	13
14	53.00	44.00	57.00	37.00	52.00	43.00	63.00	172.00	123.00	74.00	85.00	70.00	14
15	54.00	44.00	44.00	35.00	50.00	44.00	77.00	175.00	116.00	69.00	73.00	69.00	15
16	54.00	44.00	35.00	41.00	49.00	43.00	91.00	183.00	110.00	72.00	73.00	73.00	16
17	56.00	44.00	33.00	35.00	46.00	42.00	105.00	176.00	102.00	69.00	71.00	72.00	17
18	64.00	45.00	31.00	40.00	46.00	42.00	115.00	179.00	98.00	64.00	71.00	72.00	18
19	62.00	54.00	35.00	45.00	44.00	42.00	105.00	173.00	92.00	62.00	77.00	73.00	19
20	60.00	48.00	38.00	37.00	43.00	41.00	78.00	159.00	96.00	64.00	79.00	73.00	20
21	57.00	43.00	44.00	41.00	45.00	51.00	74.00	160.00	91.00	71.00	85.00	73.00	21
22	52.00	43.00	39.00	41.00	48.00	43.00	107.00	156.00	96.00	78.00	86.00	89.00	22
23	47.00	41.00	47.00	47.00	46.00	41.00	134.00	175.00	98.00	83.00	84.00	118.00	23
24	47.00	41.00	43.00	48.00	48.00	42.00	150.00	184.00	122.00	83.00	90.00	117.00	24
25	45.00	42.00	39.00	47.00	50.00	40.00	140.00	185.00	131.00	87.00	91.00	116.00	25
26	45.00	40.00	38.00	47.00	49.00	40.00	152.00	184.00	131.00	91.00	83.00	113.00	26
27	44.00	43.00	49.00	45.00	49.00	40.00	170.00	171.00	127.00	100.00	81.00	113.00	27
28	45.00	45.00	47.00	46.00	49.00	43.00	179.00	162.00	126.00	92.00	78.00	111.00	28
29	47.00	46.00	40.00	46.00	0.00	47.00	197.00	155.00	143.00	115.00	74.00	111.00	29
30	44.00	46.00	45.00	48.00	0.00	48.00	198.00	150.00	136.00	99.00	71.00	116.00	30
31	44.00	0.00	40.00	49.00	0.00	50.00	0.00	151.00	0.00	93.00	68.00	0.00	31
MONTHLY													
TOT	1895.00	1298.00	1345.00	1346.00	1362.00	1420.00	2915.00	5299.00	3741.00	2655.00	2281.00	2475.00	
MEA	61.10	43.30	43.40	43.40	48.60	45.80	97.20	171.00	125.00	85.60	73.60	82.50	
MAX	124.00	54.00	57.00	50.00	52.00	52.00	198.00	215.00	153.00	115.00	94.00	118.00	
MIN	44.00	39.00	31.00	35.00	43.00	40.00	53.00	123.00	91.00	62.00	45.00	57.00	
ACR FT	3760.00	2570.00	2670.00	2670.00	2700.00	2820.00	5780.00	10510.00	7420.00	5270.00	4520.00	4910.00	

OCT86-SEPT87 TOTAL 28032.00 MEAN 76.80 MAX 215.00 MIN 31.00 TOT ACR FT 55600.00

TOTAL MEAN MAX MIN TOT ACR FT

MAX UNIT DISCHARGE 250.00 CFS (2.36 FT) DATE APR 29 MIN UNIT DISCHARGE 30.00 CFS DATE DEC 10

REMARKS:

UTAH POWER & LIGHT COMPANY

INFLOW AND UTILIZATION RECORDS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	131.06	48.98	47.72	35.68	48.41	47.49	49.81	247.09	175.06	159.73	113.76	72.97	1
2	149.44	50.28	45.95	30.95	50.56	50.72	43.28	246.20	173.05	157.44	103.79	63.30	2
3	127.01	34.95	40.02	40.53	47.41	51.65	48.84	243.45	173.26	119.45	108.97	47.60	3
4	119.80	46.59	47.13	46.81	50.50	54.00	54.81	221.44	164.77	110.42	106.37	52.51	4
5	108.26	60.62	42.36	39.58	48.28	54.43	56.93	164.71	157.23	108.74	106.67	60.26	5
6	94.76	35.43	35.84	43.04	50.93	53.03	58.36	156.50	157.25	106.76	101.05	60.07	6
7	69.52	31.81	42.19	49.88	44.08	53.30	50.99	182.37	156.21	105.87	71.17	47.13	7
8	67.82	48.42	45.33	47.79	42.99	55.08	50.90	258.31	152.72	105.55	62.03	45.13	8
9	55.29	49.26	39.95	46.35	43.20	53.30	54.96	280.71	171.40	99.83	65.00	55.13	9
10	47.29	48.57	39.75	36.07	43.63	47.66	58.12	268.96	177.25	89.19	57.85	48.88	10
11	41.99	49.01	42.77	26.34	44.70	51.25	59.03	250.52	167.35	88.70	55.42	53.99	11
12	43.02	46.28	36.82	34.69	53.60	47.58	60.32	237.55	149.28	90.34	64.17	45.55	12
13	54.01	43.79	29.92	41.95	51.16	47.44	75.94	231.97	151.43	102.76	66.36	48.68	13
14	53.15	44.25	34.49	44.44	52.52	47.49	82.17	240.32	149.74	105.98	68.13	49.86	14
15	50.27	41.62	38.25	43.25	60.70	52.31	83.74	271.88	143.07	84.44	88.69	45.94	15
16	51.24	43.86	42.60	37.26	64.50	49.81	92.91	257.18	137.02	84.81	92.91	35.55	16
17	48.17	46.21	40.51	31.32	57.33	50.62	111.78	249.81	128.87	78.87	81.51	34.48	17
18	50.30	47.29	38.06	40.87	49.30	52.35	124.13	248.51	120.27	81.58	79.65	37.29	18
19	50.96	43.70	42.96	38.59	48.36	48.07	130.02	243.34	113.66	79.86	76.09	35.22	19
20	61.39	43.25	37.11	40.03	50.10	49.03	130.25	250.41	110.01	72.73	75.03	36.65	20
21	65.05	64.92	44.76	45.42	48.08	51.81	118.02	242.56	102.26	71.80	71.67	35.32	21
22	57.77	55.70	45.59	37.57	43.75	48.25	98.27	222.13	105.96	75.32	68.27	36.46	22
23	52.19	44.73	32.56	40.87	43.89	52.94	103.91	218.33	101.35	74.71	73.87	37.28	23
24	48.22	47.66	27.06	41.34	43.22	44.74	141.08	201.12	108.29	87.98	76.72	60.02	24
25	46.59	39.36	37.49	49.07	48.65	41.66	165.17	213.02	107.08	96.55	75.20	104.86	25
26	49.17	40.49	30.05	50.65	58.73	42.88	180.42	222.25	130.05	94.66	81.12	111.68	26
27	48.87	43.56	29.78	44.56	60.79	40.94	172.13	214.43	139.96	99.95	72.47	114.43	27
28	47.78	39.84	29.23	45.03	51.61	43.56	195.29	227.50	139.46	102.89	63.06	115.17	28
29	44.18	38.48	29.63	37.27	0.00	45.41	220.76	223.55	137.90	114.59	62.21	111.85	29
30	48.73	41.94	41.40	47.56	0.00	38.89	230.05	192.32	136.65	104.80	67.63	108.64	30
31	52.22	0.00	34.08	50.79	0.00	45.71	0.00	180.54	0.00	129.46	71.36	0.00	31
MONTHLY													
TOT	2035.51	1360.83	1201.33	1285.53	1401.02	1513.39	3102.05	7109.06	4237.90	3085.77	2428.20	1811.89	
MEA	65.66	45.36	38.75	41.47	50.04	48.82	103.40	229.32	141.26	99.54	78.33	60.40	
MAX	149.44	64.92	47.72	50.79	64.50	55.08	230.05	280.71	177.25	159.73	113.76	115.17	
MIN	41.99	31.81	27.06	26.34	42.99	38.89	43.28	156.50	101.35	71.80	55.42	34.48	

OCT86-SEPT87 TOTAL 30573. MEAN 84. MAX 281. MIN 26.

TOTAL MEAN MAX MIN

REMARKS:

HUNTINGTON CREEK - Above Power Plant
WATER ANALYSES

LOCATION	DATE	PARAMETER	CODE	VALUE	UNITS
H1	02/26/87	ALKALINITY		204.0000	MG/L
		FIELD CONDUCTIVITY		390.0000	UMOHS/L
		FIELD PH		7.5000	UNITS
		SOLIDS-SUSPENDED		2.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		365.0000	MG/L
COMMENT = ICY, CLEAR					
	05/26/87	ALKALINITY		170.0000	MG/L
		FIELD CONDUCTIVITY		332.0000	UMOHS/L
		FIELD PH		8.0000	UNITS
		SOLIDS-SUSPENDED		1070.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		510.0000	MG/L
COMMENT = VERY HIGH, MUDDY					
	09/21/87	ALKALINITY		156.0000	MG/L
		FIELD CONDUCTIVITY		370.0000	UMOHS/L
		FIELD PH		8.8000	UNITS
		SOLIDS-SUSPENDED		4.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		186.0000	MG/L
COMMENT = CLEAR					
	11/16/87	ALKALINITY		210.0000	MG/L
		FIELD CONDUCTIVITY		420.0000	UMOHS/L
		FIELD PH		8.5600	UNITS
		SOLIDS-SUSPENDED		5.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		256.0000	MG/L
COMMENT = ICY,LOW FLOW					

HUNTINGTON CREEK - Below Power Plant
WATER ANALYSES

LOCATION	DATE	PARAMETER	CODE	VALUE	UNITS
UPL9	02/26/87	ALKALINITY		172.0000	MG/L
		FIELD CONDUCTIVITY		410.0000	UMOHS/L
		FIELD PH		8.9800	UNITS
		SOLIDS-SUSPENDED		10.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		445.0000	MG/L
COMMENT = OVERCAST, WINDY					
	05/27/87	ALKALINITY		167.0000	MG/L
		FIELD CONDUCTIVITY		440.0000	UMOHS/L
		FIELD PH		8.5900	UNITS
		SOLIDS-SUSPENDED		582.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		245.0000	MG/L
COMMENT = VERY SILTY					
	09/22/87	ALKALINITY		172.0000	MG/L
		FIELD CONDUCTIVITY		475.0000	UMOHS/L
		FIELD PH		8.8000	UNITS
		SOLIDS-SUSPENDED		10.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		225.0000	MG/L
COMMENT = CLEAR					
	11/16/87	ALKALINITY		225.0000	MG/L
		FIELD CONDUCTIVITY		320.0000	UMOHS/L
		FIELD PH		7.5800	UNITS
		SOLIDS-SUSPENDED		17.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		420.0000	MG/L
COMMENT = CLEAR					

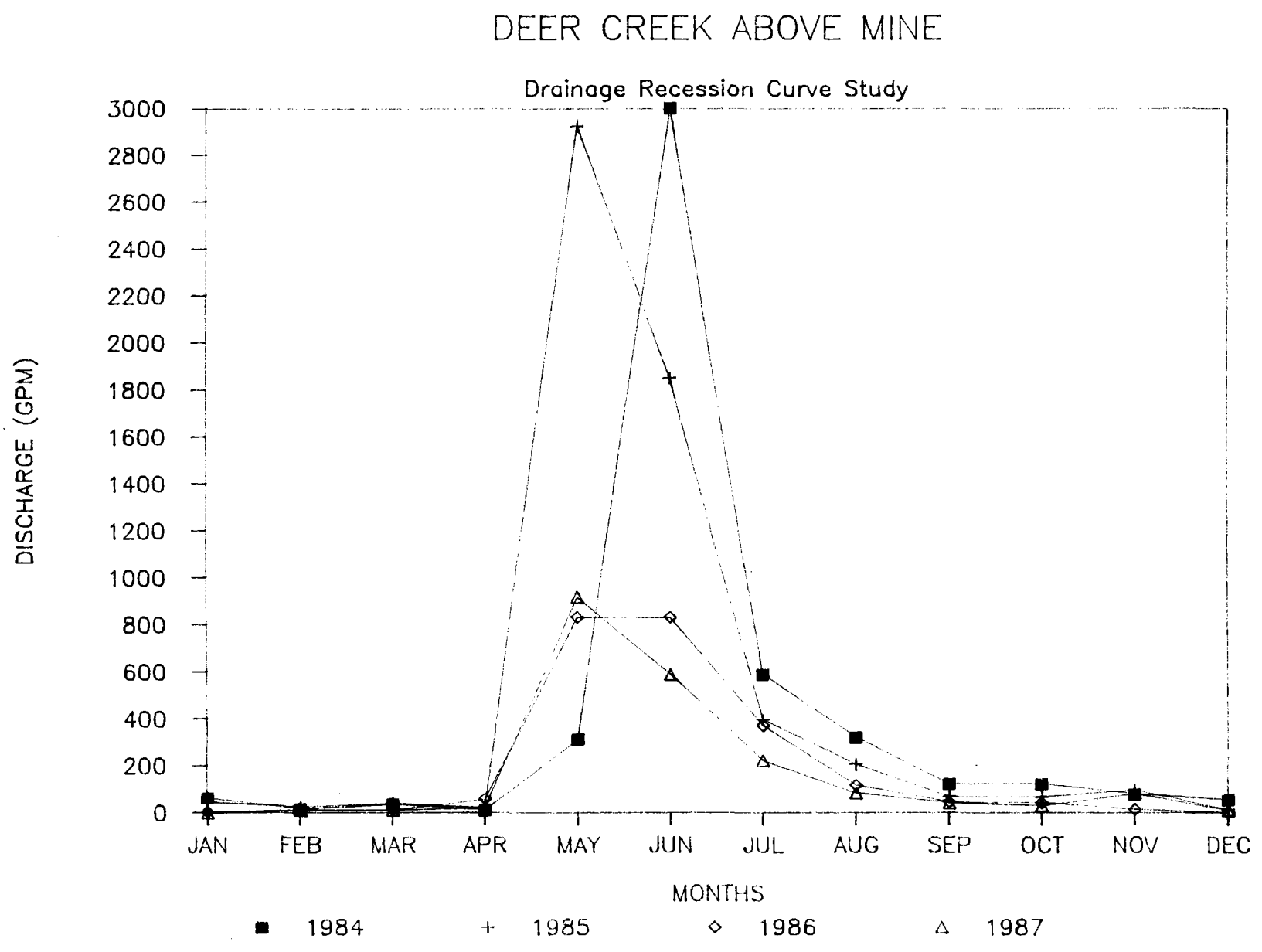
HUNTINGTON CREEK - Right Fork Above Left Fork
WATER ANALYSES 1987

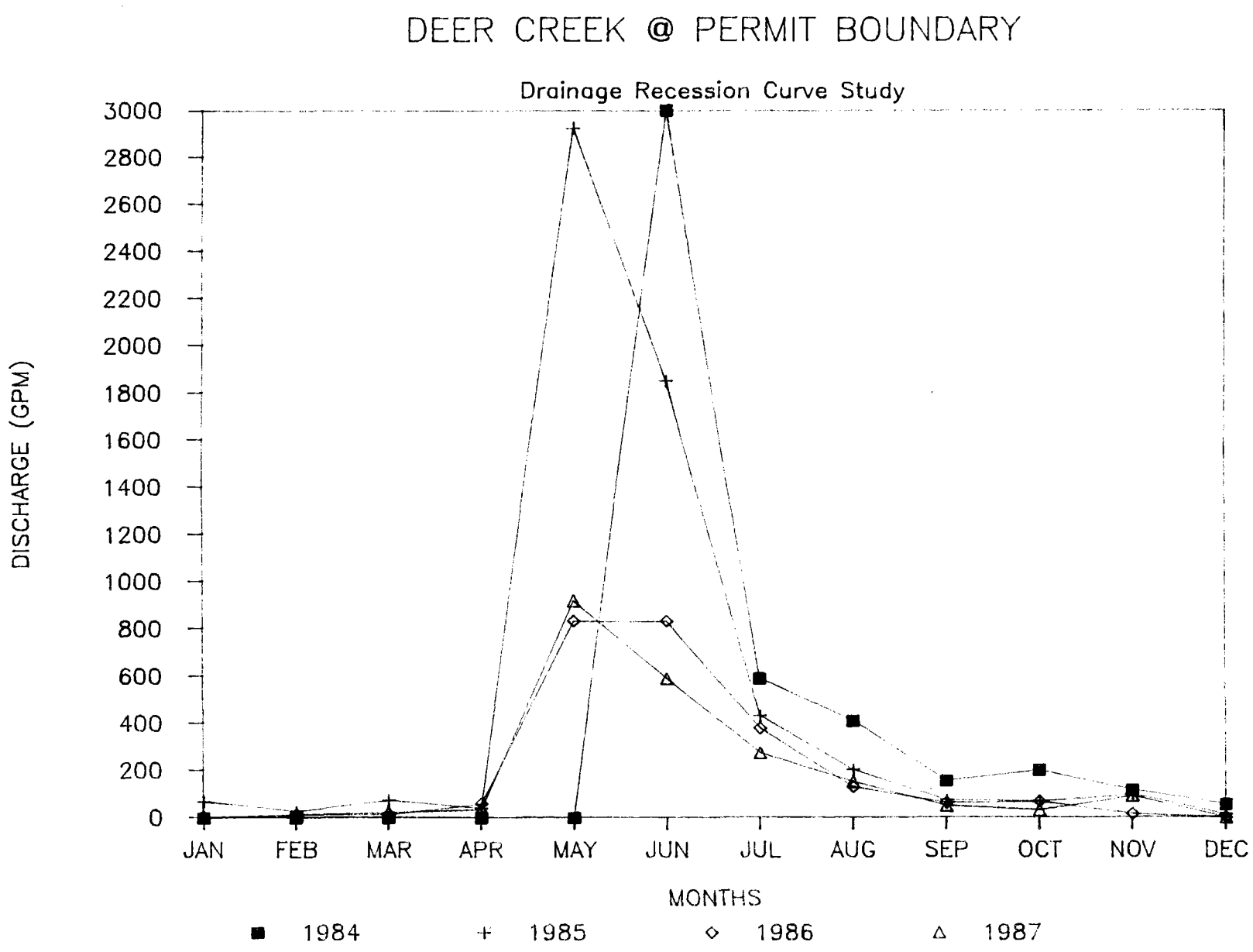
LOCATION	DATE	PARAMETER	CODE	VALUE	UNITS
UPL2	01/08/87	FIELD CONDUCTIVITY		391.0000	UMOHS/L
		FIELD PH		7.9000	UNITS
		SOLIDS-SETTABLE		1.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		192.0000	MG/L
		SULFATE		18.0000	MG/L
	04/07/87	FIELD CONDUCTIVITY		391.0000	UMOHS/L
		FIELD PH		8.0000	UNITS
		SOLIDS-SETTABLE		10.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		222.0000	MG/L
		SULFATE		20.0000	MG/L
	04/23/87	SOLIDS-TOTAL DISSOLVED		180.0000	MG/L
		SULFATE		16.0	MG/L
	05/26/87	FIELD CONDUCTIVITY		365.0000	UMOHS/L
		FIELD PH		8.0000	UNITS
		SOLIDS-TOTAL DISSOLVED		198.0000	MG/L
		SULFATE		18.0000	MG/L
	08/28/87	FIELD CONDUCTIVITY		322.0000	UMOHS/L
		FIELD PH		8.5000	UNITS
		SOLIDS-TOTAL DISSOLVED		180.0000	MG/L
		SULFATE		15.0000	MG/L
	09/21/87	FIELD CONDUCTIVITY		315.0000	UMOHS/L
		FIELD PH		8.9000	UNITS
		SOLIDS-TOTAL DISSOLVED		148.0000	MG/L
		SULFATE		11.0000	MG/L
	10/23/87	FIELD CONDUCTIVITY		463.0000	UMOHS/L
		FIELD PH		8.9000	UNITS
		SOLIDS-TOTAL DISSOLVED		306.0000	MG/L
		SULFATE		20.0000	MG/L
	11/19/87	FIELD CONDUCTIVITY		395.0000	UMOHS/L
		FIELD PH		8.2000	UNITS
		SOLIDS-TOTAL DISSOLVED		176.0000	MG/L
		SULFATE		22.0000	MG/L

HUNTINGTON CREEK - Below Electric Lake
WATER ANALYSES 1987

LOCATION	DATE	PARAMETER	CODE	VALUE	UNITS
UPL3	01/08/87	FIELD CONDUCTIVITY		274.0000	UMOHS/L
		FIELD PH		7.1000	UNITS
		SOLIDS-SETTABLE		3.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		148.0000	MG/L
		SULFATE		12.0000	MG/L
	04/07/87	FIELD CONDUCTIVITY		300.0000	UMOHS/L
		FIELD PH		7.8000	UNITS
		SOLIDS-SETTABLE		37.0000	MG/L
		SOLIDS-TOTAL DISSOLVED		156.0000	MG/L
		SULFATE		11.0000	MG/L
	04/23/87	SOLIDS-TOTAL DISSOLVED		132.0000	MG/L
		SULFATE		10.0000	MG/L
	05/26/87	FIELD CONDUCTIVITY		296.0000	UMOHS/L
		FIELD PH		7.4000	UNITS
		SOLIDS-TOTAL DISSOLVED		156.0000	MG/L
		SULFATE		13.0000	MG/L
	08/28/87	FIELD CONDUCTIVITY		250.0000	UMOHS/L
		FIELD PH		8.2000	UNITS
		SOLIDS-TOTAL DISSOLVED		138.0000	MG/L
		SULFATE		10.0000	MG/L
	09/21/87	FIELD CONDUCTIVITY		274.0000	UMOHS/L
		FIELD PH		8.6000	UNITS
		SOLIDS-TOTAL DISSOLVED		128.0000	MG/L
		SULFATE		8.0000	MG/L
	10/23/87	FIELD CONDUCTIVITY		344.0000	UMOHS/L
		FIELD PH		8.4000	UNITS
		SOLIDS-TOTAL DISSOLVED		276.0000	MG/L
		SULFATE		14.0000	MG/L
	11/19/87	FIELD CONDUCTIVITY		275.0000	UMOHS/L
		FIELD PH		8.1000	UNITS
		SOLIDS-TOTAL DISSOLVED		108.0000	MG/L
		SULFATE		14.0000	MG/L
	12/08/87	FIELD CONDUCTIVITY		330.0000	UMOHS/L
		FIELD PH		8.0400	UNITS
		SOLIDS-TOTAL DISSOLVED		174.0000	MG/L
		SULFATE		12.0000	MG/L

APPENDIX B


DEER CREEK ABOVE MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1984
1985
1986
1987


DEER CREEK @ PERMIT BOUNDARY
Drainage Recession Curve Study
DISCHARGE (GPM)
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
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JAN
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MONTHS
1984
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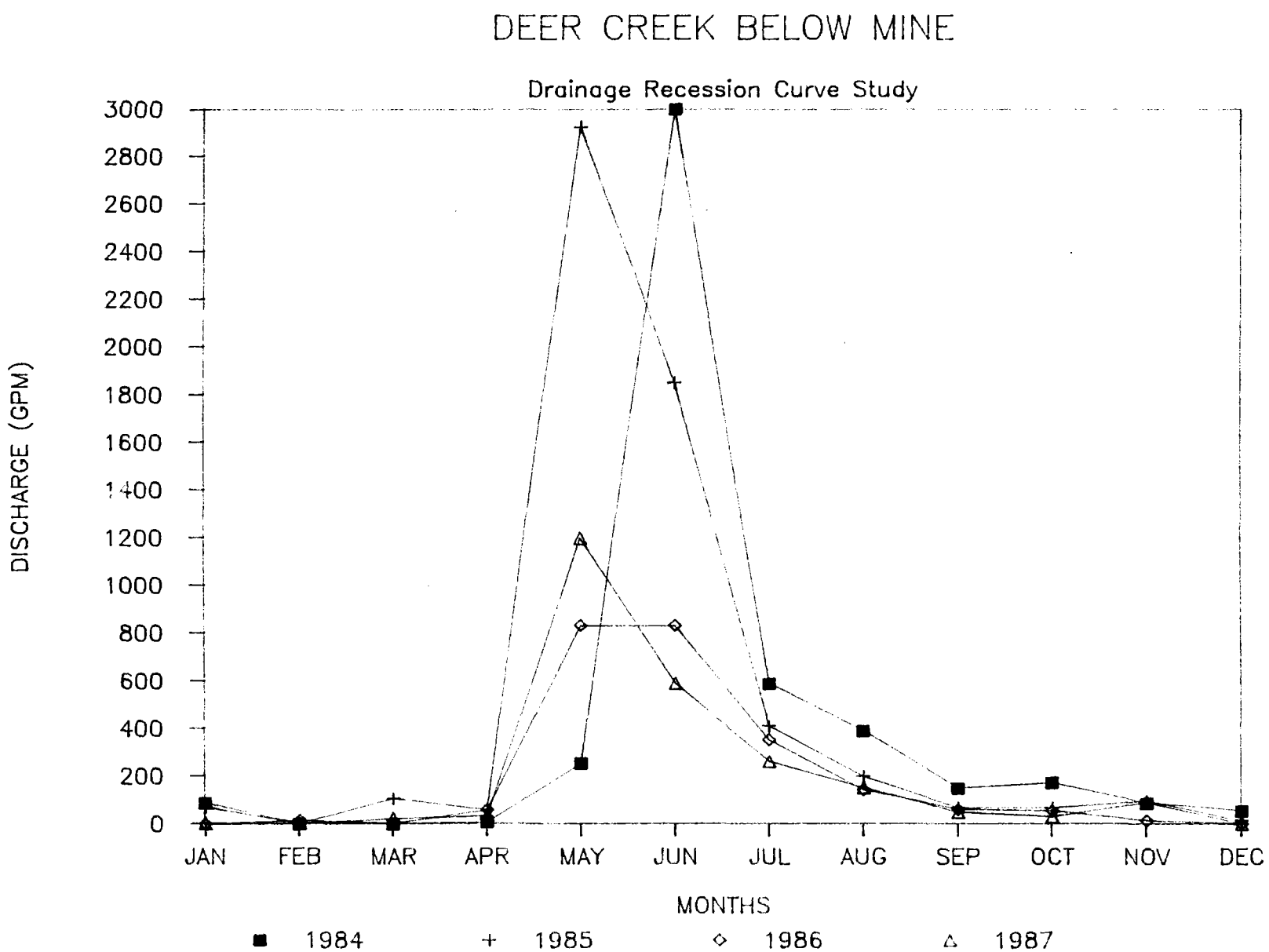
1986
1987


DEER CREEK BELOW MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1984
1985
1986
1987

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8817
Date Rec'd 4-8-87
Date Sampled 4-8-87
Time Sampled 1039

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
PO BOX 1005
HUNTINGTON, UT 84528

Sample ID: DEER CREEK RUNOFF ABOVE MINE(Culvert outlet)

Temp.38° Flow 25GPM Est. D.O. 13.04/COND. 1216

Acidity		< 1.0	mg/l $CaCO_3$
Alkalinity, Total	4-13		mg/l $CaCO_3$
Alkalinity, Bicarbonate		337	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate		< 1.0	mg/l $CaCO_3$
Chloride	4-17	176	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	1580	µmhos/cm
Fluoride			mg/l
Hardness, Total	4-15	550	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease *			mg/l
pH	4-13	7.70	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved	4-10	897	mg/l
Solids, Total Suspended		9	mg/l
Sulfate	4-15	255	mg/l
Sulfide			mg/l
Turbidity			NTU
Diss. Oxygen	4-9	7.80	mg/l
Total Cations		15.97	meq/l
Total Anions		15.80	meq/l
Settleable Solids	4-9	< 0.1	mg/l

*NO BOTTLE SUBMITTED

Analyst: Sharon Reiter

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	82	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	0.13	mg/l
Lead			mg/l
Magnesium	4-15	83.9	mg/l
Manganese	4-16	< 0.01	mg/l
Mercury			µg/l
Nickel			mg/l
Potassium	4-16	4.33	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	111.6	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	4-16	< 0.05	mg/l

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FIELD OFFICE

Respectfully submitted Cliff Swapt

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8816

Date Rec'd 4-8-87

Date Sampled 4-8-87

Time Sampled 1130

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
P.O. BOX 1005
HUNTINGTON, UT 84528

Sample ID: DEER CREEK RUNOFF
BELOW MINE

Temp. 50.4° Flow 35 GPM est. pH 7.81/D.O. 14.86/COND. 2284

Acidity		< 1.0	mg/l $CaCO_3$
Alkalinity, Total	4-13		mg/l $CaCO_3$
Alkalinity, Bicarbonate		305	mg/l $CaCO_3$ HCO_3
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$
Chloride	4-17	420	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	2650	umhos/cm
Fluoride			mg/l
Hardness, Total	4-15	815	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease *			mg/l
pH	4-13	7.40	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved	4-10	1544	mg/l
Solids, Total Suspended		41	mg/l
Sulfate	4-15	500	mg/l
Sulfide			mg/l
Turbidity			NTU
Diss. Oxygen	4-9	7.45	mg/l
Total Cations		26.62	meq/l
Total Anions		27.26	meq/l
Settleable Solids	4-9	0.1	mg/l

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	124	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	0.29	mg/l
Lead			mg/l
Magnesium	4-15	122.8	mg/l
Manganese	4-16	< 0.01	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-16	7.31	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	233.2	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	4-16	< 0.05	mg/l

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APR 21 1987
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● bottle submitted for Oil & Grease

Analyst: Sharon Reiter

Respectfully submitted Cliff Swapt

Certified Environmental Laboratory

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

FIELD OFFICE

Lab ID: 59-8909
Date Rec'd: 6-17-87
Date Sampled: 6-16-87
Time Sampled: 1220
Client: Utah Power & Light
Sample ID: Deer Creek above mine

Temp 48° Flow 1.2/590.3 GPM pH 8.31 D.O. 14.89 Cond. 384

Water Analysis Report

Acidity	6-18	< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total			mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		272	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	6-18	6.3	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	6-25	2.2	mg/l
Conductivity	6-19	440	umhos/cm	Chromium			mg/l
Fluoride	6-25		mg/l	Copper			mg/l
Hardness, Total		225	mg/l $CaCO_3$	Iron	6-25	0.31	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	6-25	27.9	mg/l
Nitrogen, Nitrite			mg/l	Manganese	6-25	0.06	mg/l
Oil & Grease	6-22	0.6	mg/l	Mercury			ug/l
pH	6-18	7.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	6-25	0.5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	6-17	275	mg/l	Silica			mg/l
Solids, Total Suspended		1	mg/l	Silver			mg/l
Sulfate	6-26	24	mg/l	Sodium	6-25	16	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Dissolved Oxygen	6-17	7.65	mg/l	Iron, Diss	6-25	< .05	mg/l

Comments: Settleable Solids < .1 mg/l

Total Cations 5.21 meq/l

Total Anions 5.15 meq/l

Analyst: Sharon Reuter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

MINING DIV
FIELD OFFICE

Lab ID: 59-8910
Date Rec'd: 6-17-87
Date Sampled: 6-16-87
Time Sampled: 1255
Client: Utah Power & Light
Sample ID: Deer Creek below mine

Temp 64° Flow 1.2/590.3 GPM pH 8.2 D.O. 11.87 Cond. 709

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	6-18		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		255	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	6-18	48	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	6-25	2.4	mg/l
Conductivity	6-19	620	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	6-25	285	mg/l $CaCO_3$	Iron	6-25	0.13	mg/l
Nitrogen, Ammonia			mg/l	Lead	6-25		mg/l
Nitrogen, Nitrate			mg/l	Magnesium		40.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese	6-25	0.02	mg/l
Oil & Grease	6-22	1.2	mg/l	Mercury			ug/l
pH	6-18	7.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	6-25	1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		429	mg/l	Silica			mg/l
Solids, Total Suspended	6-17	9	mg/l	Silver			mg/l
Sulfate	6-26	100	mg/l	Sodium	6-25	39	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Dissolved Oxygen	6-17	7.35	mg/l	Iron, Diss	6-25	0.07	mg/l
Comments: Settleable Solids		.1	mg/l	Total Cations		7.43	meq/l
Total Anions		7.62	meq/l				

Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

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RECEIVED
JUL 30 1987
MINING DIV.
FIELD OFFICE

Lab ID: 8952

Date Rec'd: 7-16-87

Date Sampled: 7-16-87

Time Sampled: 1000

Client: Utah Power & Light

Sample ID: ~~Deer Creek above~~ the mine

Temp 49° Flow .64/223.1 GPM

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-17		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		273	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	8	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	38	mg/l
Conductivity	7-17	505	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	225	mg/l $CaCO_3$	Iron	7-21	.06	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-22	31.6	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	< .01	mg/l
Oil & Grease	7-18	0.6	mg/l	Mercury			ug/l
pH	7-17	7.20	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-17	252	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	25	mg/l	Sodium	7-22	18	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Settleable Solids	7-16	< .1	mg/l	Iron,Diss	7-21	< .05	mg/l

Comments: Dissolved Oxygen 7-16 8.40 mg/l Anions 5.24 ~~meq/l~~

Cations 5.30 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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Lab ID: 8953
Date Rec'd: 7-16-87
Date Sampled: 7-16-87
Time Sampled: 1040
Client: Utah Power & Light
Temp 64° Flow 262.1 GPM
Sample ID: Deer Creek Runoff below the mine

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total			mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate	7-17	267	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	88	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	46	mg/l
Conductivity	7-17	930	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	320	mg/l $CaCO_3$	Iron	7-21	.05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-27	49.8	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	0.01	mg/l
Oil & Grease	7-18	< .5	mg/l	Mercury			ug/l
pH	7-17	7.35	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	2	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-17	489	mg/l	Silica			mg/l
Solids, Total Suspended		8	mg/l	Silver			mg/l
Sulfate	7-17	90	mg/l	Sodium	7-22	63	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Settleable Solids	7-16	< .1	mg/l	Iron, Diss	7-21	< .05	mg/l
Comments: Dissolved Oxygen	7-16	8.20	mg/l	Anions		8.75	meq/l
Cations		9.21	meq/l				

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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SINCE 1906
Member of the SGS Group (Société Générale de Surveillance)

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

September 21,1987

Job No.: 8963

Date Rec'd: August 18, 1987

Date Sampled: August 18, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Above the mine
11:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/19/87	<1.0 mg/l CaCO3	Manganese 08/24/87	0.01 mg/l
Alk., Bicarbonate 08/19/87	303 mg/l HCO3	Oil and Grease 08/26/87	1.0 mg/l
Alk., Carbonate 08/19/87	<1.0 mg/l CaCO3	Oxygen, Dissolved 08/19/87	5.7 mg/l
Alk., Total 08/19/87	248 mg/l CaCO3	pH 08/19/87	7.70 Units
Anions, Total	6.29 meq/l	Potassium 08/24/87	0.90 mg/l
Calcium 08/24/87	46.0 mg/l	Sodium 08/27/87	20.42 mg/l
Cations, Total	5.90 meq/l	Solids, Dissolved 08/25/87	312 mg/l
Chloride 08/26/87	3.5 mg/l	Solids, Settable 08/24/87	<0.1 mg/l
Conductivity 08/25/87	500 umhos/cm	Solids, Suspended 08/25/87	<4.0 mg/l
Hardness, Total 08/24/87	250 mg/l CaCO3	Sulfate 08/27/87	64.0 mg/l
Iron 08/24/87	<0.05 mg/l		
Iron, Dissolved 08/24/87	<0.05 mg/l		
Magnesium 08/24/87	33.00 mg/l		
Manganese 08/24/87	0.01 mg/l		
Oil and Grease 08/26/87	1.0 mg/l		

RECEIVED
SEP 21 1987
MINING DIV.
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
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Member of the SGS Group (Société Générale de Surveillance)

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

September 21,1987

Job No.: 8964

Date Rec'd: August 18, 1987

Date Sampled: August 18, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Below the mine
12:35 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/19/87	<1.0 mg/l CaCO3	Manganese 08/24/87	0.01 mg/l
Alk., Bicarbonate 08/19/87	272 mg/l HCO3	Oil and Grease 08/26/87	1.1 mg/l
Alk., Carbonate 08/19/87	<1.0 mg/l CaCO3	Oxygen, Dissolved 08/19/87	5.4 mg/l
Alk., Total 08/19/87	223 mg/l CaCO3	pH 08/19/87	7.60 Units
Anions, Total	11.20 meq/l	Potassium 08/24/87	3.30 mg/l
Calcium 08/24/87	78.0 mg/l	Sodium 08/27/87	197.80 mg/l
Cations, Total	18.09 meq/l	Solids, Dissolved 08/25/87	798 mg/l
Chloride 08/26/87	34.6 mg/l	Solids, Settable 08/19/87	<0.1 mg/l
Conductivity 08/25/87	1320 umhos/cm	Solids, Suspended 08/25/87	<4.0 mg/l
Hardness, Total 08/24/87	475 mg/l CaCO3	Sulfate 08/27/87	280.0 mg/l
Iron 08/24/87	<0.05 mg/l		
Iron, Dissolved 08/24/87	<0.05 mg/l		
Magnesium 08/24/87	68.00 mg/l		
Manganese 08/24/87	<0.01 mg/l		
Oil and Grease 08/26/87	1.1 mg/l		

RECEIVED
SEP 21 1987
MINING DIV.
FIELD OFFICE

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TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

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

Ocotober 14,1987

Job No.: 8996

Date Rec'd: September 22, 1987

Date Sampled: September 22, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Above The Mine
10:20 hr.
Temp 48
Flow .22/42.6

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 09/29/87	0.0 mg/l CaCO3	Iron, Dissolved 09/28/87	0.02 mg/l
Alk., Bicarbonate 09/30/87	328 mg/l HCO3	Magnesium 09/25/87	36.00 mg/
Alk., Carbonate 09/30/87	6.0 mg/l CaCO3	Manganese 09/25/87	0.01 mg/l
Alk., Total 09/30/87	275 mg/l CaCO3	Oil and Grease 09/25/87	<1.0 mg/l
Anions, Total	6.77 meq/l	Oxygen, Dissolved 09/23/87	5.3 mg/l
Calcium 09/25/87	59.1 mg/l	pH 09/22/87	8.40 Units
Cations, Total	7.14 meq/l	Potassium 09/28/87	1.08 mg/l
Chloride 09/24/87	4.0 mg/l	Sodium 09/28/87	27.80 mg/l
Conductivity 09/23/87	360 umhos/cm	Solids, Dissolved 09/23/87	256 mg/l
Hardness, Total 09/25/87	296 mg/l CaCO3	Solids, Settable 09/29/87	0.0 mg/l
Iron 09/28/87	0.04 mg/l	Sulfate 09/24/87	62.0 mg/l

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MINING DIV.
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

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

October 16, 1987

Job No.: 8995

Date Rec'd: September 22, 1987

Date Sampled: September 22, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Below The Mine
Temp 64
Flow .24/48.9 gpm
10:50 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

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WATER ANALYSIS

Acidity 09/29/87	<1.0 mg/l CaCO3	Iron, Dissolved 09/28/87	0.05 mg/l
Alk., Bicarbonate 09/30/87	344 mg/l HCO3	Magnesium 09/25/87	49.60 mg/l
Alk., Carbonate 09/30/87	8.0 mg/l CaCO3	Manganese 09/25/87	0.01 mg/l
Alk., Total 09/30/87	290 mg/l CaCO3	Oil and Grease 09/24/87	<1.0 mg/l
Anions, Total	8.76 meq/l	Oxygen, Dissolved 09/23/87	5.7 mg/l
Calcium 09/25/87	76.0 mg/l	pH 09/22/87	8.50 Units
Cations, Total	12.80 meq/l	Potassium 09/28/87	4.97 mg/l
Chloride 09/24/87	49.0 mg/l	Sodium 09/28/87	111.60 mg/l
Conductivity 09/23/87	1000 umhos/cm	Solids, Dissolved 09/23/87	730 mg/l
Hardness, Total 09/25/87	740 mg/l CaCO3	Solids, Settable 09/29/87	<1.0 mg/l
Iron 09/28/87	0.05 mg/l	Solids, Suspended 09/23/87	<1.0 mg/l
		Sulfate 09/24/87	90.0 mg/l

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

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

October 26,1987

Job No.: 9028

Date Rec'd: October 21, 1987

Date Sampled: October 21, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Above
Temp 34
Flow 0.18/31.4 gpm.
10:25 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

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WATER ANALYSIS

Acidity 10/22/87	137.0 mg/l CaCO3	Magnesium 10/23/87	[illegible] mg/l
Alk., Bicarbonate 10/22/87	276 mg/l HCO3	Manganese 10/23/87	<0.01 mg/l
Alk., Carbonate 10/22/87	<1.0 mg/l CaCO3	Oil and Grease 10/23/87	<1.0 mg/l
Anions, Total 10/23/87	7.38 meq/l	Oxygen, Dissolved 10/22/87	6.8 mg/l
Calcium 10/23/87	60.9 mg/l	pH 10/22/87	7.00 Units
Cations, Total 10/23/87	7.52 meq/l	Potassium 10/23/87	1.45 mg/l
Chloride 10/22/87	8.4 mg/l	Sodium 10/23/87	23.60 mg/l
Conductivity 10/22/87	500 umhos/cm	Solids, Dissolved 10/22/87	378 mg/l
Hardness, Total 10/23/87	324 mg/l CaCO3	Solids, Settable 10/22/87	<1.0 mg/l
Iron 10/23/87	<0.05 mg/l	Solids, Suspended 10/22/87	2.0 mg/l
Iron, Dissolved 10/23/87	<0.05 mg/l	Sulfate 10/23/87	130.0 mg/l

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Donna Tyson

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Manager, Huntington Laboratory

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

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

October 26,1987

Job No.: 9029

Date Rec'd: October 21, 1987

Date Sampled: October 21, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Below
Temp 48
Flow 31.4 gpm.
10:45 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

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OCT 26 1987
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FIELD OFFICE

WATER ANALYSIS

Acidity 10/22/87	90.0 mg/l CaCO3	Magnesium 10/23/87	85.40 mg/l
Alk., Bicarbonate 10/22/87	371 mg/l HCO3	Manganese 10/23/87	< 0.01 mg/l
Alk., Carbonate 10/22/87	<1.0 mg/l CaCO3	Oil and Grease 10/23/87	< 1.0 mg/l
Anions, Total 10/23/87	15.29 meq/l	Oxygen, Dissolved 10/22/87	6.6 mg/l
Calcium 10/23/87	102.2 mg/l	pH 10/22/87	8.27 Units
Cations, Total 10/23/87	17.39 meq/l	Potassium 10/23/87	5.69 mg/l
Chloride 10/23/87	73.6 mg/l	Sodium 10/23/87	119.20 mg/l
Conductivity 10/22/87	1300 umhos/cm	Solids, Dissolved 10/22/87	848 mg/l
Hardness, Total 10/23/87	607 mg/l CaCO3	Solids, Settable 10/22/87	<1.0 mg/l
Iron 10/23/87	<0.05 mg/l	Solids, Suspended 10/22/87	4.0 mg/l
Iron, Dissolved 10/23/87	<0.05 mg/l	Sulfate 10/23/87	347.0 mg/l

Donna Tipon
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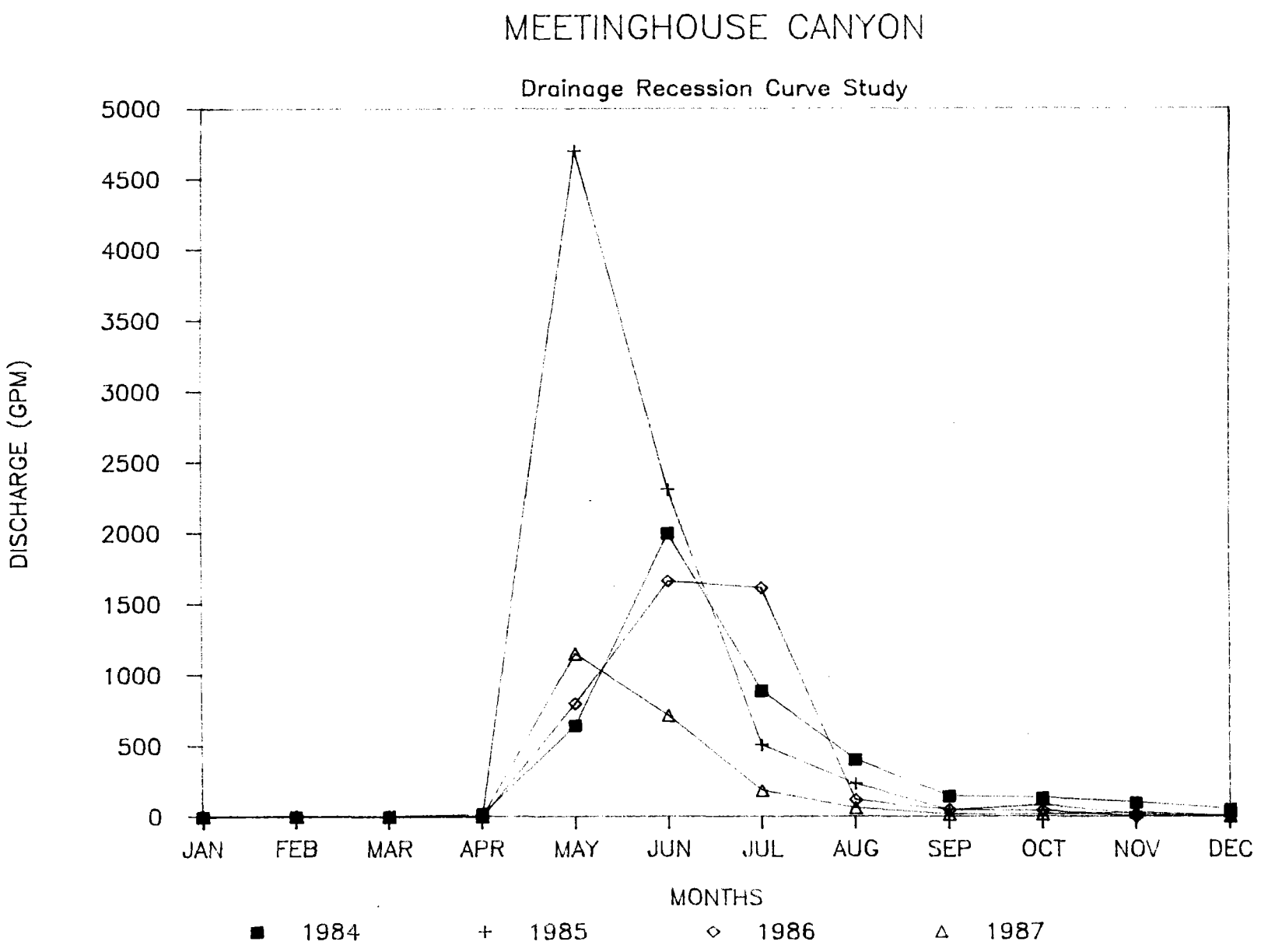
Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

