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JOB NO. 1153 LINE NO. ______ PAGE 1
AREA DUVAL DATE MAR 8,77
INSTRUMENT WEST FROM 0.0 B.M.

STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
B.S.	ELEV	ROD	H. I	F.S.	ROD	ELEV
T-1	3121.30	0.72	3122.02	TP1	12.84	3109.18
				TP2	13,02	3109.00
TP2	3109.00	7.81	3116.81	5.0	9.47	3107.34
TP1	3109.18	2.61	3111.79	0.0 BM-1	11.06	3100.73
BM 1	3100.73	9.66	3110.39	2.5	5.63	104.76
2.5	104.76	6.30	111.06	5.0	4.19	106.87
5.0	106.87	11.60	118.47	7.5	5.66	112.81
				10.0	8.47	110.00
				12.5	6.92	111.55
12,5	111.55	2.71	114.26	15.0	9.99	104.27
15.0	104.27	10.84	115.11	WELL 8	9.46	105.65
				TP1	0.15	115.26
TP-1	115.26	10.84	126.10	17.5	1.10	125.00
17.5	125.00	10.35	135.35	TP2	0.27	135.08
TP-2	135.08	8.86	143.94	20.0	4.71	139.23
				22.5	0.60	143.34
22.5	143.34	2.99	146.33	TP3	10.08	136.2
				TP4	1,41	144.92
TP 3	136.25	2.49	138.74	25.0	11.59	127.15
TP 4	144.92	10.11	155.03	27.5	0.24	154.79
27.5	154.79	8.44	163.23	30.0	6.33	156.90
				32.5	7,26	155.92
32.5	155.97	12.72	168.69	35.0	10.01	158.68
				WELL 9	9.23	159.46
				37.5	9.78	158.91
37.5	158.91	14.12	173.11	40.0	10.45	162.6
				42.5	3.82	169.29
42.5	169.29	7.30	176.59	45.0	10.51	166.08
45.0	166.08	11.57	177.65	47.5	11.70	165.91

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SECT COR. TIE

S 5°W FR STA 0.5
172' SLOPE

JOB NO. 1153 **LINE NO.** **PAGE** 2

AREA DUVAL **DATE** MAR 8, 77

INSTRUMENT [illegible]

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	H I	F.S	ROD	ELEV
2	45.0	[illegible]	11.57	177.65	TP6	1.69	175.96
3	TP 6	175.96	3.07	179.03	TP7	5.24	173.79
4	TP 7	173.79	1.98	175.77	TP8	11.63	164.14
5	" 8	164.14	0.43	164.57	" 9	7.20	157.37
6	" 9	157.37	3.64	161.01	" 10	11.88	149.13
7	" 10	149.13	1.67	150.80	" 11	11.84	138.96
8	" 11	138.96	2.60	141.56	17.5	10.40	131.16
9							
10			NO TIE				
11							
12							
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2) 1.68 (.84
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7.30

137.97
11.88
126.09

148.20
7.30
55

143.99
11.57
55.56

141.53
7.20
134.33

155 56
11.70
4386

Job No. ______ Line No. ______ Page 2A
Area RERUN Date 3-9-77
Instrument CK GOOD

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BS	EL.	ROD	HI	F.S	ROD	EL.
2	22.5	143.34	2.50	145.84	TP.	8.80	137.04
3	TP 1	137.04	0.26	137.30	25.0	10.30	127.00
4	22.5	143.34	4.45	147.79	20.0	8.53	139.26
5	47.5	165.95	10.80	176.75	TP 6	0.72	176.03
6					TP7	2.79	173.96
7	TP 7	173.96	3.40	177.36	TP 8	9.42	167.94
8	TP 8	167.94	1.97	169.91	35.0	10.12	159.79
9					30.0	12.20	157.71
10	30.0	157.71	3.80	161.51	27.5	5.62	155.89
11				161.51	TP9	11.53	149.98
12	TP 9	149.98	11.14	251.12	22.5	6.74	144.38
13					TP10	8.18	142.94
14	TP10	142.94	2.43	145.37	20.0	5.40	139.97
15							
16	20.0	139.97	2.43	142.40	TP11	11.65	130.75
17	TP 11	130.75	0.34	131.09	17.5	5.46	125.63
18					TP12	10.81	120.28
19	TP 12	120.28	0.38	120.66	TP13	12.74	107.92
20	TP13	107.92	7.39	115.31	15.0	10.56	104.75
21							(+.48)
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JOB NO. 1153 **LINE NO.** 4750-6000 SW **PAGE** 3
AREA DUVAL MINE **DATE** 3-9-77
INSTRUMENT LEVEL

STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
B.S.	ELEV	ROD	HI	F.S.	ROD	ELEV
47.5	165.95	12.42	178.37	TP-1	1.57	176.80
TP1	176.80	9.81	186.61	50.0	7.60	179.01
				TP2	1.23	185.38
TP2	185.38	12.36	197.74	TP3	0.25	197.49
TP3	197.49	3.06	200.55	52.5	1.72	198.83
				TP-4	12.09	188.46
TP4	188.46	0.17	188.63	55.0	11.73	176.90
55.0	176.90	1.36	178.26	TP5	10.32	167.94
TP5	167.94	5.03	172.97	57.5	7.28	165.69
				TP6	2.94	170.03
TP6	170.03	11.32	181.35	TP7	2.53	178.82
TP7	178.82	10.40	189.22	WELL 10	4.21	185.01
				60.0	1.85	187.37
				T/S TP8	2.68	186.54
TP8	186.54	5.12	191.66	TP9	11.29	180.37
TP9	180.37	1.77	182.14	TP10	9.46	172.68
TP10	172.68	2.38	175.06	47.5	9.11	165.95
						(0.0)

JOB NO. 1153 LINE NO. SW PAGE 4
AREA 6000 - 8500 S.W. DATE 3/14/77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	H I	F.S.	ROD	ELEV
2	600W	187.37	12.79	200.16	TP-1	11.42	188.74
3	TP-1	188.74	7.90	196.64	62.5	11.93	184.71
4					TP-2	0.43	196.21
5	TP-2	196.21	7.04	203.25	65.0	8.99	194.26
6					67.5	4.40	198.85
7	67.5	198.85	12.33	211.18	TP-3	0.67	210.51
8	TP-3	210.51	12.36	222.87	TP-4	0.08	222.79
9	TP-4	222.79	12.34	235.13	70.0	10.94	224.19
10					72.5	2.11	233.02
11	72.5	233.02	6.43	239.45	75.0	4.32	235.13
12					77.5	3.05	236.40
13	77.5	236.40	4.53	240.93	80.0	7.60	233.33
14					TP-5	8.50	232.43
15	TP-5	232.43	3.38	235.81	82.5	4.41	231.40
16					TP6	12.38	223.43
17	TP-6	223.43	1.76	225.19	85.0	8.33	216.86
18					TP-7	0.64	224.55
19	TP-7	224.55	12.72	237.27	TP-8	0.70	236.57
20	TP-8	236.57	7.88	244.45	TP-9	5.80	238.65
21	TP-9	238.65	4.36	243.01	TP-10	12.38	230.63
22	TP-10	230.63	0.65	231.28	TP-11	12.90	218.38
23	TP-11	218.38	2.57	220.95	TP-12	11.20	209.75
24	TP-12	209.75	2.52	212.27	TP-13	12.98	199.29
25	TP-13	199.29	0.75	200.04	60.0	12.40	187.64
26							(+.27)
27							
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JOB NO. 1153 LINE NO. N PAGE 5
AREA 0-1500 N DATE 3-9-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	FS	ROD	ELEV.
	SW-N 0-0	100.73	5.13	105.86	N2.5	4.26	101.60
3					WELL #2	9.85	96.01
4	WELL #2	96.01	0.10	96.11	TP-1	12.05	84.06
5	TP-1	84.06	2.97	87.03	N5.0	11.25	75.78
6					TP-2	2.00	85.03
7	TP-2	85.03	12.35	97.38	N7.5	3.12	94.26
8					TP-3	0.10	97.28
9	TP-3	97.28	11.19	108.47	TP-4	1.08	107.39
10	TP-4	107.39	5.96	113.35	N10.0	3.42	109.93
11					TP-5	12.07	101.28
12	TP-5	101.28	1.26	102.54	N12.5	7.03	95.51
13					TP-6	10.09	92.45
14	TP-6	92.45	11.33	103.78	N15.0	5.39	98.39
15				RETURN TIE	TP-7	3.39	100.39
16	TP-7	100.39	9.49	109.88	TP-8	0.35	109.53
17	TP-8	109.53	7.75	117.28	TP-9	12.76	104.52
18	TP-9	104.52	5.52	110.04	TP-10	6.02	104.02
19	TP-10	104.02	8.77	112.79	SWN 0-0	12.03	100.76
20							(+.03)
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JOB NO. 1153 LINE NO. N PAGE 6
AREA 1500-3000 N DATE 3-10-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	F.S.	ROD	ELEV
	N 15.0	98.39	6.98	105.37	N17.5	4.29	101.08
3					N20.0	4.93	100.44
4	N20.0	100.44	7.94	108.38	N22.5	10.93	97.45
5					TP1	2.14	106.24
6	TP-1	106.24	3.45	109.69	WELL #7	1.76	107.93
7					25.0	2.35	107.34
8					TP2	11.76	97.93
9	TP-2	97.93	3.76	101.69	27.5	9.34	92.35
10					30.0	12.38	89.31
11			RETURN TIE		TP-3	1.03	100.66
12	TP-3	100.66	11.31	111.97	TP-4	5.46	106.51
13	TP-4	106.51	3.43	109.94	15.0	11.60	98.34
14							(←.05)
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JOB NO. 1153 LINE NO. N PAGE 7
AREA 3000-4500 N DATE 3-10-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	FS	ROD	ELEV
2	N30.0	89.31	6.48	95.79	N32.5	7.32	88.47
3	32.5	88.47	9.93	98.40	35.0	0.01	98.39
4	35.0	98.39	13.07	111.46	TP-1	0.50	110.96
5	TP-1	110.96	12.79	123.75	TP-2	0.39	123.36
6	TP-2	123.36	7.80	131.16	37.5	5.52	125.64
7					40.0	6.50	124.66
8					TP-3	12.80	118.36
9	TP-3	118.36	0.29	118.65	TP-4	10.99	107.66
10	TP-4	107.66	0.47	108.13	TP-5	11.77	96.36
11	TP-5	96.36	0.93	97.29	42.5	5.28	92.01
12					TP-6	1.73	95.56
13	TP-6	95.56	12.23	107.79	TP-7	0.34	107.45
14	TP-7	107.45	7.56	115.01	45.0	6.86	108.15
15			RETURN	TIE	TP-8	3.04	111.97
16	TP-8	111.97	11.44	123.41	TP-9	1.27	122.14
17	TP-9	122.14	5.60	127.74	37.5	1.91 +	125.63
18	37.5	125.63	0.37	126.00	TP-10	12.30 ↓	113.70
19	TP-10	113.70	0.06	113.76	TP-11	12.60	101.16
20	TP-11	101.16	0.26	101.42	35.0	2.96	98.46
21					TP-12	12.83	88.59
22	TP-12	88.59	2.04	90.63	32.5	2.11	88.52
23	32.5	88.52	7.11	95.63	30.0	6.23	89.40
24							
25							88.60
26							(+.29)
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JOB NO. 1153 LINE NO. N PAGE 8
AREA 4500 - 6000 N DATE 3-10-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	F.S.	ROD	ELEV
2	N45.0	108.15	13.12	121.27	TP-1	0.54	120.73
3	TP-1	120.73	12.43	133.16	TP-2	1.13	132.03
4	TP-2	132.03	10.42	142.45	N47.5	7.52	134.93
5					WELL #6	8.86	133.59
6					50.0	10.34	132.11
7	50.0	132.11	3.65	135.76	TP-3	12.84	122.92
8	TP-3	122.92	1.60	124.52	52.5	10.91	113.61
9					55.0	11.46	113.06
10	55.0	113.06	5.96	119.02	57.5	4.55	114.47
11					TP-4	3.99	115.03
12	TP-4	115.03	6.51	121.54	60.0	3.60	117.94
13			RETURN	TIE	TP-5	6.70	114.84
14	TP-5	114.84	3.70	118.54	52.5	4.90	113.64
15	52.5	113.64	10.76	124.40	TP-6	1.26	123.14
16	TP-6	123.14	11.90	135.04	TP-7	0.47	134.57
17	TP-7	134.57	7.52	142.09	47.5	7.14	134.95
18					TP-8	10.86	131.23
19	TP-8	131.23	1.73	132.96	TP-9	12.62	120.34
20	TP-9	120.34	1.34	121.68	TP-10	11.24	110.44
21	TP-10	110.44	7.52	117.96	45.0	9.78	108.18
22							(+.03)
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JOB NO. 1153 LINE NO. N PAGE 9
AREA 6000-7500 N DATE 3-10-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV.	ROD	H.I	F.S.	ROD	ELEV
2	N60.0	117.94	9.16	127.10	N62.5	7.20	119.90
3					65.0	6.80	120.30
4					67.5	5.01	122.09
5	67.5	122.09	2.96	125.05	70.0	3.04	122.01
6					72.5	4.32	120.73
7	72.5	120.73	1.96	122.69	75.0	12.79	109.90
8			RETURN	TIE	TP-1	2.74	119.95
9	TP-1	119.95	6.70	126.65	TP-2	4.75	121.90
10	TP-2	121.90	3.75	125.65	60.0	7.71	117.94
11							0.0
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JOB NO. 1153 LINE NO. N PAGE 10

AREA 7500-9000 N DATE 3-11-77

INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	H.I.	F.S.	ROD	ELEV.
	N 75.0	109.90	4.31	114.21	N 77.5	6.46	107.75
3	77.5	107.75	7.84	115.59	80.0	1.15	114.44
4	80.0	114.44	10.84	125.28	WELL #5	2.40	122.88
5	WELL #5	122.88	9.58	132.46	82.5	10.95	121.51
6					85.0	7.54	124.92
7	85.0	124.92	6.41	131.33	87.5	5.00	126.33
8					TP-1	1.26	130.07
9	TP-1	130.07	6:03	136.10	90.0	6.52	129.58
10			RETURN	TIE	TP-2	10.90	125.20
11	TP-2	125.20	3.92	129.12	TP-3	12.69	116.43
12	TP-3	116.43	0.35	116.78	77.5	9.07	107.71
13	77.5	107.71	6.57	114.28	75.0	4.42	109.86
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JOB NO. 1153 LINE NO. N PAGE 11
AREA 9000 - 10500 N DATE 3-11-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	F.S.	ROD	ELEV
	N90.0	129.58	9.36	138.94	N92.5	6.15	132.79
3					TP-1	7.76	131.18
4	TP-1	131.18	7.72	138.90	95.0	6.71	132.19
5					97.5	6.58	132.32
6					TP-2	1.18	137.72
7	TP-2	137.72	9.02	146.76 (4)	100.0	6.30	+.02 140.46
8					102.5	10.42	136.34
9	102.5	136.34	6.18	142.52	105.0	1.91	140.61
10					WELL #4	0.46	142.06
11			RETURN	TIE	TP-3	3.11	139.41
12	TP-3	139.41	3.14	142.55	TP-4	10.75	131.80
13	TP-4	131.80	4.25	136.05	90.0	6.40	129.65
14							129.62
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JOB NO. 1153 **LINE NO.** N **PAGE** 12
AREA 10500 -12000 N **DATE** 3-11-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV.	ROD	HI	FS	ROD	ELEV
	N 105.0	140.61	8.11	148.72	107.5	8.95	139.77
3					110.0	1.07	147.65
4	110.0	147.65	5.26	152.91	112.5	3.97	148.94
5					115.0	7.01	145.90
6					117.5	5.08	147.83
7	117.5	147.83	4.52	152.35	120.0	5.70	146.65
8			RETURN	TIE	TP-1	3.60	148.75
9	TP-1	148.75	2.69	151.44	TP-2	11.30	140.14
10	TP-2	140.14	6.25	146.39	105.0	5.74	140.65
11							(+.04)
12							
13							
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JOB NO. 1153 LINE NO. N PAGE 13
AREA ..DUVAL 12000 - 13500 N DATE 3-11-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV.	ROD	HI	F.S.	ROD	ELEV.
	N120.0	146.65	.12.33	158.98	122.5	11.33	147.65
3					125.0	7.84	151.14
4					TP-1	0.32	158.66
5	TP-1	158.66	12.80	171.46	127.5	10.66	160.80
6					130.0	5.66	165.80
7					132.5	11.12	160.34
8	132.5	160.34	0.91	161.25	WELL #3	4.66	156.59
9					135.0	12.86	148.39
10			RETURN	TIE	TP-2	1.40	159.85
11	TP-2	159.85	11.41	171.26	TP-3	8.90	162.36
12	TP-3	162.36	0.30	162.66	TP-4	12.64	150.02
13	TP-4	150.02	8.05	158.07	120.0	8.76	149.31
14							BOST
15	120.0	146.65	8.46	155.11	125.0	4.13	150.98
16	125.0	150.98	11.80	162.78	127.5	2.05	160.73
17	127.5	160.73	9.80	170.53	130.0	5.03	165.50
18	130.0	165.50	3.70	169.20	132.5	8.86	160.34
19	132.5	160.34	1.48	161.82	WELL #3	5.25	156.57
20					TP5	13.10	148.72
21	TP-5	148.72	4.63	153.35	135.0	4.89	148.46
22							(+.07)
24							
25							
26							
28							
29							
30							

Job No. 1153 Line No. N Page 14
Area DUVAL 13500 -15000 N Date 3-11-77
Instrument

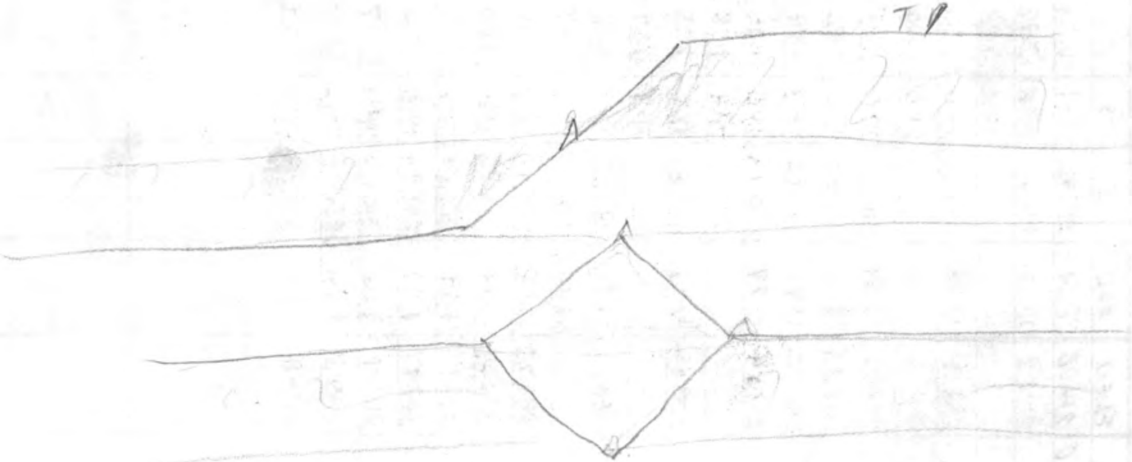
STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
B.S.	ELEV.	ROD	HI	F.S.	ROD	ELEV
135.0	148.46	4.90	153.36	137.5	6.41	146.95
				TP 1	0.42	152.94
TP-1	152.94	7.50	160.44	140.0	3.33	157.11
				142.5	4.26	156.18
142.5	156.18	3.19	159.37	TP 2	12.58	146.79
TP-2	146.79	1.86	148.65	145.0	9.99	138.66
				TP-3	7.00	141.65
TP-3	141.65	12.22	153.87	147.5	1.40	152.47
				TP-4	1.35	152.52
TP-4	152.52	11.43	163.95	150.0	0.92	163.03
		RETURN	tis	TP 5	12.62	151.33
TP-5	151.33	8.97	160.30	140.0	3.25	157.05
140.0	157.05	3.17	160.22	TP-6	8.97	151.25
TP-6	151.25	4.51	155.76	135.0	7.27	148.49
						(+.03)

JOB NO. 1153 **LINE NO.** N, NW **PAGE** 15
AREA DUVAL 15000-15750 N **DATE** 3-14-77
INSTRUMENT 250-2000 NW

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	F.S.	ROD	ELEV
	N 150.0	163.03	12.18	175.21	152.5	1.24	173.97
3					WELL #1	0.79	174.42
4	WELL #1	174.42	7.87	182.29	155.0	11.88	170.41
5					157.5	4.80	177.49
6					NW 2.5	0.61	181.68
7	NW 2.5	181.68	8.86	190.54	5.0	8.32	182.22
8					7.5	4.54	186.00
9	7.5	186.00	10.55	196.55	10.0	4.10	192.45
10					12.5	5.58	190.97
11	12.5	190.97	12.81	203.78	TP-1	0.12	203.66
12	TP-1	203.66	9.71	213.37	15.0	9.50	203.87
13					17.5	6.86	206.51
14					TP-2	0.27	213.10
15	TP-2	213.10	12.90	226.00	20.0	11.72	214.28
16			RETURN	TIE	TP-3	11.55	214.45
17	TP-3	214.45	0.01	214.46	TP-4	12.50	201.96
18	TP-4	201.96	0.72	202.68	TP5	12.91	189.77
19	TP-5	189.77	4.18	193.95	TP6	12.28	181.67
20	TP-6	181.67	2.37	184.04	TP7	10.38	173.66
21	TP-7	173.66	1.62	175.28	15.0	12.37	162.91
22							(-.12)
24							
25							
26							
28							
29							
30							

JOB NO. 1153 LINE NO. NW PAGE 16
AREA DUVAL 2000-4000 NW DATE 3-15-77
INSTRUMENT

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	HI	FS	ROD	ELEV
	NW21.0	214.28	8.64	222.92	TP-1	10.59	212.33
3	TP-1	212.33	12.12	224.45	22.5	12.97	211.48
4					TP-2	0.28	224.17
5	TP-2	224.17	12.88	237.05	25.0	3.10	233.95
6					27.5	7.40	229.65
7	27.5	229.65	10.59	240.24	30.0	3.01	237.23
8	30.0	237.23	12.61	249.84	32.5	3.82	246.02
9	32.5	246.02	11.91	257.93	TP-3	0.59	257.34
10	TP-3	257.34	12.79	270.13	35.0	11.04	259.09
11					TP-4	1.28	268.85
12	TP-4	268.85	12.96	281.81	37.5	7.33	274.48
13					TP-5	0.59	281.22
14	TP-5	281.22	11.38	292.60	40.0	3.69	288.91
15			RETURN	TIE	TP-6	8.87	283.73
16	TP-6	283.73	0.38	284.11	TP-7	10.10	274.01
17	TP-7	274.01	0.34	274.35	TP-8	13.06	261.29
18	TP-8	261.29	1.39	262.68	TP-9	12.71	249.97
19	TP-9	249.97	1.37	251.34	TP-10	12.40	238.94
20	TP-10	238.94	1.06	240.00	TP-11	12.37	227.63
21	TP-11	227.63	1.34	228.97	TP-12	12.49	216.48
22	TP-12	216.48	6.42	222.90	20.0	8.64	214.26
							(-.02)
24							
25							
26							
28							
29							
30							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JOB No. 1153 LINE No. SW PAGE 1

AREA ~ DUNK MINE DATE 2-15-77

INSTRUMENT G 219 GRAVITY METER

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BASE	11:55	2782	28	2782	28 B	82.28
	8500SW	12:18	2780	50	2780	51	80.51
3	8250SW	12:26	2779	60	2779	60	79.60
4	8000SW	12:34	2779	38	2779	38	79.38
5	7750SW	12:51	2779	21	2779	20	79.20
	7500SW	1:01	2779	20	2779	21	79.21
7	7250SW	1:09	2779	24	2779	23	79.23
8	7000SW	1:18	2779	64	2779	.65	79.65
	6750SW	1:27	2781	10	2781	12	2781.11
10	BASE	1:50	2782	26	2782	26 B	82.26
11	6500SW	2:06	2781	28	2781	28	81.28
12	6250SW	2:13	2781	79	2781	79	81.79
13	6000SW	2:19	2781	51	2781	50	81.50
14	5750SW	2:27	2782	82	2782	82	82.82
15	5500SW	2:33	2782	07	2782	06	82.06
16	5250SW	2:37	2780	59	2780	57	2780.59
17	5000SW	2:44	2781	75	2781	75	81.75
18	4750SW	2:49	2782	44	2782	44	82.44
	4500SW	2:54	2782	31	2782	31	82.31
20	4250SW	3:00	2782	09	2782	10	82.10
21	4000SW	3:09	2782	37	2782	37	82.37
22	3750SW	3:15	2782	52	2782	52	82.52
	3500SW	3:21	2782	42	2782	42	82.42
24	3250SW	3:30	~~2623~~	~~77~~ ?	~~2621~~	~~87~~ ?	
25	3000SW	3:37	2782	30	2782	31 A	82.31
26	3250SW	3:43	2782	53	2782	53 A	82.53
	BASE	4:00	2782	41	2782	40 B	2782.41
28							
29							
30							

Job No. Line No. 5W Page 2
Area — Date 3-15-77
Instrument G 219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	2750	4:10	2782 22		278222		82.22
	2500	4:18	278373		278372		83.72
3	2250	4:24	278247		278247		82.47
4	2000	4:30	278240		2782 40		82.40
5	BASE	4:38	278239		278240	B	82.40
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
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29							
30							

JOB NO. 1153 LINE NO. SW PAGE 3
AREA DUVAL MINE DATE 3-16-77
INSTRUMENT LACOSTE & ROMBERG GRAVITY METER G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BASE	8:36	278235		278235 B		82.35
2	1750SW	8:45	278297		278297		82.97
3	1500SW	8:50	278408		278408		84.08
4	1250SW	8:55	278333		278333		83.33
5	1000SW	9:00	278324		278323		83.23
6	750SW	9:04	278294		278294		82.94
7	500SW	9:09	278307		278307		83.07
8	250SW	9:15	278301		278302		83.02
9	0-0	9:20	278310		278311		83.11
10	250N	9:28	278319		278319		83.19
11	500N	9:37	278504		278504		85.04
12	750N	9:43	278402		278402		84.02
13	1000N	9:50	278326		278325		83.25
14	1250N	9:56	278453		278453		84.53
15	1500N	10:07	278476		278475		84.75
16							
17	BASE	10:19	2782.33		278233 B		82.33
18	1750N	10:38	2784.91		278490		84.90
19	2000N	10:45	2785.30		278530		85.30
20	2250N	10:54	278580		278580		85.80
21	2500N	11:03	278550		278550		85.50
22	2750N	11:09	278683		278684		86.84
23	3000N	11:13	278737		278737		87.37
24	3250N	11:18	278770		278770		87.70
25	3500N	11:27	278737		278736		87.36
26	3750N	11:35	278589		278589		85.89
27	4000N	11:40	278614		278614		86.14
28	4250N	11:46	278854		278855		88.55
29	4500N	11:50	278761		278761		87.61
30	BASE	12:08	278227		278227 B		82.27

JOB NO. 1153 LINE NO. N PAGE 4
AREA - DUVAL MINE DATE 3-16-77
INSTRUMENT L&R GRAVITY METER G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	4750N	12:36	278605	278606			86.06
	5000N	12:42	278649	278649			86.49
3	5250N	12:47	278780	278779			87.79
4	5500N	12:52	278788	278788			87.88
5	5750N	12:57	278781	278781			87.81
6	6000N	1:02	278760	278761			87.61
7	6250N	1:06	278747	278747			87.47
8	6500N	1:12	278753	278753			87.53
9	6750N	1:18	278737	278738			87.38
10	7000N	1:23	278756	278756			87.56
11	7250N	1:34	278765	278766			87.66
12	BASE	1:53	278236	278236		B	82.36
13	7500N						
14	7750N	2:12	278872	278870		278871	88.71
15	8000N	2:18	278827	278827			88.27
16	8250N	2:23	278793	278793			87.93
17	8500N	2:28	278774	278774			87.74
18	8750N	2:32	278779	278780			87.80
19	9000N	2:37	278760	278760			87.60
20	9250N	2:44	278743	278744			87.44
21	9500N	2:52	278749	278749			87.49
22	9750N	2:56	278754	278754			87.54
	10000N	3:02	278716	278716			87.16
24	10250N	3:06	278752	278753			87.53
25	10500N	3:12	278736	278736			87.36
26	10750N	3:18	278755	278754			87.54
	11000N	3:27	278714	278714			87.14
28	BASE	3:48	278259	278259		B	82.59
29							
30							

