

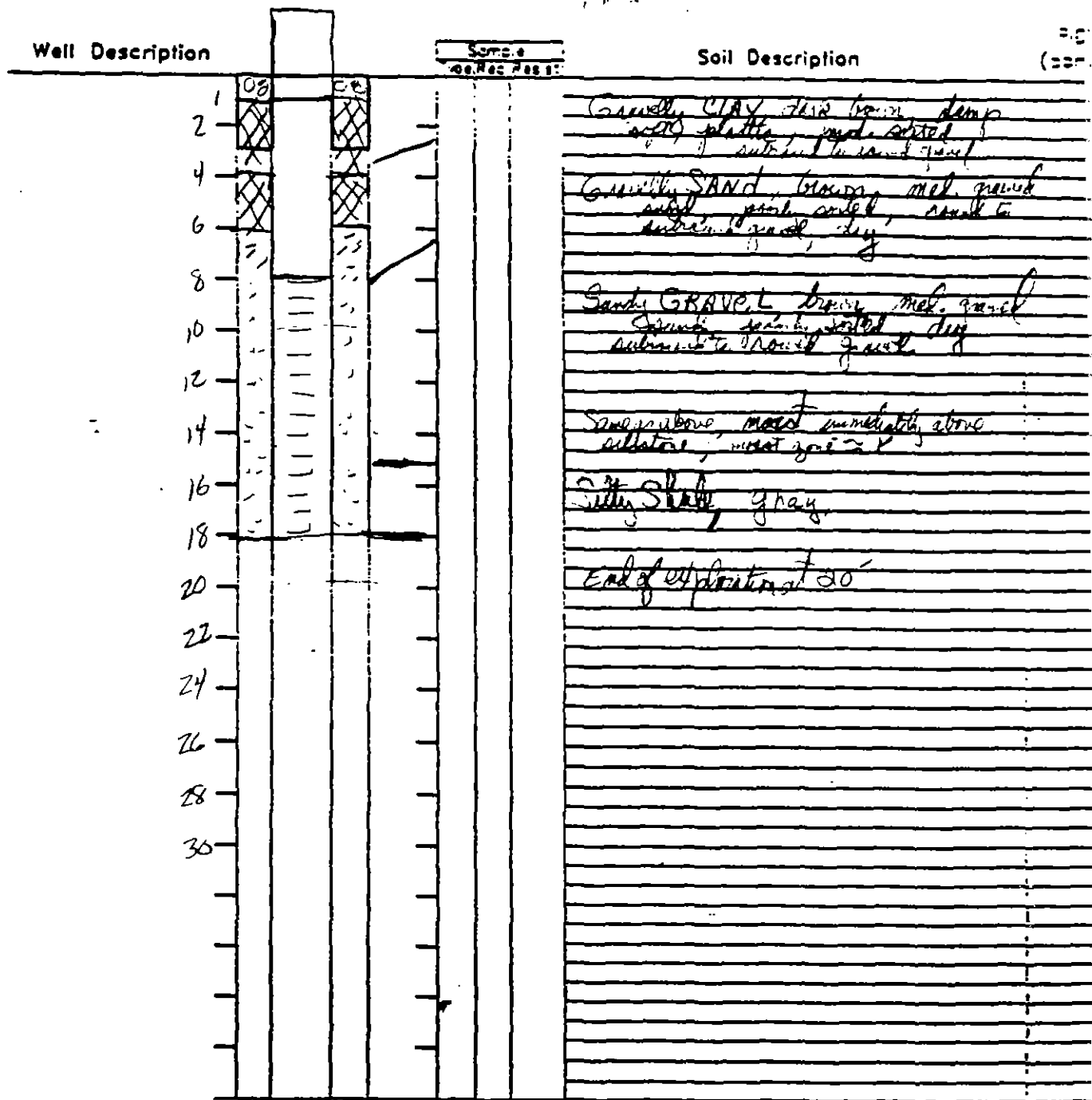


999

Doc Date:12/11/2001

S/E

"EXHIBIT 7, APPENDIX GW-1,
WELL CONSTRUCTION DIAGRAMS "



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Sam's Inc-1

Drill Foreman: _____

Boring Diameter & Method: _____

Geologist: RAY FALSKIE

Date Started: 3/7/96

Date Completed: 3/7/96

Ground Surface Elevation NA

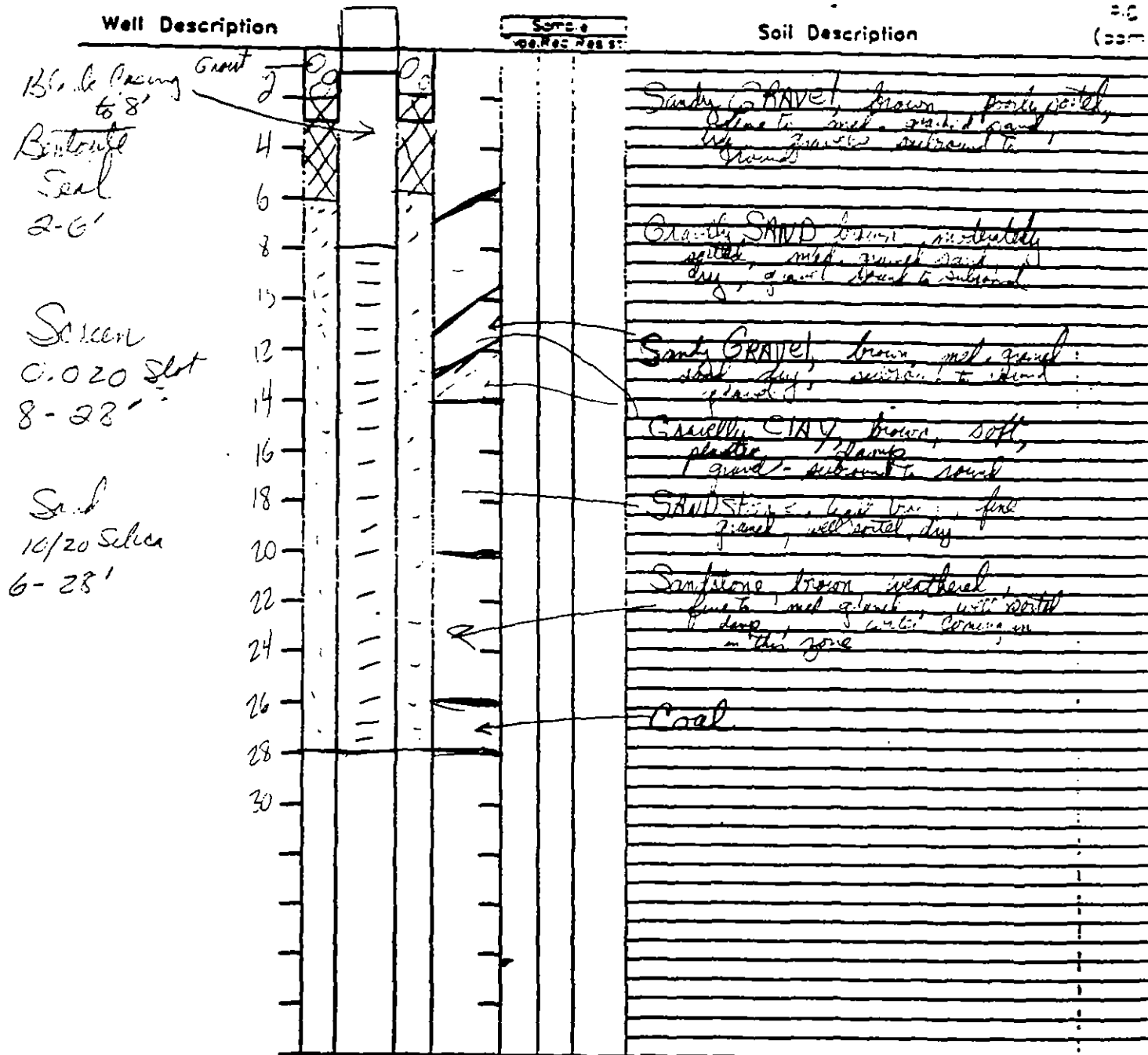
Elevation of top of riser pipe NA

GREYSTONE®

MWAC-1

Laramie Canyon

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Some to JC-1

Drill Foreman: _____

Boring Diameter & Method: 3

Geologist: KAY FAUSKE

Date Started: 3/8/96

Date Completed: 3/8/96

Ground Surface Elevation: NA

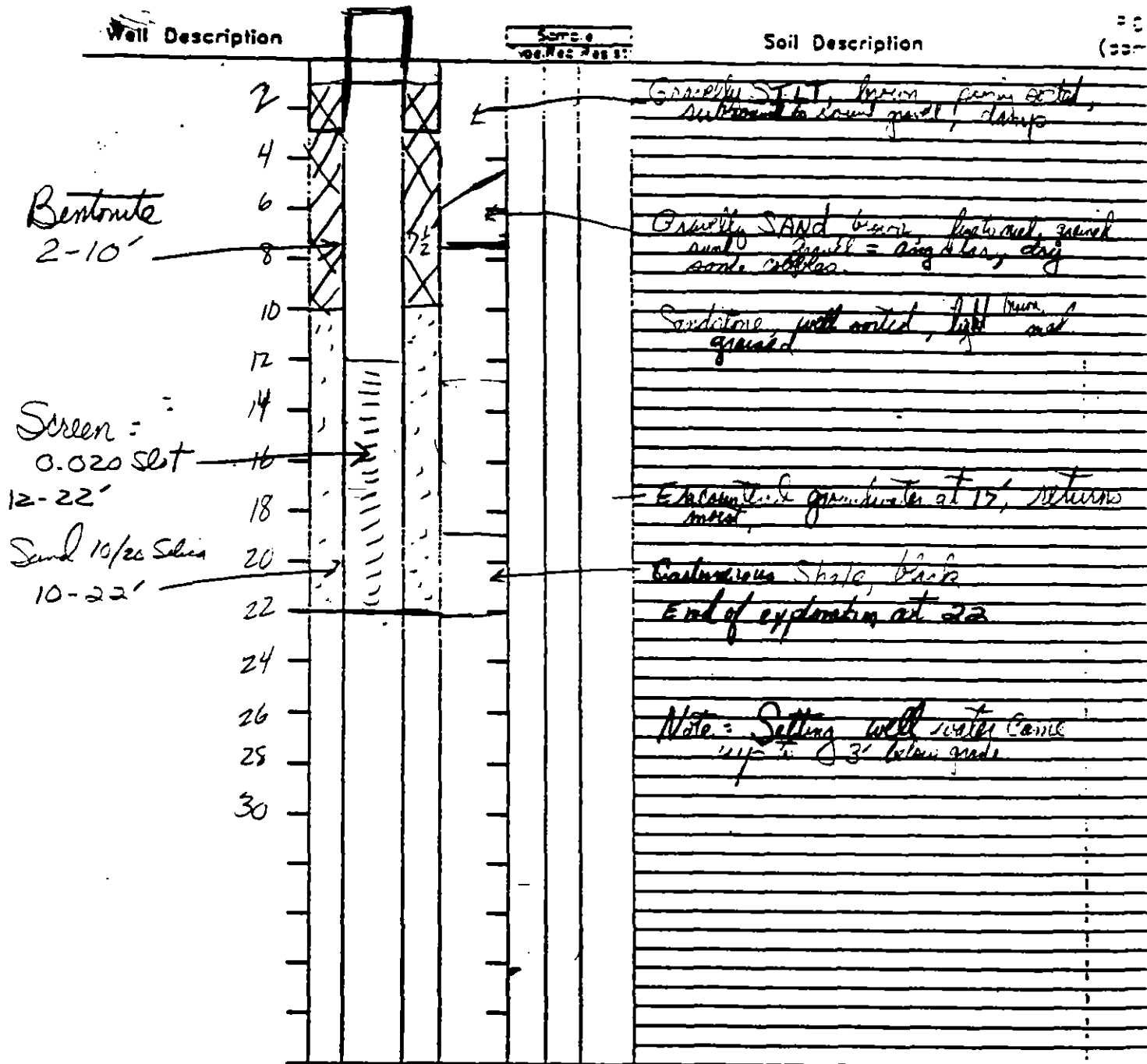
Elevation of top of riser pipe: NA

GREYSTONE®

MWCC-1

Harvesto Project

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	



Note: Relocated this well down canyon from original location on map. Wasn't able to get up to location. Called Cathy to OK change in location.

■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Same as JC-1

Drill Foreman: 7

Boring Diameter & Method: 3

Geologist: RAY FALISKE

Date Started: 3/9/96

Date Completed: 3/9/96

Ground Surface Elevation: NA

Elevation of top of riser pipe: NA

GREYSTONE®

MWCWC-1

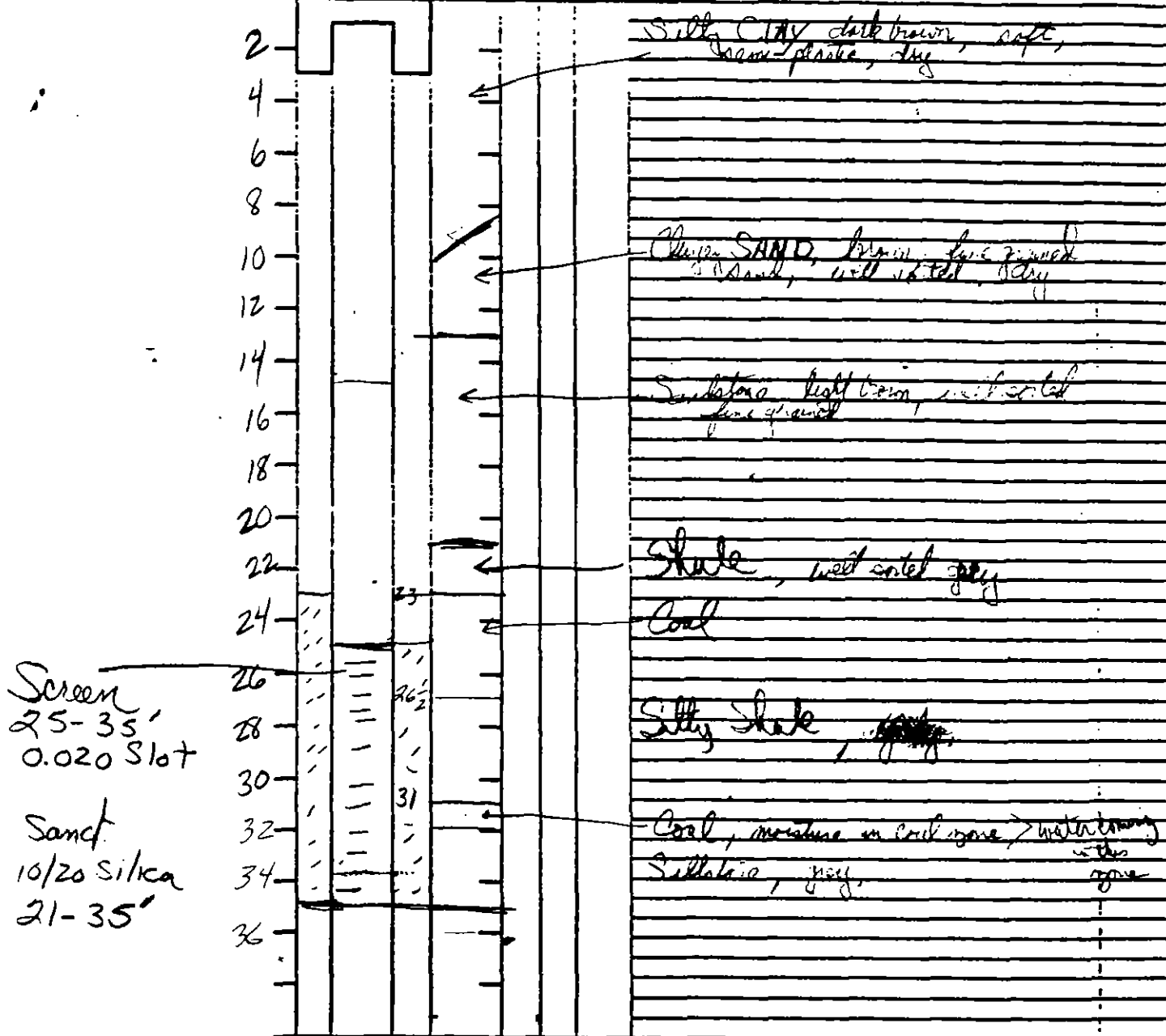
La Cuesta Canyon

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	

Well Description

Same as
see Notes Page 1:

Soil Description

3-5
(23)

■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Same as JC-1

Drill Foreman: >

Boring Diameter & Method: 3

Geologist: Ray Falskier

Date Started: 3/9/96

Date Completed: 3/9/96

Ground Surface Elevation NA

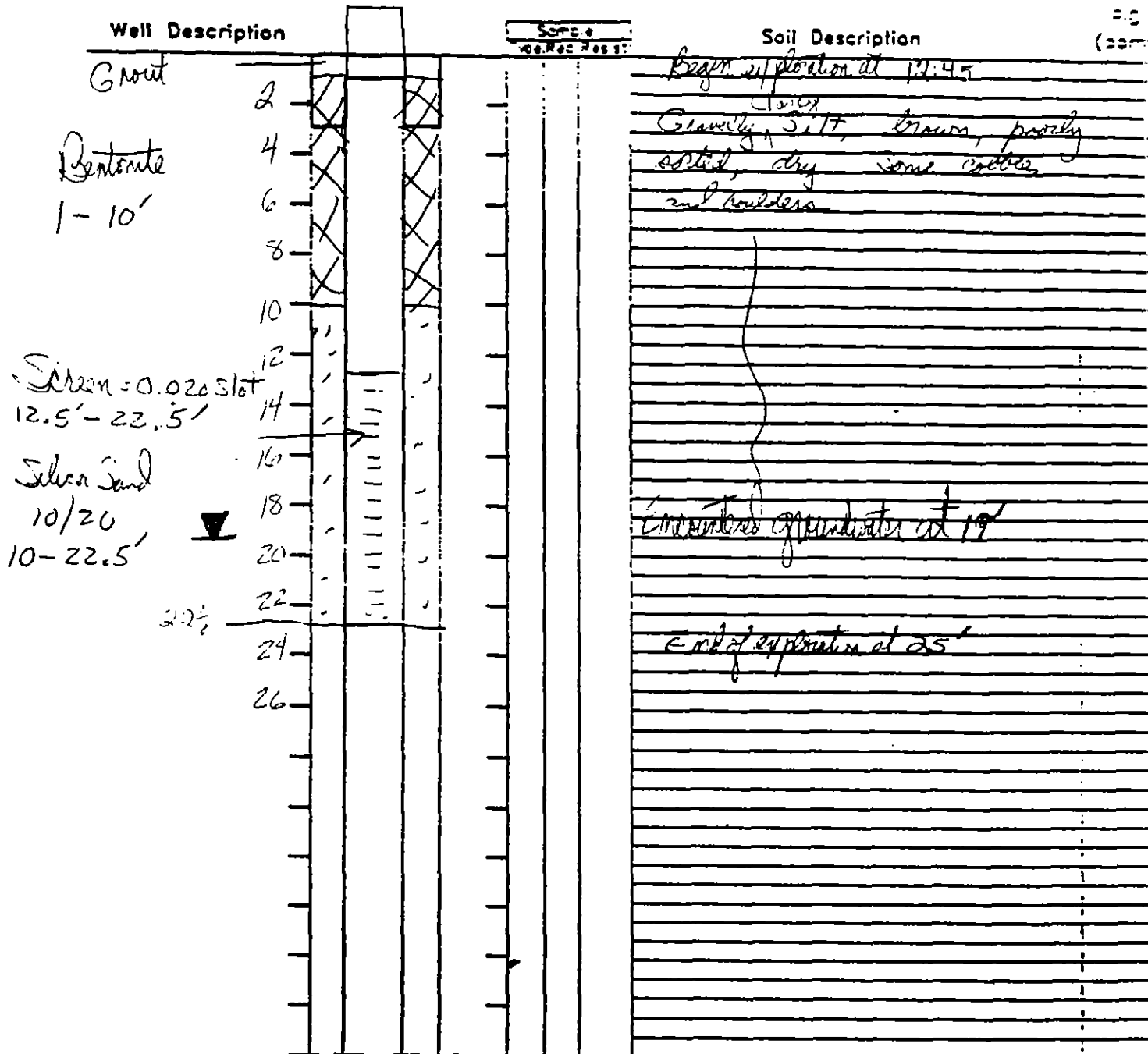
Elevation of top of riser pipe NA

GREYSTONE®

MWCWC-2

Laramie Canyon

Date:	Prepared By:	Figur
Scale: NTS	Drawn By: EC	



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Shapiro Drilling

Drill Foreman: Bill Grande

Boring Diameter & Method: 7 7/8" O.D. Air Rotary

Geologist: KAYFA/SLIC

Date Started: 3/5/96

Date Completed: 3/5/96

Ground Surface Elevation: NA

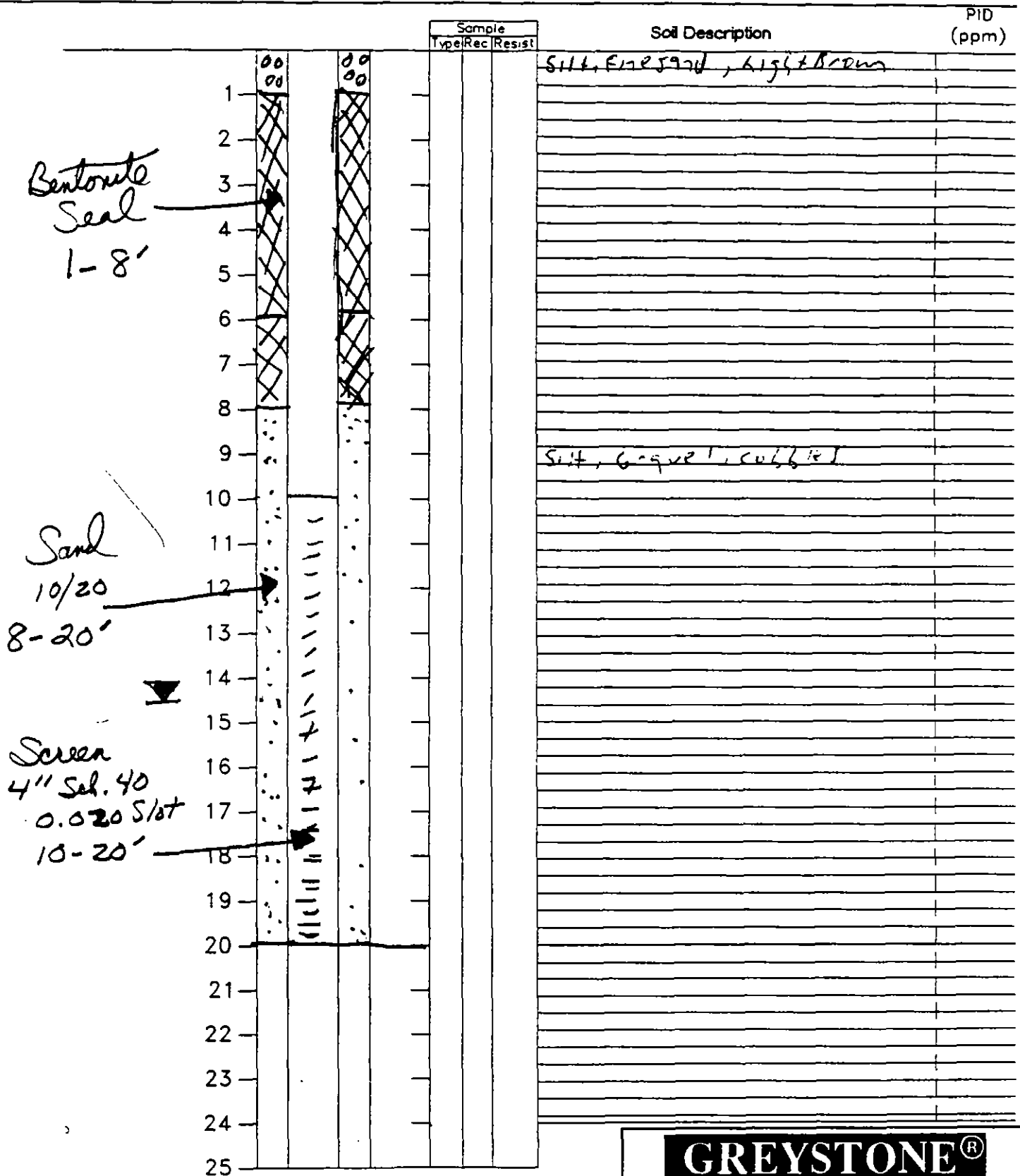
Elevation of top of riser pipe: NA

GREYSTONE®

MW-JC-1

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	

Soil Log & Well Construction LC-1



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Dikey Drilling

Drill Foreman: _____

Boring Diameter & Method: _____

Geologist: J. Spivey

Date Started: 8/27/96

Date Completed: 8/27/96

Ground Surface Elevation: _____

Elevation of top of riser pipe: _____

GREYSTONE®

Horrocks Canyon
MWC-1

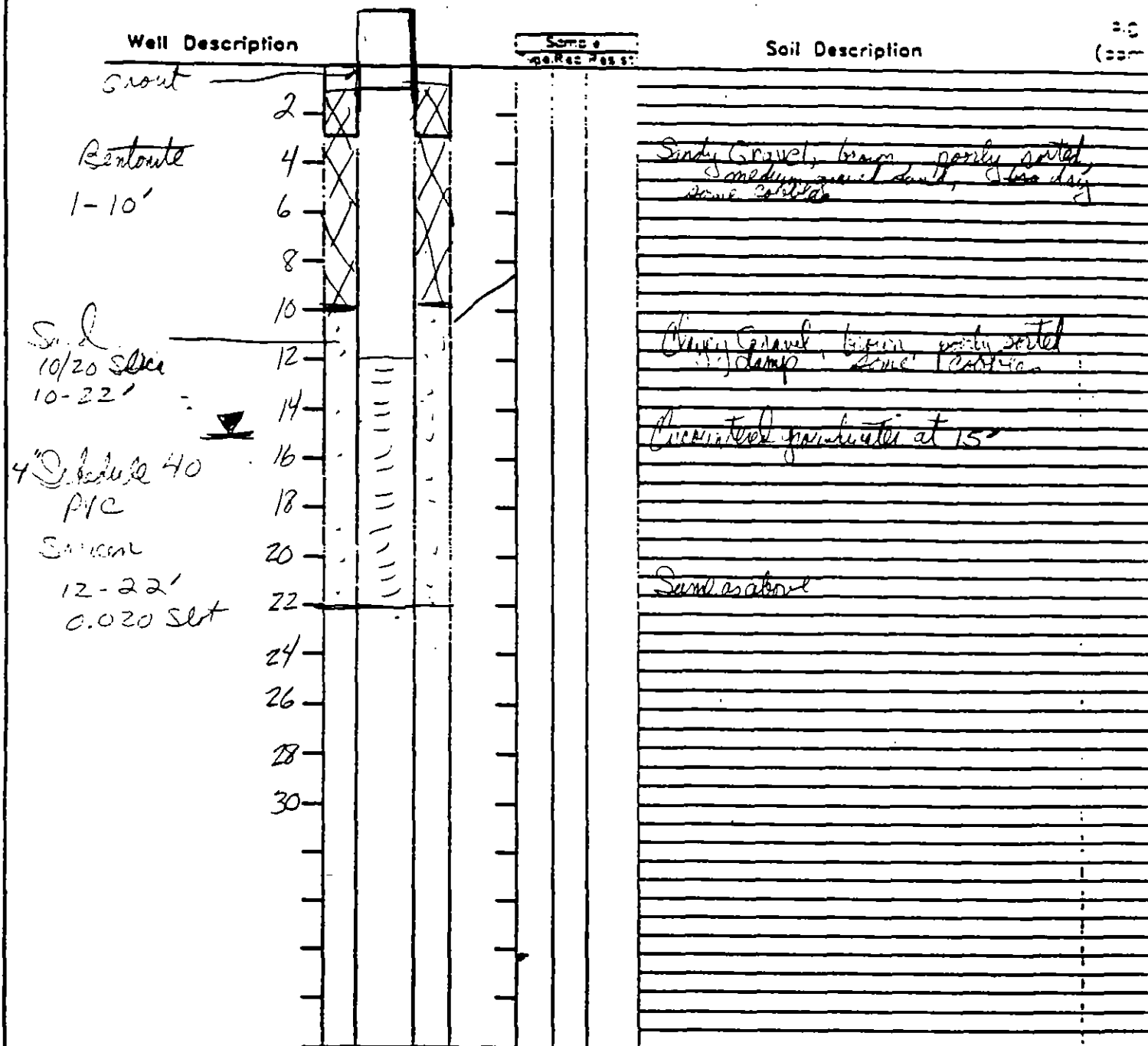
GW-1-6

Date: 8/27/96

Prepared By: MS

Scale: 1

Drawn By: _____



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Sam

Drill Foreman: Ray F. E. E.

Boring Diameter & Method: 3/7

Geologist: 3/7

Date Started: 3/7

Date Completed: 3/7

Ground Surface Elevation: NA

Elevation of top of riser pipe: NA

GREYSTONE®

MW/C-2

Larocito Canyon

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	

Well Description

Same as
No. 100-100-1

Soil Description

Bentonite 1-3.5'
 Sand 3.5-15.5'
 10/20 Screen
 5.5-15.5'
 0.020 set

2
4
6
8
10
12
14
16
18
20
22
24
26

Silty, brownish SAND, brown, medium
 grained sand, fairly sorted, dry
 some coarse, irregular to
 subangular grains, dry

Same as above, damp

Encountered groundwater at 18'
 Silty, Sandy GRAVEL, brown,
 poorly sorted, subangular
 rounded to round gravel

18' 5" TO
 3
 15.5

■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Same as JC-1

Drill Foreman: S

Boring Diameter & Method: S

Geologist: RAYFALSKIE

Date Started: 3/8/76

Date Completed: 3/8/76

Ground Surface Elevation: NA

Elevation of top of riser pipe: NA

GREYSTONE®

MWLC-3

Laramie Canyon

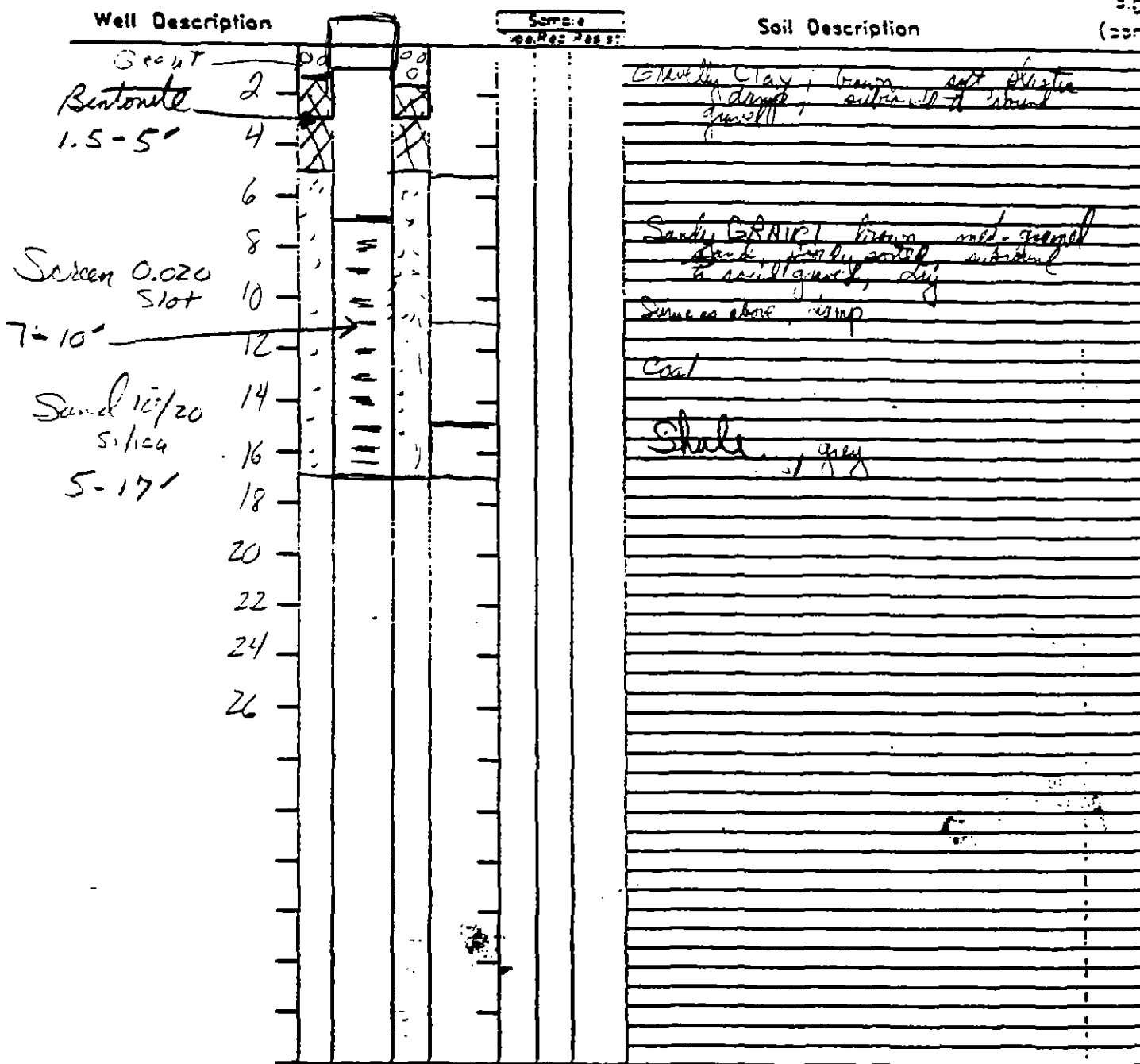
Date:

Prepared By:

Scale: NTS

Drawn By: EC

Figure



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Same as JC-1

Drill Foreman:

Boring Diameter & Method:

Geologist: RAY FALISKIE

Date Started: 3/9/96

Date Completed: 3/9/96

Ground Surface Elevation: N/A

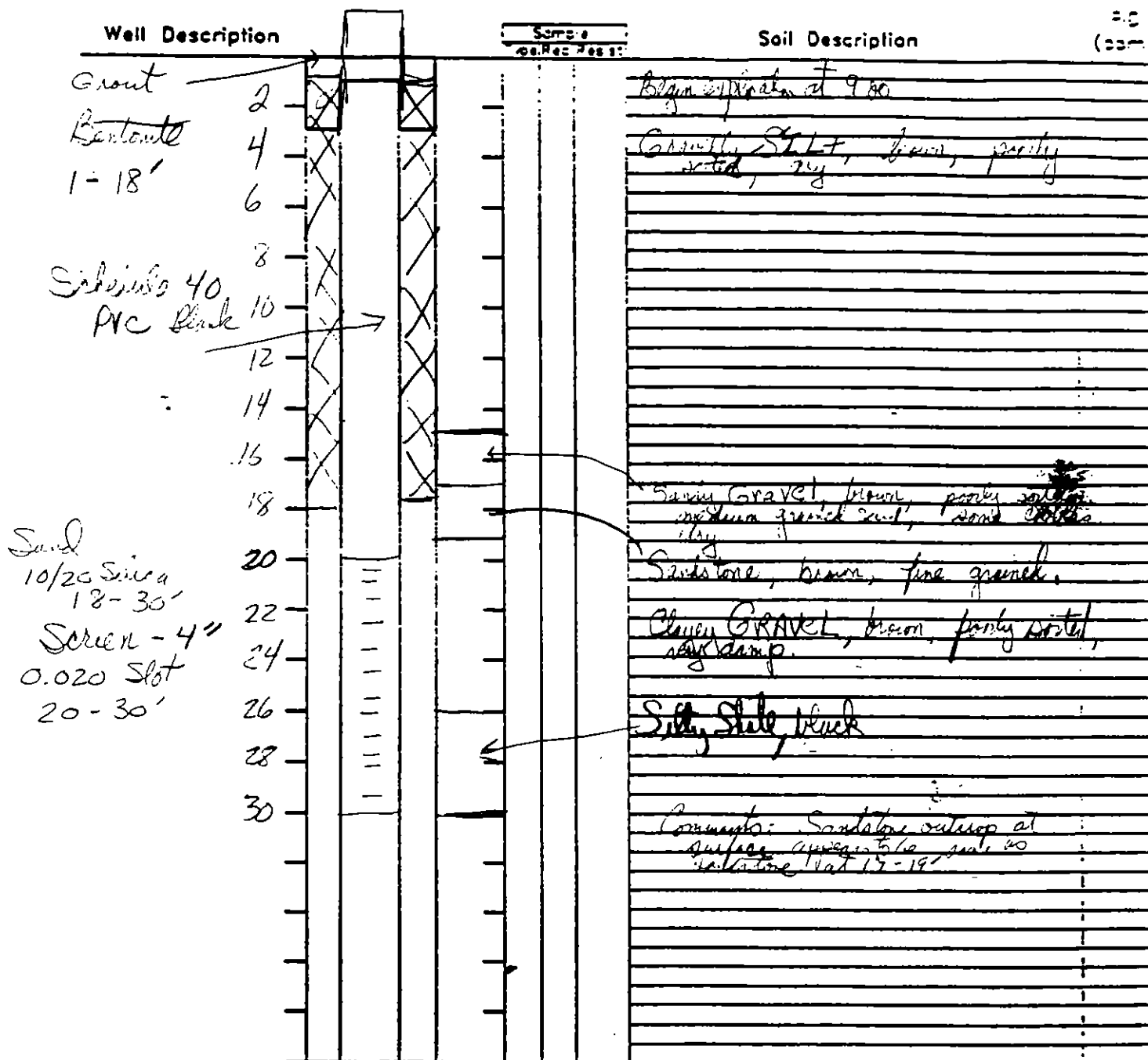
Elevation of top of riser pipe: N/A

GREYSTONE®

MWLC-4

Laravito Canyon

Date:	Prepared By:	Figure
Scale: NTS	Drawn By: EC	



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: Same as JC-1

Drill Foreman: S

Boring Diameter & Method: S

Geologist: Ray Dalshe

Date Started: 3/7/96

Date Completed: 3/7/96

Ground Surface Elevation: NA

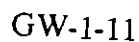
Elevation of top of riser pipe: NA

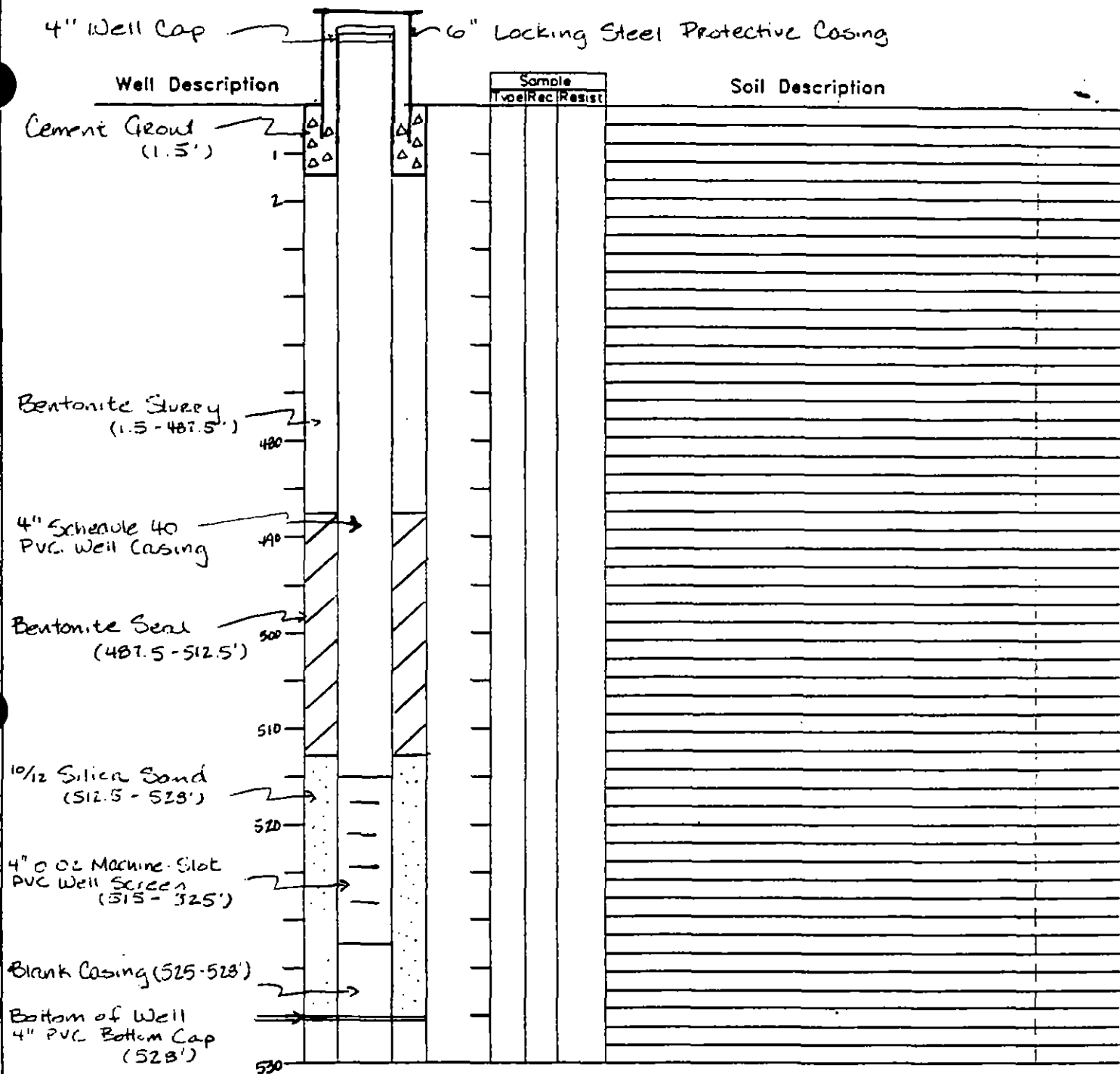
GREYSTONE®

MWPC-1

Lorenzini

Date:	Prepared By:
Scale: NTS	Drawn By: EC





■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FALISKI

Date Started: 4/2/96

Date Completed: 4/2/96

Ground Surface Elevation: 7056.9

Elevation of top of riser pipe: _____

GREYSTONE®

MW1-I

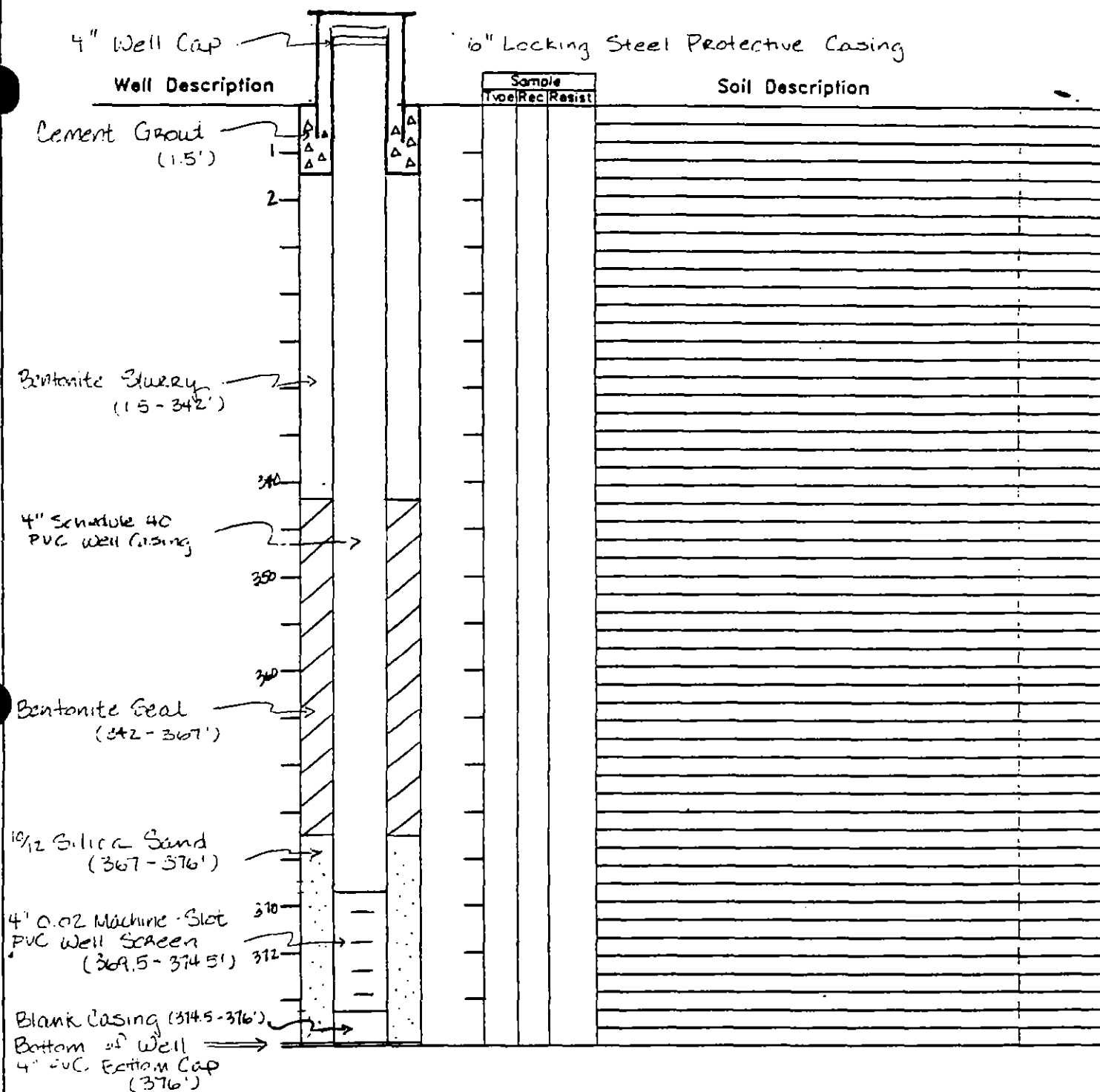
Date:

Prepared By:

Scale: NTS

Drawn By: EC

Figure



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FALISKE

Date Started: 4/24/96

Date Completed: 4/26/96

Ground Surface Elevation 7811.05

Elevation of top of riser pipe _____

GREYSTONE®

MWIA-0

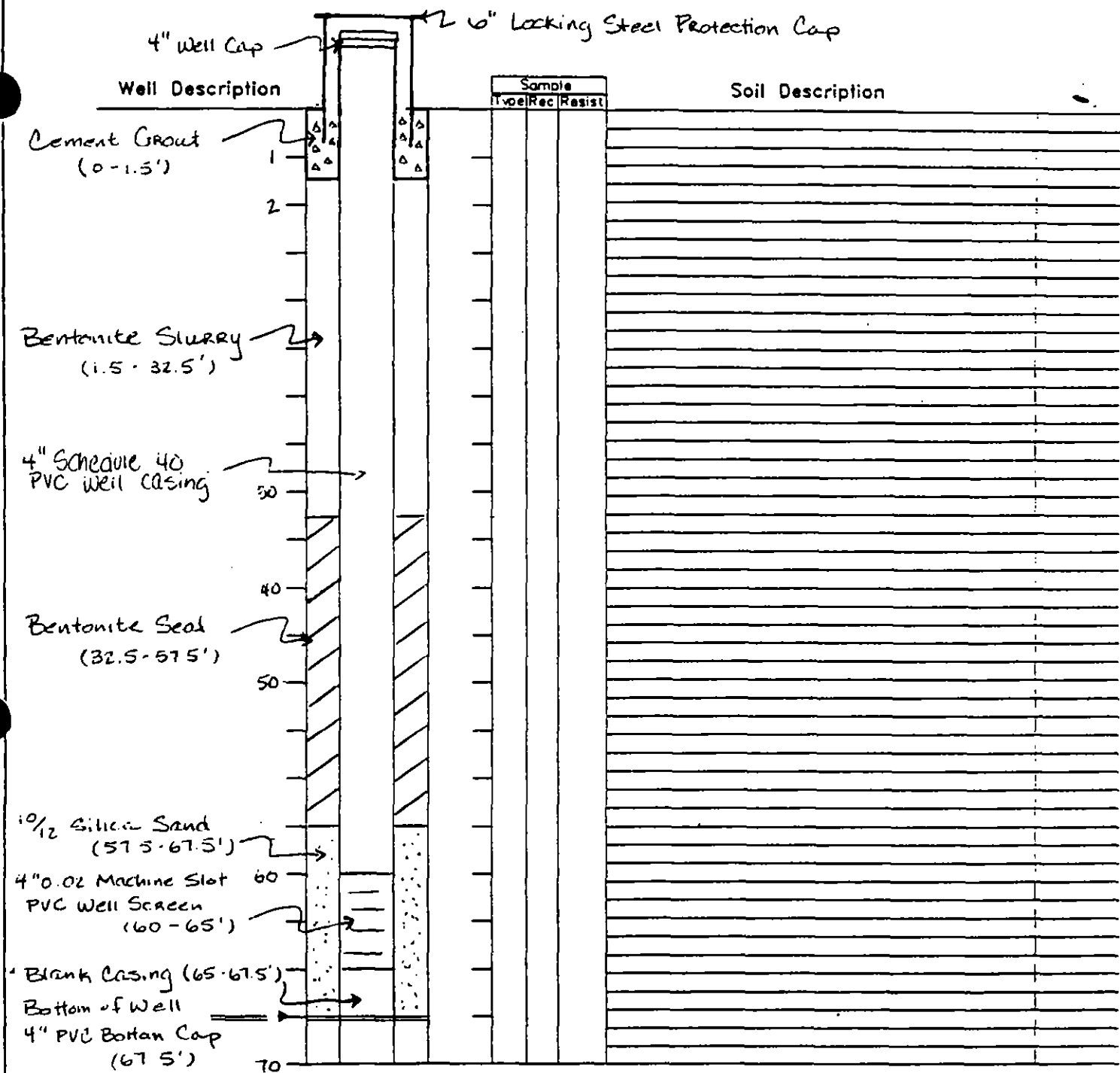
Date:

Prepared By:

Scale: NTS

Drawn By: EC

Figure



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL CREWDE

Boring Diameter & Method: 1 1/2" AIR ROTARY

Geologist: R. FALISKE

Date Started: 3/12/96

Date Completed: 3/19/96

Ground Surface Elevation: 7377.6

Elevation of top of riser pipe: _____

GREYSTONE®

MW2-C

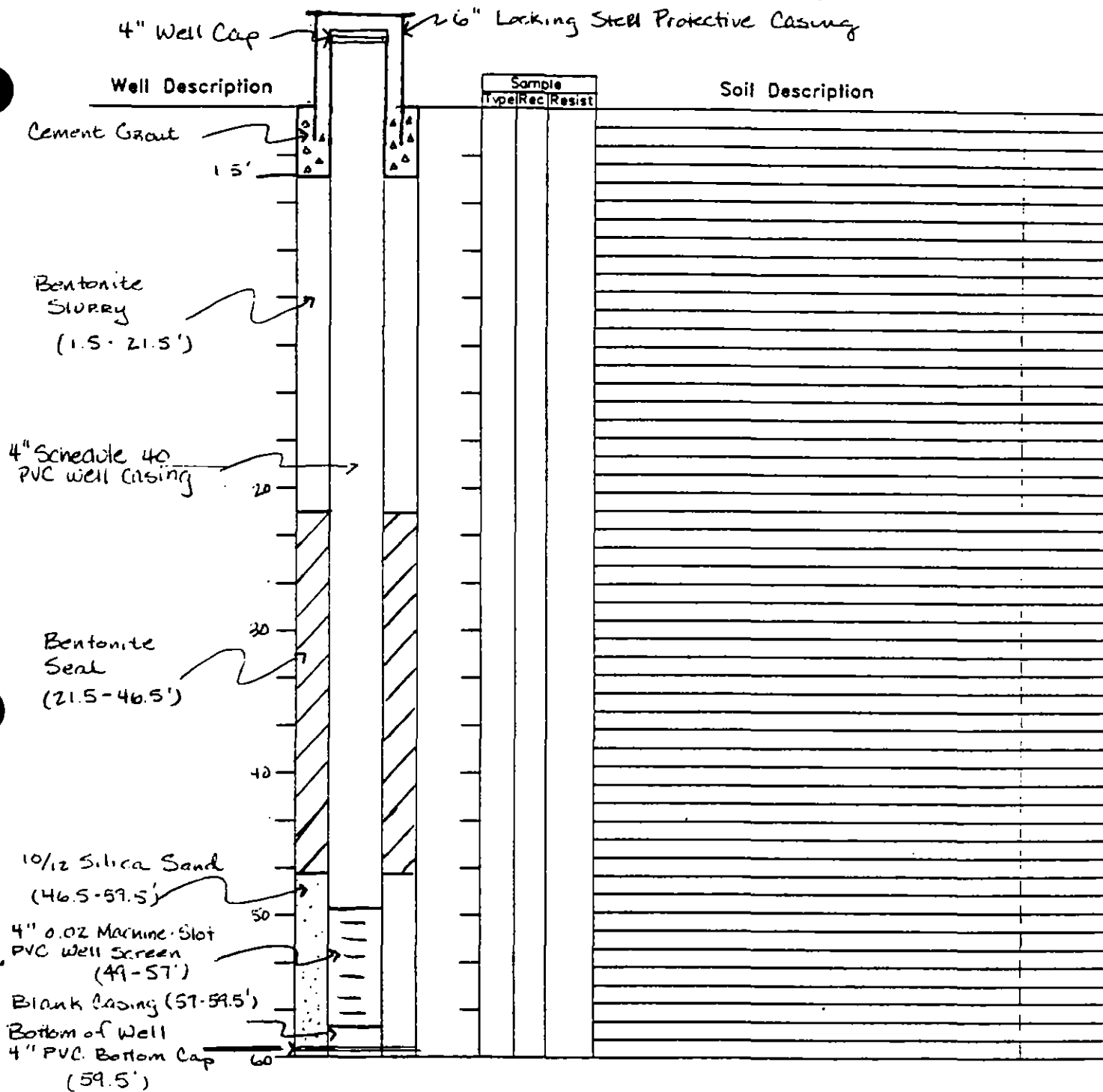
Date:

Prepared By:

Figure

Scale: NTS

Drawn By: EC



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FAUSKIE

Date Started: 3/10/96

Date Completed: 3/13/96

Ground Surface Elevation 7377.6

Elevation of top of riser pipe _____

GREYSTONE®

MWZ-0

Location of Well

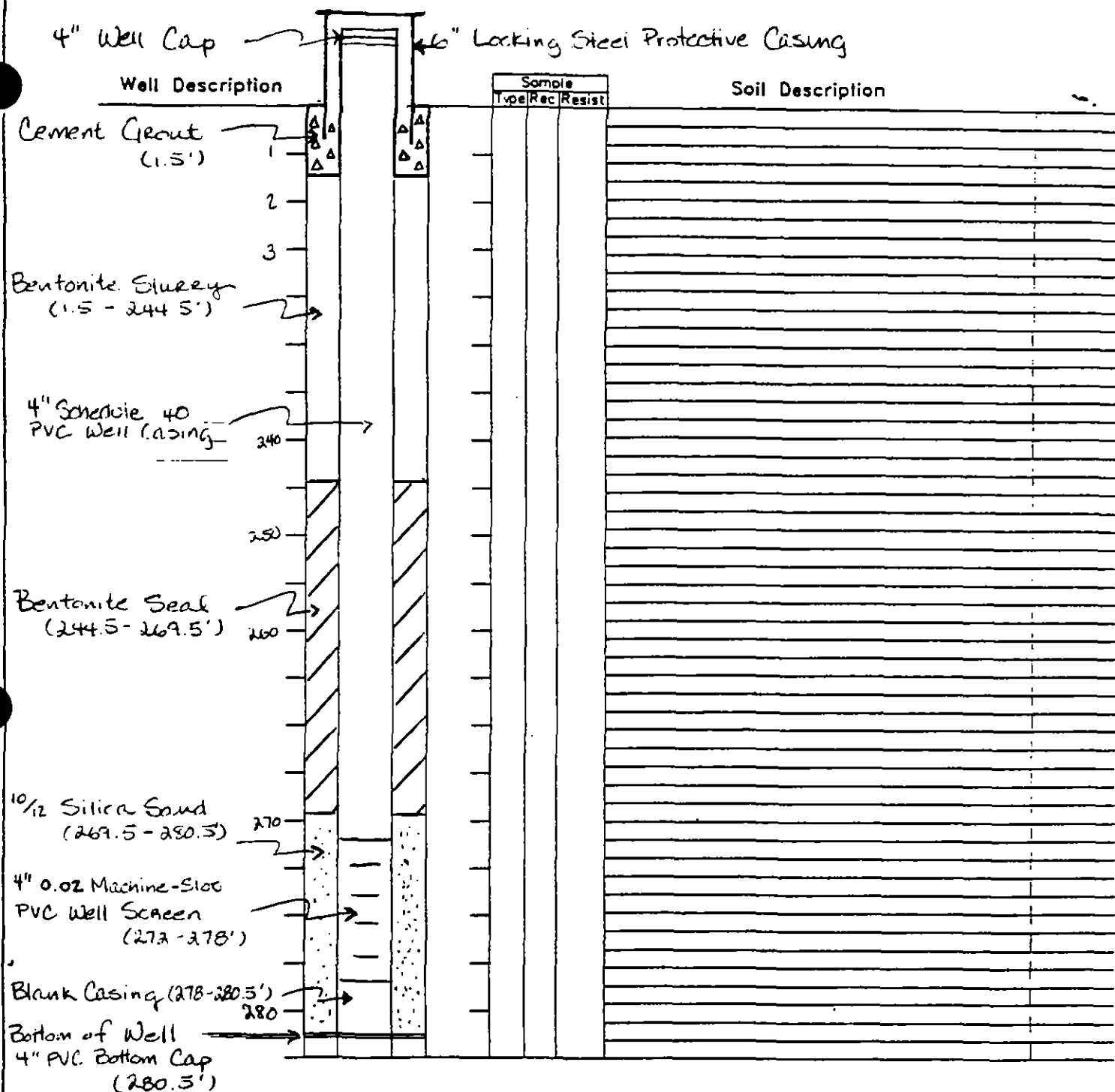
Date:

Prepared By:

Scale: NTS

Drawn By: EC

Figure



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: CHARPE DRILLING Co.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FALISKI

Date Started: 3/30/96

Date Completed: 3/31/96

Ground Surface Elevation: 7684.2

Elevation of top of riser pipe

GREYSTONE®

MW 3 - I

Date:

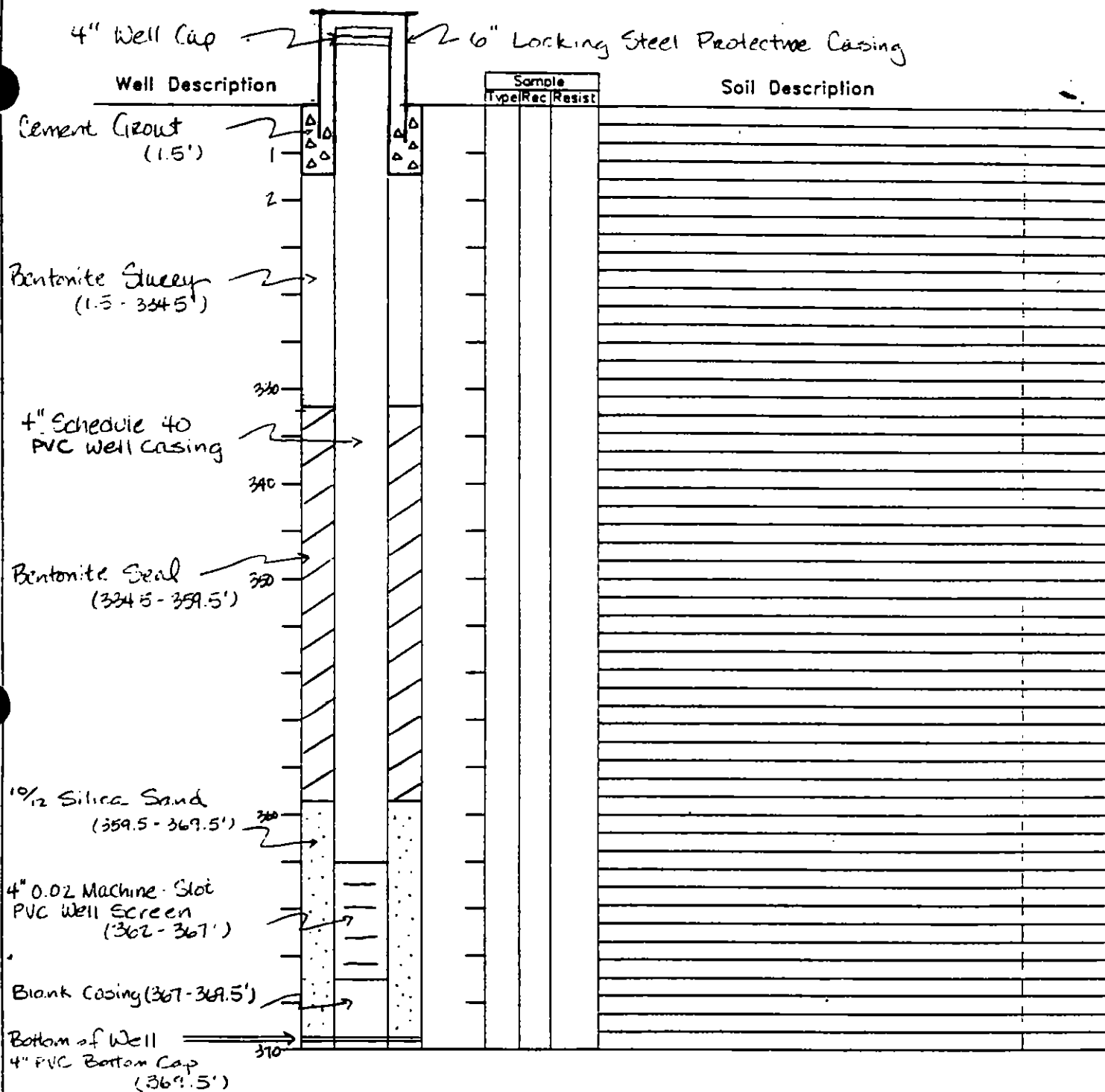
Prepared By:

Scale: NTS

Drawn By: EC

Figure

GW-1-17



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FALISKE

Date Started: 5/6/96

Date Completed: 5/2/96

Ground Surface Elevation 7056.9

Elevation of top of riser pipe _____

GREYSTONE®

MW4-C

Date:

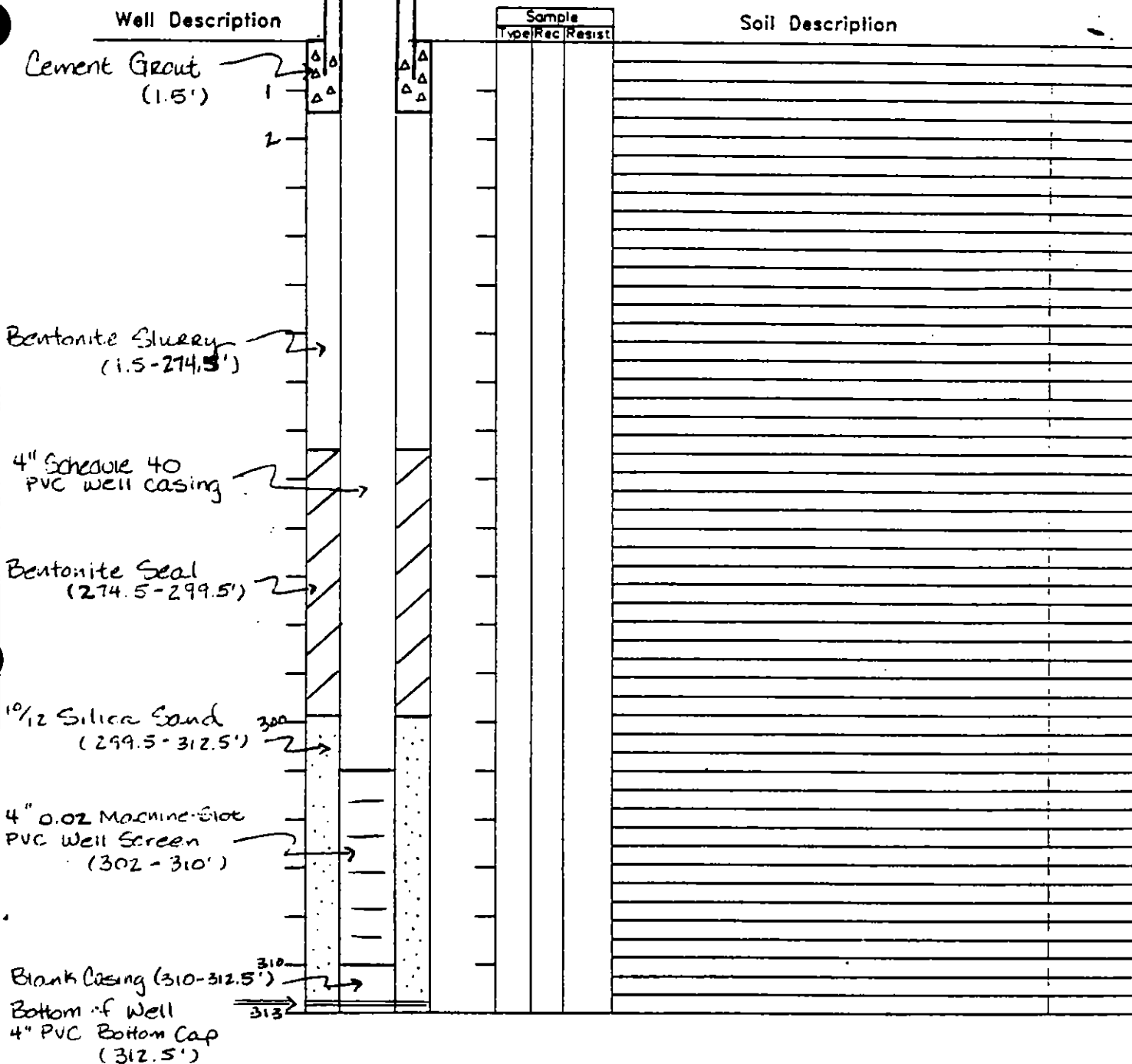
Prepared By:

Scale: NTS

Drawn By: EC

Figure

4" Well Cap → 6" Locking Steel Protective Casing



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: SHARPE DRILLING CO.

Drill Foreman: BILL GRANDE

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: R. FALISKE

Date Started: 4/25/96

Date Completed: 5/5/96

Ground Surface Elevation: 1056.7

Elevation of top of riser pipe: _____

GREYSTONE®

MW4-I

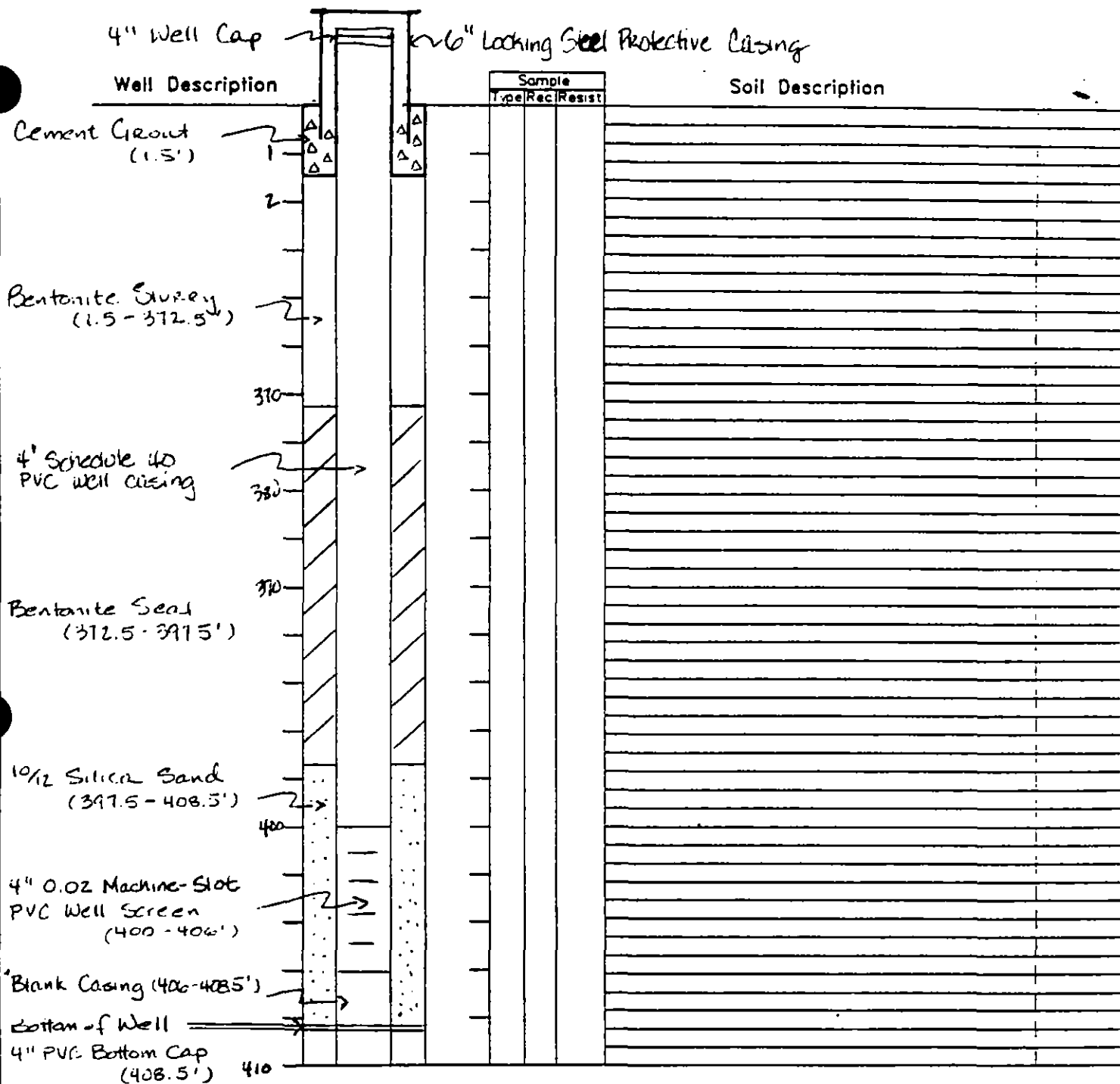
Date:

Prepared By:

Scale: NTS

Drawn By: EC

Figure



■ = Soil Samples Submitted for Analysis

▼ = Water Depth at Time of Drilling

Contractor: CHARPE DRILLING CO.