APPENDIX C


MEETINGHOUSE CANYON
Drainage Recession Curve Study
DISCHARGE (GPM)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1984
1985
1986
1987

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

Lab ID: 59-8911

Date Rec'd: 6-17-87

Date Sampled: 6-16-87

Time Sampled: 1150

Client: Utah Power & Light

Sample ID: Meetinghouse Canyon

Temp 55° Flow 0.65/712.8 GPM pH 8.4 D.O. 14.4 Cond.385

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	6-18		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		229	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	6-18	47.5	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	6-25	2.2	mg/l
Conductivity	6-19	380	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	6-25	210	mg/l $CaCO_3$	Iron	6-25	0.9	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	6-25	24.3	mg/l
Nitrogen, Nitrite			mg/l	Manganese	6-25	0.02	mg/l
Oil & Grease	6-22	1.1	mg/l	Mercury			ug/l
pH	6-18	7.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	6-25	0.6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		233	mg/l	Silica			mg/l
Solids, Total Suspended	6-17	42	mg/l	Silver			mg/l
Sulfate	6-26	20	mg/l	Sodium	6-25	7	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Dissolved Oxygen	6-17	7.35	mg/l	Iron, Diss	6-25	0.3	mg/l
Comments: Settleable Solids		0.2	mg/l	Total Cations		4.52	meq/l
Total Anions		5.52	meq/l				

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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Lab ID: 8949

Date Rec'd: 7-16-87

Date Sampled: 7-15-87

Time Sampled: 1435

Client: Utah Power & Light

Sample ID: Meetinghouse Canyon

Temp 58° Flow 0.27/185.9 GPM

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-17		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		222	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	7	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	32	mg/l
Conductivity	7-17	382	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	195	mg/l $CaCO_3$	Iron	7-21	0.26	mg/l
Nitrogen, Ammonia			mg/l	Lead	7-27		mg/l
Nitrogen, Nitrate			mg/l	Magnesium		28	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	0.022	mg/l
Oil & Grease	7-18	< .5	mg/l	Mercury			ug/l
pH	7-17	7.25	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.7	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-17	216	mg/l	Silica			mg/l
Solids, Total Suspended		16	mg/l	Silver			mg/l
Sulfate	7-17	24	mg/l	Sodium	7-22	9	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Settleable Solids	7-16	< .1	mg/l	Iron, Diss	7-21	< .05	mg/l

Comments: Dissolved Oxygen 7-16 6.70 mg/l Anions 4.34 ~~meq/l~~

Cations 4.31 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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F-465

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

September 21,1987

Job No.: 8962

Date Rec'd: August 18, 1987

Date Sampled: August 18, 1987

Sampled By: UP&L

Sample ID:

Meetinghouse
Canyon
11:05 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/19/87	<1.0 mg/l CaCO3	Manganese 08/26/87	0.04 mg/l
Alk., Bicarbonate 08/19/87	245 mg/l HCO3	Oil and Grease 08/26/87	10.9 mg/l
Alk., Carbonate 08/19/87	<1.0 mg/l CaCO3	Oxygen, Dissolved 08/19/87	5.4 mg/l
Alk., Total 08/19/87	201 mg/l CaCO3	pH 08/19/87	7.62 Units
Anions, Total	4.67 meq/l	Potassium 08/24/87	1.20 mg/l
Calcium 08/24/87	38.0 mg/l	Sodium 08/27/87	10.62 mg/l
Cations, Total	5.09 meq/l	Solids, Dissolved 08/25/87	250 mg/l
Chloride 08/26/87	3.0 mg/l	Solids, Settable 08/24/87	<0.1 mg/l
Conductivity 08/25/87	420 umhos/cm	Solids, Suspended 08/25/87	18.0 mg/l
Hardness, Total 08/24/87	230 mg/l CaCO3	Sulfate 08/27/87	32.0 mg/l
Iron 08/24/87	0.13 mg/l		
Iron, Dissolved 08/24/87	0.08 mg/l		
Magnesium 08/24/87	33.00 mg/l		
Manganese 08/26/87	0.04 mg/l		
Oil and Grease 08/26/87	10.9 mg/l		

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SEP 21 1987
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TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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

Ocotober 14,1987

Job No.: 8994

Date Rec'd: September 22, 1987

Date Sampled: September 22, 1987

Sampled By: UP&L

Sample ID:

MEETING HOUSE CANYON
10:00 hr.
Temp 58
Flow 0.5 gpm/14.1, gpm

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 09/29/87	0.0 mg/l CaCO3	Iron, Dissolved 09/28/87	0.04 mg/l
Alk., Bicarbonate 09/30/87	307 mg/l HCO3	Magnesium 09/25/87	31.15 mg/l
Alk., Carbonate 09/30/87	8.0 mg/l CaCO3	Manganese 09/25/87	<0.01 mg/l
Alk., Total 09/30/87	260 mg/l CaCO3	Oil and Grease 09/24/87	<1.0 mg/l
Anions, Total	5.94 meq/l	Oxygen, Dissolved 09/23/87	6.0 mg/l
Calcium 09/25/87	55.6 mg/l	pH 09/22/87	8.55 Units
Cations, Total	5.82 meq/l	Potassium 09/28/87	1.29 mg/l
Chloride 09/24/87	4.0 mg/l	Sodium 09/28/87	10.74 mg/l
Conductivity 09/23/87	300 umhos/cm	Solids, Dissolved 09/23/87	190 mg/l
Hardness, Total 09/25/87	267 mg/l CaCO3	Solids, Settable 09/29/87	0.0 mg/l
Iron 09/28/87	0.08 mg/l	Sulfate 09/24/87	45.0 mg/l

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

October 26,1987

Job No.: 9032

Date Rec'd: October 21, 1987

Date Sampled: October 21, 1987

Sampled By: UP&L

Sample ID:

MEETING HOUSE CANYON
Temp 36
Flow 0.05/14.0 gpm.
09:50 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

RECEIVED
OCT 26 1987

MINING DIV.
FIELD OFFICE

WATER ANALYSIS

Acidity 10/22/87	49.0 mg/l CaCO3	Magnesium 10/23/87	30.30 mg/l
Alk., Bicarbonate 10/22/87	248 mg/l HCO3	Manganese 10/23/87	<0.01 mg/l
Alk., Carbonate 10/22/87	5.0 mg/l CaCO3	Oil and Grease 10/23/87	<1.0 mg/l
Anions, Total 10/23/87	4.91 meq/l	Oxygen, Dissolved 10/22/87	6.5 mg/l
Calcium 10/23/87	41.3 mg/l	pH 10/22/87	8.38 Units
Cations, Total 10/23/87	4.82 meq/l	Potassium 10/23/87	1.29 mg/l
Chloride 10/22/87	8.8 mg/l	Sodium 10/23/87	3.80 mg/l
Conductivity 10/22/87	350 umhos/cm	Solids, Dissolved 10/22/87	259 mg/l
Hardness, Total 10/22/87	228 mg/l CaCO3	Solids, Settable 10/22/87	<1.0 mg/l
Iron 10/23/87	<0.05 mg/l	Solids, Suspended 10/22/87	2.0 mg/l
Iron, Dissolved 10/23/87	<0.05 mg/l	Sulfate 10/23/87	33.0 mg/l

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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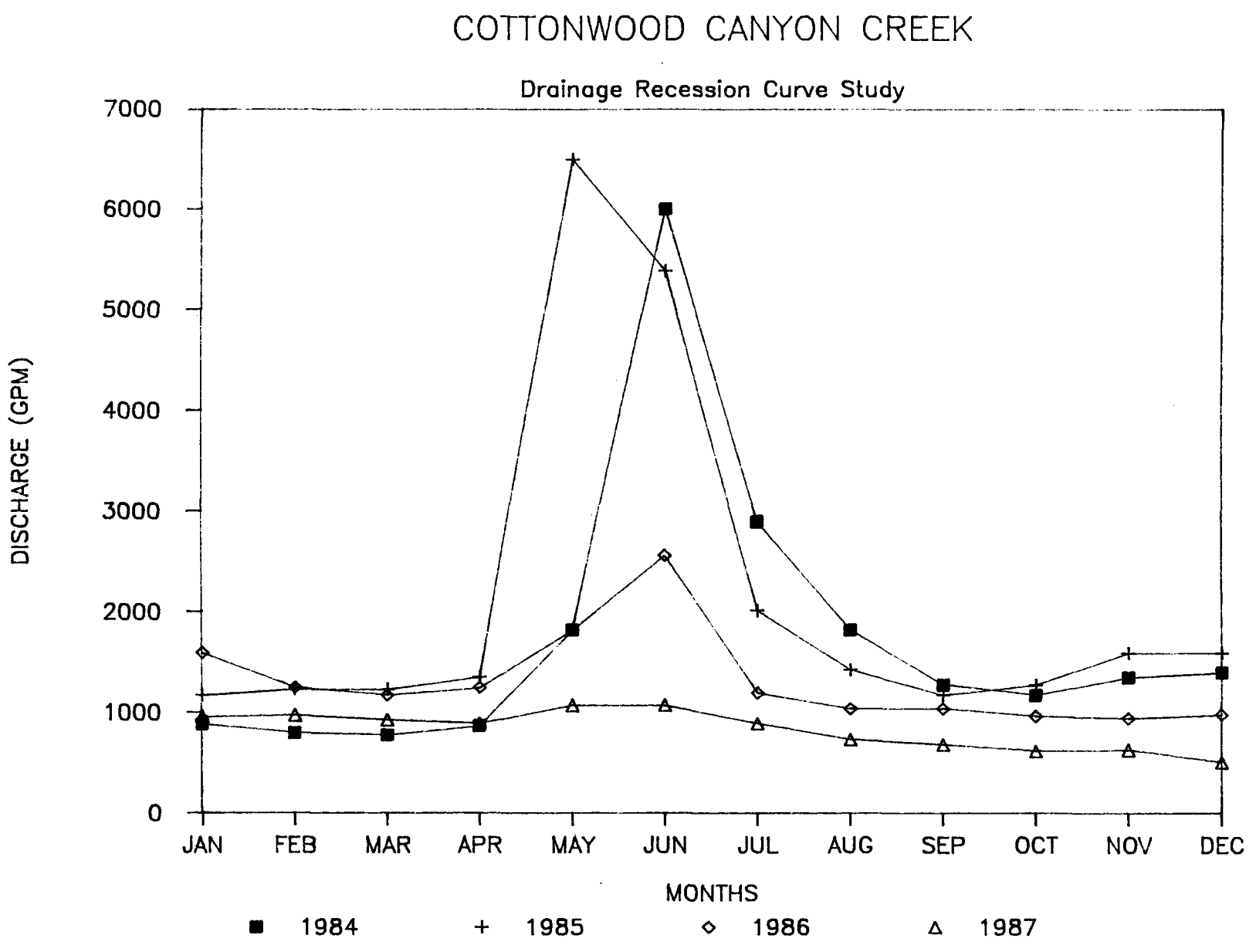
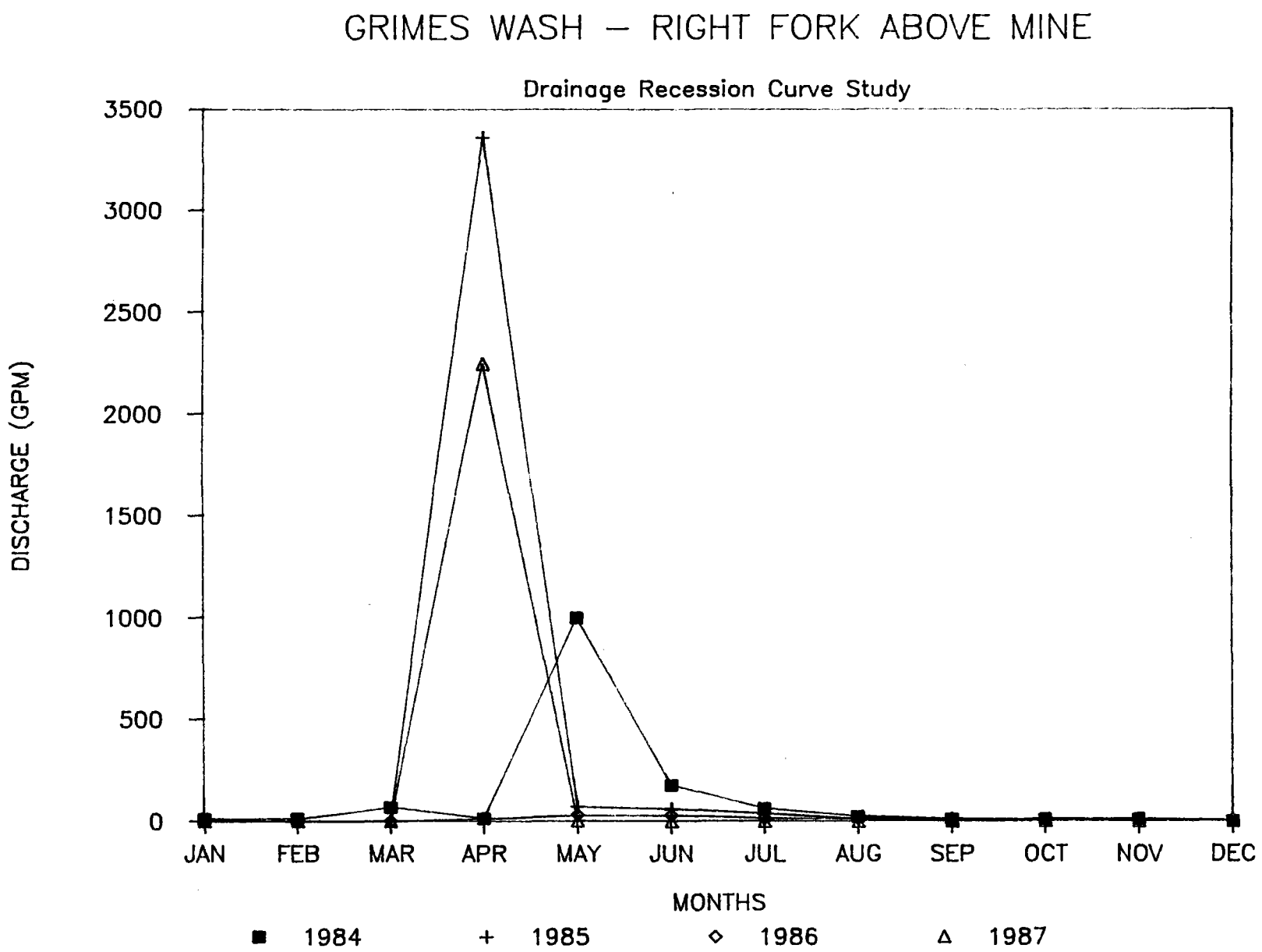
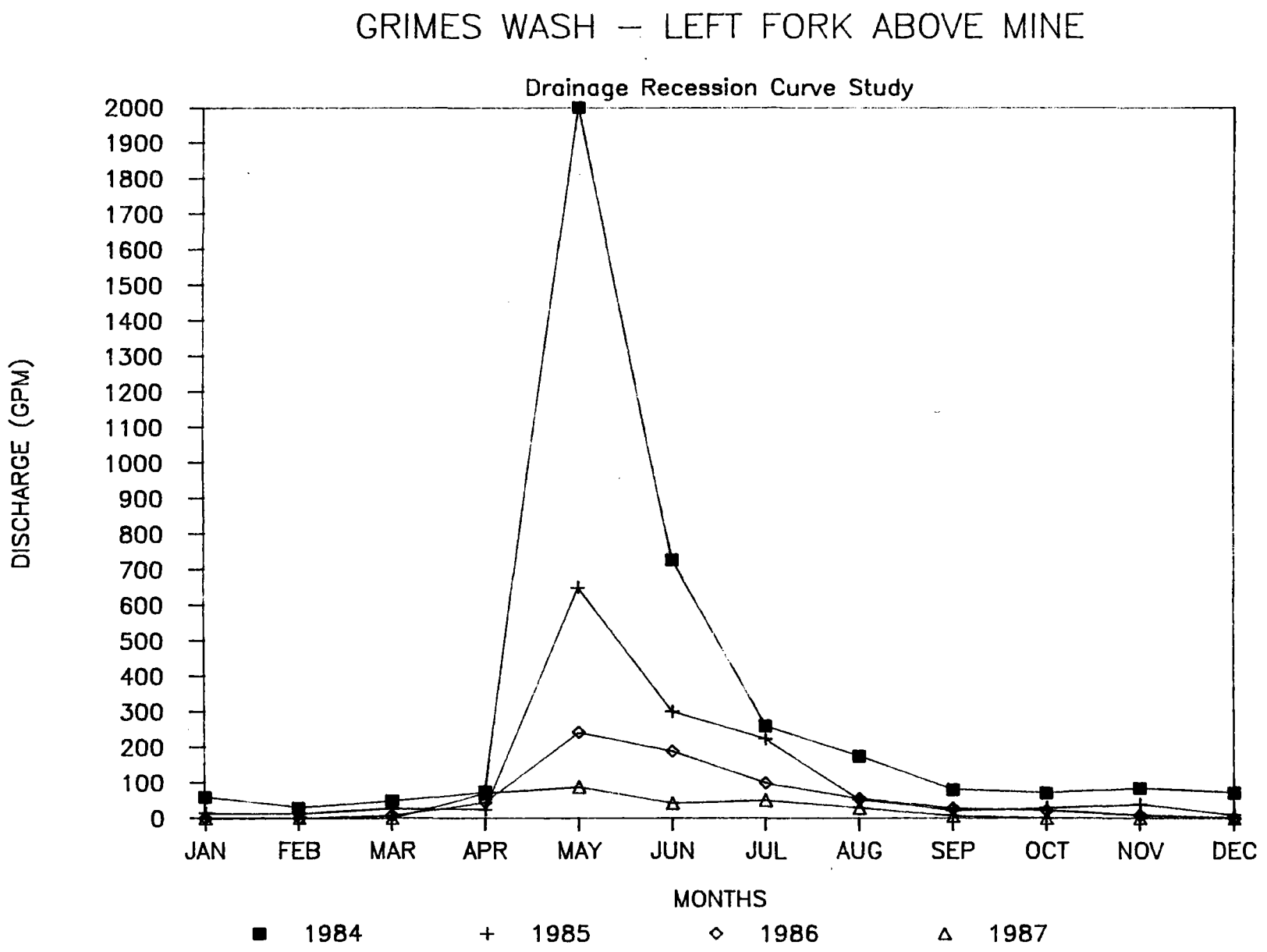
OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

APPENDIX D


COTTONWOOD CANYON CREEK
Drainage Recession Curve Study
DISCHARGE (GPM)
7000
6000
5000
4000
3000
2000
1000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1984
1985
1986
1987


GRIMES WASH – RIGHT FORK ABOVE MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
3500
3000
2500
2000
1500
1000
500
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
MONTHS
1984
1985
1986
1987


GRIMES WASH – LEFT FORK ABOVE MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
JAN
FEB
MAR
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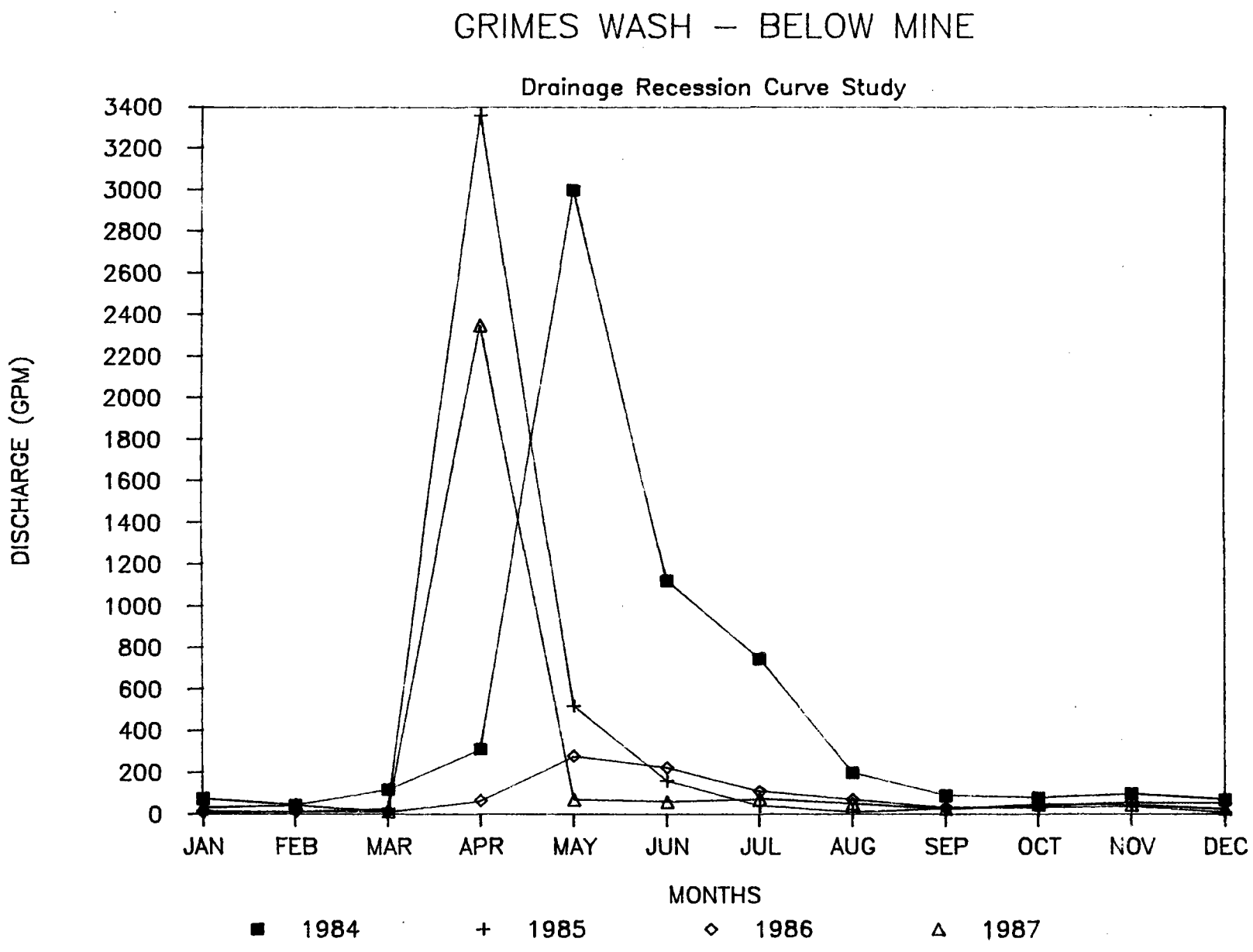
GRIMES WASH – BELOW MINE
Drainage Recession Curve Study
DISCHARGE (GPM)
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
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1984
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1986
1987

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8819

Date Rec'd 4-8-87

Date Sampled 4-8-87

Time Sampled 1350

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
PO BOX 1005
HUNTINGTON, UT 84528

Sample ID: GRIMES WASH RUNOFF
RIGHT FORK

Temp. 35.3° Flow 2250 GPM Est. pH 7.96/D.O. 13.02/Cond. 147

Acidity		<1.0	mg/l $CaCO_3$
Alkalinity, Total	4-13		mg/l $CaCO_3$
Alkalinity, Bicarbonate		104	mg/l $CaCO_3$ / HCO_3
Alkalinity, Carbonate		<1.0	mg/l $CaCO_3$
Chloride	4-17	3	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	190	umhos/cm
Fluoride			mg/l
Hardness, Total	4-15	112	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease		*	mg/l
pH	4-13	7.20	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved	4-10	115	mg/l
Solids, Total Suspended		2000	mg/l
Sulfate	4-15	20	mg/l
Sulfide			mg/l
Turbidity			NTU
Diss. Oxygen	4-9	6.80	mg/l
Total Cations		2.52	meq/l
Total Anions		2.22	meq/l
Settleable Solids	4-9	3.3	mg/l

*NO BOTTLE SUBMITTED

Analyst: Sharon Reiter

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	34.4	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	20.6	mg/l
Lead			mg/l
Magnesium	4-15	6.3	mg/l
Manganese	4-16	0.05	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-16	7.64	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	2.0	mg/l
Vanadium			mg/l
Zinc			mg/l
Diss. Iron	4-16	3.31	mg/l

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Respectfully submitted Cliff Smoot

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P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8818

Date Rec'd 4-8-87

Date Sampled 4-4-87

Time Sampled 1330

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
PO BOX 1005
HUNTINGTON, UT 84528

Sample ID: GRIMES WASH LEFT FORK

Flow 71.8 GPM Temp. 51.6° pH 7.74/D.O. 14.12/Cond. 337

Acidity		< 1.0	mg/l $CaCO_3$
Alkalinity, Total	4-13		mg/l $CaCO_3$
Alkalinity, Bicarbonate		188	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate		< 1.0	mg/l $CaCO_3$
Chloride	4-17	6	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	412	umhos/cm
Fluoride			mg/l
Hardness, Total	4-15	196	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease		*	mg/l
pH	4-13	7.60	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved		212	mg/l
Solids, Total Suspended	4-10	48	mg/l
Sulfate	4-15	45	mg/l
Sulfide			mg/l
Turbidity			NTU
Diss. Oxygen	4-9	7.80	mg/l
Total Cations		4.47	meq/l
Total Anions		4.20	meq/l
Settleable Solids	4-9	0.2	mg/l

*NO BOTTLE SUBMITTED

Analyst: Sharon Reuter

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	39.2	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	0.62	mg/l
Lead			mg/l
Magnesium	4-15	23.8	mg/l
Manganese	4-16	< 0.01	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-16	2.48	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	11.1	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	4-16	0.12	mg/l

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Respectfully submitted Cliff Snapp

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Lab. No. 8820
Date Rec'd 4-8-87
Date Sampled 4-8-87
Time Sampled 1430

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
PO BOX 1005
HUNTINGTON, UT 84528

Sample ID: GRIMES WASH RUNOFF
BELOW MINE

Temp. 39.3° pH 7.96/D.O. 12.94/Cond. 232

Acidity		<1.0	mg/l $CaCO_3$
Alkalinity, Total	4-13		mg/l $CaCO_3$
Alkalinity, Bicarbonate		117	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate		<1.0	mg/l $CaCO_3$
Chloride	4-17	16	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	295	umhos/cm
Fluoride			mg/l
Hardness, Total	4-15	146	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease		*	mg/l
pH	4-13	7.20	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved		155	mg/l
Solids, Total Suspended	4-10	3295	mg/l
Sulfate	4-15	46	mg/l
Sulfide			mg/l
Turbidity			NTU
Diss. Oxygen	4-9	7.15	mg/l
Total Cations		3.49	meq/l
Total Anions		3.33	meq/l
Settleable Solids	4-9	4.0	mg/l

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	40.8	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	22.6	mg/l
Lead			mg/l
Magnesium	4-15	10.7	mg/l
Manganese	4-16	0.04	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-16	7.31	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	9.0	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	4-16	2.25	mg/l

RECEIVED
APR 21 1987
MINING DIV.
FIELD

*NO BOTTLE SUBMITTED

Analyst: Sharon Reites

Respectfully submitted: Cliff Snapp

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TELEPHONE: (801) 653-2311

JUN 2 0 1987
MINING DIV.
FIELD OFFICE

Lab ID: 59-8907
Date Rec'd: 6-17-87
Date Sampled: 6-16-87
Time Sampled: 1540
Client: Utah Power & Light

Sample ID: Grimes Wash Left Fork
Temp: 53° Flow: 42.6 GPM
pH: 8.22 D.O.: 14.51
Conductivity: 497

Water Analysis Report

Acidity 6-18	< 1	mg/l $CaCO_3$		Aluminum			mg/l
Alkalinity, Total		mg/l $CaCO_3$		Arsenic			mg/l
Alkalinity, Bicarbonate	300	mg/l ~~$CaCO_3$~~ HCO_3		Barium			mg/l
Alkalinity, Carbonate	< 1	mg/l $CaCO_3$		Beryllium			mg/l
Chloride 6-18	9.9	mg/l		Boron			mg/l
Coliform, Fecal		MPN/100 ml		Cadmium			mg/l
Coliform, Total		MPN/100 ml		Calcium 6-25	2.3		mg/l
Conductivity 6-19	600	umhos/cm		Chromium			mg/l
Fluoride		mg/l		Copper			mg/l
Hardness, Total 6-25	290	mg/l $CaCO_3$		Iron 6-25	0.08		mg/l
Nitrogen, Ammonia		mg/l		Lead			mg/l
Nitrogen, Nitrate		mg/l		Magnesium 6-25	42.6		mg/l
Nitrogen, Nitrite		mg/l		Manganese 6-25	0.06		mg/l
Oil & Grease 6-22	1.2	mg/l		Mercury			ug/l
pH 6-18	7.85	Units		Nickel			mg/l
Phosphorus, Ortho		mg/l		Potassium 6-25	1.0		mg/l
Phosphorus, Total		mg/l		Selenium			mg/l
Solids, Total Dissolved	382	mg/l		Silica			mg/l
Solids, Total Suspended 6-17	16	mg/l		Silver			mg/l
Sulfate 6-26	90	mg/l		Sodium 6-25	30		mg/l
Sulfide		mg/l		Vanadium			mg/l
Turbidity		NTU		Zinc			mg/l
Dissolved Oxygen 6-17	7.55	mg/l		Iron, Diss 6-25	0.07		mg/l

Comments: Settleable Solids 6-17 < .1 mg/l

Total Cations 7.13 meq/l Total Anions 7.08 meq/l

Analyst: Sharon Reuter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

JUN 1 1987
MINING DIV.

Lab ID: 59-8908
Date Rec'd: 6-17-87
Date Sampled: 6-16-87
Time Sampled: 1600
Client: Utah Power & Light
Sample ID: Grimes Wash below the mine

Temp 58° Flow 60 est GPM pH 7.94 D.O. 15.04 Cond. 1428

Water Analysis Report

Acidity	6-18	< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total			mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		349	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	6-18	154	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	6-25	5.1	mg/l
Conductivity	6-19	1470	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	6-25	625	mg/l $CaCO_3$	Iron	6-25	0.64	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	6-25	89.9	mg/l
Nitrogen, Nitrite			mg/l	Manganese	6-25	0.09	mg/l
Oil & Grease	6-22	0.6	mg/l	Mercury			ug/l
pH	6-18	7.70	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	6-25	6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	6-17	1033	mg/l	Silica			mg/l
Solids, Total Suspended		4	mg/l	Silver			mg/l
Sulfate	6-26	350	mg/l	Sodium	6-25	104	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Dissolved Oxygen	6-17	7.75	mg/l	Iron,Diss	6-25	0.06	mg/l

Comments: Settleable Solids 6-17 < .1 mg/l
Total Cations 17.17 meq/l
Total Anions 17.36 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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RECEIVED
JUL 30 1987
MINING DIV.
FIELD OFFICE

Lab ID: 8951

Date Rec'd: 7-16-87

Date Sampled: 7-15-87

Time Sampled: 1008

Client: Utah Power & Light

Sample ID: Grimes Wash left fork

Temp 55° Flow 16/51.1 GPM

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-17		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		304	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	11	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	36	mg/l
Conductivity	7-17	610	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	260	mg/l $CaCO_3$	Iron	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-27	41.3	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	< .01	mg/l
Oil & Grease	7-18	< .5	mg/l	Mercury			ug/l
pH	7-17	7.30	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-17	328	mg/l	Silica			mg/l
Solids, Total Suspended		4	mg/l	Silver			mg/l
Sulfate	7-17	58	mg/l	Sodium	7-22	34	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Settleable Solids	7-16	< .1	mg/l	Iron,Diss	7-21	< .05	mg/l

Comments: Dissolved Oxygen 7-16 6.65 mg/l — Anions 6.51 meq/l

Cations 6.69 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

M M

Manager, Huntington Laboratory

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FIELD OFFICE

Lab ID: 8950
Date Rec'd: 7-16-87
Date Sampled: 7-15-87
Time Sampled: 1020
Client: Utah Power & Light
Sample ID: Grimes Wash below the mine
Temp 55° Flow 75 GPM est

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-17		mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		366	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	117	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	94	mg/l
Conductivity	7-17	1440	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	585	mg/l $CaCO_3$	Iron	7-21	0.12	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-27	85.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	0.09	mg/l
Oil & Grease	7-18	< .5	mg/l	Mercury			ug/l
pH	7-17	7.10	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		943	mg/l	Silica			mg/l
Solids, Total Suspended	7-17	< 4	mg/l	Silver			mg/l
Sulfate	7-17	315	mg/l	Sodium	7-22	88	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Settleable Solids	7-16	< .1	mg/l	Iron,Diss	7-21	0.05	mg/l
Comments: Dissolved Oxygen	7-16	7.10	mg/l	Anions		15.87	meq/l
Cations		15.67	Meq/l				

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

September 10, 1987

Job No.: 8960

Date Rec'd: August 12, 1987

Date Sampled: August 11, 1987

Sampled By: UP&L

Sample ID:

GRIMES WASH
Left Fork
13:15 hr.
Temp 62
Flow 28.3 gpm
amended

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/12/87	< 1.0 mg/l CaCO3	Oil and Grease 08/14/87	3.5 mg/l
Alk., Bicarbonate 08/12/87	312 mg/l HCO3	Oxygen, Dissolved 08/12/87	7.8 mg/l
Alk., Carbonate 08/12/87	< 1.0 mg/l CaCO3	pH 08/12/87	7.80 Units
Anions, Total	6.82 meq/l	Potassium 08/14/87	1.00 mg/l
Calcium 08/24/87	42.0 mg/l	Sodium 08/14/87	31.00 mg/l
Cations, Total	6.90 meq/l	Solids, Dissolved 08/13/87	362 mg/l
Chloride 08/14/87	156.0 mg/l	Solids, Settable 08/12/87	< 0.1 mg/l
Conductivity 08/25/87	590 umhos/cm	Solids, Suspended 08/13/87	< 4.0 mg/l
Hardness, Total 08/24/87	275 mg/l CaCO3	Sulfate 08/14/87	69.0 mg/l
Iron 08/14/87	< 0.05 mg/l		
Iron, Dissolved 08/24/87	< 0.05 mg/l		
Magnesium 08/24/87	41.00 mg/l		
Manganese 08/14/87	0.02 mg/l		

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.
Paul Connelly
Donna Tipton
Manager, Huntington Laboratory

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TELEPHONE: (801) 653-2311

September 10, 1987

Job No.: 8961

Date Rec'd: August 12, 1987

Date Sampled: August 11, 1987

Sampled By: UP&L

Sample ID:

GRIMES WASH
Below
14:00 hr.
Flow 50 gpm
Amended

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/12/87	<1.0 mg/l CaCO3	Oil and Grease 08/14/87	2.5 mg/l
Alk., Bicarbonate 08/12/87	400 mg/l HCO3	Oxygen, Dissolved 08/12/87	6.7 mg/l
Alk., Carbonate 08/12/87	<1.0 mg/l CaCO3	pH 08/12/87	7.35 Units
Anions, Total	18.05 meq/l	Potassium 08/14/87	6.70 mg/l
Calcium 08/24/87	114.0 mg/l	Sodium 08/14/87	121.00 mg/l
Cations, Total	19.53 meq/l	Solids, Dissolved 08/13/87	1201 mg/l
Chloride 08/14/87	9.0 mg/l	Solids, Settable 08/12/87	<0.1 mg/l
Conductivity 08/25/87	1700 umhos/cm	Solids, Suspended 08/13/87	5.0 mg/l
Hardness, Total 08/24/87	705 mg/l CaCO3	Sulfate 08/14/87	340.0 mg/l
Iron 08/14/87	0.23 mg/l		
Iron, Dissolved 08/24/87	0.10 mg/l		
Magnesium 08/24/87	102.00 mg/l		
Manganese 08/14/87	0.17 mg/l		

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Diane Conquell by
Donna Lyon
Manager, Huntington Laboratory

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

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

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

October 09,1987

Job No.: 8981

Date Rec'd: September 17, 1987

Date Sampled: September 17, 1987

Sampled By: UP&L

Sample ID:

GRIMES WASH
Left Fork
Flow 0
Temp 62
14:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 09/30/87	<1.0	mg/l CaCO3			
Alk., Bicarbonate 09/30/87	482	mg/l HCO3			
Alk., Carbonate 09/30/87	15.0	mg/l CaCO3	Manganese 09/26/87	<0.01	mg/l
Alk., Total 09/30/87	410	mg/l CaCO3	Oil and Grease 09/21/87	3.4	mg/l
Anions, Total	9.95	meq/l	Oxygen, Dissolved 09/23/87	5.0	mg/l
Calcium 09/25/87	71.1	mg/l	pH 09/17/87	8.60	Units
Cations, Total	10.65	meq/l	Potassium 09/28/87	1.37	mg/l
Chloride 09/24/87	10.0	mg/l	Sodium 09/28/87	33.80	mg/l
Conductivity 09/18/87	420	umhos/cm	Solids, Dissolved 09/21/87	250	mg/l
Hardness, Total 09/25/87	460	mg/l CaCO3	Solids, Settable 09/21/87	<0.0	mg/l
Iron 09/28/87	0.07	mg/l	Solids, Suspended 09/21/87	<1.0	mg/l
Iron, Dissolved 09/28/87	0.05	mg/l	Sulfate 09/21/87	79.0	mg/l
Magnesium 09/25/87	68.50	mg/l			

RECEIVED
OCT 09 1987
MINING DIV.
FIELD OFFICE

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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-465

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

October 16,1987

Job No.: 8982

Date Rec'd: September 17, 1987

Date Sampled: September 17, 1987

Sampled By: UP&L

Sample ID:

GRIMES WASH
Below The Mine
Temp 66
Flow 25 gpm
14:20 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

RECEIVED
OCT 16 1987
MINING DIV.
FIELD OFFICE

WATER ANALYSIS

Acidity 09/27/87	<1.0 mg/l CaCO3	Iron, Dissolved 09/28/87	0.05 mg/l
Alk., Bicarbonate 09/30/87	378 mg/l HCO3	Magnesium 09/25/87	72.90 mg/l
Alk., Carbonate 09/30/87	<1.0 mg/l CaCO3	Manganese 09/25/87	0.10 mg/l
Alk., Total 09/30/87	310 mg/l CaCO3	Oil and Grease 09/21/87	5.2 mg/l
Anions, Total	16.11 meq/l	Oxygen, Dissolved 09/23/87	4.5 mg/l
Calcium 09/25/87	149.0 mg/l	pH 09/17/87	8.15 Units
Cations, Total	20.23 meq/l	Potassium 09/28/87	6.80 mg/l
Chloride 09/24/87	59.2 mg/l	Sodium 09/28/87	93.60 mg/l
Conductivity 09/18/87	1200 umhos/cm	Solids, Dissolved 09/21/87	885 mg/l
Hardness, Total 09/25/87	672 mg/l CaCO3	Solids, Settable 09/21/87	<1.0 mg/l
Iron 09/28/87	0.26 mg/l	Solids, Suspended 09/21/87	<1.0 mg/l
		Sulfate 09/21/87	400.0 mg/l

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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F-465

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SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

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

October 26,1987

Job No.: 9031

Date Rec'd: October 21, 1987

Date Sampled: October 21, 1987

Sampled By: UP&L

Sample ID:

GRIMES WASH
Below
Temp 48
Flow 50 gpm.
11:25 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

RECEIVED
OCT 26 1987
MINING DIV.
FIELD OFFICE

WATER ANALYSIS

Acidity 10/22/87	127.0 mg/l CaCO3	Magnesium 10/23/87	91.60 mg/l
Alk., Bicarbonate 10/22/87	373 mg/l HCO3	Manganese 10/23/87	0.11 mg/l
Alk., Carbonate 10/22/87	<1.0 mg/l CaCO3	Oil and Grease 10/23/87	2.4 mg/l
Anions, Total 10/23/87	19.81 meq/l	Oxygen, Dissolved 10/22/87	5.9 mg/l
Calcium 10/23/87	191.5 mg/l	pH 10/22/87	7.94 Units
Cations, Total 10/23/87	20.85 meq/l	Potassium 10/23/87	7.81 mg/l
Chloride 10/22/87	49.6 mg/l	Sodium 10/23/87	82.90 mg/l
Conductivity 10/22/87	1420 umhos/cm	Solids, Dissolved 10/22/87	1078 mg/l
Hardness, Total 10/23/87	855 mg/l CaCO3	Solids, Settable 10/22/87	<1.0 mg/l
Iron 10/23/87	<0.05 mg/l	Solids, Suspended 10/22/87	4.0 mg/l
Iron, Dissolved 10/23/87	<0.05 mg/l	Sulfate 10/23/87	593.0 mg/l

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Donna Lyon

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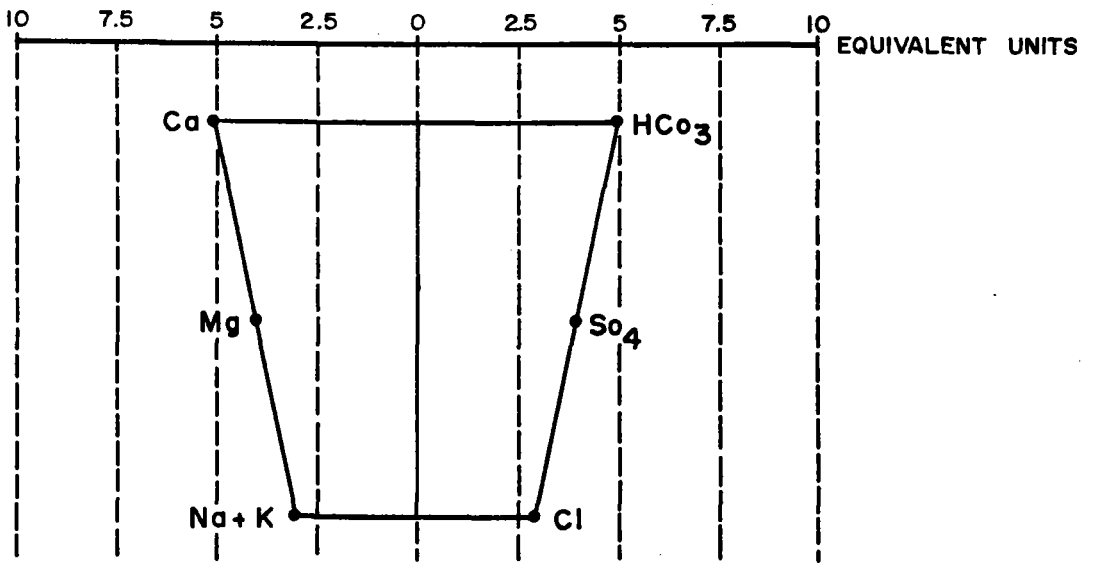
Manager, Huntington Laboratory

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

APPENDIX E

CATION – ANION DIAGRAMS



$$\frac{\text{P P M}}{\text{Equivalent Weight}} = \text{Equivalent Unit}$$

1" = 5 Equivalent Units

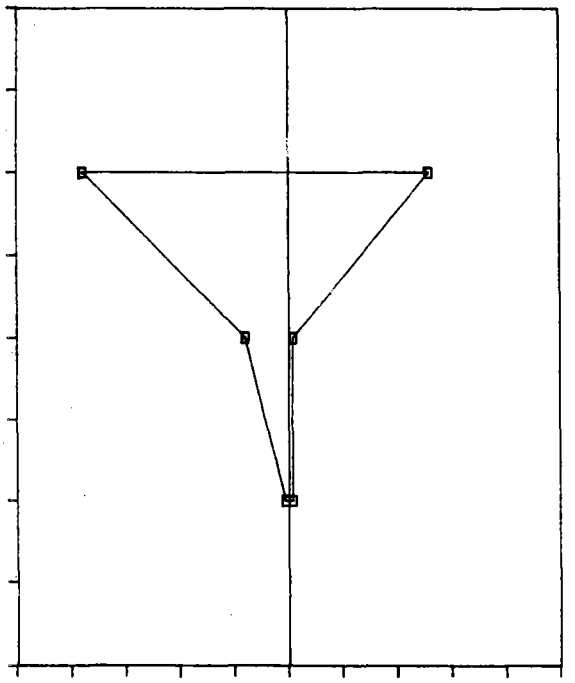
Equivalent Weights

Mg	12.16	(Magnesium)
Ca	20.04	(Calcium)
Na	23.00	(Sodium)
K	39.10	(Potassium)
So_4	48.03	(Sulfate)
$CaCO_3$	100.1	(Total Alkalinity)
Cl	35.46	(Chloride)

FLAGSTAFF LIMESTONE

SHEBA SP.

