INTERMOUNTAIN POWER AGENCY

ANNUAL HYDROLOGIC MONITORING REPORT

HORSE CANYON MINE
CARBON COUNTY, UTAH
ACT/007/013

INTRODUCTION

This 1997 Annual Hydrologic Monitoring Report for the Intermountain Power Agency (IPA) Horse Canyon Mine, Carbon County, Utah, Permit No. ACT/007/013 is submitted to the Division for their records and as a reference document. This report has been divided into six sections including this introduction. Each of the sections, except the introduction, presents a brief discussion concerning the monitoring results from each sample site and the two UPDES discharge locations. Included with this report are appendices containing the laboratory and field data sheets (Appendix A) and bar graphs illustrating measured flow, conductivity, pH, and concentrations of TDS, total iron, and hardness (Appendix B).

It is important to note that each surface and groundwater site was monitored on a quarterly basis, while the UPDES discharge points are monitored on a monthly basis.

Monitoring Site B-1

This site is located in Horse Canyon Creek downstream of the mine area. This site was visited quarterly. Surface water flow was not observed at this location in 1997.

Monitoring Site HC-1

This site is located upstream of the mine site area on Horse Canyon Creek. Flows varied between a high of 30 gpm in March and a low of 12 gpm in September. Iron (total) was not detected in any water sample. TDS concentration ranged from a low of 870 mg/l to a high of 1470 mg/l (Appendix B).

The pH of the water samples from HC-1 was measured in the field and had a range from nearly neutral at 7.32 in September to slightly alkaline at 7.64 in June. Conductivity was also measured in the field and had a range of a high of 1000 umhos/cm in September to a low of 275 umhos/cm in April.

Monitoring Site RF-1

This site is located upstream of the point where the Little Horse Canyon Road crosses the Right Fork of Horse Canyon. Flows varied between a high of 20 gpm in March and a low of 5 gpm in June. Iron (total) was noted in the April water sample at 10.4 mg/l. This concentration is likely the result of iron carried in the sediment load from spring snowmelt. TDS concentration ranged from a low of 650 mg/l to a high of 880 mg/l (Appendix B).

The pH of the water samples from RF-1 was measured in the field and had a range from nearly neutral at 7.27 to slightly alkaline at 8.15. Conductivity was also measured in the field and had a range of a high of 1100 umhos/cm to a low of 720 umhos/cm.

Monitoring Site RS-2

This monitoring site is Redden Spring. The spring discharges from a sandstone ledge in the bottom of the Right Hand Fork of Horse Canyon. Measured spring flows varied between a high of 12 gpm and a low of 10 gpm. Iron (total) was not detected in the water samples. Typical TDS concentrations for RS-2 samples ranged from 820 mg/l to 1570 mg/l. Hardness concentrations were typically between a low of 361 mg/l and 747 mg/l.

The pH of the water samples from RS-2 was measured in the field and had a range from nearly neutral at 6.3 to slightly alkaline at 7.56. Conductivity was also measured in the field and had a range of a high of 850 umhos/cm to a low of 450 umhos/cm.

UPDES Discharge Points 001A and 002A

Discharge point 001A is located at the outlet structure of Sediment Pond 1 and discharge point 002A is located at the outlet structure of Sedimentation Pond 2. No water was discharged at either point in 1997.

APPENDIX A

LABORATORY AND FIELD DATA SHEETS

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # ~~RS-1~~ RS-2 Redden Spring

Sample Date 6-26-97

Sample Time 1010

Type: Spring X Stream _____ UPDES _____

Sample Collection Point _____

Appearance of Water: Clear X Slightly Cloudy____ Cloudy___ Opaque___

Flow/Depth (gpm) 12 GPM

Water Temperature (C) 10°C

pH 6.30

Specific Conductivity 850

Dissolved Oxygen 5

Comments: AREA AROUND SPRING DISCHARGE HEAVILY DISTURBED BY CATTLE - HAVE NEVER PREVIOUSLY OBSERVED DAMAGE TO THIS EXTE

Sampled by: Leo P. Clark

Laboratory CTEE, HUNTINGTON

Date Shipped 6-26-97

Sample ID# _____

Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-2

Sample Date N/A 6-26-97 - No Flow

Sample Time 0855

Type: Spring _____ Stream No Flow UPDES _____

Sample Collection Point _____

Appearance of Water: Clear ____ Slightly Cloudy____ Cloudy___ Opaque____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: _____

Sampled by: Leo P. Clark

Laboratory ~~GT&L~~ N/A Date Shipped_____

Sample ID# _____ Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-1

Sample Date 6-26-97

Sample Time 0910

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX. CARBON - EMERY CO. LINE - END OF ROAD

Appearance of Water: Clear X Slightly Cloudy____ Cloudy___ Opaque____

Flow/Depth (gpm) 20 GPM

Water Temperature (C) 17°C

pH 7.60

Specific Conductivity 850

Dissolved Oxygen 5

Comments: STREAM BED RECENTLY HEAVILY DISTURBED BY CATTLE MOVEMENT TO RANGE CREEK

Sampled by: Leo R. Clark

Laboratory CT&E, HUNTINGTON Date Shipped 6-26-97

Sample ID# _____ Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RF-1

Sample Date 6-26-97

Sample Time 1045

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX 150' DOWNSTREAM FROM ROAD CROSSING

Appearance of Water: Clear X Slightly Cloudy____ Cloudy___ Opaque___

Flow/Depth (gpm) 5 GPM

Water Temperature (C) 22°c

pH 8.15

Specific Conductivity 1100

Dissolved Oxygen 5

Comments: STREAM FLOWING CLEAR, BUT AREA HEAVILY DISTURBED WITH CATTLE. ALGAE PRESENT

Sampled by: Leo P. Clark

Laboratory CT &E, HUNTINGTON Date Shipped 6-26-97

Sample ID# _____ Date Results Received _____

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FAX: (801) 653-2436

August 6, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: HC-1

Kind of sample reported to us: Water

Rec'd 1215 hr.
Sampled 0910 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	7.60
DO	5
Flow	20 gpm
Conductivity	850
Turbidity	Clear
Temperature	17.0°C

NOTE: DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17413

·ameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
.alinity, Bicarbonate	521	5	mg/l	as HCO_3	SM2320-B	07-08-1997 0800	SC
..kalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	07-08-1997 0800	SC
Alkalinity, Total	430	5	mg/l	as $CaCO_3$	EPA 310.1	07-08-1997 0800	SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	08-05-1997 1315	MK
Anions	24.3	----	meq/l		---------	08-05-1997 1530	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	07-18-1997 0800	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	08-05-1997 1400	MK
Boron, Dissolved	0.3	0.1	mg/l		EPA 212.3	07-16-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	08-05-1997 0845	MK
Calcium, Dissolved	77	1	mg/l		EPA 215.1	08-05-1997 1200	MK
Cations	23.0	----	meq/l		---------	08-05-1997 1530	RJ
Chloride	24	1	mg/l		SM4500-Cl-B	07-23-1997 0830	SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	08-05-1997 1330	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	08-05-1997 0800	MK
Fluoride	0.28	0.01	mg/l		SM4500-F-C	07-24-1997 0800	RJ
Hardness, Total	678	----	mg/l	as $CaCO_3$	SM2340-B	08-05-1997 1530	RJ
Iron, Total	<0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	08-05-1997 0915	MK
Magnesium, Dissolved	118	2	mg/l		EPA 242.1	08-05-1997 1230	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	08-05-1997 1030	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	07-21-1997 0700	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	08-05-1997 1430	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	08-05-1997 0830	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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August 6, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: HC-1

Kind of sample reported to us: Water

Rec'd 1215 hr.
Sampled 0910 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	7.60
DO	5
Flow	20 gpm
Conductivity	850
Turbidity	Clear
Temperature	17.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17413

ameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
.rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	07-22-1997 0720 RJ
trogen, Nitrate-Nitrite	<0.1	0.1	mg/l as N	EPA 353.3	07-21-1997 0400 AR
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	06-27-1997 0700 JC
Phosphorous, Ortho-PO_4	0.03	0.01	mg/l as P	SM4500-P-E	06-25-1997 0730 RJ
Potassium, Dissolved	5	1	mg/l	EPA 258.1	08-05-1997 1045 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	07-18-1997 1130 MK
Sodium, Dissolved	215	2	mg/l	EPA 273.1	08-05-1997 1130 MK
Solids, Total Dissolved	1470	10	mg/l	EPA 160.1	07-02-1997 0700 JC
Sulfate	724	125	mg/l	EPA 375.4	07-16-1997 0730 SC
Sulfide	<1.0	0.1	mg/l	EPA 376.1	07-04-1997 1630 RJ
Zinc, Dissolved	0.03	0.01	mg/l	EPA 289.1	08-05-1997 0815 MK
Cation/Anion Balance	-2.7	----	%		08-05-1997 1530 RJ

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August 6, 1997

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7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: RF-1

Kind of sample reported to us: Water

Rec'd 1215 hr.
Sampled 1045 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	8.15
DO	5
Flow	5 gpm
Conductivity	1100
Turbidity	Clear
Temperature	22.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17414

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst
Alkalinity, Bicarbonate	513	5	mg/l	as HCO_3	SM2320-B	07-08-1997 0800 SC
Alkalinity, Carbonate	13	5	mg/l	as CO_3	SM2320-B	07-08-1997 0800 SC
Alkalinity, Total	443	5	mg/l	as $CaCO_3$	EPA 310.1	07-08-1997 0800 SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	08-05-1997 1315 MK
Anions	16.9	----	meq/l		---------	08-05-1997 1530 RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	07-18-1997 0800 MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	08-05-1997 1400 MK
Boron, Dissolved	0.4	0.1	mg/l		EPA 212.3	07-16-1997 0700 MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	08-05-1997 0845 MK
Calcium, Dissolved	26	1	mg/l		EPA 215.1	08-05-1997 1200 MK
Cations	14.1	----	meq/l		---------	08-05-1997 1530 RJ
Chloride	17	1	mg/l		SM4500-Cl-B	07-23-1997 0830 SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	08-05-1997 1330 MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	08-05-1997 0800 MK
Fluoride	0.27	0.01	mg/l		SM4500-F-C	07-24-1997 0800 RJ
Hardness, Total	328	----	mg/l	as $CaCO_3$	SM2340-B	08-05-1997 1530 RJ
Iron, Total	0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000 MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000 MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	08-05-1997 0915 MK
Magnesium, Dissolved	64	2	mg/l		EPA 242.1	08-05-1997 1230 MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	08-05-1997 1030 MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	07-21-1997 0700 MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	08-05-1997 1430 MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	08-05-1997 0830 MK

Respectfully submitted,
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August 6, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: RF-1

Kind of sample reported to us: Water

Rec'd 1215 hr.
Sampled 1045 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	8.15
DO	5
Flow	5 gpm
Conductivity	1100
Turbidity	Clear
Temperature	22.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17414

ameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	07-22-1997 0720	RJ
rogen, Nitrate-Nitrite	<0.1	0.1	mg/l as N	EPA 353.3	07-21-1997 0400	AR
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	06-27-1997 0700	JC
Phosphorous, Ortho-PO_4	0.04	0.01	mg/l as P	SM4500-P-E	06-25-1997 0730	RJ
Potassium, Dissolved	3	1	mg/l	EPA 258.1	08-05-1997 1045	MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	07-18-1997 1130	MK
Sodium, Dissolved	172	2	mg/l	EPA 273.1	08-05-1997 1130	MK
Solids, Total Dissolved	880	10	mg/l	EPA 160.1	07-02-1997 0700	JC
Sulfate	366	125	mg/l	EPA 375.4	07-16-1997 0730	SC
Sulfide	<1.0	0.1	mg/l	EPA 376.1	07-04-1997 1630	RJ
Zinc, Dissolved	0.02	0.01	mg/l	EPA 289.1	08-05-1997 0815	MK
Cation/Anion Balance	- 9.1	----	%		08-05-1997 1530	RJ

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August 6, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: RS-~~1~~2

Kind of sample reported to us: Water

Rec'd 1215 hr..
Sampled 1010 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	6.3
DO	5
Flow	12 gpm
Conductivity	850
Turbidity	Clear
Temperature	10.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17412

rameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
kalinity, Bicarbonate	549	5	mg/l	as HCO_3	SM2320-B	07-08-1997 0800	SC
kalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	07-08-1997 0800	SC
Alkalinity, Total	450	5	mg/l	as $CaCO_3$	EPA 310.1	07-08-1997 0800	SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	08-05-1997 1315	MK
Anions	15.8	----	meq/l		---------	08-05-1997 1530	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	07-18-1997 0800	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	08-05-1997 1400	MK
Boron, Dissolved	0.2	0.1	mg/l		EPA 212.3	07-16-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	08-05-1997 0845	MK
Calcium, Dissolved	44	1	mg/l		EPA 215.1	08-05-1997 1200	MK
Cations	13.7	----	meq/l		---------	08-05-1997 1530	RJ
Chloride	17	1	mg/l		SM4500-Cl-B	07-23-1997 0830	SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	08-05-1997 1330	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	08-05-1997 0800	MK
Fluoride	0.37	0.01	mg/l		SM4500-F-C	07-24-1997 0800	RJ
Hardness, Total	361	----	mg/l	as $CaCO_3$	SM2340-B	08-05-1997 1530	RJ
Iron, Total	<0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	08-05-1997 1000	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	08-05-1997 0915	MK
Magnesium, Dissolved	61	2	mg/l		EPA 242.1	08-05-1997 1230	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	08-05-1997 1030	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	07-21-1997 0700	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	08-05-1997 1430	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	08-05-1997 0830	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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August 6, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID: RS-~~1~~ 2

Kind of sample reported to us: Water

Rec'd 1215 hr.
Sampled 1010 hr.

Sample taken at

Sample taken by: Leo Clark

Date sampled: June 26, 1997

Date received: June 26, 1997

FIELD MEASUREMENTS

pH	6.3
DO	5
Flow	12 gpm
Conductivity	850
Turbidity	Clear
Temperature	10.0°C

NOTE:DISSOLVED METALS FILTERED AT LAB!

Analysis report no. 59-17412

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	07-22-1997 0720	RJ
trogen, Nitrate-Nitrite	0.3	0.1	mg/l as N	EPA 353.3	07-21-1997 0400	AR
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	06-27-1997 0700	JC
Phosphorous, Ortho-PO_4	0.04	0.01	mg/l as P	SM4500-P-E	06-27-1997 0730	RJ
Potassium, Dissolved	1	1	mg/l	EPA 258.1	08-05-1997 1045	MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	07-18-1997 1130	MK
Sodium, Dissolved	149	2	mg/l	EPA 273.1	08-05-1997 1130	MK
Solids, Total Dissolved	870	10	mg/l	EPA 160.1	07-02-1997 0700	JC
Sulfate	303	250	mg/l	EPA 375.4	07-16-1997 0730	SC
Sulfide	<1.0	0.1	mg/l	EPA 376.1	07-04-1997 1630	RJ
Zinc, Dissolved	0.02	0.01	mg/l	EPA 289.1	08-05-1997 0815	MK
Cation/Anion Balance	-7.0	----	%		08-05-1997 1530	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-1

Sample Date 3-27-97

Sample Time 1600

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX. CARBON, EMERY CO. LINE - END OF ROAD

Appearance of Water: Clear ✓ Slightly Cloudy____ Cloudy___ Opaque___

Flow/Depth (gpm) 30 GPM

Water Temperature (C) 11°c

pH 7.59

Specific Conductivity 275

Dissolved Oxygen 5

Comments: SPRING RUN - OFF UNDERWAY

Sampled by: L. P. CLARK

Laboratory CTEE - HUNTINGTON Date Shipped 3-28-97

Sample ID# HC-1 Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RS-~~1~~ 2 AS

Sample Date 3-27-97

Sample Time 1640

Type: Spring X Stream _____ UPDES _____

Sample Collection Point PIPE DISCHARGE FROM SPRING

Appearance of Water: Clear X Slightly Cloudy____ Cloudy___ Opaque____

Flow/Depth (gpm) 10 GPM

Water Temperature (C) 10°C

pH 7.70

Specific Conductivity 450

Dissolved Oxygen 5

Comments: _____

Sampled by: L. P. CLARK

Laboratory CT&E HUNTINGTON Date Shipped 3-28-97

Sample ID# RS-1 Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RF-1

Sample Date 3-27-97

Sample Time 1515

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX 150' DOWNSTREAM FROM ROAD CROSSING

Appearance of Water: Clear ____ Slightly Cloudy ____ Cloudy ____ Opaque ____

Flow/Depth (gpm) 20 GPM

Water Temperature (C) 12°C

pH 7.27

Specific Conductivity 720

Dissolved Oxygen 6

Comments: SPRING RUN-OFF CONTRIBUTING TO FLOW

Sampled by: L. P. CLARK

Laboratory CTEB, HUNTINGTON Date Shipped 3-28-97

Sample ID# RF-1 Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-2

Sample Date N/A 3-27-97 - NO FLOW

Sample Time CHECKED 1650 & 0830 ON 3-28-97

Type: Spring _____ Stream X UPDES _____

Sample Collection Point _____

Appearance of Water: Clear ____ Slightly Cloudy____ Cloudy___ Opaque____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: _____

Sampled by: L. P. CLARK

Laboratory — Date Shipped —

Sample ID# _____ Date Results Received _____

COMMERCIAL TESTING & ENGINEERING CO.

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

: 19089

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

April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: RS-~~1~~2
Rec'd 1500 hr.
Sampled 1640 hr.

FIELD MEASUREMENTS

pH	7.70
DO	5
Flow	10 GPM
Conductivity	450
Turbidity	Clear
Temperature	10.0°C

NOTE: Dissolved metals filtered at lab!
NOTE: Nitrate & Ortho Phos. received to late to analyze before time expired!

Analysis report no. 59-17080

ıneter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
ılinity, Bicarbonate	542	5	mg/l	as HCO_3	SM2320-B	04-01-1997 1100	SW
...alinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	04-01-1997 1100	SW
Alkalinity, Total	444	5	mg/l	as $CaCO_3$	EPA 310.1	04-01-1997 1100	SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	04-04-1997 1245	MK
Anions	14.7	----	meq/l		---------	04-08-1997 0815	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	04-15-1997 0830	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	04-04-1997 1330	MK
Boron, Dissolved	0.3	0.1	mg/l		EPA 212.3	04-14-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	04-04-1997 0815	MK
Calcium, Dissolved	44	1	mg/l		EPA 215.1	04-04-1997 1130	MK
Cations	14.4	----	meq/l		---------	04-08-1997 0815	RJ
Chloride	17	1	mg/l		SM4500-Cl-B	04-01-1997 0800	SW
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	04-04-1997 1300	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	04-04-1997 0730	MK
Fluoride	0.52	0.01	mg/l		SM4500-F-C	04-24-1997 1130	RJ
Hardness, Total	382	----	mg/l	as $CaCO_3$	SM2340-B	04-08-1997 0815	RJ
Iron, Total	<0.1	0.5	mg/l		EPA 236.1	04-04-1997 0930	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	04-04-1997 0930	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	04-04-1997 0845	MK
Magnesium, Dissolved	66	1	mg/l		EPA 242.1	04-04-1997 1145	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	04-04-1997 1000	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	04-01-1997 0700	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	04-04-1997 1345	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	04-04-1997 0800	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (801) 653-2436

April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: RS-~~1~~2
Rec'd 1500 hr.
Sampled 1640 hr.