JOB NO. 1153 LINE NO. N-NW PAGE 5
AREA DUVAL MINE DATE 3-17-77
INSTRUMENT G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BASE	9:50	2782	51	2782	51 B	82.51
	11250N	10:02	2787	10	2787	09	87.09
3	11500N	10:08	2787	42	2787	42	87.42
4	11750N	10:12	2787	35	2787	36	87.36
5	12000N	10:16	2787	49	2787	49	87.49
6	12250N	10:19	2787	55	2787	55	87.55
7	12500N	10:25	2787	35	2787	35	87.35
8	12750N	10:29	2786	88	2786	88	86.88
	13000N	10:33	2786	60	2786	60	86.60
10	13250N	10:38	2787	07	2787	07	87.07
11	13500N	10:43	2787	94	2787	94	87.94
12	13750N	10:50	2788	12	2788	12	88.12
13	14000N	10:54	2787	55	2787	54	87.54
14	14250N	11:00	2787	73	2787	73	87.73
15	14500N	11:07	2789	01	2789	01	89.01
16	14750N	11:12	2787	89	2787	87 2	787.88
17	15000N	11:18	2787	22	2787	21	87.21
18	15250N	11:23	2786	59	2786	60	86.60
19	BASE	11:43	2782	48	2782	48 B	82.48
20							
21	WELL #1	12:19	27867	0	2786	70	86.70
22	15500N	12:24	27869	6	2786	96	86.96
	15750N	12:33	27867	0	2786	70	86.70
24							
25	250 NW	12:38	27865	0	2786	50	86.50
26	500 NW	12:42	27865	5	2786	55	86.55
	750 NW	12:49	27863	8	2786	36 2	78638
28	1000 NW	12:57	27860	3	2786	03	86.03
29	1250 NW	1:05	27862	5	2786	24	86.24
30							

JOB NO. 1153 LINE NO. NW PAGE 6
AREA DUVAL MINE DATE 3-17-77
INSTRUMENT G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	1500 NW	1:12	278550		278549		85.49
	1750 NW	1:19	278547		278547		85.47
3	2000 NW	1:39	278506		278506		85.06
4	BASE	1:56	278254		278254	B	82.54
5	2250 NW	2:15	278538		278538		85.38
6	2500 NW	2:22	278401		278400		84.00
7	2750 NW	2:28	278454		278455		84.55
8	3000 NW	2:36	278417		278419	27	8418
	3250 NW	2:42	278380		278380		83.80
10	3500 NW	2:48	278315		278315		83.15
11	3750 NW	2:53	278229		278229		82.29
12	4000 NW	2:59	278164		278163		81.63
13							
14	WELL #3	3:09	278744		278745		87.45
15	WELL #4	3:16	278737		278737		87.37
16	WELL #5	3:26	278793		278792		87.92
17	WELL # 6	3:36	278670		278670		86.70
18	BASE	3:46	278262		278262	FLAT TIRE B	82.62
19							
20	WELL #2	4:00	278383		278383		83.83
21	WELL #8	4:07	278428		278428		84.28
22	3250 SW	4:13	278269		278270		82.70
	WELL #9	4:18	278261		278261		82.61
24	WELL #10	4:26	278183		278183		81.83
25	BASE.	4:32	278266		278266	B	82.66
26	WELL #7	4:39	278584		278584		85.84
	7500 N	4:49	278868		278868		88.68
28	(7450)N						
29	MUCK WET ~ = elev to 7500						
30							

JOB NO. 1153 LINE NO. 5. PAGE 1
AREA DUVAL MNG DATE 3-29-77
INSTRUMENT LEVEL

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BS	ELEV	ROD	HI	FS	ROD	ELEV
2	0.0	100.73	6.21	106.94	TP-1	12.94	94.00
3	TP-1	94.00	0.88	94.88	2.505	11.69	83.19
4	2.505	83.19	0.82	84.01	TP-2	12.79	71.22
5	TP 2	71.22	2.65	73.87	5.00	1.42	72.45
6	5.00	72.45	9.33	81.78	7.50	5.00	76.78
7					TP-3	0.57	81.21
8	TP-3	81.21	11.85	93.06	TP-4	0.48	92.58
9	TP-4	92.58	8.68	101.26	10.00	10.50	90.76
10	10.00	90.76	2.37	93.13	12.50	9.02	84.11
11					TP-5	0.80	92.33
12	TP-5	92.33	11.31	103.64	15.00	6.16	97.48
13	15.00	97.48	5.05	102.53	17.50	6.73	95.80
14					TP 6	10.64	91.89
15	TP-6	91.89	7.08	98.97	20.00	7.53	91.44
16					22.50	11.72	87.25
17					25.00	6.23	92.74
18			TIE RETURN		TP 7	2.04	96.93
19	TP-7	96.93	8.11	105.04	15.00	7.36	97.68
20					TP8	7.10	97.94
21	TP8	97.94	2.59	100.53	TP9	10.78	89.75
22	TP-9	89.75	12.91	102.66	TP10	1.05	101.61
23	TP-10	101.61	7.09	108.70	0.0	8.11	100.59
24							(E-.14)
25							
26							
28							
29							
30							

JOB NO. 1153 LINE NO. S-E PAGE 2
AREA DUVAL MINE DATE 3-29-77
INSTRUMENT LEVEL

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	H.I	FS	ROD	ELEV
	0-0	100.73	0.88	101.61	TP-1	11.58	90.03
3	TP-1	90.03	1.84	91.87	$^{S}25^{E}$	3.43	88.44
4					TP-2	11.79	80.08
5	TP-2.	80.08	3.31	83.39	5.0	6.16	77.23
					TP-3	10.58	72.81
7	TP-3	72.81	2.28	75.09	7.5	6.66	68.43
8					TP-4	12.42	62.67
	TP-4	62.67	2.06	64.73	TP-5	7.46	57.27
10	TP-5	57.27	5.83	63.10	10.0	11.07	52.03
11					12.5	10.56	52.54
12	12.5	52.54	1.05	53.59	15.0	10.37	43.22
13					TP-6	1.46	52.13
14	TP-6	52.13	6.40	58.53	17.5	4.99	53.54
15					20.0	9.39	49.14
16	20.0	49.14	0.90	50.04	22.5	6.14	43.90
17					25.0	10.60	39.44
18			RETURN	TIE	20.0	0.90	49.14
	20.0	49.14	10.70	59.84	17.5	6.30	53.54
20					TP-7	1.02	58.82
21	TP-7	58.82	12.76	71.58	TP-8	0.51	71.07
22	TP-8	71.07	11.06	82.13	TP-9	0.40	81.73
	TP-9	81.73	12.41	94.14	2.5	5.58	88.56
24					TP-10	1.38	92.76
25	TP10	92.76	10.21	102.97	0.0	2.09	100.88
26							(+.15)
28							
29							
30							

JOB NO. 1153 LINE NO. N PAGE 3
AREA 15750, 18250 DATE 1-30-77
INSTRUMENT LEVEL

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BS.	ELEV	ROD	HI	FS	ROD	ELEV
2	15750	177.49	7.78	185.27	160.0	10.16	175.11
3					162.5	2.50	182.77
4	162.5	182.77	4.52	187.29	165.0	3.39	183.90
5					167.5	8.21	179.08
6					TP-1	5.28	182.01
7	TP-1	182.01	7.08	189.09	170.0	4.65	184.44
8					172.5	3.66	185.43
9					175.0	0.94	188.15
10	175.0	188.15	11.33	199.48	177.5	6.39	193.09
11					180.0	2.69	196.79
12					182.5	1.30	198.18
13			RETURN	TIE	175.0	11.33	188.15
14	175.0	188.15	0.16	188.31	170.0	3.88	184.43
15					TP 2	9.06	179.25
16	TP 2	179.25	10.32	189.57	162.5	6.82	182.75
17	162.5	182.75	3.02	185.77	160.0	10.67	175.10
18					157.5	8.29	177.48
19							
20							(-0.01)
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

JOB NO. 1153 LINE NO. N-S PAGE 4
AREA DUVAL MINE DATE 3-30-77
INSTRUMENT LEVEL

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	B.S.	ELEV	ROD	H I	F.S	ROD	ELEV
2	N 157.5	177.49	2.71	180.20	N S 2.5	6.66	173.54
3					TP-1	13.01	167.19
4	TP-1	167.19	1.89	169.08	5.0	3.60	165.48
5					7.5	11.43	157.65
6	7.5	157.65	0.63	158.28	TP2	12.83	145.45
7	TP-2	145.45	5.56	151.01	10.0	12.03	138.98
8					12.5	7.67	143.34
9	12.5	143.34	2.57	145.91	15.0	3.86	142.05
10					17.5	9.07	136.84
11	17.5	136.84	0.99	137.83	20.0	9.49	128.34
12	20.0	128.34	0.07	128.41	22.5	5.72	122.69
13					25.0	12.78	115.63
14		RETURN		TIE	TP-3	1.53	126.88
15	TP-3	126.88	12.28	139.16	TP-4	0.73	138.43
16	TP-4	138.43	10.18	148.61	12.5	5.06	143.55
17					TP-5	1.30	147.31
18	TP-5	147.31	11.76	159.07	7.5	1.36	157.71
19	7.5	157.71	12.91	170.62	TP-6	1.42	169.20
20	TP-6	169.20	11.76	180.96	157.5	3.45	177.51
21							(+0.02
22							
23							
24							
25							
26							
27							
28							
29							
30							

JOB NO. 1153 LINE NO. 5 PAGE 1
AREA DUVAL MWE DATE 3-29-77
INSTRUMENT G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
	BASE	10:29	278288	278288			82.88
1	250S	10:38	278368	278369			83.69
	500	10:42	278426	278426			84.26
3	750	10:49	278377	278378			83.78
4	1000	10:53	278268	278268			82.68
5	1250	10:56	278292	278293			82.93
	1500	11:03	278192	278192			81.92
7	1750	11:07	278184	278184			81.84
8	2000	11:12	278191	278192			81.92
	2250	11:18	278195	278195			81.95
10	2500	11:25	278153	278152			81.52
11	BASE	11:40	278275	278275		-	82.75
12							
13							
14							
15							
16							
17							
18							
20							
21							
22							
24							
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JOB No. 1153 **LINE No.** S E **PAGE** 2
AREA DUVAL MINS **DATE**
INSTRUMENT G 219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
	BASE	3:47	278292	278292			82.92
1	5250 E	3:54	278415	278415			84.15
2	5500 E	4:01	278471	278470			84.70
3	5750 E	4:06	278516	278516			85.16
4	1000	4:12	278605	278605			86.05
5	1250	4:16	278594	278595			85.95
6	1500	4:22	278651	278651			86.51
7	1750	4:25	278570	278569			85.69
8	2000	4:31	278590	278590			85.90
9	2250	4:35	278612	278611			86.11
10	2500	4:41	278637	278637			86.37
11	BASE	5:00	278291	278291			82.91
12							
13							
14							
15							
16							
17							
18							
19							
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29							
30							

Job No. 1153 Line No. N Page 3

Area DUBAL MINE Date 3-30-77

Instrument G-219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BASE	11:54	278293	278293			82.93
2							
3	BASE	1:47	278300	278300			83.00
4							
5							
6							
7							
8	13000	12:36	278709	278710			87.10
9	13250	12:43	278756	278756			87.56
10	13500	12:46	278841	278841			88.41
11	13750	12:50	278864	278863			88.63
12	14000	1:01	278802	278802			88.02
13	14250	1:07	278821	278821			88.21
14	14500	1:16	278947	278947			89.47
15	14750	1:23	278837	278837			88.37
16	15000	1:31	278771	278770			87.70
17	15250	1:35	278707	278706			87.06
18	15500	2:03	278750	278751			87.51
19	15750	2:08	278724	278725			87.25
20	16000	2:14	278755	278755			87.55
21	16250	2:18	278733	278733			87.33
22	16500	2:22	278724	278723			87.23
23	16750	2:26	278788	278788			87.88
24	17000	2:29	278758	278759			87.59
25	17250	2:33	278757	278758			87.57
26	17500	2:36	278742	278743			87.43
27	17750	2:39	278716	278716			87.16
28	18000	2:43	278692	278691			86.91
29	18250	2:46	278687	278688			86.88
30	BASE	3:06	278306	278306			83.06

↑ Base

JOB NO. 1153 LINE NO. N-E PAGE 4
AREA DUVAL MINE DATE 3-30-77
INSTRUMENT G 219

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	N 250 E	3:20	278745		278745		87.45
2	500	3:24	278792		278792		87.92
3	750	3:28	278850		278850		88.50
4	1000	3:32	278977		278977		89.77
5	1250	3:36	278946		278946		89.46
6	1500	3:40	278958		278957		89.57
7	1750	3:44	278988		278988		89.88
8	2000	3:47	279023		279023		90.23
9	2250	3:50	279040		279040		90.40
10 N	2500 E	3:54	279061		279061		90.61
11							
12							
13	BASE	3:06	278306		278306		83.06
14	BASE	4:15	278301		278301		83.01
15							
16							
17							
18							
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JOB NO. 1153 LINE NO. S-EXT (RERUN PAGE

AREA DUVAL DATE 1 APR 77

INSTRUMENT RERUN

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BS	ELEV	ROD	HI	FS	ROD	ELEV
✓ 2	BM 1	100.73	4.79	105.52	TP1	11.74	93.78
✓ 3	TP-1	93.78	0.69	94.47	2.55	11.37	83.10
✓ 4					TP2	12.88	81.59
✓ 5	TP 2	81.59	1.15	82.74	5.0S	10.22	72.52
✓ 6	5.0 S	72.52	12.35	84.87	7.5S	8.02	76.85
✓ 7	7.5 S	76.85	12.48	89.33	TP-3	0.12	89.21
✓ 8	TP-3	89.21	12.19	101.40	10.0S	10.63	90.77
✓ 9	-				TP 4	11.40	90.00
✓ 10	TP 4	90.00	4.56	94.56	12.55	10.55	84.01
* ✓ 11	TP 4	90.00	10.42	100.42	15.0S	2.84	97.58
✓ 12	15.0 S	97.58	5.34	102.92	17.5S	7.00	95.92
✓ 13					20.0S	11.39	91.53
✓ 14				-	TP5	9.97	92.95
✓ 15	TP-5	92.95	6.50	99.45	22.5S	11.30	88.15
✓ 16					25.0S	6.94	92.51
✓ 17					17.5	3.65	95.80
✓ 18	17.5	95.80	7.66	103.46	TP-6	5.29	98.17
19	TP-6	98.17	2.27	100.44	10.0S	9.74	90.70
20					TP7	6.90	93.54
21	TP7	93.54	11.45	104.49	0.0	4.53	100.46
22							
23							
24							
25							
26	3/4	4/11					
27							
28							
29							
30							

JOB NO. 1153 LINE NO. 5 FR BASE PAGE 1
AREA DUVAL MINE DATE 4-1-77
INSTRUMENT RERUN

	STA.	TIME	READING	BASE CORR.	Δt	DRIFT CORR.	VALUE
1	BASE	13:45		278303			83.03
2	0.0	13:54		278370		MAG	83.70
3	52.5	14:14		278449		8+ 85	84.49
4	5.0	14:30		278512			85.12
5	7.5	14:44		278460			84.60
6	10.0	14:59		278349	278350		83.50
7	12.5	15:14		278371			83.71
8	15.0	15:25		278254			82.54
9	17.5	15:32		278248			82.48
10	20.0	15:39		278254			82.54
11	22.5	15:57		278249			82.49
12	25.0	16:05		278196			81.96
13	BASE	17:00		278311			83.11
14							
15							
16							
17							
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DUVAL SIERRITA CORPORATION
TAILINGS DAM - EAST FACE
MACRO-SCALE SURVEY NET
BASE LINE

STATION	NORTHING	EASTING	ELEV.-FT.	HORIZ. DIST IN FT.	BEARING
B-1	86,290.84	130,802.32	3,106.92		
B-1 to B-2				2,394.55	N-10°-13'-52" W
B-2	88,647.31	130,377.00	3,131.83		
B-2 to B-3				1,454.83	N-05°-02'-07"-E
B-3	90,096.54	130,504.66	3,116.91		
B-3 to B-4				2,038.58	N-02°-09'-30"-E
B-4	92,133.86	130,581.42	3,119.57		
B-4 to B-5				1,546.64	N-00°-36'-07"-W
B-5	93,680.51	130,565.17	3,136.89		
B-5 to B-6				1,282.36	N-00°-48'-01"-W
B-6	94,962.87	130,547.26	3,141.30		
B-6 to B-7				1,701.79	
B-7					

Test holes in front of Sierrita tailings dam.

Test well No. 1.

Sec. 16; T-18-S; R-13-E.

Northing - 99,034.38

EASTING - 129,988.73

Elevation - Ground level - 3174.30 ft.

" - Top of Pipe - 3176.2 ft.

Test well No. 2.

Sec. 28; T-18-S; R-13-E.

Northing - 84,210.25

EAsting - 130,430.16

Elevation - Ground level - 3096.0 ft.

" - Top of pipe - 3096.6 ft.

E. L. Durand

12/18/75

TEST WELL LOCATIONS.

	NORTHING	EASTING	ELEVATION
Well #3	96,960.35	130,323.28	3156.36 ✓
Well #4	94,099.32	130,370.97	3142.26 ✓
Well #5	92,001.50	130,343.59	3122.89 ✓
Well #6	88,848.78	130,213.71	3133.88 ✓
Well #7	86,334.44	130,420.21	3121.68 ?
CITY TEST WELL	86,885.66	129,789.36	3103.07

ELEVATIONS ARE TO TOP OF HOLE CASING.

E F Durand
5/5/76

DUVAL SIERRITA CORPORATION
TAILINGS DAM - EAST FACE
MACRO SCALE SURVEY NET

STATION	NORTHING	EASTING	ELEV IN-FT.	HORIZ. DIST IN FT.
L-1			3,230.71	
L-1 to L-2				1,201.64
L-2			3,230.09	
L-2 to L-3				1,201.09
L-3			3,230.31	
L-3 to L-4				1,201.03
L-4	87,913.26	129,445.52	3,230.13	
L-4 to L-5				1,200.47
L-5			3,230.09	
L-5 to L-6				1,182.94
L-6			3,229.00	
L-6 to L-7				453.33
L-7	90,732.14	129,569.24	3,220.83	
L-7 to L-8				488.52
L-8			3,229.14	
L-8 to L-9				1,201.45
L-9			3,228.75	
L-9 to L-10				1,214.84
L-10			3,229.02	
L-10 to L-11				1,160.80
L-11	94,796.12	129,593.68	3,229.39	
L-11 to L-12				1,137.19
L-12			3,229.41	
L-12 to L-13				824.75
L-13			3,229.28	
L-13 to L-14				905.79
L-14			3,229.13	

Duval

Ron Teissere → Left data & reports

Ed Reed

consulting Hydrologist

(Culberson) Midland, Tx.

7/26/76

7/26/76 [illegible] —:

#1 BR — 520' — arkose

#2 " — 1032' — sandy siltstone BR?

#3 " — ? B.H. 520' sand & gravel

#4 — 510' B.R. — ? 540' olive green micritic Ls.

#5 — 640' B.H. — BR ? " " ", chert & rhyolite

#6 — 960' " — BR white limestone

#7 — 1070' B.R. — greenish gry-white dendritic rhyolite tuff (?) sulfide bearing micro vnlt, diss py &, cpy?

#8 — 1060' } ? fine grained green to brown porphyritic andesite (dacite?)
1065' } some diss & free sulfs (py & cp ?)

#9 — 1300' } green gry to white sulfide bearing rhyolite
1310' } tuffaceous (?) arkose or mudstone (?)

#10 4/5/77 Buzz picked up logs from R.T.

7/22/76

Doug Duval.

~~Doug~~

~~Bill~~ Cochran

9 holes to top of Bed rock.

profile

500'-1300'

2 Mi N.S.-1 Mi E.W.

MRS. Loretta Crosby

Re: Seismic if available

Monday 26 July.

I-1

TO

I-6

&

T-1

TO

T-10

MISSNG

Ron Teissere (Duval.) 7/19/76

Ed Reed.

Bed rock contour

7 holes x 3 mi around foot of dam

but on 3-corner well

1400' [illegible]. last hole.

rest 500'-900' ± ?

00N/S E/W

$$\frac{\overset{8}{8}\overset{2.35}{2.28}}{0.07}$$

83.11 +0.01 −0.07

−.06

83.05 × 1.05058 = 87.25 MGALS at 100.73′ ← 00N/S E/W

87.31 MGALS at 83.19′

2.55

$$\frac{\begin{array}{r}4.10\\2.97\end{array}}{1.13}$$

1.13/250′!

4.16 @	0S
3.58 @	2.5S
2.38	5.0S
1.59	7.5S
2.91	10S
1.44	12.5S

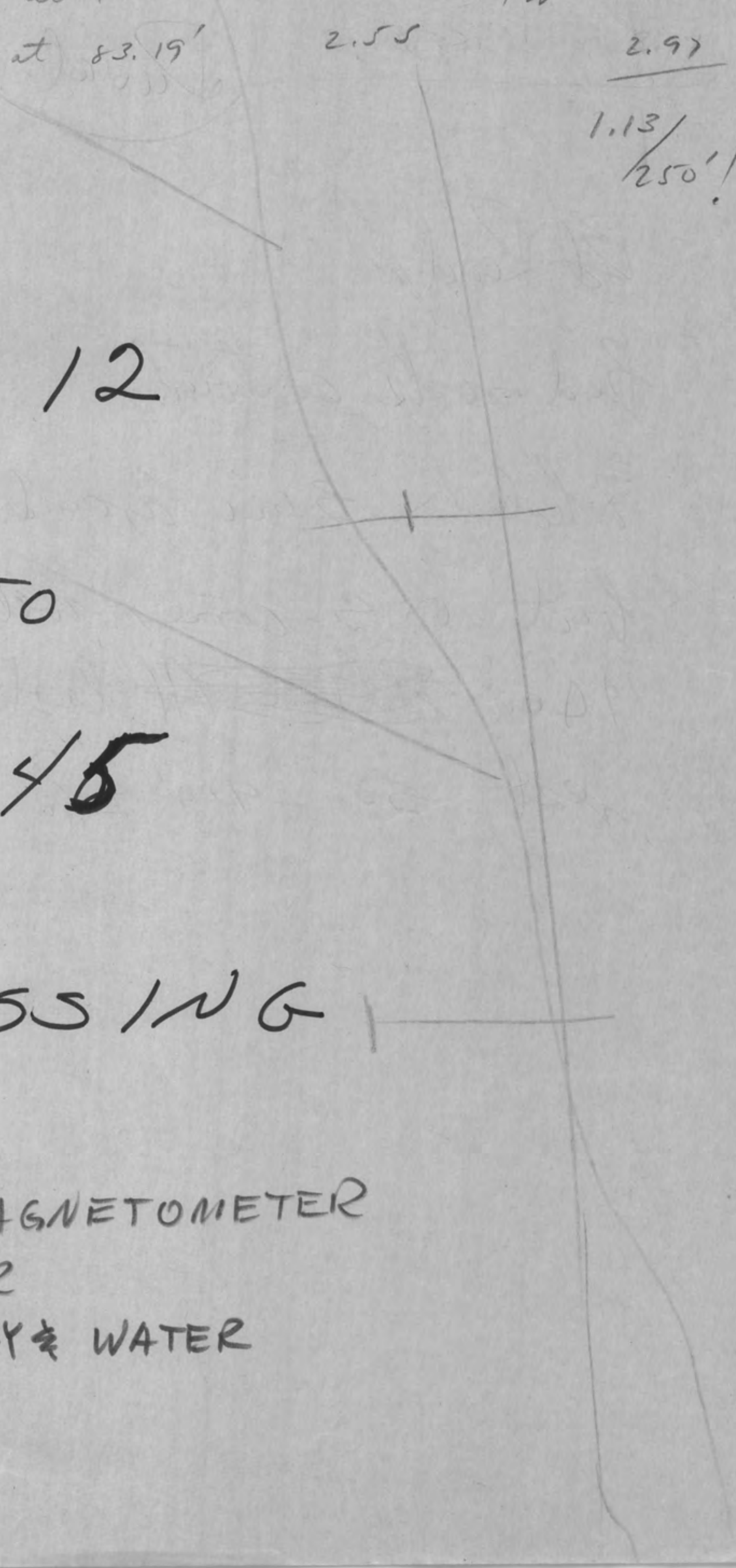
$1.713\sqrt{\frac{12}{300}}$

T-12

TO

T-45

MISSING



MOBILE MAGNETOMETER
FOR
ORE, ENERGY & WATER

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/1
	MONITOR #1 WATER WELL DRILLING PROJECT DRILLED BY CALVERT WESTERN			11/4/75 – 11/19/75 LOG BY DMA	NE CORNER SIERRITA TAILINGS DAM; NW CORN. SEC 16		
0-35	orangish	silty-sand	intermixed gravel		sub-angular elongate to circ.	poorly sorted	partially oxidized- gravels variable including qtz. dior, rhyolite
	after 35, goelhite-ht plays out — color less orange, more variable (loss of surface oxides)						
35 –	color of alluvial velley fill is variable — seds are of mixed lithologies, producing an intermediate						
430	lght color	overall.					
		primarily unconsolidated, poorly sorted sub-angular to sub-rounded sands w/ intermixed gravel and boulder (?) chips from multiple lithologies reflecting diverse source area					
		ie. rhyolite, chert, diorite, andesite, epidotized sandstone (arkose).					
		rk chip-gravel fraction usually 10-20%, generally 1/4 – 5/8".					
		accessory minerals include calcite + clay as occaissional cementing agents and goethite, epidote					
430 – 520	tan to variable	sandy	clotty clay	minor goethite	sub ang – elongate grains	1/2-1" clay clots w/ calcite	ep ss + and. lith frags
520	short interval of pebbly sand, w/ ss qtz, and, chert and other frags, generally angular transitioning						
	into bedrock → hard, calcite-bearing, epidoitized vari-grained arkose, w/ acc. py locally						

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/6
	MONITOR #2	WATER WELL DRILLING PROJECT DRILLED BY CALVERT WESTERN		11/19 – 11/26/75 LOG BY	SE CORNER SIERRITA TAILING DAM DMA		NW corner Sec. 18
0-50	vari-colored	gravels	interstratified sand	calcite	round–elongate sub-angular	poorly sorted 1/16" – 3/4"	lithic frags – dior; rhyolite; ht; tourm-qtz; and.
10	vari-color	gravels	sand (minor)	lght calcite coats	round to elongate sub-angular	1/8" – 3/4"	NOTE: These samples are dry-logged.
20	lght-brwn varicolor	grevels		"	"	1/16 – 1/4"	less coarse than previous interval
30	"	pebble-snd	gravels	"	"	70% finer pebble-snd 1/8 – 1/4	cont lithic frags – partially decomp m.g. dior.
40	"	lithic frags (grav)	interstratified clay-silt	calcite w/ clay as grain matrix	"	50% 1/4 – 1/2" gravels 50% clay-silt	increase in med. or. brwn clay
50	"	sand		calc	coarse mixed lithol. [as above]		<< clay. Limonitic rhyolite
50-270	med. orange brown	clay-silt Intercalated gravels	pebble-snd	"	rounded to elong. sub-angular	intermixed 1/16 – 1/8 snd	>> clay – intermixed mafics, rhy, qtzte(?) ep.
60	"	"	"	"		"	"
70	"	sand	interstratified clay-silt	"	ang – sub ang	80% 1/8 – 1/4	porph and., ht, rhy, assorted other liths.
80	"	Sand + clay				1/32 – 1/16 snd; frags clay; a few lithic ∧	this 20' w/in larger clay horizon (60-80)
90	"	clay-silt		calc		clay-silt med crse snd 1/16 – 1/8	
100	"	gravel	snd			1/2 – 3/4" w/ fines intermixed	mafics, ep, rhyolite other liths. No clay
110	"	"	"	clay-calc cement between 1/16 – 1/32		sand	> clay
120	"	clay-silt	s + g intermixed	"	ang – sub ang	Poorly sorted	> frags of gravel
130	"	as above, a little	less clay-silt	"			> frags of gravel
140	vari-color	Sand + pebbles (variable liths – see remarks)		"		cont. poorly sorted	Interbed – porph and, partially oxid granit, etc
150	med. or. brwn	clay-silt	sand	"	angular – sub ang but f.g.		A little gravel
160	——	as above	——		"		
170	——	as above	——		"		