07-13-87



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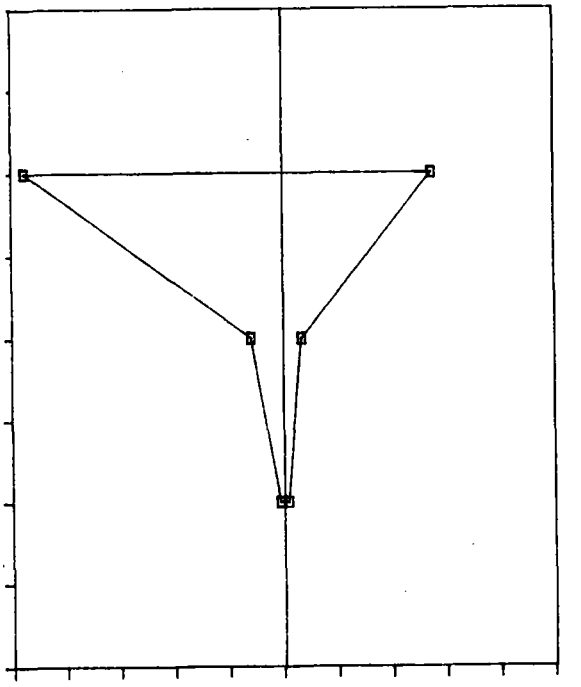
10-12-87



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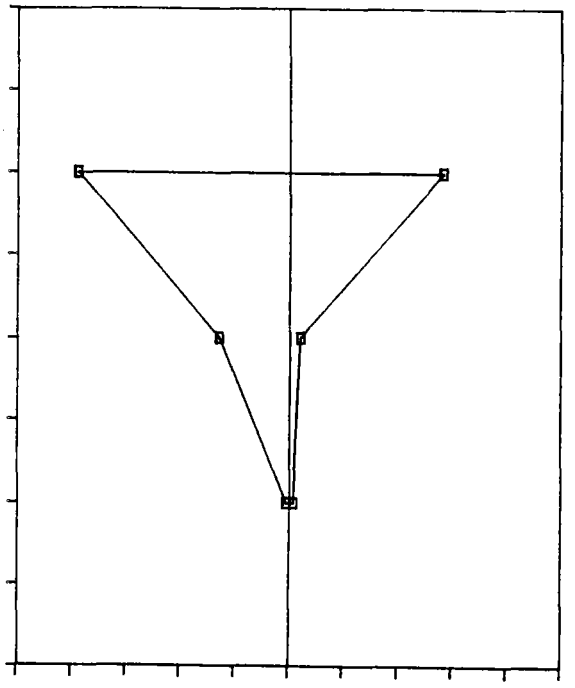

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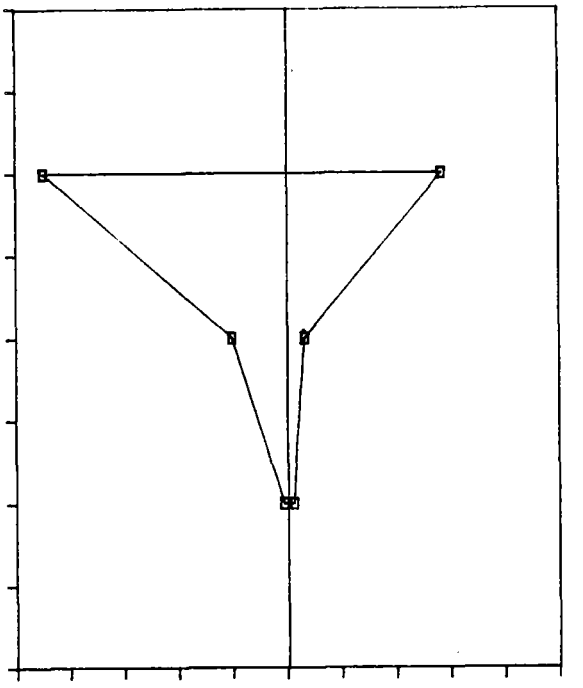
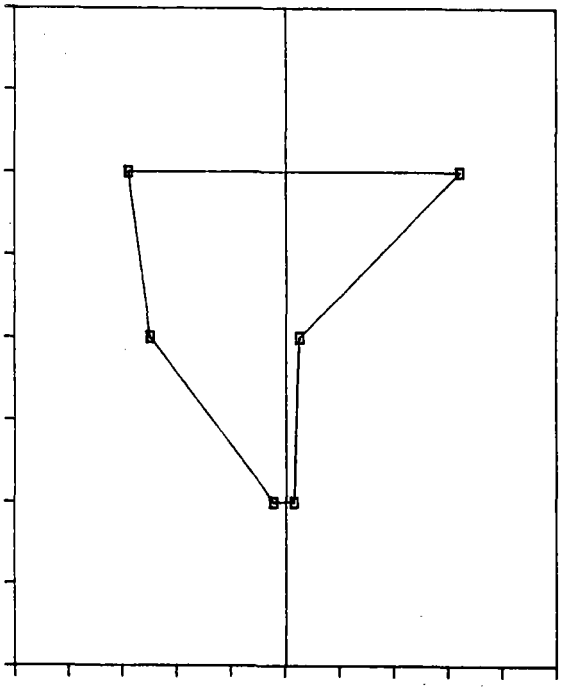


NORTH HORN FORMATION

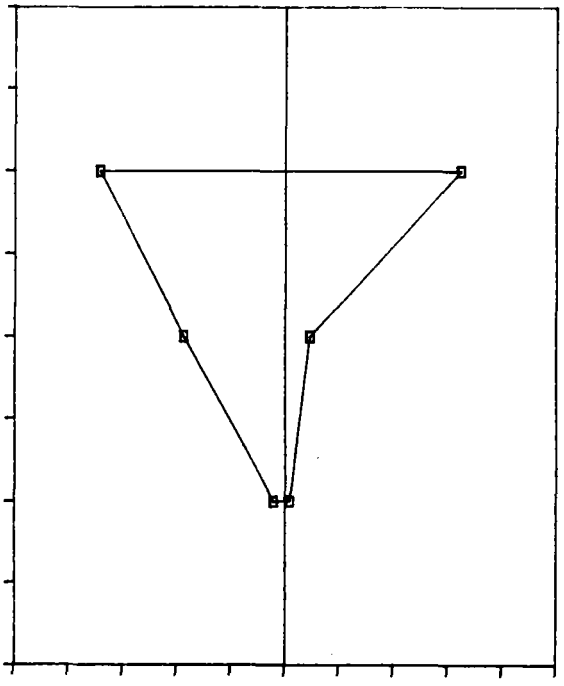
BURNT TREE

07-14-87



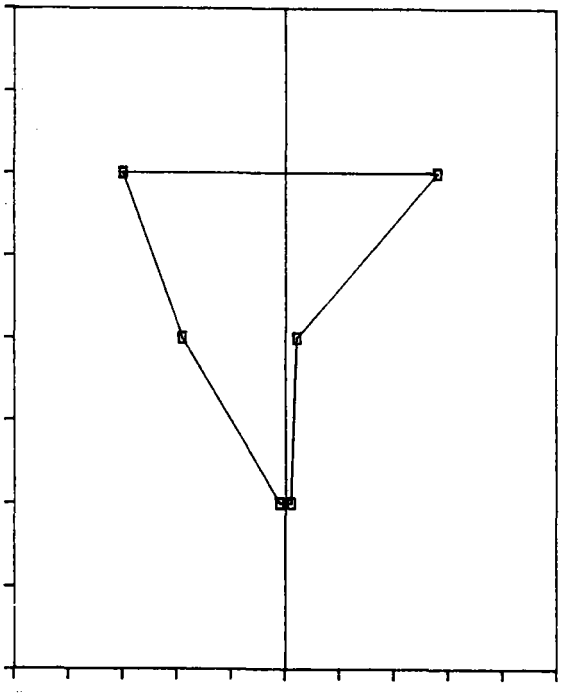
BURNT TREE

10-13-87



ELK SP.

07-13-87



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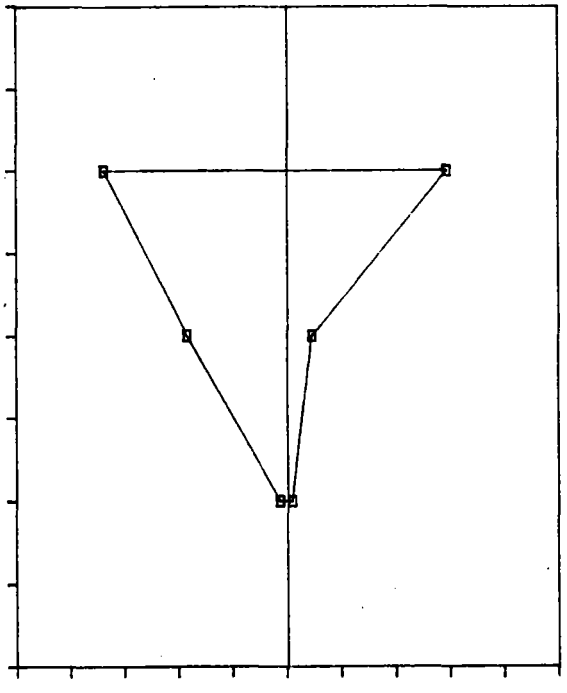
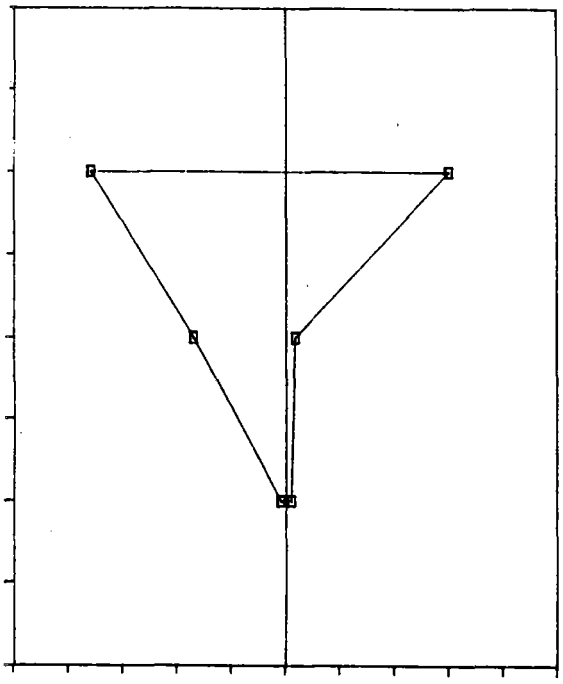


NORTH HORN FORMATION

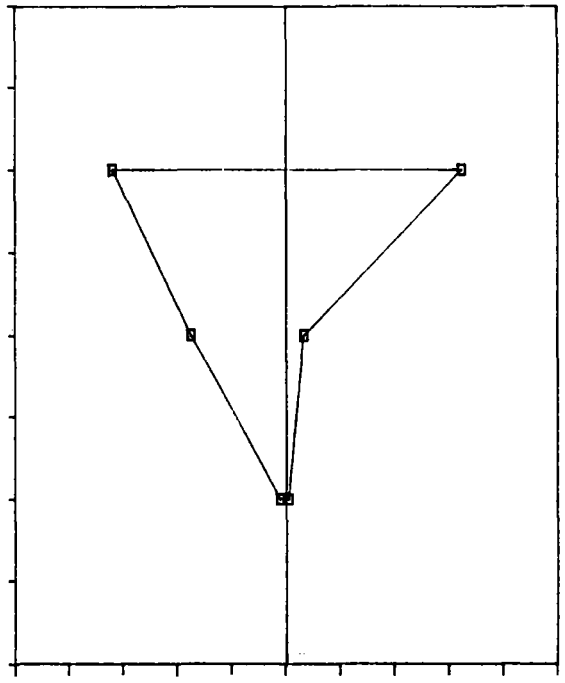
TEDS TUB

07-13-87



TEDS TUB

10-12-87



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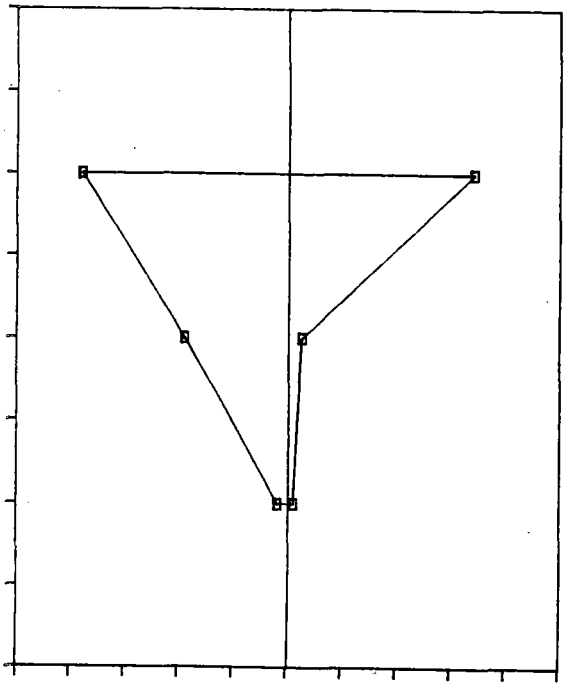

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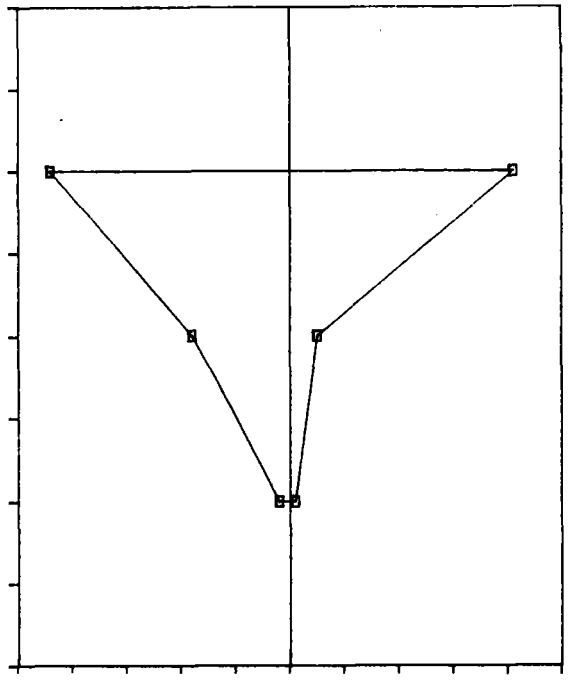

NORTH HORN FORMATION

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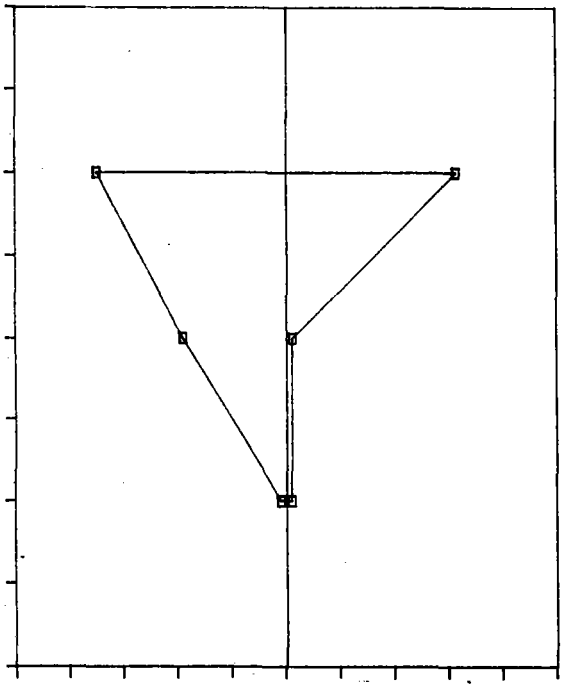

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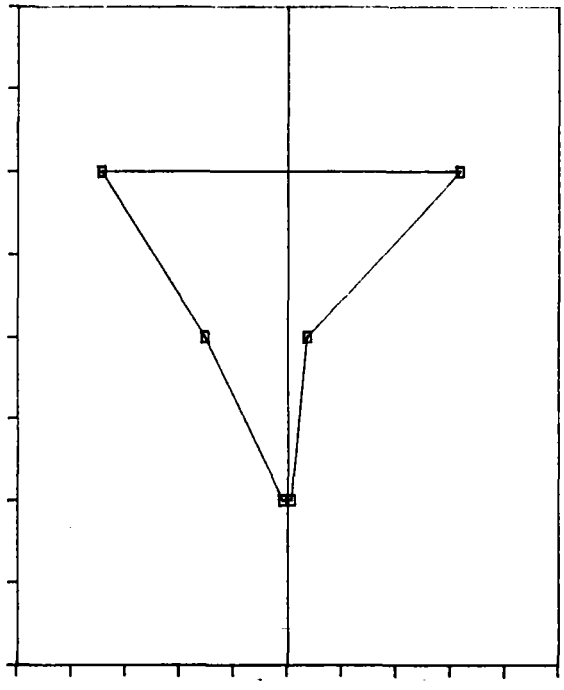

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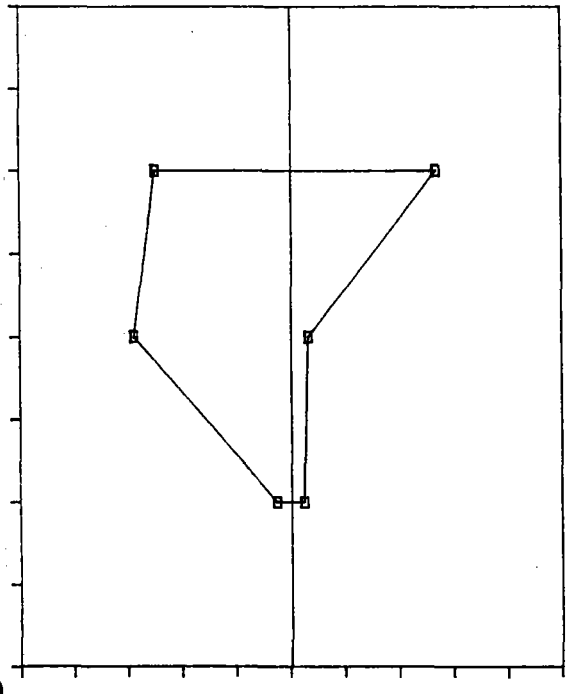

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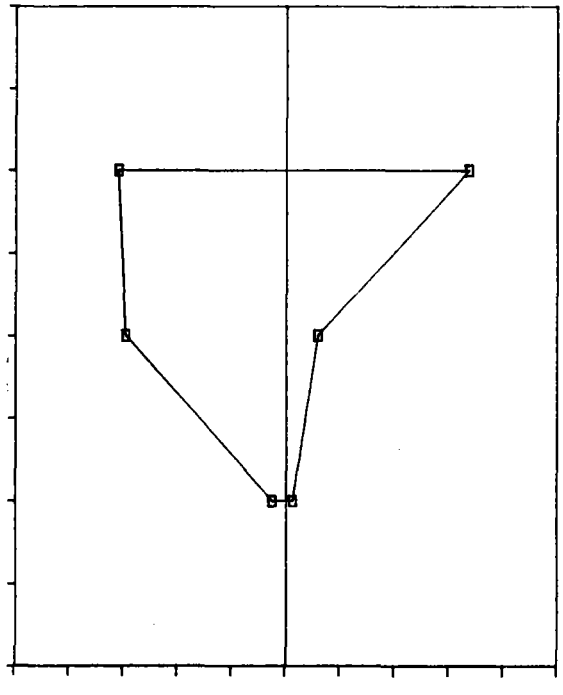

NORTH HORN FORMATION

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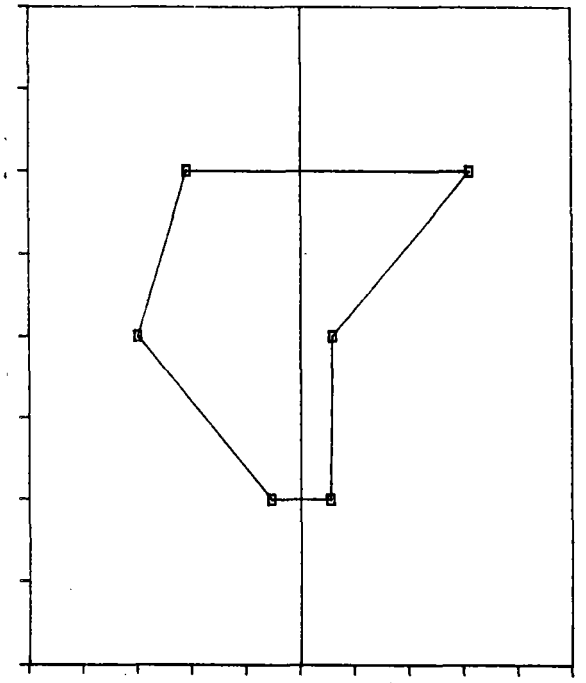

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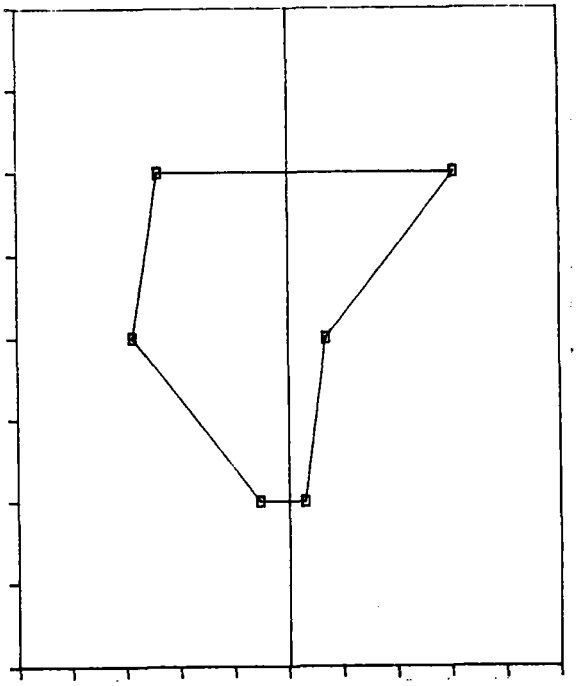

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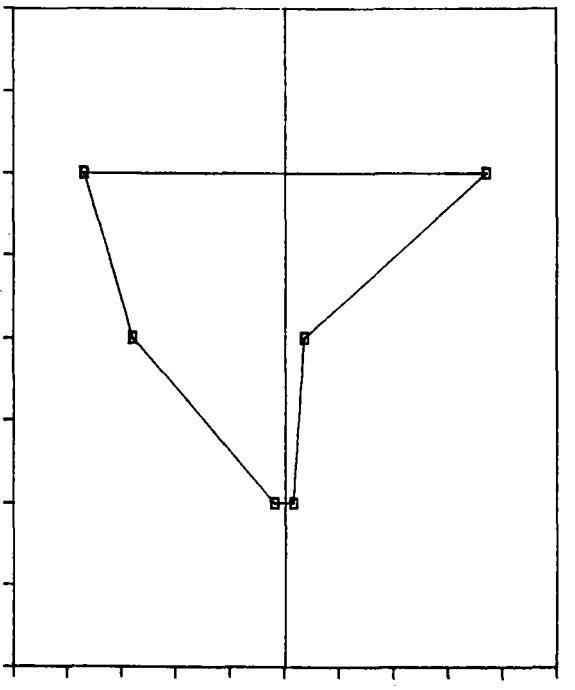
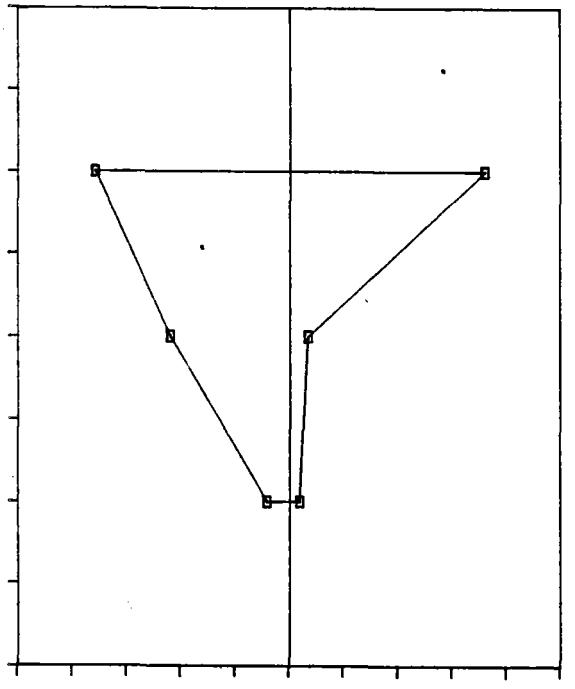


NORTH HORN FORMATION

79-38

07-13-87



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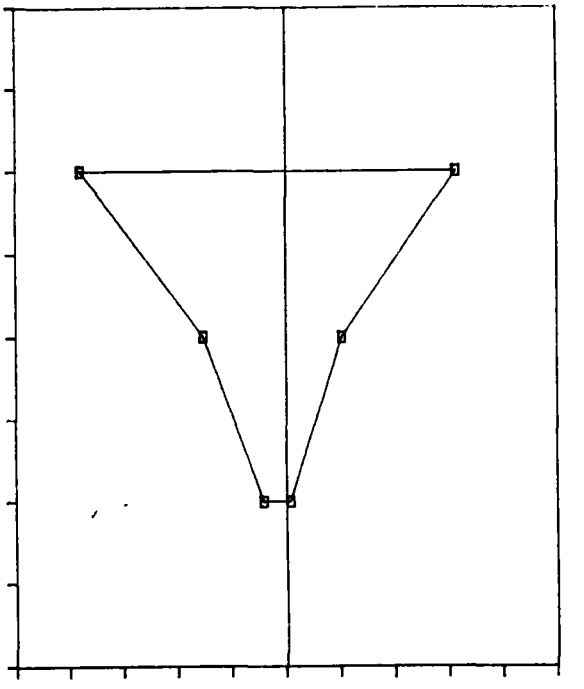

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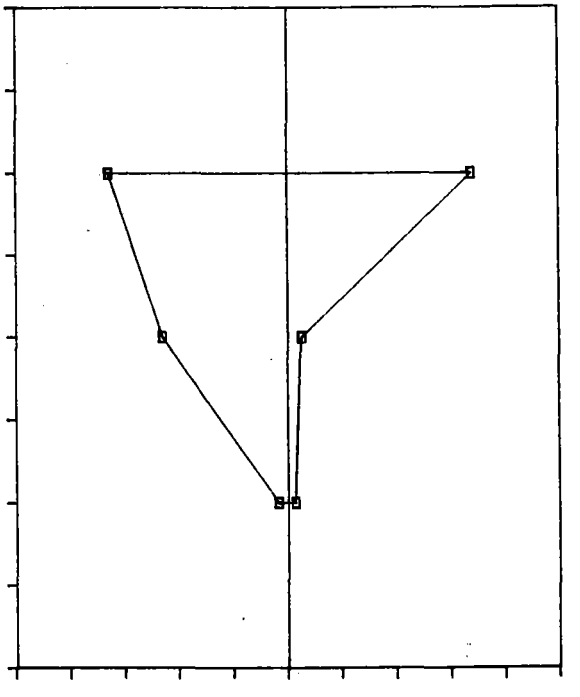

NORTH HORN FORMATION

80-46

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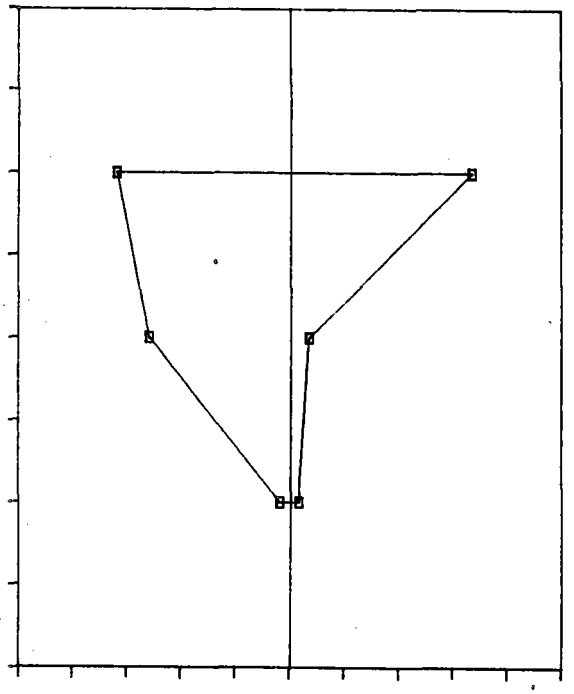

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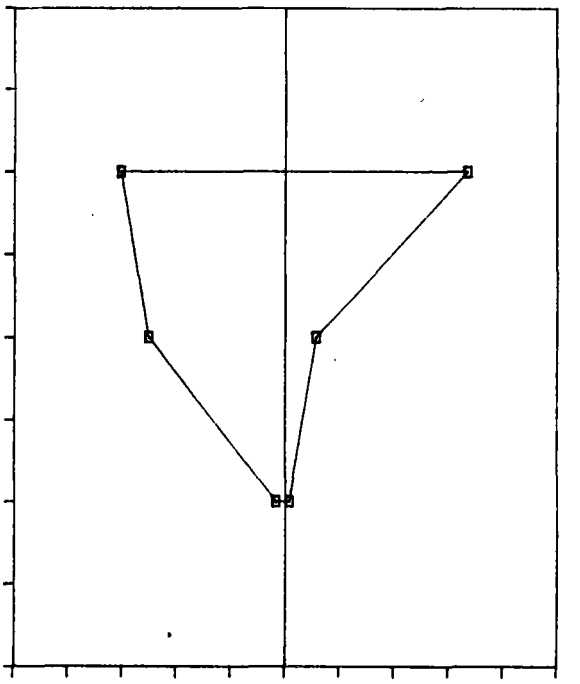

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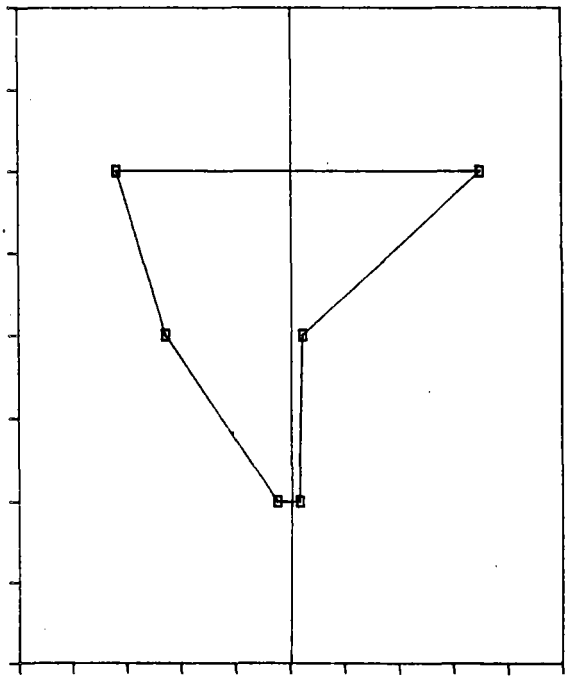

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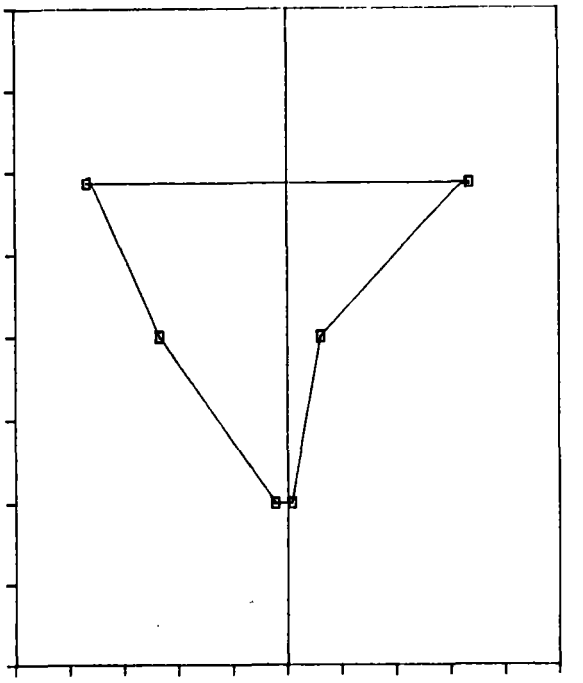
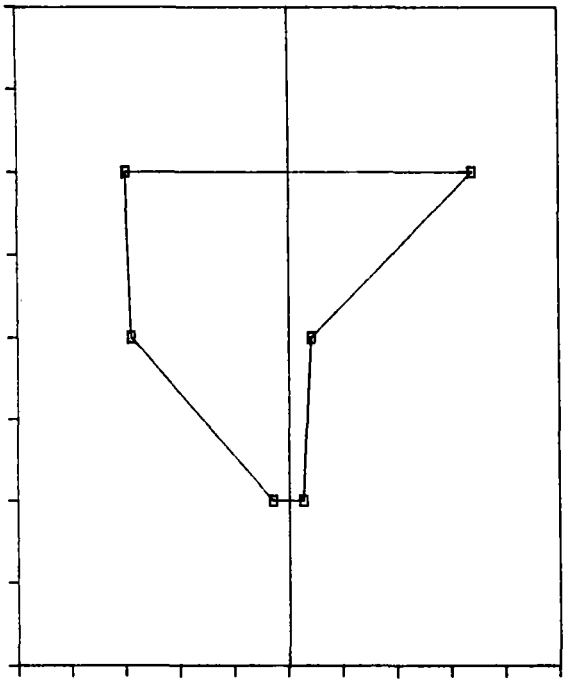


NORTH HORN FORMATION

84-56

07-14-87



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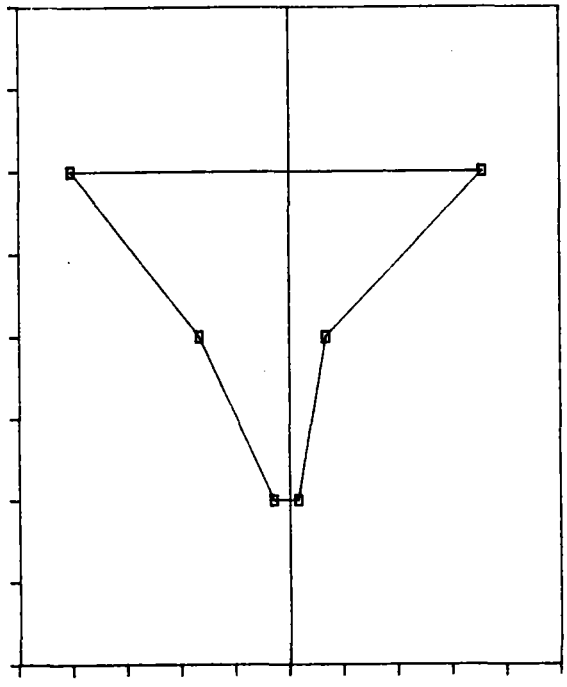
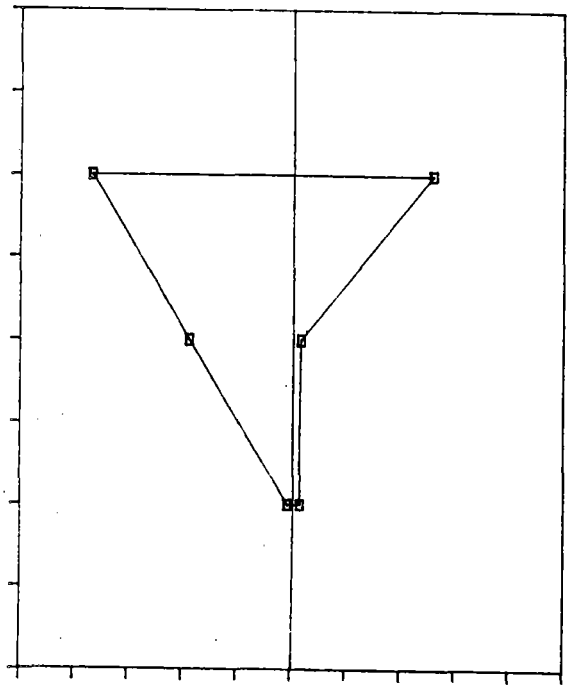


PRICE RIVER FORMATION

79-10

07-13-87



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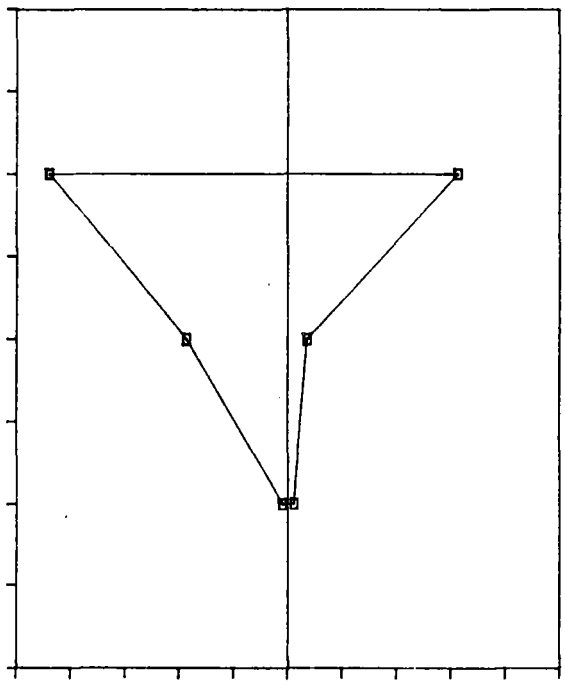

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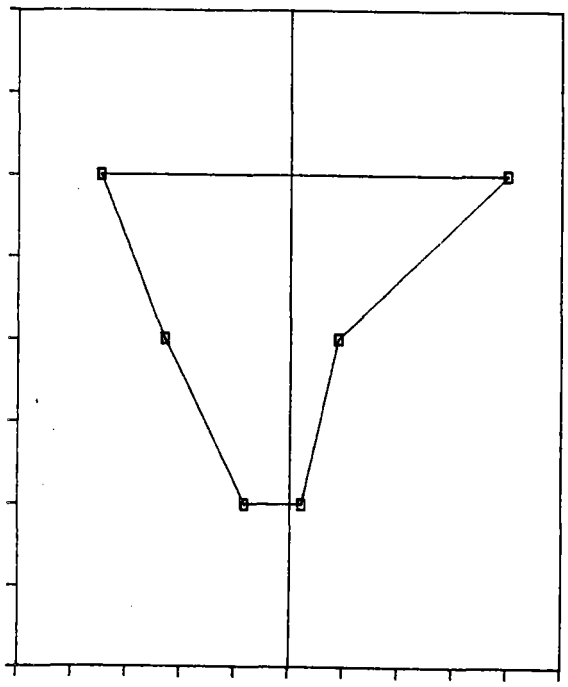

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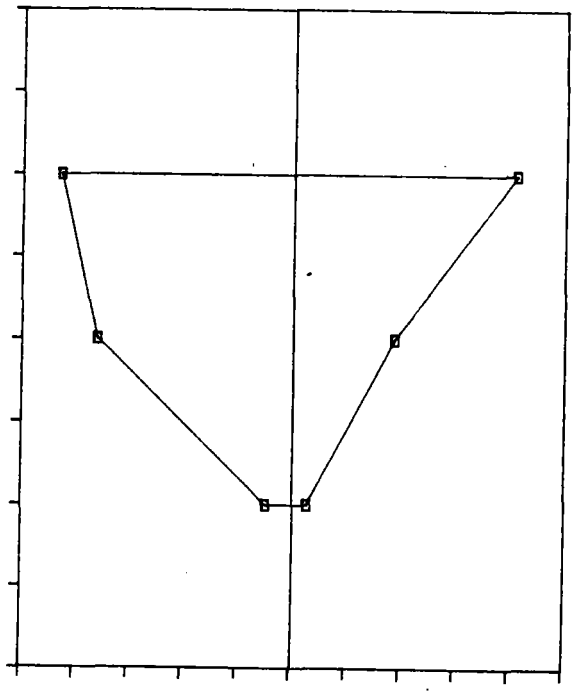
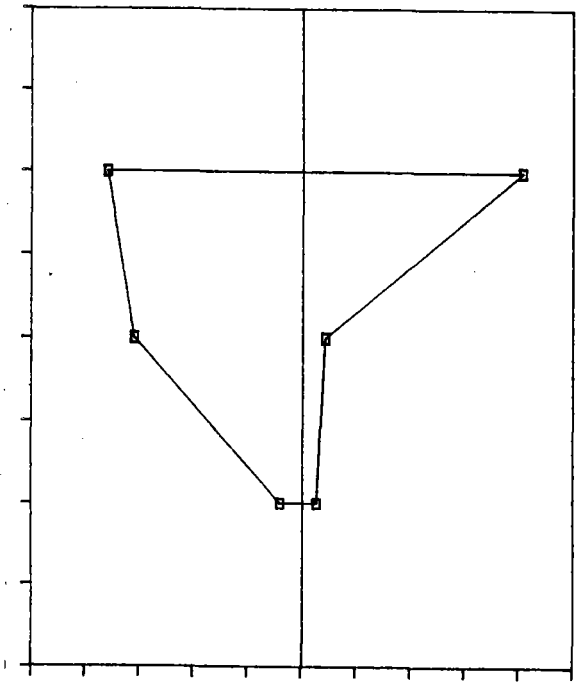
07-14-87



PRICE RIVER FORMATION

82-52

07-14-87



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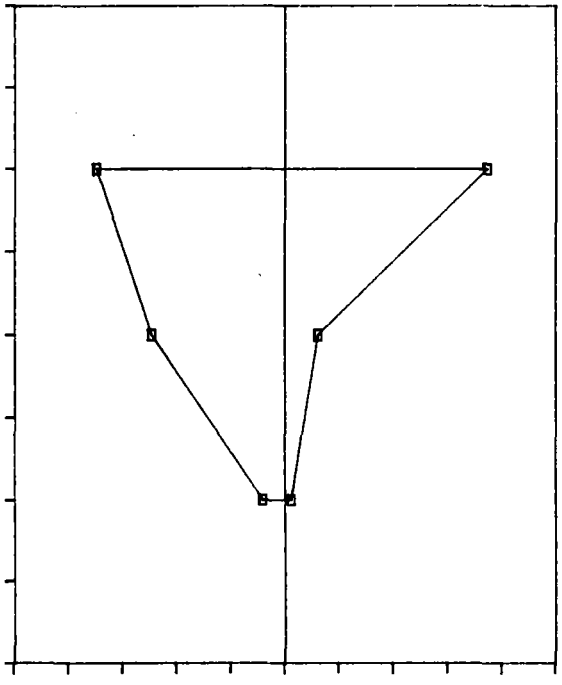

