ATTACHMENT C.1

PIPER DIAGRAM DATA FOR GROUND AND SURFACE WATER SAMPLES

(includes local and regional samples)

Attachment C.1.1

Sample Identification Used to Create Local and Regional Ground and Surface Water Piper Diagrams

(includes local and regional samples)

Sample I.D. for Local and Regional Surface Water Piper Diagrams

Sample_id	Date	pH
116621	5/11/95	2.98
139880-2	10/11/95	8.05
139880-4	10/11/95	8.41
139886-7-8	10/11/95	8.53
139892	10/11/95	8.07
61230	4/5/95	7.68
61235	4/5/95	8.03
BG-1	1/25/97	7.98
BG-1	4/18/97	8
BG-1-C	4/9/96	7.7
BG-1-D	8/2/96	6.9
BG-1-E	5/21/97	8.2
BG-1-F	7/3/97	7.5
BG-11	2/23/96	8.27
BG-2	1/25/97	7.18
BG-2-A	4/9/96	8.2
BG-2-B	8/2/96	3.5
BG-2-C	5/21/97	8.2
BHG-1	3/27/95	7.95
BUCKHORN CF	1/25/97	3.02
Buckhorn CF-A	7/21/97	3.4
BUCKHORN_CONF	10/11/95	7.97
BUCKHORN_E_TRIB	10/11/95	7.17
Buckhorn_Gulch-A	3/27/95	7.95
Buckhorn_Gulch-B	2/23/96	
Buckhorn_Seep	8/6/96	7.4
CO92W-HCBG-A	12/2/92	7.5
CO92W-HCBG-B	12/3/92	7.98
CO92W-HCBG-C	12/4/92	
CO92W-HCUH-A	12/2/92	8
CO92W-HCUH-B	12/3/92	8.01
CO92W-HCUH-C	12/4/92	
CO92W-MT-1-A	12/2/92	7.5
CO92W-MT-1-B	12/3/92	7.51
CO92W-MT-1-C	12/4/92	
CO92W-MT-2-A	12/2/92	7.5
CO92W-MT-2-B	12/3/92	7.44
CO92W-MT-2-C	12/4/92	
CO92W-SPR-A	12/2/92	7.3

Sample I.D. for Local and Regional Surface Water Piper Diagrams (Continued)

Sample_id	Date	pH
CO92W-SPR-B	12/3/92	7.08
CO92W-SPR-C	12/4/92	
CONT POND 1-A	1/26/97	7.49
CONT POND 1-B	4/17/97	7.1
Cont Pond 1-C	7/27/97	6.6
Continental_Seep	8/6/96	4.38
DECANT	1/25/97	7.46
DECANT-A	7/15/97	8
DM-6S-82	9/21/82	7.41
EBG-5	2/23/96	7.6
EDSN-1	2/26/96	7.7
EID-1	1/17/83	
EID-2	10/6/87	
EID-3	10/7/87	
EID-5	11/9/87	
Fan_Discharge	5/13/95	7.91
FIERRO SPR-A	4/24/68	7.4
FIERRO SPR-B	4/25/68	7.4
FIERRO SPR-C	5/1/93	
FS-1	2/24/96	7.2
GAP-1	2/24/96	8.3
GG-1-A	8/7/96	7.6
GG-1-B	5/20/97	8
GRP-1	2/25/96	7.3
Han Cr/Above Hanover Property	10/1/92	7.8
Han Cr/Below Hanover Property	10/1/92	8
Han Cr/Beside Hanover Property	10/1/92	8
HAN CR/BLACKHAWK	5/1/93	
HAN CR/BULL HILL	5/1/93	
HAN CR/MANHATTAN BAR-A	6/7/83	
HAN CR/MANHATTAN BAR-B	6/7/83	
HAN CR/MANHATTAN BAR-C	7/12/83	
HAN CR/UNION HILL	5/1/93	
HAN CR/W DUMP	5/1/93	
HANOVER CR SPRING	6/4/65	7.7
Hanover Creek Below Hanover	1/24/74	7.03
HC-1	1/26/97	7.57
HC-1-A	5/20/97	7.6
HC-1-B	7/27/97	6.6

Sample I.D. for Local and Regional Surface Water Piper Diagrams (Continued)

Sample_id	Date	pH
HC-2-A	1/28/97	7.8
HC-2-B	4/28/97	8
HC-2-C	4/29/97	7.91
HC-3-A	1/27/97	7.8
HC-3-B	1/27/97	7.99
HC-3-C	4/28/97	8
HC-3-D	4/29/97	7.71
HC-3-E	5/20/97	7.8
HSN-01	2/24/96	4.83
HSN-02	2/24/96	6.36
HSN-1	2/24/96	5.4
HSN-2	2/24/96	6.6
Mag Seep	7/6/97	7.9
MAGNETITE SEEP-A	1/26/97	7.47
MAGNETITE SEEP-B	4/17/97	7.2
MDD-1	2/25/96	7.5
MDD-2	2/28/96	7.5
POISON_SPRING	10/11/95	7.32
POND-A	1/25/97	6.3
POND-B	4/18/97	7.6
POND-C	7/3/97	7.7
POND B	9/26/82	8.08
PS-1	2/24/96	7.3
PS-1-A	1/26/97	5.49
PS-1-B	4/18/97	7.8
PS-1-C	4/9/96	8.4
PS-1-D	8/2/96	7.2
PS-1-E	5/21/97	8.5
PS-2	10/11/95	8.13
SBG-1	2/23/96	8.24
SEEP	1/25/95	7.22
SEEP-A	7/6/97	8.3
TAIL-1A	2/24/96	5.9
TAIL-1B	2/24/96	7.2
TPS-1	2/25/96	7.7
TPS-2	2/25/96	7.9
TPS-3	2/25/96	7.6
TRUCK_SHOP	10/11/95	7.7
UV Discharge/Manhattan Bar	1/17/83	

Sample I.D. for Local and Regional Surface Water Piper Diagrams (Continued)

Sample_id	Date	pH
WBG-1	2/23/96	7.8
WEST_DUMP	10/11/95	3.23
WINDMILL	10/1/96	7.35
WWRD_SEEP	5/13/95	3.39
ZH-1	2/23/96	8.1
ZH-2	2/23/96	8

Sample I.D. for Local and Regional Ground Water Diagrams

Sample_id	Date	pH
18S.10W.8.443A	6/12/52	
18S.13W.2.321	4/11/54	
18S.13W.8.13312	5/17/54	
19S.12W.19.11342	1/10/52	
19S.13W.29.421	6/4/54	
20S.11W.20.243	12/5/74	7.1
20S.12W.19.123	2/11/55	7.7
20S.5W.31	5/9/61	8.6
21S.11W.35.310	1/4/72	7.2
21S.12W.25.421	8/21/80	7.6
22S.11W.24.133	1/4/72	8.3
22S.6W.16.332	8/13/80	7.7
22S.6W.32.14424	8/14/80	7.8
23S.6W.28.244	8/14/80	7.9
23S.7W.33.211	9/15/71	7.9
23S.8W.21.222	10/18/71	8.2
23S.9W.28.400	11/17/54	8.1
24S.10W.12.111	9/3/52	
24S.11W.11.211	7/17/52	
24S.11W.12	8/9/62	8.3
24S.11W.13.411	8/9/52	
24S.11W.14.11132	9/15/71	7.9
24S.17W.11	5/20/55	
24S.20W.1	3/1/48	
24S.7W.16.142	7/10/73	8.1
24S.7W.3.113	7/18/45	
24S.7W.5.133	8/4/69	9.6
24S.7W.9	8/12/57	8.1
24S.8W.20.300	10/7/29	
24S.8W.20.411	10/7/29	
24S.9W.12.100	10/8/29	
24S.9W.13.111	10/8/29	
24S.9W.15.433	10/7/29	
24S.9W.6	9/12/44	
24S.9W.6.431	9/12/44	
25S.10W.13.41212	9/15/71	7.9
25S.11W.11.11223	8/15/66	8
25S.7W.12.122	5/12/52	
25S.8W.18.111A	7/25/46	

Sample I.D. for Local and Regional Ground Water Diagrams (continued)

Sample_id	Date	pH
25S.9W.11.11144	9/15/71	7.8
26S.10W.25.32122	9/16/71	7.9
26S.8W.19.14123	9/15/71	7.7
26S.9W.2.221	9/15/71	7.9
27S.19W.19	5/26/48	7.8
27S.5W.7.444	5/22/58	8
27S.7W.19.200	1/15/50	
27S.8W.15.131	8/8/52	
27S.8W.23.100	1/15/50	
27S.8W.35.12213	9/16/71	8
27S.8W.8.311	8/8/52	
27S.9W.1	7/19/54	
27S.9W.1.431	7/19/54	
28S.6W.10.31143	5/22/58	7.9
28S.7W.20	7/19/54	
28S.7W.20.42222	8/13/52	
28S.7W.26.244	5/15/52	
28S.7W.9.41114	8/8/52	
28S.8W.02.111	7/17/68	7.7
28S.8W.25.211	8/8/52	
28S.8W.26.222	5/15/52	
29S.8W.11.11313	1/15/50	
29S.8W.12.144	1/15/50	
29S.8W.17.231	5/21/58	8.1
APACHE-8	9/15/82	7.5
BULLFROG #2 SHAFT	10/1/94	7.2
CHINO WELL 16S	5/1/93	
CHINO WELL CB6D	5/1/93	
CHINO WELL WD10	5/1/93	
CHINO WELL WD4	5/1/93	
CONTINENTAL WELL 1	5/1/93	
CONTINENTAL WELL 2	5/1/93	
CONTINENTAL WELL 3	5/1/93	
CONTINENTAL WELL 4	5/1/93	
DENNIS WELL	9/26/82	7.63
DM-6D-82-A	9/21/82	12.3
DM-6D-82-B	11/9/82	12.19
ESCOBAR	5/1/93	
GRUN HAND DU	9/12/82	4

Sample I.D. for Local and Regional Ground Water Diagrams (continued)

Sample_id	Date	pH
GRUNERUD EAS	9/26/82	7.33
GW-1-A	1/28/97	7.73
GW-1-B	1/28/97	7.2
GW-1-C	4/28/97	7.4
GW-1-D	4/29/97	7.14
GW-1R	1/28/97	7.3
GW-2-A	1/27/97	7.3
GW-2-B	1/27/97	7.88
GW-2-C	4/28/97	7.11
GW-3-A	1/27/97	7.1
GW-3-B	1/27/97	7.77
GW-3-C	4/28/97	7.17
GW-4-A	1/27/97	6.1
GW-4-B	1/27/97	6.1
GW-4-C	4/29/97	6.2
GW-4-D	4/29/97	6.24
GW-4D	4/29/97	6.4
GW-5-A	1/28/97	7.2
GW-5-B	1/28/97	7.69
GW-5-C	4/28/97	7.2
GW-5-D	4/28/97	7.07
Hanover Post Office-RR Tap	10/10/79	7
Hanover-Majalca	10/30/79	7.5
Majalca-A	10/30/79	7.92
Make-Up	7/11/97	7.2
MAKE-UP-A	1/26/97	7.58
MW-1-A	1/24/97	9.2
MW-1-B	2/28/96	9.2
MW-10-A	4/9/96	7.7
MW-10-B	7/31/96	7.2
MW-10-C	1/22/97	7.75
MW-10-D	4/18/97	7.2
MW-10-E	7/4/97	6.97
MW-10-F	2/27/96	7.5
MW-12-A	4/17/97	7.5
MW-12-B	7/6/97	7.23
MW-19-A	6/11/96	
MW-19-B	7/31/96	6.9
MW-19-C	1/23/97	7.42

Sample I.D. for Local and Regional Ground Water Diagrams (continued)

Sample_id	Date	pH
MW-19-D	4/14/97	7.1
MW-19-E	7/8/97	6.63
MW-1A-A	1/23/97	7.51
MW-1A-B	4/14/97	7.4
MW-1A-C	7/3/97	6.86
MW-1A-D	2/28/96	7.1
MW-2-A	1/25/97	8.9
MW-2-B	4/18/97	8.9
MW-2-C	7/5/97	7.74
MW-2-D	2/26/96	8
MW-20-A	6/11/96	
MW-20-B	8/5/96	6.6
MW-20-C	1/24/97	7.37
MW-20-D	4/14/97	7.3
MW-20-E	7/9/97	7
MW-21-A	6/11/96	6.3
MW-21-B	8/7/96	5.9
MW-21-C	1/24/97	6.41
MW-21-D	4/18/97	6.2
MW-21-E	7/10/97	5.87
MW-24-A	4/17/97	6.4
MW-24-B	7/9/97	5.27
MW-25-A	4/23/97	6.4
MW-25-B	7/9/97	4.94
MW-3-A	1/25/97	7.6
MW-3-B	4/18/97	7.4
MW-3-C	7/5/97	7.47
MW-3-D	2/27/96	7.3
MW-4-A	1/24/97	7.85
MW-4-B	4/18/97	7.6
MW-4-C	7/8/97	7.41
MW-4-D	2/26/96	7.3
MW-5-A	1/24/97	7.58
MW-5-B	4/18/97	7.3
MW-5-C	7/6/97	6.84
MW-5-D	2/26/96	7
MW-7-A	4/9/96	7.7
MW-7-B	7/31/96	7.3
MW-7-C	1/22/97	7.89

Sample I.D. for Local and Regional Ground Water Diagrams (continued)

Sample_id	Date	pH
MW-7-D	4/18/97	6.9
MW-7-E	7/29/97	7.8
MW-7A-F	2/28/96	7.2
MW-7B-G	2/28/96	7.1
MW-8-A	4/16/97	7.1
MW-8-B	7/2/97	6.7
PW-1	12/18/95	6.3
PW-1b	12/19/95	6.4
RIFLE RANGE	9/26/82	8.64
SOLANO WELL-A	9/14/82	3.75
SOLANO WELL-B	5/1/93	
UG Sump	7/20/97	7.7
UG SUMP-A	1/29/97	7.69
UG SUMP-B	4/21/97	7.7
WTH-1	4/9/95	7.3
WTH-2	4/21/95	7
WWRDF	7/21/97	3.1

Attachment C.1.2

Local and Regional Ground and Surface Water used to Create Piper Diagrams

The data contained within this attachment were used to generate

Figures C-5 to C-8, C-10 to C-12, and C-19 to C-23.

Local Piper Data
Calcium-Sulfate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
MW-10-A	40	3.47	211	43.7	66.1	293	1	416
MW-10-B	26	6.73	292	43.1	68.8	300	1	429
MW-10-C	31.5	5.59	231	44.2	67.7	279	1	453
MW-10-D	31.4	6.38	222	44.2	62	326	1	449
MW-12-A	35.1	10.7	333	298	20	331	1	1765
MW-19-A	76	6.8	450	110	99.2	187	1	1460
MW-19-B	45	9.15	584	104	76.4	189	1	1390
MW-19-C	71.8	8.32	480	115	95.7	170	1	1570
MW-19-D	73.4	8.4	527	123	95.7	195	1	1642
MW-19-E	60.2	6.6	482	100	84	194	1	1470
MW-2-A	70.9	16.3	346	109	111	24.5	4.5	1310
MW-2-B	72.2	20.8	304	98.4	88.4	38.4	1	1148
MW-2-C	53.5	8	298	105	58	150	1	1140
MW-20-A	31	7.6	390	96	340	220	5	1100
MW-20-B	36	7.03	669	85.9	134	209	1	1270
MW-20-C	26.9	5.12	790	164	576	234	1	1540
MW-20-D	35.1	8.11	711	163	504	276	1	1424
MW-20-E	29.1	8	707	145	525	287	1	1470
MW-21-A	50	2.6	560	250	23	330	5	3000
MW-21-B	68	1.11	572	284	25.1	222	0	2770
MW-21-C	50.8	0.76	610	300	26.2	196	1.77	2810
MW-21-D	60.1	0.77	589	295	23.7	257	1	2753
MW-21-E	47.9	2.3	557	253	24	267	1	2780
MW-24-A	75.5	10.5	442	130	119	34.2	1	1662
MW-24-B	70.9	10.3	486	125	128	137	1	1690
MW-25-A	185	17.4	593	265	269	156	1	2374

Note: Concentrations in mg/L

Local Piper Data
Calcium-Sulfate Ground Water (continued)

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
MW-25-B	169	16.8	585	246	279	175	1	2430
MW-3-A	39	4.48	207	97.8	34.5	162	1	843
MW-3-B	39.1	4.16	219	98.7	29.3	207	1	818
MW-3-C	34.6	3.9	221	92	34	328	1	813
MW-7-A	42	0.7	207	35.3	12.7	288	1	479
MW-7-B	30	4.03	280	36.8	11.7	289	1	451
MW-7-C	42	3.13	237	36.6	12.2	292	1	488
MW-7-D	40.1	3.45	213	36	10.3	346	1	462
MW-7-E	40.1	3.45	213	36	10.3	346	1	462
MW-8-A	84.8	8.11	663	73.1	131	352	1	1498
MW-8-B	72	5.1	585	60.5	133	364	1	1450
MW-10-F	37	7.2	210	39	64	350	5	390
MW-2-D	59	9.4	340	110	100	100	5	1100
MW-3-D	35	4	220	85	30	240	5	710
MW-7-F	38	3.5	220	34	11	340	5	420
MW-7-G	38	3.2	220	34	11	350	5	420
CONTINENTAL_WELL_2	73.8	16.5	209	66.5	22.2	96	20	958
CONTINENTAL_WELL_3	36.9	7.3	190	79.2	20.5	210	20	657
UG_Sump	63.3	5.71	394	93.3	61.7	184	1	1185
WWRDF	41.2	1.9	408	1220	336	1	1	17700

Note: Concentrations in mg/L

Local Piper Data
Calcium-Bicarbonate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
MW-12-B	30.2	8.3	287	257	19	528	1	5
MW-1A-A	31.3	4.34	104	57.3	28.8	301	1	201
MW-1A-B	30.4	4.35	100	53.7	26.4	343	1	188
MW-1A-C	27.9	3.9	97.5	51.5	27	372	1	5
MW-1A-D	29	4.5	95	49	28	360	5	160
MW-4-A	4.18	4.04	74.2	119	10.3	460	1	196
MW-4-B	4.07	3.65	75	116	9.71	545	1	191
MW-4-C	3.7	3.4	75.1	108	9	583	1	187
MW-4-D	4	4.2	73	100	10	530	5	180
MW-5-A	10.6	3.71	156	14.6	22	345	1	205
MW-5-B	11.2	3.92	199	14.8	21.4	411	1	199
MW-5-C	9.7	2.5	173	13.6	20	410	1	194
MW-5-D	10	2.5	200	13	19	410	5	180

Note: Concentrations in mg/L

Local Piper Data
Sodium-Bicarbonate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
CONTINENTAL_WELL_1	74.2	24.6	15.1	2.64	4.09	21	162	16.1
MW-1-A	70.4	4.56	2.71	0.276	1.8	105	20.1	23.4
MW-1-B	65	1.4	2.8	0.14	1	120	12	18

Note: Concentrations in mg/L

Regional Piper Data
Calcium-Sulfate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
26S.8W.19.14123	110	3.9	120	83	250	210	0	380
BULLFROG_#2_SHAFT	115	0	267	67	45	271	0	875
CHINO_WELL_16S	128	28.7	545	169	5.18	20	20	3360
CHINO_WELL_CB6D	59	4.06	506	414	54	59	20	3270
CHINO_WELL_WD10	122	20.9	467	551	49.8	20	20	3670
CHINO_WELL_WD4	93.3	8.98	416	1410	4.18	20	20	12600
ESCOBAR	61.7	4.45	315	134	59.5	242	20	1260
GRUN_HAND_DU	74.5	1.2	578	348	62	1	1	4259
GRUNERUD_EAS	50	1.3	175	82.3	23	171	1	827
GW-1-A	82	12.7	528	107	14	246	1	1848
GW-1-B	83	12.7	597	110	11.7	232	2.1	1830
GW-1-C	75	12	649	98	11	304	1	1894
GW-1-D	76.7	8.46	654	96.2	9.43	300	1.3	1760
GW-1R	83	11	531	103	13	252	1	1931
GW-2-A	131	8.97	588	73	21.6	205	1	1766
GW-2-B	128	7.82	620	64.6	24	211	1.52	1820
GW-3-A	132	5	571	53.3	34	270	1	1657
GW-3-B	130	5	564	52.5	28.5	276	2.11	1640
GW-3-C	154	5	587	57	25.8	280	0	1570
GW-4-A	40.3	5	686	82.7	126	62.2	1	2095
GW-4-B	42.8	5	679	82.3	122	114	1	2120
GW-4-C	36.5	5	694	80	119	108	1	2230
GW-4-D	40.8	7	693	78	118	121	1	2030
GW-4D	42	10	786	86	129	110	1	2272
GW-5-A	32.1	5.2	329	41.6	8.52	340	3.55	689
GW-5-B	29	5	342	40	9.7	359	1	801

Regional Piper Data
Calcium-Sulfate Ground Water (continued)

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
GW-5-C	24.3	5	346	39.4	8.5	371	1.07	678
GW-5-D	27	5	365	44	9.3	356	1	802
Hanover-Majalca	87.4	5.46	531	153.7	160.6	183.4	0	1777
Hanover_Post_Office-RR_Tap	0	4.68	486	160.1	167.5	0	0	1769
Majalca-A	105.8	8.97	600	127.6	206.8	195.1	0	1926
Make-Up	31.4	3.5	438	79.8	38	325	1	1190
MAKE-UP-A	54.5	5.63	480	117	61.4	199	1	1600
SOLANO_WELL-A	107	2.5	500	367	87	1	1	4177
SOLANO_WELL-B	67	1.79	508	217	76.3	20	20	2770

Note: Concentrations in mg/L

Regional Piper Data
Calcium-Bicarbonate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
18S.10W.8.443A	16	0	74	12	9	240	10	33
18S.13W.2.321	6	0	68	29	8	260	0	68
19S.12W.19.11342	78	0	54	17	23	330	0	70
19S.13W.29.421	26	0	57	15	16	200	0	55
20S.12W.19.123	31	0	28	14	11	140	0	47
20S.5W.31	67	0	26	6.6	12	193	13	27
21S.12W.25.421	25	4.5	53	19	17	260	0	46
22S.11W.24.133	17	1.8	27	8.7	7.7	150	0	14
22S.6W.16.332	42	4.3	42	14	28	200	0	41
22S.6W.32.14424	45	2.4	31	5.4	13	170	0	28
23S.9W.28.400	37	3	30	5.8	9.5	180	0	17
24S.10W.12.111	21	0	42	8.2	6	190	0	15
24S.11W.11.211	21	0	36	8.1	4	180	0	11
24S.11W.13.411	31	0	37	9.3	7	190	0	20
24S.17W.11	45	0	30	13	11	179	0	57
24S.8W.20.300	41	4	30	12	16	200	5	26
24S.9W.12.100	42	4	57	13	49	200	4	49
24S.9W.15.433	35	4	30	5.9	7	180	4	18
24S.9W.6	37	0	29	7.7	9	182	0	19
24S.9W.6.431	37	0	29	7.7	9	180	0	19
25S.11W.11.11223	33	0	35	4	9.6	180	0	15
25S.8W.18.111A	41	0	36	8.7	16	200	0	24
25S.9W.11.11144	30	2.5	26	8.2	7.4	170	0	15
26S.9W.2.221	45	2.4	30	11	16	190	0	51
27S.9W.1	42	0	24	13	10	207	0	17
27S.9W.1.431	42	0	24	13	10	210	0	17

Regional Piper Data
Calcium-Bicarbonate Ground Water (continued)

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
APACHE-8	52.3	3.4	49.3	19.6	18	232	1	74
DM-6D-82-A	106	29.4	221	1	5	801	17	11
DM-6D-82-B	70.4	14.7	222	1	6	778	18	12
PW-1	11	3	222	18	92	480	0	155
PW-1b	11	2	217	18	80	476	0	150
WTH-1	7	1	146	10	6	377	0	64
WTH-2	9	2	115	15	12	322	0	113

Note: Concentrations in mg/L

Regional Piper Data
Sodium-Bicarbonate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
18S.13W.8.13312	72	0	21	5.8	38	190	0	19
20S.11W.20.243	79	7.6	34	7.4	17	280	0	49
20S.5W.31	67	0	26	6.6	12	193	13	27
23S.6W.28.244	55	2.3	23	6.3	14	170	0	38
23S.7W.33.211	120	1.2	15	7.4	11	340	0	45
23S.8W.21.222	73	1.2	11	5.5	9.2	210	0	22
24S.11W.14.11132	55	2.8	20	4.5	7.1	200	0	33
24S.20W.1	112	0	16	4.4	14	232	0	86
24S.7W.16.142	67	2.1	20	0.5	15	120	0	55
24S.7W.3.113	150	0	18	7.8	21	350	0	57
24S.7W.5.133	100	0	4	0.6	9	120	46	34
24S.7W.9	115	0	14	4.3	16	246	0	50
24S.8W.20.411	61	3	9.2	1.4	8.2	160	3	22
24S.9W.13.111	72	4	6.8	1.3	10	170	5	27
25S.10W.13.41212	45	2.6	19	6.1	7.1	160	0	38
26S.10W.25.32122	95	2.5	26	20	26	300	0	80
27S.19W.19	57	0	24	5.9	6	168	0	55
27S.7W.19.200	380	0	9.2	4.6	46	780	49	61
27S.8W.23.100	170	0	16	9.5	27	390	14	64
27S.8W.35.12213	220	6.3	9.1	4.1	45	360	0	150
27S.8W.8.311	120	0	12	5	27	200	5	90
28S.8W.02.111	210	0	11	6	50	340	0	140
28S.8W.26.222	290	0	5.2	2.1	55	400	13	190
29S.8W.11.11313	290	0	6.8	2.1	65	430	0	180
29S.8W.12.144	290	0	6.8	2.1	65	370	31	180
29S.8W.17.231	210	0	13	3.1	62	330	0	120

Regional Piper Data
Sodium-Bicarbonate Ground Water (continued)

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
DENNIS_WELL	120	1	50.2	10.8	39	280	1	137
RIFLE_RANGE	75.8	1	3.6	1	12	95	2	59

Note: Concentrations in mg/L

Regional Piper Data
Sodium-Sulfate Ground Water

GW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
24S.11W.12	278	0	36	6.6	15	122	4	568
25S.7W.12.122	280	0	54	17	230	270	0	240
27S.5W.7.444	250	0	31	17	290	240	0	83
27S.8W.15.131	160	0	12	4.8	50	200	5	130
28S.6W.10.31143	710	0	11	2.4	570	460	0	360
28S.7W.20	462	0	3.2	1	220	423	41	251
28S.7W.20.42222	450	0	2	6	260	400	30	250
28S.7W.26.244	450	0	3.2	1.2	230	390	30	250
28S.7W.9.41114	420	0	4	2.3	200	390	37	240
28S.8W.25.211	370	0	5.2	3.6	130	420	28	230

Note: Concentrations in mg/L

Local Piper Data
Calcium-Sulfate Surface Water

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
116621	191	77	475	2105	39	0	0	20180
139892	75	1	596	132	29	229	0	2012
61230	51	5	800	110	84	127.9	0	1692
BG-1-A	54	8.12	705	95.9	96	215	1	1870
BG-1-B	41.9	5.51	664	91.2	107	282	1	1737
BG-1-C	90	4.46	719	143	39.4	221	1	2030
BG-1-D	36	7.03	669	85.9	134	238	1	1500
BG-1-E	48.5	1.17	706	133	76.6	164	1	2164
BG-11	48	4.1	660	89	87	270	5	1700
BG-2	74	1.32	706	134	29.3	182	1	2130
BG-2-A	55	5.5	694	96.3	99.6	234	2	1840
BG-2-B	30	3.92	433	164	15.2	0	1	2650
BG-2-C	51.9	4.07	615	135	72.3	60.4	1	2115
BHG-1	54.4	5	609	91.3	91	231	1	1900
BUCKHORN_CF	184	4.62	240	247	17.7	0	1.27	3000
Buckhorn_CF	184	4.62	240	247	17.7	1	1	194
BUCKHORN_CONF	47.9	6	650	130	104	212	0	1600
BUCKHORN_E_TRIB	82.3	2	672	129	35	196	0	1700
Buckhorn_Gulch-A	54.4	5	609	91.3	91	231	1	1900
Buckhorn_Gulch-B	54.4	5	609	91.3	91	0	0	1900
Buckhorn_Seep	59.7	3.76	645	105	106	0	0	1910
CO92W-HCBG-A	1.7	5.2	14.4	5.4	1.4	25	1	22
CO92W-HCBG-B	0.74	2.2	10	3.8	3.2	11.5	1	23
CO92W-MT-1-A	81	5.1	584	163	57	191	1	1600
CO92W-MT-1-B	71	4.3	510	150	119	114	1	3220
CO92W-MT-1-C	83	3.55	495	147	72.4	197	20	1840

Local Piper Data
Calcium-Sulfate Surface Water (continued)

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
CO92W-MT-2-A	136	13.1	555	137	1	210	1	1500
CO92W-MT-2-B	120	12	500	130	0	107	1	2796
CO92W-MT-2-C	138	11.4	495	135	156	212	20	1700
CONT_POND_1-A	83.7	11.5	633	98.4	155	106	1	1830
CONT_POND_1-B	184	4.62	240	247	17.7	1	1	1782
Cont_Pond_1-C	86.2	12.8	568	133	121	217	1	1750
DECANT	114	15	548	158	191	134	0.026	1940
DECANT-A	109	11.8	590	148	190	164	1	1910
EBG-5	76	0.9	640	130	35	270	5	1900
EDSN-1	130	9.7	570	310	180	340	5	2500
Fan_Discharge	74.3	6.4	483	117	94	134	1	1300
FIERRO_SPR-B	92	178	313	63	186	138	0	861
GG-1-A	44	9.58	297	61.4	43.9	163	1	862
GG-1-B	35.2	7.18	340	68.4	34.7	92.1	1	1177
Han_Cr/Above_Hanover_Property	66	5.85	359	123.5	35	201	0	1350
Han_Cr/Beside_Hanover_Property	66	6.05	354	121.5	34	196	0	1347
Hanover_Creek_Below_Hanover	179.4	4.29	488.3	54.9	91.6	162.5	0	1400
HSN-01	13	3.9	56	46	5	0	0	440
HSN-02	16	1.6	51	31	8	0	0	210
HSN-1-A	13	4	61	46	5	7	5	440
HSN-2-A	16	1.6	51	31	8	58	5	210
Mag_Seep	100	16.4	565	231	147	563	1	2280
MAGNETITE_SEEP-A	111	21.8	527	277	143	142	1	2430
MAGNETITE_SEEP-B	122	12.3	631	110	176	135	1	1876
MDD-1	160	7.4	570	240	270	240	5	2000
MDD-2	120	7.7	540	210	150	240	5	2000

Local Piper Data
Calcium-Sulfate Surface Water (continued)

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
POND-A	93.3	16.3	602	36.5	221	7.9	1	1600
POND-B	115	14.6	659	21.3	240	18.3	1	1654
POND-C	111	14.7	705	24.4	225	31	1	1750
PS-1-A	23.8	0.76	76.7	34.6	7	1.7	1	422
SBG-1	42	4.8	640	86	93	270	5	1700
SEEP	109	9.07	562	321	165	74.3	1	2530
SEEP-A	126	10	639	323	196	116	1	3010
TAIL-1B	110	29	640	50	190	27	5	1600
TPS-1	94	27	600	140	160	150	5	1800
TPS-2	91	24	600	160	150	180	5	1800
TPS-3	90	16	560	180	180	150	5	1800
WBG-1	65	1.9	660	110	69	290	5	1800
WEST_DUMP	38.8	3	471	1920	11	0	0	14000
WINDMILL	34.5	7.1	686	80.5	84.8	346	1	1740
WWRD_SEEP	44.4	2	490	2460	10	1	1	20000

Note: Concentrations in mg/L

Regional Piper Data
Calcium-Bicarbonate Surface Water

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
DM-6S-82	31.1	3.9	53.4	7.3	8	149	1	76
POND_B	35.2	3	31.1	15.8	20	207	1	50

Note: Concentrations in mg/L

Local Piper Data
Sodium-Bicarbonate Surface Water

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
TAIL-1A	0.1	0.5	0.1	0.05	1	5	5	10

Note: Concentrations in mg/L

Regional Piper Data
Calcium-Sulfate Surface Water

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
61235	64	8	600	98	87	113.7	0	1484
CO92W-HCUH-A	78	6.5	420	155	77	155	1	1500
CO92W-HCUH-B	70	7	360	130	153	76.5	1	2735
Continental_Seep	45.4	9.75	742	300	18	0	0	3730
CP92W-HCUH-C	76.1	5.76	360	136	92.6	162	20	1580
EID-1	97	7	484	126	168	115	0	1807
EID-2	97	7	420	227	77	213	0	1595
EID-3	101	5	440	109	71	192	0	1320
EID-5	99	7	500	317	9	219	0	2255
Han_Cr/Below_Hanover_Property	63	5.95	344	105	34	212	0	1192
HAN_CR/BLACKHAWK	101	4.59	353	96.8	56.6	110	20	1260
HAN_CR/BULL_HILL	85.3	6.34	442	179	78.8	175	20	1700
HAN_CR/MANHATTAN_BAR-A	75.9	2.34	378	72.2	124.53	198	0	1123
HAN_CR/MANHATTAN_BAR-B	75.9	2.34	426	90.3	123.58	109	0	1134
HAN_CR/MANHATTAN_BAR-C	101.2	5.46	428	105	130.2	122	0	1228
HAN_CR/UNION_HILL	76.1	5.76	379	142	92.6	162	20	1580
HAN_CR/W_DUMP	78.2	3.89	426	105	66.4	87	20	1520
HC-2-A	78	5	358	79	75	190	2.06	1029
HC-2-B	71	5.5	331	69	90	234	1	897
HC-2-C	64.6	5	309	63.6	92.1	235	4.16	746
HC-3-A	76.7	5	405	105	69	154	1.08	1366
HC-3-B	81	5	417	99	74.7	160	1	1410
HC-3-C	74	16	560	110	102	140	1	1949
HC-3-D	84.6	5.36	492	114	96.6	144	1.34	1580
HC-3-E	21.6	2.98	134	38	30.4	69.5	1	491
UV_Discharge/Manhattan_Bar	88.9	7.02	484	126	167.8	115	0	1807

Regional Piper Data
Calcium-Sulfate Surface Water (continued)

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
ZH-1	34	4.3	560	81	50	190	5	1500
ZH-2	22	3.6	620	70	28	110	5	1600

Note: Concentrations in mg/L

Local Piper Data
Calcium-Bicarbonate Surface Water

SW SAMPLE ID	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	CHLORIDE	BICARBONATE	CARBONATE	SULFATE
139880-2	14	1	76	42	0	318	0	62
139880-4	17	1	70	41	0	359	5.8	66
139886-7-8	19	2	90	47	0	360	10	108
BG-1-F	29.4	6.5	680	75.5	124	299	1	5
CO92W-HCBG-C	1.72	1.46	11.9	4.57	3.85	25.4	20	22
CO92W-SPR-A	19.2	2.5	58.6	23.7	9.6	225	1	39
CO92W-SPR-B	17	3.3	54	23	12.2	111	1	44.3
CO92W-SPR-C	19.2	2.32	54.2	29.9	10.7	229	20	40.9
FIERRO_SPR-A	15	3.5	61	27	16	276	0	47
FIERRO_SPR-C	21.5	2.32	55.5	23.1	10.7	229	20	40.9
FS-1	20	2.4	60	23	10	270	5	45
GAP-1	13	0.8	75	36	3	340	5	69
GRP-1	13	1.4	51	26	5	240	5	13
HANOVER_CR_SPRING	32	0	48	21	15	276	0	0
HC-1	23.7	6.34	62.2	29.6	13.5	257	1	52.1
HC-1-A	1.58	6.67	12	4.88	2.15	36.6	1	18.1
HC-1-B	23.7	6.34	62.2	29.6	13.5	257	1	100
POISON_SPRING	13.5	0	60.2	34.2	5.1	255	0	60
PS-1-B	41.9	5.51	68.9	40.8	107	282	1	90.7
PS-1-C	29	166	72.2	44.4	8	290	1	101
PS-1-D	28	2.04	78.9	44.7	8.7	327	1	90.3
PS-1-E	25.2	0.55	68.2	40.3	7.13	330	1	124
PS-1-F	13	0.9	70	34	4	310	5	64
PS-2	17.7	2	63.7	42.2	5.7	297	0	66
TRUCK_SHOP	20.3	3	75.1	45.4	6.1	315	0	100

Note: Concentrations in mg/L

ATTACHMENT C.2

LOCAL AND REGIONAL GROUND WATER DATA

The data presented in this attachment were used to generate Tables C-1 and C-2.

Local Ground Water Data used to Calculate Summary Statistics

location_name	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
FAULT	nd				0.010
MW-1	nd	0.047	23	268	0.012
MW-10	0.056	0.033	430	1077	0.101
MW-12	0.010	1.525	1683	2773	0.089
MW-17	0.064	1.393	1958	3210	0.032
MW-19	0.026	0.011	1362	2356	0.952
MW-1A	0.001	0.475	185	611	0.005
MW-2	nd	0.141	1077	1783	0.004
MW-20	0.003	0.219	1355	3374	0.121
MW-21	1.914	22.749	2703	4153	48.35
MW-22	nd	0.100	1796	3060	0.042
MW-24	7.029	0.206	1495	2481	1.682
MW-25	0.109	0.623	2434	4286	0.170
MW-3	0.004	4.615	784	1340	0.009
MW-4	0.001	1.812	181	712	0.009
MW-5	0.009	0.044	195	611	0.185
MW-5A	0.003	0.019	1005	1750	0.033
MW-7	0.013	0.706	474	999	0.241
MW-8	0.002	2.183	1470	2762	0.036
SLEEPING BEAUTY SHAFT			1432	2677	
TANK	nd				10
UG SUMP	0.021	0.038	1226	2366.75	4.67

nd = non-detect
All listed values are calculated as the average of available data and reported in mg/L.

Regional Ground Water Data Used to Calculate Summary Statistics

location_name	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
18S.13W.2.321			68		
18S.13W.8.13312			19		
376-96-04			237	456	
3A-5			1190	1470	
3A-6			11	1100	
526-96-16			7	278	
526-96-17			114	308	
B-40			984	1640	
B-57R			2510	3900	
Bullfrog #2 Shaft			875	1502	
Bullfrog Shaft			950	1700	
CHINO WELL CB6D	nd	92.5	3270	5210	68.6
CHINO WELL WD10	6.74	76.7	3670	5740	30.3
CHINO WELL WD4	275	7.13	12600	17600	94.8
DENNIS WELL			137	548	
ESCOBAR			1260	2090	
GRUN HAND DU			4259	7296	
GRUNERUD EAS			827	1490	
GW-1	nd	0.186		3087	0.44
GW-2	nd	0.353		1485	2.96
GW-3	nd	0.693		2755	1.37
GW-4	nd	81.95		3477	62.85
GW-5	nd	nd		1488	0.036
Hanover			1101		
Hanover Post Office			1695		
Hanover Post Office-RR Tap			1740		
Hanover Shaft Make-Up			1579	2564	
Hanover-Fleming			968		
Hanover-Majalca			1640		
Hanover-Majalca Well			1233		
Hanover-McNutt			1400		
Hanover-Sandoval			735		
LB3			268	652	
LBCUT			1460	2600	
LBEAST			491	1110	
Majalca			1926		
MAKE-UP	44.28	3.91	2598	3239	19.1
MW-14	0.002	0.509	197	1330	0.033
MW-16	0.002	0.803	447	983	0.151
MW-4A	0.001	0.735	481	1098	0.319
PW-1			588	1217	
PW-1b			150	786	
PZ-10S			36000	48500	
PZ-12			73800	113000	
RIFLE RANGE			63	208	
SOLANO WELL	6.36	0.302	3474	5509	16.9
TLB22			56	923	
TLB32			23	287	
WD-11			434	762	
WD-5			957	1800	
WTH-1			64	417	
WTH-2			113	472	

Shaded rows indicate uncharacteristically high concentrations.
nd = non-detect
All listed values are calculated as the average of available data and reported as mg/L.

ATTACHMENT C.3

LOCAL AND REGIONAL SURFACE WATER DATA

The data contained in this attachment were used to generate Tables C-3 and C-4.

Local Surface Water Data used to Calculate Median Values

location_name	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
116621			20180		
139880-2				398	
139880-4				420	
139883-4			66	420	
139886-7-8				484	
139892				2968	
61230				2936	
BG-1	0.034		1813	2996	0.357
BG-2	0.144		2154	3326	0.796
BGWL			1600		
BGWU			1400		
BHG-1	0.063	nd	1900	2800	0.130
BUCKHORN CF	160.8	71.7	6236	7441	54.7
BUCKHORN_E_TRIB			1700	3000	
Buckhorn_Gulch			1900	2800	0.130
CO92W-HCBG				211	
CO92W-MT-1			1600	3050	
CO92W-MT-2			1500	2969	
CO92W-SPR				316	
Cobre Creek			970	1700	
CONT POND 1	0.074	0.407	1460	2499	1.662
DECANT	0.037	0.344	1970	3205	0.155
DG POOL	0.020				7.800
DG STREAM	nd				5.200
EDSN-1	0.190	nd	2500	4000	1.100
Fan_Discharge	0.018	nd		2400	nd
FIERRO SPR			604	1812	
FS-1	nd	nd	45	290	0.015
GAP-1	nd	0.020	69	400	nd
GG-1	0.060		1036	1831	0.880
GG-Seep			3400	3000	
GRP-1	nd	0.020	58	310	nd
Han Cr/Above Hanover Property			1271	1947	
Han Cr/Beside Hanover Property			1347	2036	
Han Cr/Sleeping Beauty			530		
HANOVER CR SPRING				282	
HC-1	nd		37	295	0.174
HCW-1			440		
HCW-2			2000		
HSN-1	0.024	55.000	440	600	1.400
HSN-2	nd	0.080	210	350	0.020

Local Surface Water Data used to Calculate Median Values (continued)

location_name	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
Mag Pond			2100		
Mag Seep	0.035	0.008	1753	2862	0.240
MAGNETITE DAM SEEP	nd	nd		3410	0.004
MAGNETITE SEEP	0.042	nd	1876	3684	0.252
MDD-1	0.006	nd	2000	3500	0.023
MDD-2	0.017	0.020	2000	3400	0.061
MDS				3500	
MP Seep 1			850		
MP Seep 2			2000		
Old Seep				8500	
POISON_SPRING				390	
POND	0.021	0.023	1600	2589	0.042
PS				440	
PS-1	0.020	0.017	98	506	0.022
PS-2				450	
SEEP	0.151	0.015	2710	4079	1.208
SG				3800	
SW-3	0.089	nd		1400	0.360
SW-4	nd	nd		320	nd
SW-5	0.034	nd		3500	nd
TAIL-1B	0.009	0.01	1600	2600	0.051
TAILINGS			822	1298	
TAILINGS_POND				2833	
TPS-1	0.024	nd	1800	2800	0.580
TPS-2	0.090	nd	1800	3000	0.770
TPS-3	0.028	nd	1800	2900	0.510
TRUCK_SHOP				510	
TSN				510	
UN3W-1			2400		
UN3W-2			2000	3400	
UN4W-2			2100		
UN4W-3			1900		
UN4W-4			2000		
WEST_DUMP				23000	
WWRD_Seep	369.5	10.7	8900	11150	128.0
WWRDF	276.8	27.0	16570	21215	169.2

All listed values are calculated as the average of available data and reported in mg/L.
nd = non-detect
Shaded rows indicates uncharacteristically high concentrations.

Regional Surface Water Data used to Calculate Median Value

location_name	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
61235				2472	
BG-11	0.015	nd	1700	2800	0.1
BUCKHORN_CONF				3000	
Buckhorn_Seep			1910	3310	
CO92W-HCUH				2502	
E of Hanover Post Office			1549		
EBG-5	0.058	nd	1900	2800	0.82
GRUNERUD			nd	nd	
HAN CR/BLACKHAWK			1260	1990	
HAN CR/BULL HILL			1700	2650	
HAN CR/MANHATTAN BAR			1162		0.57
HAN CR/UNION HILL			1580	2660	
HAN CR/W DUMP			1520	2300	
Hanover Cr at Hanover			510		
Hanover Creek Below Hanover			1400		
HC-2	nd	0.127		1712	1.31
HC-3	0.0075	nd	423	1923	1.53
N of Hanover Post Office			1526		
SW-1	0.018	nd		2400	nd
SW-2	0.021	nd	1700	2800	nd
SW-6				213	
UV Discharge/Manhattan Bar			1807		
WBG-1			1800		
WINDMILL	0.012	nd		2920	0.043
ZH-1	nd	nd	1500	2300	5.5
ZH-2	nd	nd	1600	2300	7.9

All listed values are calculated as the average of available data and reported as mg/L.
nd = non-detect
Shaded rows indicate uncharacteristically high concentrations.

ATTACHMENT C.4

F AND STUDENT'S *t* TEST: DATA, ANALYSES AND RESULTS AND PROBABILITY GRAPHS

C.4-1.0 Introduction

This attachment describes, in general, the statistical tests used to generate Section 3.0. Also contained in this attachment are descriptions of the statistical methods application.

C.4-2.0 Statistical Tests

C.4-2.1 F Test

The *F* test determines if two sample variances are similar. The *F* test begins by establishing a null hypothesis, which says that the variances of the two populations are equal. Three alternative hypotheses also are established that define the conditions under which the null hypothesis will be false. The test statistic used for these determinations is "*F*". F is defined as the ratio of the two sample variances being compared:

$$F = \frac{S_1^2}{S_2^2}$$

Where: S_1^2 = variance of sample 1, and

S_2^2 = variance of sample 2.

The null hypothesis: $H_o: \sigma_1^2 = \sigma_2^2$

Where: σ_1^2 = variance of population 1, and

σ_2^2 = variance of population 2.

Alternative Hypotheses:	Rejection Region:
$H_a: \sigma_1^2 > \sigma_2^2$	$F \geq F_{\alpha, m-1, n-1}$
$H_a: \sigma_1^2 < \sigma_2^2$	$F \leq F_{1-\alpha, m-1, n-1}$
$H_a: \sigma_1^2 \neq \sigma_2^2$	$F \geq F_{\alpha/2, m-1, n-1}$ or $F \leq F_{1-\alpha/2, m-1, n-1}$

Where: a = confidence interval,

m-1 = degrees of freedom for sample 1, and

n-1 = degrees of freedom for sample 2.

Values of $F_{\alpha, m-1, n-1}$ and $F_{\alpha/2, m-1, n-1}$ are determined from published tables based on the F probability distribution. Values of $F_{1-\alpha/2, m-1, n-1}$ and $F_{1-\alpha, m-1, n-1}$ are determined from the following equations:

$$F_{1-\alpha/2, m-1, n-1} = 1/ F_{\alpha/2, m-1, n-1}$$

and

$$F_{1-\alpha, m-1, n-1} = 1/ F_{\alpha, m-1, n-1}.$$

Thus, if the alternative hypotheses are false, then the null hypothesis is true and the two sample variances are statistically identical. To determine if the sample means are from the same population, the Student's *t* test is required.

C.4-2.2 Student's *t* test

The Student's *t* test was only performed on samples that passed the *F* test because one of the assumptions of the Student's *t* test is that the sample variances are statistically identical. The null hypothesis of the Student's *t* test states that the means of the two sample populations are equal. The alternative hypothesis states that the means of the

two sample populations are not equal. The following equations are used to determine the test statistic "t":

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S_e}$$

Where: $$S_e = S_p\left(\frac{1}{n_1} + \frac{1}{n_2}\right)^{0.5},$$

$$S_p = \left[\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\right]^{0.5}, \text{ and}$$

t = test statistic

$\overline{X}_1$ = mean of sample 1,

$\overline{X}_2$ = mean of sample 2,

S_e = standard error of the mean,

S_p = pooled estimate in standard deviation,

n_1 = number of observations in sample 1,

n_2 = number of observations in sample 2,

S_1 = standard deviation of sample 1, and

S_2 = standard deviation of sample 2.

The range of acceptable t values is determined from tables based on the t probability distribution. The number of degrees of freedom for the two samples combined and the confidence interval are needed to obtain a value from the tables for t_{table}. The number of degrees of freedom for the two samples is equal to the sum of the number of observations minus 2.