FIELD MEASUREMENTS

pH	7.70
DO	5
Flow	10 GPM
Conductivity	450
Turbidity	Clear
Temperature	10.0°C

NOTE: Dissolved metals filtered at lab!
NOTE: Nitrate & Ortho Phos. received to late to analyze before time expired!

Analysis report no. 59-17080

ameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	04-07-1997 0800	SW
rogen, Nitrate-Nitrite	0.2	0.1	mg/l as N	EPA 353.3	04-21-1997 0500	JC
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	03-31-1997 0830	JC
Phosphorous, Ortho-PO_4	0.02	0.01	mg/l as P	SM4500-P-E	03-31-1997 0830	JC
Potassium, Dissolved	1	1	mg/l	EPA 258.1	04-04-1997 1030	MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	04-15-1997 1100	MK
Sodium, Dissolved	156	2	mg/l	EPA 273.1	04-04-1997 1045	MK
Solids, Total Dissolved	820	10	mg/l	EPA 160.1	04-03-1997 0700	JC
Sulfate	257	50	mg/l	EPA 375.4	04-02-1997 0700	SW
Sulfide	<1.0	1.0	mg/l	EPA 376.1	04-02-1997 1015	RJ
Zinc, Dissolved	0.04	0.01	mg/l	EPA 289.1	04-04-1997 0745	MK
Cation/Anion Balance	~0.9	----	%		04-08-1997 0815	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory RJ

COMMERCIAL TESTING & ENGINEERING CO.
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TEL: (801) 653-2311
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April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: HC-1
Rec'd 1500 hr.
Sampled 1600 hr.

FIELD MEASUREMENTS

pH	7.59
DO	5
Flow	30 GPM
Conductivity	275
Turbidity	Murky
Temperature	11.0°C

NOTE: Dissolved metals filtered at lab!
NOTE: Nitrate & Ortho Phos. received to late before time expired!

Analysis report no. 59-17081

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst
Alkalinity, Bicarbonate	448	5	mg/l	as HCO_3	SM2320-B	04-01-1997 1100 SW
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	04-01-1997 1100 SW
Alkalinity, Total	367	5	mg/l	as $CaCO_3$	EPA 310.1	04-01-1997 1100 SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	04-04-1997 1245 MK
Anions	20.4	----	meq/l		---------	04-08-1997 0815 RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	04-15-1997 0830 MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	04-04-1997 1330 MK
Boron, Dissolved	0.3	0.1	mg/l		EPA 212.3	04-14-1997 0700 MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	04-04-1997 0815 MK
Calcium, Dissolved	80	1	mg/l		EPA 215.1	04-04-1997 1130 MK
Cations	20.6	----	meq/l		---------	04-08-1997 0815 RJ
Chloride	22	1	mg/l		SM4500-Cl-B	04-01-1997 0800 SW
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	04-04-1997 1300 MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	04-04-1997 0730 MK
Fluoride	0.54	0.01	mg/l		SM4500-F-C	04-24-1997 1130 RJ
Hardness, Total	624	----	mg/l	as $CaCO_3$	SM2340-B	04-08-1997 0815 RJ
Iron, Total	0.7	0.5	mg/l		EPA 236.1	04-04-1997 0930 MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	04-04-1997 0930 MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	04-04-1997 0845 MK
Magnesium, Dissolved	103	5	mg/l		EPA 242.1	04-04-1997 1145 MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	04-04-1997 1000 MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	04-01-1997 0700 MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	04-04-1997 1345 MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	04-04-1997 0800 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

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April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: HC-1
Rec'd 1500 hr.
Sampled 1600 hr.

FIELD MEASUREMENTS

pH	7.59
DO	5
Flow	30 GPM
Conductivity	275
Turbidity	Murky
Temperature	11.0°C

NOTE: Dissolved metals filtered at lab!
NOTE: Nitrate & Ortho Phos. received to late before time expired!

Analysis report no. 59-17081

'ameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst	
.rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	04-07-1997 0800	SW
trogen, Nitrate-Nitrite	<0.1	0.1	mg/l as N	EPA 353.3	04-21-1997 0500	JC
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	03-31-1997 0830	JC
Phosphorous, Ortho-PO_4	0.02	0.01	mg/l as P	SM4500-P-E	03-31-1997 0830	JC
Potassium, Dissolved	5	1	mg/l	EPA 258.1	04-04-1997 1030	MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	04-15-1997 1100	MK
Sodium, Dissolved	184	5	mg/l	EPA 273.1	04-04-1997 1045	MK
Solids, Total Dissolved	1310	10	mg/l	EPA 160.1	04-03-1997 0700	JC
Sulfate	596	250	mg/l	EPA 375.4	04-02-1997 0700	SW
Sulfide	<1.0	1.0	mg/l	EPA 376.1	04-02-1997 1015	RJ
Zinc, Dissolved	0.03	0.01	mg/l	EPA 289.1	04-04-1997 0745	MK
Cation/Anion Balance	0.6	----	%		04-08-1997 0815	RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stone

Huntington Laboratory

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April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at:

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: RF-1
Rec'd 1500 hr.
Sampled 1515 hr.

FIELD MEASUREMENTS

pH	7.27
DO	6
Flow	20 GPM
Conductivity	720
Turbidity	H1
Temperature	12.0°C

NOTE: Dissolved metals filtered at lab!
NOTE: Nitrate & Ortho Phos. received to late to analyze before time expired!

Analysis report no. 59-17079

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
Alkalinity, Bicarbonate	407	5	mg/l	as HCO_3	SM2320-B	04-04-1997 1000	SW
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	04-04-1997 1000	SW
Alkalinity, Total	344	5	mg/l	as $CaCO_3$	EPA 310.1	04-04-1997 1000	SW
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	04-04-1997 1245	MK
Anions	11.2	----	meq/l		---------	04-08-1997 1120	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	04-15-1997 0830	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	04-04-1997 1330	MK
Boron, Dissolved	0.2	0.1	mg/l		EPA 212.3	04-14-1997 0700	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	04-04-1997 0815	MK
Calcium, Dissolved	35	1	mg/l		EPA 215.1	04-04-1997 1130	MK
Cations	10.1	----	meq/l		---------	04-08-1997 1120	RJ
Chloride	14	1	mg/l		SM4500-Cl-B	04-01-1997 0800	SW
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	04-04-1997 1300	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	04-04-1997 0730	MK
Fluoride	0.49	0.01	mg/l		SM4500-F-C	04-24-1997 1130	RJ
Hardness, Total	264	----	mg/l	as $CaCO_3$	SM2340-B	04-08-1997 1120	RJ
Iron, Total	10.4	0.5	mg/l		EPA 236.1	04-04-1997 0930	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	04-04-1997 0930	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	04-04-1997 0845	MK
Magnesium, Dissolved	43	1	mg/l		EPA 242.1	04-04-1997 1145	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	04-04-1997 1000	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	04-01-1997 0700	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	04-04-1997 1345	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	04-04-1997 0800	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Scott

Huntington Laboratory

COMMERCIAL TESTING & ENGINEERING CO.

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April 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: March 27, 1997

Date received: March 28, 1997

Sample identification by LADWP

ID: RF-1
Rec'd 1500 hr.
Sampled 1515 hr.

FIELD MEASUREMENTS

pH	7.27
DO	6
Flow	20 GPM
Conductivity	720
Turbidity	H1
Temperature	12.0°C

NOTE:Dissolved metals filtered at lab!
NOTE:Nitrate & Ortho Phos. received to late to analyze before time expired!

Analysis report no. 59-17079

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Nitrogen, Ammonia	0.2	0.5	mg/l as N	EPA 350.3	04-07-1997 0800 SW
Nitrogen, Nitrate-Nitrite	0.1	0.1	mg/l as N	EPA 353.3	04-21-1997 0500 JC
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	03-31-1997 0830 JC
Phosphorous, Ortho-PO_4	0.03	0.01	mg/l as P	SM4500-P-E	03-31-1997 0830 JC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	04-04-1997 1030 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	04-15-1997 1100 MK
Sodium, Dissolved	109	1	mg/l	EPA 273.1	04-04-1997 1045 MK
Solids, Total Dissolved	650	10	mg/l	EPA 160.1	04-03-1997 0700 JC
Sulfate	198	50	mg/l	EPA 375.4	04-02-1997 0700 SW
Sulfide	<1.0	1.0	mg/l	EPA 376.1	04-04-1997 1015 RJ
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	04-04-1997 0745 MK
Cation/Anion Balance	-5.3	----	%		04-08-1997 1120 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Larry Stout

Huntington Laboratory

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-1

Sample Date 9-28-97

Sample Time 1325

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX. CARBON-EMERY CO. LINE - END OF ROAD

Appearance of Water: Clear X Slightly Cloudy_____ Cloudy___ Opaque____

Flow/Depth (gpm) 12 GPM

Water Temperature (C) 19°C

pH 7.32

Specific Conductivity 1000

Dissolved Oxygen 4

Comments: _____

Sampled by: L. P. CLARK

Laboratory CT&E, HUNTINGTON, UT Date Shipped 9-29-97

Sample ID# HC-1 Date Results Received REPORT DATED 11-4-97

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RF 1

Sample Date 9-28-97

Sample Time 1410

Type: Spring _____ Stream X UPDES _____

Sample Collection Point APPROX 150' DOWNSTREAM FROM ROAD CROSSING

Appearance of Water: Clear ____ Slightly Cloudy ____ Cloudy X Opaque ____

Flow/Depth (gpm) 6 GPM

Water Temperature (C) 21°C

pH 7.6

Specific Conductivity 1060

Dissolved Oxygen 4

Comments: STREAM FLOW HAS BEEN PRESENT AT EVERY INSPECTION THROUGHOUT SPRING, SUMMER, FALL

Sampled by: L.P. CLARK

Laboratory CTEE, HUNTINGTON Date Shipped 9-29-97

Sample ID# RF-1 Date Results Received REPORT DATED 11-13-97

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RS-~~1~~2 TAS REDDEN SPRING

Sample Date 9-28-97

Sample Time 1450

Type: Spring X Stream _____ UPDES _____

Sample Collection Point PIPE DISCHARGE FROM SPRING

Appearance of Water: Clear X Slightly Cloudy____ Cloudy___ Opaque___

Flow/Depth (gpm) 12 GPM

Water Temperature (C) 9°C

pH 7.56

Specific Conductivity 750

Dissolved Oxygen ~5

Comments: NO EVIDENCE OF CATTLE IN CANYON FOR SOME TIME -

Sampled by: L. P. CLARK

Laboratory CT&E, HUNTINGTON, UT Date Shipped_____

Sample ID# RS-1 Date Results Received LAB REPORT DATED 11-4-97

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-2

Sample Date N/A - No FLOW - 9-28-97

Sample Time — 1530

Type: Spring _____ Stream _____ UPDES _____

Sample Collection Point _____

Appearance of Water: Clear ____ Slightly Cloudy_____ Cloudy___ Opaque____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: CHECKED FOR FLOW - NONE PRESENT

Sampled by: L. P. CLARK -

Laboratory _____ Date Shipped_____

Sample ID# _____ Date Results Received _____

COMMERCIAL TESTING & ENGINEERING CO.

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P.O. BOX 1020
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TEL: (801) 653-2311
FAX: (801) 653-2436

November 4, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID:HC-1

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Rec'd 0820 hr.
Sampled 1325 hr.

FIELD MEASUREMENTS

pH	7.32
DO	4
Flow	12 GPM
Conductivity	1000
Turbidity	CLEAR
Temperature	19°C

Note:Dissolved metals filtered at lab!

Analysis report no. 59-17823

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
Alkalinity, Bicarbonate	530	5	mg/l	as HCO_3	SM2320-B	09-30-1997 1200	SC
Alkalinity, Carbonate	10	5	mg/l	as CO_3	SM2320-B	09-30-1997 1200	SC
Alkalinity, Total	451	5	mg/l	as $CaCO_3$	EPA 310.1	09-30-1997 1200	SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	10-07-1997 0145	MK
Anions	15.7	----	meq/l		---------	10-08-1997 0900	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	10-02-1997 0230	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	10-07-1997 0230	MK
Boron, Dissolved	0.2	0.1	mg/l		EPA 212.3	10-07-1997 1930	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	10-06-1997 0715	MK
Calcium, Dissolved	35	1	mg/l		EPA 215.1	10-07-1997 0030	MK
Cations	14.1	----	meq/l		---------	10-08-1997 0900	RJ
Chloride	18	1	mg/l		SM4500-Cl-B	10-02-1997 1400	SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	10-07-1997 0200	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	10-06-1997 0600	MK
Fluoride	0.10	0.01	mg/l		SM4500-F-C	10-22-1997 0800	SC
Hardness, Total	343	----	mg/l	as $CaCO_3$	SM2340-B	10-08-1997 0900	RJ
Iron, Total	2.1	0.1	mg/l		EPA 236.1	10-06-1997 2245	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	10-06-1997 2245	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	10-06-1997 0730	MK
Magnesium, Dissolved	62	1	mg/l		EPA 242.1	10-07-1997 0100	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	10-06-1997 2315	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	09-29-1997 2230	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	10-07-1997 0245	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	10-06-1997 0645	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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November 4, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID:HC-1

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Rec'd 0820 hr.
Sampled 1325 hr.

FIELD MEASUREMENTS

pH	7.32
DO	4
Flow	12 GPM
Conductivity	1000
Turbidity	CLEAR
Temperature	19°C

Note:Dissolved metals filtered at lab!

Analysis report no. 59-17823

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Nitrogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	10-20-1997 0930 RJ
Nitrogen, Nitrate-Nitrite	0.1	0.1	mg/l as N	EPA 353.3	10-09-1997 0700 JC
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	09-30-1997 0830 JC
Oil & Grease	<2	2	mg/l	SM5520-B	10-23-1997 0700 JC
Phosphorous, Ortho-PO_4	0.02	0.01	mg/l as P	SM4500-P-E	09-30-1997 0730 JC
Potassium, Dissolved	2	1	mg/l	EPA 258.1	10-06-1997 2330 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	10-03-1997 0145 MK
Sodium, Dissolved	165	2	mg/l	EPA 273.1	10-07-1997 0000 MK
Solids, Total Dissolved	870	10	mg/l	EPA 160.1	09-29-1997 0700 JC
Sulfate	298	125	mg/l	EPA 375.4	10-07-1997 1210 SC
Sulfide	5.4	0.1	mg/l	EPA 376.1	10-03-1997 1115 RJ
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	10-06-1997 0630 MK
Cation/Anion Balance	-5.7	----	%		10-08-1997 0900 RJ

Respectfully submitted,
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FAX: (801) 653-2436

November 13, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Sample identification by LADWP

ID:RF-1
Rec'd 0820 hr.
Sampled 1410 hr.

FIELD MEASUREMENTS

pH	7.6
DO	4
Flow	6 GPM
Conductivity	1060
Turbidity	MURKY
Temperature	21°C

NOTE: Dissolved metals filtered at lab
NOTE: Sulfate expired when analyzed due to rerun for charge balance

Analysis report no. 59-17824

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst	
Alkalinity, Bicarbonate	563	5	mg/l	as HCO_3	SM2320-B	09-30-1997 1200	SC
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	09-30-1997 1200	SC
Alkalinity, Total	461	5	mg/l	as $CaCO_3$	EPA 310.1	09-30-1997 1200	SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	10-07-1997 0145	MK
Anions	14.3	----	meq/l		---------	11-12-1997 1400	RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	10-02-1997 0230	MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	10-07-1997 0230	MK
Boron, Dissolved	0.1	0.1	mg/l		EPA 212.3	10-07-1997 1930	MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	10-06-1997 0715	MK
Calcium, Dissolved	45	1	mg/l		EPA 215.1	10-07-1997 0030	MK
Cations	14.1	----	meq/l		---------	11-12-1997 1400	RJ
Chloride	17	1	mg/l		SM4500-Cl-B	10-02-1997 1400	SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	10-07-1997 0200	MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	10-06-1997 0600	MK
Fluoride	<0.10	0.01	mg/l		SM4500-F-C	10-22-1997 0800	SC
Hardness, Total	364	----	mg/l	as $CaCO_3$	SM2340-B	11-12-1997 1400	RJ
Iron, Total	<0.1	0.1	mg/l		EPA 236.1	10-06-1997 2245	MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	10-06-1997 2245	MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	10-06-1997 0730	MK
Magnesium, Dissolved	61	1	mg/l		EPA 242.1	10-07-1997 0100	MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	10-06-1997 2315	MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	09-29-1997 2230	MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	10-07-1997 0245	MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	10-06-1997 0645	MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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November 13, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Kind of sample reported to us: Water

Sample taken at:

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Sample identification by LADWP

ID:RF-1
Rec'd 0820 hr.
Sampled 1410 hr.

FIELD MEASUREMENTS

pH	7.6
DO	4
Flow	6 GPM
Conductivity	1060
Turbidity	MURKY
Temperature	21°C

NOTE: Dissolved metals filtered at lab
NOTE: Sulfate expired when analyzed due to rerun for charge balance

Analysis report no. 59-17824

rameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
rogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	10-20-1997 0930 RJ
trogen, Nitrate-Nitrite	0.2	0.1	mg/l as N	EPA 353.3	10-09-1997 0700 JC
itrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	09-30-1997 0830 JC
il & Grease	<2	2	mg/l	SM5520-B	10-23-1997 0700 JC
Phosphorous, Ortho-PO_4	0.02	0.01	mg/l as P	SM4500-P-E	09-30-1997 0730 JC
otassium, Dissolved	<1	1	mg/l	EPA 258.1	10-06-1997 2330 MK
elenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	10-03-1997 0145 MK
odium, Dissolved	157	1	mg/l	EPA 273.1	10-07-1997 0000 MK
olids, Total Dissolved	830	10	mg/l	EPA 160.1	09-29-1997 0700 JC
ulfate	222	1	mg/l	EPA 375.4	11-12-1997 0900 SC
ulfide	<1.0	0.1	mg/l	EPA 376.1	10-03-1997 1115 RJ
inc, Dissolved	0.03	0.01	mg/l	EPA 289.1	10-06-1997 0630 MK
ation/Anion Balance	-0.8	----	%		11-12-1997 1400 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

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HUNTINGTON, UT 84528
TEL: (801) 653-2311
FAX: (801) 653-2436

October 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID:RS-2

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Rec'd 0820 hr.
Sampled 1450 hr.