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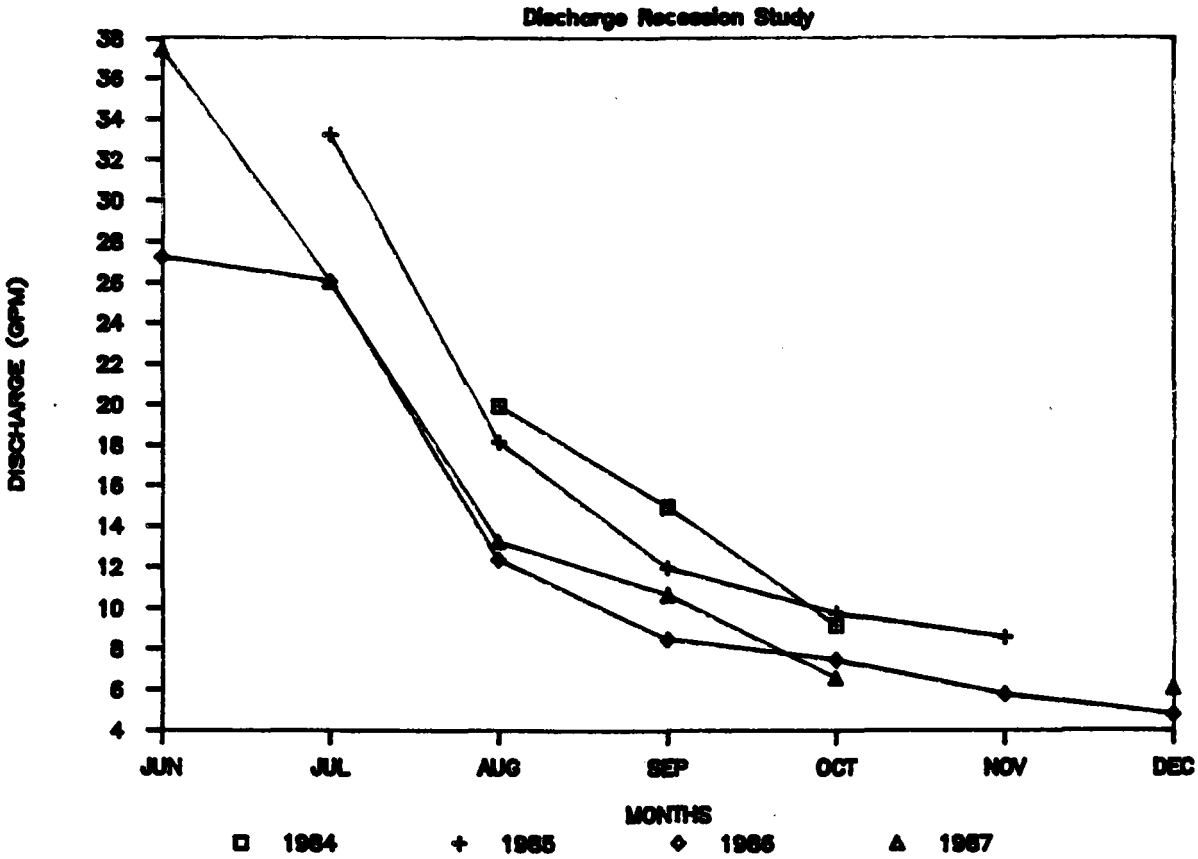
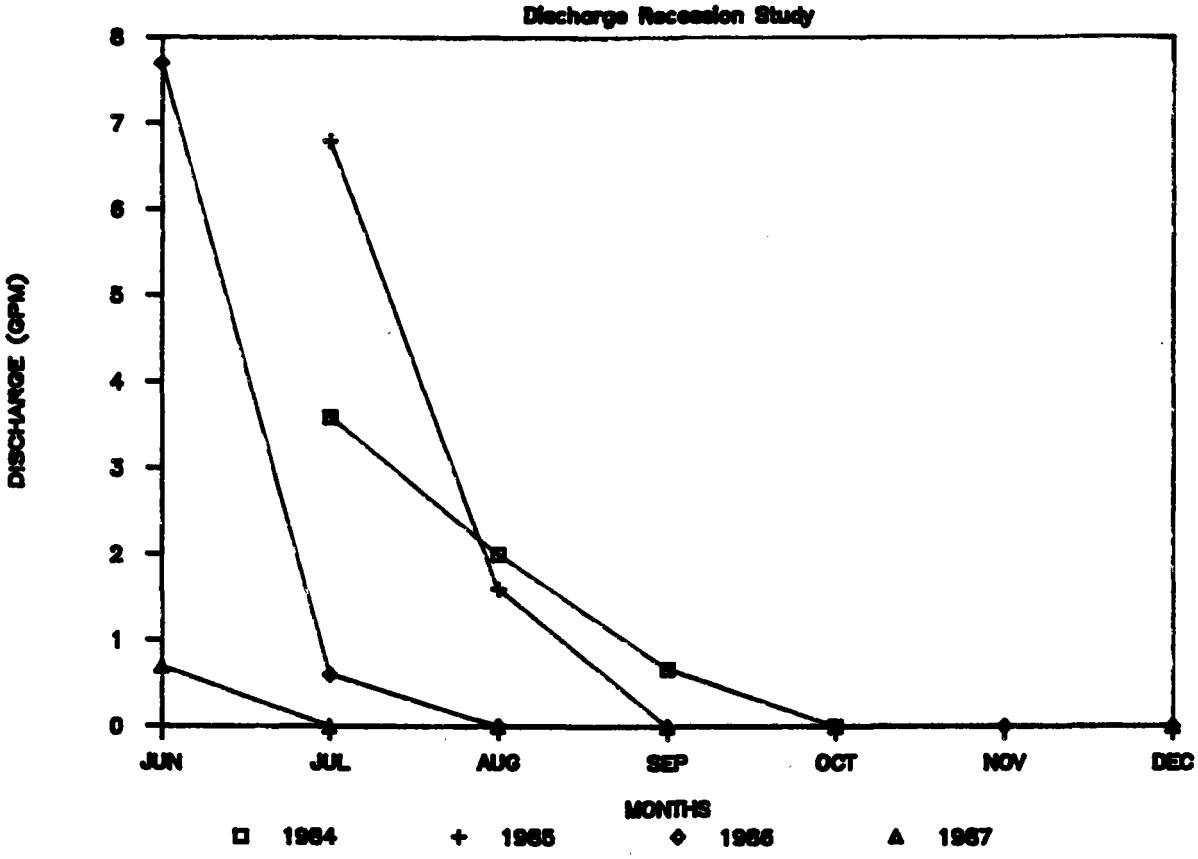
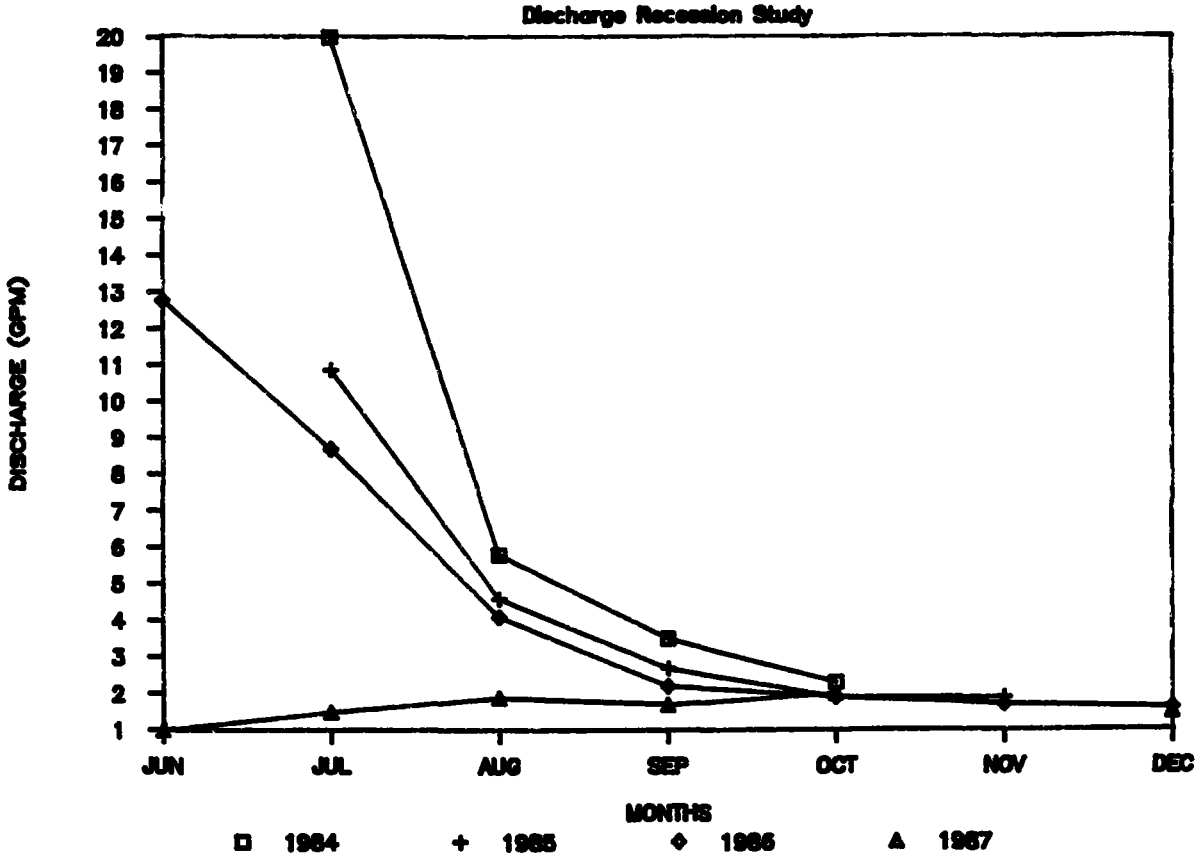


SPRING 79-23



SPRING 79-26



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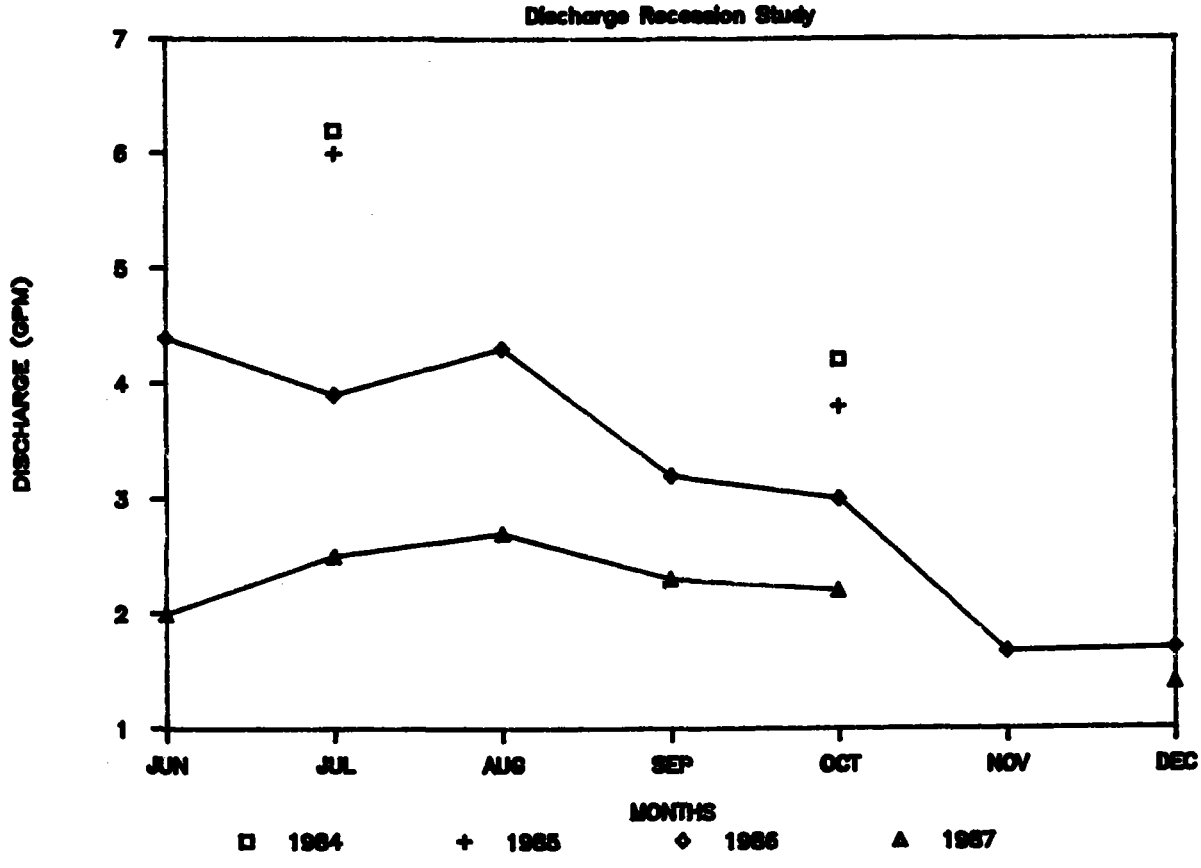

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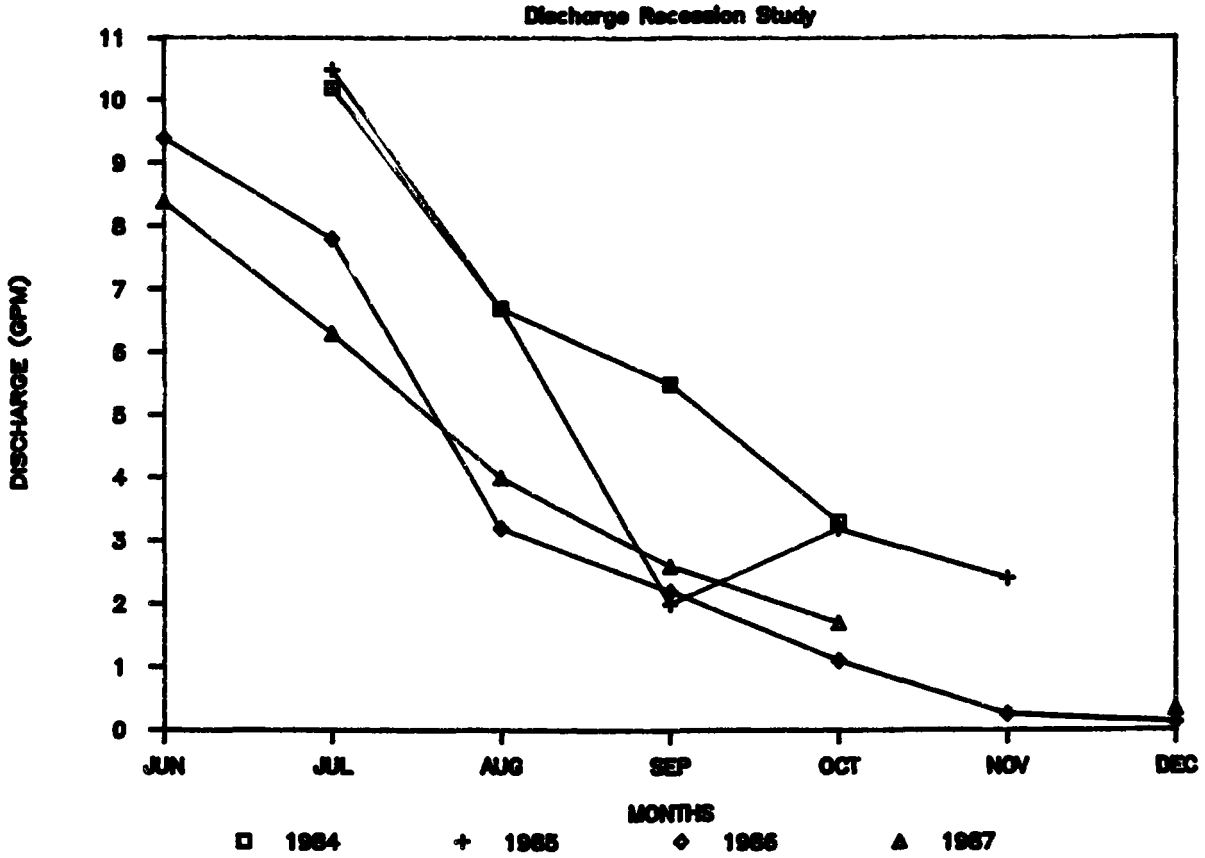
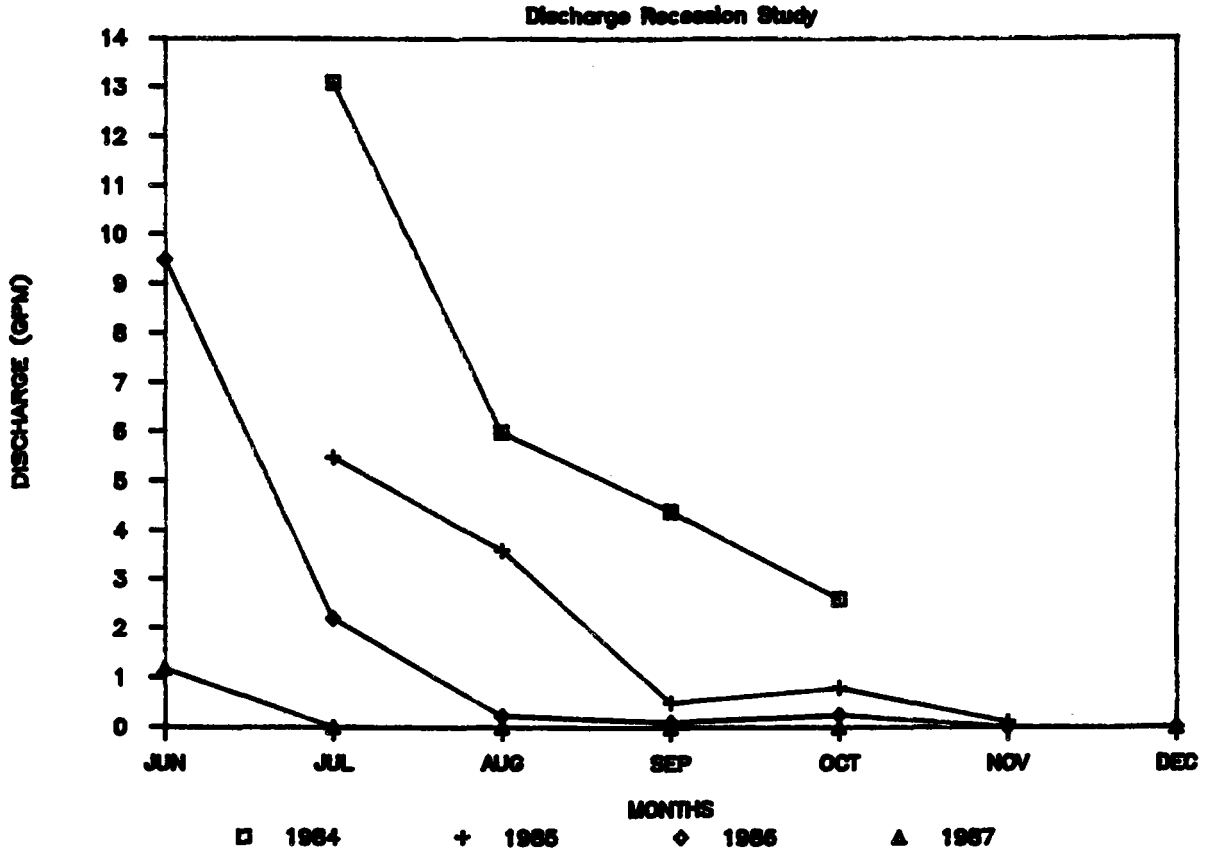
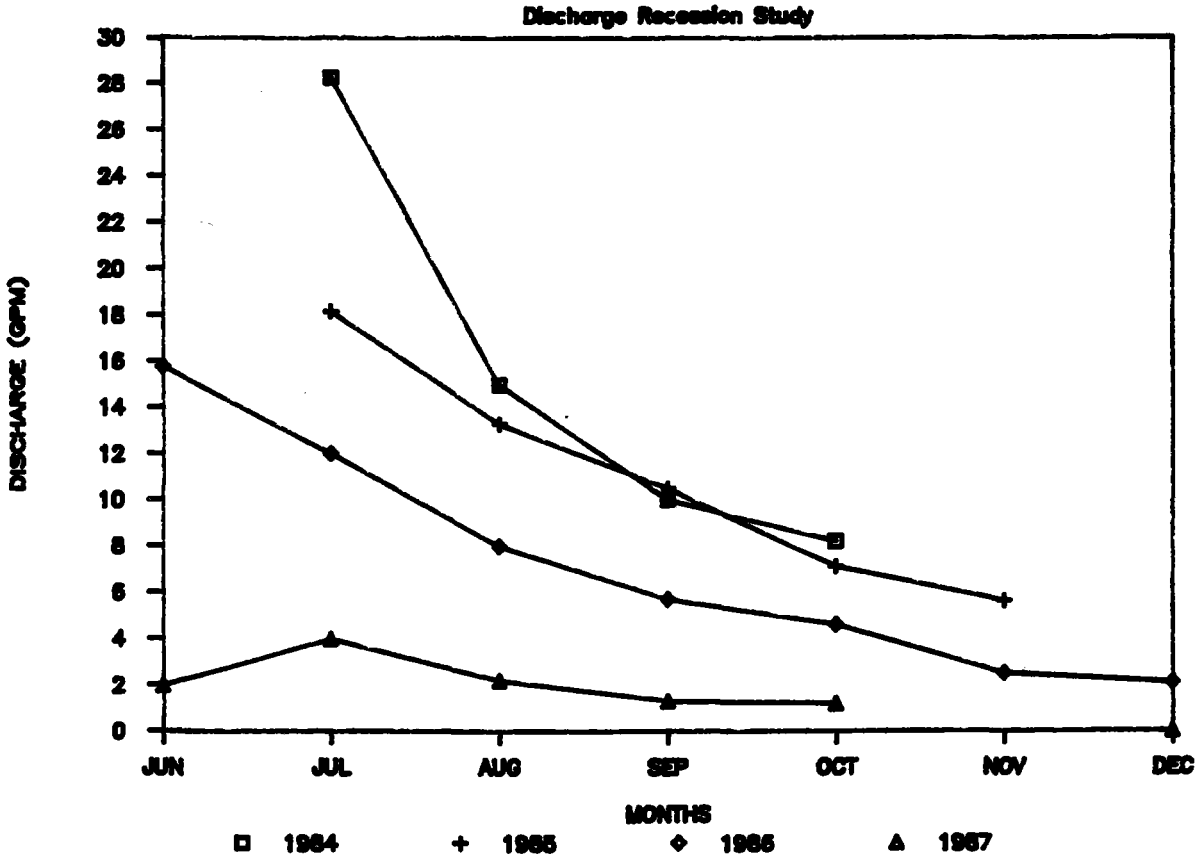


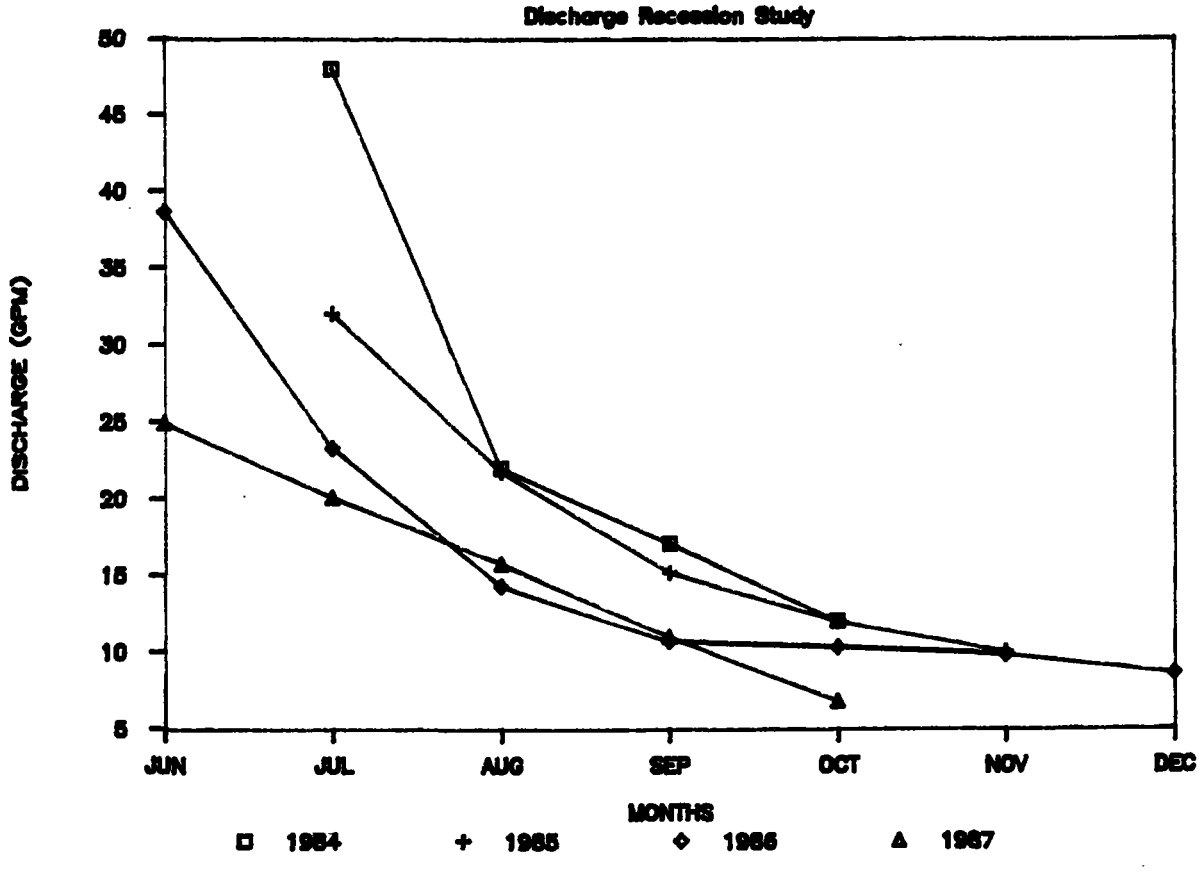
SPRING 80–44



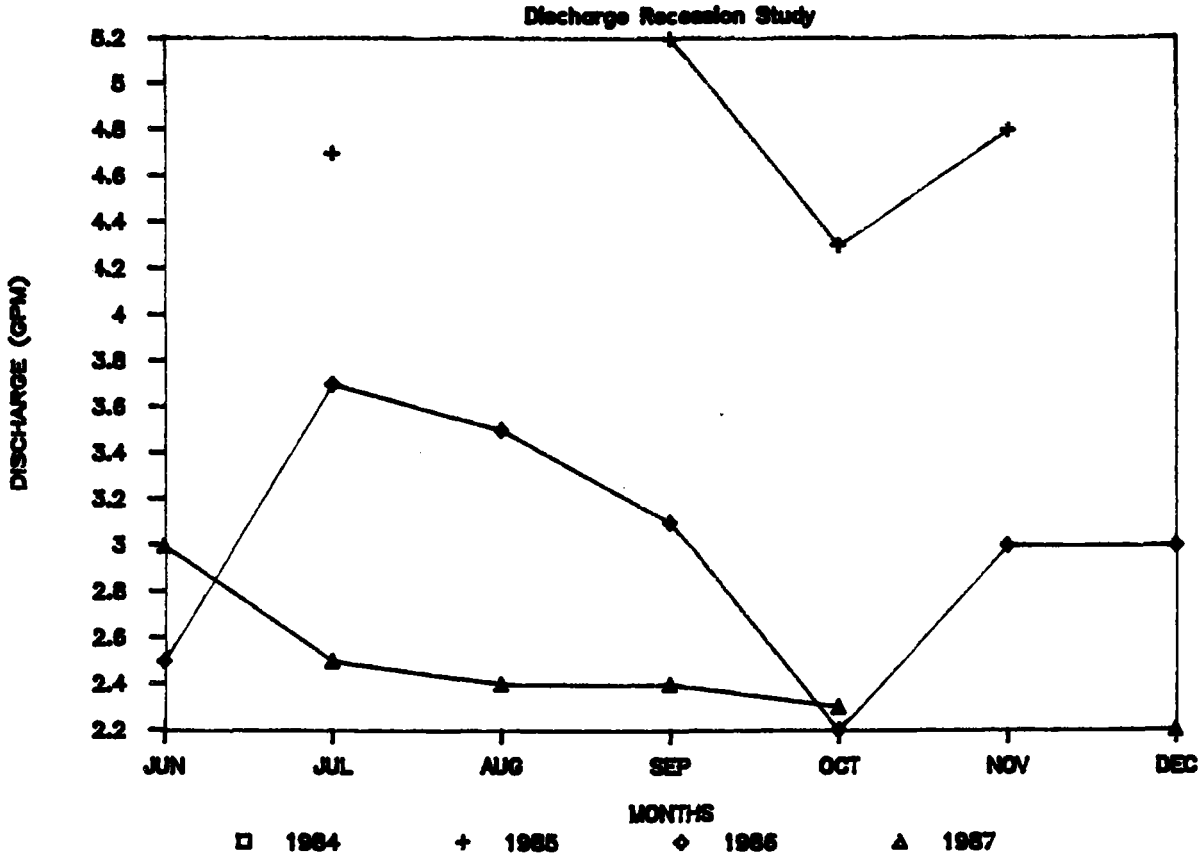
SPRING 80-46



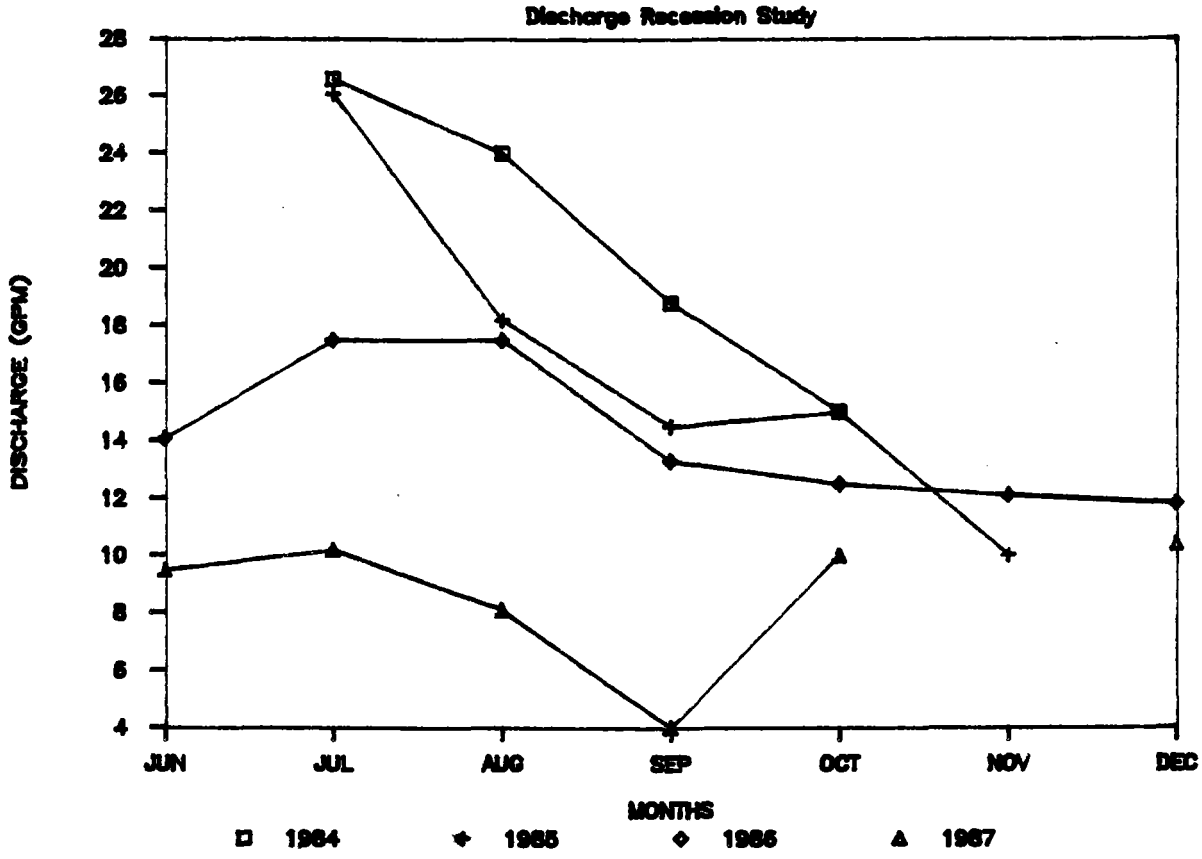
SPRING 80-52



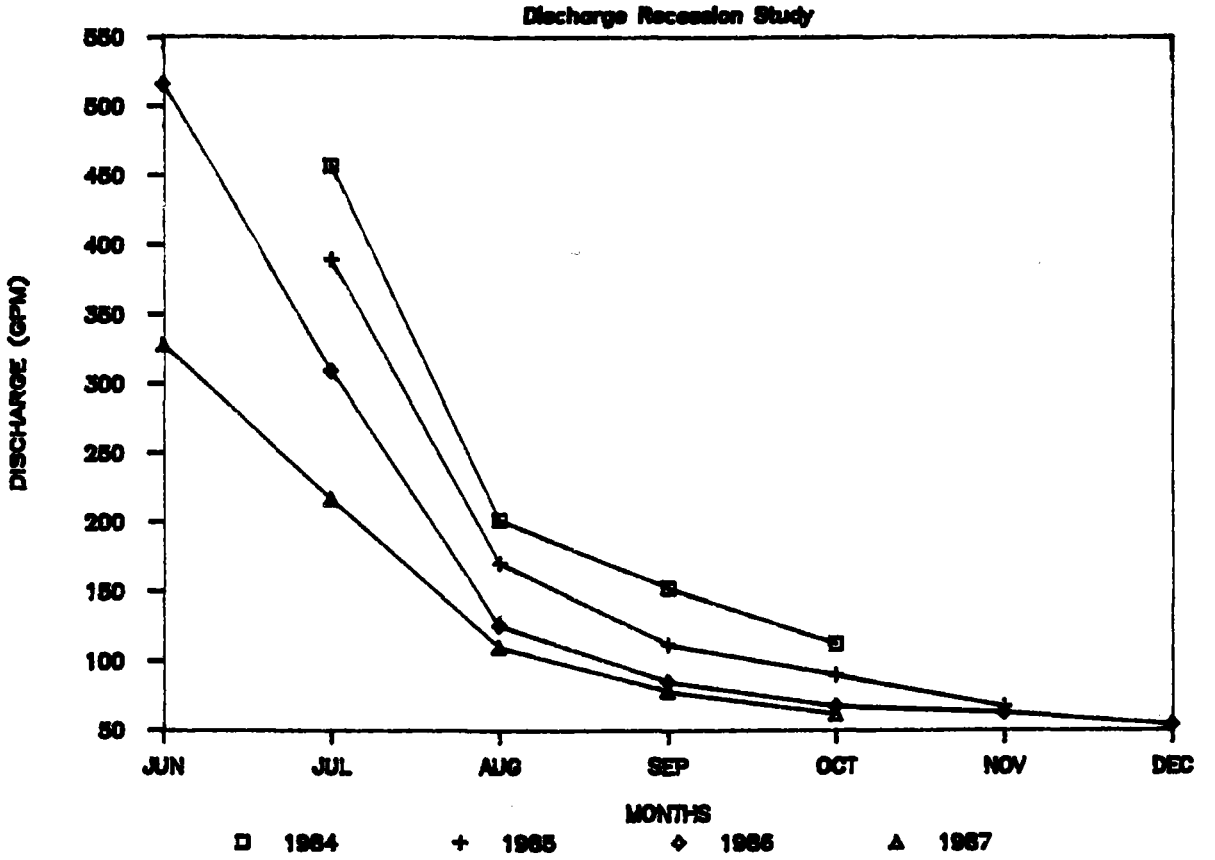
SPRING 84-56



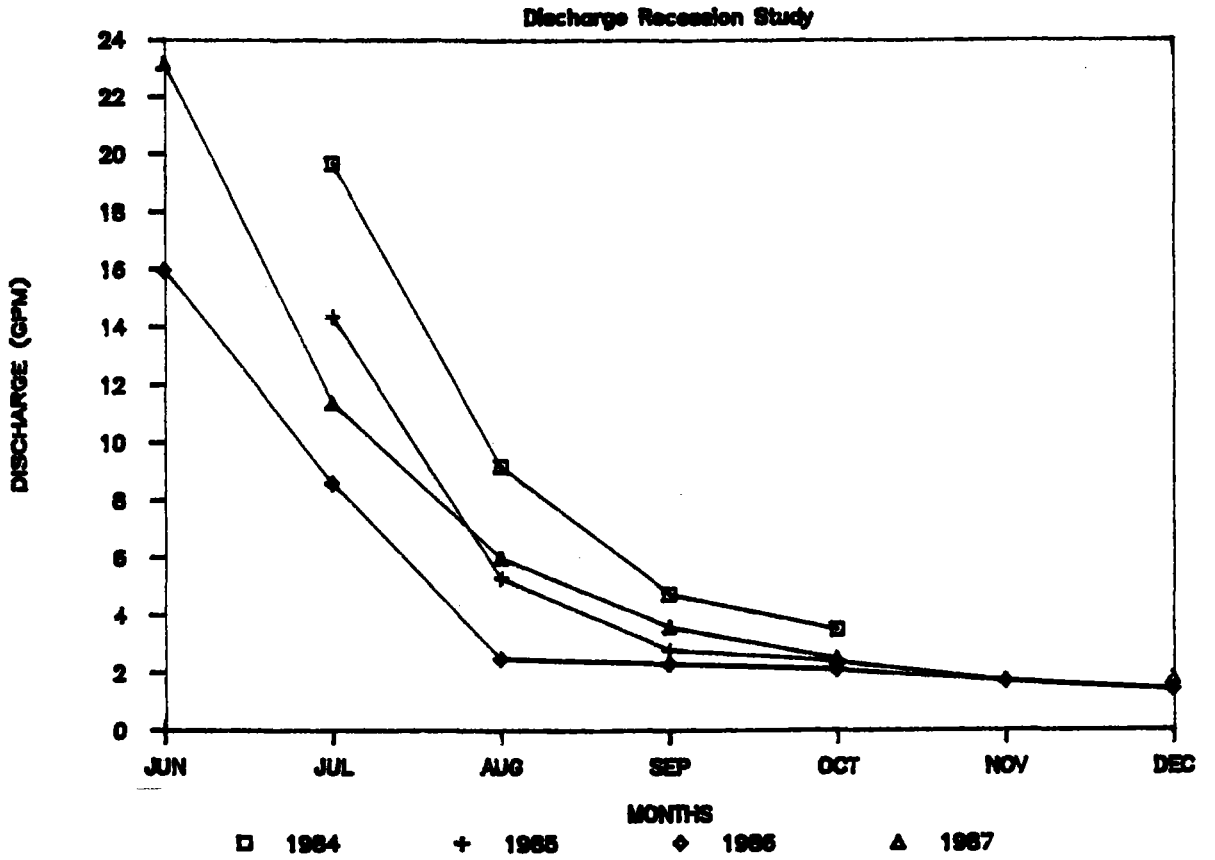
BURNT TREE SPRINGS



ELK SPRING



SHEBA SPRINGS



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Lab ID: 8944
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 47° Flow 10.2 GPM

Sample ID: East Mountain Springs
Burnt Tree

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	265	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		323	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	6	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	58	mg/l
Conductivity	7-15	470	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.17	mg/l	Copper			mg/l
Hardness, Total	7-16	270	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	30.4	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.4	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	261	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	13	mg/l	Sodium	7-22	13	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.3	NTU	Zinc			mg/l
Cations		5.96	meq/l	Anions		5.75	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
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Manager, Huntington Laboratory

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Lab ID: 8928
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs
Temp 41° Flow 217 GPM
Elk Spring

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	231	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		282	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	4	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	60	mg/l
Conductivity	7-14	450	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.14	mg/l	Copper			mg/l
Hardness, Total	7-16	250	mg/l $CaCO_3$	Iron, Diss	7-21	<.05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	23.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	6.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.3	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	229	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	11	mg/l	Sodium	7-22	6	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.5	NTU	Zinc			mg/l
Cations		5.16	meq/l	Anions		4.97	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8926
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs
Sheba Spring
Temp 42° Flow 11.4 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	212	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		259	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	3	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	76	mg/l
Conductivity	7-14	408	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.11	mg/l	Copper			mg/l
Hardness, Total	7-16	230	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead	7-16		mg/l
Nitrogen, Nitrate			mg/l	Magnesium		9.7	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	7.40	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		241	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver			mg/l
Sulfate	7-17	4	mg/l	Sodium	7-22	3	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	2.0	NTU	Zinc			mg/l
Cations		4.73	meq/l	Anions		4.42	meq/l

Comments:

Analyst: Sharon Reiter

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Manager, Huntington Laboratory

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Lab ID: 8923

Date Rec'd: 7-14-87

Date Sampled: 7-13-87

Time Sampled:

Client: Utah Power & Light

Sample ID: ~~East Mountain Springs~~
Ted's Tub

Temp 40° Flow 69 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	247	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		301	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	4	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	72	mg/l
Conductivity	7-14	460	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.13	mg/l	Copper			mg/l
Hardness, Total	7-16	265	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	20.7	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	6.95	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.2	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		240	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver	7-22		mg/l
Sulfate	7-17	9	mg/l	Sodium		5	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	1.0	NTU	Zinc			mg/l
Cations		5.52	meq/l	Anions		5.25	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
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Manager, Huntington Laboratory

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Lab ID: 8937
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 45° Flow 4.0 GPM
Sample ID: East Mountain Springs 79-2

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	281	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		343	mg/l HCO_3 / $CaCO_3$	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	4	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	76	mg/l
Conductivity	7-15	500	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.15	mg/l	Copper			mg/l
Hardness, Total	7-16	285	mg/l $CaCO_3$	Iron, Diss	7-21	<.05	mg/l
Nitrogen, Ammonia			mg/l	Lead	7-16		mg/l
Nitrogen, Nitrate			mg/l	Magnesium		23.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.3	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		263	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	28	mg/l	Silver	7-22		mg/l
Sulfate	7-17	13	mg/l	Sodium		11	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	7.8	NTU	Zinc			mg/l
Cations		6.17	meq/l	Anions		6.02	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8925
Date Rec'd: 7-14-87
Date Sampled: 7-13-8,
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 79-10
Temp 42° Flow 26.1 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total		259	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate	7-14	316	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	5	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	74	mg/l
Conductivity	7-14	490	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.15	mg/l	Copper			mg/l
Hardness, Total	7-16	280	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	23.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	7.05	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.2	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	259	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	8	mg/l	Sodium	7-22	5	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.6	NTU	Zinc			mg/l
Cations		5.80	meq/l	Anions		5.50	meq/l

Comments:

Analyst: Sharon Reiter

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MINING DIV.
FIELD OFFICE

Lab ID: 8927
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 79-15
Temp 49° Flow 14.6 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	258	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		315	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	4	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	70	mg/l
Conductivity	7-14	480	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.15	mg/l	Copper			mg/l
Hardness, Total	7-16	270	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	23.1	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	7.00	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.2	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	256	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	6	mg/l	Sodium	7-22	5	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.9	NTU	Zinc			mg/l
Cations		5.60	meq/l	Anions		5.41	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8942

Date Rec'd: 7-15-87

Date Sampled: 7-14-87

Time Sampled:

Client: Utah Power & Light

Sample ID: East Mountain Springs 79-26

Temp 52° Flow 1.5 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	269	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		328	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	9	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	50	mg/l
Conductivity	7-15	500	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.17	mg/l	Copper			mg/l
Hardness, Total	7-16	270	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	35.3	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.90	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		245	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	15	mg/l	Silver			mg/l
Sulfate	7-17	16	mg/l	Sodium	7-22	15	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	6.2	NTU	Zinc			mg/l
Cations		6.05	meq/l	Anions		5.98	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
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Lab ID: 8939
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 79-29
Temp 40° Flow 2.5 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	256	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		312	mg/l HCO_3/$CaCO_3$	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	20	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	42	mg/l
Conductivity	7-15	550	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.22	mg/l	Copper			mg/l
Hardness, Total	7-16	255	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	36.5	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.95	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	315	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	29	mg/l	Sodium	7-22	32	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	2.1	NTU	Zinc			mg/l
Cations		6.50	meq/l	Anions		6.30	meq/l

Comments:

Analyst: Sharon Reiter

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Manager, Huntington Laboratory

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JUL 27 1987
MINING DIV.
FIELD OFFICE

Lab ID: 8947
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 42° Flow 1.0 GPM
Sample ID: East Mountain Springs
79-32

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	380	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		464	mg/l $CaCO_3$ HCO3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	18	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	74	mg/l
Conductivity	7-15	800	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.22	mg/l	Copper			mg/l
Hardness, Total	7-16	415	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	55.9	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.95	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		495	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver			mg/l
Sulfate	7-17	60	mg/l	Sodium	7-22	35	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	2.7	NTU	Zinc			mg/l
Cations		9.85	meq/l	Anions		9.37	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8922
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Temp 42° Flow 10.5 GPM

Sample ID: East Mountain Springs
79-34

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	305	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		372	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	6	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	74	mg/l
Conductivity	7-14	600	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.16	mg/l	Copper			mg/l
Hardness, Total	7-16	325	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	34	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	6.70	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		343	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver			mg/l
Sulfate	7-17	18	mg/l	Sodium	7-22	11	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	3.0	NTU	Zinc			mg/l
Cations		6.97	meq/l	Anions		6.66	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8921
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs

Temp 40° Flow 6.3 GPM 79-35

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	233	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		284	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		<1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	3	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	78	mg/l
Conductivity	7-14	480	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.12	mg/l	Copper			mg/l
Hardness, Total	7-16	260	mg/l $CaCO_3$	Iron, Diss	7-21	<.05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	15.8	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	6.95	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		260	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	<4	mg/l	Silver			mg/l
Sulfate	7-17	10	mg/l	Sodium	7-22	3	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.9	NTU	Zinc			mg/l
Cations		5.33	meq/l	Anions		4.96	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
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Lab ID: 8924
Date Rec'd: 7-14-87
Date Sampled: 7-13-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 79-38
Temp 40° Flow 8.3 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-14	296	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		361	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	7	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total	7-14		MPN/100 ml	Calcium	7-16	72	mg/l
Conductivity		600	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.19	mg/l	Copper			mg/l
Hardness, Total	7-16	290	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	26.8	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-14	6.85	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.4	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	318	mg/l	Silica			mg/l
Solids, Total Suspended		6	mg/l	Silver			mg/l
Sulfate	7-17	17	mg/l	Sodium	7-22	25	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	4.7	NTU	Zinc			mg/l
Cations		6.91	meq/l	Anions		6.48	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
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Manager, Huntington Laboratory

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Lab ID: 8946
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 48° Flow 2.0 GPM

Sample ID: East Mountain Springs
79-40

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	329	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		401	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	8	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	70	mg/l
Conductivity	7-15	650	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.24	mg/l	Copper			mg/l
Hardness, Total	7-16	290	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	28	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	7.10	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.7	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		408	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	8	mg/l	Silver			mg/l
Sulfate	7-17	43	mg/l	Sodium	7-22	51	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	6.1	NTU	Zinc			mg/l
Cations		8.01	meq/l	Anions		7.71	meq/l

Comments:

Analyst: Sharon Reuter

Respectfully submitted,
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Manager, Huntington Laboratory

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Lab ID: 8940
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 42° Flow 2.5 GPM
Sample ID: East Mountain Springs 80-41

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	337	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		411	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	10	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	86	mg/l
Conductivity	7-15	730	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.18	mg/l	Copper			mg/l
Hardness, Total	7-16	395	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	43.8	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.90	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		455	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver			mg/l
Sulfate	7-17	90	mg/l	Sodium	7-22	29	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.5	NTU	Zinc			mg/l
Cations		9.17	meq/l	Anions		8.91	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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Lab ID: 8938
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 80-43
Temp 43° Flow 0.4 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	279	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		340	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	5	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	66	mg/l
Conductivity	7-15	490	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.13	mg/l	Copper			mg/l
Hardness, Total	7-16	280	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	28.0	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.75	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		235	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	12	mg/l	Silver			mg/l
Sulfate	7-17	13	mg/l	Sodium	7-22	10	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	4.6	NTU	Zinc			mg/l
Cations		6.05	meq/l	Anions		6.00	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
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Manager, Huntington Laboratory

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JUL 27 1987
MINING DIV.
FIELD OFFICE

Lab ID: 8941
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Temp 41° Flow 4.0 GPM
Sample ID: East Mountain Springs
80-46

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	275	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		336	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	6	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	64	mg/l
Conductivity	7-15	510	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.15	mg/l	Copper			mg/l
Hardness, Total	7-16	290	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	31.6	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.70	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.7	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	296	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	17	mg/l	Sodium	7-22	11	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	2.0	NTU	Zinc			mg/l
Cations		6.29	meq/l	Anions		6.03	meq/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

COMMERCIAL TESTING & ENGINEERING CO.
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Lab ID: 8948

Date Rec'd: 7-15-87

Date Sampled: 7-14-87

Time Sampled:

Client: Utah Power & Light

Sample ID: East Mountain Springs 80-47

Temp 40° Flow 7.4 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	287	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		350	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	6	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	64	mg/l
Conductivity	7-15	520	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.16	mg/l	Copper			mg/l
Hardness, Total	7-16	275	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	28	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.90	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	298	mg/l	Silica			mg/l
Solids, Total Suspended		14	mg/l	Silver			mg/l
Sulfate	7-17	11	mg/l	Sodium	7-22	15	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	1.4	NTU	Zinc			mg/l
Cations		6.16	meq/l	Anions		6.15	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8943
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Sample ID: East Mountain Springs 82-52
Temp 39° Flow 20.1 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-15	334	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		407	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	10	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	72	mg/l
Conductivity	7-15	620	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.22	mg/l	Copper			mg/l
Hardness, Total	7-16	335	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	37.7	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.80	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		385	mg/l	Silica			mg/l
Solids, Total Suspended	7-15	< 4	mg/l	Silver			mg/l
Sulfate	7-17	21	mg/l	Sodium	7-22	24	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	2.8	NTU	Zinc			mg/l
Cations		7.74	meq/l	Anions		7.41	meq/l

Comments:

Analyst: Sharon Reiter

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Lab ID: 8945
Date Rec'd: 7-15-87
Date Sampled: 7-14-87
Time Sampled:
Client: Utah Power & Light
Sample ID: ~~East Mountain Springs~~ 84-56
Temp 41° Flow 2.5 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total		279	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate	7-15	340	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	10	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-16	60	mg/l
Conductivity	7-15	550	umhos/cm	Chromium			mg/l
Fluoride	7-16	0.20	mg/l	Copper			mg/l
Hardness, Total	7-16	295	mg/l $CaCO_3$	Iron, Diss	7-21	< .05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-16	35.3	mg/l
Nitrogen, Nitrite			mg/l	Manganese			mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-15	6.70	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	0.6	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-15	280	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-17	21	mg/l	Sodium	7-22	17	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity	7-15	0.4	NTU	Zinc			mg/l
Cations		6.65	meq/l	Anions		6.31	meq/l

Comments:

Analyst: Sharon Reiter

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September 30, 1987

Job No.: 8984

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
Elk Springs
Temp 38
Flow 78.5 gpm
10:34 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	252 mg/l CaCO3
Manganese 09/25/87	0.01 mg/l
pH 09/17/87	8.00 Units

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

September 28, 1987

Job No.: 8988

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
Burnt Tree
Temp 41
4.0 gpm
13:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	278 mg/l CaCO3
Manganese 09/25/87	0.01 mg/l
pH 09/17/87	7.55 Units

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September 28, 1987

Job No.: 8991

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

Shelba Spring
Temp 45
Flow 3.6 gpm
11:25 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	262 mg/l CaCO3
Manganese 09/25/87	0.01 mg/l
pH 09/17/87	7.50 Units

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TELEPHONE: (801) 653-2311

September 28,1987

Job No.: 8986

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
10
Temp 45
Flow 10.6 gpm
11:15 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	296 mg/l CaCO3
Manganese 09/25/87	0.01 mg/l
pH 09/17/87	7.70 Units

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September 28,1987

Job No.: 8987

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
79-26
Temp 50
Flow 1.7 gpm
12:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	< 1.0	mg/l CaCO3
Hardness, Total 09/25/87	269	mg/l CaCO3
Manganese 09/25/87	< 0.01	mg/l
pH 09/17/87	8.30	Units

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TELEPHONE: (801) 653-2311

September 28, 1987

Job No.: 8985

Date Rec'd: September 16. 1987

Date Sampled: September 16. 1987

Sampled By: UP&L

Sample ID:

EMS
79-29
Temp 42
Flow 2.3 gpm
11:50 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l $CaCO_3$
Hardness, Total 09/25/87	293 mg/l $CaCO_3$
Manganese 09/25/87	0.08 mg/l
pH 09/17/87	7.75 Units

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September 28, 1987

Job No.: 8990

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
79-35
Temp 42
Flow 2.6 gpm
10:50 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	317 mg/l CaCO3
Manganese 09/25/87	<0.01 mg/l
pH 09/17/87	7.75 Units

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September 28, 1987

Job No.: 8992

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
80-46
Temp 41
Flow 1.3
13.10 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l $CaCO_3$
Hardness, Total 09/25/87	355 mg/l $CaCO_3$
Manganese 09/25/87	<0.01 mg/l
pH 09/17/87	7.40 Units

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September 28, 1987

Job No.: 8989

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
82-52
Temp 41
Flow 11.0
14:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l $CaCO_3$
Hardness, Total 09/25/87	250 mg/l $CaCO_3$
Manganese 09/25/87	0.01 mg/l
pH 09/17/87	7.70 Units

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September 28,1987

Job No.: 8983

Date Rec'd: September 16, 1987

Date Sampled: September 16, 1987

Sampled By: UP&L

Sample ID:

EMS
84-56
Temp 42
Flow 2.4 gpm
12:50 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3
Hardness, Total 09/25/87	317 mg/l CaCO3
Manganese 09/25/87	< 0.01 mg/l
pH 09/17/87	7.40 Units

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TELEPHONE: (801) 653-2311

October 21,1987

Job No.: 9017

Date Rec'd: October 13, 1987

Date Sampled: October 13, 1987

Sampled By: UP&L

Sample ID:

BURNT TREE
Temp 45
Flow 10.0 gpm.
11:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	325 mg/l HCO3	Hardness, Total 10/16/87	265 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	266 mg/l CaCO3	Magnesium 10/16/87	22.70 mg/l
Anions, Total	5.78 meq/l	pH 10/14/87	7.72 Units
Calcium 10/16/87	68.7 mg/l	Potassium 10/16/87	0.85 mg/l
Cations, Total	5.83 meq/l	Sodium 10/16/87	11.84 mg/l
Chloride 10/14/87	3.6 mg/l	Solids, Dissolved 10/15/87	287 mg/l
Conductivity 10/14/87	365 umhos/cm	Solids, Suspended 10/15/87	27.0 mg/l
Fluoride 10/14/87	0.52 mg/l	Sulfate 10/14/87	23.0 mg/l
		Turbidity 10/20/87	0.4 NTU

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TELEPHONE: (801) 653-2311

November 25, 1987

Job No.: 9018

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

ELK SPRINGS
Temp 39
Flow 0.18/61.6 gpm.
15:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	296 mg/l HCO3	pH 10/14/87	8.14 Units
Alk., Carbonate 10/14/87	1 mg/l CaCO3	Potassium 10/16/87	0.95 mg/l
Alk., Total 10/14/87	243 mg/l CaCO3	Sodium 10/16/87	7.05 mg/l
Anions, Total	5.32 meq/l	Solids, Dissolved 10/15/87	178.0 mg/l
Calcium 10/16/87	67.6 mg/l	Solids, Suspended 10/15/87	12.0 mg/l
Cations, Total	5.54 meq/l	Sulfate 10/14/87	23.0 mg/l
Chloride 10/14/87	3.6 mg/l	Sulfide	0.00 mg/l
Conductivity 10/14/87	262 umhos/cm	Turbidity	0.6 NTU
Fluoride 10/14/87	0.53 mg/l	T K N	0.00 mg/l
Hardness, Total	261 mg/l CaCO3	Vanadium	0.00 mg/l
Iron, Dissolved 10/20/87	0.05 mg/l	Zinc	0.00 mg/l
Magnesium 10/16/87	22.30 mg/l		

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ANALYST: D. Tyson

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

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300
SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

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

October 21,1987

Job No.: 9020

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

SHEBA
Temp 46
Flow 2.5 gpm.
15:45 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	275 mg/l HCO3	Hardness, Total 10/20/87	268 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	225 mg/l CaCO3	Magnesium 10/20/87	7.10 mg/l
Anions, Total	4.86 meq/l	pH 10/14/87	7.50 Units
Calcium 10/20/87	95.5 mg/l	Potassium 10/16/87	0.58 mg/l
Cations, Total 10/20/87	5.50 meq/l	Sodium 10/16/87	2.90 mg/l
Chloride 10/14/87	3.6 mg/l	Solids, Dissolved 10/15/87	235 mg/l
Conductivity 10/14/87	230 umhos/cm	Solids, Suspended 10/15/87	11.0 mg/l
Fluoride 10/14/87	0.44 mg/l	Sulfate 10/15/87	17.0 mg/l
		Turbidity 10/20/87	0.3 NTU

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TELEPHONE: (801) 653-2311

October 21,1987

Job No.: 9023

Date Rec'd: October 13. 1987

Date Sampled: October 12. 1987

Sampled By: UP&L

Sample ID:

TED'S TUBB
Temp 47
Flow 6.9 gpm.
16:45 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	325 mg/l HCO3	Hardness, Total 10/20/87	247 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	266 mg/l CaCO3	Magnesium 10/20/87	21.10 mg/l
Anions, Total	5.62 meq/l	pH 10/14/87	7.84 Units
Calcium 10/20/87	64.0 mg/l	Potassium 10/20/87	0.76 mg/l
Cations, Total 10/20/87	5.17 meq/l	Sodium 10/20/87	5.06 mg/l
Chloride 10/14/87	2.4 mg/l	Solids, Dissolved 10/15/87	264 mg/l
Conductivity 10/14/87	315 umhos/cm	Solids, Suspended 10/15/87	32.0 mg/l
Fluoride 10/14/87	0.47 mg/l	Sulfate 10/15/87	17.0 mg/l
		Turbidity 10/20/87	2.7 NTU

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October 21,1987

Job No.: 9026

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

EMS
79-2
Temp 40
Flow 2.2 gpm.
17:45 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	412 mg/l HCO3	Hardness, Total 10/16/87	311 mg/l CaCO
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	338 mg/l CaCO3	Magnesium 10/16/87	21.80 mg/l
Anions, Total	7.23 meq/l	pH 10/14/87	8.02 Units
Calcium 10/16/87	88.4 mg/l	Potassium 10/16/87	0.81 mg/l
Cations, Total	6.69 meq/l	Sodium 10/16/87	10.84 mg/l
Chloride 10/14/87	4.0 mg/l	Solids, Dissolved 10/15/87	262 mg/l
Conductivity 10/14/87	331 umhos/cm	Solids, Suspended 10/15/87	44.0 mg/l
Fluoride 10/14/87	0.53 mg/l	Sulfate 10/14/87	25.0 mg/l
		Turbidity 10/20/87	4.5 NTU

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October 21,1987

Job No.: 9019

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

EMS
79-10
Temp 44
Flow 6.6 gpm
15:20 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	314 mg/l HCO3	Hardness, Total 10/20/87	313 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	257 mg/l CaCO3	Magnesium 10/20/87	22.60 mg/l
Anions, Total	5.53 meq/l	pH 10/14/87	7.78 Units
Calcium 10/20/87	88.1 mg/l	Potassium 10/16/87	1.10 mg/l
Cations, Total 10/21/87	6.47 meq/l	Sodium 10/16/87	4.35 mg/l
Chloride 10/14/87	4.4 mg/l	Solids, Dissolved 10/15/87	282 mg/l
Conductivity 10/14/87	387 umhos/cm	Solids, Suspended 10/15/87	13.0 mg/l
Fluoride 10/14/87	0.52 mg/l	Sulfate 10/15/87	18.0 mg/l
		Turbidity 10/20/87	0.7 NTU

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October 21, 1987

Job No.: 9022

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

EMS
79-15
Temp 43
Flow 4.9 gpm.
16:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	318 mg/l HCO3	Hardness, Total 10/20/87	248 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	261 mg/l CaCO3	Magnesium 10/20/87	18.50 mg/l
Anions, Total	5.54 meq/l	pH 10/14/87	7.80 Units
Calcium 10/20/87	69.0 mg/l	Potassium 10/20/87	0.85 mg/l
Cations, Total 10/20/87	5.20 meq/l	Sodium 10/20/87	4.29 mg/l
Chloride 10/14/87	2.8 mg/l	Solids, Dissolved 10/15/87	254 mg/l
Conductivity 10/14/87	351 umhos/cm	Solids, Suspended 10/15/87	13.0 mg/l
Fluoride 10/14/87	0.51 mg/l	Sulfate 10/15/87	18.0 mg/l
		Turbidity 10/20/87	0.4 NTU

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TELEPHONE: (801) 653-2311

October 21,1987

Job No.: 9013

Date Rec'd: October 13, 1987

Date Sampled: October 13, 1987

Sampled By: UP&L

Sample ID:

EMS
79-26
Temp 46
Flow 2.0 gpm.
09:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	338 mg/l HCO3	Hardness, Total 10/16/87	303 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	277 mg/l CaCO3	Magnesium 10/16/87	36.00 mg/l
Anions, Total	6.15 meq/l	pH 10/14/87	8.16 Units
Calcium 10/16/87	62.1 mg/l	Potassium 10/16/87	1.25 mg/l
Cations, Total 10/19/87	6.70 meq/l	Sodium 10/16/87	14.13 mg/l
Chloride 10/14/87	4.8 mg/l	Solids, Dissolved 10/15/87	302 mg/l
Conductivity 10/14/87	440 umhos/cm	Solids, Suspended 10/15/87	8.0 mg/l
Fluoride 10/14/87	0.57 mg/l	Sulfate 10/15/87	29.0 mg/l
		Turbidity 10/20/87	17.0 NTU

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October 21,1987

Job No.: 9012

Date Rec'd: October 13, 1987

Date Sampled: October 13, 1987

Sampled By: UP&L

Sample ID:

EMS
79-29
Temp 40
Flow 2.2 gpm.
09:20 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	307 mg/l HCO3	Hardness, Total 10/16/87	263 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	252 mg/l CaCO3	Magnesium 10/16/87	34.80 mg/l
Anions, Total	5.94 meq/l	pH 10/13/87	8.19 Units
Calcium 10/16/87	47.9 mg/l	Potassium 10/16/87	1.50 mg/l
Cations, Total 10/19/87	6.59 meq/l	Sodium 10/16/87	30.30 mg/l
Chloride 10/14/87	11.2 mg/l	Solids, Dissolved 10/15/87	304 mg/l
Conductivity 10/14/87	440 umhos/cm	Solids, Suspended 10/15/87	16.0 mg/l
Fluoride 10/14/87	0.69 mg/l	Sulfate 10/15/87	34.0 mg/l
		Turbidity 10/20/87	3.5 NTU

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October 21.1987

Job No.: 9021

Date Rec'd: October 13. 1987

Date Sampled: October 12. 1987

Sampled By: UP&L

Sample ID:

EMS
79-35
Temp 44
Flow 1.7 gpm.
16:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	285 mg/l HCO3	Hardness, Total 10/20/87	275 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	234 mg/l CaCO3	Magnesium 10/20/87	12.30 mg/l
Anions, Total	5.02 meq/l	pH 10/14/87	7.79 Units
Calcium 10/20/87	89.9 mg/l	Potassium 10/20/87	0.62 mg/l
Cations, Total 10/20/87	5.66 meq/l	Sodium 10/20/87	3.11 mg/l
Chloride 10/14/87	4.4 mg/l	Solids, Dissolved 10/15/87	247 mg/l
Conductivity 10/14/87	312 umhos/cm	Solids, Suspended 10/15/87	4.0 mg/l
Fluoride 10/14/87	0.45 mg/l	Sulfate 10/15/87	16.0 mg/l
		Turbidity 10/20/87	0.5 NTU

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October 21,1987

Job No.: 9024

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

EMS
79-38
Temp 49
Flow 2.3 gpm.
17:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	314 mg/l HCO3	Hardness, Total 10/20/87	265 mg/l CaCO
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	257 mg/l CaCO3	Magnesium 10/20/87	18.40 mg/l
Anions, Total	6.16 meq/l	pH 10/14/87	7.74 Units
Calcium 10/20/87	76.0 mg/l	Potassium 10/20/87	1.32 mg/l
Cations, Total 10/20/87	6.38 meq/l	Sodium 10/20/87	24.00 mg/l
Chloride 10/14/87	3.2 mg/l	Solids, Dissolved 10/15/87	310 mg/l
Conductivity 10/14/87	430 umhos/cm	Solids, Suspended 10/15/87	358.0 mg/l
Fluoride 10/14/87	0.58 mg/l	Sulfate 10/15/87	50.0 mg/l
		Turbidity 10/20/87	150.0 NTU

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October 21,1987

Job No.: 9015

Date Rec'd: October 13, 1987

Date Sampled: October 13, 1987

Sampled By: UP&L

Sample ID:

EMS
80-46
Temp 41
Flow 1.2 gpm.
11:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	336 mg/l HCO3	Hardness, Total 10/16/87	278 mg/l CaCO3
Alk., Carbonate 10/14/87	1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	275 mg/l CaCO3	Magnesium 10/16/87	30.60 mg/l
Anions, Total	6.06 meq/l	pH 10/14/87	7.55 Units
Calcium 10/16/87	60.8 mg/l	Potassium 10/16/87	1.00 mg/l
Cations, Total	5.98 meq/l	Sodium 10/16/87	9.39 mg/l
Chloride 10/14/87	3.2 mg/l	Solids, Dissolved 10/15/87	279 mg/l
Conductivity 10/14/87	440 umhos/cm	Solids, Suspended 10/15/87	14.0 mg/l
Fluoride 10/14/87	0.52 mg/l	Sulfate 10/15/87	28.0 mg/l
		Turbidity 10/16/87	3.5 NTU

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TELEPHONE: (801) 653-2311

October 21,1987

Job No.: 9016

Date Rec'd: October 13, 1987

Date Sampled: October 13, 1987

Sampled By: UP&L

Sample ID:

ENS
80-47
Temp 40
Flow 7.8 gpm.
11:05 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	336 mg/l HCO3	Hardness, Total 10/16/87	301 mg/l CaCO3
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	275 mg/l CaCO3	Magnesium 10/16/87	28.50 mg/l
Anions, Total	6.10 meq/l	pH 10/14/87	8.03 Units
Calcium 10/16/87	73.7 mg/l	Potassium 10/16/87	1.21 mg/l
Cations, Total	6.59 meq/l	Sodium 10/16/87	12.50 mg/l
Chloride 10/14/87	3.2 mg/l	Solids, Dissolved 10/15/87	295 mg/l
Conductivity 10/14/87	415 umhos/cm	Solids, Suspended 10/15/87	15.0 mg/l
Fluoride 10/14/87	0.53 mg/l	Sulfate 10/14/87	30.0 mg/l
		Turbidity 10/20/87	12.0 NTU

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

October 21,1987

Job No.: 9025

Date Rec'd: October 13, 1987

Date Sampled: October 12, 1987

Sampled By: UP&L

Sample ID:

EMS
82-52
Temp 41
Flow 6.8 gpm.
17:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	373 mg/l HCO3	Hardness, Total 10/20/87	298 mg/l CaCO
Alk., Carbonate 10/14/87	< 1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	306 mg/l CaCO3	Magnesium 10/20/87	29.90 mg/l
Anions, Total	6.72 meq/l	pH 10/14/87	7.63 Units
Calcium 10/20/87	70.0 mg/l	Potassium 10/20/87	1.02 mg/l
Cations, Total 10/20/87	7.00 meq/l	Sodium 10/20/87	23.80 mg/l
Chloride 10/14/87	4.4 mg/l	Solids, Dissolved 10/15/87	322 mg/l
Conductivity 10/14/87	401 umhos/cm	Solids, Suspended 10/15/87	28.0 mg/l
Fluoride 10/14/87	0.62 mg/l	Sulfate 10/15/87	30.0 mg/l
		Turbidity 10/20/87	0.7 NTU

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Respectfully submitted,
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TELEPHONE: (801) 653-2311

October 21,1987

Job No.: 9014

Date Rec'd: October 13. 1987

Date Sampled: October 13. 1987

Sampled By: UP&L

Sample ID:

EMS
84-56
Temp 42
Flow 2.3 gpm.
10:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington. Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/14/87	357 mg/l HCO3	Hardness, Total 10/16/87	285 mg/l CaCO
Alk., Carbonate 10/14/87	<1.0 mg/l CaCO3	Iron, Dissolved 10/20/87	<0.05 mg/l
Alk., Total 10/14/87	293 mg/l CaCO3	Magnesium 10/16/87	20.20 mg/l
Anions, Total	6.57 meq/l	pH 10/14/87	7.85 Units
Calcium 10/16/87	81.0 mg/l	Potassium 10/16/87	1.07 mg/l
Cations, Total 10/19/87	6.46 meq/l	Sodium 10/16/87	16.82
Chloride 10/14/87	6.0 mg/l	Solids, Dissolved 10/15/87	320 mg/l
Conductivity 10/14/87	450 umhos/cm	Solids, Suspended 10/15/87	59.0 mg/l
Fluoride 10/14/87	0.58 mg/l	Sulfate 10/15/87	33.0 mg/l
		Turbidity 10/20/87	3.5 NTU

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

December 07,1987

Job No.: 9066

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
Burnt Tree
Temp 43
Flow 10.4 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l $CaCO_3$	pH 12/02/87	7.38 Units
Manganese 12/03/87	<0.01 mg/l	Hardness, Total 12/07/87	257 mg/l $CaCO_3$

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ANALYST: D. Lyon

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TELEPHONE: (801) 653-2311

December 07,1987

Job No.: 9070

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
Sheba
Temp 40
Flow 1.8 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l $CaCO_3$	pH 12/02/87	7.56 Units
Manganese 12/03/87	< 0.01 mg/l	Hardness, Total 12/07/87	269 mg/l $CaCO_3$

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ANALYST: D. Tipon

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TELEPHONE: (801) 653-2311

December 07,1987

Job No.: 9067

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
79-10
Temp 39
Flow 6.1 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l CaCO3	pH 12/02/87	7.46 Units
Manganese 12/03/87	<0.01 mg/l	Hardness, Total 12/07/87	309 mg/l CaCo

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ANALYST: D. Tyson

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

December 07,1987

Job No.: 9071

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
79-26
Temp 39
Flow 1.5 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l $CaCO_3$	pH 12/02/87	8.21 Units
Manganese 12/03/87	<0.01 mg/l	Hardness, Total 12/07/87	299 mg/l $CaCO_3$

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ANALYST: D. Tyson

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TELEPHONE: (801) 653-2311

December 07,1987

Job No.: 9072

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
79-29
Temp 39
Flow 1.4 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	< 1 mg/l $CaCO_3$	pH 12/02/87	7.85 Units
Manganese 12/03/87	< 0.01 mg/l	Hardness, Total 12/07/87	260 mg/l $CaCO_3$

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ANALYST: D. Tyson

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TELEPHONE: (801) 653-2311

December 07,1987

Job No.: 9069

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
79-35
Temp 39
Flow 0.33 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l $CaCO_3$	pH 12/02/87	7.56 Units
Manganese 12/03/87	<0.01 mg/l	Hardness, Total 12/07/87	297 mg/l $CaCO_3$

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ANALYST: D. Tipon

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TELEPHONE: (801) 653-2311

December 07,1987

Job No.: 9068

Date Rec'd: December 2, 1987

Date Sampled: December 2, 1987

Sampled By: UP&L

Sample ID:

E.M.S.
84-56
Temp 39
Flow 2.22 gpm.
No Time Sampled

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Carbonate 12/02/87	<1 mg/l CaCO3	pH 12/02/87	7.44 Units
Manganese 12/03/87	<0.01 mg/l	Hardness, Total 12/07/87	310 mg/l CaC(

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ANALYST: D. Tyson

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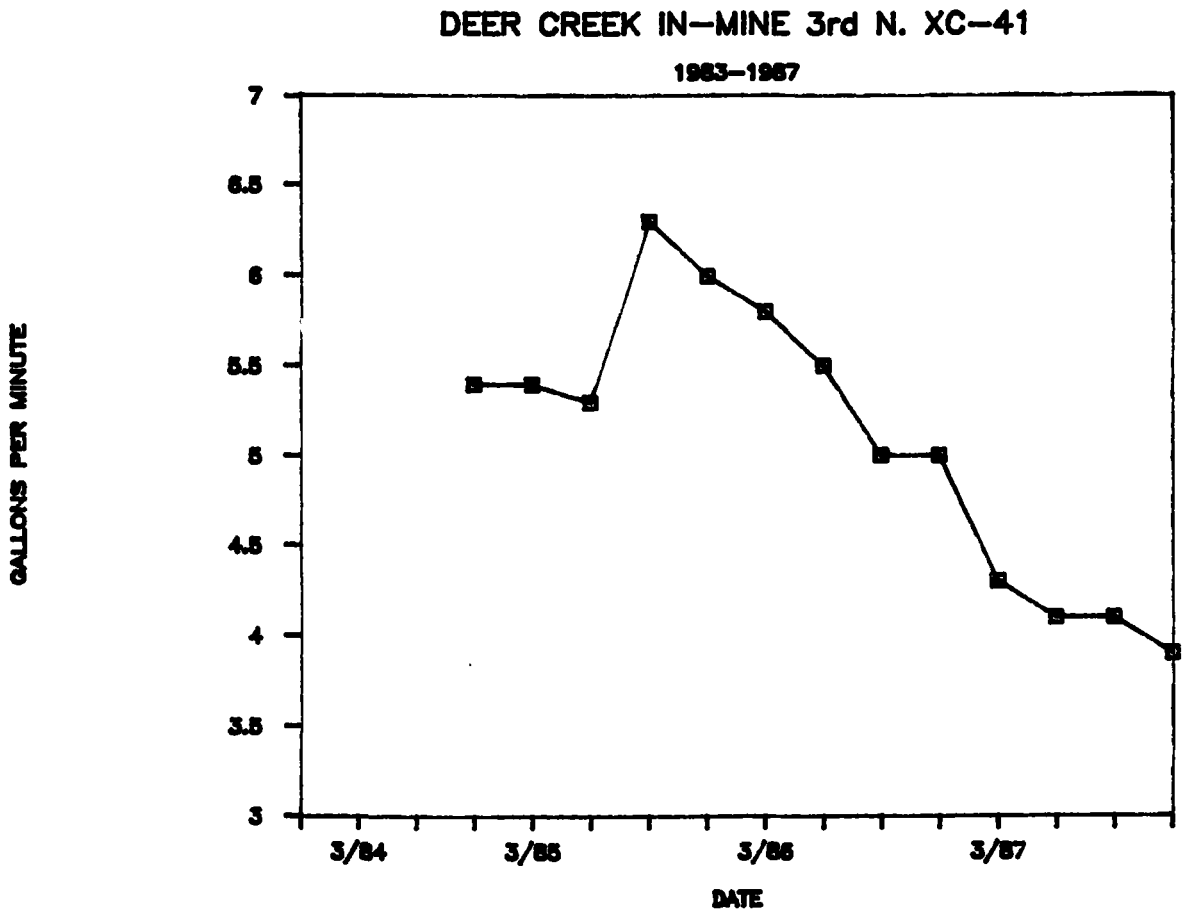
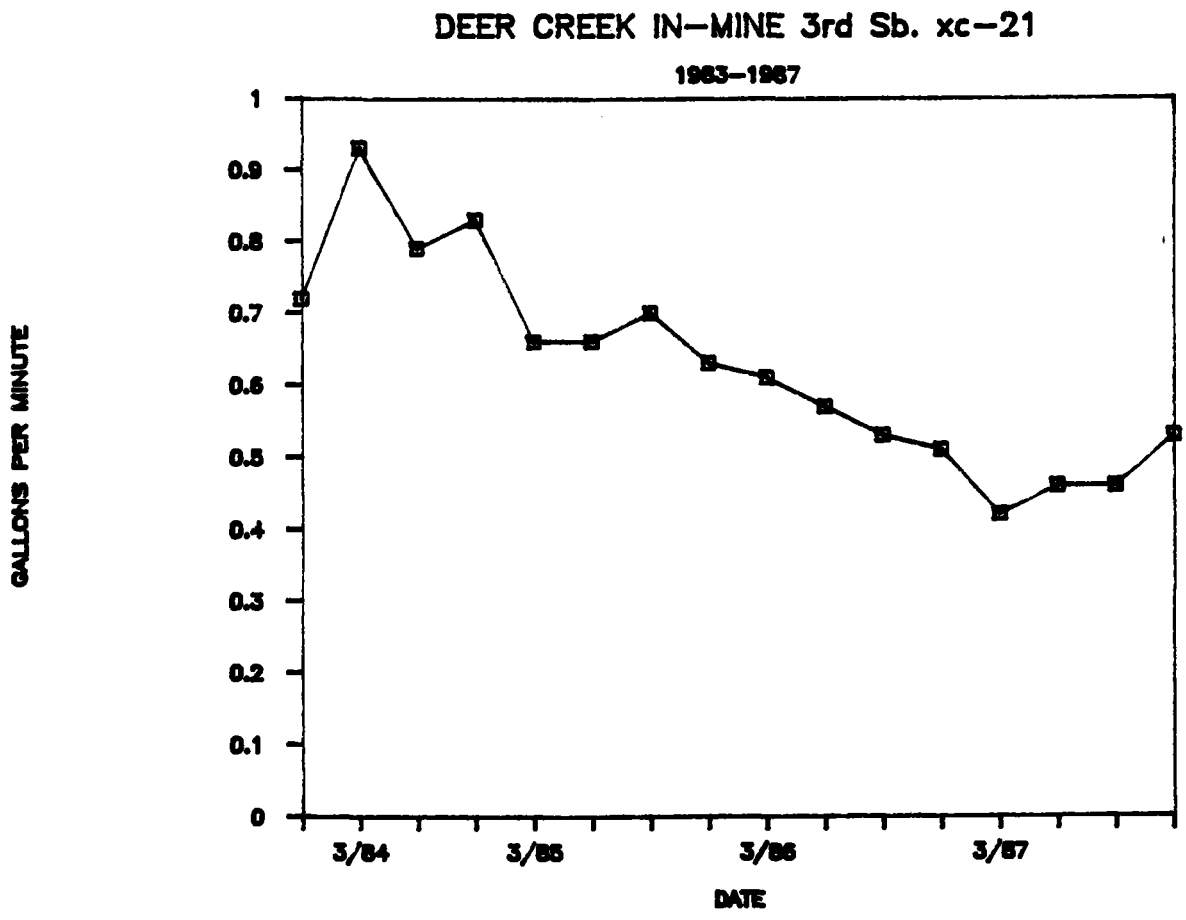
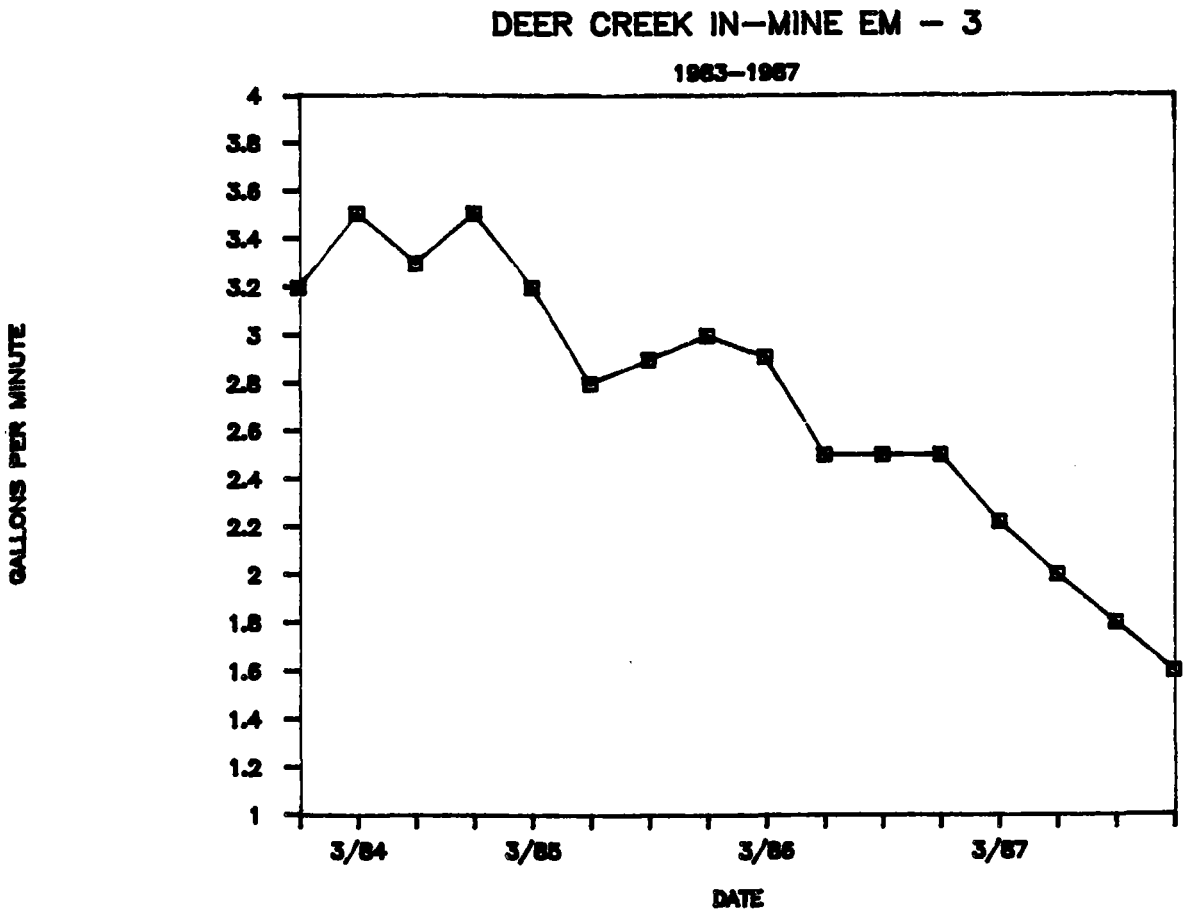
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

APPENDIX F


DEER CREEK IN-MINE 3rd N. XC-41
1983-1987
GALLONS PER MINUTE
7
6.5
6
5.5
5
4.5
4
3.5
3
3/84
3/85
3/86
3/87
DATE


DEER CREEK IN-MINE 3rd Sb. xc-21
1983-1987
GALLONS PER MINUTE
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
3/84
3/85
3/86
3/87
DATE


DEER CREEK IN-MINE EM - 3
1983-1987
GALLONS PER MINUTE
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
3/84
3/85
3/86
3/87
DATE

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 1561
Date Rec'd 4-03-87
Date Sampled 3-31-87
Time Sampled 12:30

Client: Utah Power & Light Company
Field Office
P.O. Box 1005
Huntington, Utah 84528
ATTN: Chuck Semborski

Sample ID:
Deer Creek In-Mine
3rd NXC - 41 2R

Temp 52° Flow 5g/70 sec.

Acidity		mg/l $CaCO_3$	Aluminum		mg/l
Alkalinity, Total 4-7	314	mg/l $CaCO_3$	Arsenic		mg/l
Alkalinity, Bicarbonate 4-7	383	mg/l ~~$CaCO_3$~~ HCO_3	Barium		mg/l
Alkalinity, Carbonate 4-7	0	mg/l $CaCO_3$	Beryllium		mg/l
Chloride 4-15	4.0	mg/l	Boron		mg/l
Coliform, Fecal		MPN/100 ml	Cadmium		mg/l
Coliform, Total		MPN/100 ml	Calcium 4-13	67.0	mg/l
Conductivity 4-7	610	umhos/cm	Chromium		mg/l
Fluoride		mg/l	Copper		mg/l
Hardness, Total 4-13	311	mg/l $CaCO_3$	Iron Diss. 4-16	<0.05	mg/l
Nitrogen, Ammonia		mg/l	Lead		mg/l
Nitrogen, Nitrate		mg/l	Magnesium 4-13	35.0	mg/l
Nitrogen, Nitrite		mg/l	Manganese 4-16	0.01	mg/l
Oil & Grease		mg/l	Mercury		ug/l
pH 4-7	7.33	Units	Nickel		mg/l
Phosphorus, Ortho		mg/l	Potassium 4-13	1.0	mg/l
Phosphorus, Total		mg/l	Selenium		mg/l
Solids, Total Dissolved 4-3	324	mg/l	Silica		mg/l
Solids, Total Suspended 4-3	<5.0	mg/l	Sodium 4-13	15.0	mg/l
Sulfate 4-16	28	mg/l	Vanadium		mg/l
Sulfide		mg/l	Zinc		mg/l
Turbidity		NTU			
Total Cations	6.90	meq/l			
Total Anions	6.99	meq/l			

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Analyst David Ramsey

Respectfully submitted 4-17-87

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CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 1536

Date Rec'd 3-31-87

Date Sampled 3-26-87

Time Sampled 13:30

Client: Utah Power & Light Company
Field Office
P.O. Box 1005
Huntington, Utah 84528
ATTN: Chuck Semborski

Sample ID:
Deer Creek Mine
EM-3

Temp 54° Flow 2.2 GPM

Acidity			mg/l $CaCO_3$
Alkalinity, Total	4-7	401	mg/l $CaCO_3$
Alkalinity, Bicarbonate	4-7	489	mg/l HCO_3
Alkalinity, Carbonate	4-7	0	mg/l $CaCO_3$
Chloride	4-15	9.6	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-7	1,000	umhos/cm
Fluoride			mg/l
Hardness, Total	4-13	468	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease			mg/l
pH	4-7	7.31	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved	4-2	576	mg/l
Solids, Total Suspended	4-2	<5.0	mg/l
Sulfate	4-6	80	mg/l
Sulfide			mg/l
Turbidity			NTU
Total Cations		10.14	meq/l
Total Anions		9.97	meq/l

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-13	100.0	mg/l
Chromium			mg/l
Copper			mg/l
Iron Diss.	4-16	<0.05	mg/l
Lead			mg/l
Magnesium	4-13	53.0	mg/l
Manganese	4-16	0.01	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-13	2.0	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-13	17.0	mg/l
Vanadium			mg/l
Zinc			mg/l

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Analyst David Pinney

Respectfully submitted 4-17-87

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JUL 14 1987

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Lab ID: 8920

Date Rec'd: 7-10-87

Date Sampled: 7-9-87

Time Sampled: 1300

Client: Utah Power & Light

Sample ID: Deer Creek In-Mine
3rd S b XC-21

Temp: 52° Flow: 0.46 GPM

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total		355	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate	7-10	433	mg/l $CaCO_3$ HCO3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-10	10	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-13	100	mg/l
Conductivity	7-10	900	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-13	475	mg/l $CaCO_3$	Iron, Diss	7-13	0.07	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-13	55	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-13	0.02	mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-10	7.05	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-13	1.9	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-10	533	mg/l	Silica			mg/l
Solids, Total Suspended		12	mg/l	Silver			mg/l
Sulfate	7-13	120	mg/l	Sodium	7-13	19	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l

Comments: Cations 10.38 meq/l Anions 9.89 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

Lab ID: 8919
Date Rec'd: 7-10-87
Date Sampled: 7-9-87
Time Sampled: 1320
Client: Utah Power & Light
Sample ID: Deer Creek In-Mine E-M-3
Temp: 54° Flow: 2.0 GPM

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Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-10	377	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		460	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		<1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-10	10	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-13	116	mg/l
Conductivity	7-10	990	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-13	530	mg/l $CaCO_3$	Iron, Diss	7-13	0.22	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-13	58	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-13	0.02	mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-10	7.10	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-13	1.9	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-10	586	mg/l	Silica			mg/l
Solids, Total Suspended	7-13	9	mg/l	Silver	7-13		mg/l
Sulfate		130	mg/l	Sodium		18	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l

Comments: Cations 11.43 meq/l Anions 10.54 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

Original Copy Watermarked
For Your Protection

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

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

Member of the SGS Group (Société Générale de Surveillance)

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

October 15,1987

Job No.: 9002

Date Rec'd: October 7, 1987

Date Sampled: October 7, 1987

Sampled By: UP&L

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

Sample ID:

DEER CREEK
In-Mine
3rd No.
XC-41
Temp 50
Flow 4.1 gpm
13:45 hr.

WATER ANALYSIS

Alk., Bicarbonate 10/09/87	340 mg/l HCO3
Alk., Carbonate 10/09/87	<1.0 mg/l CaCO3
Alk., Total 10/09/87	279 mg/l CaCO3
Anions, Total	6.18 meq/l
Calcium 10/14/87	69.1 mg/l
Cations, Total	6.56 meq/l
Chloride 10/08/87	6.0 mg/l
Conductivity 10/08/87	500 umhos/cm
Hardness, Total 10/14/87	299 mg/l CaCO3
Iron, Dissolved 10/12/87	<0.05 mg/l
Magnesium 10/14/87	30.44 mg/l
Manganese 10/14/87	0.01 mg/l
pH 10/07/87	7.30 Units
Potassium 10/14/87	2.41 mg/l
Sodium 10/14/87	12.84 mg/l
Solids, Dissolved 10/12/87	256 mg/l
Solids, Suspended 10/12/87	5.0 mg/l
Sulfate 10/08/87	27.0 mg/l

RECEIVED
OCT 15 1987
MINING DIV.
FIELD OFFICE

Donna Lyon

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

October 16,1987

Job No.: 9001

Date Rec'd: October 7. 1987

Date Sampled: October 7. 1987

Sampled By: UPL

Sample ID:

Deer Creek
in-mine EM3
temp 53
flow 1.8 gpm

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington. Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/09/87	494 mg/l HCO3	Iron, Dissolved 10/14/87	<0.05 mg/l
Alk., Carbonate 10/09/87	<1.0 mg/l CaCO3	Magnesium 10/14/87	36.70 mg/l
Alk., Total 10/09/87	405 mg/l CaCO3	Manganese 10/14/87	0.02 mg/l
Anions, Total	12.34 meq/l	pH 10/07/87	6.90 Units
Calcium 10/14/87	118.8 mg/l	Potassium 10/14/87	3.25 mg/l
Cations, Total	9.67 meq/l	Sodium 10/14/87	14.98 mg/l
Chloride 10/08/87	8.4 mg/l	Solids, Dissolved 10/12/87	426 mg/l
Conductivity 10/08/87	800 umhos/cm	Solids, Suspended 10/12/87	4.0 mg/l
Hardness, Total 10/14/87	448 mg/l CaCO3	Sulfate 10/15/87	200.0 mg/l

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Manager, Huntington Laboratory

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1908
Member of the SGS Group (Société Générale de Surveillance)

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

October 15,1987

Job No.: 9002

Date Rec'd: October 7, 1987

Date Sampled: October 7, 1987

Sampled By: UP&L

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

Sample ID:

DEER CREEK
In-Mine
3rd No.
XC-41
Temp 50
Flow 4.1 gpm
13:45 hr.