The null hypothesis is true if:

$$t \leq t_{table} \quad \text{and} \quad t \geq -t_{table}.$$

Thus, if the null hypothesis is true, the means of the samples are from the same population. Populations that have passed both the *F* and Student's *t* tests can be concluded to be statistically identical.

To apply the Student's t test, three assumptions must be made: (1) data are randomly selected, (2) data fit a normal type distribution, and (3) sample variances are equal (Davis, 1986). The purpose of the first assumption is to prevent the inclusion of outlier values that tend to skew statistical parameters. A review of the regional data over the period of sampling indicated that seven ground water and three surface water locations needed to be eliminated from the analysis to remove known bias, as discussed in Section 2.1.1.

The second assumption is valid based on the central limits theorem which concludes that most natural populations of adequate size conform to normal theory (Davis, 1986). The use of the *F* test, which compares the equality of sample variances, was used to confirm the third assumption.

C.4-3.0 Probability and Frequency Distribution Analysis

The ranges of concentrations for many of the key water quality parameters evaluated in this analysis were large, indicating the presence of multiple populations. Before performing any comparative statistical analyses, unique populations for each constituent were identified and separated. Two methods that aided in this task were probability distribution diagrams and frequency distribution diagrams. Probability diagrams, which have many applications in geology and engineering, are a useful technique for displaying, separating, and characterizing unique populations of data. At mine sites, these unique populations can be interpreted to represent a wide range of

conditions, ranging from natural background to effects from anthropogenic activity. However, for this analysis, the probability approach was employed only to identify and separate unique populations of data to be used in the statistical comparison.

For the probability distribution analysis, all data were transformed into logarithmic values to aid in the identification and separation step. Data reported as less than method detection limits were included in the analysis after substitution of a value equal to one half the reported detection limit. The basis for performing the logarithmic transformation is that natural populations generally follow log normal distributions, thus allowing distinct, multiple populations to be more easily recognized. Each constituent from the representative data sets was examined in this manner. Individual probability graphs were generated for each constituent and are provided in Figures C.4-1 through C.4-20. The data used in the analysis are in Tables C.4-5 through C.4-8. Summary statistics (mean, standard deviation, variance, number of values) were calculated using the arithmetic values for each population, including substituted values for below detection limit data. These statistics are summarized in Tables C.4-1 and C.4-2 below.

Table C.4-1 Statistical Summary of Ground Water Populations

Groundwater		Regional Area A Data			Local Data		
		Population			Population		
		Lower	Upper	Uncharacteristic	Lower	Upper	Uncharacteristic
Copper	Mean	0.008	102		0.0046	0.062	73
	Std. Dev.	0.004	135		0.0020	0.053	145
	Variance	1.60E-05	1.82E+04		2.7E-06	0.062	2.09E+04
	No.	29	5		118	59	20
Iron	Mean	0.047	0.59	36	0.038	4.82	
	Std. Dev.	0.033	0.32	41	0.037	9.71	
	Variance	0.0011	0.103	1670	0.0013	94.35	
	No.	10	14	10	98	98	
Zinc	Mean	0.26	31		0.047	1.51	83
	Std. Dev.	0.33	33		0.065	0.85	88
	Variance	0.111	1100		4.18E-03	0.729	7.71E+03
	No.	20	14		149	34	16
Sulfate	Mean	256	1510	18100	316	1570	12570
	Std. Dev.	194	446	25000	181	560	9230
	Variance	3.77E+04	1.99E+05	6.26E+08	3.29E+04	3.14E+05	8.52E+07
	No.	34	39	8	68	121	6
TDS	Mean	329	2000	26900	245	1970	19150
	Std. Dev.	106	944	37700	79	1142	11210
	Variance	1.12E+04	8.92E+05	6.26E+08	3.61E+03	1.30E+06	1.26E+08
	No.	8	67	6	15	225	4

All units are in mg/L.
All statistics are for arithmetic values.
Shaded cells indicate uncharacteristically high concentrations and that no further statistical analysis was performed.

Table C.4-2 Statistical Summary of Surface Water Populations

Surface Water		Regional Area A Data			Local Data		
		Population			Population		
		Lower	Upper	Uncharacteristic	Lower	Upper	Uncharacteristic
Copper	Mean	0.012			0.043	198	
	Std. Dev.	0.016			0.061	158	
	Variance	2.53E-04			3.73E-03	2.49E+04	
	No.	14			77	8	
Iron	Mean	0.054			0.020	0.40	102
	Std. Dev.	0.10			0.018	0.25	92
	Variance	1.00E-02			3.19E-04	6.17E-02	8.49E+03
	No.	13			56	9	6
Zinc	Mean	0.051	2.48		0.044	0.89	43
	Std. Dev.	0.031	2.36		0.039	0.56	49
	Variance	9.74E-04	5.58E+00		1.52E-03	3.09E-01	2.41E+03
	No.	5	10		43	33	10
Sulfate	Mean	452	1580		76	1700	10540
	Std. Dev.	85	227		44	537	6830
	Variance	7.15E+03	5.16E+04		1.97E+03	2.89E+05	4.66E+07
	No.	3	17		21	97	6
TDS	Mean	830	2540		395	3020	12420
	Std. Dev.	575	385		117	680	6085
	Variance	3.31E+05	1.48E+05		1.38E+04	4.62E+05	3.70E+07
	No.	4	22		38	124	5

All units are in mg/L.
All statistics are for arithmetic values.
Shaded cells indicate uncharacteristically high concentrations and that no further statistical analysis was performed.

In ground water, multiple populations were identified for all key parameters at regional and local monitoring locations (Table C.4-1). For regional data, relatively small populations having unusually high concentrations were identified for all five constituents. These populations, which were consistently traced to similar monitoring locations (i.e., Chino Well WD4, Chino Well WD10, Make Up), were omitted from further statistical analyses because they are not considered to represent unaltered water quality. For the same reason, upper populations identified in the local data for all key parameters were also omitted. These populations were consistently associated with two monitoring locations (WWRDF, MW-21). Therefore, two local populations of copper, sulfate, and TDS, and one local population of iron and zinc were used in the comparative analysis to regional data.

In surface water, multiple populations were identified for all key water quality parameters, with the exception of regional copper and iron data (Table C.4-2). The only regional population that was omitted from further statistical analysis was an upper population for zinc because concentrations were unusually high and incomparable to similar populations identified for local zinc data. For local data, upper populations were identified for all key water quality parameters that were not considered to represent unaltered water quality. These concentrations were consistently associated with the location Buckhorn CF. After omission of these upper populations, two lower populations for iron, zinc, sulfate, and TDS, and one lower population of copper were used in the comparative analysis to regional data.

C.4-4.0 The Comparative Analysis

As mentioned previously, several local populations were identified and determined to be suitable for comparison to regional data. Comparisons for each constituent were divided into separate cases. Each case is presented in Table C.4-3, which shows pertinent statistics and results for each case. Table C.4-3 displays the *F* test comparisons which are based on the number of observations and variance for distinct populations. The limits of the test are shown in the "*F* Statistic" column and the results for each limit are shown in the "Condition of Hypothesis" column. A "TRUE" statement appears for each condition met, indicating that a limit of the Null Hypothesis has been exceeded. A line of "FALSE" statements is required for the test to pass. Compared populations that pass the *F* test (Null Hypothesis = TRUE) are then further examined by the Student's *t* test.

Table C.4-3 Results of Test of Variances

Constituent	Population	Regional Data Variance	Regional Data No.	Local Data Variance	Local Data No.	*F* Statistic F	F_{α}	$F_{1-\alpha}$	$F_{\alpha/2}$	$F_{1-\alpha/2}$	Condition of Hypothesis $F \geq F_{\alpha}$	$F \leq F_{1-\alpha}$	$F \geq F_{\alpha/2}$	$F \leq F_{1-\alpha/2}$	[1]Null Hypothesis
GROUND WATER															
Copper	Lower	1.60E-05	29	2.65E-06	118	1.66E-01	1.70	0.59	1.89	0.53	FALSE	TRUE	FALSE	TRUE	FALSE
	Upper	1.60E-05	29	0.062	59	3.88E+03	1.76	0.57	1.96	0.51	TRUE	FALSE	TRUE	FALSE	FALSE
Iron	Lower	0.0011	10	1.34E-03	98	1.22E+00	2.59	0.39	3.15	0.32	FALSE	FALSE	FALSE	FALSE	TRUE
	Upper	0.103	14	1.34E-03	98	1.30E-02	2.19	0.46	2.57	0.39	FALSE	TRUE	FALSE	TRUE	FALSE
Zinc	Lower	0.111	20	4.18E-03	149	3.77E-02	1.89	0.53	2.14	0.47	FALSE	TRUE	FALSE	TRUE	FALSE
Sulfate	Lower	3.77E+04	34	3.29E+04	68	8.71E-01	1.68	0.60	1.86	0.54	FALSE	FALSE	FALSE	FALSE	TRUE
	Upper	1.99E+05	39	3.14E+05	121	1.58E+00	1.58	0.63	1.62	0.62	FALSE	FALSE	FALSE	FALSE	TRUE
TDS	Lower	1.12E+04	8	3.61E+03	15	3.22E-01	3.22	0.31	4.10	0.24	FALSE	FALSE	FALSE	FALSE	TRUE
	Upper	8.92E+05	67	1.30E+06	225	1.46E+00	1.41	0.71	1.51	0.66	TRUE	FALSE	FALSE	FALSE	FALSE
SURFACE WATER															
Copper	Lower	2.53E-04	14	3.73E-03	77	1.48E+01	2.20	0.45	2.59	0.39	TRUE	FALSE	TRUE	FALSE	FALSE
Iron	Lower	1.00E-02	13	3.19E-04	56	3.17E-02	2.30	0.43	2.73	0.37	FALSE	TRUE	FALSE	TRUE	FALSE
	Upper	1.00E-02	13	6.17E-02	9	6.15E+00	2.71	0.37	3.31	0.30	TRUE	FALSE	TRUE	FALSE	FALSE
Zinc	Lower	9.74E-04	5	1.52E-03	43	1.56E+00	4.46	0.22	6.16	0.16	FALSE	FALSE	FALSE	FALSE	TRUE
	Upper	9.74E-04	5	3.09E-01	33	3.17E+02	4.48	0.22	6.21	0.16	TRUE	FALSE	TRUE	FALSE	FALSE
Sulfate	Lower	7.15E+03	3	1.97E+03	21	2.76E-01	8.65	0.12	14.16	0.07	FALSE	FALSE	FALSE	FALSE	TRUE
	Upper	5.16E+04	17	2.89E+05	97	5.59E+00	2.02	0.49	2.33	0.43	TRUE	FALSE	TRUE	FALSE	FALSE
TDS	Lower	3.31E+05	4	1.38E+04	38	4.16E-02	5.72	0.17	8.42	0.12	FALSE	TRUE	FALSE	TRUE	FALSE
	Upper	1.48E+05	22	4.62E+05	124	3.12E+00	1.84	0.54	2.07	0.48	TRUE	FALSE	TRUE	FALSE	FALSE

[1]A "TRUE" null hypothesis indicates that the population variances that are compared are statistically identical. "FALSE" indicates otherwise.

To facilitate the interpretation of Table C.4-3, the following example for ground water is provided. For copper, two cases compare the two local (lower and upper) populations to the lower population from the regional data set. Both cases for ground water copper failed the *F* test, as indicated by the "FALSE" statement in the "Null Hypothesis" column. The conclusion in this example is that ground water copper at Regional Area A and local monitoring locations are statistically different. The analysis follows for the remaining key water quality parameters.

The ground water populations that passed the *F* test (shown in Table C.4-3) are the lower iron population, lower TDS population, and both sulfate populations. The surface water populations that passed the *F* test are the lower zinc and the lower sulfate populations (Table C.4-3). The key water quality parameters that did not pass this test were not evaluated further, except to conclude that they are statistically different. A conclusion that they represent effects related to mining cannot be made.

Case comparisons for populations that passed the *F* test were further examined using the Student's *t* test, which compared the means of each population. The design of this second test is important, because in a comparison of populations it removes the natural variability that is present in multiple measurements due to sampling methods, changes in time, and analytical methods. For example, unusually high or low measurements affect the statistics from small data sets to a greater extent than they affect the statistics of larger data sets. Thus, the tolerance of the Student's *t* test is greater for data sets (as it is with the data presented in this report) in which the number of data are limited.

Summary statistics, test limits, and results of each test are shown in Table C.4-4. The results show that the mean values corresponding to the lower populations for local ground water iron, sulfate, TDS, in addition to the upper populations of sulfate are identical to regional data. For surface water, only the lower population of zinc was found to be identical. Therefore, a much higher level of correlation between local and regional water quality is found for ground water than is apparent in surface water.

Table C.4-4 Results of Test of Means

	Populations	Regional		No.	Local		No.	*t* Statistics			Limits		Final Analysis
	(from *F* test)	Mean	Std. Dev.		Mean	Std. Dev.		Pooled Est. of Std. Dev.	Std. Error of the Mean	*t*	Upper	Lower	
GW Iron	Lower	0.047	0.033	10	0.038	0.037	98	0.0367	0.0122	0.74	2.27	-2.27	Means are statistically identical.
GW Sulfate	Lower	256	194	34	316	181	68	185.3908	38.9399	-1.54	2.28	-2.28	Means are statistically identical.
GW Sulfate	Upper	1510	446	39	1570	560	121	534.8062	98.4763	-0.61	2.26	-2.26	Means are statistically identical.
GW TDS	Lower	329	106	8	245	79	15	88.9157	38.9271	2.16	2.41	-2.41	Means are statistically identical.
SW Zinc	Lower	0.051	0.031	5	0.044	0.039	43	0.0384	0.0181	0.39	2.32	-2.32	Means are statistically identical.
SW Sulfate	Lower	452	85	3	76	44	97	45.2099	26.5025	14.19	2.28	-2.28	Means are statistically different.

C.4-5.0 Results of Statistical Analysis

The results of the statistical analysis show that iron, sulfate, and TDS in the local ground water system have, in part, statistically equivalent concentrations compared to the Regional Area A ground water. Similarly, some of the zinc and sulfate concentrations in the local surface waters are statistically equivalent to the concentrations in Regional Area A surface waters. Uncharacteristically high concentrations of each constituent in the ground water were identified for the local and regional areas. Similarly, local surface water had populations with high concentrations of each constituent.

Although the remaining populations are not statistically equivalent, other observations can be made. For example, local populations of copper in the ground water cannot be correlated with the Regional Area A ground water; however, one of the local populations has a mean concentration lower than the Regional Area A value. The same observation is made for zinc in both the ground water and surface water, along with iron in the surface water.

There are several instances where the multiple populations have been identified in either the local or Regional Area A data, but a corresponding population does not exist in the other region. This is observed for copper and iron in the ground water and iron and zinc in the surface water.

The following is a brief synopsis of the statistical analysis results for each constituent:

- Copper - A direct correlation between local and regional populations of copper was not evident in either surface or ground water. In ground water, the mean concentration of the regional data is between the two local populations. In surface water, the mean concentration of the local data was higher than the regional data. A middle population of copper concentration is present in the local surface water data that has a greater mean than the lower regional population mean.

- In ground water, the lower populations of iron for regional and local data were directly correlated. For surface water, the range of iron concentrations are fairly comparable, although no direct population correlation was identified. A middle population of iron concentration is present in the local surface water data that has a greater mean than the lower regional population mean.

- Local ground water and surface water zinc concentrations were lower than the respective regional means. A middle population of zinc concentrations is present in the local surface water data, with a mean greater than the lower regional population.

- Sulfate concentrations in regional and local ground water are statistically identical for the lower and middle populations. The means of the local and regional surface water sulfate concentrations in the lower populations were statistically different. The middle surface water sulfate populations have almost identical mean concentrations although their comparison failed an *F* test.

- The TDS concentrations for ground water data were similar for the regional and local data, as the population of lowest concentrations was determined to be statistically identical. The middle ground water TDS populations have almost identical mean concentrations, although their comparison failed an *F* test. The pattern observed for sulfate in the surface water follows for TDS because sulfate is the primary dissolved constituent.

Table C.4-5 Regional Groundwater for Statistical Analysis

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
FAULT	01-Jun-95	(nd)				0.01
MW-1	01-Oct-92			36	960	
MW-1	02-Dec-92				240	
MW-1	03-Dec-92				290	
MW-1	04-Dec-92				250	
MW-1	06-Dec-92	(nd) 0.01	0.075			0.011
MW-1	07-Dec-92	(nd) 0.012	0.09			0.05
MW-1	08-Dec-92	(nd) 0.006	0.0339			(nd) 0.0057
MW-1	01-May-93	(nd) 0.006	0.0339	16.1	250	(nd) 0.0057
MW-1	01-Oct-93				200	
MW-1	01-Jan-94				160	
MW-1	01-Mar-94				170	
MW-1	01-Jun-94				180	
MW-1	01-Oct-94				170	
MW-1	01-Jan-95				180	
MW-1	28-Feb-96	(nd) 0.005	(nd) 0.01	18	160	(nd) 0.005
MW-10	20-Jun-95	0.09	(nd) 0.02		1200	0.05
MW-10	27-Feb-96	0.12	(nd) 0.01	390	910	0.44
MW-10	09-Apr-96			416	1010	
MW-10	31-Jul-96			429	1040	
MW-10	22-Jan-97	0.003	0.068		1060	0.112
MW-10	18-Apr-97	0.05	0.02	449	1040	0.1
MW-10	04-Jul-97	0.06	0.02		1234	0.09
MW-10	17-Oct-97	0.04	0.15	429	1100	0.07
MW-10	20-Jan-98	0.04	(U) 0.02	427	1000	0.04
MW-10	24-Apr-98	0.04	0.05	356	1070	0.053
MW-10	27-Jul-98	0.06	(U) 0.02	546	1180	0.102
MW-10	11-Nov-98	0.06	0.09	436	1180	0.057
MW-10	03-Feb-99	0.032	(U) 0.02	427	1000	0.059
MW-10	11-Aug-99	0.076	(U) 0.02	424	1050	0.044
MW-12	17-Apr-97	(nd) 0.01	0.88	1765	2994	(nd) 0.025
MW-12	06-Jul-97	(nd) 0.01	1.38		2880	(nd) 0.02
MW-12	21-Oct-97	(nd) 0.01	0.15	1350	2690	(nd) 0.025
MW-12	27-Jan-98	(U) 0.01	3.14	1380	2750	(U) 0.025
MW-12	24-Apr-98	(U) 0.01	2.37	1290	2710	(U) 0.025
MW-12	17-Jul-98	(U) 0.05	2.1	1550	2830	(U) 0.125
MW-12	22-Oct-98	0.02	1.04	1580	2700	0.121
MW-12	05-Feb-99	0.01	2.77	2080	2990	0.035
MW-12	10-Mar-99	(U) 0.004	1.35	2040	2280	0.162
MW-12	09-Aug-99	0.067	0.07	2110	2910	0.571
MW-17	17-Jul-98	(U) 0.05	1.4	1740	3170	(U) 0.125
MW-17	17-Nov-98	0.1	0.79	1930	3360	0.052
MW-17	19-Jan-99	0.12	0.39	2220	3340	0.041
MW-17	15-Mar-99	0.035	2.99	1940	2970	0.035
MW-19	11-Jun-96			1460	2480	
MW-19	31-Jul-96			1390	2360	
MW-19	23-Jan-97	0.039	(nd) 0.024		2470	0.75
MW-19	14-Apr-97	0.02	(nd) 0.02	1642	2772	0.77
MW-19	08-Jul-97	0.04	(nd) 0.02	1470	2582	0.76
MW-19	17-Oct-97	0.02	0.02	972	1860	0.519
MW-19	27-Jan-98	0.02	0.1	1190	2230	1.21
MW-19	24-Apr-98	0.03	(U) 0.02	1190	2460	1.09
MW-19	28-Jul-98	0.02	(U) 0.02	1180	2190	0.674
MW-19	05-Nov-98	0.04	(U) 0.02	1560	2550	1
MW-19	02-Feb-99	(U) 0.01	(U) 0.02	1560	2320	1.24
MW-19	15-Mar-99	0.023	(U) 0.019	1370	2160	1.19
MW-19	11-Aug-99	0.033	(U) 0.02	1360	2190	1.27

Table C.4-5 Regional Groundwater for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
MW-1A	20-Jun-95	(nd) 0.01	(nd) 0.02		580	(nd) 0.02
MW-1A	28-Feb-96	(nd) 0.005	0.26	160	530	0.014
MW-1A	23-Jan-97	(nd) 0.003	0.711		618	0.006
MW-1A	14-Apr-97	(nd) 0.01	0.35	188	624	(nd) 0.025
MW-1A	03-Jul-97	(nd) 0.01	0.79		704	(nd) 0.02
MW-1A	17-Oct-97	(nd) 0.01	0.56	181	680	(nd) 0.025
MW-1A	23-Jan-98	(U) 0.01	1.04	166	580	0.03
MW-1A	24-Apr-98	(U) 0.01	0.44	212	650	(U) 0.025
MW-1A	31-Jul-98	(U) 0.01	0.5	207	680	(U) 0.025
MW-1A	05-Nov-98	(U) 0.01	0.54	204	690	(U) 0.025
MW-1A	28-Jan-99	(U) 0.01	0.72	161	480	(U) 0.025
MW-1A	03-Mar-99	(U) 0.004	0.233	197	577	0.005
MW-1A	03-Aug-99	0.008	0.03	172	548	0.006
MW-2	01-Oct-92			780	1400	
MW-2	10-Dec-92				1200	
MW-2	11-Dec-92				1098	
MW-2	12-Dec-92				1250	
MW-2	14-Dec-92	(nd) 0.01	0.034			(nd) 0.01
MW-2	15-Dec-92	(nd) 0.012	(nd) 0.14			0.02
MW-2	16-Dec-92	(nd) 0.0023	(nd) 0.0023			(nd) 0.0057
MW-2	01-May-93	(nd) 0.0023	(nd) 0.0023	958	1250	(nd) 0.0057
MW-2	01-Oct-93				2000	
MW-2	01-Jan-94				1900	
MW-2	01-Mar-94				2200	
MW-2	01-Oct-94				2400	
MW-2	01-Jan-95				2100	
MW-2	26-Feb-96	(nd) 0.005	0.1	1100	1900	(nd) 0.005
MW-2	10-Apr-96			1300	1890	
MW-2	30-Jul-96			1230	1940	
MW-2	25-Jan-97	(nd) 0.003	(nd) 0.024		2050	(nd) 0.003
MW-2	18-Apr-97	(nd) 0.01	(nd) 0.02	1148	1944	(nd) 0.025
MW-2	05-Jul-97	(nd) 0.01	0.33	1140	2008	(nd) 0.02
MW-2	16-Oct-97	(nd) 0.01	0.08	1020	1820	(nd) 0.025
MW-2	20-Jan-98	(U) 0.01	0.08	979	1720	(U) 0.025
MW-2	18-Apr-98	(U) 0.01	1.17	1050	1720	(U) 0.025
MW-2	29-Jul-98	(U) 0.01	0.03	1040	1830	(U) 0.025
MW-2	03-Nov-98	(U) 0.01	0.02	905	1760	0.033
MW-2	02-Feb-99	(U) 0.01	0.1	1230	1830	(U) 0.025
MW-2	11-Mar-99	(U) 0.004	0.17	1200	1810	(U) 0.004
MW-20	11-Jun-96			1100	2500	
MW-20	05-Aug-96			1270	2690	
MW-20	24-Jan-97	(nd) 0.003	(nd) 0.024		3300	0.016
MW-20	14-Apr-97	(nd) 0.01	0.06	1424	3402	(nd) 0.025
MW-20	09-Jul-97	(nd) 0.01	0.29	1470	3696	0.14
MW-20	21-Oct-97	(nd) 0.01	0.05	1270	3690	(nd) 0.025
MW-20	23-Jan-98	(U) 0.01	0.11	1430	3620	(U) 0.025
MW-20	28-Apr-98	(U) 0.01	(U) 0.02	1260	3580	(U) 0.025
MW-20	28-Jul-98	(U) 0.01	(U) 0.02	1370	3570	(U) 0.025
MW-20	17-Nov-98	(U) 0.01	1.4	1360	3640	0.77
MW-20	03-Feb-99	0.03	0.06	1600	3430	0.16
MW-21	11-Jun-96			3000	4500	
MW-21	07-Aug-96			2770	4430	
MW-21	18-Apr-97	3.58	2.49	2753	4410	33.9
MW-21	10-Jul-97	0.55	15.4	2780	4504	36
MW-21	21-Oct-97	0.29	6.28	2570		43.7
MW-21	23-Jan-98	0.13	58.9	2650	4190	60.9
MW-21	28-Apr-98	0.1	38.1	2370	4430	53.2
MW-21	24-Jul-98	0.1	9.82	2410	4360	27.7
MW-21	16-Nov-98	0.12	54.5	2740	4300	75.1

Table C.4-5 Regional Groundwater for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (–)	TDS (–)	Zn (D)
MW-21	03-Feb-99	0.28	25.2	2820	4100	60.2
MW-21	10-Mar-99	12	5.7	2800	3620	51.8
MW-21	09-Aug-99	1.99	11.1	2770	2840	41
MW-22	28-Jul-98	(U) 0.01	(U) 0.02	1730	3140	(U) 0.025
MW-22	16-Nov-98	(U) 0.01	0.47	1690	3130	0.202
MW-22	21-Jan-99	(U) 0.01	(U) 0.02	1900	3080	(U) 0.025
MW-22	03-Mar-99	(U) 0.01	(U) 0.02	1900	3080	(U) 0.025
MW-22	03-Aug-99	(U) 0.003	0.03	1760	2870	0.008
MW-24	17-Apr-97	8.62	0.07	1662	2752	1.62
MW-24	09-Jul-97	5.45	0.07	1690	2878	1.82
MW-24	16-Oct-97	6.38	(nd) 0.02	1370	2460	1.88
MW-24	27-Jan-98	4.44	0.41	1440	2360	1.88
MW-24	27-Apr-98	6.09	0.04	1270	2350	1.48
MW-24	29-Jul-98	10.9	0.5	1340	2300	1.74
MW-24	16-Nov-98	6.77	0.21	1500	2620	1.29
MW-24	04-Feb-99	6.89	0.25	1670	2470	1.79
MW-24	15-Mar-99	7.72	0.301	1510	2140	1.64
MW-25	23-Apr-97	0.11	0.12	2374	4162	0.1
MW-25	09-Jul-97	0.23	0.23	2430	4282	0.11
MW-25	16-Oct-97	0.06	0.99	2310	4310	0.183
MW-25	27-Jan-98	(U) 0.01	1.03	2460	4400	0.131
MW-25	01-May-98	0.07	1.34	2110	4300	0.12
MW-25	29-Jul-98	(U) 0.01	0.43	2380	4470	0.109
MW-25	16-Nov-98	0.3	1.7	2630	4650	0.69
MW-25	02-Feb-99	0.16	0.14	2610	4360	0.143
MW-25	10-Mar-99	0.082	0.223	2470	4130	0.085
MW-25	10-Aug-99	0.081	0.023	2570	3800	0.0263
MW-3	01-Oct-92			530	980	
MW-3	18-Dec-92				1200	
MW-3	19-Dec-92				1277	
MW-3	20-Dec-92				1230	
MW-3	22-Dec-92	(nd) 0.01	0.092			(nd) 0.01
MW-3	23-Dec-92	0.032	0.04			0.1
MW-3	24-Dec-92	(nd) 0.0042	(nd) 0.0526			(nd) 0.0057
MW-3	01-May-93	(nd) 0.0042	(nd) 0.0526	657	1230	(nd) 0.0057
MW-3	01-Oct-93				1200	
MW-3	01-Jan-94				1200	
MW-3	01-Mar-94				1300	
MW-3	01-Oct-94				1300	
MW-3	01-Jan-95				1300	
MW-3	27-Feb-96	(nd) 0.005	2.7	710	1300	(nd) 0.005
MW-3	10-Apr-96			837	1360	
MW-3	30-Jul-96			776	1400	
MW-3	25-Jan-97	(nd) 0.003	5.74		1380	0.013
MW-3	18-Apr-97	(nd) 0.01	7.23	818	1444	(nd) 0.025
MW-3	05-Jul-97	(nd) 0.01	7.65	813	1542	(nd) 0.02
MW-3	14-Oct-97	0.01	9.05	788	1420	(nd) 0.025
MW-3	20-Jan-98	(U) 0.01	11.6	757	1260	(U) 0.025
MW-3	18-Apr-98	(U) 0.01	0.25	815	1400	(U) 0.025
MW-3	27-Jul-98	(U) 0.01	8.67	843	1560	0.031
MW-3	03-Nov-98	(U) 0.01	3.74	814	1420	(U) 0.025
MW-3	04-Feb-99	0.01	1.89	926	1520	(U) 0.025
MW-3	11-Mar-99	(U) 0.004	7.37	855	1470	(U) 0.004
MW-3	09-Aug-99	0.006	7.82	821	1460	0.005
MW-4	01-Oct-92			170	710	
MW-4	02-Dec-92	(nd) 0.01	0.043			0.018
MW-4	03-Dec-92	(nd) 0.012	(nd) 0.14			0.06
MW-4	04-Dec-92	(nd) 0.0057	(nd) 0.0335			0.0155

Table C.4-5 Regional Groundwater for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (–)	TDS (–)	Zn (D)
MW-4	26-Dec-92				710	
MW-4	27-Dec-92				754	
MW-4	28-Dec-92				702	
MW-4	01-May-93	(nd) 0.0057	(nd) 0.0335	205	702	0.0155
MW-4	01-Oct-93				650	
MW-4	01-Mar-94				700	
MW-4	26-Feb-96	(nd) 0.005	3.4	180	640	(nd) 0.005
MW-4	10-Apr-96			194	655	
MW-4	30-Jul-96			180	676	
MW-4	18-Apr-97	(nd) 0.01	1.88	191	802	(nd) 0.025
MW-4	08-Jul-97	(nd) 0.01	2.2	187	816	(nd) 0.02
MW-4	15-Oct-97	0.01	2.29	161	770	(nd) 0.025
MW-4	20-Jan-98	(U) 0.01	2.13	169	740	(U) 0.02
MW-4	14-Apr-98	(U) 0.01	3.67	184	730	(U) 0.025
MW-4	27-Jul-98	(U) 0.01	2.56	192	700	(U) 0.025
MW-4	18-Nov-98	(U) 0.01	3.57	164	650	(U) 0.025
MW-5	01-Oct-93				360	
MW-5	01-Jan-94				360	
MW-5	01-Mar-94				350	
MW-5	01-Jun-94				350	
MW-5	01-Oct-94				630	
MW-5	01-Jan-95				650	
MW-5	26-Feb-96	(nd) 0.005	(nd) 0.01	180	650	0.05
MW-5	10-Apr-96			204	658	
MW-5	30-Jul-96			186	669	
MW-5	24-Jan-97	(nd) 0.003	0.067		715	0.201
MW-5	18-Apr-97	(nd) 0.01	0.04	199	742	0.31
MW-5	06-Jul-97	(nd) 0.01	(nd) 0.02	194	756	0.05
MW-5	15-Oct-97	0.07	0.06	180	750	0.295
MW-5	20-Jan-98	0.02	0.08	195	720	0.31
MW-5	14-Apr-98	(U) 0.02	0.1	203	750	0.23
MW-5	24-Jul-98	(U) 0.01	0.02	177	480	0.115
MW-5	31-Oct-98	(U) 0.01	0.04	184	570	0.181
MW-5	03-Feb-99	0.02	0.02	223	710	0.217
MW-5	03-Mar-99	(U) 0.004	(U) 0.019	206	680	0.1
MW-5	03-Aug-99	(U) 0.003	0.1	205	670	0.157
MW-5A	28-Jul-98	(U) 0.01	0.03	1040	1770	(U) 0.025
MW-5A	11-Nov-98	(U) 0.01	(U) 0.02	1000	1840	0.051
MW-5A	23-Jan-99	(U) 0.01	(U) 0.02	1010	1730	0.049
MW-5A	03-Mar-99	0.007	0.025	1000	1730	0.043
MW-5A	03-Aug-99	0.006	0.04	975	1680	0.02
MW-7	20-Jun-95	(nd) 0.01	(nd) 0.02		770	(nd) 0.02
MW-7	28-Feb-96	(nd) 0.005	0.63	420	930	0.007
MW-7	09-Apr-96			479	1030	
MW-7	31-Jul-96			451	980	
MW-7	22-Jan-97	(nd) 0.003	0.946		1010	0.022
MW-7	18-Apr-97	(nd) 0.01	0.83	462	1048	(nd) 0.025
MW-7	29-Jul-97	(nd) 0.01	0.83	462	1048	(nd) 0.025
MW-7	17-Oct-97	(nd) 0.01	0.35	389	1020	(nd) 0.025
MW-7	20-Jan-98	(U) 0.01	1.63	439	920	(U) 0.025
MW-7	18-Apr-98	0.03	1.11	446	970	3.01
MW-7	27-Jul-98	(U) 0.01	0.4	426	940	(U) 0.025
MW-7	03-Nov-98	(U) 0.01	1.09	425	920	(U) 0.025
MW-7	04-Feb-99	(U) 0.01	0.59	517	1000	0.038
MW-7	10-Mar-99	0.145	0.132	484	1000	0.052
MW-7	03-Aug-99	(U) 0.003	0.64	760	1400	0.008

Table C.4-5 Regional Groundwater for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
MW-8	16-Apr-97	(nd) 0.01	0.36	1498	2838	(nd) 0.025
MW-8	21-Oct-97	(nd) 0.01	1.29	1260	2760	(nd) 0.025
MW-8	23-Jan-98	(U) 0.01	4.47	1410	2680	0.191
MW-8	24-Apr-98	(U) 0.01	0.6	1160	2730	0.044
MW-8	29-Jul-98	(U) 0.01	5.42	1520	2890	(U) 0.025
MW-8	05-Nov-98	(U) 0.01	3.25	1510	2880	(U) 0.025
MW-8	02-Feb-99	(U) 0.01	3.38	1790	2890	0.029
MW-8	15-Mar-99	0.013	0.453	1560	2490	0.016
MW-8	11-Aug-99	0.007	0.42	1520	2700	0.044
SLEEPING BEAUTY SHAFT	01-Nov-72			530	2380	
SLEEPING BEAUTY SHAFT	01-Jun-81			1875	2250	
SLEEPING BEAUTY SHAFT	01-Sep-81			1890	3400	
TANK	01-Jun-95	(nd)				10
UG SUMP	29-Jan-97	(nd) 0.003	(nd) 0.024		2100	2.36
UG SUMP	21-Apr-97	(nd) 0.01	(nd) 0.02	1185	2112	1.42
UG SUMP	20-Jul-97	(nd) 0.01	(nd) 0.02	1185	2112	1.42
UG SUMP	16-Oct-97	0.02	0.02	1270	2450	2.92
UG SUMP	21-Jan-98	(U) 0.01	(U) 0.02	995	2020	3.21
UG SUMP	04-May-98	0.07	0.17	1070	2510	19.2
UG SUMP	29-Jul-98	0.03	(U) 0.02	1330	2500	3.75
UG SUMP	08-Oct-98	0.05	0.11	1550	3130	3.11

Table C.4-6 Regional Surface Water for Statistical Analysis

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
61235	05-Apr-95				2472	
BG-11	23-Feb-96	0.015	(nd) 0.005	1700	2800	0.1
BUCKHORN_CONF	11-Oct-95				3000	
Buckhorn_Seep	06-Aug-96			1910	3310	
CO92W-HCUH	02-Dec-92				2500	
CO92W-HCUH	03-Dec-92				2347	
CO92W-HCUH	04-Dec-92				2660	
E of Hanover Post Office	24-Jul-80			1549		
EBG-5	23-Feb-96	0.058	(nd) 0.005	1900	2800	0.82
GRUNERUD	01-Jun-93			(>) 600	(>) 1000	
HAN CR/BLACKHAWK	01-May-93			1260	1990	
HAN CR/BULL HILL	01-May-93			1700	2650	
HAN CR/MANHATTAN BAR	07-Jun-83			1134		
HAN CR/MANHATTAN BAR	12-Jul-83			1228		0.57
HAN CR/UNION HILL	01-May-93			1580	2660	
HAN CR/W DUMP	01-May-93			1520	2300	
HAN14	01-Jun-93			(>) 600	(>) 1000	
HANOVER CR	01-Jun-92			(>) 600	(>) 1000	
Hanover Cr at Hanover	17-Nov-72			510		
Hanover Creek Below Hanover	24-Jan-74			1400		
HC-2	27-Jan-97					1.86
HC-2	28-Jan-97	(nd) 0.025	0.381		1900	
HC-2	28-Apr-97	(nd) 0.025	(nd) 0.1		1646	1.1
HC-2	29-Apr-97	(nd) 0.025	(nd) 0.1		1590	0.98
HC-3	27-Jan-97	(nd) 0.025	(nd) 0.1		2479	1.7
HC-3	28-Apr-97	(nd) 0.025	(nd) 0.1		2907	2.2
HC-3	29-Apr-97	(nd) 0.025	(nd) 0.1		2710	2.17
HC-3	20-May-97	0.03		491	868	0.06
HC-3	24-Jul-98			355	650	
N of Hanover Post Office	17-Mar-80			1526		
SW-1	14-Mar-95	0.018	(nd) 0.05		2400	(nd) 0.05
SW-2	14-Mar-95	0.021	(nd) 0.05	1700	2800	(nd) 0.05
SW-6	22-Apr-93				213	
UV Discharge/Manhattan Bar	17-Jan-83			1807		
WBG-1	23-Feb-96			1800		
WINDMILL	01-Oct-96	0.012	(nd) 0.024		2920	0.043
ZH-1	23-Feb-96	(nd) 0.005	(nd) 0.01	1500	2300	5.5
ZH-2	23-Feb-96	(nd) 0.005	(nd) 0.01	1600	2300	7.9

Table C.4-7 Local Ground Water for Statistical Analysis

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (–)	TDS (–)	Zn (D)
FAULT	01-Jun-95	(nd)				0.01
MW-1	01-Oct-92			36	960	
MW-1	02-Dec-92				240	
MW-1	03-Dec-92				290	
MW-1	04-Dec-92				250	
MW-1	06-Dec-92	(nd) 0.01	0.075			0.011
MW-1	07-Dec-92	(nd) 0.012	0.09			0.05
MW-1	08-Dec-92	(nd) 0.006	0.0339			(nd) 0.0057
MW-1	01-May-93	(nd) 0.006	0.0339	16.1	250	(nd) 0.0057
MW-1	01-Oct-93				200	
MW-1	01-Jan-94				160	
MW-1	01-Mar-94				170	
MW-1	01-Jun-94				180	
MW-1	01-Oct-94				170	
MW-1	01-Jan-95				180	
MW-1	28-Feb-96	(nd) 0.005	(nd) 0.01	18	160	(nd) 0.005
MW-10	20-Jun-95	0.09	(nd) 0.02		1200	0.05
MW-10	27-Feb-96	0.12	(nd) 0.01	390	910	0.44
MW-10	09-Apr-96			416	1010	
MW-10	31-Jul-96			429	1040	
MW-10	22-Jan-97	0.003	0.068		1060	0.112
MW-10	18-Apr-97	0.05	0.02	449	1040	0.1
MW-10	04-Jul-97	0.06	0.02		1234	0.09
MW-10	17-Oct-97	0.04	0.15	429	1100	0.07
MW-10	20-Jan-98	0.04	(U) 0.02	427	1000	0.04
MW-10	24-Apr-98	0.04	0.05	356	1070	0.053
MW-10	27-Jul-98	0.06	(U) 0.02	546	1180	0.102
MW-10	11-Nov-98	0.06	0.09	436	1180	0.057
MW-10	03-Feb-99	0.032	(U) 0.02	427	1000	0.059
MW-10	11-Aug-99	0.076	(U) 0.02	424	1050	0.044
MW-12	17-Apr-97	(nd) 0.01	0.88	1765	2994	(nd) 0.025
MW-12	06-Jul-97	(nd) 0.01	1.38		2880	(nd) 0.02
MW-12	21-Oct-97	(nd) 0.01	0.15	1350	2690	(nd) 0.025
MW-12	27-Jan-98	(U) 0.01	3.14	1380	2750	(U) 0.025
MW-12	24-Apr-98	(U) 0.01	2.37	1290	2710	(U) 0.025
MW-12	17-Jul-98	(U) 0.05	2.1	1550	2830	(U) 0.125
MW-12	22-Oct-98	0.02	1.04	1580	2700	0.121
MW-12	05-Feb-99	0.01	2.77	2080	2990	0.035
MW-12	10-Mar-99	(U) 0.004	1.35	2040	2280	0.162
MW-12	09-Aug-99	0.067	0.07	2110	2910	0.571
MW-17	17-Jul-98	(U) 0.05	1.4	1740	3170	(U) 0.125
MW-17	17-Nov-98	0.1	0.79	1930	3360	0.052
MW-17	19-Jan-99	0.12	0.39	2220	3340	0.041
MW-17	15-Mar-99	0.035	2.99	1940	2970	0.035
MW-19	11-Jun-96			1460	2480	
MW-19	31-Jul-96			1390	2360	
MW-19	23-Jan-97	0.039	(nd) 0.024		2470	0.75
MW-19	14-Apr-97	0.02	(nd) 0.02	1642	2772	0.77
MW-19	08-Jul-97	0.04	(nd) 0.02	1470	2582	0.76
MW-19	17-Oct-97	0.02	0.02	972	1860	0.519
MW-19	27-Jan-98	0.02	0.1	1190	2230	1.21
MW-19	24-Apr-98	0.03	(U) 0.02	1190	2460	1.09
MW-19	28-Jul-98	0.02	(U) 0.02	1180	2190	0.674
MW-19	05-Nov-98	0.04	(U) 0.02	1560	2550	1

Table C.4-7 Local Ground Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (–)	TDS (–)	Zn (D)
MW-19	02-Feb-99	(U) 0.01	(U) 0.02	1560	2320	1.24
MW-19	15-Mar-99	0.023	(U) 0.019	1370	2160	1.19
MW-19	11-Aug-99	0.033	(U) 0.02	1360	2190	1.27
MW-1A	20-Jun-95	(nd) 0.01	(nd) 0.02		580	(nd) 0.02
MW-1A	28-Feb-96	(nd) 0.005	0.26	160	530	0.014
MW-1A	23-Jan-97	(nd) 0.003	0.711		618	0.006
MW-1A	14-Apr-97	(nd) 0.01	0.35	188	624	(nd) 0.025
MW-1A	03-Jul-97	(nd) 0.01	0.79		704	(nd) 0.02
MW-1A	17-Oct-97	(nd) 0.01	0.56	181	680	(nd) 0.025
MW-1A	23-Jan-98	(U) 0.01	1.04	166	580	0.03
MW-1A	24-Apr-98	(U) 0.01	0.44	212	650	(U) 0.025
MW-1A	31-Jul-98	(U) 0.01	0.5	207	680	(U) 0.025
MW-1A	05-Nov-98	(U) 0.01	0.54	204	690	(U) 0.025
MW-1A	28-Jan-99	(U) 0.01	0.72	161	480	(U) 0.025
MW-1A	03-Mar-99	(U) 0.004	0.233	197	577	0.005
MW-1A	03-Aug-99	0.008	0.03	172	548	0.006
MW-2	01-Oct-92			780	1400	
MW-2	10-Dec-92				1200	
MW-2	11-Dec-92				1098	
MW-2	12-Dec-92				1250	
MW-2	14-Dec-92	(nd) 0.01	0.034			(nd) 0.01
MW-2	15-Dec-92	(nd) 0.012	(nd) 0.14			0.02
MW-2	16-Dec-92	(nd) 0.0023	(nd) 0.0023			(nd) 0.0057
MW-2	01-May-93	(nd) 0.0023	(nd) 0.0023	958	1250	(nd) 0.0057
MW-2	01-Oct-93				2000	
MW-2	01-Jan-94				1900	
MW-2	01-Mar-94				2200	
MW-2	01-Oct-94				2400	
MW-2	01-Jan-95				2100	
MW-2	26-Feb-96	(nd) 0.005	0.1	1100	1900	(nd) 0.005
MW-2	10-Apr-96			1300	1890	
MW-2	30-Jul-96			1230	1940	
MW-2	25-Jan-97	(nd) 0.003	(nd) 0.024		2050	(nd) 0.003
MW-2	18-Apr-97	(nd) 0.01	(nd) 0.02	1148	1944	(nd) 0.025
MW-2	05-Jul-97	(nd) 0.01	0.33	1140	2008	(nd) 0.02
MW-2	16-Oct-97	(nd) 0.01	0.08	1020	1820	(nd) 0.025
MW-2	20-Jan-98	(U) 0.01	0.08	979	1720	(U) 0.025
MW-2	18-Apr-98	(U) 0.01	1.17	1050	1720	(U) 0.025
MW-2	29-Jul-98	(U) 0.01	0.03	1040	1830	(U) 0.025
MW-2	03-Nov-98	(U) 0.01	0.02	905	1760	0.033
MW-2	02-Feb-99	(U) 0.01	0.1	1230	1830	(U) 0.025
MW-2	11-Mar-99	(U) 0.004	0.17	1200	1810	(U) 0.004
MW-20	11-Jun-96			1100	2500	
MW-20	05-Aug-96			1270	2690	
MW-20	24-Jan-97	(nd) 0.003	(nd) 0.024		3300	0.016
MW-20	14-Apr-97	(nd) 0.01	0.06	1424	3402	(nd) 0.025
MW-20	09-Jul-97	(nd) 0.01	0.29	1470	3696	0.14
MW-20	21-Oct-97	(nd) 0.01	0.05	1270	3690	(nd) 0.025
MW-20	23-Jan-98	(U) 0.01	0.11	1430	3620	(U) 0.025
MW-20	28-Apr-98	(U) 0.01	(U) 0.02	1260	3580	(U) 0.025
MW-20	28-Jul-98	(U) 0.01	(U) 0.02	1370	3570	(U) 0.025
MW-20	17-Nov-98	(U) 0.01	1.4	1360	3640	0.77
MW-20	03-Feb-99	0.03	0.06	1600	3430	0.16

Table C.4-7 Local Ground Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (–)	TDS (–)	Zn (D)
MW-21	11-Jun-96			3000	4500	
MW-21	07-Aug-96			2770	4430	
MW-21	18-Apr-97	3.58	2.49	2753	4410	33.9
MW-21	10-Jul-97	0.55	15.4	2780	4504	36
MW-21	21-Oct-97	0.29	6.28	2570		43.7
MW-21	23-Jan-98	0.13	58.9	2650	4190	60.9
MW-21	28-Apr-98	0.1	38.1	2370	4430	53.2
MW-21	24-Jul-98	0.1	9.82	2410	4360	27.7
MW-21	16-Nov-98	0.12	54.5	2740	4300	75.1
MW-21	03-Feb-99	0.28	25.2	2820	4100	60.2
MW-21	10-Mar-99	12	5.7	2800	3620	51.8
MW-21	09-Aug-99	1.99	11.1	2770	2840	41
MW-22	28-Jul-98	(U) 0.01	(U) 0.02	1730	3140	(U) 0.025
MW-22	16-Nov-98	(U) 0.01	0.47	1690	3130	0.202
MW-22	21-Jan-99	(U) 0.01	(U) 0.02	1900	3080	(U) 0.025
MW-22	03-Mar-99	(U) 0.01	(U) 0.02	1900	3080	(U) 0.025
MW-22	03-Aug-99	(U) 0.003	0.03	1760	2870	0.008
MW-24	17-Apr-97	8.62	0.07	1662	2752	1.62
MW-24	09-Jul-97	5.45	0.07	1690	2878	1.82
MW-24	16-Oct-97	6.38	(nd) 0.02	1370	2460	1.88
MW-24	27-Jan-98	4.44	0.41	1440	2360	1.88
MW-24	27-Apr-98	6.09	0.04	1270	2350	1.48
MW-24	29-Jul-98	10.9	0.5	1340	2300	1.74
MW-24	16-Nov-98	6.77	0.21	1500	2620	1.29
MW-24	04-Feb-99	6.89	0.25	1670	2470	1.79
MW-24	15-Mar-99	7.72	0.301	1510	2140	1.64
MW-25	23-Apr-97	0.11	0.12	2374	4162	0.1
MW-25	09-Jul-97	0.23	0.23	2430	4282	0.11
MW-25	16-Oct-97	0.06	0.99	2310	4310	0.183
MW-25	27-Jan-98	(U) 0.01	1.03	2460	4400	0.131
MW-25	01-May-98	0.07	1.34	2110	4300	0.12
MW-25	29-Jul-98	(U) 0.01	0.43	2380	4470	0.109
MW-25	16-Nov-98	0.3	1.7	2630	4650	0.69
MW-25	02-Feb-99	0.16	0.14	2610	4360	0.143
MW-25	10-Mar-99	0.082	0.223	2470	4130	0.085
MW-25	10-Aug-99	0.081	0.023	2570	3800	0.0263
MW-3	01-Oct-92			530	980	
MW-3	18-Dec-92				1200	
MW-3	19-Dec-92				1277	
MW-3	20-Dec-92				1230	
MW-3	22-Dec-92	(nd) 0.01	0.092			(nd) 0.01
MW-3	23-Dec-92	0.032	0.04			0.1
MW-3	24-Dec-92	(nd) 0.0042	(nd) 0.0526			(nd) 0.0057
MW-3	01-May-93	(nd) 0.0042	(nd) 0.0526	657	1230	(nd) 0.0057
MW-3	01-Oct-93				1200	
MW-3	01-Jan-94				1200	
MW-3	01-Mar-94				1300	
MW-3	01-Oct-94				1300	
MW-3	01-Jan-95				1300	
MW-3	27-Feb-96	(nd) 0.005	2.7	710	1300	(nd) 0.005
MW-3	10-Apr-96			837	1360	
MW-3	30-Jul-96			776	1400	