Drill Foreman: Bill Grande

Boring Diameter & Method: 7 1/8 AIR ROTARY

Geologist: B. Falisick

Date Started: 5/8/56

Date Completed: 5/10/56

Ground Surface Elevation 7056.7

Elevation of top of riser pipe _____

GREYSTONE®

MW4-U

Date:

Prepared By:

Scale: NTS

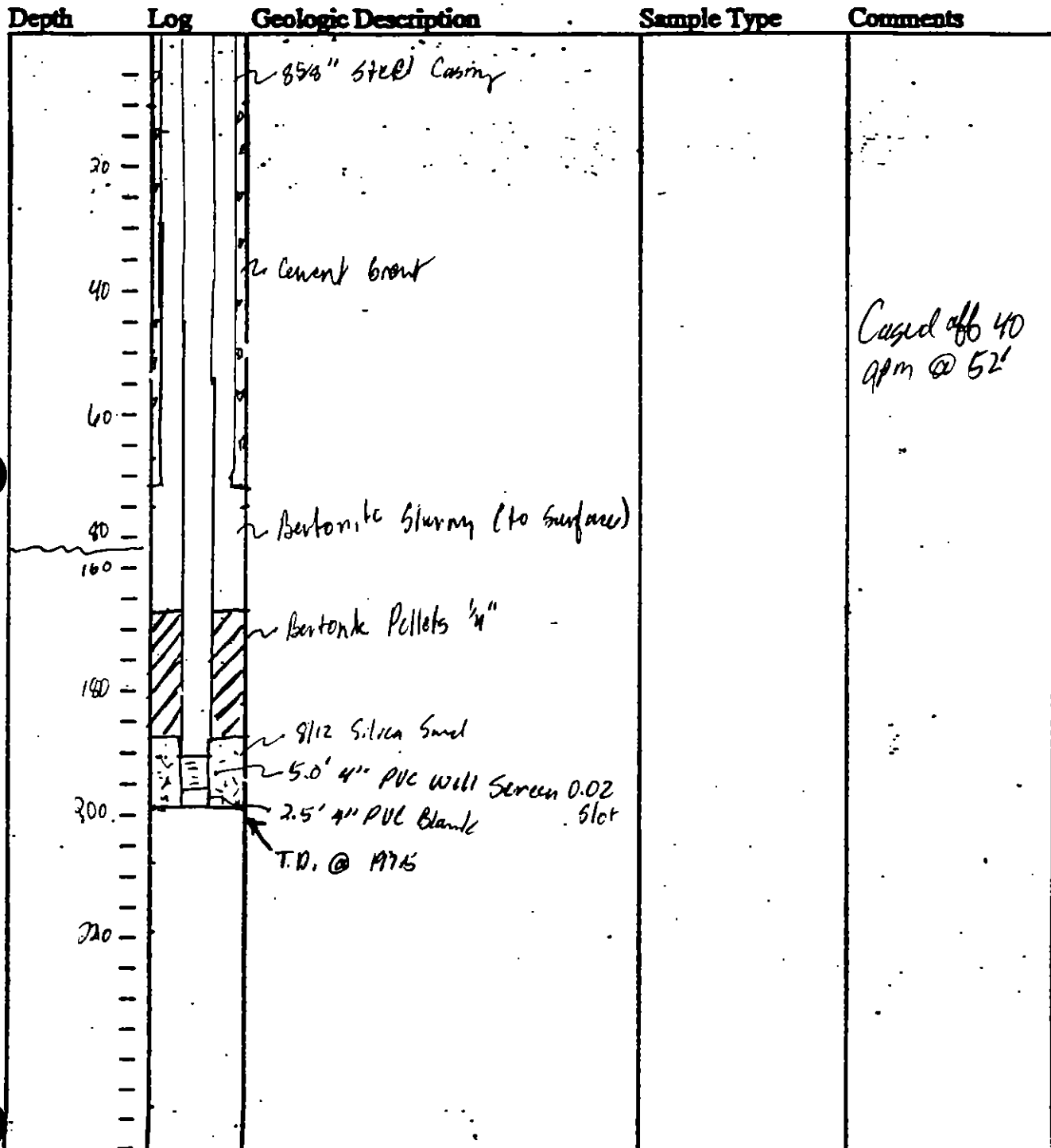
Drawn By: EC

Figure

Completion Diagram

Lithologic Log Lorencito Canyon Project

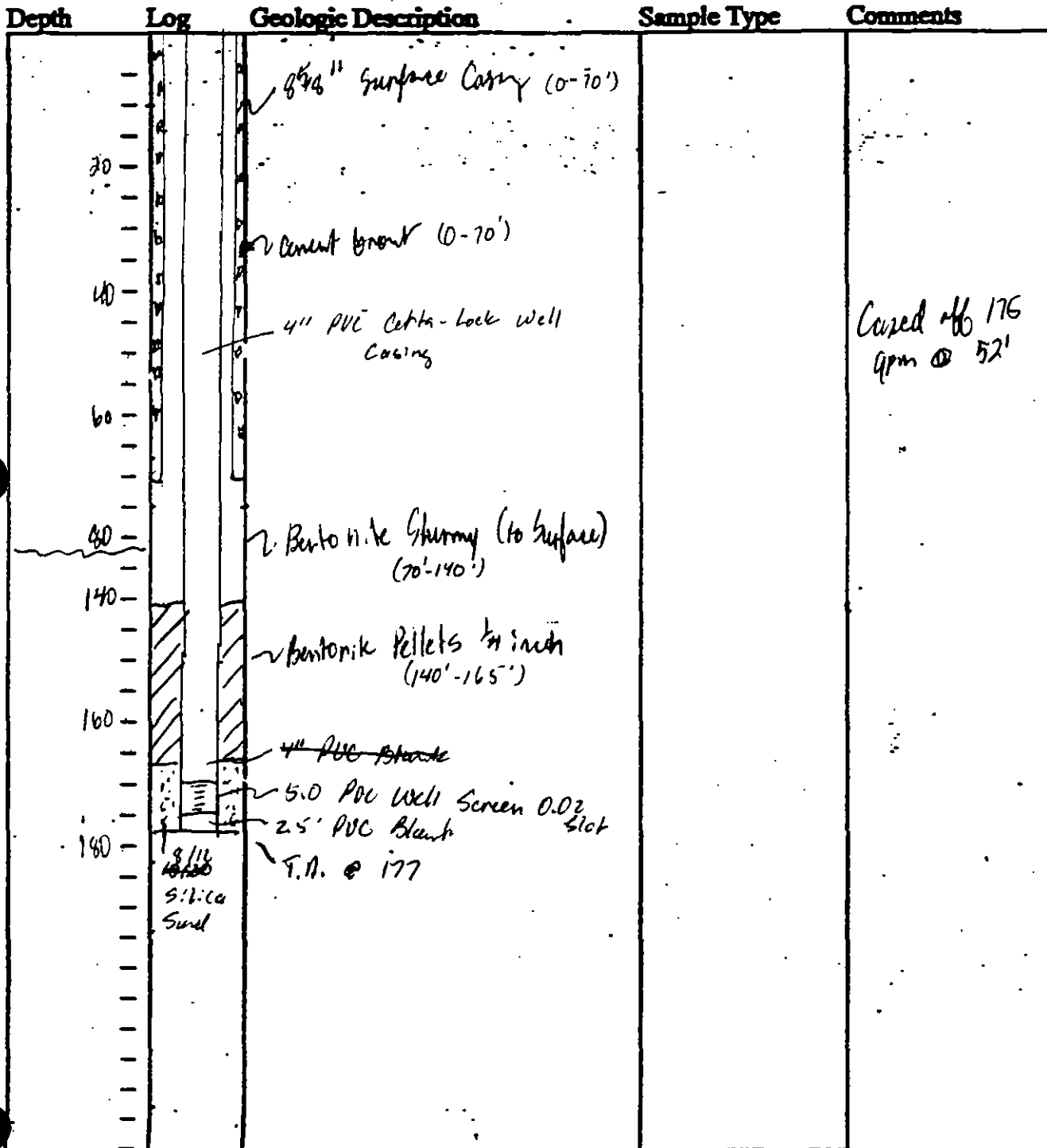
Well No. MWD-5-C Rotary Footage 172.5 Date Started 08/12/96
 Cellar Elevation _____ Core Footage 25' Date Completed 07/15/96
 Total Depth 220 1975 Screen Interval 190-195 Geologist M. J. Smith
 Scale 1" = 5' Hole Size 7 7/8 Driller B. Grande



Lithologic Log
Lorencito Canyon Project

Completion Diagram

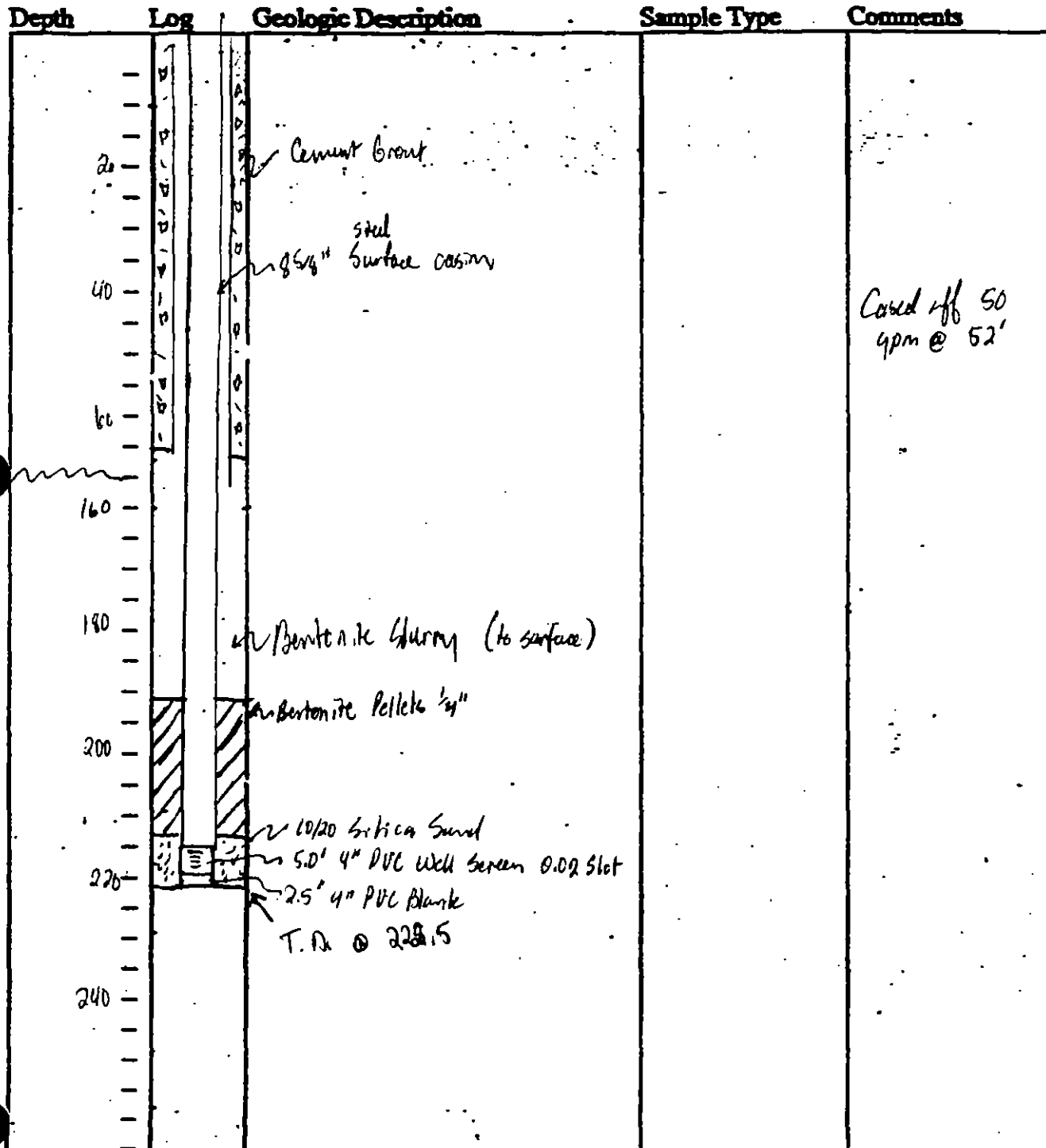
Well No. MWS-I Rotary Footage 177 Date Started 07/13/96
 Cellar Elevation _____ Core Footage _____ Date Completed 07/15/96
 Total Depth 177 Screen Interval 175-170 Geologist M. Soder
 Scale 1"=5' Hole Size 7 7/8 Driller B. Grank



Lithologic Log
Lorencito Canyon Project

Completion Diagram

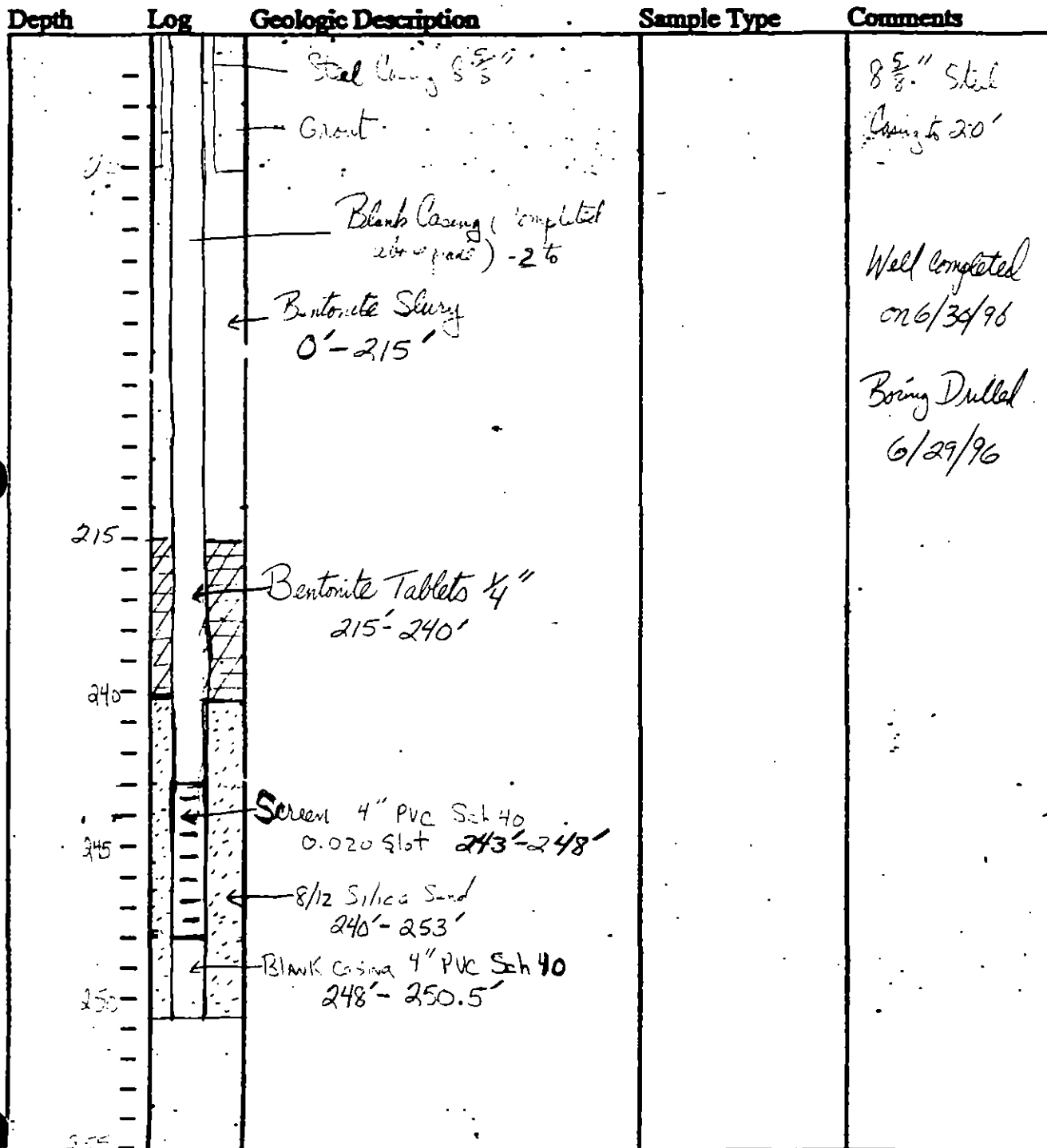
MW 5 J
 Well No. ~~01175-01~~ Rotary Footage 0 - 222.5 Date Started 07/06/96
 Celler Elevation _____ Core Footage _____ Date Completed 07/10/96
 Total Depth _____ Screen Interval _____ Geologist M. Sordani
 Scale 1-5" Hole Size 7 3/4" Driller B. Brander



Lithologic Log
Lorencito Canyon Project

Completion Diagram

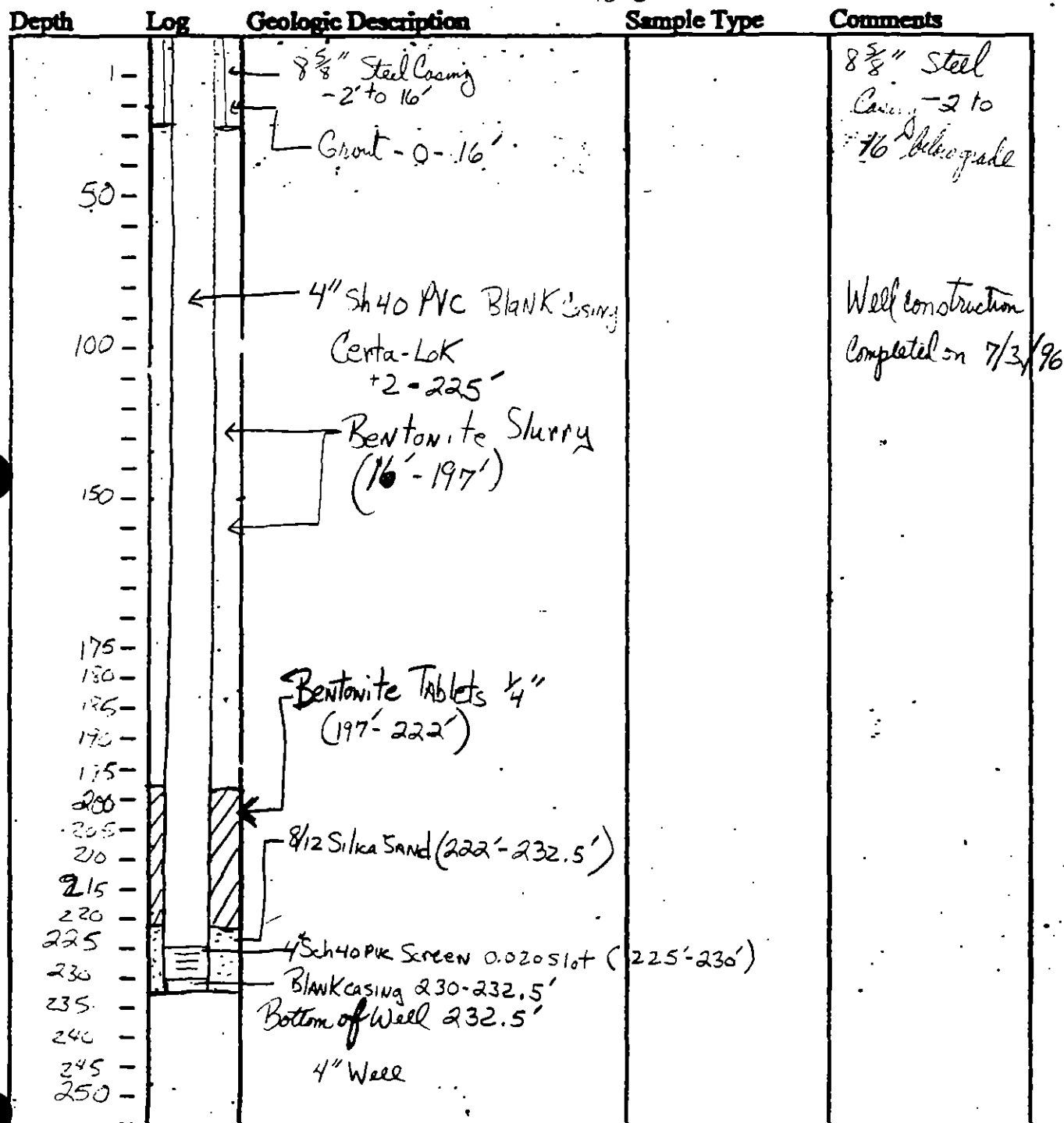
Well No. MLW6-Coal Well Rotary Footage 0-227.25' Date Started 6/28/96
 Cellar Elevation _____ Core Footage 232.35' - 250.35' Date Completed 7/2/96
 Total Depth _____ Screen Interval 243' - 248' Geologist RAY FALICK
 Scale 1" = 5' Hole Size 7 7/8" Driller SA



Lithologic Log
Lorencito Canyon Project

Completion Diagram

Well No. MWG-Interburden Rotary Footage 0-TD Date Started 7/2/96
 Cellar Elevation _____ Core Footage NA Date Completed 7/3/96
 Total Depth _____ Screen Interval 225'-230' Geologist Ran Tubshere
 Scale 1" = 5' Hole Size 12" to 16" / 7 7/8" - 16" Driller Shapiro Dilling
 to TD



Lithologic Log
Lorencito Canyon Project

Completion Diagram

Well No. MWG U Rotary Footage 0-TO Date Started 6/25/96
 Cellar Elevation _____ Core Footage NA Date Completed 6/28/96
 Total Depth 263.5' Screen Interval 256'-261' Geologist Ray Faliskie
 Scale _____ Hole Size 7 7/8" Driller Sharper Drilling

Depth	Log	Geologic Description	Sample Type	Comments
0				
100		BLANK CASING 4" PVC Sch 40 -- 256'		
200		Bentonite Slurry from surface grade to 227'		
225				
250		Bentonite Tablets 1/2 inch 227'-252'		
260		SAND 8 1/2 Silica 252'-265'		
		Screen 256'-261' Sch 40 0.020 Slot		
		4" 1/2 - Blank Casing 261'-263.5'		
	Backfill 265'- 341'	Backfill w/ drill cuttings to 265'		
275				

Deep Well

252
25



Doc Date: 12/11/2001

Vol. 3

S/E

"EXHIBIT 7, APPENDIX GW-2,
ANALYTICAL AND FIELD PARAMETERS DATA SUMMARIES"

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MMAC-1
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1100	03/25/96 1130	04/24/96 1205	05/20/96 1430	06/18/96 1620	07/16/96 1245	08/19/96 1220	09/18/96 1015	10/07/96 1030	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	15.30	14.77	13.10	13.58	14.91	15.95	18.07	16.05	17.45	13.10	18.07	15.46	1.63
Total Depth	ft. BGS	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	20.80	0.00
Purge Volume	gallons	9	13	16	15	12	7	2	6	4	2	16	9	5
Temperature	C	10.6	8.5	12.5	12.7	12.7	16.5	14.8	13.6	13.1	8.3	16.5	12.8	2.3
pH	a.u.	7.45	7.73	7.50	7.92	7.70	7.63	7.44	7.84	7.47	7.44	7.92	7.63	0.18
Dissolved Oxygen	ppm	4.9	6.7	6.8	6.2	8.5	8.9	7.0	6.2	6.5	4.9	8.9	6.9	1.2
Conductance	umhos	385	315	381	371	455	440	455	611	420	315	611	426	83
Silver, dissolved	mg/L	<0.005	"	"	<0.005	"	"	<0.005	"	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	<0.03	"	"	<0.03	"	"	0.05	"	0.15	0.03	0.15	0.07	0.06
Total Alkalinity	mg/L	230	"	"	236	"	"	247	"	242	230	247	239	7
Carbonate as CaCO3	mg/L	<2	"	"	<2	"	"	<2	"	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	230	"	"	236	"	"	247	"	242	230	247	239	7
Hydroxide as CaCO3	mg/L	<2	"	"	<2	"	"	<2	"	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	"	"	<0.001	"	"	<0.001	"	<0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.01	"	"	0.05	"	"	0.05	"	0.02	0.01	0.05	0.03	0.02
Barium, dissolved	mg/L	0.097	"	"	0.088	"	"	0.096	"	0.100	0.088	0.100	0.095	0.005
Beryllium, dissolved	mg/L	<0.0005	"	"	<0.0100	"	"	<0.0005	"	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	55.3	"	"	59.2	"	"	56.2	"	56.1	55.3	59.2	56.7	1.7
Cation-Anion Balance	%	0	"	"	4	"	"	1	"	2	0	4	2	1
Sum of Anions	meq/L	6.00	"	"	6.10	"	"	6.37	"	6.01	6.00	6.37	6.12	0.17
Sum of Cations	meq/L	6.04	"	"	6.57	"	"	6.54	"	6.30	6.04	6.57	6.36	0.25
Cadmium, dissolved	mg/L	<0.0005	"	"	<0.0005	"	"	<0.0005	"	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	3	"	"	3	"	"	4	"	3	3	4	3	1
Cyanide, free	mg/L	<0.1	"	"	<0.1	"	"	<0.1	"	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	"	"	<0.1	"	"	<0.1	"	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	"	"	<0.01	"	"	<0.01	"	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	"	"	<0.01	"	"	<0.01	"	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	"	"	<0.01	"	"	0.01	"	0.01	0.01	0.01	0.01	0.00
Conductivity 25°C	umhos/cm	493	"	"	551	"	"	570	"	586	493	586	550	41
Fluoride	mg/L	0.3	"	"	0.3	"	"	0.4	"	0.4	0.3	0.4	0.4	0.1
Iron, dissolved	mg/L	<0.01	"	"	<0.01	"	"	0.10	"	0.20	0.01	0.20	0.08	0.09
Iron, total	mg/L	0.02	"	"	27.50	"	"	18.60	"	3.15	0.02	27.50	12.32	12.98
Hardness as CaCO3	mg/L	213	"	"	232	"	"	217	"	217	213	232	220	8
Mercury, dissolved	mg/L	0.0003	"	"	<0.0002	"	"	<0.0002	"	<0.0002	0.0002	0.0003	0.0002	0.0000
Potassium, dissolved	mg/L	1.7	"	"	2.2	"	"	1.8	"	1.9	1.7	2.2	1.9	0.2
Lithium, dissolved	mg/L	<0.02	"	"	<0.02	"	"	<0.02	"	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	18.1	"	"	20.4	"	"	18.7	"	18.7	18.1	20.4	19.0	1.0
Manganese, dissolved	mg/L	<0.005	"	"	<0.005	"	"	<0.005	"	<0.005	0.005	0.005	0.005	0.000
Manganese, total	mg/L	0.009	"	"	0.605	"	"	0.513	"	0.035	0.009	0.605	0.290	0.312
Nitrogen, ammonia	mg/L	<0.05	"	"	<0.05	"	"	0.07	"	<0.05	0.05	0.07	0.06	0.01

GW-2-1

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MWAC-1
 Sample Year: 1996

SAMPLING DATE TIME	03/12/96 1180	03/25/96 1130	04/24/96 1205	05/20/96 1430	06/18/96 1620	07/16/96 1245	08/19/96 1220	09/18/96 1015	10/07/96 1030	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION	
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.02	*	*	<0.01	*	<0.01	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.57	*	*	0.28	*	*	0.53	*	0.20	0.20	0.57	0.40	0.18
Nitrate/Nitrite as N, dissolv	mg/L	0.57	*	*	0.30	*	*	0.53	*	0.20	0.20	0.57	0.40	0.18
Sodium, dissolved	mg/L	39.8	*	*	42.8	*	*	48.5	*	42.8	39.8	48.5	43.5	3.6
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	<0.005	*	*	<0.005	*	*	0.013	*	0.007	0.005	0.013	0.008	0.004
Lead, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.002	*	<0.001	0.001	0.002	0.001	0.000
pH (lab)	units	7.4	*	*	7.7	*	*	7.9	*	7.5	7.4	7.9	7.6	0.2
Sodium Absorption Ratio in Wa		1.20	*	*	1.24	*	*	1.45	*	1.28	1.20	1.45	1.29	0.11
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	0.001	*	*	0.002	*	*	0.001	*	0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	60	*	*	60	*	*	60	*	50	50	60	58	5
Residue, Filterable (TDS) @18	mg/L	330	*	*	370	*	*	320	*	330	320	370	338	22
TDS (calculated)	mg/L	317	*	*	330	*	*	339	*	319	317	339	326	10
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00

Note: Station installed 03/07/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MWCC-1
Sample Year: 1996

SAMPLING DATE TIME	03/12/96 1010	03/25/96 1645	04/24/96 1315	05/20/96 1745	06/18/96 1400	07/16/96 1530	08/19/96 1520	09/18/96 1055	10/07/96 1130	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units												
Water Level	15.45	14.07	15.87	17.13	15.58	16.48	18.20	15.60	18.02	14.07	18.20	16.27	1.33
Total Depth	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	30.30	0.00
Purge Volume	31	34	31	28	30	29	26	31	26	26	34	30	3
Temperature	11.4	1.1	12.5	13.4	13.6	14.5	14.7	14.2	13.0	1.1	14.7	12.0	4.2
pH	8.30	8.01	7.75	8.14	7.62	7.83	7.69	7.62	7.71	7.62	8.30	7.85	0.24
Dissolved Oxygen	4.7	5.1	6.3	6.1	9.2	6.5	6.0	5.6	5.6	4.7	9.2	6.1	1.3
Conductance	548	513	530	486	580	600	600	819	600	486	819	586	97
Silver, dissolved	mg/L	<0.005	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	<0.03	*	<0.03	*	*	0.05	*	<0.03	0.03	0.05	0.04	0.01
Total Alkalinity	mg/L	284	*	*	279	*	302	*	306	279	306	293	13
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	284	*	*	279	*	302	*	306	279	306	293	13
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.01	*	*	0.03	*	0.07	*	0.02	0.01	0.07	0.03	0.03
Barium, dissolved	mg/L	0.074	*	*	0.074	*	0.092	*	0.076	0.074	0.092	0.079	0.009
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	61.1	*	*	65.9	*	61.3	*	62.5	61.1	65.9	62.7	2.2
Cation-Anion Balance	%	1	*	*	3	*	0	*	2	0	3	1	1
Sum of Anions	meq/L	8.58	*	*	8.48	*	8.77	*	8.82	8.48	8.82	8.66	0.16
Sum of Cations	meq/L	8.75	*	*	8.96	*	8.78	*	9.10	8.75	9.10	8.90	0.16
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	5	*	*	5	*	6	*	5	5	6	5	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	699	*	*	749	*	783	*	836	699	836	767	58
Fluoride	mg/L	0.4	*	*	0.4	*	0.4	*	0.4	0.4	0.4	0.4	0.0
Iron, dissolved	mg/L	<0.01	*	*	0.04	*	0.04	*	0.01	0.01	0.04	0.03	0.02
Iron, total	mg/L	1.77	*	*	12.00	*	20.40	*	4.08	1.77	20.40	9.56	8.45
Hardness as CaCO3	mg/L	265	*	*	281	*	266	*	273	265	281	271	7
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	3.0	*	*	2.7	*	2.9	*	3.0	2.7	3.0	2.9	0.1
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	27.4	*	*	28.3	*	27.5	*	28.3	27.4	28.3	27.9	0.5
Manganese, dissolved	mg/L	0.015	*	*	<0.005	*	<0.005	*	<0.005	0.005	0.015	0.008	0.005
Manganese, total	mg/L	0.048	*	*	0.253	*	0.422	*	0.030	0.030	0.422	0.188	0.186
Nitrogen, ammonia	mg/L	0.05	*	*	<0.05	*	0.08	*	<0.05	0.05	0.08	0.06	0.02

CW-2-3

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MCCC-1
 Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1010	03/25/96 1645	04/24/96 1315	05/20/96 1745	06/18/96 1400	07/16/96 1530	08/19/96 1520	09/18/96 1055	10/07/96 1130	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	0.02	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.07	*	*	0.13	*	*	0.27	*	0.28	0.07	0.28	0.19	0.10
Nitrate/Nitrite as N, dissolv	mg/L	0.07	*	*	0.13	*	*	0.28	*	0.30	0.07	0.30	0.20	0.11
Sodium, dissolved	mg/L	76.4	*	*	74.4	*	*	76.7	*	81.3	74.4	81.3	77.2	2.9
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.015	*	*	<0.005	*	*	0.015	*	0.008	0.005	0.015	0.011	0.005
Lead, dissolved	mg/L	<0.001	*	*	0.005	*	*	<0.002	*	<0.001	0.001	0.005	0.002	0.002
pH (lab)	units	7.2	*	*	7.7	*	*	7.9	*	7.5	7.2	7.9	7.6	0.3
Sodium Absorption Ratio in Wa		2.06	*	*	1.95	*	*	2.07	*	2.17	1.95	2.17	2.06	0.09
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	0.002	*	*	0.002	*	*	0.001	*	<0.001	0.001	0.002	0.002	0.001
Sulfate	mg/L	130	*	*	130	*	*	120	*	120	120	130	125	6
Residue, Filterable (TDS) #18	mg/L	480	*	*	480	*	*	450	*	470	450	480	470	14
TDS (calculated)	mg/L	474	*	*	474	*	*	476	*	484	474	484	477	5
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00

Note: Station installed 03/08/96

Rev:11/19/96

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MMCMC-1
 Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1530	03/27/96 1300	04/25/96 1135	05/22/96 1130	06/18/96 0900	07/17/96 1620	08/21/96 1515	09/17/96 1130	10/08/96 1415	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	7.50	7.23	8.60	9.02	8.41	9.70	8.42	7.80	8.58	7.23	9.70	8.36	0.76
Total Depth	ft. BGS	24.60	24.60	24.60	24.60	24.60	24.60	24.60	24.60	24.60	24.60	24.60	24.60	0.00
Purge Volume	gallons	32	36	37	36	37	32	34	36	34	32	37	35	2
Temperature	C	9.0	12.7	10.0	15.5	12.6	15.7	16.5	15.6	15.5	9.0	16.5	13.7	2.7
pH	s.u.	7.60	8.02	7.98	7.63	7.76	7.92	7.66	7.99	7.49	7.49	8.02	7.78	0.20
Dissolved Oxygen	ppm	3.7	4.1	2.8	4.4	5.4	4.8	5.0	4.0	4.4	2.8	5.4	4.3	0.8
Conductance	umhos	631	970	1065	1293	1050	1000	950	1024	900	631	1293	987	174
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.006	0.002
Aluminum, dissolved	mg/L	<0.03	*	*	<0.03	*	*	0.18	*	0.06	0.03	0.18	0.08	0.07
Total Alkalinity	mg/L	355	*	*	510	*	*	354	*	341	341	510	390	80
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	355	*	*	510	*	*	354	*	341	341	510	390	80
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	<0.01	*	*	0.05	*	*	0.11	*	0.03	0.01	0.11	0.05	0.04
Barium, dissolved	mg/L	0.050	*	*	0.058	*	*	0.049	*	0.051	0.049	0.058	0.052	0.004
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0030	*	<0.0005	0.0005	0.0100	0.0035	0.0045
Calcium, dissolved	mg/L	52.1	*	*	57.4	*	*	39.9	*	44.8	39.9	57.4	48.6	7.7
Cation-Anion Balance	%	2	*	*	1	*	*	-1	*	2	-1	2	1	1
Sum of Anions	meq/L	12.90	*	*	16.70	*	*	12.30	*	11.60	11.60	16.70	13.38	2.28
Sum of Cations	meq/L	13.40	*	*	16.90	*	*	12.00	*	12.00	12.00	16.90	13.58	2.31
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0010	*	*	<0.0005	*	<0.0005	0.0005	0.0010	0.0006	0.0002
Chloride	mg/L	10	*	*	26	*	*	10	*	9	9	26	14	8
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.02	*	<0.01	0.01	0.02	0.01	0.00
Conductivity @25C	umhos/cm	1220	*	*	1445	*	*	1126	*	1107	1107	1445	1225	155
Fluoride	mg/L	0.8	*	*	0.9	*	*	0.9	*	0.9	0.8	0.9	0.9	0.1
Iron, dissolved	mg/L	<0.01	*	*	0.02	*	*	0.13	*	0.07	0.01	0.13	0.06	0.06
Iron, total	mg/L	0.35	*	*	56.00	*	*	52.60	*	29.30	0.35	56.00	34.56	25.71
Hardness as CaCO3	mg/L	255	*	*	292	*	*	196	*	218	196	292	240	42
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	3.6	*	*	4.6	*	*	4.4	*	4.3	3.6	4.6	4.2	0.4
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.04	*	<0.02	0.02	0.04	0.03	0.01
Magnesium, dissolved	mg/L	30.3	*	*	36.1	*	*	23.3	*	25.9	23.3	36.1	28.9	5.6
Manganese, dissolved	mg/L	<0.005	*	*	0.013	*	*	0.010	*	<0.005	0.005	0.013	0.008	0.004
Manganese, total	mg/L	0.014	*	*	2.840	*	*	4.640	*	2.040	0.014	4.640	2.384	1.918
Nitrogen, ammonia	mg/L	<0.05	*	*	0.06	*	*	0.09	*	0.06	0.05	0.09	0.07	0.02

GW-2-5

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MUCUC-1
 Sample Year: 1996

SAMPLING DATE TIME	03/12/96 1530	03/27/96 1300	04/25/96 1135	05/22/96 1130	06/18/96 0900	07/17/96 1620	08/21/96 1515	09/17/96 1130	10/08/96 1415	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION	
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.01	*	*	0.09	*	0.02	0.01	0.09	0.03	0.04
Nitrate as N, dissolved	mg/L	0.22	*	*	0.16	*	*	0.73	*	0.27	0.16	0.73	0.35	0.26
Nitrate/Nitrite as N, dissolv	mg/L	0.22	*	*	0.17	*	*	0.82	*	0.29	0.17	0.82	0.38	0.30
Sodium, dissolved	mg/L	187.0	*	*	248.0	*	*	181.0	*	171.0	171.0	248.0	196.8	34.8
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.018	*	*	0.024	*	*	0.011	*	0.016	0.011	0.024	0.017	0.005
Lead, dissolved	mg/L	<0.001	*	*	0.002	*	*	<0.005	*	<0.001	0.001	0.005	0.002	0.002
pH (lab)	units	7.6	*	*	7.7	*	*	7.9	*	7.6	7.6	7.9	7.7	0.1
Sodium Absorption Ratio in Wa		5.16	*	*	6.39	*	*	5.70	*	5.09	5.09	6.39	5.59	0.60
Antimony, dissolved	mg/L	<0.002	*	*	<0.010	*	*	<0.002	*	<0.002	0.002	0.010	0.004	0.004
Selenium, dissolved	mg/L	0.002	*	*	0.001	*	*	<0.001	*	<0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	260	*	*	270	*	*	230	*	210	210	270	243	28
Residue, Filterable (TDS) #18	mg/L	730	*	*	880	*	*	690	*	650	650	880	738	100
TDS (calculated)	mg/L	757	*	*	949	*	*	703	*	671	671	949	770	124
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.006	0.002
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.00

Note: Station installed 03/09/96

Rev:11/19/96

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MMCUC-2
 Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1410	03/27/96 1400	04/25/96 1040	05/22/96 1430	06/18/96 0800	07/17/96 1545	08/21/96 1320	09/17/96 1230	10/08/96 1035	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	17.55	18.34	18.60	19.11	18.32	20.20	20.86	21.21	21.58	17.55	21.58	19.53	1.46
Total Depth	ft. BGS	37.11	37.11	37.11	37.11	37.11	37.11	37.11	37.11	37.11	37.11	37.11	37.11	0.00
Purge Volume	gallons	40	39	39	38	39	36	34	34	34	34	40	37	3
Temperature	C	12.1	13.6	12.0	17.9	12.4	14.2	16.5	13.9	15.0	12.0	17.9	14.2	2.0
pH	s.u.	7.20	7.59	7.95	7.29	7.33	7.95	7.26	7.33	7.11	7.11	7.95	7.45	0.31
Dissolved Oxygen	ppm	1.7	1.7	2.2	5.5	5.3	4.2	6.8	2.8	2.4	1.7	6.8	3.6	1.9
Conductance	umhos	680	935	1215	907	890	875	1156	1187	800	680	1215	961	185
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.006	0.002
Aluminum, dissolved	mg/L	0.03	*	*	<0.03	*	*	0.22	*	0.04	0.03	0.22	0.08	0.09
Total Alkalinity	mg/L	377	*	*	371	*	*	368	*	364	364	377	370	5
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	377	*	*	371	*	*	368	*	364	364	377	370	5
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.02	*	*	0.04	*	*	0.02	*	0.12	0.02	0.12	0.05	0.05
Barium, dissolved	mg/L	0.084	*	*	0.058	*	*	0.071	*	0.046	0.046	0.084	0.065	0.016
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0030	*	<0.0005	0.0005	0.0100	0.0035	0.0045
Calcium, dissolved	mg/L	107.0	*	*	108.0	*	*	99.9	*	106.0	99.9	108.0	105.2	3.6
Cation-Anion Balance	%	1	*	*	2	*	*	-3	*	-3	-3	2	-1	3
Sum of Anions	meq/L	12.90	*	*	12.80	*	*	13.00	*	12.80	12.80	13.00	12.88	0.10
Sum of Cations	meq/L	13.10	*	*	13.40	*	*	12.30	*	12.10	12.10	13.40	12.73	0.62
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0010	*	*	<0.0005	*	<0.0005	0.0005	0.0010	0.0006	0.0002
Chloride	mg/L	10	*	*	12	*	*	12	*	10	10	12	11	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.02	*	<0.01	0.01	0.02	0.01	0.00
Conductivity @25C	umhos/cm	983	*	*	1091	*	*	1128	*	1109	983	1128	1078	65
Fluoride	mg/L	0.5	*	*	0.4	*	*	0.5	*	0.4	0.4	0.5	0.5	0.1
Iron, dissolved	mg/L	0.07	*	*	0.03	*	*	0.53	*	0.21	0.03	0.53	0.21	0.23
Iron, total	mg/L	0.37	*	*	6.44	*	*	26.70	*	10.10	0.37	26.70	10.90	11.27
Hardness as CaCO3	mg/L	441	*	*	449	*	*	422	*	435	422	449	437	11
Mercury, dissolved	mg/L	0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	4.4	*	*	3.7	*	*	3.1	*	2.9	2.9	4.4	3.5	0.7
Lithium, dissolved	mg/L	0.02	*	*	<0.02	*	*	<0.04	*	<0.02	0.02	0.04	0.03	0.01
Magnesium, dissolved	mg/L	42.3	*	*	43.5	*	*	42.0	*	41.4	41.4	43.5	42.3	0.9
Manganese, dissolved	mg/L	0.200	*	*	0.066	*	*	0.040	*	0.047	0.040	0.200	0.088	0.075
Manganese, total	mg/L	0.199	*	*	0.092	*	*	0.147	*	0.110	0.092	0.199	0.137	0.047
Nitrogen, ammonia	mg/L	0.26	*	*	0.31	*	*	0.21	*	0.15	0.15	0.31	0.23	0.07

GW-2-7

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MACUC-2
 Sample Year: 1996

SAMPLING DATE TIME	03/12/96 1410	03/27/96 1400	04/25/96 1040	05/22/96 1430	06/18/96 0800	07/17/96 1545	08/21/96 1320	09/17/96 1230	10/08/96 1035	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units												
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.01	*	*	0.02	*	0.02	0.01	0.02	0.01
Nitrate as N, dissolved	mg/L	0.23	*	*	0.07	*	*	0.19	*	<0.02	0.02	0.23	0.10
Nitrate/Nitrite as N, dissolv	mg/L	0.23	*	*	0.08	*	*	0.21	*	0.03	0.03	0.23	0.10
Sodium, dissolved	mg/L	96.5	*	*	98.3	*	*	85.0	*	75.0	75.0	98.3	10.4
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.00
Phosphorus, ortho dissolved	mg/L	0.021	*	*	0.085	*	*	0.011	*	<0.005	0.005	0.085	0.037
Lead, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.005	*	<0.001	0.001	0.005	0.002
pH (lab)	units	7.2	*	*	7.4	*	*	7.6	*	7.6	7.2	7.6	0.2
Sodium Absorption Ratio in Wa		1.98	*	*	2.04	*	*	1.82	*	1.58	1.58	2.04	0.21
Antimony, dissolved	mg/L	<0.002	*	*	<0.010	*	*	<0.002	*	<0.002	0.002	0.010	0.004
Selenium, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.000
Sulfate	mg/L	240	*	*	240	*	*	250	*	250	240	250	6
Residue, Filterable (TDS) @18	mg/L	710	*	*	700	*	*	710	*	670	670	710	19
TDS (calculated)	mg/L	726	*	*	729	*	*	715	*	705	705	729	11
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.006
Zinc, dissolved	mg/L	<0.01	*	*	0.03	*	*	0.02	*	0.01	0.01	0.03	0.01

Note: Station installed 03/09/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MWJC-1
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 0815	03/25/96 1230	04/25/96 0925	05/20/96 1205	06/18/96 0900	07/17/96 0800	08/20/96 1600	09/18/96 1145	10/07/96 1345	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	25.02	20.78	21.22	21.55	21.29	21.30	21.17	21.15	21.43	20.78	25.02	21.66	1.28
Total Depth	ft. BGS	25.02	25.02	25.02	25.02	25.02	25.02	25.02	25.02	25.02	25.02	25.02	25.02	0.00
Purge Volume	gallons	5	9	9	8	9	9	9	9	9	5	9	8	1
Temperature	C	11.7	5.4	11.1	15.3	15.0	14.0	22.0	14.2	13.2	5.4	22.0	13.5	4.4
pH	s.u.	7.60	8.02	7.44	8.05	7.74	7.78	7.66	7.81	8.05	7.44	8.05	7.79	0.21
Dissolved Oxygen	ppm	6.1	4.8	6.0	6.0	7.3	7.5	5.0	5.7	6.2	4.8	7.5	6.1	0.9
Conductance	umhos	1139	1667	628	826	910	1000	900	1060	900	628	1667	1003	288
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	0.04	*	*	<0.03	*	*	0.20	*	<0.03	0.03	0.20	0.08	0.08
Total Alkalinity	mg/L	439	*	*	413	*	*	377	*	393	377	439	406	27
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	439	*	*	413	*	*	377	*	393	377	439	406	27
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.02	*	*	0.04	*	*	0.05	*	0.02	0.02	0.05	0.03	0.02
Barium, dissolved	mg/L	0.082	*	*	0.058	*	*	0.043	*	0.040	0.040	0.082	0.056	0.019
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	59.2	*	*	59.9	*	*	44.0	*	43.1	43.1	59.9	51.6	9.2
Cation-Anion Balance	%	1	*	*	2	*	*	0	*	-1	-1	2	1	1
Sum of Anions	meq/L	14.50	*	*	13.70	*	*	12.00	*	12.30	12.00	14.50	13.13	1.18
Sum of Cations	meq/L	14.90	*	*	14.40	*	*	12.00	*	12.10	12.00	14.90	13.35	1.52
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	7	*	*	6	*	*	6	*	6	6	7	6	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	1200	*	*	1215	*	*	1076	*	1169	1076	1215	1165	62
Fluoride	mg/L	0.6	*	*	0.7	*	*	0.7	*	0.7	0.6	0.7	0.7	0.0
Iron, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.09	*	0.01	0.01	0.09	0.03	0.04
Iron, total	mg/L	1.05	*	*	26.20	*	*	36.30	*	3.84	1.05	36.30	16.85	17.17
Hardness as CaCO3	mg/L	302	*	*	299	*	*	224	*	220	302	302	261	45
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	4.6	*	*	4.5	*	*	3.8	*	3.7	3.7	4.6	4.2	0.5
Lithium, dissolved	mg/L	0.03	*	*	0.03	*	*	0.02	*	0.02	0.02	0.03	0.03	0.01
Magnesium, dissolved	mg/L	37.5	*	*	36.3	*	*	27.7	*	27.2	27.2	37.5	32.2	5.5
Manganese, dissolved	mg/L	0.015	*	*	0.011	*	*	<0.005	*	<0.005	0.005	0.015	0.009	0.005
Manganese, total	mg/L	0.042	*	*	0.462	*	*	0.582	*	0.045	0.042	0.582	0.283	0.281
Nitrogen, ammonia	mg/L	<0.05	*	*	0.05	*	*	0.05	*	<0.05	0.05	0.05	0.05	0.00

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MWJC-1
 Sample Year: 1996

SAMPLING DATE TIME		03/12/96 0815	03/25/96 1230	04/25/96 0925	05/20/96 1205	06/18/96 0900	07/17/96 0800	08/20/96 1600	09/18/96 1145	10/07/96 1345	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.02	*	*	<0.01	*	<0.01	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.54	*	*	0.29	*	*	1.16	*	0.65	0.29	1.16	0.66	0.37
Nitrate/Nitrite as N, dissolv	mg/L	0.54	*	*	0.31	*	*	1.16	*	0.65	0.31	1.16	0.67	0.36
Sodium, dissolved	mg/L	199.0	*	*	189.0	*	*	169.0	*	173.0	169.0	199.0	182.5	14.0
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.029	*	*	<0.005	*	*	0.009	*	<0.005	0.005	0.029	0.012	0.011
Lead, dissolved	mg/L	<0.001	*	*	0.007	*	*	<0.005	*	<0.001	0.001	0.007	0.004	0.003
pH (lab)	units	7.6	*	*	7.9	*	*	8.1	*	7.8	7.6	8.1	7.9	0.2
Sodium Absorption Ratio in Wa		5.04	*	*	4.81	*	*	4.97	*	5.14	4.81	5.14	4.99	0.14
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	0.001	*	*	0.002	*	*	0.001	*	<0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	260	*	*	250	*	*	200	*	200	200	260	228	32
Residue, Filterable (TDS) @18	mg/L	810	*	*	790	*	*	660	*	660	660	810	730	81
TDS (calculated)	mg/L	832	*	*	795	*	*	679	*	690	679	832	749	76
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	0.02	*	*	<0.01	*	<0.01	0.01	0.02	0.01	0.00

Note: Station installed 03/05/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MLC-1
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 0850	03/25/96 1145	04/25/96 0945	05/22/96 0730	06/18/96 0800	07/17/96 1100	08/21/96 0800	09/19/96 1615	10/07/96 1455	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	17.52	16.52	16.94	17.00	15.20	17.06	17.08	17.17	17.28	15.20	17.52	16.86	0.68
Total Depth	ft. BGS	22.58	22.58	22.58	22.58	22.58	22.58	22.58	22.58	22.58	22.58	22.58	22.58	0.00
Purge Volume	gallons	11	11	10	12	8	8	9	10	8	8	12	10	1
Temperature	C	8.6	6.5	8.4	12.8	13.8	16.8	15.2	17.7	16.4	6.5	17.7	12.9	4.1
pH	s.u.	8.20	7.87	8.27	7.95	7.74	7.80	7.69	7.87	7.84	7.69	8.27	7.91	0.20
Dissolved Oxygen	ppm	1.5	4.1	5.8	8.7	7.3	5.8	3.8	4.0	5.8	1.5	8.7	5.2	2.1
Conductance	umhos	488	585	454	365	440	450	460	563	430	365	585	471	68
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	<0.03	*	*	<0.03	*	*	0.17	*	<0.03	0.03	0.17	0.07	0.07
Total Alkalinity	mg/L	204	*	*	213	*	*	221	*	216	204	221	214	7
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	204	*	*	213	*	*	221	*	216	204	221	214	7
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.01	*	*	0.04	*	*	0.03	*	0.12	0.01	0.12	0.05	0.05
Barium, dissolved	mg/L	0.128	*	*	0.094	*	*	0.110	*	0.100	0.094	0.128	0.108	0.015
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0030	*	<0.0005	0.0005	0.0100	0.0035	0.0045
Calcium, dissolved	mg/L	45.2	*	*	47.5	*	*	45.6	*	35.8	35.8	47.5	43.5	5.2
Cation-Anion Balance	%	1	*	*	1	*	*	1	*	-1	-1	1	0	1
Sum of Anions	meq/L	5.50	*	*	6.03	*	*	5.84	*	5.94	5.50	6.03	5.83	0.23
Sum of Cations	meq/L	5.60	*	*	6.13	*	*	5.90	*	5.78	5.60	6.13	5.85	0.22
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0010	*	*	<0.0005	*	<0.0005	0.0005	0.0010	0.0006	0.0002
Chloride	mg/L	4	*	*	9	*	*	4	*	4	4	9	5	3
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	480	*	*	523	*	*	537	*	549	480	549	522	30
Fluoride	mg/L	0.4	*	*	0.4	*	*	0.5	*	0.5	0.4	0.5	0.5	0.1
Iron, dissolved	mg/L	<0.01	*	*	0.03	*	*	0.33	*	<0.01	0.01	0.33	0.10	0.16
Iron, total	mg/L	40.30	*	*	10.90	*	*	1.24	*	32.90	1.24	40.30	21.34	18.31
Hardness as CaCO3	mg/L	175	*	*	184	*	*	176	*	152	152	184	172	14
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	1.8	*	*	2.1	*	*	2.5	*	2.4	1.8	2.5	2.2	0.3
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	15.1	*	*	15.8	*	*	15.2	*	15.3	15.1	15.8	15.4	0.3
Manganese, dissolved	mg/L	0.247	*	*	0.014	*	*	0.011	*	<0.005	0.005	0.247	0.069	0.119
Manganese, total	mg/L	1.950	*	*	0.277	*	*	0.037	*	0.783	0.037	1.950	0.762	0.851
Nitrogen, ammonia	mg/L	<0.05	*	*	<0.05	*	*	0.06	*	<0.05	0.05	0.06	0.05	0.01

GW-2-11

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MMLC-1
 Sample Year: 1996

SAMPLING DATE TIME	03/12/96 0850	03/25/96 1145	04/25/96 0945	05/22/96 0730	06/18/96 0800	07/17/96 1100	08/21/96 0800	09/19/96 1615	10/07/96 1455	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION	
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	0.02	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.42	*	*	0.31	*	*	0.36	*	0.21	0.21	0.42	0.33	0.09
Nitrate/Nitrite as N, dissolv	mg/L	0.42	*	*	0.31	*	*	0.37	*	0.23	0.23	0.42	0.33	0.08
Sodium, dissolved	mg/L	46.2	*	*	54.5	*	*	51.5	*	60.8	46.2	60.8	53.3	6.1
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.016	*	*	0.011	*	*	<0.005	*	0.014	0.005	0.016	0.012	0.005
Lead, dissolved	mg/L	<0.001	*	*	0.008	*	*	<0.002	*	<0.001	0.001	0.008	0.003	0.003
pH (lab)	units	7.4	*	*	7.7	*	*	7.9	*	7.7	7.4	7.9	7.7	0.2
Sodium Absorption Ratio in W		1.54	*	*	1.77	*	*	1.71	*	2.17	1.54	2.17	1.80	0.27
Antimony, dissolved	mg/L	<0.002	*	*	<0.010	*	*	<0.002	*	<0.002	0.002	0.010	0.004	0.004
Selenium, dissolved	mg/L	0.001	*	*	0.002	*	*	<0.001	*	<0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	60	*	*	70	*	*	60	*	70	60	70	65	6
Residue, Filterable (TDS) 218	mg/L	270	*	*	300	*	*	300	*	300	270	300	293	15
TDS (calculated)	mg/L	296	*	*	327	*	*	313	*	319	296	327	314	13
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.04	*	<0.01	0.01	0.04	0.02	0.02

Note: Station installed 02/27/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MMLC-2
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 0950	03/25/96 1452	04/25/96 0730	05/21/96 1345	06/18/96 1200	07/16/96 1615	08/20/96 0900	09/18/96 1120	10/07/96 1220	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	13.40	13.29	13.17	11.06	11.26	12.13	13.72	14.01	14.30	11.06	14.30	12.93	1.17
Total Depth	ft. BGS	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	0.00
Purge Volume	gallons	23	22	23	26	27	26	24	22	21	21	27	24	2
Temperature	C	7.5	4.4	7.8	12.0	15.7	23.0	14.3	15.8	14.5	4.4	23.0	12.8	5.6
pH	s.u.	8.30	7.99	8.25	7.05	7.56	7.99	7.59	7.68	7.69	7.05	8.30	7.79	0.39
Dissolved Oxygen	ppm	5.3	7.9	6.7	8.6	6.1	4.7	4.6	5.0	5.6	4.6	8.6	6.1	1.4
Conductance	umhos	362	455	322	349	450	320	415	601	280	280	601	395	98
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	<0.03	*	*	<0.03	*	*	<0.20	*	<0.03	0.03	0.20	0.07	0.09
Total Alkalinity	mg/L	217	*	*	218	*	*	230	*	236	217	236	225	9
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	217	*	*	218	*	*	230	*	236	217	236	225	9
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	<0.01	*	*	0.04	*	*	0.03	*	0.02	0.01	0.04	0.03	0.01
Barium, dissolved	mg/L	0.088	*	*	0.082	*	*	0.093	*	0.092	0.082	0.093	0.089	0.005
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	51.7	*	*	55.5	*	*	51.9	*	51.5	51.5	55.5	52.7	1.9
Cation-Anion Balance	%	3	*	*	5	*	*	0	*	0	0	5	2	2
Sum of Anions	meq/L	5.54	*	*	5.76	*	*	6.01	*	5.93	5.54	6.01	5.81	0.21
Sum of Cations	meq/L	5.82	*	*	6.31	*	*	5.98	*	5.89	5.82	6.31	6.00	0.22
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	4	*	*	3	*	*	4	*	4	3	4	4	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	468	*	*	498	*	*	540	*	578	468	578	521	48
Fluoride	mg/L	0.3	*	*	0.4	*	*	0.4	*	0.4	0.3	0.4	0.4	0.1
Iron, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.02	*	0.02	0.01	0.02	0.02	0.01
Iron, total	mg/L	8.17	*	*	13.30	*	*	7.56	*	7.11	7.11	13.30	9.04	2.88
Hardness as CaCO3	mg/L	197	*	*	209	*	*	198	*	195	195	209	200	6
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	1.5	*	*	1.7	*	*	1.9	*	1.7	1.5	1.9	1.7	0.2
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	16.6	*	*	17.0	*	*	16.5	*	16.0	16.0	17.0	16.5	0.4
Manganese, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Manganese, total	mg/L	0.200	*	*	0.331	*	*	0.212	*	0.123	0.123	0.331	0.217	0.086
Nitrogen, ammonia	mg/L	<0.05	*	*	<0.05	*	*	<0.05	*	<0.05	0.05	0.05	0.05	0.00

GW-2-13

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MLC-2
Sample Year: 1996

SAMPLING DATE TIME	03/12/96 0950	03/25/96 1452	04/25/96 0730	05/21/96 1345	06/18/96 1200	07/16/96 1615	08/20/96 0900	09/18/96 1120	10/07/96 1220	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION	
Parameter	Units													
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.02	*	*	0.01	*	<0.01	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.37	*	*	0.53	*	*	0.28	*	0.41	0.28	0.53	0.40	0.10
Nitrate/Nitrite as N, dissolv	mg/L	0.37	*	*	0.55	*	*	0.29	*	0.41	0.29	0.55	0.41	0.11
Sodium, dissolved	mg/L	41.8	*	*	47.6	*	*	45.0	*	44.5	41.8	47.6	44.7	2.4
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.027	*	*	<0.005	*	*	0.013	*	<0.005	0.005	0.027	0.013	0.010
Lead, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
pH (lab)	units	7.2	*	*	7.6	*	*	7.9	*	7.6	7.2	7.9	7.6	0.3
Sodium Absorption Ratio in H ₂ O		1.31	*	*	1.45	*	*	1.41	*	1.40	1.31	1.45	1.39	0.06
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	0.001	*	*	0.002	*	*	<0.001	*	<0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	50	*	*	60	*	*	60	*	50	50	60	55	6
Residue, Filterable (TDS) @18	mg/L	310	*	*	350	*	*	340	*	320	310	350	330	18
TDS (calculated)	mg/L	296	*	*	317	*	*	318	*	310	296	318	310	10
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00

Note: Station installed 03/07/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MLC-3
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1030	03/25/96 1615	04/24/96 1510	05/20/96 1545	06/18/96 1450	07/16/96 1330	08/19/96 1330	09/18/96 1035	10/07/96 1310	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	13.40	13.21	11.65	10.92	11.60	12.06	13.53	13.21	12.63	10.92	13.53	12.47	0.94
Total Depth	ft. BGS	18.35	18.35	18.35	18.35	18.35	18.35	18.35	18.35	18.35	18.35	18.35	18.35	0.00
Purge Volume	gallons	8	7	15	15	15	13	6	11	13	6	15	11	4
Temperature	C	9.0	5.9	10.5	11.6	14.3	16.3	15.7	15.2	14.0	5.9	16.3	12.5	3.5
pH	s.u.	8.37	8.21	7.98	7.95	7.63	7.52	7.88	7.80	7.63	7.52	8.37	7.89	0.28
Dissolved Oxygen	ppm	4.9	5.3	7.9	6.3	8.6	8.2	6.7	5.7	7.0	4.9	8.6	6.7	1.3
Conductance	umhos	340	442	343	353	410	420	406	467	390	340	467	399	42
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	<0.03	*	*	0.14	*	*	0.07	*	0.04	0.03	0.14	0.07	0.05
Total Alkalinity	mg/L	213	*	*	218	*	*	230	*	226	213	230	222	8
Carbonate as CaCO ₃	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO ₃	mg/L	213	*	*	218	*	*	230	*	226	213	230	222	8
Hydroxide as CaCO ₃	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.01	*	*	0.05	*	*	0.05	*	0.02	0.01	0.05	0.03	0.02
Barium, dissolved	mg/L	0.100	*	*	0.099	*	*	0.114	*	0.102	0.099	0.114	0.104	0.007
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	52.4	*	*	57.2	*	*	53.9	*	51.2	51.2	57.2	53.7	2.6
Cation-Anion Balance	%	0	*	*	2	*	*	0	*	2	0	2	1	1
Sum of Anions	meq/L	5.72	*	*	5.80	*	*	5.83	*	5.49	5.49	5.83	5.71	0.15
Sum of Cations	meq/L	5.73	*	*	6.01	*	*	5.87	*	5.67	5.67	6.01	5.82	0.15
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	5	*	*	5	*	*	4	*	3	3	5	4	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	473	*	*	494	*	*	531	*	531	473	531	507	29
Fluoride	mg/L	0.5	*	*	0.3	*	*	0.4	*	0.4	0.3	0.5	0.4	0.1
Iron, dissolved	mg/L	<0.01	*	*	0.18	*	*	0.09	*	0.06	0.01	0.18	0.09	0.07
Iron, total	mg/L	8.68	*	*	13.10	*	*	61.60	*	10.10	8.68	61.60	23.37	25.55
Hardness as CaCO ₃	mg/L	193	*	*	211	*	*	200	*	190	190	211	199	9
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	4.2	*	*	1.9	*	*	2.0	*	1.9	1.9	4.2	2.5	1.1
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	15.0	*	*	16.5	*	*	15.9	*	15.2	15.0	16.5	15.7	0.7
Manganese, dissolved	mg/L	0.078	*	*	<0.005	*	*	0.011	*	<0.005	0.005	0.078	0.025	0.036
Manganese, total	mg/L	0.300	*	*	0.320	*	*	1.700	*	0.156	0.156	1.700	0.619	0.724
Nitrogen, ammonia	mg/L	0.09	*	*	<0.05	*	*	0.05	*	<0.05	0.05	0.09	0.06	0.02

GW-2-15

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MWLC-3
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1030	03/25/96 1615	04/24/96 1510	05/20/96 1545	06/18/96 1450	07/16/96 1330	08/19/96 1330	09/18/96 1035	10/07/96 1310	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Nitrite as N, dissolved	mg/L	0.02	*	*	0.01	*	*	<0.01	*	<0.01	0.01	0.02	0.01	0.00
Nitrate as N, dissolved	mg/L	0.52	*	*	0.38	*	*	0.59	*	0.31	0.31	0.59	0.45	0.13
Nitrate/Nitrite as N, dissolv	mg/L	0.54	*	*	0.39	*	*	0.59	*	0.31	0.31	0.59	0.46	0.13
Sodium, dissolved	mg/L	39.9	*	*	39.1	*	*	40.9	*	41.0	39.1	41.0	40.2	0.9
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.379	*	*	<0.005	*	*	0.008	*	0.008	0.005	0.379	0.100	0.186
Lead, dissolved	mg/L	<0.001	*	*	0.007	*	*	0.001	*	<0.001	0.001	0.007	0.003	0.003
pH (lab)	units	7.5	*	*	7.6	*	*	7.8	*	7.5	7.5	7.8	7.6	0.1
Sodium Absorption Ratio in W		1.27	*	*	1.19	*	*	1.27	*	1.31	1.19	1.31	1.26	0.05
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	<0.001	*	*	0.002	*	*	<0.001	*	<0.001	0.001	0.002	0.001	0.000
Sulfate	mg/L	60	*	*	60	*	*	50	*	40	60	60	53	10
Residue, Filterable (TDS) @18	mg/L	310	*	*	330	*	*	290	*	290	290	330	305	19
TDS (calculated)	mg/L	306	*	*	312	*	*	306	*	289	289	312	303	10
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.01	*	<0.01	0.01	0.01	0.01	0.00

Note: Station installed 03/08/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MMLC-4
Sample Year: 1996

SAMPLING DATE TIME		03/12/96 1130	03/26/96 1245	04/24/96 1120	05/20/96 1330	06/18/96 1700	07/16/96 1200	08/19/96 1100	09/18/96 0935	10/07/96 1050	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	12.50	12.70	13.10	13.25	13.21	13.30	13.50	13.40	13.44	12.50	13.50	13.16	0.34
Total Depth	ft. BGS	19.55	19.55	19.55	19.55	19.55	19.55	19.55	19.55	19.55	19.55	19.55	19.55	0.00
Purge Volume	gallons	15	14	13	9	8	6	6	9	9	6	15	10	3
Temperature	C	8.9	7.7	10.0	13.3	10.4	15.0	16.0	13.3	12.7	7.7	16.0	11.9	2.8
pH	s.u.	7.95	7.77	7.86	7.97	7.49	7.65	7.55	7.83	7.51	7.49	7.97	7.73	0.19
Dissolved Oxygen	ppm	3.6	4.3	6.0	6.1	7.3	9.0	8.2	6.3	5.2	3.6	9.0	6.2	1.8
Conductance	umhos	388	395	370	536	430	440	480	532	440	370	536	446	60
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	0.04	*	*	0.25	*	*	0.03	*	<0.03	0.03	0.25	0.09	0.11
Total Alkalinity	mg/L	242	*	*	237	*	*	262	*	267	237	267	252	15
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	242	*	*	237	*	*	262	*	267	237	267	252	15
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.01	*	*	0.03	*	*	0.03	*	0.02	0.01	0.03	0.02	0.01
Barium, dissolved	mg/L	0.117	*	*	0.109	*	*	0.115	*	0.118	0.109	0.118	0.115	0.004
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	52.4	*	*	56.7	*	*	55.4	*	57.0	52.4	57.0	55.4	2.1
Cation-Anion Balance	%	2	*	*	4	*	*	0	*	2	0	4	2	2
Sum of Anions	meq/L	6.23	*	*	5.90	*	*	6.46	*	6.50	5.90	6.50	6.27	0.28
Sum of Cations	meq/L	6.51	*	*	6.36	*	*	6.43	*	6.70	6.36	6.70	6.50	0.15
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	4	*	*	3	*	*	5	*	3	3	5	4	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	523	*	*	516	*	*	566	*	604	516	604	552	41
Fluoride	mg/L	0.3	*	*	0.3	*	*	0.4	*	0.4	0.3	0.4	0.4	0.1
Iron, dissolved	mg/L	<0.01	*	*	0.64	*	*	0.05	*	0.02	0.01	0.64	0.18	0.31
Iron, total	mg/L	<0.01	*	*	1.75	*	*	1.74	*	2.49	0.01	2.49	1.50	1.05
Hardness as CaCO3	mg/L	201	*	*	213	*	*	210	*	216	201	216	210	6
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	2.6	*	*	1.6	*	*	1.8	*	2.0	1.6	2.6	2.0	0.4
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	17.1	*	*	17.3	*	*	17.5	*	17.9	17.1	17.9	17.5	0.3
Manganese, dissolved	mg/L	0.044	*	*	0.012	*	*	0.008	*	0.008	0.008	0.044	0.018	0.017
Manganese, total	mg/L	0.046	*	*	0.031	*	*	0.034	*	0.019	0.019	0.046	0.033	0.011
Nitrogen, ammonia	mg/L	0.15	*	*	<0.05	*	*	0.10	*	<0.05	0.05	0.15	0.09	0.05

GW-2-17

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MMLC-4
 Sample Year: 1996

SAMPLING DATE TIME	03/12/96 1130	03/26/96 1245	04/24/96 1120	05/20/96 1330	06/18/96 1700	07/16/96 1200	08/19/96 1100	09/18/96 0935	10/07/96 1050	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units												
Nitrite as N, dissolved	mg/L	<0.01	*	*	<0.01	*	*	0.02	*	0.01	0.01	0.02	0.00
Nitrate as N, dissolved	mg/L	<0.02	*	*	0.15	*	*	0.08	*	0.07	0.02	0.15	0.05
Nitrate/nitrite as N, dissolv	mg/L	<0.02	*	*	0.15	*	*	0.10	*	0.08	0.02	0.15	0.05
Sodium, dissolved	mg/L	54.7	*	*	45.5	*	*	49.3	*	52.9	45.5	54.7	4.1
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	<0.005	*	*	<0.005	*	*	0.006	*	<0.005	0.005	0.006	0.000
Lead, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.000
pH (lab)	units	7.3	*	*	7.5	*	*	7.8	*	7.4	7.3	7.8	0.2
Sodium Absorption Ratio in Wa		1.70	*	*	1.37	*	*	1.50	*	1.58	1.37	1.70	0.14
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.000
Selenium, dissolved	mg/L	<0.001	*	*	0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.000
Sulfate	mg/L	60	*	*	50	*	*	50	*	50	50	60	5
Residue, Filterable (TDS) @18	mg/L	340	*	*	340	*	*	320	*	320	320	340	12
TDS (calculated)	mg/L	337	*	*	318	*	*	337	*	344	318	344	11
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00

Note: Station installed 03/09/96

Rev:11/19/96

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MUPC-1
 Sample Year: 1996

SAMPLING DATE TIME		03/12/96 0925	03/25/96 1252	04/25/96 0835	05/22/96 0915	06/18/96 1030	07/17/96 1040	08/20/96 1000	09/18/96 1200	10/07/96 1330	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units													
Water Level	cfs	21.80	20.68	22.70	22.02	20.77	20.70	20.66	20.55	20.98	20.55	22.70	21.21	0.77
Total Depth	ft. BGS	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	33.30	0.00
Purge Volume	gallons	14	14	12	12	17	15	13	15	14	12	17	14	2
Temperature	C	12.7	5.9	11.1	14.0	16.1	14.1	15.9	14.4	12.6	5.9	16.1	13.0	3.1
pH	s.u.	8.44	7.94	7.55	7.83	7.67	7.79	7.77	7.77	7.74	7.55	8.44	7.83	0.25
Dissolved Oxygen	ppm	3.4	7.9	4.0	7.2	7.4	7.1	4.1	4.2	5.6	3.4	7.9	5.7	1.8
Conductance	umhos	795	482	516	514	750	700	700	971	690	482	971	680	157
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	0.04	*	*	0.10	*	*	<0.20	*	<0.03	0.03	0.20	0.09	0.08
Total Alkalinity	mg/L	428	*	*	366	*	*	347	*	342	342	428	371	40
Carbonate as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Bicarbonate as CaCO3	mg/L	428	*	*	366	*	*	347	*	342	342	428	371	40
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	<0.001	*	*	<0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.02	*	*	0.02	*	*	0.04	*	0.02	0.02	0.04	0.03	0.01
Barium, dissolved	mg/L	0.067	*	*	0.043	*	*	0.043	*	0.041	0.041	0.067	0.049	0.012
Beryllium, dissolved	mg/L	<0.0005	*	*	<0.0100	*	*	<0.0005	*	<0.0005	0.0005	0.0100	0.0029	0.0048
Calcium, dissolved	mg/L	41.0	*	*	40.9	*	*	39.8	*	38.7	38.7	41.0	40.1	1.1
Cation-Anion Balance	%	3	*	*	-1	*	*	-1	*	0	-1	3	0	2
Sum of Anions	meq/L	11.80	*	*	10.80	*	*	10.10	*	9.80	9.80	11.80	10.63	0.89
Sum of Cations	meq/L	12.50	*	*	10.60	*	*	9.97	*	9.82	9.82	12.50	10.72	1.23
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0010	*	*	<0.0005	*	<0.0005	0.0005	0.0010	0.0006	0.0002
Chloride	mg/L	1	*	*	8	*	*	6	*	6	1	8	5	3
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Copper, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Conductivity 25C	umhos/cm	962	*	*	959	*	*	919	*	944	919	962	946	20
Fluoride	mg/L	0.9	*	*	0.8	*	*	0.8	*	0.9	0.8	0.9	0.9	0.1
Iron, dissolved	mg/L	0.01	*	*	0.09	*	*	0.07	*	0.02	0.01	0.09	0.05	0.04
Iron, total	mg/L	0.58	*	*	29.20	*	*	19.10	*	5.36	0.58	29.20	13.56	13.05
Hardness as CaCO3	mg/L	187	*	*	191	*	*	182	*	177	177	191	184	6
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	4.3	*	*	3.3	*	*	3.2	*	3.3	3.2	4.3	3.5	0.5
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.02	0.00
Magnesium, dissolved	mg/L	20.5	*	*	21.5	*	*	20.0	*	19.5	19.5	21.5	20.4	0.9
Manganese, dissolved	mg/L	0.267	*	*	0.006	*	*	<0.005	*	<0.005	0.005	0.267	0.071	0.131
Manganese, total	mg/L	0.264	*	*	0.760	*	*	0.735	*	0.119	0.119	0.760	0.470	0.327
Nitrogen, ammonia	mg/L	0.16	*	*	0.07	*	*	0.05	*	<0.05	0.05	0.16	0.08	0.05

GW-2-19

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MUPC-1
Sample Year: 1996

SAMPLING DATE TIME	03/12/96 0925	03/25/96 1252	04/25/96 0835	05/22/96 0915	06/18/96 1030	07/17/96 1040	08/20/96 1000	09/18/96 1200	10/07/96 1330	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units												
Nitrite as N, dissolved	mg/L	<0.01	*	*	0.04	*	*	<0.01	*	0.01	0.01	0.04	0.02
Nitrate as N, dissolved	mg/L	0.05	*	*	0.24	*	*	0.30	*	0.23	0.05	0.30	0.21
Nitrate/Nitrite as N, dissolv	mg/L	0.05	*	*	0.28	*	*	0.30	*	0.24	0.05	0.30	0.22
Sodium, dissolved	mg/L	196.0	*	*	153.0	*	*	142.0	*	141.0	141.0	196.0	25.9
Nickel, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.032	*	*	0.018	*	*	0.010	*	0.017	0.010	0.032	0.009
Lead, dissolved	mg/L	<0.001	*	*	0.002	*	*	<0.005	*	<0.001	0.001	0.005	0.002
pH (lab)	units	7.3	*	*	8.0	*	*	8.0	*	7.7	7.3	8.0	0.3
Sodium Absorption Ratio in Wa		6.31	*	*	4.88	*	*	4.64	*	4.67	4.64	6.31	0.80
Antimony, dissolved	mg/L	<0.002	*	*	<0.010	*	*	<0.002	*	<0.002	0.002	0.010	0.004
Selenium, dissolved	mg/L	0.001	*	*	0.001	*	*	0.001	*	<0.001	0.001	0.001	0.000
Sulfate	mg/L	150	*	*	150	*	*	140	*	130	130	150	10
Residue, Filterable (TDS) @18	mg/L	640	*	*	560	*	*	540	*	540	540	640	48
TDS (calculated)	mg/L	671	*	*	598	*	*	560	*	545	545	671	56
TDS (ratio - measured/calcula		1	*	*	1	*	*	1	*	1	1	1	0
Thallium, dissolved	mg/L	<0.002	*	*	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.000
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.000
Zinc, dissolved	mg/L	<0.01	*	*	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00

Note: Station installed 03/07/96

Rev:11/19/96

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WMBC-1
 Sample Year: 1996

SAMPLING DATE
 TIME

08/28/96

MINIMUM
 VALUE

MAXIMUM
 VALUE

MEAN
 AVERAGE

STANDARD
 DEVIATION

Parameter	Units	Pump	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	NA	N/A	N/A	N/A	N/A
Water Level	feet	*	N/A	N/A	N/A	N/A
Temperature	C	*	N/A	N/A	N/A	N/A
pH	s.u.	*	N/A	N/A	N/A	N/A
Conductance	umhos	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	N/A	N/A	N/A	N/A
Sum of Anions	mg/L	*	N/A	N/A	N/A	N/A
Sum of Cations	mg/L	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	N/A	N/A	N/A	N/A
Hardness as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A

GW-2-21

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WMC-1
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Nitrate as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	*	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	*	N/A	N/A	N/A	N/A
pH (lab)	units	*	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Sulfate	mg/L	*	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	*	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	*	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	*	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

Pump = No flow from windmill at time of sampling.
 NA = Not accessible

GW-2-22

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: WMC-2
Sample Year: 1996

SAMPLING DATE
TIME

06/28/96

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	None	N/A	N/A	N/A	N/A
Water Level	feet	NA	N/A	N/A	N/A	N/A
Temperature	C	25.8	N/A	N/A	N/A	N/A
pH	s.u.	9.63	N/A	N/A	N/A	N/A
Conductance	umhos	1439	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	10.1	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	N/A	N/A	N/A	N/A
Hardness as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A

GW-2-23

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WMC-2
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Nitrate as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	*	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	*	N/A	N/A	N/A	N/A
pH (lab)	units	*	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Sulfate	mg/L	*	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	*	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	*	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	*	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

None = None
 NA = Not accessible

GW-2-24

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WMC-3
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	None	N/A	N/A	N/A	N/A
Water Level	feet	22.45	N/A	N/A	N/A	N/A
Temperature	C	*	N/A	N/A	N/A	N/A
pH	s.u.	*	N/A	N/A	N/A	N/A
Conductance	umhos	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	N/A	N/A	N/A	N/A
Hardness as CaCO3	mg/L	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A

GW-2-25

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WABC-3
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME

Parameter	Units	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Nitrate as N, dissolved	mg/L	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	N/A	N/A	N/A	N/A
pH (lab)	units	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	N/A	N/A	N/A	N/A
Sulfate	mg/L	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) 218	mg/L	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

None = None

GW-2-26

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: WMCC-1
Sample Year: 1996

SAMPLING DATE
TIME

08/28/96

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	None	N/A	N/A	N/A	N/A
Water Level	feet	NA	N/A	N/A	N/A	N/A
Temperature	C	*	N/A	N/A	N/A	N/A
pH	s.u.	*	N/A	N/A	N/A	N/A
Conductance	umhos	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	N/A	N/A	N/A	N/A
Carbonate as CaCO ₃	mg/L	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO ₃	mg/L	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO ₃	mg/L	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	N/A	N/A	N/A	N/A
Sum of Anions	mg/L	*	N/A	N/A	N/A	N/A
Sum of Cations	mg/L	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	N/A	N/A	N/A	N/A
Hardness as CaCO ₃	mg/L	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	N/A	N/A	N/A	N/A

GW-2-27

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: LMCC-1
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME

Parameter	Units	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Nitrate as N, dissolved	mg/L	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	N/A	N/A	N/A	N/A
pH (lab)	units	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	N/A	N/A	N/A	N/A
Sulfate	mg/L	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

None = None
 NA = Not accessible

GW-2-28

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: WNCAC-1
 Sample Year: 1996

SAMPLING DATE TIME			08/28/96 1656	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units						
Flow	gpm	1.10		N/A	N/A	N/A	N/A
Water Level	feet	NA		N/A	N/A	N/A	N/A
Temperature	C	21.6		N/A	N/A	N/A	N/A
pH	s.u.	8.32		N/A	N/A	N/A	N/A
Conductance	umhos	650		N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	8.1		N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	<0.010		N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	<0.03		N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	377		N/A	N/A	N/A	N/A
Carbonate as CaCO ₃	mg/L	7		N/A	N/A	N/A	N/A
Bicarbonate as CaCO ₃	mg/L	371		N/A	N/A	N/A	N/A
Hydroxide as CaCO ₃	mg/L	<2		N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	<0.001		N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	0.02		N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.041		N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	<0.002		N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	40.4		N/A	N/A	N/A	N/A
Cation-Anion Balance	%	6		N/A	N/A	N/A	N/A
Sum of Anions	meq/L	13.00		N/A	N/A	N/A	N/A
Sum of Cations	meq/L	14.60		N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	<0.0005		N/A	N/A	N/A	N/A
Chloride	mg/L	10		N/A	N/A	N/A	N/A
Cyanide, free	mg/L	<0.1		N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	<0.1		N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	<0.01		N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	<0.01		N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.01		N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	1272		N/A	N/A	N/A	N/A
Fluoride	mg/L	1.0		N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	<0.02		N/A	N/A	N/A	N/A
Iron, total	mg/L	0.04		N/A	N/A	N/A	N/A
Hardness as CaCO ₃	mg/L	195		N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	<0.0002		N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	3.6		N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	0.03		N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	22.9		N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	<0.005		N/A	N/A	N/A	N/A
Manganese, total	mg/L	<0.005		N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.17		N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	<0.01		N/A	N/A	N/A	N/A

GW-2-29

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: LMC&C-1
Sample Year: 1996

SAMPLING DATE TIME	08/28/96 1656		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units					
Nitrate as N, dissolved	mg/L	0.40	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	0.40	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	241.0	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	<0.01	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
pH (lab)	units	8.3	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in %		7.60	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	<0.002	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	<0.0010	N/A	N/A	N/A	N/A
Sulfate	mg/L	240	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) 218	mg/L	800	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	789	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		1	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	<0.002	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.13	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

NA = Not accessible

GW-2-30

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: UNQMC-2
 Sample Year: 1996

SAMPLING DATE 08/28/96
 TIME 1630

Parameter	Units	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	N/A	N/A	N/A	N/A
Water Level	feet	N/A	N/A	N/A	N/A
Temperature	C	N/A	N/A	N/A	N/A
pH	p.u.	N/A	N/A	N/A	N/A
Conductance	umhos	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	N/A	N/A	N/A	N/A
Chloride	mg/L	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	N/A	N/A	N/A	N/A
Fluoride	mg/L	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	N/A	N/A	N/A	N/A
Iron, total	mg/L	N/A	N/A	N/A	N/A
Hardness as CaCO3	mg/L	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	N/A	N/A	N/A	N/A
Manganese, total	mg/L	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	N/A	N/A	N/A	N/A

GW-2-31

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: WNCWC-2
Sample Year: 1996

SAMPLING DATE TIME		08/28/96 1630		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units						
Nitrate as N, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	*		N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	*		N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	*		N/A	N/A	N/A	N/A
pH (lab)	units	*		N/A	N/A	N/A	N/A
Sodium Absorption Ratio in W		*		N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Sulfate	mg/L	*		N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	*		N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	*		N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		*		N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*		N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	*		N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

None = None
NA = Not accessible

GW-2-32

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: WMLPC-1
Sample Year: 1996

SAMPLING DATE 08/28/96
TIME 1510

Parameter	Units	None	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Flow	gpm	None	N/A	N/A	N/A	N/A
Water Level	feet	10.30	N/A	N/A	N/A	N/A
Temperature	C	25.4	N/A	N/A	N/A	N/A
pH	s.u.	8.96	N/A	N/A	N/A	N/A
Conductance	umhos	1440	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	"	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	<0.03	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	276	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	33	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	243	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	<2	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	<0.001	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	0.03	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.028	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	<0.002	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	24.3	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	7	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	10.50	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	12.10	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	<0.0005	N/A	N/A	N/A	N/A
Chloride	mg/L	10	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	<0.1	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	<0.1	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	<0.01	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	<0.01	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.01	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	1021	N/A	N/A	N/A	N/A
Fluoride	mg/L	0.5	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	0.01	N/A	N/A	N/A	N/A
Iron, total	mg/L	0.05	N/A	N/A	N/A	N/A
Hardness as CaCO3	mg/L	166	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	<0.0002	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	5.6	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	0.04	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	25.6	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Manganese, total	mg/L	0.018	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	<0.05	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	0.02	N/A	N/A	N/A	N/A

GW-2-33

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: WMLPC-1
Sample Year: 1996

SAMPLING DATE 08/28/96
TIME 1510

Parameter	Units		MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Nitrate as N, dissolved	mg/L	0.13	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	0.15	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	196.0	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	<0.01	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
pH (lab)	units	8.7	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		6.70	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	<0.002	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	<0.0010	N/A	N/A	N/A	N/A
Sulfate	mg/L	220	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	660	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	661	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		1	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	<0.002	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	<0.005	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.02	N/A	N/A	N/A	N/A

Note: Station installed 08/28/96

Rev:11/19/96

None = None

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-1C
Sample Year: 1996

SAMPLING DATE TIME	05/20/96 1620	06/27/96 0945	07/15/96 1405	08/19/96 1330	09/23/96 1030	10/08/96 1400	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Water Level	cfs	346.65	346.65	346.80	346.65	347.07	346.65	347.15	346.83	0.23
Total Depth	ft. BGS	396.20	396.20	396.20	396.20	396.20	396.20	396.20	396.20	0.00
Purge Volume	gallons	104	105	100	75	75	75	105	93	14
Temperature	C	*	15.1	14.7	18.8	14.0	14.0	18.8	15.6	1.9
pH	s.u.	*	8.75	9.40	8.67	8.80	8.27	9.40	8.78	0.41
Conductance	ppm	*	700	110	650	1028	110	1620	822	555
Dissolved Oxygen	ppm	*	3.8	2.0	*	*	2.0	3.8	2.9	1.3
Barium, dissolved	mg/L	0.102	*	*	0.128	*	0.091	0.128	0.107	0.019
Beryllium, dissolved	mg/L	<0.010	*	*	<0.001	*	<0.001	0.001	0.010	0.005
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	<0.01	*	*	<0.01	*	<0.01	0.01	0.01	0.00
Fluoride	mg/L	1	*	1	*	1	1	1	1	0
Lithium, dissolved	mg/L	<0.02	*	*	<0.02	*	<0.02	0.02	0.02	0.00
Antimony, dissolved	mg/L	0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.0	*	*	<0.0	*	<0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	<0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	0.06	*	*	0.60	*	0.22	0.60	0.29	0.28
Total Alkalinity	mg/L	517	*	*	471	*	461	517	483	30
Carbonate as CaCO3	mg/L	39	*	*	28	*	10	39	26	15
Bicarbonate as CaCO3	mg/L	478	*	*	444	*	452	478	458	18
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	<2	2	2	0
Arsenic, dissolved	mg/L	0.001	*	*	0.001	*	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.06	*	*	0.04	*	0.03	0.06	0.04	0.02
Calcium, dissolved	mg/L	2.5	*	*	2.8	*	2.2	2.8	2.5	0.3
Cation-Anion Balance	%	-5	*	*	2	*	-3	2	-2	4
Sum of Anions	meq/L	11.30	*	*	9.89	*	9.47	11.30	10.22	0.96
Sum of Cations	meq/L	10.20	*	*	10.30	*	8.88	10.30	9.79	0.79
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	8	*	*	7	*	7	8	7	1
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.01	*	*	<0.01	*	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	924	*	*	861	*	854	924	880	39
Iron, dissolved	mg/L	0.05	*	*	2.21	*	0.05	2.21	1.22	1.09
Iron, total	mg/L	392.0	*	*	6.5	*	4.1	392.0	134.2	223.3
Iron, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-35

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-1C
Sample Year: 1996

SAMPLING DATE TIME	05/20/96 1620	06/27/96 0945	07/15/96 1405	08/19/96 1330	09/23/96 1030	10/08/96 1400	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	9	*	*	9	*	7	7	9	8	1
Mercury, dissolved	mg/L	<0.0002	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	2.3	*	1.6	*	1.1	1.1	2.3	1.7	0.6
Magnesium, dissolved	mg/L	0.6	*	0.6	*	0.4	0.4	0.6	0.5	0.1
Manganese, dissolved	mg/L	<0.005	*	0.022	*	0.018	0.005	0.022	0.015	0.009
Manganese, total	mg/L	2.93	*	0.06	*	0.04	0.04	2.93	1.01	1.66
Manganese, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	1.97	*	0.52	*	0.42	0.42	1.97	0.97	0.87
Nitrite as N, dissolved	mg/L	0.13	*	<0.01	*	0.02	0.01	0.13	0.05	0.07
Nitrate as N, dissolved	mg/L	0.6	*	0.1	*	0.0	0.0	0.6	0.2	0.3
Nitrate/Nitrite as N, dissolv	mg/L	0.7	*	0.1	*	0.1	0.1	0.7	0.3	0.4
Sodium, dissolved	mg/L	223.0	*	223.0	*	195.0	195.0	223.0	213.7	16.2
Nickel, dissolved	mg/L	<0.01	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.095	*	0.009	*	<0.005	0.005	0.095	0.036	0.051
Lead, dissolved	mg/L	<0.001	*	0.004	*	0.001	0.001	0.004	0.002	0.002
pH (lab)	units	8.7	*	8.7	*	8.3	8.3	8.7	8.6	0.2
Sodium Absorption Ratio in Wa		33.20	*	31.90	*	32.10	31.90	33.20	32.40	0.70
Selenium, dissolved	mg/L	0.001	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Sulfate	mg/L	30	*	10	*	<10	10	30	17	12
Residue, Filterable (TDS) @18	mg/L	550	*	490	*	440	440	550	493	55
TDS (calculated)	mg/L	596	*	544	*	490	490	596	543	53
TDS (ratio - measured/calcula		1	*	1	*	1	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	<0.01	*	0.01	*	0.01	0.01	0.01	0.01	0.00

Note: Station installed 04/28/96

Rev:11/19/96

* = No samples taken.

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-11
 Sample Year: 1996

SAMPLING DATE TIME		05/20/96	06/27/96	07/15/96	08/19/96	09/23/96	10/06/96	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
	Units	1105	1200	1200	1250	1540					
Water Level	cfs	495.95	492.72	496.30	492.60	494.05	495.30	492.60	496.30	494.49	1.61
Total Depth	ft. BGS	528.00	528.00	528.00	528.00	528.00	528.00	528.00	528.00	528.00	0.00
Purge Volume	gallons	67	80	67	74	90	69	67	90	74	9
Temperature	C	18.2	16.3	25.0	18.0	15.9	16.9	15.9	25.0	18.4	3.4
pH	s.u.	7.99	7.76	7.74	8.10	8.44	8.42	7.74	8.44	8.08	0.31
Conductance	ppm	563	1400	1480	1400	2090	1000	563	2090	1322	511
Dissolved Oxygen	ppm	6.2	1.2	3.2	*	*	*	1.2	6.2	3.5	2.5
Barium, dissolved	mg/L	0.052	*	*	0.060	*	0.067	0.052	0.067	0.060	0.008
Beryllium, dissolved	mg/L	<0.010	*	*	<0.001	*	<0.001	0.001	0.010	0.004	0.005
Cobalt, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Chromium, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Fluoride	mg/L	2	*	*	2	*	2	2	2	2	0
Lithium, dissolved	mg/L	0.05	*	*	0.04	*	0.02	0.02	0.05	0.04	0.02
Antimony, dissolved	mg/L	0.009	*	*	0.006	*	0.004	0.004	0.009	0.006	0.003
Thallium, dissolved	mg/L	<0.0	*	*	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Silver, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Aluminum, dissolved	mg/L	<0.03	*	*	0.58	*	0.33	0.03	0.58	0.31	0.28
Total Alkalinity	mg/L	559	*	*	513	*	528	513	559	533	23
Carbonate as CaCO ₃	mg/L	<2	*	*	9	*	20	2	20	10	9
Bicarbonate as CaCO ₃	mg/L	559	*	*	504	*	508	504	559	524	31
Hydroxide as CaCO ₃	mg/L	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	0.002	*	0.003	0.001	0.003	0.002	0.001
Boron, dissolved	mg/L	0.19	*	*	0.15	*	0.05	0.05	0.19	0.13	0.07
Calcium, dissolved	mg/L	75.6	*	*	9.4	*	4.4	4.4	75.6	29.8	39.7
Cation-Anion Balance	%	1	*	*	-1	*	-6	-6	1	-2	4
Sum of Anions	meq/L	23.50	*	*	19.60	*	13.60	13.60	23.50	18.90	4.99
Sum of Cations	meq/L	24.10	*	*	19.30	*	12.10	12.10	24.10	18.50	6.04
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	38	*	*	34	*	16	16	38	29	12
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.01
Conductivity @25C	umhos/cm	2070	*	*	1806	*	1281	1281	2070	1719	402
Iron, dissolved	mg/L	<0.01	*	*	0.42	*	0.85	0.01	0.85	0.43	0.42
Iron, total	mg/L	9.1	*	*	2.2	*	5.0	2.2	9.1	5.4	3.5
Iron, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-37

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MM-11
Sample Year: 1996

SAMPLING DATE TIME	05/20/96 1105	06/27/96 1200	07/15/96 1200	08/19/96 1250	09/23/96 1540	10/06/96 1540	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	mg/L	319	*	*	39	*	16	319	125	169
Mercury, dissolved	mg/L	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	7.4	*	*	2.8	*	1.6	7.4	3.9	3.1
Magnesium, dissolved	mg/L	31.7	*	*	3.8	*	1.2	31.7	12.2	16.9
Manganese, dissolved	mg/L	0.040	*	*	0.030	*	0.026	0.040	0.032	0.007
Manganese, total	mg/L	0.16	*	*	0.34	*	0.07	0.34	0.19	0.14
Manganese, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	1.29	*	*	0.87	*	0.46	1.29	0.87	0.42
Nitrite as N, dissolved	mg/L	0.77	*	*	0.35	*	0.24	0.77	0.45	0.28
Nitrate as N, dissolved	mg/L	2.5	*	*	1.5	*	0.1	2.5	1.4	1.2
Nitrate/Nitrite as N, dissolv	mg/L	3.2	*	*	1.9	*	0.4	3.2	1.8	1.4
Sodium, dissolved	mg/L	395.0	*	*	415.0	*	263.0	415.0	357.7	82.6
Nickel, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.01	0.01
Phosphorus, ortho dissolved	mg/L	<0.005	*	*	0.016	*	0.006	0.006	0.029	0.033
Lead, dissolved	mg/L	<0.001	*	*	0.005	*	0.002	0.005	0.003	0.002
pH (lab)	units	8.0	*	*	8.4	*	8.5	8.5	8.3	0.3
Sodium Absorption Ratio in Wa		9.73	*	*	29.20	*	9.73	29.20	22.64	11.18
Selenium, dissolved	mg/L	0.004	*	*	0.002	*	<0.001	0.004	0.002	0.002
Sulfate	mg/L	520	*	*	390	*	120	520	343	204
Residue, Filterable (TDS) @18	mg/L	1390	*	*	1100	*	700	1390	1063	346
TDS (calculated)	mg/L	1410	*	*	1170	*	735	1410	1105	342
TDS (ratio - measured/calcula		1	*	*	1	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.37	*	*	0.13	*	0.12	0.37	0.21	0.14

Note: Station installed 04/08/96

Rev:11/19/96

* = No samples taken.