FIELD MEASUREMENTS

pH	7.56
DO	5
Flow	12 GPM
Conductivity	750
Turbidity	CLEAR
Temperature	9°C

Dissolved metals filtered at lab!

Analysis report no. 59-17825

Parameter	Result	MRL	Units		Method	Analyzed Date/Time/Analyst
Alkalinity, Bicarbonate	518	5	mg/l	as HCO_3	SM2320-B	09-30-1997 1200 SC
Alkalinity, Carbonate	<5	5	mg/l	as CO_3	SM2320-B	09-30-1997 1200 SC
Alkalinity, Total	425	5	mg/l	as $CaCO_3$	EPA 310.1	09-30-1997 1200 SC
Aluminum, Dissolved	<1	1	mg/l		EPA 202.1	10-07-1997 0145 MK
Anions	27.2	----	meq/l		---------	10-08-1997 0900 RJ
Arsenic, Dissolved	<0.01	0.01	mg/l		EPA 206.2	10-02-1997 0230 MK
Barium, Dissolved	<1	1	mg/l		EPA 208.1	10-07-1997 0230 MK
Boron, Dissolved	0.3	0.1	mg/l		EPA 212.3	10-07-1997 1930 MK
Cadmium, Dissolved	<0.01	0.01	mg/l		EPA 213.1	10-06-1997 0715 MK
Calcium, Dissolved	103	1	mg/l		EPA 215.1	10-07-1997 0030 MK
Cations	24.6	----	meq/l		---------	10-08-1997 0900 RJ
Chloride	29	1	mg/l		SM4500-Cl-B	10-02-1997 1400 SC
Chromium, Dissolved	<0.1	0.1	mg/l		EPA 218.1	10-07-1997 0200 MK
Copper, Dissolved	<0.1	0.1	mg/l		EPA 220.1	10-06-1997 0600 MK
Fluoride	<0.10	0.01	mg/l		SM4500-F-C	10-22-1997 0800 SC
Hardness, Total	747	----	mg/l	as $CaCO_3$	SM2340-B	10-08-1997 0900 RJ
Iron, Total	<0.1	0.1	mg/l		EPA 236.1	10-06-1997 2245 MK
Iron, Dissolved	<0.1	0.1	mg/l		EPA 236.1	10-06-1997 2245 MK
Lead, Dissolved	<0.1	0.1	mg/l		EPA 239.1	10-06-1997 0730 MK
Magnesium, Dissolved	119	2	mg/l		EPA 242.1	10-07-1997 0100 MK
Manganese, Dissolved	<0.1	0.1	mg/l		EPA 243.1	10-06-1997 2315 MK
Mercury, Dissolved	<0.2	0.2	ug/l		EPA 245.1	09-29-1997 2230 MK
Molybdenum, Dissolved	<0.1	0.1	mg/l		EPA 246.1	10-07-1997 0245 MK
Nickel, Dissolved	<0.1	0.1	mg/l		EPA 249.1	10-06-1997 0645 MK

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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October 30, 1997

LADWP-EARTHFAX ENGINEERING
7324 SO. UNION PARK AVENUE
SUITE 100
MIDVALE, UTAH 84047
CHRIS HANSEN

Sample identification by
LADWP

ID:RS-2

Kind of sample reported to us: Water

Sample taken at

Sample taken by: Leo Clark

Date sampled: September 28, 1997

Date received: September 29, 1997

Rec'd 0820 hr.
Sampled 1450 hr.

FIELD MEASUREMENTS

pH	7.56
DO	5
Flow	12 GPM
Conductivity	750
Turbidity	CLEAR
Temperature	9°C

Dissolved metals filtered at lab!

Analysis report no. 59-17825

Parameter	Result	MRL	Units	Method	Analyzed Date/Time/Analyst
Nitrogen, Ammonia	<0.5	0.5	mg/l as N	EPA 350.3	10-20-1997 0930 RJ
Nitrogen, Nitrate-Nitrite	<0.1	0.1	mg/l as N	EPA 353.3	10-09-1997 0700 JC
Nitrogen, Nitrite	<0.01	0.01	mg/l as N	EPA 354.1	09-30-1997 0830 JC
Phosphorous, Ortho-PO_4	0.02	0.01	mg/l as P	SM4500-P-E	09-30-1997 0730 JC
Potassium, Dissolved	7	1	mg/l	EPA 258.1	10-06-1997 2330 MK
Selenium, Dissolved	<0.01	0.01	mg/l	EPA 270.2	10-03-1997 0145 MK
Sodium, Dissolved	217	2	mg/l	EPA 273.1	10-07-1997 0000 MK
Solids, Total Dissolved	1570	10	mg/l	EPA 160.1	09-29-1997 0700 JC
Sulfate	859	250	mg/l	EPA 375.4	10-07-1997 1210 SC
Sulfide	<1.0	0.1	mg/l	EPA 376.1	10-03-1997 1115 RJ
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	10-06-1997 0630 MK
Cation/Anion Balance	5.1	----	%		10-08-1997 0900 RJ

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory

MEMBER ACIL

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-1

Sample Date N/A - 4TH Q, DECEMBER, 1997, NOT ACCESSABLE, SNOW & ICE
" " " " " " " "

Sample Time " " " " " " " "

Type: Spring _____ Stream X UPDES _____

Sample Collection Point NOT ACCESSABLE - APPROX. CARBON-EMERY COUNTY LINE- ENDOREAC

Appearance of Water: Clear ____ Slightly Cloudy____ Cloudy___ Opaque____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: NOT SAMPLED DUE TO SNOW & ICE

REPORTED BY:
Sampled by: L. PAUL CLARK

Laboratory _____ Date Shipped N/A

Sample ID# N/A Date Results Received N/A

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RF - 1

Sample Date N/A - 4TH Q, DECEMBER, 1997, NOT ACCESSABLE, SNOW & ICE

Sample Time " " " " " " " " "

Type: Spring _____ Stream X UPDES _____

Sample Collection Point NOT ACCESSABLE - APPROX 150' DOWNSTREAM FROM ROAD CROSSING

Appearance of Water: Clear ____ Slightly Cloudy ____ Cloudy ____ Opaque ____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: NOT SAMPLED DUE TO SNOW & ICE

Sampled by: REPORTED BY. L. PAUL CLARK

Laboratory _____ Date Shipped N/A

Sample ID# N/A Date Results Received N/A

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # RS-X2 REDDEN SPRING TIS

Sample Date N/A - 4TH Q, DECEMBER 1997, NOT ACCESSABLE, SNOW & ICE

Sample Time " " " " " " " "

Type: Spring _____ Stream _____ UPDES _____

Sample Collection Point _____

Appearance of Water: Clear ____ Slightly Cloudy_____ Cloudy___ Opaque____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: _____

_____

Sampled by: _____

Laboratory _____ Date Shipped_____

Sample ID# _____ Date Results Received _____

INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE

WATER MONITORING FORM

PERMIT # ACT/007/013

Station # HC-2

Sample Date N/A - NO FLOW DURING 4TH Q, 1997

Sample Time N/A

Type: Spring _____ Stream X UPDES _____

Sample Collection Point _____

Appearance of Water: Clear ____ Slightly Cloudy ____ Cloudy ____ Opaque ____

Flow/Depth (gpm) _____

Water Temperature (C) _____

pH _____

Specific Conductivity _____

Dissolved Oxygen _____

Comments: NO FLOW IN HORSE CANYON WASH AT THIS POINT DURING 4TH Q. '98

Sampled by: L. PAUL CLARK

Laboratory N/A Date Shipped N/A

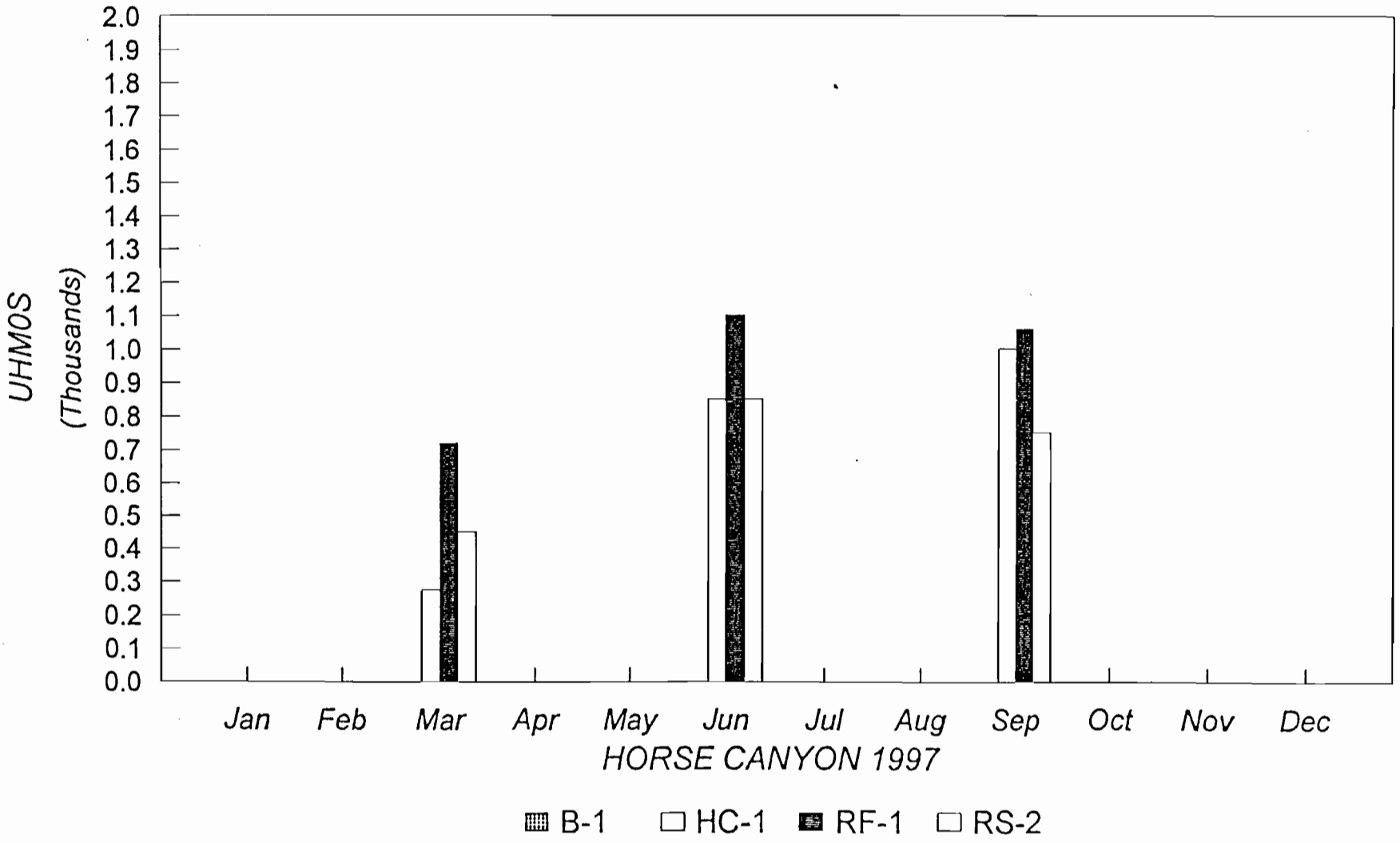
Sample ID# N/A Date Results Received N/A

APPENDIX B

BAR GRAPHS AND SPREADSHEETS

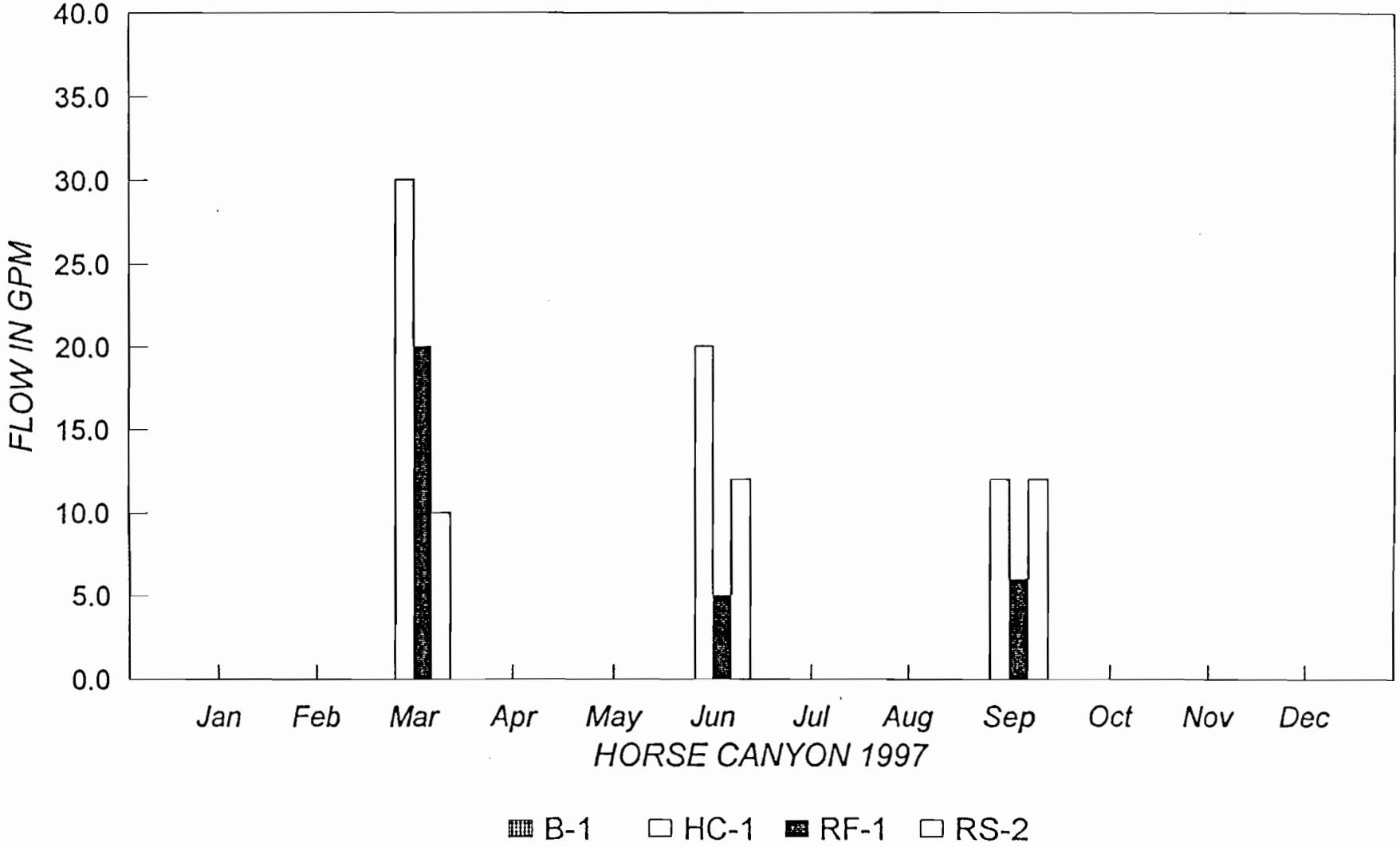
IPA

CONDUCTIVITY



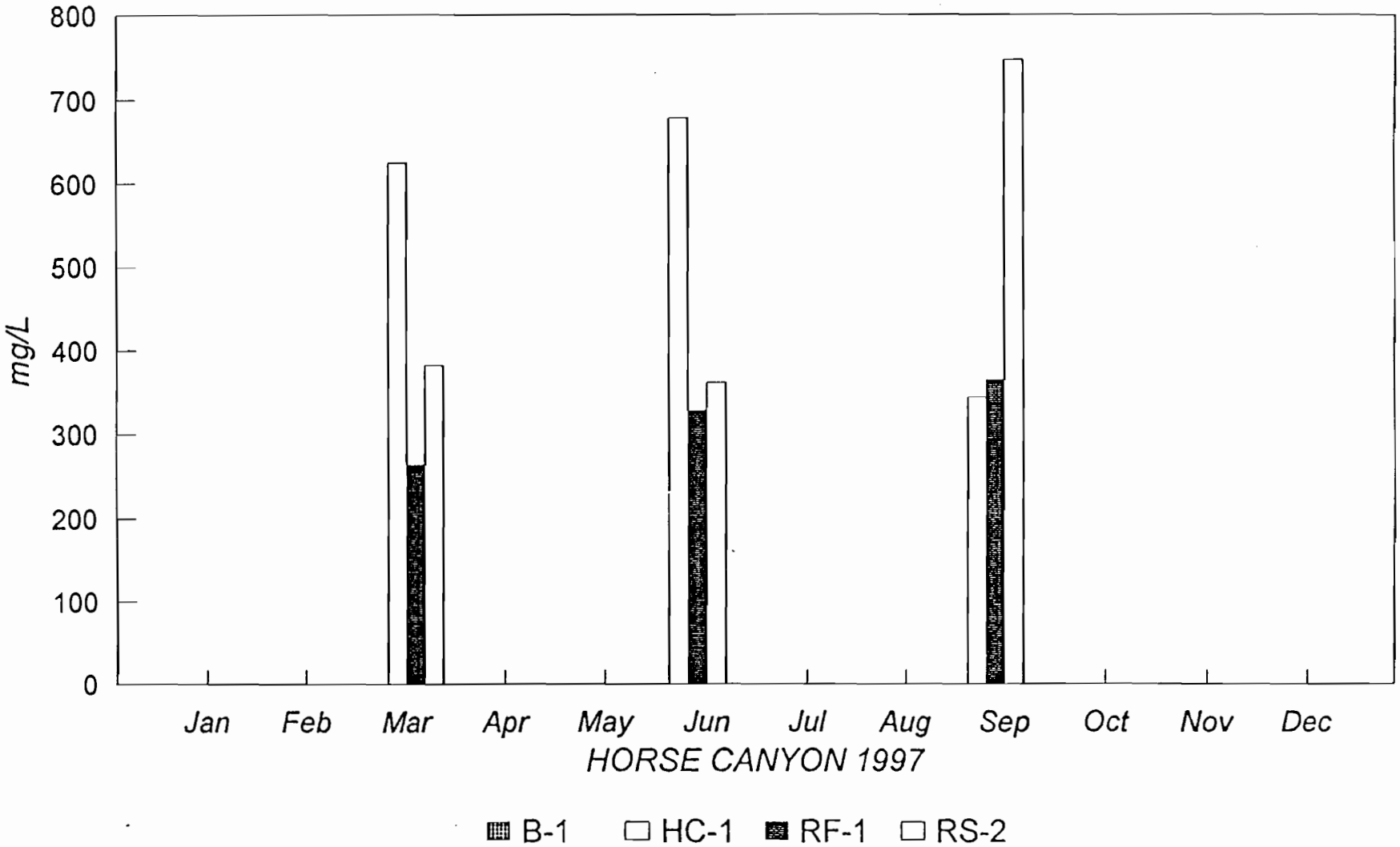
IPA

FLOW


40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
FLOW IN GPM
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HORSE CANYON 1997
B-1
HC-1
RF-1
RS-2