Table C.4-7 Local Ground Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
MW-3	25-Jan-97	(nd) 0.003	5.74		1380	0.013
MW-3	18-Apr-97	(nd) 0.01	7.23	818	1444	(nd) 0.025
MW-3	05-Jul-97	(nd) 0.01	7.65	813	1542	(nd) 0.02
MW-3	14-Oct-97	0.01	9.05	788	1420	(nd) 0.025
MW-3	20-Jan-98	(U) 0.01	11.6	757	1260	(U) 0.025
MW-3	18-Apr-98	(U) 0.01	0.25	815	1400	(U) 0.025
MW-3	27-Jul-98	(U) 0.01	8.67	843	1560	0.031
MW-3	03-Nov-98	(U) 0.01	3.74	814	1420	(U) 0.025
MW-3	04-Feb-99	0.01	1.89	926	1520	(U) 0.025
MW-3	11-Mar-99	(U) 0.004	7.37	855	1470	(U) 0.004
MW-3	09-Aug-99	0.006	7.82	821	1460	0.005
MW-4	01-Oct-92			170	710	
MW-4	02-Dec-92	(nd) 0.01	0.043			0.018
MW-4	03-Dec-92	(nd) 0.012	(nd) 0.14			0.06
MW-4	04-Dec-92	(nd) 0.0057	(nd) 0.0335			0.0155
MW-4	26-Dec-92				710	
MW-4	27-Dec-92				754	
MW-4	28-Dec-92				702	
MW-4	01-May-93	(nd) 0.0057	(nd) 0.0335	205	702	0.0155
MW-4	01-Oct-93				650	
MW-4	01-Mar-94				700	
MW-4	26-Feb-96	(nd) 0.005	3.4	180	640	(nd) 0.005
MW-4	10-Apr-96			194	655	
MW-4	30-Jul-96			180	676	
MW-4	18-Apr-97	(nd) 0.01	1.88	191	802	(nd) 0.025
MW-4	08-Jul-97	(nd) 0.01	2.2	187	816	(nd) 0.02
MW-4	15-Oct-97	0.01	2.29	161	770	(nd) 0.025
MW-4	20-Jan-98	(U) 0.01	2.13	169	740	(U) 0.02
MW-4	14-Apr-98	(U) 0.01	3.67	184	730	(U) 0.025
MW-4	27-Jul-98	(U) 0.01	2.56	192	700	(U) 0.025
MW-4	18-Nov-98	(U) 0.01	3.57	164	650	(U) 0.025
MW-5	01-Oct-93				360	
MW-5	01-Jan-94				360	
MW-5	01-Mar-94				350	
MW-5	01-Jun-94				350	
MW-5	01-Oct-94				630	
MW-5	01-Jan-95				650	
MW-5	26-Feb-96	(nd) 0.005	(nd) 0.01	180	650	0.05
MW-5	10-Apr-96			204	658	
MW-5	30-Jul-96			186	669	
MW-5	24-Jan-97	(nd) 0.003	0.067		715	0.201
MW-5	18-Apr-97	(nd) 0.01	0.04	199	742	0.31
MW-5	06-Jul-97	(nd) 0.01	(nd) 0.02	194	756	0.05
MW-5	15-Oct-97	0.07	0.06	180	750	0.295
MW-5	20-Jan-98	0.02	0.08	195	720	0.31
MW-5	14-Apr-98	(U) 0.02	0.1	203	750	0.23
MW-5	24-Jul-98	(U) 0.01	0.02	177	480	0.115
MW-5	31-Oct-98	(U) 0.01	0.04	184	570	0.181
MW-5	03-Feb-99	0.02	0.02	223	710	0.217
MW-5	03-Mar-99	(U) 0.004	(U) 0.019	206	680	0.1
MW-5	03-Aug-99	(U) 0.003	0.1	205	670	0.157

Table C.4-7 Local Ground Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
MW-5A	28-Jul-98	(U) 0.01	0.03	1040	1770	(U) 0.025
MW-5A	11-Nov-98	(U) 0.01	(U) 0.02	1000	1840	0.051
MW-5A	23-Jan-99	(U) 0.01	(U) 0.02	1010	1730	0.049
MW-5A	03-Mar-99	0.007	0.025	1000	1730	0.043
MW-5A	03-Aug-99	0.006	0.04	975	1680	0.02
MW-7	20-Jun-95	(nd) 0.01	(nd) 0.02		770	(nd) 0.02
MW-7	28-Feb-96	(nd) 0.005	0.63	420	930	0.007
MW-7	09-Apr-96			479	1030	
MW-7	31-Jul-96			451	980	
MW-7	22-Jan-97	(nd) 0.003	0.946		1010	0.022
MW-7	18-Apr-97	(nd) 0.01	0.83	462	1048	(nd) 0.025
MW-7	29-Jul-97	(nd) 0.01	0.83	462	1048	(nd) 0.025
MW-7	17-Oct-97	(nd) 0.01	0.35	389	1020	(nd) 0.025
MW-7	20-Jan-98	(U) 0.01	1.63	439	920	(U) 0.025
MW-7	18-Apr-98	0.03	1.11	446	970	3.01
MW-7	27-Jul-98	(U) 0.01	0.4	426	940	(U) 0.025
MW-7	03-Nov-98	(U) 0.01	1.09	425	920	(U) 0.025
MW-7	04-Feb-99	(U) 0.01	0.59	517	1000	0.038
MW-7	10-Mar-99	0.145	0.132	484	1000	0.052
MW-7	03-Aug-99	(U) 0.003	0.64	760	1400	0.008
MW-8	16-Apr-97	(nd) 0.01	0.36	1498	2838	(nd) 0.025
MW-8	21-Oct-97	(nd) 0.01	1.29	1260	2760	(nd) 0.025
MW-8	23-Jan-98	(U) 0.01	4.47	1410	2680	0.191
MW-8	24-Apr-98	(U) 0.01	0.6	1160	2730	0.044
MW-8	29-Jul-98	(U) 0.01	5.42	1520	2890	(U) 0.025
MW-8	05-Nov-98	(U) 0.01	3.25	1510	2880	(U) 0.025
MW-8	02-Feb-99	(U) 0.01	3.38	1790	2890	0.029
MW-8	15-Mar-99	0.013	0.453	1560	2490	0.016
MW-8	11-Aug-99	0.007	0.42	1520	2700	0.044
SLEEPING BEAUTY SHAFT	01-Nov-72			530	2380	
SLEEPING BEAUTY SHAFT	01-Jun-81			1875	2250	
SLEEPING BEAUTY SHAFT	01-Sep-81			1890	3400	
TANK	01-Jun-95	(nd)				10
UG SUMP	29-Jan-97	(nd) 0.003	(nd) 0.024		2100	2.36
UG SUMP	21-Apr-97	(nd) 0.01	(nd) 0.02	1185	2112	1.42
UG SUMP	20-Jul-97	(nd) 0.01	(nd) 0.02	1185	2112	1.42
UG SUMP	16-Oct-97	0.02	0.02	1270	2450	2.92
UG SUMP	21-Jan-98	(U) 0.01	(U) 0.02	995	2020	3.21
UG SUMP	04-May-98	0.07	0.17	1070	2510	19.2
UG SUMP	29-Jul-98	0.03	(U) 0.02	1330	2500	3.75
UG SUMP	08-Oct-98	0.05	0.11	1550	3130	3.11

Table C.4-8 Local Surface Water for Statistical Analysis

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
116621	11-May-95			20180		
139880-2	11-Oct-95				398	
139880-4	11-Oct-95				420	
139883-4	11-Oct-95			66	420	
139886-7-8	11-Oct-95				484	
139892	11-Oct-95				2968	
61230	05-Apr-95				2936	
BG-1	09-Apr-96			2030	3090	
BG-1	02-Aug-96			1500	2680	
BG-1	25-Jan-97	0.006			2940	0.096
BG-1	18-Apr-97	0.01		1737	2984	0.48
BG-1	21-May-97	0.13		2164	3458	0.45
BG-1	03-Jul-97	0.01			2500	1.02
BG-1	14-Oct-97	0.04		1800	3110	0.08
BG-1	16-Jan-98			1700	3040	
BG-1	13-Apr-98			1770	3130	
BG-1	22-Jul-98			1740	3300	
BG-1	22-Oct-98			1690	3100	
BG-1	03-Feb-99			1850	2810	
BG-1	30-Apr-99			1860	2900	
BG-1	29-Jul-99	0.008		1910	2900	0.013
BG-2	09-Apr-96			1840	3000	
BG-2	02-Aug-96			2650	3860	
BG-2	25-Jan-97	0.067			3080	0.882
BG-2	21-May-97	0.22		2115	3270	0.71
BG-2	22-Jul-98			2010	3420	
BGWL	23-Jan-96			1600		
BGWU	23-Feb-96			1400		
BHG-1	27-Mar-95	0.063	(nd) 0.05	1900	2800	0.13
BUCKHORN CF	25-Jan-97	11.3	124		4140	18.5
BUCKHORN CF	21-Jul-97	157	77.9		8300	31.6
BUCKHORN CF	14-Oct-97	263	23.9	7080	10100	69.3
BUCKHORN CF	02-Jul-98	36.3	0.23	2140	4070	14.4
BUCKHORN CF	22-Oct-98	123	3	6900	10600	40.1
BUCKHORN CF	03-Feb-99	373	0.54	9320	11700	155
BUCKHORN CF	27-Jul-99	162	272	5740	3180	53.8
BUCKHORN_E_TRIB	11-Oct-95			1700	3000	
Buckhorn_Gulch	27-Mar-95				2800	0.13
Buckhorn_Gulch	23-Feb-96			1900	2800	
CO92W-HCBG	02-Dec-92				210	
CO92W-HCBG	03-Dec-92				198	
CO92W-HCBG	04-Dec-92				225	
CO92W-MT-1	02-Dec-92				3000	
CO92W-MT-1	03-Dec-92				3118	
CO92W-MT-1	04-Dec-92				3080	
CO92W-MT-1	07-Dec-92			1600	3000	
CO92W-MT-2	02-Dec-92				2900	
CO92W-MT-2	03-Dec-92				3046	
CO92W-MT-2	04-Dec-92				3030	
CO92W-MT-2	07-Dec-92			1500	2900	
CO92W-SPR	02-Dec-92				310	
CO92W-SPR	03-Dec-92				315	
CO92W-SPR	04-Dec-92				324	
Cobre Creek	17-Jul-95			970	1700	

Table C.4-8 Local Surface Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
CONT POND 1	26-Jan-97	0.003	(nd) 0.024		2800	0.593
CONT POND 1	17-Apr-97	(nd) 0.01	0.36	1782	3092	1.66
CONT POND 1	27-Jul-97	(nd) 0.01	0.36			1.66
CONT POND 1	14-Oct-97	0.31	3.54	1620	3020	1.09
CONT POND 1	16-Jan-98	0.31	(U) 0.095	1300	2290	5.25
CONT POND 1	18-Apr-98	(U) 0.02	0.22	1600	2850	1.52
CONT POND 1	05-Aug-98	0.04	(U) 0.02	1760	2740	1.55
CONT POND 1	13-Oct-98	0.03	(U) 0.02	967	1870	1.64
CONT POND 1	03-Feb-99	(U) 0.01	(U) 0.02	1520	2040	(U) 0.025
CONT POND 1	26-Apr-99	0.047	(U) 0.02	1220	2070	1.6
CONT POND 1	22-Jul-99	0.077	(U) 0.02	1370	2220	1.72
DECANT	01-Oct-93				3200	
DECANT	01-Jan-94				3100	
DECANT	01-Mar-94				3200	
DECANT	01-Jun-94				3100	
DECANT	01-Oct-94				3100	
DECANT	01-Jan-95				3000	
DECANT	10-Apr-96			2010	3110	
DECANT	01-Aug-96			2010	3190	
DECANT	25-Jan-97	0.004	0.752		3140	0.078
DECANT	15-Jul-97	0.02	0.14	1910	3400	0.08
DECANT	16-Jan-98	0.07	(U) 0.095	2000	3390	0.21
DECANT	22-Jul-98	(U) 0.05	0.8	1660	3260	(U) 0.125
DECANT	21-Apr-99	0.09	0.03	2230	3480	0.409
DG POOL	01-Jun-95	0.02				7.8
DG STREAM	01-Jun-95	(nd)				5.2
EDSN-1	26-Feb-96	0.19		2500	4000	1.1
EDSN-1	27-Feb-96		(nd) 0.01			
Fan_Discharge	13-May-95	0.018	(nd) 0.05		2400	(nd) 0.05
FIERRO SPR	24-Apr-68			47		
FIERRO SPR	25-Apr-68			861		
FIERRO SPR	10-Aug-72			510		
FIERRO SPR	11-Aug-72			740		
FIERRO SPR	17-Nov-72			26		
FIERRO SPR	01-May-93			40.9	324	
FIERRO SPR	17-Jul-95			2000	3300	
FS-1	24-Feb-96	(nd) 0.005	(nd) 0.01	45	290	0.015
GAP-1	24-Feb-96	(nd) 0.005	0.02	69	400	(nd) 0.005
GG-1	07-Aug-96			862	1470	
GG-1	20-May-97	0.06		1177	1902	0.88
GG-1	21-Jan-98			1160	2230	
GG-1	24-Jul-98			944	1720	
GG-Seep	02-Feb-96			3400	3000	
GRP-1	25-Feb-96	(nd) 0.005	0.02	58	310	(nd) 0.005
Han Cr/Above Hanover Property	01-Oct-92			1350	2040	
Han Cr/Beside Hanover Property	01-Oct-92			1347	2036	
Han Cr/Sleeping Beauty	17-Nov-72			530		
HANOVER CR SPRING	04-Jun-65				282	
HC-1	26-Jan-97	(nd) 0.003			354	0.026
HC-1	20-May-97	(nd) 0.01		18.1	234	0.47
HC-1	27-Jul-97	(nd) 0.003				0.026
HC-1	19-Jan-98			44	280	
HC-1	11-Nov-98			46	330	
HC-1	04-May-99			39.6	275	

Table C.4-8 Local Surface Water for Statistical Analysis (continued)

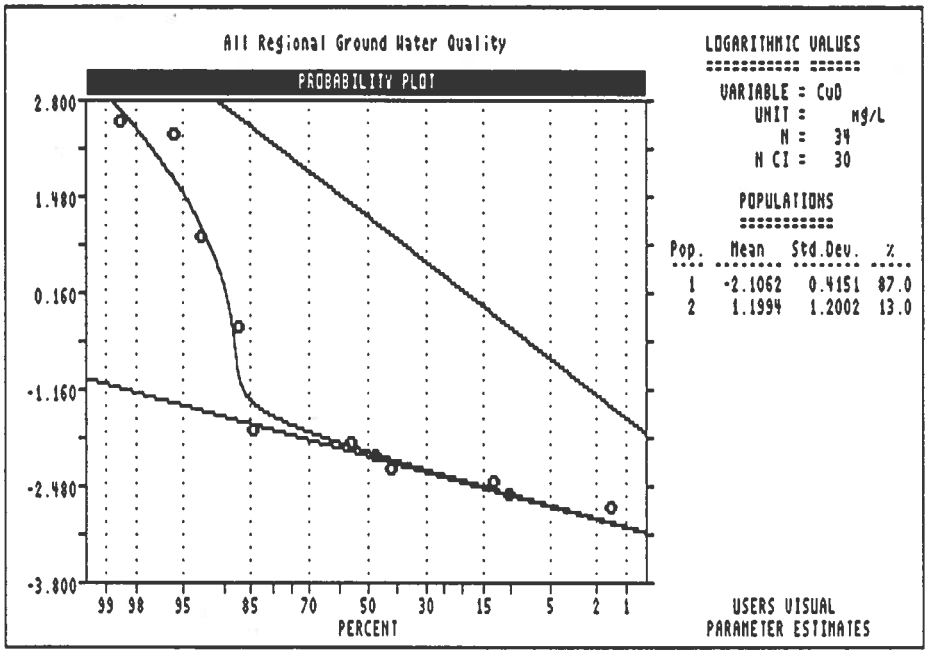
Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
HCW-1	11-Jan-96			440		
HCW-2	23-Jan-96			2000		
HSN-1	24-Feb-96	0.024	55	440	600	1.4
HSN-2	24-Feb-96	(nd) 0.005	0.08	210	350	0.02
Mag Pond	23-Jan-96			2100		
Mag Seep	06-Jul-97	0.06	(nd) 0.02	2280	3870	0.28
Mag Seep	14-Oct-97	0.03	0.02	2250	3250	0.181
Mag Seep	22-Jan-98	0.03	(U) 0.005	1840	3150	0.04
Mag Seep	18-Apr-98	0.01	(U) 0.02	2250	3870	0.044
Mag Seep	29-Jul-98	(U) 0.01	(U) 0.02	1420	2530	0.077
Mag Seep	13-Oct-98	0.02	(U) 0.02	975	1720	0.118
Mag Seep	04-Feb-99	0.02	(U) 0.02	1010	1670	0.686
Mag Seep	04-May-99	0.036	(U) 0.02	1420	2260	0.295
Mag Seep	22-Jul-99	0.113	0.05	2330	3440	0.442
MAGNETITE DAM SEEP	26-Jan-97	(nd) 0.003	(nd) 0.024		3410	0.0043
MAGNETITE SEEP	26-Jan-97	0.034	(nd) 0.024		4170	0.313
MAGNETITE SEEP	17-Apr-97	0.05	(nd) 0.02	1876	3198	0.19
MDD-1	25-Feb-96	0.006	(nd) 0.01	2000	3500	0.023
MDD-2	25-Feb-96	0.017	0.02	2000	3400	0.061
MDD-2	28-Feb-96			2000	3400	
MDS	26-Sep-95				3500	
MP Seep 1	24-Jan-96			850		
MP Seep 2	24-Jan-96			2000		
Old Seep	01-Aug-96				8500	
POISON_SPRING	11-Oct-95				390	
POND	01-Oct-94			1800	2700	
POND	10-Apr-96			1800	2670	
POND	31-Jul-96			1580	2490	
POND	25-Jan-97	0.014	0.158		2680	0.046
POND	18-Apr-97	(nd) 0.01	(nd) 0.02	1654	2988	(nd) 0.025
POND	03-Jul-97	0.01	0.03	1750	(nd) 10	(nd) 0.02
POND	14-Oct-97	0.03	(nd) 0.02	1290	2740	(nd) 0.025
POND	19-Jan-98	0.02	(U) 0.02	1490	2670	0.029
POND	18-Apr-98	(U) 0.02	(U) 0.04	1480	2910	(U) 0.05
POND	27-Jul-98	(U) 0.01	(U) 0.02	1610	3170	0.074
POND	03-Nov-98	0.01	(U) 0.02	1410	3010	0.038
POND	04-Feb-99	0.03	0.02	1660	2940	0.043
POND	28-Apr-99	0.006	(U) 0.02	1530	2440	0.057
POND	21-Jul-99	0.116	0.04	1750	2840	0.171
PS	26-Sep-95				440	
PS-1	09-Apr-96			101	459	
PS-1	02-Aug-96			90.3	478	
PS-1	26-Jan-97	0.152			643	0.022
PS-1	18-Apr-97	(nd) 0.01	(nd) 0.02	90.7	478	(nd) 0.025
PS-1	21-May-97	(nd) 0.01	(nd) 0.02	124	544	0.07
PS-1	21-Jul-97	(nd) 0.01	0.04	145	642	0.03
PS-1	19-Jan-98	(U) 0.01	(U) 0.02	83	380	(U) 0.02
PS-1	27-Jul-98	(U) 0.01	(U) 0.02	101	570	0.048
PS-1	11-Nov-98	(U) 0.01	(U) 0.02	82	490	(U) 0.025
PS-1	28-Apr-99	0.011	0.08	68.9	371	0.004
PS-2	11-Oct-95				450	

Table C.4-8 Local Surface Water for Statistical Analysis (continued)

Location _name	Collection _date	Cu (D)	Fe (D)	SO4 (--)	TDS (--)	Zn (D)
SEEP	01-Oct-93				4000	
SEEP	01-Jan-94				3800	
SEEP	01-Mar-94				4300	
SEEP	01-Jun-94				4600	
SEEP	01-Oct-94				4000	
SEEP	01-Jan-95				3600	
SEEP	10-Apr-96			3020	4430	
SEEP	01-Aug-96			2070	3280	
SEEP	25-Jan-97	0.153	(nd) 0.024		3800	1.09
SEEP	06-Jul-97	0.06	0.06	3010	4892	0.31
SEEP	19-Jan-98	0.15	(U) 0.02	2620	4100	1.28
SEEP	22-Jul-98	0.24	(U) 0.1	2830	4140	2.15
SG	26-Sep-95				3800	
SW-3	14-Mar-95	0.089	(nd) 0.05		1400	0.36
SW-4	14-Mar-95	(nd) 0.01	(nd) 0.05		320	(nd) 0.05
SW-5	15-Mar-95	0.034	(nd) 0.05		3500	(nd) 0.05
TAIL-1B	24-Feb-96	0.009	0.01	1600	2600	0.051
TAILINGS	12-Feb-97			799	1200	
TAILINGS	25-Apr-97			844	1396	
TAILINGS_POND	01-Oct-93				3000	
TAILINGS_POND	01-Jan-94				3000	
TAILINGS_POND	01-Mar-94				3100	
TAILINGS_POND	01-Jun-94				2800	
TAILINGS_POND	01-Oct-94				2700	
TAILINGS_POND	01-Jan-95				2400	
TPS-1	25-Feb-96	0.024	(nd) 0.01	1800	2800	0.58
TPS-2	25-Feb-96	0.09	(nd) 0.01	1800	3000	0.77
TPS-3	25-Feb-96	0.028	(nd) 0.01	1800	2900	0.51
TRUCK_SHOP	11-Oct-95				510	
TSN	26-Sep-95				510	
UN3W-1	11-Jan-96			2400		
UN3W-2	23-Jan-96			2000	3400	
UN4W-2	11-Jan-96			2100		
UN4W-3	11-Jan-96			1900		
UN4W-4	11-Jan-96			2000		
WEST_DUMP	11-Oct-95				23000	
WWRD_Seep	01-Oct-94			2700	4000	
WWRD_Seep	13-May-95	463				
WWRDF	21-Jul-97	261	80.3	17700		101
WWRDF	22-Jul-98	331	20.1	19100	24200	165
WWRDF	14-Oct-98	474	15.8	21800	31000	283
WWRDF	04-Feb-99	318	18.6	21600	25800	296
WWRDF	30-Apr-99	0.129	(U) 0.02	2650	3860	0.807

FIGURES

C.4-1 THROUGH C.4-20



Mean =	-1.6697	Min =	-2.6990	1st Quartile =	-2.3010
Std. Dev. =	1.3035	Max =	2.4393	Median =	-2.0000
CV % =	78.0644	Skewness =	2.1877	3rd Quartile =	-1.8861

Anti-Log Mean = 0.021 Anti-Log Std. Dev. : (-) 0.001
(+) 0.430

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1772)
0.00	1.43	0.002	-2.7876	
8.82	10.00	0.002	-2.6104	***
2.94	12.86	0.004	-2.4332	*
29.41	41.43	0.006	-2.2560	**********
5.88	47.14	0.008	-2.0788	**
8.82	55.71	0.013	-1.9016	***
29.41	84.29	0.019	-1.7245	**********
0.00	84.29	0.028	-1.5473	
0.00	84.29	0.043	-1.3701	
0.00	84.29	0.064	-1.1929	
0.00	84.29	0.096	-1.0157	
0.00	84.29	0.145	-0.8386	
0.00	84.29	0.218	-0.6614	
0.00	84.29	0.328	-0.4842	
2.94	87.14	0.493	-0.3070	*
0.00	87.14	0.742	-0.1298	
0.00	87.14	1.115	0.0474	
0.00	87.14	1.677	0.2245	
0.00	87.14	2.522	0.4017	
0.00	87.14	3.792	0.5789	
0.00	87.14	5.703	0.7561	
5.88	92.86	8.576	0.9333	**
0.00	92.86	12.896	1.1105	
0.00	92.86	19.393	1.2876	
0.00	92.86	29.163	1.4648	
0.00	92.86	43.854	1.6420	
0.00	92.86	65.947	1.8192	
0.00	92.86	99.169	1.9964	
0.00	92.86	149.128	2.1736	
2.94	95.71	224.255	2.3507	*
2.94	98.57	337.228	2.5279	*

0 1 2 3 4

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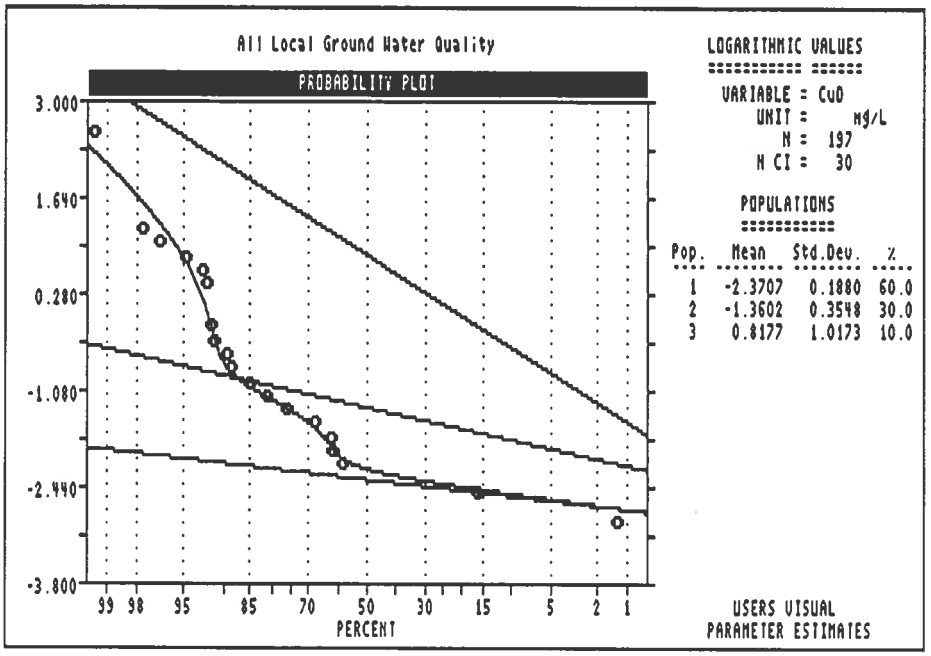
Figure C.4-1
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Ground Water Copper Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-1.7366	Min =	-3.0000	1st Quartile =	-2.3010
Std. Dev. =	1.0715	Max =	2.6758	Median =	-2.3010
CV % =	61.7045	Skewness =	2.0248	3rd Quartile =	-1.3979

Anti-Log Mean = 0.018 Anti-Log Std. Dev. : (-) 0.002
(+) 0.216

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1957)
0.00	0.25	0.001	-3.0979	
1.02	1.26	0.001	-2.9021	*
0.00	1.26	0.002	-2.7064	
14.72	15.91	0.003	-2.5107	**********
0.00	15.91	0.005	-2.3150	
42.64	58.33	0.008	-2.1193	****************************** --> 59
3.05	61.36	0.012	-1.9236	****
0.51	61.87	0.019	-1.7278	*
5.58	67.42	0.029	-1.5321	********
8.63	76.01	0.046	-1.3364	************
5.08	81.06	0.072	-1.1407	*******
4.06	85.10	0.114	-0.9450	******
3.55	88.64	0.178	-0.7493	*****
0.51	89.14	0.280	-0.5535	*
2.03	91.16	0.439	-0.3578	***
0.51	91.67	0.688	-0.1621	*
0.00	91.67	1.080	0.0336	
0.00	91.67	1.696	0.2293	
0.51	92.17	2.661	0.4250	*
0.51	92.68	4.176	0.6208	*
2.03	94.70	6.553	0.8165	***
2.03	96.72	10.285	1.0122	***
1.02	97.73	16.140	1.2079	*
0.00	97.73	25.329	1.4036	
0.00	97.73	39.750	1.5993	
0.00	97.73	62.381	1.7951	
0.00	97.73	97.897	1.9908	
0.00	97.73	153.634	2.1865	
0.00	97.73	241.104	2.3822	
1.52	99.24	378.373	2.5779	**
0.51	99.75	593.795	2.7736	*

0 1 2 3 4

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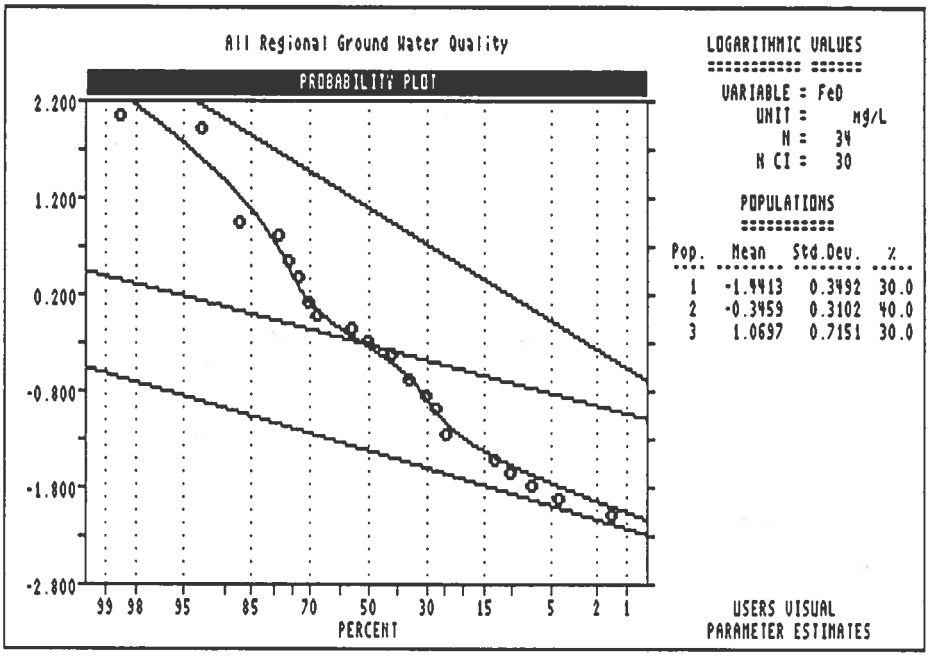
Figure C.4-2
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Ground Water Copper Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-0.2046	Min =	-2.0000	1st Quartile =	-1.1734
Std. Dev. =	1.1060	Max =	1.9731	Median =	-0.2534
CV % =	540.6236	Skewness =	0.4374	3rd Quartile =	0.3728

Anti-Log Mean = 0.624 Anti-Log Std. Dev. : (-) 0.049
(+) 7.969

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1370)
0.00	1.43	0.009	-2.0685	
2.94	4.29	0.012	-1.9315	*
2.94	7.14	0.016	-1.7945	*
2.94	10.00	0.022	-1.6575	*
2.94	12.86	0.030	-1.5205	*
0.00	12.86	0.041	-1.3835	
11.76	24.29	0.057	-1.2465	****
0.00	24.29	0.078	-1.1095	
2.94	27.14	0.107	-0.9725	*
2.94	30.00	0.146	-0.8355	*
5.88	35.71	0.200	-0.6985	**
0.00	35.71	0.275	-0.5615	
5.88	41.43	0.376	-0.4244	**
8.82	50.00	0.516	-0.2874	***
5.88	55.71	0.707	-0.1504	**
11.76	67.14	0.970	-0.0134	****
2.94	70.00	1.329	0.1236	*
0.00	70.00	1.822	0.2606	
2.94	72.86	2.498	0.3976	*
2.94	75.71	3.424	0.5346	*
0.00	75.71	4.694	0.6716	
2.94	78.57	6.436	0.8086	*
8.82	87.14	8.823	0.9456	***
0.00	87.14	12.095	1.0826	
0.00	87.14	16.581	1.2196	
0.00	87.14	22.730	1.3566	
0.00	87.14	31.161	1.4936	
0.00	87.14	42.719	1.6306	
0.00	87.14	58.563	1.7676	
5.88	92.86	80.283	1.9046	**
5.88	98.57	110.060	2.0416	**

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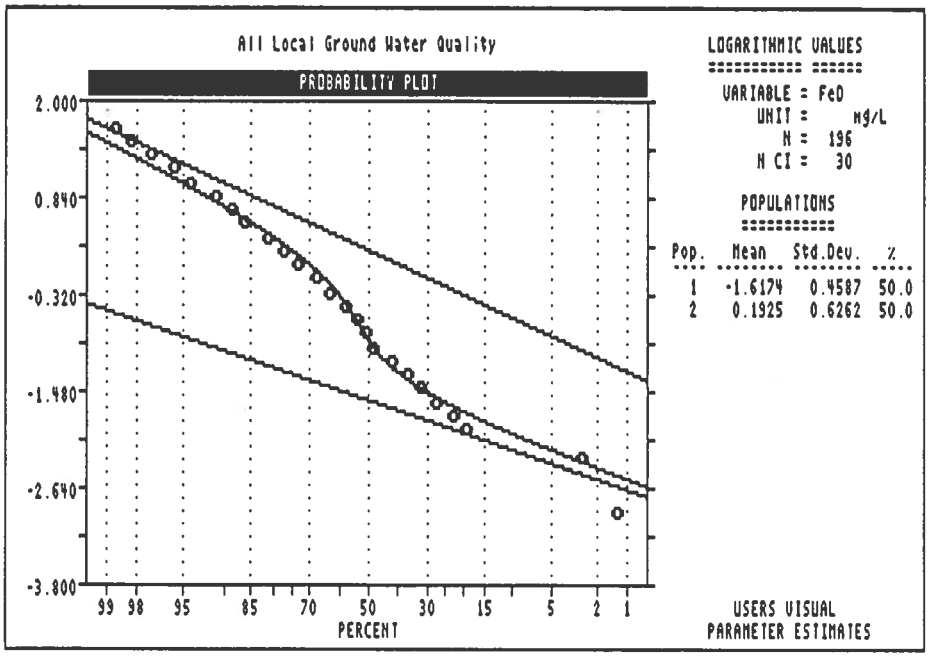
SHEPHERD MILLER INCORPORATED

Figure C.4-3
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Ground Water Iron Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-0.7113	Min =	-3.0000	1st Quartile =	-1.6990
Std. Dev. =	1.0650	Max =	1.7701	Median =	-0.8239
CV % =	149.7202	Skewness =	0.2423	3rd Quartile =	0.1303

Anti-Log Mean = 0.194 Anti-Log Std. Dev. : (-) 0.017
(+) 2.258

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1645)
0.00	0.25	0.001	-3.0822	
1.02	1.27	0.001	-2.9178	*
0.00	1.27	0.002	-2.7533	
0.00	1.27	0.003	-2.5888	
0.00	1.27	0.004	-2.4243	
1.53	2.79	0.005	-2.2598	**
0.00	2.79	0.008	-2.0953	
16.33	19.04	0.012	-1.9308	**********
3.06	22.08	0.017	-1.7663	****
5.10	27.16	0.025	-1.6019	*******
4.59	31.73	0.037	-1.4374	******
5.61	41.37	0.078	-1.1084	********
6.63	47.97	0.114	-0.9439	*********
2.55	50.51	0.166	-0.7794	****
3.06	53.55	0.243	-0.6149	****
4.08	57.61	0.354	-0.4505	******
5.61	63.20	0.518	-0.2860	********
4.08	67.26	0.756	-0.1215	******
5.61	72.84	1.104	0.0430	********
4.08	76.90	1.612	0.2075	******
4.08	80.96	2.355	0.3720	******
5.10	86.04	3.439	0.5365	*******
2.55	88.58	5.023	0.7010	****
2.55	91.12	7.336	0.8654	****
3.06	94.16	10.713	1.0299	****
1.53	95.69	15.646	1.1944	**
1.53	97.21	22.851	1.3589	**
1.02	98.22	33.372	1.5234	*
0.51	98.73	48.738	1.6879	*
1.02	99.75	71.180	1.8524	*

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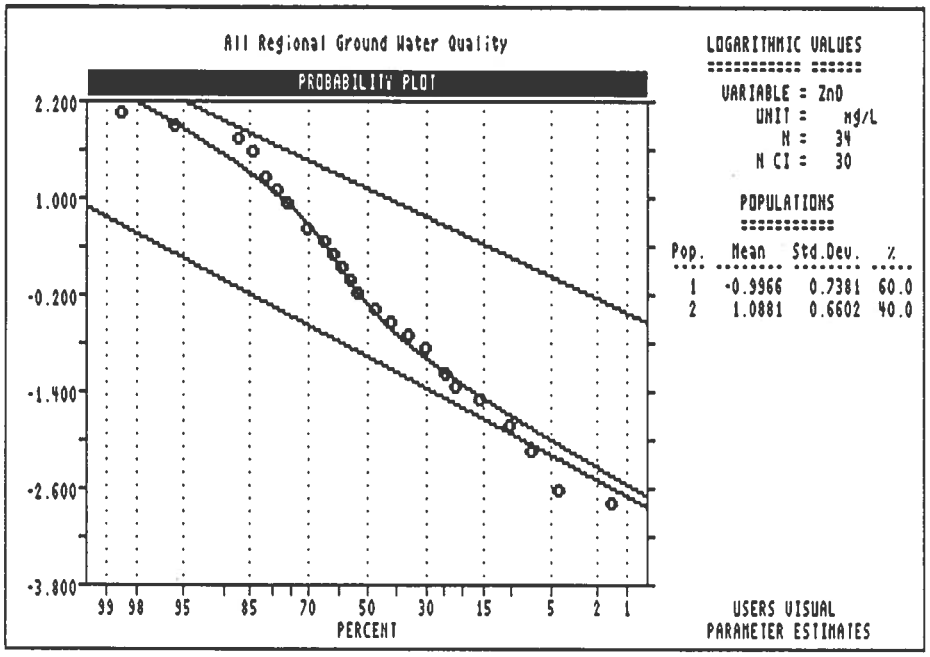
Figure C.4-4
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Ground Water Iron Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-0.1097	Min =	-2.6990	1st Quartile =	-1.0651
Std. Dev. =	1.2751	Max =	1.9768	Median =	-0.2480
CV % =	1162.3352	Skewness =	0.0258	3rd Quartile =	0.8267

Anti-Log Mean = 0.777 Anti-Log Std. Dev. : (-) 0.041
(+) 14.634

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1612)
0.00	1.43	0.002	-2.7796	
2.94	4.29	0.002	-2.6184	*
0.00	4.29	0.003	-2.4571	
0.00	4.29	0.005	-2.2959	
2.94	7.14	0.007	-2.1347	*
0.00	7.14	0.011	-1.9734	
2.94	10.00	0.015	-1.8122	*
0.00	10.00	0.022	-1.6510	
5.88	15.71	0.032	-1.4897	**
5.88	21.43	0.047	-1.3285	**
2.94	24.29	0.068	-1.1672	*
0.00	24.29	0.099	-1.0060	
5.88	30.00	0.143	-0.8448	**
5.88	35.71	0.207	-0.6835	**
5.88	41.43	0.300	-0.5223	**
5.88	47.14	0.435	-0.3611	**
5.88	52.86	0.631	-0.1998	**
2.94	55.71	0.915	-0.0386	*
2.94	58.57	1.326	0.1226	*
2.94	61.43	1.922	0.2839	*
2.94	64.29	2.787	0.4451	*
5.88	70.00	4.039	0.6063	**
0.00	70.00	5.855	0.7676	
5.88	75.71	8.488	0.9288	**
2.94	78.57	12.303	1.0900	*
2.94	81.43	17.834	1.2513	*
0.00	81.43	25.852	1.4125	
2.94	84.29	37.473	1.5737	*
2.94	87.14	54.320	1.7350	*
8.82	95.71	78.739	1.8962	***
2.94	98.57	114.137	2.0574	*

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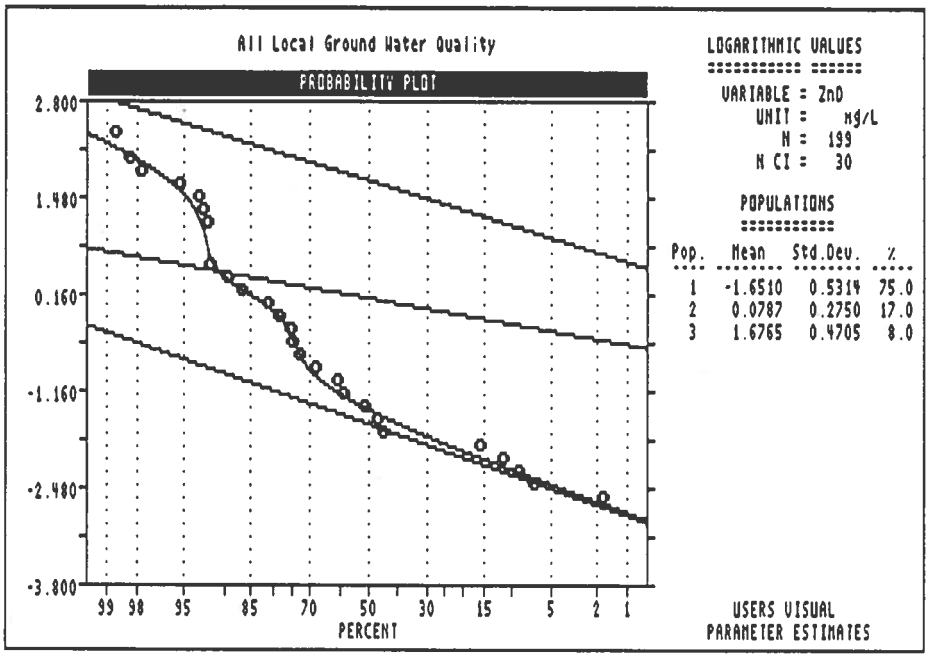
Figure C.4-5
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Ground Water Zinc Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-1.0765	Min =	-2.6990	1st Quartile =	-1.8861
Std. Dev. =	1.1692	Max =	2.4713	Median =	-1.4091
CV % =	108.6125	Skewness =	1.1041	3rd Quartile =	-0.3946

Anti-Log Mean = 0.084 Anti-Log Std. Dev. : (-) 0.006
(+) 1.238

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1783)
0.00	0.25	0.002	-2.7881	
1.51	1.75	0.002	-2.6098	**
5.03	6.75	0.004	-2.4315	*******
2.01	8.75	0.006	-2.2533	***
2.51	11.25	0.008	-2.0750	****
4.52	15.75	0.013	-1.8967	******
28.64	44.25	0.019	-1.7184	********** --> 40
2.01	46.25	0.029	-1.5401	***
5.03	51.25	0.043	-1.3618	*******
7.54	58.75	0.066	-1.1835	**********
2.01	60.75	0.099	-1.0053	***
7.04	67.75	0.149	-0.8270	**********
5.03	72.75	0.225	-0.6487	*******
2.01	74.75	0.339	-0.4704	***
0.50	75.25	0.510	-0.2921	*
3.02	78.25	0.769	-0.1138	****
3.02	81.25	1.160	0.0644	****
5.53	86.75	1.749	0.2427	********
2.51	89.25	2.636	0.4210	****
2.51	91.75	3.975	0.5993	****
0.00	91.75	5.992	0.7776	
0.00	91.75	9.034	0.9559	
0.50	92.25	13.619	1.1342	*
0.50	92.75	20.532	1.3124	*
0.50	93.25	30.955	1.4907	*
2.01	95.25	46.667	1.6690	***
2.51	97.75	70.355	1.8473	****
0.50	98.25	106.067	2.0256	*
0.00	98.25	159.906	2.2039	
0.50	98.75	241.073	2.3821	*
1.01	99.75	363.441	2.5604	*

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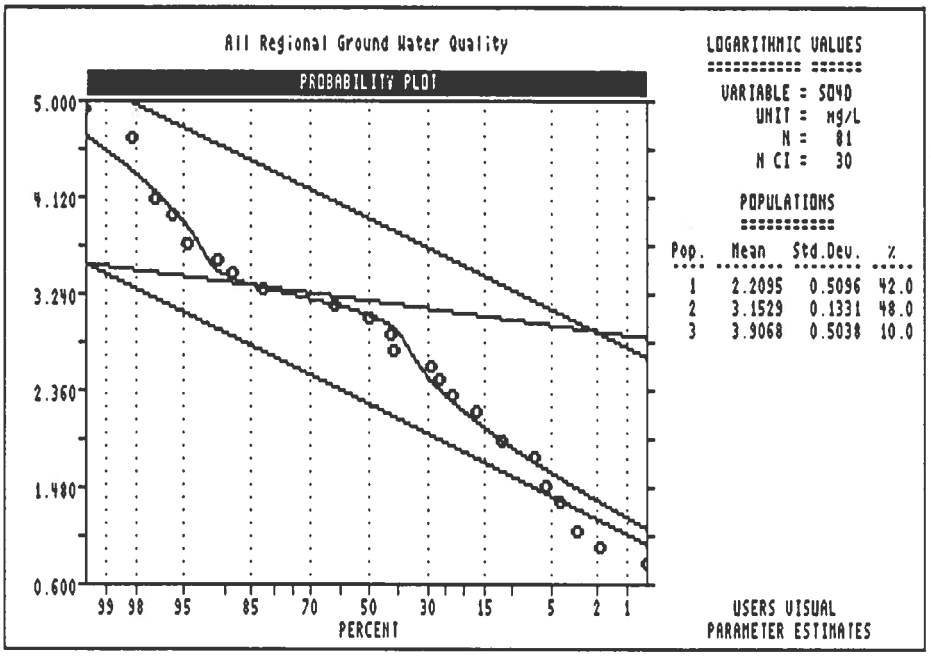
Figure C.4-6
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Ground Water Zinc Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	2.8406	Min =	0.8692	1st Quartile =	2.4148
Std. Dev. =	0.6946	Max =	4.8681	Median =	3.0008
CV % =	24.4541	Skewness =	-0.3408	3rd Quartile =	3.2144

Anti-Log Mean = 692.795 Anti-Log Std. Dev. : (-) 139.946 (+) 3429.654

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1379)
0.00	0.61	6.314	0.8003	
1.23	1.83	8.673	0.9382	*
1.23	3.05	11.914	1.0761	*
0.00	3.05	16.367	1.2140	
1.23	4.27	22.483	1.3518	*
1.23	5.49	30.884	1.4897	*
0.00	5.49	42.426	1.6276	
1.23	6.71	58.280	1.7655	*
4.94	11.59	80.059	1.9034	****
0.00	11.59	109.977	2.0413	
4.94	16.46	151.075	2.1792	****
6.17	22.56	207.531	2.3171	*****
3.70	26.22	285.084	2.4550	***
2.47	28.66	391.618	2.5929	**
12.35	40.85	537.964	2.7308	**********
1.23	42.07	738.999	2.8686	*
7.41	49.39	1015.160	3.0065	******
12.35	61.59	1394.521	3.1444	**********
20.99	82.32	1915.647	3.2823	******************
6.17	88.41	2631.516	3.4202	*****
2.47	90.85	3614.902	3.5581	**
3.70	94.51	4965.775	3.6960	***
0.00	94.51	6821.464	3.8339	
1.23	95.73	9370.615	3.9718	*
1.23	96.95	12872.372	4.1097	*
0.00	96.95	17682.721	4.2475	
0.00	96.95	24290.676	4.3854	
0.00	96.95	33367.994	4.5233	
1.23	98.17	45837.466	4.6612	*
0.00	98.17	62966.726	4.7991	
1.23	99.39	86497.113	4.9370	*