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-10
Sample Year: 1996

SAMPLING DATE TIME	05/21/96 0830	06/27/96 0915	07/16/96 1540	08/19/96 1550	09/23/96 1140	10/08/96	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Water Level	cfs	341.35	366.20	373.30	376.01	377.37	341.35	377.37	367.72	13.49
Total Depth	ft. BGS	380.20	380.20	380.20	380.20	380.20	380.20	380.20	380.20	0.00
Purge Volume	gallons	81	25	15	9	10	9	81	28	30
Temperature	C	12.7	14.0	14.8	16.8	15.0	12.7	16.8	14.7	1.5
pH	s.u.	8.02	8.52	8.20	8.05	7.86	7.86	8.52	8.13	0.25
Conductance	ppm	623	700	1100	800	1392	623	1392	923	319
Dissolved Oxygen	ppm	5.2	2.2	1.0	*	*	1.0	5.2	2.8	2.2
Barium, dissolved	mg/L	0.614	*	*	0.262	*	0.262	0.614	0.438	0.249
Beryllium, dissolved	mg/L	0.002	*	*	<0.001	*	0.001	0.002	0.001	0.001
Cobalt, dissolved	mg/L	<0.01	*	*	<0.01	*	0.01	0.01	0.01	0.00
Chromium, dissolved	mg/L	0.03	*	*	<0.01	*	0.01	0.03	0.02	0.01
Fluoride	mg/L	3	*	*	4	*	3	4	4	1
Lithium, dissolved	mg/L	0.03	*	*	<0.02	*	0.02	0.03	0.03	0.01
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.2	*	*	<0.0	*	0.0	0.2	0.1	0.1
Vanadium, dissolved	mg/L	0.031	*	*	<0.005	*	0.005	0.031	0.018	0.018
Silver, dissolved	mg/L	<0.005	*	*	<0.005	*	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	10.00	*	*	0.48	*	0.48	10.00	5.24	6.73
Total Alkalinity	mg/L	491	*	*	538	*	491	538	515	33
Carbonate as CaCO3	mg/L	17	*	*	<2	*	2	17	10	11
Bicarbonate as CaCO3	mg/L	474	*	*	538	*	474	538	506	45
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	0.001	*	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.16	*	*	0.05	*	0.05	0.16	0.11	0.08
Calcium, dissolved	mg/L	21.2	*	*	5.0	*	5.0	21.2	13.1	11.5
Cation-Anion Balance	%	17	*	*	-4	*	-4	17	7	15
Sum of Anions	meq/L	10.90	*	*	12.90	*	10.90	12.90	11.90	1.41
Sum of Cations	meq/L	15.40	*	*	11.90	*	11.90	15.40	13.65	2.47
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	5	*	*	8	*	5	8	7	2
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	0.03	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	0.013	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.05	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.05	*	*	<0.01	*	0.01	0.05	0.03	0.03
Conductivity @25C	umhos/cm	*	*	*	1078	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	21.10	*	*	0.87	*	0.87	21.10	10.99	14.30
Iron, total	mg/L	35.9	*	*	87.5	*	35.9	87.5	61.7	36.5
Iron, total recoverable	mg/L	36.30	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-39

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-10
Sample Year: 1996

SAMPLING DATE TIME	05/21/96 0830	06/27/96 0915	07/16/96 1540	08/19/96 1550	09/23/96 1140	10/08/96	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO3	80	*	*	17	*	*	17	80	49	45
Mercury, dissolved	mg/L	<0.0002	*	<0.0002	*	*	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	4.7	*	2.2	*	*	2.2	4.7	3.5	1.8
Magnesium, dissolved	mg/L	6.5	*	1.1	*	*	1.1	6.5	3.8	3.8
Manganese, dissolved	mg/L	0.202	*	0.036	*	*	0.036	0.202	0.119	0.117
Manganese, total	mg/L	0.30	*	0.94	*	*	0.30	0.94	0.62	0.45
Manganese, total recoverable	mg/L	0.301	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	0.006	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.69	*	0.60	*	*	0.60	0.69	0.64	0.06
Nitrite as N, dissolved	mg/L	0.07	*	0.03	*	*	0.03	0.07	0.05	0.03
Nitrate as N, dissolved	mg/L	0.7	*	0.4	*	*	0.4	0.7	0.5	0.2
Nitrate/Nitrite as N, dissolv	mg/L	0.8	*	0.4	*	*	0.4	0.8	0.6	0.2
Sodium, dissolved	mg/L	258.0	*	259.0	*	*	258.0	259.0	258.5	0.7
Nickel, dissolved	mg/L	0.02	*	0.01	*	*	0.01	0.02	0.02	0.01
Phosphorus, ortho dissolved	mg/L	0.059	*	0.074	*	*	0.059	0.074	0.067	0.011
Lead, dissolved	mg/L	<0.001	*	<0.005	*	*	0.001	0.005	0.003	0.003
pH (lab)	units	8.5	*	8.2	*	*	8.2	8.5	8.4	0.2
Sodium Absorption Ratio in Wa		12.70	*	27.60	*	*	12.70	27.60	20.15	10.54
Selenium, dissolved	mg/L	<0.001	*	<0.001	*	*	0.001	0.001	0.001	0.000
Sulfate	mg/L	40	*	80	*	*	40	80	60	28
Residue, Filterable (TDS) at 18	mg/L	510	*	670	*	*	510	670	590	113
TDS (calculated)	mg/L	670	*	685	*	*	670	685	678	11
TDS (ratio - measured/calcula		1	*	1	*	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.16	*	0.01	*	*	0.01	0.16	0.09	0.11

Note: Station installed 04/26/96

Rev: 11/19/96

* = No samples taken.
IR* = Insufficient Recharge

GW-2-40

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MM-2C
Sample Year: 1996

SAMPLING DATE TIME		05/21/96 1040	06/26/96 1040	07/15/96 1500	08/19/96 1630	09/21/96 1245	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units										
Water Level	cfs	Dry	Dry	Dry	Dry	Dry	Dry	N/A	N/A	N/A	N/A
Total Depth	ft. BGS	66.25	66.25	66.25	66.25	66.25	66.25	66.25	66.25	66.25	0.00
Purge Volume	gallons	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Temperature	C	*	*	*	*	*	*	N/A	N/A	N/A	N/A
pH	s.u.	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductance	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Trivalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-41

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-2C
 Sample Year: 1996

SAMPLING DATE TIME	05/21/96 1040	06/26/96 1040	07/15/96 1500	08/19/96 1630	09/21/96 1245	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Mercury, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Potassium, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Magnesium, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Manganese, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Manganese, total	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Manganese, total recoverable	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Molybdenum, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Nitrogen, ammonia	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Nitrate as N, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Sodium, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Nickel, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Lead, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
pH (lab)	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Selenium, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Sulfate	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) #18	•	•	•	•	•	•	N/A	N/A	N/A	N/A
TDS (calculated)	•	•	•	•	•	•	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Residue, Non-Filterable (TSS)	•	•	•	•	•	•	N/A	N/A	N/A	N/A
Zinc, dissolved	•	•	•	•	•	•	N/A	N/A	N/A	N/A

Note: Station installed 03/19/96

Rev:11/19/96

Dry = Dry

GW-2-42

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-21
 Sample Year: 1996

SAMPLING DATE TIME		05/21/96 1035	06/26/96 1050	07/15/96 1500	08/19/96 1630	09/21/96 1245	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units										
Water Level	cfs	Dry	Dry	Dry	Dry	Dry	Dry	N/A	N/A	N/A	N/A
Total Depth	ft. BGS	89.77	89.77	89.77	89.77	89.77	89.77	89.77	89.77	89.77	0.00
Purge Volume	gallons	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Temperature	C	*	*	*	*	*	*	N/A	N/A	N/A	N/A
pH	s.u.	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductance	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Trivalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-43

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-21
 Sample Year: 1996

SAMPLING DATE TIME	05/21/96 1035	06/26/96 1050	07/15/96 1500	08/19/96 1630	09/21/96 1245	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Mercury, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Potassium, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total recoverable	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate as N, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nickel, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Lead, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
pH (lab)	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in W	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Selenium, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sulfate	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	*	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (calculated)	*	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Non-Filterable (TSS)	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A

Note: Station installed 03/21/96

Rev:11/19/96

Dry = Dry

GW-2-44

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: PM-20
 Sample Year: 1996

SAMPLING DATE TIME		05/21/96 1030	06/26/96 1030	07/15/96 1500	08/19/96 1630	09/21/96 1245	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units										
Water Level	cfs	Dry	Dry	Dry	Dry	Dry	Dry	N/A	N/A	N/A	N/A
Total Depth	ft. BGS	59.80	59.80	59.80	59.80	59.80	59.80	59.80	59.80	59.80	0.00
Purge Volume	gallons	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Temperature	C	*	*	*	*	*	*	N/A	N/A	N/A	N/A
pH	s.u.	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductance	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Carbonate as CaCO ₃	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO ₃	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO ₃	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Trivalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A

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LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-20
Sample Year: 1996

SAMPLING DATE TIME	05/21/96 1030	06/26/96 1030	07/15/96 1500	08/19/96 1630	09/21/96	10/08/96 1245	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO3	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate as N, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
pH (lab)	units	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		*	*	*	*	*	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Sulfate	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) 218	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A

Note: Station installed 03/18/96

Rev:11/19/96

Dry = Dry

GW-2-46

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-31
 Sample Year: 1996

SAMPLING DATE TIME	05/20/96 1100	06/27/96 1215	07/15/96 1130	08/19/96 1105	09/21/96	10/08/96 1530	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Water Level	cfs	Dry	Dry	Dry	Dry	281.40	N/A	N/A	N/A	N/A
Total Depth	ft. BGS	281.50	281.50	281.50	281.50	281.50	281.50	281.50	281.50	0.00
Purge Volume	gallons	*	*	*	*	*	N/A	N/A	N/A	N/A
Temperature	C	*	*	*	*	*	N/A	N/A	N/A	N/A
pH	s.u.	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductance	ppm	*	*	*	*	*	N/A	N/A	N/A	N/A
Dissolved Oxygen	ppm	*	*	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Beryllium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Cobalt, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Fluoride	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Lithium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Antimony, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Thallium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Vanadium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Silver, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Aluminum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Total Alkalinity	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Carbonate as CaCO3	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Bicarbonate as CaCO3	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Hydroxide as CaCO3	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Arsenic, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Boron, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Calcium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Cation-Anion Balance	%	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Anions	meq/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Sum of Cations	meq/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Cadmium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chloride	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Cyanide, free	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Thiocyanate (SCN)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Trivalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Conductivity @25C	umhos/cm	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Iron, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A

CW-2-47

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-31
 Sample Year: 1996

SAMPLING DATE TIME	05/20/96 1100	06/27/96 1215	07/15/96 1130	08/19/96 1105	09/21/96 1550	10/08/96 1550	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Mercury, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Potassium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Magnesium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Manganese, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrite as N, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate as N, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrate/Nitrite as N, dissolv	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nickel, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Phosphorus, ortho dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Lead, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
pH (lab)	units	*	*	*	*	*	N/A	N/A	N/A	N/A
Sodium Absorption Ratio in Wa		*	*	*	*	*	N/A	N/A	N/A	N/A
Selenium, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Sulfate	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Filterable (TDS) @18	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (calculated)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
TDS (ratio - measured/calcula		*	*	*	*	*	N/A	N/A	N/A	N/A
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A

Note: Station installed 03/31/96

Rev:11/19/96

Dry = Dry

GW-2-48

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-4C
Sample Year: 1996

SAMPLING DATE TIME	05/22/96 0830	06/26/96 1630	07/16/96 1150	08/20/96 1000	09/22/96 1200	10/08/96 1040	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Water Level	cfs	145.50	148.16	143.05	149.30	149.36	143.05	150.17	147.59	2.76
Total Depth	ft. BGS	370.50	370.50	370.50	370.50	370.50	370.50	370.50	370.50	0.00
Purge Volume	gallons	472	125	300	250	200	125	472	266	117
Temperature	C	14.8	16.2	17.0	15.1	16.5	14.1	17.0	15.6	1.1
pH	s.u.	8.37	8.54	8.40	8.25	8.56	8.25	8.56	8.42	0.11
Conductance	ppm	820	1300	1200	1350	2200	820	2200	1345	458
Dissolved Oxygen	ppm	5.6	1.4	1.6	*	*	1.4	5.6	2.9	2.4
Barium, dissolved	mg/L	0.190	*	*	0.278	*	0.190	0.278	0.235	0.044
Beryllium, dissolved	mg/L	<0.010	*	*	<0.001	*	0.001	0.010	0.004	0.005
Cobalt, dissolved	mg/L	<0.01	*	*	<0.02	*	0.01	0.02	0.01	0.01
Chromium, dissolved	mg/L	<0.01	*	*	<0.02	*	0.01	0.02	0.01	0.01
Fluoride	mg/L	2	*	*	6	*	2	6	5	2
Lithium, dissolved	mg/L	0.06	*	*	0.04	*	0.04	0.06	0.05	0.01
Antimony, dissolved	mg/L	<0.010	*	*	<0.002	*	0.002	0.010	0.005	0.005
Thallium, dissolved	mg/L	<0.0	*	*	<0.0	*	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	<0.005	*	*	<0.010	*	0.005	0.010	0.007	0.003
Silver, dissolved	mg/L	<0.005	*	*	<0.010	*	0.005	0.010	0.007	0.003
Aluminum, dissolved	mg/L	<0.03	*	*	1.07	*	0.03	1.07	0.39	0.59
Total Alkalinity	mg/L	702	*	*	888	*	702	925	838	120
Carbonate as CaCO3	mg/L	23	*	*	40	*	15	40	26	13
Bicarbonate as CaCO3	mg/L	679	*	*	848	*	679	911	813	120
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	2	2	2	0
Arsenic, dissolved	mg/L	0.002	*	*	0.001	*	0.001	0.002	0.001	0.001
Boron, dissolved	mg/L	0.07	*	*	0.04	*	0.02	0.07	0.04	0.03
Calcium, dissolved	mg/L	3.5	*	*	2.2	*	1.9	3.5	2.5	0.9
Cation-Anion Balance	%	-1	*	*	2	*	-3	2	-1	2
Sum of Anions	meq/L	18.10	*	*	20.00	*	18.10	20.10	19.40	1.13
Sum of Cations	meq/L	17.90	*	*	20.60	*	17.90	20.60	19.20	1.35
Cadmium, dissolved	mg/L	<0.0010	*	*	<0.0005	*	0.0005	0.0010	0.0007	0.0003
Chloride	mg/L	14	*	*	8	*	7	14	10	4
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	0.1	0.4	0.2	0.2
Chromium, Trivalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.01	*	*	<0.02	*	0.01	0.02	0.01	0.01
Conductivity @25C	umhos/cm	1610	*	*	1777	*	1610	1777	1721	96
Iron, dissolved	mg/L	<0.01	*	*	0.31	*	0.01	0.31	0.11	0.17
Iron, total	mg/L	2.3	*	*	1.8	*	1.8	2.3	2.0	0.2
Iron, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-49

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-4C
 Sample Year: 1996

SAMPLING DATE TIME	05/22/96 0830	06/26/96 1630	07/16/96 1150	08/20/96 1000	09/22/96 1200	10/08/96 1040	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	13	*	*	9	*	7	7	13	10	3
Mercury, dissolved	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	2.7	*	*	1.9	*	1.6	1.6	2.7	2.1	0.6
Magnesium, dissolved	1.1	*	*	0.9	*	0.6	0.6	1.1	0.9	0.3
Manganese, dissolved	0.005	*	*	0.020	*	0.017	0.005	0.020	0.014	0.008
Manganese, total	0.02	*	*	0.03	*	0.03	0.02	0.03	0.03	0.00
Manganese, total recoverable	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	0.41	*	*	0.53	*	0.47	0.41	0.53	0.47	0.06
Nitrite as N, dissolved	0.21	*	*	<0.01	*	0.04	0.01	0.21	0.09	0.11
Nitrate as N, dissolved	0.4	*	*	0.1	*	0.0	0.0	0.4	0.2	0.2
Nitrate/Nitrite as N, dissolv	0.6	*	*	0.1	*	0.1	0.1	0.6	0.3	0.3
Sodium, dissolved	399.0	*	*	460.0	*	429.0	399.0	460.0	429.3	30.5
Nickel, dissolved	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Phosphorus, ortho dissolved	0.033	*	*	0.036	*	0.021	0.021	0.036	0.030	0.008
Lead, dissolved	0.006	*	*	<0.005	*	<0.001	0.001	0.006	0.004	0.003
pH (lab)	8.5	*	*	8.6	*	8.4	8.4	8.6	8.5	0.1
Sodium Absorption Ratio in Wa	48.20	*	*	66.80	*	70.30	48.20	70.30	61.77	11.88
Selenium, dissolved	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Sulfate	170	*	*	80	*	50	50	170	100	62
Residue, Filterable (TDS) 218	990	*	*	1030	*	1030	990	1030	1017	23
TDS (calculated)	1020	*	*	1110	*	1060	1020	1110	1063	45
TDS (ratio - measured/calcula	1	*	*	1	*	1	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01

Note: Station installed 05/08/96

Rev:11/19/96

* = No samples taken.

GW-2-50

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: M-41
Sample Year: 1996

SAMPLING DATE TIME		05/22/96 1310	06/26/96 1430	07/16/96 1400	08/20/96 1300	09/22/96 1330	10/08/96 1200	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units										
Water Level	cts	125.80	133.06	133.30	133.18	133.06	133.20	125.80	133.30	131.93	3.01
Total Depth	ft. BGS	314.55	314.55	314.55	314.55	314.55	314.55	314.55	314.55	314.55	0.00
Purge Volume	gallons	453	200	200	225	155	150	150	453	231	113
Temperature	C	17.2	16.8	17.6	17.5	16.5	16.2	16.2	17.6	17.0	0.6
pH	a.u.	8.29	8.14	8.10	8.01	8.40	8.39	8.01	8.40	8.22	0.16
Conductance	ppm	848	1800	1800	1610	2840	1720	848	2840	1770	636
Dissolved Oxygen	ppm	7.6	3.9	1.5	*	*	*	1.5	7.6	4.3	3.1
Barium, dissolved	mg/L	0.275	*	*	0.529	*	0.564	0.275	0.564	0.456	0.158
Beryllium, dissolved	mg/L	<0.010	*	*	<0.001	*	<0.001	0.001	0.010	0.004	0.005
Cobalt, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Chromium, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Fluoride	mg/L	5	*	*	6	*	6	5	6	6	1
Lithium, dissolved	mg/L	0.06	*	*	0.06	*	0.06	0.06	0.08	0.07	0.01
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.0	*	*	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Silver, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Aluminum, dissolved	mg/L	<0.03	*	*	1.44	*	1.06	0.03	1.44	0.84	0.73
Total Alkalinity	mg/L	1211	*	*	1262	*	1270	1211	1270	1248	32
Carbonate as CaCO3	mg/L	54	*	*	47	*	26	26	54	42	15
Bicarbonate as CaCO3	mg/L	1156	*	*	1216	*	1244	1156	1244	1205	45
Hydroxide as CaCO3	mg/L	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	0.002	*	*	0.001	*	<0.001	0.001	0.002	0.001	0.001
Boron, dissolved	mg/L	0.09	*	*	0.04	*	0.02	0.02	0.09	0.05	0.04
Calcium, dissolved	mg/L	4.1	*	*	2.8	*	2.8	2.8	4.1	3.2	0.8
Cation-Anion Balance	%	-4	*	*	0	*	-3	-4	0	-2	2
Sum of Anions	meq/L	26.70	*	*	26.60	*	26.70	26.60	26.70	26.67	0.06
Sum of Cations	meq/L	24.70	*	*	26.40	*	25.10	24.70	26.40	25.40	0.89
Cadmium, dissolved	mg/L	<0.0010	*	*	<0.0005	*	<0.0005	0.0005	0.0010	0.0007	0.0003
Chloride	mg/L	10	*	*	6	*	6	6	10	7	2
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.01
Conductivity @25C	umhos/cm	2240	*	*	2288	*	2303	2240	2303	2277	33
Iron, dissolved	mg/L	0.01	*	*	0.42	*	1.00	0.01	1.00	0.48	0.50
Iron, total	mg/L	10.7	*	*	1.2	*	1.6	1.2	10.7	4.5	5.4
Iron, total recoverable	mg/L	*	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-51

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-41
Sample Year: 1996

SAMPLING DATE TIME	05/22/96 1310	06/26/96 1430	07/16/96 1400	08/20/96 1300	09/22/96 1330	10/08/96 1200	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	18	*	*	12	*	12	12	18	14	3
Mercury, dissolved	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	3.4	*	*	2.1	*	2.2	2.1	3.4	2.6	0.7
Magnesium, dissolved	1.9	*	*	1.2	*	1.1	1.1	1.9	1.4	0.4
Manganese, dissolved	0.012	*	*	0.030	*	0.034	0.012	0.034	0.025	0.012
Manganese, total	0.14	*	*	0.04	*	0.04	0.04	0.14	0.07	0.06
Manganese, total recoverable	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	0.62	*	*	0.64	*	0.58	0.58	0.64	0.61	0.03
Nitrite as N, dissolved	0.31	*	*	<0.01	*	0.11	0.01	0.31	0.14	0.15
Nitrate as N, dissolved	0.2	*	*	0.1	*	<0.0	0.0	0.2	0.1	0.1
Nitrate/Nitrite as N, dissolv	0.5	*	*	0.1	*	0.1	0.1	0.5	0.2	0.3
Sodium, dissolved	551.0	*	*	589.0	*	559.0	551.0	589.0	566.3	20.0
Nickel, dissolved	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Phosphorus, ortho dissolved	0.023	*	*	0.024	*	0.008	0.008	0.024	0.018	0.009
Lead, dissolved	<0.001	*	*	<0.005	*	<0.001	0.001	0.005	0.002	0.002
pH (lab)	8.4	*	*	8.5	*	8.3	8.3	8.5	8.4	0.1
Sodium Absorption Ratio in Wa	57.10	*	*	75.10	*	72.50	57.10	75.10	68.23	9.73
Selenium, dissolved	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Sulfate	90	*	*	40	*	40	40	90	57	29
Residue, Filterable (TDS) @18	1290	*	*	1380	*	1390	1290	1390	1353	55
TDS (calculated)	1410	*	*	1430	*	1390	1390	1430	1410	20
TDS (ratio - measured/calcula	1	*	*	1	*	1	1	1	1	0
Residue, Non-Filterable (TSS)	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.01

Note: Station installed 05/06/96

Rev:11/19/96

GW-2-52

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-4U
 Sample Year: 1996

SAMPLING DATE TIME		05/21/96 1115	06/27/96 1300	07/16/96 0935	08/20/96 0800	09/22/96 1000	10/07/96 1500	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units										
Water Level	cfs	154.95	211.37	202.50	240.25	216.51	246.40	154.95	246.40	212.00	32.70
Total Depth	ft. BGS	410.15	410.15	410.15	410.15	410.15	410.15	410.15	410.15	410.15	0.00
Purge Volume	gallons	536	75	325	125	120	200	75	536	230	174
Temperature	C	14.9	18.4	17.6	15.7	16.6	17.7	14.9	18.4	16.8	1.3
pH	s.u.	7.28	8.11	7.88	8.37	8.43	8.43	7.28	8.43	8.08	0.45
Conductance	ppm	2080	1600	1650	1950	3260	2150	1600	3260	2115	604
Dissolved Oxygen	ppm	5.5	3.1	0.9	*	*	*	0.9	5.5	3.2	2.3
Barium, dissolved	mg/L	0.208	*	*	0.569	*	0.547	0.208	0.569	0.441	0.202
Beryllium, dissolved	mg/L	<0.002	*	*	<0.001	*	<0.001	0.001	0.002	0.001	0.001
Cobalt, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Chromium, dissolved	mg/L	<0.01	*	*	<0.02	*	<0.01	0.01	0.02	0.01	0.01
Fluoride	mg/L	1	*	*	3	*	4	1	4	3	2
Lithium, dissolved	mg/L	0.06	*	*	0.06	*	0.06	0.06	0.06	0.06	0.00
Antimony, dissolved	mg/L	<0.002	*	*	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.2	*	*	<0.0	*	<0.0	0.0	0.2	0.1	0.1
Vanadium, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Silver, dissolved	mg/L	<0.005	*	*	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Aluminum, dissolved	mg/L	0.29	*	*	2.08	*	0.56	0.29	2.08	0.98	0.97
Total Alkalinity	mg/L	639	*	*	1411	*	1532	639	1532	1194	484
Carbonate as CaCO ₃	mg/L	<2	*	*	64	*	<2	2	64	23	36
Bicarbonate as CaCO ₃	mg/L	639	*	*	1347	*	1532	639	1532	1173	471
Hydroxide as CaCO ₃	mg/L	<2	*	*	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	<0.001	*	*	0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.07	*	*	0.06	*	0.05	0.05	0.07	0.06	0.01
Calcium, dissolved	mg/L	21.2	*	*	6.4	*	5.5	5.5	21.2	11.0	8.8
Cation-Anion Balance	%	0	*	*	-1	*	-3	-3	0	-1	1
Sum of Anions	meq/L	19.30	*	*	29.80	*	31.80	19.30	31.80	26.97	6.71
Sum of Cations	meq/L	19.10	*	*	29.60	*	30.30	19.10	30.30	26.33	6.27
Cadmium, dissolved	mg/L	<0.0005	*	*	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	13	*	*	7	*	11	7	13	10	3
Cyanide, free	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	*	*	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	<0.01	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	0.041	*	*	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	<0.01	*	*	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.01
Conductivity @25C	uS/cm	*	*	*	2522	*	2837	2522	2837	2680	223
Iron, dissolved	mg/L	0.27	*	*	0.56	*	0.80	0.27	0.80	0.54	0.27
Iron, total	mg/L	2.3	*	*	10.3	*	17.7	2.3	17.7	10.1	7.7
Iron, total recoverable	mg/L	2.29	*	*	*	*	*	N/A	N/A	N/A	N/A

GW-2-53

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-4U
 Sample Year: 1996

SAMPLING DATE TIME	05/21/96 1115	06/27/96 1300	07/16/96 0935	08/20/96 0800	09/22/96 1000	10/07/96 1500	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units									
Hardness as CaCO ₃	89	*	*	28	*	22	22	89	46	37
Mercury, dissolved	<0.0002	*	*	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	3.9	*	*	3.3	*	3.0	3.0	3.9	3.4	0.5
Magnesium, dissolved	8.8	*	*	2.9	*	2.1	2.1	8.8	4.6	3.7
Manganese, dissolved	0.018	*	*	0.020	*	0.027	0.018	0.027	0.022	0.005
Manganese, total	0.05	*	*	0.11	*	0.15	0.05	0.15	0.10	0.05
Manganese, total recoverable	0.047	*	*	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	0.007	*	*	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	0.62	*	*	0.79	*	0.75	0.62	0.79	0.72	0.09
Nitrite as N, dissolved	0.15	*	*	<0.01	*	0.28	0.01	0.28	0.15	0.14
Nitrate as N, dissolved	0.4	*	*	0.1	*	<0.0	0.0	0.4	0.2	0.2
Nitrate/Nitrite as N, dissolv	0.5	*	*	0.1	*	0.3	0.1	0.5	0.3	0.2
Sodium, dissolved	390.0	*	*	650.0	*	672.0	390.0	672.0	570.7	156.8
Nickel, dissolved	<0.01	*	*	<0.02	*	0.01	0.01	0.02	0.01	0.01
Phosphorus, ortho dissolved	<0.005	*	*	0.046	*	0.231	0.005	0.231	0.094	0.120
Lead, dissolved	0.003	*	*	<0.005	*	0.002	0.002	0.005	0.003	0.002
pH (lab)	8.0	*	*	8.5	*	8.4	8.0	8.5	8.3	0.3
Sodium Absorption Ratio in Wa	18.20	*	*	54.20	*	62.50	18.20	62.50	44.97	23.55
Selenium, dissolved	<0.001	*	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Sulfate	290	*	*	60	*	30	30	290	127	142
Residue, Filterable (TDS) @18	1110	*	*	1550	*	1630	1110	1630	1430	280
TDS (calculated)	1110	*	*	1610	*	1650	1110	1650	1457	301
TDS (ratio - measured/calcula	1	*	*	1	*	1	1	1	1	0
Residue, Non-Filterable (TSS)	*	*	*	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	0.01	*	*	<0.02	*	0.04	0.01	0.04	0.02	0.02

Note: Station installed 05/10/96

Rev: 11/19/96

* = No samples taken.

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-5C
 Sample Year: 1996

SAMPLING DATE TIME		07/18/96 0820	08/21/96 1400	09/25/96 1000	10/06/96 1100	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units								
Water Level	ft.	135.70	132.82	131.03	130.73	130.73	135.70	132.57	2.28
Total Depth	ft. BGS	197.50	197.50	197.50	197.50	197.50	197.50	197.50	0.00
Purge Volume	gallons	130	85	135	100	85	135	112	24
Temperature	C	13.6	15.2	13.8	13.4	13.4	15.2	14.0	0.8
pH	s.u.	7.32	8.46	9.11	8.92	7.32	9.11	8.45	0.80
Conductance	ppm	410	600	964	650	410	964	656	230
Dissolved Oxygen	ppm	5.1	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.127	0.124	*	0.072	0.072	0.127	0.108	0.031
Beryllium, dissolved	mg/L	<0.003	<0.001	*	<0.001	0.001	0.003	0.001	0.001
Cobalt, dissolved	mg/L	<0.05	<0.01	*	<0.01	0.01	0.05	0.02	0.02
Chromium, dissolved	mg/L	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Fluoride	mg/L	*	2	*	2	2	2	2	0
Lithium, dissolved	mg/L	0.02	0.02	*	0.02	0.02	0.02	0.02	0.00
Antimony, dissolved	mg/L	<0.002	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.0	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	10.30	0.18	*	0.21	0.18	10.30	3.56	5.83
Total Alkalinity	mg/L	432	392	*	363	363	432	396	35
Carbonate as CaCO3	mg/L	23	31	*	20	20	31	25	6
Bicarbonate as CaCO3	mg/L	408	362	*	343	343	408	371	33
Hydroxide as CaCO3	mg/L	<2	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	0.002	<0.001	*	0.001	0.001	0.002	0.001	0.001
Boron, dissolved	mg/L	0.04	0.03	*	0.03	0.03	0.04	0.03	0.01
Calcium, dissolved	mg/L	18.3	1.2	*	1.5	1.2	18.3	7.0	9.8
Cation-Anion Balance	%	21	1	*	0	0	21	7	12
Sum of Anions	meq/L	10.00	9.33	*	8.95	8.95	10.00	9.43	0.53
Sum of Cations	meq/L	15.40	9.58	*	8.91	8.91	15.40	11.30	3.57
Cadmium, dissolved	mg/L	0.0012	<0.0005	*	<0.0005	0.0005	0.0012	0.0007	0.0004
Chloride	mg/L	5	4	*	5	4	5	5	1
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	0.06	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	<0.005	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.06	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.06	0.01	*	0.01	0.01	0.06	0.03	0.03
Conductivity @25C	uohms/cm	970	843	*	848	843	970	887	72
Iron, dissolved	mg/L	32.20	0.16	*	2.93	0.16	32.20	11.76	17.75
Iron, total	mg/L	58.5	8.9	*	19.0	8.9	58.5	28.8	26.2
Iron, total recoverable	mg/L	52.70	*	*	*	N/A	N/A	N/A	N/A

GW-2-55

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-5C
 Sample Year: 1996

SAMPLING DATE TIME	07/18/96 0820	08/21/96 1400	09/25/96 1000	10/06/96 1100	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Hardness as CaCO ₃	81	4	*	5	4	81	30	44
Mercury, dissolved	mg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0002	0.0002
Potassium, dissolved	mg/L	4.1	0.8	*	0.8	4.1	1.9	1.9
Magnesium, dissolved	mg/L	8.6	0.3	*	0.3	8.6	3.1	4.8
Manganese, dissolved	mg/L	0.309	0.005	*	0.025	0.309	0.113	0.170
Manganese, total	mg/L	0.43	0.07	*	0.14	0.43	0.21	0.19
Manganese, total recoverable	mg/L	0.367	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	0.001	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.83	0.44	*	0.34	0.83	0.54	0.26
Nitrite as N, dissolved	mg/L	0.10	<0.01	*	<0.01	0.10	0.04	0.05
Nitrate as N, dissolved	mg/L	0.3	0.1	*	<0.0	0.3	0.1	0.1
Nitrate/Nitrite as N, dissolv	mg/L	0.4	0.1	*	<0.0	0.4	0.2	0.2
Sodium, dissolved	mg/L	243.0	214.0	*	195.0	243.0	217.3	24.2
Nickel, dissolved	mg/L	0.03	<0.01	*	<0.01	0.03	0.02	0.01
Phosphorus, ortho dissolved	mg/L	0.017	0.005	*	<0.005	0.017	0.009	0.007
Lead, dissolved	mg/L	0.037	<0.005	*	<0.001	0.037	0.014	0.020
pH (lab)	units	8.6	8.8	*	8.5	8.8	8.6	0.2
Sodium Absorption Ratio in Na		11.90	45.80	*	38.40	11.90	32.03	17.82
Selenium, dissolved	mg/L	0.002	<0.001	*	<0.001	0.002	0.001	0.001
Sulfate	mg/L	60	60	*	70	60	63	6
Residue, Filterable (TDS) @18	mg/L	530	480	*	480	530	497	29
TDS (calculated)	mg/L	651	531	*	503	651	562	79
TDS (ratio - measured/calcula		1	1	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	3830	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.26	<0.01	*	0.01	0.26	0.09	0.14

Note: Station installed 07/15/96

Rev: 11/19/96

GW-2-56

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-51
 Sample Year: 1996

SAMPLING DATE TIME		07/18/96 1000	08/22/96 0930	09/23/96 1410	10/06/96 1330	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units								
Water Level	cfs	135.70	138.00	131.53	130.95	130.95	138.00	134.05	3.38
Total Depth	ft. BGS	177.00	177.00	177.00	177.00	177.00	177.00	177.00	0.00
Purge Volume	gallons	75	82	135	100	75	135	98	27
Temperature	C	15.4	14.5	13.7	12.9	12.9	15.4	14.1	1.1
pH	s.u.	7.56	8.10	8.98	8.65	7.56	8.98	8.32	0.62
Conductance	ppm	450	490	858	500	450	858	575	190
Dissolved Oxygen	ppm	5.2	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.098	0.069	*	0.036	0.036	0.098	0.068	0.031
Beryllium, dissolved	mg/L	<0.003	<0.001	*	<0.001	0.001	0.003	0.001	0.001
Cobalt, dissolved	mg/L	<0.05	<0.01	*	<0.01	0.01	0.05	0.02	0.02
Chromium, dissolved	mg/L	*	<0.01	*	<0.01	0.01	0.01	0.01	0.00
Fluoride	mg/L	*	1	*	1	1	1	1	0
Lithium, dissolved	mg/L	0.02	0.02	*	0.02	0.02	0.02	0.02	0.00
Antimony, dissolved	mg/L	<0.010	<0.002	*	<0.002	0.002	0.010	0.005	0.005
Thallium, dissolved	mg/L	<0.0	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	2.05	0.17	*	0.09	0.09	2.05	0.77	1.11
Total Alkalinity	mg/L	341	319	*	321	319	341	327	12
Carbonate as CaCO3	mg/L	16	27	*	14	14	27	19	7
Bicarbonate as CaCO3	mg/L	325	293	*	307	293	325	308	16
Hydroxide as CaCO3	mg/L	<2	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	0.003	0.001	*	0.001	0.001	0.003	0.002	0.001
Boron, dissolved	mg/L	0.03	0.02	*	0.02	0.02	0.03	0.02	0.01
Calcium, dissolved	mg/L	12.8	1.7	*	1.0	1.0	12.8	5.2	6.6
Cation-Anion Balance	%	7	1	*	0	0	7	2	4
Sum of Anions	meq/L	8.45	8.01	*	7.85	7.85	8.45	8.10	0.31
Sum of Cations	meq/L	9.71	8.10	*	7.82	7.82	9.71	8.54	1.02
Cadmium, dissolved	mg/L	<0.0005	<0.0005	*	<0.0005	0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	5	3	*	4	3	5	4	1
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	<0.01	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	0.009	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	<0.01	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.01	0.01	*	0.01	0.01	0.01	0.01	0.00
Conductivity @25C	umhos/cm	747	736	*	774	736	774	752	20
Iron, dissolved	mg/L	5.36	0.41	*	0.02	0.02	5.36	1.93	2.98
Iron, total	mg/L	0.3	5.3	*	2.0	0.3	5.3	2.5	2.6
Iron, total recoverable	mg/L	9.59	*	*	*	N/A	N/A	N/A	N/A

GW-2-57

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-51
Sample Year: 1996

SAMPLING DATE TIME	07/18/96 1000	08/22/96 0930	09/23/96 1410	10/06/96 1330	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Hardness as CaCO ₃	53	7	*	3	3	53	21	28
Mercury, dissolved	mg/L	<0.0002	<0.0002	*	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	2.0	0.8	*	0.6	2.0	1.1	0.8
Magnesium, dissolved	mg/L	5.0	0.6	*	0.2	5.0	1.9	2.7
Manganese, dissolved	mg/L	0.148	0.006	*	0.005	0.148	0.053	0.082
Manganese, total	mg/L	0.06	0.08	*	0.03	0.03	0.06	0.03
Manganese, total recoverable	mg/L	0.152	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	0.003	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.50	0.36	*	0.31	0.31	0.50	0.10
Nitrite as N, dissolved	mg/L	0.02	0.07	*	<0.01	0.01	0.07	0.03
Nitrate as N, dissolved	mg/L	0.2	<0.0	*	0.0	0.0	0.2	0.1
Nitrate/Nitrite as N, dissolv	mg/L	0.3	0.1	*	0.0	0.0	0.3	0.1
Sodium, dissolved	mg/L	183.0	179.0	*	175.0	183.0	179.0	4.0
Nickel, dissolved	mg/L	0.01	<0.01	*	<0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.009	0.016	*	0.009	0.016	0.011	0.004
Lead, dissolved	mg/L	0.008	<0.002	*	0.001	0.008	0.004	0.004
pH (lab)	units	8.6	8.8	*	8.5	8.5	8.8	0.2
Sodium Absorption Ratio in Wa		11.10	30.40	*	42.30	11.10	42.30	15.75
Selenium, dissolved	mg/L	0.002	<0.001	*	<0.001	0.001	0.002	0.001
Sulfate	mg/L	70	70	*	60	60	70	6
Residue, Filterable (TDS) @18	mg/L	500	420	*	450	420	500	40
TDS (calculated)	mg/L	497	460	*	440	440	497	29
TDS (ratio - measured/calcula		1	1	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	805	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.06	0.01	*	<0.01	0.01	0.06	0.03

Note: Station installed 07/15/96

Rev:11/19/96

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MU-5U
Sample Year: 1996

SAMPLING DATE TIME	07/17/96 1500	08/22/96 0745	09/23/96 1505	10/06/96 1235	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Water Level	cfs	140.25	138.25	136.81	136.53	140.25	137.96	1.70
Total Depth	ft. BGS	222.50	222.50	222.50	222.50	222.50	223.25	1.50
Purge Volume	gallons	175	150	105	105	175	139	30
Temperature	C	15.5	14.4	13.7	13.7	15.5	14.4	0.8
pH	s.u.	7.48	8.90	9.07	7.48	9.07	8.56	0.73
Conductance	ppm	450	550	895	450	895	599	202
Dissolved Oxygen	ppm	3.4	*	*	N/A	N/A	N/A	N/A
Berius, dissolved	mg/L	0.294	0.118	*	0.118	0.294	0.177	0.102
Beryllium, dissolved	mg/L	<0.003	<0.001	*	0.001	0.003	0.001	0.001
Cobalt, dissolved	mg/L	<0.05	<0.01	*	0.01	0.05	0.02	0.02
Chromium, dissolved	mg/L	*	<0.01	*	0.01	0.01	0.01	0.00
Fluoride	mg/L	*	2	*	1	2	1	0
Lithium, dissolved	mg/L	<0.10	0.02	*	0.02	0.10	0.05	0.05
Antimony, dissolved	mg/L	<0.010	<0.002	*	0.002	0.010	0.005	0.005
Thallium, dissolved	mg/L	<0.0	<0.0	*	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.005	*	0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	<0.005	*	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	3.13	0.16	*	0.16	3.13	1.16	1.71
Total Alkalinity	mg/L	364	339	*	326	364	343	19
Carbonate as CaCO3	mg/L	10	38	*	17	38	22	15
Bicarbonate as CaCO3	mg/L	354	301	*	308	354	321	29
Hydroxide as CaCO3	mg/L	<2	<2	*	2	2	2	0
Arsenic, dissolved	mg/L	0.004	<0.001	*	0.001	0.004	0.002	0.002
Boron, dissolved	mg/L	0.03	0.03	*	0.02	0.03	0.03	0.01
Calcium, dissolved	mg/L	46.5	1.1	*	1.2	46.5	16.3	26.2
Cation-Anion Balance	%	13	3	*	-2	13	5	8
Sum of Anions	meq/L	8.73	8.24	*	8.15	8.73	8.37	0.31
Sum of Cations	meq/L	11.30	8.75	*	7.88	11.30	9.31	1.78
Cadmium, dissolved	mg/L	0.0006	<0.0005	*	<0.0005	0.0006	0.0005	0.0001
Chloride	mg/L	6	4	*	4	6	5	1
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	<0.01	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	0.012	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.02	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.02	0.01	*	<0.01	0.02	0.01	0.01
Conductivity @25C	umhos/cm	753	770	*	783	753	769	15
Iron, dissolved	mg/L	8.34	0.39	*	0.39	8.34	3.18	4.48
Iron, total	mg/L	21.4	13.6	*	1.2	21.4	12.1	10.2
Iron, total recoverable	mg/L	22.10	*	*	N/A	N/A	N/A	N/A

GW-2-59

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-5U
Sample Year: 1996

SAMPLING DATE TIME	07/17/96 1500	08/22/96 0745	09/23/96 1505	10/06/96 1235	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Hardness as CaCO3	mg/L	170	4	*	4	170	59	96
Mercury, dissolved	mg/L	<0.0002	<0.0002	*	<0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	2.5	0.8	*	0.7	2.5	1.3	1.0
Magnesium, dissolved	mg/L	13.0	0.3	*	0.2	13.0	4.5	7.4
Manganese, dissolved	mg/L	0.430	0.010	*	0.012	0.010	0.430	0.242
Manganese, total	mg/L	0.38	0.20	*	0.01	0.01	0.38	0.18
Manganese, total recoverable	mg/L	0.371	*	*	*	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	<0.001	*	*	*	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.32	0.39	*	0.30	0.30	0.39	0.05
Nitrite as N, dissolved	mg/L	0.03	0.07	*	<0.01	0.01	0.07	0.03
Nitrate as N, dissolved	mg/L	0.3	<0.0	*	<0.0	0.0	0.3	0.2
Nitrate/Nitrite as N, dissolv	mg/L	0.4	0.1	*	<0.0	0.0	0.4	0.2
Sodium, dissolved	mg/L	160.0	195.0	*	175.0	160.0	195.0	17.6
Nickel, dissolved	mg/L	0.02	<0.01	*	<0.01	0.01	0.02	0.01
Phosphorus, ortho dissolved	mg/L	0.034	0.011	*	<0.005	0.005	0.034	0.015
Lead, dissolved	mg/L	0.042	<0.002	*	<0.001	0.001	0.042	0.023
pH (lab)	units	8.4	8.9	*	8.5	8.4	8.9	0.3
Sodium Absorption Ratio in Wa		5.41	43.00	*	39.40	5.41	43.00	20.74
Selenium, dissolved	mg/L	0.001	<0.001	*	<0.001	0.001	0.001	0.000
Sulfate	mg/L	60	60	*	70	60	70	6
Residue, Filterable (TDS) @18	mg/L	480	440	*	440	440	480	23
TDS (calculated)	mg/L	523	482	*	455	455	523	34
TDS (ratio - measured/calcula		1	1	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	2830	*	*	*	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.19	0.01	*	0.01	0.01	0.19	0.10

Note: Station installed 07/10/96

Rev:11/19/96

GW-2-60

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-6C
Sample Year: 1996

SAMPLING DATE TIME	07/17/96 1115	08/21/96 1000	09/21/96 1420	10/07/96 1045	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Water Level	cfs	167.85	166.85	167.16	165.90	167.85	166.94	0.81
Total Depth	ft. BGS	251.00	251.00	251.00	251.00	251.00	251.00	0.00
Purge Volume	gallons	125	150	120	100	150	124	21
Temperature	C	16.7	14.8	14.8	14.2	16.7	15.1	1.1
pH	s.u.	8.42	8.78	8.78	8.48	8.42	8.62	0.19
Conductance	ppm	1105	1100	1700	1150	1100	1264	292
Dissolved Oxygen	ppm	1.4	*	*	*	N/A	N/A	N/A
Barium, dissolved	mg/L	0.100	0.217	*	0.153	0.100	0.157	0.059
Beryllium, dissolved	mg/L	<0.003	<0.001	*	<0.001	0.001	0.003	0.001
Cobalt, dissolved	mg/L	<0.05	<0.01	*	<0.01	0.01	0.05	0.02
Chromium, dissolved	mg/L	*	<0.01	*	<0.01	0.01	0.01	0.00
Fluoride	mg/L	*	5	*	6	5	6	1
Lithium, dissolved	mg/L	0.03	0.04	*	0.04	0.03	0.04	0.01
Antimony, dissolved	mg/L	0.002	0.002	*	<0.010	0.002	0.010	0.005
Thallium, dissolved	mg/L	<0.0	<0.0	*	<0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.005	*	<0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	<0.005	*	<0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	4.79	1.17	*	0.15	0.15	4.79	2.44
Total Alkalinity	mg/L	782	795	*	801	782	801	10
Carbonate as CaCO3	mg/L	30	36	*	28	28	36	4
Bicarbonate as CaCO3	mg/L	752	759	*	774	752	774	11
Hydroxide as CaCO3	mg/L	<2	<2	*	<2	2	2	0
Arsenic, dissolved	mg/L	0.002	<0.001	*	0.001	0.001	0.002	0.001
Boron, dissolved	mg/L	0.04	0.07	*	0.04	0.04	0.07	0.02
Calcium, dissolved	mg/L	12.7	3.2	*	1.6	1.6	12.7	6.0
Cation-Anion Balance	%	6	2	*	-1	-1	6	3
Sum of Anions	meq/L	16.00	16.70	*	16.50	16.00	16.70	0.36
Sum of Cations	meq/L	17.90	17.50	*	16.20	16.20	17.90	0.89
Cadmium, dissolved	mg/L	<0.0005	<0.0005	*	<0.0005	0.0005	0.0005	0.0000
Chloride	mg/L	4	4	*	4	4	4	0
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	0.02	*	*	*	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	<0.005	*	*	*	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.02	*	*	*	N/A	N/A	N/A
Copper, dissolved	mg/L	0.02	0.01	*	<0.01	0.01	0.02	0.01
Conductivity @25C	umhos/cm	1382	1423	*	1542	1382	1542	83
Iron, dissolved	mg/L	12.30	0.90	*	0.21	0.21	12.30	6.79
Iron, total	mg/L	16.0	10.9	*	2.5	2.5	16.0	6.8
Iron, total recoverable	mg/L	15.90	*	*	*	N/A	N/A	N/A

GW-2-61

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-6C
Sample Year: 1996

SAMPLING DATE TIME		07/17/96 1115	08/21/96 1000	09/21/96 1420	10/07/96 1045	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units								
Hardness as CaCO ₃	mg/L	44	11	*	6	6	44	20	21
Mercury, dissolved	mg/L	<0.0002	<0.0002	*	<0.0002	0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	2.9	1.8	*	1.2	1.2	2.9	2.0	0.9
Magnesium, dissolved	mg/L	2.9	0.8	*	0.5	0.5	2.9	1.4	1.3
Manganese, dissolved	mg/L	0.144	0.023	*	0.025	0.023	0.144	0.064	0.069
Manganese, total	mg/L	0.13	0.15	*	0.04	0.04	0.15	0.11	0.06
Manganese, total recoverable	mg/L	0.126	*	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	0.003	*	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	0.39	0.40	*	0.38	0.38	0.40	0.39	0.01
Nitrite as N, dissolved	mg/L	<0.01	<0.01	*	0.04	0.01	0.04	0.02	0.02
Nitrate as N, dissolved	mg/L	0.4	0.1	*	0.1	0.1	0.4	0.2	0.2
Nitrate/Nitrite as N, dissolv	mg/L	0.4	0.1	*	0.1	0.1	0.4	0.2	0.2
Sodium, dissolved	mg/L	357.0	386.0	*	364.0	357.0	386.0	369.0	15.1
Nickel, dissolved	mg/L	0.01	0.01	*	<0.01	0.01	0.01	0.01	0.00
Phosphorus, ortho dissolved	mg/L	0.132	<0.005	*	0.053	0.005	0.132	0.063	0.064
Lead, dissolved	mg/L	0.009	<0.002	*	<0.001	0.001	0.009	0.004	0.004
pH (lab)	units	8.6	8.6	*	8.4	8.4	8.6	8.5	0.1
Sodium Absorption Ratio in Wa		23.80	50.60	*	65.10	23.80	65.10	46.50	20.95
Selenium, dissolved	mg/L	<0.001	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Sulfate	mg/L	10	20	*	<10	10	20	13	6
Residue, Filterable (TDS) @18	mg/L	770	840	*	880	770	880	830	56
TDS (calculated)	mg/L	889	915	*	871	871	915	892	22
TDS (ratio - measured/calcula		1	1	*	1	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	440	*	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.09	0.01	*	<0.01	0.01	0.09	0.04	0.05

Note: Station installed 07/02/96

Rev: 11/19/96

GW-2-62

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MU-61
 Sample Year: 1996

SAMPLING DATE TIME		07/15/96 1300	08/21/96 1300	09/21/96 1000	10/06/96 1240	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units								
Water Level	cfs	166.45	165.20	162.12	165.15	162.12	166.45	164.73	1.84
Total Depth	ft. BGS	232.50	232.50	232.50	232.50	232.50	232.50	232.50	0.00
Purge Volume	gallons	150	125	175	100	100	175	138	32
Temperature	C	17.9	15.7	16.1	14.7	14.7	17.9	16.1	1.3
pH	s.u.	8.18	8.44	8.46	8.04	8.04	8.46	8.28	0.20
Conductance	ppm	1145	1550	2340	1550	1145	2340	1646	500
Dissolved Oxygen	ppm	1.6	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.259	0.394	*	0.360	0.259	0.394	0.344	0.074
Beryllium, dissolved	mg/L	*	<0.001	*	<0.001	0.001	0.001	0.001	0.000
Cobalt, dissolved	mg/L	<0.05	<0.02	*	<0.01	0.01	0.05	0.03	0.02
Chromium, dissolved	mg/L	*	<0.02	*	<0.01	0.01	0.02	0.02	0.01
Fluoride	mg/L	*	4	*	7	4	7	6	2
Lithium, dissolved	mg/L	0.04	0.05	*	0.06	0.04	0.06	0.05	0.01
Antimony, dissolved	mg/L	0.005	0.002	*	<0.002	0.002	0.005	0.003	0.002
Thallium, dissolved	mg/L	<0.0	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.010	*	<0.005	0.005	0.010	0.008	0.004
Silver, dissolved	mg/L	<0.005	<0.010	*	<0.005	0.005	0.010	0.007	0.003
Aluminum, dissolved	mg/L	45.00	0.72	*	1.25	0.72	45.00	15.66	25.41
Total Alkalinity	mg/L	1016	1164	*	1164	1016	1164	1115	85
Carbonate as CaCO3	mg/L	64	36	*	<2	2	64	34	31
Bicarbonate as CaCO3	mg/L	952	1128	*	1164	952	1164	1081	113
Hydroxide as CaCO3	mg/L	<2	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	0.004	0.002	*	0.002	0.002	0.004	0.003	0.001
Boron, dissolved	mg/L	0.04	0.03	*	0.03	0.03	0.04	0.03	0.01
Calcium, dissolved	mg/L	63.7	3.5	*	3.5	3.5	63.7	23.6	34.8
Cation-Anion Balance	%	34	-1	*	-2	-2	34	10	20
Sum of Anions	meq/L	21.10	24.10	*	24.90	21.10	24.90	23.37	2.00
Sum of Cations	meq/L	42.40	23.60	*	24.20	23.60	42.40	30.07	10.69
Cadmium, dissolved	mg/L	0.0018	<0.0005	*	<0.0005	0.0005	0.0018	0.0009	0.0008
Chloride	mg/L	6	5	*	8	5	8	6	2
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	0.22	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	<0.005	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.22	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.06	0.02	*	0.01	0.01	0.06	0.03	0.03
Conductivity 25C	umhos/cm	1759	1936	*	2246	1759	2246	1980	247
Iron, dissolved	mg/L	176.00	1.26	*	1.53	1.26	176.00	59.60	100.81
Iron, total	mg/L	299.0	120.0	*	3.6	3.6	299.0	140.9	148.8
Iron, total recoverable	mg/L	267.00	*	*	*	N/A	N/A	N/A	N/A

GW-2-63

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-61
Sample Year: 1996

SAMPLING DATE TIME	07/15/96 1300	08/21/96 1300	09/21/96 1000	10/06/96 1240	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Hardness as CaCO ₃	281	14	*	15	14	281	103	154
Mercury, dissolved	mg/L	<0.0002	<0.0002	*	<0.0002	0.0002	0.0002	0.0000
Potassium, dissolved	mg/L	14.5	3.6	*	2.1	14.5	6.7	6.8
Magnesium, dissolved	mg/L	29.6	1.3	*	1.5	29.6	10.8	16.3
Manganese, dissolved	mg/L	2.690	0.030	*	0.029	2.690	0.916	1.536
Manganese, total	mg/L	3.16	1.30	*	0.04	3.16	1.50	1.57
Manganese, total recoverable	mg/L	2.850	*	*	N/A	N/A	N/A	N/A
Molybdenum, dissolved	mg/L	0.002	*	*	N/A	N/A	N/A	N/A
Nitrogen, ammonia	mg/L	1.55	2.17	*	0.58	2.17	1.43	0.80
Nitrite as N, dissolved	mg/L	0.01	0.04	*	0.17	0.01	0.07	0.09
Nitrate as N, dissolved	mg/L	0.3	0.2	*	0.1	0.3	0.2	0.1
Nitrate/Nitrite as N, dissolv	mg/L	0.3	0.3	*	0.2	0.3	0.3	0.1
Sodium, dissolved	mg/L	495.0	521.0	*	535.0	495.0	517.0	20.3
Nickel, dissolved	mg/L	0.06	<0.02	*	<0.01	0.01	0.06	0.03
Phosphorus, ortho dissolved	mg/L	0.023	<0.005	*	0.076	0.005	0.035	0.037
Lead, dissolved	mg/L	0.065	<0.005	*	<0.001	0.001	0.065	0.036
pH (lab)	units	8.6	8.5	*	8.3	8.3	8.5	0.2
Sodium Absorption Ratio in Na		13.00	61.10	*	61.00	13.00	45.03	27.74
Selenium, dissolved	mg/L	<0.001	<0.001	*	<0.001	0.001	0.001	0.000
Sulfate	mg/L	30	20	*	50	20	33	15
Residue, Filterable (TDS) @18	mg/L	1050	1090	*	1330	1050	1157	151
TDS (calculated)	mg/L	1500	1280	*	1310	1280	1500	119
TDS (ratio - measured/calcula		1	1	*	1	1	1	0
Residue, Non-Filterable (TSS)	mg/L	15090	*	*	N/A	N/A	N/A	N/A
Zinc, dissolved	mg/L	0.51	<0.02	*	0.02	0.02	0.51	0.28

Note: Station installed 07/07/96

Rev:11/19/96

* = No samples taken.

GW-2-64

LORENCITO COAL COMPANY
Lorencito Coal Mine
Station: MW-65
Sample Year: 1996

SAMPLING DATE TIME		07/17/96 0830	08/21/96 0825	09/21/96 1210	10/06/96 1545	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units								
Water Level	cfs	167.40	168.20	169.21	169.45	167.40	169.45	168.57	0.95
Total Depth	ft. BGS	265.00	265.00	265.00	265.00	265.00	265.00	265.00	0.00
Purge Volume	gallons	200	175	125	200	125	200	175	35
Temperature	C	14.7	16.2	15.0	15.5	14.7	16.2	15.4	0.7
pH	s.u.	8.32	8.71	8.76	8.65	8.32	8.76	8.61	0.20
Conductance	ppm	1100	1150	1705	1100	1100	1705	1264	295
Dissolved Oxygen	ppm	1.3	*	*	*	N/A	N/A	N/A	N/A
Barium, dissolved	mg/L	0.132	0.233	*	0.236	0.132	0.236	0.200	0.059
Beryllium, dissolved	mg/L	<0.003	<0.001	*	<0.001	0.001	0.003	0.001	0.001
Cobalt, dissolved	mg/L	<0.05	<0.01	*	<0.01	0.01	0.05	0.02	0.02
Chromium, dissolved	mg/L	*	0.01	*	<0.01	0.01	0.01	0.01	0.00
Fluoride	mg/L	*	6	*	5	5	6	6	1
Lithium, dissolved	mg/L	0.03	0.04	*	0.04	0.03	0.04	0.04	0.01
Antimony, dissolved	mg/L	0.002	<0.002	*	<0.002	0.002	0.002	0.002	0.000
Thallium, dissolved	mg/L	<0.0	<0.0	*	<0.0	0.0	0.0	0.0	0.0
Vanadium, dissolved	mg/L	*	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Silver, dissolved	mg/L	<0.005	<0.005	*	<0.005	0.005	0.005	0.005	0.000
Aluminum, dissolved	mg/L	12.20	1.36	*	0.17	0.17	12.20	4.58	6.63
Total Alkalinity	mg/L	805	818	*	834	805	834	819	15
Carbonate as CaCO3	mg/L	62	30	*	18	18	62	37	23
Bicarbonate as CaCO3	mg/L	744	788	*	816	744	816	783	36
Hydroxide as CaCO3	mg/L	<2	<2	*	<2	2	2	2	0
Arsenic, dissolved	mg/L	0.001	0.001	*	0.001	0.001	0.001	0.001	0.000
Boron, dissolved	mg/L	0.04	0.09	*	0.03	0.03	0.09	0.05	0.03
Calcium, dissolved	mg/L	17.3	2.8	*	1.4	1.4	17.3	7.2	8.8
Cation-Anion Balance	%	8	3	*	-2	-2	8	3	5
Sum of Anions	meq/L	17.50	17.00	*	17.10	17.00	17.50	17.20	0.26
Sum of Cations	meq/L	20.60	18.10	*	16.40	16.40	20.60	18.37	2.11
Cadmium, dissolved	mg/L	<0.0005	0.0005	*	<0.0030	0.0005	0.0030	0.0013	0.0014
Chloride	mg/L	9	4	*	4	4	9	6	3
Cyanide, free	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Thiocyanate (SCN)	mg/L	<0.1	<0.1	*	<0.1	0.1	0.1	0.1	0.0
Chromium, Trivalent	mg/L	0.04	*	*	*	N/A	N/A	N/A	N/A
Chromium, Hexavalent	mg/L	<0.005	*	*	*	N/A	N/A	N/A	N/A
Chromium, total recoverable	mg/L	0.04	*	*	*	N/A	N/A	N/A	N/A
Copper, dissolved	mg/L	0.04	0.01	*	<0.01	0.01	0.04	0.02	0.02
Conductivity @25C	umhos/cm	1414	1442	*	1545	1414	1545	1467	69
Iron, dissolved	mg/L	20.80	0.90	*	0.23	0.23	20.80	7.31	11.69
Iron, total	mg/L	50.5	19.3	*	3.8	3.8	50.5	24.5	23.8
Iron, total recoverable	mg/L	46.40	*	*	*	N/A	N/A	N/A	N/A

GW-2-65

LORENCITO COAL COMPANY
 Lorencito Coal Mine
 Station: MW-6U
 Sample Year: 1996

SAMPLING DATE TIME	07/17/96 0830	08/21/96 0825	09/21/96 1210	10/06/96 1545	MINIMUM VALUE	MAXIMUM VALUE	MEAN AVERAGE	STANDARD DEVIATION
Parameter	Units							
Hardness as CaCO ₃	70	10	*	5	5	70	28	36
Mercury, dissolved	mg/L	<0.0002	<0.0002	*	<0.0002			
Potassium, dissolved	mg/L	4.1	1.8	*	1.3			
Magnesium, dissolved	mg/L	6.6	0.8	*	0.4			
Manganese, dissolved	mg/L	0.446	0.031	*	0.018			
Manganese, total	mg/L	0.49	0.24	*	0.05			
Manganese, total recoverable	mg/L	0.445	*	*	*			
Molybdenum, dissolved	mg/L	<0.001	*	*	*			
Nitrogen, ammonia	mg/L	0.58	0.49	*	0.41			
Nitrite as N, dissolved	mg/L	<0.01	<0.01	*	<0.01			
Nitrate as N, dissolved	mg/L	9.4	0.1	*	0.0			
Nitrate/Nitrite as N, dissolv	mg/L	9.4	0.1	*	0.0			
Sodium, dissolved	mg/L	376.0	400.0	*	368.0			
Nickel, dissolved	mg/L	0.03	0.01	*	<0.01			
Phosphorus, ortho dissolved	mg/L	0.029	<0.005	*	0.022			
Lead, dissolved	mg/L	0.029	0.002	*	<0.001			
pH (lab)	units	8.6	8.6	*	8.4			
Sodium Absorption Ratio in Wa		19.70	54.90	*	71.40			
Selenium, dissolved	mg/L	<0.001	<0.001	*	<0.001			
Sulfate	mg/L	20	10	*	<10			
Residue, Filterable (TDS) @18	mg/L	880	850	*	900			
TDS (calculated)	mg/L	985	931	*	889			
TDS (ratio - measured/calcula		1	1	*	1			
Residue, Non-Filterable (TSS)	mg/L	1160	*	*	*			
Zinc, dissolved	mg/L	0.13	0.01	*	<0.01			

Note: Station installed 06/28/96

Rev:11/19/96



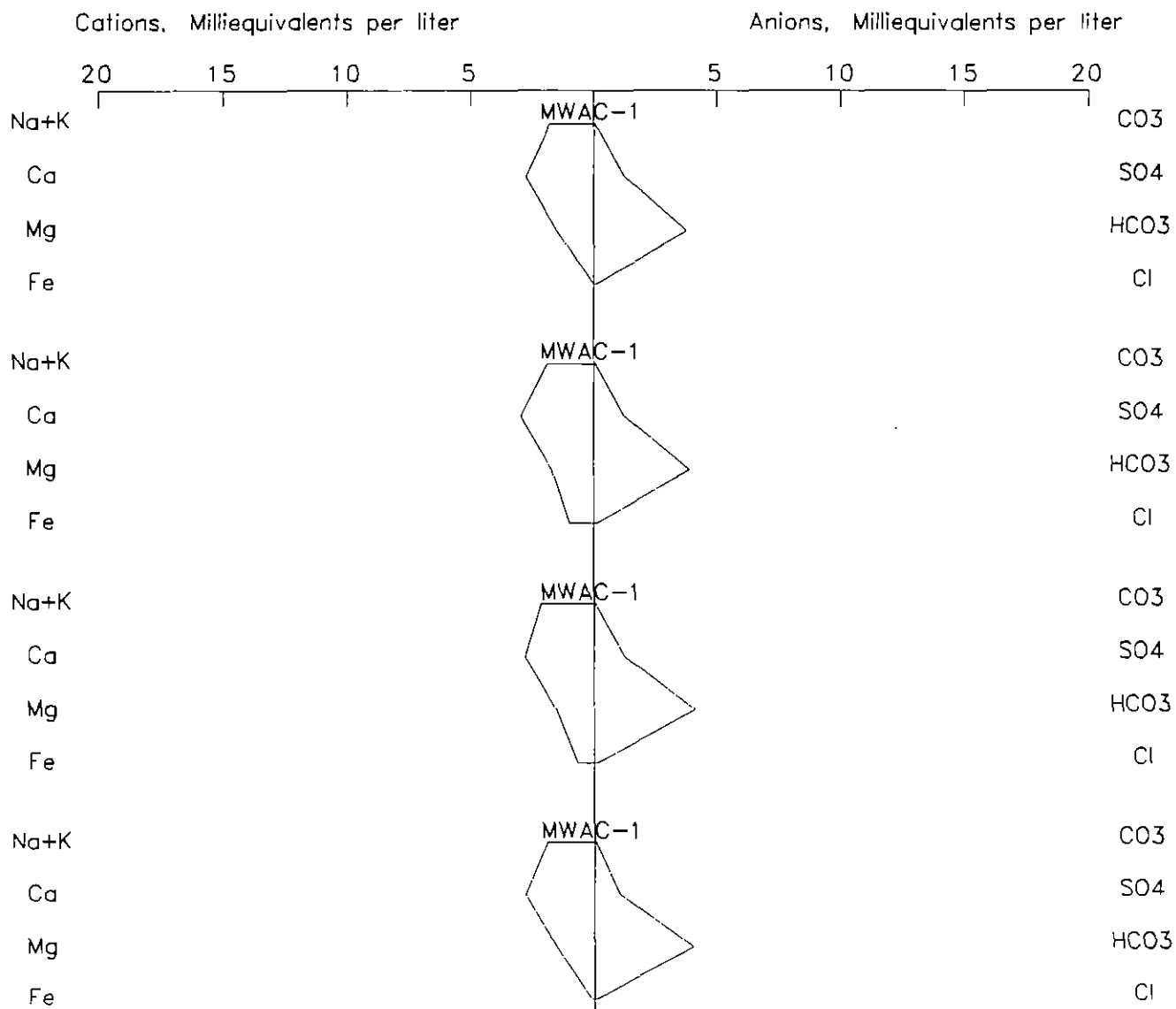
999

Doc Date: 12/11/2001

VOL. 3

"EXHIBIT 7, APPENDIX GW-3,
GROUNDWATER QUALITY DIAGRAMS *"*

Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWAC-1	3/13/1996	1.77	2.76	1.49	0.00	0.07	1.25	3.77	0.08
MWAC-1	5/21/1996	1.92	2.95	1.68	0.98	0.07	1.25	3.87	0.08
MWAC-1	8/20/1996	2.16	2.80	1.54	0.67	0.07	1.25	4.05	0.11
MWAC-1	10/8/1996	1.91	2.80	1.54	0.11	0.07	1.04	3.97	0.08



Diamond=◈ Square=■ Circle=°

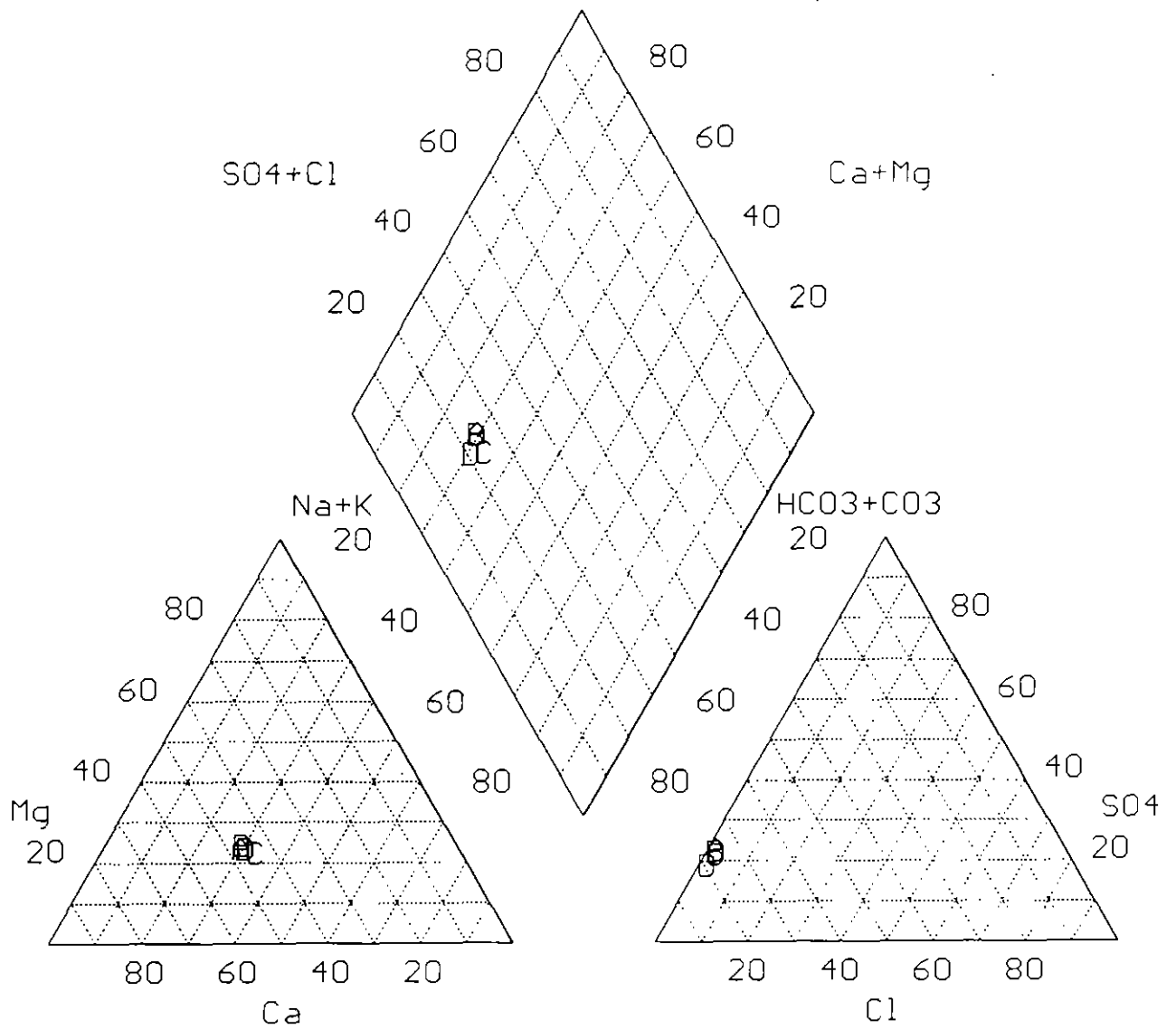
MWAC-1

03/12/1996-A MWAC-1

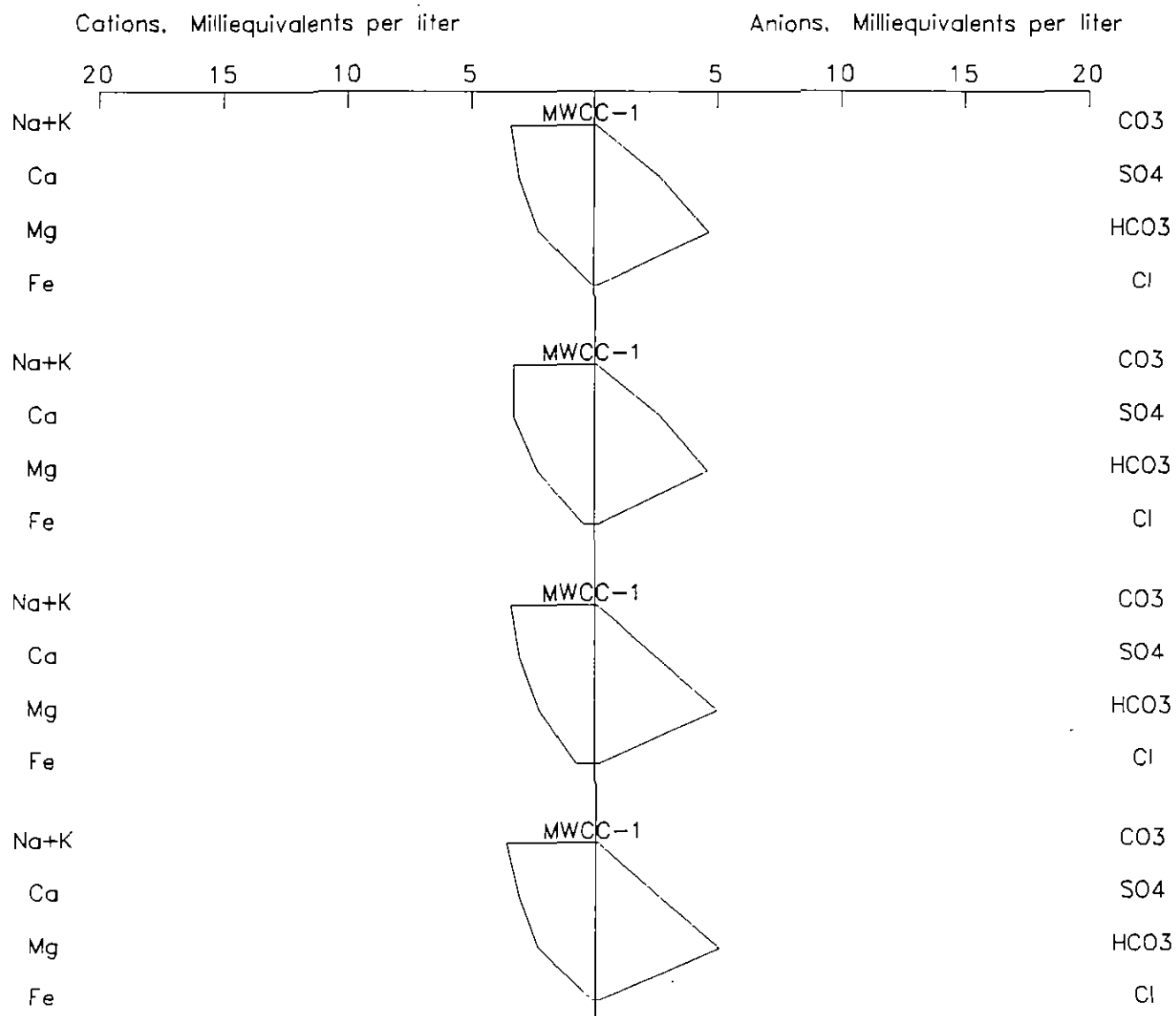
05/20/1996-B MWAC-1

08/19/1996-C MWAC-1

10/07/1996-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWCC-1	3/13/1696	3.40	3.05	2.25	0.06	0.07	2.71	4.65	0.14
MWCC-1	5/21/1696	3.31	3.29	2.33	0.43	0.07	2.71	4.57	0.14
MWCC-1	8/20/1696	3.41	3.06	2.26	0.73	0.07	2.50	4.95	0.17
MWCC-1	10/8/1696	3.61	3.12	2.33	0.15	0.07	2.50	5.02	0.14



Diamond=◈ Square=■ Circle=°

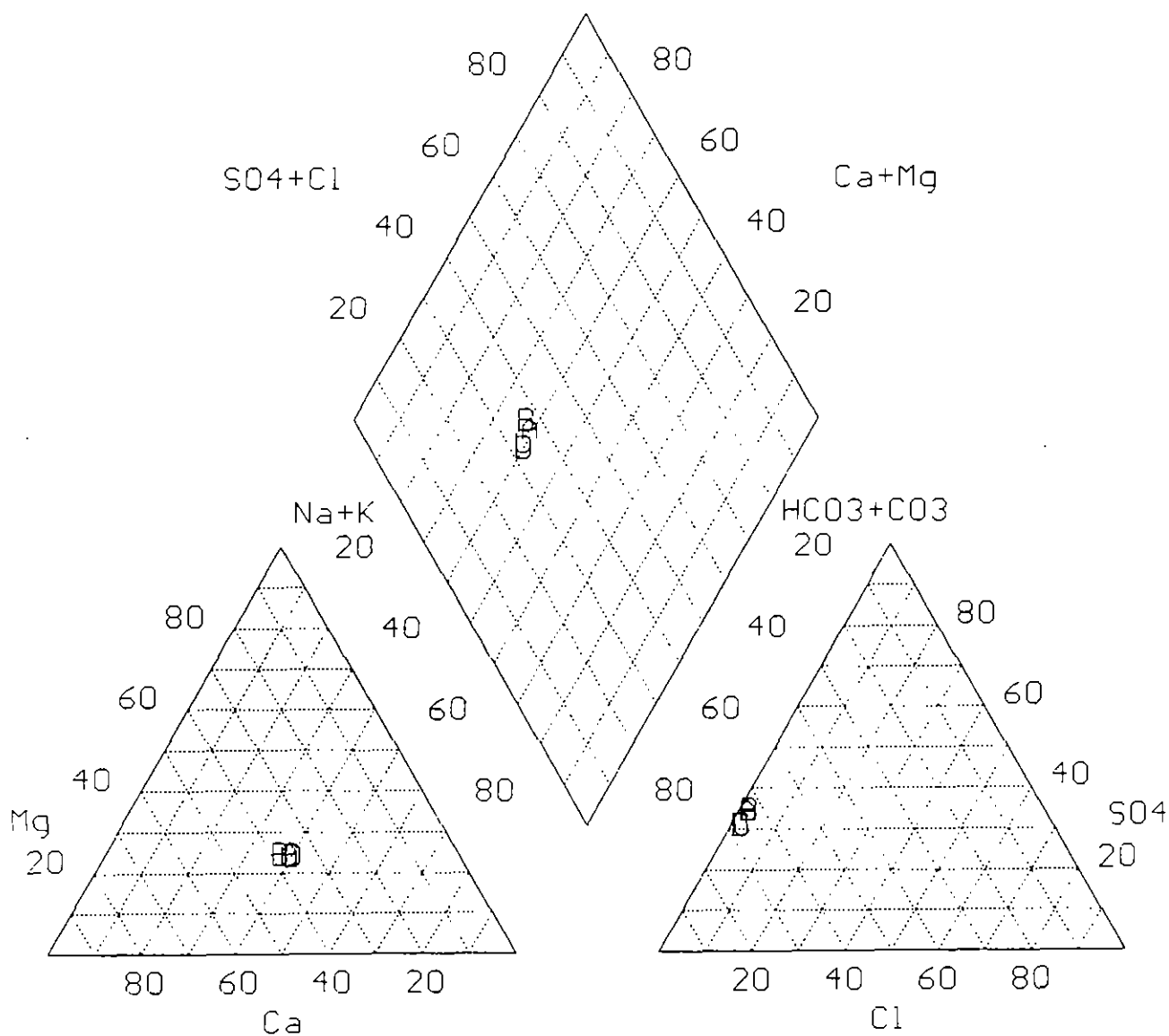
MWCC-1

03/13/1696-A MWCC-1

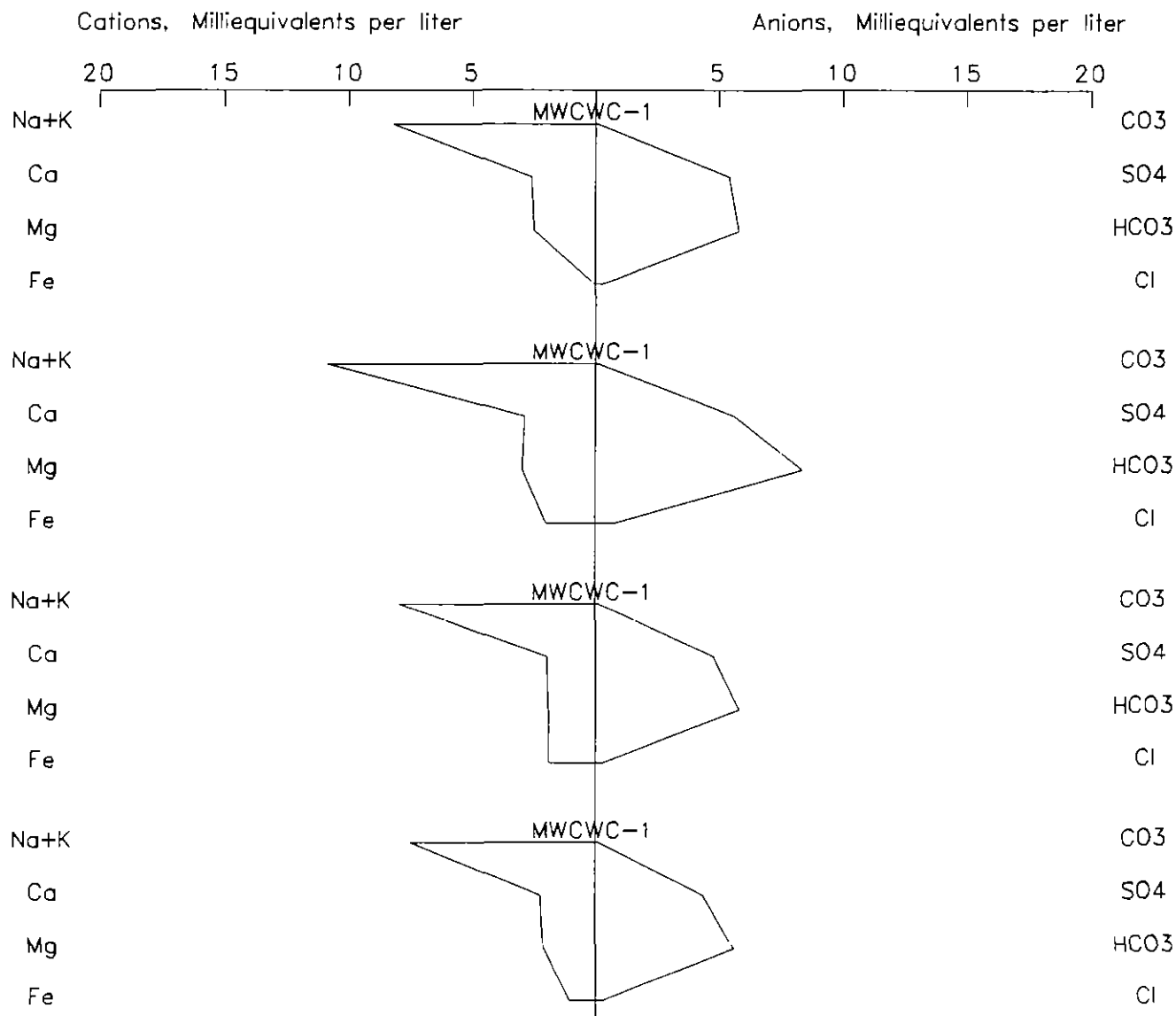
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08/20/1696-C MWCC-1