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
180	med o brwn —	as above —		Calc			
190	" —	as above —		"	sub-ang elong.		m f.g. diorite
200	"	sand	gravel	clay-calc	sub angular circular		mafics, rhy, ht, unid'd qtzite (?)
210	med orange brwn	sand	clay	calc	"		minor gravels
220	"	sand	clay	"	"	more f.g.	> clay
230	"	clay	sand	"	"	clay w/ intermixed crse snd	mafics
240	"	"	"	"	"	intermixed crse + fn sand	as above ht. intermixed
250	"	"	"	"	"	"	transitional - frags of arkose, mafics + other
260	"	clay	sand	"	Coarser	"	"
260-470	variable — m.o. brwn	gravelly pebble-sand	silt-clay w/ calcite, often as matrix between coarser frags, + as light coat on gravels				
270		clay rich partially decomposed lithic clots		calc			
280	med. or. brwn	clay - cementing mafic snd + pebbles		"	sub - ang	1/16 - 1/4"	some intermixed qtz-rich gravel
290	"	clay	mafic rk chips	"		1/8 - 1/2" chips cuttings (?)	mafic rk chips from boulder (?)
300	"	sand				mostly 1/16 - 1/8 w/ clay-silt intermix	calc vn on and frag Minor 3/4" material
310	"	"		calc contcs component of matrix in variably cemented material			<< clay
320	"	"		calc			<< clay, minor gravel
330	"	"	silt	calc		1/32 av size 1/2" minor lith.	> silt porph and + g. lith frags
340	"	"		detrital ep. calc	cont. generally sub ang. circular	coarser - 1/8 av. size	< silt partially decomp feldspthc rk
350	"	"	gravel	calc	"		> silt
360	"	gravelly snd	silt intermix	"	"		and, ht, qtz other lithic frags

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 3/6
370	med orange brwn	gravelly snd	"				
380	w/ black-grey	— as above —	—			> silt	
390	—	as above	—			< silt, more crse snd (pebble size)	
400	—	as above	— goethite			Coarse snd	
410	—	as above	— silt	cont calc	ang snd	" minor clay	Abnt mafics
420	—	as above	—	↓			Epidoitized porph and (black + green)
430	—	as above	—				Mafics + g frags
440	—	as above	—				
450		— as above —	silt-clay			>> silt-clay	silica, ht, mafic frags
460	—	as above	—				
470	—	as above	— Calc-clay-goeth cement around frags. FRAGS →		(ang to sub-ang elong to circ.	1/16 - 1/4 frags)	
470 – 600	Lt. yellow tan	Sndy clayey silt, often clotted, compacted w/ intermixed mafic rk chips and intermixed goethite and ht. 'Sticky gumbo' when wet. Clogs drill-bit. Finer than previous "unit."					
480	Med. Orange Brown	snd	abnt silt-clay	cont. calc		Minor ½"+ frags	
490	w/ black + grey detri-tal frags	as above	—	spotty ht.-rich frags			
500		Sandy silt-clay		↓		Minor 3/8"+ frags	
510	"	clayey silt-snd	and, rk chips				Boulder-cobble (?) AND goethite + ht. replacement in felsic rk
520	"	— as above —		Cont calc	compacted clots		
530	Becoming lighter	— as above —		"	"		"
540	Lt. yellow tan	— as above —		"	no gravels compacted clots		"
550	"	— as above —		"	"		

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 4/6
560	Lt. yellow tan	— as above —		cont calc	compacted clots		nr total decomp. of detrital rk frags
570	"	— as above —		"			This horizon 470-600 forms sticky
580	Lt orange grey	sandy - clayey silt		more conspic. goeth.			gumbo when wet
590	"	"		cont calc			
600	"	"		spotty ht	1/4" mafic frags		
600 - 720	Whitish leached soil-like zone. Fewer rk frags, generally finer grained; w/ cont calc. Texture is generally clotted granular to sub-platy						
610	Whitish	clotted sandy clayey silt		[SAMPLES HAVE HEMP FIBERS MIXED IN FROM			
620		— as above —		DRILL-JNT SEALS. RESEMBLES ROOTS.]			
630	—	as above —		cont calc	clotty		Some admixed 1/4 mafic pebbles
640	—	as above —		"	"		
650	—	as above —		"	"		
660	—	as above —		"	"		
670	—	as above —		"	"		Some partially decomp ferric rk material
680	Lght tan		small carbonate white flecks →	"	"	1/4-1/2" clots	
690			(after plug?)	"	"		
700		cont. clots - granular to		< calc	"	↑	
710		sub platy		<, calc	"	Intermixed and black pebbles	
720	Becoming darker			< calc	"	↓	
720 - 820	This interval somewhat variable, darker than previous w/ generally little calc. Also coarser grained and more loosely consolidated. Intermixed partially decomposed rk frags						
730	Variably Colored	silty - clay		ep frags	crse snd w/ conspic. intermixed 1/8" and frags		Generally med yellow brown. Less leached

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 5/6
740	med yellow brwn			ep frags			less leached
750	l.y. brwn	Silty clay					
760	"			white clay frags			
770	light yell. brwn		intermixed and, sand + other pebbles				
780	med brwn	Sand	intermixed partially decomposed rk frags		crse snd		
790	"	— as above —		no calc	sub ang rk frgs		
800	"	— as above —		no calc	"		
810	"	— as above —			"		
820	"	— as above —		tr calc	"		
820 – 940	Generally light tan; variably clotty → 1/4 - 3/4" cemented and,-decomposed rk – clay – silt clots. Intermixed angular rk frags + generally good calcite						
830	lt tan	clots w/ cbnt	silt-clay + intermixed rk frags	good calc	ang	3/4" clots	
840	white tan	as above		cont. cbnt calc			
850		as above		"			
860		— as above — few clots		"			
870	white tan	abnt clay-silt	<< clots	> porph and. rk frags			
880		Sandy	1/4 - 3/8" clots of decomp porph rk + and.				Snd is and-qtz primarily
890		— as above —					
900		— as above —			ang. and. frags		
910	Lght clots w/ brown snd + silt				1/4 - 3/4 clots		
920		— as above —					

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 6/6
930	— as above —			calc cont			
940	lght. o.brwn	clots w/ silty snd			1/4-1/2' clots		
940 – 1038	Poorly sorted crse pebble-snd, sub angular to sub-rounded. No calcite. Detritus is generally black + red						
950	variable	Snd		no calc	Subang – sub rounded	Poorly sorted	and qt ep etc
960		pebble - snd	some clay cement of clots	no calc	"	"	
970	blk + red	"	w/ thin clay wash	no calc	"	"	
980	" minor white + tan	"		"	"	"	
990	"	"		"	"	"	vesiculer black frag
1000	blk + red	"		"			and, ep, oxid porph rk.
1010		sndy	subrounded med or. brwn claysilt 7/8 clots	tr calc			and – qtz rk chips (boulders)?
1020		clots of poorly sorted snd slt – – snd –		calc			some nontronite (?)
1030		rk chips – blk and, vfg ht sand-siltstone w/calc					
1040	B.R. 1032 – calcite bearing ferruginous grey-red sandy siltstone					uniform rk chips	

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/3
		WATER WELL DRILLING PROJECT — HOLE #3 — FEB 26, 1976 - DMA					
			DRILLED BY VENTURE				
0-10	m.r.b.	snd	clay	silt	sub-ang → sub-rnd.	poor	
10-20	"	silt	snd	gravel	s.a. → s.r.	poor	ap. qrtz etc frags
20-30	"	silt	clay	"snd	as above, grains roughly circular, not elongate	good (silt)	mica plate - f.g
30-40	"	large grn snd	f.g. snd	clay - silt	fines mixed and crse. snd grains	fair	f - med - gp. rk frags
40-50	m.b.	clay	f.g. snd - silt	crse - snd	mud paste - incompletely dried	fair - gd	
50-60	"	clay - silt	m.g. snd			fair	
60-70	"	snd	clay - silt	crse snd	sa → sr	poor	"dirty snd"
70-80	"	clay	snd - silt	"	as above, w/ more clay		
80-90	"	snd - clay	silt	crse. s+g.	"	poor - fair	
90-100	"	"	"	"		"	
100-110	"	snd	silt - clay	crse s+g		"	rk frags sub ang. and ?
110-120	"	"	"	"		"	
120-130	"	coarser snd	silt - clay	s+g		"	Porph. and Ortzone ?
130-140	"	"	"	"		Red, white strand Rhyolite. Poor sorting	? frags (grains)
140-150	"	clay	snd	"			Much less snd than above
150-160	med. yell. brwn	"	"	"	NOTE - SOME S+G may be sluffed off from hole walls		
160-170	"	silt - clay	snd			cont. poor-fair sorting. Snd grains w/in silt-clay slurry	
170-180	"	"	"			"	

PTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 2/3
180-190	red y. brwn	clay	silt-snd		subrounded q. grains in slurry		
190-200	"	snd	clay-silt	gravel	sand med. q. subang. clay silt matrix	poor	
200-210	"	clay	snd-silt	—	sub-ang - sub rnd q. snd grains	good fair-poor	lght + drk detritus
210-220	"	"	"	—	"	"	
220-230	"	snd	clay silt	gravel	becoming coarser	"	
230-240	"	clay	snd-silt	like 210-220		"	
240-250	"	snd	clay-silt	like 230-240		R.S. granodiorite(?). Cont. roundness q. Cont.	frag. Mod weathered euhedrons fd grns, fairly fresh. lt-gt.
250-260	"	"	"				
260-270	samples losing red tones — becoming grayer	"	"	gravel		may be felds. → pelitic (op) arkose	ortho quartzite frag w/ altered biot.
270-280	"	"	"	"	s.a. snd in clay silt matrix		ortho - qtzite or op. arkose rk frg.
280-290		sand-silt-clay	gravel	NOTE: samples		poor	frags include q. grains of op. volt. tuff, black
290-300	med v brwn very black, red white	gravel	clay	becoming coarser	elongate to sub-rnd.; s.a.	fair	K-spar. porph. and w/ plag. laths (Ox Fe)
300-310	"	snd	clay-silt	w/ depth ↓		Poor	some op grains blacky
310-320		S + g	clay silt			Poor	And, op. etc rock w/ lg. px.
320-330		silt-clay	s + g			Poor	Rhyolite welded tuff dk. ? Grey
330-340		crse snd	clay-silt		abnt clay-silt slurry mixed w/ crse. snd	Poor-fair	
340-350		med. snd	"		ang to s-s ang snd.		
350-360	veri-colored light clay stain-tan	multi-sized snd	abnt clay-silt slurry	gravel	varitextured grains	Poor	and, qtzite etc
360-370		"	silt clay (light)		" size diverse also	fair - mostly snd. little silt-clay	
370-380		snd	clay-silt	gravel			

PTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 3/3
380-390		s+g	clay-silt			poor	Most clay-silt minor fractions are not
390-400		s+g	clay-silt				stuck together, as might be expected
400-410		s+g	clay silt.		enuff clay to loosely stick toget	poor in snd grains	of clay alone. Essentially the samples
410-420							are vari-sized and in a very dirty
420-430		red fn. grn snd	silt-clay				bath.
430-440	vari-colored light clay stain - tan	multi-sized snd	light clay	gravel	vari textured grains	fair (mainly snd but not well graded	and qtzite etc.
440-450	red brown	s+g	clay (light)			poor - wide size rnge	
450-460	same	snd	clayey bath (much water in samp)		''	fair -(Settles) attaining a uniformity of size w/ extremes.	Primarily med. g. snd.
460-470	vari	snd	as above				
470-480		gravel - pea	gravel) light silt snd coat		sub-ang-sub rnd		Diverse - Qtzite, and dark red siltstone?:
480-490		snd-gravel	mixture of previous - 450-460				Diorite (gd) Ep + q.
490-500		gravel-snd	clay wash		sub ang-sub rnd	Poor - mixture of diverse grain sizes	Some Lt frags unknown lith
500-510		snd - gravel	''			Poor -	
510-520	brown grey	snd	A few pieces of gravel		Overall →	good - med. f.g. snd. w/out dirt	Spotty ep grains, lt, in dominant q.

.PTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/3
				WATER WELL DH# 4	DRILLING PROJECT MARCH 1976	- TAILINGS DAM, - DMA	IERPITA
				DRILLED BY	VENTURE		
0-10	Red brwn	snd	pebbles		sub-rnded to sub-angular	poor	loose
10-20	″	″	pebbles w/ decomposed rk frags		″		″
20-30	″	″	″		sub rndd	Slightly crser, and more uniform	″
30-40	yellow brwn	″	rk frags clay matrix		clay welding crse ang. snd into clots	poor	~~mod~~ little calc, blocky
40-50	″	″	″		″	″	blocky
50-60	red brwn	snd-clay			intermix of clay snd, holds shape	better	light calc
60-70	tan brwn	snd-clay	lithic frags.		frags sub ang	incipient clayey s.s.; fair sorting	mod calc
70-80	″	clay ⟷	f.g. snd		smaller, fewer qtz grains	even textured (sized)	″
80-70	″	″	″	lithic frags ie q. + and.	as	above	″
70-100	″	″	″	fewer lithic frags	as	above	″
100-110	″	clay	″		f.g. snd-logged w/in a clay	w/ sample wet - soft - calc.	- snd is a but.
110-120	″	clay w/ snd	rk frags		sub ang - ½" and smaller in clay snd	poor sorting matrix	Cont. calc.
120-130	″	clay	″		coarser qtz snd in finer clay-snd	frags - ⅛" etc. matrix	″
130-140	″	″	f.g. snd		Uniform sndy clay Sub rounded	Improved sorting - better mixed	lght - mod calc
140-150	lght tan brwn	clay silt (?)	snd	rk frags	clotty, ang. rk frags	Diverse sizing - pebbles to clay-silt	Partially decomp biotite flakes
150-160	″	clay silt	f.g. snd	rk frags	still clotty but more f.g.	more even than above	Cont. calc. mod.
160-170	″	silt	clay	v. minor rk. frag (contam ?)		Fairly well sorted Mostly silt	″
170-180	″	″	″	increase in rk frags.	sub angular rk ~~frags~~ frags	Fair. Not as uniform.	

.PTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE DH-1 Mar 76	SORTING	REMARKS 2/3
180-19	lght tan	gravel	clay	sand tr	elongate to blocky sub-ang	mod - mostly bi-modal	rhyolite, and. etc. as frags
190-2	"	"	"	"	"	poor - range of sizes diverse	abnt. calc.
200-21	"	gravel	"	"	gravel welded together to some extent w/ clay		biot. flakes obs.
210-22	"	"	"	"	"		
220-23	"	"	increase in clay			becoming less coarse	Calc. abnt.
230-24	"	gravel - pebbles w/ clay	"		cont. sub ang. elong to blocky		
240-25	"	clay - silt	gravel			Principally clay-silt. Will not hold mold	
250-2	"	gravel	clay-silt			Poorly sorted Diverse size	
260-2	"	clayey silt	gravel		New unit - going out of gravel Generally silt w/ clay. Will not hold mold		Calc. abnt
270-28	"	clay	silt/snd	gravel	Plastic, w/ mod. crser grn material	Poor - Mod	
280-2	"	clayey silt	small gravel (1/8")		Rk. frags sub-rnded	Fair - like 260-270	~~soil-like~~ soil-like
290-300	"	as above	"				
300-310	—	silty-clay	small gravel		logged wet - granular thin mud	Fair	Cont. calc
310-320		"	"			Poor-Fair	Some ang. lithic frags 1/8"
320-330		as above - logged wet - retaining water well (locked up clays or gravel pore space and sealed in bag by lighter clays)					
330-340		silty clay	increase in vol. of gravel ~ 50%			Poor	
340-350		clayey snd	gravel			Poorly sorted but fines are crser	Drier
350-360		pebbly to coarse snd	clay	gravel	ang. to sub-ang. rk frags		
360-370		"	increase in clay		Less crse material overall - sample wetter than above		Abnt. calc.
370-380	Med drk brwn	dirty 1/4 - 1/2" gravels	clay		sub-rnded to sub-angular	Fair - gravel w/ intermixed clay	some and. porph. and other liths.

PTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE D-1-1 MAR 76	SORTING	REMARKS 3/3
380-39	↑	clay	Snd-silt	gravel		Fair (Sticky)	Retains moisture
390-400		as above		increasing gravel			
400-410	med. drk brwn (wet)	clay	gravel - abnt	f.g. snd-silt	clay retains mold		
410-420	red ~~dark~~ brwn	gravel	~~cat~~ clay still abnt	snd-silt	sub ang- elong to blocky	Poor - Diverse size	Abnt calc cont.
420-430	red brwn	gravel	clay-silt cement		1/8-1/2 in. sub rnd to sub ang.	Essentially gravel w/ dirty component	
430-44	"	pebbles + gravel	"		Finer than above (less crse)		
440-450	"	"	"		Increase in clay		
450-46	vari-colored	sand	gravel	clay (minor)	sub-ang - sub rnd	// Fair - good. Significantly little clay	and. + rhyolite, other Rks.
460-47	↓	as above					Calc. cont.
470-48		pebbles + snd	clay	gravel.		Poor - becoming more clayey	Dior. frag. noted
48-4		snd	gravel	pebbly	Med. f.g. snd is dominant	Fair - good. Snd to gravel	Ep frag, granodiorite and, rhy., q.
490-50		as above			sub rnded circular to elongate snd xls.	Essentially vari-sized sand	Porph. and. frags
500-51		"	~~f.g. sand is~~		snd. is f.g overall w/ a soft quality		Calc. Cont.
510-520		picking "up green rk chips also. Bedrock ?			NOTE ON GRAVELS: Rhyolite welded tuff, med. grn. biot. dior., m.f.g. unaltered and., porph. rhyolite, lightly epidotitized biot. granodiorite, f.g. dense equigranular rhyolite, tourmaline-bearing crse-grn. felsite		
520-530	↓	as above - minor gravel					
530-54	green - brwn	high % bedrock chips mixed w/ apparent cave of sand from horizon above B.R.					
540-55	Bed rock -		olive green micritic limestone - depositional texture not distinct				
550-56			fine grain discreet particles or fragments poorly identifiable				
560-57			under 40 power observation.				
570-58							

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/4
		WATER WELL	DRILLING PROJECT		HOLE #5		
			APRIL 1976				
			DRILLED BY VENTURE LOGGED BY DMA				
0-10	orange-red	snd	gravel				siliz. rk frags surface oxide
0-20	"	snd	gravel { sub-rounded		snd is sub-rounded	broad rnge of snd., mostly f-g.	calc.
0-30		as above	clay		some clotting - calc - clay cement		
30-40		s + g	clay/silt			ext. poor >> clay	silicic.; mafic f-g. rk frags
40-50		clay w/ abnt gravel				poor	
50-60		gravel	clay		gravels sub-rnd	"	
60-70		clay w/ gravel			as above	poor ext	
70-80		silty clay	gravel				
80-90	red tan	gravel	clay				mod calcite
90-100 100-110		silty clay	gravel			poor	
110-120	red brwn (wet)	silty clay	snd				
120-130	tan	"	s + g				
130-140		"					
140-150		"					mod calc
150-160		clay silt	s+g				
160-170		clay silt			f.g.	fair -	

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 2/4
170-180		as above					Traces of Fe-oxide
180-190	tan	gravel	clay/silt		sub rounded	poor - multisize	up to 3/4"
190-200		as above				gravel is finer grained than above	
200-210	tan	silt/clay	s+g		s.r. + s.a.	up to 3/8" More f.g. (re snd+silt+clay)	
210-220	grey tan	gravel	clay		s.ang - s.r.	3/8" - 1/2"; fair	Retains water
220-230		gravel ←	silt/clay			poor - mixed crse/fn.grn.	
230-240		gravel ←	silt/clay		sa. - sr.	1/2" - 1/8" gravels	l.s., and, rhy,
240-250		silt + gravel	+ snd		"	abnt. f.g. material } gradational size change	
250-260		gravel —	as above				
260-270	grey tan	gravel	minor clay	mostly coarse gravels	s.r - s.a. up to 1"	fair - vari-sized gravels	trace py - oxide, ep., p. and.
270-280		s+g	silt/clay		sa. - sr	diverse sizes	calc cont.
280-290		gravel	clay		sub. ang.	1/4 - 1/2" gravel in	clay, calc cemnt
290-300	Yellow brwn	gravel	as above				
300-310	grey tan	gravel	silt/clay		sa - sr	1" - 1/8" gravels	ls., and., rhy. frag
310-320	lght. tan	s+g	silt/clay		sr snd	diverse sizes	calc cont.
320-330		gravel	snd/clay				
330-340		gravel (snd) ←	silt		s.r. gravel	poor - gravel is mostly 1/8 (coarse snd)	
340-350		gravel as	above			more gravel - 1/4"	
350-360		snd/silt/gravel		Note: sample is roughly boundary	s.r. overall	poor - little mostly less than 1/4.	v-large gravel
360-370	grey tan	gravel	sand/silt		sr - s.a.	poor - 3/8" gravels dominate w/ minor snd/silt	And. rhy. frag

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 3/4
370-380		as above					calc cont.
380-390	multi colored	s+g	clay (wk)		s.a. — s.r.	fair - crse snd to 3/4" grav.	better washed
390-400		as above					op, alt. and, qtzite, l.s. ?
400-410		as above					calc cont.
410-420		as above			1/8 - 1/2" sub angular	becoming less sandy good sorting -	uniformity fair size
420-430		s+g			sr. - sa.	Poorer - more clast sizes	
430-440		s+g			sa - mod sr	sand gravel abnt	3/4" gravel & m.-f.g. snd
440-450		as above					well washed
450-460		s+g			river sand(?)	more sandy - f.g. is more quartzose	light calc
460-470		sand			sub ang	vari-sized sand	retains moisture
470-480		as above					poor recovery. 460—480
480-490		snd				poor (in snd range but diverse sizes) silt ⟷ gravel	
490-500		s+g			s.r. - s.a.	bimodal - sugary red tan v.f.g. sand + 1/4-1/8" gravel (chr, and, ep, q)	
500-510		silty snd		spotty gravel		good	
510-520		snd			s.a.	mod (in snd range) vari sized snd	Abnt qtz.
520-530		as above				more straight f.g.	
530-540		silty snd		spotty gravel		good	
540-550		sand			s.a.	Vari - size —	vari-comp poor recovery
550-560		as above					
560-570		as above					

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 4/4
570-580	varicolor	as above					poor recovery
580-590		as above					v. poor recov.
590-600		as above				Becoming coarser	
600-610		s+g				poor	rhy, chert, and, green l.s.
610-620		s+g				v. poor. V.f.g. snd (or silt) to ½" gravel	
620-630		silty snd	coarser snd	gravel		fairly gd.	
630-640	T.D.	s+g			s.a – s.r.	fair	f.g. micritic gr ls, and, chert, rhyolite

NOTE ON FINAL GRAVELS – include fine grain micritic green limestone, andesite, chert, rhyolite

1/5

WATER WELL DRILLING PROJECT HOLE #6 LOGGED BY DMA

APRIL 1976 – DRILLED BY VENTURE

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
		No sample taken 0-20					
20-30	orange · tan	clay-silt	rk frag			poor – diverse sizes	Logged dry
30-40		as above	rk frgs – snd				
40-50		clay	"		sub-ang to sub rnd'd rk frags	poor – mod. F.g. material dominant	Porous texture to dried material
50-60		as above				NOTE: Gravels include porph. and., + rhyolite welded tuff	
60-70		as above					
70-80		as above	– silt			mod – mostly f.g. Less gravel	Calcite
80-90		as above	silt – gravel		As above – gravels (contam?)	more silt	
90-100		clay	"				cont. calc. abut.
100-110		clay-silt				good – minor gravels intermixed	
110-120		snd – clay	gravel			poor – sample is like "dirty pea gravel"	
120-130		as above			sub-ang to sub-rnded	cont. clay, abnt	
130-140	tan	pea gravel – clay – gravel			clotty, clay-carb cement of	pea gravel	frags include andesite pyroclastic, dacite w.t
140-150		clay	snd	gravel	Not clotty, but muddy – sticky	much more f.g.	Slightly wet
150-160		as above					

EPTH.	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY.	TEXTURE	SORTING	REMARKS 2/5
60-170		clay-silt	gravel-snd		blocky + porous	poor	cont calc.
70-180		as above					
80-190		as above				more gravel	ep. noted in some gravel
90-200		s + g	clay		sub ang - sub rnded	poor -> crse	fraction
200-210	tan - varicolor	gravel	snd/clay			abnt gravel but	v. dirty
210-220	"	s+g	clay		"	less clay over-all- cleaner	diverse liths
220-230		as above w/ more clay/silt; less coarse gravel					cont calc.
230-240		as above					porph rhy, ep. and. etc.
240-250		s+g less clay					
250-260		s+g	minor f.g.		sub-ang is most prevalent	fair	porph. and. common
260-270		as above			gravels sub rnd. snd sub. ang	fair - diverse snd sizes	
270-280		as above					cont calc
280-290	tan	s+g	>> clay/silt		as above but w/ more f.g.	major increase in f.g (silt/clay)	
290-300		s+g	<< clay		sub ang - sub rnd	less f.g.; 1/8-1/4"	dominant
300-310		~~s+~~ gravel	<< snd		sub ang dom.	crser - 1/4-1/2" w/~5% 1" frags	mostly gravel
320-330 ~~310-320~~		clay/silt	gravel		sub-rnded (clay lense)	poor - major local >> in silt/clay	
310-320 ~~320-330~~		s+g	<<< clay		sub ang - some sub-rnd	back into gravel snd B "pea gravel"	light calc or nr. foot
330-340		gravel	clay/snd		Sub-rnd w/ some sub-ang	v. dirty 1/4-3/4" gravels	
340-350	~~grey~~ tan						and + other frags
350-360	grey tan	gravel + snd			Circ- angular sub ang - sub rnd	Broad spread of gravel - snd	cont. " calc.