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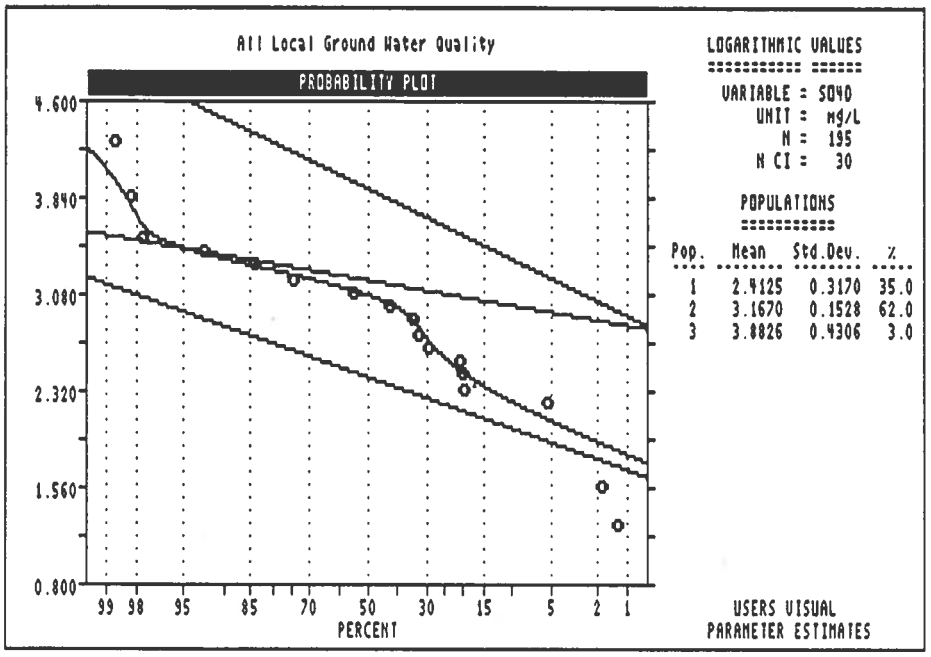
Figure C.4-7
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Ground Water Sulfate Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	2.9296	Min =	1.2068	1st Quartile =	2.6309
Std. Dev. =	0.4643	Max =	4.3385	Median =	3.0622
CV % =	15.8487	Skewness =	-0.5275	3rd Quartile =	3.2139

Anti-Log Mean = 850.349 Anti-Log Std. Dev. : (-) 291.940
(+) 2476.855

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1080)
0.00	0.26	14.218	1.1528	
1.03	1.28	18.231	1.2608	*
0.00	1.28	23.378	1.3688	
0.00	1.28	29.977	1.4768	
0.51	1.79	38.440	1.5848	*
0.00	1.79	49.291	1.6928	
0.00	1.79	63.206	1.8008	
0.00	1.79	81.048	1.9087	
0.00	1.79	103.927	2.0167	
0.00	1.79	133.265	2.1247	
3.59	5.36	170.885	2.2327	*****
13.85	19.13	219.125	2.3407	**********
0.51	19.64	280.983	2.4487	*
0.51	20.15	360.302	2.5567	*
9.23	29.34	462.013	2.6647	**********
3.08	32.40	592.436	2.7726	****
1.54	33.93	759.676	2.8806	**
8.21	42.09	974.127	2.9886	**********
12.31	54.34	1249.117	3.0966	**********
20.00	74.23	1601.733	3.2046	**********
9.74	83.93	2053.892	3.3126	**********
8.72	92.60	2633.691	3.4206	**********
5.13	97.70	3377.163	3.5286	*******
0.00	97.70	4330.512	3.6365	
0.00	97.70	5552.986	3.7445	
0.51	98.21	7120.554	3.8525	*
0.00	98.21	9130.637	3.9605	
0.00	98.21	11708.152	4.0685	
0.00	98.21	15013.281	4.1765	
0.51	98.72	19251.424	4.2845	*
1.03	99.74	24685.966	4.3925	*

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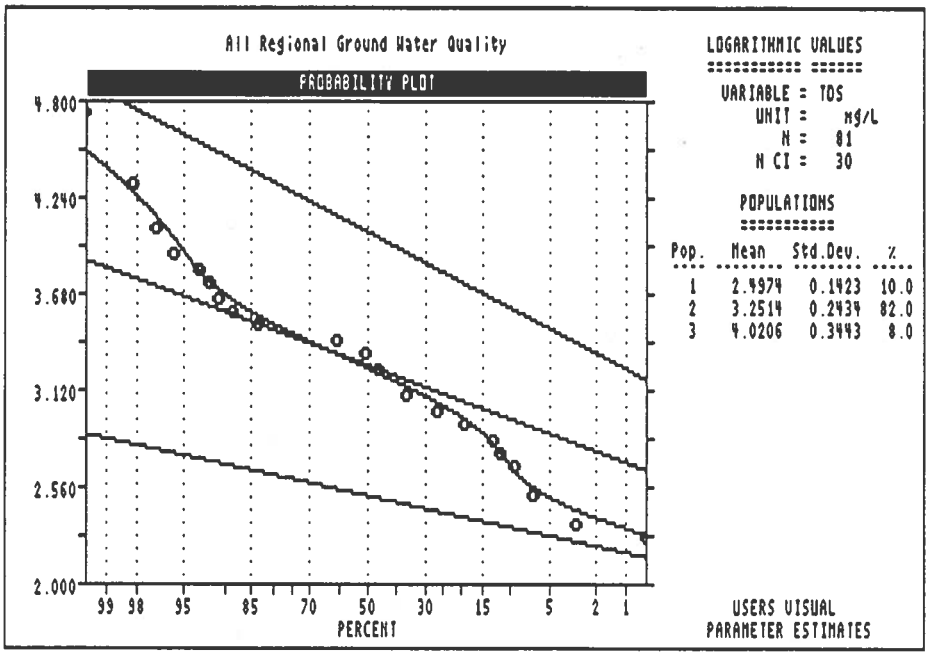
Figure C.4-8
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Ground Water Sulfate Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	3.2448	Min =	2.3032	1st Quartile =	2.9764
Std. Dev. =	0.4025	Max =	4.6857	Median =	3.3222
CV % =	12.4037	Skewness =	0.2410	3rd Quartile =	3.4624

Anti-Log Mean = 1757.128 Anti-Log Std. Dev. : (-) 695.550
(+) 4438.934

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0822)
0.00	0.61	182.860	2.2621	
2.47	3.05	220.940	2.3443	**
0.00	3.05	266.951	2.4264	
3.70	6.71	322.543	2.5086	***
0.00	6.71	389.713	2.5907	
2.47	9.15	470.870	2.6729	**
2.47	11.59	568.929	2.7551	**
1.23	12.80	687.409	2.8372	*
6.17	18.90	830.561	2.9194	*****
7.41	26.22	1003.525	3.0015	******
9.88	35.98	1212.510	3.0837	********
0.00	35.98	1465.014	3.1658	
9.88	45.73	1770.103	3.2480	********
4.94	50.61	2138.727	3.3302	****
9.88	60.37	2584.117	3.4123	********
23.46	83.54	3122.259	3.4945	**********
4.94	88.41	3772.469	3.5766	****
2.47	90.85	4558.085	3.6588	**
1.23	92.07	5507.305	3.7409	*
1.23	93.29	6654.201	3.8231	*
2.47	95.73	8039.937	3.9053	**
0.00	95.73	9714.252	3.9874	
1.23	96.95	11737.244	4.0696	*
0.00	96.95	14181.523	4.1517	
0.00	96.95	17134.823	4.2339	
1.23	98.17	20703.147	4.3160	*
0.00	98.17	25014.575	4.3982	
0.00	98.17	30223.856	4.4803	
0.00	98.17	36517.969	4.5625	
0.00	98.17	44122.830	4.6447	
1.23	99.39	53311.403	4.7268	*

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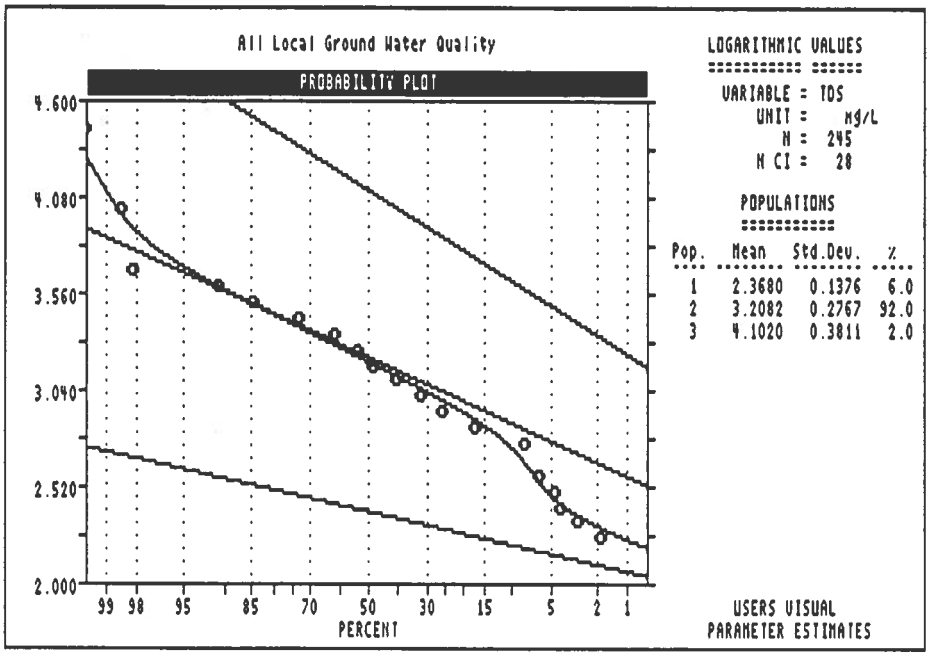
Figure C.4-9
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Ground Water TDS Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	3.1821	Min =	2.2041	1st Quartile =	2.9098
Std. Dev. =	0.3648	Max =	4.4914	Median =	3.2355
CV % =	11.4631	Skewness =	-0.1124	3rd Quartile =	3.4394

Anti-Log Mean = 1520.974 Anti-Log Std. Dev. : (-) 656.675
(+) 3522.841

%	cum %	antilog	cls int	(# of bins = 28 - bin size = 0.0847)
0.00	0.20	145.132	2.1618	
1.63	1.83	176.391	2.2465	**
1.22	3.05	214.382	2.3312	**
1.22	4.27	260.556	2.4159	**
0.41	4.67	316.675	2.5006	*
1.63	6.30	384.881	2.5853	**
0.00	6.30	467.778	2.6700	
1.63	7.93	568.529	2.7548	**
8.98	16.87	690.979	2.8395	**********
8.57	25.41	839.803	2.9242	**********
6.53	31.91	1020.681	3.0089	*********
8.16	40.04	1240.517	3.0936	**********
7.76	47.76	1507.702	3.1783	**********
5.71	53.46	1832.433	3.2630	********
8.16	61.59	2227.106	3.3477	**********
11.43	72.97	2706.783	3.4325	**********
11.84	84.76	3289.775	3.5172	**********
6.12	90.85	3998.332	3.6019	*********
7.35	98.17	4859.499	3.6866	*********
0.00	98.17	5906.145	3.7713	
0.00	98.17	7178.220	3.8560	
0.00	98.17	8724.277	3.9407	
0.41	98.58	10603.325	4.0254	*
0.00	98.58	12887.086	4.1102	
0.00	98.58	15662.728	4.1949	
0.00	98.58	19036.191	4.2796	
0.00	98.58	23136.236	4.3643	
0.82	99.39	28119.356	4.4490	*
0.41	99.80	34175.747	4.5337	*

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Each "*" represents approximately 1.7 observations.

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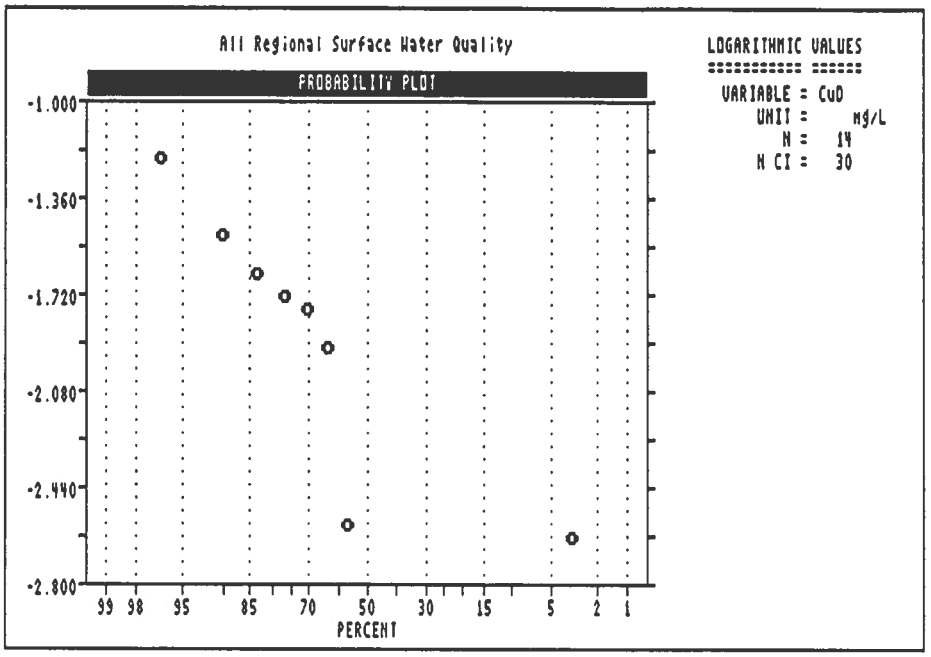
Figure C.4-10
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Ground Water TDS Concentrations

Date: December 1999
Project: p:\100222\
File: GWprbplt.PPT



Mean =	-2.1959	Min =	-2.6021	1st Quartile =	-2.6021
Std. Dev. =	0.5098	Max =	-1.2366	Median =	-2.6021
CV % =	23.2169	Skewness =	0.5545	3rd Quartile =	-1.7843

Anti-Log Mean = 0.006 Anti-Log Std. Dev. : (-) 0.002
(+) 0.021

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0471)
0.00	3.33	0.002	-2.6256	
57.14	56.67	0.003	-2.5785	********
0.00	56.67	0.003	-2.5314	
0.00	56.67	0.003	-2.4843	
0.00	56.67	0.004	-2.4373	
0.00	56.67	0.004	-2.3902	
0.00	56.67	0.005	-2.3431	
0.00	56.67	0.005	-2.2960	
0.00	56.67	0.006	-2.2489	
0.00	56.67	0.006	-2.2018	
0.00	56.67	0.007	-2.1547	
0.00	56.67	0.008	-2.1077	
0.00	56.67	0.009	-2.0606	
0.00	56.67	0.010	-2.0135	
0.00	56.67	0.011	-1.9664	
7.14	63.33	0.012	-1.9193	*
0.00	63.33	0.013	-1.8722	
0.00	63.33	0.015	-1.8251	
7.14	70.00	0.017	-1.7781	*
7.14	76.67	0.019	-1.7310	*
0.00	76.67	0.021	-1.6839	
7.14	83.33	0.023	-1.6368	*
0.00	83.33	0.026	-1.5897	
0.00	83.33	0.029	-1.5426	
7.14	90.00	0.032	-1.4955	*
0.00	90.00	0.036	-1.4485	
0.00	90.00	0.040	-1.4014	
0.00	90.00	0.044	-1.3543	
0.00	90.00	0.049	-1.3072	
0.00	90.00	0.055	-1.2601	
7.14	96.67	0.061	-1.2130	*

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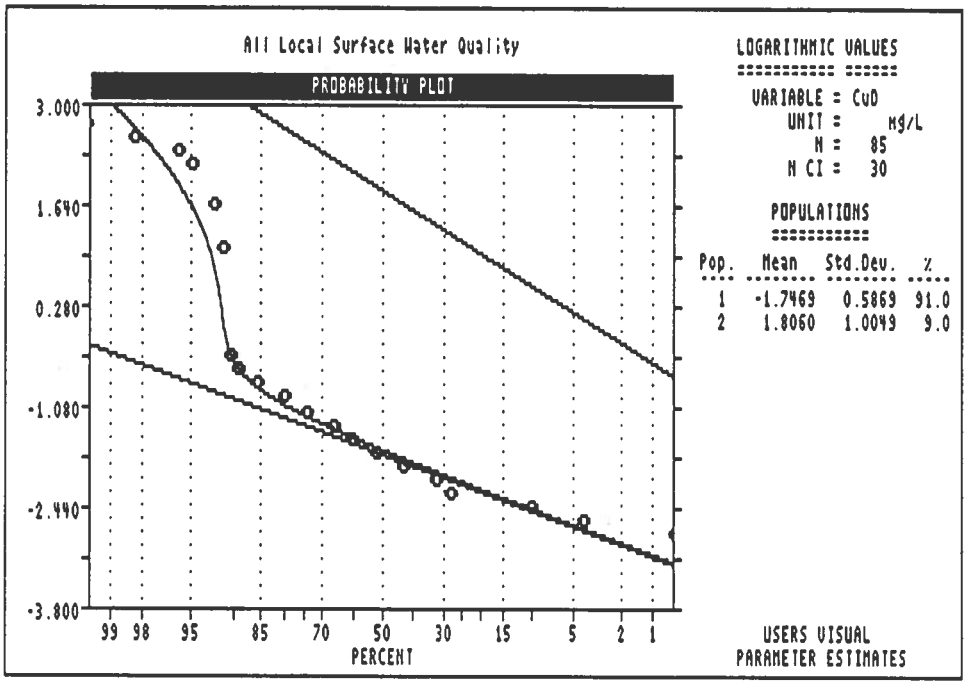
Figure C.4-11
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Surface Water Copper Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	-1.3852	Min =	-2.6990	1st Quartile =	-2.3010
Std. Dev. =	1.2687	Max =	2.6656	Median =	-1.6990
CV % =	91.5888	Skewness =	1.9237	3rd Quartile =	-1.1446

Anti-Log Mean = 0.041 Anti-Log Std. Dev. : (-) 0.002
(+) 0.765

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1850)
0.00	0.58	0.002	-2.7915	
3.53	4.07	0.002	-2.6065	***
5.88	9.88	0.004	-2.4215	*****
17.65	27.33	0.006	-2.2365	**********
4.71	31.98	0.009	-2.0515	****
10.59	42.44	0.014	-1.8665	*********
9.41	51.74	0.021	-1.6815	********
8.24	59.88	0.032	-1.4966	*******
5.88	65.70	0.049	-1.3116	*****
8.24	73.84	0.075	-1.1266	*******
5.88	79.65	0.114	-0.9416	*****
5.88	85.47	0.175	-0.7566	*****
3.53	88.95	0.268	-0.5716	***
1.18	90.12	0.411	-0.3867	*
0.00	90.12	0.629	-0.2017	
0.00	90.12	0.962	-0.0167	
0.00	90.12	1.473	0.1683	
0.00	90.12	2.256	0.3533	
0.00	90.12	3.453	0.5383	
0.00	90.12	5.287	0.7232	
0.00	90.12	8.095	0.9082	
1.18	91.28	12.394	1.0932	*
0.00	91.28	18.976	1.2782	
0.00	91.28	29.052	1.4632	
1.18	92.44	44.480	1.6482	*
0.00	92.44	68.101	1.8332	
0.00	92.44	104.264	2.0181	
2.35	94.77	159.632	2.2031	**
1.18	95.93	244.402	2.3881	*
2.35	98.26	374.187	2.5731	**
1.18	99.42	572.893	2.7581	*

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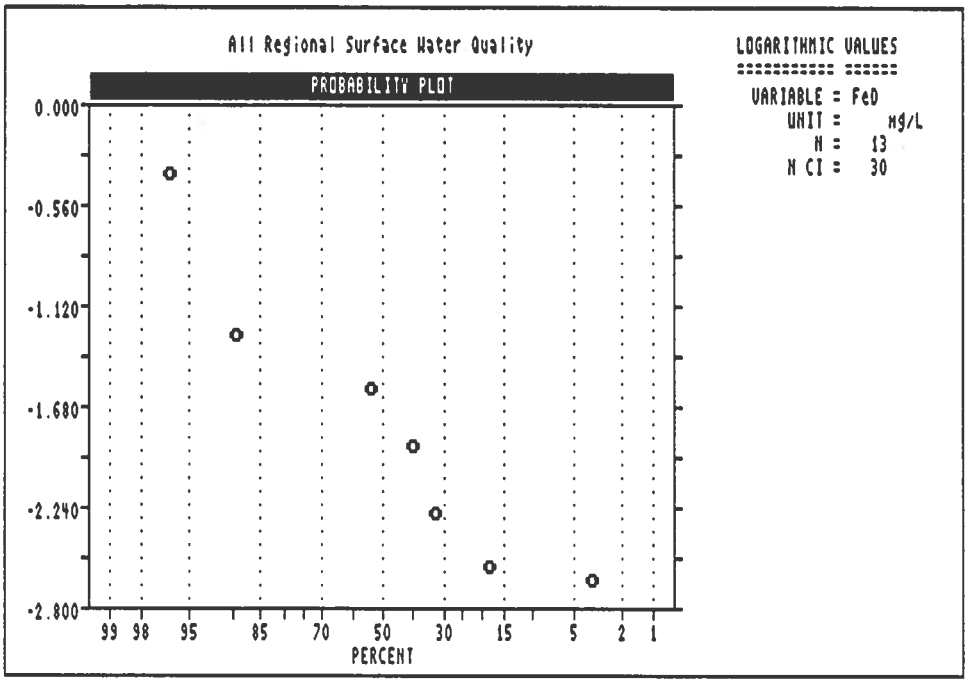
Figure C.4-12
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Surface Water Copper Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	-1.6812	Min =	-2.6021	1st Quartile =	-2.3010
Std. Dev. =	0.6357	Max =	-0.4191	Median =	-1.6021
CV % =	37.8147	Skewness =	0.0760	3rd Quartile =	-1.3010

Anti-Log Mean = 0.021 Anti-Log Std. Dev. : (-) 0.005
(+) 0.090

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0753)
0.00	3.57	0.002	-2.6397	
15.38	17.86	0.003	-2.5644	**
0.00	17.86	0.003	-2.4891	
0.00	17.86	0.004	-2.4139	
0.00	17.86	0.005	-2.3386	
15.38	32.14	0.005	-2.2633	**
0.00	32.14	0.006	-2.1880	
0.00	32.14	0.008	-2.1128	
0.00	32.14	0.009	-2.0375	
0.00	32.14	0.011	-1.9622	
7.69	39.29	0.013	-1.8869	*
0.00	39.29	0.015	-1.8117	
0.00	39.29	0.018	-1.7364	
0.00	39.29	0.022	-1.6611	
15.38	53.57	0.026	-1.5858	**
0.00	53.57	0.031	-1.5106	
0.00	53.57	0.037	-1.4353	
0.00	53.57	0.044	-1.3600	
38.46	89.29	0.052	-1.2847	*****
0.00	89.29	0.062	-1.2095	
0.00	89.29	0.073	-1.1342	
0.00	89.29	0.087	-1.0589	
0.00	89.29	0.104	-0.9836	
0.00	89.29	0.123	-0.9084	
0.00	89.29	0.147	-0.8331	
0.00	89.29	0.175	-0.7578	
0.00	89.29	0.208	-0.6825	
0.00	89.29	0.247	-0.6073	
0.00	89.29	0.294	-0.5320	
0.00	89.29	0.349	-0.4567	
7.69	96.43	0.415	-0.3814	*

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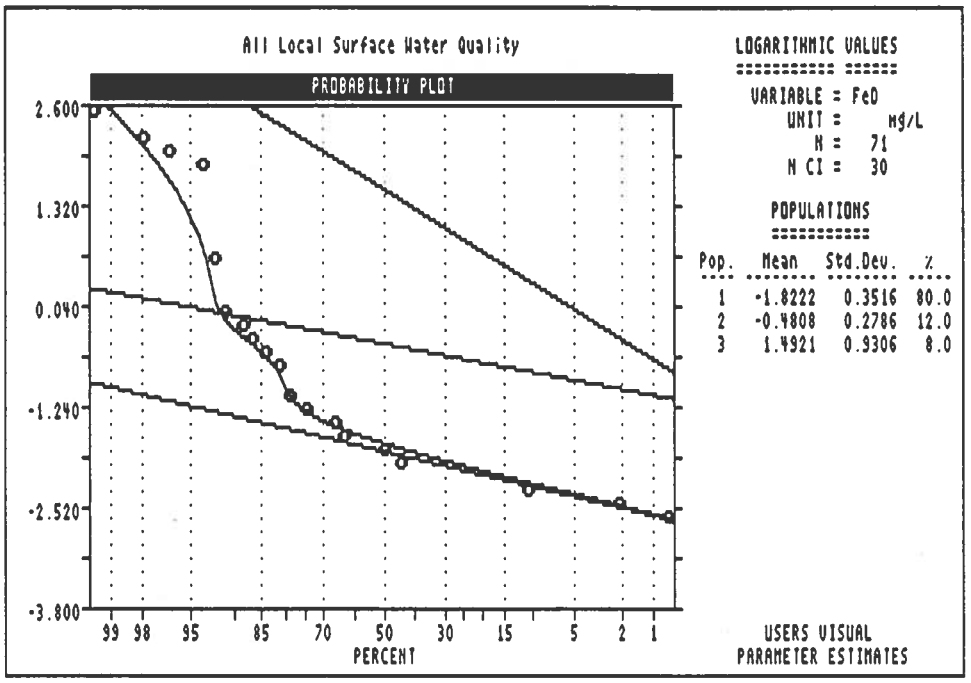
Figure C.4-13
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Surface Water Iron Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	-1.3634	Min =	-2.5229	1st Quartile =	-2.0000
Std. Dev. =	1.1146	Max =	2.4346	Median =	-1.8099
CV % =	81.7545	Skewness =	2.0204	3rd Quartile =	-1.2416

Anti-Log Mean = 0.043 Anti-Log Std. Dev. : (-) 0.003
(+) 0.564

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1709)
0.00	0.69	0.002	-2.6084	
1.41	2.08	0.004	-2.4374	*
8.45	10.42	0.005	-2.2665	******
0.00	10.42	0.008	-2.0955	
33.80	43.75	0.012	-1.9246	************************
5.63	49.31	0.018	-1.7536	****
14.08	63.19	0.026	-1.5827	**********
2.82	65.97	0.039	-1.4117	**
8.45	74.31	0.057	-1.2408	******
4.23	78.47	0.085	-1.0698	***
0.00	78.47	0.126	-0.8989	
2.82	81.25	0.187	-0.7279	**
2.82	84.03	0.277	-0.5570	**
2.82	86.81	0.411	-0.3860	**
1.41	88.19	0.609	-0.2151	*
2.82	90.97	0.903	-0.0442	**
0.00	90.97	1.339	0.1268	
0.00	90.97	1.985	0.2977	
0.00	90.97	2.942	0.4687	
1.41	92.36	4.361	0.6396	*
0.00	92.36	6.465	0.8106	
0.00	92.36	9.583	0.9815	
0.00	92.36	14.206	1.1525	
0.00	92.36	21.058	1.3234	
0.00	92.36	31.215	1.4944	
0.00	92.36	46.271	1.6653	
1.41	93.75	68.589	1.8363	*
2.82	96.53	101.672	2.0072	**
1.41	97.92	150.712	2.1781	*
0.00	97.92	223.406	2.3491	
1.41	99.31	331.163	2.5200	*

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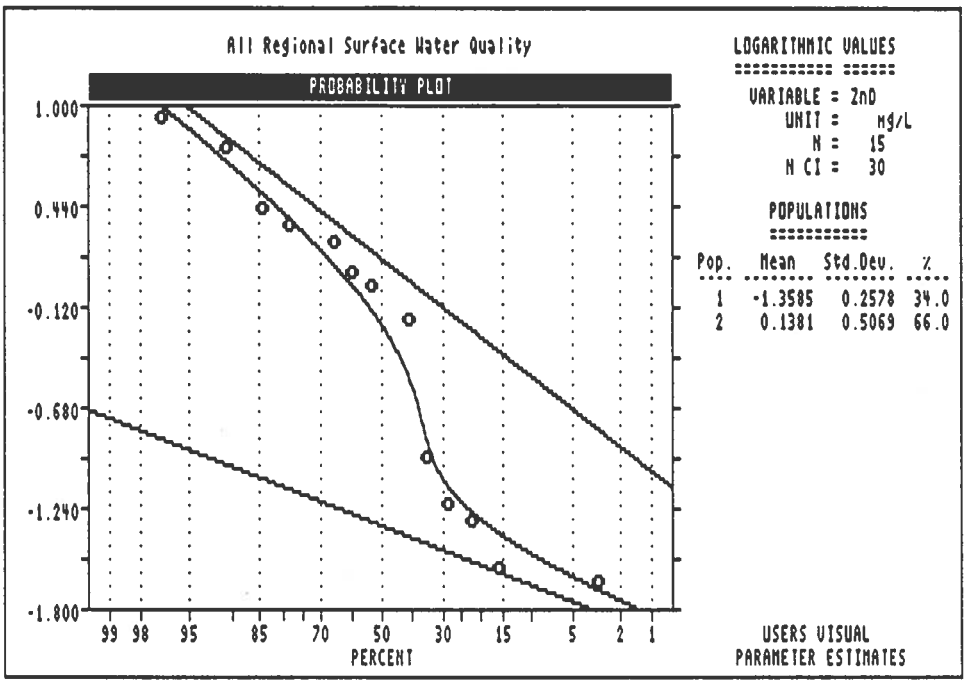
Figure C.4-14
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Surface Water Iron Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	-0.2849	Min =	-1.6021	1st Quartile =	-1.3304
Std. Dev. =	0.8475	Max =	0.8976	Median =	-0.0475
CV % =	297.4734	Skewness =	-0.4031	3rd Quartile =	0.3197

Anti-Log Mean = 0.519 Anti-Log Std. Dev. : (-) 0.074
(+) 3.652

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0862)
0.00	3.13	0.023	-1.6452	
13.33	15.63	0.028	-1.5590	**
0.00	15.63	0.034	-1.4728	
0.00	15.63	0.041	-1.3866	
6.67	21.88	0.050	-1.3004	*
6.67	28.13	0.061	-1.2142	*
0.00	28.13	0.074	-1.1280	
0.00	28.13	0.091	-1.0418	
6.67	34.38	0.111	-0.9556	*
0.00	34.38	0.135	-0.8694	
0.00	34.38	0.165	-0.7832	
0.00	34.38	0.201	-0.6970	
0.00	34.38	0.245	-0.6108	
0.00	34.38	0.299	-0.5246	
0.00	34.38	0.364	-0.4384	
0.00	34.38	0.444	-0.3522	
0.00	34.38	0.542	-0.2660	
6.67	40.63	0.661	-0.1798	*
0.00	40.63	0.806	-0.0936	
13.33	53.13	0.983	-0.0074	**
6.67	59.38	1.199	0.0788	*
0.00	59.38	1.462	0.1650	
6.67	65.63	1.783	0.2512	*
13.33	78.12	2.174	0.3374	**
6.67	84.37	2.652	0.4235	*
0.00	84.37	3.234	0.5097	
0.00	84.37	3.944	0.5959	
0.00	84.37	4.810	0.6821	
6.67	90.62	5.866	0.7683	*
0.00	90.62	7.154	0.8545	
6.67	96.87	8.724	0.9407	*

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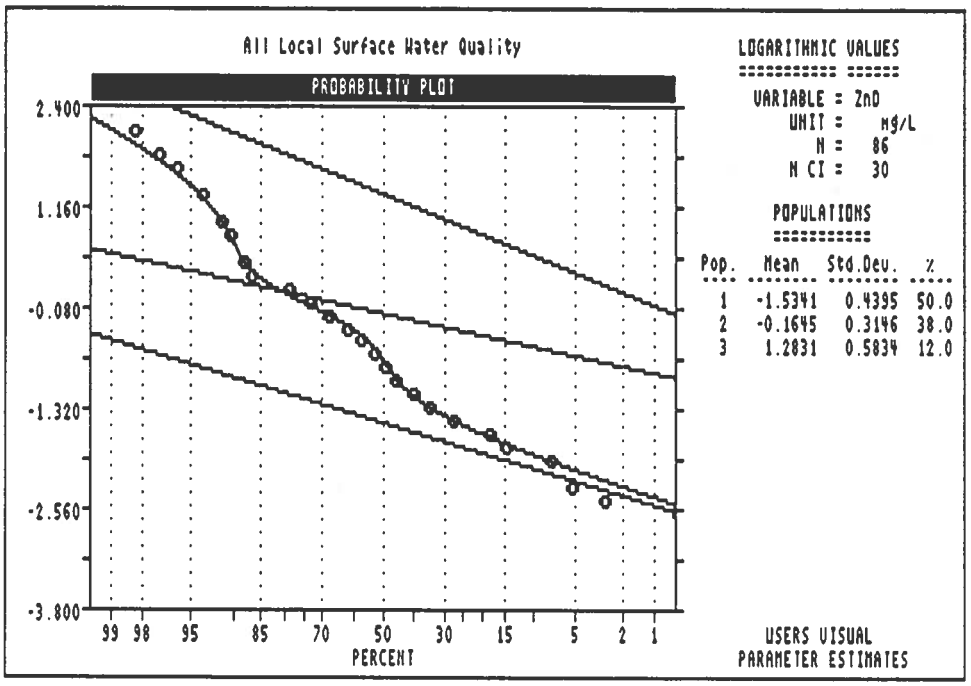
Figure C.4-15
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Surface Water Zinc Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	-0.6629	Min =	-2.5229	1st Quartile =	-1.5613
Std. Dev. =	1.0656	Max =	2.1903	Median =	-0.7212
CV % =	160.7441	Skewness =	0.5577	3rd Quartile =	0.0230

Anti-Log Mean = 0.217 Anti-Log Std. Dev. : (-) 0.019
(+) 2.528

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1625)
0.00	0.57	0.002	-2.6041	
2.33	2.87	0.004	-2.4416	**
2.33	5.17	0.005	-2.2791	**
0.00	5.17	0.008	-2.1166	
2.33	7.47	0.011	-1.9540	**
6.98	14.37	0.016	-1.7915	******
3.49	17.82	0.023	-1.6290	***
9.30	27.01	0.034	-1.4665	********
6.98	33.91	0.050	-1.3039	******
5.81	39.66	0.072	-1.1414	*****
5.81	45.40	0.105	-0.9789	*****
3.49	48.85	0.153	-0.8164	***
3.49	52.30	0.222	-0.6538	***
4.65	56.90	0.323	-0.4913	****
4.65	61.49	0.469	-0.3288	****
5.81	67.24	0.682	-0.1663	*****
5.81	72.99	0.991	-0.0037	*****
5.81	78.74	1.441	0.1588	*****
8.14	86.78	2.096	0.3213	*******
1.16	87.93	3.047	0.4838	*
0.00	87.93	4.429	0.6463	
2.33	90.23	6.440	0.8089	**
1.16	91.38	9.363	0.9714	*
0.00	91.38	13.612	1.1339	
2.33	93.68	19.790	1.2964	**
0.00	93.68	28.772	1.4590	
2.33	95.98	41.831	1.6215	**
1.16	97.13	60.816	1.7840	*
0.00	97.13	88.419	1.9465	
1.16	98.28	128.549	2.1091	*
1.16	99.43	186.893	2.2716	*

0 1 2 3 4

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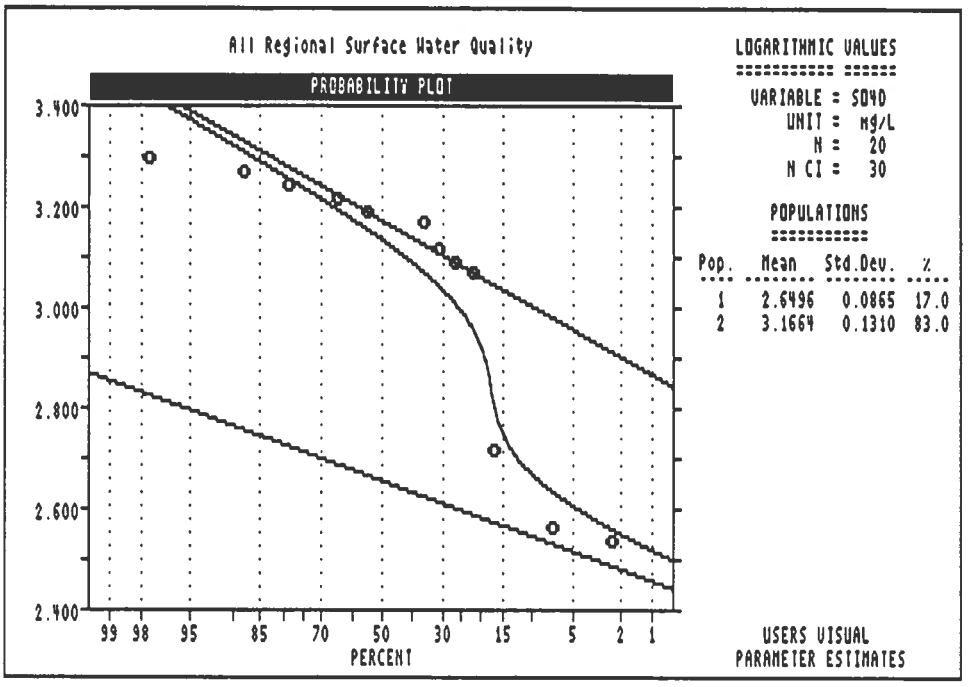
Figure C.4-16
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Surface Water Zinc Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	3.1118	Min =	2.5502	1st Quartile =	3.1004
Std. Dev. =	0.2100	Max =	3.2810	Median =	3.1901
CV % =	6.7474	Skewness =	-1.6743	3rd Quartile =	3.2304

Anti-Log Mean = 1293.730 Anti-Log Std. Dev. : (-) 797.768
(+) 2098.026

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0252)
0.00	2.38	344.848	2.5376	
5.00	7.14	365.450	2.5628	*
0.00	7.14	387.283	2.5880	
0.00	7.14	410.420	2.6132	
0.00	7.14	434.940	2.6384	
0.00	7.14	460.924	2.6636	
0.00	7.14	488.460	2.6888	
10.00	16.67	517.642	2.7140	**
0.00	16.67	548.567	2.7392	
0.00	16.67	581.339	2.7644	
0.00	16.67	616.070	2.7896	
0.00	16.67	652.875	2.8148	
0.00	16.67	691.879	2.8400	
0.00	16.67	733.214	2.8652	
0.00	16.67	777.017	2.8904	
0.00	16.67	823.438	2.9156	
0.00	16.67	872.632	2.9408	
0.00	16.67	924.765	2.9660	
0.00	16.67	980.012	2.9912	
0.00	16.67	1038.560	3.0164	
0.00	16.67	1100.606	3.0416	
5.00	21.43	1166.358	3.0668	*
5.00	26.19	1236.039	3.0920	*
5.00	30.95	1309.882	3.1172	*
0.00	30.95	1388.137	3.1424	
5.00	35.71	1471.067	3.1676	*
20.00	54.76	1558.952	3.1928	****
10.00	64.29	1652.087	3.2180	**
15.00	78.57	1750.786	3.2432	***
10.00	88.10	1855.382	3.2684	**
10.00	97.62	1966.226	3.2936	**

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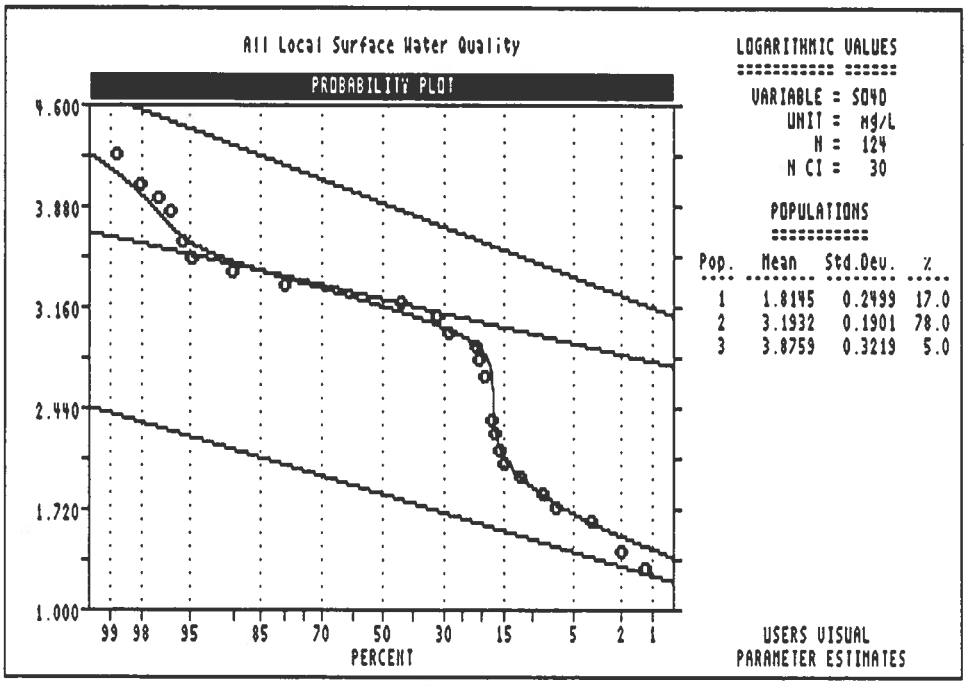
Figure C.4-17
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Surface Water Sulfate Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	3.0030	Min =	1.2577	1st Quartile =	2.9750
Std. Dev. =	0.5928	Max =	4.3049	Median =	3.2279
CV % =	19.7410	Skewness =	-1.2403	3rd Quartile =	3.3010

Anti-Log Mean = 1006.855 Anti-Log Std. Dev. : (-) 257.130
(+) 3942.588

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.1051)
0.00	0.40	16.038	1.2051	
0.81	1.20	20.428	1.3102	*
0.81	2.00	26.019	1.4153	*
0.00	2.00	33.141	1.5204	
1.61	3.60	42.213	1.6254	*
3.23	6.80	53.768	1.7305	***
1.61	8.40	68.486	1.8356	*
3.23	11.60	87.233	1.9407	***
3.23	14.80	111.111	2.0458	***
0.81	15.60	141.526	2.1508	*
0.81	16.40	180.266	2.2559	*
0.81	17.20	229.610	2.3610	*
0.00	17.20	292.461	2.4661	
0.00	17.20	372.516	2.5711	
1.61	18.80	474.485	2.6762	*
1.61	20.40	604.366	2.7813	*
0.81	21.20	769.799	2.8864	*
7.26	28.40	980.516	2.9915	******
3.23	31.60	1248.912	3.0965	***
12.10	43.60	1590.777	3.2016	**********
36.29	79.60	2026.220	3.3067	**********
10.48	90.00	2580.856	3.4118	*********
4.84	94.80	3287.314	3.5168	****
0.81	95.60	4187.150	3.6219	*
0.00	95.60	5333.298	3.7270	
0.81	96.40	6793.181	3.8321	*
0.81	97.20	8652.677	3.9372	*
0.81	98.00	11021.173	4.0422	*
0.00	98.00	14037.998	4.1473	
0.81	98.80	17880.617	4.2524	*
0.81	99.60	22775.076	4.3575	*

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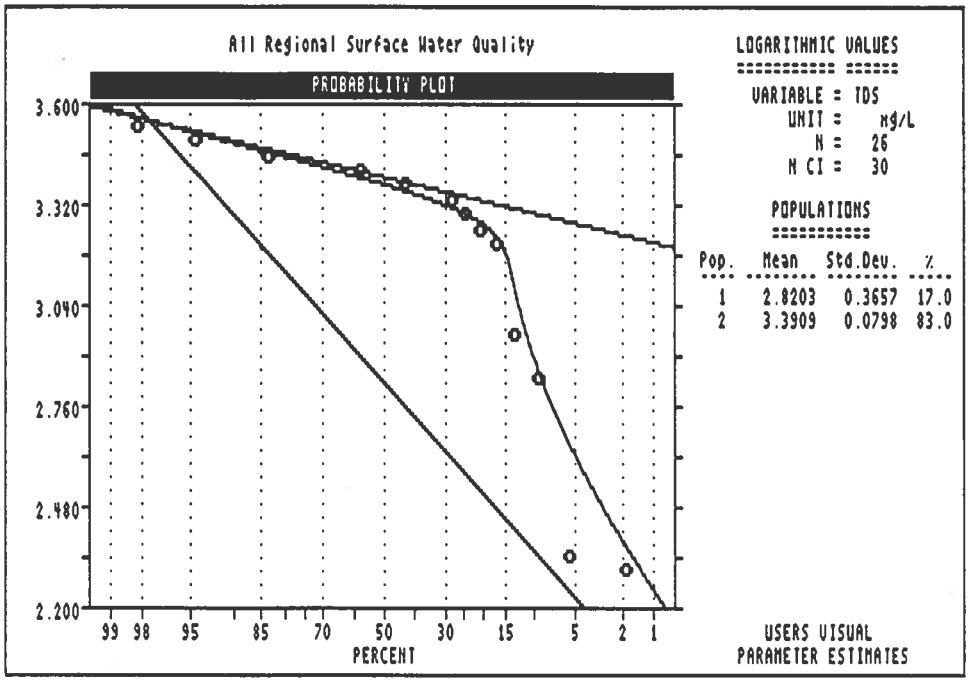
Figure C.4-18
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Surface Water Sulfate Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	3.3104	Min =	2.3284	1st Quartile =	3.2888
Std. Dev. =	0.2561	Max =	3.5198	Median =	3.3943
CV % =	7.7349	Skewness =	-2.5869	3rd Quartile =	3.4401

Anti-Log Mean = 2043.483 Anti-Log Std. Dev. : (-) 1133.227
(+) 3684.898

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0411)
0.00	1.85	203.160	2.3078	
3.85	5.56	223.317	2.3489	*
0.00	5.56	245.474	2.3900	
0.00	5.56	269.830	2.4311	
0.00	5.56	296.603	2.4722	
0.00	5.56	326.031	2.5133	
0.00	5.56	358.380	2.5543	
0.00	5.56	393.938	2.5954	
0.00	5.56	433.025	2.6365	
0.00	5.56	475.989	2.6776	
0.00	5.56	523.217	2.7187	
0.00	5.56	575.130	2.7598	
0.00	5.56	632.194	2.8009	
3.85	9.26	694.920	2.8419	*
0.00	9.26	763.870	2.8830	
0.00	9.26	839.661	2.9241	
3.85	12.96	922.971	2.9652	*
0.00	12.96	1014.548	3.0063	
0.00	12.96	1115.211	3.0474	
0.00	12.96	1225.862	3.0884	
0.00	12.96	1347.491	3.1295	
0.00	12.96	1481.189	3.1706	
3.85	16.67	1628.151	3.2117	*
3.85	20.37	1789.696	3.2528	*
3.85	24.07	1967.269	3.2939	*
3.85	27.78	2162.460	3.3349	*
15.38	42.59	2377.018	3.3760	****
15.38	57.41	2612.865	3.4171	****
26.92	83.33	2872.112	3.4582	*******
11.54	94.44	3157.081	3.4993	***
3.85	98.15	3470.325	3.5404	*