10/08/1696-D



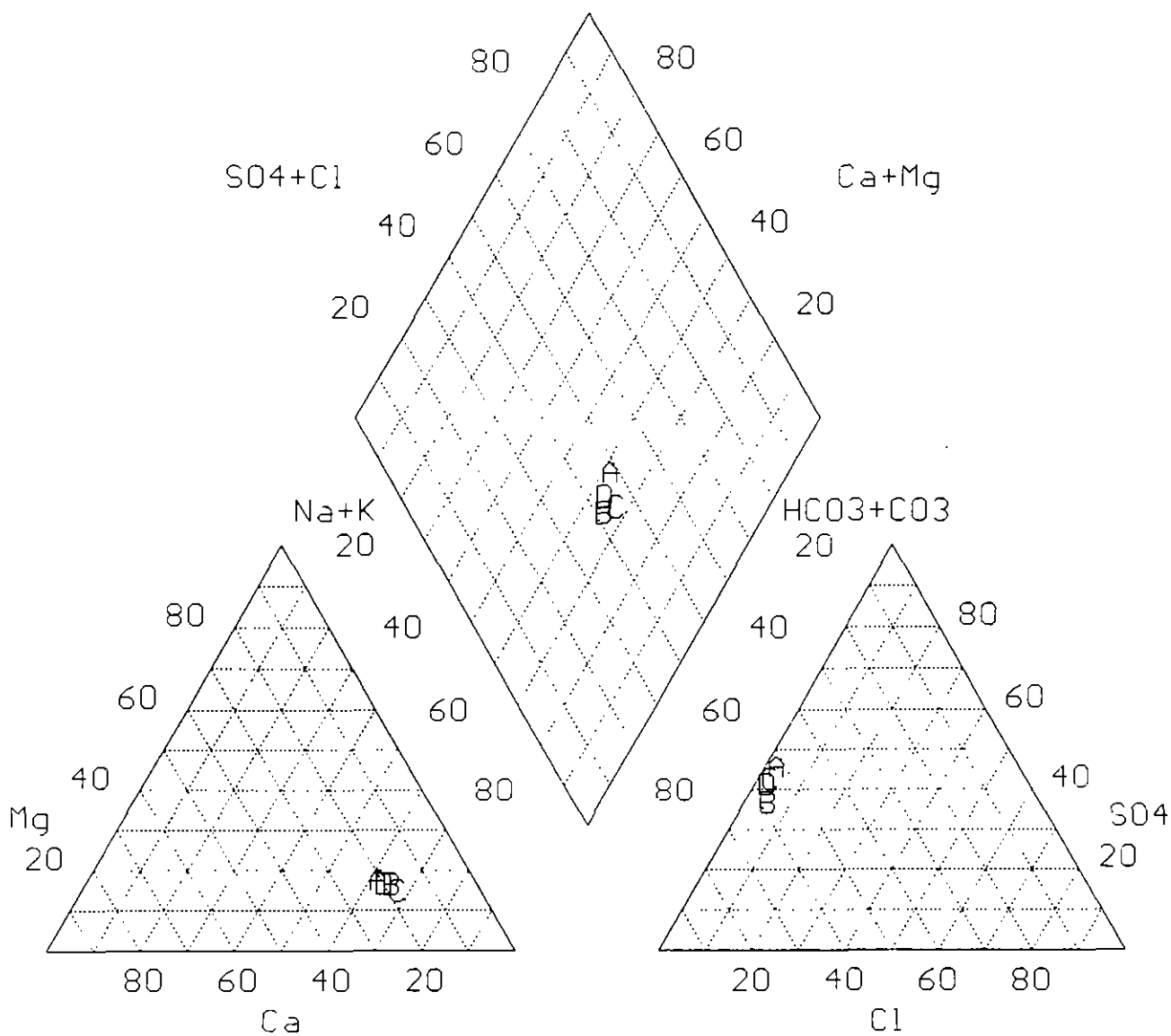
Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWCWC-1	3/13/1696	8.23	2.60	2.48	0.01	0.07	5.41	5.82	0.28
MWCWC-1	5/23/1696	10.91	2.86	2.97	2.01	0.07	5.62	8.36	0.73
MWCWC-1	6/22/1696	7.99	1.99	1.92	1.88	0.07	4.79	5.80	0.28
MWCWC-1	10/ 9/1696	7.55	2.24	2.13	1.05	0.07	4.37	5.59	0.25



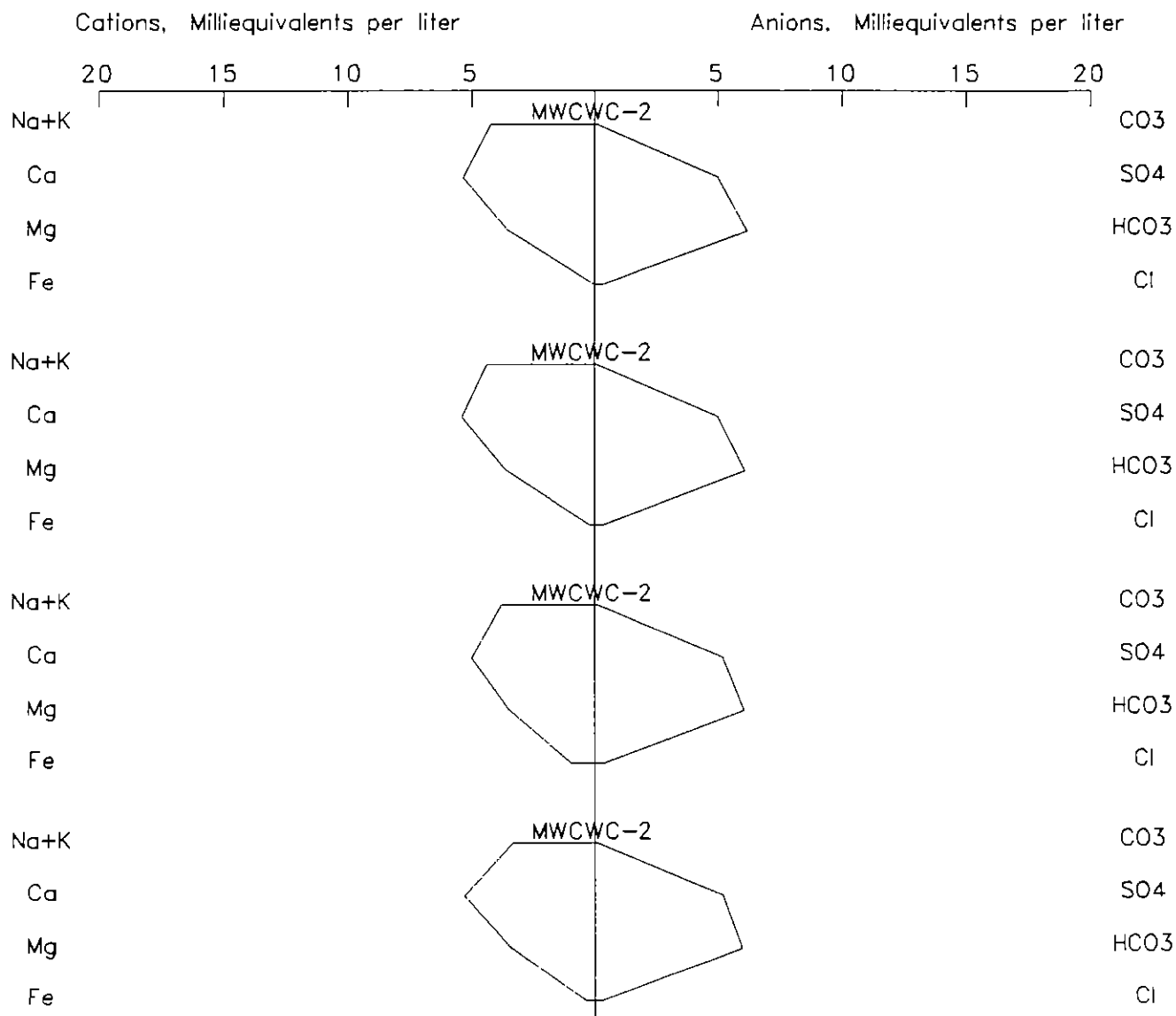
GW-3-5

Diamond=◈ Square=■ Circle=°

MWCWC-1 03/13/1696-A MWCWC-1 05/23/1696-B MWCWC-1 08/22/1696-C MWCWC-1 10/09/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWCWC-2	3/13/1996	4.22	5.34	3.49	0.01	0.07	5.00	6.18	0.28
MWCWC-2	5/23/1996	4.37	5.39	3.58	0.23	0.07	5.00	6.08	0.34
MWCWC-2	8/22/1996	3.78	4.99	3.45	0.36	0.07	5.20	6.03	0.34
MWCWC-2	10/9/1996	3.34	5.29	3.41	0.36	0.07	5.20	5.97	0.28



GW-3-7

Diamond=♦ Square=■ Circle=°

MWCHC-2

03/13/1696-A

MWCHC-2

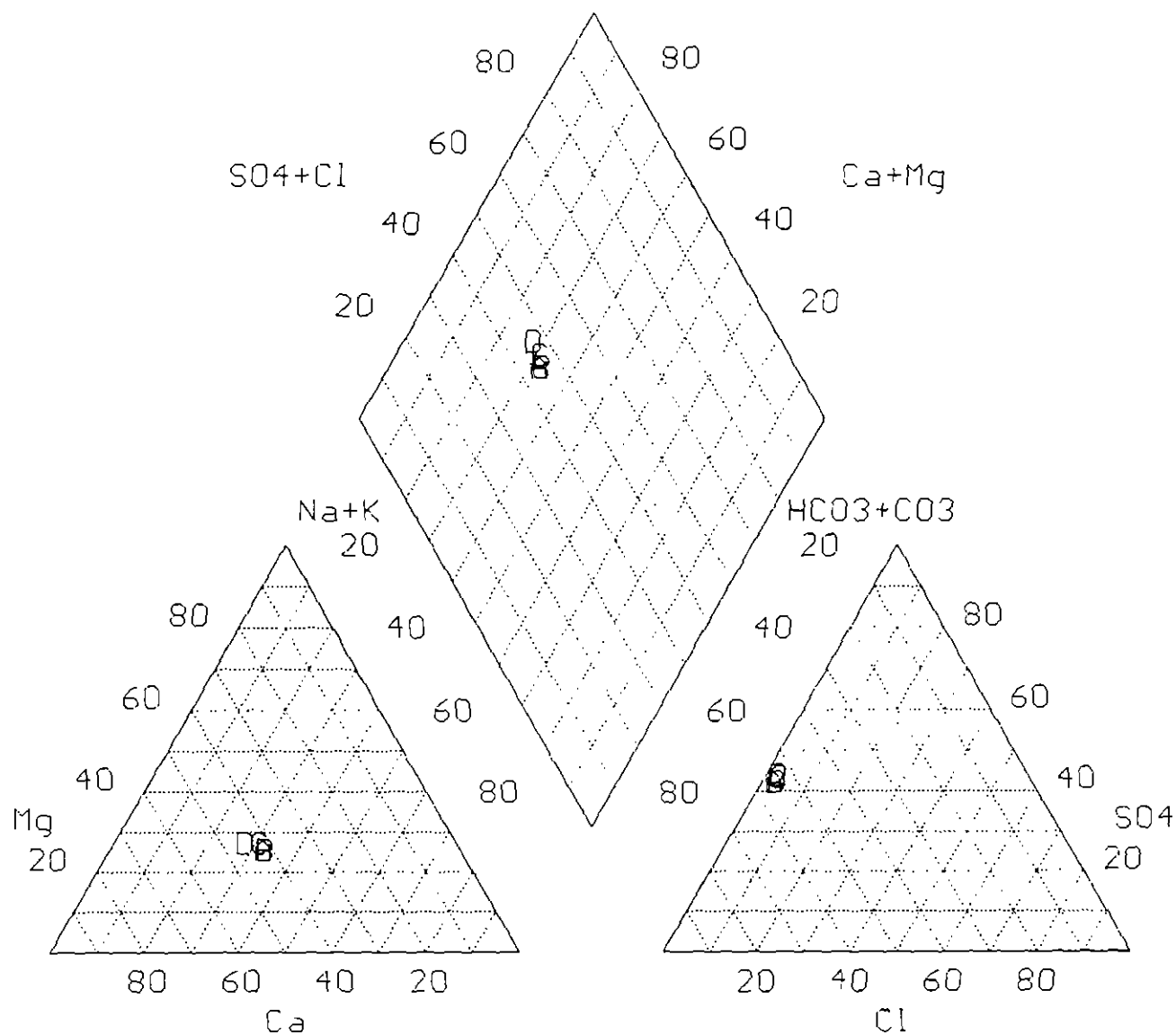
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MWCHC-2

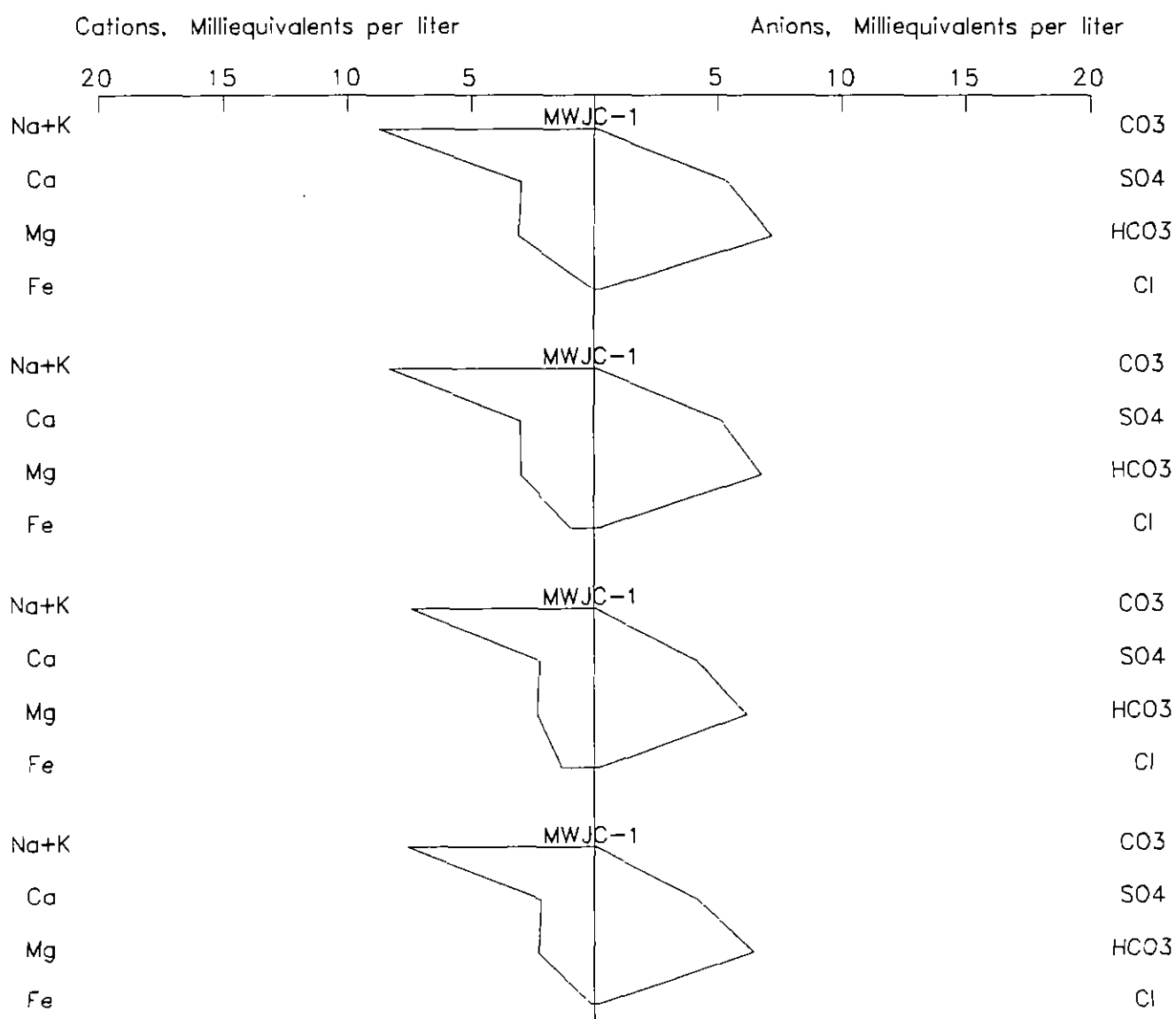
08/22/1696-C

MWCHC-2

10/09/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWJC-1	3/13/1996	8.77	2.95	3.08	0.04	0.07	5.41	7.20	0.20
MWJC-1	5/21/1996	8.34	2.99	2.99	0.94	0.07	5.20	6.77	0.17
MWJC-1	8/21/1996	7.45	2.20	2.28	1.30	0.07	4.16	6.18	0.17
MWJC-1	10/8/1996	7.62	2.15	2.24	0.14	0.07	4.16	6.44	0.17



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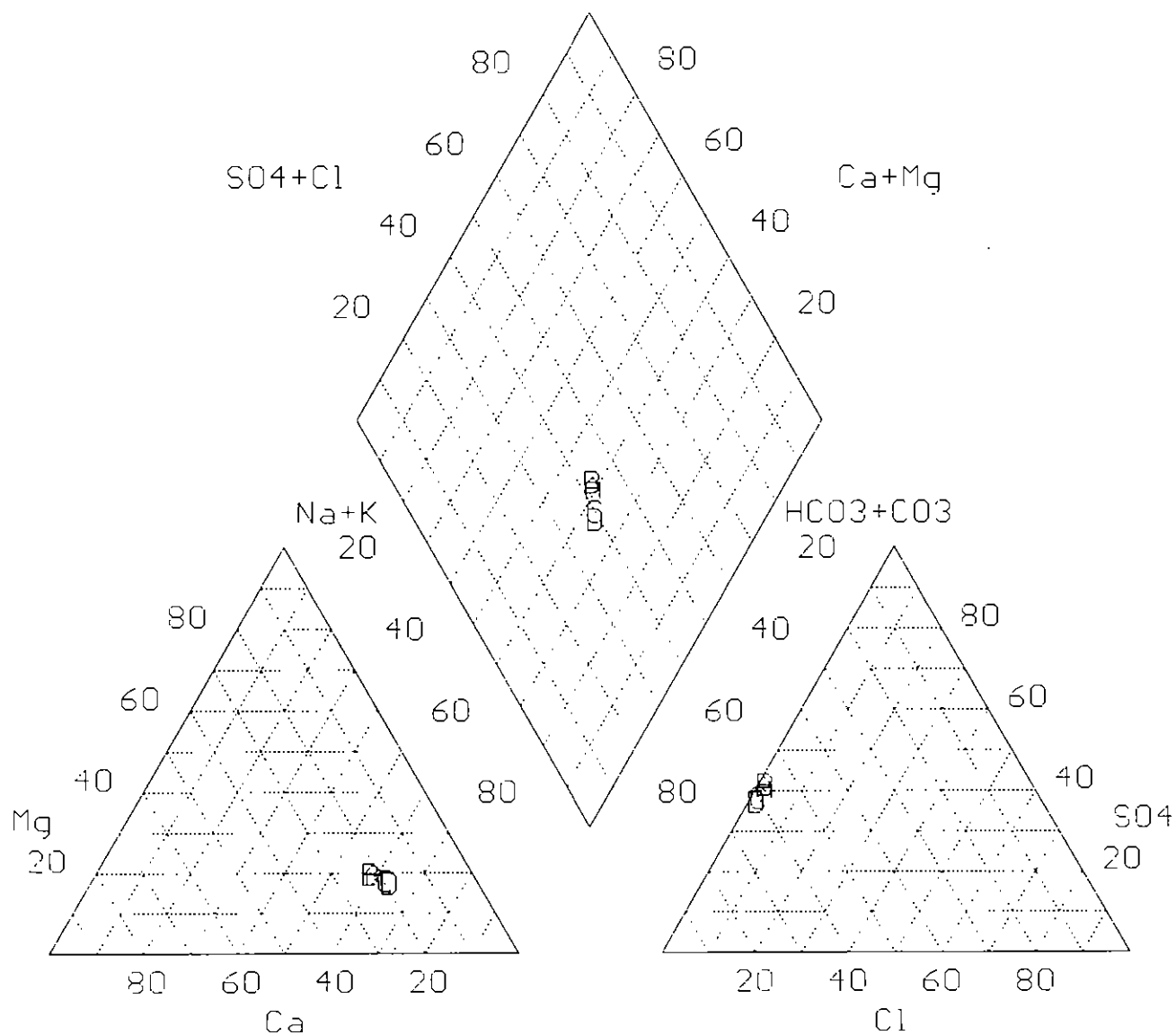
MWJC-1

03/13/1696-A MWJC-1

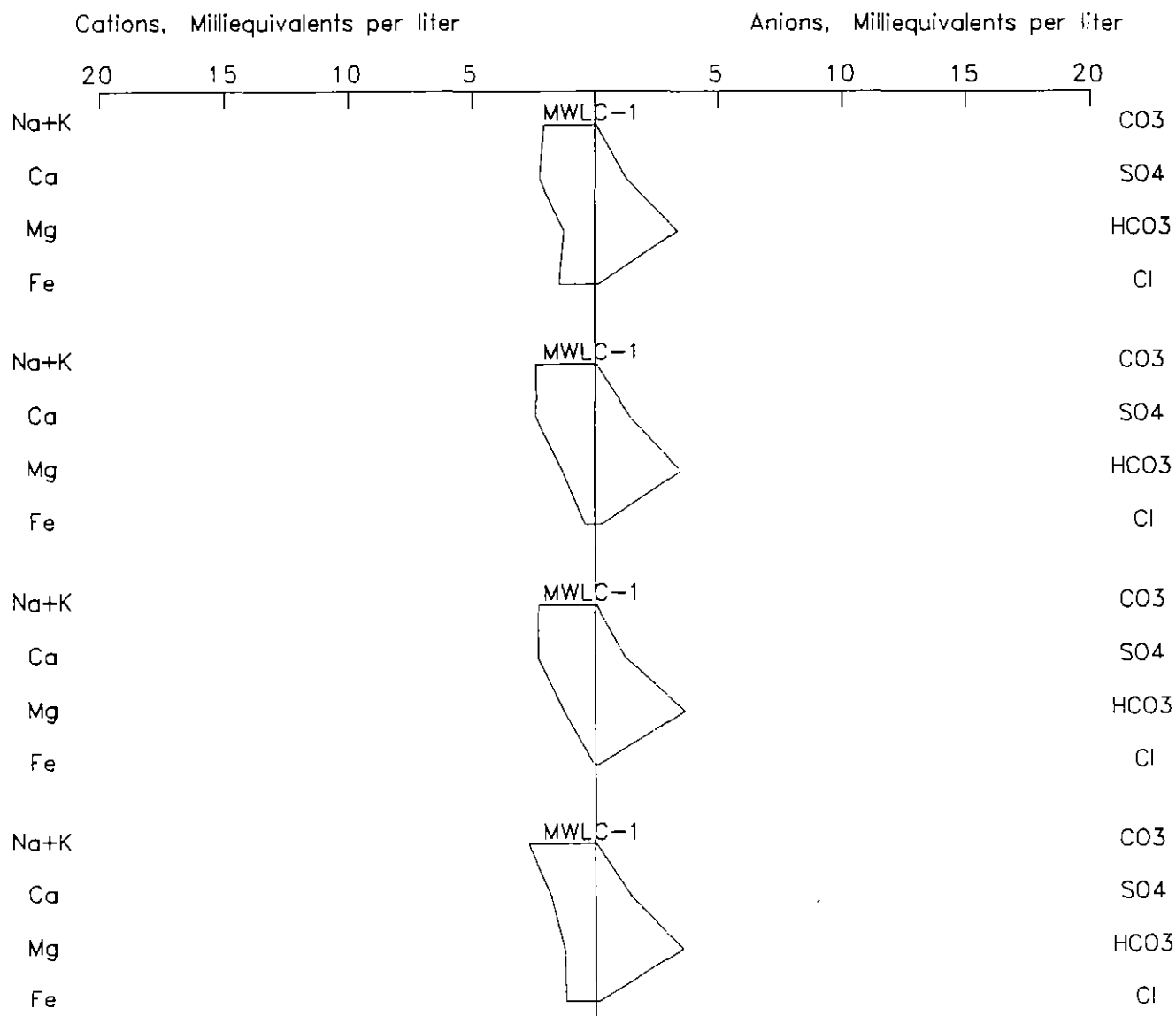
05/21/1696-B MWJC-1

08/21/1696-C MWJC-1

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWLC-1	3/13/1996	2.06	2.26	1.24	1.44	0.07	1.25	3.34	0.11
MWLC-1	5/23/1996	2.42	2.37	1.30	0.39	0.07	1.46	3.49	0.25
MWLC-1	8/22/1996	2.30	2.28	1.25	0.04	0.07	1.25	3.62	0.11
MWLC-1	10/8/1996	2.71	1.79	1.26	1.18	0.07	1.46	3.54	0.11



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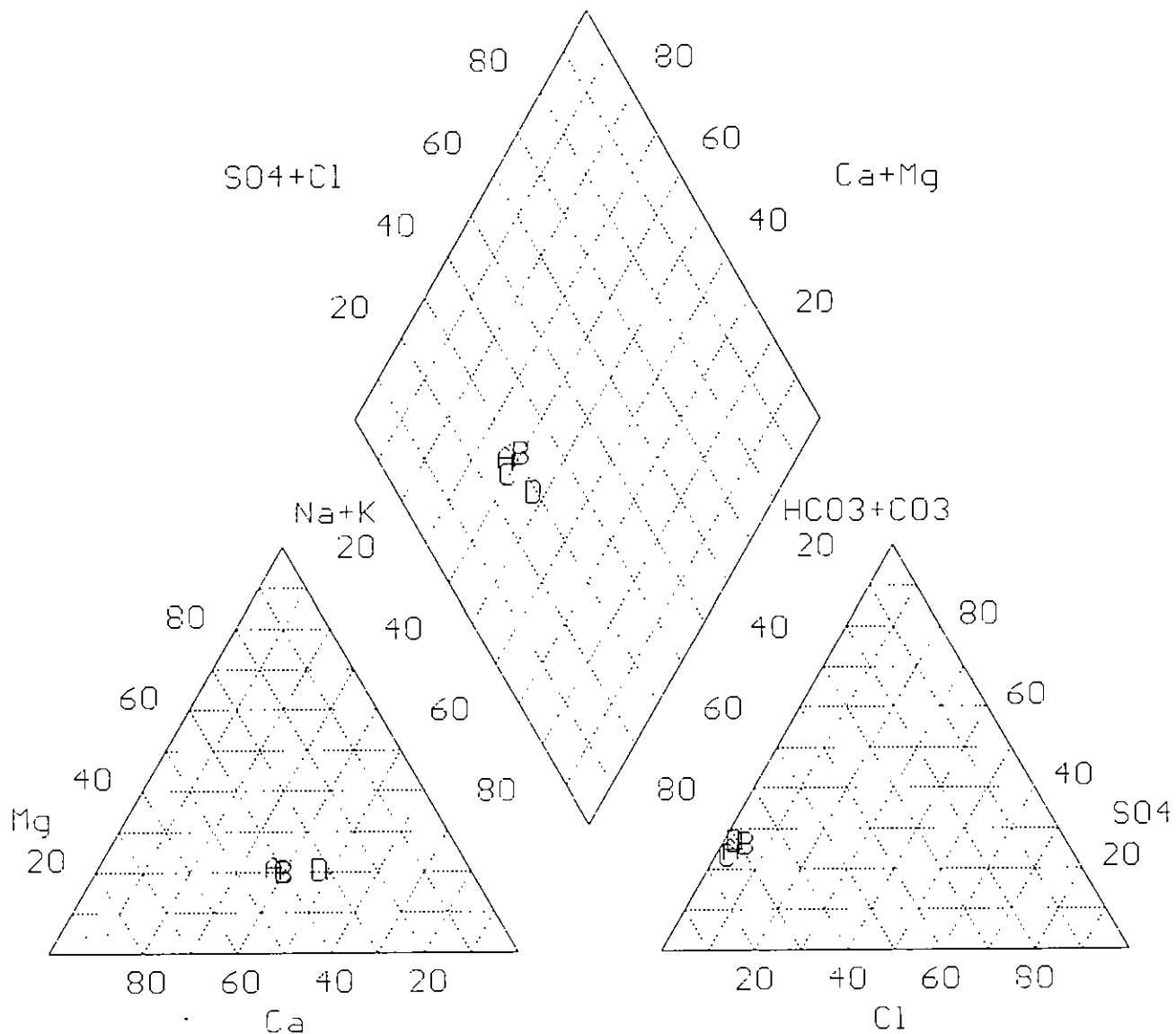
MWLC-1

03/13/1696-A MWLC-1

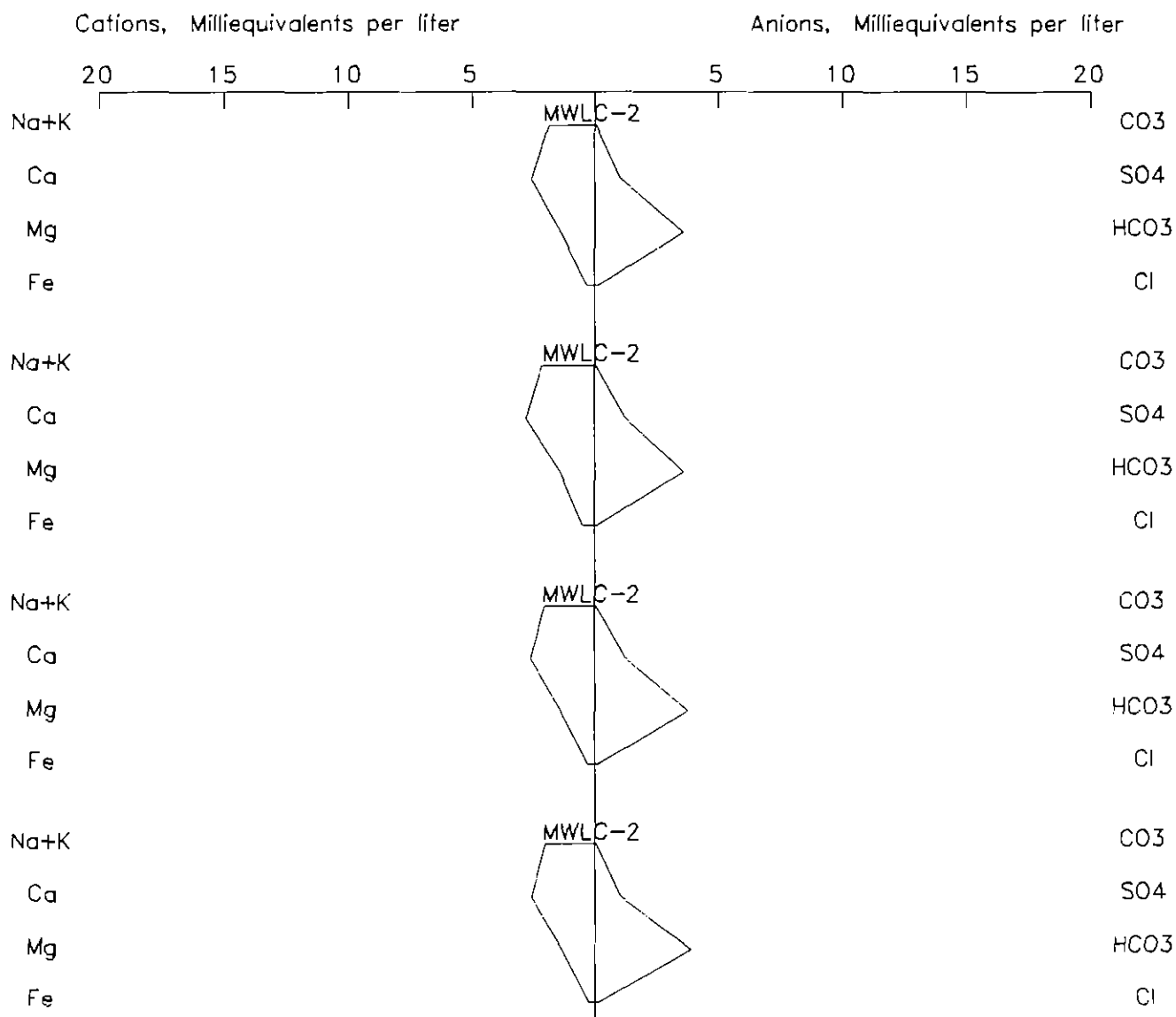
05/23/1696-B MWLC-1

08/22/1696-C MWLC-1

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWLC-2	3/13/1996	1.86	2.58	1.37	0.29	0.07	1.04	3.56	0.11
MWLC-2	5/22/1996	2.11	2.77	1.40	0.46	0.07	1.25	3.57	0.06
MWLC-2	8/21/1996	2.01	2.59	1.36	0.27	0.07	1.25	3.77	0.11
MWLC-2	10/8/1996	1.98	2.57	1.32	0.25	0.07	1.04	3.87	0.11



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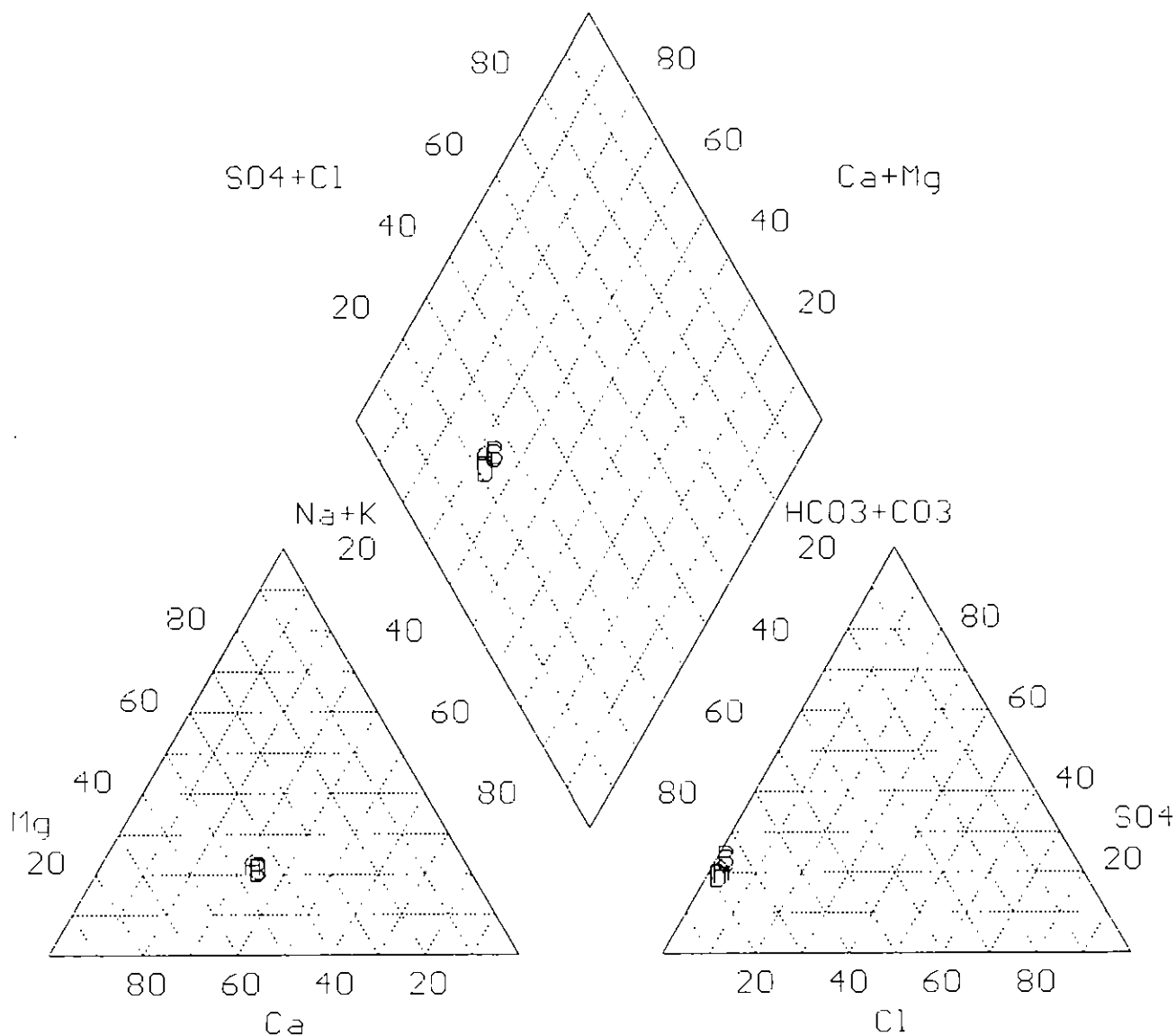
MWLC-2

03/13/1696-A MWLC-2

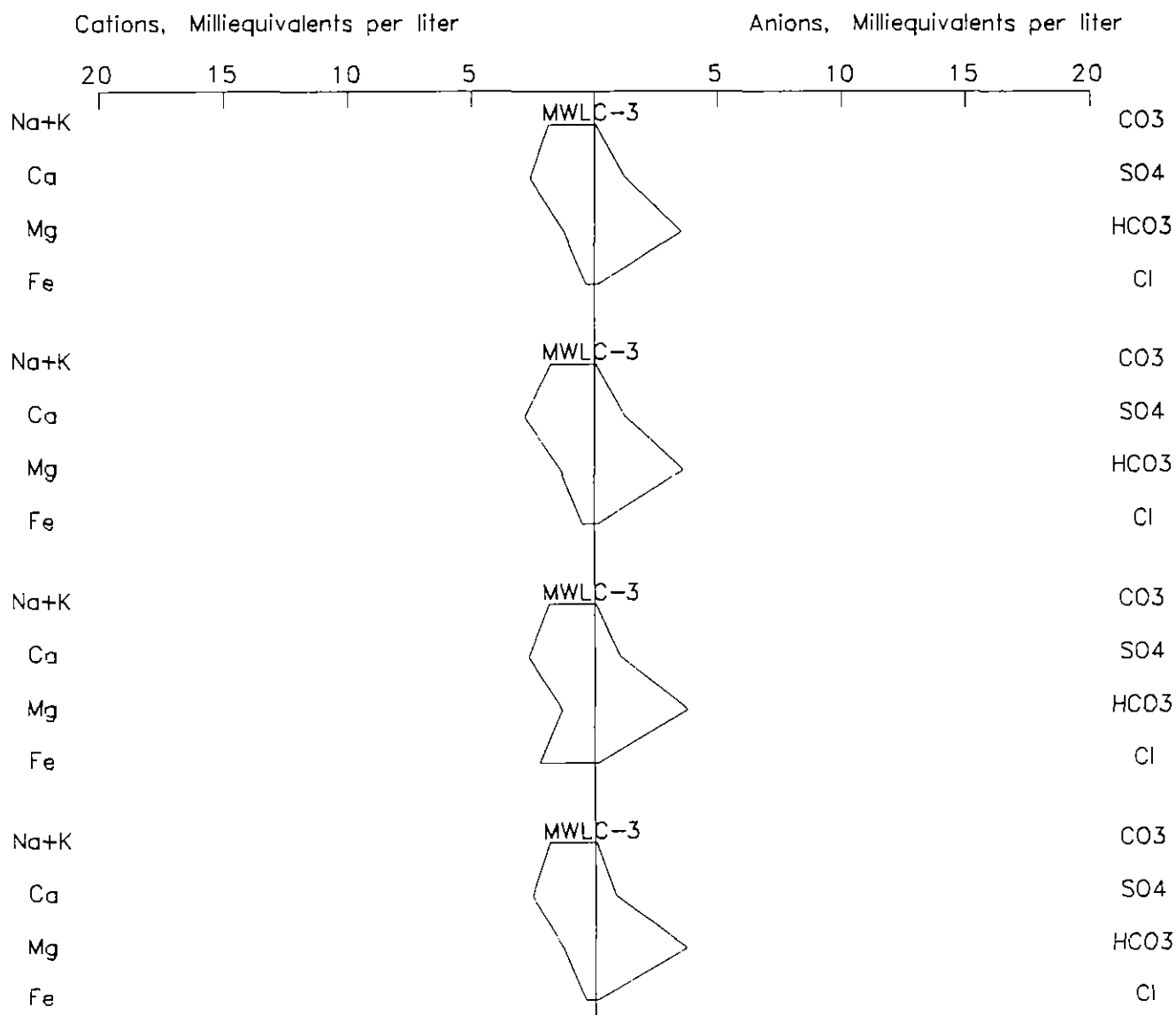
05/22/1696-B MWLC-2

08/21/1696-C MWLC-2

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWLC-3	3/13/1696	1.84	2.61	1.23	0.31	0.07	1.25	3.49	0.14
MWLC-3	5/21/1696	1.75	2.85	1.36	0.47	0.07	1.25	3.57	0.14
MWLC-3	8/20/1696	1.83	2.69	1.31	2.21	0.07	1.04	3.77	0.11
MWLC-3	10/ 8/1696	1.83	2.55	1.25	0.36	0.07	0.93	3.70	0.08



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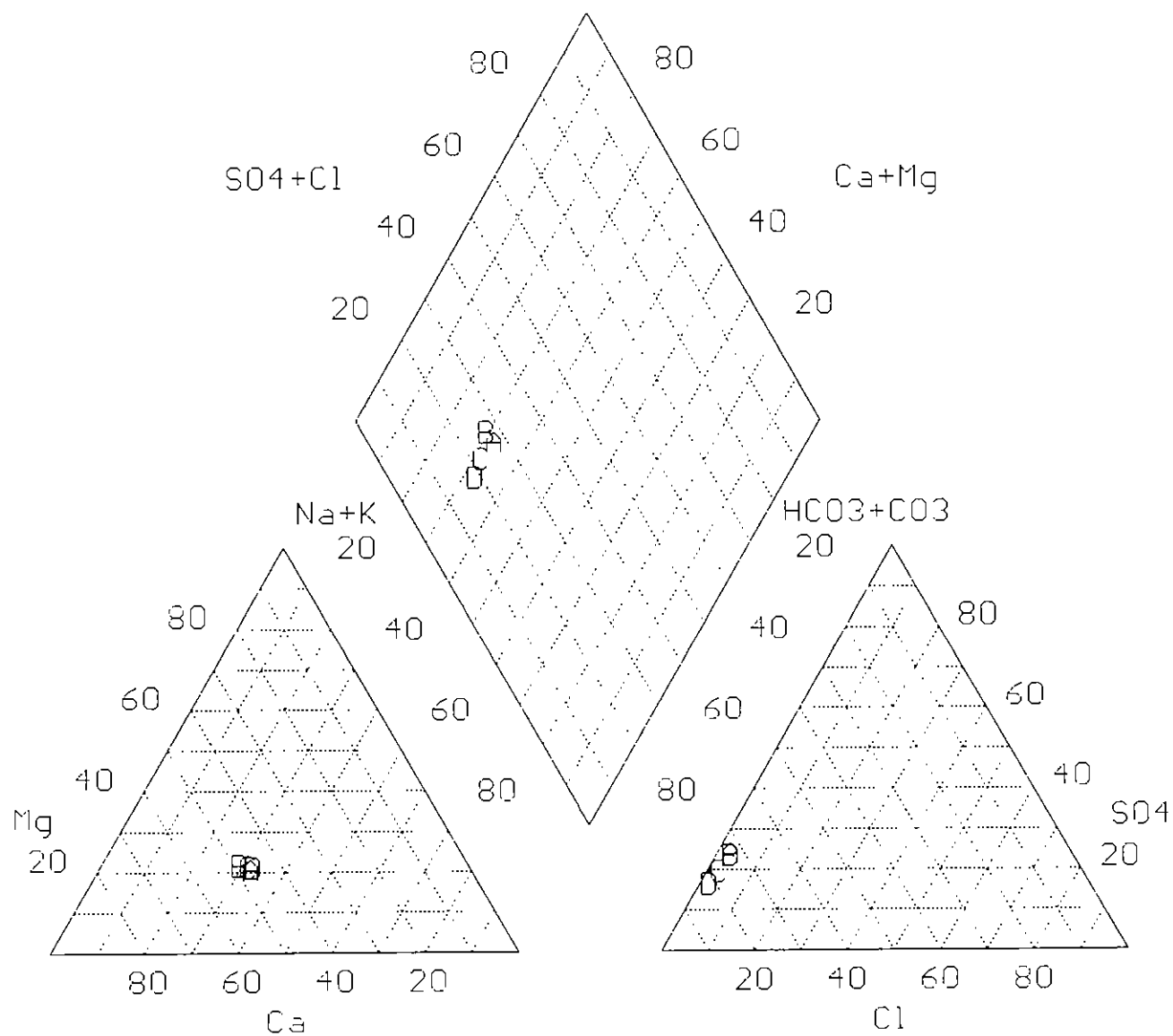
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03/13/1696-A MWLC-3

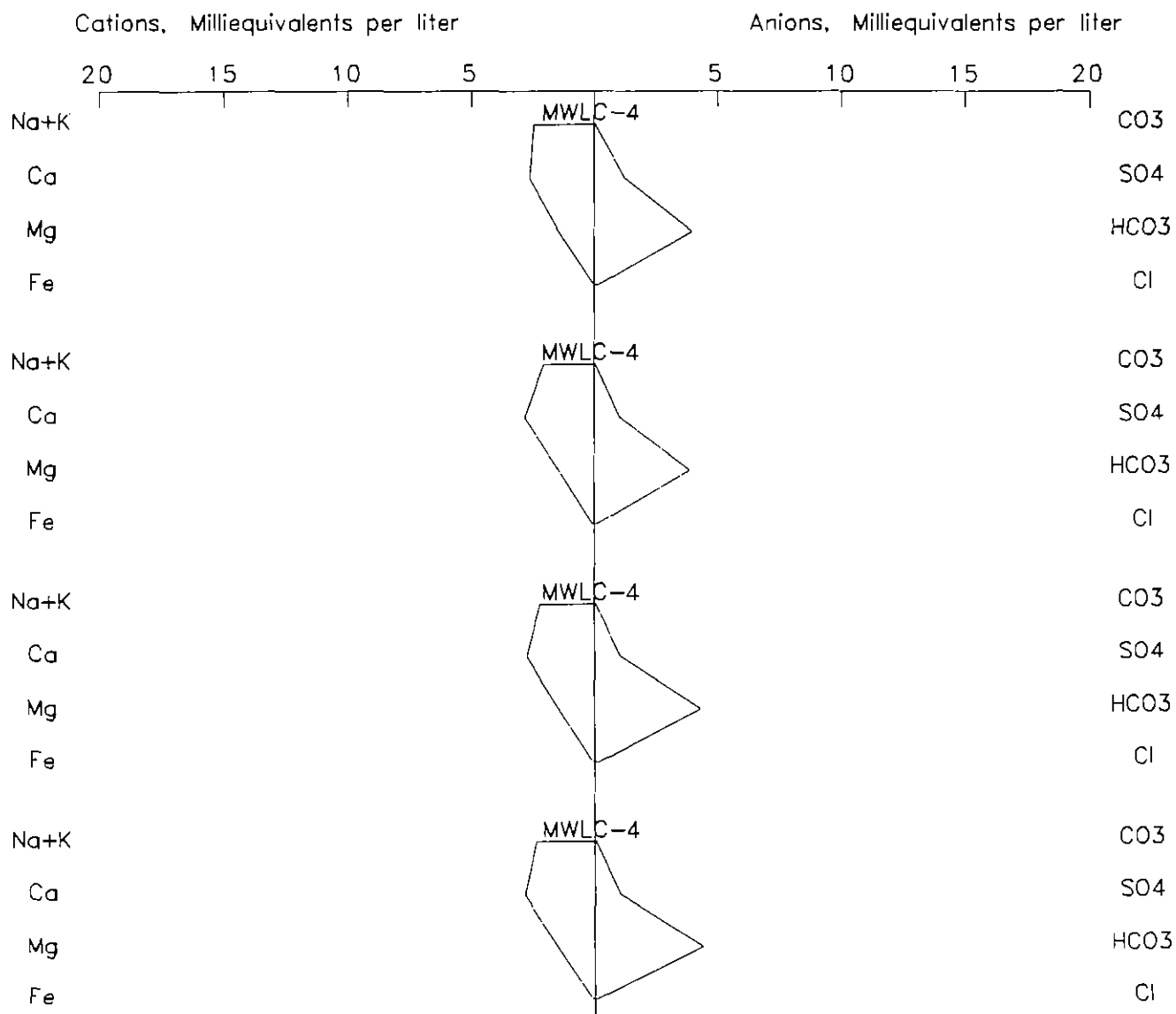
05/21/1696-B MWLC-3

08/20/1696-C MWLC-3

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWLC-4	3/13/1696	2.45	2.61	1.41	0.00	0.07	1.25	3.97	0.11
MWLC-4	5/21/1696	2.02	2.83	1.42	0.06	0.07	1.04	3.88	0.08
MWLC-4	8/20/1696	2.19	2.76	1.44	0.06	0.07	1.04	4.29	0.14
MWLC-4	10/8/1696	2.35	2.84	1.47	0.09	0.07	1.04	4.38	0.08



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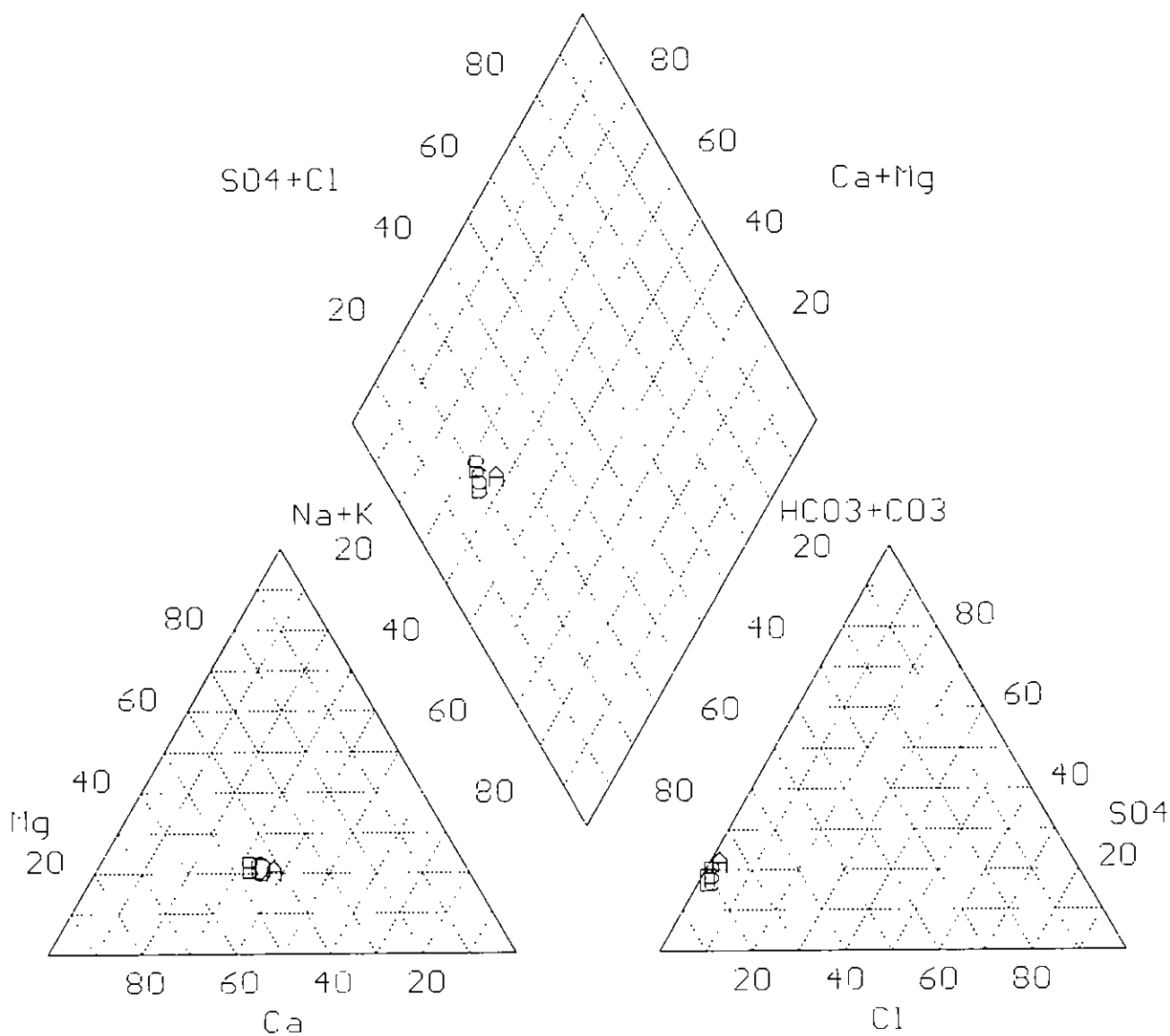
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03/13/1696-A MWLC-4

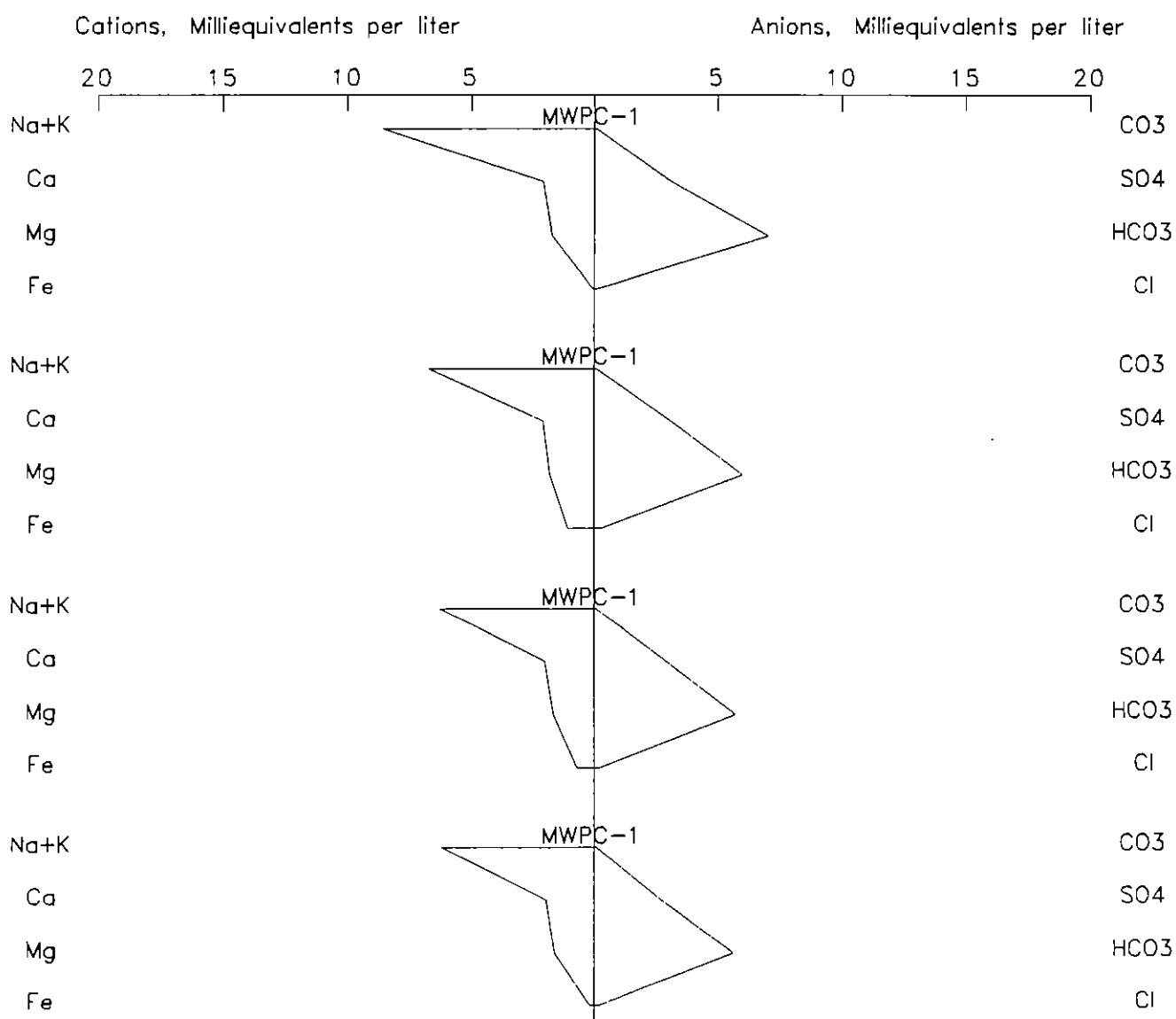
05/21/1696-B MWLC-4

08/20/1696-C MWLC-4

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MWPC-1	3/13/1996	8.64	2.05	1.69	0.02	0.07	3.12	7.01	0.03
MWPC-1	5/23/1996	6.74	2.04	1.77	1.05	0.07	3.12	6.00	0.23
MWPC-1	8/21/1996	6.26	1.99	1.65	0.68	0.07	2.91	5.69	0.17
MWPC-1	10/8/1996	6.22	1.93	1.60	0.19	0.07	2.71	5.61	0.17



Diamond=◊ Square=■ Circle=°

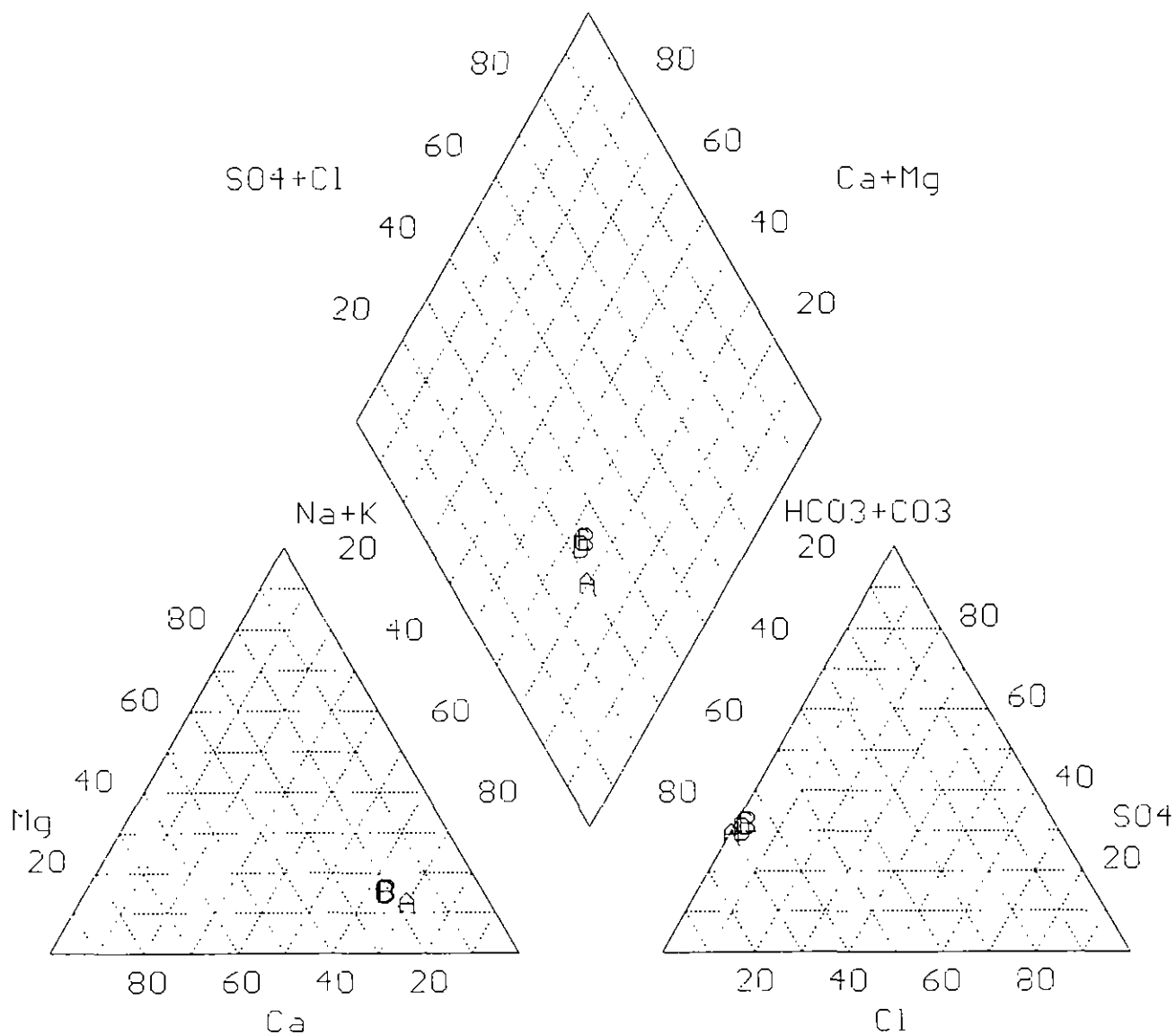
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03/13/1696-A MWPC-1

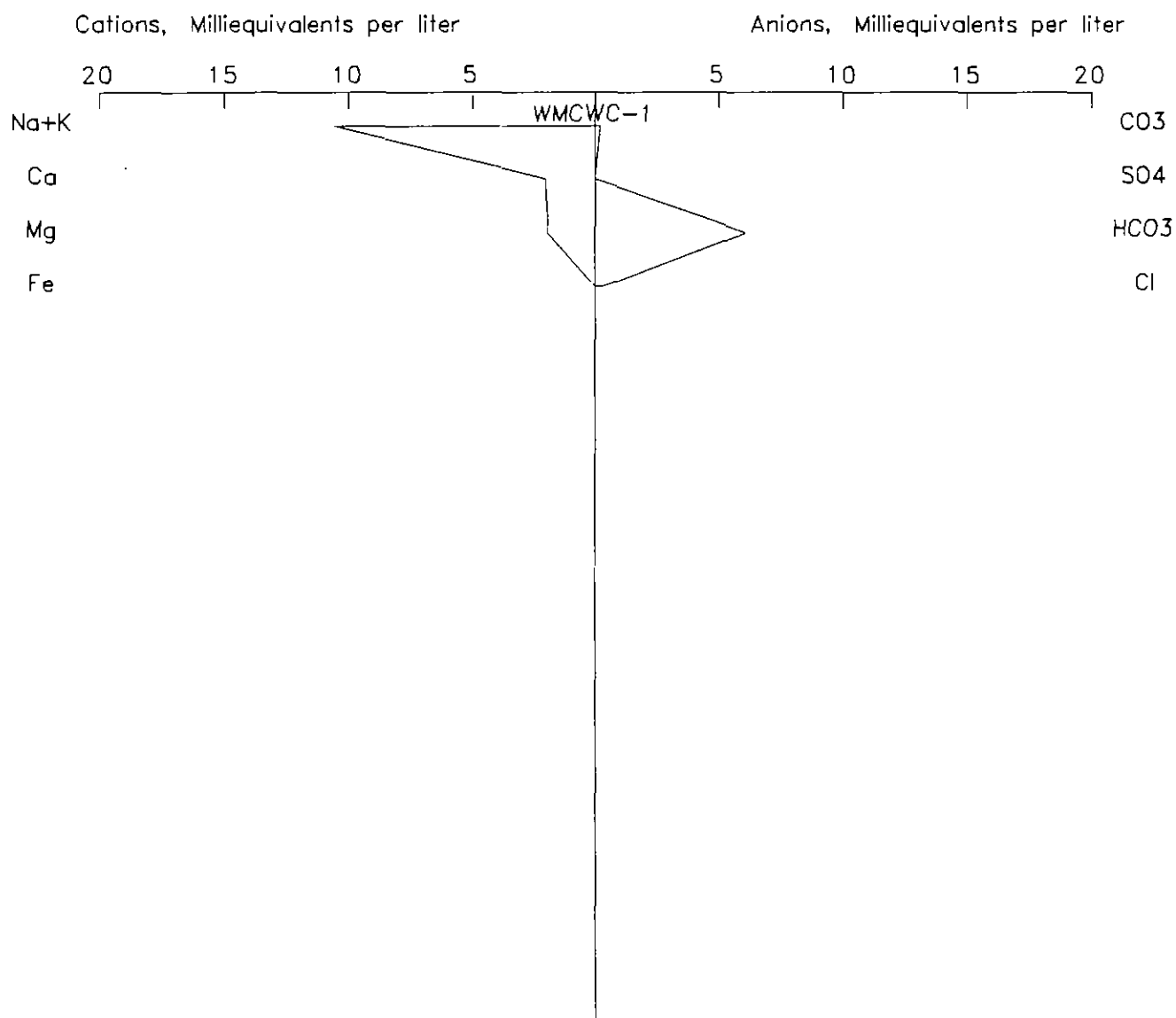
05/23/1696-B MWPC-1

08/21/1696-C MWPC-1

10/08/1696-D



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
WMCWC-1	8/29/1996	10.58	2.02	1.68	0.00	0.23	0.00	6.08	0.28

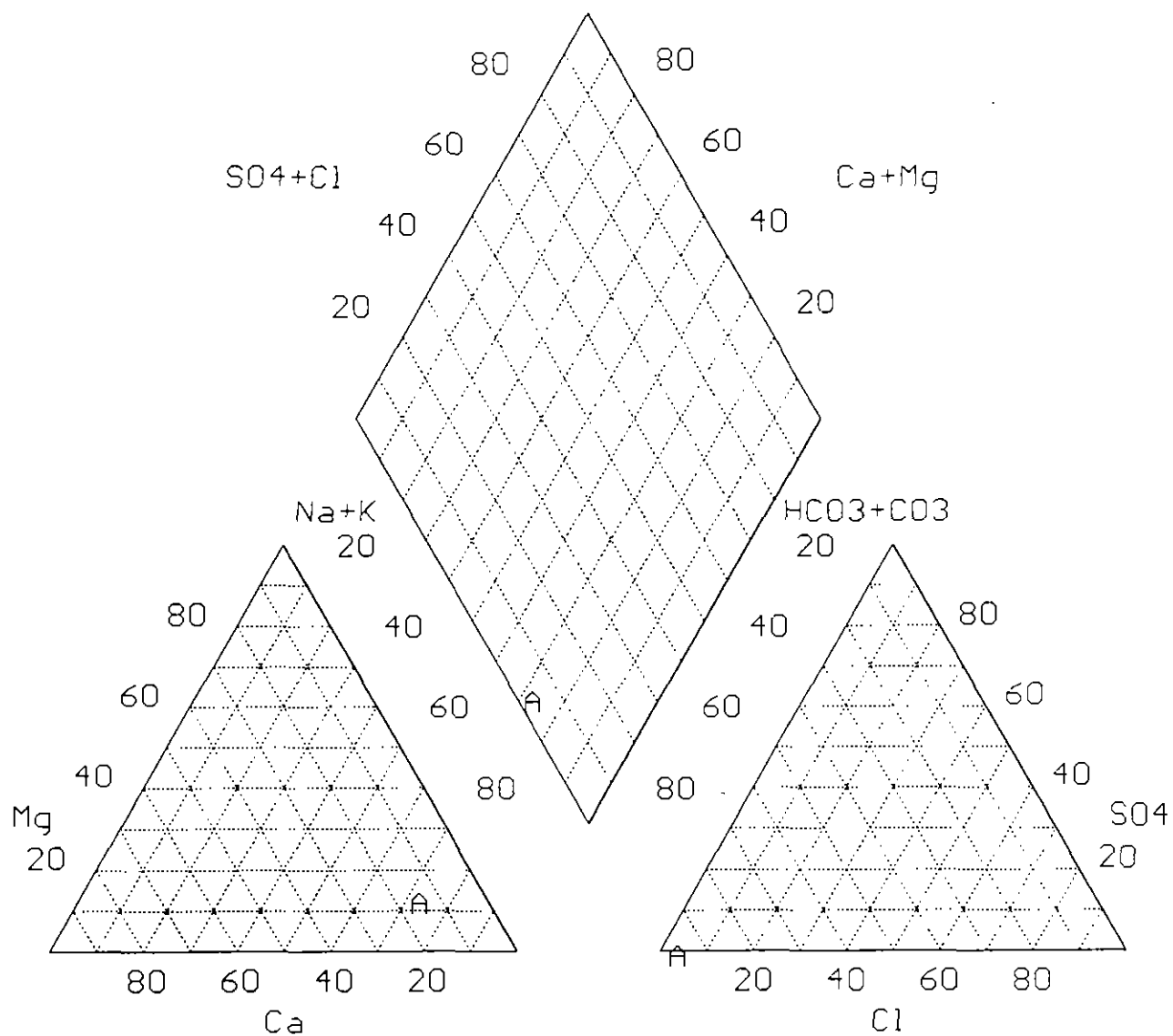


GW-3-21

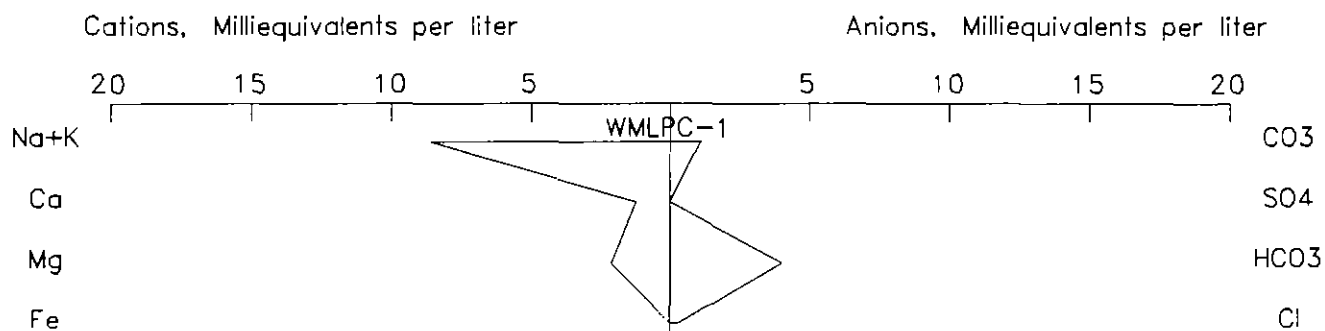
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UHCWC-1

08/28/1996-A



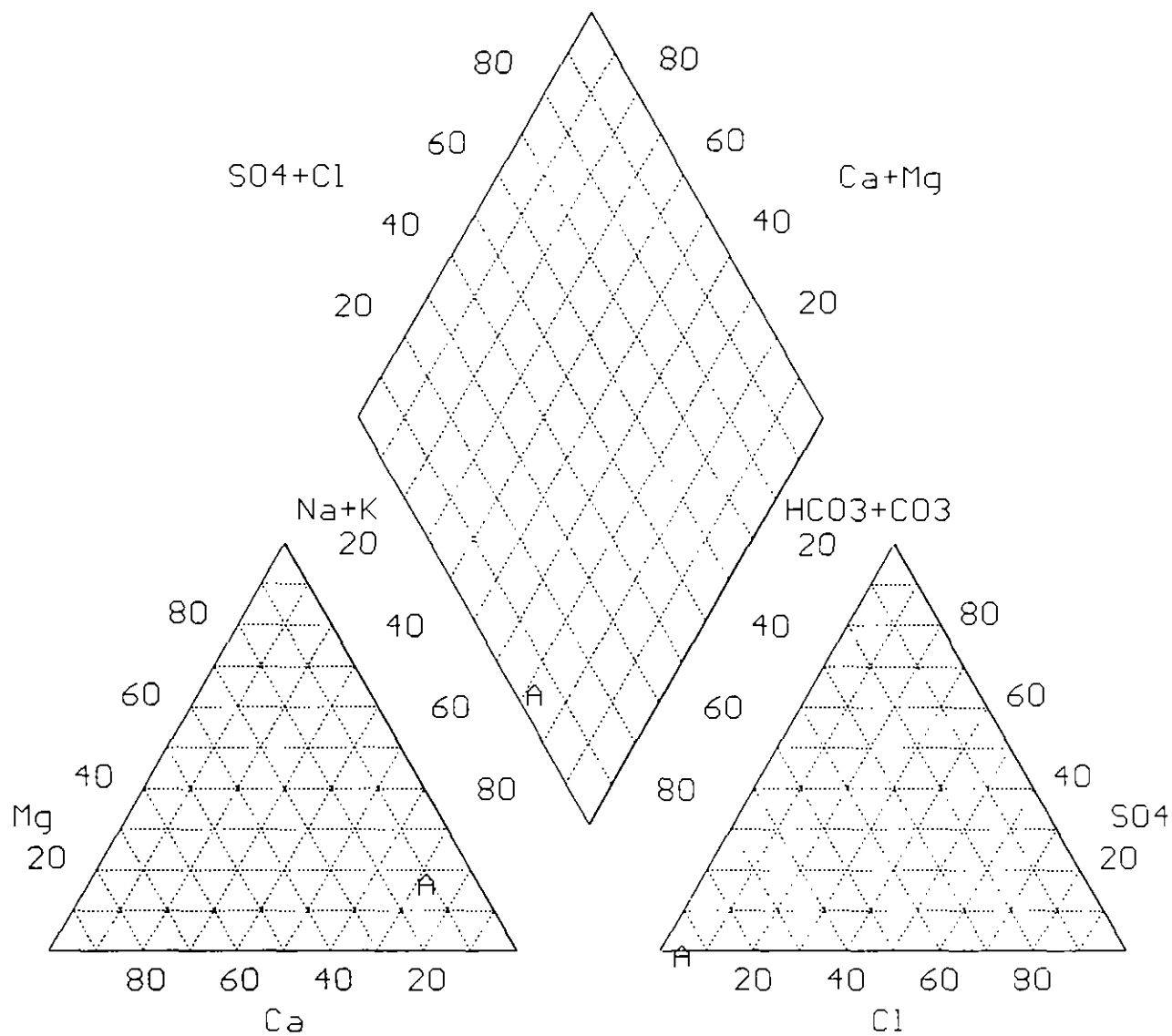
Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
WMLPC-1	8/29/1996	8.67	1.21	2.11	0.00	1.10	0.00	3.98	0.29



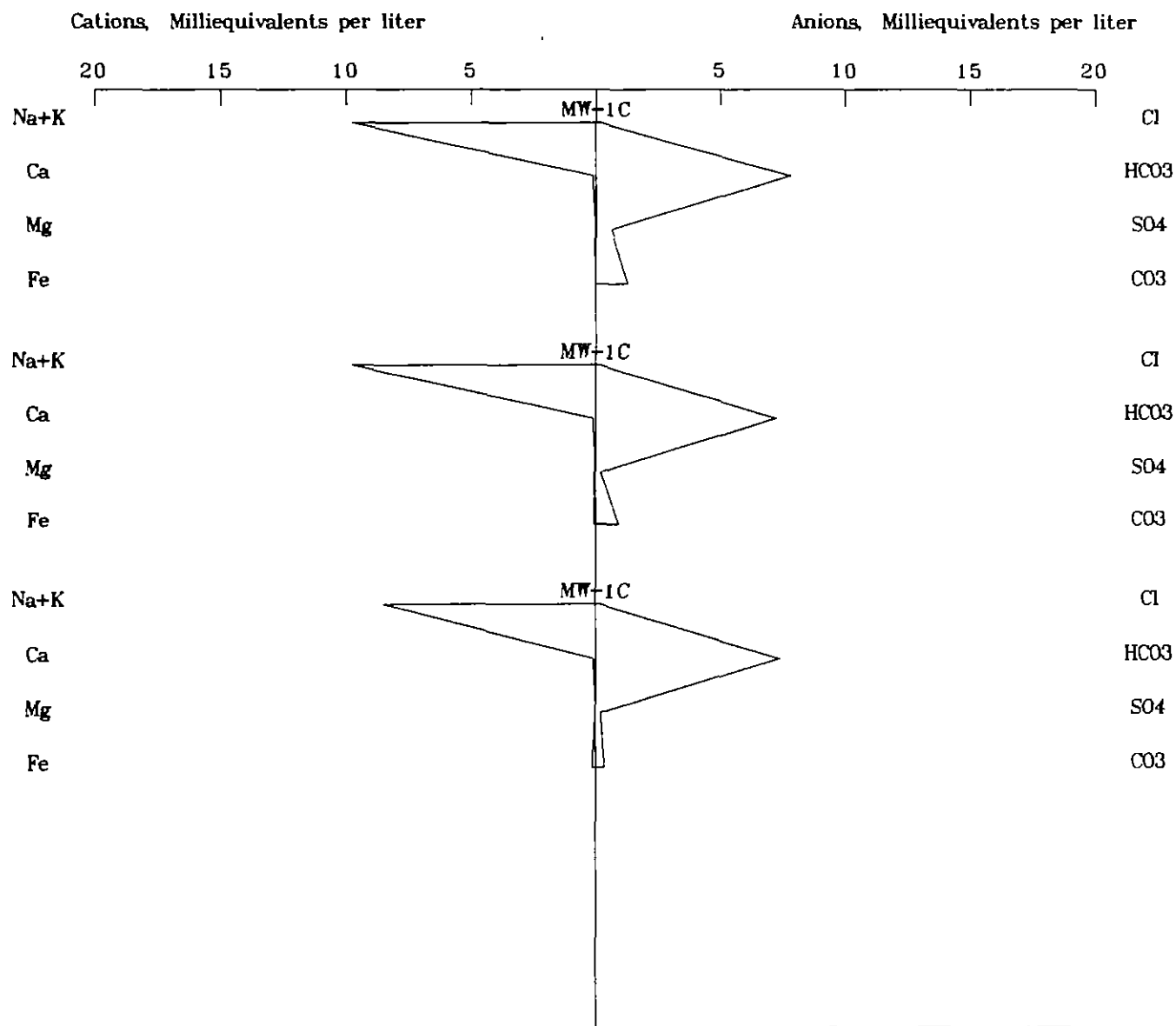
GW-3-23

Diamond=◆ Square=■ Circle=°

WMLPC-1 08/28/1996-A



Sample	Chemical Constituents in Equivalents per Million						CO3	SO4	HCO3	Cl
	Date	NaK	Ca	Mg	Fe					
MW-1C	20/ 5/1996	9.76	0.12	0.05	0.00		1.30	0.62	7.83	0.23
MW-1C	19/ 8/1996	9.74	0.14	0.05	0.08		0.93	0.21	7.28	0.20
MW-1C	8/10/1996	8.51	0.11	0.03	0.15		0.33	0.21	7.41	0.20



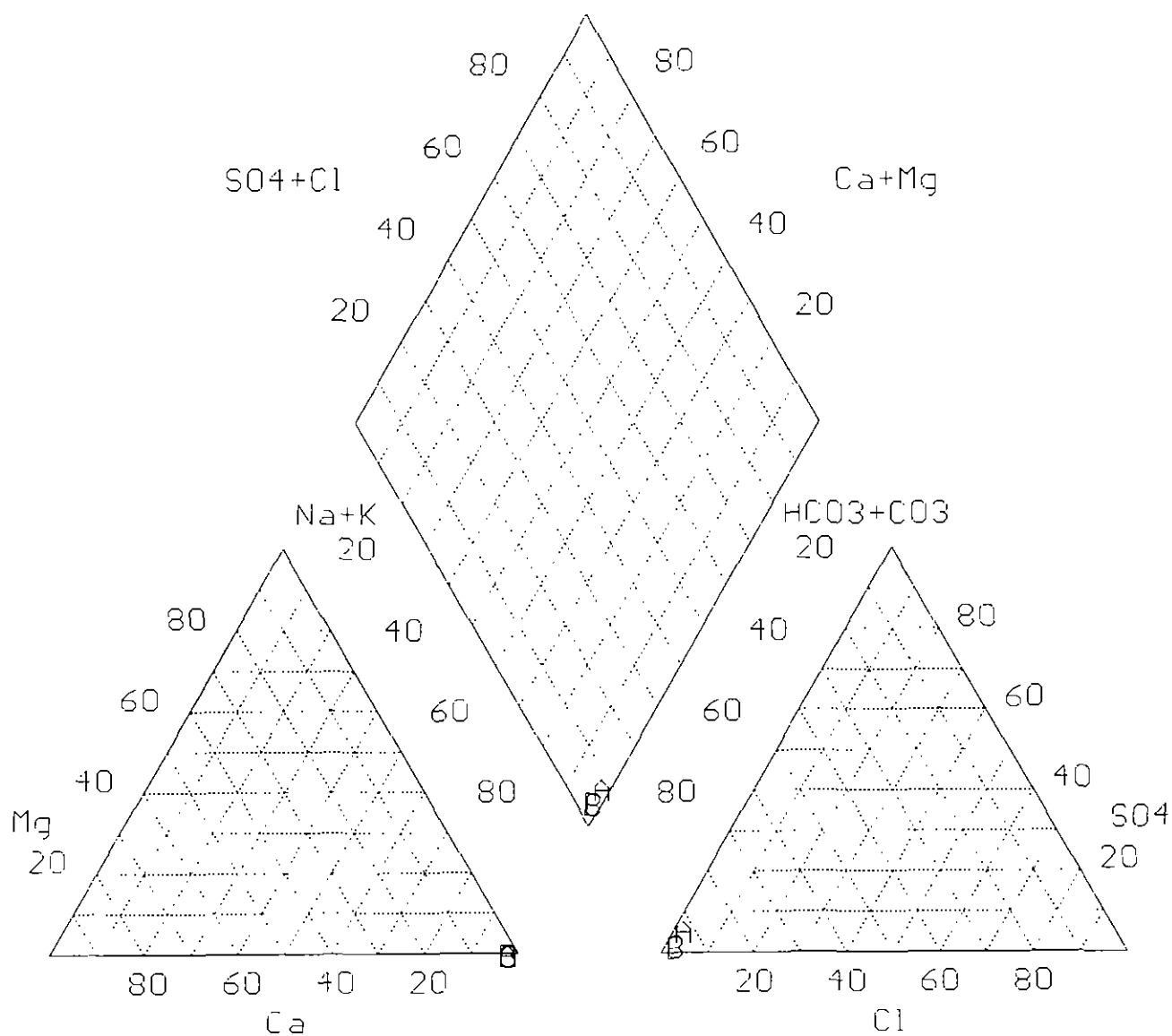
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MW-1C

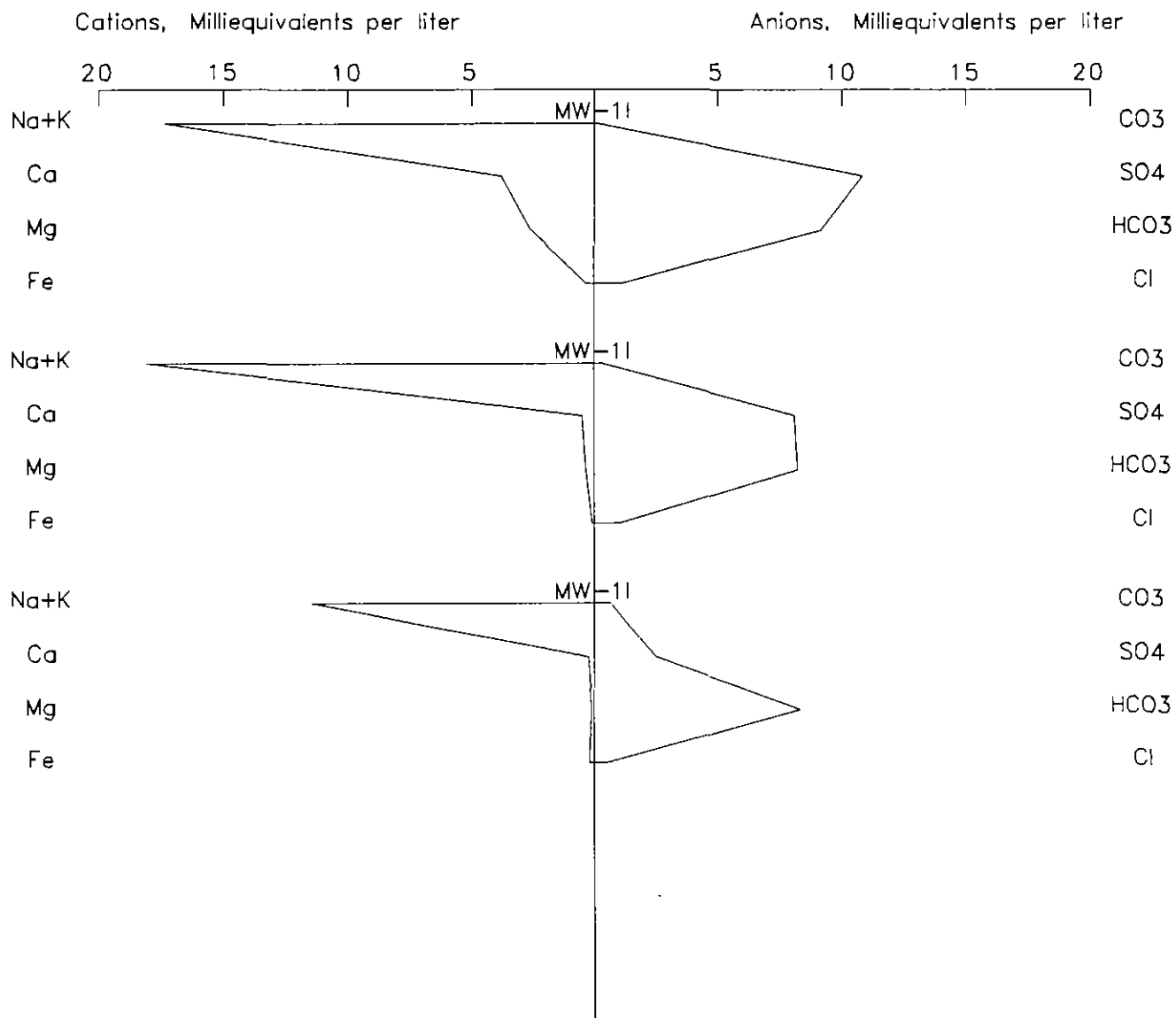
05/21/1696-A NW-1C

08/20/1696-B MW-1C

10/09/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-11	5/21/1996	17.37	3.77	2.61	0.33	0.07	10.83	9.16	1.07
MW-11	8/20/1996	18.12	0.47	0.31	0.08	0.30	8.12	8.26	0.96
MW-11	10/7/1996	11.48	0.22	0.10	0.18	0.67	2.50	8.33	0.45