DEPTH.	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 3/5
360-370	grey tan	s+g	v. lght. clay(	grain coats) as	above – gravel	horizon con	ts.
370-380		small gravel/snd/	clay >>> clay		clotty, gravel lightly cemented w/ clay, calc.	v. poor diverse sizes	
380-390		s+g				5/8", smaller w/ interspersed clay	
390-400		s+g					
400-410	grey tan	s+g	v. lght clay coat			poor-fair	lght ht. on some frags
410-420		as above					
420-430		as above	> clay		sub rnd - sub ang		
430-440	tan grey	as above	< clay-silt		sub ang	sample cleaner ~1/2" av. size gravel	vclc frags
440-450		gravel	snd – clay		s-a to s-round, f.g.-c.g. and etc.	gravels larger — 1/2" to ~1" diam. w/ ad	mixed fines
450-460		s+g	clay coat			fewer large gravel ~~frags~~	
460-470	vari colored	sand	lght clay/grav.			fair	New stratig. zn. Out of gravels → snd
470-480		sand	clay-calcite wk. cement		ang./sub-ang. (some s.R)	fair – pea gravel mixed into m-f.g	cont. calc. snds
480-490		as above					and-felsite snd., some seds.
490-500		as above					
500-510		as above			some small frags look like rk chips	fair – some fines along w/ calc;	shll in sample cementing agent
510-520		as above			s.a – sr.	fair – gd. entire sample med-crs grn	g, ep, and, rhy grains
520-530		as above			slightly moist but no clotability	sample has (insuff. clay)	minor ht. noted
530-540		"			NOTE: These sands thru a drying out	are moisture re period exposed to air,	tentive; having gone they are still moi
540-550		"					
550-560		"					

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/5
560-570		as above					
570-580	varicolor	as above				med-crse g. snd cont.	
580-590		as above	> clay				a little stickier
590-600		"	< clay				
600-610		as above					
610-620		as above					
620-630		gravel	clay/sand		angular - sub ang pea gravel	1/4" strongest size w/ clay, calc cement	
630-640	tan	silt - pea gravel	snd - clay		"	poor	
640-650	reddish brown	as above - diverse sizes			ang - sub rnded		color resembles surface oxide zn.
650-660	orange brown	pea-gravel-silt - clay			clotty - goeth-clay-calc matrix in clots.		calc cont.
660-670	o-S	silt-snd	clay - gravel			poor - but f.g. dominates	goethite perv.
670-680	tan grey	pea gravel/snd	silt clay (loss of oxides, seds. more permeable)				abrupt color + text. change
680-690	tan grey	snd			any - sub ang	varisized snd	well washed; and. frags dom., qad. qz, lt,
690-700	tan	snd >>> clay	silt		dirty ang-sub ang. snd	poor - fair; snd + clay dom.	
700-710	red-grey	lt clay - pea gravel	m-g snd			poor - clay + sand	
710-720	orange tan	clay silt	snd			poor	
720-730	med brwn	clay	sand			mostly clay - w/ grit	sticky gumbo
730-740	red orange	as above					abut calc.
740-750	"	as above					
750-760	med brwn	clay/snd				>> sand - poor	

DEPTH-	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 5/5
760-770	tan grey	vari-sized sand pea gravel	clay			Poor— diverse sizes	Back into dirty snds, out of oxide clay(Km
770-780	red grey	as above, w/ Fe-oxide stain					cdc cont., picking up
780-790	red-or.	clay-snd				abnt sand, but gummy	Fe-oxide
790-800	pink brown	sand (ang; like rk chips)	clay		clay as discoloring wash — ang.		
800-810	red brown	snd	silt-clay		sub-ang - ang minor sub-rnd		And frags some qtz.
810-820		as above					
820-830		as above					
830-840	brown red	as above					abnt oxide
840-850	"	as above			Note: These lt. snds may be channel zn. for underground flow. Well oxidized		
850-860	orange tan	clay - snd				>>clay, less snd	
860-870	brown red	sand	clay			two strong size modes (snd + cly)	light cdc.
870-880		as above					
880-890	streaked grey + tan	as above			NOTE: Streaked color possible leaching by v. strong (pervasive) action of groundwater		
890-900		as above					
900-910	grey yellow	as above		NOTE: LITHOLOGY — These sands are dominantly white, disseminated (py + cp) sulfide-bearing limestone			mod cdc.
910-920		as above				abnt clay	
920-930	grey varicolored	snd	minor clay			fair - good	ep, oxide, and., rhyolite frags
930-940		as above	no clay		angular to sub angular		
940-950		as above	light clay				
950-960	white	Rock chip	—				white limestone — bedrock

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/6
			WATER WELL	DRILLING	PROJECT - BASE	OF SIERRITA	TAILINGS DAM
				DRILL HOLE	#7 - DRILLED	BY VENTURE	
				MARCH 1976		LOGGED BY DMA	
0-10							
10-20							
20-30	red brwn	sand			sub rounded	varisized sand	
30-40	tan (wet)	s+g	abnt clay			poor	
40-50		as above.				more gravel	
50-60		clay	gravel			<< gravel	Mod calcite
60-70		gravel				>> gravel	
70-80	tan grey	gravel	clay		sub ang-sub rnd.	less clay - fair sorting	1/8" - 1/2"
80-90		gravel	clay				
90-100		clay	gravel			bi-modal — essentially clay + gravel	
100-110		as	above				Mod calcite
110-120		clay	snd			fair - essentially clay w/minor admixed snd	
120-130		as	above				
130-140		as	above				
140-150		clay	gravel			>> gravel	
150-160		clay	sand			fair - good << gravel, admixed sand	
160-170		as above					

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 2/6
70-180	tan brown- logged	as above			wet — slurry		
180-190	wet	as above					
90-200		as above					
00-210		as above	> gravel				
210-220		as above	gravel + snd				
220-230		clay / sand →				Poor - Note >> snd.	
230-240		clay	s + g			Poor.	
240-250		as bove.					
250-260		as above					
260-270	cont logged wet	clay	sand			<< pea gravel	mod. calc.
270-280							
280-290		clay	s + g			poor — cont abnt clay	
290-300		as above				> gravel	
300-310		clay	sand			<< gravel	
310-320		clay	s + g			>> gravel	
320-330		as above					
330-340	tan (dry)	gravel	clay - snd		sub rounded	poor	
340-350		clay - snd	gravel			poor - less gravel, more clay	
350-360	multi- color	sand - (rk chip)	—		ang. to sub rnd	good.	ep, and, qtz., l.s.,
360-370		as above					

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 4/6
570/580				See notes on	pg. 3.		
580/590							
590/600							
600/610						> clay	
610/620							
620/630							
630/640							
640/650							
650/660			clay			> clay	
660/670			clay				
670/680				clay	finer grn sand	< clay	
680/690				clay			
690/700				clay			
700/710	orange tan (wet)	sand	clay			> clay	
710/720		sand	clay			Poor, abut clay	
720/730		as	above				
730/740							
740/750							
750/760							
760/770							

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 5/6
70/780		Sand ←	→ clay	see notes	on page 3	cont. poor — increase in clay	
80/790							
790/800		sand	clay			decrease in clay	
00/810						> clay	
10/820						> clay	
820/830							
830/840							
840/850	red - orange	snd	clay			poor cont abnt clay	Note color — Red siltstone incl.
850/860	yellow orange	– wet					
860/870	red orange						
870/880	varicolor	stg	<<< clay		angular to sbnt s.r.	fair – good (limited range) coarse snd to pea gravel	
880/890	"	stg			as above	a little finer grain	qz., and, dacite welded tuff, chert,
890/900	yellow + white	sand			angular – may be. cuttings		9/z, no calcite
900/910	red, yellow white	sand			from closely spaced cobbles		siltstone, rhyol, oxidized siltstone
910/920	red + white	Sand					
920/930	varicolor (red + orange dominant)	as above				good - crse to v. coarse	
930/940							
940/950	varicolor	snd		clay			no calc
950/960	orange, yell. wet varicolor	snd	clay			light clay wash on snd	
960/970		as above					

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 6/6
970/980	red brwn	snd		clay	ang. to sub rndd	good, light clay wash	some sub rnding is well developed
980/990		as above					
990/1000	Varicolor dark	Snd		clay			
1000/1010			as above				
1010/1020							
1020/1030							
1030/1040							
1040/1050							
1050/1060							
1060/1070							
1070/1080	blue grey	bedrock			rk chips		Partially reactive
1080/1090		"					
1090/1100		"					

Further note on bedrock —

Fair occurrence of calc. and py. suggests this rock is in the propylitic zone (of Sierrita-type?) or a ~~regional propylitic halo~~

Bedrock — greyish gry-white partially reactive Demetrie rhyolite tuff (?)
v. fine grain moderately soft groundmass;
sulfide bearing (microvnlt + diss) py (and cpy ?).
Color is mottled, caused in part by irregular distribution
of fine grain chlorite (?) Darker material generally unreactive
to mod strng HCl. Some frags are hematitic (after chl ?)
w/ white [illegible] [illegible] [illegible] Some yellow (jarosite ?) crusts

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/6
—				WATER WELL	DRILLING PROJECT		
				HOLE #8 -	SOUTH SIDE SIERRITA TAILINGS DAM		
				JUNE 1976	LOGGED BY DMA./DEK	END of	HOLE 1065
0-30	RED BROWN	Sand	Clay + gravel		sub-rnded to sub-angular	mod. well sorted snd w/ coarser gravels.	Mod calcite
70-40	Red Brown	Gravel	Sand w/ minor clay+oxides.		angular to subr. elong. to blocky	poorly sorted - broad range of gravels - 3/4"	to med. grn. snd
70-50	Orange Brown	S + G	Abund. clay		s.r - s.a. vari-shaped	Poor; less coarse gravels. Finer overall	epidote, qtz., and., diverse rks.
50-60	MED. TAN BROWN	CLAY	SAND & GRAVEL		VERY WET CLAY W/SAND [illegible] GRAVEL MIXED [illegible]	MOD. WELL SORTED	
60-70	MED TAN BROWN	C	MORE SAND & G.		WET CLAY W/SAND [illegible]	MED WELL SORTED GRAVEL UP TO 3/4"	
70-80	MED. TAN BROWN	C	MORE LESSER SAND & GRAVEL		DIRTY WET CLAY W/SAND & GRAVEL [illegible]	MOD. SORTED GRAVEL - 3/4"	
80-90	MED TAN BROWN	C	COURSE AND FINE SAND [illegible]		DIRTY CLAY VERY SANDY, [illegible]	MOD WELL SORT, FROM CLAY TO COURSE [illegible]	
90-100	MED TAN BROWN	C	SAND & MUCH LESS GRAVEL		DIRTY CLAY, ANG. TO SUB CIRCULAR GRAVEL	POOR SORTING	
100-110	MED. TAN BROWN	C	SAND & MINOR GRAVEL	[illegible]	DIRTY CLAY, ANG. TO SUB CIR. GRAVEL	POOR SORTING GRAVEL [illegible]	
110-120	DARK TAN BROWN	G	SAND & CLAY		ANGULAR TO CIRCULAR - ROUNDED	MOD [illegible] GRAVEL 3/4 to med SAND	CLAY(DIRTY) COVERS THE GRAVEL
120-130	DARK TAN BROWN	C & G	SAND		SUBANGULAR TO CIRCULAR - ROUNDED	POORLY SORTED GRAVEL PEA SIZED	clay (DIRTY) COVERS GRAVEL
130-140	MED. TAN BROWN	C	SAND & GRAVEL		DIRTY WET CLAY, GRAVEL FROM SAND TO 3/4"	V. POORLY SORTED	
140-150	MED. TAN BROWN	C	SAND		DIRTY WET CLAY [illegible], FEW PEA SIZED GRAVEL.	MOD. WELL SORTED	
150-160	MED TAN BROWN	C	SAND & GRAVEL		DIRTY WET clay ANGULAR TO BLOCKY [illegible]	POOR SORTED	
160-170	MED TAN BROWN	C	S & G		DIRTY WET CLAY ANGULAR TO BLOCKY	V. POORLY SORTED GRAVEL	
170-180	MED. TAN BROWN	C	G & S		DIRTY WET CLAY ANGULAR, BLOCKY TO CIRCULAR, ROUND G.	V. POORLY SORTED	
180-190	MED TAN BROWN	G	C & S		SUBANGULAR TO BLOCKY, TABULAR 3/4"	MOD. SORTED	Clay covers GRAVEL

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
90-200	MED TAN BROWN	G	S & C		ANGULAR SUBANG., TABULAR, BLOCKY	POOR SORTING	CLAY COVERS GRAVEL
00-210	MED TAN BROWN	G	S & C		VARI-SHAPED PEA SIZED	POOR SORTING	CLAY COVERS GRAVEL
10-220	MED. TAN BROWN	G	S & C		VARI SHAPED PEA SIZED TO 3/4"	POOR SORTING	CLAY COVERS GRAVEL
20-230	MED. TAN BROWN	G	S & C		VARI SHAPED PEA TO 3/4"	POOR SORTING	CLAY COVERS GRAVEL
30-240	MED-DARK TAN-BROWN	G	S & C		VARI SHAPED PEA TO 1"	POOR SORTING	CLAY COVERS GRAVEL
40-250	CHOC. BRN.	G	S & C		VARI SHAPED PEA TO 1"	POOR SORTING	CLAY COVERS GRAVEL
50-260	CHOC. BRN.	G	S & C		TABULAR, BLOCKY ANGULAR	POOR SORTING	cly covers GRAVEL
60-270	CHOC. BRN.	G	S & C		VARI. SHAPED PEA TO 1"	POOR SORTING	cly covers GRAVEL
270-280	DARK BRN.	G	S & C (BOTH LESSER)		SUB ANG - ROUNDED, CIRCULAR	POOR SORTING	LITTLE cly, LESS H_2O GRAVEL STILL SLIGHTLY COVERED
280-290	CHOC. BRN	G	S & C		SUB - ANG - ROUNDED, CIRCULAR PEA TO 3/4	POOR SORTING	MORE H_2O cly DECREASING
290-300	VARIOUS [illegible]	G	S & C		VARI SHAPED PEA TO 3/4"	MOD SORTING	LESS H_2O CALCITE STILL REMAINS
300-310	VARIOUS	G	SILT & SAND		BLOCKY, TABULAR CIRCULAR, ROUNDED PEA TO 3/4"	MOD SORTING	EPIDOTE, QTZ, AND. VARI RXS.
310-320	MULTI	G	SILT & SAND		ROUNDED, CIRCULAR	POOR SORTING	CALCIUM ENDS EPIDOTE, ETC.
320-330	MULTI	G	SAND		TABLULAR, ROUNDED; PEA TO 3/4"	MOD. SORTING FINER	VARIOUS RX, AND. EPIDOTE, [illegible]
330-340	MULTI	G	SAND		SUBANGULAR TO ROUNDED PEA SIZED	MOD. SORTING FINER	VARIOUS RX
340-350	MULTI	G	SAND		ROUNDED TO CIRCULAR LESS THAN PEA SIZED	MOD. SORTING	VARIOUS RX
350-360	MULTI MOSTLY BLK	G	SAND		PEA SIZED ROUNDED TO CIRCULAR	MOD. SORTING	AND. VARIOUS RX
360-370	MULTI GEN. BLK.	G	SAND		PEA SIZED VARI. SHAPED	MOD. SORTING	AND. EPIDOTE, VARIOUS RX
370-380	MULTI BLK [illegible]	G	SAND		PEA SIZED VARI SHAPED	MOD. SORTING	AND. EPIDOTE VARIOUS Rx
380-390	MULTI	G	SAND		PEA SIZED VARI SHAPED	MOD. SORTING	AND. QTZ. EPIDOTE VARIOUS

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
90-400	MULTI w/tan brown	G	C ⅓ S		TABULAR, SUBANGULAR TO CIRCULAR B.B. SIZED	VERY POOR	CALCIUM MORE S ⅓ C
00-410	MULTI W/TAN BROWN	G	C ⅓ S		B.B. SIZED VARI. SHAPED	VERY POOR CLY TO PEA GRAVEL	EPIDOTE MORE C
10-420	MULTI W/TAN BRN	G	C ⅓ S		VARI. SHAPED FROM MED. SND TO B.B. TO PEA OR LARGER	VERY POOR	G INCREASING IN SIZE
20-430	MOSTLY BRN. W/ VARI. COLOR	G	C ⅓ S		B.B. SIZED OR LESS VARI. SHAPED	POOR SORTING	G DECREASING IN SIZE INC. CLY
30-440	ORANGE BRN	C	G ⅓ S		WET DIRTY CLY. FROM FINE SND TO BB GRAVEL	POOR SORTING TO MOD.	LITTLE GRAVEL MOD. CALCIUM
40-450	ORANGE, BRN, & GRAY	C	G ⅓ S		WET DIRTY CLY FROM MEDSND. TO PEA GRAVEL	VERY POOR SORTING	INCREASED GRAVEL EPIDOTE, AND.
50-460	ORNG-BRN TO MULTI	S	G(?) ⅓ C		MED TO COARSE GRAINED SND. LITTLE GRAVEL VARI. SHAPED	MOD TO POOR SORTING	LITTLE OR NO GRAVEL
60-470	ORNG-BRN TO MULTI	S	G ⅓ C		MED. TO COARSE SAND. VARI SHAPED	POOR SORTING	INCREASE IN GRAVEL B.B. SIZE
70-480	RED-BRN	C	S		FINE TO COARSE SND.	MOD TO GOOD SORTING	VERY LITTLE, IF ANY, GRAVEL
80-490	RED-BRN	C	G ⅓ S		WET DIRTY CLY FINE TO COARSE SND PEA GRAVEL	POOR TO VY POOR SORTING	INCREASE IN GRAVEL
90-500	GRAY- [illegible] BRN	C	G ⅓ S		WET DIRTY CLY B.B. TO PEA SIZED GRAVEL	VERY POOR SORTING	DECREASE IN SIZE OF GRAVEL
00-510	ORNG.- BRN	C	S ⅓ G		WET DIRTY CLY FINE SAND TO VARI. SHAPED PEA GRAVEL	VERY POOR TO POOR SORTING	
10-520	RED-ORNG-BRN	C	S		WET DIRTY CLY FINE SND TO COARSE SND	MOD. SORTING FINER MATERIAL	LITTLE GRAVEL FOUND
20-530	RED-ORNG BRN	C	S		WET DIRTY CLY FINE TO MED SND	MOD. SORTING	ANDESITE, EPIDOTE
30-540	MED. TAN BRN - MULTI	G	C ⅓ S		WET DIRTY CLY VARI SHAPED GRAVEL	POOR SORTING	AND, EPID, QTZ, ETC. [illegible] CLAY
40-550	ORNG-TAN BRN	C	S ⅓ G		WET DIRTY CLY VARI SHAPED GRAVEL PEA SIZED	VERY POOR TO POOR SORTING	MUCH MORE CLAY, LESS GRAVEL
50-560	MULTI COLORED	G	S		ANGULAR TO SUB-ANGULAR PEA SIZED GRAVEL	MOD. TO GOOD SORTING	LITTLE CLY, MOSTLY ANDESITE
60-570	TAN BRN.	C	S ⅓ G		WET DIRTY CLY FINE TO COARSE SND, PEA GRAVEL	POOR SORTING	VERY LITTLE GRAVEL
70-580	TAN BRN,	C	S ⅓ G		WET DIRTY CLY MED. TO CRS SND. BB TO PEA GRAVEL	VERY POOR SORTING	
80-590	TAN BRN.	C	S ⅓ G		WET DIRTY CLY FINE TO COARSE SND, BB SIZED GRAVEL	POOR SORTING	

3/6

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
370-380	varicolored dark grey,	sand note:			Essentially	As noted above	
380-390	green, white	from 350 — 500 sample is			angular w/ some sub-angular	good sorting overall w/ a span in the	
90-400		sand, w/ strong				mod. crse to very	
00-410		dark fraction of andesite, ep.,				coarse range in sand.	
10-420		and admixed			Considering the fair angularity and sorting of these coarse		
20-430		quartz, oxide—			sands, and their thickness as a continuous bed, the sand		
30-440					should constitute a good aquifer.		
40-450							chert, siltstone frags, noted
50-460							
460-470							calc. light
470-480							
480-490							
490-500							
00-510		500— sand becomes a little lighter colored, slightly more clay — clay becomes gradationally more prevalent and is strongly admixed w/ sand from 700 — 870.					
510-520							
520-530		sand	clay			fair - light admix of clay	
530-540							
540-550							
550-560							
560-570							

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
590-600	DARK TAN BRN	C	S $\frac{1}{3}$ G		WET DIRTY CLAY FINE TO PEA SIZE [illegible] GRAVEL	POOR SORTING	VERY LITTLE CALCIUM
600-610	ORNG-GRY BRN	C	S $\frac{1}{3}$ G		WET DIRTY CLY VERY [illegible] SIZED MED SND TO PEA GRAVEL	POOR SORTING	NO CALCIUM
610-620	LIGHT TAN	C	S $\frac{1}{3}$ G		WET DIRTY CLY MED TO CRS SND [illegible] TO SUB-ROUNDED PEA GRAVEL	POOR SORTING	COLOR BECOMING LIGHTER
620-630	GRY — OLIVE GRN.	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE TO COARSE SND	POOR TO MOD. SORTING	LITTLE GRAVEL COLOR CHANGING
630-640	GRY - OLIVE GRN	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE SND TO PEA GRAVEL	POOR SORTING	..
640-650	OLIVE GRN - GRY	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE SND TO PEA SUB ROUNDED GRAVEL	POOR TO MOD. SORTING	
650-660	OLIVE GRN- GRY	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE TO COARSE SND	POOR SORTING	LITTLE GRAVEL UP TO PEA SIZE
660-670	GRY - LIGHT OLIVE GRN	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE TO COARSE SND	MOD. SORTING	LITTLE GRAVEL
670-680	GRY - LIGHT OLIVE GRN	C	S $\frac{1}{3}$ G		WET DIRTY CLY FINE SND TO PEA GRAVEL	POOR SORTING	MORE GRAVEL
680-690	TAN GRAY	C $\frac{1}{3}$ S	G		WET DIRTY CLY FINE TO COARSE SND.	POOR SORTING	PEA GRAVEL
690-700	DARK TAN-GRAY	S $\frac{1}{3}$ C	G		FINE TO COARSE SND, WET DIRTY CLY	VERY POOR SORTING	B.B. SIZE GRAVEL
700-710	MED BRN GRAY	S $\frac{1}{3}$ C	G		FINE TO COARSE SND, WET DIRTY CLY	VERY POOR SORTING	B.B SIZE GRAVEL
710-720	MED BRN GRAY	S	C $\frac{1}{3}$ G		FINE TO COARSE SND. WET DIRTY CLY	VERY POOR SORTING	B.B. TO PEA SIZE GRAVEL
720-730	MED BRN GRAY	C $\frac{1}{3}$ S	G		FINE TO COARSE SND, WET DIRTY CLY	VERY POOR SORTING	BB. SIZED GRAVEL
730-740	DARK BRN GRAY	C $\frac{1}{3}$ S	G (?)		FINE TO COARSE SND, WET DIRTY CLY	MOD TO GOOD SORTING	LITTLE OR NO GRAVEL
740-750	DARK BRN GRAY	C $\frac{1}{3}$ S	G (?)		FINE TO COARSE SND WET DIRTY CLY	MOD TO GOOD SORTING	
750-760	DARK BRN GRAY	C $\frac{1}{3}$ S	G		FINE TO COARSE SND. WET DIRTY CLY	POOR SORTING	MORE GRAVEL (PEA)
760-770	ORNG - GRAY	C $\frac{1}{3}$ S	G		FINE TO COARSE SND. WET DIRTY CLY	POOR TO MOD. SORTING	LITTLE GRAVEL
770-780	ORNG- GRAY BRN	C $\frac{1}{3}$ S	G		FINE TO COARSE SND. WET DIRTY CLY PEA SIZED GRAVEL	POOR SORTING	
780-790	ORNG- TAN	C $\frac{1}{3}$ S	G		FINE TO COARSE SND, WET DIRTY CLY, PEA SIZED GRAVEL	POOR SORTING	INCREASE IN GRAVEL

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
90- 800	ORNG- TAN	C 3 S	G		FINE TO COARSE SND WET DIRTY CLAY PEA GRAVEL	VERY POOR SORTING	
800- 810	ORNG- TAN	C 3 S	G		FINE TO MED SND WET DIRTY CLAY PEA GRAVEL	VERY POOR SORTING	
810- 820	ORNG- BRN	C 3 S	G		FINE TO MED SND WET DIRTY CLAY [illegible]	VERY POOR SORTING	
820- 830	ORNG- BRN	C 3 S	G		FINE TO COARSE SND WET DIRTY CLY PEA GRAVEL	VERY POOR SORTING	ANDESITE
830- 840	OLIVE GRN- GRAY	C 3 S	G		FINE TO COARSE SND WET DIRTY CLY PEA GRAVEL	VERY POOR SORTING	ANDESITE
840- 850	ORNG BRN	C 3 S	G		FINE TO COARSE SND WET DIRTY CLY PEA GRAVEL	VERY POOR SORTING	
850- 860	RED, ORNG, GRN-GRAY	C 3 S	G		FINE TO COARSE SND. WET DIRTY CLAY PEA GRAVEL	VERY POOR SORTING	ANDESITE
860- 870	RUSTY RED BRN	S	C 3 G		WET DIRTY CLAY ANGULAR TO SUBANGULAR	VERY POOR FINE TO COARSE SND.	ANDESITE
870- 880	TAN-ORNG -RUST	S	C 3 G		WET DIRTY CLAY BLOCKY AND ANGULAR TO SUBANGULAR	VERY POOR FINE TO COARSE SND	ANDESITE QTZ?
880- 890	SLIGHTLY DARKER [illegible]	C	S 3 G		WET DIRTY CLAY PEA SIZED, ANGULAR TO ROUNDED GRAVEL	VERY POOR TO POOR FINE TO COARSE SND	LESS GRAVEL
890- 900	ORNG-TAN- GRN-GRAY	C	G 3 S		WET DIRTY CLAY GRAVEL SIZE AN- [illegible]	VERY POOR LITTLE SAND MATRIX)	ANDESITE EPIDOTE
900- 910	TAN GRY ORNG	C	S 3 G (?)		WET DIRTY CLAY PEA GRAVEL-BLOCKY	POOR FINE TO MED. SND	ANDESITE LESS GRAVEL
910- 920	ORNG- TAN	C	S 3 G (?)		WET DIRTY STICKY CLY [illegible] PEA SIZED	MOD TO GOOD FINE TO MED SND	ANDESITE LITTLE GRAVEL
920- 930	TAN ORNG	C	S		WET DIRTY STICKY CLY	MOD TO GOOD FINE TO MED. SND	LITTLE OR NO GRAVEL
930- 940	ORNG- TAN	C	S 3 G		WET DIRTY STICKY CLAY	MOD. FINE TO MED SND	ANDESITE GRAVEL OF PEA SIZE
940- 950	LIGHT TAN- RED ORNG	C	S 3 G		WET DIRTY STICKY CLY	POOR FINE TO COARSE SND	PEA GRAVEL
950- 960	ORNG TAN ORNG	C	S		WET DIRTY CLY	POOR TO MOD FINE TO COARSE SND	VERY LITTLE GRAVEL
960- 970	ORNG TAN ORNG	C	S 3 G		WET DIRTY CLY PEA GRAVEL-ANGULAR	POOR FINE TO COARSE SND	
970- 980	TAN ORNG	C	S 3 G		WET DIRTY CLY PEA GRAVEL-ANGULAR	POOR FINE TO COARSE SND	ANDESITE
980- 990	ORNG TAN	C	S 3 G		WET DIRTY CLY PEA GRAVEL-ANG.	POOR FINE TO COARSE SND	ANDESITE

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 6/6
990-1000	ORNG TAN	C	S ¦ G		WET DIRTY CLAY FINE TO COARSE SND	POOR TO MOD. PEA GRAVEL	VERY LITTLE GRAVEL
1000-1010	ORNG RED	C	S ¦ G		WET DIRTY CLY PEA GRAVEL - ANG	VERY POOR FINE TO COARSE SND	ANDESITE
1010-1020	RED-BRN BRN	C	S ¦ G		WET DIRTY CLY PEA GRAVEL - ANG	VERY POOR FINE TO COARSE SND	ANDESITE
1020-1030	BRN-BLACK-MULTI	G	C ¦ S		ANGULAR TO VARI. SHAPED. FINE TO [illegible] NOT [illegible]	POOR [illegible]	PORPHYRITIC DACITE (ANDESITE?)
1030-1040	GRN-BLK-BLK-MULTI	G	S		ANGULAR SHAPED FINE SND	GOOD SORTING PEA GRAVEL	SAME AS ABOVE
1040-1050	GRN-TAN BLK-MULTI	G	S ¦ C		ANGULAR TO VARI. SHAPED.	POOR TO VERY POOR PEA GRAVEL FINE TO COARSE SND	SAME AS ABOVE
1050-1060	BLK-GRN BLK-TO MULTI	G	S		ANGULAR TO SUB-ANG [illegible] WET CLAY. PEA GRAVEL FINE TO [illegible]	MED TO GOOD [illegible] SAND	SAME AS ABOVE
1060-1065	BLK-GRN [illegible]	G			ANGULAR TO SUB-ANG [illegible] fine [illegible]	MED. TO GOOD	SAME AS ABOVE

porphyritic

NOTES ON BEDROCK: Fine grained green to brown, porphyritic andesite (dacite?) w/ euhedral plag phenocrysts. Abnt lt. staining, associated w/ fractures and groundmass magnetite. Chlorite, calc. present — weak propylitic alteration.

Some diss. + free sulfs (py + cp?) observed, but may be from contaminant grains.