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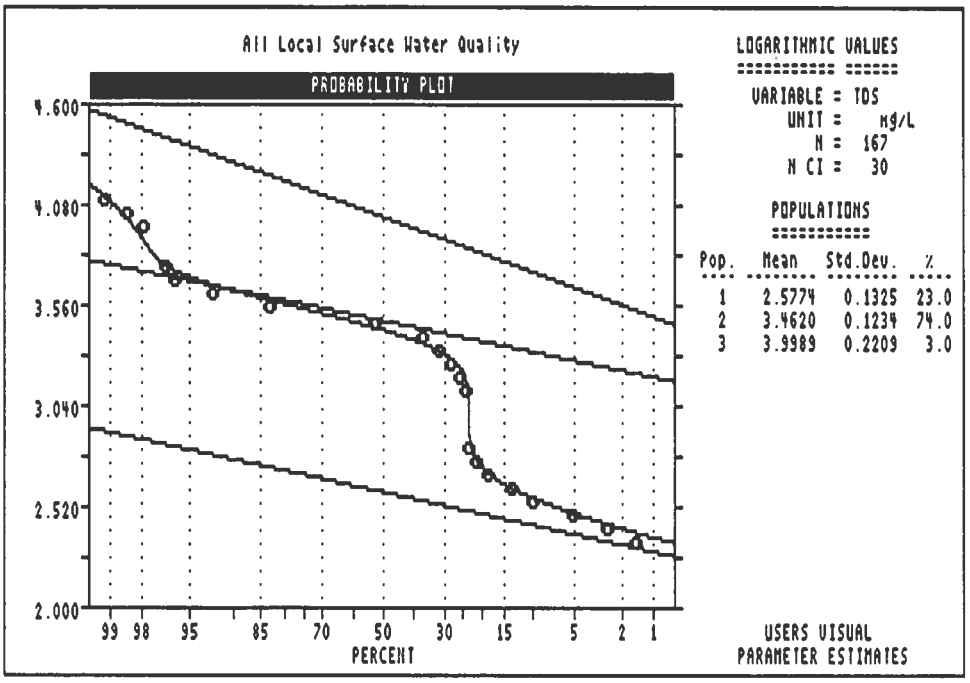
Figure C.4-19
Logarithmic Probability Graph and Frequency Distribution Diagram for Regional Surface Water TDS Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT



Mean =	3.2825	Min =	2.2967	1st Quartile =	3.1514
Std. Dev. =	0.4136	Max =	4.3617	Median =	3.4624
CV % =	12.5990	Skewness =	-0.9044	3rd Quartile =	3.5142

Anti-Log Mean = 1916.620 Anti-Log Std. Dev. : (-) 739.553
(+) 4967.099

%	cum %	antilog	cls int	(# of bins = 30 - bin size = 0.0712)
0.00	0.30	182.415	2.2611	
1.20	1.49	214.916	2.3323	*
1.20	2.68	253.209	2.4035	*
2.40	5.06	298.324	2.4747	***
4.79	9.82	351.477	2.5459	******
3.59	13.39	414.101	2.6171	****
4.79	18.15	487.882	2.6883	******
2.99	21.13	574.810	2.7595	****
1.80	22.92	677.225	2.8307	**
0.00	22.92	797.888	2.9019	
0.00	22.92	940.051	2.9732	
0.00	22.92	1107.542	3.0444	
0.60	23.51	1304.876	3.1156	*
1.80	25.30	1537.370	3.1868	**
2.40	27.68	1811.288	3.2580	***
3.59	31.25	2134.010	3.3292	****
5.39	36.61	2514.233	3.4004	******
16.17	52.68	2962.202	3.4716	******************
30.54	83.04	3489.986	3.5428	************************************
9.58	92.56	4111.807	3.6140	**********
3.59	96.13	4844.420	3.6852	****
0.60	96.73	5707.565	3.7565	*
0.00	96.73	6724.499	3.8277	
0.00	96.73	7922.623	3.8989	
1.20	97.92	9334.220	3.9701	*
0.60	98.51	10997.326	4.0413	*
0.60	99.11	12956.752	4.1125	*
0.00	99.11	15265.295	4.1837	
0.00	99.11	17985.158	4.2549	
0.00	99.11	21189.627	4.3261	
0.60	99.70	24965.046	4.3973	*

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Figure C.4-20
Logarithmic Probability Graph and Frequency Distribution Diagram for Local Surface Water TDS Concentrations

Date: December 1999
Project: p:\100222\
File: SWprbplt.PPT

ATTACHMENT C.5
FACILITY-SPECIFIC WATER QUALITY DATA

Table C.5-1 Representative Downgradient Water Quality at the Tailings Pond Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb
MW-24	17-Apr-97	1.93	0		0.053	119	0	0.15	8.62	0.07	0
MW-24	09-Jul-97	1.42	0		0.095	128	0	0.21	5.45	0.07	0
MW-24	16-Oct-97	1.28	0		0.068	125	0.01	0.21	6.38	0	0
MW-24	27-Jan-98	0.82	0		0.058	113	0.02	0.77	4.44	0.41	0
MW-24	27-Apr-98	1.52	0		0.027	105	0	0.41	6.09	0.04	0
MW-24	29-Jul-98	2.32	0		0.06	133	0	0.37	10.9	0.5	0
MW-24	16-Nov-98	1.35	0		0.022	116	0	0.23	6.77	0.21	0
MW-24	04-Feb-99	2	0		0	100	0	0.3	6.89	0.25	0
MW-24	15-Mar-99	2.52	0.002		0.076	108	0	0.302	7.72	0.301	0
MW-25	23-Apr-97	0	0		0	269	0	0	0.11	0.12	0
MW-25	09-Jul-97	0	0		0	279	0	0	0.23	0.23	0
MW-25	16-Oct-97	0	0		0	293	0	0	0.06	0.99	0
MW-25	27-Jan-98	0	0		0	384	0	0	0	1.03	0
MW-25	01-May-98	0	0		0.001	252	0	0.02	0.07	1.34	0
MW-25	29-Jul-98	0.1	0		0.001	415	0	0	0	0.43	0
MW-25	16-Nov-98	0	0		0.001	385	0	0	0.3	1.7	0
MW-25	02-Feb-99	0.19	0		0.001	349	0.06	0.02	0.16	0.14	0
MW-25	10-Mar-99	0	0.002		0.0015	349	0	0	0.082	0.223	0
MW-25	10-Aug-99	0.074	0		0.003	371	0	0	0.081	0.023	0
MW-3	01-Oct-92					20					
MW-3	18-Dec-92					18					
MW-3	19-Dec-92					22.7					
MW-3	20-Dec-92					20.5					
MW-3	22-Dec-92	0	0		0		0	0	0	0.092	0
MW-3	23-Dec-92	0.26	0		0		0	0.068	0.032	0.04	0
MW-3	24-Dec-92	0	0		0		0	0	0	0	0
MW-3	01-May-93	0	0		0	20.5	0	0	0	0	0
MW-3	01-Oct-93					25					
MW-3	01-Jan-94					24					
MW-3	01-Mar-94					25					

Table C.5-1 Representative Downgradient Water Quality at the Tailings Pond Facility (continued)

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb
MW-3	01-Jun-94					25					
MW-3	01-Oct-94					27					
MW-3	01-Jan-95					29					
MW-3	27-Feb-96	0	0	0	0	30	0.005	0	0	2.7	0
MW-3	01-Apr-96										
MW-3	10-Apr-96					33.2					
MW-3	30-Jul-96					31.5					
MW-3	01-Oct-96										
MW-3	02-Oct-96										
MW-3	25-Jan-97	0	0		0	34.5	0.007		0	5.74	0
MW-3	18-Apr-97	0	0		0	29.3	0	0	0	7.23	0
MW-3	05-Jul-97	0	0		0	34	0	0	0	7.65	0
MW-3	14-Oct-97	0	0		0	39	0.01	0	0.01	9.05	0
MW-3	20-Jan-98	0	0		0	36	0	0	0	11.6	0
MW-3	18-Apr-98	0	0		0	31	0	0	0	0.25	0
MW-3	27-Jul-98	0	0		0	51	0	0	0	8.67	0
MW-3	03-Nov-98	0.13	0		0	37.7	0	0	0	3.74	0
MW-3	04-Feb-99	0.06	0.046		0.004	35	0.04	0.01	0.01	1.89	0.058
MW-3	11-Mar-99	0	0.002		0	33.1	0	0	0	7.37	0
MW-3	09-Aug-99	0	0			35.1	0	0	0.006	7.82	0
TPS-3	25-Feb-96	0	0	0	0	180	0	0	0.028	0	0
UN4W-2	11-Jan-96					160					
	Average	0.444	0.001	0.0	0.013	119	0.004	0.088	1.79	2.28	0.002
	Count	36	36	2	35	46	36	35	36	36	36
	Min	0	0	0	0	18	0	0	0	0	0
	Max	2.52	0.046	0	0.095	415	0.06	0.77	10.9	11.6	0.058

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.

Table C.5-1 Representative Downgradient Water Quality at the Tailings Pond Facility (continued)

Location _name	Collection _date	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-24	17-Apr-97	46.9			0.11	6.4	0		1662	2752	1.62
MW-24	09-Jul-97	45.7			0.1	5.27	0		1690	2878	1.82
MW-24	16-Oct-97	48.9			0.12		0		1370	2460	1.88
MW-24	27-Jan-98	48.9			0.2	5.8	0		1440	2360	1.88
MW-24	27-Apr-98	46.1			0.11	6	0		1270	2350	1.48
MW-24	29-Jul-98	54.2			0.11	5.41	0		1340	2300	1.74
MW-24	16-Nov-98	38.7			0	5	0		1500	2620	1.29
MW-24	04-Feb-99	53.8			0.11	4.6	0		1670	2470	1.79
MW-24	15-Mar-99	49.9			0.079		0		1510	2140	1.64
MW-25	23-Apr-97	3.69			0.05	6.4	0		2374	4162	0.1
MW-25	09-Jul-97	4.27			0.02	5.94	0		2430	4282	0.11
MW-25	16-Oct-97	3.16			0.02		0		2310	4310	0.183
MW-25	27-Jan-98	7.74			0.03	6.4	0		2460	4400	0.131
MW-25	01-May-98	5.1			0.04	6.7	0		2110	4300	0.12
MW-25	29-Jul-98	4.21			0	6.6	0		2380	4470	0.109
MW-25	16-Nov-98	3			0.3	6.1	0		2630	4650	0.69
MW-25	02-Feb-99	4.12			0.06	5.3	0		2610	4360	0.143
MW-25	10-Mar-99	2.75			0		0		2470	4130	0.085
MW-25	10-Aug-99	4.59			0	6.01	0		2570	3800	0.0263
MW-3	01-Oct-92					8.94			530	980	
MW-3	18-Dec-92					7.9			610	1200	
MW-3	19-Dec-92					7.81			1239	1277	
MW-3	20-Dec-92								657	1230	
MW-3	22-Dec-92		0		0			0			0
MW-3	23-Dec-92	0.52	0		0.11			0			0.1
MW-3	24-Dec-92	0.529	0		0.0041			0			0
MW-3	01-May-93	0.529	0		0.0041		0	0	657	1230	0
MW-3	01-Oct-93					7.71			700	1200	

Table C.5-1 Representative Downgradient Water Quality at the Tailings Pond Facility (continued)

Location _name	Collection _date	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-3	01-Jan-94					7.4			1100	1200	
MW-3	01-Mar-94					7.71			720	1300	
MW-3	01-Jun-94					6.7			710	1300	
MW-3	01-Oct-94					7.4			750	1300	
MW-3	01-Jan-95					7.58			740	1300	
MW-3	27-Feb-96	0.49	0	0.072	0	7.3	0		710	1300	0
MW-3	01-Apr-96					7.43					
MW-3	10-Apr-96					7.6			837	1360	
MW-3	30-Jul-96					7.5			776	1400	
MW-3	01-Oct-96					7.5					
MW-3	02-Oct-96					7.4					
MW-3	25-Jan-97	0.567			0	7.5	0		843	1380	0.013
MW-3	18-Apr-97	0.5			0	7.4	0		818	1444	0
MW-3	05-Jul-97	0.046			0		0		813	1542	0
MW-3	14-Oct-97	0.39			0.03		0		788	1420	0
MW-3	20-Jan-98	0.857			0	7.3	0		757	1260	0
MW-3	18-Apr-98	0.15			0	6.9	0		815	1400	0
MW-3	27-Jul-98	0.452			0.02	7.48	0		843	1560	0.031
MW-3	03-Nov-98	0.39			0	7.5	0		814	1420	0
MW-3	04-Feb-99	0.55			0.02	6.9	0.08		926	1520	0
MW-3	11-Mar-99	0.509			0		0		855	1470	0
MW-3	09-Aug-99	0.454			0	7.18	0		821	1460	0.005
TPS-3	25-Feb-96	0.52	0	0.49	0	7.6	0		1800	2900	0.51
UN4W-2	11-Jan-96					7.38			2100		
	Average	13.81	0.000	0.281	0.05	6.9	0.002	0.00	1338	2257	0.486
	Count	35	6	2	36	40	33	4	46	45	36
	Min	0.046	0	0.072	0	4.6	0	0	530	980	0
	Max	54.2	0	0.49	0.3	8.9	0.08	0	2630	4650	1.88

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.

Table C.5-2 Representative Water Quality at the Tailings Pond Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
POND	01-Oct-94					170										6.8			1800	2700	
POND	10-Apr-96					183										8.3			1800	2670	
POND	31-Jul-96					172										8.3			1580	2490	
POND	25-Jan-97	0	0		0.0004	221	0.034		0.014	0.158	0	0.457			0	6.3	0		1600	2680	0.046
POND	18-Apr-97	0	0		0	240	0	0	0	0	0	0.22			0	7.6	0.009		1654	2988	0
POND	03-Jul-97	0	0		0	225	0.04	0	0.01	0.03	0	0.162			0	7.7	0		1750		0
POND	14-Oct-97	0	0		0	162	0.03	0.01	0.03	0	0	0.27			0.02		0.006		1290	2740	0
POND	19-Jan-98	0	0		0	220	0	0	0.02	0	0	0.289			0	6.8	0.006		1490	2670	0.029
POND	18-Apr-98	0	0		0	252	0	0	0	0	0	0.32			0	7.7	0.007		1480	2910	0
POND	27-Jul-98	0	0		0	304	0	0	0	0	0	0.366			0	7.88	0.005		1610	3170	0.074
POND	03-Nov-98	0.25	0		0	267	0.01	0	0.01	0	0	0.41			0.01	7.4	0.005		1410	3010	0.038
POND	04-Feb-99	0	0		0	246	0.05	0.02	0.03	0.02	0	0.51			0.04	5.2	0.007		1660	2940	0.043
POND	28-Apr-99	0.026	0		0	259	0	0	0.006	0	0	0.35			0	7.4	0		1530	2440	0.057
POND	21-Jul-99	0.08	0.003		0.0009	234	0	0	0.116	0.04	0	0.426			0	8.2	0		1750	2840	0.171
TAIL-1B	24-Feb-96	0	0	0	0	190	0	0	0.009	0.01	0	0.29		0.71	0	7.2	0		1600	2600	0.051
TAILINGS	26-Jan-97															5.44					
TAILINGS	12-Feb-97															7.65			799	1200	
TAILINGS	25-Apr-97															7.1			844	1396	
TAILINGS	30-Jul-97															8.1					
TAILINGS	29-Jan-98	0.1							0					0.08		7.9			305	550	0
TAILINGS	30-Apr-98	0.05							0					0.08		7.9			666	1620	0.045
TAILINGS	06-Nov-98	0							0.02					0.07		7.5			1290	2290	1.29
TAILINGS	05-May-99	0.038							0					0		5.94			1350	2020	1.47
TAILINGS	29-Jul-99	0							0.008					0.056		7.86			979	1480	0.057
UN4W-3	11-Jan-96					140										6.73			1900		
	Average	0.032	0.000	0.0	0.000	218	0.014	0.003	0.02	0.02	0.000	0.34	No data	0.166	0.01	7.3	0.004	No Data	1397	2353	0.198
	Count	17	12	1	12	16	12	11	17	12	12	12	0	6	12	24	12		23	21	17
	Min	0	0	0	0	140	0	0	0	0	0	0.16	0	0	0	5.2	0		305	550	0
	Max	0.25	0.003	0	0.0009	304	0.05	0.02	0.116	0.158	0	0.51	0	0.71	0.04	8.3	0.009		1900	3170	1.47

Note: Average considers all non-detect values to be 0.0mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-3 Representative Upgradient Water Quality for the Tailings Pond Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
139880-2	11-Oct-95																		62	398	
139880-4	11-Oct-95															8.41			66	420	
139883-4	11-Oct-95															8.41			66	420	
MW-7	20-Jun-95		0		0	11		0	0	0	0	0.83			0.04	7.3		0	560	770	0
MW-7	28-Feb-96	0	0	0	0	11	0	0	0	0.63	0	0.81	0	0.38	0.02	7.2	0		420	930	0.007
MW-7	09-Apr-96					12.7										7.7			479	1030	
MW-7	31-Jul-96					11.7										7.3			451	980	
MW-7	02-Oct-96															7.2					
MW-7	22-Jan-97	0.03	0		0	12.2	0		0	0.946	0	0.921	0		0	7.89	0		488	1010	0.022
MW-7	18-Apr-97	0	0		0	10.3	0	0	0	0.83	0	0.8			0	6.9	0		462	1048	0
MW-7	29-Jul-97	0	0		0	10.3	0	0	0	0.83	0	0.8			0	7.8	0		462	1048	0
MW-7	17-Oct-97	0	0		0	53	0	0	0	0.35	0	0.879			0.01		0		389	1020	0
MW-7	20-Jan-98	0	0		0	21	0	0	0	1.63	0	1.17			0	7.5	0		439	920	0
MW-7	18-Apr-98	0.14	0		0	18	0	0.03	0.03	1.11	0				0	7.5	0		446	970	
MW-7	27-Jul-98	0	0		0	35	0	0	0	0.4	0	0.772			0	7.38	0		426	940	0
MW-7	03-Nov-98	0.14	0		0	21.8	0	0	0	1.09	0	0.63			0.01	7.1	0		425	920	0
MW-7	04-Feb-99	0	0		0	11	0	0	0	0.59	0	0.82			0	6.6	0		517	1000	0.038
MW-7	10-Mar-99	0	0		0	11	0.017	0	0.145	0.132	0	0.65			0.018		0		484	1000	0.052
MW-7	03-Aug-99	0	0		0	14.6	0	0	0	0.64	0	1.06			0	6.64	0.002		760	1400	0.008
NG	11-Oct-95					5.1										7.32			60	390	
PS	26-Sep-95					5.2										8.07			64	440	
PS-1	24-Feb-96	0	0	0	0	4	0	0	0	0	0	0	0	0	0	7.3	0		64	370	0
PS-1	09-Apr-96					8										8.4			101	459	
PS-1	02-Aug-96					8.7										7.2			90.3	478	
PS-1	26-Jan-97	0.155			0.0003	7	0		0.152		0				0	5.49			422	643	0.022
PS-1	18-Apr-97	0	0		0		0	0	0	0	0	0			0	7.8			90.7	478	0
PS-1	21-May-97	0	0		0	7.13	0	0	0	0	0	0.012	0		0	8.5			124	544	0.07
PS-1	21-Jul-97	0	0		0	9	0	0	0	0.04	0	0.291	0		0	7.1			145	642	0.03
PS-1	19-Jan-98	0	0		0	6	0	0	0	0	0	0.008			0	7.4			83	380	0
PS-1	27-Jul-98	0	0		0	7	0	0	0	0	0	0.205			0	7.7	0		101	570	0.048
PS-1	11-Nov-98	0	0		0	19	0	0	0	0	0	0.02			0	7.9	0		82	490	0
PS-1	28-Apr-99	0.075	0.001		0	6.4	0	0	0.011	0.08	0	0.319			0	8.2	0		68.9	371	0.004
PS-2	11-Oct-95					5.7										8.13			66	450	
	Average	0.026	0.0	0.000	0	12.958	0.00	0.002	0.02	0.443	0.0	0.550	0.00	0.190	0.00	7.511	0.00	0.000	280	717	0.014
	Count	21	21	2	22	28	21	20	22	21	22	20	5	2	22	30	16	1	32	32	21
	Min	0	0	0	0	4	0	0	0	0	0	0	0	0	0	5.49	0	0	60	370	0
	Max	0.155	0.001	0	0.0003	53	0.017	0.03	0.152	1.63	0	1.17	0	0.38	0.04	8.5	0.002	0	760	1400	0.07

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-4 Representative Water Quality Upgradient of the West Waste Rock Disposal Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-21	11-Jun-96					23										6.3			3000	4500	
MW-21	07-Aug-96					25.1										5.9			2770	4430	
MW-21	30-Sep-96															6.18					
MW-21	24-Jan-97	0.168	(nd) 0.002		0.133	26.2	(nd) 0.005		2.79	4.46	(nd) 0.005	152			0.299	6.41	(nd) 0.04		2810	4230	41.4
MW-21	18-Apr-97	0.2	(nd) 0.005		0.109	23.7	0.02	1.49	3.58	2.49	(nd) 0.005	135			0.34	6.2	(nd) 0.005		2753	4410	33.9
MW-21	10-Jul-97	(nd) 0.05	(nd) 0.005		0.104	24	(nd) 0.01	1.75	0.55	15.4	0.005	154			0.3	5.87	(nd) 0.005		2780	4504	36
MW-21	21-Oct-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	73	0.04	1.78	0.29	6.28	(nd) 0.005	127			0.37		(nd) 0.005		2570	4340	43.7
MW-21	23-Jan-98	(U) 0.05	0.018		0.206	62	0.04	4.24	0.13	58.9	(U) 0.005	169			0.57	6.3	(U) 0.005		2650	4190	60.9
MW-21	28-Apr-98	(U) 0.05	(U) 0.005		0.049	47	(U) 0.01	2.97	0.1	38.1	(U) 0.005	169			0.46	6.3	(U) 0.005		2370	4430	53.2
MW-21	24-Jul-98	0.12	(U) 0.005		(U) 0.001	94	(U) 0.01	1.1	0.1	9.82	(U) 0.005	78.3			0.21	5.95	(U) 0.005		2410	4360	27.7
MW-21	16-Nov-98	(U) 0.05	(U) 0.005		0.046	48	0.01	3.45	0.12	54.5	(U) 0.005	230			0.59	5.9	(U) 0.005		2740	4300	75.1
MW-21	03-Feb-99	(U) 0.05	(U) 0.005		0.163	32	0.01	2.17	0.28	25.2	(U) 0.005	147			0.4	6.2	(U) 0.005		2820	4100	60.2
MW-21	10-Mar-99	0.111	0.002		0.18	19.8	(U) 0.008	1.78	12	5.7	(U) 0.001	138			0.438		(U) 0.002		2800	3620	51.8
MW-21	09-Aug-99	0.185	(U) 0.001		0.068	20.9	(U) 0.005	1.74	1.99	11.1	(U) 0.001	131			0.354	5.62	(U) 0.01		2770	2840	41
	Average	0.07	0.002	No data	0.096	40	0.011	2.247	1.99	21.09	0.000	148	No data	No data	0.39	6.1	0.000	No data	2711	4173	47.7
	Count	11	11	0	11	13	11	10	11	11	11	11	0	0	11	12	11	0	13	13	11
	Min	0	0	0	0	19.8	0	1.1	0.1	2.49	0	78.3	0	0	0.21	5.62	0	0	2370	2840	27.7
	Max	0.2	0.018	0	0.206	94	0.04	4.24	12	58.9	0.005	230	0	0	0.59	6.41	0	0	3000	4504	75.1

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-5 Representative Water Quality at the West Waste Rock Disposal Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
WWRD_Seep	01-Oct-94					200										7.8			2700	4000	
WWRD_Seep	13-May-95	1510	(nd) 0.03		0.712	10	0.1	23.5	463	42.8	(nd) 0.004	1400		(nd) 0.04	11.5	3.39	(nd) 0.025	0.149	20000	24000	312
WWRD_Seep	14-Oct-97	950	(nd) 0.005		0.346	70	(nd) 0.01	13.2	276	10.7	(nd) 0.005	582			6.81		0.012		15100	18300	128
WWRDF	21-Jul-97	1130	(nd) 0.005		0.043	336	(nd) 0.01	13.5	261	80.3	(nd) 0.005	635			7.27	3.1	0.014		17700		101
WWRDF	22-Jul-98	1200	(U) 0.005		0.05	207	(U) 0.01	17.9	331	20.1	(U) 0.005	765			9.4	3.6	0.016		19100	24200	165
WWRDF	14-Oct-98	1180	(U) 0.005		0.849	295	(U) 0.01	24.4	474	15.8	(U) 0.005	1140			11.1	2.9	(U) 0.005		21800	31000	283
WWRDF	04-Feb-99	864	(U) 0.005		0.751	99	(U) 0.01	21.8	318	18.6	(U) 0.005	1240			9.81	1.7	0.006		21600	25800	296
	Average	1139	0.000	No data	0.459	174	0.017	19.1	354	31.4	0.000	960	No data	0.000	9.32	3.7	0.008	0.149	16857	21217	214
	Count	6	6	0	6	7	6	6	6	6	6	6	0	1	6	6	6	1	7	6	6
	Min	864	0	0	0.043	10	0	13.2	261	10.7	0	582	0	0	6.81	1.7	0	0.149	2700	4000	101
	Max	1510	0	0	0.849	336	0.1	24.4	474	80.3	0	1400	0	0	11.5	7.8	0.016	0.149	21800	31000	312

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-6 Representative Water Quality Downgradient of the West Waste Rock Disposal Facility

Location _name	Collection _date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-20	11-Jun-96					340													1100	2500	
MW-20	05-Aug-96					134										6.6			1270	2690	
MW-20	30-Sep-96															6.18					
MW-20	24-Jan-97	(nd) 0.021	(nd) 0.002		(nd) 0.0001	576	0.016		(nd) 0.003	(nd) 0.024	(nd) 0.001	0.88			(nd) 0.017	7.37	(nd) 0.04		1540	3300	0.016
MW-20	14-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	504	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.06	(nd) 0.005	0.97			0.02	7.3	(nd) 0.005		1424	3402	(nd) 0.025
MW-20	09-Jul-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	525	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.29	(nd) 0.005	0.566			0.08	7	(nd) 0.005		1470	3696	0.14
MW-20	21-Oct-97	0.06	(nd) 0.005		(nd) 0.001	508	0.03	0.02	(nd) 0.01	0.05	(nd) 0.005	0.397			0.09		(nd) 0.005		1270	3690	(nd) 0.025
MW-20	23-Jan-98	0.37	(U) 0.005		(U) 0.001	620	(U) 0.01	(U) 0.01	(U) 0.01	0.11	(U) 0.005	0.385			0.12	6.8	(U) 0.005		1430	3620	(U) 0.025
MW-20	28-Apr-98	(U) 0.05	(U) 0.005		(U) 0.001	463	(U) 0.01	(U) 0.01	(U) 0.01	(U) 0.02	(U) 0.005	0.234			0.09	6	(U) 0.005		1260	3580	(U) 0.025
MW-20	28-Jul-98	(U) 0.05	(U) 0.005		(U) 0.001	576	(U) 0.01	(U) 0.01	(U) 0.01	(U) 0.02	(U) 0.005	0.096			0.04	7.11	(U) 0.005		1370	3570	(U) 0.025
MW-20	17-Nov-98	(U) 0.05	(U) 0.005		(U) 0.001	516	(U) 0.01	(U) 0.01	(U) 0.01	1.4	(U) 0.005	0.3			0.3	6.6	(U) 0.005		1360	3640	0.77
MW-20	03-Feb-99	(U) 0.05	(U) 0.005		(U) 0.001	529	0.02	0.01	0.03	0.06	(U) 0.005	0.36			0.04	7	(U) 0.005		1600	3430	0.16
	Average	0.05	0.000	No data	0.000	481	0.01	0.00	0.00	0.22	0.000	0.47	No data	No data	0.09	6.8	0.000	No data	1372	3374	0.121
	Count	9	9	0	9	11	9	8	9	9	9	9	0	0	9	10	9	0	11	11	9
	Min	0	0	0	0	134	0	0	0	0	0	0.096	0	0	0	6	0	0	1100	2500	0
	Max	0.37	0	0	0	620	0.03	0.02	0.03	1.4	0	0.97	0	0	0.3	7.37	0	0	1600	3696	0.77

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-7 Representative Water Quality Downgradient of the Underground Workings

Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
UG SUMP	29-Jan-97	0.023	(nd) 0.002		0.0019	65.1	(nd) 0.005		(nd) 0.003	(nd) 0.024	(nd) 0.001	1.01			0.02	7.69	(nd) 0.04		1290	2100	2.36
UG SUMP	21-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	61.7	(nd) 0.01	0.01	(nd) 0.01	(nd) 0.02	(nd) 0.005	0.62			(nd) 0.01	7.7	(nd) 0.005		1185	2112	1.42
UG SUMP	20-Jul-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	61.7	(nd) 0.01	0.01	(nd) 0.01	(nd) 0.02	(nd) 0.005	0.62			(nd) 0.01	7.7	(nd) 0.005		1185	2112	1.42
UG SUMP	16-Oct-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	99	(nd) 0.01	0.02	0.02	0.02	(nd) 0.005	1.2			0.02		(nd) 0.005		1270	2450	2.92
UG SUMP	21-Jan-98	(U) 0.05	(U) 0.005		(U) 0.001	65	(U) 0.01	(U) 0.01	(U) 0.01	(U) 0.02	(U) 0.005	0.807			0.01	7.5	(U) 0.005		995	2020	3.21
UG SUMP	04-May-98	(U) 0.05	(U) 0.005		(U) 0.001	95	(U) 0.01	0.06	0.07	0.17	(U) 0.005	1.34			0.05	6.5	(U) 0.005		1070	2510	19.2
UG SUMP	29-Jul-98	(U) 0.05	(U) 0.005		0.003	118	(U) 0.01	0.02	0.03	(U) 0.02	(U) 0.005	1.04			(U) 0.01	6.5	0.005		1330	2500	3.75
UG SUMP	08-Oct-98	(U) 0.05	0.012		0.003	132	(U) 0.01	(U) 0.01	0.05	0.11	(U) 0.005	0.616			(U) 0.01	7.5	(U) 0.005		1550	3130	3.11
	Average	0.00	0.002	No data	0.001	87	0.00	0.02	0.02	0.04	0.000	0.91	No data	No data	0.01	7.3	0.001	No data	1234	2367	4.67
	Count	8	8	0	8	8	8	7	8	8	8	8	0	0	8	7	8	0	8	8	8
	Min	0	0	0	0	61.7	0	0	0	0	0	0.616	0	0	0	6.5	0	0	995	2020	1.42
	Max	0.023	0.012	0	0.003	132	0	0.06	0.07	0.17	0	1.34	0	0	0.05	7.7	0.005	0	1550	3130	19.2

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-8 Representative Water Quality Upgradient of the Underground Mine Workings

Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-2	01-Oct-92					24										9.12			780	1400	
MW-2	10-Dec-92					18										9.9			720	1200	
MW-2	11-Dec-92					25										10.38			1465	1098	
MW-2	12-Dec-92					22.2													958	1250	
MW-2	14-Dec-92	(nd) 0.05	(nd) 0.005		(nd) 0.005		(nd) 0.01	(nd) 0.01	(nd) 0.01	0.034	(nd) 0.002	(nd) 0.01	(nd) 0.0002		(nd) 0.02			(nd) 0.01			(nd) 0.01
MW-2	15-Dec-92	0.24	(nd) 0.0035		(nd) 0.005		0.007	0.049	(nd) 0.012	(nd) 0.14	(nd) 0.0024	(nd) 0.004	0.009		0.092			(nd) 0.0034			0.02
MW-2	16-Dec-92	(nd) 0.0346	(nd) 0.0032		(nd) 0.0015		(nd) 0.0026	(nd) 0.0013	(nd) 0.0023	(nd) 0.0023	(nd) 0.002	(nd) 0.0039	0.00018		(nd) 0.0026			(nd) 0.0036			(nd) 0.0057
MW-2	01-May-93	(nd) 0.0346	(nd) 0.0032		(nd) 0.0015	22.2	(nd) 0.0026	(nd) 0.0013	(nd) 0.0023	(nd) 0.0023	(nd) 0.002	(nd) 0.0039	0.00018		(nd) 0.0026		(nd) 0.0039	(nd) 0.0036	958	1250	(nd) 0.0057
MW-2	01-Oct-93					83										8.8			1100	2000	
MW-2	01-Jan-94					76										9.3			1200	1900	
MW-2	01-Mar-94					83										8.19			1400	2200	
MW-2	01-Jun-94					96										8.2			1583	2300	
MW-2	01-Oct-94					96										7.7			1500	2400	
MW-2	01-Jan-95					90										8.05			1400	2100	
MW-2	26-Feb-96	(nd) 0.05	(nd) 0.05	0.1	(nd) 0.005	100	(nd) 0.005	(nd) 0.005	(nd) 0.005	0.1	(nd) 0.05	0.034	(nd) 0.0001	0.1	(nd) 0.02	8	0.05		1100	1900	(nd) 0.005
MW-2	01-Apr-96															8.9					
MW-2	10-Apr-96					88										8.1			1300	1890	
MW-2	30-Jul-96					85.3										8.5			1230	1940	
MW-2	01-Oct-96															8.97					
MW-2	02-Oct-96															7.8					
MW-2	25-Jan-97	(nd) 0.021	(nd) 0.002		(nd) 0.0001	111	(nd) 0.005		(nd) 0.003	(nd) 0.024	(nd) 0.001	0.022			(nd) 0.017	8.6	(nd) 0.04		1310	2050	(nd) 0.003
MW-2	18-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	88.4	(nd) 0.01	(nd) 0.01	(nd) 0.01	(nd) 0.02	(nd) 0.005	0.01			(nd) 0.01	8.9	(nd) 0.005		1148	1944	(nd) 0.025
MW-2	05-Jul-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	58	0.01	(nd) 0.01	(nd) 0.01	0.33	(nd) 0.005	0.074			(nd) 0.01	7.74	(nd) 0.005		1140	2008	(nd) 0.02
MW-2	16-Oct-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	109	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.08	(nd) 0.005	0.025			(nd) 0.01		(nd) 0.005		1020	1820	(nd) 0.025
MW-2	20-Jan-98	(U) 0.05	(U) 0.005		(U) 0.004	76	(U) 0.01	(U) 0.01	(U) 0.01	0.08	(U) 0.05	0.031			(U) 0.01	7.9	(U) 0.005		979	1720	(U) 0.025
MW-2	18-Apr-98	(U) 0.05	(U) 0.005		(U) 0.001	71	(U) 0.01	(U) 0.01	(U) 0.01	1.17	(U) 0.005	0.829			(U) 0.01	8	(U) 0.005		1050	1720	(U) 0.025
MW-2	29-Jul-98	(U) 0.05	(U) 0.005		(U) 0.001	120	(U) 0.01	(U) 0.01	(U) 0.01	0.03	(U) 0.005	0.029			(U) 0.01	8.34	(U) 0.005		1040	1830	(U) 0.025
MW-2	03-Nov-98	0.11	(U) 0.005		(U) 0.001	74.5	(U) 0.01	(U) 0.01	(U) 0.01	0.02	(U) 0.005	0.04			(U) 0.01	8.7	(U) 0.005		905	1760	0.033
MW-2	02-Feb-99	(U) 0.05	(U) 0.005		(U) 0.001	78	(U) 0.01	(U) 0.01	(U) 0.01	0.1	(U) 0.005	0.07			(U) 0.01	7.4	(U) 0.005		1230	1830	(U) 0.025
MW-2	11-Mar-99	(U) 0.037	0.003		(U) 0.0001	80.7	(U) 0.008	(U) 0.003	(U) 0.004	0.17	(U) 0.001	0.03			(U) 0.016		(U) 0.002		1200	1810	(U) 0.004
MW-4	01-Oct-92					11										8.2			170	710	
MW-4	02-Dec-92	(nd) 0.05	(nd) 0.005		(nd) 0.005		(nd) 0.01	(nd) 0.01	(nd) 0.01	0.043	(nd) 0.002		(nd) 0.0002		(nd) 0.02			(nd) 0.01			0.018
MW-4	03-Dec-92	0.11	(nd) 0.0035		(nd) 0.005		(nd) 0.006	0.089	(nd) 0.012	(nd) 0.14	(nd) 0.0024		(nd) 0.0002		0.15			(nd) 0.0034			0.06
MW-4	04-Dec-92	(nd) 0.062	(nd) 0.0032		(nd) 0.0015		(nd) 0.0026	(nd) 0.0013	(nd) 0.0057	(nd) 0.0335	(nd) 0.0065		(nd) 0.0001		(nd) 0.0026			(nd) 0.0036			0.0155
MW-4	26-Dec-92					8.9										7.3			160	710	
MW-4	27-Dec-92					11.6										7.56			316	754	
MW-4	28-Dec-92					9.62													205	702	
MW-4	01-May-93	(nd) 0.062	(nd) 0.0032		(nd) 0.0015	9.62	(nd) 0.0026	(nd) 0.0013	(nd) 0.0057	(nd) 0.0335	(nd) 0.0065	0.158	(nd) 0.0001		(nd) 0.0026		(nd) 0.0039	(nd) 0.0036	205	702	0.0155
MW-4	01-Oct-93					9.5													170	650	
MW-4	01-Jan-94					7.5										8			150	660	
MW-4	01-Mar-94					9.4										8.03			170	700	
MW-4	01-Jun-94					9.5										5.46			160	660	
MW-4	01-Oct-94					9.9										7.5			140	620	
MW-4	26-Feb-96	(nd) 0.05	(nd) 0.05	(nd) 0.1	(nd) 0.005	10	(nd) 0.005	(nd) 0.005	(nd) 0.005	3.4	(nd) 0.05	0.067	(nd) 0.0001	0.023	(nd) 0.02	7.3	(nd) 0.05		180	640	(nd) 0.005

Table C.5-8 Representative Water Quality Upgradient of the Underground Mine Workings (continued)

Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-4	01-Apr-96															8.11					
MW-4	10-Apr-96					11										7.6			194	655	
MW-4	30-Jul-96					10.2										7.4			180	676	
MW-4	01-Oct-96															8.3					
MW-4	09-Oct-96															7.4					
MW-4	24-Jan-97	(nd) 0.021	(nd) 0.002		(nd) 0.0001	10.3	(nd) 0.005		(nd) 0.003	1.62	(nd) 0.001	0.075			(nd) 0.017	7.85	(nd) 0.04		196	761	0.032
MW-4	18-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	9.71	(nd) 0.01	(nd) 0.01	(nd) 0.01	1.88	(nd) 0.005	0.07			(nd) 0.01	7.6	(nd) 0.005		191	802	(nd) 0.025
MW-4	08-Jul-97	0.23	(nd) 0.005		(nd) 0.001	9	(nd) 0.01	(nd) 0.01	(nd) 0.01	2.2	(nd) 0.005	0.08			(nd) 0.01	7.41	(nd) 0.005		187	816	(nd) 0.02
MW-4	15-Oct-97	0.05	(nd) 0.005		(nd) 0.004	24	(nd) 0.01	(nd) 0.01	0.01	2.29	(nd) 0.005	0.111			(nd) 0.01		(nd) 0.005		161	770	(nd) 0.025
MW-4	20-Jan-98	(U) 0.05	(U) 0.005		(U) 0.004	21	(U) 0.01	(U) 0.01	(U) 0.01	2.13	(U) 0.005	0.067			(U) 0.01	7.4	(U) 0.005		169	740	(U) 0.02
MW-4	14-Apr-98	(U) 0.05	(U) 0.005		(U) 0.001	13	(U) 0.01	(U) 0.01	(U) 0.01	3.67	(U) 0.005	0.082			(U) 0.01	6.7	(U) 0.005		184	730	(U) 0.025
MW-4	27-Jul-98	(U) 0.05	(U) 0.005		(U) 0.001	12	(U) 0.01	(U) 0.01	(U) 0.01	2.56	(U) 0.005	0.064			(U) 0.01	7.55	(U) 0.005		192	700	(U) 0.025
MW-4	18-Nov-98	(U) 0.05	(U) 0.005		(U) 0.001	20	(U) 0.01	(U) 0.01	(U) 0.01	3.57	(U) 0.005	0.08			(U) 0.01	7.4	(U) 0.005		164	650	(U) 0.025
MW-5	01-Oct-92															6.47					
MW-5	01-Oct-93					20										7.15			150	360	
MW-5	01-Jan-94					18										7			150	360	
MW-5	01-Mar-94					20										7.75			160	350	
MW-5	01-Jun-94					19										9.45			160	350	
MW-5	01-Oct-94					20										7			160	630	
MW-5	01-Jan-95					20										7.07			170	650	
MW-5	26-Feb-96	(nd) 0.05	(nd) 0.05	(nd) 0.1	(nd) 0.005	19	(nd) 0.005	(nd) 0.005	(nd) 0.005	(nd) 0.01	(nd) 0.05	(nd) 0.005	(nd) 0.0001	(nd) 0.005	(nd) 0.02	7	(nd) 0.05		180	650	0.05
MW-5	01-Apr-96															7.4					
MW-5	10-Apr-96					24.4										7.2			204	658	
MW-5	30-Jul-96					20.8										7.1			186	669	
MW-5	01-Oct-96															7.58					
MW-5	09-Oct-96															7.1					
MW-5	24-Jan-97	(nd) 0.021	(nd) 0.002		(nd) 0.0001	22	(nd) 0.005		(nd) 0.003	0.067	(nd) 0.001	0.013			(nd) 0.017	7.58	(nd) 0.04		205	715	0.201
MW-5	18-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	21.4	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.04	(nd) 0.005	0.05			(nd) 0.01	7.3	(nd) 0.005		199	742	0.31
MW-5	06-Jul-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	20	(nd) 0.01	(nd) 0.01	(nd) 0.01	(nd) 0.02	(nd) 0.005	0.008			(nd) 0.01		(nd) 0.005		194	756	0.05
MW-5	07-Jul-97															6.84					
MW-5	15-Oct-97	0.29	(nd) 0.005		(nd) 0.004	33	(nd) 0.01	(nd) 0.01	0.07	0.06	(nd) 0.005	0.209			(nd) 0.01		(nd) 0.005		180	750	0.295
MW-5	20-Jan-98	(U) 0.05	(U) 0.005		(U) 0.004	92	(U) 0.01	(U) 0.01	0.02	0.08	(U) 0.005	0.074			(U) 0.01	6.7	(U) 0.005		195	720	0.31
MW-5	14-Apr-98	(U) 0.1	(U) 0.005		(U) 0.001	23	(U) 0.02	(U) 0.02	(U) 0.02	0.1	(U) 0.005	0.06			(U) 0.02	6.8	(U) 0.005		203	750	0.23
MW-5	24-Jul-98	0.06	(U) 0.005		(U) 0.001	20	(U) 0.01	(U) 0.01	(U) 0.01	0.02	(U) 0.005	0.014			(U) 0.01	7.05	(U) 0.005		177	480	0.115
MW-5	31-Oct-98	(U) 0.05	(U) 0.005		(U) 0.001	22	(U) 0.01	(U) 0.01	(U) 0.01	0.04	(U) 0.005	0.03			(U) 0.01	7.2	(U) 0.005		184	570	0.181
MW-5	03-Feb-99	(U) 0.05	(U) 0.005		(U) 0.001	25	(U) 0.01	(U) 0.01	0.02	0.02	(U) 0.005	0.06			(U) 0.01	7.1	(U) 0.005		223	710	0.217
MW-5	03-Mar-99	(U) 0.037	0.001		(U) 0.0001	27.6	(U) 0.008	(U) 0.003	(U) 0.004	(U) 0.019	(U) 0.001	0.005			(U) 0.016		(U) 0.002		206	680	0.1
MW-5	03-Aug-99	(U) 0.024	0.001		0.0002	22.7	(U) 0.005	(U) 0.005	(U) 0.003	0.1	(U) 0.001	0.033			(U) 0.023	6.43	(U) 0.001		205	670	0.157
	Average	0.027	0.000	0.03	0.000	39	0.000	0.00	0.00	0.65	0.000	0.070	0.001	0.041	0.01	7.8	0.001	0.00	542	1082	0.06
	Count	40	40	3	40	65	40	37	40	40	40	37	11	3	40	65	34	8	65	65	40
	min	0	0	0	0	7.5	0	0	0	0	0	0	0	0	0	5.46	0	0	140	350	0
	Max	0.29	0.003	0.1	0.0002	120	0.01	0.089	0.07	3.67	0	0.829	0.009	0.1	0.15	10.38	0.05	0	1583	2400	0.31

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-9 Representative Water Quality at and Downgradient of the South Waste Rock Disposal Facility

At SWRDF																				
Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
EDSN-1	26-Feb-96	0		No Data	0	180	0	0	0.19		0	0.42	0	0.013	0.04		0.07	No Data	2500	4000	1.1
EDSN-1	27-Feb-96									0						7.7					
	Average	0.000	No Data	No Data	0.000	180	0.000	0.000	0.19	0.00	0.000	0.42	0.000	0.013	0.04	7.7	0.070	No Data	2500	4000	1.100
	Count	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
	Min	0	0	0	0	180	0	0	0.19	0	0	0.42	0	0.013	0.04	7.7	0.07	0	2500	4000	1.1
	Max	0	0	0	0	180	0	0	0.19	0	0	0.42	0	0.013	0.04	7.7	0.07	0	2500	4000	1.1
Downgradient of SWRDF																					
Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-12	17-Apr-97	0	0	No Data	0	20	0	0	0	0.88	0	1.71	No Data	No Data	0.02	7.5	0.048	No Data	1765	2994	0
MW-12	06-Jul-97	0	0		0	19	0.02	0	0	1.38	0	2.07			0.02	7.23	0			2880	0
MW-12	21-Oct-97	0	0		0	54	0.02	0	0	0.15	0	1.48			0.01		0		1350	2690	0
MW-12	27-Jan-98	0	0		0	61	0	0	0	3.14	0	2.37			0	7.3	0		1380	2750	0
MW-12	24-Apr-98	0	0		0	45	0	0	0	2.37	0	0.952			0	7.3	0		1290	2710	0
MW-12	17-Jul-98	0	0		0	11	0.07	0	0	2.1	0	0.814			0	7.37	0		1550	2830	0
MW-12	22-Oct-98	0	0		0	46	0.01	0.01	0.02	1.04	0	0.75			0.01	7	0		1580	2700	0.121
MW-12	05-Feb-99	0.08	0		0	30	0	0	0.01	2.77	0	1.41			0	7.1	0		2080	2990	0.035
MW-12	10-Mar-99	0	0.002		0.0001	18.2	0	0	0	1.35	0	0.888			0		0		2040	2280	0.162
MW-12	09-Aug-99	0	0		0.003	24.2	0	0	0.067	0.07	0	0.685			0.027	6.48	0		2110	2910	0.571
	Average	0.008	0.000	No Data	0.000	33	0.012	0.001	0.01	1.53	0.000	1.31	No Data	No Data	0.01	7.2	0.005	No Data	1683	2773	0.089
	Count	10	10	0	10	10	10	10	10	10	10	10	0	0	10	8	10	0	9	10	10
	Min	0	0	0	0	11	0	0	0	0.07	0	0.69	0	0	0	6.5	0	0	1290	2280	0
	Max	0.08	0.002	0	0.003	61	0.07	0.01	0.067	3.14	0	2.37	0	0	0.027	7.5	0.05	0	2110	2994	0.571

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

Table C.5-10 Representative Water Quality for Hanover Mountain (Pit)

Upgradient ground water																				
Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
MW-1A	20-Jun-95		(nd) 0.05		(nd) 0.005	31		(nd) 0.01	(nd) 0.01	(nd) 0.02	(nd) 0.003				(nd) 0.02	7		(nd) 0.02	170	580	(nd) 0.02
MW-1A	28-Feb-96	(nd) 0.05	(nd) 0.05	(nd) 0.1	(nd) 0.005	28	(nd) 0.005	(nd) 0.005	(nd) 0.005	0.26	(nd) 0.05	0.38	(nd) 0.0001	(nd) 0.005	(nd) 0.02	7.1	(nd) 0.05		160	530	0.014
MW-1A	10-Apr-96					35.5										7.4			215	632	
MW-1A	31-Jul-96					30.3										7.1			178	588	
MW-1A	02-Oct-96															6.8					
MW-1A	23-Jan-97	(nd) 0.021	(nd) 0.002		(nd) 0.0001	28.8	(nd) 0.005		(nd) 0.003	0.711	(nd) 0.001	0.47			(nd) 0.017	7.51	(nd) 0.04		201	618	0.006
MW-1A	14-Apr-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	26.4	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.35	(nd) 0.005	0.47			(nd) 0.01	7.4	(nd) 0.005		188	624	(nd) 0.025
MW-1A	03-Jul-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	27	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.79	(nd) 0.005	0.568			(nd) 0.01	6.86	(nd) 0.005			704	(nd) 0.02
MW-1A	17-Oct-97	(nd) 0.05	(nd) 0.005		(nd) 0.001	59	(nd) 0.01	(nd) 0.01	(nd) 0.01	0.56	(nd) 0.005	0.543			(nd) 0.01		(nd) 0.005		181	680	(nd) 0.025
MW-1A	23-Jan-98	(U) 0.05	(U) 0.005		(U) 0.001	22	(U) 0.01	(U) 0.01	(U) 0.01	1.04	(U) 0.005	0.521			(U) 0.01	6.2	(U) 0.005		166	580	0.03
MW-1A	24-Apr-98	(U) 0.05	(U) 0.005		(U) 0.001	25	(U) 0.01	(U) 0.01	(U) 0.01	0.44	(U) 0.005	0.433			(U) 0.01	6.6	(U) 0.005		212	650	(U) 0.025
MW-1A	31-Jul-98	(U) 0.05	(U) 0.005		(U) 0.001	31	(U) 0.01	(U) 0.01	(U) 0.01	0.5	(U) 0.005	0.521			(U) 0.01	6.98	(U) 0.005		207	680	(U) 0.025
MW-1A	05-Nov-98	(U) 0.05	(U) 0.005		(U) 0.001	32	(U) 0.01	(U) 0.01	(U) 0.01	0.54	(U) 0.005	0.63			(U) 0.01	7.1	(U) 0.005		204	690	(U) 0.025
MW-1A	28-Jan-99	(U) 0.05	(U) 0.005		(U) 0.001	18	(U) 0.01	(U) 0.01	(U) 0.01	0.72	(U) 0.005	0.44			(U) 0.01	6.9	(U) 0.005		161	480	(U) 0.025
MW-1A	03-Mar-99	(U) 0.037	0.003		(U) 0.0001	24.8	(U) 0.008	(U) 0.003	(U) 0.004	0.233	0.001	0.226			(U) 0.016		(U) 0.002		197	577	0.005
MW-1A	03-Aug-99	0	0.001		(U) 0.0001	25.7	(U) 0.005	(U) 0.005	0.008	0.03	0.002	0.448			(U) 0.023	6.45	(U) 0.001		172	548	0.006
	Average	0.00	0.000	0.0	0.000	30	0.00	0.00	0.00	0.47	0.000	0.47	0.0000	0.000	0.00	7.0	0.000	0.00	187	611	0.005
	Count	12	13	1	13	15	12	12	13	13	13	12	1	1	13	14	12	1	14	15	13
	Min	0	0	0	0	18	0	0	0	0	0	0.226	0	0	0	6.2	0	0	160	480	0
	Max	0	0.003	0	0	59	0	0	0.008	1.04	0.002	0.63	0	0	0	7.51	0	0	215	704	0.03
Seep Face																					
Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
HSN-1	24-Feb-96	(nd) 0.05	0.06	(nd) 0.1	(nd) 0.005	5	(nd) 0.005	0.16	0.024	55	(nd) 0.05	3.1	(nd) 0.0001	(nd) 0.005	0.13	4.83	(nd) 0.05		440	600	1.4
1000 feet downstream from seep face (HSN-1)																					
Location_name	Collection_date	Al	As	B	Cd	Cl	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	pH	Se	Ag	SO4	TDS	Zn
HSN-2	24-Feb-96	(nd) 0.05	(nd) 0.05	(nd) 0.1	(nd) 0.005	8	(nd) 0.005	(nd) 0.005	(nd) 0.005	0.08	(nd) 0.05	0.24	(nd) 0.0001	(nd) 0.005	(nd) 0.02	6.36	(nd) 0.05		210	350	0.02

Note: Average considers all non-detect values to be 0.0 mg/L.
Count is the number of values, including non-detects.
nd and U = non-detect (detection limit shown).