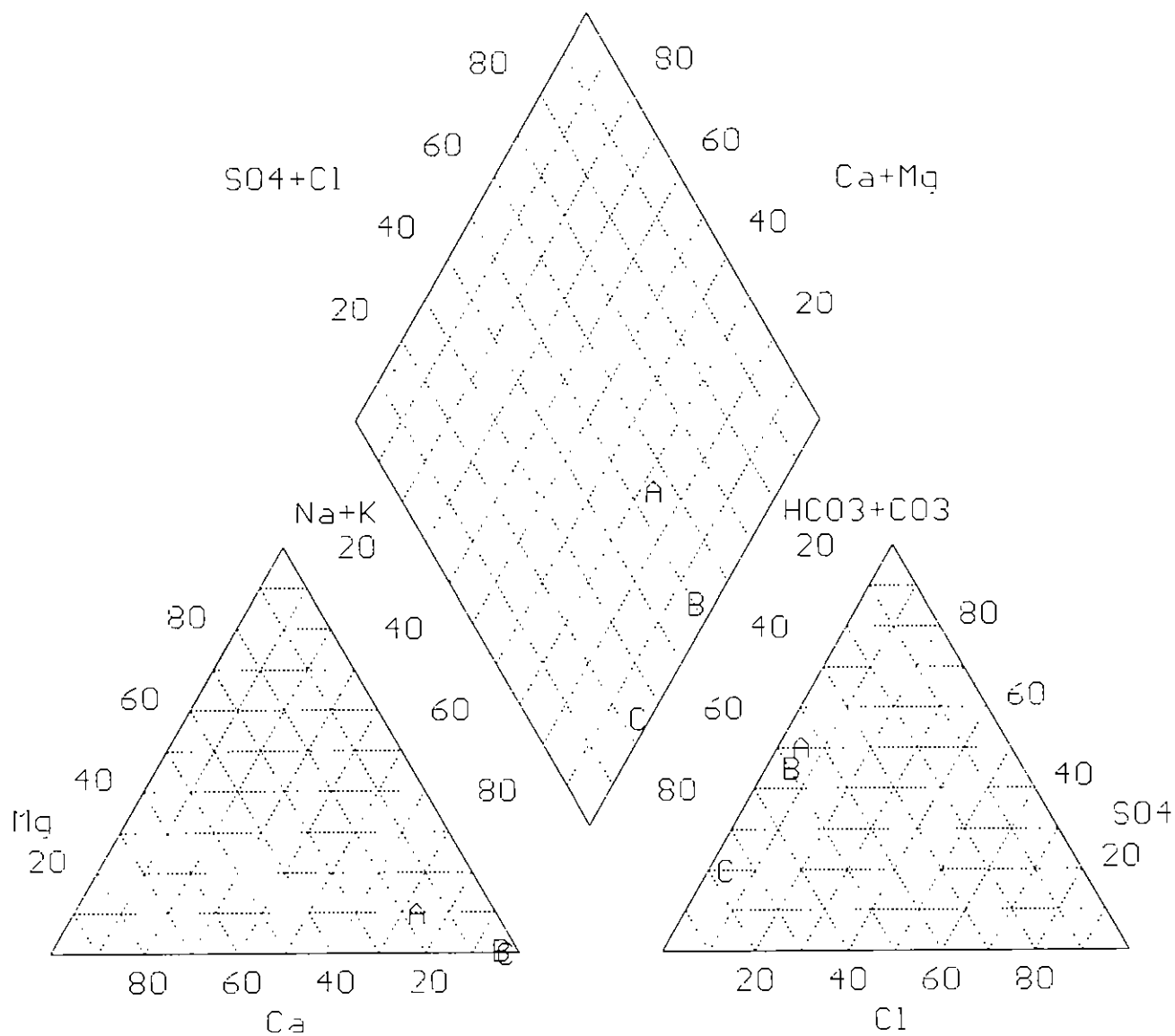
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MW-11

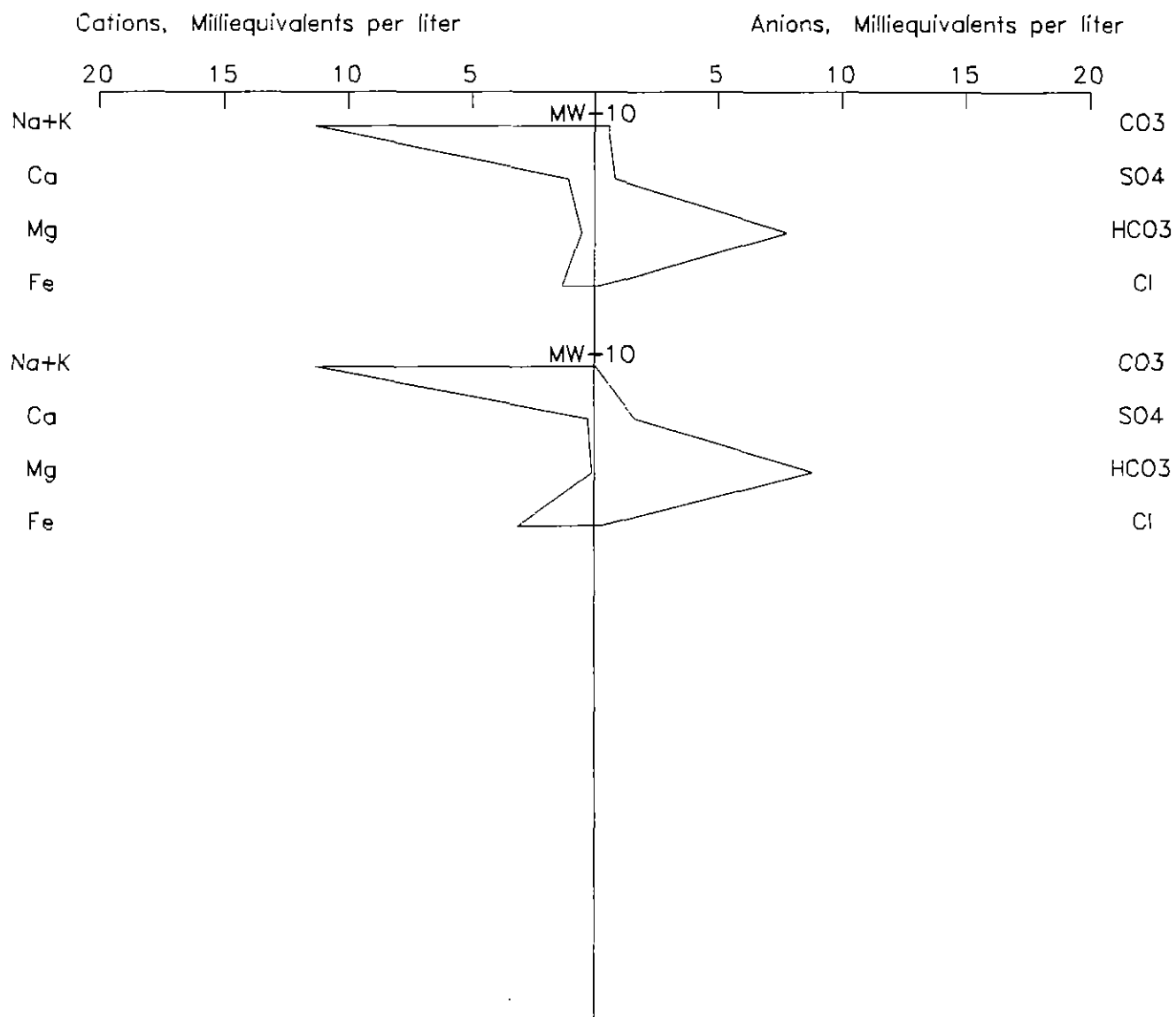
05/21/1696-A MW-11

08/20/1696-B MW-11

10/07/1696-C



Sample Name	Date	Na+I	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-10	5-22-1996	11.34	1.06	0.53	1.30	0.57	0.83	7.77	0.14
MW-10	8-20-1996	11.32	0.25	0.09	3.13	0.07	1.67	8.82	0.23

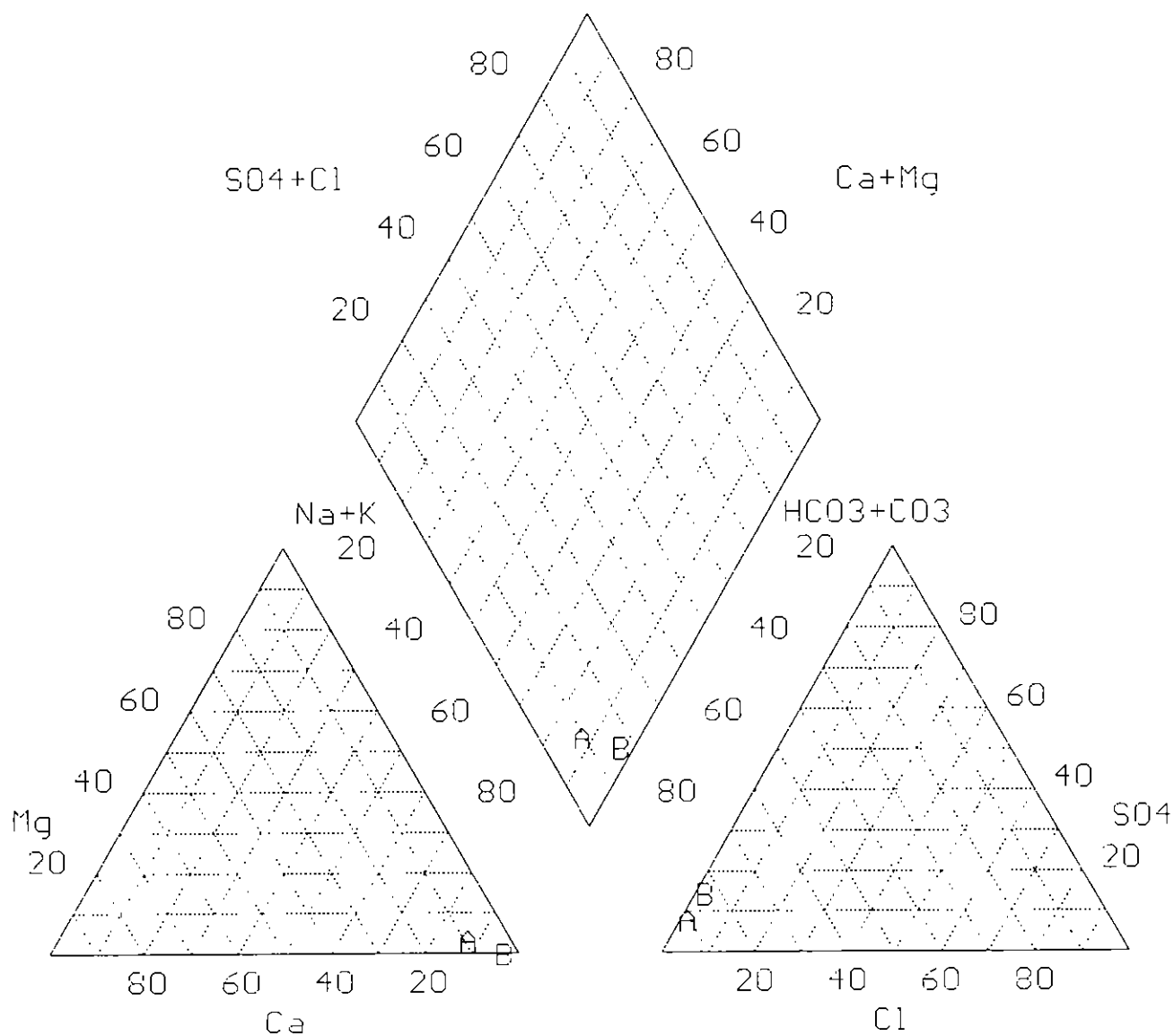


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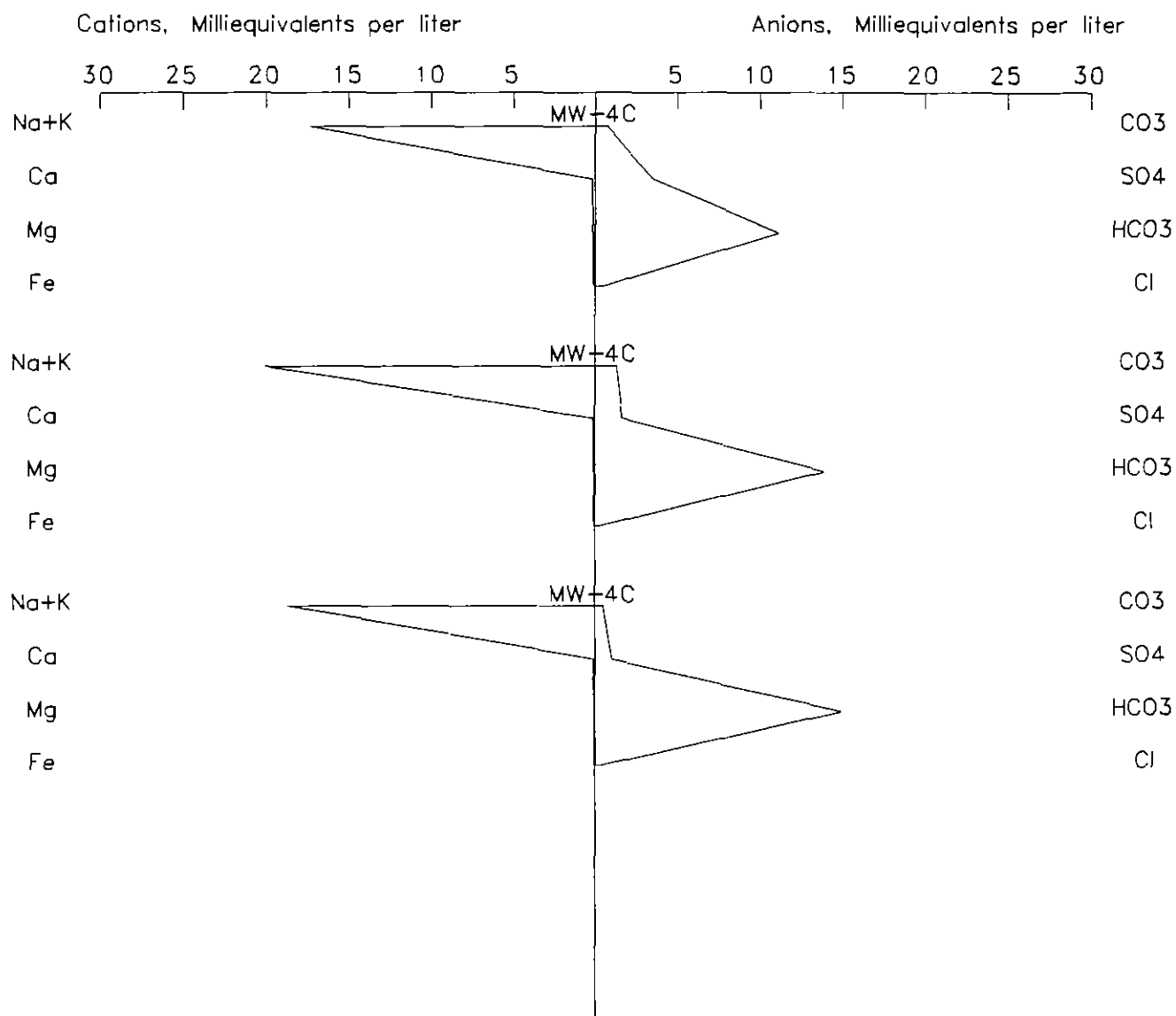
MW-10

05/22/1696-A MW-10

08/20/1696-B



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-4C	5/23/1696	17.43	0.17	0.09	0.08	0.77	3.54	11.13	0.39
MW-4C	8/21/1696	20.06	0.11	0.07	0.06	1.33	1.67	13.90	0.23
MW-4C	10/9/1696	18.70	0.09	0.05	0.08	0.50	1.04	14.93	0.20



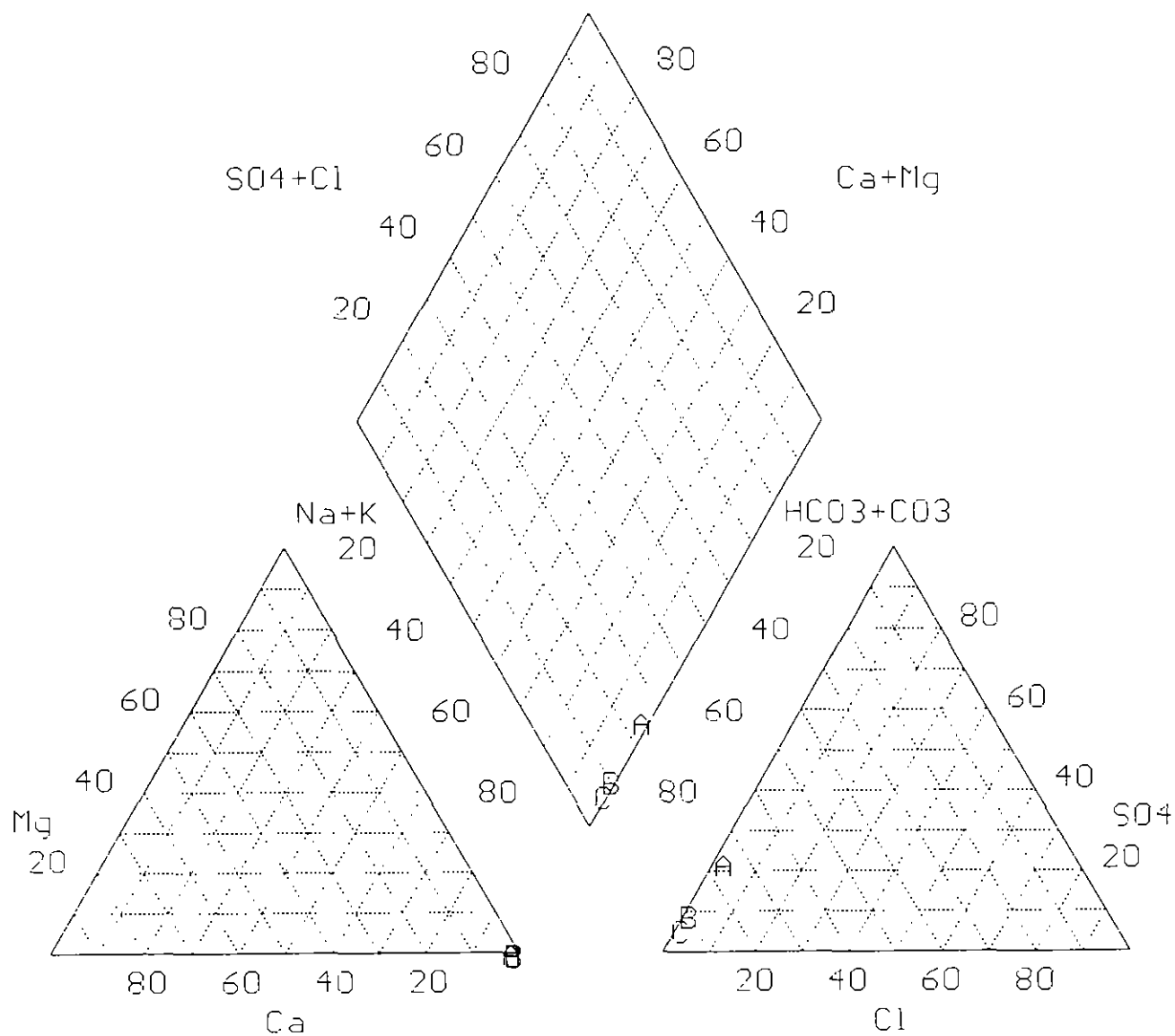
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MW-4C

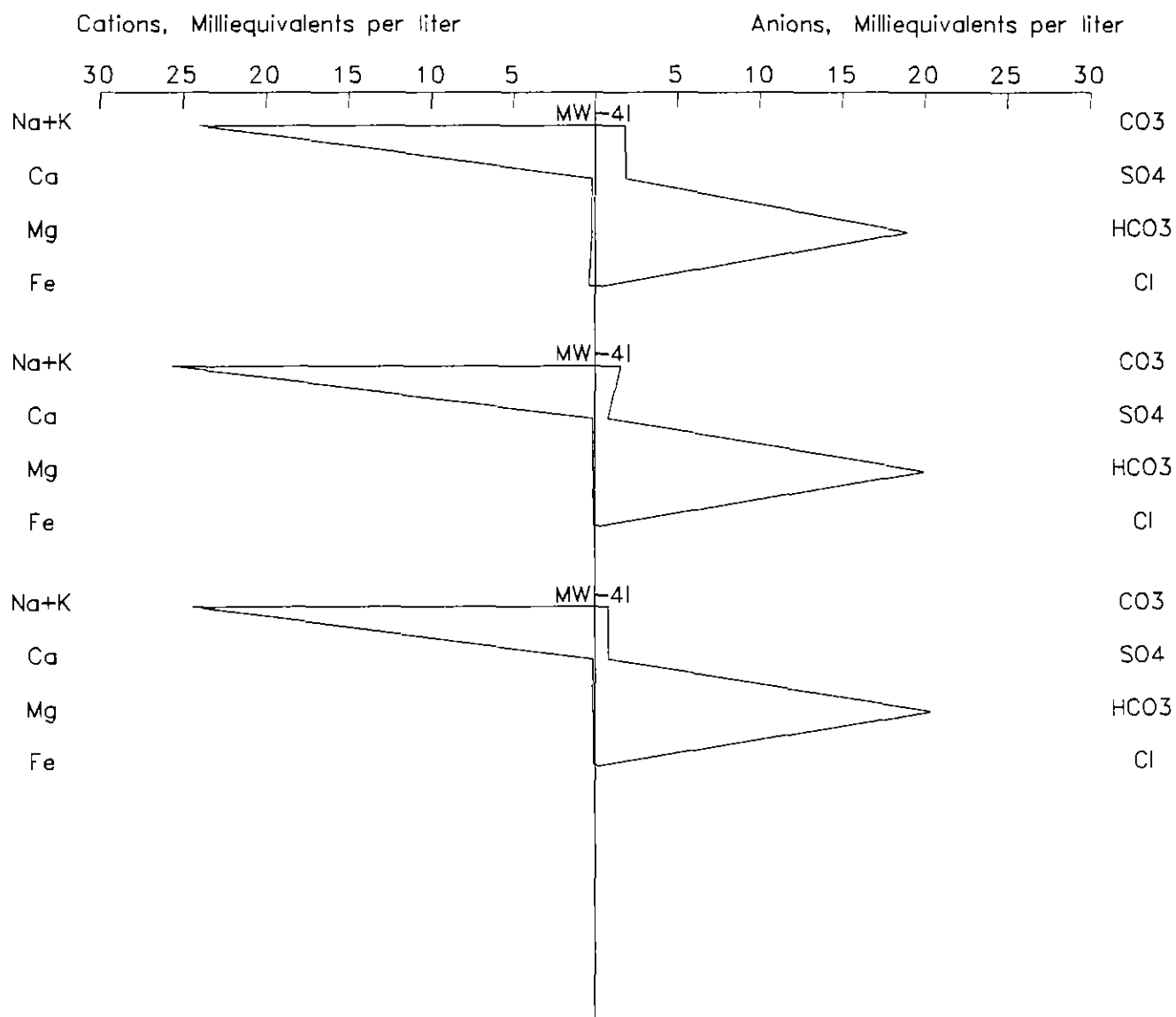
05/23/1696-A MW-4C

08/21/1696-B MW-4C

10/09/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-41	5/23/1996	24.06	0.20	0.16	0.38	1.80	1.87	18.95	0.28
MW-41	8/21/1996	26.68	0.14	0.10	0.04	1.57	0.83	19.93	0.17
MW-41	10/9/1996	24.37	0.14	0.09	0.06	0.87	0.83	20.39	0.17



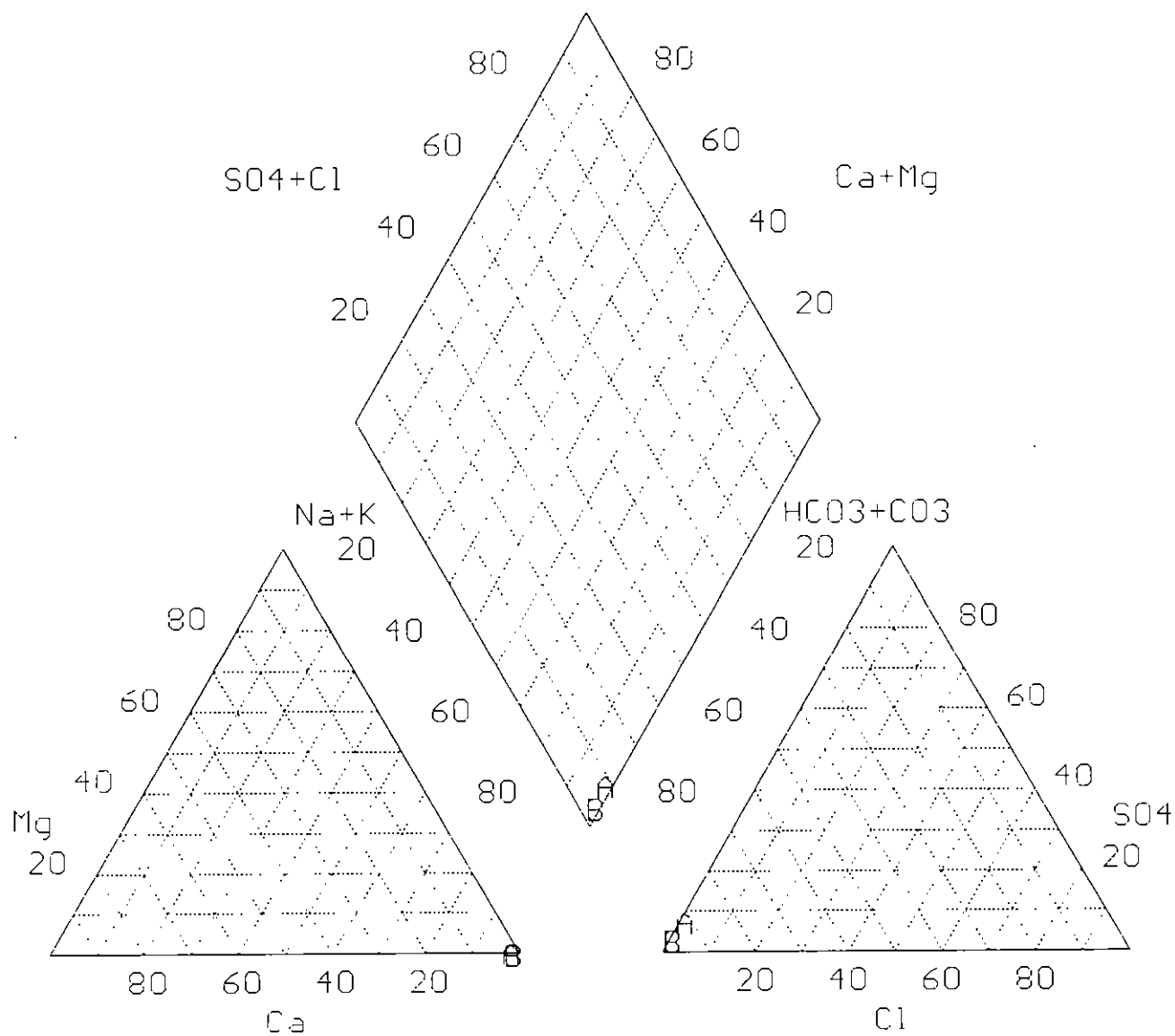
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MW-4I

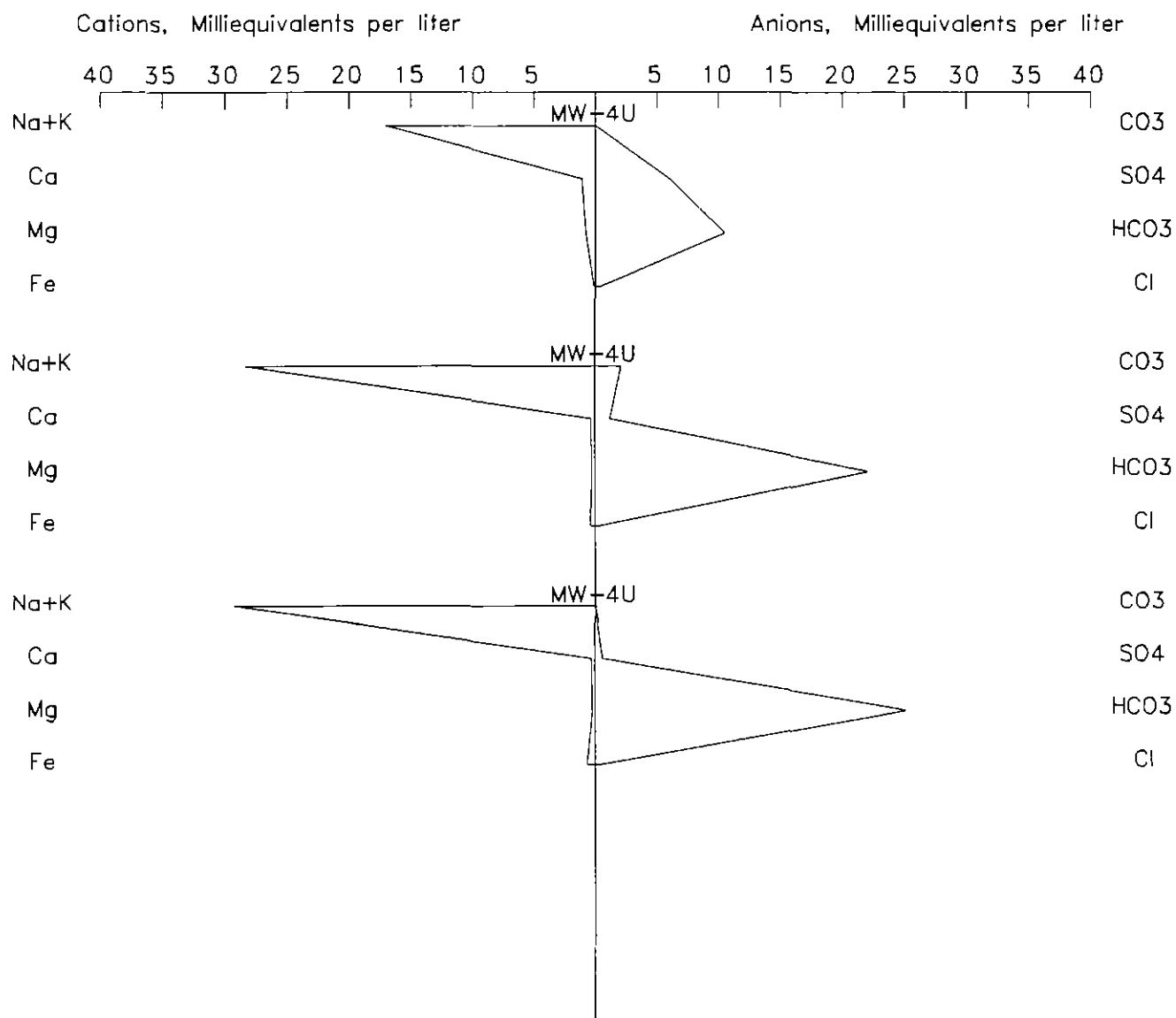
05/23/1696-A MW-4I

08/21/1696-B MW-4I

10/09/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-4U	5/22/1996	17.06	1.06	0.72	0.08	0.07	6.04	10.47	0.37
MW-4U	8/21/1996	28.36	0.32	0.24	0.37	2.13	1.25	22.08	0.20
MW-4U	10/9/1996	29.31	0.27	0.17	0.63	0.07	0.62	25.11	0.31



GW-3-35

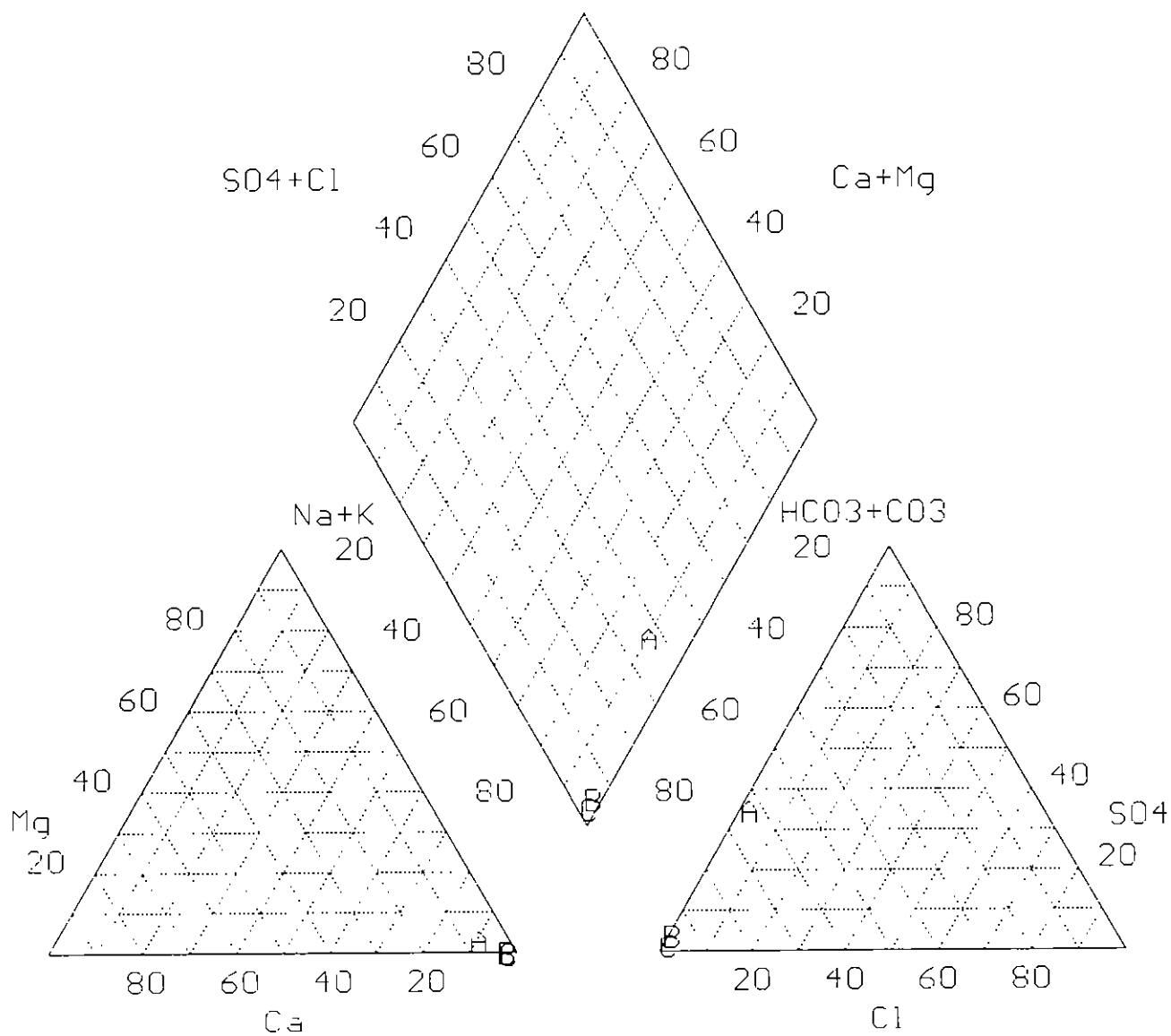
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MW-4U

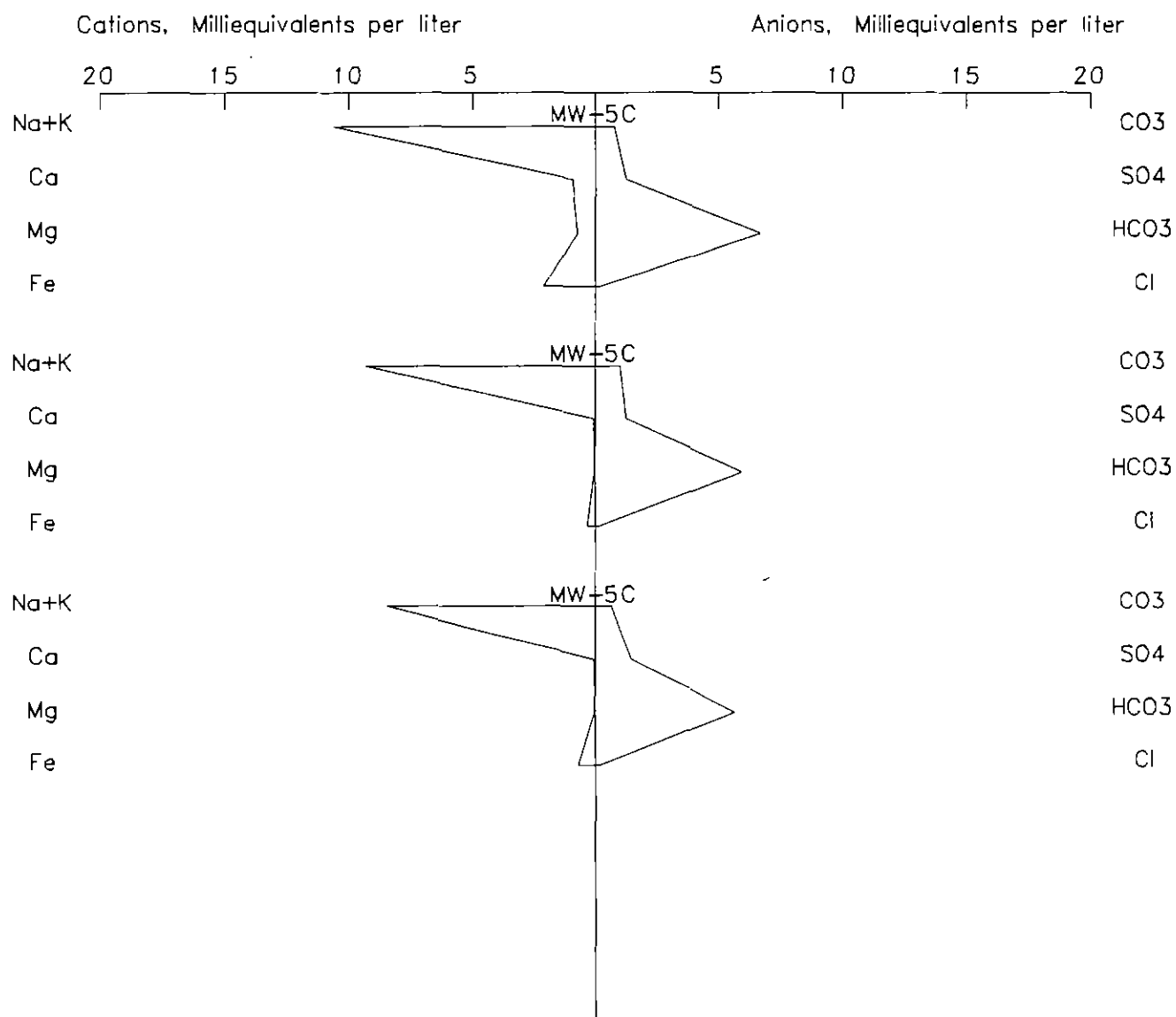
05/22/1696-A MW-4U

08/21/1696-B MW-4U

10/08/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-5C	7/19/1696	10.68	0.91	0.71	2.09	0.77	1.25	6.69	0.14
MW-5C	8/22/1696	9.33	0.06	0.02	0.32	1.03	1.25	5.93	0.11
MW-5C	10/7/1696	8.50	0.07	0.02	0.68	0.67	1.46	5.62	0.14



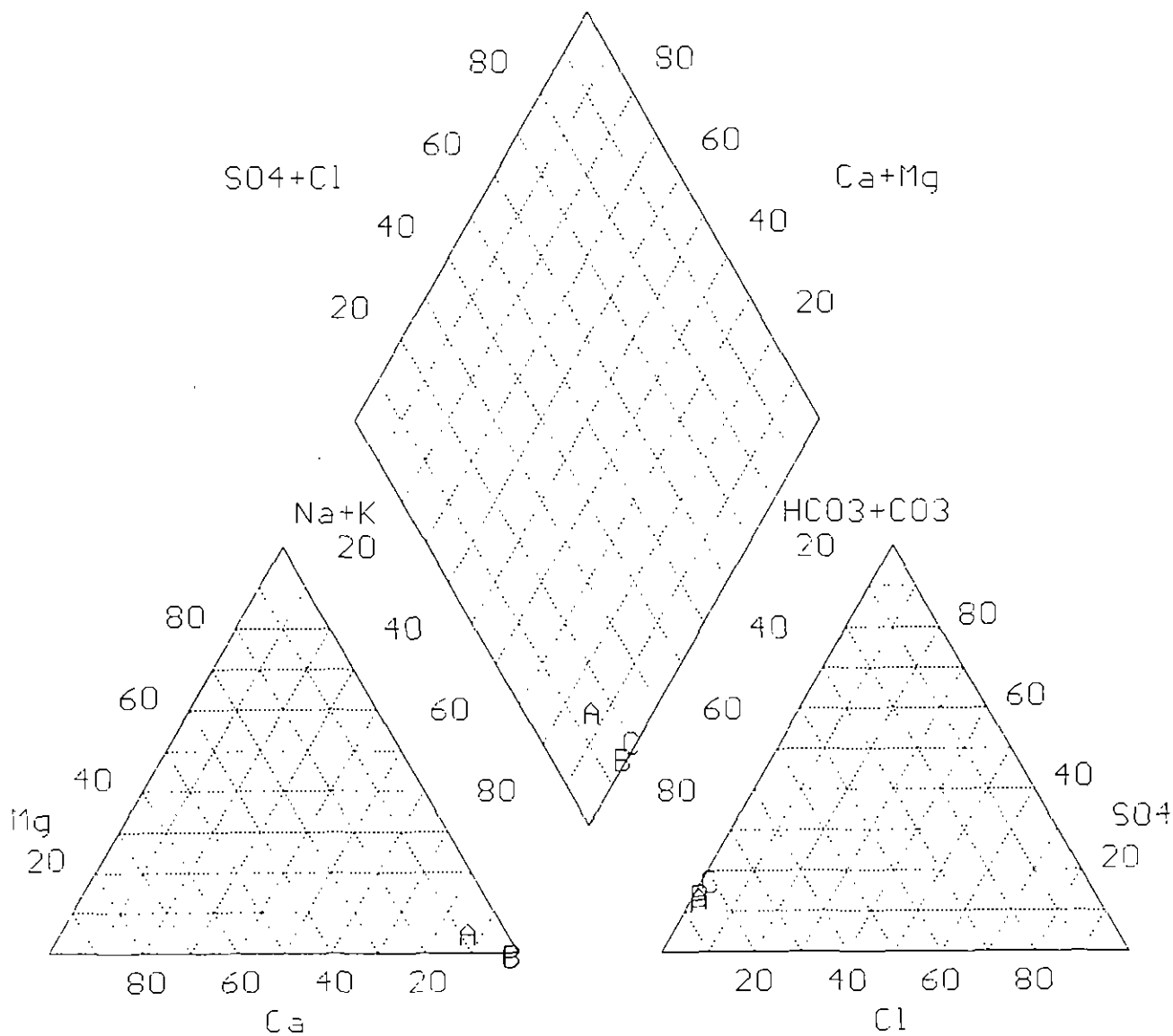
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11W-5C

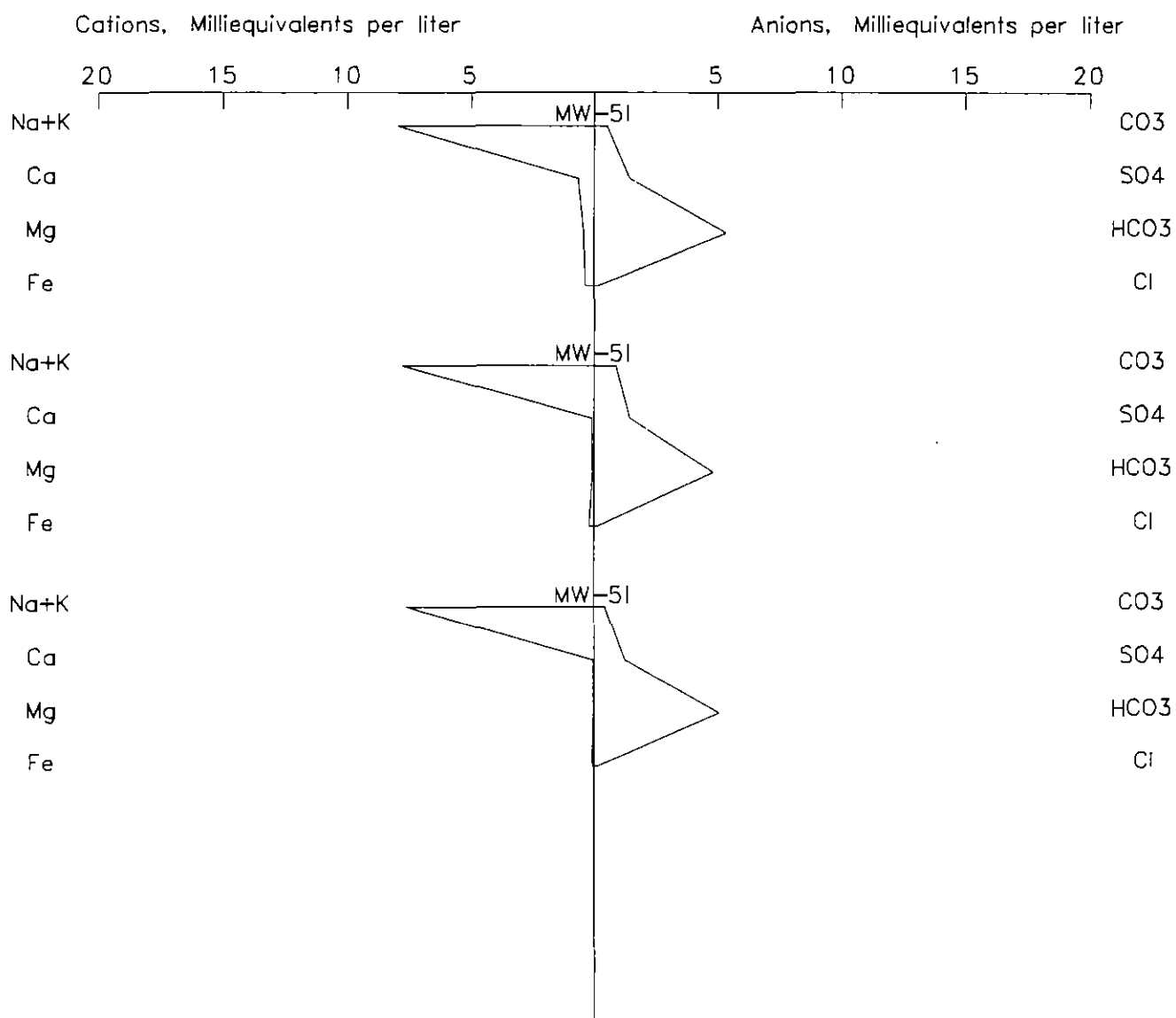
07/19/1696-A 11W-5C

08/22/1696-B 11W-5C

10/07/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-51	7/19/1996	8.01	0.64	0.41	0.34	0.93	1.96	5.33	0.14
MW-51	8/23/1996	7.81	0.08	0.05	0.19	0.90	1.46	4.80	0.08
MW-51	10/27/1996	7.63	0.05	0.02	0.07	0.47	1.25	5.03	0.11



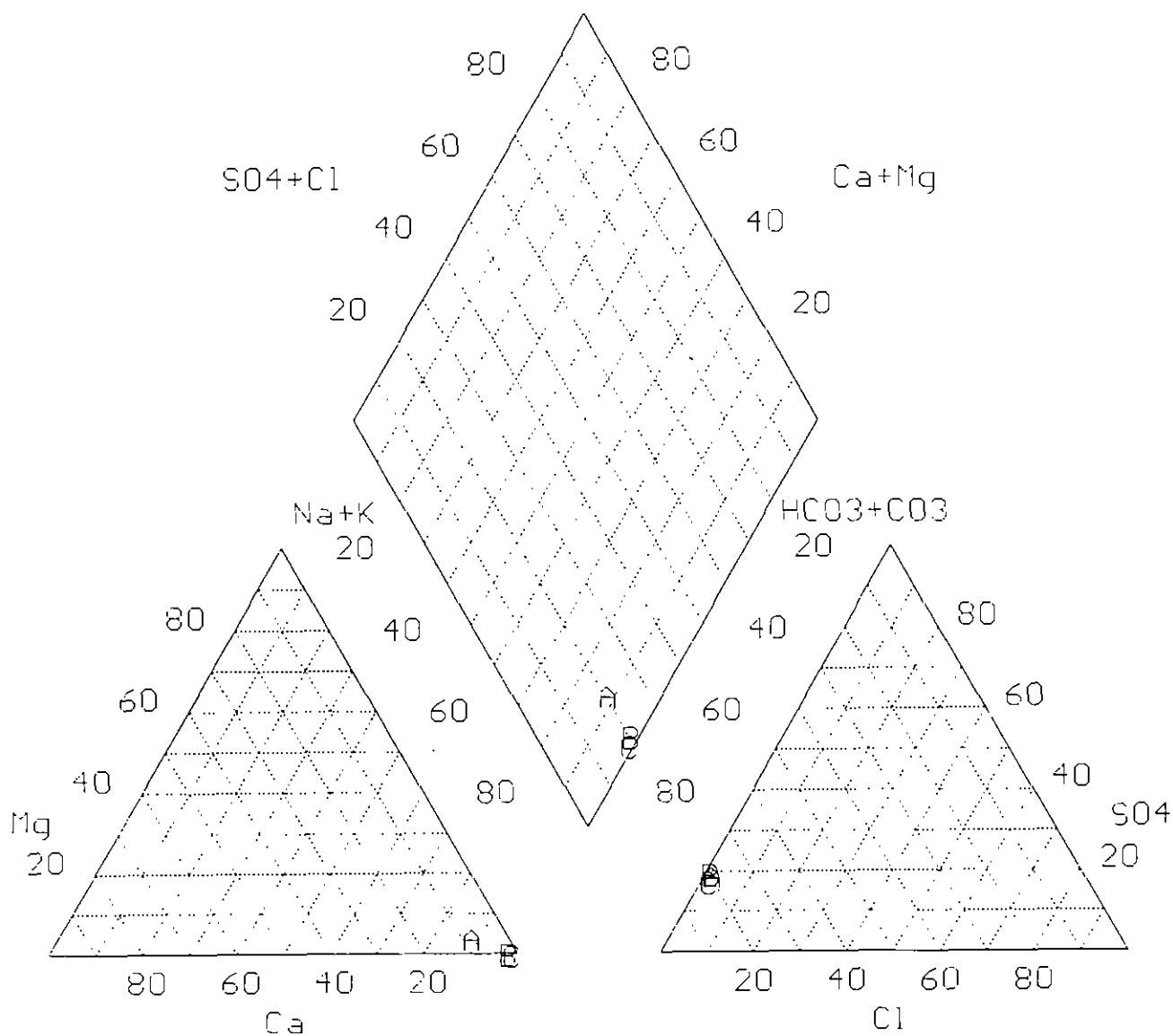
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11W-51

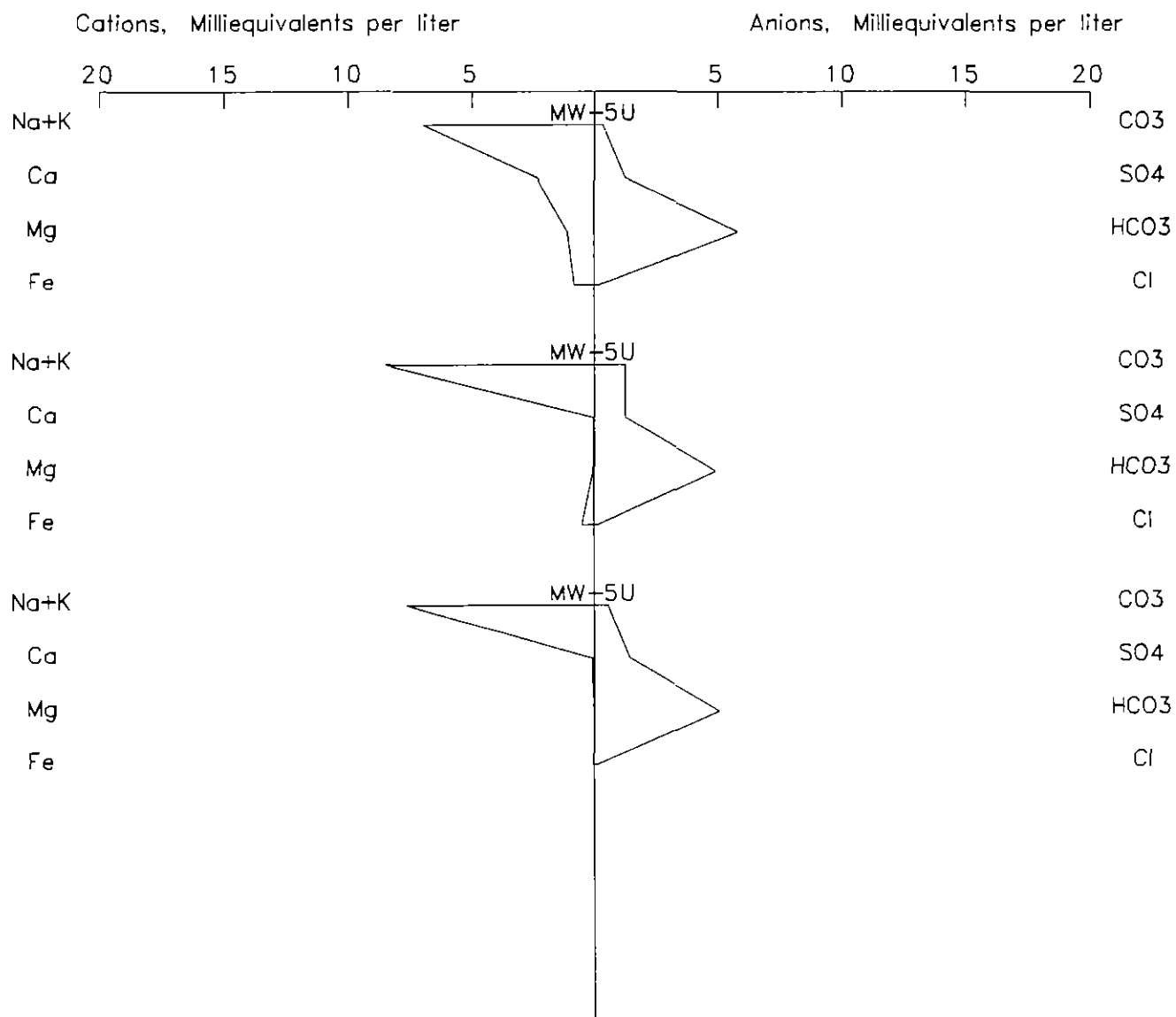
07/19/1696-A MW-51

08/23/1696-B MW-51

10/07/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-5U	7/18/1996	7.02	2.32	1.07	0.79	0.33	1.25	5.80	0.17
MW-5U	8/23/1996	8.50	0.05	0.02	0.49	1.27	1.25	4.93	0.11
MW-5U	10/7/1996	7.63	0.06	0.02	0.04	0.57	1.46	5.05	0.11



GW-3-41

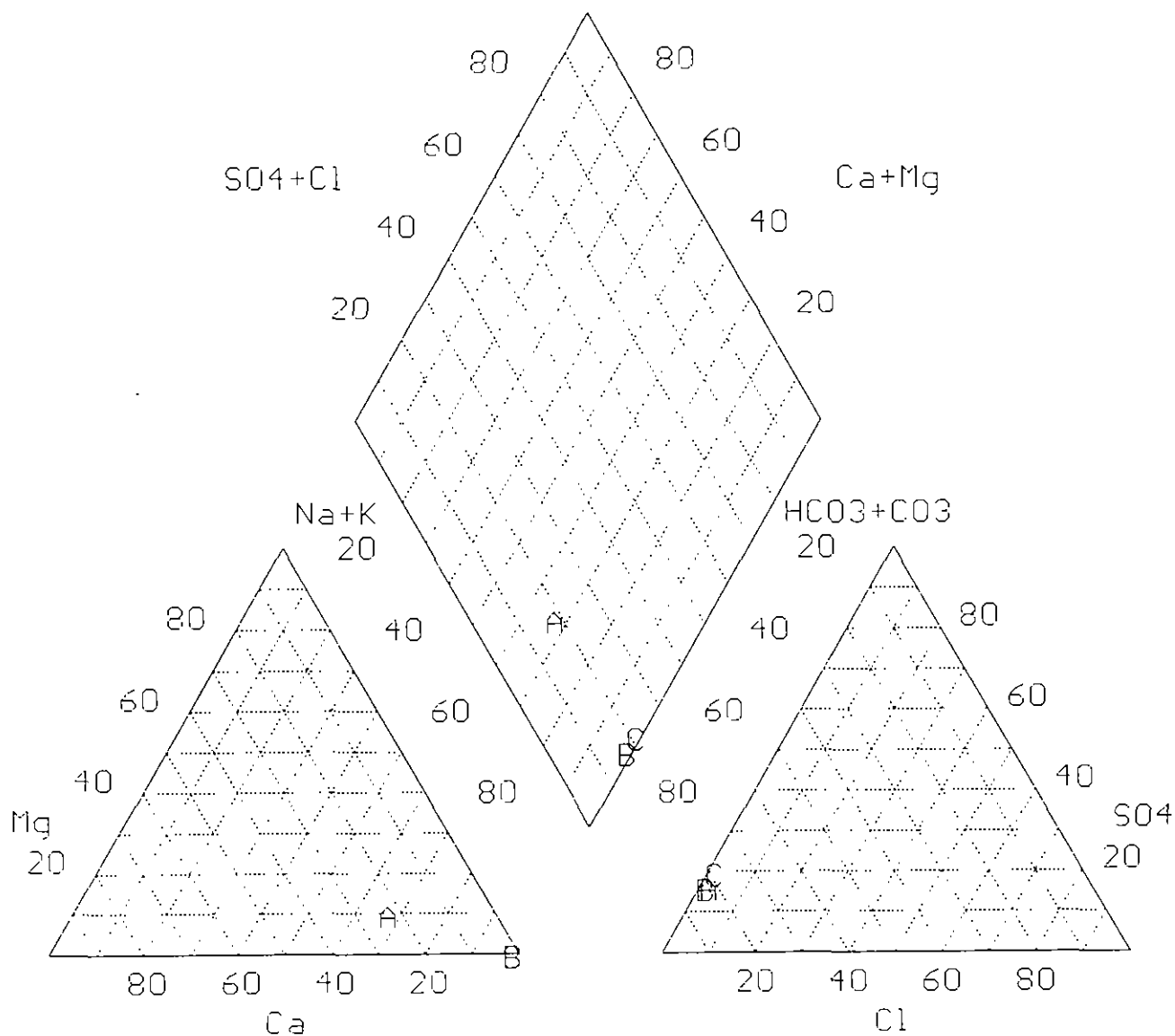
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MW-5U

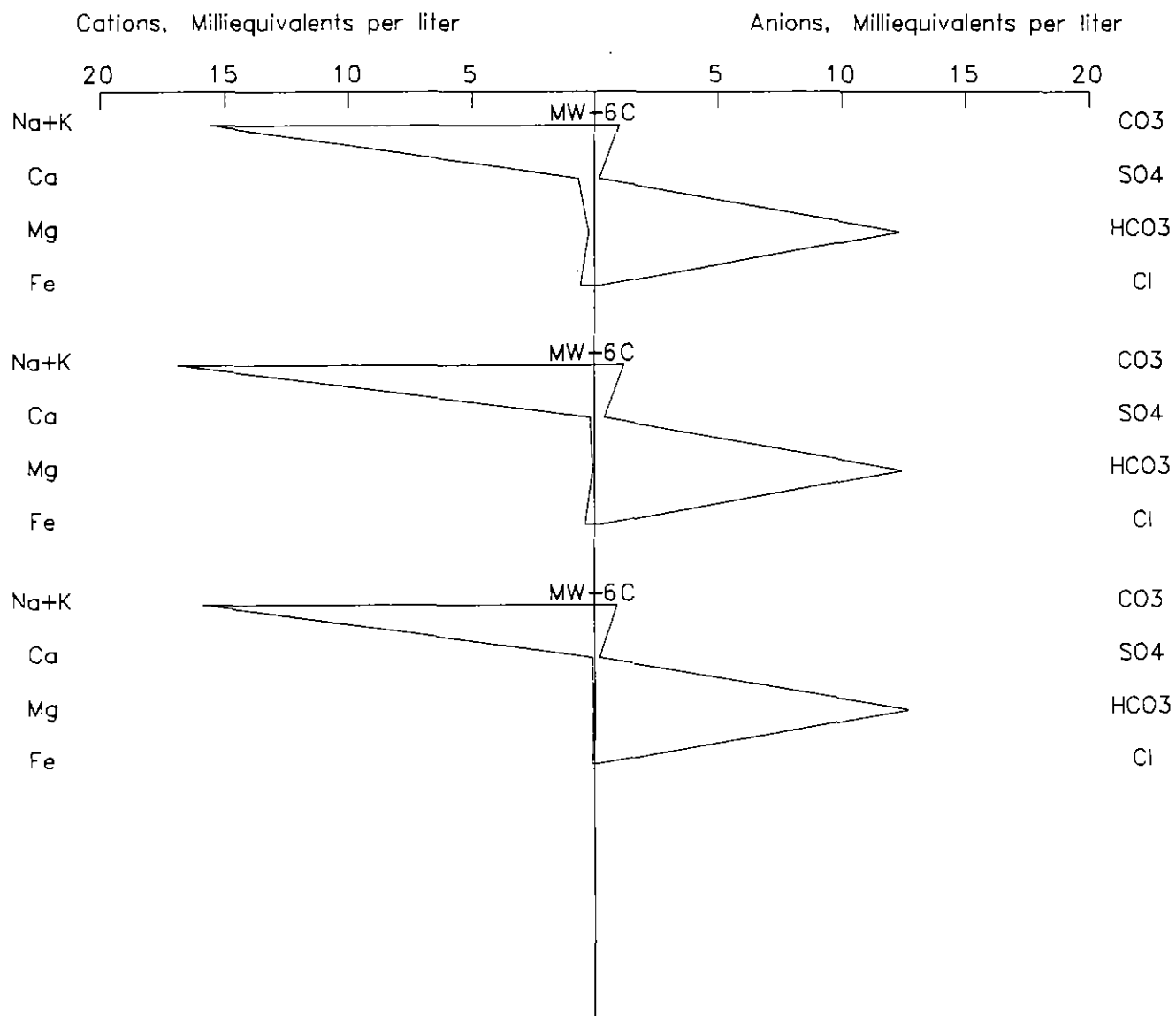
07/18/1696-A MW-5U

08/23/1696-B MW-5U

10/07/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-6C	7/19/1696	15.60	0.63	0.24	0.57	1.00	0.21	12.33	0.11
MW-6C	8/22/1696	16.84	0.16	0.07	0.39	1.20	0.42	12.44	0.11
MW-6C	10/8/1696	15.86	0.08	0.04	0.03	0.93	0.21	12.69	0.11



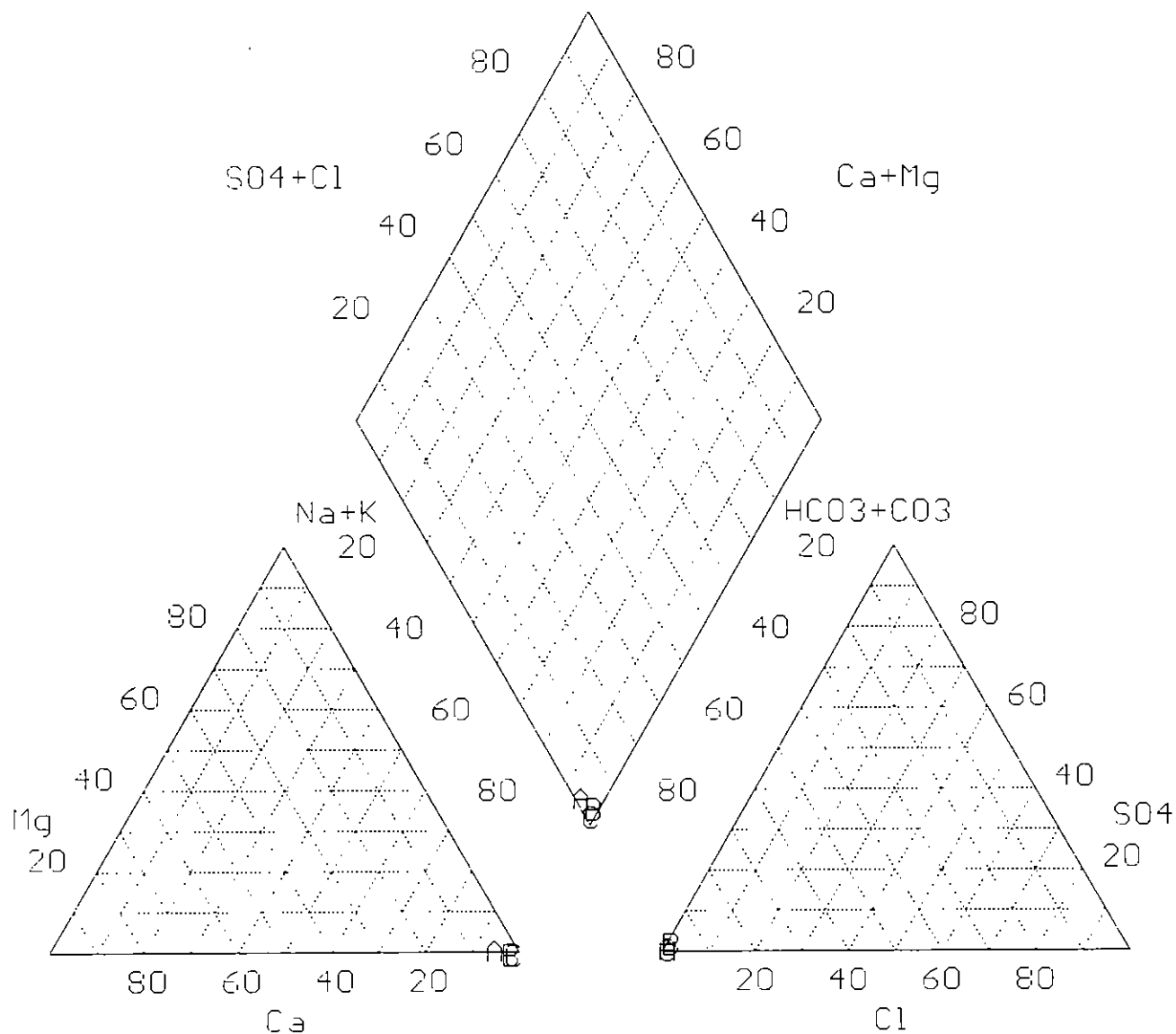
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MW-6C

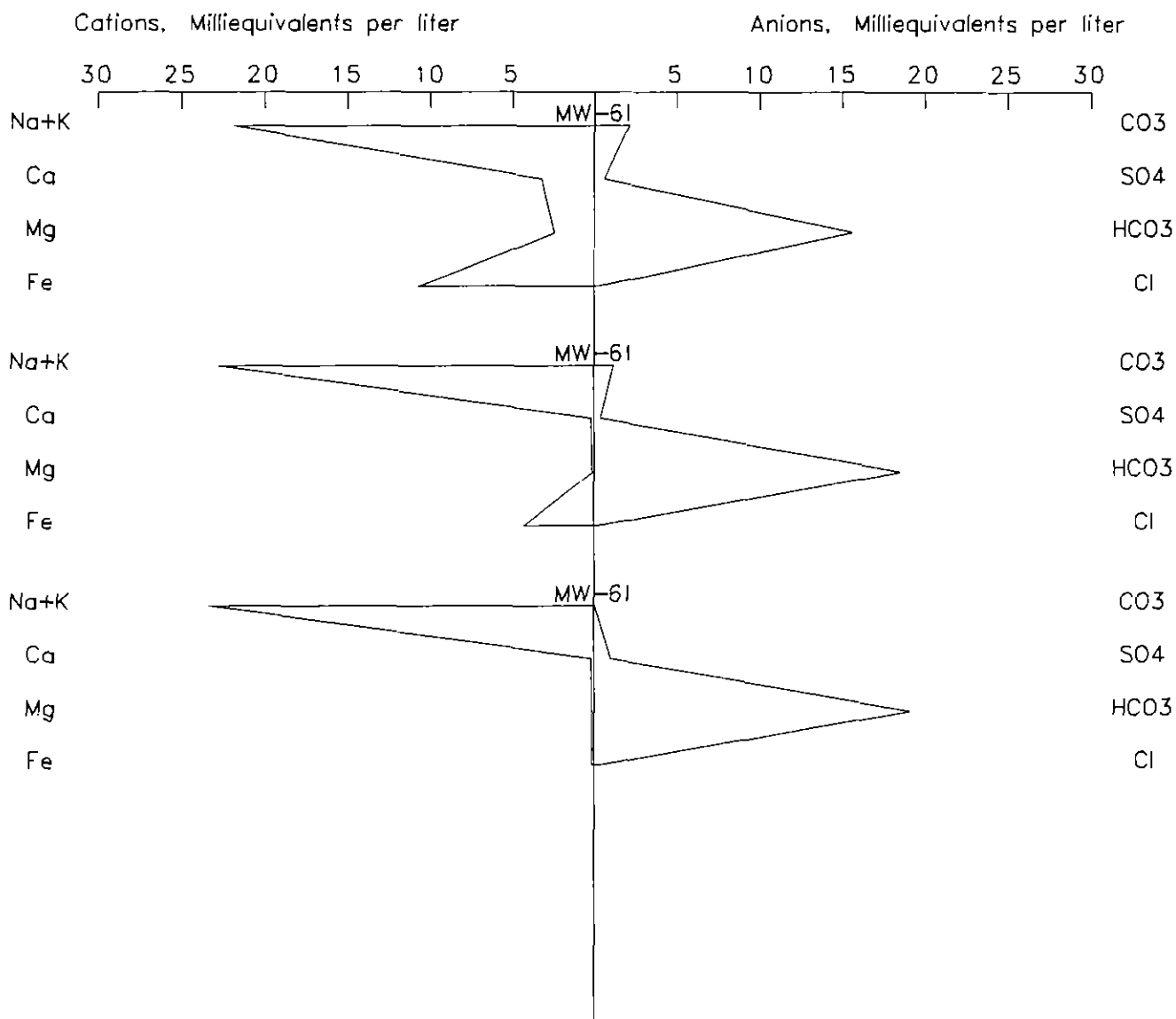
07/18/1696-A MW-6C

08/22/1696-E MW-6C

10/08/1696-C



Sample Name	Date	Na+K	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-61	7/16/1996	21.90	3.18	2.43	10.21	2.13	0.62	15.60	0.17
MW-61	8/22/1996	22.26	3.17	3.11	4.36	1.20	0.42	18.49	0.14
MW-61	10/7/1996	23.33	0.17	0.12	0.13	0.07	1.04	19.08	0.23



MW-61

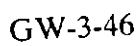
07.16.1696-A

MW-51

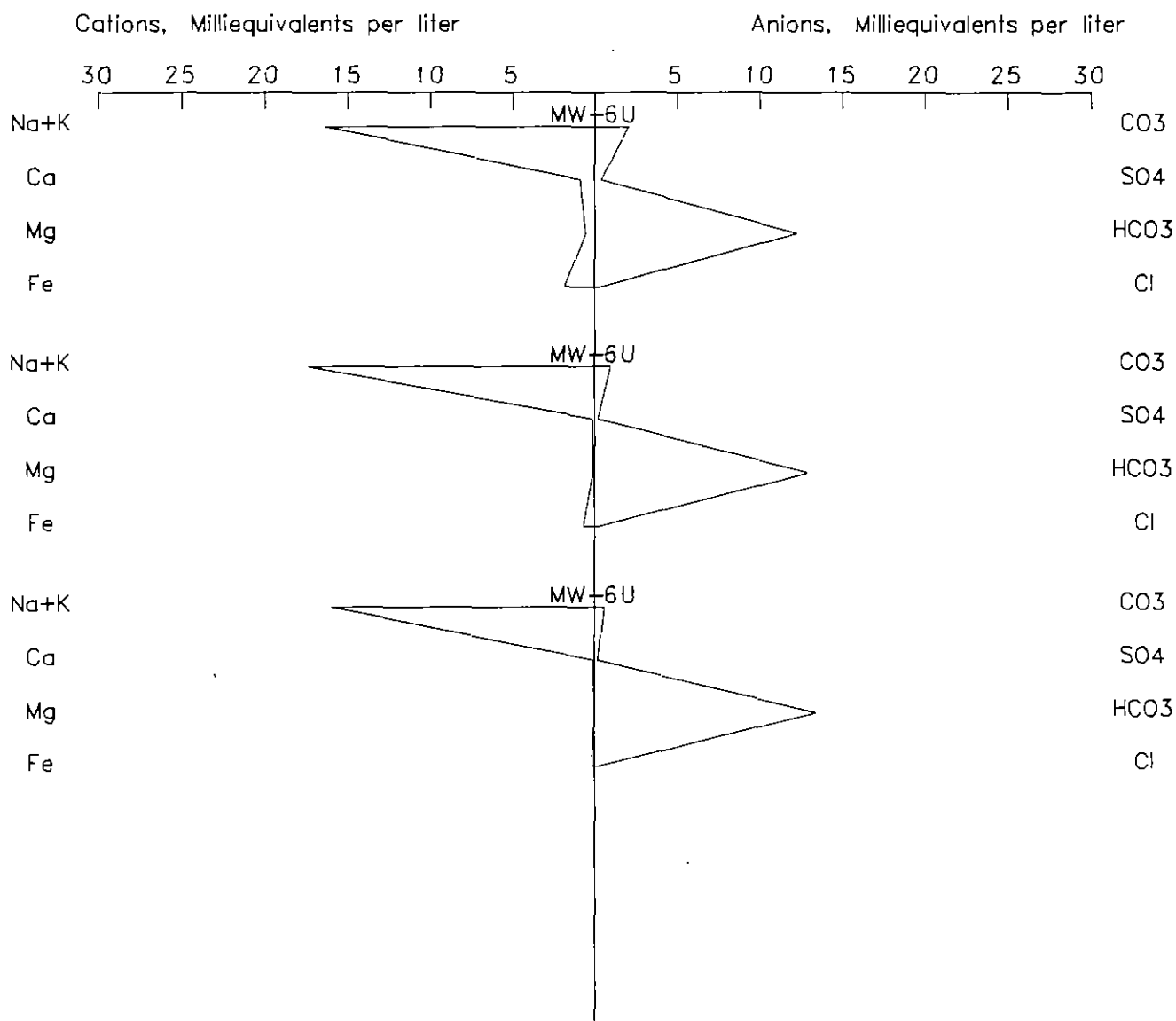
08/22/1636-E

MIJ-61

10/07/1636-C



Sample Name	Date	Na+V	Ca	Mg	Fe	CO3	SO4	HCO3	Cl
MW-6U	7/18/1696	16.46	0.86	0.54	1.81	2.07	0.42	12.19	0.25
MW-6U	8/22/1696	17.45	0.14	0.07	0.69	1.00	0.21	12.92	0.11
MW-6U	10/7/1696	16.04	0.07	0.03	0.14	0.60	0.21	13.37	0.11



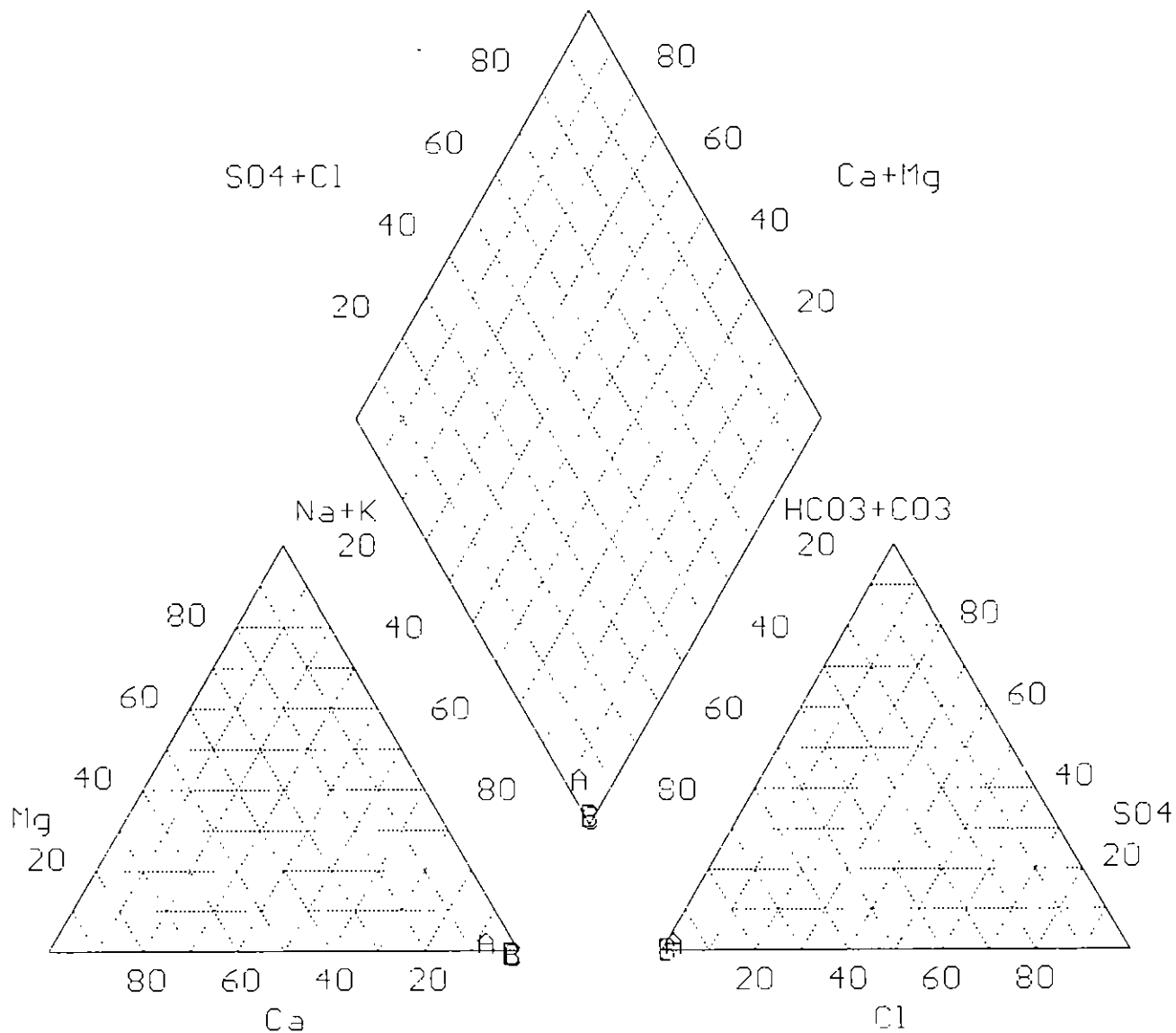
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MW-6U

07/18/1696-A MW-6U

08/22/1696-B MW-6U

10/07/1696-C





Doc Date:12/11/2001

Vol. 3

"EXHIBIT 7, **APPENDIX GW-4,**
REGIONAL GROUNDWATER ELEVATION DATA "

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level, (from Ground Level)	Altitude of Water Level
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371435104521801	7310	49.78	7260
372220105061401	8570	3.09	8567
372240104451401	6895	31.42	6864
372316104454701	7056	12.22	7044
372347104460001	7200	39.21	7161
372401105050801	8130	7.56	8122
372421104485801	7630	39.17	7591
372500104465401	7152	47.17	7105
372610104435501	7098	55.81	7041
372733105041401	7800	3.42	7797
372853105013601	7235	6.40	7229
372923105030201	7358	22.00	7309
372950105014301	7180	42.09	7138
373058104475301	6695	24.35	6671
373116104483901	6836	42.38	6794
373220104471301	6475	23.03	6452
373412104491801	6560	53.16	6507
373426104465301	6288	17.16	6271
373820104460001	6898	38.27	6860
373859104583001	6797	18.40	6779
373951105070301	7560	51.96	7508
374025105031801	7170	13.63	7156
374105104220001	6600	16.63	6583
374222104523601	6280	27.50	6253
374236104511501	6200	35.01	6165
374253104501001	6159	42.32	6117
374338105004801	6432	9.91	6422
374445104512701	6050	14.77	6035
375715104530901	6403	18.09	6385
372408105070001	8080	3.33	8077

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level (from Ground Level)	Altitude of Water Level
372415105072101	8300	2.47	8298
372835105030601	7408	98.26	7310
372925105022901	7285	37.00	7248
372935105021501	7245	32.75	7212
373147104585101	6880	25.47	6855
373153104594701	7002	12.25	6990
373213104592801	6895	25.58	6869
373240104533101	6741	439.00	6302
373251104574201	6838	9.08	6829
373301104594201	7030	32.98	6997
373431104574901	6823	30.06	6793
373534104583801	6770	37.22	6733
373535104573201	6880	53.42	6827
373535104595401	7024	38.21	6986
373538104583101	6900	42.90	6857
373539104585201	6946	39.69	6906
373652104574001	6960	35.72	6924
373835105011301	7055	26.72	7028
374044104504101	6252	31.05	6221
374155104581801	6480	18.84	6461
372402104550701	8360	5.41	8355
372748104541501	7600	40.18	7560
372800104590001	7480	4.44	7456
372825104534501	7404	25.84	7378
372917104590001	7240	18.95	7221
372918104560301	7720	62.50	7657
372944104590601	7161	6.00	7155
373005105022701	7120	8.94	7111
373012104525001	7150	9.06	7141