1/8

WATER WELL DRILLING PROJECT
D-HOLE #9
SIERRITA TAILINGS DAM
JUNE 1976 LOGGED BY ARK/DMA
BEDROCK 1300 — TOTAL DEPTH 1400

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
0-10	LIGHT TAN	C	S 1/3 G		DRY CLAY GRAVEL PEA SIZED VARI-SHAPED	POOR FINE TO COARSE SAND	MOD CALCIUM
0-20	LIGHT TAN	C	S 1/3 G		DRY CLY GRAVEL PEA SIZED ANGULAR TO SUBANG.	POOR FINE TO COARSE SND	
0-30	LGT TAN-VARI COLOR	C	G 1/3 S		DRY CLY GRAVEL UP TO 1" VARI-SHAPED	VERY POOR FINE TO COARSE SND	ANDESITE (!)
30-40	LGT TAN.	C	S 1/3 G		DRY CLY GRAVEL PEA SIZED ROUNDED TO CIRCULAR	POOR FINE TO COARSE SND	MUCH LESS GRAVEL
40-50	MED TAN BROWN	C	S 1/3 G		DAMP CLY GRAVEL PEA SIZED [illegible]	POOR FINE TO COARSE SND	
50-60	MED. BRN	C	S		DAMP CLY FINE TO MED SND	MOD TO GOOD	NO GRAVEL
0-70	MED. TAN	C	S 1/3 G		WET DIRTY CLAY GRAVEL UP TO 3/4" ANGULAR	VERY POOR FINE TO MED SND	
70-80	MED TAN	C	S 1/3 G		WET DIRTY CLAY GRAVEL UP TO 3/4" ANGULAR	VERY POOR FINE TO MED SND	
80-90	MED. TAN	C	S 1/3 G		WET DIRTY CLY PEA GRAVEL	VERY POOR TO POOR FINE TO MED SND	
90-100	MED TO [illegible]	C	S 1/3 G		WET DIRTY CLY PEA GRAVEL	VERY POOR FINE TO MED SND.	
100-110	MED. TAN	C	S 1/3 G		WET DIRTY CLY GRAVEL UP TO 1/2" [illegible]	VERY POOR FINE TO MED SND. [illegible]	
110-120	MED. TAN	C	G 1/3 S		WET DIRTY CLY GRAVEL UP TO 1/2" ANGULAR TO [illegible]	VERY POOR FINE TO MED. SND [illegible]	
120-130	MED. TAN	G	C 1/3 S		WET DIRTY CLY. GRAVEL UP TO 3/4" ANGULAR TO [illegible]	VERY POOR FINE TO MED. SND.	CLAY COATS GRAVEL.
130-140	MED. TO MED DARK [illegible]	C	S 1/3 G		WET DIRTY CLY PEA GRAVEL FINE TO MED SND.	VERY POOR TO POOR.	MUCH LESS GRAVEL
140-150	[illegible] TO MULTI	G	C 1/3 S		WET DIRTY CLY PEA GRAVEL ANGULAR TO ROUNDED	POOR MED. TO COARSE SND. [illegible]	
150-160	MULTI	G	S		GRAVEL UP TO 3/4" BLOCKY TO TABULAR VARI. SHAPED	POOR TO MOD. MED TO COARSE SND.	LITTLE CLY ANDESITE
160-170	DARK TAN	C	S 1/3 G		DAMP CLY BLOCKY GRAVEL UP TO 1"	VERY POOR FINE TO MED SND.	

2/8

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
70-180	MED. TAN TO [illegible]	G	S 3 C		GRAVEL UP TO [illegible] BLOCKY TO ROUNDED	POOR [illegible]	ANDESITE (?)
80-190	MED. TAN	G	S 3 C		GRAVEL [illegible] ROUNDED TO VARI-SHAPED	VERY POOR FINE TO MED. SND	
90-200	MED. TO DARK TAN	G	S 3 C		GRAVEL UP TO ½" TABULAR TO BLOCKY, ROUNDED	VERY POOR FINE TO MED. SND	
00-210	MED. TAN	C	S 3 G		WET DIRTY CLY PEA GRAVEL	VERY POOR FINE TO COARSE SND	
10-220	DARK TAN TO MULTI	G	S 3 C		GRAVEL UP TO ½" TABULAR TO BLOCKY, ROUNDED	VERY POOR FINE TO MED. SND	ANDESITE (?) QUARTZ (?)
20-230	DARK TAN TO MULTI	G	S 3 C		GRAVEL UP TO ½" TABULAR TO BLOCKY, ROUNDED	VERY POOR FINE TO COARSE SND	↑
230-240	DARK TAN TO MED. BRN.	G	S 3 C		GRAVEL UP TO ¾" TABULAR TO BLOCKY VARI-SHAPED	VERY POOR FINE TO COARSE SND	
40-250	MED. TAN	G	S 3 C		GRAVEL UP TO ½" MOSTLY PEA SIZED VARI-SHAPED	VERY POOR FINE TO COARSE SND	WET DIRTY CLAY
50-260	MED. TAN	C	S 3 G		WET DIRTY CLY. GRAVEL UP TO ¾" BLOCKY, TABULAR-ANGULAR	VERY POOR FINE TO COARSE SND	
260-270	MED. TAN	G	S 3 C		GRAVEL UP TO ¾" BLOCKY - TABULAR, VARI-SHAPED	VERY POOR FINE TO COARSE SND	WET DIRTY CLY
270-280	TAN - BRN.	G	S 3 C		GRAVEL UP TO ¾" BLOCKY-TABULAR-ANGULAR	VERY POOR FINE TO COARSE SND	↓
280-290	TAN - BRN - MULTI	G	S 3 C		GRAVEL UP TO ½" BLOCKY - TABULAR ANG - SUBANGULAR	VERY POOR FINE TO COARSE SND	↓
290-300	TAN-BRN MULTI	G	S 3 C		GRAVEL UP TO ½" BLOCKY - TABULAR - ANGULAR	VERY POOR FINE TO COARSE SND	↓
300-310	MED-TAN BRN MULTI	G	S 3 C		GRAVEL UP TO ½" BLOCKY - TABULAR - ANGULAR	VERY POOR FINE TO COARSE SND	↓ /ANDESITE
310-320	MED TAN BRN	G	S 3 C		GRAVEL UP TO ¾" BLOCKY - TABULAR ANGULAR TO SUB ANG.	VERY POOR FINE TO MED. SND	↓ /ANDESITE
320-330	MED TAN BRN	G	S 3 C		GRAVEL UP TO ¾" BLOCKY - TABULAR ANGULAR TO SUB A[illegible]	VERY POOR FINE TO MED. SND	↓ /ANDESITE
330-340	LIGHT TAN BRN	G	S 3 C		GRAVEL UP TO ½" BLOCKY - TABULAR VARI-SHAPED	VERY POOR FINE TO COARSE SND	↓ /ANDESITE
340-350	MED. TAN BRN	G	S 3 C		PEA GRAVEL - TABULAR VARI SHAPED	VERY POOR FINE TO COARSE SND	↓ /ANDESITE, [illegible]
350-360	MED. TAN BRN-MULTI	G	S 3 C		GRAVEL UP TO ¾" BLOCKY - TABULAR ANGULAR - ROUNDED	VERY POOR FINE TO COARSE SND	↓ /ANDESITE (?)
360-370	MED. - TAN BRN	G	S 3 C		GRAVEL PEA SIZED VARI-SHAPED	VERY POOR FINE TO COARSE SND	↓ /ANDESITE

3/8

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
370 - 380	MULTI	G	S & C		GRAVEL UP TO 3/4" TABULAR - BLOCKY - [illegible]	POOR TO MOD. [illegible] TO COARSE SND	ANDESITE [illegible] RHYOLITE CALCIUM WET DIRTY CLY
380 - 390	MULTI	G	S & C		GRAVEL UP TO 1/2" VARI - SHAPE	POOR TO MOD. COARSE SND.	ANDESITE RHYOLITE
390 - 400	MULTI	G	S & C		GRAVEL UP TO 1/2" ANGULAR ROUNDED [illegible]	POOR TO MOD. MED TO COARSE SND	ANDESITE RHYOLITE [illegible]
400 - 410	MULTI	G	S & C		GRAVEL UP TO 3/4" BLOCKY - TABULAR ANGULAR	POOR MED TO COARSE SND	ANDESITE RHYOLITE
410 - 420	MULTI	G	S		GRAVEL UP TO 3/4" BLOCKY - TABULAR [illegible]	POOR COARSE GRD SND.	↓
420 - 430	MULTI	G	S		GRAVEL UP TO 1/2" BLOCKY - ANGULAR - SUB ANG. - ROUNDED	POOR MED TO COARSE SND.	↓
430 - 440	MULTI	G	S & C		GRAVEL UP TO 1/2" ANG - SUB. ANG - ROUNDED	POOR MED TO COARSE SND	↓ / CLY CO- COMING [illegible]
440 - 450	MULTI (CLEAR-PINKISH [illegible])	G	S & C		GRAVEL UP TO 1/2" VARI - SHAPED	POOR FINE TO COARSE SND	↓ / CLY COLOR CHANGING
450 - 460	MULTI ([illegible])	G	S & C		GRAVEL UP TO 1" BLOCKY - TABULAR - ANGULAR	VERY POOR TO POOR FINE TO COARSE SND	↓ / MOST GRAVEL COATED BY PINK CLAY
460 - 470	MULTI	G	S & C		GRAVEL UP TO 1" BLOCKY - TABULAR ANGULAR	POOR FINE SAND	↓ ?
470 - 480	MULTI (LESS [illegible])	S & G	C		GRAVEL UP TO 1/2" VARI SHAPED.	VERY POOR FINE TO COARSE SND	RHYOLITE ANDESITE ([illegible] SND)
480 - 490	RED - GRAY PINK	C	S		WET DIRTY CLY	MOD. TO GOOD FINE SND.	LITTLE OR NO GRAVEL FOUND
490 - 500	RED - GRAY [illegible]	C	S		WET DIRTY CLY FINE SND	MOD TO GOOD	
500 - 510	RED-BRN RED	C	S & G		WET DIRTY CLY FINE SND GRAVEL -	POOR BLOCKY - UP TO 1/2"	
510 - 520	RED-BRN RED	C	S & G		WET DIRTY CLY FINE SND GRAVEL -	POOR BLOCKY - UP TO 1/2"	
520 - 530	RED-BRN RED	C	S		WET DIRTY CLY FINE SAND	MOD. TO GOOD	NO GRAVEL
530 - 540	GRAYISH RED	C	S & G		WET DIRTY CLY FINE TO MED SND [illegible] GRAVEL	MOD.	LITTLE GRAVEL
540 - 550	RED - BRN GRAY	C ?	(?)		WET DIRTY CLY FINE TO COARSE SND.	MOD. TO GOOD.	
550 - 560	ORNG- BRN	S	C		FINE TO COARSE SND WET DIRTY CLY	GOOD	NO GRAVEL NOTED
560 :- 570	LIGHT RED- BRN	S	C		FINE TO COARSE SND. WET DIRTY CLY	GOOD	

4/8.

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
570- 580	RED BRN [illegible]	[illegible]	C		FINE TO COARSE SND [illegible]	GOOD	LITTLE GRAVEL NOTED
580- 590	[illegible]	S	C 3 G		FINE TO [illegible]	MOD TO POOR	
590- 600	[illegible] BRN	S	C 3 G		FINE TO COARSE WET DIRTY CLAY [illegible]	POOR	
600- 610	PINK GRAY [illegible]	S	[illegible]		FINE TO COARSE [illegible] [illegible]	MOD. TO GOOD	
610- 620	RED-BRN GRAY	C	S		WET DIRTY CLY FINE TO COARSE SND	MOD. TO GOOD	NO GRAVEL
620- 630	[illegible]	C	S		WET DIRTY CLY FINE TO COARSE SND	MOD. TO GOOD	"
630- 640	[illegible]	C	S		WET DIRTY CLY FINE TO COARSE SND	MOD. TO GOOD	
640- 650	GREY RED BRN	C	S 3 G		WET DIRTY CLY FINE TO COARSE SND [illegible] LITTLE PEA GRAVEL	POOR TO MOD.	
650- 660	RED BRN - GRAY	C	S 3 G		WET DIRTY CLY FINE TO COARSE SND PEA GRAVEL	VERY POOR	ANDESITE, RHYOLITE
660- 670	RED-GRAY BRN.	C	S 3 G		WET DIRTY CLAY FINE TO MED. SND PEA GRAVEL	VERY POOR	ANDESITE, RHYOLITE
670- 680	DARK RED- GRAY BRN	C	S 3 G		WET DIRTY CLAY FINE TO MED. SND PEA GRAVEL	VERY POOR	" "
680- 690	DARK RED- ORNG- BRN	C	S 3 G		WET DIRTY CLY FINE TO MED. SND PEA GRAVEL	VERY POOR	" "
690- 700	DARK-RED GRAY-BRN	C	S 3 G		WET DIRTY CLY FINE TO MED. SND PEA GRAVEL	VERY POOR	" "
700- 710	[illegible] [illegible]-BRN	C	S 3 G		WET DIRTY CLY FINE TO MED. SND. PEA GRAVEL	VERY POOR	ABDT H_2O
710- 720	PINK GRAY BRN	C	S 3 G		WET DIRTY CLY FINE TO MED SND PEA GRAVEL	VERY POOR TO POOR	ABDT H_2O LITTLE GRAVEL
720- 730	RED-ORNG BRN	C	S 3 G (?)		WET DIRTY CLY FINE TO COARSE SND.	POOR	ABDT H_2O LITTLE GRAVEL [illegible]
730- 740	RED-ORNG BRN	C	S 3 G		WET DIRTY CLY FINE TO MED SND PEA GRAVEL-RARE	VERY POOR TO POOR	
740- 750	LIGHT BRN	C	S 3 G		WET DIRTY CLY FINE TO MED SND PEA GRAVEL	POOR	ABDT H_2O
750- 760	TAN BRN	C	S 3 G		WET DIRTY CLY FINE TO MED SND PEA GRAVEL-ANG	POOR	ABDT. H_2O
760- 770	TAN BRN	C	S 3 G		WET DIRTY CLY FINE TO COARSE SND. PEA GRAVEL	Poor	ABDT. H_2O ANDESITE, RHYOLITE

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 5/8.
70- 80	[illegible]	C	S 3 G		WET DIRTY CLY [illegible] SND. [illegible] GRAVEL - AND	POOR	[illegible]
80- 790	[illegible] BRN	C	S 3 G		WET DIRTY CLY FINE TO [illegible] [illegible]	POOR SAMP	[illegible] BEGINNING [illegible] [illegible]
790- 800	[illegible]	C	S 3 G		[illegible]	POOR	
800- 810	GRAY-TAN BRN	C	S 3 G		WET DIRTY CLY FINE TO MED. SND. [illegible] - AND	POOR	ANDESITE
810- 820	DARK TAN BRN	C	S 3 G		WET DIRTY CLAY FINE TO COARSE SND PEA GRAVEL	POOR	
820- 830	DARK TAN BRN [illegible]	C	S 3 G		WET DIRTY CLAY FINE TO COARSE SND. PEA GRAVEL - AND	POOR	
830- 840	TAN BRN- TO BLACK	S	C 3 G		COARSE GRN. SND. WET DIRTY CLAY PEA SIZED GRAVEL	POOR TO MOD.	ANDESITE
840- 850	DARK TAN BRN	C	S 3 G		WET DIRTY CLAY MED. TO COARSE SND PEA-SIZED GRAVEL	POOR	ANDESITE
850- 860	LIGHT TAN	C	S 3 G		WET DIRTY CLAY FINE [illegible] [illegible] GRAVEL	POOR	
860- 870	GREY [illegible]	S	CLAY		[illegible] SIZED SND [illegible] CLAY	POOR	[illegible] [illegible]
870- 880		[illegible]	SND		AS ABOVE. —	————	—
880- 890	"	CLAY	SND		AS ABOVE ——	————	—
890- 900.	RED [illegible]	CLAY	SND		[illegible] [illegible]	POOR	[illegible] SOME GREY STREAKS
900- 910	"	CLAY	SND		AS ABOVE (SAND [illegible] TO BE [illegible])		
910- 920	DARK TAN [illegible]	CLAY	SND		WET DIRTY CLAY MED-MED CRSE. SND	POOR	[illegible] OXIDE
920- 930	"	AS ABOVE			AS ABOVE		[illegible] OXIDE
930- 940	RED ORANGE	CLAY	SND		COARSER SAND [illegible]	POOR	> OXIDE
940- 950	DARK TAN BROWN	CLAY	SND		WET CLAY MED-CRSE. SND	POOR	AND. + VARIOUS MINOR CONSTITUENTS
950- 960	LIGHT GREY TAN	CLAY	SND		WET CLAY MED- CRSE "BB" SND	POOR	
960- 970	LIGHT GREY [illegible]	SND	CLAY		A LITTLE MORE SANDY CONT. AND.- SUB AND.	POOR	

6/8

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
70-980	[illegible]	CLAY	SAND		WET CLAY W/ [illegible] SAND	[illegible]	
80-990	LIGHT GRAY	SAND	CLAY (AS ABOVE BUT W/ SAND > CLAY)				
90-1000	LIGHT GRAY [illegible]	SAND & CLAY			WET CLAY W/ MIXED [illegible]	POOR	
00-1010	LIGHT GRAY TAN	S & C			WET CLY MED TO CRSE GRN. SND-ANG.	POOR TO MOD	
10-1020	LIGHT TAN GRAY	C	S		WET CLY MED TO CRSE GRN SND. ROUGH	POOR TO MOD.	
20-1030	GRAY-TAN [illegible]	C	S	AS	ABOVE —	—	
30-1040	LIGHT TAN GRAY	C	S	AS	ABOVE —	—	[illegible] H2O
40-1050	GRAY W/ [illegible]	C & S		AS	ABOVE —	—	H2O
50-1060	TAN-GRAY [illegible]	C & S		AS	ABOVE W/ ANG. COARSE SND.		H2O
60-1070	GRAY	C & S	G(?)	AS	ABOVE W/ ANG. [illegible] GRAVEL		H2O
70-1080	GRAY W/ [illegible]	S	C & S		PEA GRAVEL - [illegible] [illegible]	VERY POOR	ANDESITES
80-1090	BLACK TO [illegible]	G	C & S		PEA GRAVEL [illegible]	POOR	ANDESITE [illegible]
90-1100	GRAY TO [illegible]	S	C		COARSE SND. WET [illegible] CLY	POOR TO MOD.	SAME AS ABOVE.
100-1110	DARK GRAY	S	C		MED TO FINE SND. WET DIRTY CLAY	MOD.	
110-1120	DARK GRAY	S	C	AS	ABOVE	MOD.	[illegible]
120-1130	[illegible] GRAY [illegible]	—	— AS ABOVE	—	—	—	ANDESITE
130-1140	—	—	— AS ABOVE	—	—	—	—
140-1150	GRAY	S	C		MED TO COARSE [illegible]	MOD.	H_2O ANDESITE
150-1160	MULTI	S	G		PEA SIZED GRAVEL COARSE SND. [illegible] CHIPS	GOOD	[illegible]
160-1170	MULTI	S	G	AS	ABOVE —	—	—

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 7/8
1170-1180	MED GRAY	C ¦ S			FINE TO COARSE SAND [illegible]	med.	[illegible]
1180-1190	LIGHT GRAY	C ¦ S		—	—	AS ABOVE	[illegible] —
1190-1200	GRAY TAN-BRN	S ¦ C		—	—	AS ABOVE	[illegible] —
1200-1210	GRAY TAN-BRN	S ¦ C		—	— AS ABOVE	w/ [illegible]	[illegible]!
1210-1220	MULTI - [illegible]	S	C	— AS	ABOVE —	—	[illegible]
1220-1230	MULTI - MOSTLY RED [illegible]	S	C	— AS	ABOVE	—	—
1230-1240	MULTI - [illegible]	S	C	— AS	ABOVE /w	MED TO COARSE	[illegible]! —
1240-1250	RED BRN	C	S		[illegible]	GOOD	[illegible]
1250-1260	BRN - RED	C	S	— AS	ABOVE —	—	—
1260-1270	[illegible] GRAY BRN	C	S	— AS	ABOVE —	—	—
1270-1280	MED. GRAY BRN.	C	S	G	Sub-angular to sub-rnded gravel frags		Gravel frags-[illegible] and
1280-1290	MED. GRAY [illegible]	[illegible]			[illegible]	[illegible]	[illegible]
1290-1300	DARK GRAY } [illegible]	S ¦ C					Trace [illegible]
1300-1310	MED. [illegible]	Bedrock - see description below (pg. 8)					Bedrock
1310-1320	MED. GRAY	Texture overall of cuttings is wet sandy clay.					
1320-1330	MED. GRAY						
1330-1340	MED. GRAY						
1340-1350	MED. GRAY						
1350-1360	MED GRAY						
1360-1370	MED GRAY						

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 8/8
70- 380							
380- 1390							
90- 400	As above	– Bedrock	see description below				

Bedrock: 1300-1400 green grey to white sulfide bearing rhyolitic tuffaceous (?) arkose, & w/ accessory calcite, in groundmass and vns. (or mudstone ?) (This unit resembles Demetrie rhyolite tuff (?) of D7, B.R.; 1070'.)

Abundant light grey clay alteration, from feldspars (?) or possibly devitrified ash; drilling of this material produces plentiful clay in the cuttings.

Locally chloritized, or oxidized w/ jarosite, ht. and goeth on some grains. The limonites are after sulfides in some cases. Hematite microbands occur in quartzose material

Abnt disseminated sulfides (cp-py) w/ occasional cp (?) and py microvnlts. Traces of azurite crusts occur in the upper bedrock intervals and in a regolith (?) zone 1290-1300.

Texture is not well developed. Distinct lithic fragments or familiar igneous textures are absent. Granularity is spotty.

NOTE: Venture used a #1 bit in this portion of the hole. The bit generated abundant rk flour or clay and silty sized fragments, and cut rk "chips" the size of medium crse snd or finer Bedrock samples from 1300-1350 were first interpreted as sndy grey clay. Examination of later intervals indicated similar fine textures w/ repitition of green grey to white "sndy" rk chips. This was recognized as bedrock, and earlier samples re-evaluated.
In the sample bags, much very fine grain sulfide material is segregated in streaks

WWDP #10 - TD 600 B.R. SUB-ARKOSE 2/77

SUMMARY OF [illegible]

0-40 - clay/sand, very poor sorting

40-280 - tan clay/sand, poorly sorted overall; ang, sub-ang, to sub-rnded; spottily admixed rk chips suggesting cobbles. Sand grains of andesite dominate, w/ silicic frags, some goeth., hem, other grains.

280-550 - dominantly red-orange clay w/ jarositic, nontronite (like) occurrences; fairly good sorting, clay w/ admixed grit. Spotty grainy sulfide (py-cp). Occaisional felsic (?) rk chips ie 430-440 resembling bedrock

550-600 increasing monolithologic rk chips, m.f. grain sub-arkosic rock w/ "felsic" comp; equigranular argillized plag. and qtz. w/ f-grain pyrite; and variably tarnished dots scattered across chips (mt and biot ?), speckling the overall white groundmass. Unreactive to HCl and H_2SO_4 at room T°

NOTE: Unit may correlate to arkose reported in log of D-8 at 385-690, and arkose of DDH 565 at 420-438 (Angelica Arkose - Ka ?). The uniformity, continuity, well-oxidized state of the above described red-orange clay zn (280-550) may represent:

1. Nr vert flt - w/ deep and uniform effects of hydration and oxidation.
2. In-place pervasive oxidation and argillization of the parent unit; inconsistent w/ other sed. profiles observed in Santa Cruz valley thru current drilling program
3. Detrital clays, from a low-energy environment in which little opportunity existed for admixture of coarse grained sediments. This is inconsistent for the reason cited in point 2 above. Old bajada sediments typically show fluctuating energy, discharge and particle size.

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 1/4
		WWDP - HOLE #10	~2/2 - 2/6/77				
		T.D. = 600	SOUTH SIDE/SIERRITA TAILINGS DAM/SEC. 30 - 125 FSL, 175 FEL				
		BEDROCK – SUB-ARKOSE	LOGGED BY DMA		DRILLED BY VENTURE		
-10							
10-20	tan	clay	(pebbly) sand	calcite	F.g snd-Qtz, FeOx Angular and. pebbles	Poor	
0-30		~~as above but more gritty~~					
30-40							
40-50		as above but more gritty					
50-60	tan w/ blk flecks	snd-clay	rk chip/gravel		rk chip-dior, rhy sa - sr snd	poor - varied crse to fine grn. snd	Snd comp - ep, oxide, and, qtz. – calcite
0-70		as above, a little coarser (more sandy)					
0-80	tan w/ num. blk flecks	as above, w/ increasing blk + white (mafic + qtz) rk			fragments (chips) up to 1/2"	bimodal; fines of clay/rk chip + snd	cont. ep, oxide (Fe)
80-90	orange tan as above	as above					
0-100	tan, as above	as above	more rk chip/ gravel (and qtz)		s-a - sr	Snd, gravel-chip, clay (silt?) poor	
00-110		Snd dominant but varied in size	still v. dirty and		Pebbly to broken	Diverse size as above; diverse lithologies as above. Calcite still present	
10-120		gravelly (rk chip?) snd	clay - sample still v. dirty		"	"	Abnt and frags; rhy, ep lt.
20-130		as above	"		chips range 1/16 - 1/4		
0-140		snd-clay (becomes somewhat finer grained overall)			as above, fewer 1/4" frags		
40-150		sand	clay				Coarser w/ abund. pebbly snd. Overall 0-150 v. similar + continuous

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
50-160	tan w/ dark flecks	gravel/rk chip	clay - snd		s-a to s-r, and. generally ang.	Poor; as above -	Similar to foregoing
50-170	"	sand	clay			Poor, but better than above. Mostly snd <1/8	" Clay fairly abnt. but v. little gravel
70-180	"	clay	snd	Overall as above but clay gets upper hand over sand			
80-190	since 150-160, sample a little greener	sand	clay	As above, reversing to >sand			
90-200		as above > sand					
00-210		as above				snd is crser; up to ~1/16 (few 1/8")	Cont poor sorting
10-220		as above					And. snd-pebbles dominate; fair yellow-red Fe Ox, stains, silica frags
220-230		clay - snd, as above					NOTE: These samples are logged wet
230-240	a-pick > brwn (> Fe^{+++} ?) less yellow	as above		Cont. calcite — light response to HCl 1/3 sol.			
40-250		> sand, as above					
250-260		sand			sr - sa some chip	poor but more distinctly a crse. snd unit w/ chlorite and., qz, qtz, fe & etc as frags in a dirty mix.	
260-270		clay - snd			Many and frags chip like (from cobbles?)		
270-280		>> clay	sand			~bi-modal: clay and med - crse snd	Some whitish grns in clay (nontronite ?)
280-290	grey-white	clay - calcite mod.	— sand		sticky, plastic - Note: calcite lt granules	Good - Essentially 95% clay	May be restricted bed of decomposed limy clasts
290-300	orange brown	clay	fair snd-chip		s-a to sr	Poor - mixed snd w/ abnt. goeth. clay	And/Dacite (lapilli tuff?) is dominant crse. lith.
300-310		as above > snd					Calc. cont.
310-320	red-orange brown	clay -	less sand		Note: spotty calc.	Better - mostly clay	Transistion unit - from [280-310] to [320 - dept.
320-330	orange	clay	—	sand-gravel spotty, mafic	v. minor gravels - a-sa		Streaks of yellow brwn No calcite.
330-340		as above					
340-350		as above					jarosite (?) clay in ~1/2" balls

EPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS 3/14
50-360		as above					
60-370	red. orange	as above					1" x 1/4" ang. rk frag. 1/16" and. chips (clasts?)
70-380							Abut v.f.grain py. flecks admixed; spot of azur, sp.
80-390	orange	as above	These samples are f	airly bright orange,	abundant	Fe Ox.	
90-400			Fine grit present in samples				Some lima bean pink 1/2" clay balls intermixed
400-410							This unit has a grainy two-tone color, even tho the "grains are actually vari-sized
10-420							vari-colored hematitic-gthitic clay balls.
20-430	orange/ grey spots	as above			V.plastic, sticky		Increasing grey-white clay "granules", These are soft.
30-440		as above	Felsic 1/8" rk chips; look like the B.R. lithology, but v. sparse				
40-450		as above		Increase in above feature to ~15-20%			
50-460		as above		as above	NOTE - A 200 MESH SCR	EENED FRACTION YIELDS 1/4-3/4" CLAY BALLS, SPOTTY B.R.-like CHIPS, GREY S-R. SAND, SPOTTY EP., ABNT. FE OX.	A few diss. oxidized/grey chips of comp like "rk chips" of accessory classif.
60-470	reddish	as above overwhelmingly orange clay w/ red tone		—		chips up to 1/2" in a few cases; but not common	Minor rk chip resembles B.R. w/ diss. oxide after sulf? a mt? Lght. argillz. likely.
70-480	(orange w/ grey tones	as above				Few small rk chips clay overall	
80-490		as above					> grey clay; still reddish orange overall.
90-500	more light grey		> Fine grit (rk chip?) red-cse sd.				
00-510	less light grey, rd-or. w/ blk.				Ang. rk chips		Num. mafic rk chips. spotty light chips
10-520	more light grey than above						Some chloritic clasts few ma fic chips a few granodiorite (f grain) chips
520-530		as above	grittier than above			Note - inspection of	sample strongly suggests the appearance of broken down, argillized oxidized bedrock
30-540	greyish red-orange	clay		grit - rk chip			Scattered felsic - mf.g phaneritic rk.
40-550		as above					Few rk. chips

DEPTH	COLOR	MAIN FRACTION	MINOR FRACTION	ACCESSORY	TEXTURE	SORTING	REMARKS
550-560	red-orange	as above	Increasing rk chips [Clay still v. abnt]				Bedrock coming in
560-570		as above	Increasing rk chips [Clay still abnt]				
570-580	lighter than above	"	"				More chips - A clay-sand like mix
580-590			Abnt rk chips *				
590-600							
T.D.							