FIGURES

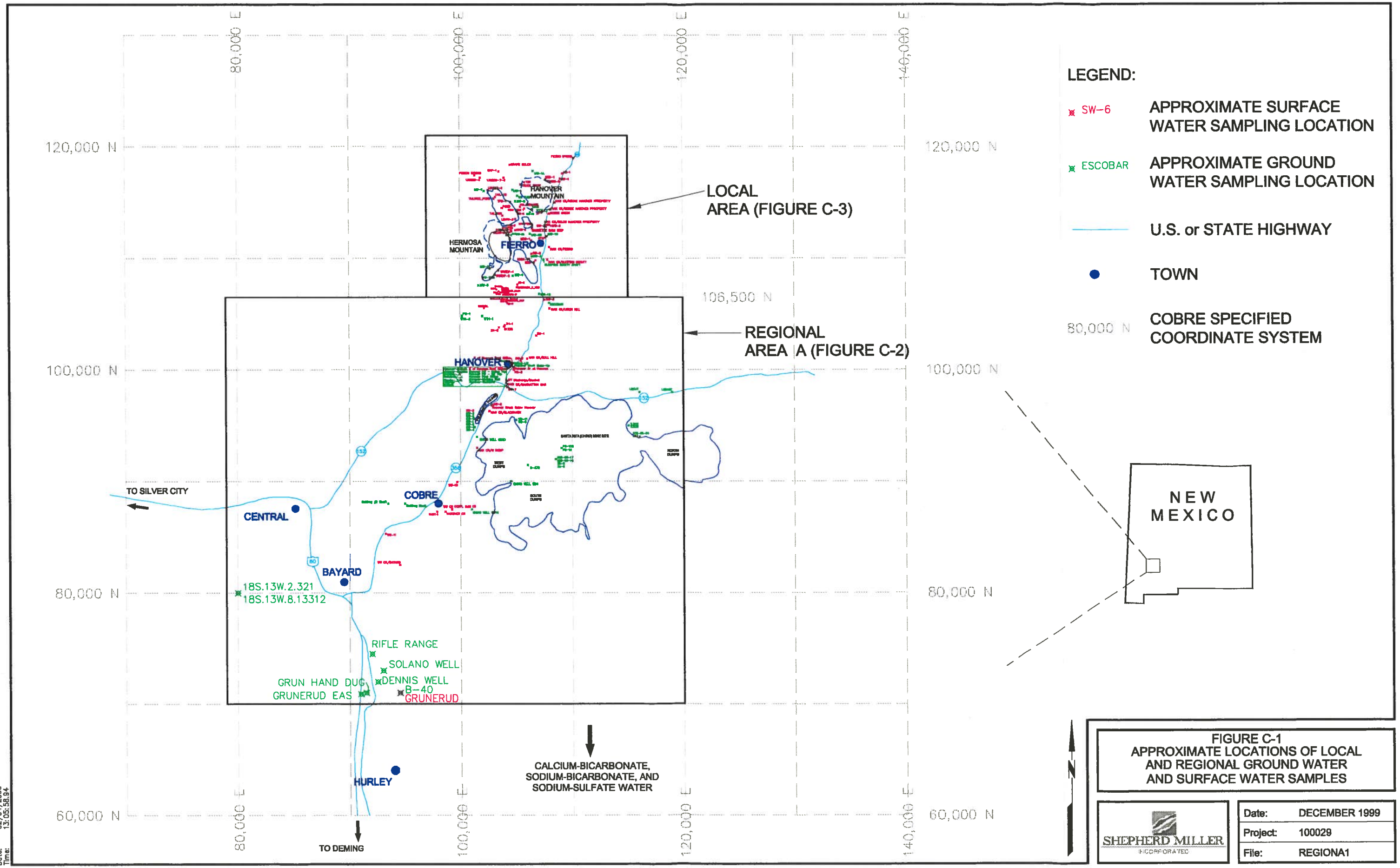
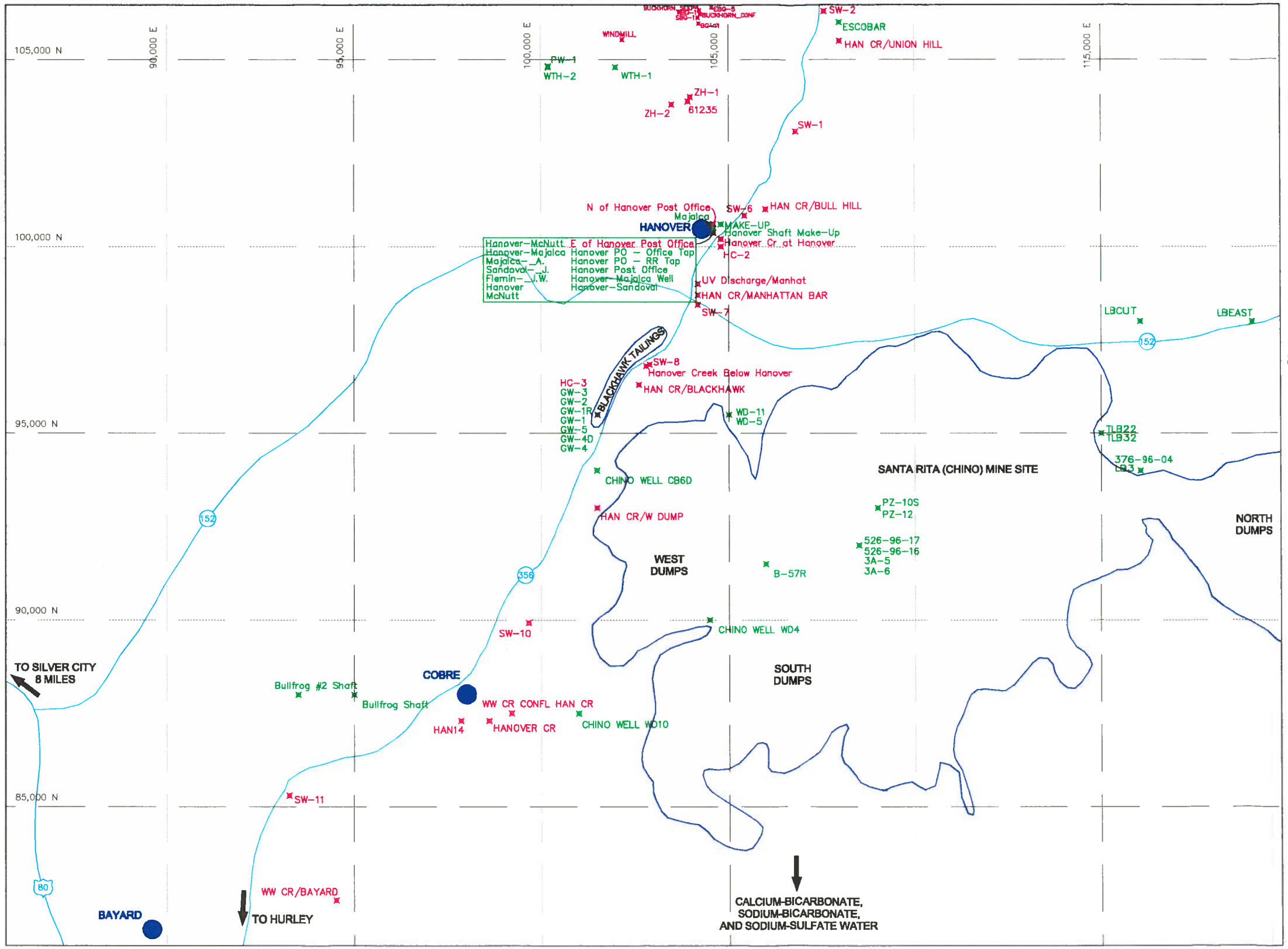


FIGURE C-1
APPROXIMATE LOCATIONS OF LOCAL AND REGIONAL GROUND WATER AND SURFACE WATER SAMPLES

SHEPHERD MILLER INCORPORATED

Date:	DECEMBER 1999
Project:	100029
File:	REGIONA1

Filename: E:\100029\REGIONA1.dwg
Date: 02/04/2000
Time: 13:05:58.94



LEGEND:

- SW-6 — APPROXIMATE SURFACE WATER SAMPLING LOCATION
- ESCOBAR — APPROXIMATE GROUND WATER SAMPLING LOCATION
- U.S. or STATE HIGHWAY
- TOWN
- 80,000 N — COBRE SPECIFIED COORDINATE SYSTEM

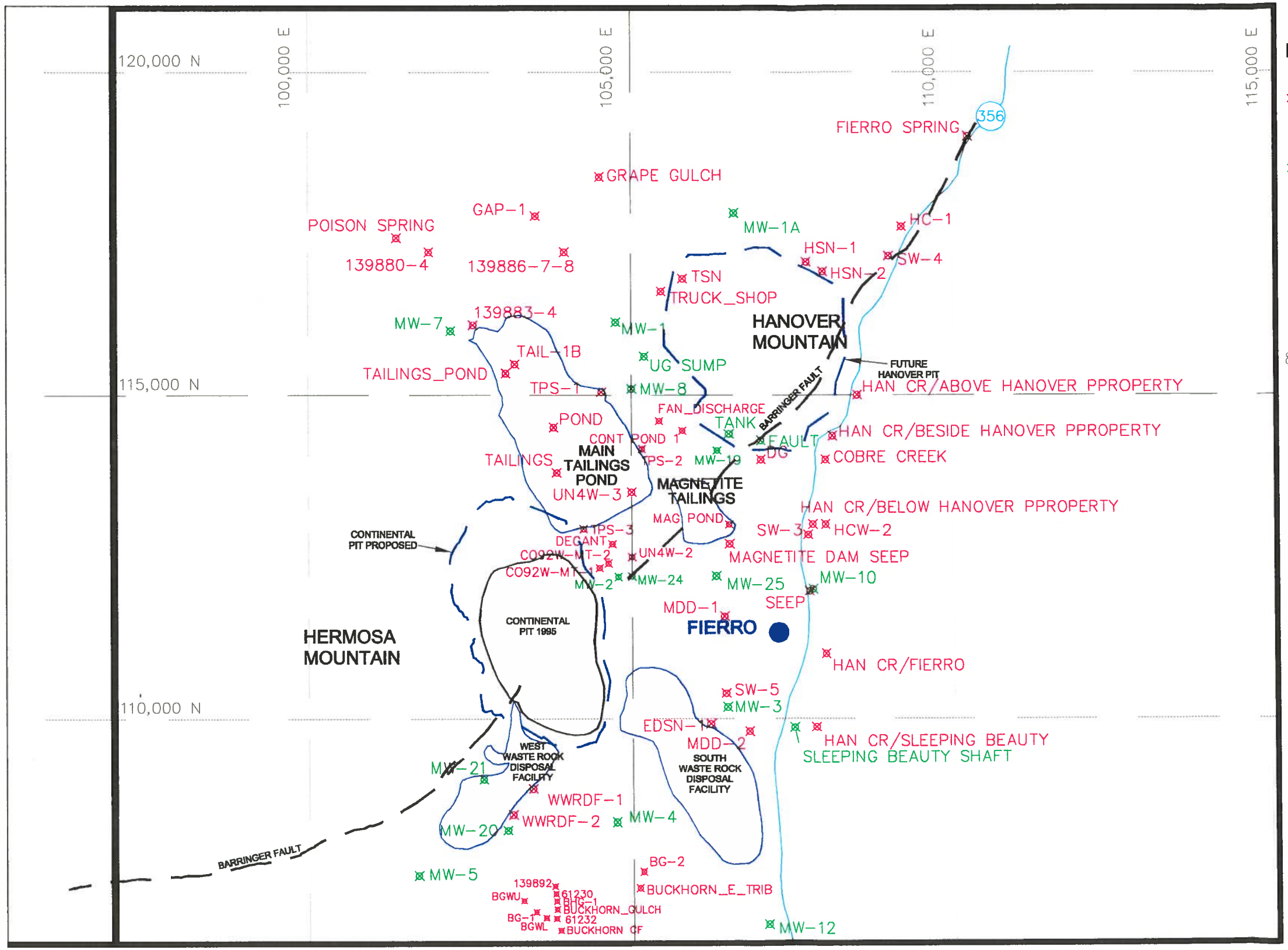
N

FIGURE C-2
APPROXIMATE LOCATIONS OF REGIONAL GROUND WATER AND SURFACE WATER SAMPLES

SHEPHERD MILLER INCORPORATED

Date:	DECEMBER 1999
Project:	100029
File:	REGIONA

Filename: E:\100029\REGIONA.dwg
Date: 02/04/2000
Time: 13:17:52.51



LEGEND:

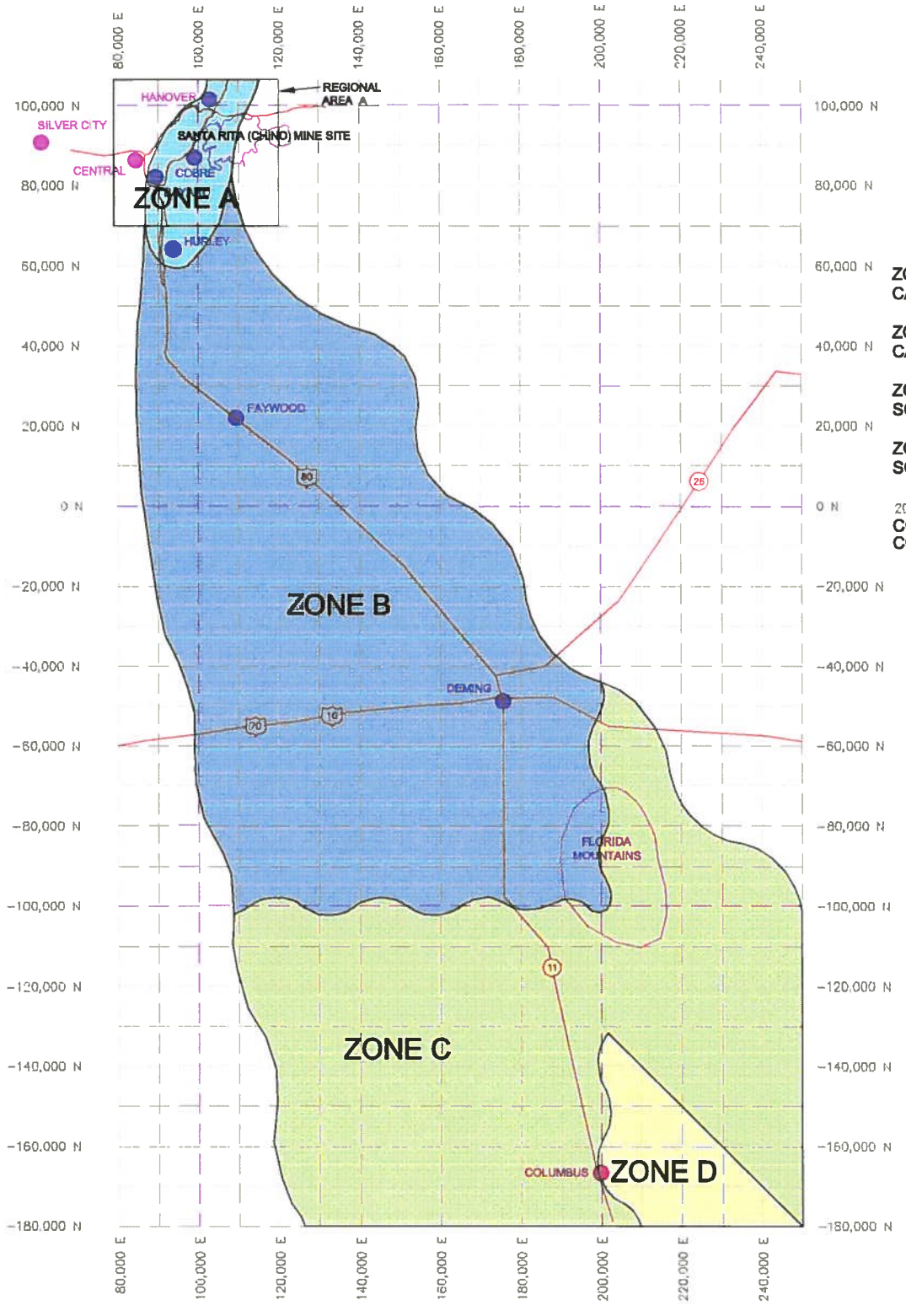
- SW-6 — APPROXIMATE SURFACE WATER SAMPLING LOCATION
- ESCOBAR — APPROXIMATE GROUND WATER SAMPLING LOCATION
- U.S. or STATE HIGHWAY
- TOWN
- 80,000 N — COBRE SPECIFIED COORDINATE SYSTEM

FIGURE C-3
APPROXIMATE LOCATIONS OF LOCAL GROUND WATER AND SURFACE WATER SAMPLES

SHEPHERD MILLER INCORPORATED

Date:	DECEMBER 1999
Project:	100029
File:	REGIONA

Filename: E:\100029\REGIONA.dwg
Date: 02/04/2000
Time: 13:14:36.76



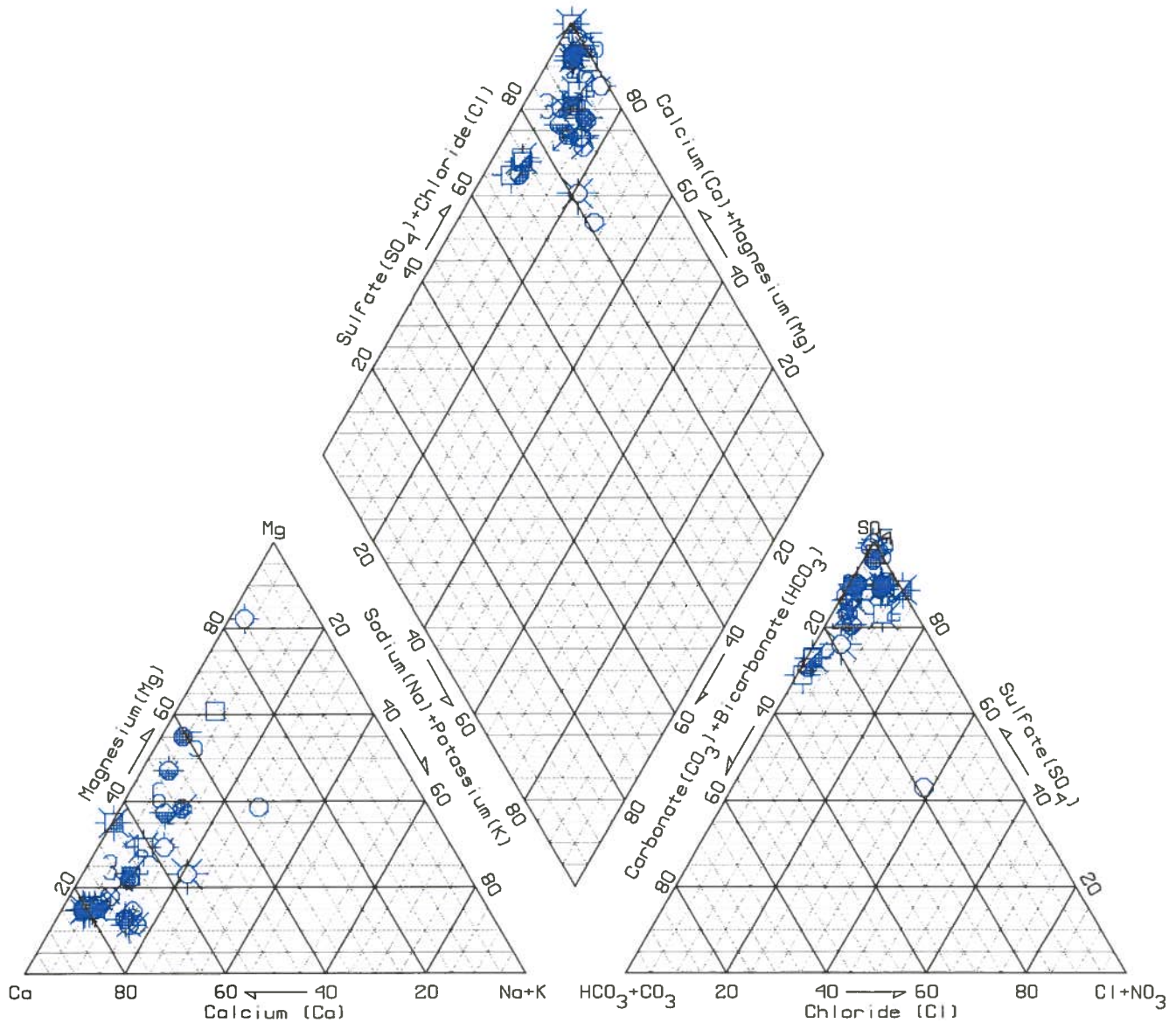
SHEPHERD MILLER
INCORPORATED

FIGURE C-4
ESTIMATED REGIONAL GROUND AND SURFACE WATER ZONES

Date:	DECEMBER 1999
Project:	100029
File:	WTRTYPE1

LEGEND

- 26S.8W.19.14123
- BULLFROG-#2-SHAFT
- CHINO-WELL-16
- CHINO-WELL-CB6D
- CHINO-WELL-WD10
- CHINO-WELL-WD4
- ESCOBAR
- GRUN-HAND-DU
- GRUNERUD-EAS
- GW-1-A
- GW-1-B
- GW-1-C
- GW-1-D
- GW-1R
- GW-2-A
- GW-2-B
- GW-3-A
- GW-3-B
- GW-3-C
- GW-4-A
- GW-4-B
- GW-4-C
- GW-4-D
- GW-4D
- GW-5-A
- GW-5-B
- GW-5-C
- GW-5-D
- HANOVER-MAJALCA
- HANOVER-POST-OFFICE-RR-TAP
- 2 MAJALCA-A
- 3 MAKE-UP
- 4 MAKE-UP-A
- 5 SOLANO-WELL-A
- 6 SOLANO-WELL-B



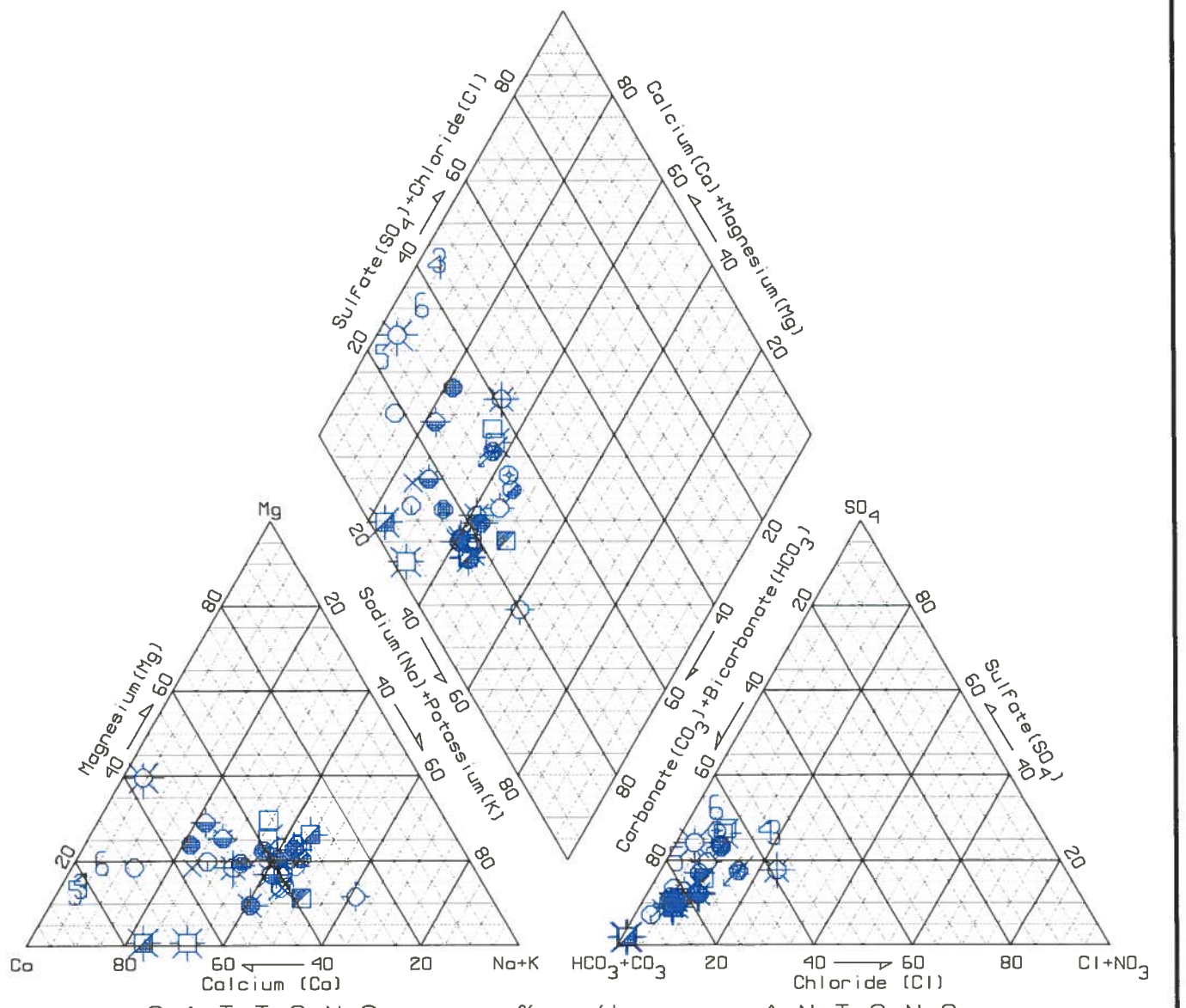
SHEPHERD MILLER INCORPORATED

FIGURE C-5
PIPER DIAGRAM
CALCIUM-SULFATE REGIONAL GROUND WATER

Date:	DECEMBER 1999
Project:	100029
File:	PRTYPA

LEGEND

18S.10W.8.443A	22S.6W.16.332	24S.9W.12.100	27S.9W.1
18S.13W.2.321	22S.6W.32.14424	24S.9W.15.433	27S.9W.1.431
19S.12W.19.11342	23S.9W.288.400	24S.9W.6	APACHE-8
19S.13W.29.421	24S.10W.12.111	24S.9W.6.431	DM-6D-82-A
20S.12W.19.123	24S.11W.11.211	25S.11W.11.11223	DM-6D-82-B
20S.5W.31	24S.11W.13.411	25S.8W.18.111A	3 PW-1
21S.12W.25.421	24S.17W.11	25S.9W.11.11144	4 PW-1B
22S.11W.24.133	24S.8W.20.300	26S.9W.2.221	5 WTH-1
			6 WTH-2



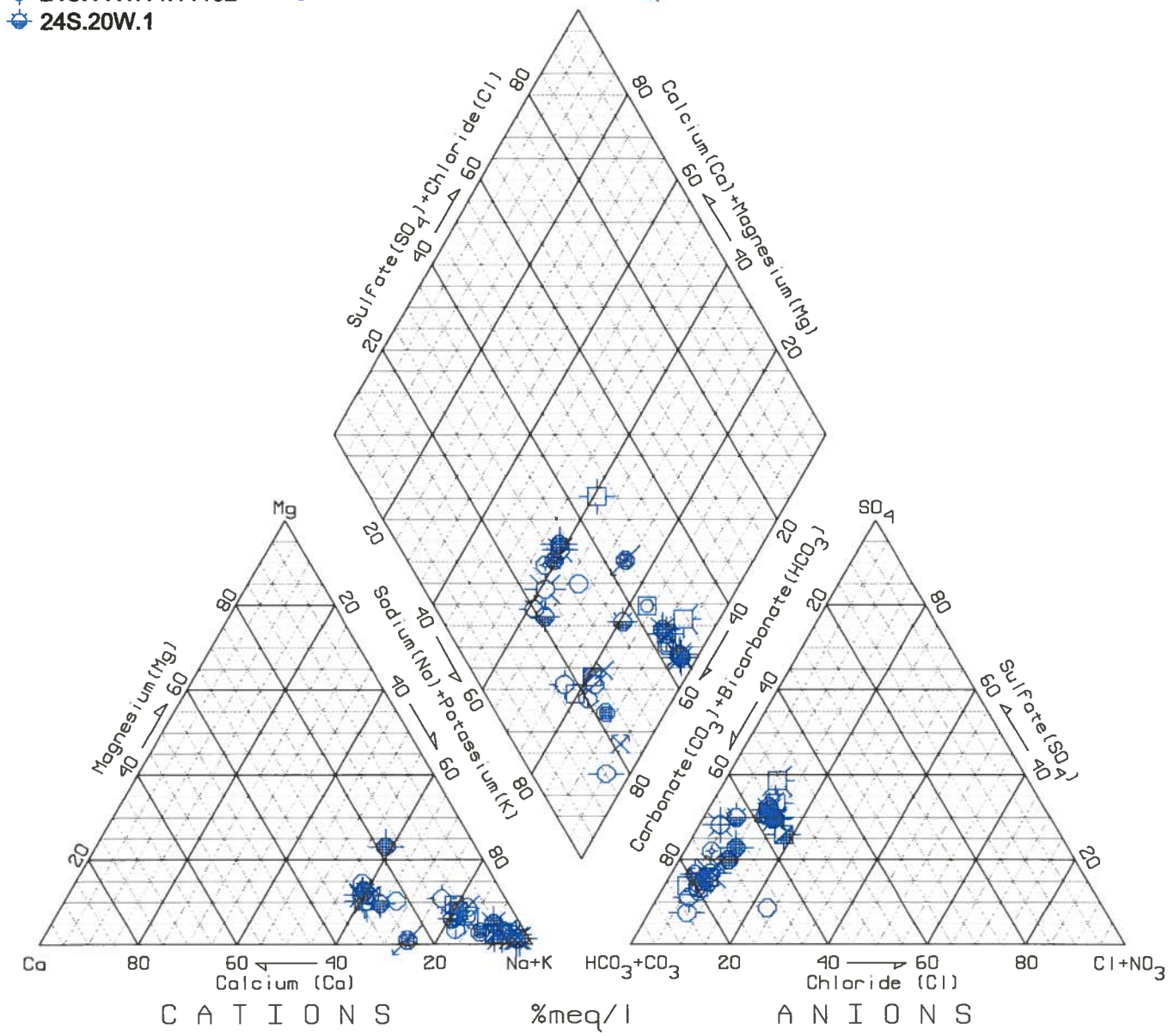
SHEPHERD MILLER INCORPORATED

FIGURE C-6
PIPER DIAGRAM
CALCIUM-BICARBONATE REGIONAL GROUND WATER

Date:	DECEMBER 1999
Project:	100029
File:	PRTYPB

LEGEND

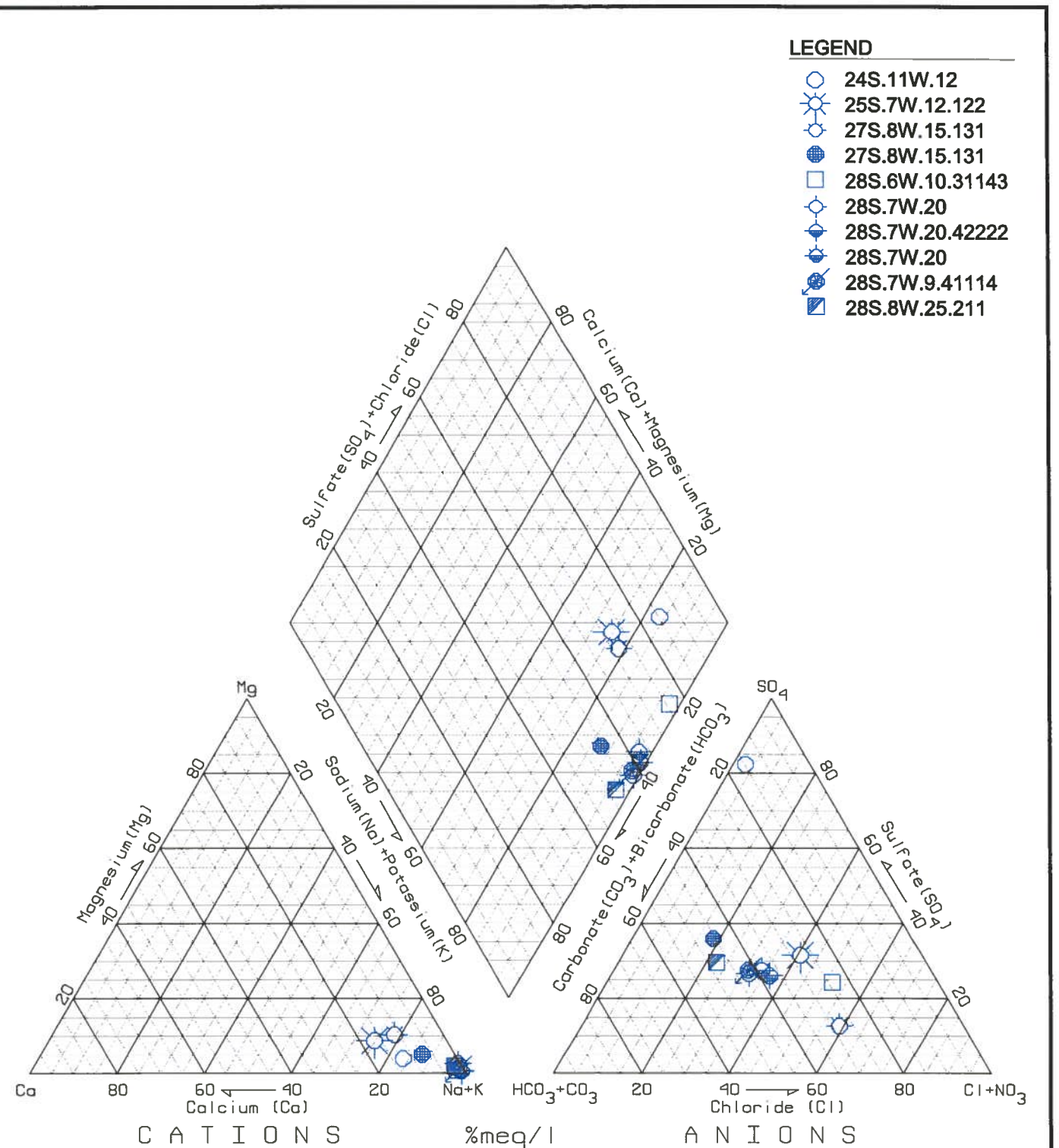
- 18S.13W.8.13312
- 20S.11W.20.243
- 20S.5W.31
- 23S.6W.28.244
- 23S.7W.33.211
- 23S.8W.21.222
- 24S.11W.14.11132
- 24S.20W.1
- 24S.7W.16.142
- 24S.7W.3.113
- 24S.7W.5.133
- 24S.7W.9
- 24S.8W.20.411
- 24S.9W.13.111
- 25S.10W.13.41212
- 26S.10W.25.32122
- 27S.19W.19
- 27S.7W.19.200
- 27S.8W.23.100
- 27S.8W.35.12213
- 27S.8W.8.311
- 28S.8W.02.111
- 28S.8W.26.222
- 29S.8W.11.11313
- 29S.8W.12.144
- 29S.8W.17.231
- DENNIS-WELL
- RIFLE-RANGE



SHEPHERD MILLER INCORPORATED

FIGURE C-7
PIPER DIAGRAM
SODIUM-BICARBONATE REGIONAL GROUND WATER

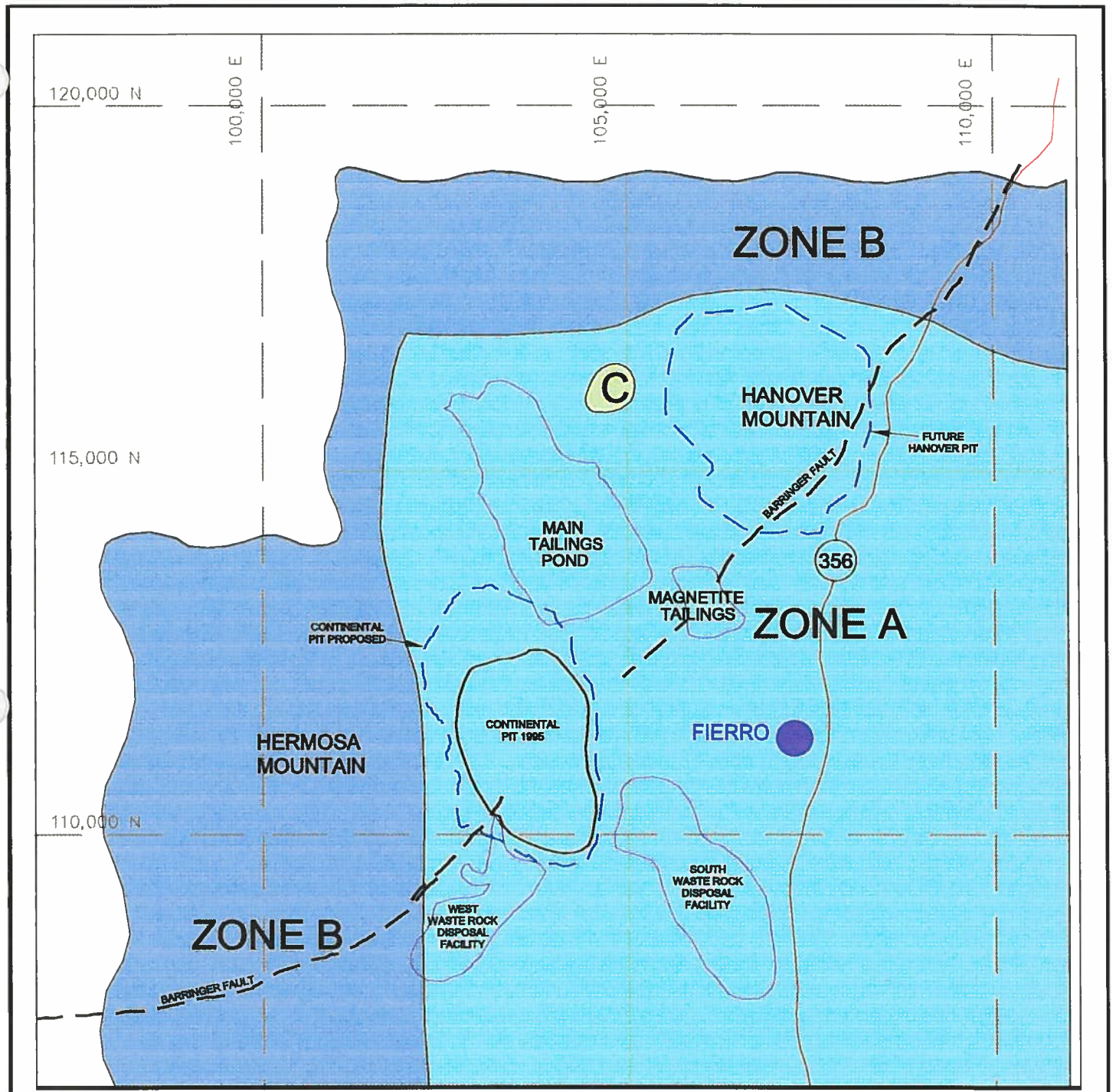
Date:	DECEMBER 1999
Project:	100029
File:	PRTYPC



SHEPHERD MILLER
INCORPORATED

FIGURE C-8
PIPER DIAGRAM
SODIUM-SULFATE REGIONAL GROUND WATER

Date:	DECEMBER 1999
Project:	100029
File:	PRTYPD



ZONE A	CALCIUM-SULFATE WATER
ZONE B	CALCIUM-BICARBONATE WATER
ZONE C	SODIUM-BICARBONATE WATER
110,000 N	COBRE SPECIFIED COORDINATE SYSTEM

N

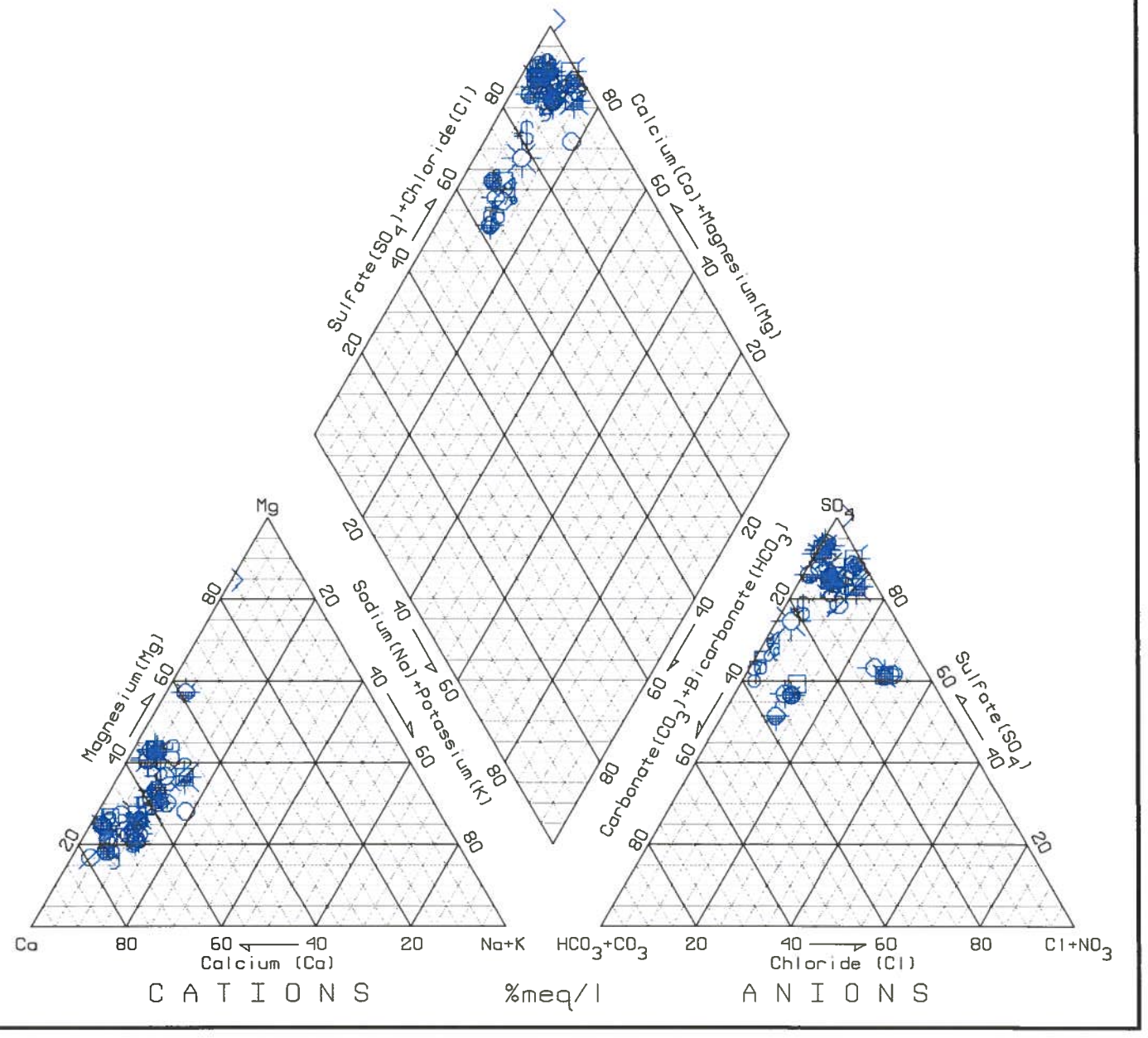
SHEPHERD MILLER INCORPORATED

FIGURE C-9
ESTIMATED LOCAL GROUND AND SURFACE WATER ZONES

Date:	DECEMBER 1999
Project:	100029
File:	WTRTYPE2

LEGEND

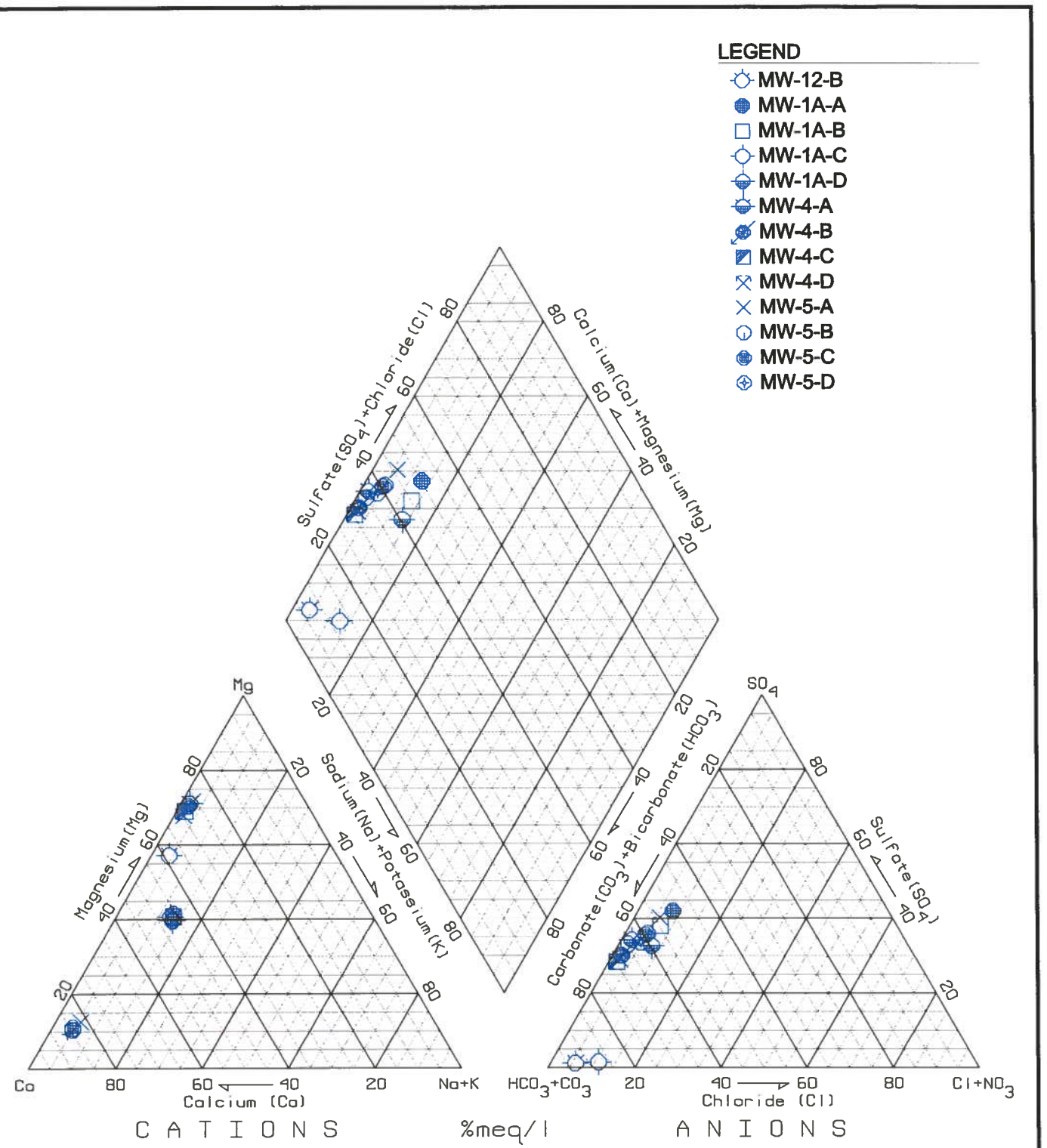
CONTINENTAL-WELL-2	MW-19-C	MW-20-D	MW-25-B	MW-7-E
CONTINENTAL-WELL-3	MW-19-D	MW-20-E	MW-3-A	MW-7-F
MW-10-A	MW-19-E	MW-21-A	MW-3-B	MW-7-G
MW-10-B	MW-2-A	MW-21-B	MW-3-C	MW-8-A
MW-10-C	MW-2-B	MW-21-C	MW-3-D	MW-8-B
MW-10-D	MW-2-C	MW-21-D	MW-7-A	UG-SUMP
MW-10-F	MW-2-D	MW-21-E	MW-7-B	WWRF
MW-12-A	MW-20-A	MW-24-A	MW-7-C	
MW-19-A	MW-20-B	MW-24-B	MW-7-D	
MW-19-B	MW-20-C	MW-25-A		