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level (from Ground Level)	Altitude of Water Level
373028105003201	7018	8.02	7010
373030105062301	7400	22.19	7378
373047105004401	6980	5.13	6975
373115105024701	7180	7.10	7173
373117105011301	7080	10.37	7070
373120105013001	7159	31.89	7127
373132105020301	7198	47.40	7151
373208104494401	6798	21.50	6777
373232105013401	7270	56.58	7213
373233105020201	7328	72.93	7255
373233105022701	7349	40.73	7308
373328104505701	6570	16.87	6553
373330105012901	7200	13.19	7187
373331105041401	7680	32.23	7648
373356105000201	7058	17.56	7030
373424105011501	7191	9.49	7182
373503105000501	7270	22.30	7248
373527104475501	6362	10.14	6352
373536105013101	7160	39.41	7121
373629105013001	7154	24.87	7129
372603104470101	7030	223.12	6807
372252104382301	6660	14.64	6645
372407104381001	6345	21.73	6322
372806104395101	6500	47.15	6453
372900104403501	6440	21.90	6418
372941104411801	6660	59.53	6600
372942104423601	6545	34.29	6511
373558104403001	7320	230.00	7090
370816104485301	6839	24.88	6814

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level (from Ground Level)	Altitude of Water Level
370829104575501	7515	102.38	7413
370919104381201	6600	23.02	6577
370933104481501	7138	16.14	7122
370940104471301	6800	13.57	6786
371020104503801	7444	12.75	7431
371031104475201	6923	15.48	6908
371033104390301	6590	18.06	6572
371042104510701	7510	36.79	7473
371102104423301	6790	29.82	6760
371103104423401	6800	30.55	6769
371130104390801	6650	31.43	6619
371133104550201	7672	68.61	7603
371134104455201	7170	12.09	7158
371200104385801	6730	25.02	6705
371216104580501	7720	31.27	7689
371218104411801	6842	70.20	6772
371227104512001	7461	21.27	7440
371237104390501	6780	31.16	6749
371237104473501	7256	10.08	7246
371241104415201	6900	14.40	6886
371244104474201	7346	38.99	7307
371246104390901	6790	16.18	6774
371251104450601	7360	42.24	7318
371258104575801	7845	3.83	7841
371323104440101	7117	21.12	7096
371340104515001	7534	42.70	7491
371343104482001	7570	42.60	7527
371346104460801	7205	17.78	7187

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level \ (from Ground Level)	Altitude of Water Level
371402104415501	7000	34.89	6965
371427104452901	7385	55.34	7330
371433104521301	7470	6.94	7463
371433104522001	7590	45.34	7545
371440104532401	7648	24.11	7624
371501104540001	7710	34.70	7675
371516104445701	7225	33.60	7191
371536104523701	7990	85.66	7904
371537104563601	8160	32.74	8127
371543104441301	7320	53.50	7267
371617104353001	6680	20.69	6659
371620104561001	8010	27.87	7982
371629104574301	8380	35.82	8344
371637104410501	7160	40.28	7120
371647104463701	7275	44.47	7231
371650104400201	7040	24.48	7016
371651104454501	7310	53.46	7257
371653104585401	8605	17.21	8588
371655104322001	6220	28.29	6192
371658104384601	6800	16.33	6784
371658104440901	7388	32.04	7356
371659104412201	7310	15.10	7295
371725104592101	8530	24.24	8506
371810104554001	8320	21.75	8298
371815104570001	8640	29.12	8611
371844104461001	6990	34.98	6965
371850104551301	8195	31.20	8164
371850104561101	8340	9.00	8331
371906104475301	7245	42.42	7203

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level (from Ground Level)	Altitude of Water Level
371908104544601	8250	35.53	8214
371915104303401	6005	35.70	5969
371918104493501	7440	12.05	7428
371923104545301	8190	25.36	8165
371940104542601	8114	6.50	8107
371954104435201	6810	27.67	6782
372000104452701	6946	39.36	6907
372009104560401	8580	5.86	8574
372011104531801	8100	9.95	8090
372019104350001	6266	43.93	6222
372020104340501	6190	53.20	6137
372035104385501	6620	21.60	6598
372052104541001	8640	83.10	8557
372119104432401	6850	33.50	6817
372154104362201	6134	32.09	6102
372216104420501	6610	20.14	6590
372226104442001	6790	34.57	6785
372254104304901	6015	22.92	5992
372544104425901	7240	52.47	7198
372751104500601	7178	15.47	7163
372759104495001	7135	23.50	7112
372804104401201	6505	36.87	6468
372842104462601	6836	21.70	6814
372918104461101	6830	15.06	6815
372922104463501	6850	20.68	6829
372924104493601	6955	8.46	6947
372928104472901	6955	46.74	6907
372954104511301	7075	21.63	7053
372957104490501	6850	46.09	6804
373128104435701	6530	122.92	6407

USGS Site ID. No. (Latitude - Longitude)	Altitude (Ground Level)	Water Level \ (from Ground Level)	Altitude of Water Level
373909104364101	6300	13.26	6287
370347104485101	6980	5.00	6975
370418104450501	6710	17.97	6692
370450104473501	6860	21.91	6838
370601104485701	6980	28.07	6952
370602104471701	6740	23.83	6716
371440104461801	7360	6.62	7353
370010105032601	9040	1.00	9039
370038105015801	8660	3.40	8657
370345105030801	8440	13.16	8427
370522104444101	7140	18.35	7122
370603104425901	6740	53.26	6687
370614104285701	6506	22.94	6483
370648104433401	6820	19.08	6801
370657105032101	8340	19.95	8220
370743105030301	8200	28.79	8171
370756105030401	8180	17.00	8163
370802105030601	8220	14.20	8206
370904105021301	7920	9.12	7908
371105105005501	8220	8.43	8212
371200105025801	8640	1.99	8638
371334105025901	8740	16.58	8733
372531104585601	8195	12.53	8182
370746104374701	6240	19.00	6221
371140104530302	7280	278.64	7001
371200104385601	6730	24.87	6705
371507104535801	7750	360.00	7390
371700104472401	7510	277.41	7233
372725104441602	7000	351.55	6648
372922104445801	6860	172.56	6687



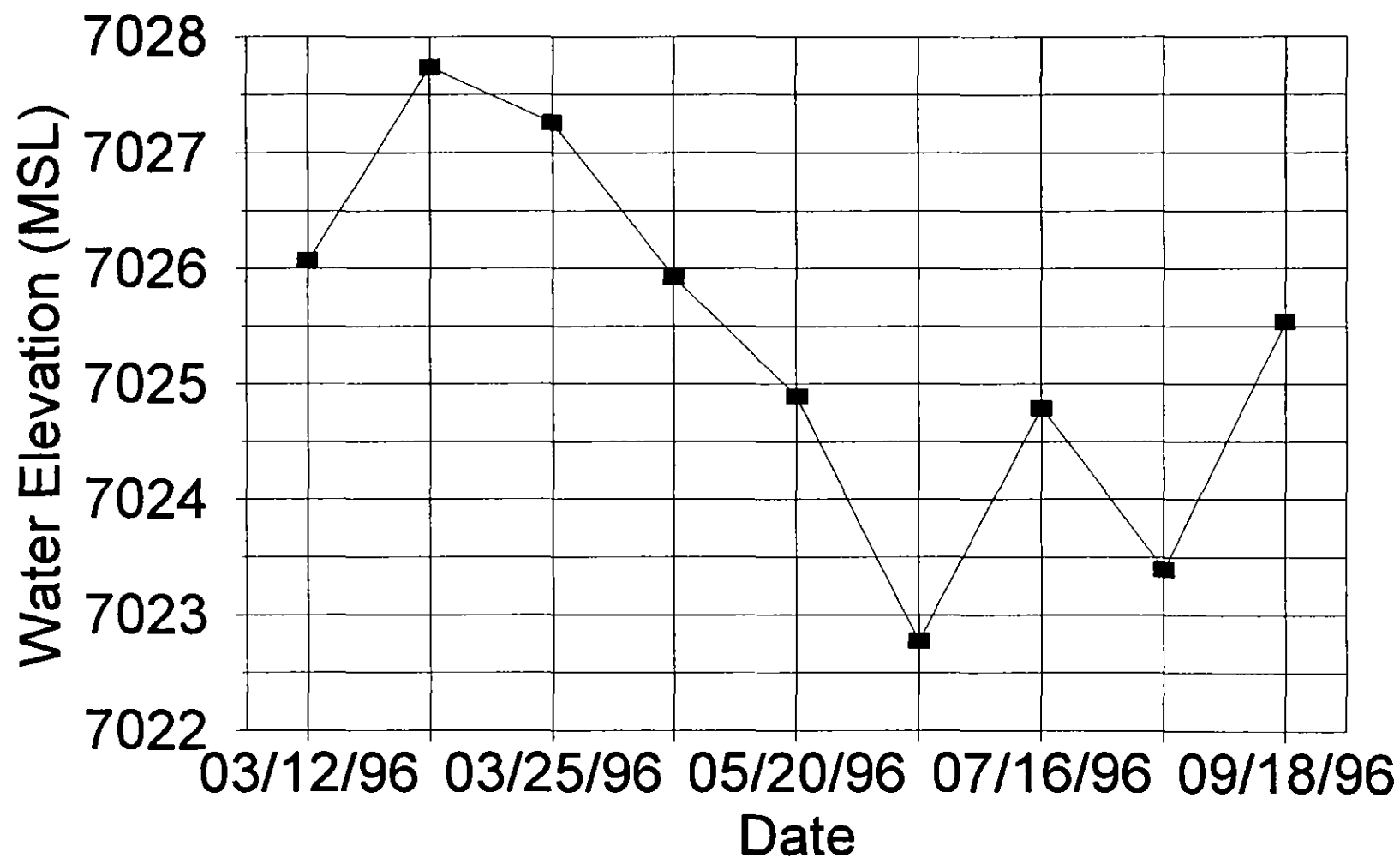
999

Doc Date:12/11/2001

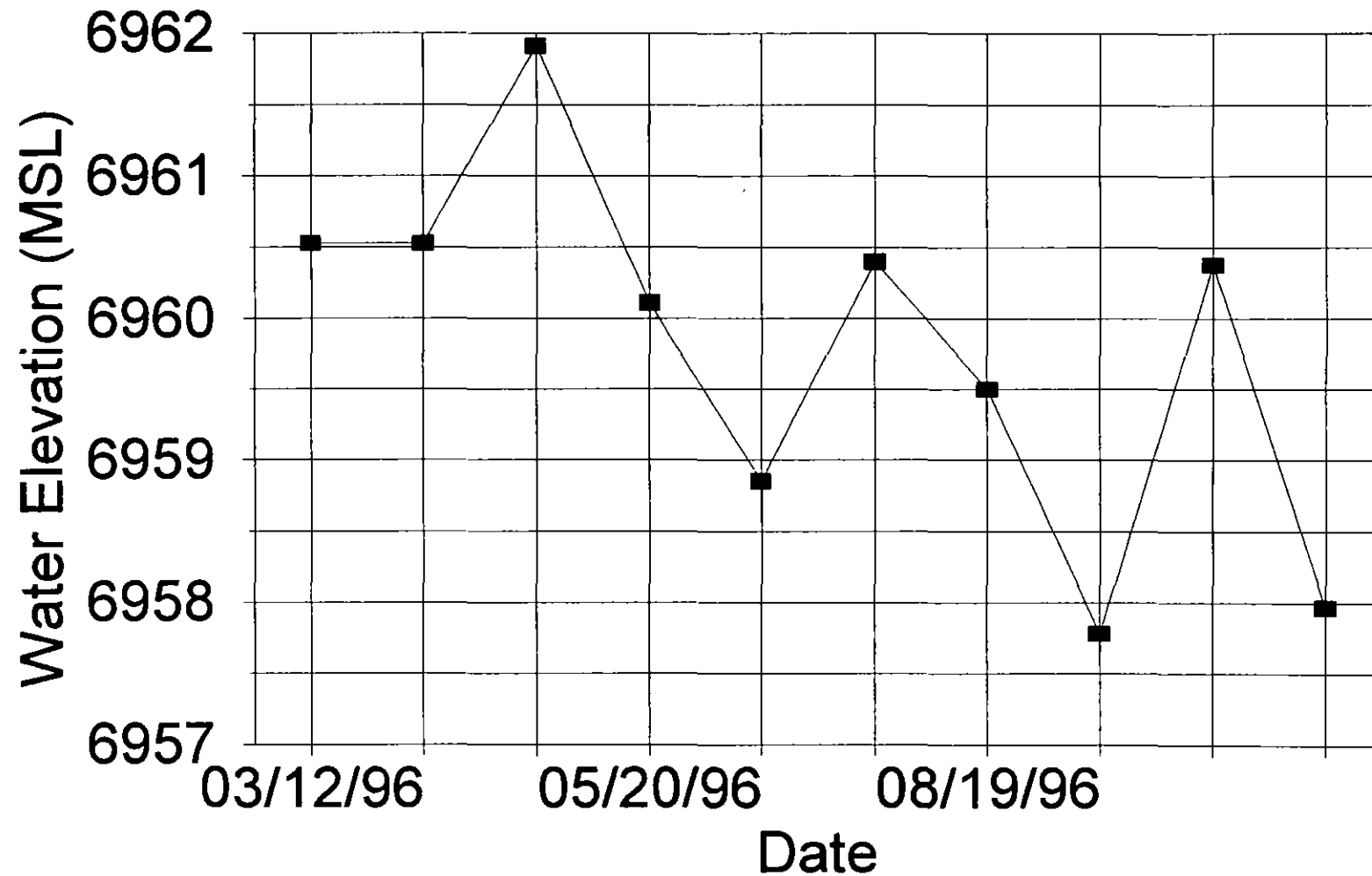
VOL. 3

S/E "EXHIBIT 7, APPENDIX GW-5,
ALLUVIAL WELL HYDROGRAPHS"

MWAC1 Water Levels

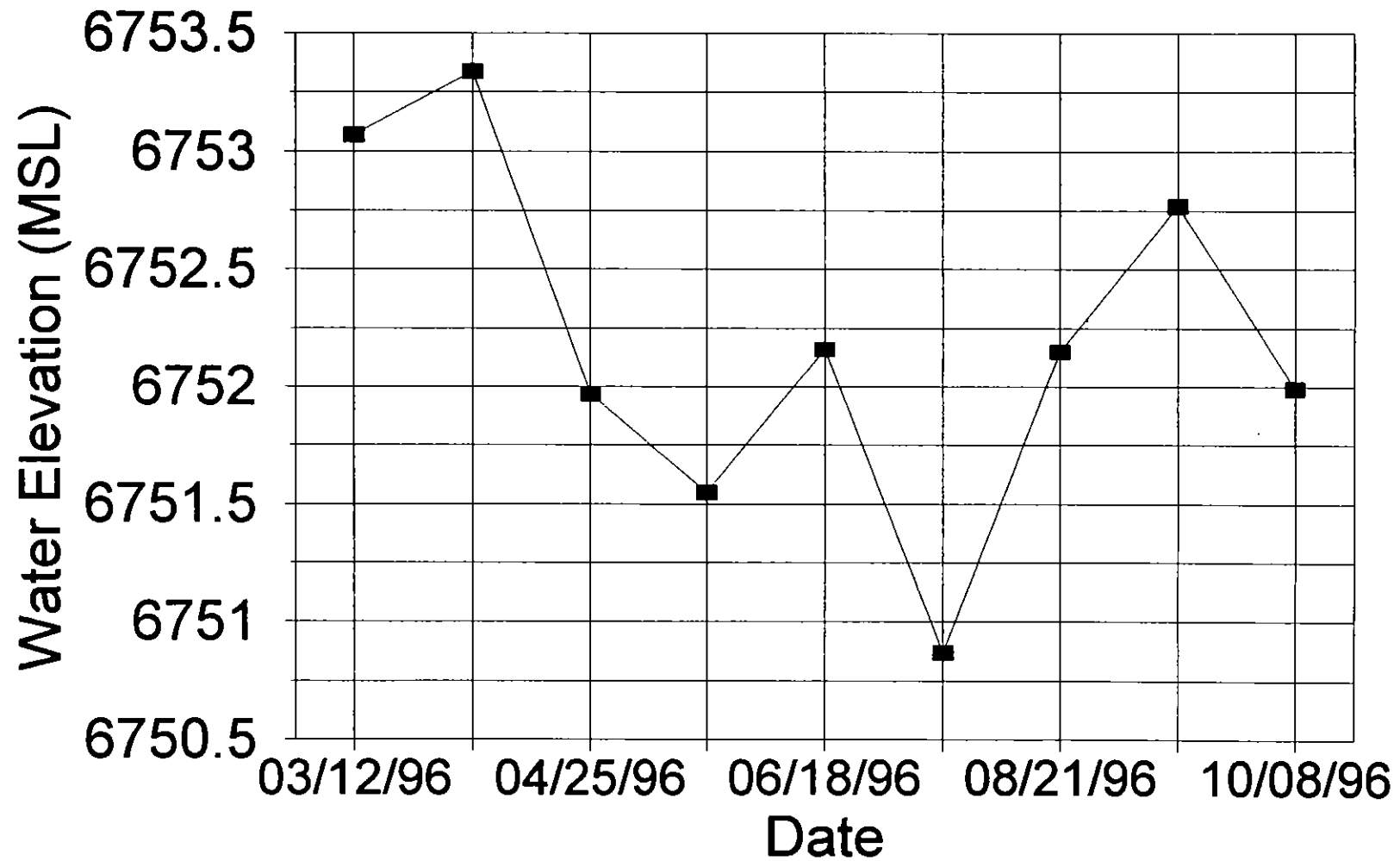


MWCC1 Water Levels



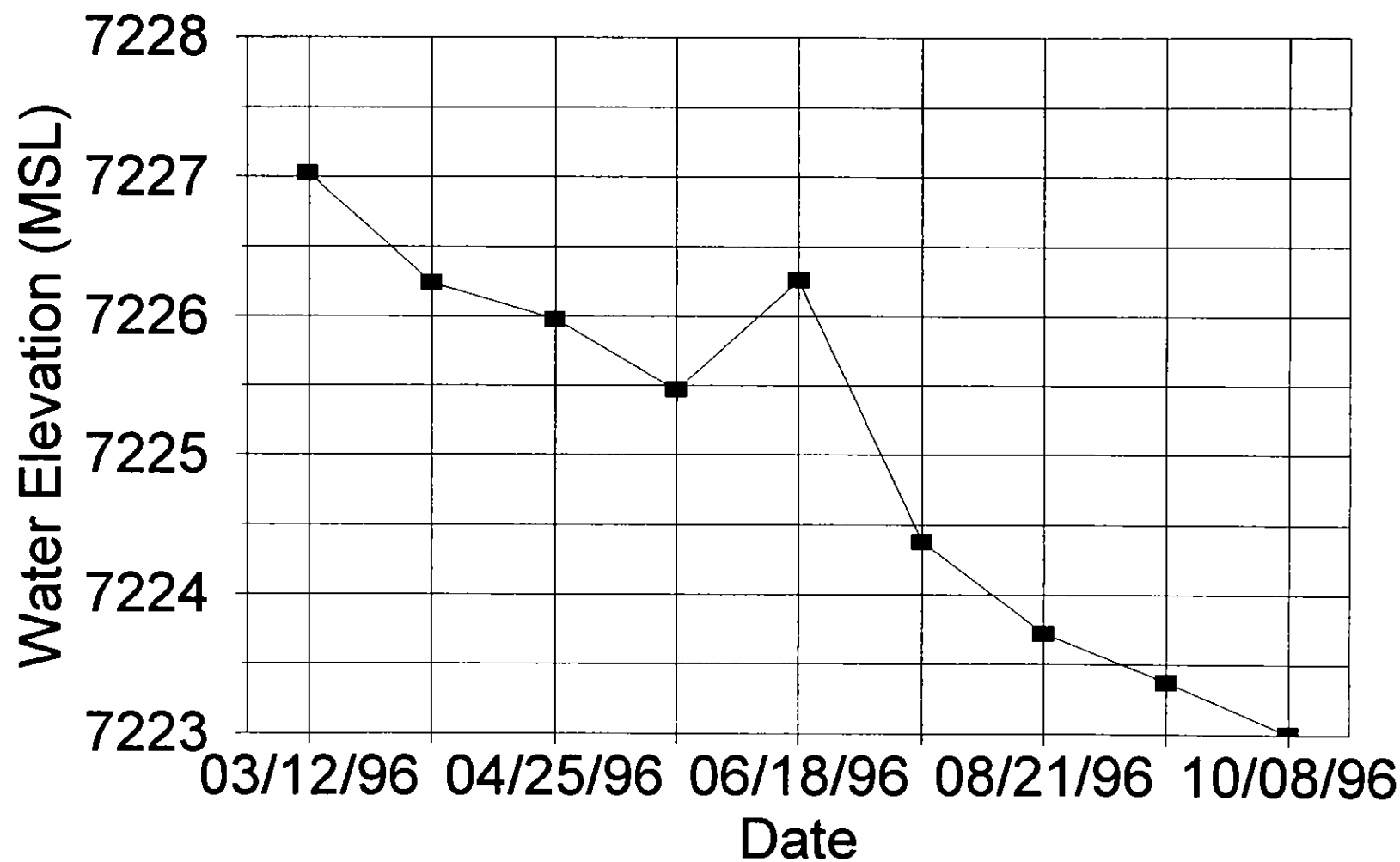
GW-5-2

MWCWC1 Water Levels

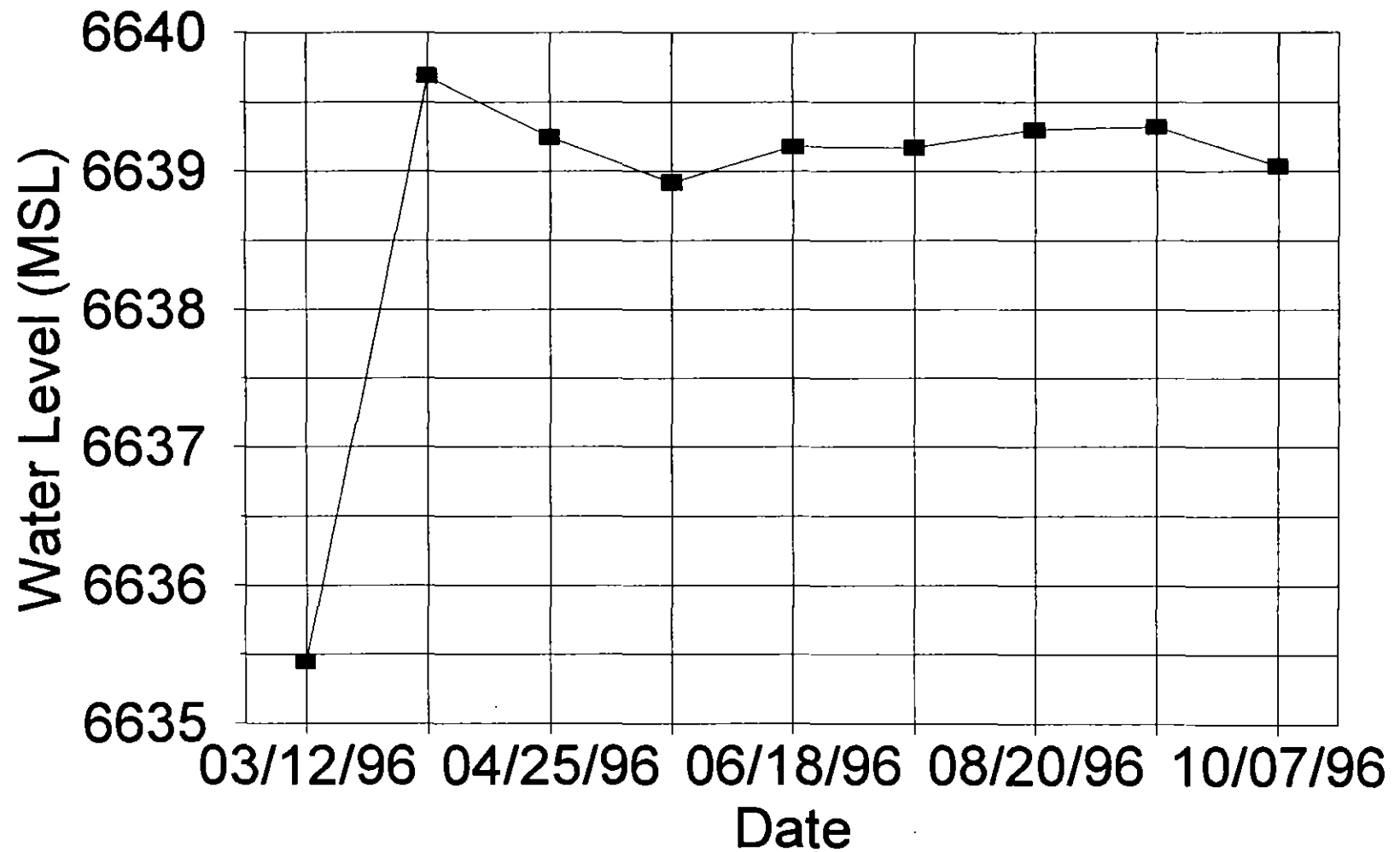


GW-5-3

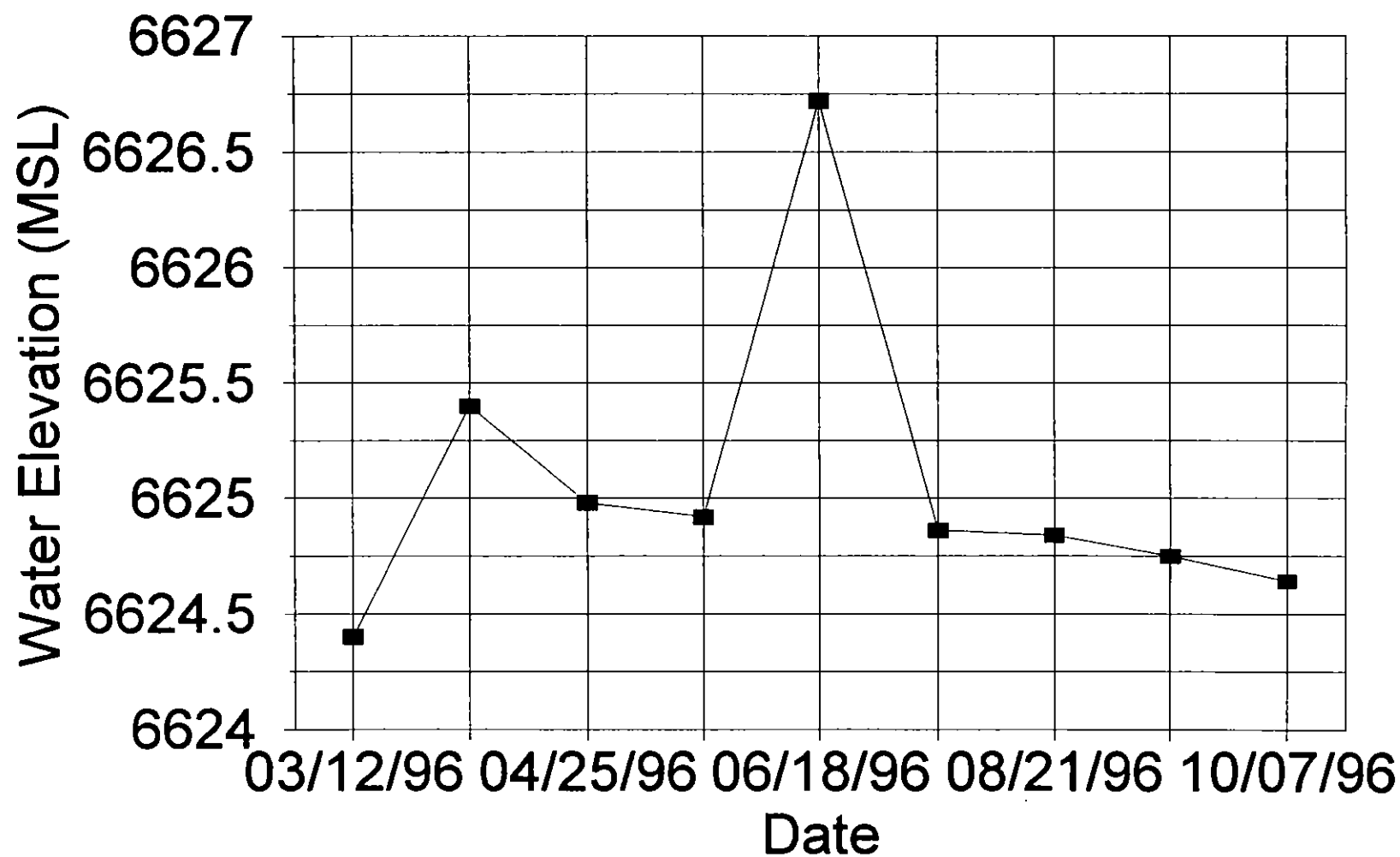
MWCWC2 Water Levels



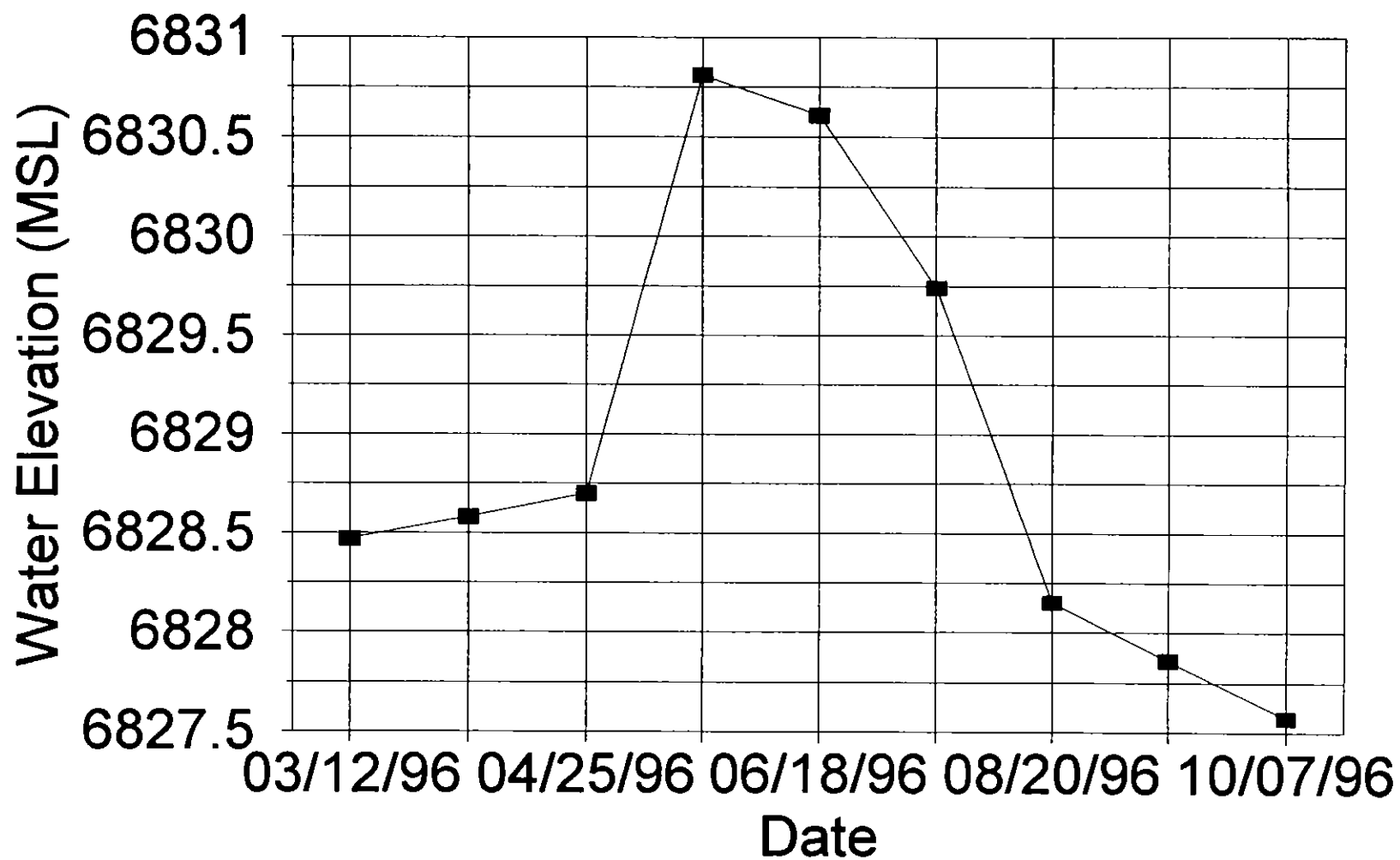
MWJC1 Water Levels



MWLC1 Water Levels

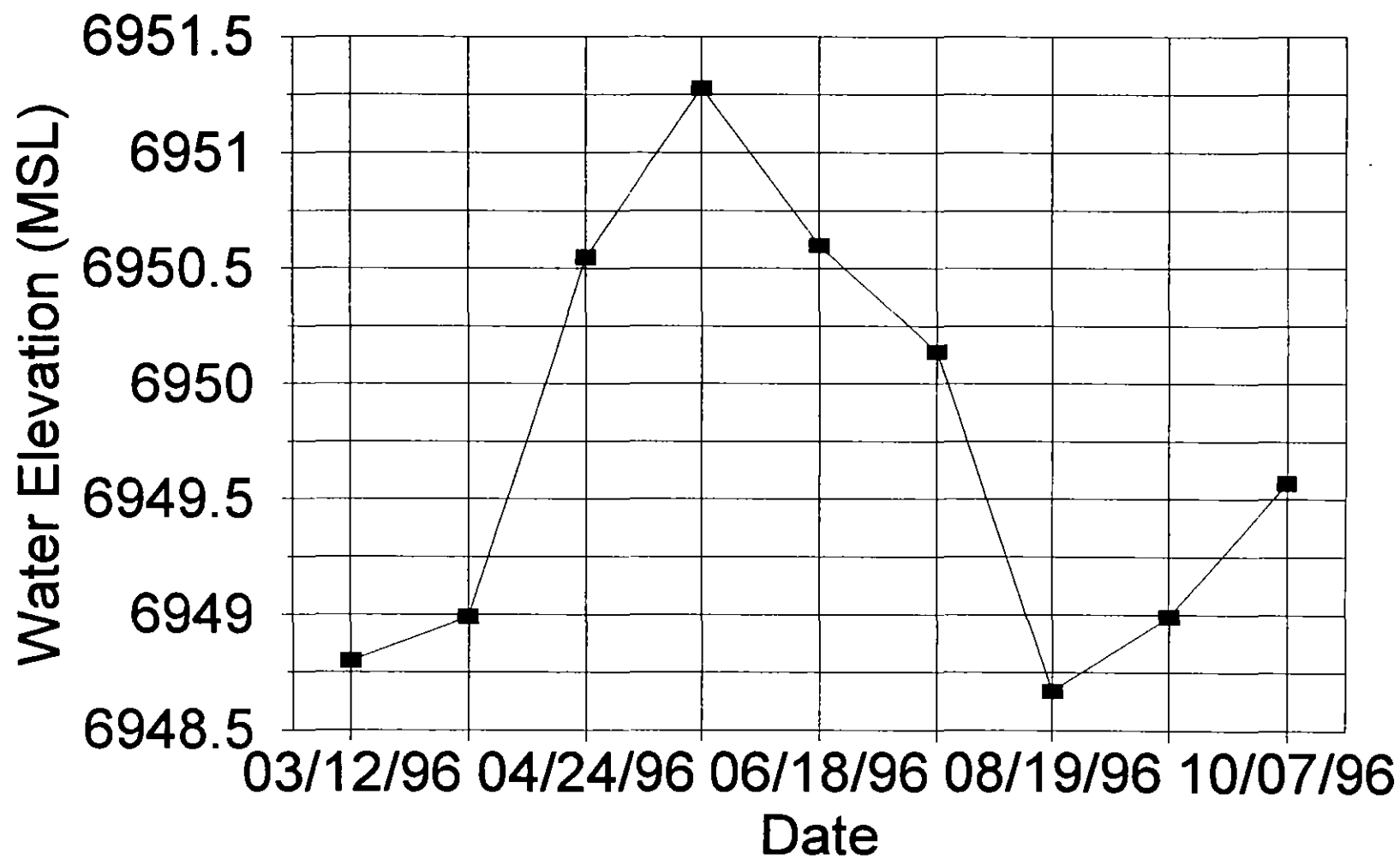


MWLC2 Water Levels



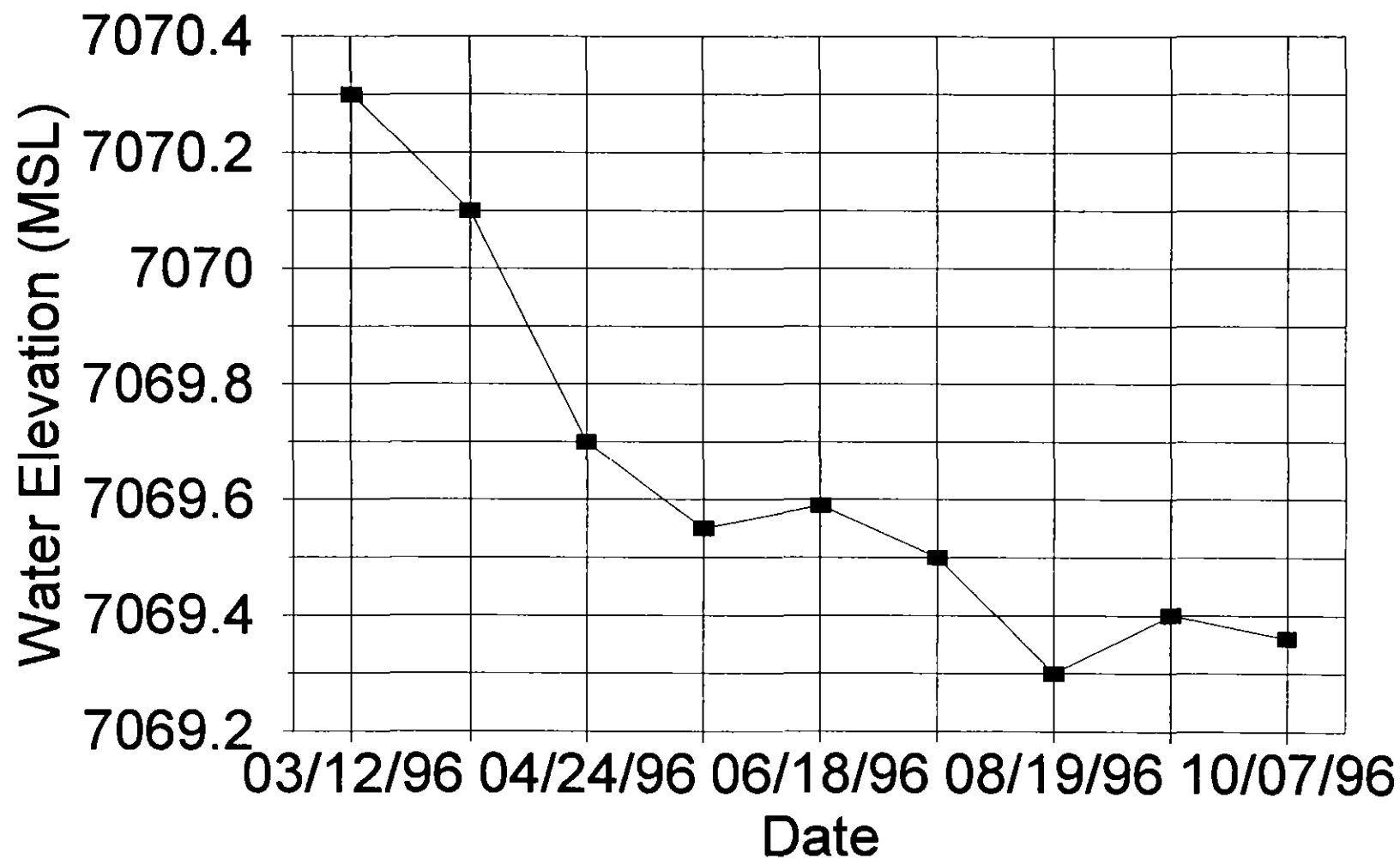
GW-5-7

MWLC3 Water Levels

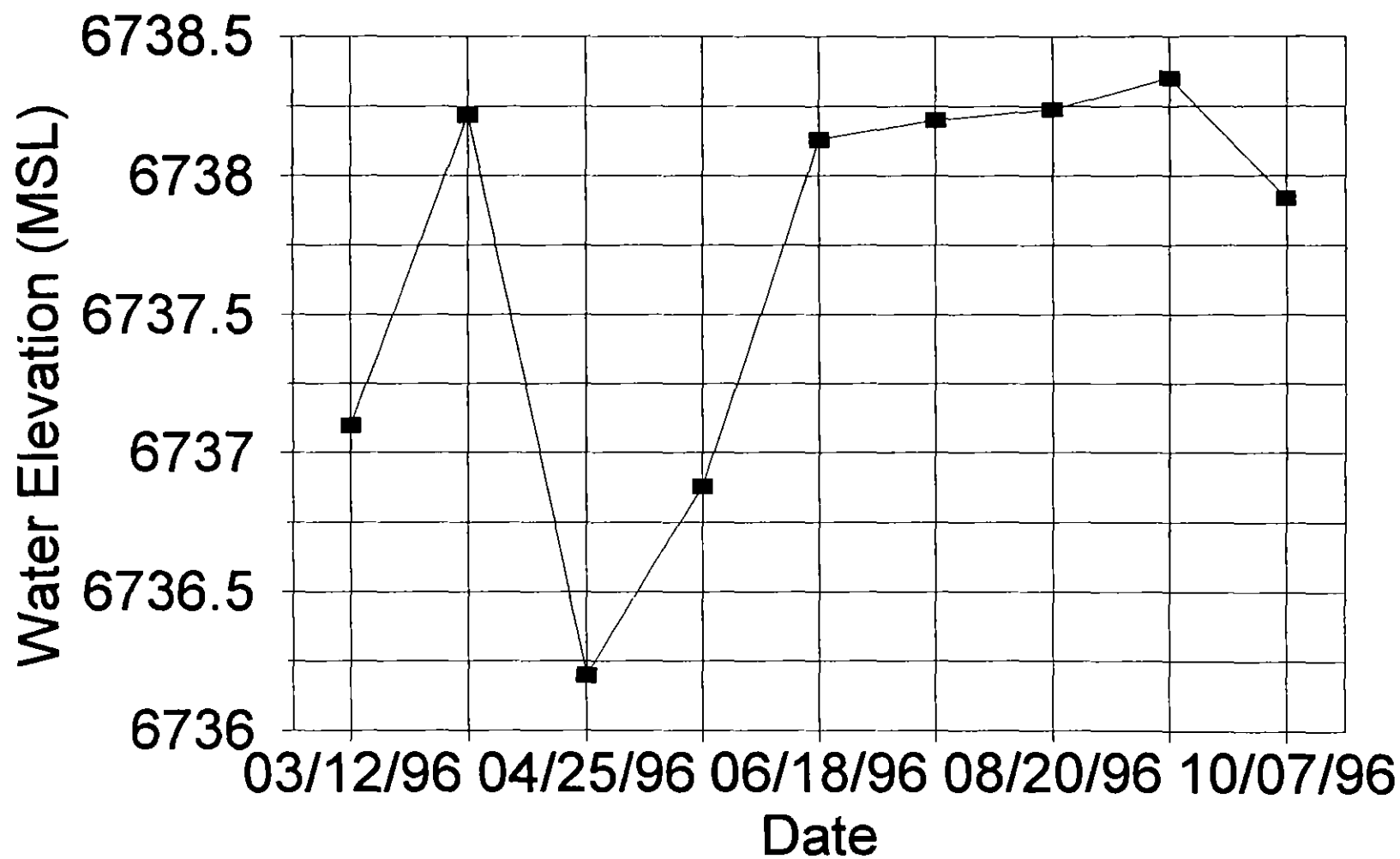


GW-5-8

MWLC4 Water Levels



MWPC1 Water Levels





999

Doc Date:12/11/2001

Vol. 3

S/E

"EXHIBIT 7, APPENDIX GW-6,
SLUG TEST DATA"

A Q T E S O L V R E S U L T S
Version 1.10

10/03/96

09:10:58

=====
TEST DESCRIPTION
=====

Data set..... ac1n.dat
Data set title..... Lorencito Canyon AC-1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... AC1
Obs. well..... AC1

Knowns and Constants:

No. of data points..... 157
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 8
Well screen length..... 8
Static height of water in well..... 8
Log(Re/Rw)..... 1.789
A, B, C..... 0.000, 0.000, 1.378

=====
ANALYTICAL METHOD
=====

Bouwer-Rice (Unconfined Aquifer Slug Test)

=====
RESULTS FROM STATISTICAL CURVE MATCHING
=====

STATISTICAL MATCH PARAMETER ESTIMATES

Estimate Std. Error
K = 2.6902E-002 +/- 9.1286E-004
y0 = 1.5814E+000 +/- 2.3371E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 157
Number of estimated parameters..... 2
Degrees of freedom..... 155
Residual mean..... 0.01907

Residual standard deviation..... 0.1149
 Residual variance..... 0.01319

Del Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.75	1.5701	0.17992	1
0.0066	1.816	1.5589	0.25712	1
0.01	1.778	1.5474	0.23058	1
0.0133	1.75	1.5364	0.21362	1
0.0166	1.731	1.5254	0.20558	1
0.02	1.712	1.5142	0.19779	1
0.0233	1.674	1.5034	0.17059	1
0.0266	1.674	1.4927	0.18132	1
0.03	1.645	1.4817	0.16329	1
0.0333	1.617	1.4711	0.14586	1
0.0366	1.608	1.4606	0.14736	1
0.04	1.57	1.4499	0.1201	1
0.0433	1.56	1.4396	0.12044	1
0.0466	1.56	1.4293	0.13071	1
0.05	1.551	1.4188	0.13222	1
0.0533	1.513	1.4087	0.10434	1
0.0566	1.494	1.3986	0.095393	1
0.06	1.475	1.3883	0.086673	1
0.0633	1.437	1.3784	0.058578	1
0.0666	1.428	1.3686	0.059413	1
0.07	1.418	1.3585	0.059473	1
0.0733	1.4	1.3488	0.051166	1
0.0766	1.371	1.3392	0.031789	1
0.08	1.352	1.3294	0.022633	1
0.0833	1.352	1.3199	0.032118	1
0.0866	1.333	1.3105	0.022535	1
0.09	1.305	1.3008	0.0041675	1
0.0933	1.296	1.2916	0.0044487	1
0.0966	1.267	1.2823	-0.015336	1
0.1	1.248	1.2729	-0.024911	1
0.1033	1.229	1.2638	-0.034829	1
0.1066	1.22	1.2548	-0.034811	1
0.11	1.201	1.2456	-0.044588	1
0.1133	1.182	1.2367	-0.054701	1
0.1166	1.173	1.2279	-0.054877	1
0.12	1.154	1.2189	-0.064852	1
0.1233	1.144	1.2102	-0.066156	1
0.1266	1.135	1.2015	-0.066521	1
0.13	1.116	1.1927	-0.07669	1
0.1333	1.106	1.1842	-0.07818	1
0.1366	1.097	1.1757	-0.078731	1
0.14	1.078	1.1671	-0.089089	1
0.1433	1.069	1.1588	-0.089762	1
0.1466	1.059	1.1505	-0.091494	1
0.15	1.05	1.142	-0.092038	1
0.1533	1.031	1.1339	-0.10289	1
0.1566	1.021	1.1258	-0.1048	1
0.16	1.012	1.1175	-0.10552	1
0.1633	1.002	1.1096	-0.10755	1
0.1666	0.993	1.1016	-0.10863	1
0.17	0.983	1.0935	-0.11054	1
0.1733	0.974	1.0857	-0.11173	1

0.1766	0.964	1.078	-0.11399	1
0.18	0.955	1.0701	-0.11506	1
0.1833	0.946	1.0624	-0.11643	1
0.1866	0.936	1.0548	-0.11885	1
0.19	0.927	1.0471	-0.1201	1
0.1933	0.927	1.0396	-0.11263	1
0.1966	0.917	1.0322	-0.11521	1
0.2	0.908	1.0246	-0.11662	1
0.2033	0.898	1.0173	-0.11931	1
0.2066	0.889	1.0101	-0.12105	1
0.21	0.889	1.0026	-0.11363	1
0.2133	0.879	0.99547	-0.11647	1
0.2166	0.87	0.98837	-0.11837	1
0.22	0.87	0.98111	-0.11111	1
0.2233	0.86	0.97411	-0.11411	1
0.2266	0.851	0.96716	-0.11616	1
0.23	0.851	0.96005	-0.10905	1
0.2333	0.842	0.9532	-0.1112	1
0.2366	0.832	0.9464	-0.1144	1
0.24	0.832	0.93944	-0.10744	1
0.2433	0.823	0.93274	-0.10974	1
0.2466	0.823	0.92608	-0.10308	1
0.25	0.813	0.91928	-0.10628	1
0.2533	0.813	0.91272	-0.099717	1
0.2566	0.804	0.9062	-0.1022	1
0.26	0.804	0.89954	-0.095544	1
0.2633	0.794	0.89313	-0.099125	1
0.2666	0.794	0.88675	-0.092753	1
0.27	0.785	0.88024	-0.095235	1
0.2733	0.785	0.87395	-0.088955	1
0.2766	0.785	0.86772	-0.082719	1
0.28	0.775	0.86134	-0.086341	1
0.2833	0.775	0.8552	-0.080196	1
0.2866	0.766	0.84909	-0.083094	1
0.29	0.766	0.84285	-0.076853	1
0.2933	0.756	0.83684	-0.080839	1
0.2966	0.756	0.83087	-0.074869	1
0.3	0.747	0.82476	-0.077761	1
0.3033	0.747	0.81888	-0.071877	1
0.3066	0.747	0.81303	-0.066034	1
0.31	0.737	0.80706	-0.070058	1
0.3133	0.737	0.8013	-0.0643	1
0.3166	0.737	0.79558	-0.058583	1
0.32	0.728	0.78973	-0.061735	1
0.3233	0.728	0.7841	-0.0561	1
0.3266	0.719	0.77851	-0.059506	1
0.33	0.719	0.77278	-0.053784	1
0.3333	0.719	0.76727	-0.04827	1
0.35	0.709	0.73996	-0.030965	1
0.3666	0.7	0.71379	-0.013786	1
0.3833	0.69	0.68838	0.0016161	1
0.4	0.671	0.66389	0.007114	1
0.4166	0.662	0.6404	0.021601	1
0.4333	0.652	0.61761	0.034391	1
0.45	0.643	0.59563	0.047371	1
0.4666	0.624	0.57456	0.049443	1
0.4833	0.614	0.55411	0.05989	1
0.5	0.605	0.53439	0.07061	1
0.5166	0.596	0.51548	0.080515	1
0.5333	0.586	0.49714	0.08886	1

TYPE CURVE DATA

K = 4.87305E-002

y0 = 1.81970E+000

Time	Drawdown	Time	Drawdown	Time	Drawdown
-----	-----	-----	-----	-----	-----
0.000E+000	1.820E+000	5.000E+000	5.310E-009		

Q T E S O L V R E S U L T S
Version 1.10

03/03/96

09:20:35

TEST DESCRIPTION

Data set..... cclna.dat
Data set title..... Lorencito Canyon CC-1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... CC1
Obs. well..... CC1

Knowns and Constants:

No. of data points..... 187
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 5.5
Well screen length..... 5.5
Static height of water in well..... 5.5
Log(Re/Rw)..... 1.504
A, B, C..... 0.000, 0.000, 1.170

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	2.1196E-002 +/-	9.5843E-004
y0 =	2.2226E+000 +/-	3.5513E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 187
Number of estimated parameters..... 2
Degrees of freedom..... 185
Residual mean..... 0.03182

Residual standard deviation..... 0.2037
 Residual variance..... 0.04149

del Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	2.829	2.2124	0.61661	1
0.0066	2.876	2.2022	0.67379	1
0.01	2.838	2.1918	0.64624	1
0.0133	2.782	2.1817	0.60033	1
0.0166	2.734	2.1716	0.56237	1
0.02	2.687	2.1613	0.52567	1
0.0233	2.64	2.1514	0.48863	1
0.0266	2.592	2.1415	0.45053	1
0.03	2.555	2.1313	0.42369	1
0.0333	2.507	2.1215	0.3855	1
0.0366	2.469	2.1117	0.35727	1
0.04	2.422	2.1017	0.32028	1
0.0433	2.384	2.092	0.29196	1
0.0466	2.346	2.0824	0.26359	1
0.05	2.29	2.0725	0.21747	1
0.0533	2.261	2.063	0.19801	1
0.0566	2.223	2.0535	0.16951	1
0.06	2.195	2.0438	0.15125	1
0.0633	2.148	2.0343	0.11366	1
0.0666	2.11	2.025	0.085022	1
0.07	2.072	2.0154	0.056626	1
0.0733	2.044	2.0061	0.037905	1
0.0766	2.015	1.9969	0.018141	1
0.08	1.987	1.9874	-0.00038794	1
0.0833	1.959	1.9782	-0.019238	1
0.0866	1.93	1.9691	-0.039131	1
0.09	1.94	1.9598	-0.019791	1
0.0933	1.873	1.9508	-0.077768	1
0.0966	1.854	1.9418	-0.087787	1
0.1	1.817	1.9326	-0.11558	1
0.1033	1.807	1.9237	-0.11668	1
0.1066	1.788	1.9148	-0.12682	1
0.11	1.76	1.9057	-0.14574	1
0.1133	1.741	1.897	-0.15597	1
0.1166	1.731	1.8882	-0.15723	1
0.12	1.713	1.8793	-0.16628	1
0.1233	1.694	1.8706	-0.17663	1
0.1266	1.684	1.862	-0.17801	1
0.13	1.665	1.8532	-0.18818	1
0.1333	1.656	1.8447	-0.18865	1
0.1366	1.646	1.8362	-0.19016	1
0.14	1.627	1.8274	-0.20045	1
0.1433	1.618	1.819	-0.20104	1
0.1466	1.608	1.8107	-0.20266	1
0.15	1.599	1.8021	-0.20307	1
0.1533	1.589	1.7938	-0.20478	1
0.1566	1.58	1.7855	-0.20552	1
0.16	1.571	1.777	-0.20605	1
0.1633	1.561	1.7689	-0.20787	1
0.1666	1.552	1.7607	-0.20872	1
0.17	1.542	1.7524	-0.21037	1
0.1733	1.533	1.7443	-0.2113	1

0.1766	1.533	1.7363	-0.20327	1
0.18	1.523	1.728	-0.20504	1
0.1833	1.514	1.7201	-0.20608	1
0.1866	1.504	1.7122	-0.20816	1
0.19	1.504	1.704	-0.20004	1
0.1933	1.495	1.6962	-0.2012	1
0.1966	1.485	1.6884	-0.20339	1
0.2	1.485	1.6804	-0.19538	1
0.2033	1.476	1.6726	-0.19664	1
0.2066	1.466	1.6649	-0.19894	1
0.21	1.466	1.657	-0.19105	1
0.2133	1.457	1.6494	-0.19242	1
0.2166	1.457	1.6418	-0.18482	1
0.22	1.448	1.634	-0.18604	1
0.2233	1.448	1.6265	-0.17851	1
0.2266	1.438	1.619	-0.18103	1
0.23	1.429	1.6113	-0.18235	1
0.2333	1.429	1.6039	-0.17493	1
0.2366	1.419	1.5965	-0.17754	1
0.24	1.419	1.589	-0.16997	1
0.2433	1.41	1.5817	-0.17166	1
0.2466	1.41	1.5744	-0.16437	1
0.25	1.4	1.5669	-0.16691	1
0.2533	1.391	1.5597	-0.16869	1
0.2566	1.391	1.5525	-0.16151	1
0.26	1.381	1.5451	-0.16415	1
0.2633	1.381	1.538	-0.15703	1
0.2666	1.372	1.531	-0.15895	1
0.27	1.372	1.5237	-0.15169	1
0.2733	1.362	1.5167	-0.15468	1
0.2766	1.362	1.5097	-0.14769	1
0.28	1.353	1.5025	-0.14953	1
0.2833	1.353	1.4956	-0.14262	1
0.2866	1.353	1.4887	-0.13573	1
0.29	1.343	1.4817	-0.13867	1
0.2933	1.343	1.4748	-0.13185	1
0.2966	1.334	1.4681	-0.13406	1
0.3	1.334	1.4611	-0.12709	1
0.3033	1.325	1.4544	-0.12937	1
0.3066	1.325	1.4477	-0.12267	1
0.31	1.315	1.4408	-0.12581	1
0.3133	1.315	1.4342	-0.11917	1
0.3166	1.306	1.4276	-0.12157	1
0.32	1.306	1.4208	-0.1148	1
0.3233	1.306	1.4143	-0.10826	1
0.3266	1.296	1.4077	-0.11175	1
0.33	1.296	1.4011	-0.10507	1
0.3333	1.287	1.3946	-0.10762	1
0.35	1.287	1.3624	-0.075429	1
0.3666	1.268	1.3312	-0.063168	1
0.3833	1.249	1.3004	-0.051442	1
0.4	1.23	1.2704	-0.040425	1
0.4166	1.211	1.2413	-0.030275	1
0.4333	1.202	1.2126	-0.010625	1
0.45	1.183	1.1846	-0.0016351	1
0.4666	1.164	1.1575	0.0065465	1
0.4833	1.154	1.1307	0.023263	1
0.5	1.135	1.1046	0.030362	1
0.5166	1.126	1.0793	0.046708	1
0.5333	1.116	1.0544	0.06162	1

0.55	1.097	1.03	0.066957	1
0.5666	1.088	1.0064	0.081591	1
0.5833	1.069	0.98318	0.085821	1
0.6	1.06	0.96049	0.099515	1
0.6166	1.041	0.93845	0.10255	1
0.6333	1.031	0.91679	0.11421	1
0.65	1.022	0.89562	0.12638	1
0.6666	1.012	0.87507	0.13693	1
0.6833	1.003	0.85488	0.14812	1
0.7	0.984	0.83514	0.14886	1
0.7166	0.974	0.81598	0.15802	1
0.7333	0.965	0.79715	0.16785	1
0.75	0.956	0.77875	0.17725	1
0.7666	0.946	0.76088	0.18512	1
0.7833	0.937	0.74332	0.19368	1
0.8	0.927	0.72616	0.20084	1
0.8166	0.918	0.7095	0.2085	1
0.8333	0.899	0.69312	0.20588	1
0.85	0.889	0.67712	0.21188	1
0.8666	0.88	0.66159	0.21841	1
0.8833	0.87	0.64632	0.22368	1
0.9	0.861	0.6314	0.2296	1
0.9166	0.851	0.61691	0.23409	1
0.9333	0.842	0.60267	0.23933	1
0.95	0.832	0.58876	0.24324	1
0.9666	0.823	0.57525	0.24775	1
0.9833	0.814	0.56197	0.25203	1
1	0.804	0.549	0.255	1
1.2	0.728	0.41506	0.31294	1
1.4	0.634	0.3138	0.3202	1
1.6	0.558	0.23725	0.32075	1
1.8	0.492	0.17937	0.31263	1
2	0.435	0.13561	0.29939	1
2.2	0.388	0.10252	0.28548	1
2.4	0.34	0.077511	0.26249	1
2.6	0.302	0.058601	0.2434	1
2.8	0.274	0.044305	0.2297	1
3	0.246	0.033496	0.2125	1
3.2	0.217	0.025324	0.19168	1
3.4	0.198	0.019146	0.17885	1
3.6	0.179	0.014475	0.16453	1
3.8	0.16	0.010943	0.14906	1
4	0.151	0.0082737	0.14273	1
4.2	0.132	0.0062552	0.12574	1
4.4	0.123	0.0047291	0.11827	1
4.6	0.113	0.0035754	0.10942	1
4.8	0.104	0.0027031	0.1013	1
5	0.094	0.0020436	0.091956	1
5.2	0.094	0.0015451	0.092455	1
5.4	0.085	0.0011681	0.083832	1
5.6	0.075	0.00088314	0.074117	1
5.8	0.075	0.00066769	0.074332	1
6	0.066	0.00050479	0.065495	1
6.2	0.066	0.00038164	0.065618	1
6.4	0.066	0.00028853	0.065711	1
6.6	0.056	0.00021814	0.055782	1
6.8	0.056	0.00016492	0.055835	1
7	0.056	0.00012469	0.055875	1
7.2	0.056	9.4268E-005	0.055906	1
7.4	0.047	7.127E-005	0.046929	1

RESULTS FROM VISUAL CURVE MATCHING

```

      Estimate
K   =  2.1196E-002
y0  =  2.2226E+000

```

[illegible]

```
K    = 2.11958E-002
y0   = 2.22262E+000
```

GW-6-10

A Q T E S O L V R E S U L T S
Version 1.10

06/12/96

08:43:43

=====
TEST DESCRIPTION
=====

Data set..... cwc1n.dat
Data set title..... Lorencito Canyon CWC1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... CWC-1
Obs. well..... CWC-1

Knowns and Constants:

No. of data points..... 186
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 5
Well screen length..... 5
Static height of water in well..... 5
Log(Re/Rw)..... 1.436
A, B, C..... 0.000, 0.000, 1.114

=====
ANALYTICAL METHOD
=====

Bouwer-Rice (Unconfined Aquifer Slug Test)

=====
RESULTS FROM STATISTICAL CURVE MATCHING
=====

STATISTICAL MATCH PARAMETER ESTIMATES

Estimate Std. Error
K = 2.2084E-002 +/- 4.0383E-004
y0 = 1.5280E+000 +/- 9.8334E-003

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 186
Number of estimated parameters.... 2
Degrees of freedom..... 184
Residual mean..... 0.01627

Residual standard deviation..... 0.05655
 Residual variance..... 0.003198

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.145	1.521	-0.37601	1
0.0066	1.561	1.5141	0.046941	1
0.01	1.552	1.5069	0.045065	1
0.0133	1.542	1.5001	0.041948	1
0.0166	1.542	1.4932	0.048799	1
0.02	1.542	1.4862	0.055825	1
0.0233	1.542	1.4794	0.062612	1
0.0266	1.542	1.4726	0.069369	1
0.03	1.542	1.4657	0.076298	1
0.0333	1.533	1.459	0.073992	1
0.0366	1.533	1.4523	0.080656	1
0.04	1.533	1.4455	0.087489	1
0.0433	1.533	1.4389	0.094091	1
0.0466	1.523	1.4323	0.090663	1
0.05	1.514	1.4256	0.088402	1
0.0533	1.495	1.4191	0.075913	1
0.0566	1.485	1.4126	0.072394	1
0.06	1.476	1.406	0.070041	1
0.0633	1.466	1.3995	0.066462	1
0.0666	1.447	1.3931	0.053854	1
0.07	1.438	1.3866	0.051409	1
0.0733	1.429	1.3803	0.048742	1
0.0766	1.419	1.374	0.045046	1
0.08	1.41	1.3675	0.042511	1
0.0833	1.4	1.3612	0.038756	1
0.0866	1.391	1.355	0.035973	1
0.09	1.381	1.3487	0.032349	1
0.0933	1.372	1.3425	0.029509	1
0.0966	1.362	1.3364	0.02564	1
0.1	1.353	1.3301	0.022928	1
0.1033	1.343	1.324	0.019003	1
0.1066	1.334	1.318	0.01605	1
0.11	1.324	1.3117	0.012251	1
0.1133	1.315	1.3058	0.0092419	1
0.1166	1.306	1.2998	0.0062055	1
0.12	1.296	1.2937	0.0023214	1
0.1233	1.287	1.2878	-0.00077018	1
0.1266	1.287	1.2819	0.0051113	1
0.13	1.277	1.2759	0.0011429	1
0.1333	1.268	1.27	-0.0020301	1
0.1366	1.258	1.2642	-0.0062296	1
0.14	1.249	1.2583	-0.0092811	1
0.1433	1.249	1.2525	-0.0035343	1
0.1466	1.239	1.2468	-0.0078138	1
0.15	1.23	1.2409	-0.010947	1
0.1533	1.22	1.2353	-0.01528	1
0.1566	1.211	1.2296	-0.018638	1
0.16	1.211	1.2239	-0.012852	1
0.1633	1.201	1.2183	-0.017263	1
0.1666	1.192	1.2127	-0.020699	1
0.17	1.182	1.207	-0.024992	1
0.1733	1.182	1.2015	-0.01948	1

0.1766	1.173	1.196	-0.022993	1
0.18	1.164	1.1904	-0.026365	1
0.1833	1.154	1.1849	-0.030929	1
0.1866	1.154	1.1795	-0.025517	1
0.19	1.145	1.174	-0.028967	1
0.1933	1.135	1.1686	-0.033605	1
0.1966	1.135	1.1633	-0.028268	1
0.2	1.126	1.1578	-0.031794	1
0.2033	1.116	1.1525	-0.036507	1
0.2066	1.116	1.1472	-0.031243	1
0.21	1.107	1.1418	-0.034845	1
0.2133	1.107	1.1366	-0.02963	1
0.2166	1.097	1.1314	-0.034439	1
0.22	1.088	1.1261	-0.038115	1
0.2233	1.088	1.121	-0.032972	1
0.2266	1.078	1.1159	-0.037852	1
0.23	1.069	1.1106	-0.041602	1
0.2333	1.069	1.1055	-0.036529	1
0.2366	1.059	1.1005	-0.04148	1
0.24	1.059	1.0953	-0.036302	1
0.2433	1.05	1.0903	-0.0403	1
0.2466	1.05	1.0853	-0.03532	1
0.25	1.041	1.0802	-0.039214	1
0.2533	1.031	1.0753	-0.04428	1
0.2566	1.031	1.0704	-0.039369	1
0.26	1.022	1.0653	-0.043333	1
0.2633	1.022	1.0605	-0.038467	1
0.2666	1.012	1.0556	-0.043624	1
0.27	1.012	1.0507	-0.038657	1
0.2733	1.003	1.0459	-0.042858	1
0.2766	0.993	1.0411	-0.048082	1
0.28	0.993	1.0362	-0.043183	1
0.2833	0.993	1.0315	-0.038451	1
0.2866	0.984	1.0267	-0.04274	1
0.29	0.974	1.0219	-0.047909	1
0.2933	0.974	1.0172	-0.043242	1
0.2966	0.965	1.0126	-0.047596	1
0.3	0.965	1.0078	-0.042831	1
0.3033	0.955	1.0032	-0.048228	1
0.3066	0.955	0.99865	-0.043646	1
0.31	0.955	0.99395	-0.038947	1
0.3133	0.946	0.98941	-0.043408	1
0.3166	0.936	0.98489	-0.048889	1
0.32	0.936	0.98025	-0.044255	1
0.3233	0.927	0.97578	-0.048778	1
0.3266	0.927	0.97132	-0.044321	1
0.33	0.927	0.96675	-0.039751	1
0.3333	0.918	0.96234	-0.044336	1
0.35	0.908	0.9403	-0.032299	1
0.3666	0.889	0.91889	-0.029894	1
0.3833	0.87	0.89785	-0.027852	1
0.4	0.851	0.87729	-0.026292	1
0.4166	0.832	0.85732	-0.025321	1
0.4333	0.823	0.83769	-0.014689	1
0.45	0.804	0.81851	-0.014507	1
0.4666	0.785	0.79987	-0.014874	1
0.4833	0.766	0.78156	-0.015558	1
0.5	0.757	0.76366	-0.0066607	1
0.5166	0.738	0.74628	-0.0082768	1
0.5333	0.719	0.72919	-0.010188	1

0.55	0.709	0.71249	-0.0034897	1
0.5666	0.69	0.69627	-0.0062707	1
0.5833	0.681	0.68033	0.00067343	1
0.6	0.672	0.66475	0.0072525	1
0.6166	0.653	0.64962	0.0033846	1
0.6333	0.643	0.63474	0.0082604	1
0.65	0.634	0.6202	0.013796	1
0.6666	0.624	0.60609	0.017914	1
0.6833	0.605	0.59221	0.012793	1
0.7	0.596	0.57865	0.017354	1
0.7166	0.586	0.56547	0.020526	1
0.7333	0.577	0.55252	0.024475	1
0.75	0.567	0.53987	0.027127	1
0.7666	0.558	0.52758	0.030417	1
0.7833	0.548	0.5155	0.032498	1
0.8	0.539	0.5037	0.035303	1
0.8166	0.53	0.49223	0.037769	1
0.8333	0.52	0.48096	0.039041	1
0.85	0.511	0.46995	0.041054	1
0.8666	0.501	0.45925	0.041752	1
0.8833	0.492	0.44873	0.043269	1
0.9	0.482	0.43846	0.043544	1
0.9166	0.473	0.42847	0.044525	1
0.9333	0.463	0.41866	0.044337	1
0.95	0.454	0.40908	0.044924	1
0.9666	0.454	0.39976	0.054236	1
0.9833	0.444	0.39061	0.053391	1
1	0.435	0.38166	0.053335	1
1.2	0.369	0.2892	0.079802	1
1.4	0.312	0.21913	0.092867	1
1.6	0.265	0.16604	0.098957	1
1.8	0.227	0.12582	0.10118	1
2	0.189	0.095333	0.093667	1
2.2	0.17	0.072237	0.097763	1
2.4	0.151	0.054736	0.096264	1
2.6	0.132	0.041475	0.090525	1
2.8	0.123	0.031426	0.091574	1
3	0.113	0.023813	0.089187	1
3.2	0.104	0.018044	0.085956	1
3.4	0.094	0.013672	0.080328	1
3.6	0.085	0.01036	0.07464	1
3.8	0.085	0.0078498	0.07715	1
4	0.075	0.005948	0.069052	1
4.2	0.075	0.004507	0.070493	1
4.4	0.075	0.003415	0.071585	1
4.6	0.066	0.0025877	0.063412	1
4.8	0.066	0.0019607	0.064039	1
5	0.066	0.0014857	0.064514	1
5.2	0.066	0.0011258	0.064874	1
5.4	0.066	0.00085302	0.065147	1
5.6	0.066	0.00064636	0.065354	1
5.8	0.056	0.00048976	0.05551	1
6	0.056	0.00037111	0.055629	1
6.2	0.056	0.0002812	0.055719	1
6.4	0.056	0.00021307	0.055787	1
6.6	0.056	0.00016145	0.055839	1
6.8	0.056	0.00012233	0.055878	1
7	0.056	9.2696E-005	0.055907	1
7.2	0.056	7.0238E-005	0.05593	1
7.4	0.056	5.3221E-005	0.055947	1

RESULTS FROM VISUAL CURVE MATCHING

```

      Estimate
K   =  2.2084E-002
y0  =  1.5280E+000

```

[illegible]

```
K = 2.20837E-002
y0 = 1.52798E+000
```

GW-6-15

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A Q T E S O L V R E S U L T S
Version 1.10

06/12/96

09:08:09

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TEST DESCRIPTION

Data set..... cwc2n.dat
Data set title..... Lorencito Canyon CWC2
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... CWC-2
Obs. well..... CWC-2

Knowns and Constants:

No. of data points..... 188
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 3.5
Well screen length..... 3.5
Static height of water in well..... 3.5
Log(Re/Rw)..... 1.194
A, B, C..... 0.000, 0.000, 0.900

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ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

=====

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	1.5779E-002 +/-	9.5213E-004
y0 =	2.1365E+000 +/-	3.5007E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 188
Number of estimated parameters.... 2
Degrees of freedom..... 186
Residual mean..... 0.0888

Residual standard deviation..... 0.2356
 Residual variance..... 0.05553

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.78	2.1306	-0.35062	1
0.0066	1.941	2.1248	-0.18376	1
0.01	2.423	2.1187	0.30426	1
0.0133	2.433	2.1129	0.32008	1
0.0166	2.423	2.1071	0.31589	1
0.02	2.405	2.1011	0.30386	1
0.0233	2.386	2.0954	0.29064	1
0.0266	2.357	2.0896	0.2674	1
0.03	2.338	2.0837	0.25432	1
0.0333	2.329	2.078	0.25105	1
0.0366	2.31	2.0722	0.23776	1
0.04	2.291	2.0664	0.22463	1
0.0433	2.281	2.0607	0.22031	1
0.0466	2.253	2.055	0.19798	1
0.05	2.244	2.0492	0.1948	1
0.0533	2.225	2.0436	0.18143	1
0.0566	2.215	2.0379	0.17705	1
0.06	2.196	2.0322	0.16382	1
0.0633	2.187	2.0266	0.16041	1
0.0666	2.168	2.021	0.14698	1
0.07	2.158	2.0153	0.14271	1
0.0733	2.149	2.0098	0.13925	1
0.0766	2.13	2.0042	0.12577	1
0.08	2.121	1.9985	0.12245	1
0.0833	2.102	1.9931	0.10895	1
0.0866	2.092	1.9876	0.10443	1
0.09	2.083	1.9819	0.10106	1
0.0933	2.064	1.9765	0.087505	1
0.0966	2.064	1.9711	0.092939	1
0.1	2.045	1.9655	0.079522	1
0.1033	2.035	1.9601	0.074926	1
0.1066	2.026	1.9547	0.071315	1
0.11	2.007	1.9491	0.057852	1
0.1133	1.997	1.9438	0.053211	1
0.1166	1.988	1.9384	0.049555	1
0.12	1.979	1.933	0.046046	1
0.1233	1.969	1.9276	0.04136	1
0.1266	1.96	1.9223	0.03766	1
0.13	1.95	1.9169	0.033105	1
0.1333	1.941	1.9116	0.029376	1
0.1366	1.931	1.9064	0.024631	1
0.14	1.912	1.901	0.011031	1
0.1433	1.903	1.8957	0.007258	1
0.1466	1.903	1.8905	0.01247	1
0.15	1.893	1.8852	0.0078252	1
0.1533	1.884	1.88	0.0040083	1
0.1566	1.874	1.8748	-0.00082281	1
0.16	1.865	1.8695	-0.0045122	1
0.1633	1.855	1.8644	-0.0093722	1
0.1666	1.837	1.8592	-0.022246	1
0.17	1.837	1.854	-0.01698	1
0.1733	1.827	1.8489	-0.021882	1

0.1766	1.818	1.8438	-0.025799	1
0.18	1.808	1.8386	-0.030576	1
0.1833	1.799	1.8335	-0.034521	1
0.1866	1.789	1.8285	-0.03948	1
0.19	1.78	1.8233	-0.043301	1
0.1933	1.77	1.8183	-0.048288	1
0.1966	1.761	1.8133	-0.052289	1
0.2	1.751	1.8082	-0.057152	1
0.2033	1.742	1.8032	-0.061181	1
0.2066	1.742	1.7982	-0.056223	1
0.21	1.732	1.7931	-0.06113	1
0.2133	1.723	1.7882	-0.0652	1
0.2166	1.713	1.7833	-0.070283	1
0.22	1.704	1.7782	-0.074232	1
0.2233	1.704	1.7733	-0.069343	1
0.2266	1.695	1.7685	-0.073467	1
0.23	1.685	1.7635	-0.078458	1
0.2333	1.676	1.7586	-0.082609	1
0.2366	1.666	1.7538	-0.087774	1
0.24	1.666	1.7488	-0.082807	1
0.2433	1.657	1.744	-0.086998	1
0.2466	1.647	1.7392	-0.092203	1
0.25	1.638	1.7343	-0.096277	1
0.2533	1.628	1.7295	-0.10151	1
0.2566	1.628	1.7248	-0.096754	1
0.26	1.619	1.7199	-0.10087	1
0.2633	1.609	1.7151	-0.10614	1
0.2666	1.6	1.7104	-0.11042	1
0.27	1.6	1.7056	-0.10558	1
0.2733	1.59	1.7009	-0.11089	1
0.2766	1.581	1.6962	-0.11521	1
0.28	1.581	1.6914	-0.11041	1
0.2833	1.571	1.6868	-0.11576	1
0.2866	1.562	1.6821	-0.12012	1
0.29	1.562	1.6774	-0.11536	1
0.2933	1.553	1.6727	-0.11974	1
0.2966	1.543	1.6681	-0.12515	1
0.3	1.543	1.6634	-0.12042	1
0.3033	1.534	1.6588	-0.12485	1
0.3066	1.524	1.6543	-0.13029	1
0.31	1.524	1.6496	-0.1256	1
0.3133	1.515	1.6451	-0.13006	1
0.3166	1.515	1.6405	-0.12554	1
0.32	1.505	1.6359	-0.13089	1
0.3233	1.496	1.6314	-0.1354	1
0.3266	1.496	1.6269	-0.13091	1
0.33	1.486	1.6223	-0.1363	1
0.3333	1.477	1.6178	-0.14084	1
0.35	1.467	1.5955	-0.12846	1
0.3666	1.439	1.5735	-0.13451	1
0.3833	1.42	1.5517	-0.13174	1
0.4	1.392	1.5303	-0.13827	1
0.4166	1.373	1.5092	-0.13623	1
0.4333	1.354	1.4883	-0.13434	1
0.45	1.325	1.4678	-0.14275	1
0.4666	1.306	1.4476	-0.14156	1
0.4833	1.287	1.4275	-0.14053	1
0.5	1.278	1.4078	-0.12978	1
0.5166	1.259	1.3884	-0.12942	1
0.5333	1.24	1.3692	-0.12921	1

0.55	1.221	1.3503	-0.12926	1
0.5666	1.202	1.3317	-0.12969	1
0.5833	1.193	1.3133	-0.12027	1
0.6	1.174	1.2951	-0.1211	1
0.6166	1.164	1.2773	-0.11328	1
0.6333	1.145	1.2596	-0.11461	1
0.65	1.136	1.2422	-0.10618	1
0.6666	1.126	1.2251	-0.099099	1
0.6833	1.117	1.2081	-0.091148	1
0.7	1.098	1.1914	-0.093432	1
0.7166	1.089	1.175	-0.086045	1
0.7333	1.079	1.1588	-0.079787	1
0.75	1.06	1.1428	-0.082754	1
0.7666	1.051	1.127	-0.076036	1
0.7833	1.041	1.1114	-0.070443	1
0.8	1.032	1.0961	-0.064064	1
0.8166	1.022	1.081	-0.058989	1
0.8333	1.013	1.066	-0.053032	1
0.85	1.003	1.0513	-0.048283	1
0.8666	0.994	1.0368	-0.042823	1
0.8833	0.994	1.0225	-0.028478	1
0.9	0.984	1.0083	-0.024331	1
0.9166	0.975	0.99446	-0.019462	1
0.9333	0.965	0.9807	-0.015702	1
0.95	0.956	0.96713	-0.011133	1
0.9666	0.947	0.95383	-0.0068314	1
0.9833	0.947	0.94063	0.006366	1
1	0.937	0.92762	0.0093807	1
1.2	0.88	0.78506	0.094939	1
1.4	0.823	0.66441	0.15859	1
1.6	0.776	0.5623	0.2137	1
1.8	0.748	0.47589	0.27211	1
2	0.71	0.40275	0.30725	1
2.2	0.691	0.34086	0.35014	1
2.4	0.672	0.28847	0.38353	1
2.6	0.643	0.24414	0.39886	1
2.8	0.624	0.20662	0.41738	1
3	0.615	0.17487	0.44013	1
3.2	0.596	0.14799	0.44801	1
3.4	0.587	0.12525	0.46175	1
3.6	0.568	0.106	0.462	1
3.8	0.558	0.08971	0.46829	1
4	0.549	0.075923	0.47308	1
4.2	0.539	0.064255	0.47474	1
4.4	0.53	0.05438	0.47562	1
4.6	0.52	0.046023	0.47398	1
4.8	0.511	0.03895	0.47205	1
5	0.501	0.032964	0.46804	1
5.2	0.501	0.027898	0.4731	1
5.4	0.492	0.023611	0.46839	1
5.6	0.482	0.019982	0.46202	1
5.8	0.473	0.016911	0.45609	1
6	0.473	0.014312	0.45869	1
6.2	0.464	0.012113	0.45189	1
6.4	0.454	0.010251	0.44375	1
6.6	0.454	0.0086759	0.44532	1
6.8	0.445	0.0073425	0.43766	1
7	0.445	0.0062141	0.43879	1
7.2	0.435	0.0052591	0.42974	1
7.4	0.435	0.0044509	0.43055	1

RESULTS FROM VISUAL CURVE MATCHING

[illegible]

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	2.038E+000	1.300E+001	1.464E-005		

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A Q T E S O L V R E S U L T S
Version 1.10

06/11/96

15:00:40

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TEST DESCRIPTION

Data set..... jcln.dat
Data set title..... Lorencito Canyon JC-1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... JC-1
Obs. well..... JC-1

Knowns and Constants:

No. of data points..... 191
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 3
Well screen length..... 3
Static height of water in well..... 3
Log(Re/Rw)..... 1.092
A, B, C..... 0.000, 0.000, 0.813

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ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	2.6374E-003 +/-	2.6025E-004
y0 =	7.2651E-001 +/-	1.4093E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 191
Number of estimated parameters..... 2
Degrees of freedom..... 189
Residual mean..... 0.004069

Residual standard deviation..... 0.1519
 Residual variance..... 0.02307

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.021	0.7262	0.2948	1
0.0066	1.494	0.72589	0.76811	1
0.01	1.258	0.72556	0.53244	1
0.0133	1.258	0.72525	0.53275	1
0.0166	1.229	0.72494	0.50406	1
0.02	1.201	0.72462	0.47638	1
0.0233	1.163	0.72431	0.43869	1
0.0266	1.135	0.72399	0.41101	1
0.03	1.116	0.72367	0.39233	1
0.0333	1.087	0.72336	0.36364	1
0.0366	1.059	0.72305	0.33595	1
0.04	1.031	0.72273	0.30827	1
0.0433	1.012	0.72242	0.28958	1
0.0466	0.993	0.7221	0.2709	1
0.05	0.964	0.72178	0.24222	1
0.0533	0.955	0.72147	0.23353	1
0.0566	0.927	0.72116	0.20584	1
0.06	0.927	0.72084	0.20616	1
0.0633	0.908	0.72053	0.18747	1
0.0666	0.898	0.72022	0.17778	1
0.07	0.889	0.7199	0.1691	1
0.0733	0.87	0.71959	0.15041	1
0.0766	0.86	0.71928	0.14072	1
0.08	0.841	0.71896	0.12204	1
0.0833	0.822	0.71865	0.10335	1
0.0866	0.813	0.71834	0.094659	1
0.09	0.804	0.71802	0.085978	1
0.0933	0.804	0.71771	0.086288	1
0.0966	0.794	0.7174	0.076597	1
0.1	0.785	0.71708	0.067915	1
0.1033	0.785	0.71678	0.068225	1
0.1066	0.766	0.71647	0.049533	1
0.11	0.766	0.71615	0.049852	1
0.1133	0.756	0.71584	0.04016	1
0.1166	0.747	0.71553	0.031469	1
0.12	0.747	0.71521	0.031787	1
0.1233	0.737	0.71491	0.022095	1
0.1266	0.728	0.7146	0.013403	1
0.13	0.728	0.71428	0.01372	1
0.1333	0.718	0.71397	0.0040281	1
0.1366	0.718	0.71366	0.0043358	1
0.14	0.718	0.71335	0.0046527	1
0.1433	0.709	0.71304	-0.0040399	1
0.1466	0.699	0.71273	-0.013733	1
0.15	0.709	0.71242	-0.0034161	1
0.1533	0.699	0.71211	-0.013109	1
0.1566	0.699	0.7118	-0.012802	1
0.16	0.69	0.71149	-0.021486	1
0.1633	0.69	0.71118	-0.021179	1
0.1666	0.69	0.71087	-0.020873	1
0.17	0.69	0.71056	-0.020557	1
0.1733	0.671	0.71025	-0.039251	1