WATER ANALYSIS

Alk., Bicarbonate 10/09/87	340 mg/l HCO3	Iron, Dissolved 10/12/87	<0.05 mg/l
Alk., Carbonate 10/09/87	<1.0 mg/l CaCO3	Magnesium 10/14/87	30.44 mg/l
Alk., Total 10/09/87	279 mg/l CaCO3	Manganese 10/14/87	0.01 mg/l
Anions, Total	6.18 meq/l	pH 10/07/87	7.30 Units
Calcium 10/14/87	69.1 mg/l	Potassium 10/14/87	2.41 mg/l
Cations, Total	6.56 meq/l	Sodium 10/14/87	12.84 mg/l
Chloride 10/08/87	6.0 mg/l	Solids, Dissolved 10/12/87	256 mg/l
Conductivity 10/08/87	500 umhos/cm	Solids, Suspended 10/12/87	5.0 mg/l
Hardness, Total 10/14/87	299 mg/l CaCO3	Sulfate 10/08/87	27.0 mg/l

RECEIVED
OCT 15 1987
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FIELD OFFICE

Donna Lyon

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

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

October 16,1987

Job No.: 9001

Date Rec'd: October 7. 1987

Date Sampled: October 7. 1987

Sampled By: UPL

Sample ID:

Deer Creek
in-mine EM3
temp 53
flow 1.8 gpm

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington. Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/09/87	494 mg/l HCO3	Iron, Dissolved 10/14/87	<0.05 mg/l
Alk., Carbonate 10/09/87	<1.0 mg/l CaCO3	Magnesium 10/14/87	36.70 mg/l
Alk., Total 10/09/87	405 mg/l CaCO3	Manganese 10/14/87	0.02 mg/l
Anions, Total	12.34 meq/l	pH 10/07/87	6.90 Units
Calcium 10/14/87	118.8 mg/l	Potassium 10/14/87	3.25 mg/l
Cations, Total	9.67 meq/l	Sodium 10/14/87	14.98 mg/l
Chloride 10/08/87	8.4 mg/l	Solids, Dissolved 10/12/87	426 mg/l
Conductivity 10/08/87	800 umhos/cm	Solids, Suspended 10/12/87	4.0 mg/l
Hardness, Total 10/14/87	448 mg/l CaCO3	Sulfate 10/15/87	200.0 mg/l

RECEIVED
OCT 16 1987
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FIELD OFFICE

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

December 21,1987

Job No.: 9080

Date Rec'd: December 15, 1987

Date Sampled: December 14, 1987

Sampled By: UP&L

Sample ID:

Deer Creek in mine
EM-3
Temp 57
Flow 1.57 gpm
Sampled 15:10

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 12/15/87	473 mg/l HCO3	Iron, Dissolved 12/17/87	0.21 mg/l
Alk., Carbonate 12/15/87	<1 mg/l CaCO3	Magnesium 12/17/87	53.40 mg/l
Alk., Total 12/15/87	388 mg/l CaCO3	Manganese 12/17/87	<0.01 mg/l
Anions, Total 12/18/87	11.02 meq/l	pH 12/15/87	7.55 Units
Calcium 12/17/87	123.9 mg/l	Potassium 12/17/87	2.49 mg/l
Cations, Total 12/18/87	11.43 meq/l	Sodium 12/17/87	18.40 mg/l
Chloride 12/17/87	16.0 mg/l	Solids, Dissolved 12/17/87	411.0 mg/l
Conductivity 12/15/87	890 umhos/cm	Solids, Suspended 12/17/87	<1.0 mg/l
Hardness, Total 12/18/87	529 mg/l CaCO3	Sulfate 12/17/87	143.0 mg/l

RECEIVED
DEC 21 1987
MINING DIV.
FIELD OFFICE

ANALYST: D. Igoe

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

COMMERCIAL TESTING & ENGINEERING CO.
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SINCE 1908
Member of the SGS Group (Société Générale de Surveillance)

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

December 21,1987

Job No.: 9081

Date Rec'd: December 15, 1987

Date Sampled: December 14, 1987

Sampled By: UP&L

Sample ID:

Deer Creek in mine
3rd So. XC-21
Temp 55
Flow 0.53 gpm
Sampled 14:44

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 12/15/87	449 mg/l HCO3	Iron, Dissolved 12/17/87	<0.05 mg/l
Alk., Carbonate 12/15/87	<1 mg/l CaCO3	Magnesium 12/17/87	53.70 mg/l
Alk., Total 12/15/87	368 mg/l CaCO3	Manganese 12/17/87	<0.01 mg/l
Anions, Total	9.72 meq/l	pH 12/15/87	7.52 Units
Calcium 12/17/87	110.4 mg/l	Potassium 12/17/87	2.88 mg/l
Cations, Total 12/18/87	10.91 meq/l	Sodium 12/17/87	21.20 mg/l
Chloride 12/17/87	14.0 mg/l	Solids, Dissolved 12/17/87	265.0 mg/l
Conductivity 12/15/87	800 umhos/cm	Solids, Suspended 12/17/87	<1.0 mg/l
Hardness, Total 12/18/87	497 mg/l CaCO3	Sulfate 12/17/87	102.0 mg/l

RECEIVED
DEC 21 1987
MINING DIV.
FIELD OFFICE

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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F-465

APPENDIX G

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.
Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 1218
Date Rec'd 2-2-87
Date Sampled 1-30-87
Time Sampled 14:00

Client:
Utah Power & Light
Field Office
P.O. Box 1005
Huntington, Utah 84528

Sample ID:
Deer Creek Discharge

Temp. 54°

Flow 650 GPM

Acidity 2-9	0	mg/l $CaCO_3$
Alkalinity, Total 2-9	263	mg/l $CaCO_3$
Alkalinity, Bicarbonate 2-9	321	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate 2-9	0	mg/l $CaCO_3$
Chloride 2-12	17.2	mg/l
Coliform, Fecal		MPN/100 ml
Coliform, Total		MPN/100 ml
Conductivity 2-9	1,010	umhos/cm
Fluoride		mg/l
Hardness, Total 2-9	490	mg/l $CaCO_3$
Nitrogen, Ammonia		mg/l
Nitrogen, Nitrate		mg/l
Nitrogen, Nitrite		mg/l
Oil & Grease 2-11	<2.0	mg/l
pH 2-9	7.60	Units
Phosphorus, Ortho		mg/l
Phosphorus, Total		mg/l
Solids, Total Dissolved 2-9	660	mg/l
Solids, Total Suspended 2-3	76.0	mg/l
Sulfate 2-13	260	mg/l
Sulfide		mg/l
Turbidity		NTU
Dissolved Oxygen 2-3	9.96	mg/l
Total Cations	11.22	meq/l
Total Anions	11.17	meq/l

Aluminum		mg/l
Arsenic		mg/l
Barium		mg/l
Beryllium		mg/l
Boron		mg/l
Cadmium		mg/l
Calcium 2-9	102.0	mg/l
Chromium		mg/l
Copper		mg/l
Iron 2-13	0.68	mg/l
Lead		mg/l
Magnesium 2-9	57.1	mg/l
Manganese 2-13	0.05	mg/l
Mercury		ug/l
Nickel		mg/l
Potassium 2-12	5.7	mg/l
Selenium		mg/l
Silica		mg/l
Sodium 2-12	29.3	mg/l
Vanadium		mg/l
Zinc		mg/l
Diss. Iron 2-13	<0.05	mg/l

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FEB 18 1987
MINING & EXPLORATION
FIELD OFFICE

Analyst David Downey

Respectfully submitted 2-13-87

Certified Environmental Laboratory

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 135[illegible]

Date Rec'd 3-2-87

Date Sampled 2-27-87

Time Sampled 14:00

Client: Utah Power & Light Co.
Field Office
P.O. Box 1005
Huntington, Utah 84528
ATTN: Chuck Semborski

Sample ID: Deer Creek Discharge

Temp 52° Flow 400 GPM Est.

Acidity 3-3	0	mg/l $CaCO_3$	
Alkalinity, Total 3-3	275	mg/l $CaCO_3$	
Alkalinity, Bicarbonate 3-3	335	mg/l ~~$CaCO_3$~~ HCO_3	
Alkalinity, Carbonate 3-3	0	mg/l $CaCO_3$	
Chloride 3-10	10.7	mg/l	
Coliform, Fecal		MPN/100 ml	
Coliform, Total		MPN/100 ml	
Conductivity 3-3	1,090	umhos/cm	
Fluoride		mg/l	
Hardness, Total 3-9	505	mg/l $CaCO_3$	
Nitrogen, Ammonia		mg/l	
Nitrogen, Nitrate		mg/l	
Nitrogen, Nitrite		mg/l	
Oil & Grease 3-9	<2.0	mg/l	
pH 3-3	7.58	Units	
Phosphorus, Ortho		mg/l	
Phosphorus, Total		mg/l	
Solids, Total Dissolved 3-4	708	mg/l	
Solids, Total Suspended 3-4	91.0	mg/l	
Sulfate 3-10	270	mg/l	
Sulfide		mg/l	
Turbidity		NTU	
Dissolved Oxygen 3-3	6.73	mg/l	
Total Cations	11.48	meq/l	
Total Anions	11.43	meq/l	

Aluminum		mg/l
Arsenic		mg/l
Barium		mg/l
Beryllium		mg/l
Boron		mg/l
Cadmium		mg/l
Calcium 3-9	108.0	mg/l
Chromium		mg/l
Copper		mg/l
Iron 3-6	0.34	mg/l
Lead		mg/l
Magnesium 3-9	57.1	mg/l
Manganese 3-6	0.02	mg/l
Mercury		ug/l
Nickel		mg/l
Potassium 3-6	5.6	mg/l
Selenium		mg/l
Silica		mg/l
Sodium 3-6	28.5	mg/l
Vanadium		mg/l
Zinc		mg/l
Dissolved Iron 3-6	<0.05	mg/l

RECEIVED
MAR 12 1987
MINING DIV.
FIELD OFFICE

Analyst Dave Ramey

Respectfully submitted [illegible] 3-10-87

Certified Environmental Laboratory

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.
Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8808
Date Rec'd 4-6-87
Date Sampled 4-6-87
Time Sampled 1240

Client: UTAH POWER & LIGHT CO.
P.O. BOX 1005
HUNTINGTON, UT 84528

Sample ID: DEER CREEK DISCHARGE
(For March)

MINING DIVISION

Temp. 52° Flow 450 GPM Meter(Cowens Line) 7.7 acre FT

Acidity		< 1	mg/l $CaCO_3$
Alkalinity, Total	4-13	223	mg/l $CaCO_3$
Alkalinity, Bicarbonate		272	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$
Chloride	4-17	39	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	4-10	1250	umhos/cm
Fluoride			mg/l
Hardness, Total	4-15	590	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease	4-14	2.4	mg/l
pH	4-13	7.90	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved	4-10	796	mg/l
Solids, Total Suspended		29	mg/l
Sulfate	4-15	390	mg/l
Sulfide			mg/l
Turbidity			NTU
Dissolved Oxygen	4-7	7.70	mg/l
Total Cations		13.68	meq/l
Total Anions		13.69	meq/l

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	4-15	120	mg/l
Chromium			mg/l
Copper			mg/l
Iron	4-16	0.24	mg/l
Lead			mg/l
Magnesium	4-15	70.5	mg/l
Manganese	4-8	0.03	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	4-16	6.58	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	4-16	39.4	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	4-16	< 0.05	

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APR 21 1987
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FIELD OFFICE

Analyst: Sharon Reiter

Respectfully submitted Cliff Sargent

Certified Environmental Laboratory

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 8827

Date Rec'd 4-29-87

Date Sampled 4-29-87

Time Sampled 1100

Client: UTAH POWER & LIGHT CO.
MINING DIVISION
PO BOX 1005
HUNTINGTON, UT 84528

Sample ID: DEER CREEK DISCHARGE

Meter Reading

Temp. 55° Flow 550 GPM Cowen's: 82.5 Double "0"=.002

Acidity		< 1.0	mg/l $CaCO_3$
Alkalinity, Total	5-4	266	mg/l $CaCO_3$
Alkalinity, Bicarbonate		325	mg/l ~~$CaCO_3$~~ HCO_3
Alkalinity, Carbonate		< 1.0	mg/l $CaCO_3$
Chloride	5-4	9.9	mg/l
Coliform, Fecal			MPN/100 ml
Coliform, Total			MPN/100 ml
Conductivity	5-4	1050	umhos/cm
Fluoride			mg/l
Hardness, Total	5-4	490	mg/l $CaCO_3$
Nitrogen, Ammonia			mg/l
Nitrogen, Nitrate			mg/l
Nitrogen, Nitrite			mg/l
Oil & Grease	5-4	4.5	mg/l
pH	5-4	7.45	Units
Phosphorus, Ortho			mg/l
Phosphorus, Total			mg/l
Solids, Total Dissolved		628	mg/l
Solids, Total Suspended	5-4	5	mg/l
Sulfate	5-4	280	mg/l
Sulfide			mg/l
Turbidity			NTU
Dissolved Oxygen	4-29	8.0	mg/l
Total Cations		11.28	meq/l
Total Anions		11.44	meq/l

Aluminum			mg/l
Arsenic			mg/l
Barium			mg/l
Beryllium			mg/l
Boron			mg/l
Cadmium			mg/l
Calcium	5-4	98	mg/l
Chromium			mg/l
Copper			mg/l
Iron	5-4	0.08	mg/l
Lead			mg/l
Magnesium	5-4	59.6	mg/l
Manganese	5-4	0.14	mg/l
Mercury			ug/l
Nickel			mg/l
Potassium	5-4	5.4	mg/l
Selenium			mg/l
Silica			mg/l
Sodium	5-4	31.0	mg/l
Vanadium			mg/l
Zinc			mg/l
Iron (Diss.)	5-4	0.07	mg/l

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MAY 0 6 1987
MINING DIV.
FINANCE

Analyst: Sharon Reiter

Respectfully submitted Cliff

Certified Environmental Laboratory

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SINCE 1908
Member of the SGS Group (Societe' Generale de Surveillance)

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

Branch Code 59

Job. No. 8902

Date Rec'd. 6-1-87

Date Sampled 6-1-87

Sampled By Utah Power & Light

Sample I.D. Deer Creek Mine Discharge

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

Acidity	6-2	< 1	mg/l $CaCO_3$
Alkalinity, Total	6-2	248	mg/l $CaCO_3$
Alkalinity, Bicarbonate	6-2	303	mg/l HCO_3
Alkalinity, Carbonate	6-2	< 1	mg/l $CaCO_3$
Conductivity	6-2	1020	umhos/cm
Hardness, Total	6-3	575	mg/l $CaCO_3$
Oil & Grease	6-8	0.5	mg/l
pH	6-2	7.80	Units
Solids, Total Dissolved	6-11	763	mg/l
Solids, Total Suspended	6-11	9	mg/l
Sulfate	6-8	335	mg/l
Dissolved Oxygen	6-2	9.0	mg/l
Calcium	6-3	120	mg/l
Iron, Total	6-5	0.16	mg/l
Magnesium	6-3	66.9	mg/l
Manganese	6-5	0.02	mg/l
Potassium	6-15	5.4	mg/l
Sodium	6-15	33	mg/l
Iron, Dissolved	6-5	< .05	mg/l

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Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.
Manager, Huntington Laboratory

Pacific Printing Co., Price Utah

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Lab ID: 59-8912
Date Rec'd: 6-25-87
Date Sampled: 6-24-87
Time Sampled:
Client: Utah Power & Light
Sample ID: Deer Creek Mine Discharge

Temp: 54°F Flow: 1100 GPM

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	6-26	236	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		288	mg/l HCO_3 ~~$CaCO_3$~~	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride			mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	6-25	90	mg/l
Conductivity	6-26	1000	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	6-25	530	mg/l $CaCO_3$	Iron	6-25	0.23	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	6-25	74.2	mg/l
Nitrogen, Nitrite			mg/l	Manganese	6-25	0.02	mg/l
Oil & Grease	6-26	1.3	mg/l	Mercury			ug/l
pH	6-26	7.45	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	6-25	5.1	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	6-26	696	mg/l	Silica			mg/l
Solids, Total Suspended		30	mg/l	Silver	6-25		mg/l
Sulfate	6-26	300	mg/l	Sodium		27.0	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc	6-25		mg/l
Dissolved Oxygen	6-25	6.95	mg/l	Dissolved Iron		0.06	mg/l

Comments:

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

Lab ID: 8954
Date Rec'd: 7-16-87
Date Sampled: 7-16-87
Time Sampled:

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FIELD OFFICE

Client: Utah Power & Light
Temp 53° Flow 950 GPM

Sample ID: Deer Creek Discharge

Water Analysis Report

Acidity		< 1	mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total		249	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate	7-17	304	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-17	17	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-27	106	mg/l
Conductivity	7-17	1050	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-27	515	mg/l $CaCO_3$	Iron	7-21	0.23	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-27	60.8	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-21	0.02	mg/l
Oil & Grease	7-18	0.9	mg/l	Mercury			ug/l
pH	7-17	7.30	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-22	5	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-17	706	mg/l	Silica			mg/l
Solids, Total Suspended		19	mg/l	Silver			mg/l
Sulfate	7-17	240	mg/l	Sodium	7-22	28	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l
Dissolved Oxygen	7-16	9.00	mg/l	Iron, Diss	7-21	0.05	mg/l

Comments:

Cations 11.63 meq/l Anions 10.47 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

September 21,1987

Job No.: 8965

Date Rec'd: August 18. 1987

Date Sampled: August 18, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Discharge
11:55 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 08/19/87	<1.0 mg/l CaCO3	Magnesium 08/24/87	67.00 mg/l
Alk., Bicarbonate 08/19/87	312 mg/l HCO3	Manganese 08/24/87	0.01 mg/l
Alk., Carbonate 08/19/87	<1.0 mg/l CaCO3	Oil and Grease 08/26/87	2.6 mg/l
Alk., Total 08/19/87	256 mg/l CaCO3	Oxygen, Dissolved 08/19/87	4.5 mg/l
Anions, Total	14.19 meq/l	pH 08/19/87	7.70 Units
Calcium 08/24/87	122.0 mg/l	Potassium 08/24/87	6.00 mg/l
Cations, Total	13.10 meq/l	Sodium 08/27/87	31.10 mg/l
Chloride 08/26/87	13.5 mg/l	Solids, Dissolved 08/25/87	773 mg/l
Conductivity 08/25/87	1100 umhos/cm	Solids, Suspended 08/25/87	0.1 mg/l
Fluoride 08/27/87	0.19 mg/l	Sulfate 08/27/87	420.0 mg/l
Hardness, Total 08/24/87	580 mg/l CaCO3		
Iron 08/24/87	0.07 mg/l		
Iron, Dissolved 08/24/87	0.06 mg/l		
Magnesium 08/24/87	67.00 mg/l		
Manganese 08/24/87	<0.01 mg/l		

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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

Ocotober 14,1987

Job No.: 8997

Date Rec'd: September 22, 1987

Date Sampled: September 22, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Discharge
Temp 56
Flow 700 gpm
Staff
10:30 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 09/29/87	0.0 mg/l CaCO3	Iron, Dissolved 09/28/87	0.07 mg/l
Alk., Bicarbonate 09/30/87	403 mg/l HCO3	Magnesium 09/25/87	35.00 mg/l
Alk., Carbonate 09/23/87	<1.0 mg/l CaCO3	Manganese 09/25/87	0.01 mg/l
Alk., Total 09/23/87	330 mg/l CaCO3	Oil and Grease 09/25/87	11.1 mg/l
Anions, Total	8.56 meq/l	Oxygen, Dissolved 09/23/87	4.9 mg/l
Calcium 09/25/87	117.0 mg/l	pH 09/22/87	7.80 Units
Cations, Total	9.76 meq/l	Potassium 09/28/87	3.28 mg/l
Chloride 09/24/87	8.0 mg/l	Sodium 09/28/87	22.20 mg/l
Conductivity 09/23/87	800 umhos/cm	Solids, Dissolved 09/23/87	672 mg/l
Hardness, Total 09/25/87	436 mg/l CaCO3	Solids, Settable 09/29/87	0.6 mg/l
Iron 09/28/87	4.40 mg/l	Solids, Suspended 09/23/87	556.0 mg/l
Iron, Dissolved 09/28/87	0.07 mg/l	Sulfate 09/24/87	90.0 mg/l

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

October 26, 1987

Job No.: 9030

Date Rec'd: October 21, 1987

Date Sampled: October 21, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK
Discharge
Temp 56
Flow 1050 gpm.
10:15 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

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WATER ANALYSIS

Acidity 10/22/87	96.0 mg/l CaCO3	Iron, Dissolved 10/23/87	< 0.05 mg/l
Alk., Bicarbonate 10/22/87	344 mg/l HCO3	Magnesium 10/23/87	49.73 mg/l
Alk., Carbonate 10/22/87	< 1.0 mg/l CaCO3	Manganese 10/23/87	0.01 mg/l
Alk., Total 10/22/87	282 mg/l CaCO3	Oil and Grease 10/23/87	2.7 mg/l
Anions, Total	10.20 meq/l	Oxygen, Dissolved 10/22/87	6.1 mg/l
Calcium 10/23/87	95.7 mg/l	pH 10/22/87	7.82 Units
Cations, Total	9.99 meq/l	Potassium 10/23/87	6.37 mg/l
Chloride 10/22/87	7.2 mg/l	Sodium 10/23/87	22.30 mg/l
Conductivity 10/22/87	700 umhos/cm	Solids, Dissolved 10/22/87	486 mg/l
Hardness, Total 10/23/87	444 mg/l CaCO3	Solids, Suspended 10/22/87	31.0 mg/l
Iron 10/23/87	< 0.05 mg/l	Sulfate 10/23/87	214.0 mg/l

Donna Tyson

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

November 19,1987

Job No.: 9039

Date Rec'd: November 10, 1987

Date Sampled: November 1, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK MINE
Discharge
10:35 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

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WATER ANALYSIS

Acidity 11/12/87	60 mg/l CaCO3	Iron, Dissolved 11/16/87	<0.02 mg/l
Alk., Bicarbonate 11/12/87	370 mg/l HCO3	Magnesium 11/16/87	54.52 mg/l
Alk., Carbonate 11/12/87	<1 mg/l CaCO3	Manganese 11/17/87	<0.01 mg/l
Alk., Total 11/12/87	304 mg/l CaCO3	Oil and Grease 11/16/87	3.0 mg/l
Anions, Total	9.35 meq/l	Oxygen, Dissolved 11/12/87	4.1 mg/l
Calcium 11/16/87	99.9 mg/l	pH 11/12/87	8.03 Units
Cations, Total	10.71 meq/l	Potassium 11/16/87	4.13 mg/l
Chloride 11/17/87	5.8 mg/l	Sodium 11/16/87	26.40 mg/l
Conductivity 11/12/87	690 umhos/cm	Solids, Dissolved 11/13/87	231.0 mg/l
Hardness, Total 11/17/87	474 mg/l CaCO3	Solids, Suspended 11/13/87	2.0 mg/l
Iron 11/16/87	<0.02 mg/l	Sulfate 11/13/87	155.4 mg/l

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

December 15,1987

Job No.: 9078

Date Rec'd: December 10, 1987

Date Sampled: December 10, 1987

Sampled By: UP&L

Sample ID:

DEER CREEK DISCHARGE
Temp 57
Flow 880 gpm.
11:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Acidity 12/10/87	86 mg/l CaCO3	Iron, Dissolved 12/15/87	<0.05 mg/l
Alk., Bicarbonate 12/10/87	309 mg/l HCO3	Magnesium 12/15/87	42.60 mg/l
Alk., Carbonate 12/10/87	1 mg/l CaCO3	Manganese 12/15/87	<0.01 mg/l
Alk., Total 12/10/87	253 mg/l CaCO3	Oil and Grease 12/15/87	1.0 mg/l
Anions, Total	9.48 meq/l	Oxygen, Dissolved 12/10/87	6.0 mg/l
Calcium 12/15/87	74.1 mg/l	pH 12/10/87	8.04 Units
Cations, Total	10.15 meq/l	Potassium 12/15/87	6.46 mg/l
Chloride 12/14/87	18.0 mg/l	Sodium 12/15/87	64.80 mg/l
Conductivity 12/10/87	650 umhos/cm	Solids, Dissolved 12/15/87	289.0 mg/l
Hardness, Total	360 mg/l CaCO3	Solids, Suspended 12/15/87	1.0 mg/l
Iron 12/15/87	<0.05 mg/l	Sulfate 12/15/87	192.0 mg/l

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ANALYST: D. Tyson

Respectfully submitted,
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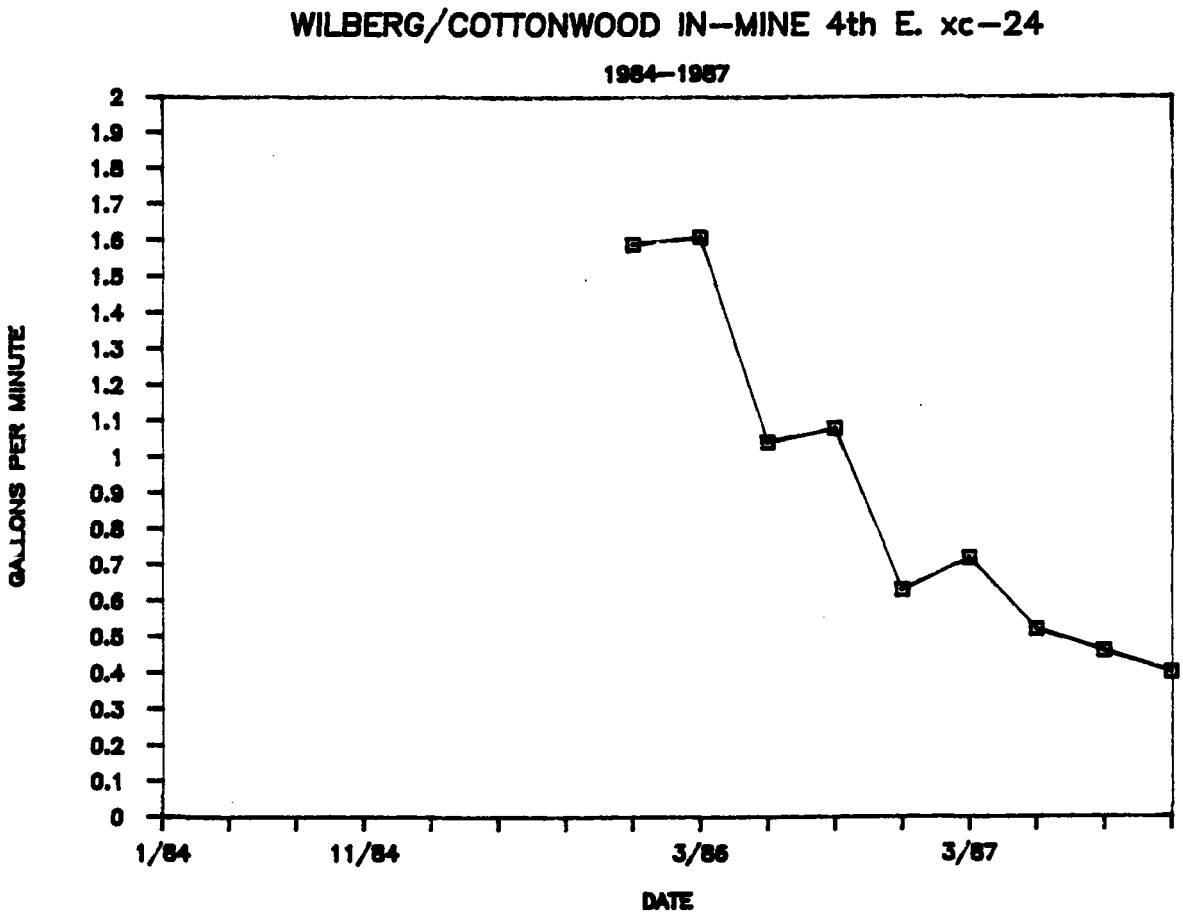
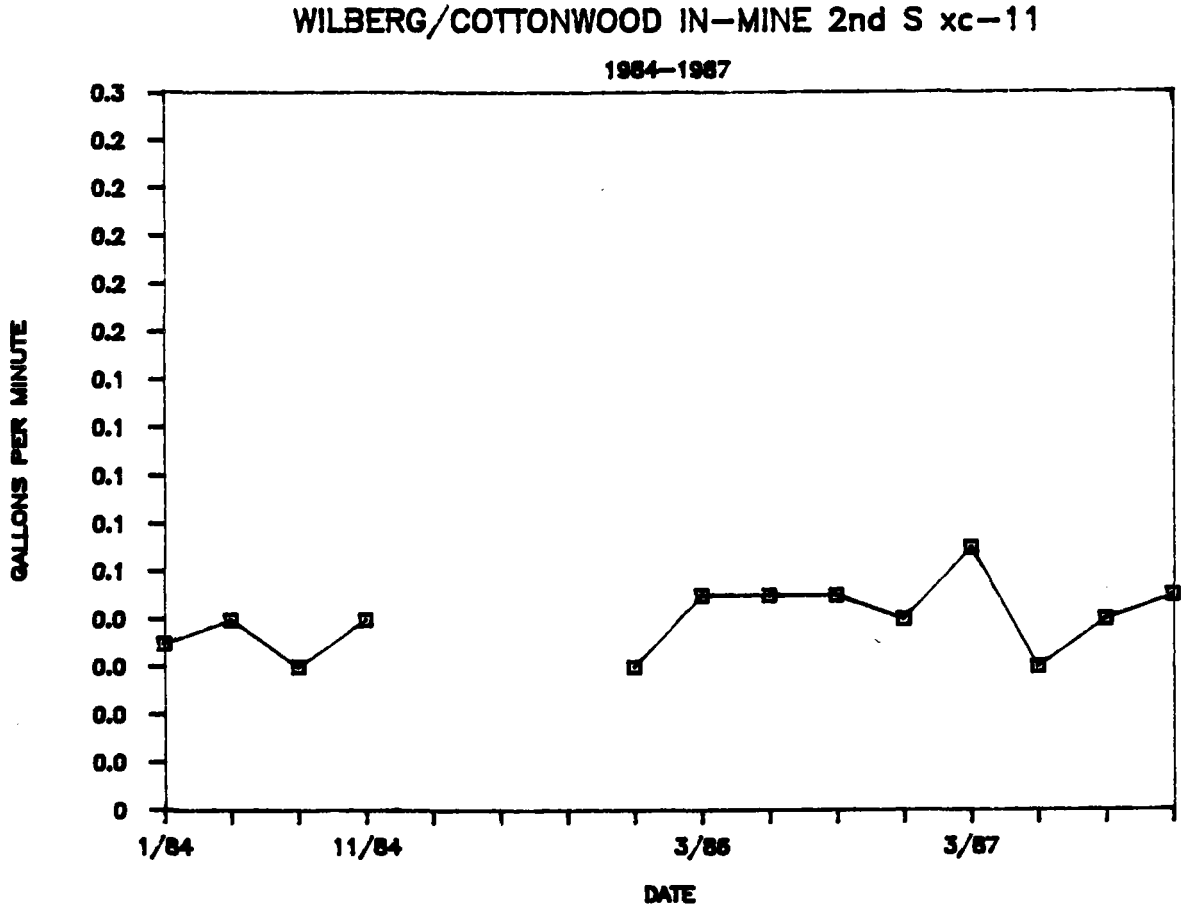
TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

APPENDIX H


WILBERG/COTTONWOOD IN-MINE 4th E. xc-24
1984-1987
GALLONS PER MINUTE
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1/84
11/84
3/86
3/87
DATE


WILBERG/COTTONWOOD IN-MINE 2nd S xc-11
1984-1987
GALLONS PER MINUTE
0.3
0.2
0.2
0.2
0.2
0.2
0.1
0.1
0.1
0.1
0.1
0.0
0.0
0.0
0.0
0
1/84
11/84
3/86
3/87
DATE

CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 156[illegible]

Date Rec'd 4-03-87

Date Sampled 3-31-87

Time Sampled 9:30

Client: Utah Power & Light Company
Field Office
P.O. BOX 1005
Huntington, Utah 84528
ATTN: Chuck Semborski

Sample ID: Wilberg In-Mine
4th EXC - 24

Temp. 52° Flow 22 sec. ,72

Acidity		mg/l $CaCO_3$	Aluminum		mg/l
Alkalinity, Total 4-7	438	mg/l $CaCO_3$	Arsenic		mg/l
Alkalinity, Bicarbonate 4-7	534	mg/l ~~$CaCO_3$~~ HCO_3	Barium		mg/l
Alkalinity, Carbonate 4-7	0	mg/l $CaCO_3$	Beryllium		mg/l
Chloride 4-15	27.1	mg/l	Boron		mg/l
Coliform, Fecal		MPN/100 ml	Cadmium		mg/l
Coliform, Total		MPN/100 ml	Calcium 4-13	279.0	mg/l
Conductivity 4-7	2,400	umhos/cm	Chromium		mg/l
Fluoride		mg/l	Copper		mg/l
Hardness, Total 4-13	1,482	mg/l $CaCO_3$	Iron Diss. 4-16	<0.05	mg/l
Nitrogen, Ammonia		mg/l	Lead		mg/l
Nitrogen, Nitrate		mg/l	Magnesium 4-13	191.0	mg/l
Nitrogen, Nitrite		mg/l	Manganese 4-16	<0.01	mg/l
Oil & Grease		mg/l	Mercury		ug/l
pH 4-7	7.60	Units	Nickel		mg/l
Phosphorus, Ortho		mg/l	Potassium 4-13	9.0	mg/l
Phosphorus, Total		mg/l	Selenium		mg/l
Solids, Total Dissolved 4-3	1,848	mg/l	Silica		mg/l
Solids, Total Suspended 4-3	<5.0	mg/l	Sodium 4-13	47.0	mg/l
Sulfate 4-16	1,040	mg/l	Vanadium		mg/l
Sulfide		mg/l	Zinc		mg/l
Turbidity		NTU			
Total Cations	31.93	meq/l			
Total Anions	31.19	meq/l			

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Analyst David Romney

Respectfully submitted [illegible] 4-20-87

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CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.
Box 1140, Huntington, Utah 84528 801-653-2314

Lab. No. 1563
Date Rec'd 4-03-87
Date Sampled 3-31-87
Time Sampled 9:15

Client: Utah Power & Light Company
Field Office
P.O. Box 1055
Huntington, Utah 84528
ATTN: Chuck Semborski

Sample ID:
Wilberg In-Mine
2nd SXC - 11

Temp 53.5° Flow 146.0 sec.

Acidity		mg/l $CaCO_3$
Alkalinity, Total 4-7	363	mg/l $CaCO_3$
Alkalinity, Bicarbonate 4-7	443	mg/l HCO_3
Alkalinity, Carbonate 4-7	0	mg/l $CaCO_3$
Chloride 4-15	13.3	mg/l
Coliform, Fecal		MPN/100 ml
Coliform, Total		MPN/100 ml
Conductivity 4-7	1,380	umhos/cm
Fluoride		mg/l
Hardness, Total 4-13	725	mg/l $CaCO_3$
Nitrogen, Ammonia		mg/l
Nitrogen, Nitrate		mg/l
Nitrogen, Nitrite		mg/l
Oil & Grease		mg/l
pH 4-7	7.66	Units
Phosphorus, Ortho		mg/l
Phosphorus, Total		mg/l
Solids, Total Dissolved 4-3	908	mg/l
Solids, Total Suspended 4-3	<5.0	mg/l
Sulfate 4-16	380	mg/l
Sulfide		mg/l
Turbidity		NTU
Total Cations	15.60	meq/l
Total Anions	15.56	meq/l

Aluminum		mg/l
Arsenic		mg/l
Barium		mg/l
Beryllium		mg/l
Boron		mg/l
Cadmium		mg/l
Calcium 4-13	119.0	mg/l
Chromium		mg/l
Copper		mg/l
Iron Diss. 4-16	<0.05	mg/l
Lead		mg/l
Magnesium 4-13	104.0	mg/l
Manganese 4-16	0.01	mg/l
Mercury		ug/l
Nickel		mg/l
Potassium 4-13	4.0	mg/l
Selenium		mg/l
Silica		mg/l
Sodium 4-13	23.0	mg/l
Vanadium		mg/l
Zinc		mg/l

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APR 20 1987
MINING DIV.
FIELD OFFICE

Analyst [signature]

Respectfully submitted [signature] 4-17-87

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RECEIVED JUL 7 1987 MINING DIV. FIELD OFFICE

Lab ID: 8918
Date Rec'd: 7-7-87
Date Sampled: 7-7-87
Time Sampled: 1240
Client: Utah Power & Light
Temp: 53° Flow: 0.52 GPM
Sample ID: Wilberg In-Mine 4th E XC-24

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-8-87	412	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		503	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-10	30	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-13	282	mg/l
Conductivity	7-10	2375	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-13	1585	mg/l $CaCO_3$	Iron, Diss	7-13	0.08	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-13	212	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-13	0.03	mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-8-87	7.30	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-13	8.8	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved	7-8	2111	mg/l	Silica			mg/l
Solids, Total Suspended		< 4	mg/l	Silver			mg/l
Sulfate	7-13	1100	mg/l	Sodium	7-13	45	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l

Comments: Cations: 33.69 meq/l Anions 32.00 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

1908

Member of the SGS Group (Société Générale de Surveillance)

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

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JUL 14 1987
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FIELD OFFICE

Lab ID: 8917

Date Rec'd: 7-7-87

Date Sampled: 7-7-87

Time Sampled: 1150

Client: Utah Power & Light

Temp: 52° Flow: 0.06 GPM

Sample ID: Wilberg In-Mine
2nd S XC-11

Water Analysis Report

Acidity			mg/l $CaCO_3$	Aluminum			mg/l
Alkalinity, Total	7-8	375	mg/l $CaCO_3$	Arsenic			mg/l
Alkalinity, Bicarbonate		458	mg/l ~~$CaCO_3$~~ HCO_3	Barium			mg/l
Alkalinity, Carbonate		< 1	mg/l $CaCO_3$	Beryllium			mg/l
Chloride	7-10	15	mg/l	Boron			mg/l
Coliform, Fecal			MPN/100 ml	Cadmium			mg/l
Coliform, Total			MPN/100 ml	Calcium	7-13	122	mg/l
Conductivity	7-10	1320	umhos/cm	Chromium			mg/l
Fluoride			mg/l	Copper			mg/l
Hardness, Total	7-13	750	mg/l $CaCO_3$	Iron, Diss	7-13	0.05	mg/l
Nitrogen, Ammonia			mg/l	Lead			mg/l
Nitrogen, Nitrate			mg/l	Magnesium	7-13	108	mg/l
Nitrogen, Nitrite			mg/l	Manganese	7-13	0.02	mg/l
Oil & Grease			mg/l	Mercury			ug/l
pH	7-8	7.50	Units	Nickel			mg/l
Phosphorus, Ortho			mg/l	Potassium	7-13	3.4	mg/l
Phosphorus, Total			mg/l	Selenium			mg/l
Solids, Total Dissolved		926	mg/l	Silica			mg/l
Solids, Total Suspended	7-8	< 4	mg/l	Silver			mg/l
Sulfate	7-13	410	mg/l	Sodium	7-13	25	mg/l
Sulfide			mg/l	Vanadium			mg/l
Turbidity			NTU	Zinc			mg/l

Comments: Cations 16.17 meq/l Anions 16.47 meq/l

Analyst: Sharon Reiter

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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

October 09, 1987

Job No.: 8999

Date Rec'd: October 1, 1987

Date Sampled: September 30, 1987

Sampled By: UP&L

Sample ID:

WILBER MINE
In-Mine
2nd so.
X-C 11
Temp. 53
15:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/01/87	543 mg/l HCO3	Iron, Dissolved 10/05/87	< 0.05 mg/l
Alk., Carbonate 10/01/87	< 1.0 mg/l CaCO3	Magnesium 10/05/87	104.20 mg
Alk., Total 10/01/87	445 mg/l CaCO3	Manganese 10/05/87	< 0.01 mg/l
Anions, Total	16.10 meq/l	pH 10/01/87	7.95 Units
Calcium 10/05/87	222.0 mg/l	Potassium 10/05/87	6.16 mg/l
Cations, Total	21.39 meq/l	Sodium 10/05/87	36.90 mg/l
Chloride 10/08/87	9.6 mg/l	Solids, Dissolved 10/01/87	722 mg/l
Conductivity 10/01/87	1000 umhos/cm	Solids, Suspended 10/01/87	< 1.0 mg/l
Hardness, Total 10/05/87	983 mg/l CaCO3	Sulfate 10/07/87	340.0 mg/l

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Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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

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

October 09, 1987

Job No.: 9000

Date Rec'd: October 1, 1987

Date Sampled: September 30, 1987

Sampled By: UP&L

Sample ID:

WILBER MINE
In-Mine
4th east
XC-24
Temp. 55
15:25 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/01/87	604 mg/l HCO3		
Alk., Carbonate 10/01/87	<1.0 mg/l CaCO3		
Alk., Total 10/01/87	495 mg/l CaCO3	Manganese 10/05/87	<0.01 mg/l
Anions, Total	29.05 meq/l	pH 10/01/87	7.40 Units
Calcium 10/05/87	294.0 mg/l	Potassium 10/05/87	8.33 mg/l
Chloride 10/08/87	17.6 mg/l	Sodium 10/05/87	39.10 mg/l
Conductivity 10/01/87	1800 umhos/cm	Solids, Dissolved 10/01/87	1472 mg/l
Hardness, Total 10/05/87	1171 mg/l CaCO3	Solids, Suspended 10/01/87	<1.0 mg/l
Iron, Dissolved 10/05/87	0.05 mg/l	Sulfate 10/07/87	900.0 mg/l
Magnesium 10/05/87	106.00 mg/l		

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TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

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

October 09, 1987

Job No.: 8999

Date Rec'd: October 1, 1987

Date Sampled: September 30, 1987

Sampled By: UP&L

Sample ID:

WILBER MINE
In-Mine
2nd so.
X-C 11
Temp. 53
15:00 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/01/87	543 mg/l HCO3	Iron, Dissolved 10/05/87	< 0.05 mg/l
Alk., Carbonate 10/01/87	< 1.0 mg/l CaCO3	Magnesium 10/05/87	104.20 mg/
Alk., Total 10/01/87	445 mg/l CaCO3	Manganese 10/05/87	< 0.01 mg/l
Anions, Total	16.10 meq/l	pH 10/01/87	7.95 Units
Calcium 10/05/87	222.0 mg/l	Potassium 10/05/87	6.16 mg/l
Cations, Total	21.39 meq/l	Sodium 10/05/87	36.90 mg/l
Chloride 10/08/87	9.6 mg/l	Solids, Dissolved 10/01/87	722 mg/l
Conductivity 10/01/87	1000 umhos/cm	Solids, Suspended 10/01/87	< 1.0 mg/l
Hardness, Total 10/05/87	983 mg/l CaCO3	Sulfate 10/07/87	340.0 mg/l

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MINING DIV.
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Respectfully submitted,
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Manager, Huntington Laboratory

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

October 09,1987

Job No.: 9000

Date Rec'd: October 1, 1987

Date Sampled: September 30, 1987

Sampled By: UP&L

Sample ID:

WILBER MINE
In-Mine
4th east
XC-24
Temp. 55
15:25 hr.