SHEPHERD MILLER INCORPORATED

FIGURE C-10
PIPER DIAGRAM
CALCIUM-SULFATE LOCAL GROUND WATER

Date:	DECEMBER 1999
Project:	100029
File:	POSTYPA



SHEPHERD MILLER
INCORPORATED

FIGURE C-11
PIPER DIAGRAM
CALCIUM-BICARBONATE LOCAL GROUND WATER

Date:	DECEMBER 1999
Project:	100029
File:	POSTYPB

LEGEND

- ○ CONTINENTAL-WELL-1
- ☼ MW-1-A
- ☼ MW-1-B

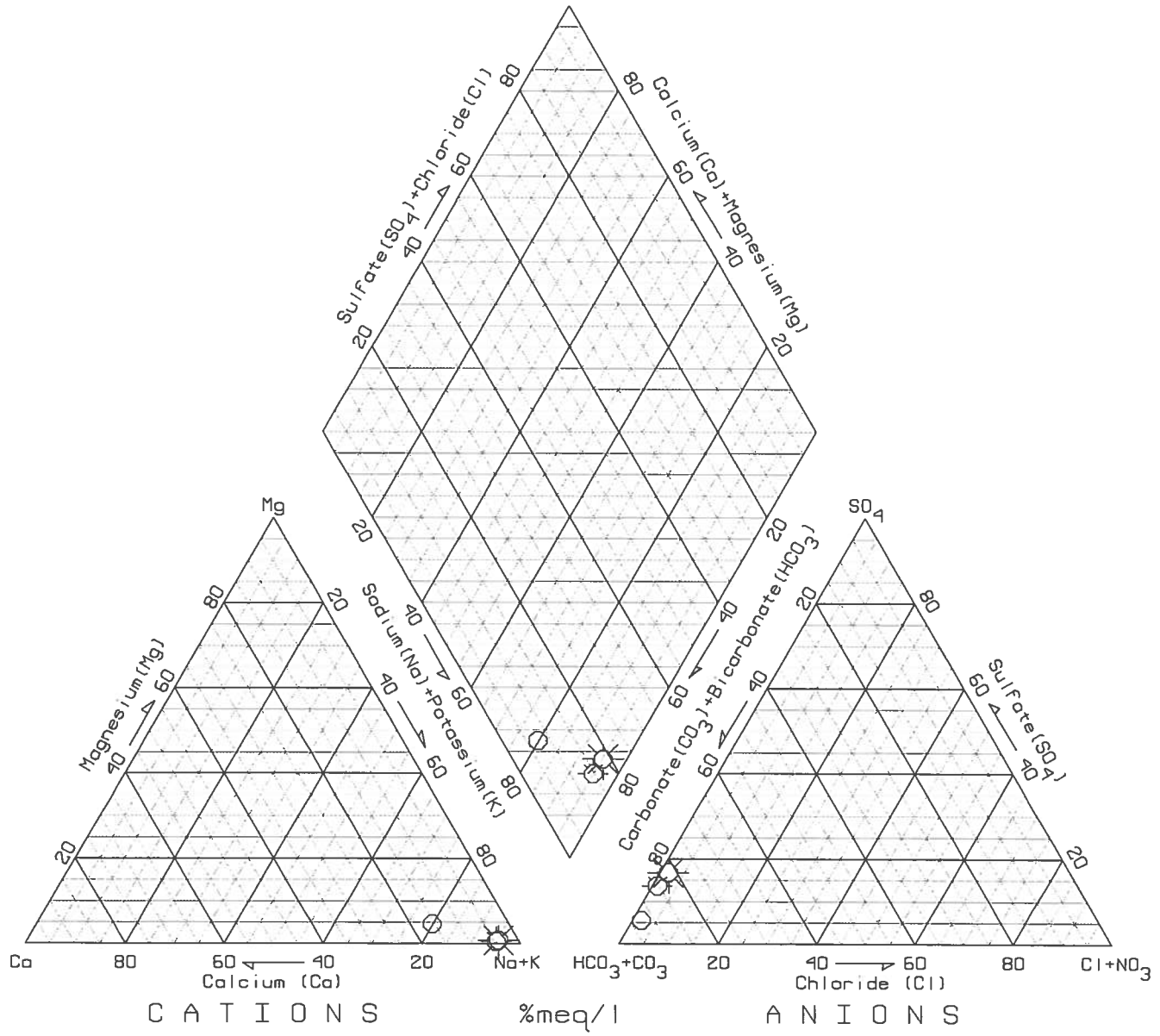


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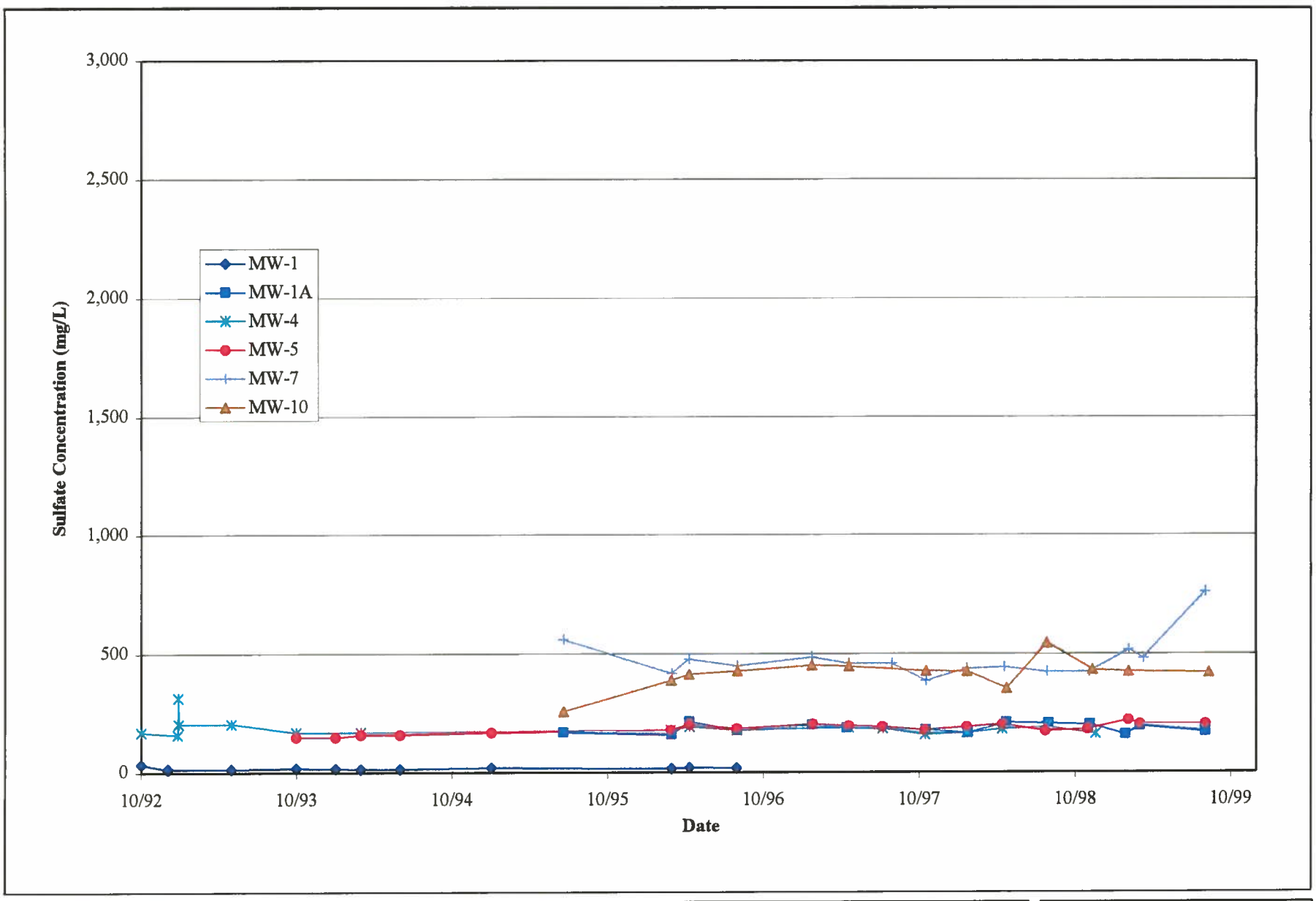
FIGURE C-12
PIPER DIAGRAM
SODIUM-BICARBONATE LOCAL GROUND WATER

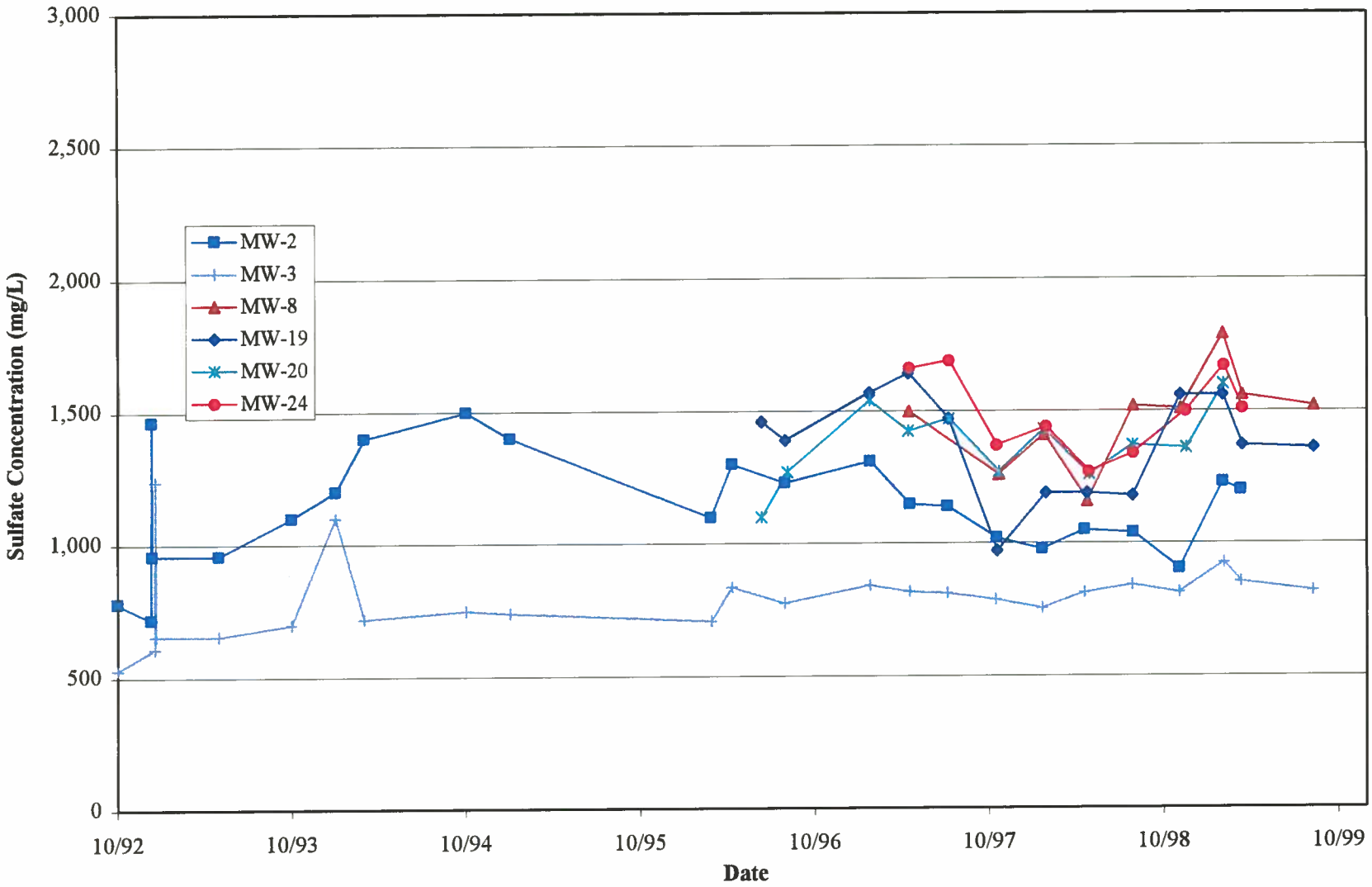
Date:	DECEMBER 1999
Project:	100029
File:	POSTYPC



SHEPHERD MILLER

FIGURE C-13
HISTORIC TRENDS IN SULFATE
LOCAL WELLS MW-1, MW-1A, MW-4, MW-5, MW-7, MW-10

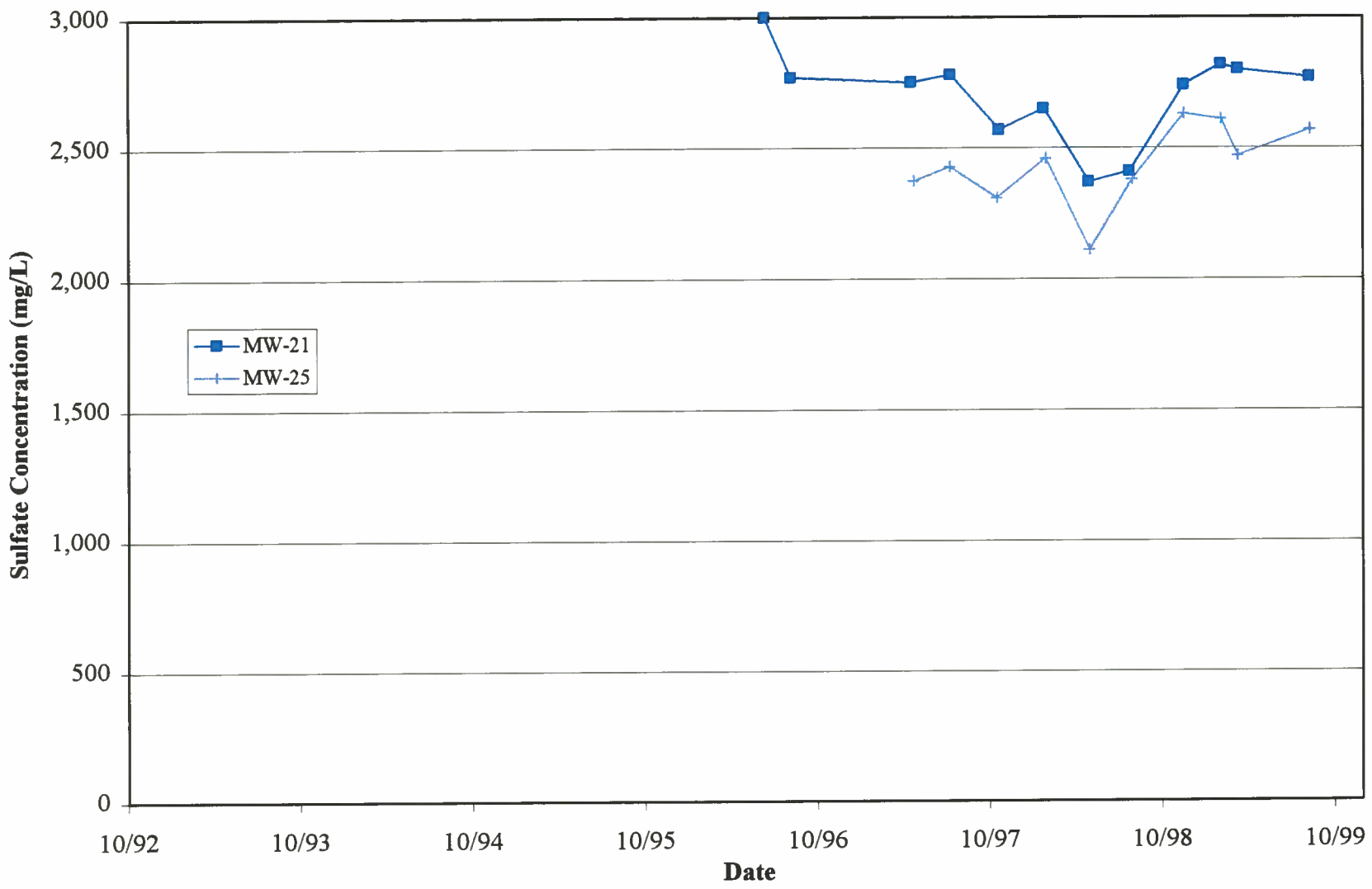
Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS



SHEPHERD MILLER

FIGURE C-14
HISTORIC TRENDS IN SULFATE
LOCAL WELLS MW-2, MW-3, MW-8, MW-19, MW-20, MW-24

Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS



SHEPHERD MILLER INCORPORATED

FIGURE C-15
HISTORIC TRENDS IN SULFATE
LOCAL WELLS MW-21 AND MW-25

Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS

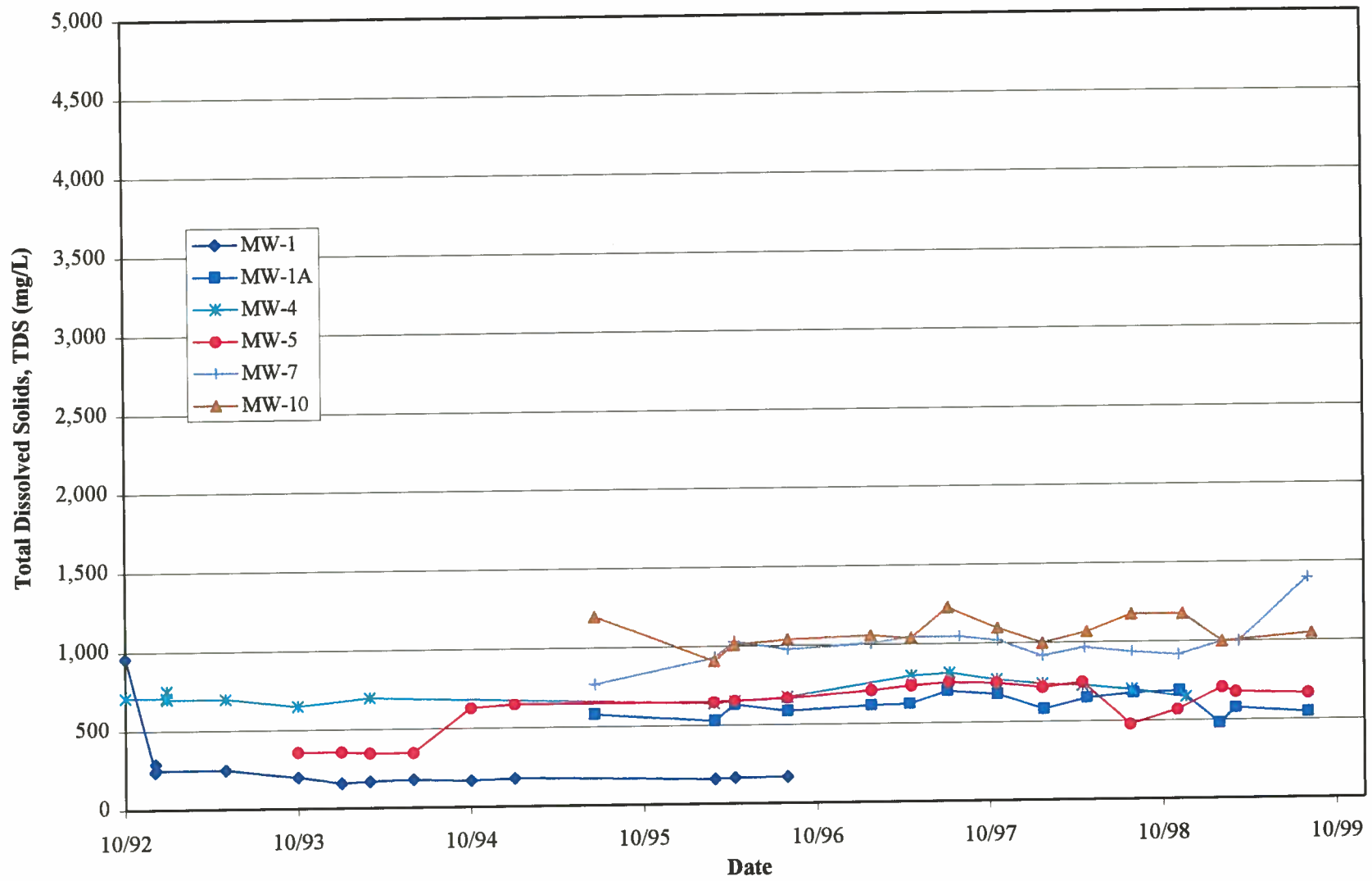


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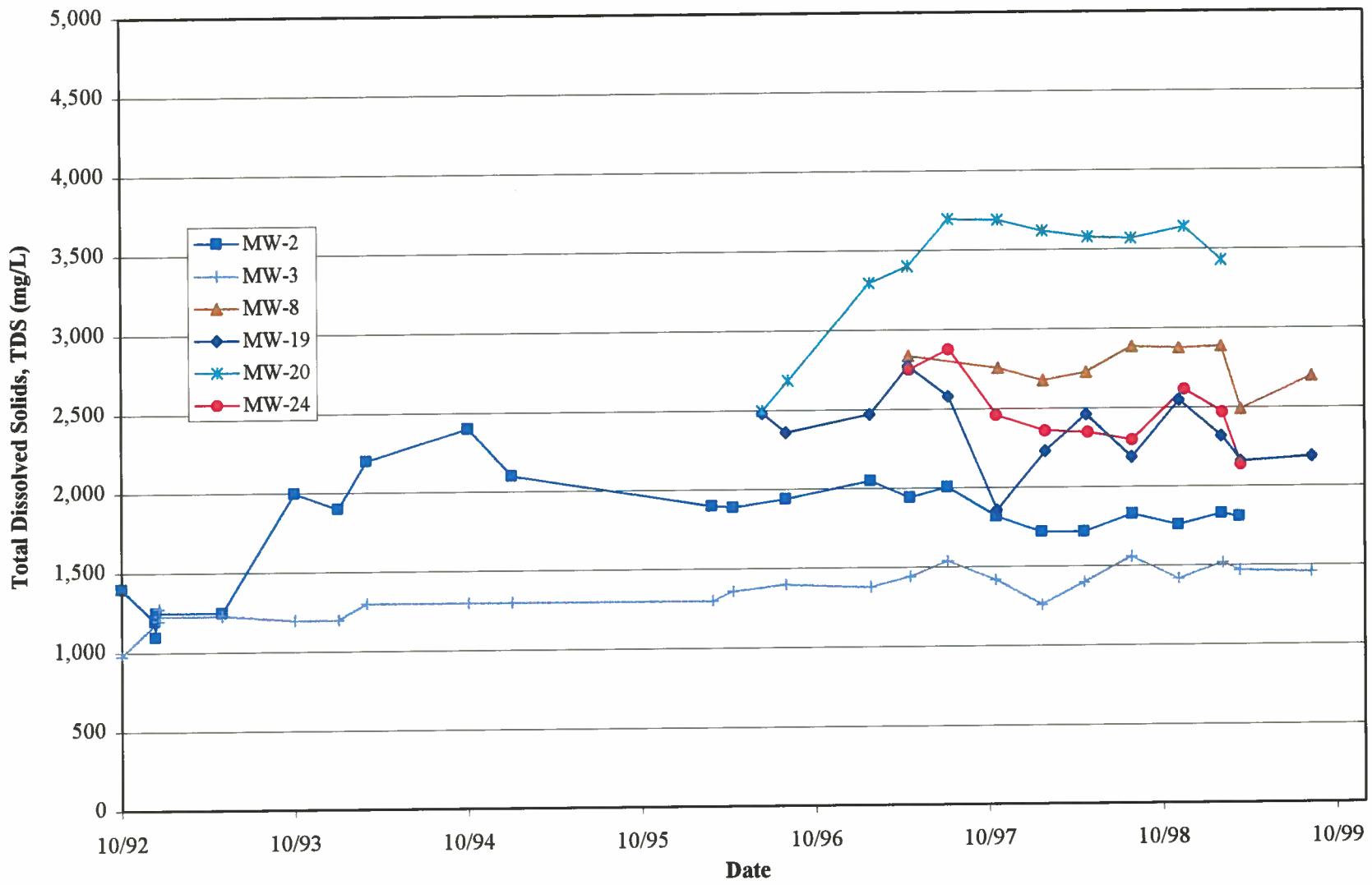
FIGURE C-16
HISTORIC TRENDS IN TOTAL DISSOLVED SOLIDS
LOCAL WELLS MW-1, MW-1A, MW-4, MW-5, MW-7, MW-10

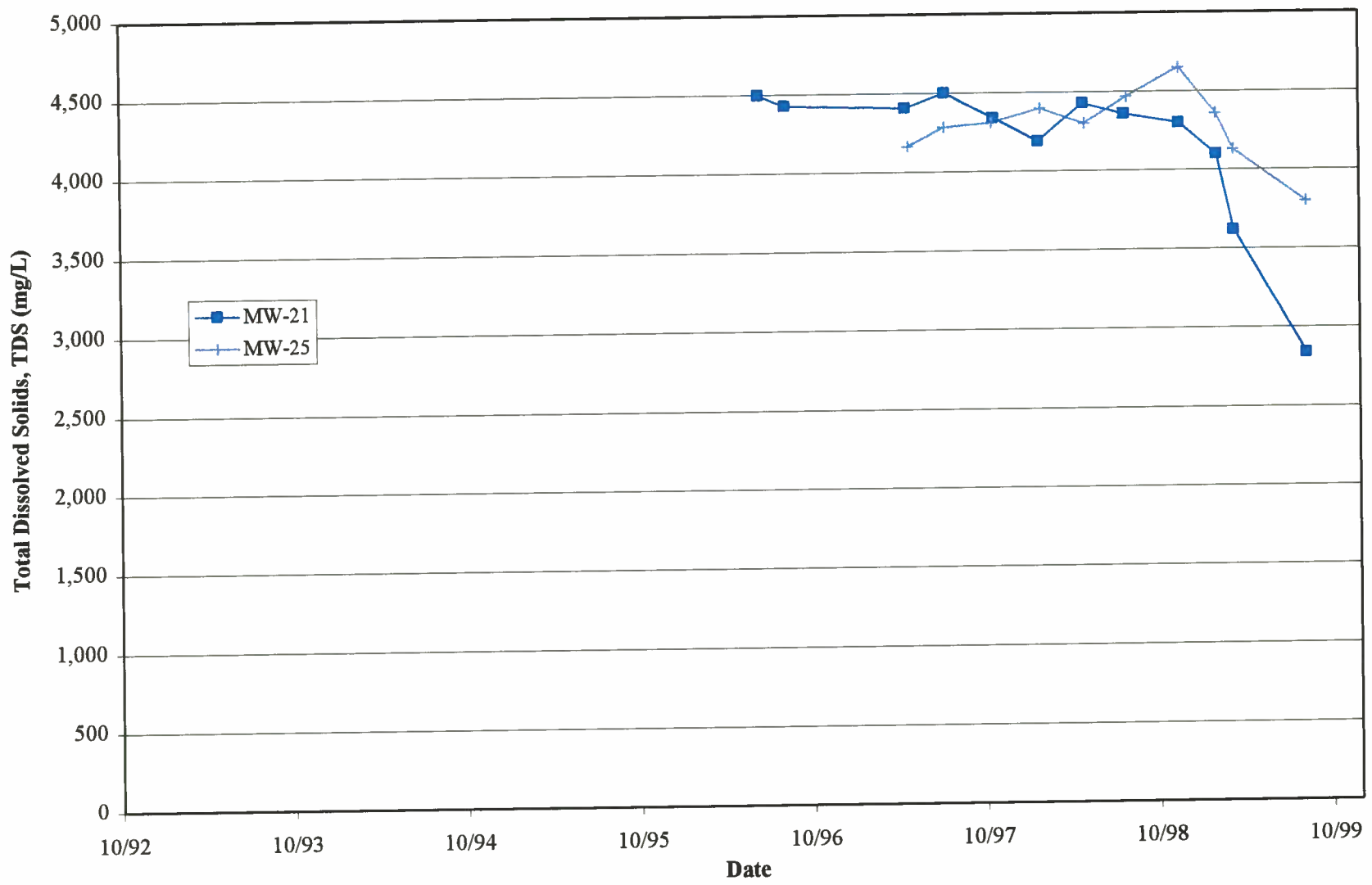
Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS



SHEPHERD MILLER

FIGURE C-17
HISTORIC TRENDS IN TOTAL DISSOLVED SOLIDS
LOCAL WELLS MW-2, MW-3, MW-8, MW-19, MW-20, MW-24

Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS



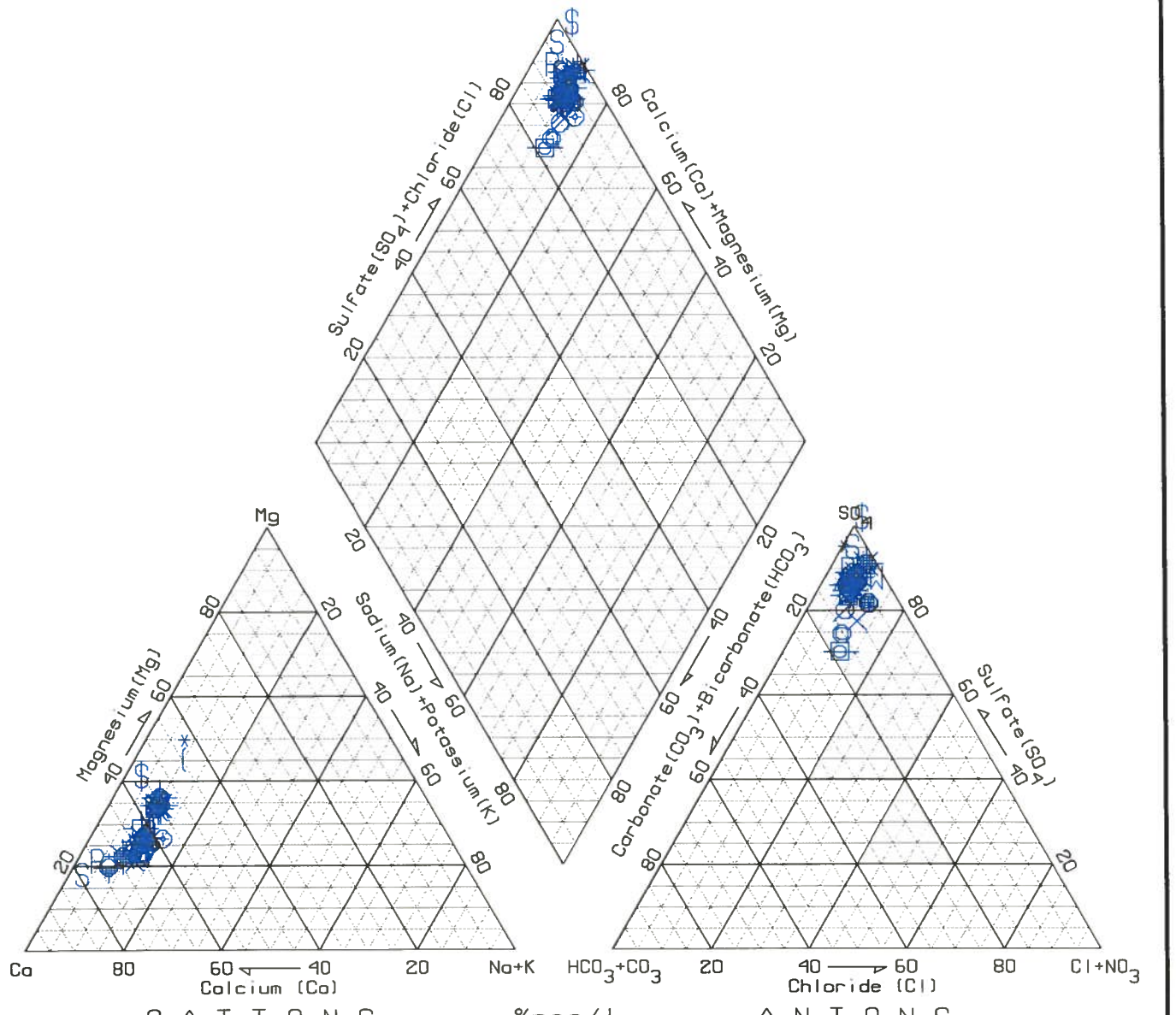
SHEPHERD MILLER

FIGURE C-18
HISTORIC TRENDS IN TOTAL DISSOLVED SOLIDS
LOCAL WELLS MW-21 AND MW-25

Date:	December 1999
Project:	100029
File:	APPCFIGS.XLS

LEGEND

- 61235
- CO92W-HCUH-A
- CO92W-HCUH-B
- CO92W-HCUH-C
- CONTINENTAL-SEEP
- EID-1
- EID-2
- EID-3
- EID-5
- HAN-CR/BELOW-HANOVER
- HAN-CR/BLACKHAWK
- HAN-CR/BULL-HILL
- HAN-CR/MANHATTAN-BAR-A
- HAN-CR/MANHATTAN-BAR-B
- HAN-CR/MANHATTAN-BAR-C
- HAN-CR/UNION-HILL
- HAN-CR/W-DUMP
- HC-2-A
- HC-2-B
- HC-2-C
- HC-3-A
- HC-3-B
- HC-3-C
- HC-3-D
- HC-3-E
- UV-DISCHARGE/MANHATTAN-BAR
- ZH-1
- ZH-2



SHEPHERD MILLER INCORPORATED

FIGURE C-19
PIPER DIAGRAM
CALCIUM-SULFATE REGIONAL SURFACE WATER

Date:	DECEMBER 1999
Project:	100029
File:	SRPIPA

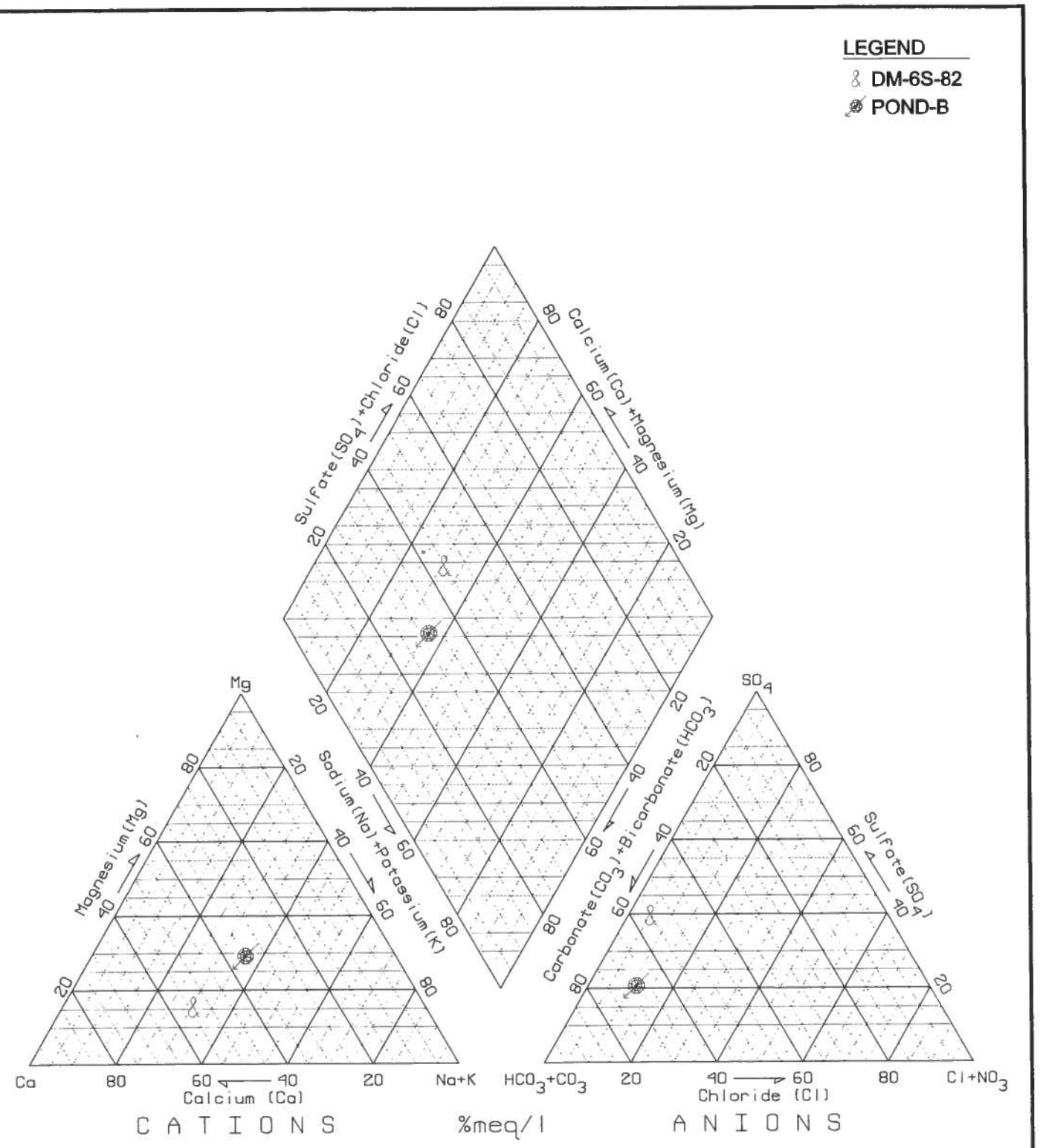


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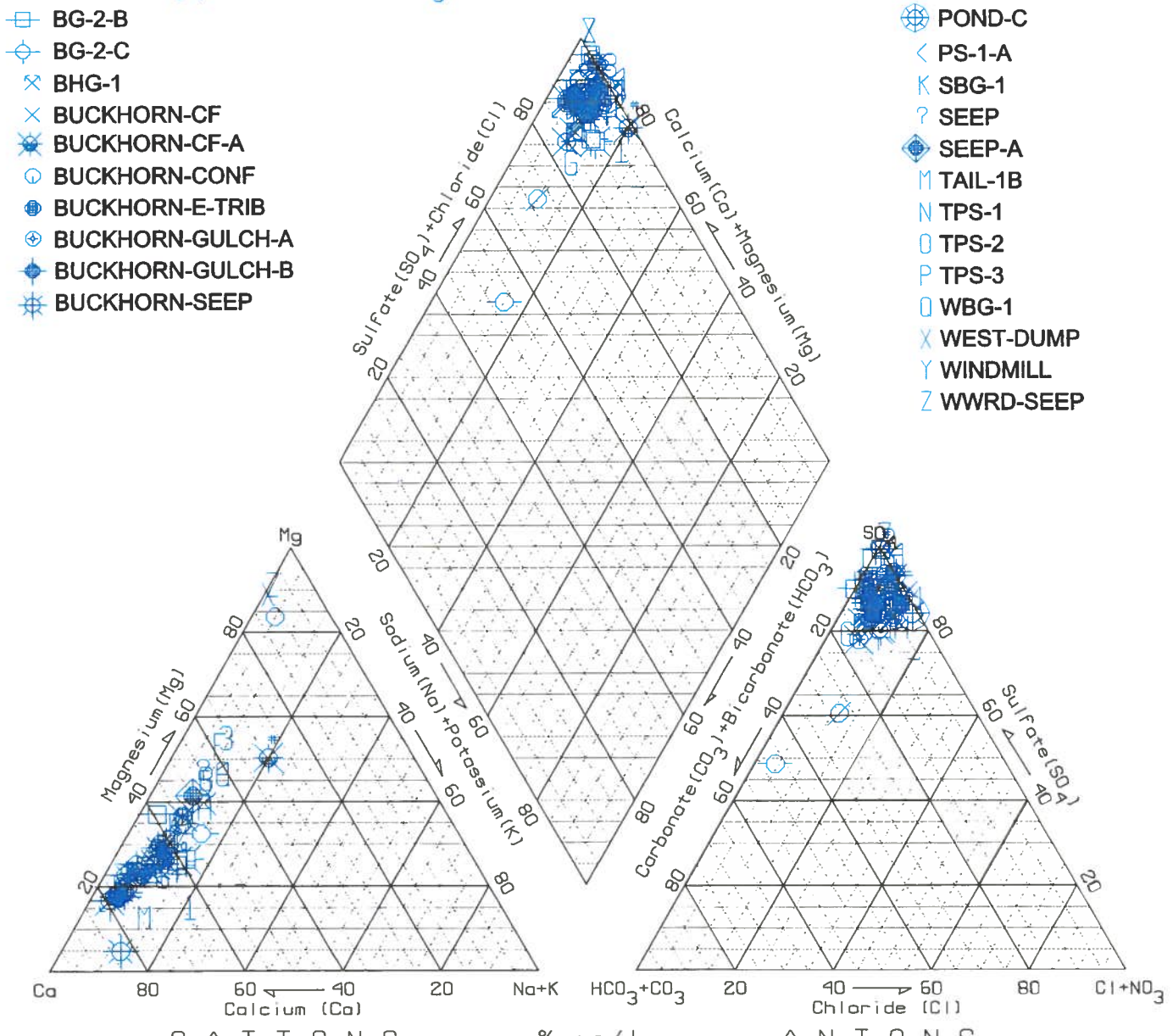
FIGURE C-20
PIPER DIAGRAM
CALCIUM-BICARBONATE REGIONAL SURFACE WATER

Date:	DECEMBER 1999
Project:	100029
File:	SRPIPB

LEGEND

- 116621
- 139892
- 61230
- BG-1-A
- BG-1-B
- BG-1-C
- BG-1-D
- BG-1-E
- BG-11
- BG-2
- BG-2-A
- BG-2-B
- BG-2-C
- BHG-1
- BUCKHORN-CF
- BUCKHORN-CF-A
- BUCKHORN-CONF
- BUCKHORN-E-TRIB
- BUCKHORN-GULCH-A
- BUCKHORN-GULCH-B
- BUCKHORN-SEEP
- CO92W-HCBG-A
- CO92W-HCBG-B
- CO92W-MT-1-A
- CO92W-MT-1-B
- CO92W-MT-1-C
- CO92W-MT-2-A
- CO92W-MT-2-B
- CO92W-MT-2-C
- CONT-POND-1-A
- CONT-POND-1-B
- CONT-POND-1-C
- DECANT
- DECANT-A
- EBG-5
- EDSN-1
- FAN-DISCHARGE
- FIERRO-SPR-B
- GG-1-A
- GG-1-B
- HAN-CR/ABOVE-HANOVER PROPERTY
- HAN-CR/BELOW HANOVER PROPERTY
- HAN-CR/BESIDE-HANOVER PROPERTY
- HSN-1
- HSN-1-A
- HSN-2
- HSN-2-A
- MAG-SEEP
- MAGNETITE-SEEP-A
- MAGNETITE-SEEP-B
- MDD-1
- MDD-2
- POND-A
- POND-B
- POND-C
- PS-1-A
- SBG-1
- SEEP
- SEEP-A
- TAIL-1B
- TPS-1
- TPS-2
- TPS-3
- WBG-1
- WEST-DUMP
- WINDMILL
- WWRD-SEEP