0.1766	0.681	0.70994	-0.028945	1
0.18	0.662	0.70963	-0.04763	1
0.1833	0.662	0.70932	-0.047324	1
0.1866	0.662	0.70902	-0.047018	1
0.19	0.662	0.7087	-0.046703	1
0.1933	0.652	0.7084	-0.056398	1
0.1966	0.652	0.70809	-0.056092	1
0.2	0.652	0.70778	-0.055778	1
0.2033	0.652	0.70747	-0.055473	1
0.2066	0.643	0.70717	-0.064168	1
0.21	0.643	0.70685	-0.063854	1
0.2133	0.643	0.70655	-0.063549	1
0.2166	0.643	0.70624	-0.063245	1
0.22	0.633	0.70593	-0.072931	1
0.2233	0.633	0.70563	-0.072627	1
0.2266	0.633	0.70532	-0.072323	1
0.23	0.633	0.70501	-0.07201	1
0.2333	0.624	0.70471	-0.080706	1
0.2366	0.624	0.7044	-0.080402	1
0.24	0.624	0.70409	-0.080089	1
0.2433	0.624	0.70379	-0.079786	1
0.2466	0.624	0.70348	-0.079483	1
0.25	0.614	0.70317	-0.08917	1
0.2533	0.614	0.70287	-0.088867	1
0.2566	0.614	0.70256	-0.088564	1
0.26	0.614	0.70225	-0.088252	1
0.2633	0.614	0.70195	-0.08795	1
0.2666	0.605	0.70165	-0.096647	1
0.27	0.605	0.70134	-0.096336	1
0.2733	0.605	0.70103	-0.096033	1
0.2766	0.605	0.70073	-0.095731	1
0.28	0.605	0.70042	-0.09542	1
0.2833	0.605	0.70012	-0.095118	1
0.2866	0.595	0.69982	-0.10482	1
0.29	0.595	0.69951	-0.10451	1
0.2933	0.595	0.6992	-0.1042	1
0.2966	0.595	0.6989	-0.1039	1
0.3	0.595	0.69859	-0.10359	1
0.3033	0.595	0.69829	-0.10329	1
0.3066	0.595	0.69799	-0.10299	1
0.31	0.595	0.69768	-0.10268	1
0.3133	0.586	0.69738	-0.11138	1
0.3166	0.586	0.69708	-0.11108	1
0.32	0.586	0.69677	-0.11077	1
0.3233	0.586	0.69647	-0.11047	1
0.3266	0.586	0.69617	-0.11017	1
0.33	0.586	0.69586	-0.10986	1
0.3333	0.586	0.69556	-0.10956	1
0.35	0.595	0.69404	-0.099044	1
0.3666	0.595	0.69254	-0.097541	1
0.3833	0.586	0.69103	-0.10503	1
0.4	0.586	0.68953	-0.10353	1
0.4166	0.577	0.68803	-0.11103	1
0.4333	0.577	0.68653	-0.10953	1
0.45	0.577	0.68504	-0.10804	1
0.4666	0.577	0.68355	-0.10655	1
0.4833	0.567	0.68206	-0.11506	1
0.5	0.567	0.68058	-0.11358	1
0.5166	0.567	0.6791	-0.1121	1
0.5333	0.567	0.67762	-0.11062	1

0.55	0.558	0.67615	-0.11815	1
0.5666	0.558	0.67468	-0.11668	1
0.5833	0.558	0.67321	-0.11521	1
0.6	0.558	0.67174	-0.11374	1
0.6166	0.548	0.67029	-0.12229	1
0.6333	0.548	0.66883	-0.12083	1
0.65	0.548	0.66737	-0.11937	1
0.6666	0.548	0.66593	-0.11793	1
0.6833	0.548	0.66447	-0.11647	1
0.7	0.548	0.66303	-0.11503	1
0.7166	0.539	0.66159	-0.12259	1
0.7333	0.539	0.66015	-0.12115	1
0.75	0.539	0.65871	-0.11971	1
0.7666	0.539	0.65728	-0.11828	1
0.7833	0.539	0.65585	-0.11685	1
0.8	0.539	0.65442	-0.11542	1
0.8166	0.529	0.653	-0.124	1
0.8333	0.529	0.65158	-0.12258	1
0.85	0.529	0.65016	-0.12116	1
0.8666	0.529	0.64875	-0.11975	1
0.8833	0.529	0.64734	-0.11834	1
0.9	0.529	0.64593	-0.11693	1
0.9166	0.52	0.64453	-0.12453	1
0.9333	0.52	0.64312	-0.12312	1
0.95	0.52	0.64172	-0.12172	1
0.9666	0.52	0.64033	-0.12033	1
0.9833	0.52	0.63894	-0.11894	1
1	0.52	0.63755	-0.11755	1
1.2	0.51	0.6211	-0.1111	1
1.4	0.491	0.60509	-0.11409	1
1.6	0.482	0.58948	-0.10748	1
1.8	0.472	0.57428	-0.10228	1
2	0.463	0.55947	-0.096472	1
2.2	0.454	0.54504	-0.091045	1
2.4	0.444	0.53099	-0.086989	1
2.6	0.444	0.5173	-0.073296	1
2.8	0.435	0.50396	-0.068956	1
3	0.425	0.49096	-0.06596	1
3.2	0.425	0.4783	-0.053299	1
3.4	0.416	0.46597	-0.049965	1
3.6	0.406	0.45395	-0.047949	1
3.8	0.406	0.44224	-0.036242	1
4	0.397	0.43084	-0.033838	1
4.2	0.397	0.41973	-0.022727	1
4.4	0.387	0.4089	-0.021904	1
4.6	0.387	0.39836	-0.011359	1
4.8	0.378	0.38809	-0.010086	1
5	0.368	0.37808	-0.010078	1
5.2	0.368	0.36833	-0.00032817	1
5.4	0.368	0.35883	0.0091702	1
5.6	0.359	0.34958	0.0094237	1
5.8	0.359	0.34056	0.018439	1
6	0.35	0.33178	0.018221	1
6.2	0.35	0.32322	0.026777	1
6.4	0.35	0.31489	0.035112	1
6.6	0.34	0.30677	0.033232	1
6.8	0.34	0.29886	0.041143	1
7	0.331	0.29115	0.03985	1
7.2	0.331	0.28364	0.047358	1
7.4	0.331	0.27633	0.054673	1

RESULTS FROM VISUAL CURVE MATCHING

```

      Estimate
K   =  1.7999E-003
y0  =  5.5839E-001

```

[illegible]

```
K = 1.79988E-003
y0 = 5.58387E-001
```

GW-6-25

[illegible]

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[illegible]

```

Data set..... lc1n.dat
Data set title..... Lorencito Canyon LC-1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... LC1
Obs. well..... LC1

```

Knowns and Constants:

No. of data points.....	187		
Radius of well casing.....	0.333		
Radius of well.....	0.67		
Aquifer saturated thickness.....	5.5		
Well screen length.....	5.5		
Static height of water in well.....	5.5		
Log(Re/Rw).....	1.504		
A, B, C.....	0.000,	0.000,	1.170

01

Bouwer-Rice (Unconfined Aquifer Slug Test)

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	8.2854E-004 +/-	7.2708E-005
y0 =	2.3992E+000 +/-	2.6572E-002

ANALYSIS OF MODEL RESIDUALS

```
residual = calculated - observed
weighted residual = residual * weight
```

Weighted Residual Statistics:

Number of residuals.....	187
Number of estimated parameters....	2
Degrees of freedom.....	185
Residual mean.....	0.001427

Residual standard deviation..... 0.2996
 Residual variance..... 0.08977

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	3.889	2.3987	1.4903	1
0.0066	3.331	2.3983	0.93271	1
0.01	3.208	2.3978	0.81016	1
0.0133	3.236	2.3974	0.83859	1
0.0166	3.18	2.397	0.78302	1
0.02	3.142	2.3965	0.74547	1
0.0233	3.132	2.3961	0.7359	1
0.0266	3.095	2.3957	0.69933	1
0.03	3.057	2.3952	0.66178	1
0.0333	3.047	2.3948	0.65221	1
0.0366	3.019	2.3944	0.62464	1
0.04	2.99	2.3939	0.59609	1
0.0433	2.971	2.3935	0.57752	1
0.0466	2.953	2.393	0.55995	1
0.05	2.905	2.3926	0.51239	1
0.0533	2.896	2.3922	0.50383	1
0.0566	2.886	2.3917	0.49426	1
0.06	2.867	2.3913	0.4757	1
0.0633	2.83	2.3909	0.43913	1
0.0666	2.801	2.3904	0.41056	1
0.07	2.763	2.39	0.37301	1
0.0733	2.763	2.3896	0.37344	1
0.0766	2.744	2.3891	0.35487	1
0.08	2.707	2.3887	0.31832	1
0.0833	2.697	2.3883	0.30875	1
0.0866	2.678	2.3878	0.29018	1
0.09	2.65	2.3874	0.26262	1
0.0933	2.621	2.3869	0.23405	1
0.0966	2.612	2.3865	0.22548	1
0.1	2.603	2.3861	0.21693	1
0.1033	2.574	2.3856	0.18836	1
0.1066	2.555	2.3852	0.16979	1
0.11	2.546	2.3848	0.16123	1
0.1133	2.527	2.3843	0.14266	1
0.1166	2.508	2.3839	0.12409	1
0.12	2.498	2.3835	0.11453	1
0.1233	2.479	2.383	0.095962	1
0.1266	2.47	2.3826	0.087392	1
0.13	2.451	2.3822	0.068835	1
0.1333	2.442	2.3817	0.060264	1
0.1366	2.432	2.3813	0.050694	1
0.14	2.413	2.3809	0.032136	1
0.1433	2.404	2.3804	0.023566	1
0.1466	2.394	2.38	0.013995	1
0.15	2.385	2.3796	0.0054374	1
0.1533	2.375	2.3791	-0.0041334	1
0.1566	2.366	2.3787	-0.012704	1
0.16	2.356	2.3783	-0.022262	1
0.1633	2.347	2.3778	-0.030833	1
0.1666	2.338	2.3774	-0.039404	1
0.17	2.328	2.377	-0.048963	1
0.1733	2.328	2.3765	-0.048534	1

0.1766	2.319	2.3761	-0.057105	1
0.18	2.309	2.3757	-0.066664	1
0.1833	2.309	2.3752	-0.066235	1
0.1866	2.3	2.3748	-0.074807	1
0.19	2.29	2.3744	-0.084366	1
0.1933	2.29	2.3739	-0.083937	1
0.1966	2.29	2.3735	-0.083509	1
0.2	2.281	2.3731	-0.092068	1
0.2033	2.281	2.3726	-0.09164	1
0.2066	2.271	2.3722	-0.10121	1
0.21	2.271	2.3718	-0.10077	1
0.2133	2.262	2.3713	-0.10934	1
0.2166	2.262	2.3709	-0.10892	1
0.22	2.262	2.3705	-0.10848	1
0.2233	2.252	2.37	-0.11805	1
0.2266	2.252	2.3696	-0.11762	1
0.23	2.243	2.3692	-0.12618	1
0.2333	2.243	2.3688	-0.12575	1
0.2366	2.243	2.3683	-0.12533	1
0.24	2.233	2.3679	-0.13489	1
0.2433	2.233	2.3675	-0.13446	1
0.2466	2.233	2.367	-0.13403	1
0.25	2.233	2.3666	-0.13359	1
0.2533	2.224	2.3662	-0.14216	1
0.2566	2.224	2.3657	-0.14174	1
0.26	2.224	2.3653	-0.1413	1
0.2633	2.215	2.3649	-0.14987	1
0.2666	2.215	2.3644	-0.14944	1
0.27	2.215	2.364	-0.14901	1
0.2733	2.215	2.3636	-0.14858	1
0.2766	2.205	2.3632	-0.15815	1
0.28	2.205	2.3627	-0.15771	1
0.2833	2.205	2.3623	-0.15729	1
0.2866	2.205	2.3619	-0.15686	1
0.29	2.196	2.3614	-0.16542	1
0.2933	2.196	2.361	-0.165	1
0.2966	2.196	2.3606	-0.16457	1
0.3	2.196	2.3601	-0.16413	1
0.3033	2.196	2.3597	-0.16371	1
0.3066	2.186	2.3593	-0.17328	1
0.31	2.186	2.3588	-0.17284	1
0.3133	2.186	2.3584	-0.17242	1
0.3166	2.186	2.358	-0.17199	1
0.32	2.186	2.3576	-0.17155	1
0.3233	2.177	2.3571	-0.18013	1
0.3266	2.177	2.3567	-0.1797	1
0.33	2.177	2.3563	-0.17927	1
0.3333	2.177	2.3558	-0.17884	1
0.35	2.177	2.3537	-0.17669	1
0.3666	2.177	2.3516	-0.17456	1
0.3833	2.167	2.3494	-0.18241	1
0.4	2.158	2.3473	-0.18927	1
0.4166	2.158	2.3451	-0.18714	1
0.4333	2.148	2.343	-0.195	1
0.45	2.139	2.3409	-0.20186	1
0.4666	2.139	2.3387	-0.19974	1
0.4833	2.129	2.3366	-0.2076	1
0.5	2.129	2.3345	-0.20547	1
0.5166	2.12	2.3324	-0.21235	1
0.5333	2.12	2.3302	-0.21023	1

0.55	2.11	2.3281	-0.2181	1
0.5666	2.11	2.326	-0.21599	1
0.5833	2.101	2.3239	-0.22287	1
0.6	2.101	2.3217	-0.22075	1
0.6166	2.092	2.3196	-0.22764	1
0.6333	2.082	2.3175	-0.23552	1
0.65	2.082	2.3154	-0.23341	1
0.6666	2.073	2.3133	-0.24031	1
0.6833	2.073	2.3112	-0.2382	1
0.7	2.063	2.3091	-0.24609	1
0.7166	2.063	2.307	-0.244	1
0.7333	2.054	2.3049	-0.25089	1
0.75	2.054	2.3028	-0.24879	1
0.7666	2.044	2.3007	-0.2567	1
0.7833	2.044	2.2986	-0.2546	1
0.8	2.044	2.2965	-0.2525	1
0.8166	2.035	2.2944	-0.25942	1
0.8333	2.035	2.2923	-0.25733	1
0.85	2.025	2.2902	-0.26523	1
0.8666	2.025	2.2882	-0.26316	1
0.8833	2.016	2.2861	-0.27007	1
0.9	2.016	2.284	-0.26798	1
0.9166	2.016	2.2819	-0.26591	1
0.9333	2.006	2.2798	-0.27383	1
0.95	2.006	2.2777	-0.27175	1
0.9666	1.997	2.2757	-0.27868	1
0.9833	1.997	2.2736	-0.27661	1
1	1.997	2.2715	-0.27453	1
1.2	1.959	2.2468	-0.28784	1
1.4	1.921	2.2224	-0.30141	1
1.6	1.893	2.1982	-0.30524	1
1.8	1.874	2.1743	-0.30034	1
2	1.845	2.1507	-0.3057	1
2.2	1.827	2.1273	-0.30032	1
2.4	1.808	2.1042	-0.29619	1
2.6	1.798	2.0813	-0.28331	1
2.8	1.779	2.0587	-0.27968	1
3	1.77	2.0363	-0.2663	1
3.2	1.76	2.0142	-0.25416	1
3.4	1.751	1.9923	-0.24126	1
3.6	1.751	1.9706	-0.2196	1
3.8	1.741	1.9492	-0.20817	1
4	1.732	1.928	-0.19598	1
4.2	1.722	1.907	-0.18502	1
4.4	1.722	1.8863	-0.16428	1
4.6	1.713	1.8658	-0.15277	1
4.8	1.713	1.8455	-0.13249	1
5	1.713	1.8254	-0.11242	1
5.2	1.704	1.8056	-0.10158	1
5.4	1.704	1.7859	-0.081944	1
5.6	1.704	1.7665	-0.062526	1
5.8	1.694	1.7473	-0.05332	1
6	1.694	1.7283	-0.034322	1
6.2	1.694	1.7095	-0.01553	1
6.4	1.694	1.6909	0.0030569	1
6.6	1.694	1.6726	0.021442	1
6.8	1.694	1.6544	0.039627	1
7	1.685	1.6364	0.048614	1
7.2	1.685	1.6186	0.066406	1
7.4	1.685	1.601	0.084005	1

RESULTS FROM VISUAL CURVE MATCHING

[illegible]

Time	Drawdown	Time	Drawdown	Time	Drawdown
-----	-----	-----	-----	-----	-----
0.000E+000	2.292E+000	2.500E+000	1.614E+000		

=====

A Q T E S O L V R E S U L T S
Version 1.10

06/11/96

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TEST DESCRIPTION

Data set..... lc2n.dat
Data set title..... Lorencito Canyon LC-2
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... LC2
Obs. well..... LC2

Knowns and Constants:

No. of data points..... 187
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 8.5
Well screen length..... 8.5
Static height of water in well..... 8.5
Log(Re/Rw)..... 1.838
A, B, C..... 0.000, 0.000, 1.410

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ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	1.0405E-001 +/-	1.0784E-003
y0 =	1.9793E+000 +/-	1.4202E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 187
Number of estimated parameters.... 2
Degrees of freedom..... 185
Residual mean..... 0.01914

Residual standard deviation..... 0.0398
 Residual variance..... 0.001584

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.94	1.9234	0.016601	1
0.0066	2.063	1.8691	0.19391	1
0.01	1.874	1.8147	0.059268	1
0.0133	1.808	1.7635	0.044511	1
0.0166	1.741	1.7137	0.027308	1
0.02	1.675	1.6639	0.011143	1
0.0233	1.637	1.6169	0.020126	1
0.0266	1.571	1.5712	-0.00021735	1
0.03	1.533	1.5255	0.0074747	1
0.0333	1.486	1.4824	0.0035517	1
0.0366	1.429	1.4406	-0.011588	1
0.04	1.391	1.3987	-0.0076944	1
0.0433	1.344	1.3592	-0.015199	1
0.0466	1.315	1.3208	-0.0058184	1
0.05	1.268	1.2824	-0.014408	1
0.0533	1.221	1.2462	-0.025196	1
0.0566	1.202	1.211	-0.0090066	1
0.06	1.164	1.1758	-0.01179	1
0.0633	1.145	1.1426	0.0024116	1
0.0666	1.117	1.1103	0.0066755	1
0.07	1.069	1.078	-0.0090356	1
0.0733	1.013	1.0476	-0.034595	1
0.0766	0.956	1.018	-0.062013	1
0.08	0.946	0.98841	-0.042409	1
0.0833	0.918	0.9605	-0.042498	1
0.0866	0.88	0.93338	-0.053376	1
0.09	0.852	0.90623	-0.054233	1
0.0933	0.833	0.88064	-0.047643	1
0.0966	0.804	0.85578	-0.051776	1
0.1	0.776	0.83089	-0.05489	1
0.1033	0.747	0.80743	-0.060427	1
0.1066	0.729	0.78463	-0.055628	1
0.11	0.71	0.76181	-0.05181	1
0.1133	0.691	0.7403	-0.049299	1
0.1166	0.672	0.71939	-0.047394	1
0.12	0.653	0.69847	-0.045474	1
0.1233	0.634	0.67875	-0.044751	1
0.1266	0.615	0.65958	-0.044584	1
0.13	0.596	0.6404	-0.044403	1
0.1333	0.587	0.62232	-0.03532	1
0.1366	0.568	0.60475	-0.036747	1
0.14	0.558	0.58716	-0.029161	1
0.1433	0.539	0.57058	-0.031581	1
0.1466	0.53	0.55447	-0.024469	1
0.15	0.511	0.53834	-0.027345	1
0.1533	0.501	0.52314	-0.022143	1
0.1566	0.492	0.50837	-0.016371	1
0.16	0.473	0.49359	-0.020587	1
0.1633	0.463	0.47965	-0.016649	1
0.1666	0.454	0.46611	-0.012105	1
0.17	0.445	0.45255	-0.0075507	1
0.1733	0.435	0.43977	-0.0047718	1

0.1766	0.426	0.42735	-0.0013538	1
0.18	0.416	0.41493	0.001074	1
0.1833	0.397	0.40321	-0.0062096	1
0.1866	0.388	0.39182	-0.0038239	1
0.19	0.388	0.38043	0.0075706	1
0.1933	0.378	0.36969	0.008313	1
0.1966	0.369	0.35925	0.009752	1
0.2	0.359	0.3488	0.010199	1
0.2033	0.35	0.33895	0.011048	1
0.2066	0.34	0.32938	0.01062	1
0.21	0.331	0.3198	0.011198	1
0.2133	0.331	0.31077	0.020229	1
0.2166	0.321	0.302	0.019004	1
0.22	0.312	0.29321	0.018786	1
0.2233	0.303	0.28493	0.018066	1
0.2266	0.303	0.27689	0.026112	1
0.23	0.293	0.26884	0.024164	1
0.2333	0.293	0.26124	0.031755	1
0.2366	0.284	0.25387	0.030132	1
0.24	0.274	0.24649	0.027515	1
0.2433	0.274	0.23953	0.034475	1
0.2466	0.265	0.23276	0.032238	1
0.25	0.265	0.22599	0.039007	1
0.2533	0.255	0.21961	0.035389	1
0.2566	0.246	0.21341	0.03259	1
0.26	0.246	0.2072	0.038796	1
0.2633	0.236	0.20135	0.034647	1
0.2666	0.236	0.19567	0.040333	1
0.27	0.227	0.18998	0.037023	1
0.2733	0.227	0.18461	0.042387	1
0.2766	0.227	0.1794	0.0476	1
0.28	0.217	0.17418	0.042817	1
0.2833	0.217	0.16926	0.047736	1
0.2866	0.208	0.16448	0.043515	1
0.29	0.208	0.1597	0.048299	1
0.2933	0.198	0.15519	0.042808	1
0.2966	0.198	0.15081	0.047191	1
0.3	0.198	0.14642	0.051576	1
0.3033	0.189	0.14229	0.046711	1
0.3066	0.189	0.13827	0.050729	1
0.31	0.189	0.13425	0.05475	1
0.3133	0.179	0.13046	0.048541	1
0.3166	0.179	0.12678	0.052224	1
0.32	0.179	0.12309	0.055911	1
0.3233	0.17	0.11961	0.050387	1
0.3266	0.17	0.11624	0.053765	1
0.33	0.17	0.11286	0.057145	1
0.3333	0.161	0.10967	0.051331	1
0.35	0.161	0.09487	0.06613	1
0.3666	0.151	0.08214	0.06886	1
0.3833	0.142	0.071056	0.070944	1
0.4	0.132	0.061468	0.070532	1
0.4166	0.123	0.053219	0.069781	1
0.4333	0.113	0.046038	0.066962	1
0.45	0.113	0.039826	0.073174	1
0.4666	0.104	0.034482	0.069518	1
0.4833	0.094	0.029829	0.064171	1
0.5	0.094	0.025804	0.068196	1
0.5166	0.085	0.022341	0.062659	1
0.5333	0.085	0.019326	0.065674	1

0.55	0.075	0.016718	0.058282	1
0.5666	0.075	0.014475	0.060525	1
0.5833	0.075	0.012522	0.062478	1
0.6	0.066	0.010832	0.055168	1
0.6166	0.066	0.0093786	0.056621	1
0.6333	0.066	0.0081131	0.057887	1
0.65	0.056	0.0070183	0.048982	1
0.6666	0.056	0.0060765	0.049923	1
0.6833	0.056	0.0052566	0.050743	1
0.7	0.056	0.0045472	0.051453	1
0.7166	0.056	0.0039371	0.052063	1
0.7333	0.047	0.0034058	0.043594	1
0.75	0.047	0.0029462	0.044054	1
0.7666	0.047	0.0025509	0.044449	1
0.7833	0.047	0.0022067	0.044793	1
0.8	0.047	0.0019089	0.045091	1
0.8166	0.047	0.0016527	0.045347	1
0.8333	0.037	0.0014297	0.03557	1
0.85	0.037	0.0012368	0.035763	1
0.8666	0.037	0.0010708	0.035929	1
0.8833	0.037	0.00092634	0.036074	1
0.9	0.037	0.00080134	0.036199	1
0.9166	0.037	0.00069381	0.036306	1
0.9333	0.037	0.00060019	0.0364	1
0.95	0.037	0.0005192	0.036481	1
0.9666	0.037	0.00044953	0.03655	1
0.9833	0.028	0.00038887	0.027611	1
1	0.028	0.0003364	0.027664	1
1.2	0.028	5.9282E-005	0.027941	1
1.4	0.028	1.0447E-005	0.02799	1
1.6	0.018	1.841E-006	0.017998	1
1.8	0.018	3.2443E-007	0.018	1
2	0.018	5.7173E-008	0.018	1
2.2	0.018	1.0075E-008	0.018	1
2.4	0.018	1.7755E-009	0.018	1
2.6	0.018	3.1289E-010	0.018	1
2.8	0.018	5.514E-011	0.018	1
3	0.018	9.717E-012	0.018	1
3.2	0.018	1.7124E-012	0.018	1
3.4	0.018	3.0177E-013	0.018	1
3.6	0.018	5.3179E-014	0.018	1
3.8	0.018	9.3715E-015	0.018	1
4	0.018	1.6515E-015	0.018	1
4.2	0.018	2.9103E-016	0.018	1
4.4	0.018	5.1288E-017	0.018	1
4.6	0.018	9.0382E-018	0.018	1
4.8	0.018	1.5928E-018	0.018	1
5	0.018	2.8068E-019	0.018	1
5.2	0.018	4.9464E-020	0.018	1
5.4	0.018	8.7167E-021	0.018	1
5.6	0.018	1.5361E-021	0.018	1
5.8	0.018	2.707E-022	0.018	1
6	0.018	4.7705E-023	0.018	1
6.2	0.018	8.4067E-024	0.018	1
6.4	0.018	1.4815E-024	0.018	1
6.6	0.018	2.6107E-025	0.018	1
6.8	0.018	4.6008E-026	0.018	1
7	0.018	8.1078E-027	0.018	1
7.2	0.018	1.4288E-027	0.018	1
7.4	0.018	2.5179E-028	0.018	1

RESULTS FROM VISUAL CURVE MATCHING

[illegible]

Time	Drawdown	Time	Drawdown	Time	Drawdown
-----	-----	-----	-----	-----	-----
0.000E+000	1.372E+000	5.000E+000	2.162E-015		

A Q T E S O L V R E S U L T S
Version 1.10

06/11/96

14:08:18

=====
TEST DESCRIPTION
=====

Data set..... lc3n.dat
Data set title..... Lorencito Canyon LC-3
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... LC3
Obs. well..... LC3

Knowns and Constants:

No. of data points..... 192
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 3
Well screen length..... 3
Static height of water in well..... 3
Log(Re/Rw)..... 1.092
A, B, C..... 0.000, 0.000, 0.813

=====
ANALYTICAL METHOD
=====

Bouwer-Rice (Unconfined Aquifer Slug Test)

=====
RESULTS FROM STATISTICAL CURVE MATCHING
=====

STATISTICAL MATCH PARAMETER ESTIMATES

 Estimate Std. Error
K = 2.5527E-003 +/- 9.4793E-004
y0 = 2.7309E-001 +/- 1.9909E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 192
Number of estimated parameters.... 2
Degrees of freedom..... 190
Residual mean..... 0.003719

Residual standard deviation..... 0.2154
 Residual variance..... 0.04639

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.097	0.27298	0.82402	1
0.0066	1.305	0.27286	1.0321	1
0.01	1.249	0.27275	0.97625	1
0.0133	1.182	0.27263	0.90937	1
0.0166	1.126	0.27252	0.85348	1
0.02	1.059	0.2724	0.7866	1
0.0233	0.984	0.27229	0.71171	1
0.0266	0.955	0.27217	0.68283	1
0.03	0.946	0.27206	0.67394	1
0.0333	0.823	0.27194	0.55106	1
0.0366	0.738	0.27183	0.46617	1
0.04	0.7	0.27171	0.42829	1
0.0433	0.653	0.2716	0.3814	1
0.0466	0.596	0.27149	0.32451	1
0.05	0.558	0.27137	0.28663	1
0.0533	0.511	0.27126	0.23974	1
0.0566	0.463	0.27114	0.19186	1
0.06	0.444	0.27103	0.17297	1
0.0633	0.406	0.27091	0.13509	1
0.0666	0.378	0.2708	0.1072	1
0.07	0.331	0.27069	0.060315	1
0.0733	0.312	0.27057	0.041428	1
0.0766	0.274	0.27046	0.0035404	1
0.08	0.255	0.27034	-0.015343	1
0.0833	0.236	0.27023	-0.034231	1
0.0866	0.227	0.27012	-0.043118	1
0.09	0.227	0.27	-0.043002	1
0.0933	0.217	0.26989	-0.052889	1
0.0966	0.208	0.26978	-0.061777	1
0.1	0.198	0.26966	-0.071661	1
0.1033	0.198	0.26955	-0.071548	1
0.1066	0.189	0.26944	-0.080436	1
0.11	0.189	0.26932	-0.08032	1
0.1133	0.189	0.26921	-0.080208	1
0.1166	0.179	0.2691	-0.090095	1
0.12	0.179	0.26898	-0.08998	1
0.1233	0.179	0.26887	-0.089867	1
0.1266	0.179	0.26876	-0.089755	1
0.13	0.17	0.26864	-0.09864	1
0.1333	0.17	0.26853	-0.098528	1
0.1366	0.17	0.26842	-0.098416	1
0.14	0.17	0.2683	-0.0983	1
0.1433	0.17	0.26819	-0.098188	1
0.1466	0.17	0.26808	-0.098076	1
0.15	0.17	0.26796	-0.097961	1
0.1533	0.17	0.26785	-0.097849	1
0.1566	0.17	0.26774	-0.097738	1
0.16	0.17	0.26762	-0.097623	1
0.1633	0.17	0.26751	-0.097511	1
0.1666	0.16	0.2674	-0.1074	1
0.17	0.17	0.26728	-0.097285	1
0.1733	0.16	0.26717	-0.10717	1

0.1766	0.16	0.26706	-0.10706	1
0.18	0.16	0.26695	-0.10695	1
0.1833	0.16	0.26684	-0.10684	1
0.1866	0.16	0.26672	-0.10672	1
0.19	0.16	0.26661	-0.10661	1
0.1933	0.16	0.2665	-0.1065	1
0.1966	0.16	0.26639	-0.10639	1
0.2	0.16	0.26627	-0.10627	1
0.2033	0.16	0.26616	-0.10616	1
0.2066	0.16	0.26605	-0.10605	1
0.21	0.16	0.26594	-0.10594	1
0.2133	0.16	0.26583	-0.10583	1
0.2166	0.16	0.26571	-0.10571	1
0.22	0.16	0.2656	-0.1056	1
0.2233	0.16	0.26549	-0.10549	1
0.2266	0.16	0.26538	-0.10538	1
0.23	0.16	0.26526	-0.10526	1
0.2333	0.16	0.26515	-0.10515	1
0.2366	0.16	0.26504	-0.10504	1
0.24	0.16	0.26493	-0.10493	1
0.2433	0.16	0.26482	-0.10482	1
0.2466	0.16	0.26471	-0.10471	1
0.25	0.16	0.26459	-0.10459	1
0.2533	0.16	0.26448	-0.10448	1
0.2566	0.16	0.26437	-0.10437	1
0.26	0.16	0.26426	-0.10426	1
0.2633	0.16	0.26415	-0.10415	1
0.2666	0.16	0.26404	-0.10404	1
0.27	0.16	0.26393	-0.10393	1
0.2733	0.16	0.26382	-0.10382	1
0.2766	0.16	0.26371	-0.10371	1
0.28	0.16	0.26359	-0.10359	1
0.2833	0.16	0.26348	-0.10348	1
0.2866	0.16	0.26337	-0.10337	1
0.29	0.16	0.26326	-0.10326	1
0.2933	0.16	0.26315	-0.10315	1
0.2966	0.16	0.26304	-0.10304	1
0.3	0.16	0.26293	-0.10293	1
0.3033	0.16	0.26282	-0.10282	1
0.3066	0.16	0.26271	-0.10271	1
0.31	0.16	0.2626	-0.1026	1
0.3133	0.16	0.26249	-0.10249	1
0.3166	0.16	0.26238	-0.10238	1
0.32	0.16	0.26226	-0.10226	1
0.3233	0.16	0.26215	-0.10215	1
0.3266	0.16	0.26204	-0.10204	1
0.33	0.16	0.26193	-0.10193	1
0.3333	0.16	0.26182	-0.10182	1
0.35	0.17	0.26127	-0.09127	1
0.3666	0.17	0.26072	-0.090723	1
0.3833	0.17	0.26017	-0.090173	1
0.4	0.17	0.25962	-0.089624	1
0.4166	0.17	0.25908	-0.08908	1
0.4333	0.17	0.25853	-0.088533	1
0.45	0.17	0.25799	-0.087988	1
0.4666	0.17	0.25745	-0.087447	1
0.4833	0.16	0.2569	-0.096904	1
0.5	0.16	0.25636	-0.096362	1
0.5166	0.16	0.25582	-0.095825	1
0.5333	0.16	0.25528	-0.095285	1

0.55	0.16	0.25475	-0.094747	1
0.5666	0.16	0.25421	-0.094212	1
0.5833	0.16	0.25368	-0.093676	1
0.6	0.16	0.25314	-0.093141	1
0.6166	0.16	0.25261	-0.09261	1
0.6333	0.16	0.25208	-0.092078	1
0.65	0.16	0.25155	-0.091546	1
0.6666	0.16	0.25102	-0.091019	1
0.6833	0.16	0.25049	-0.090489	1
0.7	0.16	0.24996	-0.089961	1
0.7166	0.151	0.24944	-0.098437	1
0.7333	0.151	0.24891	-0.097911	1
0.75	0.151	0.24839	-0.097386	1
0.7666	0.151	0.24786	-0.096865	1
0.7833	0.151	0.24734	-0.096342	1
0.8	0.151	0.24682	-0.09582	1
0.8166	0.151	0.2463	-0.095303	1
0.8333	0.151	0.24578	-0.094783	1
0.85	0.151	0.24526	-0.094265	1
0.8666	0.151	0.24475	-0.093751	1
0.8833	0.151	0.24423	-0.093234	1
0.9	0.151	0.24372	-0.092719	1
0.9166	0.151	0.24321	-0.092208	1
0.9333	0.151	0.2427	-0.091695	1
0.95	0.151	0.24218	-0.091183	1
0.9666	0.151	0.24168	-0.090676	1
0.9833	0.151	0.24117	-0.090166	1
1	0.151	0.24066	-0.089657	1
1.2	0.142	0.23465	-0.092648	1
1.4	0.132	0.22879	-0.096789	1
1.6	0.132	0.22308	-0.091076	1
1.8	0.132	0.21751	-0.085506	1
2	0.132	0.21208	-0.080075	1
2.2	0.132	0.20678	-0.07478	1
2.4	0.132	0.20162	-0.069616	1
2.6	0.132	0.19658	-0.064582	1
2.8	0.132	0.19167	-0.059674	1
3	0.132	0.18689	-0.054888	1
3.2	0.132	0.18222	-0.050221	1
3.4	0.132	0.17767	-0.045671	1
3.6	0.132	0.17323	-0.041235	1
3.8	0.142	0.16891	-0.026909	1
4	0.142	0.16469	-0.022691	1
4.2	0.142	0.16058	-0.018579	1
4.4	0.142	0.15657	-0.01457	1
4.6	0.142	0.15266	-0.01066	1
4.8	0.142	0.14885	-0.0068482	1
5	0.142	0.14513	-0.0031315	1
5.2	0.142	0.14151	0.00049235	1
5.4	0.142	0.13797	0.0040257	1
5.6	0.151	0.13453	0.016471	1
5.8	0.151	0.13117	0.01983	1
6	0.151	0.12789	0.023105	1
6.2	0.151	0.1247	0.026299	1
6.4	0.151	0.12159	0.029413	1
6.6	0.151	0.11855	0.032449	1
6.8	0.151	0.11559	0.035409	1
7	0.151	0.1127	0.038295	1
7.2	0.151	0.10989	0.041109	1
7.4	0.151	0.10715	0.043853	1

RESULTS FROM VISUAL CURVE MATCHING

```

      Estimate
K   =  5.2076E-001
y0  =  1.9165E+000

```

[illegible]

```
K = 5.20765E-001
y0 = 1.91646E+000
```

Time	Drawdown	Time	Drawdown	Time	Drawdown
-----	-----	-----	-----	-----	-----
0.000E+000	1.916E+000	1.000E+000	1.204E-011		

A Q T E S O L V R E S U L T S
Version 1.10

14:23:42

```

Data set..... lc4n.dat
Data set title.... Lorencito Canyon LC-4
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... LC4
Obs. well..... LC4

```

No. of data points.....	188		
Radius of well casing.....	0.333		
Radius of well.....	0.67		
Aquifer saturated thickness.....	5		
Well screen length.....	5		
Static height of water in well.....	5		
Log(Re/Rw).....	1.436		
A, B, C.....	0.000,	0.000,	1.114

Bouwer-Rice (Unconfined Aquifer Slug Test)

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	8.7151E-003 +/-	7.6503E-004
y0 =	2.3573E+000 +/-	4.6977E-002

```
residual = calculated - observed
weighted residual = residual * weight
```

Number of residuals.....	188
Number of estimated parameters....	2
Degrees of freedom.....	186
Residual mean.....	0.07599

Residual standard deviation..... 0.3635
 Residual variance..... 0.1321

el Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.353	2.353	-1	1
0.0066	2.763	2.3488	0.41425	1
0.01	4.352	2.3444	2.0076	1
0.0133	2.905	2.3402	0.56485	1
0.0166	3.037	2.3359	0.70107	1
0.02	3.009	2.3316	0.67741	1
0.0233	2.943	2.3274	0.61562	1
0.0266	2.905	2.3232	0.58182	1
0.03	2.905	2.3189	0.58614	1
0.0333	2.867	2.3147	0.55233	1
0.0366	2.848	2.3105	0.53751	1
0.04	2.82	2.3062	0.5138	1
0.0433	2.782	2.302	0.47997	1
0.0466	2.782	2.2979	0.48412	1
0.05	2.753	2.2936	0.45939	1
0.0533	2.735	2.2895	0.44553	1
0.0566	2.716	2.2853	0.43066	1
0.06	2.687	2.2811	0.40591	1
0.0633	2.668	2.277	0.39103	1
0.0666	2.659	2.2729	0.38614	1
0.07	2.63	2.2686	0.36137	1
0.0733	2.621	2.2645	0.35646	1
0.0766	2.602	2.2605	0.34155	1
0.08	2.536	2.2562	0.27975	1
0.0833	2.526	2.2522	0.27383	1
0.0866	2.526	2.2481	0.27789	1
0.09	2.498	2.2439	0.25407	1
0.0933	2.46	2.2399	0.22012	1
0.0966	2.526	2.2358	0.29016	1
0.1	2.432	2.2317	0.20032	1
0.1033	2.451	2.2277	0.22335	1
0.1066	2.413	2.2236	0.18937	1
0.11	2.403	2.2195	0.1835	1
0.1133	2.384	2.2155	0.16851	1
0.1166	2.375	2.2115	0.16351	1
0.12	2.356	2.2074	0.14862	1
0.1233	2.318	2.2034	0.11461	1
0.1266	2.299	2.1994	0.099582	1
0.13	2.309	2.1953	0.11367	1
0.1333	2.29	2.1914	0.098634	1
0.1366	2.261	2.1874	0.073589	1
0.14	2.252	2.1833	0.068657	1
0.1433	2.233	2.1794	0.053598	1
0.1466	2.214	2.1755	0.038531	1
0.15	2.205	2.1714	0.033576	1
0.1533	2.186	2.1675	0.018496	1
0.1566	2.167	2.1636	0.0034077	1
0.16	2.157	2.1596	-0.0025691	1
0.1633	2.139	2.1557	-0.016671	1
0.1666	2.129	2.1518	-0.022781	1
0.17	2.11	2.1478	-0.037779	1
0.1733	2.091	2.1439	-0.052903	1

0.1766	2.082	2.14	-0.058033	1
0.18	2.072	2.1361	-0.064054	1
0.1833	2.053	2.1322	-0.079199	1
0.1866	2.044	2.1284	-0.08435	1
0.19	2.025	2.1244	-0.099392	1
0.1933	2.015	2.1206	-0.10556	1
0.1966	1.997	2.1167	-0.11973	1
0.2	1.987	2.1128	-0.12579	1
0.2033	1.968	2.109	-0.14098	1
0.2066	1.959	2.1052	-0.14617	1
0.21	1.949	2.1013	-0.15226	1
0.2133	1.93	2.0975	-0.16747	1
0.2166	1.921	2.0937	-0.17268	1
0.22	1.911	2.0898	-0.17879	1
0.2233	1.902	2.086	-0.18402	1
0.2266	1.892	2.0823	-0.19025	1
0.23	1.874	2.0784	-0.20438	1
0.2333	1.864	2.0746	-0.21063	1
0.2366	1.855	2.0709	-0.21588	1
0.24	1.845	2.067	-0.22203	1
0.2433	1.826	2.0633	-0.2373	1
0.2466	1.817	2.0596	-0.24258	1
0.25	1.807	2.0557	-0.24875	1
0.2533	1.798	2.052	-0.25404	1
0.2566	1.788	2.0483	-0.26033	1
0.26	1.779	2.0445	-0.26553	1
0.2633	1.769	2.0408	-0.27184	1
0.2666	1.76	2.0372	-0.27715	1
0.27	1.76	2.0334	-0.27336	1
0.2733	1.751	2.0297	-0.27869	1
0.2766	1.741	2.026	-0.28503	1
0.28	1.732	2.0223	-0.29026	1
0.2833	1.722	2.0186	-0.29661	1
0.2866	1.713	2.015	-0.30197	1
0.29	1.703	2.0112	-0.30822	1
0.2933	1.703	2.0076	-0.30459	1
0.2966	1.694	2.004	-0.30997	1
0.3	1.684	2.0002	-0.31624	1
0.3033	1.684	1.9966	-0.31263	1
0.3066	1.675	1.993	-0.31803	1
0.31	1.665	1.9893	-0.32432	1
0.3133	1.665	1.9857	-0.32073	1
0.3166	1.656	1.9821	-0.32615	1
0.32	1.656	1.9785	-0.32246	1
0.3233	1.646	1.9749	-0.32889	1
0.3266	1.637	1.9713	-0.33433	1
0.33	1.637	1.9677	-0.33066	1
0.3333	1.628	1.9641	-0.33611	1
0.35	1.628	1.9462	-0.31824	1
0.3666	1.609	1.9286	-0.31963	1
0.3833	1.59	1.9111	-0.32108	1
0.4	1.571	1.8937	-0.32269	1
0.4166	1.561	1.8766	-0.31556	1
0.4333	1.542	1.8595	-0.31748	1
0.45	1.533	1.8426	-0.30956	1
0.4666	1.523	1.8259	-0.30289	1
0.4833	1.504	1.8093	-0.30527	1
0.5	1.495	1.7928	-0.29781	1
0.5166	1.486	1.7766	-0.29059	1
0.5333	1.476	1.7604	-0.28442	1

0.55	1.467	1.7444	-0.2774	1
0.5666	1.457	1.7286	-0.27162	1
0.5833	1.448	1.7129	-0.26489	1
0.6	1.438	1.6973	-0.2593	1
0.6166	1.429	1.6819	-0.25295	1
0.6333	1.429	1.6666	-0.23764	1
0.65	1.419	1.6515	-0.23248	1
0.6666	1.41	1.6365	-0.22654	1
0.6833	1.4	1.6216	-0.22164	1
0.7	1.4	1.6069	-0.20689	1
0.7166	1.391	1.5923	-0.20135	1
0.7333	1.381	1.5779	-0.19686	1
0.75	1.372	1.5635	-0.1915	1
0.7666	1.372	1.5494	-0.17736	1
0.7833	1.363	1.5353	-0.17226	1
0.8	1.353	1.5213	-0.16828	1
0.8166	1.353	1.5075	-0.15452	1
0.8333	1.344	1.4938	-0.1498	1
0.85	1.334	1.4802	-0.14621	1
0.8666	1.334	1.4668	-0.13282	1
0.8833	1.325	1.4535	-0.12847	1
0.9	1.325	1.4402	-0.11524	1
0.9166	1.315	1.4272	-0.11221	1
0.9333	1.315	1.4142	-0.099227	1
0.95	1.306	1.4014	-0.095357	1
0.9666	1.296	1.3887	-0.09268	1
0.9833	1.296	1.376	-0.080042	1
1	1.287	1.3635	-0.07652	1
1.2	1.239	1.2221	0.016884	1
1.4	1.192	1.0954	0.096623	1
1.6	1.135	0.98178	0.15322	1
1.8	1.098	0.87997	0.21803	1
2	1.06	0.78871	0.27129	1
2.2	1.022	0.70692	0.31508	1
2.4	0.993	0.63361	0.35939	1
2.6	0.965	0.5679	0.3971	1
2.8	0.937	0.509	0.428	1
3	0.899	0.45622	0.44278	1
3.2	0.88	0.40891	0.47109	1
3.4	0.851	0.3665	0.4845	1
3.6	0.823	0.32849	0.49451	1
3.8	0.804	0.29443	0.50957	1
4	0.776	0.26389	0.51211	1
4.2	0.757	0.23653	0.52047	1
4.4	0.738	0.212	0.526	1
4.6	0.709	0.19001	0.51899	1
4.8	0.691	0.17031	0.52069	1
5	0.672	0.15264	0.51936	1
5.2	0.653	0.13681	0.51619	1
5.4	0.634	0.12263	0.51137	1
5.6	0.624	0.10991	0.51409	1
5.8	0.605	0.098511	0.50649	1
6	0.586	0.088295	0.4977	1
6.2	0.577	0.079139	0.49786	1
6.4	0.558	0.070932	0.48707	1
6.6	0.539	0.063576	0.47542	1
6.8	0.53	0.056983	0.47302	1
7	0.511	0.051073	0.45993	1
7.2	0.501	0.045777	0.45522	1
7.4	0.482	0.041029	0.44097	1

RESULTS FROM VISUAL CURVE MATCHING

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	1.434E+000	1.200E+001	2.449E-001		

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A Q T E S O L V R E S U L T S
Version 1.10

06/12/96

08:40:17

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TEST DESCRIPTION

Data set..... pc1n.dat
Data set title..... Lorencito Canyon PC1
Company..... Greystone
Project..... 475
Client..... A. P. Maxwell
Location..... Lorencito Canyon
Test date..... 04/10/96
Test well..... PC-1
Obs. well..... PC-1

Knowns and Constants:

No. of data points..... 226
Radius of well casing..... 0.333
Radius of well..... 0.67
Aquifer saturated thickness..... 10
Well screen length..... 10
Static height of water in well..... 10
Log(Re/Rw)..... 1.972
A, B, C..... 0.000, 0.000, 1.496

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ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate	Std. Error
K =	3.0010E-004 +/-	1.9337E-005
y0 =	1.0114E+000 +/-	1.1417E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:

Number of residuals..... 226
Number of estimated parameters.... 2
Degrees of freedom..... 224
Residual mean..... 0.002582

Residual standard deviation..... 0.1419
 Residual variance..... 0.02013

Level Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	1.75	1.0113	0.73872	1
0.0066	0.738	1.0112	-0.27319	1
0.01	1.788	1.0111	0.7769	1
0.0133	1.097	1.011	0.085993	1
0.0166	1.41	1.0109	0.39908	1
0.02	1.353	1.0108	0.34218	1
0.0233	1.22	1.0107	0.20927	1
0.0266	1.41	1.0106	0.39936	1
0.03	1.182	1.0105	0.17146	1
0.0333	1.381	1.0105	0.37055	1
0.0366	1.211	1.0104	0.20064	1
0.04	1.324	1.0103	0.31373	1
0.0433	1.249	1.0102	0.23883	1
0.0466	1.268	1.0101	0.25792	1
0.05	1.249	1.01	0.23901	1
0.0533	1.239	1.0099	0.2291	1
0.0566	1.249	1.0098	0.23919	1
0.06	1.22	1.0097	0.21029	1
0.0633	1.239	1.0096	0.22938	1
0.0666	1.22	1.0095	0.21047	1
0.07	1.22	1.0094	0.21057	1
0.0733	1.211	1.0093	0.20166	1
0.0766	1.211	1.0093	0.20175	1
0.08	1.192	1.0092	0.18284	1
0.0833	1.201	1.0091	0.19193	1
0.0866	1.182	1.009	0.17303	1
0.09	1.173	1.0089	0.16412	1
0.0933	1.173	1.0088	0.16421	1
0.0966	1.173	1.0087	0.1643	1
0.1	1.164	1.0086	0.1554	1
0.1033	1.164	1.0085	0.15549	1
0.1066	1.145	1.0084	0.13658	1
0.11	1.154	1.0083	0.14567	1
0.1133	1.145	1.0082	0.13676	1
0.1166	1.135	1.0081	0.12686	1
0.12	1.126	1.008	0.11795	1
0.1233	1.126	1.008	0.11804	1
0.1266	1.126	1.0079	0.11813	1
0.13	1.116	1.0078	0.10823	1
0.1333	1.107	1.0077	0.099318	1
0.1366	1.107	1.0076	0.09941	1
0.14	1.107	1.0075	0.099504	1
0.1433	1.097	1.0074	0.089595	1
0.1466	1.097	1.0073	0.089686	1
0.15	1.097	1.0072	0.08978	1
0.1533	1.088	1.0071	0.080871	1
0.1566	1.078	1.007	0.070963	1
0.16	1.069	1.0069	0.062057	1
0.1633	1.069	1.0069	0.062148	1
0.1666	1.059	1.0068	0.052239	1
0.17	1.059	1.0067	0.052333	1
0.1733	1.05	1.0066	0.043424	1

0.1766	1.05	1.0065	0.043515	1
0.18	1.05	1.0064	0.043609	1
0.1833	1.041	1.0063	0.0347	1
0.1866	1.041	1.0062	0.034792	1
0.19	1.031	1.0061	0.024886	1
0.1933	1.031	1.006	0.024977	1
0.1966	1.031	1.0059	0.025068	1
0.2	1.022	1.0058	0.016162	1
0.2033	1.022	1.0057	0.016253	1
0.2066	1.022	1.0057	0.016344	1
0.21	1.022	1.0056	0.016438	1
0.2133	1.012	1.0055	0.0065288	1
0.2166	1.012	1.0054	0.0066199	1
0.22	1.012	1.0053	0.0067137	1
0.2233	1.003	1.0052	-0.0021952	1
0.2266	1.003	1.0051	-0.0021041	1
0.23	1.003	1.005	-0.0020103	1
0.2333	0.993	1.0049	-0.011919	1
0.2366	0.993	1.0048	-0.011828	1
0.24	0.993	1.0047	-0.011734	1
0.2433	0.993	1.0046	-0.011643	1
0.2466	0.984	1.0046	-0.020552	1
0.25	0.984	1.0045	-0.020459	1
0.2533	0.984	1.0044	-0.020368	1
0.2566	0.984	1.0043	-0.020277	1
0.26	0.974	1.0042	-0.030183	1
0.2633	0.974	1.0041	-0.030092	1
0.2666	0.974	1.004	-0.030001	1
0.27	0.974	1.0039	-0.029907	1
0.2733	0.965	1.0038	-0.038816	1
0.2766	0.965	1.0037	-0.038726	1
0.28	0.965	1.0036	-0.038632	1
0.2833	0.965	1.0035	-0.038541	1
0.2866	0.965	1.0035	-0.03845	1
0.29	0.955	1.0034	-0.048356	1
0.2933	0.955	1.0033	-0.048265	1
0.2966	0.955	1.0032	-0.048175	1
0.3	0.955	1.0031	-0.048081	1
0.3033	0.946	1.003	-0.05699	1
0.3066	0.946	1.0029	-0.056899	1
0.31	0.946	1.0028	-0.056806	1
0.3133	0.946	1.0027	-0.056715	1
0.3166	0.946	1.0026	-0.056624	1
0.32	0.946	1.0025	-0.05653	1
0.3233	0.936	1.0024	-0.06644	1
0.3266	0.936	1.0023	-0.066349	1
0.33	0.936	1.0023	-0.066255	1
0.3333	0.936	1.0022	-0.066164	1
0.35	0.946	1.0017	-0.055705	1
0.3666	0.936	1.0012	-0.065249	1
0.3833	0.927	1.0008	-0.07379	1
0.4	0.927	1.0003	-0.073331	1
0.4166	0.918	0.99988	-0.081875	1
0.4333	0.918	0.99942	-0.081417	1
0.45	0.908	0.99896	-0.090959	1
0.4666	0.908	0.9985	-0.090504	1
0.4833	0.908	0.99805	-0.090046	1
0.5	0.899	0.99759	-0.098589	1
0.5166	0.899	0.99713	-0.098134	1
0.5333	0.899	0.99668	-0.097677	1

0.55	0.889	0.99622	-0.10722	1
0.5666	0.889	0.99577	-0.10677	1
0.5833	0.889	0.99531	-0.10631	1
0.6	0.889	0.99485	-0.10585	1
0.6166	0.88	0.9944	-0.1144	1
0.6333	0.88	0.99395	-0.11395	1
0.65	0.88	0.99349	-0.11349	1
0.6666	0.88	0.99304	-0.11304	1
0.6833	0.87	0.99258	-0.12258	1
0.7	0.87	0.99213	-0.12213	1
0.7166	0.87	0.99167	-0.12167	1
0.7333	0.87	0.99122	-0.12122	1
0.75	0.87	0.99077	-0.12077	1
0.7666	0.87	0.99031	-0.12031	1
0.7833	0.87	0.98986	-0.11986	1
0.8	0.861	0.98941	-0.12841	1
0.8166	0.861	0.98896	-0.12796	1
0.8333	0.861	0.9885	-0.1275	1
0.85	0.861	0.98805	-0.12705	1
0.8666	0.861	0.9876	-0.1266	1
0.8833	0.861	0.98715	-0.12615	1
0.9	0.851	0.98669	-0.13569	1
0.9166	0.851	0.98625	-0.13525	1
0.9333	0.851	0.98579	-0.13479	1
0.95	0.851	0.98534	-0.13434	1
0.9666	0.851	0.98489	-0.13389	1
0.9833	0.851	0.98444	-0.13344	1
1	0.851	0.98399	-0.13299	1
1.2	0.832	0.9786	-0.1466	1
1.4	0.832	0.97324	-0.14124	1
1.6	0.823	0.96792	-0.14492	1
1.8	0.813	0.96262	-0.14962	1
2	0.804	0.95735	-0.15335	1
2.2	0.804	0.9521	-0.1481	1
2.4	0.795	0.94689	-0.15189	1
2.6	0.795	0.94171	-0.14671	1
2.8	0.785	0.93655	-0.15155	1
3	0.785	0.93142	-0.14642	1
3.2	0.776	0.92632	-0.15032	1
3.4	0.776	0.92125	-0.14525	1
3.6	0.766	0.91621	-0.15021	1
3.8	0.766	0.91119	-0.14519	1
4	0.766	0.9062	-0.1402	1
4.2	0.757	0.90124	-0.14424	1
4.4	0.757	0.89631	-0.13931	1
4.6	0.757	0.8914	-0.1344	1
4.8	0.757	0.88652	-0.12952	1
5	0.747	0.88166	-0.13466	1
5.2	0.747	0.87684	-0.12984	1
5.4	0.747	0.87204	-0.12504	1
5.6	0.738	0.86726	-0.12926	1
5.8	0.738	0.86251	-0.12451	1
6	0.738	0.85779	-0.11979	1
6.2	0.728	0.85309	-0.12509	1
6.4	0.728	0.84842	-0.12042	1
6.6	0.728	0.84378	-0.11578	1
6.8	0.719	0.83916	-0.12016	1
7	0.719	0.83456	-0.11556	1
7.2	0.719	0.82999	-0.11099	1
7.4	0.719	0.82545	-0.10645	1

7.6	0.719	0.82093	-0.10193	1
7.8	0.709	0.81644	-0.10744	1
8	0.709	0.81197	-0.10297	1
8.2	0.709	0.80752	-0.098519	1
8.4	0.7	0.8031	-0.1031	1
8.6	0.7	0.7987	-0.098701	1
8.8	0.7	0.79433	-0.094328	1
9	0.7	0.78998	-0.089979	1
9.2	0.69	0.78565	-0.095654	1
9.4	0.69	0.78135	-0.091352	1
9.6	0.69	0.77707	-0.087074	1
9.8	0.69	0.77282	-0.082819	1
10	0.681	0.76859	-0.087588	1
11	0.672	0.74778	-0.075776	1
12	0.662	0.72753	-0.065528	1
13	0.653	0.70783	-0.054828	1
14	0.653	0.68866	-0.035662	1
15	0.634	0.67001	-0.036014	1
16	0.634	0.65187	-0.017872	1
17	0.624	0.63422	-0.01022	1
18	0.615	0.61705	-0.0020471	1
19	0.605	0.60034	0.0046612	1
20	0.586	0.58408	0.0019171	1
21	0.567	0.56827	-0.0012672	1
22	0.567	0.55288	0.01412	1
23	0.567	0.53791	0.029091	1
24	0.548	0.52334	0.024656	1
25	0.548	0.50917	0.038827	1
26	0.539	0.49539	0.043615	1
27	0.539	0.48197	0.057029	1
28	0.511	0.46892	0.042079	1
29	0.511	0.45622	0.054777	1
30	0.492	0.44387	0.04813	1
31	0.501	0.43185	0.069149	1
32	0.492	0.42016	0.071843	1
33	0.482	0.40878	0.07322	1
34	0.482	0.39771	0.084289	1
35	0.473	0.38694	0.086058	1
36	0.463	0.37646	0.086535	1
37	0.454	0.36627	0.087729	1
38	0.454	0.35635	0.097647	1
39	0.444	0.3467	0.097296	1
40	0.435	0.33732	0.097684	1
41	0.425	0.32818	0.096818	1
42	0.425	0.3193	0.1057	1
43	0.416	0.31065	0.10535	1
44	0.388	0.30224	0.085762	1
45	0.388	0.29405	0.093946	1
46	0.378	0.28609	0.091908	1
47	0.369	0.27834	0.090655	1
48	0.359	0.27081	0.088192	1
49	0.369	0.26347	0.10553	1
50	0.35	0.25634	0.093659	1
51	0.35	0.2494	0.1006	1

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RESULTS FROM VISUAL CURVE MATCHING

	Estimate
K =	1.3781E-002
y0 =	1.3307E+000

TYPE CURVE DATA

Time	Drawdown	Time	Drawdown	Time	Drawdown
0.000E+000	1.331E+000	5.000E+000	2.436E-003		



999

Doc Date:12/11/2001

VOL. 3

EXHIBIT 7 GROUNDWATER TECHNICAL REPORT

BASELINE TECHNICAL REPORT

**LORENCITO CANYON MINE
GROUNDWATER TECHNICAL REPORT**

Prepared for:

LORENCITO COAL COMPANY

December 1996

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LORENCITO CANYON MINE GROUNDWATER TECHNICAL REPORT

SECTION 1 - INTRODUCTION

To fulfill the requirements of the Regulations of the Colorado Mined Land Reclamation Board, the following report has been assembled in compliance with Rule 2.04.7. Since the beginning of 1996, substantial work has been performed at the Lorencito Canyon Mine site to interpret the hydrology of the area. Specific methodologies employed for this work are described in Section 2 of this document. Further background materials were obtained from a study of the Raton Basin published in 1982. The study "The Hydrogeology of the Raton Basin" (Howard, 1982) is utilized in conjunction with the site-specific materials to provide a comprehensive view of the hydrogeology of the site area. Field work accomplished during the baseline year has included the installation and testing of 10 alluvial wells, 16 consolidated aquifer wells, along with the monitoring of springs and seeps in the site area. From the field data collected, insight has been gained into the recharge and discharge characteristics of aquifers, hydraulic properties, potentiometric and water table surfaces, and water quality for each of the hydrologic units. On the basis of the previous study and the baseline data, both conceptual and mathematical hydrologic models have been developed to show the relationships between the various units.

SECTION 2 - METHODOLOGY

Determinations of Aquifer Extents and Depths

To determine the site-specific aquifer and potential water-bearing zone extensive field studies and existing data reviews were performed. Existing data and field studies show both Primero and Ciruela coal outcrop at the surface at the site. Elevations for these two coal seams are approximately 6800 and 7200 feet AMSL, respectively. These values were combined with contour maps developed during the baseline data period to approximate the location of the coal outcrops at the site. Outcrops were assumed as downgradient extents for these coals. The downgradient extent for the target coals are found on the north side of the site.

Following the initial review of the coal elevations and preliminary mine plans, a baseline characterization plan was developed based upon proposed mining areas. For alluvial groundwater, monitoring wells were emplaced above and below proposed disturbances and in tributary drainage areas (**Table GW-1 and Map 2.04.7-1**). These placements allow for monitoring of effects within all drainages at the site. Consolidated rock monitoring wells were emplaced to provide up and downgradient of the proposed mine layouts. Sites MW-1 and MW-3 were placed to determine the potential upgradient effects from proposed R-1 through R-4 mines. Site MW-2 was placed for determination of the potential effects from these same mines in the downgradient direction. Well sites MW-4 and MW-6 were placed to determine the downstream effects from the P-1 and P-2

mines. Well site MW-4 also serves to determine the upgradient effect from the P3 mine. Well site MW-5 was emplaced to determine the potential upgradient effect from the P1 and P2 mines.

TABLE GW-1
LORENCITO CANYON MINE
SUMMARY OF GROUNDWATER MONITORING STATIONS

Station/Well	Type	Purpose
MWLC-1	Alluvial/Surface	Lorencito Canyon- Downstream Station
MWLC-2	Alluvial/Surface	Lorencito Canyon- Upgradient of P1/P2 Box Cut
MWLC-3	Alluvial/Surface	Lorencito Canyon- Upgradient of P1/P2 Box Cut Disturbance
MWLC-4	Alluvial/Surface	Lorencito Canyon- Upgradient of P1/P2 Under Affected Area
MWJC-1	Alluvial/Surface	Jeff Canyon- Downgradient of Surface Mine
MWPC-1	Alluvial/Surface	Puertecito Canyon- Downgradient of Surface Mine
MWBC-1	Alluvial/Surface	Bonita Canyon
MWCC-1	Alluvial/Surface	Chimney Canyon- Downgradient of R3 and R4 Portals
MWAC-1	Alluvial/Surface	Alamosa Canyon - Site Above P1 Undermining
CWC-1	Alluvial/Surface	Cow Canyon- Downgradient of All Disturbance
CWC-2	Alluvial/Surface	Cow Canyon- Downgradient of R1 and R2 Surface Facilities
MW-1 (Three Wells)	Overburden/Ciruela/ Interburden	Upgradient of R1 and R2
MW-2 (Three Wells)	Overburden/Ciruela/ Interburden	Downgradient of R1 and R2
MW-3 (Three Wells)	Overburden/Ciruela/ Interburden	Upgradient of R3 and R4
MW-4 (Three Wells)	Interburden/Primero/ Underburden	Downgradient of P1 Mine and upgradient of P3
MW-5 (Three Wells)	Interburden/Primero/ Underburden	Upgradient of P1 and P2 Mines
MW-6 (Three Wells)	Interburden/Primero/ Underburden	Downgradient of P2 Mine

Aquifer and potential water bearing zone depths were determined via drilling. Drilling was performed utilizing a Midway 1500 drill rig. Air, water, and limited use of a foamer was allowed for drilling fluids. Prior to actual drilling, surface casing was installed. Each surface casing was emplaced by first drilling a 12 inch hole to approximately 20 feet below grade (see construction diagrams) and subsequently installing a 10 inch conductor pipe. Cement was utilized to set each

pipe and allowed to cure. Each borehole was drilled using a 7-7/8 inch drill bit. Coring was performed in some areas with a 5-5/8 inch drill bit drilling to the core point, and a 4-7/8 inch core barrel utilized to cut the core. During the drilling for each hole, lithologic logs were prepared by a geologist. Following the drilling to the total depth of each hole, a suite of electric logs was ran including gamma ray, caliper, micro-resistivity, resistivity, and density suites. Copies of these logs are included in the geology exhibit within this permit. During the drilling operation, any presence of water encountered was noted.

To determine the presence of alluvial aquifers, wells were installed in the alluvium of major canyons within the permit area. Four wells were installed in Lorencito Canyon, and two wells in Cow Canyon, with the other canyons having one well installed near the canyon mouth. A total of ten wells were installed. Each of these wells were installed by methods similar to those described above, except the wells did not have electric logging or coring performed. Most wells were installed with ten feet of screen and generally do not exceed thirty feet in depth. Construction diagrams and well logs are included in **Appendix GW-1**. Alluvial wells were assigned names based upon location. Each well was designated with an MW prefix, followed by a two or three letter code for the canyon the well was located in, and a number to designate the location with the numbers increasing up the canyon. A summary of this nomenclature for all monitoring points is included as **Table GW-2**.

TABLE GW-2 LORENCITO CANYON MINE SUMMARY OF SITE NOMENCLATURE			
Abbreviation	Type of Station	Abbreviation	Location of Station
MW	Monitor Well	LC	Lorencito Canyon
WM	Windmill	JC	Jeff Canyon
P	Pond	LPC	Little Pine Canyon
SP	Spring	CYC	Coyote Canyon
None	Surface Water	BC	Bonita Canyon
		PC	Puertecito Canyon
		AC	Alamosa Canyon
		CC	Chimney Canyon
		CWC	Cow Canyon
		UD	Unnamed Drainage

Consolidated rock wells were installed in boreholes following the logging or coring operations. Wells were installed in both the Ciruela and Primero Coals, and within the overburden, interburden, and underburden zones. In general, no aquifers (flow > 5 gpm) were noted during drilling. Screening intervals for the wells were installed according to the lithology encountered

at each site. Wells were set in nested configurations with three wells to each drill site. At each site at least one well was installed in the coal (Primerio or Ciruela), and one well each in the zone directly above the coal and below the coal in a zone that potentially is a water-bearing zone, typically sandstones. Each well was set into an individually drilled borehole. All wells were constructed of Schedule 40 PVC well casing and screen. All screens were 0.002 inch machine-slotted and equipped with 2½ foot casing below the screens for capture of sediments. Screen intervals were generally five feet for the coals and ranged to ten feet for the sandstones. Silica sand (10/20 mesh) was installed for the length of the screen and to two feet above the screen. Bentonite pellets were emplaced to 25 feet above the sand to form a seal, and the rest of the annular space filled to near surface with a bentonite slurry. Cement grout was added from ten feet to surface grade. Each well was fitted with an above-ground locking cover. All wells were installed in accordance with the guidelines of the State Engineers' Office. All boreholes drilled and abandoned were done so in accordance with Section 4.07. Copies of the construction diagrams and well logs for these wells are included in **Appendix GW-1**.

All wells in the permit area are proposed for the life of the mine. Following the cessation of mining activities and the bond liability period, all wells will be abandoned in accordance with the standards in Rule 4.07.

Water Quality

To determine the quality of the water within each formation samples were obtained from each well. Prior to sampling, each well was developed and field parameters obtained. Samples were then collected. The following methodology was utilized for water quality determination.

Following the installation of the alluvial wells, each well was developed by repetitive surging of the water column within the well. This surging was accomplished utilizing a 3-inch Schedule 40 PVC bailer. Each well was surged until turbidity within the well effluent was substantially reduced. A minimum of three well volumes were removed or well production was performed until the well was dry. Following this procedure, field parameters were obtained and recorded. Subsequently, wells were sampled in accordance with 40CFR 136. Samples from each well were obtained via a PVC bailer. Each sample was collected according to the requirements of the parameters analyzed for **Table GW-3**. Samples were preserved by cooling to 4°C and shipped for receipt by the laboratory prior within the required holding times. Each of these samples were analyzed for the constituents found on **Table GW-4**.

Following the installation of the wells, sampling was performed to determine groundwater quality. Prior to the initial sampling, each of the consolidated rock wells was first developed by surging utilizing a 3-inch diameter 6 foot long Schedule 40 PVC bailer. The bailer was repeatedly surged back and forth in the well using an 8 horsepower wireline rig. Surging took place an initial fifty times in the well bore, followed by bailing 10 to 15 gallons, and then repeating the procedure. A minimum of three well volumes were removed in this manner, or the well bailed until turbidity

**TABLE GW-3
LORENCITO CANYON MINE
SAMPLE PARAMETERS, CONTAINERS, AND PRESERVATIVES**

Parameter	Sample Container	Preservation Technique	Sample Transport	Holding Time (days)
Alkalinity	Plastic, Glass	Refrigeration	Cool to 4° C	14
Aluminum	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Antimony	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Arsenic	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Barium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Beryllium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Boron	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	28
Bromide	Plastic, Glass	None Required	Cool to 4° C	28
Cadmium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Chromium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Cobalt	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Chloride	Plastic, Glass	None Required	Cool to 4° C	28
Conductivity	Plastic, Glass	Refrigeration	Cool to 4° C	28
Copper	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Cyanide Free	Plastic, Glass	NaOH to pH ≥ 12 (Dark)	Cool to 4° C	14
Fluoride	Plastic	None Required	Cool to 4° C	28
Hardness Calcium & Magnesium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Iron, total	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Iron, dissolved	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Lead	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Lithium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Manganese, total	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Manganese, dissolved	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Mercury	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	28
Nickel	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	28
Nitrogen Ammonia	Plastic/Glass	Refrigeration, H ₂ SO ₄ pH ≤ 2	Cool to 4° C	28
NO ₃ /NO ₂	Plastic/Glass	Refrigeration, H ₂ SO ₄ pH ≤ 2	Cool to 4° C	28
Nitrate	Plastic	Refrigeration	Cool to 4° C	48 hrs
Nitrite	Plastic	Refrigeration	Cool to 4° C	48 hrs
Oil & grease	Glass (1-ltr)	Refrigeration, Sulfuric Acid to pH ≤ 2	Cool to 4° C	28
pH	Plastic			Immed.

TABLE GW-3
LORENCITO CANYON MINE
SAMPLE PARAMETERS, CONTAINERS, AND PRESERVATIVES

Parameter	Sample Container	Preservation Technique	Sample Transport	Holding Time (days)
Phosphorus				
Orthophosphate, Dissolved	Plastic/Glass	Refrigeration	Cool to 4° C	48 hrs
Total Dissolved	Plastic/Glass	Refrigeration, H ₂ SO ₄ pH ≤ 2	Cool to 4° C	48 hrs
Selenium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Silver	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Sodium	Plastic, Glass	Refrigeration	Cool to 4° C	180
Solids				
Dissolved	Plastic	Refrigeration	Cool to 4° C	7
Suspended	Plastic	Refrigeration	Cool to 4° C	7
Total	Plastic	Refrigeration	Cool to 4° C	7
Volatile	Plastic	Refrigeration	Cool to 4° C	7
Sulfate	Plastic, Glass	Refrigeration	Cool to 4° C	28
Suspended Sediments	Plastic, Glass	None Required	Cool to 4° C	7
Thallium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Vanadium	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180
Zinc	Plastic, Glass	HNO ₃ to pH ≤ 2	Cool to 4° C	180

**TABLE GW-4
LORENCITO CANYON MINE
SAMPLE PARAMETERS AND METHODS**

Parameter	Method	Detection Limit (mg/L)
pH	EPA 150.1	0.01 (units)
Alkalinity (incl Bicarb, Carb.)	EPA 310.1	2
Conductivity	EPA 120.1	1 (umhos)
TDS (incl. TDS Ratio & Calc.)	EPA 160.1	10
Chloride	EPA 325.2	1
Sulfate	EPA 375.3	10
Hardness, SAR, CAB	Calculations	n/a
Sum of Anions, Cations	Calculations	n/a
Nitrogen, Nitrite	EPA 353.2	0.02
Nitrogen, Nitrate	EPA 353.2	0.02
Nitrate/Nitrite	EPA 353.2	0.02
Nitrogen, Ammonia	EPA 350.1	0.05
Fluoride	EPA 340.2	0.1
Boron, Dissolved	EPA200.7, ICP	0.01
Calcium, Dissolved	EPA 200.7 ICP	0.2
Magnesium, Dissolved	EPA 200.7 ICP	0.3
Potassium, Dissolved	EPA 200.7 ICP	0.3
Sodium, Dissolved	EPA 200.7 ICP	0.3
Orthophosphate	EPA 365.1	0.005
Cyanide, Free	EPA 335.3	0.1
Thiocyanate	SM 4500 M-CN	0.1
Dissolved Metals		
Aluminum	EPA 200.7 ICP	0.03
Antimony	EPA 204.2 GFAA	0.002
Arsenic	EPA 206.2 GFAA	0.001
Barium	EPA 200.7 ICP	0.003
Beryllium	EPA 210.2 GFAA	0.0005
Cadmium	EPA 213.2 GFAA	0.0005
Chromium	EPA 200.7 ICP	0.01

**TABLE GW-4
LORENCITO CANYON MINE
SAMPLE PARAMETERS AND METHODS**

Parameter	Method	Detection Limit (mg/L)
Cobalt	EPA 200.7 ICP	0.01
Copper	EPA 200.7 ICP	0.01
Iron	EPA 200.7 ICP	0.01
Lead	EPA 239.2 GFAA	0.001
Lithium	EPA 200.7 ICP	0.02
Manganese	EPA 200.7 ICP	0.005
Mercury	EPA 245.1 CVAA	0.0002
Nickel	EPA 200.7 ICP	0.01
Selenium	SM 3500-Se C, AA-Hyd.	0.001
Silver	EPA 200.7 ICP	0.005
Thallium	EPA 279.2 GFAA	0.002
Vanadium	EPA 200.7 ICP	0.005
Zinc	EPA 200.7 ICP	0.01
Total Metals		
Iron	EPA 200.7 ICP	0.01
Manganese	EPA 200.7 ICP	0.005
Total Metals Digestion	EPA 3010	n/a

was substantially reduced. Following the initial sampling/development event, wells were bailed at each subsequent event until the field parameters (pH, conductivity, temperature) stabilized, then sampling occurred. Following this procedure, field parameters were obtained from each well. Subsequently, the wells were sampled. Samples from each well were obtained via a PVC bailer. Each sample was treated according to the requirements of the parameters analyzed for (Table GW-3). Samples were preserved by cooling to 4° C and shipped for receipt by the laboratory prior within the required holding times. Each of these samples were analyzed for the constituents found on Table GW-4. methodologies correspond to analytical procedures identified in 40 CFR with three subtle exceptions. Lithium is not specified in 40 CFR 136 but was analyzed with the approved ICP metals analysis for many metals, EPA 200.7 ICP. The automated technique for selenium was utilized rather than the manual technique. The total metals digestion comparable to EPA's "Methods of Chemical Analysis of Water and Wastes."

Water quality data was synthesized by developing tables of concentration over time for the major cations and anions (carbonate, bicarbonate, sulfate, sodium, potassium, magnesium, and calcium)

and for pH and TDS as included in **Appendix GW-2**.
diagrams were generated and are arranged by specific horizo.
etc.) and included as **Appendix GW-3**.

Aquifer Characteristics

Aquifer and water-bearing zone characteristics were determined from literature and specific field studies. During monitoring events, each well was gauged for depth to water and these depths recorded. For each horizon, surveyed well elevations were utilized to establish the elevation of the groundwater in the well to sea level datum. These elevations were plotted and the groundwater gradient established for each of the horizons.

In addition to the establishment of the gradients within the area, each horizon was tested for aquifer parameters. Testing of the wells was conducted by slug testing. The alluvial wells were tested by first emplacing an In-Situ pressure transducer in the well and allowing the well to equilibrate. This transducer was connected to an In-Situ model 2000 Hermit datalogger for test data recording. Test data was recorded in a logarithmic fashion allowing for greater data gathering during the early part of the test procedure. Following the input of transducer calibration values into the Hermit, a "slug" of water was removed from the well with a 3 inch bailer. Concurrent with the slug removal, the data recording was initiated. Data from these "slug-out" tests were analyzed utilizing AQTESOLV, an aquifer test solver computer program. All alluvial well data was analyzed via the Bouwer and Rice methodology for unconfined aquifers.

Testing in the consolidated rock was also performed via slug testing. These wells were tested by the "slug-in" method since all water-bearing zones encountered by these wells were considered confined or semi-confined. Test was performed in a similar fashion to the alluvial wells except the slug was introduced into the well instead of being removed. This has the effect of adding static head to the well. The datalogger measures the subsequent falling head in the well. These test were also analyzed utilizing AQTESOLV, but utilizing the method of Cooper and Pappadapolous.

Developed Groundwater Resources and Water Rights

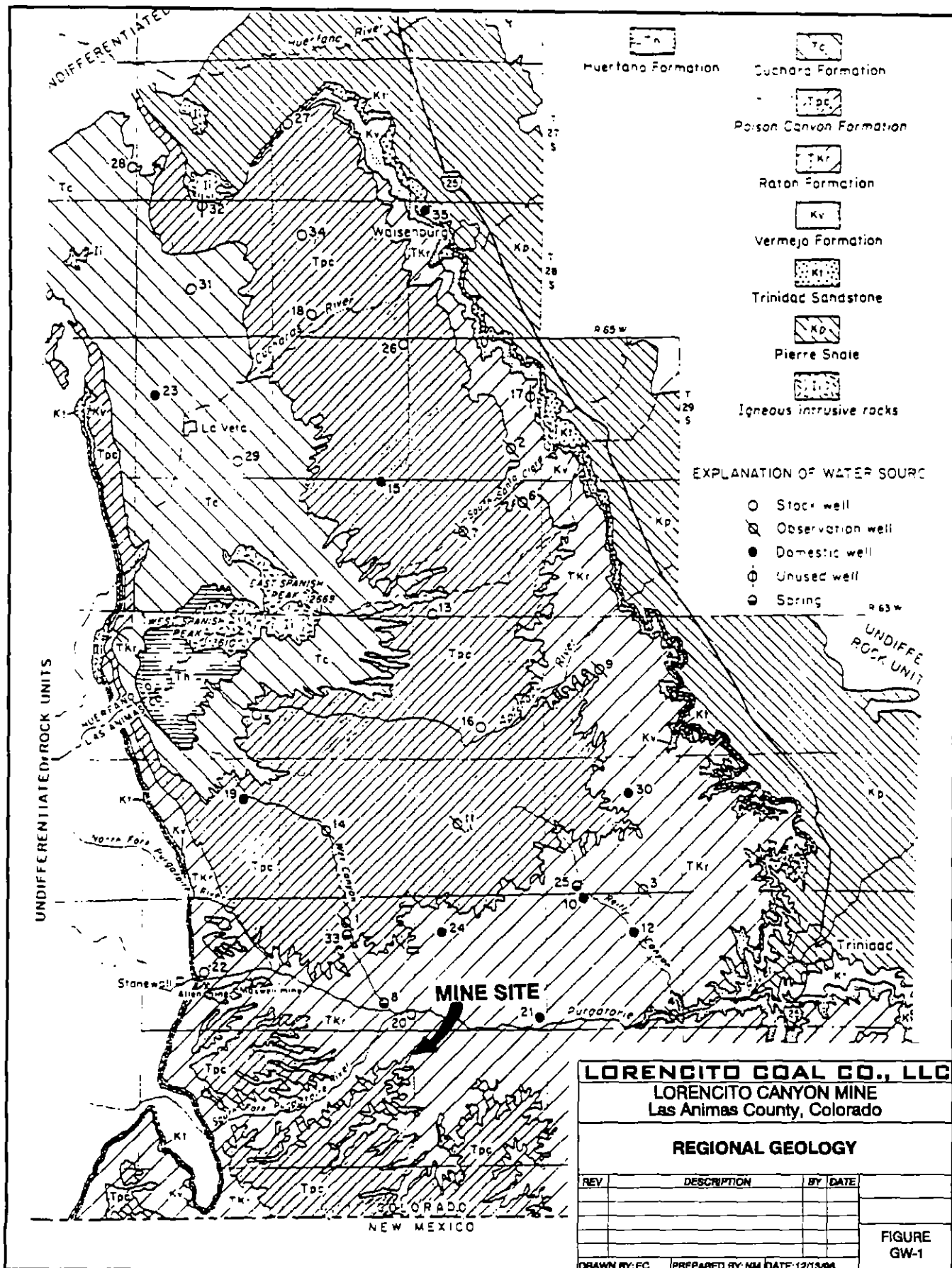
Water resources and water rights were researched through both the State Engineer's Office and field studies. In addition, field studies were performed via land and air searches for additional water uses at the property. All items spotted from aerial surveys were confirmed by ground surveys prior to transfer to the master hydrology map.

SECTION 3 - RESULTS AND DISCUSSION

Literature Review/Overview

Raton Formation

Within the permit area two formations outcrop, the Raton and Poison Canyon (**Figure GW-1**). Further discussion of geology can be found in the geology section of the permit. The Vermejo and



Raton Formations are typically discussed as one aquifer system due to the complex nature of the structure of these units. Correlation of the aquifer units is very difficult due to the lack of lateral continuity common to these units (Howard, 1982). According to the study by Howard, the best water-bearing zones in the formations are the coal units. In addition, this study also indicates the next best water bearing zones in the formation are the channel sands. Studies performed by Howard in the area of the project included core plug analyses for horizontal and vertical hydraulic conductivity (k_x , k_z) of these sands, slug tests from wells installed in the formations, and water quality analyses. Generally, the zones are described as being confined with low hydraulic conductivities, and very low yields (Howard, 1982).

Poison Canyon Formation

The Poison Canyon Formation outcrops in the site area and forms the highest unit in the proposed project boundary. This formation is generally found on the ridgetops of the site area and described as a medium grain sandstone, conglomerate and occasional interbedded mudstone unit. Regionally, some of the sandstones in the formation are productive aquifers (Howard, 1982). The Poison Canyon Formation is a major ridge forming unit in the area.

Drilling Program Overview

The intent of the drilling program was to determine the existence of aquifers or water-bearing zones in the permit area, and to characterize these zones. Drilling was performed as described in the Methodology Section (Section 2). Drilling targeted the overburden, Ciruela Coal, interburden, Primero Coal, and underburden. The rationale for screening the wells is related to determining the potential impacts from dewatering to the various lithologies, and the potential production of water from each zone. No continuous or regional aquifers were encountered during the drilling of any borings. Some low-yield zones were noted.

Generally, the screens were installed in the best potential zone immediately above and below the coal. Therefore, there are two sets of wells within the interburden. One of these sets of wells is screened in the sand immediately below the Ciruela seam, and one is screened in the sand immediately above the Primero seam. Screened wells also exist in the coal seams, the underburden of the Primero, and the overburden. Construction diagrams and boring logs are included in **Appendix GW-1**.