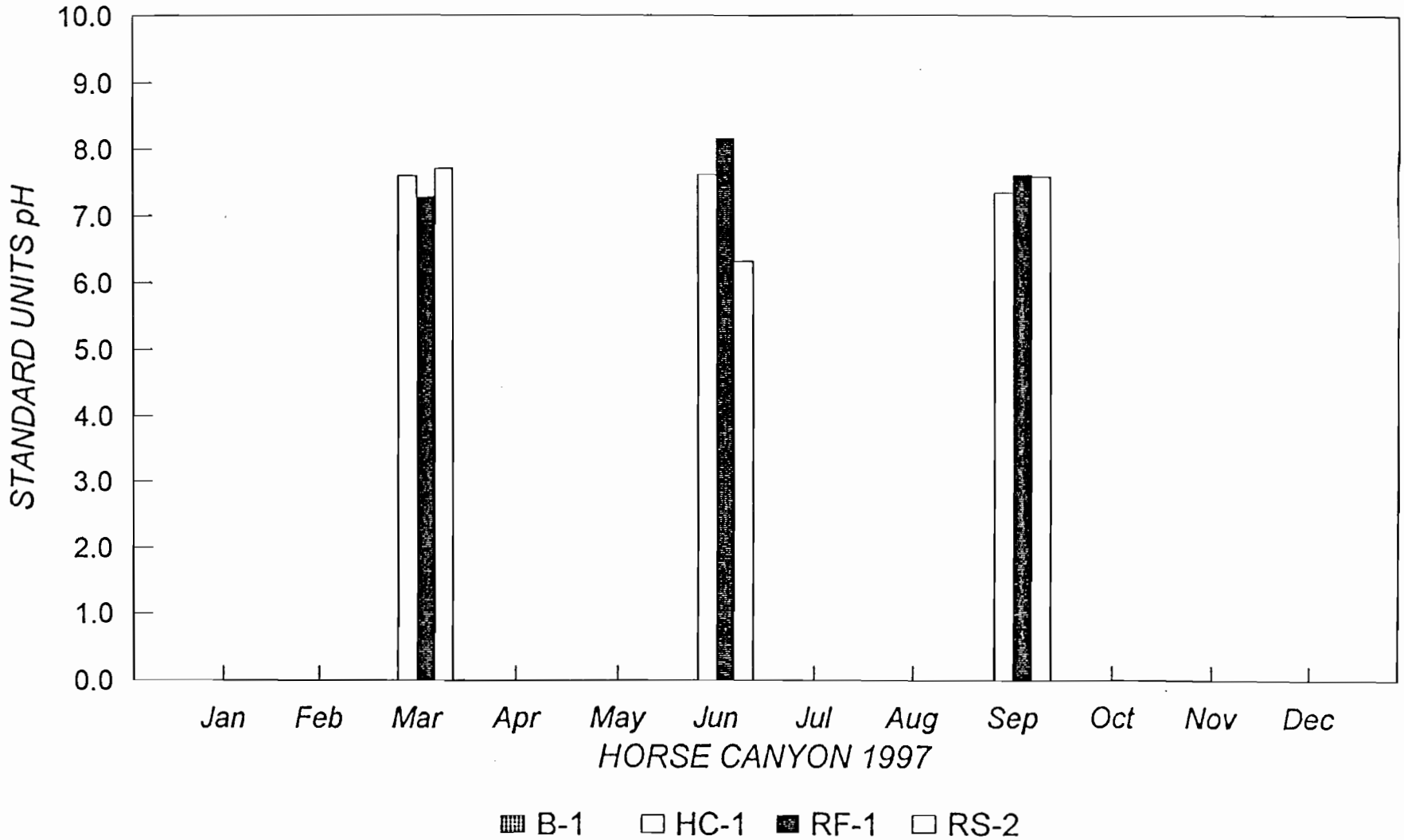
IPA

HARDNESS



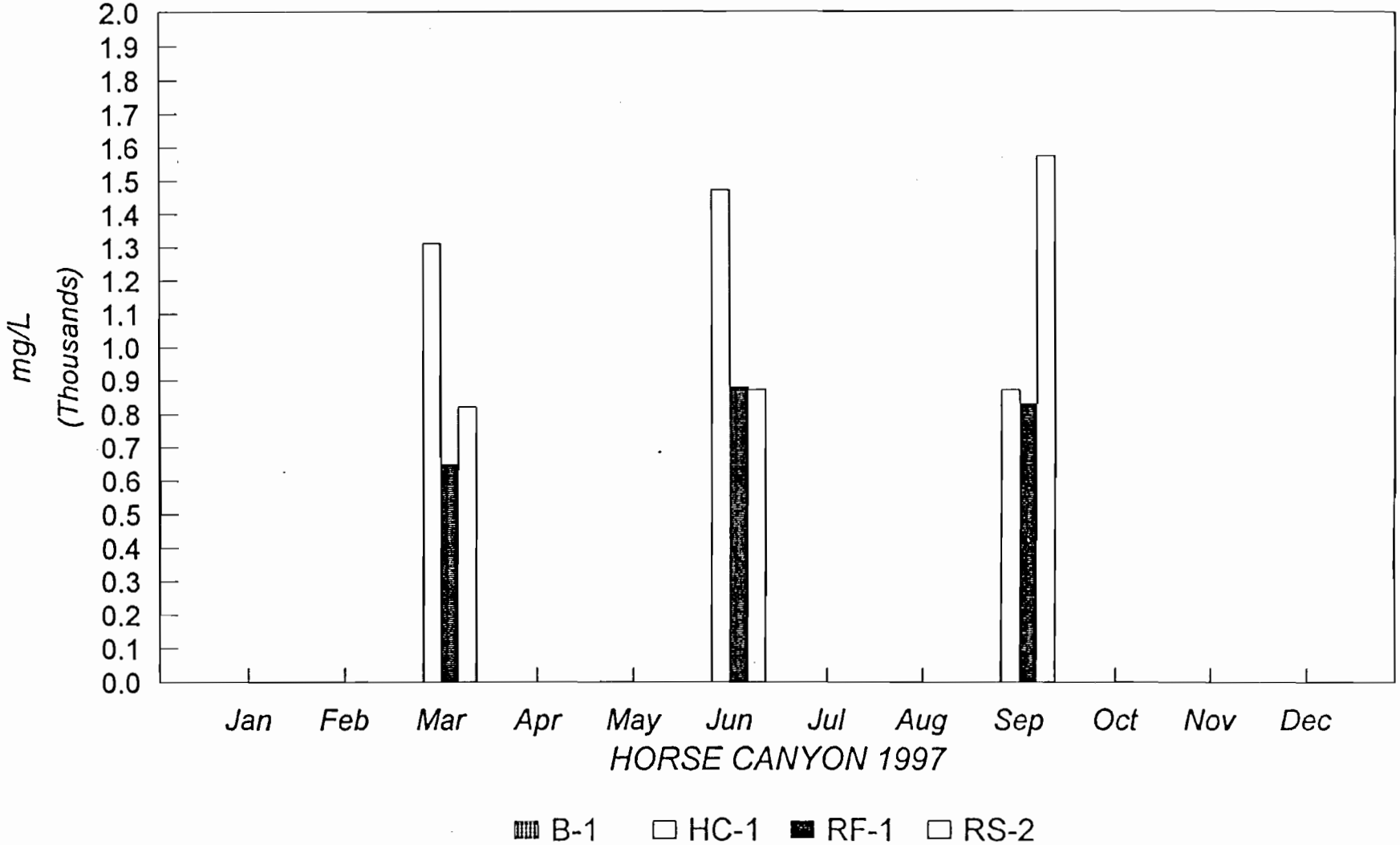
IPA

pH


10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
STANDARD UNITS pH
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HORSE CANYON 1997
B-1
HC-1
RF-1
RS-2

IPA

TDS


2.0
1.9
1.8
1.7
1.6
1.5
1.4
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1.2
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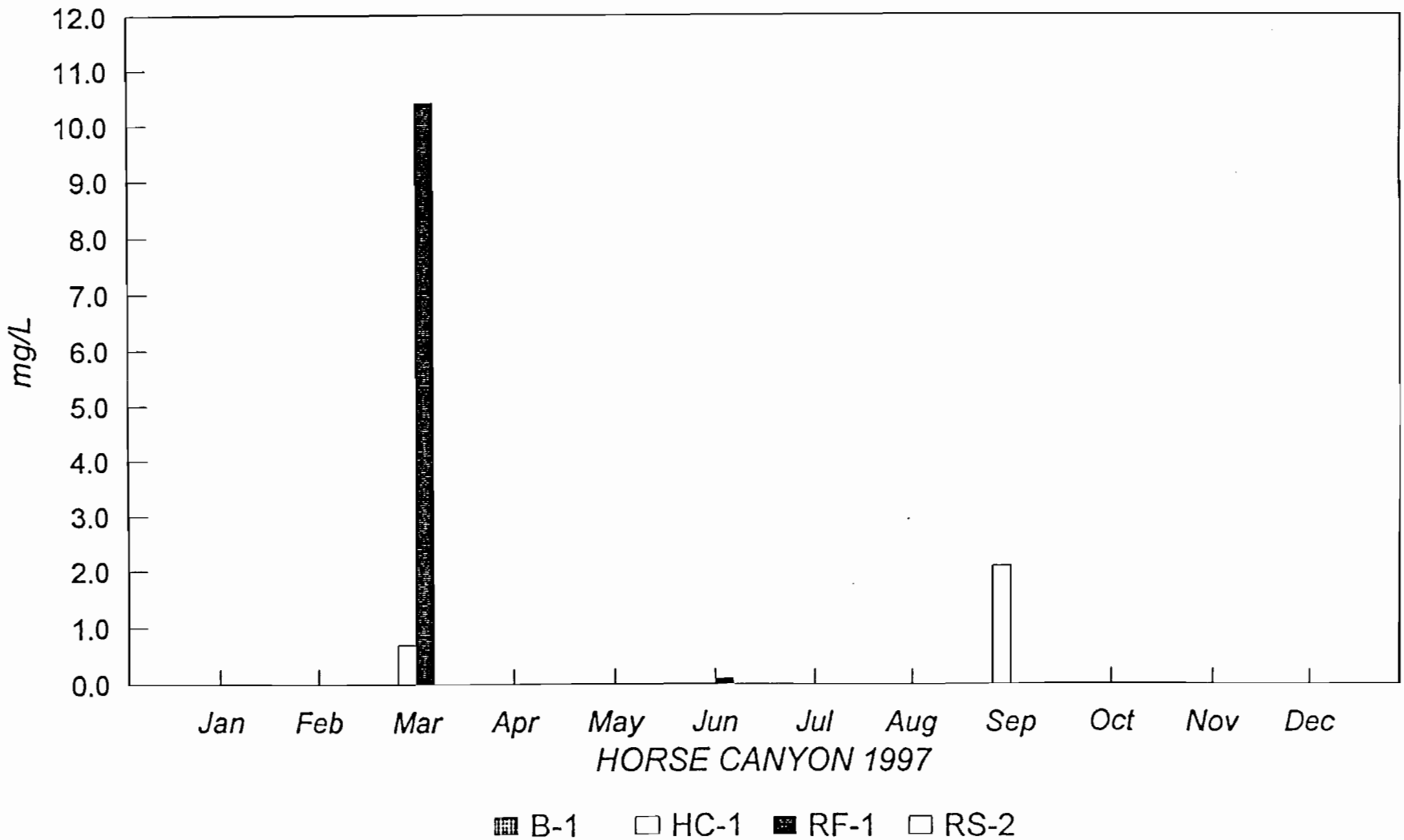
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
mg/L
(Thousands)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
HORSE CANYON 1997
B-1
HC-1
RF-1
RS-2

IPA

TOTAL IRON



IPA
HORSE CANYON MINE
ACT/007/013

1997 WATER MONITORING DATA

SAMPLE LOCATION: B - 1 (Horse Canyon Wash Below Mine) * - Inaccessible

Parameter	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flow	(gpm)			0			0			0			
pH	standard												
Temp	o C												
Conductivity	umhos/cm												
Dissolved Oxygen	ppm												
Aluminum	mg/l												
Arsenic	mg/l												
Barium	mg/l												
Bicarbonate	mg/l												
Boron	mg/l												
Cadmium	mg/l												
Calcium	mg/l												
Carbonate	mg/l												
Chloride	mg/l												
Chromium	mg/l												
Copper	mg/l												
Fluoride	mg/l												
Hardness	mg/l												
Iron Total	mg/l												
Lead	mg/l												
Magnesium	mg/l												
Manganese	mg/l												
Mercury	mg/l												
Molybdenum	mg/l												
Nickel	mg/l												
Ammonia	mg/l												
Nitrate	mg/l												
Nitrite	mg/l												
Phosphate	mg/l												
Potassium	mg/l												
Selenium	mg/l												
Sodium	mg/l												
Sulfate	mg/l												
Sulfide	mg/l												
TDS	mg/l												
Zinc	mg/l												

IPA
HORSE CANYON MINE
ACT/007/013

1997 WATER MONITORING DATA

SAMPLE LOCATION: HC - 1 (Horse Canyon Wash)

* - Inaccessible

Parameter	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flow	(gpm)			30			20			12			
pH	standard			7.59			7.6			7.32			
Temp	o C			11			17			19			
Conductivity	umhos/cm			275			850			1000			
Dissolved Oxygen	ppm			5			5			4			
Aluminum	mg/l			<1			<1			<1			
Arsenic	mg/l			<0.01			<0.01			<0.01			
Barium	mg/l			<1			<1			<1			
Bicarbonate	mg/l			448			521			530			
Boron	mg/l			0.3			0.3			0.2			
Cadmium	mg/l			<0.001			<0.01			<0.01			
Calcium	mg/l			80			77			35			
Carbonate	mg/l			<5			<5			10			
Chloride	mg/l			22			24			18			
Chromium	mg/l			<0.01			<0.1			<0.1			
Copper	mg/l			<0.1			<0.1			<0.1			
Fluoride	mg/l			0.54			0.28			0.1			
Hardness	mg/l			624			678			343			
Iron Total	mg/l			0.7			<0.1			2.1			
Lead	mg/l			<0.1			<0.1			<0.1			
Magnesium	mg/l			103			118			62			
Manganese	mg/l			<0.1			<0.1			<0.1			
Mercury	mg/l			<0.2			<0.2			<0.2			
Molybdenum	mg/l			<0.1			<0.1			<0.1			
Nickel	mg/l			<0.1			<0.1			<0.1			
Ammonia	mg/l			<0.5			<0.5			<0.5			
Nitrate	mg/l			<0.1			<0.1			0.1			
Nitrite	mg/l			<0.01			<0.01			<0.01			
Phosphate	mg/l			<0.02			0.03			0.02			
Potassium	mg/l			5			5			2			
Selenium	mg/l			<0.01			<0.01			<0.01			
Sodium	mg/l			184			215			165			
Sulfate	mg/l			596			724			298			
Sulfide	mg/l			<0.1			<0.1			5.4			
TDS	mg/l			1310			1470			870			
Zinc	mg/l			<0.03			0.03			0.01			

IPA
HORSE CANYON MINE
ACT/007/013

1997 WATER MONITORING DATA

SAMPLE LOCATION: RF - 1 (Right Fork, Horse Canyon Wash) * - Inaccessible

Parameter	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flow	(gpm)			20			5			6			
pH	standard			7.27			8.15			7.6			
Temp	o C			12			22			21			
Conductivity	umhos/cm			720			1100			1060			
Dissolved Oxygen	ppm			6			5			4			
Aluminum	mg/l			<1			<1			<1			
Arsenic	mg/l			<0.01			<0.01			<0.01			
Barium	mg/l			<1			<1			<1			
Bicarbonate	mg/l			407			513			563			
Boron	mg/l			0.2			0.4			0.1			
Cadmium	mg/l			<0.01			<0.01			<0.01			
Calcium	mg/l			35			26			45			
Carbonate	mg/l			<5			13			<5			
Chloride	mg/l			14			17			17			
Chromium	mg/l			<0.1			<0.1			<0.1			
Copper	mg/l			<0.1			<0.1			<0.1			
Fluoride	mg/l			0.49			0.27			<0.1			
Hardness	mg/l			264			328			364			
Iron Total	mg/l			10.4			0.1			<0.1			
Lead	mg/l			<0.1			<0.1			<0.1			
Magnesium	mg/l			43			64			61			
Manganese	mg/l			<0.1			<0.1			<0.1			
Mercury	mg/l			<0.2			<0.2			<0.2			
Molybdenum	mg/l			<0.1			<0.1			<0.1			
Nickel	mg/l			<0.1			<0.1			<0.1			
Ammonia	mg/l			0.2			<0.5			<0.5			
Nitrate	mg/l			0.1			<0.1			0.2			
Nitrite	mg/l			<0.01			<0.01			<0.01			
Phosphate	mg/l			0.03			0.04			0.02			
Potassium	mg/l			2			3			<1			
Selenium	mg/l			<0.01			<0.01			<0.01			
Sodium	mg/l			109			172			157			
Sulfate	mg/l			198			366			22			
Sulfide	mg/l			<0.1			<0.1			<1			
TDS	mg/l			650			880			830			
Zinc	mg/l			<0.01			0.02			0.03			

IPA
HORSE CANYON MINE
ACT/007/013

1997 WATER MONITORING DATA

SAMPLE LOCATION: RS - 2 (Redden Spring)

* - Inaccessible

Parameter	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flow	(gpm)	*	*	10			12			12			*
pH	standard			7.7			6.3			7.56			
Temp	o C			10			10			9			
Conductivity	umhos/cm			450			850			750			
Dissolved Oxygen	ppm			5			5			5			
Aluminum	mg/l			<1			<1			<1			
Arsenic	mg/l			<0.01			<0.01			<0.01			
Barium	mg/l			<0.1			<0.1			<1			
Bicarbonate	mg/l			542			549			518			
Boron	mg/l			0.3			0.2			0.3			
Cadmium	mg/l			<0.01			<0.01			<0.01			
Calcium	mg/l			44			44			103			
Carbonate	mg/l			<5			<5			<5			
Chloride	mg/l			17			17			29			
Chromium	mg/l			<0.1			<0.1			<0.1			
Copper	mg/l			<0.1			<0.1			<0.1			
Fluoride	mg/l			0.52			0.37			<0.1			
Hardness	mg/l			382			361			747			
Iron Total	mg/l			<0.1			<0.1			<0.1			
Lead	mg/l			<0.1			<0.1			<0.1			
Magnesium	mg/l			66			61			119			
Manganese	mg/l			<0.1			<0.1			<0.1			
Mercury	mg/l			<0.2			<0.2			<0.2			
Molybdenum	mg/l			<0.1			<0.1			<0.1			
Nickel	mg/l			<0.1			<0.1			<0.1			
Ammonia	mg/l			<0.5			<0.5			<0.5			
Nitrate	mg/l			0.2			0.3			<0.1			
Nitrite	mg/l			<0.01			<0.01			<0.01			
Phosphate	mg/l			0.02			0.04			0.02			
Potassium	mg/l			1			1			7			
Selenium	mg/l			<0.01			<0.01			<0.01			
Sodium	mg/l			156			149			217			
Sulfate	mg/l			257			303			849			
Sulfide	mg/l			<1.0			<1.0			<1			
TDS	mg/l			820			870			1570			
Zinc	mg/l			0.04			0.02			0.01			

Note:

(1) The following data was taken from the "Mining and Reclamation Plan, Horse Canyon Mine, Volume III, Appendix VI-I".