* Bedrock - Despite plentiful clay, review of screened fraction shows monolithologic rock chips for at least 40 feet. M. f. grained subarkosic rock. "Felsic" composition - equigranular argillized plagioclase and qtz. w/ f.g. pyrite (and variably oxidized magnetite and (biotite?)) occurring as numerous tarnished dots scattered across chips, speckling the overall white color. Unreactive to HCl or H_2SO_4 at room T°.

May correlate to arkose reported in log of D-8 at 385-690 and arkose of DDH-565 at 420-438. The latter is described as 70% feldspar and 25% qtz.; 5% other w/ no FeMag minerals; grains < 1.5 mm. Mn in fracs; limonite solution staining. Many of these features correspond to B. Rock of WWDP #10 although #10 grains are < 1 mm.

The uniformity, continuity and well oxidized state of the red-orange clay zone w/ bands of light and orange clay (310 - ~T.D.) may indicate the hole has penetrated a gauge zn., the clay being derived from argillized arkose feldspars and Fe from pervasive pyrite (ie 370-380), and other sulfs. A near vertical fault channelway would provide means for deeper than normal penetration of water, deepening the effects of hydration and oxidation. Note the occurrence of bedrock chips 430-460, possibly wall rock of the fault.

The pervasive, more or less uniform oxidation and argillization in-place of a rock unit in this environment for a thickness greater than 250′ seems a less likely explanation for the thick clay zn than the above gauge theory. On the other hand, these may simply be detrital clays but the consistency of their color does not suggest varying states of oxidation and water penetration such as might be expected in a variably wet and dry environment, nor does it relate to likely influences from probable varied sources and their proximity to deposit.

Bedrock subarkose = Angelica arkose ? (Ka)

GEOEX
Cable: GEOEX
REC'D MAR 1 1977 REC'D
BOX 5964 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0578

HEINRICHS GEOEXPLORATION COMPANY

P.O. BOX 5964, TUCSON, ARIZONA 85703, 806 WEST GRANT ROAD, PHONE: (602) 623-0578

February 25, 1977

Duval Corporation
4715 East Fort Lowell Road
Tucson, Arizona 85712

Attention: Mr. Douglas Cochran
Vice President

Re: GEOEX Proposal #1153
Sierrita Tailings
Gravity Survey

Dear Mr. Cochran:

Confirming the discussion in your office last Friday with yourself, Ron Teissere, Chris Ludwig and myself in attendance, on or about 1 March 1977 GEOEX will provide complete personnel and equipment and with same, will conduct, interpret and report in writing, a gravity meter survey on Duval's behalf. Work will be done on a staged or phased basis, with succeeding stages dependent on Duval's desire for further work. To some degree, this will depend on the results and recommendations of the first phase.

Location of the proposed work is the vicinity of the main Sierrita tailings complex, particularly the areas below the main retaining dike.

Initial objective is to provide confirmation and hopefully further resolution and definition to the sub-alluvial profile already established by drill holes. If this proves sufficiently successful or encouraging, an additional profile or other type of station coverage may be implemented to better determine the bedrock topography and character and structure.

Two men and one vehicle will commonly be the field crew complement plus necessary gravity meter and level surveying equipment, with one man acting as instrument man and the other as helper, rodman, and note keeper. These men will be supervised more or less on a daily basis by a GEOEX staff professional. A LaCoste-Romberg Model "G" gravity meter or equivalent will be used.

Charges for the basic two man crew will be $250.00 per eight hour field day plus directly incidental job expenses at GEOEX cost plus 15%. Expenses include a gravity meter rental fee of $20.00 per day and any outside data processing or computer services that may be indicated, recommended and accepted.

Our normal work schedule is based on a five day week and an eight hour work day. Overtime in excess of this schedule will be charged on $37.50 per crew hour plus expenses as above. Standby time due to your request or inclement weather and mobilization and travel time, if not overtime, is charged at $15.00 per crew hour plus expenses as above. Should additional helpers be required, they will be supplied at $7.50 per hour base rate and $11.25 per overtime hour.

Vehicles are charged at $17.50 per day per vehicle and $0.21 per mile per vehicle.

Routine data computations, compilation and drafting are charged at $12.50 per hour. Interpretation and report are charged at $20.63 per hour, as is interim professional supervision, consultation, etc.

First phase of the work consisting of one profile is estimated at about $6,250.00 for two to three weeks field work and two to three weeks data reduction, interpretation and report on a preliminary basis.

Sincerely,

Heinrichs GEOEXploration Co.

Walter E. Heinrichs, Jr.
President & General Manager

WEH:mt
cc: enclosed
Approval may be indicated by executing one copy as provided below and returning to us.

Date: February 28, 1977

Approved by:

Title: V.P. Special Projects

Initial

Detail Gravity Profile Survey
Sierrita Tailings Dam Area
Pima County, Arizona

for

Duval Corporation
Tucson, Arizona

April 1977

by

GEOEX

GEOEX Job# 1153

Initial

Detail Gravity Profile Survey
Sierrita Tailings Dam Area
Pima County, Arizona

for

Duval Corporation
Tucson, Arizona

April 1977

by

Heinrichs GEOEXploration Company
P.O. Box 5964 Tucson, AZ 85703

GEOEX Job #1153

CONTENTS

Page
Introduction-- 1
Conclusions and Recommendations--------------------------- 1
Interpretation-- 3
Procedures-- 5

In Map Pocket (3 pieces)
- Gravity Location Plan
- Bouguer Gravity Profile and Interpretation Section of the East Line
- Bouguer Gravity Profiles and Interpretation Sections of the North and South Lines

INTRODUCTION

At the request of Mr. Douglas Cochran, Vice President Special Projects, Duval Corporation, Heinrichs GEOExploration Company was contracted to conduct a gravity survey around the north, east and south periphery of the Sierrita Tailings Dam, Pima County, Arizona. Field work on the project took place in several phases during the interim March 4 to April 1, 1977. Personnel involved in the field work were Glenn Fisher, Geophysical Technician, assisted by Edward Merikle.

Three gravity traverses were run, all with a 250 foot station interval: the North Line, the East Line and the South Line. The North Line is an E-W traverse, 6500 feet in length, positioned 1500 feet north of the NE corner of the tailings dam. The East Line is a N-S traverse, 20,750 feet in length, located about 700 feet east of the east foot of the dam passing over monitor wells #1 through 7. The South Line is an E-W traverse, 11,000 feet long, located about 200 feet south of the south foot of the dam to cross monitor wells #8, 9 and 10. A coordinate origin was established about 280 feet south of Well #2 from which all stations are designated in hundreds of feet. Refer to the included plan map for more precise line location details.

The data are presented as Bouguer gravity profiles, calculated assuming a 2.00 gram per cubic centimeter (g/cc) near-surface alluvial density. An interpretation section is also included below each gravity profile to show the surface profile, the monitor wells and interpreted two-dimensional subsurface density distributions which could cause the observed gravity. In addition, a station elevation profile is shown.

The purpose of this survey was to attempt to define the sub-alluvial bedrock topography as an aid to determining ground water flow away from the tailings dam area - ultimately as a factor in possible control of this flow.

CONCLUSIONS AND RECOMMENDATIONS

The generally smooth gravity profiles obtained suggest a mostly rather gentle bedrock topography around the periphery of the tailings dam. Several possible minor bedrock canyons are indicated, however, that could perhaps be of some limited significance to the groundwater flow patterns. These bedrock lows are located near stations 97.5N, 147.5N and 70N on the East Line and near station 5E on the North Line. The indicated canyon relief is 150 feet, or less, and their possible shape is shown on the interpretation sections and discussed further in the report interpretation.

A sharp break in bedrock slope or perhaps a fault or contact is interpreted near Well #7 with bedrock being deeper or less dense (perhaps low density tuffaceous volcanics) to the south. This feature could be a factor in groundwater movement and it is not certain whether Well #7 is located on this feature or to either side. A similar feature could also be present near station 20W on the South Line.

Gravity indicated bedrock depths on the north half of the East Line correlate quite well with the bedrock intercepts logged in Wells #1, 3, 4 and 5. However, there is considerable correlation difficulty on the south half of the East Line and along the South Line as discussed in detail in the report interpretation. It is speculated that perhaps high density arkosic or agglomeratic "bedrock" material may have been intersected but unnoticed in Well #6 and Well #9 several hundred feet above the logged bedrock depths. It is recommended that at least these two wells be relogged with this possibility in mind. Bedrock depths in Wells #2, 7, 8 and 10 are also somewhat unresolved with respect to the gravity indicated depths and may also warrant some further study. It is even possible, based on the gravity data, that Well #2 has not quite reached bedrock, as suggested in the interpretation section of the East Line.

Additional gravity coverage might help resolve these discrepancies if the recommended relogging is inconclusive. However, a more accurate bedrock mapping could likely be made seismically, particularly considering that relatively simple structures are probably involved as suggested by these initial gravity results. Seismics may also be able to distinguish between intermediately indurated material, unconsolidated alluvium and crystalline bedrock - a difficult problem for gravity without having more control than now available.

Depending on the permeability and porosity of an intermediately indurated material, as may be present above the logged bedrock in Wells #6 and 9, this material could be a significant aquifer or it may act as a groundwater flow barrier. Therefore, considering the ultimate objectives involved in this study, more factual data in the south part of the area could be quite important.

It is recommended that a regional gravity map be produced for this general area. This can probably be adequately accomplished by use of publicly available U.S.G.S. and University of Arizona data. This information has been stored in a computer data bank and could be generated on a 1:62,500 scale for a 9 township sized area surrounding the tailings dam for about $300.00. This information should show the gross shape of the Santa Cruz basin, major breaks in buried pediments and large scale structures. It may also assist in further assessing the significance of the detail gravity data of this study.

It is also suggested that GEOEX be kept informed of additional drilling results as they progress, in order to update and refine the gravity interpretation and maximize the usefulness of the data.

INTERPRETATION

For the most part, the gravity data indicates a relatively simple bedrock topography and only three or four possible minor bedrock canyons are indicated:

1.) A minor 0.2 milligal gravity low at station 97.5N between Wells #4 and 5 could be caused by a bedrock depression about 100 feet deep and roughly 700 feet wide. This rather subtle anomaly could also be caused by a local shallow zone of lower alluvial density, possible more porous material, centered near 97.5N. Another possibility would be a lower density bedrock material being locally present below 97.5N.

2.) A relatively sharp gravity crossover anomaly, of 0.3 milligal amplitude, between Wells #1 and 3, peaking at station 145N, may be caused by a buried bedrock ridge - canyon combination. A steep, buried ridge about 250' higher than the local average bedrock level having about a 100 foot deep local depression directly to the north could cause this anomaly. The peak is indicated near 145N and the lowest part of the canyon is suggested near 147.5N although it could be as far north as 150N. Again, it is possible, but considered unlikely, that this anomaly is caused by near-surface variations in alluvial density.

3.) Between Wells #5 and 6, a very minor, broad, 0.15 milligal gravity low is present that could be due to a broad depression of about 20 feet relief, positioned in the 65N to 75N vicinity.

4.) A broad gravity low centered near 5E on the North Line could be caused by a broad topographic low of about 150 feet relief centered near 5E. This low is somewhat north and east of the main area of concern but it could still be a minor groundwater flow control. It is conceivable that this low correlates with the low near 147.5N on the East Line and, if so, a SSW-NNE trend is indicated.

With the limited single-line data available, it is not possible to distinguish between a buried canyon and a buried saddle in that both situations would produce a gravity low. However, in either case, depending on the water level and gradients present, they both could be possible groundwater escape routes. Another factor to consider is that changes in bedrock density can create anomalism essentially indistinguishable from bedrock topographic variations. In other words, the interpreted topographic lows could possibly be caused by zones of lower bedrock density.

The most significant appearing anomalism noted on this survey is the pronounced decrease in gravity south of 52.5N persisting to at least the south end of the East Line at 25S. This drop amounts to 6.6 milligals, and, at an assumed density contrast of 0.65 g/cc between alluvium (2.00g/cc) and bedrock (2.65g/cc) an increase in alluvial thickness of about 1000 feet is indicated between 52.5N and 25S.

The steepest gradient along this gravity decrease is near Well #7 suggesting that Well #7 is in the vicinity of the steepest bedrock slope or perhaps near a fault zone or contact depending on the actual cause of the gravity anomaly.

Attempting to correlate the logged drill hole bedrock depths with the gravity indicated bedrock topography on the south half of the East Line runs into considerable difficulty. The gravity data strongly suggests that bedrock is at least as shallow near Well #6 as near Well #5. The logs, however, imply that bedrock was seen about 300 feet deeper in Well #6 than in Well #5. To rationalize this discrepancy involves invoking, for example, a rather unrealistic three-dimensional bedrock geometry, e.g., major buried hills lying to the side or sides of the traverse. Another possibility would be an increased bedrock density in the Well #6 vicinity relative to Well #5. However, the well logs suggest that a similar rock type is present in Wells #5 and 6 and even Well #4 - making a bedrock density change also an unlikely possibility. Therefore, it is speculated that high density material may have been intersected, but not recognized as bedrock, in Well #6 for perhaps 300 feet above the logged bedrock intercept at 904 feet in depth. Cuttings of an arkosic or agglomeratic rock may be quite difficult to distinguish from alluvial sands and gravels in some cases and these two rock types certainly exist elsewhere in this area.

Similar problems may exist in Wells #7 and 2. The simplest gravity interpretation, i.e., a simple increase in alluvial thickness to the south (as shown by the solid line interpretation on the interpretation section), suggests that bedrock may be shallower than indicated on the drill log of Well #7, similar to the Well #6 situation. And, high density bedrock may not have even been reached in Well #2.

By interposing a southerly thickening wedge of intermediate density material (possibly the sandy siltstone logged at the bottom of Well #2), the log indicated bedrock depths for Wells #2 and 7 can be rationalized with the gravity profile. This possibility is shown as a dashed line on the interpretation section.

The South Line also has correlation problems. The interpretation section shows that for an assumed 0.65g/cc density contrast, much shallower bedrock is indicated than logged in Wells #8, 9 and 10. If a lower density bedrock is invoked, say about 2.35g/cc, so that the alluvium - bedrock contrast is only about 0.35g/cc, then the alluvium would need to be about twice as deep to cause an equivalent gravity response, thereby agreeing reasonably well with Wells #8 and 10. However, Well #9 still would show bedrock too deep and a situation similar to that speculated for Well #6 should be considered for at least Well #9 if not all three South Line wells.

One interpretational complication relative to the South Line is that it is close to and roughly parallels a strong east-west gravity

gradient, with decreasing gravity to the south. This feature is evident on large scale district surveys as well as the south part of the East Line near Well #7 as previously discussed. This strong gradient, parallel to the line, implies that the two-dimensional interpretational model used may not be valid and depth estimates could be in minor to considerable error. However, in a relative sense, the general interpreted shape (a fairly uniform increase in alluvial thickness to the east) is probably reasonably close to reality and Well #9 still cannot be easily rationalized as being deeper to bedrock than Well #8.

PROCEDURES

A La Coste & Romberg "Model G" gravity meter (#219) was used to obtain the gravity readings. A base station, survey control point T-1 near Well #2, was occupied approximately every two hours to allow making proper tidal and instrument drift corrections.

Station elevations were obtained with a Filotecnica self-leveling level. Survey point T-1 was used as the elevation base and all level loops were closed to within 0.5 feet. Station locations were established by Brunton and chain on 250 foot intervals and tied to the Duval Corporation 1" = 500' topographic plan and the ten monitor wells.

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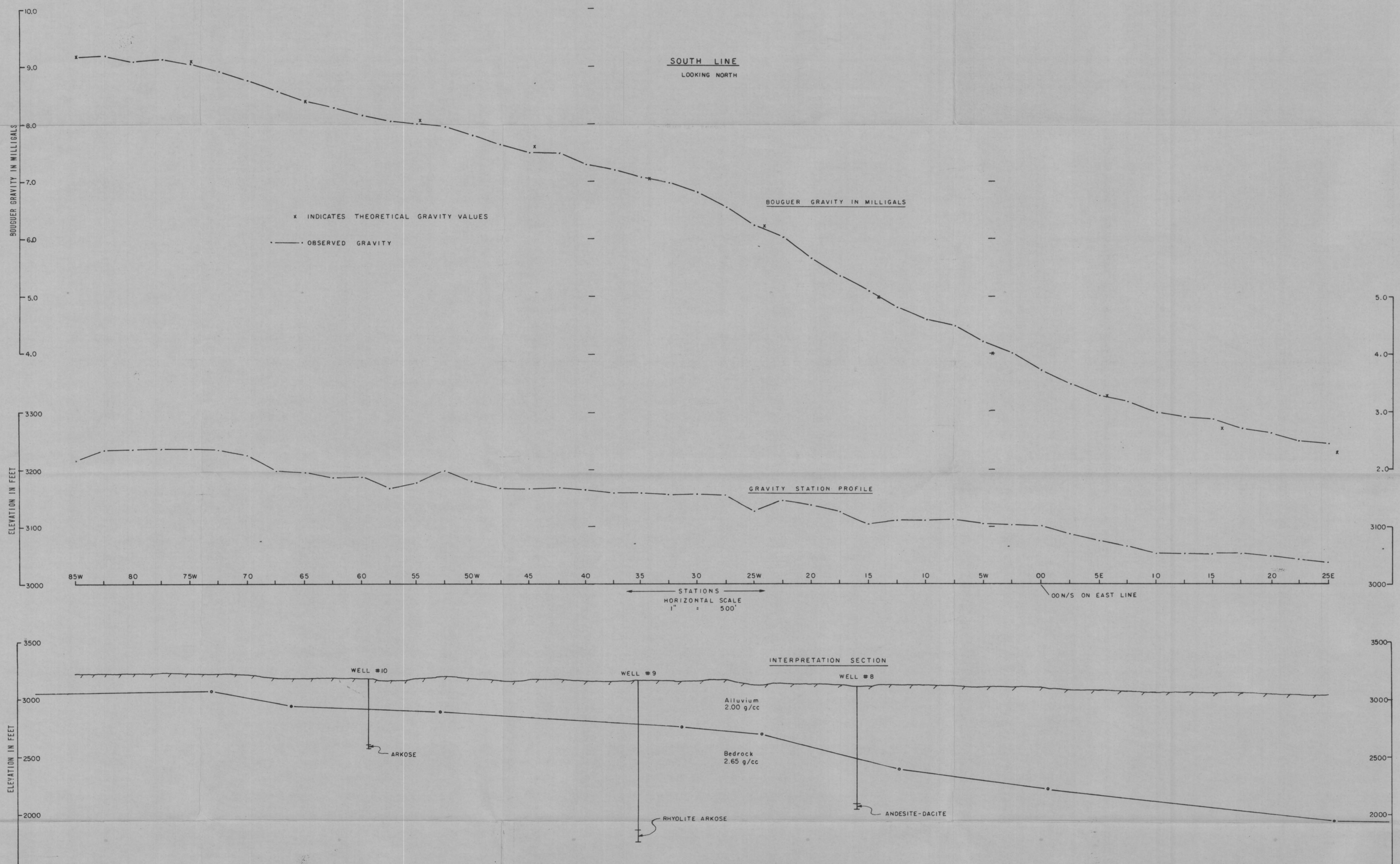
Respectfully submitted,

Heinrichs GEOExploration Co.

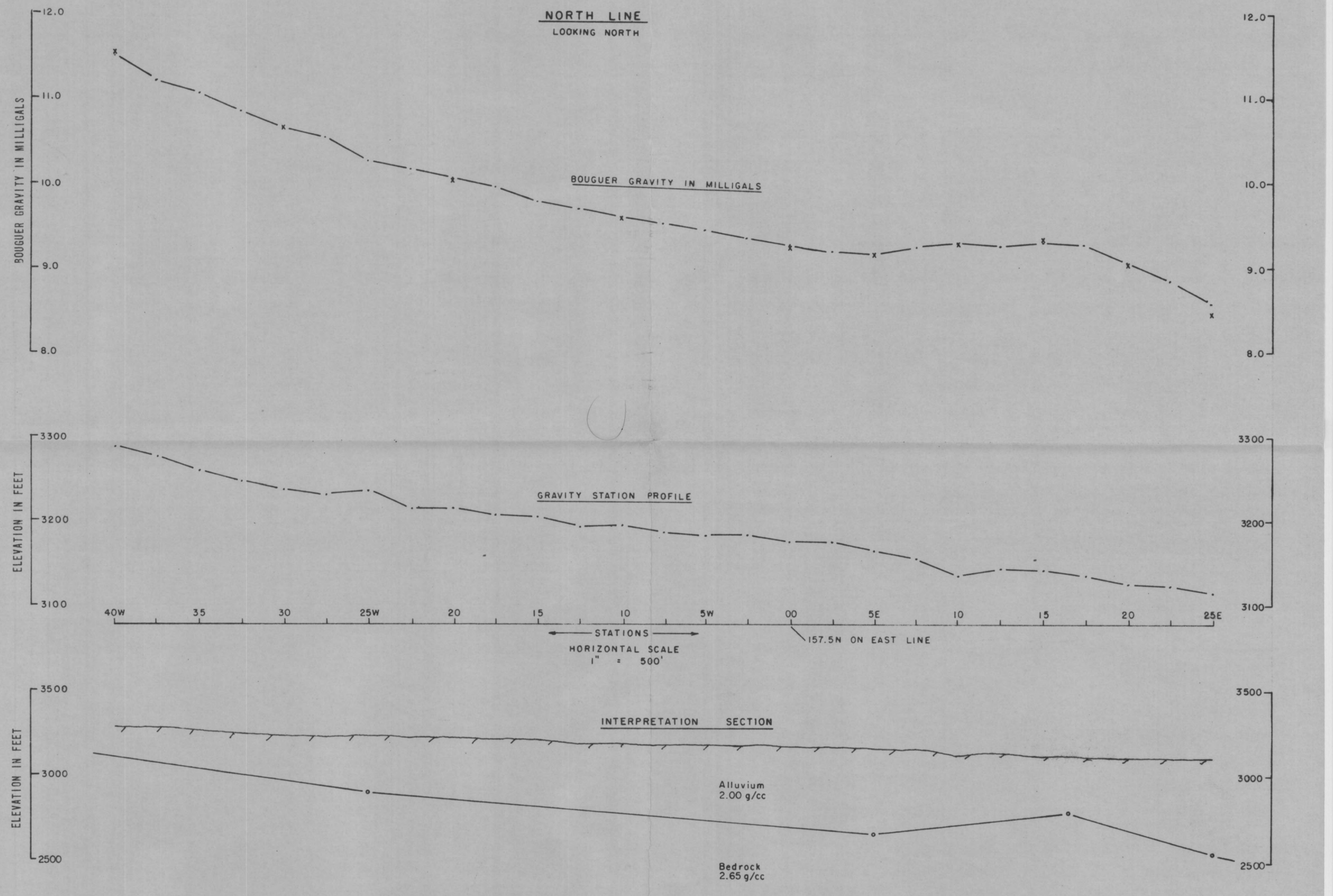
Chris S. Ludwig
Chief Geophysicist

CSL:mt

BOUGUER GRAVITY PROFILES
AND INTERPRETATION SECTIONS
of the
NORTH AND SOUTH LINES
SIERRITA TAILINGS DAM AREA
PIMA COUNTY, ARIZONA
for
DUVAL CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1153   APRIL 1977



NOTE: Bedrock depths and rock types shown on well plots are from drill logs furnished by Duval Corporation.



BOUGUER GRAVITY PROFILE
AND INTERPRETATION SECTION
OF THE
EAST LINE
SIERRITA TAILINGS DAM AREA
PIMA COUNTY, ARIZONA
for
DUVAL CORPORATION
BY
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1153 APRIL 1977

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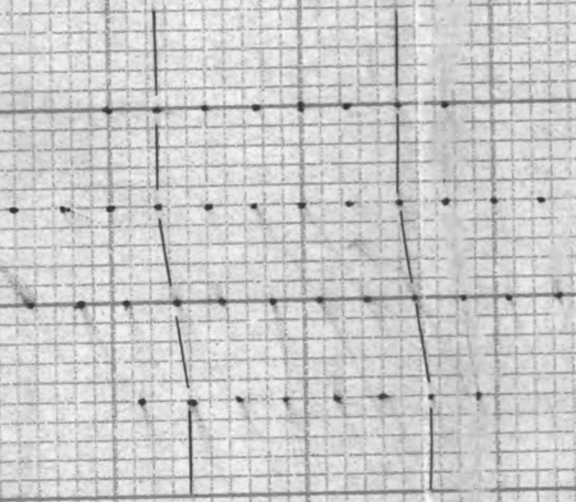
GRAVITY PLAN MAP
of
SIERRITA TAILINGS DAM AREA
PIMA COUNTY, ARIZONA
for
DUVAL CORPORATION
by
HEINRICHS GEOEXPLORATION COMPANY
P.O. BOX 5964, TUCSON, AZ. 85703
JOB NUMBER 1153 APRIL 1977

BASE MAP FURNISHED BY CLIENT
SCALE: 1" = 500'
• OBSERVED GRAVITY STATION

1 Original + 1 Xerox Copy

Job# 1153 Report



Initial

Detail Gravity Profile Survey
Sierrita Tailings Dam Area
Pima County, Arizona

for

Duval Corporation

Tucson, Arizona

April 1977

by

Heinrichs GEOEXploration Company
P.O. Box 5964 Tucson, AZ 85703

GEOEX Job #1153

CONTENTS

Page
Introduction-- 1
Conclusions and Recommendations--------------------------- 1
Interpretation-- 3
Procedures-- 5

In Map Pocket (3 pieces)
- Gravity Location Plan
- Bouguer Gravity Profile and Interpretation Section of the East Line
- Bouguer Gravity Profiles and Interpretation Sections of the North and South Lines

INTRODUCTION

At the request of Mr. Douglas Cochran, Vice President Special Projects, Duval Corporation, Heinrichs GEOEXploration Company was contracted to conduct a gravity survey around the north, east and south periphery of the Sierrita Tailings Dam, Pima County, Arizona. Field work on the project took place in several phases during the interim March 4 to April 1, 1977. Personnel involved in the field work were Glenn Fisher, Geophysical Technician, assisted by Edward Merikle.

Three gravity traverses were run, all with a 250 foot station interval: the North Line, the East Line and the South Line. The North Line is an E-W traverse, 6500 feet in length, positioned 1500 feet north of the NE corner of the tailings dam. The East Line is a N-S traverse, 20,750 feet in length, located about 700 feet east of the east foot of the dam passing over monitor wells #1 through 7. The South Line is an E-W traverse, 11,000 feet long, located about 200 feet south of the south foot of the dam to cross monitor wells #8, 9 and 10. A coordinate origin was established about 280 feet south of Well #2 from which all stations are designated in hundreds of feet. Refer to the included plan map for more precise line location details.

The data are presented as Bouguer gravity profiles, calculated assuming a 2.00 gram per cubic centimeter (g/cc) near-surface alluvial density. An interpretation section is also included below each gravity profile to show the surface profile, the monitor wells and interpreted two-dimensional subsurface density distributions which could cause the observed gravity. In addition, a station elevation profile is shown.

The purpose of this survey was to attempt to define the sub-alluvial bedrock topography as an aid to determining ground water flow away from the tailings dam area - ultimately as a factor in possible control of this flow.