Overburden

During the drilling of the overburden for the Ciruela wells, no water was encountered, with the exception of the wells at site MW-1A. Nominal amounts of water were encountered in the overburden well MW-1A with a flow rate (estimated during drilling) of less than 5 gpm. At the other two pad sites, MW-2 and MW-3, no water was encountered in drilling through the overburden. Wells were installed in the overburden at the sites MW-1A and MW-2. Two of the

three proposed wells at the MW-3 site were not installed, since groundwater was not encountered. Data from the drilling at MW-2 and MW-3 indicates that the aquifer is discontinuous, at best.

Ciruela Coal

Drilling of the Ciruela seams was at locations MW-1, MW-1A, MW-2, and MW-3. Drilling in these areas encountered limited water (<5 gpm) in the location MW-1A. Drilling at the MW-1 location was moved to the MW-1A location after the initial boring determined the coal was pinched out at the MW-1 location. Drilling in the MW-2 and MW-3 locations did not encounter any water. Two of the three wells in the MW-3 site were not installed, since water was not encountered.

Interburden

Drilling in the second interburden zone (Primero) did not indicate large quantities of water in this zone. Water was encountered in the drilling for MW-4 at approximately 25 feet below grade, but this well is located in an alluvial valley, and the alluvium is thought to be the source of this water. Increased production of water was not noted as the boring progressed. Wells were set in the sandstone immediately overlying the Primero, since water production more than 5 gpm was not noted during drilling. The location MW-6 encountered water at approximately 110 feet below grade, but groundwater flow from this formation was also nominal. The location MW-5 encountered groundwater in the boring at 50 feet below grade, and a flow of 125 gpm was estimated from this zone. This zone is also thought to represent a fractured sandstone that is in contact with the alluvium; therefore, during the installation of these wells this zone was cased off. Well screens at these locations were set in the consolidated sandstones overlying the coal.

Primero Coal

No increase in water flow was noted during drilling through the Primero Coal at well locations MW-4, MW-5, and MW-6. All wells in this zone were set as per the aforementioned methodology.

Underburden Wells

Underburden wells were installed in the sandstone encountered below the Primero Coal at well sites MW-4, MW-5, and MW-6. With the exception of MW-5, no increase in flow was noted during the drilling of this zone. At MW-5 an increase of 5 gpm was estimated during the drilling of this well through this zone.

Ground Water Quality

Overview

Ground water quality in the area has been characterized in literature and by site specific studies. Review of the study by Howard indicates general quality parameters for the Raton and Poison Canyon Formations. These parameters indicate a highly mineralized ground water with specific conductances in the Poison Canyon and Raton Formations of 1199 and 1884 $\mu\text{mhos/cm}$, respectively. From the samples collected within the formations comprising the Colorado Raton Basin, the mean TDS value was 1026 mg/l. Within the samples obtained by Howard, pH, calcium (Ca), sodium (Na), potassium (K), chloride (Cl), sulfate (SO_4^{2-}), nitrate (NO_3^- as N), fluoride (F), total iron (Fe), and manganese (Mn) were elevated within some samples. Statistical parameters from this study are present on **Table GW-5**.

In addition to collection of ground water samples and subsequent analyses of these samples, Howard also determined water types for the major formations in the Raton Basin. These determinations were made based upon analyses of the cation and anion percentages on trilinear diagrams (Piper, 1942) (**Figure GW-2**). Following the identification of the chemical characteristic of each sampling point a map was constructed of the dominant water types in the Raton Basin. This map is presented as **Figure GW-3**. Examination of the map indicates the dominant water type in the area of the proposed Lorencito Mine to be of a sodium bicarbonate (NaHCO_3) type. Howard further plotted samples from each formation on separate trilinear diagrams to determine the water types from the individual formations. Water from the Poison Canyon Formation is characterized as a calcium bicarbonate (CaHCO_3) type, and waters from the Raton/Vermejo Formations are classified as a NaHCO_3 type (**Figures GW-4 and GW-5**).

Site Specific Results

Windmills

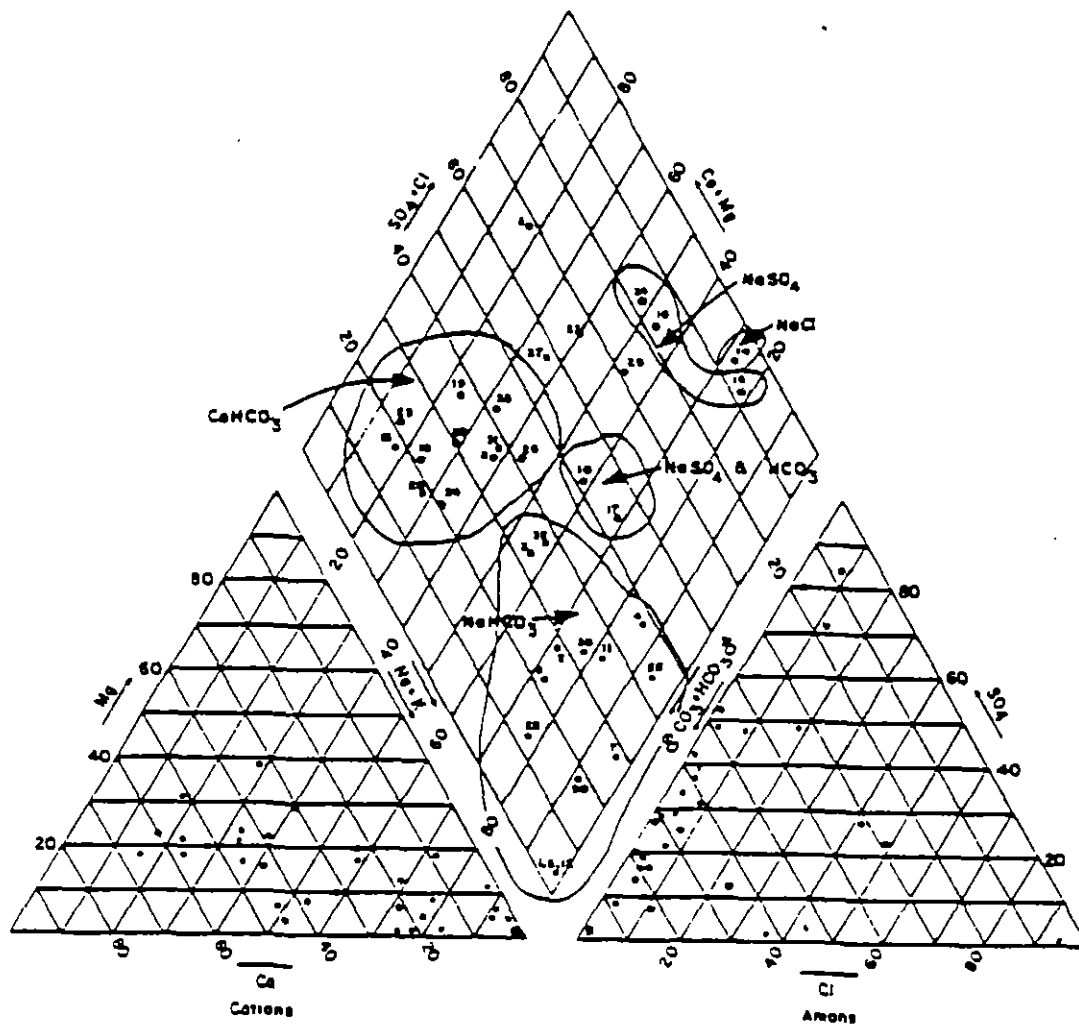
Windmills in the site area were surveyed in August 1996. Each windmill was surveyed for depth to water (if possible), temperature, pH, specific conductance, and dissolved oxygen. Several of the windmills were either non-operational, or were inaccessible. **Table GW-6** summarizes the data collected from the wells, and **Map 2.04.7-1** illustrates the location of the windmills.

Conductivity data from these windmill sites indicates a fairly high degree of mineralization. Comparison of the dissolved oxygen readings and pH values from WMBC2 and WMCWC2 indicate the water in the stock tank may not be representative of the water pumped from the wells. Several of the wells are set in the alluvium; however, depths of many of the wells would indicate that these wells are not set within the alluvium, but within more competent rock.

Data was collected from the windmills on August 28, 1996. Each of the windmills were monitored once for field parameters. Water samples were obtained for laboratory analyses from WMLPC-1 and WMCWC-1. A summary table showing the results from the windmills is included in **Appendix GW-2**.

TABLE GW-5 LORENCITO CANYON MINE STATISTICAL PARAMETERS REPRESENTING 35 WATER SAMPLES COLLECTED DURING REGIONAL STUDY¹				
Constituent	Mean	Standard Deviation	Range	Units
Specific Conductance	1825.6	2104.0	430.0-8000.0	μmhos/Cm
pH	7.21	1.01	5.6-11.5	Mg/l
Dissolved Oxygen	3.85	2.47	1.0-7.9	Mg/l
HCO ₃	563.8	698.9	50.0-3206.0	Mg/l
Al	1.03	3.32	0.00-.38	Mg/l
Ca	82.66	112.13	1.8-560.0	Mg/l
Na	286.3	418.5	17.0-1800.0	Mg/l
K	9.1	36.7	0.9-220.0	Mg/l
Fe	0.31	0.47	0.01-2.30	Mg/l
Mg	19.8	23.4	0.2-100.0	Mg/l
Mn	0.030	0.038	0.000-1.000	Mg/l
Cl	77.9	212.8	3.9-2600.0	Mg/l
SO ₄	201.8	323.3	8.7-1700.0	Mg/l
NO ₃	0.06	0.11	0.03-0.07	Mg/l
SiO ₂	10.7	4.5	0.6-24.0	Mg/l
F	1.30	1.35	0.0-6.1	Mg/l
Zn	162.3	29.3	3.0-1400.0	μg/l
B	61.7	70.5	10.0-380.0	μg/l
As	0.37	0.54	0.0-2.0	μg/l
Cd	2.8	3.1	1.0-17.0	μg/l
Se	2.2	3.7	0.16	μg/l
Pb	18.9	41.4	0.0-230.0	μg/l
Ag	0.03	0.17	0.0-1.0	μg/l
Hardness CaCO ₃	300.0	323.0	6.0-1600.0	Mg/l

¹After Howard, 1982



LORENCITO COAL CO., LLC

LORENCITO CANYON MINE
Las Animas County, Colorado

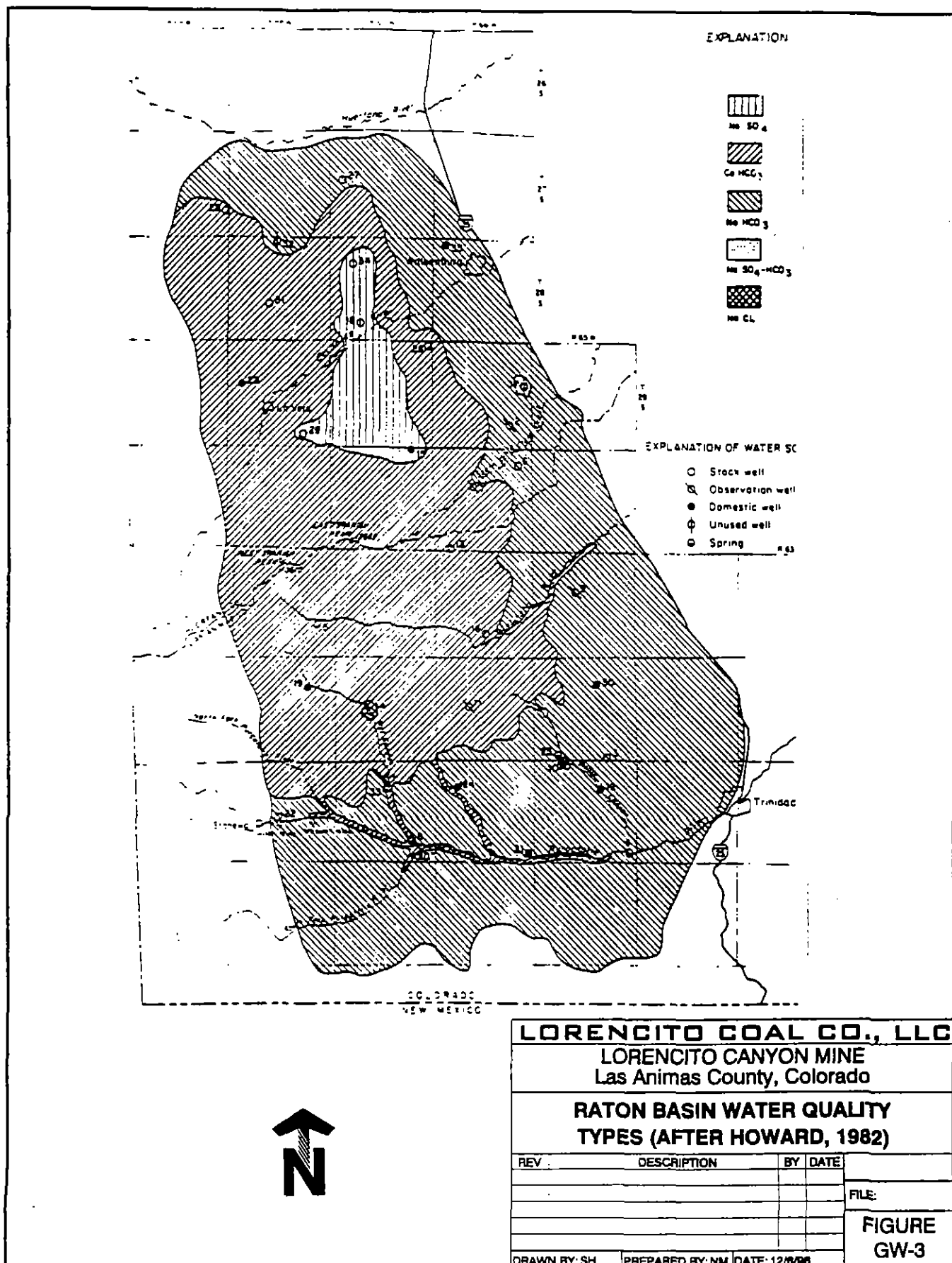
**TRILINEAR PLOT OF RATOR BASIN WATER
WATER QUALITY (AFTER HOWARD, 1982)**

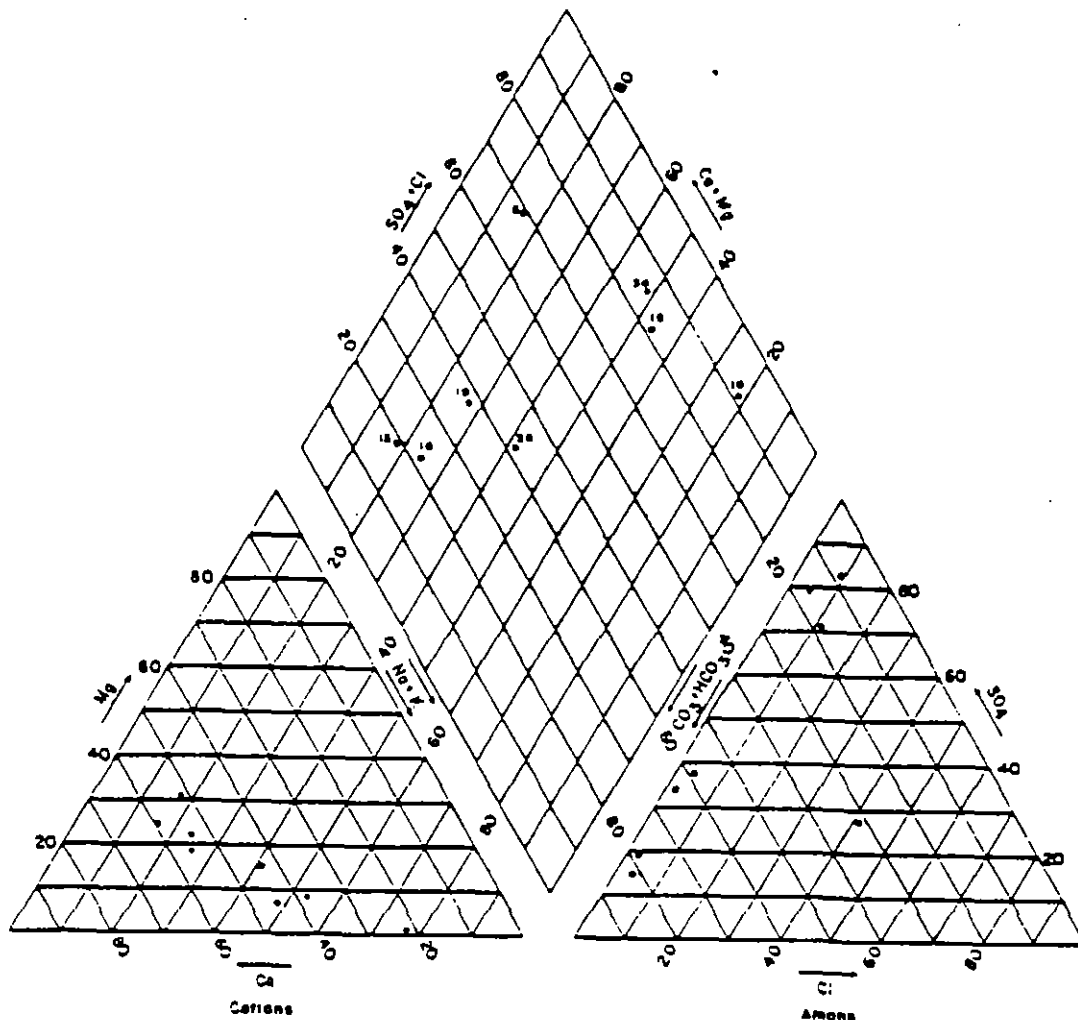
REV	DESCRIPTION	BY	DATE

FILE:

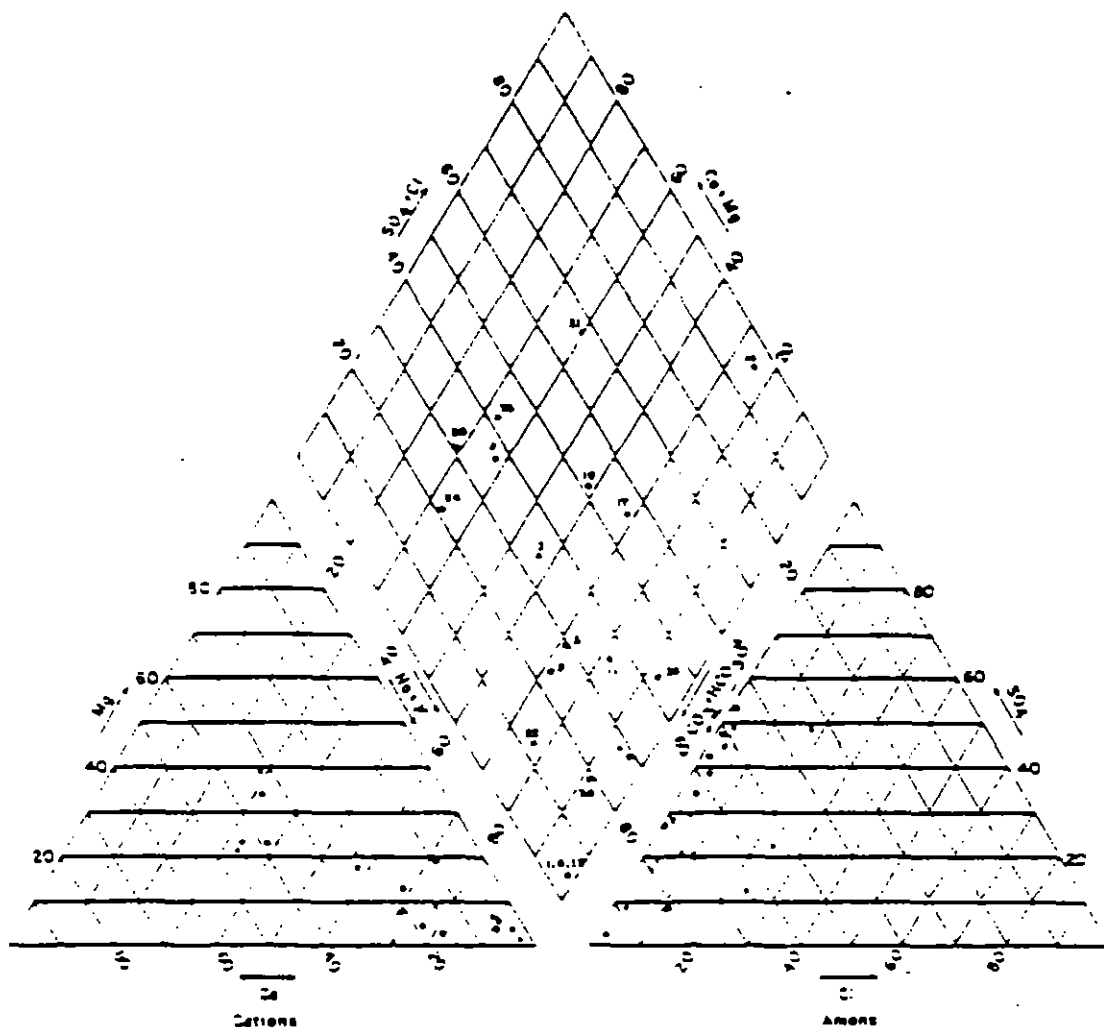
**FIGURE
GW-2**

DRAWN BY: SH PREPARED BY: NM DATE: 12/8/98





LORENCITO COAL CO., LLC			
LORENCITO CANYON MINE Las Animas County, Colorado			
TRILINEAR PLOT OF SAMPLES FROM POISON CANYON FORMATION (HOWARD 1982)			
REV	DESCRIPTION	BY	DATE
DRAWN BY: SH			PREPARED BY: NM DATE: 12/8/88
FILE:			FIGURE GW-4



LORENCITO COAL CO., LLC

LORENCITO CANYON MINE
Las Animas County, Colorado

**TRILINEAR PLOT OF SAMPLES FROM
THE RATON / VERMEJO FORMATION
(HOWARD 1982)**

REV	DESCRIPTION	BY	DATE

FILE:

**FIGURE
GW-5**

DRAWN BY: SH PREPARED BY: NM DATE: 12/8/88

**TABLE GW-6
LORENCITO CANYON MINE
SUMMARY OF RESULTS FROM WINDMILLS**

Site	Depth to Water (feet)	Temperature °F	pH (S.U.)	Specific Conductance (μmhos/cm)	Dissolved Oxygen (mg/L)	Estimated Total Depth (feet) ¹
WMCC1	NA	Dry	Dry	Dry	Dry	NE
WMLPC1	10.30	77.7	8.96	1440	6.79	NE
WMPC1	NA	77.1	8.30	986	3.27	60
WMBC1	NA	Dry	Dry	Dry	Dry	40
WMBC2 ²	NA	78.2	9.63	1439	10.1	70
WMBC3	22.45	Dry	Dry	Dry	Dry	60
WMCWC1	NA	70.8	8.32	650	8.07	60
WMCWC2 ²	NA	77.3	9.71	820	16.95	80

NA- not accessible, no means of entry was available for the probe.

¹ Depths are from personal communication with Sid Bayes, Ranch manager

² Water samples for these wells were obtained from the stock tank since no flow was observed and no access was available to the well.

Results from the laboratory analyses was interpreted through the use of trilinear and Stiff diagrams. These diagrams indicate principal cation and anion milliequivalents per liter and are useful for determining water type. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in the windmills is a sodium bicarbonate type. This water is typically neutral to partially alkaline, with low hardness, and low to moderate salinity. The pH ranges from 8.32 to 9.71 and hardness ranges from 166 to 80 mg/L. Total dissolved solids in the samples ranged from 660 to 800 mg/L (filterable residue).

All parameters required for analysis were compared with the Colorado Department of Health, Water Quality Control Division The Basic Standards for Ground Water 3.11.0 (04/30/96), which include and specify secondary drinking water standards, agricultural standards, human health standards and total dissolved solids standards. In addition, sodium absorption ratios (SAR) and conductivity measurements were compared to Mined Land Reclamation Division Guidelines, "Division Procedures for the Assessment of Material Damage with Respect to Alluvial Valley Floors, The Cumulative Hydrologic Impact Assessment, and Subsidence at Coal Mines (11/87)." The standards and maximums observed at a site which were exceeding are listed in **Table GW-7**.

**TABLE GW-7
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - ALLUVIAL WELLS**

Parameter	Units	MWAC-1	MWCC-1	MWCWC-1	MWCWC-2	MWJC-1	MWLC-1	MWLC-2	MWLC-3	MWLC-4	MWPC-1	MWCWC-1	WMLPC-1	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
pH	s.u												8.96		6.5-8.5		
Specific Conductance	µmhos/cm		819	1293	1215	1667					971		1440				700
Dissolved Oxygen	mg/L																
Barium, dissolved	mg/L													2.0			
Beryllium, dissolved	mg/L	< 0.0100 ^{DL}	< 0.0100 ^{DL}		< 0.0100 ^{DL}	< 0.0100 ^{DL}	< 0.0100 ^{DL}		< 0.0100 ^{DL}	< 0.0100 ^{DL}	< 0.0100 ^{DL}			0.004		0.1	
Cobalt, dissolved	mg/L															0.05	
Chromium, dissolved	mg/L													0.1		0.01	
Fluoride	mg/L													4.0		2.0	
Lithium, dissolved	mg/L															2.5	
Antimony, dissolved	mg/L													0.006			
Thallium, dissolved	mg/L													0.002			
Vanadium, dissolved	mg/L															0.1	
Silver, dissolved	mg/L											8.1		0.05			
Aluminum, dissolved	mg/L															5.0	5.0
Arsenic, dissolved	mg/L													0.05		0.1	0.1
Boron, dissolved	mg/L															0.75	0.50
Cadmium, dissolved	mg/L													0.005		0.01	0.01
Chloride	mg/L														250		
Cyanide, free	mg/L													0.20			

TABLE GW-7 (continued)
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - ALLUVIAL WELLS

Parameter	Units	NWAC-1	MWCC-1	MWCWC-1	MWCWC-2	MWJC-1	MWLC-1	MWLC-2	MWLC-3	MWLC-4	MWPC-1	MWCWC-1	WMLPC-1	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
Thiocyanate (SCN)	mg/L																
Chromium, total recoverable	mg/L													0.1		0.1	
Copper, dissolved	mg/L														1	0.2	0.2
Conductivity @25°C	umhos/cm		836	1445	1128	1215					962	1272	1021				700
Iron, dissolved	mg/L				0.53					0.64					0.3	5.0	
Iron, total	mg/L																
Iron, total recoverable	mg/L																
Hardness as CaCO ₃	mg/L																
Mercury, dissolved	mg/L													0.002		0.01	
Manganese, dissolved	mg/L	0.605	0.422		0.200	0.247			0.078		0.267				0.05	0.2	0.2
Manganese, total	mg/L																
Nitrite as N, dissolved	mg/L													1.0		10	
Nitrate as N, dissolved	mg/L													10.0			
Nitrate/Nitrite as N, dissolved	mg/L													10.0		100	
Nickel, dissolved	mg/L													0.1		0.20	0.20
Lead, dissolved	mg/L													0.05		0.1	5.0
pH (Lab)	units												8.7		6.5-8.5	6.5-8.5	
Sodium Absorption Ratio in Water	mg/L																

TABLE GW-7 (continued)
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - ALLUVIAL WELLS

Parameter	Units	MWAC-1	MWCC-1	MWCWC-1	MWCWC-2	MWJC-1	MWLC-1	MWLC-2	MWLC-3	MWLC-4	MWPC-1	MWCWC-1	MWLPC-1	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
Selenium, dissolved	mg/L													0.05		0.02	0.02
Sulfate	mg/L			270	250	260									250		
Residue, Filterable (TDS) @18°C	mg/L																
TDS (Calculated)	mg/L						810				640	789	661				
Zinc, Dissolved	mg/L														5	2	2.0

DL = Detection limit

Exceedances for total dissolved solids were observed in windmills WMLPC-1 and WMCWC-1. The pH standards were exceeded in windmills WMCWC-2, WMBC-2 and WMLPC-1. SAR levels ranged from 6.70 to 7.60. Electrical conductivity ranged from 0.650 to 1.439 mmhos/cm.

Alluvium

Data was collected from each of the alluvial wells (MWAC-1, MWCC-1, MWCWC-1, MWCWC-2, MWJC-1, MWLC-1, MWLC-2, MWLC-3, MWLC-4 and MWPC-1) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. A summary table showing the results from all the alluvial wells is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of trilinear and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in the alluvial wells is a calcium-sodium bicarbonate type. This water is typically neutral with low hardness, and low to moderate salinity. The pH ranges from 7.05 to 8.37 and hardness ranges from 177 mg/L to 302 mg/L. Total dissolved solids in the samples ranged from 152 to 880 mg/L (filterable residue).

All parameters required for analysis were compared with standards similar to windmill results. The standards and results are listed in **Table GW-7**. The method detection limit was reported greater than the Human Health Standards for beryllium for the samples obtained from all the alluvial wells, except well MWCWC-1. Exceedances of iron from the secondary drinking water standard were observed in wells MWCWC-2-1 and MWLC-4. The agricultural and secondary drinking water standards for manganese were exceeded in wells MWAC-1, MWCC-1, MWCWC-2, MWJC-1, MWLC-3 and MWPC-1. The secondary drinking water standard for sulfate was exceeded in wells MWCWC-1, MWCWC-2 and MWJC-1. Sites MWCC-1, MWCWC-1, MWCWC-2, MWJC-1, MWPC-1, and WMLPC-1 exhibited specific conductance values which periodically exceeded the CDMG material damage standard of 700 μ mhos/cm. Total dissolved solids standards were exceeded in wells MWLC-1, MWPC-1, WMCWC-1, and WMLPC-1. SAR levels ranged from 1.19 to 6.39. Electrical conductivity ranged from 0.315 to 1.667 mmhos/cm. The human health standard for silver was exceeded in WMCWC-1.

Overburden

Data was collected from each of the overburden wells (MW-10 and MW-20) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. Monitor well MW-20 was dry during the 1996 baseline monitoring period and was not sampled. A summary table showing the results from the overburden well is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of Piper and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in well MW-1O is a sodium bicarbonate type. This water is typically neutral to partially alkaline, with low hardness, and low to moderate salinity. The pH ranges from 7.86 to 8.5 and hardness ranges from 17 to 80 mg/L. Total dissolved solids in the samples ranged from 510 to 670 mg/L (filterable residue).

All parameters required for analysis were compared with the applicable CDPHE and CDMG standards. The standards and exceedances are listed in **Table GW-8**. Exceedances from the groundwater standards of aluminum, antimony, fluoride, manganese, iron, pH and total dissolved solids were observed in well MW-1O. These exceedances reflect limitations for domestic and agricultural use. SAR levels ranged from 9.73 to 29.20. Electrical conductivity ranged from 0.563 to 2.090 mmhos/cm, periodically exceeding the CDMG damage standard. Wells MW-2O and MW-3O remained dry during the 1996 monitoring and sampling period and were not sampled.

Ciruela Coal

Data was collected from each of the wells screened in the Ciruela Coal (MW-1C, MW-2C and MW-3C) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. Monitor wells MW-2C and MW-3C were dry during the 1996 baseline monitoring period and were not sampled. A summary table showing the results from all the wells completed in the Ciruela Coal is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of Piper and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in well MW-1C is a sodium bicarbonate type. This water is typically neutral to partially alkaline. The pH ranges from 8.27 to 9.40 and hardness ranges from 7 to 9 mg/L. Total dissolved solids in the samples ranged from 440 to 550 mg/L (filterable residue).

All parameters required for analysis were compared with the applicable CDPHE and CDMG standards. The standards and exceedances are listed in **Table GW-8**. Exceedances for iron, pH and total dissolved solids were observed in well MW-1C. In addition, beryllium was reported with a detection limit greater than the human health standard. SAR levels ranged from 32.10 to 33.20. Electrical conductivity ranged from 0.110 to 1.620 mmhos/cm. As noted previously, wells MW-2C and MW-3C remained dry during the 1996 monitoring and sampling period and were not sampled.

**TABLE GW-8
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - CONSOLIDATED ROCK AQUIFERS**

Parameter	Units	MW 1C	MW 1I	MW 1O	MW 2C	MW 2I	MW 2O	MW 3I	MW 4C	MW 4I	MW 4U	MW 5C	MW 5I	MW 5U	MW 6C	MW 6I	MW 6U	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
pH	s.u.	9.40		8.52					8.56			9.11	8.98	9.07	8.78		8.76		6.5-8.5		
Specific Conductance	µmhos/cm	1620	2090	1392					2200	2840	3260	964	658	895	1700	2340	1705				700
Dissolved Oxygen	ppm																				
Barium, dissolved	mg/L																	2.0			
Beryllium, dissolved	mg/L	< 0.010 ^{PL}																0.004		0.1	
Cobalt, dissolved	mg/L																			0.05	
Chromium, dissolved	mg/L																	0.1		0.1	
Fluoride	mg/L			4					6	6	4	2		2	6	7	6	4.0		2.0	
Lithium, dissolved	mg/L																			2.5	
Antimony, dissolved	mg/L		0.009															0.006			
Thallium, dissolved	mg/L																	0.002			
Vanadium, dissolved	mg/L																			0.1	
Silver, dissolved	mg/L																	0.05			
Aluminum, dissolved	mg/L			10.00								10.30				45.00	12.20			5.0	5.0
Total Alkalinity	mg/L																				
Carbonate as CaCO ₃	mg/L																				
Bicarbonate as CaCO ₃	mg/L																				
Hydroxide as CaCO ₃	mg/L																				
Arsenic, dissolved	mg/L																	0.05		0.1	0.1
Boron, dissolved	mg/L																			0.75	0.50

TABLE GW-8 (continued)
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - CONSOLIDATED ROCK AQUIFERS

Parameter	Units	MW 1C	MW 1I	MW 1O	MW 2C	MW 2I	MW 2O	MW 3I	MW 4C	MW 4I	MW 4U	MW 5C	MW 5I	MW 5U	MW 6C	MW 6I	MW 6U	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
Calcium, dissolved	mg/L																				
Cadmium, dissolved	mg/L																	0.005		0.01	
Chloride	mg/L																		250		
Cyanide, free	mg/L																	0.20			
Thiocyanate (SCN)	mg/L																				
Chromium, Trivalent	mg/L																				
Chromium, Hexavalent	mg/L																				
Chromium, total recoverable	mg/L																				
Copper, dissolved	mg/L																		1	0.2	0.2
Conductivity, @25°C	µmhos/cm	924	2040	1078					1777	2303	2837	970	774	783	1542	2246	1545				700
Iron, dissolved	mg/L	2.21	0.85	21.10					0.31	1.00	0.80	32.20	5.36	8.34	12.30	176.00	20.80		0.3	5.0	
Iron, total	mg/L																				
Iron, total recoverable	mg/L																				
Hardness as CaCO ₃	mg/L																				
Mercury, dissolved	mg/L																	0.002		0.01	
Potassium, dissolved	mg/L																				
Magnesium, dissolved	mg/L															2.690	0.446				
Manganese, dissolved	mg/L			0.202								0.309	0.148	0.430					0.05	0.2	0.2
Manganese, total	mg/L																				

TABLE GW-8 (continued)
LORENCITO CANYON MINE
QUALITY STANDARDS EXCEEDANCES - CONSOLIDATED ROCK AQUIFERS

Parameter	Units	MW 1C	MW 1I	MW 1O	MW 2C	MW 2I	MW 2O	MW 3I	MW 4C	MW 4I	MW 4U	MW 5C	MW 5I	MW 5U	MW 6C	MW 6I	MW 6U	Human Health Standards (mg/L)	Secondary Drinking Water Standards (mg/L)	Agricultural Standards (mg/L)	CDMG Material Damage Standards (mg/L)
Molybdenum, dissolved	mg/L																				
Nitrogen, ammonia	mg/L																				
Nitrite as N, dissolved	mg/L																	1.0		10	
Nitrate as N, dissolved	mg/L																	10.0			
Nitrate/Nitrite as N, dissolved	mg/L																	10.0		100	
Sodium, dissolved	mg/L																				
Nickel, dissolved	mg/L																	0.1		0.20	0.20
Lead, dissolved	mg/L														8.6	8.6	8.6	0.05		0.1	5.0
pH (Lab)	units	8.7							8.6			8.8	8.8	8.9					6.5-8.5	6.5-8.5	
Sodium Absorption Ratio in Water	mg/L																				
Selenium, dissolved	mg/L																	0.05		0.02	0.02
Sulfate	mg/L										290								250		
Residue, Filterable (TDS) @18°C	mg/L																				
TDS (Calculated)	mg/L	596	1410	685					1110	1430	1650										
Zinc, Dissolved	mg/L																		5	2	2.0

DL = Detection limit

Interburden

Data was collected from each of the interburden wells (MW-1I through MW-6I) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. Monitor wells MW-2I and MW-3I remained dry during the 1996 baseline monitoring period and were not sampled. A summary table showing the results from all the interburden wells is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of Piper and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed is a sodium bicarbonate type. This water is typically neutral to partially alkaline, with low hardness, and moderate to high salinity. The pH ranges from 7.56 to 8.98 and hardness ranges from 3 to 319 mg/L. Total dissolved solids in the samples ranged from 420 to 1430 mg/L (filterable residue).

All parameters required for analysis were compared with the applicable CDPHE and CDMG standards. The standards and exceedances are listed in **Table GW-8**. Exceedances of the secondary drinking water standard for pH were observed in MW-5I. Exceedances for iron from secondary drinking water standards and agricultural standards were detected in the samples obtained from monitor wells MW-1I and MW-4I through MW-6I. Manganese standards for secondary drinking water were exceeded in monitor wells MW-5I and MW-6I. Antimony domestic standards were exceeded in monitor wells MW-1I and MW-6I. Lead and aluminum standards were exceeded in monitor well MW-6I. Fluoride agricultural and human health standards were exceeded in monitor wells MW-4I and MW-6I. Total dissolved solids standards were exceeded in monitor wells MW-1I and MW-4I. SAR levels ranged from 9.73 to 75.10. Electrical conductivity ranged from 0.450 to 2.340 mmhos/cm, exceeding CDMG material damage standards at MW-1I, MW-4I, MW-5I, and MW-6I. Wells MW-2I and MW-3I remained dry during the 1996 monitoring and sampling period.

Primero Coal

Data was collected from each of the wells screened in the Primero Coal (MW-4C, MW-5C and MW-6C) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. A summary table showing the results from all the wells screened in the Primero Coal is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of Piper and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in wells MW-4C through MW-6C is a sodium bicarbonate type. This water is alkaline, with low hardness, and moderate to high salinity. The pH ranges from 8.56 to 9.11 and hardness ranges

from 4 to 81 mg/L. Total dissolved solids in the samples ranged from 420 to 1430 mg/L (filterable residue).

All parameters required for analysis were compared with the applicable CDPHE and CDMG standards. The standards and results are listed in **Table GW-8**. Exceedances for fluoride, iron and pH were detected in wells MW-4C, MW-5C and MW-6C. Total dissolved standards were exceeded in monitor well MW-4C. Aluminum and manganese standards were exceeded in monitor well MW-5C. SAR levels ranged from 11.90 to 70.30. Electrical conductivity ranged from 0.410 to 2.200 mmhos/cm, exceeding CDMG material standards at MW-4C, MW-5C, and MW-6C. This water-bearing seam shows evidence of limitations for primary and secondary domestic use and agricultural use.

Underburden

Data was collected from each of the underburden wells (MW-4U, MW-5U and MW-6U) during the 1996 baseline monitoring period. Each of the wells were monitored monthly for field parameters and water samples were obtained for laboratory analyses. A summary table showing the results from all the overburden wells is included in **Appendix GW-2**.

Results from the laboratory analyses was interpreted through the use of Piper and Stiff diagrams. Copies of these diagrams are included in **Appendix GW-3**. The principal water type observed in wells MW-4U through MW-6U is a sodium bicarbonate type. This water is typically neutral to partially alkaline. The pH ranges from 7.28 to 9.07 and hardness ranges from 4 to 170 mg/L. Total dissolved solids in the samples ranged from 482 to 1650 mg/L (filterable residue).

All parameters required for analysis were compared with the applicable CDPHE and CDMG standards. The standards and results are listed in **Table GW-8**. Exceedances for iron and fluoride were detected in wells MW-4U, MW-5U and MW-6U. Exceedances for pH and manganese were detected in wells MW-5U and MW-6U. Sulfate and total dissolved solids standards were exceeded in well MW-4U. Lead and aluminum standards were exceeded in wells MW-5U and MW-6U, respectively. SAR levels ranged from 5.41 to 71.40. Electrical conductivity ranged from 0.450 to 3.260 mmhos/cm, exceeding CDMG material damage standards at MW-4U, MW-5U, and MW-6U. The water found in this zone exhibits limitations for domestic and agricultural use.

Aquifer Characteristics

Recharge in the Raton Basin occurs principally in the form of precipitation. Studies by Howard (1982) indicate that the recharge occurs in the area above 7500 MSL. Precipitation in this area is approximately 16.32 inches per year at 7200 feet MSL, and 14.94 inches per year at 6600 ft MSL. This illustrates that precipitation decreases substantially with a decrease in elevation. Precipitation in the area appears to be highest in the months of May, July, and August (**Table GW-9**). Recharge appears to occur above the 7500 MSL elevation (Howard, 1982). Recharge

also occurs in the form of influent streams. A major influence to regional recharge in the area is the presence of fractures in the rock. This fracturing is mainly associated with igneous intrusives, which have not been encountered in the permit area.

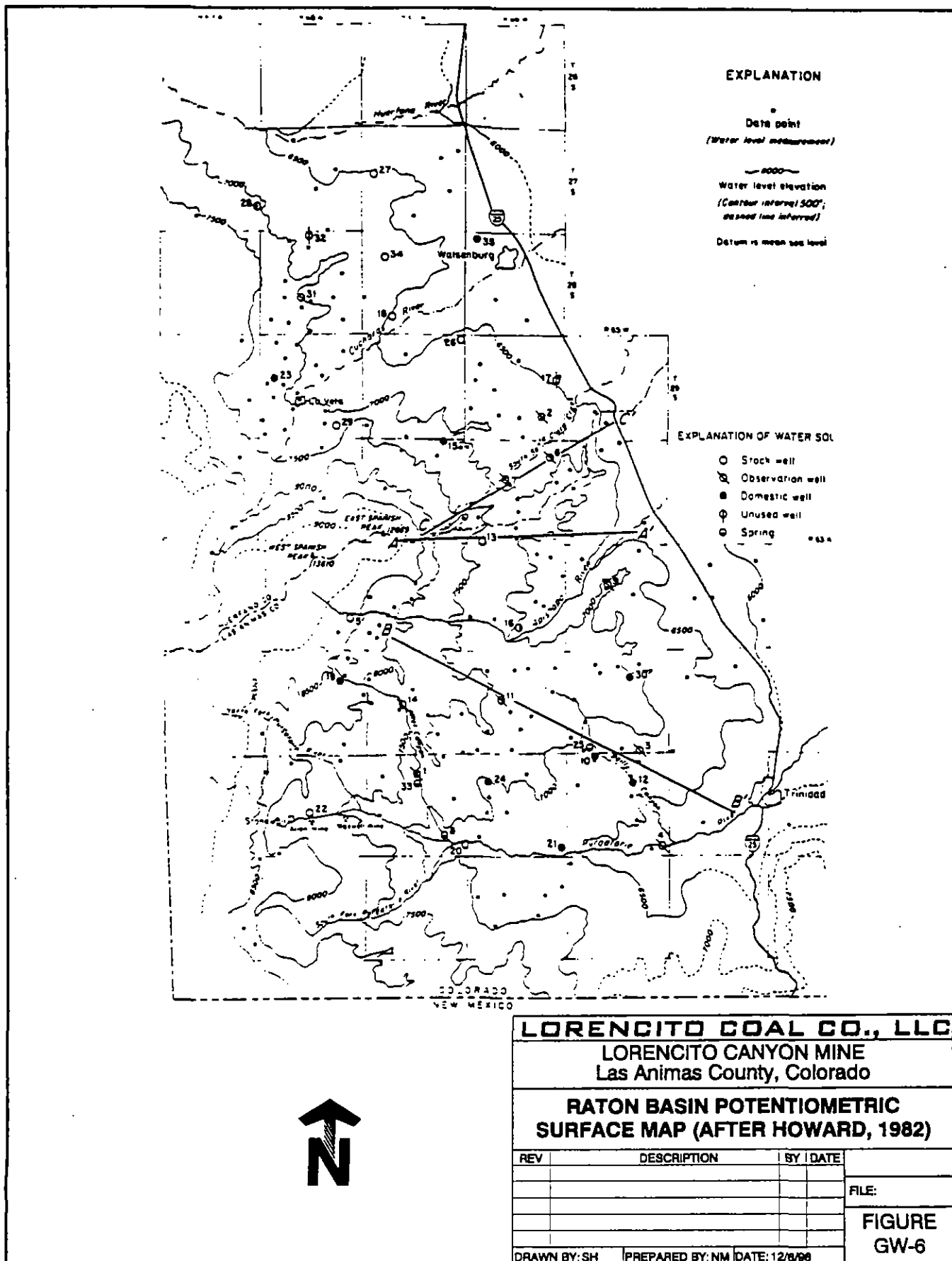
**TABLE GW-9
LORENCITO CANYON MINE
PRECIPITATION FOR MINE SITE (INCHES)**

Month	North Lake 8,810 Ft. MSL	Trinidad Airport 5,740 Ft MSL	Lorencito 6,600 Ft. MSL	Lorencito 7,200 Ft. MSL
January	0.92	0.38	0.53	0.64
February	1.00	0.44	0.60	0.71
March	1.66	0.77	1.02	1.19
April	1.75	0.97	1.19	1.34
May	2.21	1.86	1.96	2.03
June	1.42	1.46	1.45	1.44
July	3.47	2.03	2.43	2.71
August	2.96	2.00	2.27	2.46
September	1.44	1.07	1.17	1.25
October	1.31	.074	0.90	1.01
November	1.01	0.69	0.78	0.84
December	0.92	0.52	0.63	0.71
Annual	20.07	12.93	14.94	16.32

Note: Extrapolation between North Lake and Trinidad based on elevation difference.

Discharge in the area is mainly through evapotranspiration (ET). According to Howard (1982) ET in the area is approximately 46.4 inches greater than precipitation (from Trinidad airport data). This amount of ET would create a large deficit in the permit area hydrologic budget. Other loss mechanisms include springs and gaining streams with springs in the area generally originating from either formational contacts (Poison Canyon/Raton), or confined coals.

Regionally, potentiometric surface gradient is thought to be to the east, and in the site area to the east-northeast. **Figure GW-6** depicts a potentiometric surface map based upon the work of Howard (1982). To develop this map, over two hundred wells were inventoried to determine location and elevation. This data is included in **Appendix GW-4**. This map indicates that the recharge to the aquifers in the site area occurs in the topographic highs and discharges to the Purgatoire River.



$$K \text{ ft/day} \times \text{thick} = T \text{ ft}^2/\text{day}$$

$$\frac{T \text{ ft}^2/\text{day}}{.134} = T \text{ gpd/ft}^2$$

Raton/Vermejo Formation aquifer and water-bearing zone characteristics were described by Howard (1982) from slug tests performed in the formations. Methodology employed in that investigation involved the testing of wells screened across several zones within the same formation and the values derived are thought to be representative of the entire formation. Values determined via laboratory core analyses indicate a mean horizontal hydraulic conductivity (k_x) value of 9.38×10^{-5} ft/day, and a mean vertical hydraulic conductivity (k_z) of 8.04×10^{-5} ft/day. These values are extremely low for sandstones (Heath, 1983). In addition, siltstone and shale were found throughout the site and are considered impermeable and semi-permeable layers that confine coals and sandstones within the formation (Howard, 1982). Head differences in the aquifers would seem to be the result of these confining layers.

In addition to laboratory analyses, Howard (1982) also performed field slug tests on wells installed in the Raton/Vermejo Formations. These tests resulted in a range of K values from 1.07×10^{-4} ft/day to 0.119 ft/day. The variance shows the complexity of the system of aquifers in the Raton/Vermejo Formations. Within the data from Howard (1982) the well resulting in a K value of 0.119 ft/day is anomalous. This well is the only well completed in only coal, and is not thought to be indicative of the entire formation. The mean value of the data presented by Howard indicates a hydraulic conductivity of 0.0408 ft/day. The population standard deviation is 0.392, and sample standard deviation (n-1) is 0.0419. A summary of this data is presented on Table GW-10.

**TABLE GW-10
LORENCITO CANYON MINE
AQUIFER TEST DATA**

Well No.	Aquifer	Aquifer Thickness	T (gpd/ft)	S (gpd/ft)	K (gpd/ft)*	K (ft/day)
1	Vermejo-Raton	125.0	41.1	0.0028	0.33	0.044
2	Vermejo-Raton	238.5	212.0	0.1470	0.888	0.119
3	Vermejo-Raton	165.7	4.11	0.0028	0.025	0.0034
4	Trinidad	50.0	5.46	0.0038	0.109	0.088
6	Vermejo-Raton	198.6	41.613	0.2890	0.200	0.028
7	Vermejo-Raton	162.0	27.96	0.0194	0.175	0.023
9	Vermejo-Raton	220.2	35.3	0.0020	0.16	0.021
11	Raton	187.5	0.143	0.00010	0.0008	0.000107
14	Raton	236.8	**	**	**	

* 1 gpd/ft² = 0.134 ft/day

** - Test not complete

Mean = 0.0408

$\sigma_{Xn} = 0.0392$

$\sigma_{Xn-1} = 0.0419$

(From Howard, 1982)

T = Transmissivity

S = Storativity

K = Hydraulic Conductivity

To present a better understanding of the aquifer physical characteristics in the permit area, slug tests and field observations will be presented. Site specific slug tests were conducted in all of the consolidated rock water-bearing zones and in the alluvial wells. Site specific mapping of outcrops will be incorporated to determine the areas of recharge and discharge into and from the aquifers.

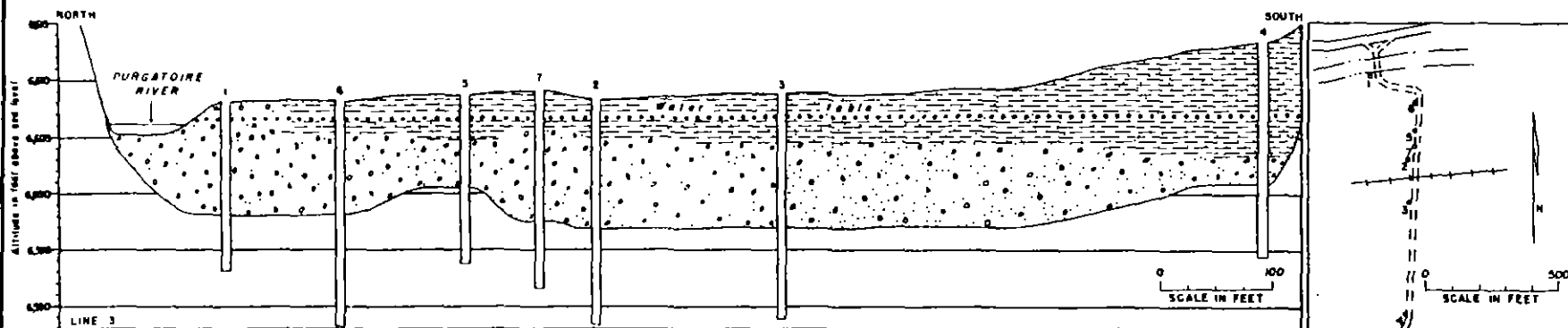
Alluvium

Stream laid deposits alluvium in the Lorencito Canyon Permit area are found in three main areas. To the north, the Purgatoire River alluvium borders the site, Lorencito Canyon alluvium bisects the property from north to south in the east, and Cow Canyon alluvial and colluvial deposits bisect the property north to south in the west (**Map 2.04.7-2**). Alluvium in the Purgatoire River valley was investigated by Powell, with a transect of borings being performed near the mouth of Lorencito Canyon. The borings revealed an average depth of 12 feet for the alluvium, and a depth to water of two to three feet. The cross-section of this transect is depicted as **Figure GW-7**. Alluvium is also found in Lorencito Canyon ranging in thickness from 12 feet in the north to 22 feet in the south. Unconsolidated deposits in Cow Canyon ranges from almost non-existent up to 10 feet thick. Within the side canyons, alluvium does occur in areas demonstrating slight topographic relief.

Recharge to the alluvium is principally via precipitation, infiltration of runoff, or from losing streams. Precipitation in all areas of the site is directed into the various canyons and routed along these canyons either toward Cow Canyon or Lorencito Canyon. During this process, some of the water is infiltrated either into the small areas of alluvium encountered in the drainages, or into the main alluvial bodies. Evidence of loss from streams is apparent in Lorencito, Cow, and Alamosa Canyons, where streams are intermittent and recharge to the alluvium occurs in the areas where streamflow is reduced or non-existent.

Discharge from the alluvium is principally through underflow and losses to streams. In Lorencito Canyon several of the stream reaches above the Purgatoire alluvium are losing; however, near the mouth of Lorencito Canyon, Lorencito is apparently a gaining stream. This would coincide with a decrease in alluvial thickness as apparent in LC-1. Additionally, a monthly reach mapping and monitoring events at the LC-1 site have consistently shown flow. In the area between LC-2 and slightly above Jeff Canyon, the stream reaches are generally dry and indicate an area of stream loss to the alluvium. The area between the proposed box cut and LC-2 is apparently a gaining area, and the area from the Box Cut to Alamosa Canyon losing. Areas above Alamosa appear to be gaining.

Within Cow Canyon, the stream appears to be losing almost through the entire canyon. This may be in part to the high number of retention structures (ponds) located in this drainage (**Map 2.04.7-1**). Ponds limit runoff through storage and subsequently decrease recharge downstream along the channel. This may result in a groundwater deficit within the canyon. Some intermittent flow is evident near the mouth of this canyon.



LORENCITO COAL CO., LLC			
LORENCITO CANYON MINE			
Las Animas County, Colorado			
CROSS SECTION OF PURGATOIRE RIVER			
ALLUVIUM AT LORENCITO CANYON			
(POWELL, 1952)			
REV	DESCRIPTION	BY	DATE
DRAWN BY: EC			PREPARED BY: NM DATE: 12/16/06
			FIGURE GW-7

Groundwater in the alluvium at the site is characterized as being under unconfined, water table conditions. The water table gradient in the Lorencito Canyon alluvium is to the north with the gradient from the respective side canyons from up canyon down toward Lorencito. Gradient averages 0.027 ft/ft in the alluvium. A potentiometric surface map of Lorencito Canyon is presented as **Map 2.04.7-3**. Hydrographs of the alluvial well water elevations are included as **Appendix GW-5**. Aquifer characteristics of the alluvium were determined via slug testing. A summary of the data from these wells is presented in **Table GW-11**.

TABLE GW-11 LORENCITO CANYON MINE SUMMARY OF ALLUVIAL WELLS SLUG TEST RESULTS		
Well	Hydraulic Conductivity (ft/day)	Standard Error (from ft/min values)
LC1	1.19	+/- 7.2708E-005
LC2	149.8	+/- 1.0784E-003
LC3	3.68	+/- 9.4793E-004
LC4	12.55	+/- 7.6503E-004
JC1	3.80	+/- 2.6025E-004
PC1	0.43	+/- 1.9337E-005
CC1	30.5	+/- 9.5843E-004
AC1	38.74	+/- 9.1286E-004
CWC1	31.80	+/- 4.0383E-004
CWC2	22.72	+/- 9.5213E-004

Statistical analyses of the hydraulic conductivity was conducted to determine the average hydraulic conductivity for the alluvium. The range of the data was from 0.43 to 149.8 ft/day. The mean value calculated for the data was 29.52, with a population standard deviation of 42.27. This indicates a wide variance in the data from the alluvial wells. Consideration of the individual standard error from each data set (derived during analyses) indicates that each well analysis has a fairly high degree of certainty; therefore, the alluvial properties probably vary widely within the alluvium itself. All values for the alluvium fall within ranges typical for clean fine-grained sand to coarse grain sand (Heath, 1983). Storativity values for the alluvium cannot be calculated from the testing performed. Storativity in this case is estimated from literature sources to be 0.1 to 0.3 (Heath, 1983). Copies of all analyses and data from the slug tests performed at the site are included in **Appendix GW-6**.

Calculation of the transmissivity for the alluvium is performed utilizing the formula $T = Kb$, where T is transmissivity, K is the hydraulic conductivity, and b is the aquifer thickness (Fetter, 1980). Utilizing the mean hydraulic conductivity for all alluvial wells within the permit area, and an aquifer thickness of 7 feet (Lorencito wells, saturated thickness), the transmissivity can be derived as:

$$T = Kb$$

$$T = (29.52 \text{ ft/day}) (7 \text{ ft})$$

$$T = 206.6 \text{ ft}^2/\text{day} \text{ or } 1545 \text{ g/d/ft}$$

This value is within the range characteristic of a sand aquifer (Heath, 1983), and reflects that this is within an acceptable range for the materials encountered onsite.

The seepage velocity of the water through the alluvium can also be calculated from the hydraulic conductivity, the gradient (dh/dl , I from the potentiometric surface map), and the effective porosity n_e . This relationship is $v_s = Ki/n_e$. Therefore:

$$v_s = (29.52 \text{ ft/day}) (0.016 \text{ ft/ft}) / 10 \%$$

$$v_s = 4.72 \text{ ft/day} \text{ or } 1724 \text{ ft/yr}$$

Potential pumping rates from wells in the alluvium can also be calculated using the formula $Q = Ts/1500$, where Q is the flow rate, T is the transmissivity, s is the available drawdown, and 1500 is a constant incorporating conversion for g/d/ft to gpm. The 1500 constant is for unconfined aquifers, such as alluvium, 2000 is utilized for confined aquifers. Therefore:

$$Q = (1545 \text{ g/d/ft}) [7 \text{ ft (for saturated thickness)}] / 1500$$

$$Q = 7.2 \text{ gpm (for mean hydraulic conductivity data)}$$

This would compare favorably to the experience of field personnel with bailing some of the wells. A number of the wells at the site do not produce this volume of water during bailing. This transmissivity indicates a fair to poor potential for domestic supply.

Overburden

The overburden in the Lorencito Canyon Permit area is located in higher elevations, above the Ciruela Coal seam. The total estimated thickness of the overburden is up to 500 feet. The top of this unit consists of the Poison Canyon Formation, which outcrops in the southern portions of the site (**Figure GW-1**). The Poison Canyon Formation was investigated by Howard (1982), and is described as a medium grain sandstone, conglomerate and occasional interbedded mudstone. Within the Raton Basin, the Poison Canyon may have unconfined aquifer conditions within the sandstones. This is explained by the good porosity of the sandstone and the atmospheric contact

of the formation (Howard, 1982). Within the permit area no water was encountered in the Poison Canyon and very little water in the Raton Formation overburden.

Recharge to the overburden is via precipitation, since this unit forms the highest topographic unit in the permit area. Much of the water from precipitation events is lost to evapotranspiration or to runoff. Some of the water does infiltrate through the sandstones of the Poison Canyon, into the overburden.

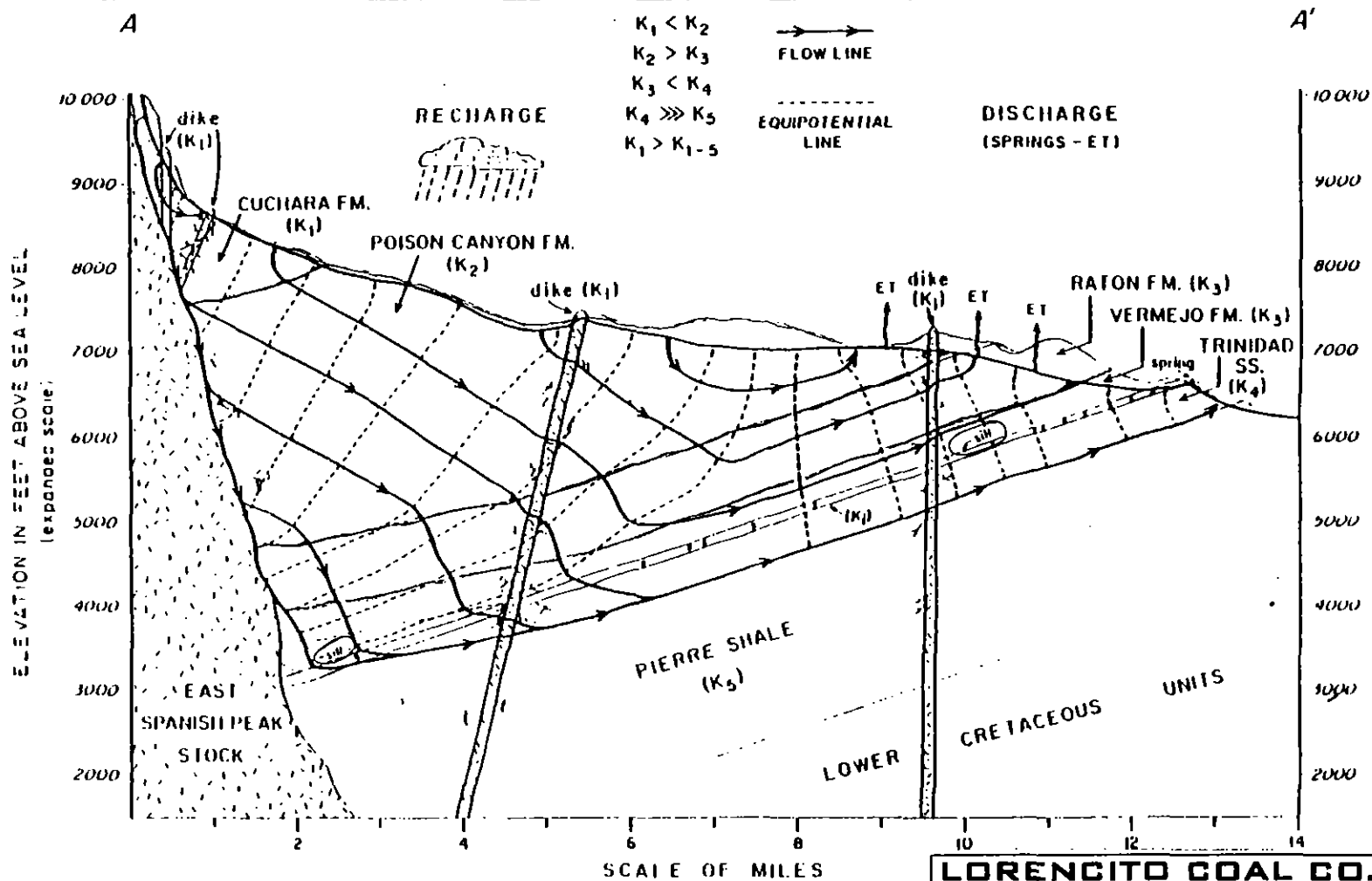
Examination of a flow net of the system (**Figure GW-8**), indicates that some of the recharge into the Poison Canyon Formation is discharged via evapotranspiration from the formation itself. Particular to the permit area, several of the principal springs are thought to emanate from the Poison Canyon/Raton Formation contacts. Springs in the Bonita Canyon area of the project emanate from underneath massive sandstones that are indicative of the Poison Canyon, and may provide a mechanism for discharge from this formation. Discharge from springs would reduce the amount of water entering as recharge to the underlying units.

Groundwater in the overburden is characterized as being under confined conditions. Water was not apparent in any of the borings into the overburden; therefore, wells were set into the sandstone overlying the Ciruela. The wells at location MW-2 have been dry and two of the three planned wells were not set at the location for MW-3 due to dry conditions. Water was present in only one well installed in the overburden (MW-1A). Groundwater in the overburden appears to be intermittent throughout the zone; therefore the potentiometric surface could not be determined.

The physical characteristics of an overburden water-bearing zone could not be determined. A slug test was attempted in well MW-10, and no recovery from the initial "slug in" was recorded in eight hours of data collection. This indicates an extremely low hydraulic conductivity for the sandstone immediately overlying the Ciruela. Although not quantifiable, estimated hydraulic conductivity would be in range of 10^{-3} to 10^{-6} ft/day. Accordingly, the water-bearing zone is confined and the range of these values is generally 10^3 to 10^6 (Heath, 1983). Bailing of the well during the acquisition of field chemistry parameters indicates that the hydraulic conductivity in this layer is extremely low, since water production from the well is limited. The potential production of water from this zone for domestic water would be characterized as poor to infeasible.

Ciruela Coal

The Ciruela Coal in the Lorencito Canyon Permit area outcrops at approximately 7200 feet AMSL. The outcrop is considered the downgradient extent of this unit for hydrologic analyses. Total estimated thickness for this unit ranges from 0 to 5.9 feet with an average thickness of 3.56 feet. Recharge to the Ciruela is via precipitation on outcrop surfaces, and from inflow from fractures or overlying units. Infiltration rates for this unit are anticipated as low.



LORENCITO COAL CO., LLC

LORENCITO CANYON MINE
Las Animas County, Colorado

**REGIONAL FLOW NET LORENCITO
CANYON MINE (AFTER HOWARD, 1982)**

REV	DESCRIPTION	BY	DATE

FILE:

**FIGURE
GW-8**

DRAWN BY: SH PREPARED BY: NM DATE: 12/8/98

Examination of a flow net of the system (**Figure GW-8**), indicates that some of the recharge is discharged at the outcrop surface area via evapotranspiration. In addition, springs would generally be anticipated to emanate for the coal at the outcrop. Spring and seep surveys conducted during the baseline period did not determine springs to exist at this particular outcrop area. This may be the result of small amounts of recharge combined with the high evapotranspiration in the area.

Groundwater in the Ciruela is characterized as being under confined conditions. Water was not apparent in any of the borings into the overburden; however, wells were set into the Ciruela. Well MW-2 has been dry and no well was set in the Ciruela at the location for MW-3 due to dry conditions. Water was present in only one well installed in the overburden (MW-1C). Groundwater in the Ciruela appears to be intermittent throughout the zone; therefore the potentiometric surface could not be determined.

The characteristics of the Ciruela water-bearing zone were determined via slug testing. A slug test was performed in well MW-1C, and recovery of the well to static water level required approximately 16 hours of data collection. This indicates low hydraulic conductivity for the Ciruela. Estimated hydraulic conductivity as determined via this testing was 1.37 ft/day. Storativity estimated by this method (Cooper, Pappadapoulous) was 2.14×10^{-6} . The hydraulic conductivity determined was also within the same order of magnitude as the value determined by Howard (1982) for the Raton Formation coals. Utilizing the hydraulic conductivity, and a coal thickness of 5 feet (MW-4C well, saturated thickness), the transmissivity can be derived as:

$$T = Kb$$

$$T = (1.37 \text{ ft/day}) (5 \text{ ft})$$

$$T = 6.85 \text{ ft}^2/\text{day} \text{ or } 51.23 \text{ g/d/ft}$$

This value is within the range characteristic of a coal unit and compares favorably to the values in the study by Howard (1982).

The seepage velocity of the water through the coal cannot be calculated without a gradient. Gradient in this zone is unknown; however, the potential pumping rates from wells in the coal can be calculated. Utilizing the formula $Q = Ts/2000$ this calculation can be performed; where the constant 2000 is used for confined zones. Therefore:

$$Q = 51.23 \text{ g/d/ft} [50 \text{ ft (for available drawdown)}]/2000$$

$$Q = 1.28 \text{ gpm}$$

This would compare favorably to the experience of field personnel with bailing this well; therefore, the values derived during testing would appear valid for this water-bearing unit. Considering the transmissivity of this zone, the potential for domestic water supply is considered poor.

Interburden

The interburden in the Lorencito Canyon Permit area has a total estimated thickness of approximately 570 feet. Recharge to the interburden is via precipitation on outcrop surfaces, and from inflow from fractures or overlying units. Infiltration rates for this unit are anticipated as low. Discharge from this unit is anticipated as being low.

Groundwater in the interburden is characterized as being under confined conditions. Water was not apparent in two of the Ciruela borings into the interburden; however, the third well (MW-1I) had water present. Wells MW-2I and MW-3I both have been dry during the baseline period. These wells were set in the sandstone directly below the Ciruela. Water was present in all three wells installed in the interburden above the Primero. Water was encountered in the borings for these wells; however, this water was encountered during the drilling through alluvium (MW-4 and MW-5) and at 100 feet in the boring for site MW-6. All interburden Primero wells were set in the sandstone immediately above the Primero coal seam.

The potentiometric surface of the interburden is to the east-southeast, based on the data from the wells MW-4, MW-5, and MW-6 (Map 2.04.7-4). The gradient of this surface is 0.0055 ft/ft or 29 ft/mi. This is a relatively shallow gradient. Comparison of this gradient to the regional gradient of Howard (1982) (Figure GW-6), shows that this gradient is much more easterly. The gradient accepted as the regional gradient is generally to the north or northeast in the permit area.

Characteristics of the interburden were determined via slug testing. A slug test was performed in well MW-6I, and recovery of the well was monitored for approximately 17 hours. Within this time period the water level recovery was extremely limited. Extrapolation of the slug test curve data indicates complete recovery would take approximately 695 days. This indicates an extremely low hydraulic conductivity for the interburden. Estimated hydraulic conductivity as determined via this testing was 1.28×10^{-3} ft/day. This value can be translated to transmissivity (T) by the equation $T = Kb$, where T is transmissivity, K is hydraulic conductivity, and b is the interburden thickness. Therefore:

$$T = Kb$$

$$T = (1.28 \times 10^{-3} \text{ ft/day}) (5 \text{ ft})$$

$$T = 6.40 \times 10^{-3} \text{ ft}^2/\text{day} \text{ or } 4.78 \times 10^{-2} \text{ g/d/ft}$$

Comparing this to the regional values:

$$T = Kb$$

$$T = (0.0408 \text{ ft/day}) (5 \text{ ft})$$

$$T = 0.204 \text{ ft}^2/\text{day} \text{ or } 1.53 \text{ g/d/ft}$$

Comparing this value to the established values determined in the regional study by Howard (Table GW 7), this value is one order of magnitude lower. Based upon field data from bailing the wells at the site, the value determined from site specific slug test would appear extremely low. Comparison of field data, the potential pumping rates based upon site-specific data, and the data from the regional study indicates that the regional values may be more consistent with field data from bailing. The potential pumping rate from the well can be estimated from the equation $Q = Ts/2000$ (derived from Fetter, 1980). In this calculation Q is the flow rate, T is the transmissivity (determined from the hydraulic conductivity $T = Kb$), s the available drawdown, and 2000 is a constant (accounts for conversion of T in g/d/ft). Therefore:

$$Q = (4.78 \times 10^2 \text{ g/d/ft}) [187 \text{ ft (for MW-4I)}] / 2000$$

$$Q = 0.0045 \text{ gpm (for site-specific data)}$$

$$Q = 36.6 \text{ g/d/ft} [187 \text{ ft (for MW-4I)}] / 2000$$

$$Q = 0.14 \text{ gpm (for regional data)}$$

Generally, the rate of evacuation for the wells during the sampling events is estimated as 1.0 gpm. This value and the potential pumping rate for the well (determined above utilizing regional data) compare more favorably; therefore the range of the transmissivity in this zone is $4.78 \times 10^2 \text{ g/d/ft}$ to 0.14 g/d/ft .

Storativity estimated by this method (Cooper, Pappadapoulous) was 2.25×10^4 . The storage value is within the range for a confined zone (Heath, 1983). The hydraulic conductivity determined was one order of magnitude higher than the value determined by Howard (1982) for the Raton Formation sandstone.

Groundwater seepage velocity (v_s) can be determined from the gradient (dh/dl , or I), effective porosity (n_e), and hydraulic conductivity (K). Seepage velocity represents the rate at which water actually moves through the pore spaces. The relationship $v_s = Ki/n_e$, is utilized to determine this value (Fetter, 1980). From the above analyses:

$$K = 1.28 \times 10^{-3} \text{ ft/day (for site specific tests), } 0.0408 \text{ ft/day (for regional values)}$$

$$I = 0.0055 \text{ ft/ft}$$

$$n_e = 10 \%$$

Therefore:

$$v_s = Ki/n_e$$

$$v_s = (1.28 \times 10^{-3} \text{ ft/day}) (0.0055 \text{ ft/ft}) / 10 \%$$

$$v_s = 7.04 \times 10^{-5} \text{ ft/day or } 2.56 \times 10^{-2} \text{ ft/yr (for site-specific)}$$

$$v_s = (0.0408 \text{ ft/day}) (0.0055 \text{ ft/ft}) / 10 \%$$

$$v_s = 2.24 \times 10^{-3} \text{ ft/day or } 0.82 \text{ ft/yr (from regional data)}$$

These velocities indicate that ground water seepage ranges from 2.56×10^2 ft/yr to 0.82 ft/yr. Transmissivity value derived for this zone indicates that water production for domestic use is infeasible.

Primero Coal

The Primero Coal in the Lorencito Canyon Permit area outcrops at approximately 6800 feet AMSL. Total estimated thickness for this unit ranges from 0 to 9.3 feet with an average thickness of 5.12 feet. Recharge to the Primero is via precipitation on outcrop surfaces, and from inflow from fractures or overlying units. Infiltration rates for this unit are anticipated as low.

Examination of a flow net of the system (**Figure GW-8**), indicates that some of the recharge is discharged at the outcrop surface area via evapotranspiration. In addition, springs would generally be anticipated to emanate for the coal at the outcrop. Spring and seep surveys conducted during the baseline period did not determine springs (with the exception of SPLJC-1) to exist at this particular outcrop area. This may be the result of small amounts of recharge combined with the high evapotranspiration in the area.

Groundwater in the Primero is characterized as being under confined conditions. Water was apparent in all of the borings into the Primero; however, substantial flow increases through the Primero seam were not apparent. Groundwater in the Primero appears to be continuous throughout the zone.

The potentiometric surface of the aquifer was determined from data from wells MW-4, MW-5, and MW-6. The data indicates the flow direction to be to the east-northeast, with a gradient of 0.0078 ft/ft or 41.68 ft/mi. This flow direction is relatively comparable to the direction established in the region by Howard (1982). A map of the potentiometric surface of this unit is included as **Map 2.04.7-5**.

Characteristics of the Primero were determined via slug testing. A slug test was performed in well MW-4-C, and recovery of the well to static was not accomplished in 17 hours of data collection. Approximately 65 percent of the recovery did take place in this time. This indicates an extremely low hydraulic conductivity for the Primero. Estimated hydraulic conductivity as determined via this testing was 1.22×10^{-1} ft/day. This value can be translated to transmissivity (T) by the equation $T = Kb$, where T is transmissivity, K is hydraulic conductivity, and b is the aquifer thickness. Therefore:

$$T = Kb$$

$$T = (1.22 \times 10^{-1} \text{ ft/day}) (5 \text{ ft})$$

$$T = 6.10 \times 10^{-1} \text{ ft}^2/\text{day} \text{ or } 4.56 \text{ g/d/ft}$$

Comparing this to the regional values:

$$T = Kb$$

$$T = (0.0408 \text{ ft/day}) (5 \text{ ft})$$

$$T = 0.204 \text{ ft}^2/\text{day} \text{ or } 1.53 \text{ g/d/ft}$$

Comparing this value to the established values determined in the regional study by Howard (1982) (**Table GW-7**), this value is slightly higher. Based upon field data from bailing the wells at the site, the value determined from site specific and regional data slug test would appear low. The potential pumping rate from the well can be estimated from the equation $Q = Ts/2000$ (derived from Fetter, 1980). In this calculation Q is the flow rate, T is the transmissivity (determined from the hydraulic conductivity $T = Kb$), s the available drawdown, and 2000 is a constant (accounts for conversion of T in g/d/ft). Therefore:

$$Q = 4.56 \text{ g/d/ft [221 ft (for MW-4C)]}/2000$$

$$Q = 0.50 \text{ gpm (for site-specific data)}$$

$$Q = 1.53 \text{ g/d/ft [221 ft (for MW-4C)]}/2000$$

$$Q = 0.169 \text{ gpm (for regional data)}$$

Generally, the rate of evacuation for the wells during the sampling events is estimated as 1.0 gpm. This value and the potential pumping rate for the well (determined above utilizing site-specific data) compares more favorably; therefore the range of the transmissivity in this zone is 0.169 g/d/ft to 4.56 g/d/ft.

Storativity estimated by this method (Cooper, Pappadapoulos) was 9.93×10^{-6} . Both values are within acceptable ranges for a confined zone (Heath, 1983). The hydraulic conductivity determined was one order of magnitude lower than the value determined by Howard (1982) for the Raton Formation coals.

Groundwater seepage velocity (v_s) can be determined from the gradient (dh/dl , or I), effective porosity (n_e), and hydraulic conductivity (K). Seepage velocity represents the rate at which water actually moves through the pore spaces. The relationship $v_s = Ki/n_e$, is utilized to determine this value (Fetter, 1980). From the above analyses:

$$K = 1.22 \times 10^{-1} \text{ ft/day (for site specific tests), } 0.0408 \text{ ft/day (for regional values)}$$

$$I = 0.0078 \text{ ft/ft}$$

$$n_e = 10 \%$$

Therefore:

$$v_s = Ki/n_e$$

$$v_s = 1.22 \times 10^{-1} \text{ ft/day } (0.0078 \text{ ft/ft})/10 \%$$

$$v_s = 9.52 \times 10^{-3} \text{ ft/day or } 3.47 \text{ ft/yr (for site-specific)}$$

$$v_s = 0.0408 \text{ ft/day } (0.0078 \text{ ft/ft})/10 \%$$

$$v_s = 3.18 \times 10^{-3} \text{ ft/day or } 1.16 \text{ ft/yr (from regional data)}$$

These velocities indicate that ground water flow through the coal is higher than the surrounding Raton formation. The transmissivity of this zone indicates that water production for domestic use ranges from infeasible to poor.

Underburden

The underburden in the Lorencito Canyon Permit area has a total estimated thickness of up to 1000 feet. Recharge to the underburden is via inflow from fractures or overlying units. Infiltration rates for this unit are anticipated as low. Discharge from this unit is anticipated as being low.

Groundwater in the underburden is characterized as being under confined conditions. Water was present in all three wells installed in the underburden below the Primero. Water was encountered in the borings for these wells; however, this water was encountered during the drilling through alluvium (MW-4 and MW-5) and at 100 feet in the boring for site MW-6. No appreciable increase in flow was noted during the drilling of the underburden zone. All underburden Primero wells were set in the sandstone immediately below the Primero coal seam.

The potentiometric surface of the underburden was determined from data from wells MW-4, MW-5, and MW-6. The flow direction established by this data is to the northeast. The gradient is 0.0084 ft/ft or 44.60 ft/mi. This data compares very favorably to the regional gradient established by Howard in the 1982 study. A copy of this map is included as **Map 2.04.7-6**.

Aquifer characteristics of the underburden were determined via slug testing. A slug test was performed in well MW-4U, and recovery of the well was monitored for approximately 7 hours. Within this time period no recovery was noted. This indicates an extremely low hydraulic conductivity for the underburden. Estimated hydraulic conductivity would be on the order of 10^{-2} ft/day. Storativity would be estimated as 10^{-3} to 10^{-6} . A second well MW-6U was also tested. This well has a sound of either cascading water or gas. According to the slug test results of this well, this material would have a hydraulic conductivity 5 to 7 orders of magnitude higher than any of the other consolidated rock wells onsite. This data indicates either the interception of fracture zone, or the releasing of gas through the well. This data would not be considered as representative of the underburden zone.

Estimated hydraulic conductivity is from the regional data provided by Howard. Examining the values of hydraulic conductivity, this value is estimated as 0.0408 ft/day. This value can be translated to transmissivity (T) by the equation $T = Kb$, where T is transmissivity, K is hydraulic conductivity, and b is the aquifer thickness. Therefore:

$$T = Kb$$

$$T = (0.0408 \text{ ft/day})(1000 \text{ ft})$$

$$T = 40.8 \text{ ft}^2/\text{day} \text{ or } 305 \text{ g/d/ft (estimated for entire thickness)}$$

The potential pumping rate from a fully penetrating well can be estimated from the equation $Q = Ts/2000$. (derived from Fetter, 1980). In this calculation Q is the flow rate, T is the transmissivity (determined from the hydraulic conductivity $T = Kb$), s the available drawdown, and 2000 is a constant (accounts for conversion of T in g/d/ft). Therefore:

$$Q = 305 \text{ g/d/ft [1000 ft (formation thickness)]/2000}$$

$$Q = 152 \text{ gpm (for regional data)}$$

Generally, the rate of evacuation for the wells during the sampling events is estimated as 1.0 gpm. This value and the potential pumping rate for the well (determined above utilizing regional data) compare favorably; therefore the range of the transmissivity in this zone is probably 305 g/d/ft.

Groundwater seepage velocity (v_s) can be determined from the gradient (dh/dl, or I), effective porosity (n_e), and hydraulic conductivity (K). Seepage velocity represents the rate at which water actually moves through the pore spaces. The relationship $v_s = Ki/n_e$, is utilized to determine this value (Fetter, 1980). From the above analyses:

$$K = 0.98 \text{ ft/day (for regional values)}$$

$$I = 0.008 \text{ ft/ft}$$

$$n_e = 10 \%$$

Therefore:

$$v_s = Ki/n_e$$

$$v_s = (0.0408 \text{ ft/day}) (0.008 \text{ ft/ft})/10 \%$$

$$v_s = 3.3 \times 10^{-3} \text{ ft/day or } 1.19 \text{ ft/yr (from regional data)}$$

Comparison of the transmissivity estimated from a fully penetrating well indicates this formation is potentially a good to fair formation for domestic use; however, the thickness precludes installation of economically viable household wells.

Conclusions

In accordance with Rule 2.04.7, baseline data for the hydrology of the site has been collected during 1996. During this data collection a total of eleven alluvial wells were installed, and 16 consolidated rock wells were installed. These wells were installed into the zones immediately above and below the target coals, and within the coals themselves. Samples were obtained from the water in all zones and this water was analyzed for various constituents to determine the water types and quality. Testing was performed in each of the zones to determine the hydrologic characteristics of each zone.

Groundwater at the site was principally a calcium-sodium bicarbonate type for the wells within the alluvium, and a sodium-bicarbonate type for the wells in the consolidated rock strata. Water from the alluvial wells was typically neutral, with low hardness and low salinity. Water from the consolidated strata was typically neutral to partially alkaline, with low hardness and low to moderate salinity. Accedences to water quality standards were evident in both the alluvial and consolidated rock aquifers.

Groundwater at the Lorencito Canyon Mine site exists principally in the alluvium of Lorencito Canyon, and at the mouths of the various side canyons. The overburden, interburden, and both coals outcrop onsite, with this outcrop being the downgradient extent of the water-bearing zones. Typically, the consolidated aquifers are confined, with a low hydraulic conductivity and a correspondingly low storativity. Water within the consolidated rock units does exist; however, this water is not considered to be an aquifer since an aquifer is defined as "a rock or sediment in a formation which is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs" (Fetter, 1980). These units have been deemed "water-bearing zones" since the zones would appear incapable of transmitting economic quantities of water.

SECTION 4 - REFERENCES CITED

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