(2) The Annual Hydrologic Monitoring Reports have been submitted to the Division by I.P.A. since 1989; however, because of the volume of these reports, only the 1997 Annual Report is included with this Appendix for reference.

U.S. Steel Data

SURFACE WATER QUALITY DATA
GENEVA COAL MINE

Sampling Date:	2/81	3/81	4/81	5/81
-1				
low (gpm)	NA	NA	NA	375
Acidity as $CaCO_3$ mg/l	<0.1	<0.1	<0.01	6.00
Alkalinity as $CaCO_3$ mg/l	424.00	372.00	346.00	330.00
Dissolved Iron mg/l	0.270	0.210	0.190	0.520
Iron as Fe (Total) mg/l	0.310	0.250	0.560	0.950
Manganese as Mn (Tot) mg/l	0.020	0.010	0.030	0.050
Suspended Solids mg/l	18.0	9.0	87.0	50.0
Total Dissolved Solids mg/l	1,900	1,800	2,050	1,700
pH Units	8.40	8.0	8.30	8.10

Sampling Date:	7/81	9/81	10/81	3/82
B-1				
Flow (gpm)	375	310	650	300
Acidity as $CaCO_3$ mg/l	<0.01	<0.01	<0.01	4.50
Alkalinity as $CaCO_3$ mg/l	356.00	298.00	1,095.00	293.60
Dissolved Iron mg/l	0.020	0.075	0.080	0.640
Iron as Fe (Total) mg/l	0.440	0.280	0.255	1.110
Manganese as Mn (Tot) mg/l	0.030	0.014	0.017	0.022
Suspended Solids mg/l	136	10.0	8.1	18.0
Total Dissolved Solids mg/l	1,850	2,000	1,850	362
pH Units	8.20	8.30	8.30	8.20

Sampling Date:	4/82	5/82	6/82	8/82
B-1				
Flow (gpm)	425	400	500	520
Acidity as $CaCO_3$ mg/l	<0.01	<0.01	<0.01	<0.01
Alkalinity as $CaCO_3$ mg/l	291.60	350.30	366.90	297.50
Dissolved Iron mg/l	NA	NA	0.760	0.810
Iron as Fe (Total) mg/l	1.600	0.060	1.720	1.920
Manganese as Mn (Tot) mg/l	0.060	0.015	0.070	0.090
Suspended Solids mg/l	105	3.0	98.0	114
Total Dissolved Solids mg/l	2,708	2,178	2,175	2,372
pH Units	7.80	8.10	7.90	8.10

Sampling Date:	9/82	10/82	4/83
B-1			
Flow (gpm)	400	350	NA
Acidity as $CaCO_3$ mg/l	<0.01	<0.01	NA
Alkalinity as $CaCO_3$ mg/l	304.00	399.20	NA
Dissolved Iron mg/l	0.820	0.920	NA
Iron as Fe (Total) mg/l	1.890	2.140	14.800
Manganese as Mn (Tot) mg/l	0.095	0.095	0.515
Suspended Solids mg/l	21.0	8.0	640
Total Dissolved Solids mg/l	2,120	1,900	1,688
pH Units	8.20	8.30	7.80

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	3-81	4-81	5-81	6-81
HC1				
Flow (gpm)	NA	NA	25	NA
Acidity as CaCO3 mg/l	< 0.1	< 0.01	10.00	< 0.01
Alkalinity as CaCO3 mg/l	370.00	416.00	360.00	408.00
Dissolved Iron mg/l	0.030	0.010	0.140	0.010
Iron as Fe (Total) mg/l	0.060	0.230	0.270	0.120
Manganese as Mn (Tot) mg/l	0.030	0.020	0.040	0.050
Suspended Solids mg/l	1.0	23.0	12.0	44.0
Total Dissolved Solids mg/l	1,400	1,450	1,300	1,450
pH Units	7.70	8.10	8.00	8.10

Sampling Date:	7-81	8-81	10-81	11-81
HC1				
Flow (gpm)	40	3	35	25
Acidity as CaCO3 mg/l	< 0.01	< 0.01	< 0.01	< 0.01
Alkalinity as CaCO3 mg/l	420.00	416.00	985.00	452.00
Dissolved Iron mg/l	0.070	0.090	0.130	0.019
Iron as Fe (Total) mg/l	0.080	0.140	0.265	0.155
Manganese as Mn (Tot) mg/l	0.050	0.120	0.130	0.030
Suspended Solids mg/l	11.0	5.0	6.6	16.0
Total Dissolved Solids mg/l	1,400	1,400	1,500	1,500
pH Units	8.20	8.30	8.20	8.10

Sampling Date:	12-81	4-82	5-82	6-82
HC1				
Flow (gpm)	17	12	60	65
Acidity as CaCO3 mg/l	< 0.01	< 0.01	4.00	2.00
Alkalinity as CaCO3 mg/l	360.00	252.00	517.50	412.00
Dissolved Iron mg/l	0.013	NA	NA	0.040
Iron as Fe (Total) mg/l	0.150	0.030	2.250	0.070
Manganese as Mn (Tot) mg/l	0.025	0.010	0.100	0.010
Suspended Solids mg/l	11.0	4.0	106	9.0
Total Dissolved Solids mg/l	1,325	1,566	1,372	1,375
pH Units	8.10	7.80	7.90	8.00

Sampling Date:	7-82	8-82	10-82	4-83
HC1				
Flow (gpm)	45	40	10	NA
Acidity as CaCO3 mg/l	< 0.01	< 0.01	6.00	NA
Alkalinity as CaCO3 mg/l	339.50	523.00	211.00	NA
Dissolved Iron mg/l	0.040	0.040	0.038	NA
Iron as Fe (Total) mg/l	0.040	0.044	0.040	49.300
Manganese as Mn (Tot) mg/l	0.010	0.055	0.042	1.450
Suspended Solids mg/l	2.0	2.0	14.0	2,152
Total Dissolved Solids mg/l	1,425	1,502	1,500	1,188
pH Units	8.00	8.10	7.80	8.10

SURFACE WATER QUALITY DATA
GENEVA COAL MINE

Sampling Date:	2/81	3/81	4/81	5/81
RF-1				
Flow (gpm)	NA	NA	NA	10
Acidity as CaCO3 mg/l	<0.1	14.0	<0.01	4.00
Alkalinity as CaCO3 mg/l	520.00	444.00	386.00	400.00
Dissolved Iron mg/l	0.218	0.210	0.820	0.070
Iron as Fe (Total) mg/l	1.100	0.250	3.080	0.180
Manganese as Mn (Tot) mg/l	0.060	0.010	0.290	0.020
Suspended Solids mg/l	59.0	9.0	303	104
Total Dissolved Solids mg/l	1,000	1,800	950	900
pH Units	8.00	8.00	8.10	8.20

Sampling Date:	6/81	7/81	8/81	9/81
RF-1				
Flow (gpm)	NA	5	7	15
Acidity as CaCO3 mg/l	<0.01	4.00	<0.01	<0.01
Alkalinity as CaCO3 mg/l	404.00	438.00	390.00	396.00
Dissolved Iron mg/l	0.030	0.010	<0.001	0.024
Iron as Fe (Total) mg/l	0.050	0.020	0.070	0.065
Manganese as Mn (Tot) mg/l	0.010	0.010	<0.001	0.013
Suspended Solids mg/l	15.0	8.0	2.0	7.0
Total Dissolved Solids mg/l	950	1,000	900	950
pH Units	8.20	7.70	8.60	8.30

Sampling Date:	10/81	11/81	12/81	3/82
RF-1				
Flow (gpm)	25	15	15	18
Acidity as CaCO3 mg/l	10.00	<0.01	<0.01	10.00
Alkalinity as CaCO3 mg/l	46.00	485.00	380.00	497.00
Dissolved Iron mg/l	0.030	0.033	0.026	1.900
Iron as Fe (Total) mg/l	0.140	0.065	0.095	9.400
Manganese as Mn (Tot) mg/l	0.020	0.020	0.013	0.018
Suspended Solids mg/l	6.2	5.0	2.0	130
Total Dissolved Solids mg/l	987	950	900	874
pH Units	8.00	8.20	8.10	7.60

Sampling Date:	4/82	5/82	6/82	7/82
RF-1				
Flow (gpm)	20	20	25	10
Acidity as CaCO3 mg/l	<0.01	<0.01	<0.01	<0.01
Alkalinity as CaCO3 mg/l	345.00	485.00	413.50	327.20
Dissolved Iron mg/l	NA	NA	0.030	0.030
Iron as Fe (Total) mg/l	0.200	1.100	0.100	0.040
Manganese as Mn (Tot) mg/l	0.020	0.035	0.008	0.005
Suspended Solids mg/l	15.0	59.0	13.0	<1.0
Total Dissolved Solids mg/l	988	862	925	915
pH Units	8.10	8.20	8.40	8.50

SURFACE WATER QUALITY DATA
GENEVA COAL MINE

Sampling Date:	8/82	9/82	10/82	4/83
E-1				
low (gpm)	25	20	20	NA
Acidity as CaCO3 mg/l	<0.01	<0.01	<0.01	NA
Alkalinity as CaCO3 mg/l	505.00	364.40	537.00	NA
Dissolved Iron mg/l	0.020	0.036	0.021	NA
Iron as Fe (Total) mg/l	0.025	0.052	0.030	26.500
Manganese as Mn (Tot) mg/l	0.008	0.008	0.010	0.360
Suspended Solids mg/l	4.0	9.0	8.0	1,648
Total Dissolved Solids mg/l	874	890	920	940
pH Units	8.30	8.40	8.50	8.10

Sampling Date:

Flow (gpm)
Acidity as CaCO3 mg/l
Alkalinity as CaCO3 mg/l
Dissolved Iron mg/l
Iron as Fe (Total) mg/l
Manganese as Mn (Tot) mg/l
Suspended Solids mg/l
Total Dissolved Solids mg/l
pH Units

ampling Date:

Flow (gpm)
Acidity as CaCO3 mg/l
Alkalinity as CaCO3 mg/l
Dissolved Iron mg/l
Iron as Fe (Total) mg/l
Manganese as Mn (Tot) mg/l
Suspended Solids mg/l
Total Dissolved Solids mg/l
pH Units

Sampling Date:

Flow (gpm)
Acidity as CaCO3 mg/l
Alkalinity as CaCO3 mg/l
Dissolved Iron mg/l
Iron as Fe (Total) mg/l
Manganese as Mn (Tot) mg/l
Suspended Solids mg/l
Total Dissolved Solids mg/l
pH Units

SURFACE WATER QUALITY

MINE DISCHARGES

	001 4-6-81	002 4-6-81
Aluminum, Al mg/l	0.016	0.025
Ammonia, NH3 mg/l	0.10	0.45
Antimony, Sb mg/l	<0.001	<.001
Arsenic, As mg/l	0.002	0.005
Barium, Ba mg/l	0.035	0.045
Bicarbonate, HNO3 mg/l		
Boron, B mg/l	0.020	0.033
Cadmium, Cd mg/l	<0.001	<0.001
Beryllium, Be mg/l	<0.01	<0.01
Bromide, Br mg/l	<0.001	<0.001
Cobalt, Co, mg/l	<0.001	<0.004
Chromium, Cr mg/l	<0.001	<0.001
Conductivity, umhos/cm		
Copper, Cu mg/l	0.003	0.006
Flouride, F mg/l	0.35	0.41
Hardness, CaCO3 mg/l		
Iron, Fe (total) mg/l	0.120	0.170
Lead, Pb mg/l	0.003	<0.001
Magnesium, Mg mg/l	112.80	96.00
Manganese, Mn mg/l	0.012	0.016
Mercury, Hg mg/l	<0.0002	<0.0002
Molybdenum, Mo mg/l	0.003	0.009
Nickel, Ni mg/l	0.094	0.095
Nitrate, NO3-N mg/l	0.66	0.62
Nitrite, NO2-N mg/l	<0.01	0.08
Phosphate, PO4 mg/l	0.070	0.060
Potassium, K mg/l		
Selenium, Se mg/l	<0.001	<0.001
Sodium, Na mg/l		
Sulfate, SO4 mg/l	990	960
Sulfide, S mg/l	0.67	0.92
Suspended Solids mg/l	20.0	28.0
Total Combustable Solids mg/l		
Total Dissolved Solids mg/l		
Zinc, Zn mg/l	0.006	0.019
pH Units		

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	3/11/81	3/27/81	4/6/81	4/22/81
001				
Average Flow (Mgpd)	NA	NA	1.60	1.60
Acidity as CaCO3 mg/l	<0.1	<0.1	NA	<0.1
Alkalinity as CaCO3 mg/l	376.00	378.00	NA	386.00
Dissolved Iron mg/l	0.220	0.040	NA	0.020
Iron as Fe (Total) mg/l	0.240	0.140	0.120	0.080
Manganese as Mn (Tot) mg/l	0.010	0.010	0.012	0.020
Oil and Grease mg/l	1.60	NA	0.80	NA
Suspended Solids mg/l	8.0	8.0	20.0	25.0
Total Dissolved Solids mg/l	1,770	1,750	NA	2,100
pH Units	7.70	7.80	7.30	8.10

Sampling Date:	5/13/81	6/11/81	6/24/81	7/8/81
001				
Average Flow (Mgpd)	1.60	1.60	0.197	0.197
Acidity as CaCO3 mg/l		<0.01	<0.01	<0.01
Alkalinity as CaCO3 mg/l		370.00	366.00	366.00
Dissolved Iron mg/l		0.010	0.180	0.050
Iron as Fe (Total) mg/l		0.080	0.210	0.080
Manganese as Mn (Tot) mg/l		0.010	0.010	<0.001
Oil and Grease mg/l		1.00	NA	<0.01
Suspended Solids mg/l		1.0	29.0	9.0
Total Dissolved Solids mg/l		1,700	1,900	1,850
pH Units		8.10	8.10	8.20

Sampling Date:	7/22/81	8/12/81	8/26/81	9/9/81
001				
Average Flow (Mgpd)	0.197	0.197	0.197	0.197
Acidity as CaCO3 mg/l	<0.01	<0.01	3.46	3.60
Alkalinity as CaCO3 mg/l	372.00	370.00	388.00	340.00
Dissolved Iron mg/l	0.185	0.038	0.150	0.024
Iron as Fe (Total) mg/l	0.240	0.050	0.260	0.110
Manganese as Mn (Tot) mg/l	0.012	0.010	0.018	0.015
Oil and Grease mg/l	NA	1.60	NA	1.40
Suspended Solids mg/l	5.0	4.0	12.5	10.0
Total Dissolved Solids mg/l	1,822	1,800	1,850	1,975
pH Units	8.20	8.30	7.90	7.60

Sampling Date:	9/9/81	10/14/81	10/28/81	11/10/81
001				
Average Flow (Mgpd)	0.197	0.271	0.271	0.271
Acidity as CaCO3 mg/l	<0.01	2.40	6.00	<0.01
Alkalinity as CaCO3 mg/l	368.00	363.00	362.00	439.00
Dissolved Iron mg/l	0.040	0.040	0.085	NA
Iron as Fe (Total) mg/l	0.068	0.115	0.112	0.112
Manganese as Mn (Tot) mg/l	0.015	0.015	0.018	0.050
Oil and Grease mg/l	NA	2.50	NA	0.20
Suspended Solids mg/l	13.0	4.0	11.0	15.0
Total Dissolved Solids mg/l	1,985	2,000	1,900	1,800
pH Units	8.10	7.95	7.90	8.10

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	11/15/81	12/9/81	12/23/81	1/13/82
001				
Average Flow (Mgpd)	0.271	0.271	0.271	0.127
Acidity as $CaCO_3$ mg/l				
Alkalinity as $CaCO_3$ mg/l				
Dissolved Iron mg/l				
Iron as Fe (Total) mg/l				
Manganese as Mn (Tot) mg/l				
Oil and Grease mg/l				
Suspended Solids mg/l				
Total Dissolved Solids mg/l				
pH Units				

Sampling Date:	1/27/82	2/9/82	2/22/82	3/9/82
001				
Average Flow (Mgpd)	0.127	0.319	0.319	0.325
Acidity as $CaCO_3$ mg/l		<0.01	NA	6.00
Alkalinity as $CaCO_3$ mg/l		238.00	NA	472.00
Dissolved Iron mg/l		0.110	NA	0.380
Iron as Fe (Total) mg/l		0.125	0.240	0.420
Manganese as Mn (Tot) mg/l		0.044	NA	0.062
Oil and Grease mg/l		<1.0	NA	1.60
Suspended Solids mg/l		5.0	26.0	2.0
Total Dissolved Solids mg/l		2,000	2,150	2,456
pH Units		7.70	7.70	7.80

Sampling Date:	3/23/82	4/13/82	4/27/82	5/13/82
001				
Average Flow (Mgpd)	0.325	0.119	0.119	0.162
Acidity as $CaCO_3$ mg/l	NA	<0.01	NA	10.0
Alkalinity as $CaCO_3$ mg/l	NA	323.50	NA	381.20
Dissolved Iron mg/l	NA	0.180	NA	0.250
Iron as Fe (Total) mg/l	0.260	0.195	0.286	0.250
Manganese as Mn (Tot) mg/l	NA	0.020	NA	0.040
Oil and Grease mg/l	NA	1.4	NA	<0.1
Suspended Solids mg/l	1.0	13.0	4.0	5.0
Total Dissolved Solids mg/l	2,308	2,654	2,632	2,566
pH Units	7.80	7.90	7.90	7.80

Sampling Date:	5/24/82	6/8/82	6/23/82	7/13/82
001				
Average Flow (Mgpd)	0.162	0.184	0.184	0.183
Acidity as $CaCO_3$ mg/l	NA	<0.01	NA	1.00
Alkalinity as $CaCO_3$ mg/l	NA	401.10	NA	313.40
Dissolved Iron mg/l	NA	0.200	NA	0.250
Iron as Fe (Total) mg/l	0.150	0.210	0.230	0.250
Manganese as Mn (Tot) mg/l	NA	0.015	NA	0.035
Oil and Grease mg/l	NA	0.2	NA	1.2
Suspended Solids mg/l	2.0	9.0	6.0	5.0
Total Dissolved Solids mg/l	2,268	1,875	2,150	2,035
pH Units	8.00	7.90	7.80	7.80

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	7/28/82	8/11/82	8/26/82	9/15/8
001				
Average Flow (Mgpd)	0.263	0.208	0.208	0.2
Acidity as CaCO3 mg/l	NA	1.00	NA	9.
Alkalinity as CaCO3 mg/l	NA	398.70	NA	348.
Dissolved Iron mg/l	NA	0.050	NA	0.2
Iron as Fe (Total) mg/l	0.290	0.116	0.180	0.3
Manganese as Mn (Tot) mg/l	NA	0.055	NA	0.0
Oil and Grease mg/l	NA	<0.1	NA	0.
Suspended Solids mg/l	1.0	7.0	38.0	1.
Total Dissolved Solids mg/l	1,970	1,890	1,820	2,6
pH Units	8.00	8.00	7.90	7.