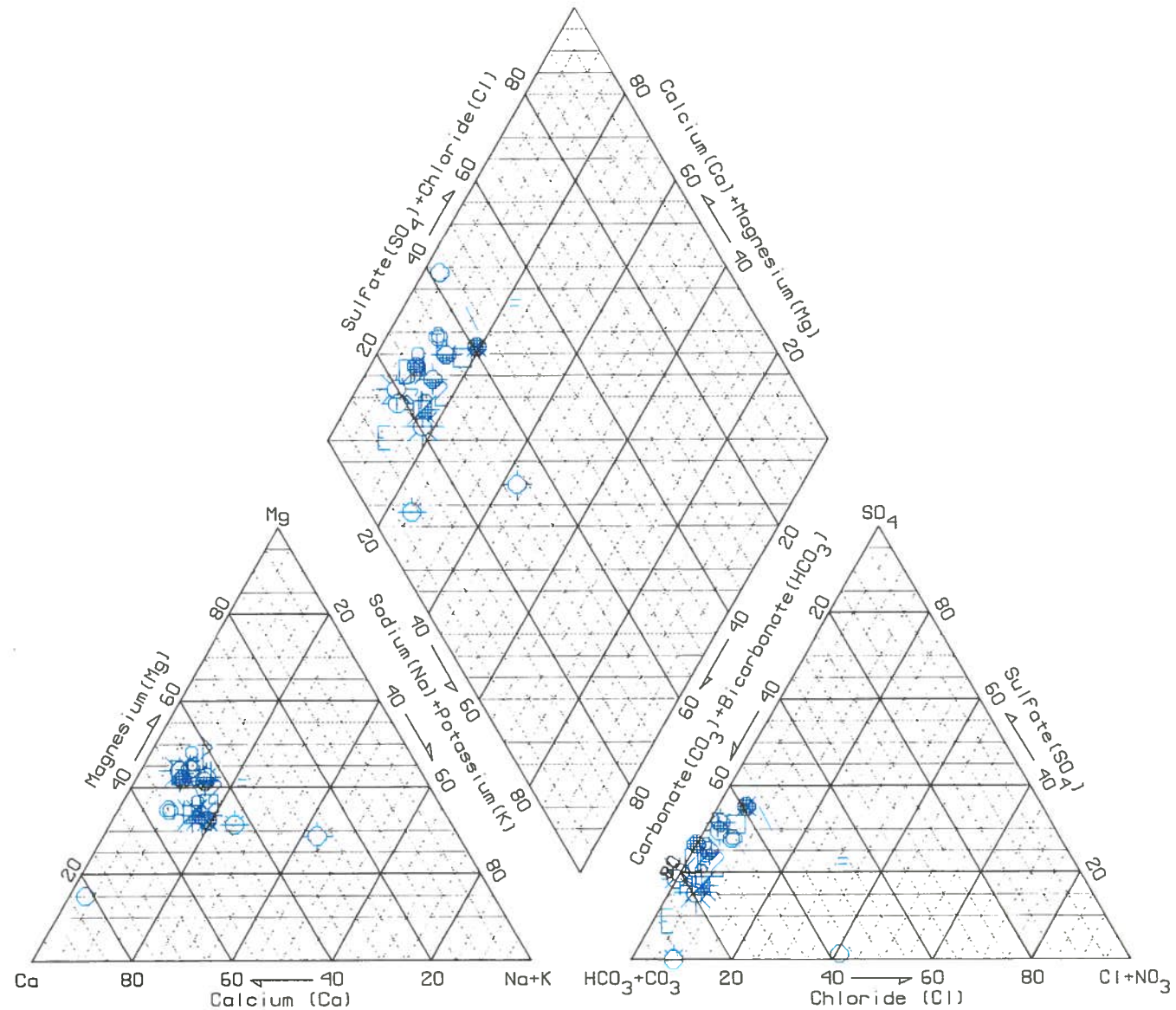
SHEPHERD MILLER INCORPORATED

FIGURE C-21
PIPER DIAGRAM
CALCIUM-SULFATE LOCAL SURFACE WATER

Date:	DECEMBER 1999
Project:	100029
File:	SPIPA

LEGEND

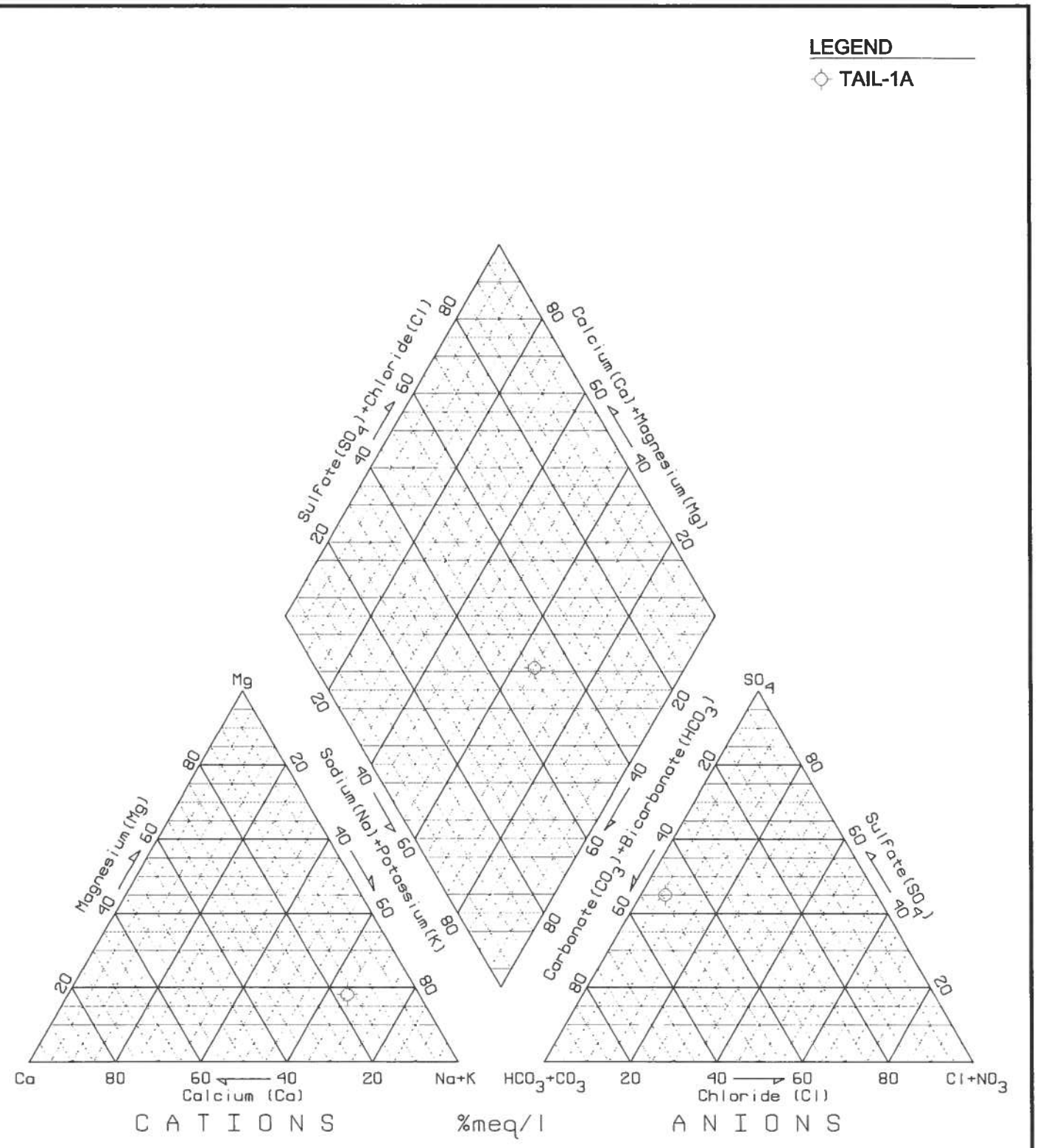
- 139880-2
- 139880-4
- 139886-7-8
- BG-1-F
- CO92-HCBG-C
- CO92W-SPR-A
- CO92W-SPR-B
- CO92W-SPR-C
- FIERRO-SPR-A
- FIERRO-SPR-C
- FS-1
- GAP-1
- GRP-1
- HANOVER-CR-SPRING
- HC-1
- HC-1-A
- HC-1-B
- POISON-SPRING
- PS-1
- PS-1-B
- PS-1-C
- PS-1-D
- PS-1-E
- PS-2
- TRUCK-SHOP



SHEPHERD MILLER INCORPORATED

FIGURE C-22
PIPER DIAGRAM
CALCIUM-BICARBONATE LOCAL SURFACE WATER

Date:	DECEMBER 1999
Project:	100029
File:	SPIPB



SHEPHERD MILLER
INCORPORATED

FIGURE C-23
PIPER DIAGRAM
SODIUM-BICARBONATE LOCAL SURFACE WATER

Date:	DECEMBER 1999
Project:	100029
File:	SPIPC

APPENDIX C

WATER QUALITY CHARACTERIZATION STUDY, CONTINENTAL MINE, GRANT COUNTY, NEW MEXICO

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December 1999

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INCORPORATED

APPENDIX C

WATER QUALITY CHARACTERIZATION STUDY CONTINENTAL MINE, GRANT COUNTY, NEW MEXICO

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1.0 INTRODUCTION

This appendix provides general descriptions of the local and regional water quality associated with the Continental Mine Expansion Project. The objectives of this report are to classify the general water quality types in the region, compare water quality between local baseline and regional sample populations, and describe the baseline water quality associated with specific facilities at the Continental Mine.

The various analyses used to generate this document include:

- Piper diagrams. This tool was used to group and to distinguish the general ionic character of local and regional water samples.
- Comparison of the median value of 5 key constituents to the New Mexico Water Quality Control (NMWQC) primary and secondary drinking water standards. In order to assess general water quality these five constituents (sulfate, TDS, copper, iron and zinc) were chosen because they are the most probable constituents of concern at the mine.
- Sulfate and Total Dissolved Solids (TDS) concentrations in local wells as a function of time.
- Preliminary comparisons of the average water quality at specific facilities to estimate potential facility impacts to surrounding water quality. Facilities evaluated include, the Main Tailings Pond, the waste rock disposal facilities, the underground workings, and the proposed Hanover Pit.

Various companies and agencies collected surface and ground water samples at various times between October 1929 and August 1999. The samples were collected both locally (Continental Mine) and regionally. A list of the documents reviewed to obtain local and regional data is included in the reference section (Section 5.0).

2.0 WATER QUALITY DATA AND ANALYSIS

2.1 Ground Water Quality

Ground water quality data were obtained from regional and local sampling locations as shown on Figures C-1 through C-3.

2.1.1 Regional Ground Water Quality

The quality of ground water in nearly all of Grant County is suitable for livestock, irrigation, domestic use, and most industrial uses (Trauger, 1972); however, ground water of unsuitable quality for general use is found in localized areas. Ground water has moderate to high hardness (high calcium and magnesium) nearly everywhere within the county. These hard waters are generally derived from carbonate aquifers due to the dissolution of calcite ($CaCO_3$) and/or dolomite ($CaMg(CO_3)_2$). The Colorado and Percha Shale Formations may also produce hard water due to naturally occurring gypsum ($CaSO_4 \bullet 2H_2O$) in these formations. Ground water from volcanic formations is typically of the best quality. It is usually soft (low calcium and magnesium) with low TDS concentrations (Bureau of Land Management [BLM], 1996).

Ground water samples from 89 regional sample locations (Regional Area A shown on Figures C-1 and C-2) were used to characterize the regional ground water quality. Four different water types were identified as follows:

- Calcium-sulfate water - predominant along Hanover Creek (Figure C-5).
- Calcium-bicarbonate water - prevalent in locations south of Hurley, New Mexico and south of the Peru Hill Mill (Luna County, New Mexico) (Figure C-6).
- Sodium-bicarbonate and sodium-sulfate waters - occurring south of the Florida Mountains (Luna County, New Mexico) (Figures C-7 and C-8, respectively).

Figure C-4 shows the approximate zones of the four regional ground water types. Differences in water type zones are most likely due to the variety of aquifer host formations within the study area. Attachment C.1 contains the analytical data used to create the Piper diagrams and the corresponding pH values and dates for each sample.

Water samples in Zone A (Figure C-4) have the same water type as samples collected near the Continental Mine Project (Zone A on Figure C-9) and are in close proximity to the mine site. Therefore, Regional Area A is considered to represent the regional water quality for the mine area and will be used to compare against local water quality.

To understand the general character of the water quality in Regional Area A, the median and range of sulfate, TDS, iron, copper, and zinc concentration were calculated. Mean values were not considered to be adequately representative of the data because the locations of the regional samples and frequency with which they were sampled were uncontrolled. The data set analyzed included all available ground water data from Regional Area A. The majority of the data were collected during the 1990s (1990 through 1999), with only a few samples dating as far back as 45 years to 1954. To calculate the median value, the concentrations of each constituent at each ground water sampling location were first averaged. The median value was then calculated from that set of averages. The range is the minimum and maximum in the set of average concentrations.

Because there was no control regionally over where and at what frequency water was sampled, sample locations that had unusually high concentrations were considered uncharacteristic of the regional water quality as a whole and were omitted. These data were omitted because their inclusion would have positively biased the regional (off-site) data statistics. The locations from Regional Area A that were omitted from the analysis are Chino Well CB6D, Chino Well WD10, Chino Well WD4, GW-4, MAKE-UP, PZ-10S, and PZ-12 (shown in Figure C-2). Wells PZ-10S and PZ-12 were omitted because their low pH values (3.7 to 3.9) coincided with

uncharacteristically high sulfate and TDS values. The typical pH values in other regional ground water samples ranged from 5 to 9 (average of 7.2). Sample, MAKE-UP was omitted from analysis because it came from waters generated from mine operations and is therefore not representative of regional quality. The remaining wells with unusually high TDS and SO_4 were omitted because they had uncharacteristically high constituent concentrations, most likely because they were located near dumps on the Chino Mine site or next to the Blackhawk Tailings. All of the average ground water data considered (including the uncharacteristically high values) are included in Attachment C.2.

Range and median statistics for the five dissolved constituents analyzed prior to and after the omission of the few samples with uncharacteristic data are shown in Table C-1. Table C-1 also shows the NMWQC standards for the constituents. The median values for sulfate and TDS for Regional Area A ground water exceeded NMWQC secondary standards while the median concentrations for iron, copper, and zinc were below the standards.

Table C-1. Summary Statistics of Regional Area A Ground Water Quality

All Data	**Cu**	**Fe**	**SO_4**	**TDS**	**Zn**
Min	nd	nd	7	208	0.033
Max	275	92.5	73800	113000	94.8
Median	6.360	0.77	950	1487.5	2.96
Count	7	12	47	41	13
Excluding Uncharacteristic Data					
Min	nd	nd	7	208	0.03
Max	6.36	0.80	4259	7296	16.90
Median	0.002	0.51	735	1274	0.38
Count	4	7	41	34	8
New Mexico Water Quality Secondary Standard for Domestic Water Supply (mg/L)					
	1.0	1.0	600	1000	10.0

Units are mg/L
nd = non-detect

2.1.2 Local Ground Water Quality

Ground water samples from 21 local sampling locations were used to characterize local ground water quality (see Figure C-3). Figure C-9 shows the approximate locations of the three types of local ground water. Attachment C.1 shows the analytical data used to create the Piper diagrams and the corresponding pH values and dates for each sample. Three water types were identified as follows:

- Calcium-sulfate water - predominant in areas along Buckhorn Gulch [south of the West and South Waste Rock Disposal Facilities (WRDF)] and to the east and south of the tailings pond (Figure C-10).

- Calcium-bicarbonate water - prevalent on the northern portion of the mine site (Figure C-11).

- Sodium-bicarbonate water - occurred in only one well (MW-1) located northeast of the tailings pond (Figure C-12). This well is completed in a shale unit of the Colorado formation, which could explain the sodium-dominated characteristic of this water. The water quality in MW-1 is different than any other local sample, and no other local ground water samples were characterized as sodium-sulfate water.

Similar to the regional ground water quality data, a median value was calculated for copper, iron, sulfate, TDS, and zinc. The majority of the data were collected during the 1990s (1990 through 1999), with only a few samples dating as far back as 1972. Range and median statistics for the five constituents analyzed are given in Table C-2. As with the regional wells, the median values for the local wells exceeded water quality standards for sulfate and TDS. The highest local sulfate and TDS concentrations occurred primarily in the areas west and southwest of the tailings pond and in the Buckhorn Gulch area south of the West and South Waste Rock Disposal Facility (WRDF). The median concentrations for iron, copper, and zinc were all below the water quality secondary standards for domestic water supply. Average local ground water quality data are included in Attachment C.2. No local samples were omitted from interpretation.

Table C-2. Summary Statistics of Local Ground Water Quality

All Data	Cu	Fe	SO_4	TDS	Zn
Min	nd	nd	23	268	nd
Max	7	23	2703	4286	48
Median	0.012	0.22	1291	2361	0.089
Count	16	19	20	20	21
New Mexico Water Quality Secondary Standard for Domestic Water Supply (mg/L)					
	1.0	1.0	600	1000	10.0

Units are mg/L
nd = non-detect

Figures C-13 through C-15 show sulfate concentrations over time at local monitoring wells. Sulfate concentrations have remained relatively stable at wells MW-1, MW-1A, MW-4, and MW-10. Sulfate concentrations at well MW-5 have increased from 150 to approximately 200 mg/L in the last 6 years. The sulfate concentrations in well MW-7 have remained stable since monitoring began. However, the result from the August 1999 sample shows a sudden increase in sulfate. This data point may reflect operational changes in the Main Tailings and Reclaim Pond, but will require additional monitoring to determine if this trend will continue. Historically, sulfate concentrations at wells MW-1, MW-1A, MW-4, MW-5, MW-7, and MW-10 have been below NMWQC secondary water quality standard (600 mg/L). Based on the past and current trends, it appears that the sulfate concentrations in these wells (except possibly MW-7) will remain below water quality standards in the future (Figure C-13).

Sulfate concentrations at wells MW-2, MW-8, MW-19, MW-21, and MW-24 have varied between approximately 1,000 and 1,700 mg/L during the period of record, but an overall trend is not obvious from the data (Figure C-14). However, the observed variations of sulfate concentration in these wells appear to coincide to one another, suggesting that the variations are being controlled in part by the same mechanism in each well. Well MW-3 has been generally increasing from approximately 650 mg/L to 850 mg/L sulfate over the period of record. Subtle variations similar to those noted above are seen in the data.

The TDS concentrations over time in the local monitoring wells are shown in Figures C-16 through C-18. TDS concentrations in monitoring wells MW-1, MW-1A, MW-4, and MW-5 are relatively stable below the NMWQC water quality standard of 1,000 mg/L for TDS (Figure C-16).

The TDS concentrations in well MW-7 have remained stable since monitoring began (Figure C-17). However, the result from the August 1999 sample shows a sudden increase in TDS. This data point may reflect operational changes in the Main Tailings pond, but will require additional monitoring to determine if this trend will continue. The TDS concentration at well MW-10 has remained relatively stable over time at approximately 1,200 mg/L (Figure C-16). Well MW-3 has been generally increasing from approximately 1,200 to 1,500 mg/L TDS over the period of record. Wells MW-2, MW-8, MW-19, and MW-24 show variations in TDS, but no overall trend is obvious in the data. Well MW-20 has shown the largest increase in TDS concentrations over time, with an initial increase in TDS of approximately 1,200 mg/L during the first year, but has remained stable near 3,600 mg/L since. (Figure C-17). Between November 1998 and August 1999, TDS concentrations in wells MW-21 and MW-25 have significantly decreased (Figure C-18).

2.2 Surface Water Quality

The approximate locations of the regional and local surface water samples are included in Figures C-1 through C-3.

2.2.1 Regional Surface Water Quality

Within Grant County, surface waters from storm runoff typically are elevated in TDS, whereas surface waters from baseflow contain lower TDS concentrations. Generally, surface water quality is best at stream headwaters and decreases downstream (BLM, 1996).

Surface water data from 35 regional sampling locations were used to help characterize regional surface water into zones (Figure C-4). Based on assessment of the

characterization of the regional ground water, as discussed in Section 2.1.1, the regional samples used in this analysis were narrowed to 21 surface water samples located within Regional Area A (Figures C-1 and C-2). Most surface water samples were obtained from the vicinity of and north of Hanover, New Mexico. Two water types were identified:

- Calcium-sulfate water - predominantly occurred in areas along Hanover Creek. A majority of sample locations were of this type (Figure C-19).

- Calcium-bicarbonate water - located south of Hurley, New Mexico; two sampling locations were of this type (Figure C-20).

Attachment C.1 contains the analytical data used to create the Piper diagrams and the corresponding pH values and dates for each sample.

A median value of the dissolved concentration of sulfate, TDS, iron, copper, and zinc in Regional Area A surface water was calculated in the same fashion as for the ground water data. The majority of the data were collected in the 1990s (mostly 1990 through 1996), with a few samples dating back to 1972 (27 years).

Table C-3 lists the ranges and median values of the five constituents analyzed for the available Regional Area A surface water quality sampling locations. Like the ground water results, the median values for sulfate and TDS exceeded water quality standards, and the median values for iron, copper, and zinc concentrations were below the water quality standards. Average surface water quality data are included in Attachment C.3.

Table C-3. Summary Statistics of Regional Area A Surface Water Quality

All Data	Cu	Fe	SO_4	TDS	Zn
Min	0.0075	0.127	423	213	0.043
Max	0.058	0.127	1910	3310	7.9
Median	0.0165	0.127	1565	2487	1.07
Count	6	1	18	18	8
New Mexico Water Quality Secondary Standard for Domestic Water Supply (mg/L)					
	1.0	1.0	600	1000	10.0

Units are mg/L
nd = non-detect

2.2.2 Local Surface Water Quality

Data from 62 local surface water sampling locations were examined and used to characterize types of local surface water. The trends in water type with location were similar to those determined for the ground water samples. Three surface water types were identified.

- Calcium-sulfate water - prevalent in areas to the east and south of the tailings pond and along Buckhorn Gulch (Figure C-21).
- Calcium-bicarbonate water - occurs on the northern portion of the site, particularly at Poison Spring, along Grape Gulch, and at Fierro Spring (Figure C-22).
- Sodium-bicarbonate water - occurred only at one sampling location in the tailings pile (Figure C-23).

Figure C-9 displays the local extents of the various water type zones. Attachment C.1 contains the analytical data used to create the Piper diagrams and the corresponding pH values and dates for each sample.

Table C-4 lists the ranges and medians for the five constituents analyzed with respect to local surface water quality. Several local surface water sampling locations were excluded from the analysis because of their uncharacteristically high constituent values. Excluded sampling locations included 11662, BUCKHORN CF, WEST DUMP, WWRD_SEEP, and WWRDF. As with the regional surface water data and

the ground water data, the median concentrations of sulfate and TDS exceeded water quality standards for the site. Median concentrations for iron, copper, and zinc were below water quality standards. The average local surface water quality data, including the uncharacteristically high constituents, are included in Attachment C.3.

Table C-4. Summary Statistics of Local Surface Water Quality

All Data	**Cu**	**Fe**	**SO_4**	**TDS**	**Zn**
Min	nd	nd	37	211	nd
Max	369.5	71.65	20180	23000	169.16
Median	0.036	0.023	1776	2700	0.36
Count	26	15	52	62	30
Excluding Uncharacteristic Data					
Min	nd	nd	36.9	211	nd
Max	0.19	55.00	20180	8500	7.80
Median	0.03	0.02	1700	2544	0.25
Count	23	12	49	58	27
New Mexico Water Quality Secondary Standard for Domestic Water Supply (mg/L)					
	1.0	1.0	600	1000	10.0

Units are mg/L
nd = non-detect

3.0 COMPARISON OF LOCAL AND REGIONAL AREA A WATER QUALITY

Water quality at local and Regional Area A ground water and surface water monitoring locations were compared by examining dissolved concentrations of: (1) iron, (2) copper, (3) zinc, (4) sulfate, and (5) TDS. This comparison was facilitated by statistical tests, the *F* test and Student's *t* test, to distinguish if the two separate data sets are different. The local and Regional Area A data were assumed to be two independent data sets representing water quality surrounding the mine site. The purpose of this comparison was to show areas where local water quality differs from that found regionally. The data used in the analysis are included in Attachment C.4. Cobre can use these differences to direct further investigation and characterization efforts.

3.1 Probability and Frequency Distribution Analysis

Before performing any comparative statistical analyses, unique populations for each constituent needed to be identified and separated. Two methods that aided in this task were probability distribution diagrams and frequency distribution diagrams. Probability diagrams, which have many applications in geology and engineering, are a useful technique for displaying, separating, and characterizing unique populations of data. At mine sites, these unique populations can sometimes be interpreted to represent a wide range of conditions, ranging from natural background to effects from anthropogenic activity. However, for this analysis, the probability approach was employed only to identify and separate unique populations of data to be used in the statistical comparison. Further characterization work will be required to assess the reasons for differences found.

For the probability distribution analysis, all data were transformed into logarithmic values to aid in the identification and separation step. The basis for performing the logarithmic transformation is that natural populations generally follow log normal

distributions, thus allowing distinct, multiple populations to be more easily recognized. Data reported as less than method detection limits were included in the analysis after substitution of a value equal to one half the reported detection limit. Each constituent from the representative data sets was examined in this manner. Individual probability graphs were generated for each constituent and are provided in Attachment C.4, Figures C.4-1 through C.4-20. After identification of distinct populations, the data were transformed back to arithmetic values. Summary statistics (that is, the arithmetic mean, standard deviation, variance, and number of values) were calculated using the arithmetic values for each population, including substituted values for below detection limit data. These statistics are summarized in Attachment C.4.

3.2 Description of Statistical Tests

Using the local and regional populations identified for each constituent by the probability distribution analysis (Attachment C.4), statistical tests were performed to determine if populations could be correlated. The *F* test evaluated a pair of samples (groups of data) to determine if their variances were statistically equivalent. This test assumes that the sample variance represents the true population from which the samples were randomly drawn. A failed *F* test indicates that the sample data sets have statistically different variances. Thus, they may be sampled from different populations. An *F* test that passes indicates that the variances are statistically equivalent and therefore the sample sets may be from the same overall population.

For pairs of samples that pass the *F* test, an additional procedure, the Student *t* test, is required. The *t* test confirms that the pair of sample sets are from the same population by testing the equality of means. If the results of the Student *t* test indicate that the sample means do not correlate, the sample data sets are considered to be from different populations. A correlation of the sample means indicates that the two samples (local and Regional Area A) are statistically identical. A detailed description of the *F* test and Student *t* test along with the details of the analysis is provided in

Attachment C.4. Further descriptions can be found in fundamental books on statistics for applied sciences.

The results of the statistical tests are summarized in Tables C-5 (ground water) and C-6 (surface water). All of the mean concentrations are included in Attachment C.4. Tables C-5 and C-6 are divided into columns according to which populations were compared to one another for the Student *t* test. Generally, population 1 of the Regional Area A was compared against population 1 of the local data and similarly for population 2. For example, iron in the ground water for population 1 in the Regional Area A data is statistically equivalent to population 1 in the local data, but not to population 2 of the local data.

Table C-5 Statistical Comparison Summary of Ground Water Quality Populations

Ground Water		Lower Populations Comparison		Statistically Different ?	Upper Populations Comparison		Statistically Different ?
		Regional Area A	Local		Regional Area A	Local	
Copper	Mean	0.008	0.0046		0.008	0.062	
	Std. Dev.	0.004	0.0020	Y	0.004	0.053	Y
	No.	29	118		29	59	
Iron	Mean	0.047[a]	0.038[a]		0.59	0.038	
	Std. Dev.	0.033	0.037	N	0.32	0.037	Y
	No.	10	98		14	98	
Zinc	Mean	0.26[a]	0.047[b]				
	Std. Dev.	0.33	0.065	Y			NA
	No.	20	149				
Sulfate	Mean	256[a]	316[a]		1510	1570	
	Std. Dev.	194	181	N	446	560	N
	No.	34	68		39	121	
TDS	Mean	329[a]	245[a]		2000	1970	
	Std. Dev.	106	79	N	944	1142	Y
	No.	8	15		67	225	

Units are in mg/L. All statistics are for arithmetic values. Shaded cells indicate use of lower population values because a second population does not exist. Different letters within a comparison indicate the populations are statistically different.

Table C-6 Statistical Comparison Summary of Surface Water Quality Populations

Ground Water		Lower Populations Comparison		Statistically Different ?	Upper Populations Comparison		Statistically Different ?
		Regional Area A	Local		Regional Area A	Local	
Copper	Mean	0.012	0.043				
	Std. Dev.	0.016	0.061	Y			NA
	No.	14	77				
Iron	Mean	0.054	0.020		0.054	0.040	
	Std. Dev.	0.01	0.018	Y	0.10	0.25	Y
	No.	13	56		13	9	
Zinc	Mean	0.051	0.044		0.051	0.089	
	Std. Dev.	0.031	0.039	N	0.031	0.56	Y
	No.	5	43		5	33	
Sulfate	Mean	452	76		1580	1700	
	Std. Dev.	85	44	N	227	537	Y
	No.	3	21		17	97	
TDS	Mean	830	395		2540	3020	
	Std. Dev.	575	117	N	385	680	Y
	No.	4	38		22	124	

Units are in mg/L. All statistics are for arithmetic values. Shaded cells indicate use of the lower population values because a second population does not exist.

3.3 Summary and Conclusions

The following can be summarized from this analysis:

- Generally, at least two distinct populations can be identified for each of the five constituents analyzed.

- Comparison of arithmetic mean values (from the constituent populations identified) to NMWQC drinking water standards indicates that the Upper Population, both locally and regionally, exceeds standards for sulfate and TDS.

- The arithmetic mean value for the upper population, local, surface-water zinc concentrations exceeds NMWQC drinking water standards (which may be a result of surface water sampling from abandoned zinc mine pits).

- Comparing average sulfate and TDS values that exceed drinking water standards generally shows that there are different populations locally and regionally.

The objective of this analysis was to present and summarize baseline water quality data in an efficient and useful manner. This work will be used in subsequent characterization efforts to:

- Examine the reasons two populations generally exist
- Find where average sulfate and TDS values exceed NMWQC standards
- Establish whether or not a spatial correlation exists between the identified populations
- Identify the different processes that are responsible for the indicated water quality distributions.

4.0 FACILITY-SPECIFIC WATER QUALITY

This section discusses the potential water quality effects from several facilities on site. The facilities considered include the Main Tailings Pond, the South and West WRDFs, the underground workings, and the proposed Hanover Pit. Representative water quality data associated with these local facilities are summarized and designated as upgradient, downgradient, and facility samples. Constituents that have applicable New Mexico Water Quality Control (NMWQC) drinking water standards for ground water were considered in the analysis. Attachment C.5 contains the data used in the facility specific analysis. It should be noted that for all constituents reported with a non-detect qualifier, a concentration of 0.00 mg/L was assigned to that constituent for use in the analysis.

The data and analyses used to establish which wells and sampling locations were representative of upgradient, downgradient, or facility ground water are found in Appendix E (titled *General Hydrology and Water Balance Models for the Proposed Continental Mine Expansion Project, Grants County, New Mexico*). Open intervals, ground water flow directions, and surface water routes were considered in determining which sampling locations were appropriate for the analysis.

4.1 Main Tailings Pond

The average water quality upgradient of, downgradient of, and at the Main Tailings Pond were determined using the sampling locations listed on Table C-7. The average water quality data along with various NMWQC Standards are listed in Table C-8. All samples are surface water samples except those beginning with "MW," which are ground water samples.

Table C-7 Ground and Surface Water Sample Locations Associated with the Main Tailings Pond

Upgradient	Downgradient	Tailings Pond
139880-2	MW-2	POND
139880-4	MW-24	TAIL-1B
139883-4	MW-25	TAILINGS
MW-7	MW-3	UN4W-3
POISON SPRING	TPS-3	
PS	UN4W-2	
PS-1		
PS-2		

Several constituents listed on Table C-8 show an increase in average concentration between upgradient and downgradient samples that could possibly be the result of influences from the Main Tailings Pond. These constituents include chloride, sulfate, and TDS.

Several other constituents are elevated in the downgradient samples relative to the upgradient samples, but cannot be accounted for by the Main Tailings Pond water quality listed in Table C-8; these include cadmium, cobalt, copper, iron, manganese, and zinc. The concentrations of these constituents in the Main Tailings Pond were not sufficiently high to cause the observed increases in downgradient concentrations. Thus, the water quality downgradient of the Main Tailings Pond (that is, the Fierro Area) is not affected solely by the water quality of the tailings pond. For example, the magnetite dam, located northeast of the Main Tailings Pond, may also have an influence on the water quality in the Fierro Area. Monitoring well MW-25 (downgradient of the magnetite dam) had similar concentrations and the same water type as in samples from near the magnetite dam.

The average concentration of several constituents equals or exceeds one of the NMWQC standards, including cadmium, cobalt, copper, iron, manganese, sulfate, and TDS. Further analysis will be required to understand these exceedances.

Table C-8 Water Quality Results Associated with the Main Tailings Pond

Constituent (mg/L unless noted)	New Mexico Ground Water Standards			Upgradient		Tailings Facility		Downgradient	
	Human Health Standards	Other Standards for Domestic Supply	Standards for Irrigation Use	Average (mg/L)	Count	Average (mg/L)	Count	Average (mg/L)	Count
Aluminum	--	--	5.0	0.03	(21)	0.03	(17)	0.44	(36)
Arsenic	0.1	--	--	0.000	(21)	0.000	(12)	0.001	(36)
Boron	--	--	0.75	0.0	(2)	0.0	(1)	0.0	(2)
Cadmium	0.01	--	--	0.000	(22)	0.000	(12)	0.010	(35)
Chloride	--	250.0	--	13	(28)	218	(16)	119	(46)
Chromium	0.05	--	--	0.00	(21)	0.01	(12)	0.004	(36)
Cobalt	--	--	0.05	0.00	(20)	0.00	(11)	0.09	(35)
Copper	--	1.0	--	0.02	(22)	0.02	(17)	1.80	(36)
Iron	--	1.0	--	0.44	(21)	0.02	(12)	2.28	(36)
Lead	0.05	--	--	0.000	(22)	0.000	(12)	0.002	(36)
Manganese	--	0.2	--	0.55	(20)	0.34	(12)	13.81	(35)
Mercury	0.002	--	--	0.000	(5)	No Data	(0)	0.000	(6)
Molybdenum	--	--	1.0	0.190	(2)	0.17	(6)	0.281	(2)
Nickel	--	--	0.2	0.00	(22)	0.01	(12)	0.05	(36)
pH (standard units)	--	6 - 9	--	7.5	(30)	7.3	(24)	6.9	(40)
Selenium	0.05	--	--	0.000	(16)	0.004	(12)	0.002	(33)
Silver	0.05	--	--	0.00	(1)	No Data	(0)	0.00	(4)
Sulfate	--	600	--	280	(32)	1397	(23)	1338	(46)
TDS	--	1000	--	717	(32)	2353	(21)	2257	(45)
Zinc	--	10.0	--	0.014	(21)	0.20	(17)	0.486	(36)

Note: "Average" indicates the arithmetic average of all available samples (assuming non-detect values are 0.00 mg/L)
An average concentration of 0.00 mg/L indicates all available samples are non-detect values.
"Count" indicates how many samples were included in the average calculation, including non-detect values (assumed to be 0.00 mg/L)

4.2 Waste Rock Disposal Facilities

Average water quality was compared between two sample locations relating to the South Waste Rock Disposal Facility (WRDF): MW-12, the downgradient ground water sample location, and EDSN-1, a seep that is likely representative of the leachate water quality from the South WRDF. Ground water and surface water flow directions are discussed in Appendix E (titled *General Hydrology and Water Balance Models for the Proposed Continental Mine Expansion Project, Grants County, New Mexico*).

Table C-9 lists the constituents and the corresponding NMWQC standards that were considered. The average concentration of several constituents at MW-12 (downgradient of the South WRDF) exceeds some of the NMWQC standards, including iron, manganese, sulfate and TDS. The concentration of selenium[1], sulfate, and TDS at the EDSN-1 seep exceeds the NMWQC standards. However, only one sample has been collected at the EDSN-1 seep, which is not enough to establish a trend. Further analysis will be required to understand these exceedances.

The downgradient and at-facility samples exhibit different characteristics with respect to heavy metals concentrations, as shown in Table C-9. This is likely due to the fact that MW-12 is located near the old workings on Union Hill, while the seep sample (EDSN-1) is located in the Fierro Area, thus the samples are likely impacted by different sources.

[1] This exceedance of the selenium standard at the seep is an isolated measurement. No subsequent samples have exceeded the selenium standard. Also, the reason that this sample showed the selenium standard being exceeded was because of laboratory non-detect limits (ie., the samples were analyzed with a method that had a minimum detection limit at the water quality standard). It should also be noted that an additional sample taken at the same time and analyzed for total (i.e. not dissolved) selenium did not exceed the standard.

Table C-9. Water Quality Results Associated with the South Waste Rock Disposal Facility

Constituent (mg/L unless noted)	Human Health Standards	New Mexico Ground Water Standards		South Waste Rock Facility (EDSN-1)		Downgradient (MW-12)	
		Other Standards for Domestic Supply	Standards for Irrigation Use	Average (mg/L)	Count	Average (mg/L)	Count
Aluminum	--	--	5.0	0.00	(1)	0.01	(10)
Arsenic	0.1	--	--	No Data	(0)	0.000	(10)
Boron	--	--	0.75	No Data	(0)	No Data	(0)
Cadmium	0.01	--	--	0.000	(1)	0.000	(10)
Chloride	--	250.0	--	180	(1)	33	(10)
Chromium	0.05	--	--	0.000	(1)	0.01	(10)
Cobalt	--	--	0.05	0.000	(1)	0.001	(10)
Copper	--	1.0	--	0.19	(1)	0.01	(10)
Iron	--	1.0	--	0.00	(1)	1.53	(10)
Lead	0.05	--	--	0.00	(1)	0.000	(10)
Manganese	--	0.2	--	0.42	(1)	1.31	(10)
Mercury	0.002	--	--	0.000	(1)	No Data	(0)
Molybdenum	--	--	1.0	0.013	(1)	No Data	(0)
Nickel	--	--	0.2	0.04	(1)	0.01	(10)
pH (std units)	--	6 - 9	--	7.7	(1)	7.2	(8)
Selenium	0.05	--	--	0.07	(1)	0.005	(10)
Silver	0.05	--	--	No Data	(0)	No Data	(0)
Sulfate	--	600	--	2500	(1)	1683	(9)
TDS	--	1000	--	4000	(1)	2773	(10)
Zinc	--	10.0	--	1.1	(1)	0.089	(10)

Note: "Average" indicates the arithmetic average of all available samples (assuming non-detect values are 0.00 mg/L)
An average concentration of 0.00 mg/L indicates all available samples are non-detect values.
"Count" indicates how many samples were included in the average calculation, including non-detect values (assumed to be 0.00 mg/L)

For the West WRDF, the upgradient sample is MW-21, the downgradient sample is MW-20, and the West WRDF disposal seep (WWRDF_SEEP) and sample location WWRDF are the samples considered at the facility. Table C-10 lists the constituents and the corresponding NMWQC standards considered in the analysis. As shown in Table C-10, downgradient concentrations are lower than upgradient concentrations for almost all of the constituents. Only chloride appears to have increased between the upgradient area and the downgradient area, but the increase is not necessarily attributable to the West WRDF because the concentration downgradient is higher than at the facility itself. For almost all of the constituents considered (except chloride), the concentrations at the West WRDF are higher than the upgradient sample location, but do not appear to affect the water at the downgradient location. More hydrologic characterization is necessary to explain these results.

Average concentrations in the upgradient location (MW-21) exceed the NMWQC standards for cadmium, cobalt, copper, iron, manganese, nickel, sulfate, TDS, and zinc. For the downgradient sample (MW-20), average concentrations exceeded the standards for chloride, manganese, sulfate, and TDS. Average concentrations exceeded water quality standards at the facility for aluminum, cadmium, cobalt, copper, iron, manganese, nickel, pH, sulfate, TDS, and zinc.

Table C-10 Water Quality Results Associated with the West Waste Rock Disposal Facility

Constituent (mg/L unless noted)	Human Health Standards	New Mexico Ground Water Standards		Upgradient		West Waste Rock Facility		Downgradient	
		Other Standards for Domestic Supply	Standards for Irrigation Use	Average (mg/L)	Count	Average (mg/L)	Count	Average (mg/L)	Count
Aluminum	--	--	5.0	0.07	(11)	1139	(6)	0.05	(9)
Arsenic	0.1	--	--	0.002	(11)	0.000	(6)	0.000	(9)
Boron	--	--	0.75	No data	(0)	No data	(0)	No data	(0)
Cadmium	0.01	--	--	0.096	(11)	0.459	(6)	0.000	(9)
Chloride	--	250.0	--	40	(13)	174	(7)	481	(11)
Chromium	0.05	--	--	0.011	(11)	0.017	(6)	0.01	(9)
Cobalt	--	--	0.05	2.247	(10)	19.1	(6)	0.00	(8)
Copper	--	1.0	--	1.99	(11)	354	(6)	0.00	(9)
Iron	--	1.0	--	21.09	(11)	31.4	(6)	0.22	(9)
Lead	0.05	--	--	0.000	(11)	0.000	(6)	0.000	(9)
Manganese	--	0.2	--	148	(11)	960	(6)	0.47	(9)
Mercury	0.002	--	--	No data	(0)	No data	(0)	No data	(0)
Molybdenum	--	--	1.0	No data	(0)	0.000	(1)	No data	(0)
Nickel	--	--	0.2	0.39	(11)	9.32	(6)	0.09	(9)
pH (std units)	--	6 - 9	--	6.1	(12)	3.7	(6)	6.8	(10)
Selenium	0.05	--	--	0.000	(11)	0.008	(6)	0.000	(9)
Silver	0.05	--	--	No data	(0)	0.149	(1)	No data	(0)
Sulfate	--	600	--	2711	(13)	16857	(7)	1372	(11)
TDS	--	1000	--	4173	(13)	21217	(6)	3374	(11)
Zinc	--	10.0	--	47.7	(11)	214	(6)	0.121	(9)

Note: "Average" indicates the arithmetic average of all available samples (assuming non-detect values are 0.00 mg/L)
An average concentration of 0.00 mg/L indicates all available samples are non-detect values.
"Count" indicates how many samples were included in the average calculation, including non-detect values (assumed to be 0.00 mg/L)

4.3 Underground Workings

Table C-11 lists the constituents and the corresponding NMWQC standards considered to evaluate whether the underground workings may impact the ground water. The upgradient ground water is represented by the sample locations MW-2, MW-4, and MW-5. The downgradient ground water is represented by sample location UG_SUMP, which is water collected by the underground workings. The concentrations at UG_SUMP (downgradient) were higher than the average concentrations at upgradient locations for chloride, manganese, sulfate, TDS, and zinc. The average concentrations in UG_SUMP were lower than the average upgradient concentrations for aluminum and iron.

The average upgradient ground water concentration for TDS exceeded the NMWQC standard. At UG_SUMP, the NMWQC standards were exceeded for manganese, sulfate, and TDS.

Table C-11. Water Quality Results Associated with the Underground Workings

Constituent (mg/L unless noted)	Human Health Standards	New Mexico Ground Water Standards		Upgradient		Downgradient (UG_SUMP)	
		Other Standards for Domestic Supply	Standards for Irrigation Use	Average (mg/L)	Count	Average (mg/L)	Count
Aluminum	--	--	5.0	0.027	(40)	0.00	(8)
Arsenic	0.1	--	--	0.000	(40)	0.002	(8)
Boron	--	--	0.75	0.03	(3)	No data	(0)
Cadmium	0.01	--	--	0.000	(40)	0.001	(8)
Chloride	--	250.0	--	39	(65)	87	(8)
Chromium	0.05	--	--	0.000	(40)	0.00	(8)
Cobalt	--	--	0.05	0.00	(37)	0.02	(7)
Copper	--	1.0	--	0.00	(40)	0.02	(8)
Iron	--	1.0	--	0.65	(40)	0.04	(8)
Lead	0.05	--	--	0.000	(40)	0.000	(8)
Manganese	--	0.2	--	0.070	(37)	0.91	(8)
Mercury	0.002	--	--	0.001	(11)	No data	(0)
Molybdenum	--	--	1.0	0.041	(3)	No data	(0)
Nickel	--	--	0.2	0.01	(40)	0.01	(8)
pH (std units)	--	6 - 9	--	7.8	(65)	7.3	(7)
Selenium	0.05	--	--	0.001	(34)	0.001	(8)
Silver	0.05	--	--	0.00	(8)	No data	(0)
Sulfate	--	600	--	542	(65)	1234	(8)
TDS	--	1000	--	1082	(65)	2367	(8)
Zinc	--	10.0	--	0.06	(40)	4.67	(8)

Note: "Average" indicates the arithmetic average of all available samples (assuming non-detect values are 0.00 mg/L)
An average concentration of 0.00 mg/L indicates all available samples are non-detect values.
"Count" indicates how many samples were included in the average calculation, including non-detect values (assumed to be 0.00 mg/L)

4.4 Hanover Mountain (Pit)

Three samples are considered near Hanover Mountain to compare water quality: MW-1A, HSN-1, and HSN-2. Monitoring well, MW-1A, is approximately 1,000 feet upgradient of Hanover Mountain and is completed in a sandstone unit of the Colorado Formation (Figure C-3). HSN-1 is a surface water sample taken from a seep that issues from a sandstone unit on the north side of Hanover Mountain. HSN-2 is a surface water sample taken after the seep water traveled approximately 1,000 feet downstream from HSN-1 over other outcrops of the Colorado Formation. Table C-12 lists water quality constituents and the corresponding NMWQC standard. Concentrations in the HSN-1 sample were greater than those in the MW-1A sample for cobalt, copper, iron, manganese, nickel, sulfate, and zinc. In addition, the pH of the HSN-1 sample was lower than the pH of the MW-1A sample. Effects of mineralization associated with Hanover Mountain likely caused the differences between HSN-1 and MW-1A.

Chloride concentrations and pH values were greater in the HSN-2 sample than the HSN-1 sample. HSN-2 had lower concentrations than HSN-1 of cobalt, copper, iron, manganese, nickel, sulfate, TDS, and zinc. These differences were due to the effects of the seep water being exposed to the atmosphere and the Colorado Formation outcrops as the seep water flows approximately 1,000 feet from HSN-1.

All three samples have an average concentration of manganese that exceeds the NMWQC standard. Also, average concentrations of cobalt and iron in HSN-1 exceed the NMWQC standards.

Another sampling location important to this analysis is MW-1 because it will likely be upgradient of the final Hanover Pit. Monitoring well MW-1 was a unique sample because it was the only local ground water sample that was classified as sodium-bicarbonate water (Figure C-12). The pH of this sample was 9.3. MW-1 is completed in a shale unit in the lower portion of the Colorado Formation. The

hydraulic conductivity of this shale unit is relatively low (5×10^{-7} cm/sec) when compared to the average hydraulic conductivity (8.2×10^{-5} cm/sec) for the Colorado Formation. This indicates that the waters in this unit do not readily flow into and mix with waters from upper portions of the Colorado Formation.

Table C-12. Water Quality Results Associated with Hanover Mountain (Pit)

Constituent (mg/L unless noted)	Human Health Standards	New Mexico Ground Water Standards		Upgradient (MW-1A)		HSN-1 (Seep Face)		Downgradient	
		Other Standards for Domestic Supply	Standards for Irrigation Use	Average (mg/L)	Count	Average (mg/L)	Count	Average (mg/L)	Count
Aluminum	--	--	5.0	0.00	(12)	0.00	(1)	0.00	(1)
Arsenic	0.1	--	--	0.000	(13)	0.06	(1)	0.00	(1)
Boron	--	--	0.75	0.0	(1)	0.0	(1)	0.0	(1)
Cadmium	0.01	--	--	0.000	(13)	0.000	(1)	0.000	(1)
Chloride	--	250.0	--	30	(15)	5	(1)	8	(1)
Chromium	0.05	--	--	0.00	(12)	0.00	(1)	0.00	(1)
Cobalt	--	--	0.05	0.00	(12)	0.16	(1)	0.00	(1)
Copper	--	1.0	--	0.00	(13)	0.024	(1)	0.000	(1)
Iron	--	1.0	--	0.47	(13)	55	(1)	0.08	(1)
Lead	0.05	--	--	0.000	(13)	0.00	(1)	0.00	(1)
Manganese	--	0.2	--	0.47	(12)	3.1	(1)	0.24	(1)
Mercury	0.002	--	--	0.00	(1)	0.00	(1)	0.00	(1)
Molybdenum	--	--	1.0	0.000	(1)	0.000	(1)	0.000	(1)
Nickel	--	--	0.2	0.00	(13)	0.13	(1)	0.00	(1)
pH (std units)	--	6 - 9	--	7.0	(14)	4.8	(1)	6.4	(1)
Selenium	0.05	--	--	0.000	(12)	0.00	(1)	0.00	(1)
Silver	0.05	--	--	0.00	(1)	No data	(0)	No data	(0)
Sulfate	--	600	--	187	(14)	440	(1)	210	(1)
TDS	--	1000	--	611	(15)	600	(1)	350	(1)
Zinc	--	10.0	--	0.005	(13)	1.4	(1)	0.02	(1)

Note: "Average" indicates the arithmetic average of all available samples (assuming non-detect values are 0.00 mg/L)
An average concentration of 0.00 mg/L indicates all available samples are non-detect values.
"Count" indicates how many samples were included in the average calculation, including non-detect values (assumed to be 0.00 mg/L)

4.5 Proposed Leach Pad Areas

The proposed Fierro Leach Pad Area is to be located downgradient of the tailings pond. The water in the proposed Fierro Leach Pad Area was classified as calcium-sulfate water. In general, water quality standards were not exceeded except for cadmium, copper, iron, manganese, sulfate and TDS. More detailed information on this area can be found in Section 4.1 of this appendix concerning the samples that were collected downgradient of the Main Tailings Pond.

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