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 10/01/87	604 mg/l HCO3		
Alk., Carbonate 10/01/87	<1.0 mg/l CaCO3		
Alk., Total 10/01/87	495 mg/l CaCO3	Manganese 10/05/87	<0.01 mg/l
Anions, Total	29.05 meq/l	pH 10/01/87	7.40 Units
Calcium 10/05/87	294.0 mg/l	Potassium 10/05/87	8.33 mg/l
Chloride 10/08/87	17.6 mg/l	Sodium 10/05/87	39.10 mg/l
Conductivity 10/01/87	1800 umhos/cm	Solids, Dissolved 10/01/87	1472 mg/l
Hardness, Total 10/05/87	1171 mg/l CaCO3	Solids, Suspended 10/01/87	<1.0 mg/l
Iron, Dissolved 10/05/87	0.05 mg/l	Sulfate 10/07/87	900.0 mg/l
Magnesium 10/05/87	106.00 mg/l		

RECEIVED
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Manager, Huntington Laboratory

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

December 21,1987

Job No.: 9083

Date Rec'd: December 16, 1987

Date Sampled: December 15, 1987

Sampled By: UP&L

Sample ID:

WILBERG-IN MINE
2nd So. XC-11
12:25 hr.
Temp 56
Flow 0.09

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 12/16/87	403 mg/l HCO3	Iron, Dissolved 12/17/87	<0.02 mg/l
Alk., Carbonate 12/16/87	<1 mg/l CaCO3	Magnesium 12/17/87	115.60 mg/l
Alk., Total 12/16/87	330 mg/l CaCO3	Manganese 12/21/87	<0.01 mg/l
Anions, Total	18.93 meq/l	pH 12/16/87	7.86 Units
Calcium 12/17/87	167.6 mg/l	Potassium 12/17/87	3.72 mg/l
Cations, Total	19.15 meq/l	Sodium 12/17/87	27.70 mg/l
Chloride 12/17/87	130.0 mg/l	Solids, Dissolved 12/21/87	664.0 mg/l
Conductivity 12/16/87	2500 umhos/cm	Solids, Suspended 12/21/87	<1.0 mg/l
Hardness, Total 12/21/87	895 mg/l CaCO3	Sulfate 12/17/87	421.0 mg/l

ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS,
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PLEASE ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1020, HUNTINGTON, UT 84528
TELEPHONE: (801) 653-2311

January 06,1988

Job No.: 9084

Date Rec'd: December 16, 1987

Date Sampled: December 15, 1987

Sampled By: UP&L

Sample ID:

WILBERG-IN MINE
4th E. XC-24
14:00 hr.
Temp 55
Flow 0.4 gpm.
Amended Chloride

UTAH POWER & LIGHT CO.
P.O. Box 1005
Huntington, Utah 84528

WATER ANALYSIS

Alk., Bicarbonate 12/16/87	450 mg/l HCO3	Iron, Dissolved 12/17/87	0.03 mg/l
Alk., Carbonate 12/16/87	<1 mg/l CaCO3	Magnesium 12/17/87	227.60 mg/l
Alk., Total 12/16/87	369 mg/l CaCO3	Manganese 12/21/87	0.01 mg/l
Anions, Total	34.82 meq/l	pH 12/16/87	7.53 Units
Calcium 12/17/87	383.9 mg/l	Potassium 12/17/87	8.66 mg/l
Cations, Total	40.63 meq/l	Sodium 12/17/87	59.30 mg/l
Chloride 12/30/87	85.0 mg/l	Solids, Dissolved 12/21/87	1770.0 mg/l
Conductivity 12/16/87	1250 umhos/cm	Solids, Suspended 12/21/87	< 1.0 mg/l
Hardness, Total 12/21/87	1896 mg/l CaCO3	Sulfate 12/17/87	1202.0 mg/l

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ANALYST: D. Tyson

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Manager, Huntington Laboratory

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APPENDIX I

MAY 20/21 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 5/21/87

pH	uS	DO-ppm	F
8.23	538	11.83	
8.17	544	11.5	
8.21	548	11	
8.23	552	10.61	
8.24	553	10.33	
8.22	547.00	11.05	

GRIMES WASH - LEFT FORK 5/21/87

pH	uS	DO-ppm	F
8.24	477	14.15	
8.26	499	13.79	
8.27	509	13.62	
8.27	525	13.53	
8.26	534	13.46	
8.26	508.80	13.71	

GRIMES WASH - BELOW THE MINE 5/21/87

pH	uS	DO-ppm	F
7.69	1668	12.14	
7.66	1677	11.99	
7.69	1686	11.85	
7.69	1697	11.86	
7.7	1698	11.88	
7.69	1685.20	11.94	

DEER CREEK - ABOVE THE MINE 5/20/87

pH	uS	DO-ppm	F
8.3	408		
8.33	413		
8.34	418		
8.34	420		
8.34	426		
8.35	428	12.44	41.9
8.33	418.83	12.44	

DEER CREEK - @ PERMIT BOUNDARY 5/20/87

pH	uS	DO-ppm	F
8.31	679	12.46	
8.32	681	12.48	
8.32	674	12.48	
8.33	683	12.5	
8.33	692		
8.33	698		43.9
8.32	684.50	12.48	

DEER CREEK - BELOW THE MINE 5/20/87

pH	uS	DO-ppm	F
8.13	825		49.6
8.13	825	11.85	
8.13	830	11.83	
8.13	830	11.85	
8.13	827.50	11.84	

MEETINGHOUSE CANYON 5/20/87

pH	uS	DO-ppm	F
8.37	361	13.82	
8.36	361	13.76	
8.36	363	13.79	
8.36	363		44.3
8.36	362.00	13.79	

COTTONWOOD CANYON CREEK 5/21/87

pH	uS	DO-ppm	F
8.25	469	14.36	
8.26	484	14.19	
8.28	495	14.14	
8.29	496	14.11	
8.3	478	14.12	
8.27	486.00	14.20	

JUNE 16, 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 6/16/87

	pH	uS	DO-ppm	F
	DRY			
AVERAGE				

GRIMES WASH - LEFT FORK 6/16/87

	pH	uS	DO-ppm	F
	8.18	448	14.17	53
	7.9	474	14.38	
	8.23	499	14.51	
AVERAGE	8.10	473.67	14.35	

GRIMES WASH - BELOW THE MINE 6/16/87

	pH	uS	DO-ppm	F
	7.93	1406	15.08	53
	7.94	1432	15.08	
	7.95	1451	15.04	
AVERAGE	7.94	1429.67	15.07	

DEER CREEK - ABOVE THE MINE 6/16/87

	pH	uS	DO-ppm	F
	8.25	366	14.6	48
	8.33	387	14.89	
	8.34	405	14.94	
AVERAGE	8.31	386.00	14.81	

DEER CREEK - @ PERMIT BOUNDARY 6/16/87

	pH	uS	DO-ppm	F
	Problem	477	14.59	53
	with	495	14.49	
	meter	488	14.47	
AVERAGE		486.67	14.52	

DEER CREEK - BELOW THE MINE 6/16/87

	pH	uS	DO-ppm	F
	8.14	710	11.9	54
	8.20	709	11.87	
	8.22	707	11.91	
AVERAGE	8.19	708.67	11.89	

MEETINGHOUSE CANYON 6/16/87

	pH	uS	DO-ppm	F
	8.36	376	14.52	55
	8.39	379	14.49	
	8.40	380	14.4	
AVERAGE	8.38	378.33	14.47	

COTTONWOOD CANYON CREEK 6/16/87

	pH	uS	DO-ppm	F
	7.96	451	13.12	62
	8.10	468	13.08	
	8.31	487	13.07	
	8.12	468.67	13.09	

JULY 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 7/15/87

	pH	uS	DO-ppm	F
DRY				
AVERAGE				

GRIMES WASH - LEFT FORK 7/15/87

	pH	uS	DO-ppm	F
	7.92	544	11.71	55
	8.17	549	11.71	
	8.28	559	11.65	
AVERAGE	8.12	550.67	11.69	

GRIMES WASH - BELOW THE MINE 7/15/87

	pH	uS	DO-ppm	F
	8.28	1316		55
	8.22	1328	12.03	
	8.22	1339	11.75	
AVERAGE	8.24	1327.67	11.89	

DEER CREEK - ABOVE THE MINE 7/16/87

	pH	uS	DO-ppm	F
	7.88	467	13.33	49
	7.91	473	12.97	
	7.91	475	12.62	
AVERAGE	7.90	471.67	12.97	

DEER CREEK - @ PERMIT BOUNDARY 7/16/87

	pH	uS	DO-ppm	F
	8.45	658	15.24	53
	8.46	661	13.42	
	8.47	662	12.92	
AVERAGE	8.46	660.33	13.86	

DEER CREEK - BELOW THE MINE 7/16/87

	pH	uS	DO-ppm	F
	8.47	910	9.78	64
	8.5	910	9.77	
	8.53	911	9.81	
AVERAGE	8.50	910.33	9.79	

MEETINGHOUSE CANYON 7/15/87

	pH	uS	DO-ppm	F
	8.39	382	9.07	58
	8.39	387	8.9	
	8.39	393	8.96	
AVERAGE	8.39	387.33	8.98	

COTTONWOOD CANYON CREEK 7/15/87

	pH	uS	DO-ppm	F
	8.63	526	11.52	50
	8.67	529	11.47	
	8.69	529	11.52	
AVERAGE	8.66	528.00	11.50	

EAST MOUNTAIN SPRINGS
FIELD DATA
JULY 13 & 14/87

Spring	pH	uS	DO-ppm	Temp.(F)
Burnt Tree	7.51	460.3	10.8	47
Elk	7.87	412		41
Sheba	7.35	388		42
Ted's	7.74	437		40
79-2	8.02	520	8.98	45
79-10	7.07	451		42
79-15	8	459		49
79-26	7.82	495	10.35	52
79-29	7.41	509	10.48	40
79-32	7.06	767		42
79-34	7.48	542		42
79-35	7.85	384		40
79-38	7.52	516		40
79-40	7.82	608	10.07	48
80-41	7.9	685	12.67	42
80-43	8.01	457	9.56	46
80-46	7.53	470	10.02	41
80-47	7.81	537	11.48	40
82-52	8.04	548	12.64	39
84-56	7.62	486	22.26	41

AUGUST 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 8/11/87

	pH	uS	DO-ppm	F
	DRY			
AVERAGE				

GRIMES WASH - LEFT FORK 8/11/87

	pH	uS	DO-ppm	F
	8.31	547	9.83	62
	8.35	558	9.84	
	8.33	568	9.83	
AVERAGE	8.33	557.67	9.83	

GRIMES WASH - BELOW THE MINE 8/11/87

	pH	uS	DO-ppm	F
	8.05	1565	10.86	60
	8.06	1578	10.87	
	8.05	1592	10.88	
AVERAGE	8.05	1578.33	10.87	

DEER CREEK - ABOVE THE MINE 8/18/87

	pH	uS	DO-ppm	F
	7.95	491	12.77	48
	7.99	497	12.77	
	8.04	502	12.77	
AVERAGE	7.99	496.67	12.77	

DEER CREEK - @ PERMIT BOUNDARY 8/18/87

	pH	uS	DO-ppm	F
	8.29	978	11.93	50
	8.31	985	11.93	
	8.33	991	11.92	
AVERAGE	8.31	984.67	11.93	

DEER CREEK - BELOW THE MINE 8/18/87

	pH	uS	DO-ppm	F
	8.25	1365	11.92	66
	8.27	1365	11.94	
AVERAGE	8.26	1365.00	11.93	

MEETINGHOUSE CANYON 8/18/87

	pH	uS	DO-ppm	F
	7.45	415	12.12	58
	7.47	420	12.16	
	7.49	425	12.14	
AVERAGE	7.47	420.00	12.14	

COTTONWOOD CANYON CREEK 8/11/87

	pH	uS	DO-ppm	F
	7.1	528	10.67	59
AVERAGE	7.10	528.00	10.67	

EAST MOUNTAIN SPRINGS 8-19-87

	79-10	SHEBA	ELK	79-35	79-29	79-26	84-56	80-44	80-46	BURNT TREE	79-23	82-52
pH	7.25	7.32	7.5	7.56	7.65	8.01	7.92	dry	7.68	7.87	dry	7.8
uS	476	408	400	405	500	543	474		533	461		582
DO	11.03	13.16	14.29	14.21	10.85	10.38	9.7		10.25	10.87		10.87
F	44	45	42	40	46	64	44		47	44		42

SEPTEMBER 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 9/17/87

	pH	uS	DO-ppm	F
DRY				
AVERAGE				

GRIMES WASH - LEFT FORK 9/17/87

	pH	uS	DO-ppm	F
	8.53	598		62
	8.56	619		
AVERAGE	8.55	608.50		

GRIMES WASH - BELOW THE MINE 9/17/87

	pH	uS	DO-ppm	F
	8.61	1771		66
	8.56	1779		
AVERAGE	8.59	1775.00		

DEER CREEK - ABOVE THE MINE 9/22/87

	pH	uS	DO-ppm	F
	8.75	549		48
	8.7	553		
AGE	8.73	551.00		

DEER CREEK - @ PERMIT BOUNDARY 9/22/87

	pH	uS	DO-ppm	F
	8.83	902		58
	8.8	905		
	8.82	903.50		

DEER CREEK - BELOW THE MINE 9/22/87

	pH	uS	DO-ppm	F
	7.38	1449		64
	7.42	1462		
	7.40	1455.50		

MEETINGHOUSE CANYON 9/22/87

	pH	uS	DO-ppm	F
	8.44	440		58
	8.47	442		
AVERAGE	8.46	441.00		

COTTONWOOD CANYON CREEK 9/17/87

	pH	uS	DO-ppm	F
	8.95	538		57
	8.93	537		
	8.94	537.50		

EAST MOUNTAIN SPRINGS 8-19-87

	79-10	SHEBA	ELK	79-35	79-29	79-26	84-56	80-44	80-46	BURNT TREE	79-23	82-52
pH	7.57	7.57	7.5	7.36	7.7	7.8	7.82	dry	7.86	7.82	dry	7.77
uS	438	415	400	399	503	519	507		490	479		604
DO												
F	44	46	39	44	40	46	42		41	45		41

OCTOBER 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 10/21/87

	pH	uS	DO-ppm	F
	DRY			
AVERAGE				

GRIMES WASH - LEFT FORK 10/21/87

	pH	uS	DO-ppm	F
	DRY			
AVERAGE				

GRIMES WASH - BELOW THE MINE 10/21/87

	pH	uS	DO-ppm	F
	8.06	1791		48
AVERAGE	8.06	1791.00		

DEER CREEK - ABOVE THE MINE 10/21/87

	pH	uS	DO-ppm	F
	7.52	608		34
AVERAGE	7.52	608.00		

DEER CREEK - @ PERMIT BOUNDARY 10/21/87

	pH	uS	DO-ppm	F
	7.79	1228		42
AVERAGE	7.79	1228.00		

DEER CREEK - BELOW THE MINE 10/21/87

	pH	uS	DO-ppm	F
	7.95	1625		48
AVERAGE	7.95	1625.00		

MEETINGHOUSE CANYON 10/21/87

	pH	uS	DO-ppm	F
	8.34	485		36
AVERAGE	8.34	485.00		

COTTONWOOD CANYON CREEK 10/21/87

	pH	uS	DO-ppm	F
	6.98	516		48
AVERAGE	6.98	516.00		

EAST MOUNTAIN SPRINGS 10/12&13/87

	79-10	SHEBA	ELK	79-35	79-29	79-26	84-56	80-44	80-46	BURNT TREE	79-23	82-52
pH	8.07	7.57	8.21	8.06	7.75	7.46	7.11	dry	7.19	6.96	dry	7.58
uS	456	434	441	437	540	483	527		490	477		618
DO												
F	44	46	39	44	40	46	42		41	45		41

NOVEMBER 1987
FIELD DATA

	GRIMES WASH - RIGHT FORK 11/17/87				GRIMES WASH - LEFT FORK 11/17/87				GRIMES WASH - BELOW THE MINE 11/17/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	DRY				DRY				7.16	1985		38
VERAGE									7.16	1985.00		

	DEER CREEK - ABOVE MINE 11/10/87				DEER CREEK - @ PERMIT BOUNDARY 11/10/87				DEER CREEK - BELOW THE MINE 11/10/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	7.83	678		36	7.89	1221		40	8.03	1562		48
VERAGE	7.83	678.00			7.89	1221.00			8.03	1562.00		

	MEETINGHOUSE CANYON 11/10/87				COTTONWOOD CANYON CREEK 11/17/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	7.65	478		33	7.09	581		32
VERAGE	7.65	478.00			7.09	581.00		

EAST MOUNTAIN SPRINGS NOVEMBER - INACCESSIBLE

	79-10	SHEBA	ELK	79-35	79-29	79-26	84-56	80-44	80-46	BURNT TREE	79-23	82-52
pH												
uS												
DO												
F												

DECEMBER 1987
FIELD DATA

GRIMES WASH - RIGHT FORK 12/15/87				GRIMES WASH - LEFT FORK 12/15/87				GRIMES WASH - BELOW THE MINE 12/15/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	DRY				DRY				7.81	4065		32
AVERAGE									7.81	4065.00		

DEER CREEK - ABOVE MINE 12/10/87				DEER CREEK - @ PERMIT BOUNDARY 11/10/87				DEER CREEK - BELOW THE MINE 12/10/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	7.9	922		57	DRY				DRY			48
AVERAGE	7.90	922.00										

MEETINGHOUSE CANYON 12/10/87				COTTONWOOD CANYON CREEK 12/15/87			
	pH	uS	DO-ppm	F	pH	uS	DO-ppm	F
	DRY				7.99	665		33
AVERAGE					7.99	665.00		

EAST MOUNTAIN SPRINGS NOVEMBER 12/02/87

	79-10	SHEBA	ELK	79-35	79-29	79-26	84-56	80-44	80-46	BURNT TREE	79-23	82-52
pH	6.9	6.84	*	6.89	6.91	6.73	6.88	DRY	FROZEN	6.8	DRY	*
uS	414	354		435	495	424	519			410		
DO												
F	39	40		39	39	39	39			43		

* [illegible]ISSIBLE

UTAH POWER & LIGHT CO
MINNG DIVISION
SPRING DISCHARGE RECESSION STUDY

YEAR 1987

SPRING		JUN	JUL	AUG	SEP	OCT	NOV	DEC
79-10	F:	37.5	26.1	13.3	10.7	6.6	INACCESSIBLE	6.1
	T:	43	42	44	45	44		39
	D:	6-3	7-13	8-19	9-15	10-12		12-2
SHEBA SPRINGS	F:	23.2	11.4	6	3.6	2.5		1.8
	T:	50	42	45	45	46		40
	D:	6-3	7-13	8-19	9-15	10-12		12-2
ELK SPRING	F:	329	217	110.1	78.5	61.6		NO ACCESS
	T:	41	41	42	38	39		
	D:	6-3	7-13	8-19	9-15	10-12		12-2
79-35	F:	8.4	6.3	4	2.6	1.7		0.34
	T:	41	40	40	42	44		39
	D:	6-3	7-13	8-19	9-15	10-12		12-2
79-26	F:	1	1.5	1.9	1.7	2		1.5
	T:	48	52	64	50	46		35
	D:	6-3	7-14	8-19	9-15	10-13		12-2
79-29	F:	2	2.5	2.7	2.3	2.2		1.4
	T:	40	40	46	42	40		39
	D:	6-3	7-14	8-19	9-15	10-13		12-2
84-56	F:	3	2.5	2.4	2.4	2.3		2.2
	T:	41	41	44	42	42		39
	D:	6-3	7-14	8-19	9-15	10-13		12-2
80-44	F:	1.2	DRY	DRY	DRY	DRY		DRY
	T:	50						
	D:	6-3	7-14	8-19	9-15	10-13		12-2
80-46	F:	2	4	2.2	1.3	1.2		FROZEN
	T:	39	41	41	41	41		
	D:	6-3	7-14	8-19	9-15	10-13		12-2
BURNT TREE	F:	9.5	10.2	8.1	4	10		10.4
	T:	46	47	44	41	45		43
	D:	6-3	7-14	8-19	9-15	10-13		12-2
79-23	F:	0.7	DRY	DRY	DRY	DRY		DRY
	T:	56						
	D:	6-3	7-14	8-19	9-15	10-13		12-2
82-52	F:	25	20.1	15.8	11	6.8		NO ACCESS
	T:	40	39	42	41	41		
	D:	6-3	7-14	8-19	9-15	10-13		12-2

EAST MOUNTAIN TEMPERATURES - HISTORICAL SUMMARY

OCTOBER SUMMARY

	HIGH	LOW
AVG.	44.5	28.7
MAX.	62.2	43.7
MIN.	22.3	9.5

NOVEMBER SUMMARY

	HIGH	LOW
AVG.	35.0	22.1
MAX.	54.3	41.9
MIN.	13.1	2.7

DECEMBER SUMMARY

	HIGH	LOW
AVG.	30.7	13.8
MAX.	55.9	41.8
MIN.	4.7	-8.8

JANUARY SUMMARY

	HIGH	LOW
AVG.	30.4	15.9
MAX.	49.3	34.9
MIN.	2.0	-15.2

FEBRUARY SUMMARY

	HIGH	LOW
AVG.	32.4	15.6
MAX.	55.5	39.2
MIN.	0.1	-14.1

MARCH SUMMARY

	HIGH	LOW
AVG.	36.4	19.5
MAX.	58.7	39.8
MIN.	15.1	0.1

APRIL SUMMARY

	HIGH	LOW
AVG.	44.9	25.2
MAX.	68.1	45.2
MIN.	12.7	-0.3

MAY SUMMARY

	HIGH	LOW
AVG.	51.0	31.5
MAX.	76.4	53.4
MIN.	15.8	3.4

JUNE SUMMARY

	HIGH	LOW
AVG.	65.9	43.8
MAX.	83.2	61.2
MIN.	27.7	13.1

JULY SUMMARY

	HIGH	LOW
AVG.	72.0	51.2
MAX.	86.9	65.1
MIN.	48.5	20.4

AUGUST SUMMARY

	HIGH	LOW
AVG.	70.8	51.4
MAX.	85.0	63.8
MIN.	47.6	35.4

SEPTEMBER SUMMARY

	HIGH	LOW
AVG.	60.3	41.9
MAX.	79.8	56.3
MIN.	34.0	20.0

HISTORICAL SUMMARY

PARAMETER	DATE	TEMP
AVERAGE HIGH		47.9
MAXIMUM HIGH	04-Jul-85	86.9
AVG. MAX. HIGH		84.2
MINIMUM HIGH	01-Feb-85	0.1
AVG. MIN. HIGH		8.4
AVERAGE LOW		30.3
MAXIMUM LOW	06-Jul-85	65.1
AVG. MAX. LOW		61.1
MINIMUM LOW	31-Jan-85	-15.2
AVG. MIN. LOW		-7.5

DATE	TIME		INCHES PRECIPITATION		
01-Oct-86	08:32	PM START			
03-Oct-86	04:52	PM STOP	0.99		
11-Oct-86	11:19	AM START			
12-Oct-86	02:17	AM STOP	0.12		
17-Oct-86	03:05	PM START			
17-Oct-86	04:32	PM STOP	0.04		
17-Oct-86	09:10	PM START			
18-Oct-86	12:05	AM STOP	0.07		
18-Oct-86	04:35	PM START			
18-Oct-86	05:46	PM STOP	0.05		
19-Oct-86	03:08	AM START			
19-Oct-86	06:29	AM STOP	0.05		
31-Oct-86	08:24	AM START			
31-Oct-86	12:49	PM STOP	0.17		
31-Oct-86	04:07	PM START			
31-Oct-86	09:49	PM STOP	0.09	1.57	INCHES PRECIP.
01-Nov-86	04:57	AM START			
01-Nov-86	11:37	AM STOP	0.09		
07-Nov-86	12:45	PM START			
07-Nov-86	10:08	PM STOP	0.05		
17-Nov-86	04:47	PM START			
17-Nov-86	06:15	PM STOP	0.06		
17-Nov-86	07:25	PM START			
18-Nov-86	01:25	AM STOP	0.03		
18-Nov-86	02:29	AM START			
18-Nov-86	10:01	AM STOP	0.12		
20-Nov-86	05:35	PM START			
20-Nov-86	08:55	PM STOP	0.02		
24-Nov-86	04:41	AM START			
24-Nov-86	06:42	PM STOP	0.03	0.39	INCHES PRECIP.
05-Dec-86	04:02	PM START			
10-Dec-86	09:40	AM STOP	0.14		
18-Dec-86	07:58	AM START			
21-Dec-86	11:50	PM STOP	0.02	0.16	INCHES PRECIP.
01-Jan-87	04:44	PM START			
01-Jan-87	08:50	PM STOP	0.04		
02-Jan-87	01:20	AM START			
02-Jan-87	08:47	AM STOP	0.06		
05-Jan-87	03:57	AM START			
05-Jan-87	03:37	PM STOP	0.33		
07-Jan-87	01:14	AM START			
07-Jan-87	02:13	PM STOP	0.09		
15-Jan-87	08:46	AM START			
15-Jan-87	02:45	PM STOP	0.07		
15-Jan-87	06:33	PM START			
16-Jan-87	07:03	PM STOP	0.41		
17-Jan-87	12:01	AM START			

DATE	TIME		INCHES PRECIPITATION	
17-Jan-87	03:20 AM	STOP	0.04	
19-Jan-87	09:42 AM	START		
19-Jan-87	05:59 PM	STOP	0.13	
27-Jan-87	09:09 PM	START		
28-Jan-87	01:54 AM	STOP	0.07	
28-Jan-87	05:02 AM	START		
28-Jan-87	01:47 PM	STOP	0.12	1.37 INCHES PRECIP.
09-Feb-87	07:53 PM	START		
10-Feb-87	02:18 PM	STOP	0.04	
11-Feb-87	07:48 PM	START		
12-Feb-87	01:09 PM	STOP	0.18	
13-Feb-87	06:34 AM	START		
13-Feb-87	06:41 PM	STOP	0.28	
18-Feb-87	09:07 AM	START		
18-Feb-87	02:50 PM	STOP	0.04	
23-Feb-87	07:01 AM	START		
23-Feb-87	12:26 PM	STOP	0.13	
23-Feb-87	01:37 PM	START		
23-Feb-87	05:18 PM	STOP	0.02	
23-Feb-87	06:05 PM	START		
23-Feb-87	07:57 PM	STOP	0.29	
24-Feb-87	04:54 AM	START		
24-Feb-87	02:13 PM	STOP	0.24	
24-Feb-87	04:10 PM	START		
25-Feb-87	06:25 PM	STOP	0.11	
26-Feb-87	07:12 AM	START		
26-Feb-87	10:15 AM	STOP	0.05	1.37 INCHES PRECIP.
08-Mar-87	09:18 AM	START		
08-Mar-87	03:50 PM	STOP	0.06	
08-Mar-87	09:11 PM	START		
09-Mar-87	02:56 AM	STOP	0.06	
13-Mar-87	12:18 PM	START		
13-Mar-87	08:57 PM	STOP	0.03	
15-Mar-87	03:43 AM	START		
15-Mar-87	02:38 PM	STOP	0.50	
15-Mar-87	05:12 PM	START		
15-Mar-87	11:53 PM	STOP	0.21	
16-Mar-87	03:59 AM	START		
16-Mar-87	06:41 AM	STOP	0.06	
16-Mar-87	09:43 AM	START		
16-Mar-87	07:10 PM	STOP	0.20	
16-Mar-87	11:08 PM	START		
17-Mar-87	05:15 AM	STOP	0.03	
19-Mar-87	06:43 AM	START		
19-Mar-87	08:41 PM	STOP	0.02	
20-Mar-87	07:30 AM	START		
20-Mar-87	11:33 AM	STOP	0.01	
21-Mar-87	08:31 AM	START		

DATE	TIME		INCHES PRECIPITATION	
22-Mar-87	03:53 AM	STOP	0.38	
22-Mar-87	10:29 AM	START		
22-Mar-87	07:15 PM	STOP	0.05	
26-Mar-87	10:16 PM	START		
27-Mar-87	03:02 AM	STOP	0.03	1.65 INCHES PRECIP.
03-Apr-87	05:15 PM	START		
03-Apr-87	07:32 PM	STOP	0.08	
03-Apr-87	10:23 PM	START		
04-Apr-87	04:34 AM	STOP	0.29	
04-Apr-87	11:15 AM	START		
04-Apr-87	06:54 PM	STOP	0.56	
06-Apr-87	04:57 AM	START		
06-Apr-87	05:15 AM	STOP	0.07	
06-Apr-87	01:46 PM	START		
06-Apr-87	07:50 PM	STOP	0.08	
30-Apr-87	06:03 AM	START		
30-Apr-87	07:25 AM	STOP	0.08	1.16 INCHES PRECIP.
01-May-87	07:29 AM	START		
01-May-87	02:43 PM	STOP	0.11	
10-May-87	12:36 PM	START		
10-May-87	01:23 PM	STOP	0.05	
13-May-87	08:00 AM	START		
13-May-87	08:45 AM	STOP	0.08	
17-May-87	01:03 AM	START		
17-May-87	12:56 PM	STOP	0.10	
18-May-87	05:48 AM	START		
18-May-87	09:38 AM	STOP	0.08	
19-May-87	05:06 AM	START		
19-May-87	06:24 AM	STOP	0.12	
19-May-87	12:12 PM	START		
19-May-87	01:14 PM	STOP	0.04	
20-May-87	03:40 AM	START		
20-May-87	01:01 PM	STOP	0.44	
21-May-87	05:27 AM	START		
21-May-87	01:07 PM	STOP	0.08	
22-May-87	07:30 AM	START		
22-May-87	09:08 AM	STOP	0.15	
23-May-87	03:39 PM	START		
23-May-87	05:14 PM	STOP	0.01	
25-May-87	07:11 PM	START		
26-May-87	06:07 AM	STOP	0.34	
26-May-87	10:11 AM	START		
27-May-87	03:20 AM	STOP	0.07	
27-May-87	05:40 AM	START		
27-May-87	07:24 AM	STOP	0.10	1.77 INCHES PRECIP.
05-Jun-87	03:39 AM	START		
05-Jun-87	02:54 AM	STOP	0.04	

DATE	TIME		INCHES PRECIPITATION		
14-Jun-87	04:49	AM START			
14-Jun-87	04:24	AM STOP	0.03		
14-Jun-87	05:00	AM START			
13-Jun-87	04:32	PM STOP	0.40		
13-Jun-87	06:06	PM START			
13-Jun-87	02:38	PM STOP	0.11	0.58	INCHES PRECIP.
11-Jul-87	11:41	AM START			
11-Jul-87	03:19	PM STOP	0.41		
16-Jul-87	07:27	AM START			
16-Jul-87	07:54	AM STOP	0.09		
16-Jul-87	06:20	PM START			
16-Jul-87	07:30	PM STOP	0.12		
20-Jul-87	05:20	AM START			
20-Jul-87	06:44	AM STOP	0.16		
20-Jul-87	08:55	AM START			
20-Jul-87	10:53	PM STOP	0.17		
25-Jul-87	11:26	AM START			
25-Jul-87	12:38	PM STOP	0.07		
26-Jul-87	02:52	PM START			
26-Jul-87	03:33	PM STOP	0.28		
27-Jul-87	11:26	AM START			
27-Jul-87	12:54	PM STOP	0.05		
28-Jul-87	04:16	PM START			
28-Jul-87	06:33	PM STOP	0.35		
28-Jul-87	07:19	PM START			
29-Jul-87	02:46	AM STOP	0.09		
29-Jul-87	04:01	AM START			
29-Jul-87	04:49	AM STOP	0.41		
30-Jul-87	01:36	AM START			
30-Jul-87	06:17	AM STOP	0.29	2.49	INCHES PRECIP.
05-Aug-87	12:21	PM START			
05-Aug-87	12:12	PM STOP	0.08		
06-Aug-87	07:00	AM START			
06-Aug-87	09:02	AM STOP	0.30		
06-Aug-87	02:18	PM START			
06-Aug-87	03:37	PM STOP	0.09		
13-Aug-87	09:27	AM START			
13-Aug-87	11:03	AM STOP	0.14		
23-Aug-87	10:18	PM START			
23-Aug-87	09:08	PM STOP	0.40		
24-Aug-87	09:30	AM START			
24-Aug-87	10:11	AM STOP	0.03		
25-Aug-87	10:58	AM START			
25-Aug-87	11:26	AM STOP	0.13	1.16	INCHES PRECIP.
14-Sep-87	09:06	PM START			
14-Sep-87	09:26	PM STOP	0.06	0.06	INCHES PRECIP.

DATE	TIME	INCHES PRECIPITATION
		13.73 TOTAL PRECIPITATION 1987

UTAH POWER & LIGHT MINING DIVISION
EAST MOUNTAIN PRECIPITATION
WATER YEARS

	1981	1982	1983	1984	1985	1986	1987	MEAN	ST DEV
OCT	1.28	1.93	0.38	0.76	3.27	1.15	1.57	1.48	0.87
NOV	0.39	0.53	2.90	2.43	0.97	2.38	0.39	1.43	1.02
DEC	0.05	0.97	1.39	2.42	1.67	0.87	0.16	1.07	0.78
JAN	0.29	3.22	1.30	0.27	0.49	0.30	1.37	1.04	1.00
FEB	0.52	0.14	1.81	0.65	0.59	2.10	1.37	1.03	0.68
MAR	2.77	1.67	1.98	1.22	1.77	1.43	1.65	1.78	0.46
APR	0.64	0.00	0.92	0.50	1.35	1.05	1.16	0.80	0.43
MAY	0.87	0.45	0.71	0.22	1.73	0.38	1.77	0.88	0.59
JUN	0.11	0.09	0.61	1.18	0.28	0.53	0.58	0.48	0.35
JUL	0.57	1.86	1.27	1.90	2.47	0.87	2.49	1.63	0.70
AUG	0.85	1.10	4.83	2.33	0.12	2.24	1.16	1.80	1.43
SEP	2.55	2.61	1.62	0.64	2.31	1.63	0.06	1.63	0.91
TOTAL	10.90	14.57	19.71	14.53	17.02	14.92	13.73	15.06	2.54

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
01-Oct-86	01:29 PM	48.1		HIGH
01-Oct-86	08:53 PM		30.9	LOW
02-Oct-86	09:10 AM	43.8		HIGH
02-Oct-86	08:20 PM		27.0	LOW
03-Oct-86	08:15 AM	36.9		HIGH
03-Oct-86	09:20 PM		24.1	LOW
04-Oct-86	03:35 AM		24.4	LOW
04-Oct-86	11:26 AM	43.5		HIGH
05-Oct-86	01:32 AM		28.6	LOW
05-Oct-86	08:21 AM	42.6		HIGH
06-Oct-86	02:39 AM		29.9	LOW
06-Oct-86	01:05 PM	50.2		HIGH
07-Oct-86	03:42 AM		34.5	LOW
07-Oct-86	01:07 PM	52.3		HIGH
08-Oct-86	03:04 AM		34.8	LOW
08-Oct-86	12:34 PM	55.2		HIGH
09-Oct-86	02:40 AM		37.6	LOW
09-Oct-86	12:36 PM	57.6		HIGH
10-Oct-86	12:06 PM	55.4		HIGH
10-Oct-86	10:33 PM		32.6	LOW
11-Oct-86	12:36 AM	31.4		HIGH
11-Oct-86	08:17 PM		16.2	LOW
12-Oct-86	01:43 AM		17.2	LOW
12-Oct-86	12:54 PM	33.3		HIGH
13-Oct-86	01:04 AM		23.4	LOW
13-Oct-86	12:45 PM	42.3		HIGH
14-Oct-86	12:31 PM	47.1		HIGH
14-Oct-86	10:04 PM		29.7	LOW
15-Oct-86	04:48 AM		29.1	LOW
15-Oct-86	12:50 PM	47.9		HIGH
16-Oct-86	04:38 AM		30.3	LOW
16-Oct-86	12:15 PM	49.7		HIGH
17-Oct-86	04:18 AM		32.0	LOW
17-Oct-86	12:03 PM	48.4		HIGH
18-Oct-86	01:08 AM		32.2	LOW
18-Oct-86	09:16 AM	44.5		HIGH
19-Oct-86	12:10 PM	47.2		HIGH
19-Oct-86	08:26 PM		28.0	LOW
20-Oct-86	10:24 AM	40.6		HIGH
20-Oct-86	06:12 PM		27.0	LOW
21-Oct-86	02:25 AM		26.4	LOW
21-Oct-86	10:01 AM	39.5		HIGH
22-Oct-86	01:16 AM		28.2	LOW
22-Oct-86	11:11 AM	47.0		HIGH
23-Oct-86	01:14 AM		27.7	LOW
23-Oct-86	10:26 AM	48.8		HIGH
24-Oct-86	01:38 AM		29.0	LOW
24-Oct-86	08:41 AM	46.0		HIGH
25-Oct-86	12:05 PM	50.5		HIGH
25-Oct-86	10:49 PM		33.9	LOW
26-Oct-86	01:22 AM		32.0	LOW
26-Oct-86	11:04 AM	50.1		HIGH
27-Oct-86	03:01 AM		33.3	LOW
27-Oct-86	11:56 AM	49.0		HIGH
28-Oct-86	03:06 AM		34.2	LOW

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
28-Oct-86	12:40 PM	52.0		HIGH
29-Oct-86	12:14 PM	50.8		HIGH
29-Oct-86	10:39 PM		34.0	LOW
30-Oct-86	09:27 AM	50.8		HIGH
30-Oct-86	10:32 PM		27.3	LOW
31-Oct-86	12:59 AM	26.8		HIGH
31-Oct-86	11:15 AM		22.2	LOW
01-Nov-86	01:21 AM		23.9	LOW
01-Nov-86	09:42 PM	28.7		HIGH
02-Nov-86	02:26 AM		25.5	LOW
02-Nov-86	09:33 AM	39.6		HIGH
03-Nov-86	03:32 AM		28.4	LOW
03-Nov-86	11:08 AM	40.0		HIGH
04-Nov-86	06:31 AM		25.5	LOW
04-Nov-86	10:02 AM	49.7		HIGH
05-Nov-86	07:45 AM	49.8		HIGH
05-Nov-86	09:14 PM		35.7	LOW
06-Nov-86	02:06 AM	35.7		HIGH
06-Nov-86	10:39 PM		26.1	LOW
07-Nov-86	06:33 AM	30.3		HIGH
07-Nov-86	11:00 PM		24.1	LOW
08-Nov-86	08:24 AM	24.4		HIGH
08-Nov-86	10:38 PM		20.3	LOW
09-Nov-86	09:44 AM	34.8		HIGH
09-Nov-86	02:06 PM		27.9	LOW
10-Nov-86	08:36 AM	37.9		HIGH
10-Nov-86	04:03 PM		28.7	LOW
11-Nov-86	08:50 AM	43.4		HIGH
11-Nov-86	09:18 PM		34.6	LOW
12-Nov-86	08:54 AM	44.1		HIGH
12-Nov-86	09:42 PM		31.4	LOW
13-Nov-86	08:22 AM	42.4		HIGH
13-Nov-86	08:19 PM		32.1	LOW
14-Nov-86	08:06 AM	43.7		HIGH
14-Nov-86	04:08 PM		34.6	LOW
15-Nov-86	07:16 AM	46.8		HIGH
15-Nov-86	09:07 PM		38.1	LOW
16-Nov-86	08:37 AM	46.7		HIGH
16-Nov-86	06:57 PM		41.8	LOW
17-Nov-86	08:29 AM	48.1		HIGH
17-Nov-86	08:03 PM		39.7	LOW
18-Nov-86	03:20 AM	44.9		HIGH
18-Nov-86	11:35 AM		39.6	LOW
19-Nov-86	07:41 AM	44.4		HIGH
19-Nov-86	07:14 PM		36.5	LOW
20-Nov-86	06:41 AM	46.5		HIGH
20-Nov-86	09:52 PM		33.7	LOW
21-Nov-86	05:51 AM	41.8		HIGH
21-Nov-86	11:00 PM		24.8	LOW
22-Nov-86	06:43 AM	38.7		HIGH
22-Nov-86	10:50 PM		26.1	LOW
23-Nov-86	07:40 AM	37.3		HIGH
23-Nov-86	12:55 PM		32.5	LOW
24-Nov-86	05:56 AM	50.5		HIGH

Oct-86 SUMMARY

	HIGH	LOW
AVG.	46.1	29.0
MAX.	57.6	37.6
MIN.	26.8	16.2

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
24-Nov-86	07:20 PM		34.4	LOW
25-Nov-86	01:02 AM	37.9		HIGH
25-Nov-86	09:26 PM		33.9	LOW
26-Nov-86	08:53 AM	42.2		HIGH
26-Nov-86	08:39 PM		34.0	LOW
27-Nov-86	06:50 AM	43.5		HIGH
27-Nov-86	03:04 PM		34.2	LOW
28-Nov-86	06:18 AM	42.1		HIGH
28-Nov-86	02:51 PM		33.6	LOW
29-Nov-86	04:27 AM	40.3		HIGH
29-Nov-86	08:00 PM		30.4	LOW
30-Nov-86	09:33 AM	38.3		HIGH
30-Nov-86	03:28 PM		33.8	LOW
01-Dec-86	08:40 AM	43.1		HIGH
01-Dec-86	01:25 PM		36.1	LOW
02-Dec-86	08:09 AM	42.9		HIGH
02-Dec-86	02:09 AM		28.5	LOW
03-Dec-86	09:21 AM	39.0		HIGH
03-Dec-86	08:35 PM		27.6	LOW
04-Dec-86	08:15 AM	37.5		HIGH
04-Dec-86	07:48 PM		25.3	LOW
05-Dec-86	08:45 AM	32.7		HIGH
05-Dec-86	09:34 PM		22.9	LOW
06-Dec-86	07:58 AM	30.0		HIGH
06-Dec-86	04:59 PM		21.1	LOW
07-Dec-86	08:16 AM	28.2		HIGH
07-Dec-86	08:31 PM		19.5	LOW
08-Dec-86	08:31 AM	29.7		HIGH
08-Dec-86	09:27 PM		12.7	LOW
09-Dec-86	08:24 AM	14.2		HIGH
09-Dec-86	07:30 PM		-0.6	LOW
10-Dec-86	01:30 AM		2.6	LOW
10-Dec-86	08:55 AM	17.1		HIGH
11-Dec-86	09:43 AM	34.7		HIGH
11-Dec-86	10:08 PM		15.1	LOW
12-Dec-86	06:31 AM	21.8		HIGH
12-Dec-86	02:32 PM		11.9	LOW
13-Dec-86	09:38 AM	28.3		HIGH
13-Dec-86	09:47 PM		13.8	LOW
14-Dec-86	03:29 AM		13.2	LOW
14-Dec-86	09:29 AM	25.7		HIGH
15-Dec-86	02:26 AM		14.8	LOW
15-Dec-86	08:36 AM	26.3		HIGH
16-Dec-86	02:19 AM		17.9	LOW
16-Dec-86	08:13 AM	31.8		HIGH
17-Dec-86	03:03 AM		18.1	LOW
17-Dec-86	08:42 AM	32.0		HIGH
18-Dec-86	09:10 AM	27.5		HIGH
18-Dec-86	08:46 PM		15.0	LOW
19-Dec-86	03:07 AM		16.6	LOW
19-Dec-86	05:40 AM	25.6		HIGH
20-Dec-86	08:14 AM	25.8		HIGH
20-Dec-86	06:47 PM		14.4	LOW
21-Dec-86	07:42 AM	28.6		HIGH

Nov-86 SUMMARY

	HIGH	LOW
AVG.	41.2	31.5
MAX.	50.5	41.8
MIN.	24.4	20.3

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
21-Dec-86	10:12 PM		16.3	LOW
22-Dec-86	01:35 AM		15.5	LOW
22-Dec-86	08:00 AM	27.3		HIGH
23-Dec-86	09:00 AM	30.5		HIGH
23-Dec-86	10:25 PM		15.2	LOW
24-Dec-86	09:27 AM	27.1		HIGH
24-Dec-86	07:05 PM		11.8	LOW
25-Dec-86	08:52 AM	25.2		HIGH
25-Dec-86	02:59 PM		12.2	LOW
26-Dec-86	02:04 AM		13.4	LOW
26-Dec-86	07:53 AM	24.5		HIGH
27-Dec-86	08:22 AM	30.3		HIGH
27-Dec-86	08:46 PM		16.7	LOW
28-Dec-86	02:15 AM		17.1	LOW
28-Dec-86	10:38 AM	32.1		HIGH
29-Dec-86	03:55 AM		19.7	LOW
29-Dec-86	09:46 AM	33.2		HIGH
30-Dec-86	09:57 AM	33.2		HIGH
30-Dec-86	10:38 PM		15.1	LOW
31-Dec-86	01:53 AM		11.0	LOW
31-Dec-86	06:02 AM	20.4		HIGH
01-Jan-87	12:24 PM	29.5		HIGH
01-Jan-87	05:12 PM		21.3	LOW
02-Jan-87	05:26 AM		17.7	LOW
02-Jan-87	10:41 AM	25.7		HIGH
03-Jan-87	12:59 AM	26.3		HIGH
03-Jan-87	05:27 AM		14.6	LOW
04-Jan-87	10:31 AM	25.6		HIGH
04-Jan-87	07:58 PM		16.3	LOW
05-Jan-87	04:15 AM		15.6	LOW
05-Jan-87	09:16 AM	24.8		HIGH
06-Jan-87	10:17 AM	25.4		HIGH
06-Jan-87	10:03 PM		14.3	LOW
07-Jan-87	05:04 AM		9.5	LOW
07-Jan-87	11:25 AM	22.7		HIGH
08-Jan-87	11:04 AM	20.5		HIGH
08-Jan-87	09:54 PM		8.2	LOW
09-Jan-87	09:27 AM	17.1		HIGH
09-Jan-87	08:19 PM		4.3	LOW
10-Jan-87	01:48 AM		9.6	LOW
10-Jan-87	09:56 AM	24.6		HIGH
11-Jan-87	04:12 AM		21.5	LOW
11-Jan-87	12:33 PM	34.4		HIGH
12-Jan-87	04:28 AM		27.6	LOW
12-Jan-87	10:50 AM	45.4		HIGH
13-Jan-87	10:21 AM	39.2		HIGH
13-Jan-87	10:35 PM		20.4	LOW
14-Jan-87	11:51 AM	30.5		HIGH
14-Jan-87	10:03 PM		8.3	LOW
15-Jan-87	10:38 AM	20.8		HIGH
15-Jan-87	09:24 PM		2.9	LOW
16-Jan-87	02:25 AM		1.8	LOW
16-Jan-87	07:38 AM	11.7		HIGH
17-Jan-87	09:56 AM	9.2		HIGH