Sampling Date:	9/28/82	10/12/82	10/26/82	11/10/
001				
Average Flow (Mgpd)	0.263	0.208	0.208	0.2
Acidity as CaCO3 mg/l	NA	1.00	NA	9.
Alkalinity as CaCO3 mg/l	NA	398.70	NA	348.
Dissolved Iron mg/l	NA	0.050	NA	0.2
Iron as Fe (Total) mg/l	0.290	0.116	0.180	0.3
Manganese as Mn (Tot) mg/l	NA	0.055	NA	0.0
Oil and Grease mg/l	NA	<0.1	NA	0
Suspended Solids mg/l	1.0	7.0	38.0	1
Total Dissolved Solids mg/l	1,970	1,890	1,8250	2,6
pH Units	8.00	8.00	7.90	7.

Sampling Date:	11/24/82	12/8/82	12/22/82	1/12/
001				
Average Flow (Mgpd)	0.234	0.263	0.263	0.2
Acidity as CaCO3 mg/l	NA	<0.01	NA	<0.
Alkalinity as CaCO3 mg/l	NA	319.80	NA	439.
Dissolved Iron mg/l	NA	0.420	NA	0.
Iron as Fe (Total) mg/l	0.370	0.430	0.210	0.
Manganese as Mn (Tot) mg/l	NA	0.025	NA	0.
Oil and Grease mg/l	NA	0.6	NA	1
Suspended Solids mg/l	6.0	17.0	5.0	4
Total Dissolved Solids mg/l	1,920	1,815	1,840	1,8
pH Units	8.00	8.10	7.90	8.

Sampling Date:	1/26/83	2/9/83	2/22/83	3/9/
001				
Average Flow (Mgpd)	0.272	NA	NA	NA
Acidity as CaCO3 mg/l	NA	6.00	NA	
Alkalinity as CaCO3 mg/l	NA	328.20	NA	344.
Dissolved Iron mg/l	NA	0.380	NA	0.
Iron as Fe (Total) mg/l	0.550	0.430	0.190	0.
Manganese as Mn (Tot) mg/l	NA	0.020	NA	0.
Oil and Grease mg/l	NA	0.6	NA	
Suspended Solids mg/l	17.0	26.0	<0.1	5
Total Dissolved Solids mg/l	1,850	1,800	1,775	1,8
pH Units	7.80	7.80	7.80	7.

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	3/23/83	4/14/83	4/28/83	5/17/83
001				
Average Flow (Mgpd)	NA	0.075	0.075	0.048
Acidity as CaCO3 mg/l	NA	<0.01	NA	<0.01
Alkalinity as CaCO3 mg/l	NA	324.00	NA	338.00
Dissolved Iron mg/l	NA	0.310	NA	0.190
Iron as Fe (Total) mg/l	0.200	0.370	0.290	0.190
Manganese as Mn (Tot) mg/l	NA	0.025	NA	0.018
Oil and Grease mg/l	NA	<0.2	NA	<0.1
Suspended Solids mg/l	13.0	3.0	15.0	11.0
Total Dissolved Solids mg/l	1,810	2,160	2,172	2,124
pH Units	7.30	7.10	7.80	8.20

Sampling Date:	5/26/83	6/8/83	6/29/83
001			
Average Flow (Mgpd)	0.048		
Acidity as CaCO3 mg/l	NA	<0.01	NA
Alkalinity as CaCO3 mg/l	NA	320.00	NA
Dissolved Iron mg/l	NA	0.030	NA
Iron as Fe (Total) mg/l	0.240	0.170	0.100
Manganese as Mn (Tot) mg/l	NA	0.027	NA
Oil and Grease mg/l	NA	<0.2	NA
Suspended Solids mg/l	30.0	29.0	11.0
Total Dissolved Solids mg/l	2,016	1,988	1,710
pH Units	8.00	7.90	7.80

Sampling Date:

Flow (gpm)
Acidity as CaCO3 mg/l
Alkalinity as CaCO3 mg/l
Dissolved Iron mg/l
Iron as Fe (Total) mg/l
Manganese as Mn (Tot) mg/l
Suspended Solids mg/l
Total Dissolved Solids mg/l
pH Units

Sampling Date:

Flow (gpm)
Acidity as CaCO3 mg/l
Alkalinity as CaCO3 mg/l
Dissolved Iron mg/l
Iron as Fe (Total) mg/l
Manganese as Mn (Tot) mg/l
Suspended Solids mg/l
Total Dissolved Solids mg/l
pH Units

SURFACE WATER QUALITY - GENEVA COAL MINE

Sampling Date:	2/12/81	2/27/81	3/11/81	3/27/81
002				
Average Flow (Mgpd)	NA	NA	NA	NA
Acidity as CaCO3 mg/l	<0.1	12.0	8.0	10.0
Alkalinity as CaCO3 mg/l	462.00	430.00	432.00	390.00
Dissolved Iron mg/l	NA	0.270	0.620	0.310
Iron as Fe (Total) mg/l	0.660	0.270	0.650	0.340
Manganese as Mn (Tot) mg/l	NA	0.025	0.030	0.020
Oil and Grease mg/l	5.60	NA	1.20	NA
Suspended Solids mg/l	3.0	6.0	7.0	6.0
Total Dissolved Solids mg/l	1,750	1,950	1,750	1,700
pH Units	8.40	7.50	7.60	7.30

Sampling Date:	4/6/81	4/22/81	5/13/81	6/11/81
002				
Average Flow (Mgpd)	0.319	0.319	0.319	0.319
Acidity as CaCO3 mg/l	NA	10.00	35.00	
Alkalinity as CaCO3 mg/l	NA	368.00	470.00	
Dissolved Iron mg/l	NA	0.020	0.050	
Iron as Fe (Total) mg/l	0.170	0.310	0.160	
Manganese as Mn (Tot) mg/l	0.016	0.250	0.020	
Oil and Grease mg/l	0.80	NA	2.10	
Suspended Solids mg/l	28.0	18.0	9.0	
Total Dissolved Solids mg/l	NA	1,900	1,800	
pH Units	7.40	7.60	7.80	

Sampling Date:	6/24/81	7/8/81	7/22/81	8/12/81
002				
Average Flow (Mgpd)	0.319	0.225	0.225	0.225
Acidity as CaCO3 mg/l	6.80	8.00	5.70	20.00
Alkalinity as CaCO3 mg/l	404.00	404.00	364.00	382.00
Dissolved Iron mg/l	0.330	0.110	0.350	0.090
Iron as Fe (Total) mg/l	0.350	0.140	0.398	0.150
Manganese as Mn (Tot) mg/l	0.080	<0.001	0.085	0.010
Oil and Grease mg/l	NA	<0.01	NA	0.80
Suspended Solids mg/l	19.0	9.0	4.0	5.0
Total Dissolved Solids mg/l	1,800	1,800	1,810	1,700
pH Units	7.80	7.80	7.70	7.90

Sampling Date:	8/26/81	9/9/81	9/23/81	10/14/81
002				
Average Flow (Mgpd)	0.225	0.225	0.225	0.213
Acidity as CaCO3 mg/l				10.00
Alkalinity as CaCO3 mg/l				451.00
Dissolved Iron mg/l				0.095
Iron as Fe (Total) mg/l				0.150
Manganese as Mn (Tot) mg/l				0.010
Oil and Grease mg/l				0.20
Suspended Solids mg/l				2.0
Total Dissolved Solids mg/l				1,800
pH Units				7.80

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SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	10/28/81	11/10/81	11/25/81	12/9/81
002				
Average Flow (Mgpd)	0.213	0.213	0.213	0.213
Acidity as $CaCO_3$ mg/l				
Alkalinity as $CaCO_3$ mg/l				
Dissolved Iron mg/l				
Iron as Fe (Total) mg/l				
Manganese as Mn (Tot) mg/l				
Oil and Grease mg/l				
Suspended Solids mg/l				
Total Dissolved Solids mg/l				
pH Units				

Sampling Date:	12/13/81	1/13/82	1/27/82	2/9/82
002				
Average Flow (Mgpd)	0.213	0.000	0.000	0.000
Acidity as $CaCO_3$ mg/l				
Alkalinity as $CaCO_3$ mg/l				
Dissolved Iron mg/l				
Iron as Fe (Total) mg/l				
Manganese as Mn (Tot) mg/l				
Oil and Grease mg/l				
Suspended Solids mg/l				
Total Dissolved Solids mg/l				
pH Units				

Sampling Date:	2/22/82	3/9/82	3/23/82	4/13/82
002				
Average Flow (Mgpd)	0.000	0.122	0.122	0.197
Acidity as $CaCO_3$ mg/l			NA	<0.01
Alkalinity as $CaCO_3$ mg/l			NA	335.80
Dissolved Iron mg/l			NA	0.570
Iron as Fe (Total) mg/l			0.630	0.588
Manganese as Mn (Tot) mg/l			NA	0.050
Oil and Grease mg/l			NA	1.6
Suspended Solids mg/l			1.0	12.0
Total Dissolved Solids mg/l			2,516	2,404
pH Units			7.40	7.60

Sampling Date:	4/27/82	5/17/82	5/24/82	6/8/82
002				
Average Flow (Mgpd)	0.197	0.185	0.185	0.819
Acidity as $CaCO_3$ mg/l	NA	12.00	NA	24.00
Alkalinity as $CaCO_3$ mg/l	NA	442.10	NA	410.20
Dissolved Iron mg/l	NA	0.300	NA	0.350
Iron as Fe (Total) mg/l	0.665	0.300	0.250	0.350
Manganese as Mn (Tot) mg/l	NA	0.035	NA	0.045
Oil and Grease mg/l	NA	<0.1	NA	0.6
Suspended Solids mg/l	6.0	6.0	3.0	9.0
Total Dissolved Solids mg/l	2,772	2,150	2,192	2,275
pH Units	7.60	7.70	7.70	7.50

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	6/23/82	7/13/82	7/29/82	8/11/82
002				
Average Flow (Mgpd)	0.819	0.360	0.360	0.253
Acidity as $CaCO_3$ mg/l	NA		NA	10.00
Alkalinity as $CaCO_3$ mg/l	NA		NA	311.80
Dissolved Iron mg/l	NA		NA	0.320
Iron as Fe (Total) mg/l	0.160		1.100	0.350
Manganese as Mn (Tot) mg/l	NA		NA	0.030
Oil and Grease mg/l	NA		NA	0.2
Suspended Solids mg/l	5.0		14.0	5.0
Total Dissolved Solids mg/l	2,200		2,344	2,450
pH Units	7.40		7.60	7.80

Sampling Date:	8/27/82	9/15/82	9/28/82	10/12/82
002				
Average Flow (Mgpd)	0.253	0.185	0.185	0.164
Acidity as $CaCO_3$ mg/l	NA	5.00	NA	8.00
Alkalinity as $CaCO_3$ mg/l	NA	346.10	NA	485.10
Dissolved Iron mg/l	NA	0.290	NA	0.065
Iron as Fe (Total) mg/l	1.320	0.330	0.230	0.380
Manganese as Mn (Tot) mg/l	NA	0.036	NA	0.041
Oil and Grease mg/l	NA	<0.1	NA	<0.1
Suspended Solids mg/l	18.0	25.0	1.0	6.0
Total Dissolved Solids mg/l	1,900	2,190	1,820	1,800
pH Units	7.80	7.80	7.80	7.60

Sampling Date:	10/26/82	11/10/82	11/24/82	12/8/82
002				
Average Flow (Mgpd)	0.164	0.180	1.180	0.153
Acidity as $CaCO_3$ mg/l	NA	<0.01	NA	3.00
Alkalinity as $CaCO_3$ mg/l	NA	339.60	NA	320.20
Dissolved Iron mg/l	NA	0.065	NA	0.520
Iron as Fe (Total) mg/l	0.240	0.120	0.570	0.535
Manganese as Mn (Tot) mg/l	NA	0.020	NA	0.025
Oil and Grease mg/l	NA	0.8	NA	1.0
Suspended Solids mg/l	5.0	2.0	3.0	11.0
Total Dissolved Solids mg/l	1,910	1,900	2,500	2,505
pH Units	7.70	8.10	7.40	7.50

Sampling Date:	12/22/82	1/13/83	1/27/83	2/9/83
002				
Average Flow (Mgpd)	0.153	0.993	0.993	0.150
Acidity as $CaCO_3$ mg/l	NA	9.00	NA	11.00
Alkalinity as $CaCO_3$ mg/l	NA	422.50	NA	329.00
Dissolved Iron mg/l	NA	0.500	NA	NA
Iron as Fe (Total) mg/l	0.380	0.530	0.300	0.310
Manganese as Mn (Tot) mg/l	NA	0.025	NA	0.015
Oil and Grease mg/l	NA	<0.1	NA	<0.1
Suspended Solids mg/l	8.0	9.0	27.0	27.0
Total Dissolved Solids mg/l	2,510	1,785	2,500	1,775
pH Units	7.70	7.50	7.60	7.60

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	2/22/83	3/9/83	3/23/83	4/13/83
002				
Average Flow (Mgpd)	0.150	0.132	0.132	0.304
Acidity as CaCO3 mg/l	NA	7.00	NA	<0.01
Alkalinity as CaCO3 mg/l	NA	351.30	NA	394.00
Dissolved Iron mg/l	NA	0.270	NA	0.380
Iron as Fe (Total) mg/l	0.250	0.270	0.285	0.380
Manganese as Mn (Tot) mg/l	NA	0.015	NA	0.015
Oil and Grease mg/l	NA	<0.2	NA	<0.2
Suspended Solids mg/l	1.0	3.0	13.0	<0.1
Total Dissolved Solids mg/l	1,845	1,725	1,750	1,710
pH Units	7.60	7.40	7.20	7.80

Sampling Date:	4/27/83	5/10/83	5/25/83	6/8/83
002				
Average Flow (Mgpd)	0.304	0.253	0.253	
Acidity as CaCO3 mg/l	NA	<0.01	NA	<0.01
Alkalinity as CaCO3 mg/l	NA	428.00	NA	374.00
Dissolved Iron mg/l	NA	0.300	NA	0.030
Iron as Fe (Total) mg/l	0.410	0.445	0.370	0.220
Manganese as Mn (Tot) mg/l	NA	0.017	NA	0.015
Oil and Grease mg/l	NA	<0.2	NA	1.2
Suspended Solids mg/l	14.0	11.0	27.0	12.0
Total Dissolved Solids mg/l	1,988	1,822	1,978	1,902
H Units	7.60	7.80	7.80	7.70

Sampling Date:	6/29/83
002	
Average Flow (Mgpd)	
Acidity as CaCO3 mg/l	NA
Alkalinity as CaCO3 mg/l	NA
Dissolved Iron mg/l	NA
Iron as Fe (Total) mg/l	0.180
Manganese as Mn (Tot) mg/l	NA
Oil and Grease mg/l	NA
Suspended Solids mg/l	13.0
Total Dissolved Solids mg/l	1,724
pH Units	7.60

Sampling Date:	
Flow (gpm)	
Acidity as CaCO3 mg/l	
Alkalinity as CaCO3 mg/l	
Dissolved Iron mg/l	
Iron as Fe (Total) mg/l	
Manganese as Mn (Tot) mg/l	
Oil and Grease mg/l	
Suspended Solids mg/l	
Total Dissolved Solids mg/l	
pH Units	

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	2/1281	3/11/82	4/6/81	5/13/81
003				
BOD 5 day mg/l	4.8	0.19	0.04	NA
Free Chlorine (Avail) as C12	0.20	0.19	0.04	NA
MPN Fecal Coliform MPN/100 ml	<2.0	790	<2.0	<2.0
MPN Total Coliform MPN/100 ml	8.0	1,300	NA	460
Oil and Grease mg/l	2.01	3.80	<0.01	1.20
Suspended Solids mg/l	26.0	4.0	30.0	16.0
Total Chlorine mg/l	NA	NA	NA	<0.01
pH Units	7.80	7.50	7.50	7.50

Sampling Date:	6/11/81	7/8/81	8/12/81	9/9/81
003				
BOD 5 day mg/l	16.8	12.0	4.5	11.0
Free Chlorine (Avail) as C12	NA	NA	NA	NA
MPN Fecal Coliform MPN/100 ml	<2.0	23.0	23.0	<2.0
MPN Total Coliform MPN/100 ml	130	700	3,300	110
Oil and Grease mg/l	<0.01	1.20	5.40	<0.01
Suspended Solids mg/l	32.0	30.0	2.0	9.0
Total Chlorine mg/l	0.04	0.01	0.08	0.06
pH Units	7.20	7.30	7.50	7.70

Sampling Date:	10/15/81	11/10/81	11/12/81	12/9/81
003				
BOD 5 day mg/l	2.6	4.4	NA	2.0
MPN Fecal Coliform MPN/100 ml	<2.0	NA	<2.0	<2.0
MPN Total Coliform MPN/100 ml	8.0	NA	<2.0	<2.0
Oil and Grease mg/l	2.70	0.80	NA	4.00
Suspended Solids mg/l	4.0	2.0	NA	4.2
Total Chlorine mg/l	1.58	3.17	NA	2.14
pH Units	7.68	7.50	NA	7.70

Sampling Date:	1/13/82	2/9/82	3/9/82	4/14/82
003				
BOD 5 day mg/l	6.6	6.5	7.0	1.8
MPN Fecal Coliform MPN/100 ml	3,300	2.0	5.0p	<2.0
MPN Total Coliform MPN/100 ml	13,000	79.0	130	1,700
Oil and Grease mg/l	2.20	<1.0	1.20	1.6
Suspended Solids mg/l	12.0	15.0	3.2	4.0
Total Chlorine mg/l	3.11	2.46	3.78	0.06
pH Units	7.40	7.40	7.70	7.70

SURFACE WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	5/17/82	6/8/82	7/13/82	8/11/82
003				
BOD 5 Day mg/l	3.7	3.5	12.6	9.5
MPN Fecal Coliform MPN/100 ml	<2.0	<2.0	5.0	<2.0
MPN Total Coliform MPN/100 ml	79.0	1,300	13,000	4,900
Oil and Grease mg/l	4.0	1.8	13.0	0.6
Suspended Solids mg/l	16.0	22.0	18.0	8.5
Total Chlorine mg/l	<0.01	<0.01	<0.01	<0.01
pH Units	7.90	7.80	7.50	7.90

Sampling Date:	9/15/82	10/12/82	11/19/82	12/8/82
003				
BOD 5 Day mg/l	7.0	5.0	2.0	2.1
MPN Fecal Coliform MPN/100 ml	<2.0	<2.0	<2.0	<2.0
MPN Total Coliform MPN/100 ml	<2.0	21.0	<2.0	11.0
Oil and Grease mg/l	0.4	0.8	0.6	0.6
Suspended Solids mg/l	16.0	18.0	8.0	15.0
Total Chlorine mg/l	<0.01	5.48	0.63	0.83
pH Units	7.30	7.60	NA	7.60

Sampling Date:	1/12/83	2/9/83	3/9/83	4/13/83
003				
BOD 5 day mg/l	4.4	5.2	5.0	2.8
MPN Fecal Coliform MPN/100 ml	<2	<2	<2	<2
MPN Total Coliform MPN/100 ml	<2.0	79.0	<2.0	33.0
Oil and Grease mg/l	<0.2	0.2	<0.2	<0.2
Suspended Solids mg/l	24.0	13.0	12.0	4.0
Total Chlorine mg/l	0.84	0.07	4.22	0.34
pH Units	7.80	7.50	7.50	7.60

Sampling Date:	5/10/83	6/8/83
003		
BOD 5 day mg/l	3.2	3.90
MPN Fecal Coliform MPN/100 ml	<2	2
MPN Total Coliform MPN/100 ml	<2.0	22.0
Oil and Grease mg/l	<0.2	0.6
Suspended Solids mg/l	12.0	14.0
Total Chlorine mg/l	0.09	<0.02
pH Units	7.90	7.80

GROUND WATER QUALITY DATA - GENEVA COAL MINE

Sampling Date:	2-81	3-81	4-81	5-81
RS2				
Flow (gpm)	NA	NA	NA	20
Acidity as CaCO3 mg/l	< 0.1	< 0.1	2.50	4.00
Alkalinity as CaCO3 mg/l	500.00	434.00	418.00	450.00
Dissolved Iron mg/l	0.032	0.060	NA	0.390
Iron as Fe (Total) mg/l	0.040	0.190	0.160	0.440
Manganese as Mn (Tot) mg/l	< 0.001	0.050	0.010	0.050
Suspended Solids mg/l	NA	NA	NA	9.0
Total Dissolved Solids mg/l	900	900	1,000	900
pH Units	8.10	7.80	8.00	8.20

Sampling Date:	6-81	7-81	8-81	9-81
RS2				
Flow (gpm)	NA	34	24	25
Acidity as CaCO3 mg/l	< 0.01	4.00	4.00	< 0.01
Alkalinity as CaCO3 mg/l	424.00	424.00	416.00	430.00
Dissolved Iron mg/l	0.010	<0.001	<0.001	0.018
Iron as Fe (Total) mg/l	0.400	0.010	0.070	0.420
Manganese as Mn (Tot) mg/l	0.010	0.010	0.010	0.009
Suspended Solids mg/l	113	14.0	5.0	8.0
Total Dissolved Solids mg/l	900	950	900	950
pH Units	8.10	7.80	8.10	8.10

Sampling Date:	10-81	11-81	12-81	4-82
RS2				
Flow (gpm)	30	30	24	20
Acidity as CaCO3 mg/l	< 0.01	< 0.01	< 0.01	< 0.01
Alkalinity as CaCO3 mg/l	79.00	486.00	388.00	494.00
Dissolved Iron mg/l	0.020	NA	0.015	NA
Iron as Fe (Total) mg/l	0.450	0.465	0.460	<0.001
Manganese as Mn (Tot) mg/l	0.015	0.025	0.017	0.010
Suspended Solids mg/l	6.1	NA	2.0	7.0
Total Dissolved Solids mg/l	950	900	900	1,050
pH Units	8.30	8.10	8.30	7.80

Sampling Date:	5-82	6-82	7-82	8-82
RS2				
Flow (gpm)	30	30	25	30
Acidity as CaCO3 mg/l	6.00	18.00	5.00	<0.01
Alkalinity as CaCO3 mg/l	520.20	411.00	500.00	536.00
Dissolved Iron mg/l	NA	0.010	0.030	0.060
Iron as Fe (Total) mg/l	0.060	0.010	0.030	0.150
Manganese as Mn (Tot) mg/l	0.005	0.002	0.005	0.015
Suspended Solids mg/l	7.0	11.0	<1.0	5.0
Total Dissolved Solids mg/l	886	900	950	862
pH Units	7.80	7.60	7.60	8.20

NA = NOT AVAILABLE

Sampling Date:	9-82	10-82	4-83
RS2			
Flow (gpm)	25	30	20
Acidity as CaCO3 mg/l	< 0.01	5.00	NA
Alkalinity as CaCO3 mg/l	318.30	552	NA
Dissolved Iron mg/l	0.045	0.040	NA
Iron as Fe (Total) mg/l	0.056	0.049	0.180
Manganese as Mn (Tot) mg/l	0.010	0.012	0.003
Suspended Solids mg/l	11.0	8.0	61.0
Total Dissolved Solids mg/l	946	910	966
pH Units	8.10	7.80	7.90

Sampling Date:	1-81	2-81	3-81	4-81
2WB				
Flow (gpm)	3	3	3	3
Acidity as CaCO3 mg/l	<0.1	<0.1	2.0	3.60
Alkalinity as CaCO3 mg/l	184.00	168.00	162.00	150.00
Dissolved Iron mg/l	0.420	0.050	0.040	0.030
Iron as Fe (Total) mg/l	0.640	0.060	0.060	0.070
Manganese as Mn (Tot) mg/l	0.030	0.020	0.020	0.020
Suspended Solids mg/l	59.0	10.0	8.0	8.0
Total Dissolved Solids mg/l	2,200	2,200	2,100	2,200
pH Units	7.40	8.00	7.70	8.10

Sampling Date:	5-81	6-81	7-81	8-81
2WB				
Flow (gpm)	3	3	5	7
Acidity as CaCO3 mg/l	5.70	<0.01	10.80	<0.01
Alkalinity as CaCO3 mg/l	124.00	140.00	350.00	210.00
Dissolved Iron mg/l	0.140	0.033	0.150	0.146
Iron as Fe (Total) mg/l	0.360	0.075	0.380	0.410
Manganese as Mn (Tot) mg/l	0.030	0.025	0.027	0.020
Suspended Solids mg/l	19.0	13.0	15.0	1.0
Total Dissolved Solids mg/l	2,300	2,400	2,050	2,200
pH Units	8.00	8.10	7.60	7.90

Sampling Date:	9-81	10-81	11-81	12-81
2WB				
Flow (gpm)	3	3	3	3
Acidity as CaCO3 mg/l	2.00	<0.01	<0.01	<0.01
Alkalinity as CaCO3 mg/l	265.00	198.10	203.30	228.20
Dissolved Iron mg/l	0.136	0.150	0.150	0.150
Iron as Fe (Total) mg/l	0.390	0.380	0.380	0.400
Manganese as Mn (Tot) mg/l	0.022	0.025	0.025	0.027
Suspended Solids mg/l	24.0	17.0	13.0	7.0
Total Dissolved Solids mg/l	2,200	2,175	2,200	2,175
pH Units	8.10	7.90	8.10	8.20

NA = NOT AVAILABLE

GROUND WATER QUALITY MONITORING
GENEVA COAL MINE

RS-2

Sample Date:	9/13/78	9/16/79	8/8/80	9/24/80
Aluminum, Al mg/l	0.31	0.010	0.310	NA
Ammonia, NH3 mg/l	NA	NA	<0.01	NA
Arsenic, As mg/l	<0.001	<0.001	<0.001	NA
Antimony as Sb mg/l	<0.001	<0.001	0.060	NA
Barium, Ba mg/l	0.210	0.050	0.030	NA
Beryllium as Be mg/l	0.020	<0.001	<0.001	NA
Bicarbonate, HNO3 mg/l	NA	NA	534.36	NA
Boron, B mg/l	0.315	0.190	0.090	NA
Cadmium, Cd mg/l	<0.001	<0.001	<0.001	NA
Calcium,Ca mg/l	49.6	168.00	52.00	NA
Carbonate, CO3 mg/l	<0.01	<0.01	1.20	NA
Chloride, Cl mg/l	22.0	22.0	30.0	NA
Chromium, Cr mg/l	<0.001	<0.001	<0.001	NA
Cobalt as Co mg/l	0.005	0.004	<0.001	NA
Copper, Cu mg/l	0.004	0.006	0.020	NA
Flouride, F mg/l	0.24	0.19	0.18	NA
Flow gpm	NA	9	30	30
Germanium as Ge mg/l	<0.001	<0.002	<0.001	NA
Hardness, CaCO3 mg/l	NA	NA	460	NA
Iron, Fe (total) mg/l	0.018	<0.001	0.310	0.080
Lead, Pb mg/l	0.003	<0.001	<0.001	NA
Magnesium, Mg mg/l	72.0	16.80	79.20	NA
Manganese, Mn mg/l	0.016	0.012	0.010	0.010
Mercury, Hg mg/l	<0.0002	<0.0002	<0.0002	NA
Molybdenum, Mo mg/l	0.16	<0.001	<0.001	NA
Nickel, Ni mg/l	<0.001	0.001	<0.001	NA
Nitrate, NO3-N mg/l	0.04	0.45	<0.01	NA
Nitrite, NO2-N mg/l	<0.01	<0.01	<0.01	NA
Phosphate, PO4 mg/l	0.055	0.060	0.010	NA
Potassium, K mg/l	NA	NA	1.57	NA
Selenium, Se mg/l	<0.001	0.004	<0.001	NA
Silver as As mg/l	<0.001	0.001	<0.001	NA
Sodium, Na mg/l	140.9	170.00	171.00	NA
Sulfate, SO4 mg/l	300.0	350	320	NA
Sulfide, S mg/l	NA	NA	<0.01	NA
Suspended Solids mg/l	9.0	1.0	10.0	14.0
Total Dissolved Solids mg/l	920	900	925	1,000
Total Kjeldahl Nitrogen mg/l	<0.01	0.10	0.22	NA
Vanadium as V mg/l	0.25	<0.001	<0.001	NA
Zinc, Zn mg/l	0.018	0.017	0.020	NA
pH Units	NA	NA	NA	7.70

NA - Not Available

JBR Data

CHEMTECH
28 EAST 1500 NORTH
OREM, UTAH 84057
(801) 226-8822

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION

CLIENT: JBR Consultants
2556 East Oak Creek Circle
Sandy, UT 84092

LAB NO.: U009230

DATE SAMPLED: 11-6-85

TIME SAMPLED: 1500

SAMPLED BY: Martz

LOCATION: RB-21 H-1

COMMENTS: metals - dissolved

PARAMETER	LEVEL
Alkalinity as $CaCO_3$, mg/l	365
Ammonia as NH_3-N, mg/l	0.15
Arsenic as As, mg/l	0.012
Barium as Ba, mg/l	0.060
Bicarbonate as HCO_3, mg/l	445
Boron as B, mg/l	0.59
Cadmium as Cd, mg/l	<.005
Calcium as Ca, mg/l	27.5
Carbonate as CO_3, mg/l	0
Sulfide as S, mg/l	<.05
Molybdenum as Mo, mg/l	<.005

PARAMETER	LEVEL
Chloride as Cl, mg/l	12.6
Chromium as Cr (Hex.), mg/l	<.005
Chromium as Cr (Total), mg/l	<.005
Conductivity, umhos/cm	866
Copper as Cu, mg/l	0.020
Fluoride as F, mg/l	0.17
Hardness as $CaCO_3$, mg/l	399
Hydroxide as OH, mg/l	0
Iron as Fe (Dissolved), mg/l	0.248
Iron as Fe (Total), mg/l	--
Lead as Pb, mg/l	0.022
Magnesium as Mg, mg/l	48.2
Manganese as Mn, mg/l	0.020
Mercury as Hg, mg/l	0.0003
Nickel as Ni, mg/l	0.006
Nitrate as NO_3-N, mg/l	0.27
Nitrite as NO_2-N, mg/l	<.005
Phosphate as PO_4-P, mg/l	0.042
Potassium as K, mg/l	1.92
Selenium as Se, mg/l	<.002
Silica as SiO_2 (Dissolved), mg/l	10.44
Silver as Ag, mg/l	<.005
Sodium as Na, mg/l	89.8
Sulfate as SO_4, mg/l	115
Total Dissolved Solids, mg/l	581
Turbidity, NTU	--
Zinc as Zn, mg/l	0.10
pH Units	7.69

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28 EAST 1500 NORTH
OREM, UTAH 84057
(801) 226-8822

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION

CLIENT: JBR Consultants
2556 East Oak Creek Circle
Sandy, UT 84092

LAB NO.: U009231

DATE SAMPLED: 11-8-85

TIME SAMPLED: 1130

SAMPLED BY: Martz

LOCATION: RB-26 H-6

COMMENTS: metals - dissolved

PARAMETER	LEVEL
Alkalinity as $CaCO_3$, mg/l	375
Ammonia as NH_3-N, mg/l	0.15
Arsenic as As, mg/l	0.010
Barium as Ba, mg/l	0.050
Bicarbonate as HCO_3, mg/l	457
Boron as B, mg/l	1.07
Cadmium as Cd, mg/l	<.005
Calcium as Ca, mg/l	32.5
Carbonate as CO_3, mg/l	0
Sulfide as S, mg/l	<.05
Molybdenum as Mo, mg/l	0.016

PARAMETER	LEVEL
Chloride as Cl, mg/l	27.1
Chromium as Cr (Hex.), mg/l	<.005
Chromium as Cr (Total), mg/l	<.005
Conductivity, umhos/cm	1300
Copper as Cu, mg/l	0.010
Fluoride as F, mg/l	0.38
Hardness as $CaCO_3$, mg/l	401
Hydroxide as OH, mg/l	0
Iron as Fe (Dissolved), mg/l	0.023
Iron as Fe (Total), mg/l	--
Lead as Pb, mg/l	0.024
Magnesium as Mg, mg/l	68.8
Manganese as Mn, mg/l	<.005
Mercury as Hg, mg/l	0.0005
Nickel as Ni, mg/l	<.005
Nitrate as NO_3-N, mg/l	0.48
Nitrite as NO_2-N, mg/l	<.005
Phosphate as PO_4-P, mg/l	0.016
Potassium as K, mg/l	1.84
Selenium as Se, mg/l	0.004
Silica as SiO_2 (Dissolved), mg/l	10.71
Silver as Ag, mg/l	<.005
Sodium as Na, mg/l	161
Sulfate as SO_4, mg/l	251
Total Dissolved Solids, mg/l	892
Turbidity, NTU	--
Zinc as Zn, mg/l	0.06
pH Units	7.87

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28 EAST 1500 NORTH
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CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION

CLIENT: JBR Consultants
2556 East Oak Creek Circle
Sandy, UT 84092

LAB NO.: U009220

DATE SAMPLED: 11-8-85

TIME SAMPLED: 1015

SAMPLED BY: Martz

OCATION: EWL-25 H-18

COMMENTS: metals - dissolved

PARAMETER	LEVEL
Alkalinity as $CaCO_3$, mg/l	377
Ammonia as NH_3-N, mg/l	0.12
Arsenic as As, mg/l	0.012
Barium as Ba, mg/l	0.120
Bicarbonate as HCO_3, mg/l	460
Boron as B, mg/l	0.37
Cadmium as Cd, mg/l	<.005
Calcium as Ca, mg/l	29.6
Carbonate as CO_3, mg/l	0
Sulfide as S, mg/l	<.05
Molybdenum as Mo, mg/l	<.005

PARAMETER	LEVEL
Chloride as Cl, mg/l	25.2
Chromium as Cr (Hex.), mg/l	<.005
Chromium as Cr (Total), mg/l	<.005
Conductivity, umhos/cm	1010
Copper as Cu, mg/l	0.030
Fluoride as F, mg/l	0.24
Hardness as $CaCO_3$, mg/l	343
Hydroxide as OH, mg/l	0
Iron as Fe (Dissolved), mg/l	0.040
Iron as Fe (Total), mg/l	--
Lead as Pb, mg/l	0.024
Magnesium as Mg, mg/l	52.8
Manganese as Mn, mg/l	<.005
Mercury as Hg, mg/l	0.0010
Nickel as Ni, mg/l	<.005
Nitrate as NO_3-N, mg/l	0.11
Nitrite as NO_2-N, mg/l	<.005
Phosphate as PO_4-P, mg/l	0.025
Potassium as K, mg/l	1.64
Selenium as Se, mg/l	<.002
Silica as SiO_2 (Dissolved), mg/l	10.76
Silver as Ag, mg/l	<.005
Sodium as Na, mg/l	123
Sulfate as SO_4, mg/l	107
Total Dissolved Solids, mg/l	641
Turbidity, NTU	--
Zinc as Zn, mg/l	0.10
pH Units	7.58