Dec-86 SUMMARY

	HIGH	LOW
AVG.	26.0	13.2
MAX.	43.1	36.1
MIN.	14.2	-0.6

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
17-Jan-87	05:28 PM		-0.6	LOW
18-Jan-87	01:57 AM		2.5	LOW
18-Jan-87	09:23 PM	13.2		HIGH
19-Jan-87	10:04 AM	24.8		HIGH
19-Jan-87	09:04 PM		10.8	LOW
20-Jan-87	08:11 AM	12.0		HIGH
20-Jan-87	09:56 PM		-2.4	LOW
21-Jan-87	02:15 AM		-3.5	LOW
21-Jan-87	09:44 AM	17.6		HIGH
22-Jan-87	03:43 AM		13.7	LOW
22-Jan-87	10:19 AM	27.2		HIGH
23-Jan-87	01:06 AM		14.9	LOW
23-Jan-87	10:57 AM	36.4		HIGH
24-Jan-87	09:56 AM	27.9		HIGH
24-Jan-87	10:34 PM		13.0	LOW
25-Jan-87	02:14 AM		15.6	LOW
25-Jan-87	09:04 AM	29.7		HIGH
26-Jan-87	01:18 AM		25.1	LOW
26-Jan-87	07:43 AM	33.5		HIGH
27-Jan-87	11:24 AM	42.1		HIGH
27-Jan-87	10:23 PM		27.2	LOW
28-Jan-87	09:40 AM	39.4		HIGH
28-Jan-87	10:33 PM		21.7	LOW
29-Jan-87	05:27 AM	31.1		HIGH
29-Jan-87	09:04 PM		10.4	LOW
30-Jan-87	01:33 AM		11.8	LOW
30-Jan-87	06:50 AM	26.9		HIGH
31-Jan-87	01:04 AM		14.2	LOW
31-Jan-87	06:15 AM	27.2		HIGH
01-Feb-87	01:53 AM		22.0	LOW
01-Feb-87	12:43 PM	35.3		HIGH
02-Feb-87	01:59 AM		26.2	LOW
02-Feb-87	11:06 AM	43.6		HIGH
03-Feb-87	09:27 AM		38.2	HIGH
03-Feb-87	09:17 PM		21.3	LOW
04-Feb-87	10:34 AM	35.8		HIGH
04-Feb-87	09:35 PM		16.4	LOW
05-Feb-87	01:06 AM		13.9	LOW
05-Feb-87	12:09 PM	39.5		HIGH
06-Feb-87	03:42 AM		23.5	LOW
06-Feb-87	10:47 AM	43.1		HIGH
07-Feb-87	09:53 AM	45.2		HIGH
07-Feb-87	11:10 PM		28.7	LOW
08-Feb-87	09:53 AM	42.6		HIGH
08-Feb-87	10:50 PM		21.7	LOW
09-Feb-87	02:45 AM		20.7	LOW
09-Feb-87	11:23 AM	36.3		HIGH
10-Feb-87	09:41 AM	33.2		HIGH
10-Feb-87	07:52 PM		20.3	LOW
11-Feb-87	01:21 AM		17.9	LOW
11-Feb-87	09:30 AM	38.7		HIGH
12-Feb-87	07:53 AM	34.2		HIGH
12-Feb-87	07:30 PM		21.5	LOW
13-Feb-87	06:50 AM	31.0		HIGH

Jan-87 SUMMARY

	HIGH	LOW
AVG.	26.5	12.5
MAX.	45.4	27.6
MIN.	9.2	-3.5

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
13-Feb-87	10:37 PM		18.7	LOW
14-Feb-87	08:33 AM	21.0		HIGH
14-Feb-87	06:55 PM		11.3	LOW
15-Feb-87	12:56 AM		11.1	LOW
15-Feb-87	08:27 AM	28.6		HIGH
16-Feb-87	06:08 AM	23.3		HIGH
16-Feb-87	10:35 PM		12.1	LOW
17-Feb-87	08:01 AM	28.6		HIGH
17-Feb-87	10:43 PM		9.7	LOW
18-Feb-87	01:10 AM		9.0	LOW
18-Feb-87	08:37 AM	25.0		HIGH
19-Feb-87	01:07 AM		8.5	LOW
19-Feb-87	07:58 AM	20.4		HIGH
20-Feb-87	08:58 AM	26.2		HIGH
20-Feb-87	10:21 PM		7.4	LOW
21-Feb-87	02:29 AM		8.6	LOW
21-Feb-87	09:40 AM	29.5		HIGH
22-Feb-87	02:06 AM		10.6	LOW
22-Feb-87	11:27 AM	33.8		HIGH
23-Feb-87	06:31 AM	23.2		HIGH
23-Feb-87	10:09 PM		8.3	LOW
24-Feb-87	03:43 AM	20.4		HIGH
24-Feb-87	08:28 PM		1.7	LOW
25-Feb-87	03:25 AM	22.5		HIGH
25-Feb-87	06:18 PM		6.7	LOW
26-Feb-87	04:51 AM	18.8		HIGH
26-Feb-87	07:22 PM		8.2	LOW
27-Feb-87	09:54 AM	21.9		HIGH
27-Feb-87	01:15 PM		6.5	LOW
28-Feb-87	12:43 AM		8.5	LOW
28-Feb-87	08:47 AM	32.3		HIGH
01-Mar-87	07:42 AM	36.4		HIGH
01-Mar-87	08:32 PM		13.7	LOW
02-Mar-87	12:38 AM		20.0	LOW
02-Mar-87	09:57 AM	37.7		HIGH
03-Mar-87	01:22 AM		20.9	LOW
03-Mar-87	08:56 AM	40.7		HIGH
04-Mar-87	08:07 AM		22.7	LOW
04-Mar-87	02:20 PM	44.2		HIGH
05-Mar-87	08:57 AM		23.3	LOW
05-Mar-87	03:00 PM	44.8		HIGH
06-Mar-87	08:32 AM		27.4	LOW
06-Mar-87	03:31 PM	44.2		HIGH
07-Mar-87	07:09 AM		26.7	LOW
07-Mar-87	03:34 PM	45.5		HIGH
08-Mar-87	09:17 AM		25.9	LOW
08-Mar-87	02:42 PM	41.6		HIGH
09-Mar-87	02:13 PM	35.7		HIGH
09-Mar-87	09:36 PM		24.1	LOW
10-Mar-87	06:38 AM		17.7	LOW
10-Mar-87	03:57 PM	42.7		HIGH
11-Mar-87	08:41 AM		21.7	LOW
11-Mar-87	02:10 PM	38.6		HIGH
12-Mar-87	09:18 AM		20.4	LOW

Feb-87 SUMMARY

	HIGH	LOW
AVG.	33.4	12.1
MAX.	45.2	38.2
MIN.	18.8	1.7

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
12-Mar-87	04:47 PM	45.2		HIGH
13-Mar-87	02:03 PM	41.7		HIGH
13-Mar-87	09:54 PM		18.9	LOW
14-Mar-87	08:23 AM		14.4	LOW
14-Mar-87	03:27 PM	36.9		HIGH
15-Mar-87	09:45 AM		20.9	LOW
15-Mar-87	06:01 PM	30.8		HIGH
16-Mar-87	07:16 PM	26.9		HIGH
16-Mar-87	10:16 PM		17.4	LOW
17-Mar-87	10:48 AM		20.9	LOW
17-Mar-87	03:53 PM	28.8		HIGH
18-Mar-87	01:26 AM		19.0	LOW
18-Mar-87	02:52 PM	38.5		HIGH
19-Mar-87	09:31 AM		14.3	LOW
19-Mar-87	03:03 PM	30.6		HIGH
20-Mar-87	04:15 PM	27.1		HIGH
20-Mar-87	10:27 PM		8.4	LOW
21-Mar-87	02:24 AM		8.1	LOW
21-Mar-87	03:01 PM	25.7		HIGH
22-Mar-87	04:09 PM	28.8		HIGH
22-Mar-87	10:49 PM		12.6	LOW
23-Mar-87	03:09 AM		9.3	LOW
23-Mar-87	01:25 PM	25.6		HIGH
24-Mar-87	07:12 AM		11.0	LOW
24-Mar-87	04:26 PM	36.2		HIGH
25-Mar-87	07:58 AM		11.3	LOW
25-Mar-87	05:32 PM	29.4		HIGH
26-Mar-87	06:25 AM		12.1	LOW
26-Mar-87	04:20 PM	38.0		HIGH
27-Mar-87	05:31 AM		7.8	LOW
27-Mar-87	03:59 PM	20.3		HIGH
28-Mar-87	06:41 AM		6.4	LOW
28-Mar-87	04:38 PM	24.4		HIGH
29-Mar-87	07:47 AM		5.9	LOW
29-Mar-87	03:03 PM	23.1		HIGH
30-Mar-87	02:03 AM		8.8	LOW
30-Mar-87	04:28 PM	39.6		HIGH
31-Mar-87	06:11 AM		20.8	LOW
31-Mar-87	04:34 PM	47.3		HIGH
01-Apr-87	04:40 AM		25.8	LOW
01-Apr-87	04:40 PM	50.9		HIGH
02-Apr-87	08:08 AM		17.2	LOW
02-Apr-87	04:10 PM	44.7		HIGH
03-Apr-87	07:06 AM		22.9	LOW
03-Apr-87	09:51 AM	48.6		HIGH
04-Apr-87	08:25 AM	38.5		HIGH
04-Apr-87	09:11 PM		19.7	LOW
05-Apr-87	12:52 AM		18.9	LOW
05-Apr-87	08:22 AM	40.6		HIGH
06-Apr-87	06:14 AM	40.6		HIGH
06-Apr-87	08:32 PM		24.8	LOW
07-Apr-87	01:22 AM		26.6	LOW
07-Apr-87	08:15 AM	46.3		HIGH
08-Apr-87	12:45 AM		29.2	LOW

Mar-87 SUMMARY

	HIGH	LOW
AVG.	35.4	16.5
MAX.	47.3	27.4
MIN.	20.3	5.9

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
08-Apr-87	07:38 AM	48.7		HIGH
09-Apr-87	09:00 AM	43.9		HIGH
09-Apr-87	05:57 PM		27.9	LOW
10-Apr-87	12:40 AM		28.4	LOW
10-Apr-87	10:55 AM	49.6		HIGH
11-Apr-87	10:33 AM	46.0		HIGH
11-Apr-87	10:17 PM		17.1	LOW
12-Apr-87	09:59 AM	28.6		HIGH
12-Apr-87	08:47 PM		14.4	LOW
13-Apr-87	01:14 AM		14.0	LOW
13-Apr-87	11:24 AM	45.8		HIGH
14-Apr-87	01:40 AM		30.2	LOW
14-Apr-87	11:08 AM	54.7		HIGH
15-Apr-87	01:11 AM		39.2	LOW
15-Apr-87	10:36 AM	58.4		HIGH
16-Apr-87	01:24 AM		40.2	LOW
16-Apr-87	10:17 AM	62.0		HIGH
17-Apr-87	09:46 AM	65.0		HIGH
17-Apr-87	09:24 PM		40.9	LOW
18-Apr-87	09:43 AM	62.7		HIGH
18-Apr-87	11:06 PM		30.2	LOW
19-Apr-87	01:36 AM	26.6		HIGH
19-Apr-87	12:44 PM		16.7	LOW
20-Apr-87	09:29 AM	43.3		HIGH
20-Apr-87	09:23 PM		20.9	LOW
21-Apr-87	12:09 AM		22.7	LOW
21-Apr-87	10:35 AM	50.1		HIGH
22-Apr-87	12:27 AM		37.7	LOW
22-Apr-87	10:25 AM	60.3		HIGH
23-Apr-87	01:16 AM		43.5	LOW
23-Apr-87	09:29 AM	64.6		HIGH
24-Apr-87	01:41 AM		43.5	LOW
24-Apr-87	08:03 AM	62.8		HIGH
25-Apr-87	01:15 AM		44.4	LOW
25-Apr-87	10:18 AM	66.1		HIGH
26-Apr-87	08:16 AM	64.8		HIGH
26-Apr-87	06:40 PM		41.9	LOW
27-Apr-87	09:15 AM	68.1		HIGH
27-Apr-87	09:38 PM		40.9	LOW
28-Apr-87	09:08 AM	67.1		HIGH
28-Apr-87	08:14 PM		43.7	LOW
29-Apr-87	02:01 AM		43.7	LOW
29-Apr-87	09:59 AM	67.1		HIGH
30-Apr-87	03:56 AM	56.6		HIGH
30-Apr-87	09:03 PM		35.2	LOW
01-May-87	06:06 AM	56.7		HIGH
01-May-87	09:34 PM		28.0	LOW
02-May-87	07:23 AM	39.2		HIGH
02-May-87	08:40 PM		27.1	LOW
03-May-87	02:19 AM		31.0	LOW
03-May-87	11:53 AM	55.0		HIGH
04-May-87	02:16 AM		37.2	LOW
04-May-87	01:39 PM	55.1		HIGH
05-May-87	03:47 AM		40.3	LOW

Apr-87 SUMMARY

	HIGH	LOW
AVG.	52.4	30.1
MAX.	68.1	44.4
MIN.	26.6	14.0

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
05-May-87	01:21 PM	58.7		HIGH
06-May-87	03:41 AM		39.6	LOW
06-May-87	12:39 PM	60.4		HIGH
07-May-87	03:08 AM		42.5	LOW
07-May-87	12:13 PM	65.1		HIGH
08-May-87	02:19 AM		43.8	LOW
08-May-87	12:46 PM	66.9		HIGH
09-May-87	01:58 AM		46.1	LOW
09-May-87	11:37 AM	63.9		HIGH
10-May-87	03:07 AM		44.0	LOW
10-May-87	01:31 PM	66.3		HIGH
11-May-87	01:53 AM		42.7	LOW
11-May-87	01:13 PM	64.6		HIGH
12-May-87	11:53 AM	63.9		HIGH
12-May-87	10:21 PM		41.5	LOW
13-May-87	01:41 AM		39.9	LOW
13-May-87	01:38 PM	61.2		HIGH
14-May-87	12:01 PM	68.6		HIGH
14-May-87	10:32 PM		42.9	LOW
15-May-87	11:53 AM	62.7		HIGH
15-May-87	09:32 PM		40.3	LOW
16-May-87	10:57 AM	64.0		HIGH
16-May-87	08:38 PM		38.8	LOW
17-May-87	09:41 AM	50.7		HIGH
17-May-87	09:55 PM		39.7	LOW
18-May-87	04:00 AM	51.4		HIGH
18-May-87	09:53 PM		34.6	LOW
19-May-87	10:39 AM	49.7		HIGH
19-May-87	09:23 PM		33.8	LOW
20-May-87	09:33 AM	47.2		HIGH
20-May-87	08:32 PM		30.6	LOW
21-May-87	06:13 AM	45.6		HIGH
21-May-87	02:44 PM		31.4	LOW
22-May-87	05:19 AM	48.0		HIGH
22-May-87	07:56 AM		31.7	LOW
23-May-87	08:26 AM	55.5		HIGH
23-May-87	08:29 PM		32.1	LOW
24-May-87	08:40 AM	51.8		HIGH
24-May-87	09:08 PM		34.2	LOW
25-May-87	04:56 AM	41.2		HIGH
25-May-87	09:57 PM		25.9	LOW
26-May-87	08:53 AM	39.0		HIGH
26-May-87	04:07 PM		25.3	LOW
27-May-87	07:51 AM	44.9		HIGH
27-May-87	08:53 PM		29.2	LOW
28-May-87	09:07 AM	46.4		HIGH
28-May-87	08:57 PM		31.2	LOW
29-May-87	07:54 AM	50.2		HIGH
29-May-87	08:01 PM		35.0	LOW
30-May-87	02:33 AM		42.3	LOW
30-May-87	01:28 PM	59.4		HIGH
31-May-87	02:32 AM		44.1	LOW
31-May-87	01:55 PM	68.7		HIGH
01-Jun-87	02:36 AM		38.3	LOW

May-87 SUMMARY

	HIGH	LOW
AVG.	55.5	36.3
MAX.	68.7	46.1
MIN.	39.0	25.3

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
01-Jun-87	02:19 PM	57.2		HIGH
02-Jun-87	03:49 AM		37.9	LOW
02-Jun-87	12:55 PM	62.1		HIGH
03-Jun-87	04:43 AM		44.2	LOW
03-Jun-87	02:50 PM	69.0		HIGH
04-Jun-87	03:53 AM		49.6	LOW
04-Jun-87	02:07 PM	74.9		HIGH
05-Jun-87	11:14 AM	70.2		HIGH
05-Jun-87	09:32 PM		51.1	LOW
06-Jun-87	09:46 AM	66.1		HIGH
06-Jun-87	08:56 PM		46.2	LOW
07-Jun-87	03:11 AM		45.5	LOW
07-Jun-87	11:13 AM	64.0		HIGH
08-Jun-87	10:26 AM	66.6		HIGH
08-Jun-87	09:36 PM		43.8	LOW
09-Jun-87	03:18 AM		43.4	LOW
09-Jun-87	10:41 AM	59.7		HIGH
10-Jun-87	02:39 AM		46.7	LOW
10-Jun-87	01:34 PM	67.2		HIGH
11-Jun-87	02:42 AM		49.9	LOW
11-Jun-87	12:40 PM	71.8		HIGH
12-Jun-87	01:49 AM		53.7	LOW
12-Jun-87	02:14 PM	75.0		HIGH
13-Jun-87	03:31 AM		53.8	LOW
13-Jun-87	02:39 PM	75.4		HIGH
14-Jun-87	03:23 AM		54.2	LOW
14-Jun-87	12:07 PM	78.9		HIGH
15-Jun-87	10:19 AM	75.3		HIGH
15-Jun-87	10:38 PM		53.5	LOW
16-Jun-87	03:39 AM		48.4	LOW
16-Jun-87	01:43 PM	72.0		HIGH
17-Jun-87	03:25 AM		50.5	LOW
17-Jun-87	01:20 PM	71.0		HIGH
18-Jun-87	04:35 AM		48.9	LOW
18-Jun-87	01:34 PM	72.1		HIGH
19-Jun-87	03:48 AM		50.9	LOW
19-Jun-87	02:06 PM	70.5		HIGH
20-Jun-87	03:03 AM		50.7	LOW
20-Jun-87	09:49 AM	70.2		HIGH
21-Jun-87	03:10 AM		50.8	LOW
21-Jun-87	02:02 PM	78.7		HIGH
22-Jun-87	12:57 PM	64.8		HIGH
22-Jun-87	09:46 PM		45.0	LOW
23-Jun-87	02:41 AM		46.6	LOW
23-Jun-87	12:06 PM	72.0		HIGH
24-Jun-87	12:13 PM	73.4		HIGH
24-Jun-87	09:23 PM		52.3	LOW
25-Jun-87	01:36 AM		51.6	LOW
25-Jun-87	01:27 PM	74.1		HIGH
26-Jun-87	02:48 AM		54.4	LOW
26-Jun-87	12:08 PM	75.3		HIGH
27-Jun-87	02:16 PM	77.3		HIGH
27-Jun-87	09:28 PM		57.8	LOW
28-Jun-87	12:28 PM	69.3		HIGH
28-Jun-87	09:24 PM		49.9	LOW

Jun-87 SUMMARY

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
29-Jun-87	11:17 AM	56.5		HIGH
29-Jun-87	04:20 PM		44.1	LOW
30-Jun-87	12:14 PM	67.5		HIGH
30-Jun-87	10:22 PM		52.9	LOW
01-Jul-87	02:47 AM		53.2	LOW
01-Jul-87	02:23 PM	81.5		HIGH
02-Jul-87	02:04 AM		53.5	LOW
02-Jul-87	12:33 PM	75.8		HIGH
03-Jul-87	11:25 AM	75.5		HIGH
03-Jul-87	10:04 PM		57.9	LOW
04-Jul-87	02:40 AM		51.6	LOW
04-Jul-87	12:08 PM	73.5		HIGH
05-Jul-87	02:29 AM		51.6	LOW
05-Jul-87	01:32 PM	79.3		HIGH
06-Jul-87	10:00 AM	74.4		HIGH
06-Jul-87	09:44 PM		49.8	LOW
07-Jul-87	01:38 AM		48.2	LOW
07-Jul-87	12:29 PM	75.7		HIGH
08-Jul-87	01:44 AM		53.0	LOW
08-Jul-87	11:56 AM	74.4		HIGH
09-Jul-87	11:11 AM	79.0		HIGH
09-Jul-87	09:41 PM		56.5	LOW
10-Jul-87	12:07 PM	70.5		HIGH
10-Jul-87	10:08 PM		46.5	LOW
11-Jul-87	08:42 AM	57.5		HIGH
11-Jul-87	05:58 PM		38.1	LOW
12-Jul-87	01:15 AM		44.9	LOW
12-Jul-87	11:56 AM	64.7		HIGH
13-Jul-87	01:56 AM		44.5	LOW
13-Jul-87	01:23 PM	71.3		HIGH
14-Jul-87	01:22 AM		50.7	LOW
14-Jul-87	12:38 PM	75.6		HIGH
15-Jul-87	01:41 AM		55.2	LOW
15-Jul-87	01:17 PM	82.4		HIGH
16-Jul-87	08:20 AM	73.1		HIGH
16-Jul-87	08:19 PM		48.2	LOW
17-Jul-87	09:50 AM	64.6		HIGH
17-Jul-87	08:53 PM		45.0	LOW
18-Jul-87	12:59 PM	65.3		HIGH
18-Jul-87	09:11 PM		43.7	LOW
19-Jul-87	01:29 AM		42.5	LOW
19-Jul-87	01:10 PM	68.9		HIGH
20-Jul-87	04:40 AM	56.7		HIGH
20-Jul-87	07:18 PM		44.7	LOW
21-Jul-87	09:27 AM	64.8		HIGH
21-Jul-87	08:57 PM		49.1	LOW
22-Jul-87	01:26 AM		47.5	LOW
22-Jul-87	12:54 PM	73.9		HIGH
23-Jul-87	01:56 AM		49.0	LOW
23-Jul-87	12:44 PM	78.3		HIGH
24-Jul-87	02:50 AM		55.7	LOW
24-Jul-87	01:05 PM	83.1		HIGH
25-Jul-87	10:21 AM	69.8		HIGH
25-Jul-87	02:32 PM		49.4	LOW

	HIGH	LOW
AVG.	69.9	48.9
MAX.	78.9	57.8
MIN.	56.5	37.9

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
26-Jul-87	08:35 AM	73.0		HIGH
26-Jul-87	07:24 PM		48.2	LOW
27-Jul-87	09:08 AM	69.9		HIGH
27-Jul-87	07:30 PM		48.6	LOW
28-Jul-87	08:08 AM	69.7		HIGH
28-Jul-87	08:27 PM		50.4	LOW
29-Jul-87	04:12 AM	63.1		HIGH
29-Jul-87	08:04 PM		50.7	LOW
30-Jul-87	02:11 AM	57.6		HIGH
30-Jul-87	04:19 PM		47.7	LOW
31-Jul-87	06:14 AM	65.3		HIGH
31-Jul-87	04:54 PM		51.9	LOW
01-Aug-87	11:12 AM	73.8		HIGH
01-Aug-87	09:18 PM		56.9	LOW
02-Aug-87	02:38 AM	57.0		HIGH
02-Aug-87	10:52 AM	76.6		HIGH
03-Aug-87	10:46 AM	74.2		HIGH
03-Aug-87	08:13 PM		54.4	LOW
04-Aug-87	12:34 PM	74.6		HIGH
04-Aug-87	07:42 PM		56.2	LOW
05-Aug-87	03:36 AM		53.9	LOW
05-Aug-87	11:38 AM	75.6		HIGH
06-Aug-87	12:20 PM	65.6		HIGH
06-Aug-87	09:09 PM		45.4	LOW
07-Aug-87	09:39 AM	63.5		HIGH
07-Aug-87	08:32 PM		47.4	LOW
08-Aug-87	02:00 AM		45.4	LOW
08-Aug-87	12:58 PM	68.1		HIGH
09-Aug-87	02:12 AM		49.3	LOW
09-Aug-87	11:41 AM	70.3		HIGH
10-Aug-87	02:27 AM		50.7	LOW
10-Aug-87	08:41 AM	69.8		HIGH
11-Aug-87	10:26 AM	71.1		HIGH
11-Aug-87	08:50 PM		51.0	LOW
12-Aug-87	01:54 AM		48.5	LOW
12-Aug-87	10:53 AM	69.6		HIGH
13-Aug-87	07:31 AM	62.2		HIGH
13-Aug-87	09:01 PM		42.1	LOW
14-Aug-87	01:29 AM		42.0	LOW
14-Aug-87	12:45 PM	62.3		HIGH
15-Aug-87	02:07 AM		42.9	LOW
15-Aug-87	10:09 AM	63.7		HIGH
16-Aug-87	02:20 AM		41.4	LOW
16-Aug-87	12:21 PM	66.5		HIGH
17-Aug-87	11:55 AM	67.7		HIGH
17-Aug-87	09:16 PM		47.2	LOW
18-Aug-87	02:53 AM		47.3	LOW
18-Aug-87	12:19 PM	72.5		HIGH
19-Aug-87	03:01 AM		53.4	LOW
19-Aug-87	11:19 AM	76.9		HIGH
20-Aug-87	06:36 AM	66.3		HIGH
20-Aug-87	08:42 PM		43.0	LOW
21-Aug-87	08:24 AM	67.8		HIGH
21-Aug-87	10:51 AM		48.0	LOW

Jul-87 SUMMARY

	HIGH	LOW
AVG.	71.2	49.3
MAX.	83.1	57.9
MIN.	56.7	38.1

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
22-Aug-87	06:09 AM	64.4		HIGH
22-Aug-87	07:38 PM		44.6	LOW
23-Aug-87	07:20 AM	58.9		HIGH
23-Aug-87	07:15 PM		43.5	LOW
24-Aug-87	06:38 AM	60.0		HIGH
24-Aug-87	07:25 PM		38.6	LOW
25-Aug-87	07:21 AM	56.2		HIGH
25-Aug-87	05:00 PM		35.4	LOW
26-Aug-87	09:43 AM	57.6		HIGH
26-Aug-87	07:58 PM		39.3	LOW
27-Aug-87	02:36 AM		39.9	LOW
27-Aug-87	11:53 AM	62.1		HIGH
28-Aug-87	01:41 AM		45.5	LOW
28-Aug-87	10:26 AM	64.1		HIGH
29-Aug-87	02:03 AM		45.5	LOW
29-Aug-87	11:26 AM	68.9		HIGH
30-Aug-87	02:20 AM		48.2	LOW
30-Aug-87	09:39 AM	72.5		HIGH
31-Aug-87	02:06 AM		50.7	LOW
31-Aug-87	11:06 AM	72.4		HIGH
01-Sep-87	01:20 AM		52.8	LOW
01-Sep-87	10:46 AM	75.0		HIGH
02-Sep-87	01:49 AM		49.7	LOW
02-Sep-87	07:14 AM	67.7		HIGH
03-Sep-87	09:41 AM	70.3		HIGH
03-Sep-87	08:27 PM		43.8	LOW
04-Sep-87	03:21 AM		43.0	LOW
04-Sep-87	10:53 AM	62.6		HIGH
11-Sep-87	11:47 AM	70.5		HIGH
11-Sep-87	08:32 PM		50.4	LOW
12-Sep-87	02:57 AM		48.2	LOW
12-Sep-87	12:00 PM	68.6		HIGH
13-Sep-87	09:57 AM	50.4		HIGH
13-Sep-87	07:55 PM		35.6	LOW
14-Sep-87	01:35 AM		35.7	LOW
14-Sep-87	08:17 AM	57.6		HIGH
15-Sep-87	01:26 AM		43.2	LOW
15-Sep-87	11:25 AM	65.6		HIGH
16-Sep-87	10:46 AM	63.4		HIGH
16-Sep-87	09:19 PM		42.1	LOW
17-Sep-87	01:24 AM		41.9	LOW
17-Sep-87	10:57 AM	65.8		HIGH
18-Sep-87	01:41 AM		40.4	LOW
18-Sep-87	10:15 AM	64.3		HIGH
19-Sep-87	02:45 AM		46.7	LOW
19-Sep-87	11:58 AM	65.9		HIGH
20-Sep-87	11:04 AM	70.1		HIGH
20-Sep-87	10:31 PM		46.7	LOW
21-Sep-87	11:23 AM	67.0		HIGH
21-Sep-87	09:19 PM		48.7	LOW
22-Sep-87	01:54 AM		45.1	LOW
22-Sep-87	12:06 PM	70.1		HIGH
23-Sep-87	02:54 AM		48.8	LOW
23-Sep-87	10:59 AM	72.1		HIGH

Aug-87 SUMMARY

	HIGH	LOW
AVG.	66.2	48.3
MAX.	76.9	56.9
MIN.	56.2	35.4

UTAH POWER & LIGHT CO. EAST MOUNTAIN TEMPERATURES

DATE	TIME	TEMPERATURE (DEG. F)		
24-Sep-87	11:57 AM	70.4		HIGH
24-Sep-87	09:50 PM		48.2	LOW
25-Sep-87	10:27 AM	70.2		HIGH
25-Sep-87	09:07 PM		46.4	LOW
26-Sep-87	11:11 AM	66.9		HIGH
26-Sep-87	09:10 PM		43.4	LOW
27-Sep-87	02:05 AM		43.5	LOW
27-Sep-87	10:39 AM	62.6		HIGH
28-Sep-87	01:29 AM		41.3	LOW
28-Sep-87	11:14 AM	65.1		HIGH
29-Sep-87	02:29 AM		41.0	LOW
29-Sep-87	12:10 PM	66.6		HIGH
30-Sep-87	01:52 AM		43.2	LOW
30-Sep-87	11:10 AM	68.6		HIGH

Sep-87 SUMMARY

	HIGH	LOW
AVG.	65.2	44.2
MAX.	75.0	52.8
MIN.	50.4	35.6

APPENDIX J

utah power
& LIGHT COMPANY
MINING DIVISION
Field Office
P. O. Box 1005
Huntington, UT 84528

(801) 653-2312
(801) 653-2318

May 31, 1988

Mr. Tom Munson
Utah State Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203

Dear Tom:

Per your request of February 9, 1988 we have compiled a summary of our hydrologic monitoring plan and yearly monitoring schedules. The summary, a copy of which is enclosed for your review, includes a listing of the locations in which hydrologic parameters are monitored and the parameters tested (i.e., flow, quality). It will be included as an appendix in our 1987 Hydrologic Monitoring Report which will be completed in June. According to your recommendations we began monitoring according to the plan in January 1988.

We plan to include the plan in the mid-term review for the Deer Creek and Des-Bee-Dove mines and to add it to our Wilberg/Cottonwood permit as an amendment.

If you have any comments or suggestions regarding the summary, please contact me.

Sincerely,

Charles A. Semborski

Charles A. Semborski
Senior Geologist/Hydrologist

CAS/sh/1102
Enclosures

cc: D. Smaldone, w/enclosures
V. Payne "
R. Fry "

UTAH POWER & LIGHT COMPANY
MINING DIVISION - TECHNICAL SERVICES
HYDROLOGIC MONITORING PROGRAM
DEER CREEK, WILBERG/COTTONWOOD, and DES-BEE-DOVE MINES

I. Monitoring Locations

A. Surface Water Hydrology (see attached Map #1 for locations listed below)

1. Cottonwood Creek Drainage System
   a. Cottonwood Canyon Creek - USGS Flume: 700 feet North, 200 feet East of the Southwest corner of Section 31, Township 17 South, Range 7 East.
   b. Grimes Wash
      (1) Right Fork: (Approximately 1500 feet upstream from the inlet culvert for the disturbed area.) 550 feet North, 1500 feet West of the Southwest corner of Section 22, Township 17 South, Range 7 East.
      (2) Left Fork: (Approximately 50 feet upstream from the inlet culvert for the disturbed area.) 200 feet South, 2350 feet East of the Northwest corner of Section 27, Township 17 South, Range 7 East.
      (3) Below the mine: (Approximately 500 feet downstream from the outlet culvert below the disturbed area.) 1770 feet South, 1820 feet West of the Northeast corner of Section 27, Township 17 South, Range 7 East.

2. Huntington Creek Drainage System
   a. Huntington Creek: UP&L's Environmental Department monitors the following four sites along Huntington Creek:
      (1) Below Electric Lake*
      (2) Above the Forks*
      (3) Above the power plant diversion
      (4) Below the power plant

      * Not listed on map due to scale.
   b. Deer Creek
      (1) Above the mine: (Approximately 600 feet upstream from the mine facility.) 200 feet North, 800 feet West of the Southeast corner of Section 10, Township 17 South, Range 7 East.

(2) At Permit: (Approximately 5,000 feet downstream from the mine facility.) 480 feet North, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

(3) Below the Mine: (Approximately 12,000 feet downstream from the mine facility.) 480 feet South, 3360 feet East of the Northwest corner of Section 1, Township 17 South, Range 7 East.

c. Meetinghouse Canyon - South Fork: (Approximately 200 feet upstream from the north and south convergence.) 800 feet North, 1500 feet East of the Southwest corner of Section 35, Township 16 South, Range 7 East.

B. Groundwater Hydrology

1. East Mountain Springs (see attached Map #2 for spring locations)

Burnt Tree *
Elk Spring *
Sheba Springs *
Ted's Tub
79-2
79-10 *
79-15
79-23 *
79-24
79-26 *
79-29 *
79-34
79-35 *
80-41
80-43
80-44 *
80-46 *
80-47
82-51
82-52 *
84-56 *

* Recession Study Springs

2. Piezometric Data

a. Surface

(1) Rilda Canyon (see attached Map #1 for locations)

P1
P2
P3

P4
P5
EM-47

(2) Cottonwood Canyon Creek
EM-31

b. Underground (Deer Creek): Program was terminated due to access and mine construction projects. New locations will be added when prospective sites meet long-term monitoring criteria.

3. In-Mine
   a. Deer Creek Mine (see attached Map #3 for locations)
      (a) 3rd South "B" xc-21
      (b) 3rd North xc-41
   b. Wilberg/Cottonwood Mines (see attached Map #4 for locations)
      (a) 2nd South xc-11
      (b) 4th East xc-24

II. Monitoring Schedule

A. Field Measurement: Listed below are the sites which will be monitored by UP&L Mining Division in accordance with the guidelines established by DOGM; i.e.,
   - Date and Time
   - Flow
   - pH
   - Temperature
   - Dissolved oxygen

1. Cottonwood Canyon Creek
   a. Cottonwood Canyon Creek - USGS Flume
   b. Grimes Wash
      (1) Right Fork
      (2) Left Fork
      (3) Below the mine

2. Huntington Canyon Drainage
   a. Deer Creek
      (1) Above the mine
      (2) At Permit Boundary
      (3) Below the mine
   b. Meetinghouse Canyon - South Fork

3. East Mountain Springs

4. In-Mine
   a. Deer Creek
   b. Wilberg/Cottonwood

All sites will be monitored monthly except for East Mountain Springs and in-mine locations. East Mountain Springs will be field tested during the months of July and October. In addition, the Recession

Study Springs (denoted by asterisks in the Monitoring Location section) will be field tested from July through October. In-Mine locations will be field tested quarterly. wrong

B. Quality Sampling (Laboratory Measurements)

1. Surface Water Hydrology: 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 Quality (see Table #1). Quarterly sampling was initiated during March 1988 and will continue throughout the year; i.e., June, September, and December. Baseline analysis was performed in 1986 and will be repeated every five years thereafter.
   a. Cottonwood Creek Drainage, Grimes Wash
      (1) Right Fork
      (2) Left Fork
      (3) Below the mine
   b. Huntington Creek Drainage
      (1) Deer Creek
         (a) Above the mine
         (b) Below the mine
      (2) Meetinghouse Canyon - South Fork

2. Groundwater Hydrology
   a. East Mountain Springs: Water samples will be collected and analyzed during the months of July and October. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2). In addition, the Recession Study Springs (denoted by asterisks in the Monitoring Location section) will be sampled monthly for the following parameters:
      (1) Total Hardness
      (2) Carbonate
      (3) Total Manganese

      (See attached memo for clarification.)
   b. In-Mine: Two four water samples will be collected and anlyzed per mine quarterly. Parameters analyzed are those listed in the DOGM Guidelines for Groundwater Water Quality (see Table #2).

X

wrong

TABLE 1

SURFACE WATER BASELINE, OPERATIONAL AND POSTMINING WATER QUALITY PARAMETER LIST

Field Measurements:

*	-	Water Levels or Flow
*	-	pH
*	-	Specific Conductivity (umhos/cm)
*	-	Temperature (C^o)
*	-	Dissolved Oxygen (ppm) (perennial streams only)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements are to be analyzed in total and dissolved forms.)

#	*	-	Total Settleable Solids
#	*	-	Total Suspended Solids
	*	-	Total Dissolved Solids
	*	-	Total Hardness (as $CaCO_3$)
	*		Acidity ($CaCO_3$)
		-	Aluminum (Al)
		-	Arsenic (As)
		-	Barium (Ba)
		-	Boron (B)
	*	-	Carbonate (CO_3^{-2})
	*	-	Bicarbonate (HCO_3^-)
		-	Cadmium (Cd)
	*	-	Calcium (Ca)
	*	-	Chloride (Cl^-)
		-	Chromium (Cr)
		-	Copper (Cu)
		-	Fluoride (F^-)
	*	-	Iron (Fe)
		-	Lead (Pb)
	*	-	Magnesium (Mg)
	*	-	Total Manganese (Mn)
		-	Mercury (Hg)
		-	Molybdenum (Mo)
		-	Nickel (Ni)
		-	Nitrogen: Ammonia (NH_3)
		-	Nitrite (NO_2)
		-	Nitrate (NO_3^-)
	*	-	Potassium (K)
		-	Phosphate (PO_4^{-3})
		-	Selenium (Se)
	*	-	Sodium (Na)
	*	-	Sulfate (SO_4^{-2})
		-	Sulfide (S^-)
		-	Zinc (Zn)
	*	-	Oil and Grease
	*	-	Cation-Anion Balance

Sampling Period:

-Baseline

*Operational, Postmining

#Construction

TABLE 2

GROUND WATER BASELINE, OPERATIONAL AND POSTMINING WATER QUALITY PARAMETER LIST

Field Measurements:

* - Water Levels or Flow
* - pH
* - Specific Conductivity (umhos/cm)
* - Temperature (C^o)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements are to be analyzed in dissolved form only.)

* - Total Dissolved Solids
* - Total Hardness (as $CaCO_3$)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
* - Carbonate (CO_3^{-2})
* - Bicarbonate (HCO_3^-)
- Cadmium (Cd)
* - Calcium (Ca)
* - Chloride (CL^-)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F^-)
* - Iron (Fe)
- Lead (Pb)
* - Magnesium (Mg)
* - Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH_3)
- Nitrite (NO_2)
- Nitrate (NO_3^-)
* - Potassium (K)
- Phosphate (PO_4^{-3})
- Selenium (Se)
* - Sodium (Na)
* - Sulfate (SO_4^{-2})
- Sulfide (S^-)
- Zinc (Zn)

Sampling Period:

-Baseline
*Operational, Postmining

utah power
& LIGHT COMPANY
MINING DIVISION
Field Office
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Huntington, UT 84528

(801) 653-2312
(801) 653-2318

RESUBMITTED: Corrections made May 13, 1988

April 30, 1987

Mr. Tom Munson
UTAH STATE DIVISION of
OIL, GAS & MINING
3 Triad Center
Salt Lake City, UT 84180-1204

Dear Tom:

As we discussed in our meeting on April 13, Utah Power & Light Company is desirous of revising its Hydrologic Monitoring Program. It is our contention that the data collected to date more than adequately define the flow characteristics and quality of the springs relative to baseline data; therefore, we propose to modify our Monitoring Program as follows:

I. Only the springs located within or immediately adjacent to areas overlying coal to be mined in the next five (5) years or areas overlying previously mined areas will be monitored [except that the twelve (12) discharge recession curve springs and Rilda Canyon wells (in lieu of North and South springs) will all be monitored regardless of location].

   A. Each Annual Hydrologic Monitoring Report will include a map which will show previously mined areas and areas to be mined in the upcoming five (5) years. The springs to be monitored in the upcoming year will be identified from the map.

   B. New springs will be added each year based on the new areas to be mined in the upcoming five (5) years.

   C. Springs will cease to be monitored when 1) it has been determined that mining induced subsidence has stabilized and that the spring monitoring indicates stable hydrologic conditions, and 2) it is mutually agreed by UP&L and the Division that monitoring should be terminated.

   D. The springs will be monitored in July and as many as are accessible will be monitored in October.

   E. Each spring will be measured for the following parameters:

      1. Quantity of discharge
      2. pH (Field Measurement)

3. Temperature (Field Measurement)
4. Conductivity (Field Measurement)
5. Dissolved oxygen (Field Measurement)
6. Bicarbonate Alkalinity
7. Chloride
8. Conductivity
9. pH
10. Solids, Total Dissolved
11. Solids, Total Suspended
12. Sulfate
13. Total Cation
14. Total Anion
15. Calcium
16. Iron
17. Magnesium
18. Potassium
19. Sodium
20. Hardness
21. Carbonate
22. Manganese

E. In 1987 the following springs will be monitored under the program:

1. 79-2
2. 79-15
3. 79-24
4. 79-32
5. 79-34
6. 79-38
7. 79-40
8. 80-41
9. 80-43
10. 80-47
11. 82-51
12. Ted's Tub

II. The twelve (12) springs identified for discharge recession curve monitoring and Rilda Canyon wells will be monitored monthly, access permitting, each year between July and October.

A. The springs include:

1. 79-10
2. 79-23
3. 79-26
4. 79-29
5. 79-35
6. 80-44
7. 80-46
8. 82-52
9. 84-56

10. Burnt Tree
11. Elk
12. Sheba
13. Rilda Canyon Wells

B. The springs will be measured twice a year (July and October) in accordance with the parameters listed for spring monitoring under item I. E. (DOGM's Guidelines for Groundwater Water Quality) of this document.

C. Recession Study Springs will be measured monthly for the following parameters:

1. Discharge
2. Specific conductivity (Field Measurement)
3. Temperature (Field Measurement)
4. pH (Field Measurement)
5. Total Hardness
6. Carbonate
7. Total Manganese

III. All other portions of our Hydrologic Monitoring, both surface and underground, will remain unchanged and as listed in the approved Plan.

I am submitting this to you so that you may understand our intent. If you are in agreement with the changes, we will submit a formal modification to our Monitoring Plan. Please contact me if you have any questions and when you have determined that the changes listed are acceptable.

Sincerely,

Rodger C. Fry
Director of Exploration

RCF/sh/858
cc: C. Semborski

YEAR ======) 1988 & 1990

			LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SURFACE	HYDROLOGY	COTTONWOOD CREEK DRAINAGE SYSTEM	COTTONWOOD CANYON CREEK	field	field	field	field	field	field	field	field	field	field	field	field
			GRIMES WASH												
			RIGHT FORK	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			LEFT FORK	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			BELOW MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
		HUNTINGTON CREEK DRAINAGE SYSTEM	DEER CREEK												
			ABOVE MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			@ PERMIT ✓	field	field	field	field	field	field	field	field	field	field	field	field
			BELOW MINE	field	field	operational	field	field	operational	field	field	operational	field	field	operational
			MEETINGHOUSE CANYON	field	field	operational	field	field	operational	field	field	operational	field	field	operational
GROUNDWATER	HYDROLOGY		EAST MOUNTAIN SPRINGS							operational *			operational *		
			RECESSION STUDY SPRINGS								operational ** modified **	operational ** modified **			
			IN-MINE												
			DEER CREEK			operational			operational			operational			operational
			WILBERG/ COTTONWOOD			operational			operational			operational			operational

* includes recession study springs
** see attached mean

YEAR ======) 1989
(Baseline monitoring preceeding repermitting)

			LOCATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SURFACE	HYDROLOGY	COTTONWOOD CREEK DRAINAGE SYSTEM	COTTONWOOD CANYON CREEK	field	field	field	field	field	field	field	field	field	field	field	field
			GRIMES WASH												
			RIGHT FORK	field	field	operational	field	field	baseline	field	field	operational	field	field	baselin
			LEFT FORK	field	field	operational	field	field	baseline	field	field	operational	field	field	baselin
			BELOW MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baselin
		HUNTINGTON CREEK DRAINAGE SYSTEM	DEER CREEK												
			ABOVE MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			@ PERMIT	field	field	field	field	field	field	field	field	field	field	field	field
			BELOW MINE	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
			MEETINGHOUSE CANYON	field	field	operational	field	field	baseline	field	field	operational	field	field	baseline
GROUNDWATER	HYDROLOGY		EAST MOUNTAIN SPRINGS							operational *			baseline *		
			RECESSION STUDY SPRINGS							* includes recession study springs ** see attached memo modified ** modified ** operational operational					
			IN-MINE												
			DEER CREEK			operational			baseline			operational			operationa
			WILBERG/ COTTONWOOD			operational			baseline			operational			operationa