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28 EAST 1500 NORTH
OREM, UTAH 84057
(801) 226-8822

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION

CLIENT: JBR Consultants
2556 East Oak Creek Circle
Sandy, UT 84092

LAB NO.: U009221

DATE SAMPLED: 11-8-85

TIME SAMPLED: 0945

SAMPLED BY: Martz

LOCATION: EWL-26 H-21

COMMENTS: metals - dissolved

PARAMETER	LEVEL
Alkalinity as $CaCO_3$, mg/l	152
Ammonia as NH_3-N, mg/l	0.15
Arsenic as As, mg/l	0.011
Barium as Ba, mg/l	0.220
Bicarbonate as HCO_3, mg/l	186
Boron as B, mg/l	0.22
Cadmium as Cd, mg/l	<.005
Calcium as Ca, mg/l	13.4
Carbonate as CO_3, mg/l	0
Sulfide as S, mg/l	<.05
Molybdenum as Mo, mg/l	<.005

PARAMETER	LEVEL
Chloride as Cl, mg/l	21.0
Chromium as Cr (Hex.), mg/l	<.005
Chromium as Cr (Total), mg/l	<.005
Conductivity, umhos/cm	525
Copper as Cu, mg/l	0.013
Fluoride as F, mg/l	0.10
Hardness as $CaCO_3$, mg/l	152
Hydroxide as OH, mg/l	0
Iron as Fe (Dissolved), mg/l	0.105
Iron as Fe (Total), mg/l	--
Lead as Pb, mg/l	0.011
Magnesium as Mg, mg/l	20.4
Manganese as Mn, mg/l	0.008
Mercury as Hg, mg/l	0.0008
Nickel as Ni, mg/l	<.005
Nitrate as NO_3-N, mg/l	0.29
Nitrite as NO_2-N, mg/l	<.005
Phosphate as PO_4-P, mg/l	0.025
Potassium as K, mg/l	0.67
Selenium as Se, mg/l	0.004
Silica as SiO_2 (Dissolved), mg/l	10.90
Silver as Ag, mg/l	<.005
Sodium as Na, mg/l	72.1
Sulfate as SO_4, mg/l	77.2
Total Dissolved Solids, mg/l	347
Turbidity, NTU	--
Zinc as Zn, mg/l	0.09
pH Units	7.86

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1989 Water Monitoring Data

Water Quality and Flow Summa - Surface and Groundwater
Horse Canyon Mine
(N = number of samples)
Reproduced by UEI 10/28/03

Parameter	Units	Sample Site RS-2				Sample Site B-1				Sample Site RF-1				Sample Site HC-1				Sample Site 2WB				Sample Site 1E2			
		Mean	Max	Min	N	Mean	Max	Min	N	Mean	Max	Min	N	Mean	Max	Min	N	Mean	Max	Min	N	Mean	Max	Min	N
Flow	gpm	23.92	34.0	9	25	236	630	0	18	11.36	25	0	22	20.95	65	0	19	3.39	7	3	22	1	1	1	19
ph	stand	7.95	8.36	7.37	27	8.13	8.40	7.8	15	8.20	8.60	7.60	22	8.05	8.48	7.7	22	7.9	8.2	7.4	22	7.95	8.5	7.5	22
Temp	^{0}C	9.00	10.0	8.0	7					11.00	11.00	11.00	2	13.83	20.0	10.0	6								
Conductivity	uoh ms	2414	2700	2200	7					2500	2700	2300	2	3767	3900	3600	6								
Dissolved 0_2	ppm	6.47	8.10	4.2	7					4.4	4.9	3.9	2	5.77	7.4	4.3	6								
Acidity as CaC03	mg/l	2.69	10.0	0.0	18	.75	6.0	0.0	14	2.21	14.0	0.0	19	1.47	10.0	0.0	15	2.05	12.0	0.0	22	2.65	14.0	0.0	22
Alkalinity as CaC03	mg/l	432	532	79	18	394	1095	292	14	408	537	46	19	429	985	211	15	204	350	124	22	316	439	218	22
Aluminum	mg/l	.063	.310	.00	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Antimony as Sb	mg/l	.02	.06	0.0	3																				
Arsenic	mg/l	0.0	0.0	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Barium	mg/l	.029	.21	0.0	10					0.0	0.0	.0.	2	0.0	0.0	0.0	6								
Beryllium	mg/l	.007	.02	0.0	3																				
Bicarbonate	mg/l	518.3	581	338	8					424	513	336	2	486	537	424	6								
Boron	mg/l	.198	.315	0.09	10					.18	.18	.18	2	.24	.4	.16	6								
Cadmium	mg/l	0.0	0.0	0.0	10					0.0	0.0	0..0	2	0.0	0.0	0.0	6								
Calcium	mg/l	63.14	168.0	30.2	10					48	52	44.8	2	63.35	83.9	41.1	6								
Carbonate	mg/l	8.27	78.0	0.0	10					44	72	16	2	6.8	19	0.0	6								
Chloride	mg/l	22	30	19.7	10					24.2	26.3	22	2	32.3	43	13	6								
Chromium	mg/l	0.0	0.0	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Cobalt	mg/l	.003	.003	0.0	3																				
Copper	mg/l	.003	.02	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Fluoride	mg/l	.37	.52	.10	10					.63	.78	.48	2	.61	1.01	.14	6								
Germanium	mg/l	0.0	0.0	0.0	3																				
Hardness	mg/l	402	460	310	8					410	433	387	2	717	872	271	6								
Iron disol	mg/l	.052	.39	0.0	14	.443	.92	.02	12	.206	1.9	0.0	17	.052	.14	.01	13	.125	.42	.02	20	.606	10.55	.002	20

Iron total	mg/l	.293	4.21	0.0	29	1.006	14.8	0.06	15	141	3000	.02	22	2.447	49.3	.02	22	.22	.64	.05	22	.743	13.2	0	22
Lead	mg/l	0.009	.003	0.0	8					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Magnesium	mg/l	61.18	102	.8	10					70.45	70	70.1	2	78.58	133	33	6								
Manganese	mg/l	0.0	0.0	0.0	7					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Manganese Total	mg/l	.014	.05	0.0	23	.076	.515	.01	15	.047	.36	0.0	20	.136	1.45	.01	16	.021	.03	.003	22	.02	.115	0.0	22
Mercury	mg/l	0.0	0.0	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Molybdenum	mg/l	.016	.16	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Nickel	mg/l	0.0	0.0	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Arsenic	mg/l	.27	.68	0.0	8					.32	.44	.20	2	.08	.28	0.0	6								
Nitrate	mg/l	.70	3.46	0.0	10					.06	.12	0.0	2	.27	1.24	0.0	6								
Nitrite	mg/l	0.0	.02	0.0	10					.01	.02	0..0	2	.01	.03	0.0	6								
Phosphate	mg/l	.013	.06	0.0	10					0.0	0.0	0.0	2	.002	.01	0.0	6								
Potassium	mg/l	4.25	12.4	0.0	8					2.3	2.8	1.0	2	6.35	8.1	2.6	6								
Selenium	mg/l	0.0	0.0	0.0	10					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
silver	mg/l	0.0	0.0	0.0	3																				
sodium	mg/l	185.59	408	140	10					179.5	180	179	2	204	224	184	6								
Sulfate	mg/l	306	475	79	10					298	308	288	2	485	817	232	6								
Sulfite	mg/l	0.0	0.0	0.0	8					0.0	0.0	0.0	2	0.0	0.0	0.0	6								
Susp Solids	mg/l	16	113	0.0	10	88.3	640	3	15	120.3	1648	0.0	20	151.2	2152	1.0	16	14	59	1.0	22	8.6	20	1.0	22
TDS	mg/l	930	1380	774	29	1910	2708	362	15	964	1809	847	22	1386	1760	800	22	2435	3928	2050	22	2106	2825	1430	22
Total Nitrogen	mg/l	.11	.22	0.0	3																				
Vanadium	mg/l	.08	.25	0.0	3																				
Zinc	mg/l	.019	.12	0.0	10																				

NOTE: 0 = below detection limit - see analysis for detection limit

KAISER COAL CORPORATION
HORSE CANYON MINE
ACT/007/013

1989 WATER MONITORING DATA

SAMPLE LOCATION: B - 1 (Horse Canyon Wash Below Mine) * INACCESSIBLE

Parameter	Units	Jan 89	Feb 89	Mar 89	Apr 89	May 89	June 89	July 89	Aug 89	Sep 89	Oct 89	Nov 89	Dec 89
Flow	(gpm)	*	*	0	0	0	0	0	0	0			
pH	standard												
Temp	o C												
Conductivity	umhos/cm												
Dissolved Oxygen	ppm												
Aluminum	mg/l												
Arsenic	mg/l												
Barium	mg/l												
Bicarbonate	mg/l												
Boron	mg/l												
Cadmium	mg/l												
Calcium	mg/l												
Carbonate	mg/l												
Chloride	mg/l												
Chromium	mg/l												
Copper	mg/l												
Flouride	mg/l												
Hardness	mg/l												
Iron Total	mg/l												
Lead	mg/l												
Magnesium	mg/l												
Manganese	mg/l												
Mercury	mg/l												
Molybdenum	mg/l												
Nickel	mg/l												
Ammonia	mg/l												
Nitrate	mg/l												
Nitrite	mg/l												
Phosphate	mg/l												
Potassium	mg/l												
Selenium	mg/l												
Sodium	mg/l												
Sulfate	mg/l												
Sulfide	mg/l												
TDS	mg/l												
Zinc	mg/l												

KAISER COAL CORPORATION
HORSE CANYON MINE
ACT/007/013

1989 WATER MONITORING DATA

SAMPLE LOCATION: HC - 1 (Horse Canyon Wash) * INACCESSIBLE

Parameter	Units	Jan 89	Feb 89	Mar 89	Apr 89	May 89	June 89	July 89	Aug 89	Sep 89	Oct 89	Nov 89	Dec 89
Flow	(gpm)	*	*	3	3	6	9	<1	<1	0			
pH	standard			8.33	8.48	7.88	7.78	8.02	8.1				
Temp	o C			10	13	12	10	18	20				
Conductivity	umhos/cm			3700	3900	3600	3800	3800	3800				
Dissolved Oxygen	ppm			4.3	4.8	5.2	6.3	6.6	7.4				
Aluminum	mg/l			<.1	<.1	<.1	<.1	<.1	<.1				
Arsenic	mg/l			<.01	<.01	<.01	<.01	<.01	<.1				
Barium	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Bicarbonate	mg/l			424	491	537	499	514	456				
Boron	mg/l			0.22	0.4	0.22	0.157	0.18	0.26				
Cadmium	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Calcium	mg/l			41.1	83.9	41.1	80.7	74.1	59.2				
Carbonate	mg/l			19	9.5	12.3	0	0	0				
Chloride	mg/l			29.3	33.1	13	43	34.1	41.3				
Chromium	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Copper	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Flouride	mg/l			0.32	0.66	0.14	0.86	0.68	1.01				
Hardness	mg/l			766	697	271	872	834	863				
Iron Total	mg/l			0.182	0.17	0.02	0.055	0.07	0.102				
Lead	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Magnesium	mg/l			102	112	38.4	33	53.1	133				
Manganese	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Mercury	mg/l			<.0002	<.0002	<.0002	<.0002	<.0002	<.0002				
Molybdenum	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Nickel	mg/l			<.01	<.01	<.01	<.01	<.01	<.01				
Ammonia	mg/l			0.18	<.1	0.28	<.2	<.2	<.2				
Nitrate	mg/l			0.257	<.1	1.24	<.01	<.02	0.14				
Nitrite	mg/l			0.028	<.01	<.005	<.01	0.0065	<.005				
Phosphate	mg/l			<.01	<.01	<.01	<.01	<.01	0.01				
Potassium	mg/l			8.1	6.1	5.5	8	2.6	7.8				
Selenium	mg/l			<.002	<.002	<.002	<.002	<.002	<.002				
Sodium	mg/l			202	224	197	202	184	218				
Sulfate	mg/l			560	724	232	281	294	817				
Sulfide	mg/l			<.1	<.1	<.1	<.1	<.1	<.1				
TDS	mg/l			1400	1420	824	800	1635	1760				
Zinc	mg/l			<.01	<.01	0.012	0.012	<.01	<.01				

KAISER COAL CORPORATION
HORSE CANYON MINE
ACT/007/013

1989 WATER MONITORING DATA

MPLE LOCATION: RF - 1 (Right Fork, Horse Canyon Wash) * INACCESSIBLE

rameter	Units	Jan 89	Feb 89	Mar 89	Apr 89	May 89	June 89	July 89	Aug 89	Sep 89	Oct 89	Nov 89	Dec 89
ow	(gpm)	*	*	<1	<1	0	0	0	0	0			
l	standard			8.45	8.51								
mp	o C			11	11								
nductivity	umhos/cm			2300	2700								
ssolved Oxygen	ppm			3.9	4.9								
uminum	mg/l			<.1	<.1								
senic	mg/l			<.01	<.01								
rium	mg/l			<.01	<.01								
carbonate	mg/l			336	513								
ron	mg/l			0.18	0.18								
dmium	mg/l			<.01	<.01								
lcium	mg/l			52.8	44.8								
rbonate	mg/l			72	16								
loride	mg/l			22	26.3								
romium	mg/l			<.01	<.01								
pper	mg/l			<.01	<.01								
ouride	mg/l			0.78	0.48								
rdness	mg/l			433	387								
on Total	mg/l			0.144	0.065								
ad	mg/l			<.01	<.01								
gnesium	mg/l			70.8	70.1								
nganese	mg/l			<.01	<.01								
rcury	mg/l			<.0002	<.0002								
lybdenum	mg/l			<.01	<.01								
ckel	mg/l			<.01	<.01								
monia	mg/l			0.2	0.44								
trate	mg/l			<.01	0.12								
trite	mg/l			0.021	<.01								
osphate	mg/l			<.01	<.01								
tassium	mg/l			1.8	2.8								
lenium	mg/l			<.002	<.002								
dium	mg/l			180	179								
lfate	mg/l			308	288								
lfide	mg/l			<.1	<.1								
S	mg/l			847	876								
nc	mg/l			<.01	<.1								

Table 7.–Summary of chemical constituents and bacteria in water at gaging station 09314374 in Horse Canyon, August 1978 through September 1979

	Parameters and constituents	No. of analyses	Mean	Minimum-maximum
	Discharge (cubic feet per second)	12	-	<0.01-1.20
	Water temperature (degrees Celsius)	12	18.0	6.0-27.0
	Specific conductance (micromhos per centimeter)	12	2,800	1,390-7,000
	pH (units)	12	-	8.5-8.7
Milligrams per liter	Dissolved solids, sum of constituents	12	1,960	953-4,220
	Oxygen, dissolved (O_2)	12	7.8	6.1-10.6
	Carbon dioxide, dissolved (CO_2)	12	2.1	1.2-4.7
	Alkalinity ($CaCO_3$)	12	350	290-380
	Bicarbonate (HCO_3)	12	398	338-444
	Carbonate (CO_3)	12	16	8-26
	Oil and grease	3	-	0
	Nitrogen, dissolved (N)	2	-	0.83-0.89
	Nitrogen, organic dissolved (N)	4	.31	0.20-0.46
	Nitrogen, ammonia dissolved (N)	4	.19	0-0.42
	Nitrogen, nitrite dissolved (N)	4	.03	0.02-0.06
	Nitrogen, nitrate dissolved (N)	4	.54	0.19-1.20
	Nitrogen, ammonia + organic suspended total (N)	4	.16	0.08-0.25
	Nitrogen, nitrite + nitrate dissolved (N)	4	.57	0.21-1.20
	Nitrogen, ammonia + organic total (N)	4	.66	0.50-0.85
	Phosphorus, total (P)	4	.02	0-0.04
	Phosphorus, ortho dissolved (P)	4	.005	0-0.02
	Carbon, organic dissolved (C)	4	4.0	1.8-8.8
	Hardness, (as $CaCO_3$)	12	790	420-1,600
	Hardness, (as noncarbonate $CaCO_3$)	12	440	99-1,400
	Calcium, dissolved (Ca)	12	98	61-210
	Magnesium, dissolved (Mg)	12	130	65-260
	Sodium, dissolved (Na)	12	360	130-1,000
	Sodium-adsorption-ratio	12	5.7	1.4-12.0
	Potassium, dissolved (K)	12	11	5.7-26
	Chloride, dissolved (Cl)	12	160	18-1,500
	Sulfate, dissolved (SO_4)	12	960	440-1,300
	Fluoride, dissolved (F)	4	.3	0.2-0.4
	Silica, dissolved (SiO_2)	12	11	10-15
Micrograms per liter	Arsenic, dissolved (As)	4	-	1
	Boron, dissolved (B)	4	260	0-360
	Chromium, dissolved (Cr)	4	5	0-10
	Iron, dissolved (Fe)	4	20	10-30
	Lead, dissolved (Pb)	4	15	0-47
	Manganese, dissolved (Mn)	4	15	10-20
	Strontium, dissolved (Sr)	4	1,400	1,100-2,000
	Zinc, dissolved (Zn)	4	20	10-30
	Lithium, dissolved (Li)	4	200	50-630
	Selenium, dissolved (Se)	4	1.2	0-3
	Phenols	4	1.2	1-2
	Bacteria (colonies per 100 milliliters)			
	Coliform, fecal	2	-	3-5
	Streptococci, fecal	1	-	84

Water Samples and Observations - South Lease Coal Property
(For Locations refer to Plate VII-2 Water Resources Map)

Date	No. 14 Williams Draw	No. 16 Above S-17	WMH-1a Total Depth 44.8'	WHH-2a Total Depth 43.3'	WMH-3d Surface EL: 6567'	CSG-1 Highest Level Noted	CSG-2 Highest Level Noted	CSG-3 Highest Level Noted	No. 22 Below S-17
1981 3-Quar.	>1g/m	>1g/m	Dry	Level=42.0'	Level=736'	2' Noted	2' Noted	None	Dry
4-Quar. 12/9/81	Trickle Sampled	>1g/m Sampled	Dry(mud)	Level=38.3'	Level=731'	None	20" Noted	20" Noted	Dry

Williams Draw wash

Little Park wash 1 mile south of Permit area

confluence of Williams Draw and Little Park washes