CONCLUSIONS AND RECOMMENDATIONS

The generally smooth gravity profiles obtained suggest a mostly rather gentle bedrock topography around the periphery of the tailings dam. Several possible minor bedrock canyons are indicated, however, that could perhaps be of some limited significance to the groundwater flow patterns. These bedrock lows are located near stations 97.5N, 147.5N and 70N on the East Line and near station 5E on the North Line. The indicated canyon relief is 150 feet, or less, and their possible shape is shown on the interpretation sections and discussed further in the report interpretation.

A sharp break in bedrock slope or perhaps a fault or contact is interpreted near Well #7 with bedrock being deeper or less dense (perhaps low density tuffaceous volcanics) to the south. This feature could be a factor in groundwater movement and it is not certain whether Well #7 is located on this feature or to either side. A similar feature could also be present near station 20W on the South Line.

Gravity indicated bedrock depths on the north half of the East Line correlate quite well with the bedrock intercepts logged in Wells #1, 3, 4 and 5. However, there is considerable correlation difficulty on the south half of the East Line and along the South Line as discussed in detail in the report interpretation. It is speculated that perhaps high density arkosic or agglomeratic "bedrock" material may have been intersected but unnoticed in Well #6 and Well #9 several hundred feet above the logged bedrock depths. It is recommended that at least these two wells be relogged with this possibility in mind. Bedrock depths in Wells #2, 7, 8 and 10 are also somewhat unresolved with respect to the gravity indicated depths and may also warrant some further study. It is even possible, based on the gravity data, that Well #2 has not quite reached bedrock, as suggested in the interpretation section of the East Line.

Additional gravity coverage might help resolve these discrepancies if the recommended relogging is inconclusive. However, a more accurate bedrock mapping could likely be made seismically, particularly considering that relatively simple structures are probably involved as suggested by these initial gravity results. Seismics may also be able to distinguish between intermediately indurated material, unconsolidated alluvium and crystalline bedrock - a difficult problem for gravity without having more control than now available.

Depending on the permeability and porosity of an intermediately indurated material, as may be present above the logged bedrock in Wells #6 and 9, this material could be a significant aquifer or it may act as a groundwater flow barrier. Therefore, considering the ultimate objectives involved in this study, more factual data in the south part of the area could be quite important.

It is recommended that a regional gravity map be produced for this general area. This can probably be adequately accomplished by use of publicly available U.S.G.S. and University of Arizona data. This information has been stored in a computer data bank and could be generated on a 1:62,500 scale for a 9 township sized area surrounding the tailings dam for about $300.00. This information should show the gross shape of the Santa Cruz basin, major breaks in buried pediments and large scale structures. It may also assist in further assessing the significance of the detail gravity data of this study.

It is also suggested that GEOEX be kept informed of additional drilling results as they progress, in order to update and refine the gravity interpretation and maximize the usefulness of the data.

INTERPRETATION

For the most part, the gravity data indicates a relatively simple bedrock topography and only three or four possible minor bedrock canyons are indicated:

1.) A minor 0.2 milligal gravity low at station 97.5N between Wells #4 and 5 could be caused by a bedrock depression about 100 feet deep and roughly 700 feet wide. This rather subtle anomaly could also be caused by a local shallow zone of lower alluvial density, possible more porous material, centered near 97.5N. Another possibility would be a lower density bedrock material being locally present below 97.5N.

2.) A relatively sharp gravity crossover anomaly, of 0.3 milligal amplitude, between Wells #1 and 3, peaking at station 145N, may be caused by a buried bedrock ridge - canyon combination. A steep, buried ridge about 250' higher than the local average bedrock level having about a 100 foot deep local depression directly to the north could cause this anomaly. The peak is indicated near 145N and the lowest part of the canyon is suggested near 147.5N although it could be as far north as 150N. Again, it is possible, but considered unlikely, that this anomaly is caused by near-surface variations in alluvial density.

3.) Between Wells #5 and 6, a very minor, broad, 0.15 milligal gravity low is present that could be due to a broad depression of about 20 feet relief, positioned in the 65N to 75N vicinity.

4.) A broad gravity low centered near 5E on the North Line could be caused by a broad topographic low of about 150 feet relief centered near 5E. This low is somewhat north and east of the main area of concern but it could still be a minor groundwater flow control. It is conceivable that this low correlates with the low near 147.5N on the East Line and, if so, a SSW-NNE trend is indicated.

With the limited single-line data available, it is not possible to distinguish between a buried canyon and a buried saddle in that both situations would produce a gravity low. However, in either case, depending on the water level and gradients present, they both could be possible groundwater escape routes. Another factor to consider is that changes in bedrock density can create anomalism essentially indistinguishable from bedrock topographic variations. In other words, the interpreted topographic lows could possibly be caused by zones of lower bedrock density.

The most significant appearing anomalism noted on this survey is the pronounced decrease in gravity south of 52.5N persisting to at least the south end of the East Line at 25S. This drop amounts to 6.6 milligals, and, at an assumed density contrast of 0.65 g/cc between alluvium (2.00g/cc) and bedrock (2.65g/cc) an increase in alluvial thickness of about 1000 feet is indicated between 52.5N and 25S.

The steepest gradient along this gravity decrease is near Well #7 suggesting that Well #7 is in the vicinity of the steepest bedrock slope or perhaps near a fault zone or contact depending on the actual cause of the gravity anomaly.

Attempting to correlate the logged drill hole bedrock depths with the gravity indicated bedrock topography on the south half of the East Line runs into considerable difficulty. The gravity data strongly suggests that bedrock is at least as shallow near Well #6 as near Well #5. The logs, however, imply that bedrock was seen about 300 feet deeper in Well #6 than in Well #5. To rationalize this discrepancy involves invoking, for example, a rather unrealistic three-dimensional bedrock geometry, e.g., major buried hills lying to the side or sides of the traverse. Another possibility would be an increased bedrock density in the Well #6 vicinity relative to Well #5. However, the well logs suggest that a similar rock type is present in Wells #5 and 6 and even Well #4 - making a bedrock density change also an unlikely possibility. Therefore, it is speculated that high density material may have been intersected, but not recognized as bedrock, in Well #6 for perhaps 300 feet above the logged bedrock intercept at 904 feet in depth. Cuttings of an arkosic or agglomeratic rock may be quite difficult to distinguish from alluvial sands and gravels in some cases and these two rock types certainly exist elsewhere in this area.

Similar problems may exist in Wells #7 and 2. The simplest gravity interpretation, i.e., a simple increase in alluvial thickness to the south (as shown by the solid line interpretation on the interpretation section), suggests that bedrock may be shallower than indicated on the drill log of Well #7, similar to the Well #6 situation. And, high density bedrock may not have even been reached in Well #2.

By interposing a southerly thickening wedge of intermediate density material (possibly the sandy siltstone logged at the bottom of Well #2), the log indicated bedrock depths for Wells #2 and 7 can be rationalized with the gravity profile. This possibility is shown as a dashed line on the interpretation section.

The South Line also has correlation problems. The interpretation section shows that for an assumed 0.65g/cc density contrast, much shallower bedrock is indicated than logged in Wells #8, 9 and 10. If a lower density bedrock is invoked, say about 2.35g/cc, so that the alluvium - bedrock contrast is only about 0.35g/cc, then the alluvium would need to be about twice as deep to cause an equivalent gravity response, thereby agreeing reasonably well with Wells #8 and 10. However, Well #9 still would show bedrock too deep and a situation similar to that speculated for Well #6 should be considered for at least Well #9 if not all three South Line wells.

One interpretational complication relative to the South Line is that it is close to and roughly parallels a strong east-west gravity

gradient, with decreasing gravity to the south. This feature is evident on large scale district surveys as well as the south part of the East Line near Well #7 as previously discussed. This strong gradient, parallel to the line, implies that the two-dimensional interpretational model used may not be valid and depth estimates could be in minor to considerable error. However, in a relative sense, the general interpreted shape (a fairly uniform increase in alluvial thickness to the east) is probably reasonably close to reality and Well #9 still cannot be easily rationalized as being deeper to bedrock than Well #8.

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Initial

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Duval Corporation

Tucson, Arizona

April 1977

by

Heinrichs GEOEXploration Company
P.O. Box 5964 Tucson, AZ 85703

GEOEX Job #1153

CONTENTS

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Respectfully submitted,

Heinrichs GEOExploration Co.

Chris S. Ludwig

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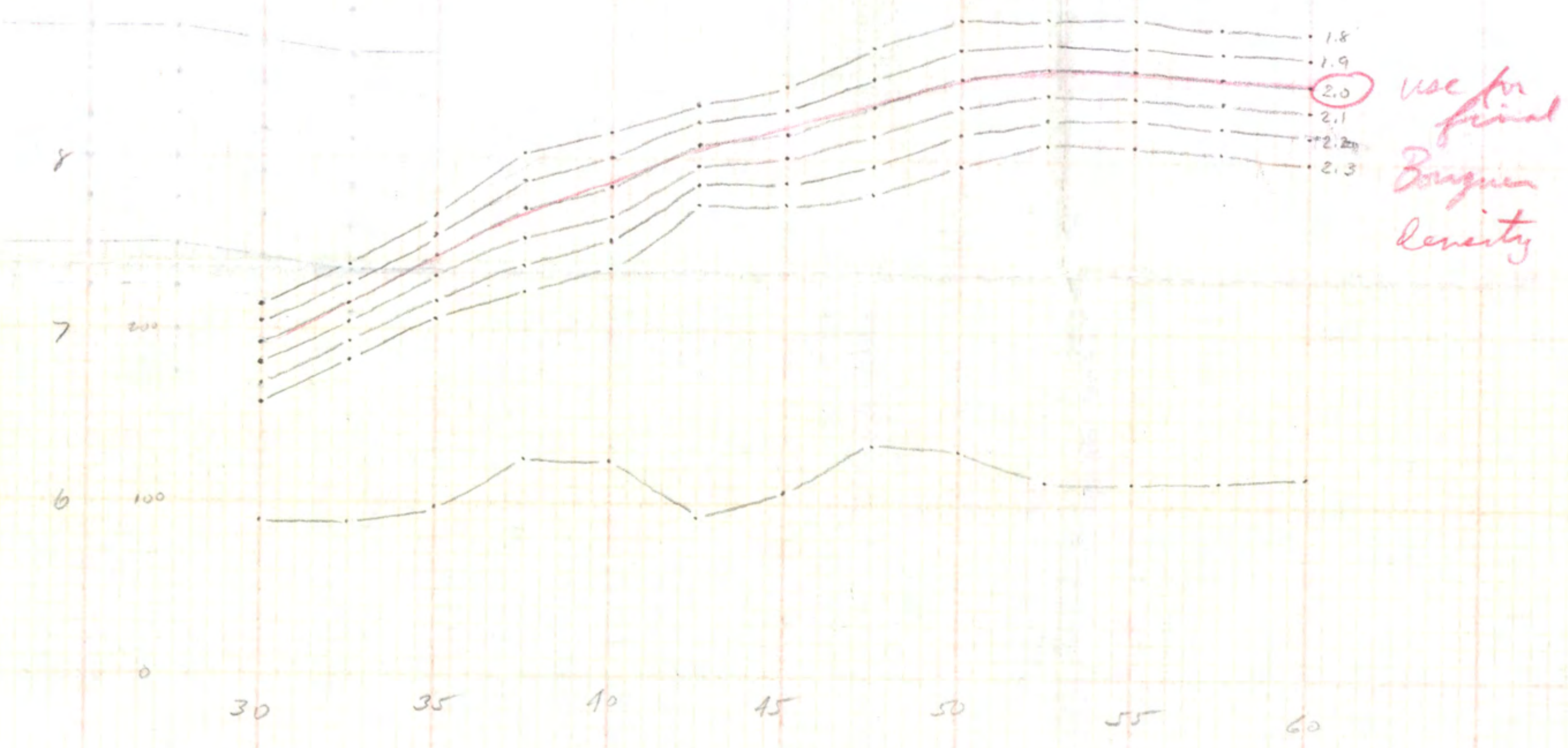
Chief Geophysicist

CSL:mt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1.9
2.0
2.1
2.2
2.3
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35
40
45
50
55
60

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 IIIIIIII   PPPPPPPPP    GGGGGGGG  EEEEEEEEE   NN      NN   999999     CCCCCCCC      IPGEN9C
    II      PP     PP   GG     GG  EE          NNNN    NN  99    99   CC     CC      IPGEN9C
    II      PP     PP   GG     GG  EE          NNNN    NN  99    99   CC     CC      IPGEN9C
    II      PPPPPPPPP   GG         EEEEEEE     NN  NN  NN   9999999   CC             IPGEN9C
    II      PPPPPPPPP   GG         EEEEEEE     NN  NN  NN   9999999   CC             IPGEN9C
    II      PP          GG    GGGG EE          NN    NNNN        99   CC             IPGEN9C
    II      PP          GG    GGGG EE          NN    NNNN        99   CC             IPGEN9C
    II      PP          GG     GG  EE          NN     NNN        99   CC     CC      IPGEN9C
    II      PP          GG     GG  EE          NN     NNN        99   CC     CC      IPGEN9C
 IIIIIIII   PP           GGGGGGGG  EEEEEEEEE   NN      NN      999     CCCCCCCC      IPGEN9C
 IIIIIIII   PP           GGGGGGGG  EEEEEEEEE   NN      NN      999     CCCCCCCC      IPGEN9C



                        09/14/73     000000      888888    18.05.20.
                        09/14/73     000000      888888    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73    00    00     888888    18.05.20.
                        09/14/73    00    00     888888    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73    00    00   88    88    18.05.20.
                        09/14/73     000000      888888    18.05.20.
                        09/14/73     000000      888888    18.05.20.



MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 20
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 20
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 20
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 20
```

t
z MGALS
y KFT
x ELEV

0.09406 - 0.01276×1.8 = 0.071092
0.09406 - 0.01276×1.9 = 0.069816 $\Delta = 0.001276$

D.C. MGALS - 0.2219 mgal/kft N × KFT N + ELEV FT × 0.071092 mgals/ft → STO 1

RCL 1 - ELEVFT × 0.001276 → STO 2
RCL 2 - RCL 1 → STO 9
RCL2 + RCL 9 → STO 3

0.2219 STO 0
0.071092 STO 7
0.001276 STO 8

DC MGALS
↑
K FT N
↑
key ELEV
STO 9
RCL 7
×
↻
RCL 0
×
−
+
90
−
STO 1
RCL 9
RCL 8
×
CHS
↑
↑
RCL 1
GTO 00

then press + for $\rho = 1.9$, again for 2.0 etc. ...

$$\rho \simeq \rho_0 + \frac{\Sigma(\Delta g_i - \bar{\Delta}_g)(h - \bar{h})}{0.01276\,\Sigma(h-\bar{h})^2} = 2.00 + \frac{65.75}{0.01276 \times 2959}$$

$\bar{\Delta}_g$ 8.007 R7
$\bar{\Delta}h$ = 111.75 R8

$\Delta g = 12.76\,\Delta\rho\,T$

$\frac{4.7}{12.76\,\Delta\rho} = T$

2.0
2.6

0.6

$\Delta g = 0.6$

$\frac{0.6}{12.76}$

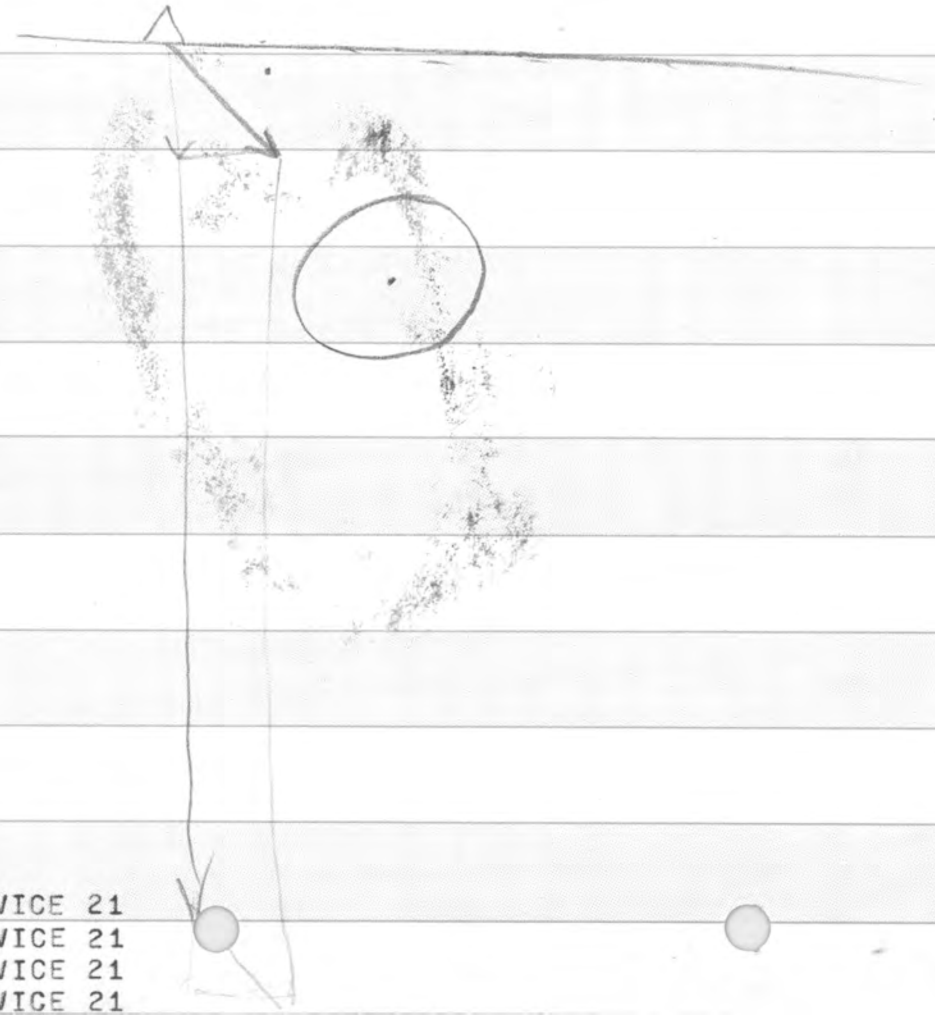
.5 = $\Delta\rho$

= 90

```
DDDDDDDD     IIIIIIII   MMM    MMM     AAAA     PPPPPPPPP   MMM    MMM  DDDDDDDD        DIMAPMD
DDDDDDDD     IIIIIIII   MMM    MMM     AAAA     PPPPPPPPP   MMM    MMM  DDDDDDDD        DIMAPMD
DD     DD       II      MMMM  MMMM    AA  AA    PP      PP  MMMM  MMMM  DD     DD       DIMAPMD
DD     DD       II      MMMM  MMMM    AA  AA    PP      PP  MMMM  MMMM  DD     DD       DIMAPMD
DD      DD      II      MM  MM  MM   AA    AA   PPPPPPPPP   MM  MM  MM  DD      DD      DIMAPMD
DD      DD      II      MM  MM  MM   AA    AA   PPPPPPPPP   MM  MM  MM  DD      DD      DIMAPMD
DD      DD      II      MM      MM  AAAAAAAAAA  PP          MM      MM  DD      DD      DIMAPMD
DD      DD      II      MM      MM  AAAAAAAAAA  PP          MM      MM  DD      DD      DIMAPMD
DD     DD       II      MM      MM  AA      AA  PP          MM      MM  DD     DD       DIMAPMD
DD     DD       II      MM      MM  AA      AA  PP          MM      MM  DD     DD       DIMAPMD
DDDDDDDD     IIIIIIII   MM      MM  AA      AA  PP          MM      MM  DDDDDDDD        DIMAPMD
DDDDDDDD     IIIIIIII   MM      MM  AA      AA  PP          MM      MM  DDDDDDDD        DIMAPMD

                         09/18/73     000000      888888     17.10.59.
                         09/18/73     000000      888888     17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73    00    00     888888     17.10.59.
                         09/18/73    00    00     888888     17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73    00    00   88     88    17.10.59.
                         09/18/73     000000      888888     17.10.59.
                         09/18/73     000000      888888     17.10.59.

MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 21
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 21
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 21
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM  PRINTED ON DEVICE 21
```



Drift & Base Correction for HP-55

$B_0 = 82.28$ B_i & B_{i+1} $i = 0, 1, 2, \ldots$

t_i & t_{i+1}

$$\text{drift rate} = \frac{B_{i+1} - B_i}{t_{i+1} - t_i}$$

$$\text{drift correction at time } t = \frac{B_{i+1} - B_i}{t_{i+1} - t_i} \cdot (t - t_i) \text{ for } t_i \leq t \leq t_{i+1}$$

$$\text{base offset} = B_i - B_0$$

∴ @ t, to base & drift correct a reading $R(t)$

$$R_c(t) = R(t) - B_i + B_0 - \frac{B_{i+1} - B_i}{t_{i+1} - t_i}(t - t_i)$$

$B_0 \rightarrow R0$
$B_i \rightarrow R1$
$t_i \rightarrow R2$ → store as decimal time
$B_{i+1} \rightarrow R3$
$t_{i+1} \rightarrow R4$ →
$1.05058 \rightarrow R6$

Scale factor for 2700 —
1.05058

ρ = 1.8, 1.9, 2.0, 2.1, 2.2

.9806 − 0.01276ρ

1.8 0.07109
1.9 [illegible]
2.0 [illegible]

Enter t in HMS
↑
key $R(t)$
STO 5
↓
f
|
RCL 2
−
RCL 3
RCL 1
−
RCL 4
RCL 2
−
÷
×
CHS
RCL 0
+
RCL 1
−
RCL 5
+ ← RCL 6 ×
GTO 00

D.C. MGALS − KFEET NORTH × 0.2219 + ELEV ×

Latitude factor @ 31°50.90′ = φ

$1.307 \sin 2\varphi$ mgals/mile × 1 mile/5280 ft =

1.172/5280 ft = 0.2219 mgals/kft

key D.C. mgals
↑
Elev
− RCL
×
+
GTO 00

8.53
1.93
6.6

1" ≈ 500'

Smoothed Bouguer Gravity Profile N-S Line

x S→N inches	mgals	elev. surface ft						
0	1.93	3092	14	8.25	3126	28	8.78	3145
0.5	2.14	↓↓91		8.43	133		8.80	↓146
1	2.34	92	15	8.52	↓122	29	8.85	147
1.5	2.54	93		8.53	113		8.90	153
2	2.71	92	16	8.51	113	30	8.95	161
	2.93	90		8.47	116		8.98	163
3	3.09	84	17	8.41	119	31	9.02	157
	3.25	73		8.40	120		9.06	148
4	3.41	78	18	8.39	121	32	9.10	149
	3.56	92		8.40	122		9.16	156
5	3.76	3103	19	8.40	122	33	9.27	152
	3.95	3090		8.38	117		9.26	150
6	4.11	3086	20	8.40	107	34	9.01	156
	4.28	3101		8.40	110		9.00	166
7	4.55	3104	21	8.40.	120	35	9.04	172
	4.89	3096		8.44	123		9.15	175
8	5.24	3100	22	8.46	127	36	9.29	177
	5.55	3102		8.46	129		9.47	178
9	5.85	3100	23	8.44	131	37	9.61	182
	6.15	3100		8.41	134		9.78	182
10	6.46	3098	24	8.40	134	38	9.84	182
	6.76	↓↓90		8.45	138		9.84	184
11	7.04	87	25	8.50	139	39	9.84	187
	7.30	90		8.57	140		9.81	190
12	7.56	3114	26	8.62	140	40	9.78	194
	7.78	127		8.66	145		9.74	3197
13	7.95	↓101	27	8.70	148	41		
	8.09	3099		8.75	3145			

Alluvium thickness ($\rho = 2.0\ g/cc$)

WH	x	Elev of bottom'	thickness'
2	5.38	2064	1032
7	~~9.80~~ 9.70	2072	1036
6	14.68	2514? 2230?	620? 904?
5	21.03	2503	620
4	25.54	2627	515
3	31.30	2662	495'
1	35.09	2654	520

Fit alluvium shape to curve from 16 – 40.5

$12.77\,\Delta\rho\,T = \Delta g$

@ $0.65 = \Delta\rho$, $8.3\ ^{mgals}/_{kft}$ or $0.12\ ^{kft}/_{mgal}$ or $120'/_{mgal}$

$12.77\ (1.2 - x)\,0.65 = 6$

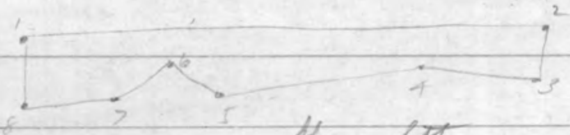
1200 $x = 480'$

$- \ x$

SEQ, X, Y?

#200 ~~or~~ Township mgal residual 1st order

contours @ 1 mgal ? ½ mgal



File A

	x	z	hf	hft			
1	26	0	13	0	13, 0	Δρ = −0.65	
2	44	0	22	0	22, 0	"	
3	44		22	0.37	22, 0.50	22, ~~0.45~~ 0.50	
4			19	0.30	19, 0.43	19, 0.34	
5			17.08	0.59	16.9, 0.56	16.91, 0.60	~~16.91, 0.60~~ ~~16.85, 0.64~~ 16.85, 0.6
6			16.67	0.32	16.67, 0.32	"	16.7, ~~0.29~~ 16.7, ~~0.30~~ (16.7, 0.26)
7			16.25	0.47	16.45, 0.45	16.35 " 0.47	16.4, 0.47
8			13	0.62	13, 0.62	13 " 0.59	
			(13	0)	(13, 0)	(")	

34.16
33.4
16.67

8.9
9.1
9.3
9.5
9.7

32.5
33.8 16
16.9

44
26
18" ×500
9000

32.9
16.95

STA. File C

STA.				Calc		Smoothed data		Δ		
1	15	4.89	1	8.95	.93 .90	8.95	.94 .90	.00		−.02 .01
2	(15.25)	5.01	2	8.98	.97 .97	8.98	.97 .98	.00		−.01 .00
3	15.5	5.16	3	9.03	.01 .01	9.02	.02 .02	.01		−.01 .00
4	(15.75)		4	9.07	.05 .06	9.06	.06 .07	.01		−.01 .01
5	16		5	9.13	.10 .11	9.10	.12 .12	.03		.00 .02
6	(16.25)		6	9.17	.22 .16 .16	9.16	.18 .19	.03	.06	.00 .03
7	16.5		7	9.23	.29 .20 .21	9.27	.24 .26	−.04	.02	−.07 .01
8	(16.75)		8	9.18	.25 .13 .15	9.26	.18 .21	−.08	−0.1	−.13 −.05
9	17		9	9.05	.10 .01 .02	9.01	.03 .05	.4	0.9	.00 .04
10	(17.25)		10	9.01	.03 .97 .98	9.00	.99 .00	.01	.03	−.03 .00
11	17.5		11	9.06	.07 .03	9.04	.04 .04	.02	.05	−.01 .00
12	(17.75)		12	9.16	.17 .14	9.15	.15 .15	.01	.04	−.01 .00
13	18			9.30	.31 .29	9.29	.29	.01		.00
14	(18.25)			9.46	.44	9.47		.01		−.03
15	18.5			9.62	.61	9.61		.01		.00
16	(18.75)			9.76		9.78		−.02		
17	19			986		9.84		.02		
18	(19.25)			9.89		9.84		.05		
19	19.5			9.87		9.84		.03		
20	(19.75)			9.83		9.81		.02		
21	20			9.78		9.78		.00		

9.1

x = 9

c = 0 to start

Δe = −0.65

STA FILE D | BODY FILE D

STA	hft	Vertex	x	z				
1	0	1	−8	0				
2	1	2	20	0				
3	2	3	20	0.62				
4	3	4	9	0.62				
5	4	5	8	0.5				
6	5	6	6	0.5			7, 0.5	
7	6	7	4.7	1.25	4.25, 1.5	4.5, 1.35	—	4.7, 1.2
8	7	8	2	1.25	2, 1.5	2, 1.35	—	2, 1.2
9	8	9	−3	1.7	−3, 2	−3, 1.85	−1, 1.9	−1, 1.7
10	9	10	−8	1.7	−8, 2	−8, 1.85	−8, 1.9	−8, 1.7
11	10	(11)	(−8	0)				
12	11							
13	12							

hft ↓		x				X	•	0				↓		
0	1	0	1.93	2.15	1.87	1.90	0.82	1.86	1.88	1.92	2.27	1.92	1.33	1.62
2	2	1	2.71	2.79	2.41	2.45	1.54	2.62	2.66	2.72	3.27	2.72	2.11	2.29
4	3	2	3.41	3.52	2.97	2.97	2.27	3.36	3.43	3.56	4.25	3.56	2.98	3.06
6	4	3	4.11	4.28	3.57	3.48	2.88	3.91	4.04	4.29	4.90	4.29	3.82	3.87
8	5	4	5.24	5.09	4.47	4.18	3.52	4.42	4.72	5.01	5.43	5.03	4.70	4.74
10	6	5	6.46	6.35	6.11	5.56	4.56	5.25	6.10	6.06	6.33	6.14	5.93	6.10
12	7	6	7.56	7.76	8.37	7.64	6.12	6.61	8.00	7.77	7.71	7.57	7.36	7.62
14	8	7	8.25	8.34	9.53	8.70	7.80	8.09	8.68	8.65	8.27	8.16	8.24	8.26
16	9	8	8.51	8.49	9.	8.92	8.43	8.61	8.79	8.79	8.43	8.38	8.59	8.44
18	10	9	8.39	8.43		8.67	8.31	8.44	8.53	8.53	8.42	8.38	8.93	8.39
20	11	10	8.40	8.38		8.65	8.30	8.40	8.45	8.45	8.44	8.41	8.41	8.41
22	12	11	8.46	8.48	9.61	8.68	8.36	8.44	8.48	8.48	8.48	8.46	8.44	8.45
24	13		8.40											

13.75
11.83
1.92

File D

STA	x	Vertex	x, z						
1	0	1	-8, 0						
2	1	2	20, 0						
3	2	3	20, 0.62						
4	3	4	9, 0.62		□				
5	4	5	8, 0.5		8, 0., 0.58	7.5, 0.55			
6	5	6	5.6, 0.5	6, 0.5	5.5, 0.6 ~~5.6~~, 0.58	5.4, 0.60		5.7, 0.60	5.3, 0.60 ~~5.4, 0.60~~
7	6	7	4.7, 1.2	5, 1.04		4.8, 1.1	4.8, 1.05	..	4.9, 1.05
8	7	8	2, 1.2		2, 1.2	3, 1.2	3, 1.15	3.7,	4, 1.05 ~~3.7, 1.04~~
9	8	9	-1, 1.75			-	-1, 1.65	-1, 1.7	-1, 1.65
10	9	10	-8, 1.75						
11	10	(11)							
12	11								

5	7.5, 0.55	
6	5.7, 0.60	0.65 5.3, 0.70
7	4.8, 1.05	
8	3.7, 1.05	
9	-1, 1.7	

50

x	5. B.G.													
0	1.95 1.93	1.93	0.00	1.97	+.04	1.88	-0.05	2.12	.19	1.95	.02		/	.02
1	2.64 2.71	2.61	-0.10	2.67	-.04	2.54	-.17	2.75	.04	2.64	-.07		/	-.07
2	3.44 3.41	3.38	-0.03	3.47	+.06	3.30	-.11	3.47	.06	3.43	.02		/	.03
3	4.29 4.11	4.18	+0.07	4.33	+.22	4.13	.02	4.26	.15	4.27	.16	4.28	.17	.17
4	5.16 5.24	4.98	-0.26	5.18	-.06	5.00	-.24	5.13	.11	5.11	.13	5.13	.11	-.08
5	6.35 6.46	6.12	-0.34	6.34	-.12	6.13	-.33	6.40	.06	6.19	-.27	6.23	.23	-.11
6	7.63 7.56	7.58	+0.02	7.74	+.18	7.40	+.16	7.78	.22	7.61	.05	7.45	.11	.07
7	8.26 8.25	8.27	+0.02	8.34	+.09	8.14	+.11	8.35	.10	8.29	.04	8.16	.09	.01
8	8.46 8.51	8.45	-0.06	8.48	-.03	8.42	+.09	8.49	-.02	8.46	-.05	8.43	.08	-.05
9	8.42 8.39	8.41	+0.02	8.42	+.03	8.39	.00	8.43	.04	8.41	.02	8.40	.01	.03
10	8.43 8.40	8.42	+0.02	8.43	+.03	8.42	.02	8.44	.04	8.43	.03	8.42	.02	.03
11	8.46 8.46	8.46	+0.00	8.47	+.01	8.46	.00	8.48	.02	8.47	.01	8.46	0	.00

E

F

N/S LINE

STA	x	Vertex	x, z			
1	0	1	-8, 0			
2	1	2	20, 0			
3	2	3	20, 0.62			
4	3	4	9, 0.62			
5	4	5	7.5, 0.55			
6	5	6	4.5, 0.75	4.5, 0.70	4.5, ~~0.65~~ 0.80	
7	6	7	4, 1.25	4, 1.13	4, 1.15	~~4, 1.11~~ 4, 1.13
8	7	8	-3, 1.9	-3, 1.83		-3, 1.81
9	8	9	-8, 1.9	-8, 1.83		
10	9	(10)	~~(-8, 0)~~			
11	10					
12	11					

.2 .12

7 8 8

E 13.8

x	MGALS									
0	1.93	1.34	1.95	1.90		1.91	1.89	-.04	2.02	+.09
1	2.71	1.93	2.58	2.52	-.19	2.53	2.51	-.20	2.64	-.07
2	3.41	2.63	3.29	3.23	-.18	3.24	3.20	-.21	3.33	-.08
3	4.11	3.49	4.13	4.08	-	4.12	4.01	-.10	4.13	+0.02
4	5.24	4.81	5.32	5.35	.11	5.45	5.14	-.10	5.24	0
5	6.46	6.46	6.75	6.91	+.45	7.12	6.51	+.05	6.57	+.11
6	7.56	7.50	7.66	7.80	+.24		7.48	-.08	7.51	-.05
7	8.25	8.16	8.26	8.33			8.17	-.08	8.19	-.06
8	8.51	8.42	8.50	8.52			8.46	-.05	8.47	-.04
9	8.39	8.40	8.46	8.46			8.44	.05	8.45	.06
10	8.40 8.37	8.43	8.47	8.47			8.46	.06	8.47	.07
11	8.46	8.48	8.51	8.51			8.50	+.04	8.51	+.05

5.32
13.8

South line

G STA	x	Vertex	G x, z			
1	0	1	-4, 0			
2	1	2	22, 0			
3	2	3	22, 1.1			
4	3	4	11, 1.1			
5	4	5	8.5, 1	8.5, ~~1.1~~	8.5, 0.9	8.5, 0.~~92~~ .88
6	5	6	7.2, 0.85	7.2, 0.95	7.2, 0.75	7.2, 0.~~77~~ .73
7	6	7	6, 0.4			6, 0.45
8	7	8	5.3, 0.3	5.3, 0.35		5.3, 0.4
9	8	9	3.2, 0.28			
10	9	10	1.9, 0.25			
11	10	11	1.2, 0.15			
12	11	12	-4, 0.15			
		13	( )			

x ft	MEAS									
0	9.19 9.20	.01	9.18		9.17	-.03	9.19	-.01	9.19	-.01
1	9.09 9.05	.04	9.08		9.06	.01	9.09	.04	9.08	.03
2	8.40 8.50	-.09	8.40	-.10	8.37	-.13	8.41	-.09	8.40	-.10
3	8.07 8.00	.07	8.09	+.09	8.04	.04	8.10	+.10	8.06	+.06
4	7.61 7.52	+0.09	7.86	+.34	7.67	.15	7.76	+.24	7.61	.09
5	7.05 7.05	.00	7.50	.45	7.15	.10	7.32	+.27	7.06	.01
6	6.22 6.20	.02	6.31	.11	6.01	-.19	6.45	+.22	6.32	.12
7	4.98 5.00	.02	4.53	-.47	4.06	-.94	4.98	-.02	4.87	-.13
8	4.07 4.15	.08	3.41	-.74	2.89	-	3.93	-.22	3.81	-.34
9	3.29 3.26	.03	2.78	-.48	2.35	-.43	3.21	-.05	3.12	-.14
10	2.72 2.80	.08	2.39	-.41	2.11	-.28	2.67	-.13	2.61	-.19
11	2.30 2.42	.12	2.14	-.28	1.99	+.15	2.27	-.15	2.45	+.03

H I

H

North line

STA	x	Vertex	x, z	
1	0	1	-10, 0	
2	1	2	9, 0	
3	2	3	9, 1	
4	3	4	6.5, 0.61	6.5, 0.56
5	4	5.	5.65, 0.35	
6	4.5	6	4.5, 0.5	
7	5	7	1.5, 0.33	
8	5.5	8	-0.5, 0.10	
9	6	(9)	~~-10, 0.10~~	
10	6.5			

12.9 → 12.96

plotted for final

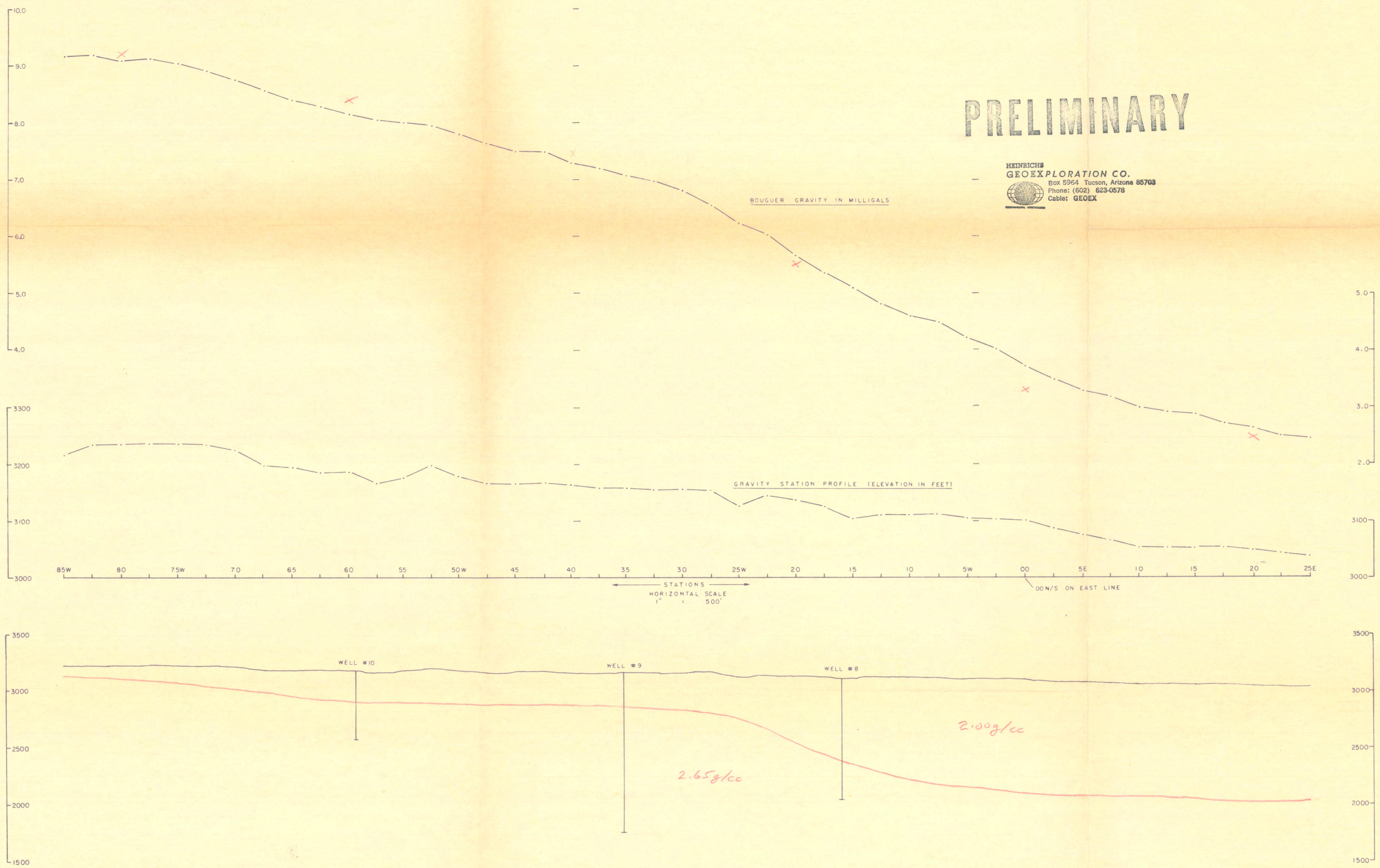
x	MGALS					
						+0.06
0	11.45	11.45	0.00	11.45	0.00	11.51
1	10.66	10.59	-.07	10.60	-.06	10.66
2	10.04	9.96	-.08	9.97	-.07	10.03
3	9.59	9.52	-.08	9.53	-.06	9.59
4	9.25	9.17	-.08	9.18	-.07	9.24
4.5	9.18	9.10	-.08	9.13	-.05	9.19
5	9.29	9.19	-.10	9.23	-.06	9.29
5.5	9.30	9.22	-.08	9.30	00	9.36 63
6	9.05	8.81	-.24	8.97	-.08	9.03
6.5	8.60	8.22	-.38	8.43	$\overset{16}{-.17}$	8.49

.08 × 120 10

63

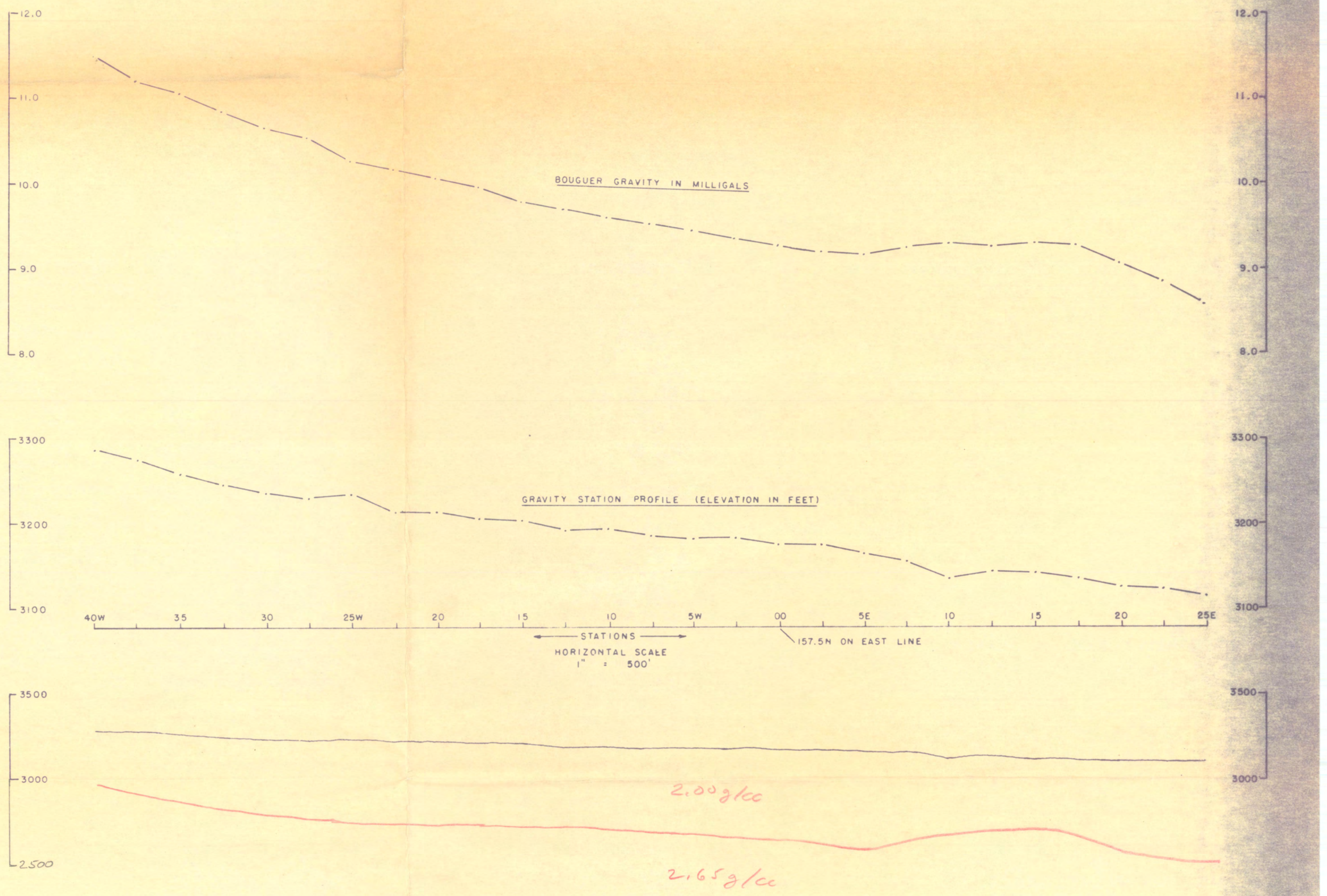

BOUGUER GRAVITY IN MILLIGALS
× Theoretical gravity values
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
25S
20
15
10
5S
00
5N
10
15
20
25N
30
35
40
45
50N
55
60
65
70
75N
80
85
90
95
100N
105
110
115
120
125N
130
135
140
145
150N
155
160
165
170
175N
180
182.5N
00 ON SOUTH LINE
00 ON NORTH LINE
STATIONS
HORIZONTAL SCALE
1" = 500'
GRAVITY STATION PROFILE (ELEVATION IN FEET)
3200
3100
3000
INTERPRETATION SECTION
~~TOPOGRAPHIC PROFILE~~ (ELEVATION IN FEET)
3500
3000
2500
2000
WELL #2
WELL #7
WELL #6
WELL #5
WELL #4
WELL #3
WELL #1
2.00 g/cc
2.25 g/cc
2.65 g/cc
sandy siltstone
rhyolite tuff
limestone
bedrock?
arkose

GEOEX



PRELIMINARY

HEINRICHS
GEOEXPLORATION CO.
Box 5964 Tucson, Arizona 85703
Phone: (602) 623-0578
Cable: GEOEX



LEGEND

- ○ HOLES BY BEAR CREEK MINING CO. 1—39
- ○ HOLES BY SUPERIOR OIL CO. D1—21
- ○ HOLES BY HECLA MINING CO. P1—12
- ○ HOLES BY DUVAL SIERRITA CORPORATION 551—574-X
- ○ HOLES BY DUVAL CORP (ESPERANZA) DC 37—43
- ● HOLES BY C.F.I CFI 1—4
- ● HOLES RECOMMENDED BY STATE - S·1 etc.
- ● HOLES BY BEACH B3—5
- ○ HOLES BY BANNER 165, 166
- ○ HOLES BY AMEX A1—5
- ○ HOLES BY ANACONDA A—

		Depth to bedrock		TD
No.1	Sec. 16, (493' FNL, 355' FWL) G.L. 3174.3', B.R. 2694'	480'	? 520	524'
No.2	Sec. 28 (453' FSL, 515' FWL) G.L. 3096.0', B.R. 2064'	1032	1020' 1030	1038
No.3	Sec. 16 (2,567' FNL, 552' FWL) G.L. 3155.3', B.R. 2660'	495	?	520
No.4	Sec. 21 (217' FNL, 459' FWL) G.L. 3141.8', B.R. 2627'	515 ?	le	540 550
No.5	Sec. 21 (2315' FNL, 431' FWL) G.L. 3122.0', B.R. 2512'	610 ?		640
No.6	Sec. 28 (189' FNL, 303' FWL) G.L. 3133.3', B.R. 2229'	904	le	960
No.7	Sec. 28 (2577' FSL, 507 FWL) G.L. 3120.0', B.R. 2084'	1036 ?	tf	1100
No.8	Sec. 29 (144' FSL, 1091' FEL) G.L. 3092.4', B.R. 2072'	1020 ?	andesite	1065
No.9	Sec. 29 (105' FSL, 3773' FEL) G.L. 3137.1', B.R. 1837'	1300	D.R.	1400
No.10	Sec. 30		rhy tuff arkose mudstone	

DUVAL CORPORATION

COPPER DIVISION

ESPERANZA PROPERTY
SAHUARITA, ARIZONA

DUVAL SIERRITA CORPORATION
DRILL HOLE LOCATIONS
PROPOSED TAILING DISPOSAL AREA

Design'd by	Scale 1" = 1000'	Date 3-15-68 To Date - 3-15-68 9-14-73
App'd by	Drawn by DWL	Drawing No.
App'd by	Ch'k'd by	L-113-aR LAND DEPARTMENT

Rev. 9-14-73

DUVAL SIERRITA CORPORATION   TAILING DISPOSAL AREA   SCALE 1" = 500'   10' C.I.   1-7-77   C.A.S.   (761233)

Page 6

J.o.b # 1153

	TIME	READ (S.D.)	DRIFT CORR.	MGALS.	B/L = N82,500 KFT N OF B/L	(-3000.00) ELEV. FT.	Bouguer Gravity -90.00 ρ=1.8 g/cc	1.9	2.0	2.1	2.2	2.3 g/cc
N/S LINE Repeat & Extend												
Base	1154	8293		8644								
130 N	1236	8710	+.05	9080								
132.5N	1243	8756	+.02	9127								
135N	1246	8841	+.01	9217								
137.5N	1250	8863	+.04	9239								
140N	1301	8802	+.01	9175								
142.5N	1307	8821	-.01	9194								
145N	1316	8947	-.03	9326								
147.5N	1323	8837	-.01	9210								
150N	1331	8770	-.01	9139								
152.5N	1335	8706	-.05	9071								
Base	1347	8300		8644								
155N	1403	8751	+.04	9117								
157.5N	1408	8725	+.04	9089	1690	17749	976	953	931	908	885	863
160N	1414	8755		9120	1715	17511	984	962	940	917	895	873
162.5N	1418	8733		9097	1740	18277	1010	987	964	940	917	894
165N	1422	8723		9086	1765	18390	1002	978	955	931	908	884
167.5N	1426	8788		9154	1790	17908	1030	1007	984	961	939	916
170N	1429	8759		9123	1815	18444	1031	1008	984	961	937	914
172.5N	1433	8757		9121	1840	18543	1031	1007	984	960	936	913
175N	1436	8743		9106	1865	18815	1030	1006	982	958	934	910
177.5N	1439	8716		9077	1890	19309	1030	1006	981	956	932	907
180N	1443	8691		9050	1915	19679	1024	999	974	949	924	899
182.5N	1446	8688		9047	1940	19818	1025	1000	975	950	924	899
Base	1506	8306		8644								

Page 5

Job # 1153

				DRIFT	B/L = N82,500	(-3000.00)	Bouguer Gravity -9000					
		TIME	READ (S.D.)	CORR MGALS	KFTN OF B/L	ELEV. FT.	ρ=1.8 g/cc	1.9	2.0	2.1	2.2	2.3 g/cc
S Line to East	Base	347	8292	8644								
	2.5E	354	8415	8773	140	8844	371	359	348	337	326	314
	5E	401	8470	8831	140	7723	349	339	329	319	310	300
	7.5E	406	8516	8880	140	6843	335	327	318	309	300	292
	10E	412	8605	8973	140	5203	312	305	299	292	285	279
	12.5E	416	8595	8963	140	5254	305	299	292	285	279	272
	15E	422	8651	9022	140	4322	298	293	287	282	276	271
	17.5E	425	8569	8936	140	5354	286	279	272	265	258	251
	20E	431	8590	8958	140	4914	276	270	264	257	251	245
	22.5E	435	8611	8980	140	4390	261	255	250	244	239	233
	25E	441	8637	9007	140	3944	256	251	246	241	236	231
	Base	500	8291	8644								
N Line to East	Base	306	8306	8644								
	2.5E	320	8745	9106	1690	17354	965	943	920	898	876	854
	5E	324	8792	9156	1690	16548	957	936	915	894	873	852
	7.5E	328	8850	9217	1690	15765	963	943	925	902	882	862
	10E	332	8977	9351	1690	13898	964	946	929	911	893	875
	12.5E	336	8946	9319	1690	14334	963	945	926	908	890	872
	15E	340	8957	9331	1690	14205	966	948	930	911	893	875
	17.5E	344	8988	9364	1690	13684	962	944	927	909	892	875
	20E	347	9023	9401	1690	12834	938	922	906	889	873	857
	22.5E	350	9040	9419	1690	12269	916	901	885	869	854	838
	25E	354	9061	9441	1690	11563	888	873	859	844	829	814
	Base	415	8301	8644								

1.90 Page 4

Job# 1153

			DRIFT	B/L = N82,500	(-3000.00)	Bouguer	Gravity	-90.00			
	TIME	READ (S.D.)	CORR MEAS.	KFT N OF B/L	ELEV. FT.	ρ = 1.8 g/cc	1.9	2.0	2.1	2.2	2.3 g/cc
Base	1356	8254	8644								
22.5W	1415	8538	8941	1690	21146	1069	1042	1015	988	961	934
25 W	1422	8400	8796	1690	23393	1084	1054	1024	994	965	935
27.5W	1428	8455	8853	1690	22963	1110	1081	1052	1023	993	964
30W	1436	8418	8813	1690	23721	1124	1094	1064	1034	1003	973
32.5W	1442	8380	8773	1690	24600	1147	1115	1084	1053	1021	990
35W	1448	8315	8704	1690	25907	1171	1138	1105	1072	1039	1005
37.5W	1453	8229	8614	1690	27446	1190	1155	1120	1085	1050	1015
40W	1459	8163	8544	1690	28889	1223	1186	1149	1112	1075	1038
Well# 3	1509	8745	9154	1455	15657	944	924	904	884	864	844
Well#4	1516	8737	9145	1178	14204	893	875	857	839	821	803
Well #5	1526	8792	9203	952	12288	865	850	834	818	803	787
Well#6	1536	8670	9074	635	13359	883	866	849	832	815	798
Base	1546	8262	8644								
Well#2	1600	8383	8770	170	9601	415	403	390	378	366	354
Well#8	1607	8428	8817	139	10565	537	524	510	497	483	470
32.5 SW (repeat)	1613	8270	8650	139	15597	728	708	688	668	648	628
Well #9	1618	8261	8640	138	15946	743	723	702	682	662	641
Well #10	1626	8183	8558	138	18501	843	819	795	772	748	725
Base	1632	8266	8644								
Well#7	1639	8584	8978	386	10793	660	646	632	618	605	591
75N (= 74.5N)	1649	8868	9275	880	10990	861	847	833	819	805	791
N/S Line Base →	1345 1029	8303 8288	8644 8644								
2.5S	1414 1038	8449 8369	8796 8731	115	8310 8319	361 297	351 286	340 276	329 265	319 254	308 244
5S	1430 1042	8512 8426	8860 8792	90	7252 7245	358 287	348 278	339 269	330 259	321 250	311 241
7.5S	1444 1049	8460 8378	8807 8743	65	7685 7678	339 274	329 265	319 255	310 245	300 235	290 225
10S	1459 1053	8350 8268	8690 8628	40	9077 9076	326 264	315 253	303 241	292 230	280 218	269 206
12.5S	1514 1056	8371 8293	8712 8655	15	8401 8411	306 250	295 239	284 228	274 217	263 207	252 196
15S	1525 1103	8254 8192	8588 8550	-10	9758 9748	284 245	271 233	259 220	247 208	234 195	222 183
17.5S	1532 1107	8248 8184	8582 8542	-35	9592 9580	272 231	259 219	247 206	235 194	223 182	210 170
20S	1539 1112	8254 8192	8588 8552	-60	9153 9144	252 215	240 204	229 192	217 180	205 169	194 157
22.5S	1557 1118	8249 8195	8582 8556	-85	8815 8725	228 195	216 184	205 173	194 162	183 151	171 139
25S	1605 1125	8196 8152	8526 8512	-110	9251 9274	208 196	196 184	184 172	173 160	161 148	149 137
Base →	1700 1140	8311 8275	8644 8644								
0.0	1354	8370	8714	140	10046	397	384	371	359	346	333

Job #1153

Page 3

	TIME	READ (S.D.)	DRIFT CORR. MGALS	B/L = N82,500 KFTN OF B/L	(-3000.00) ELEV. FT.	Bouguer Gravity		-90.00			
						ρ = 1.8 g/cc	1.9	2.0	2.1	2.2	2.3 g/cc
97.5 N	14 56	87 54	91 75	11 02	132 32	8 71	8 54	8 37	8 21	8 04	7 87
100 N	15 02	87 16	91 34	11 26	140 44	8 83	8 65	8 47	8 29	8 11	7 93
102.5 N	15 06	87 53	91 72	11 51	136 32	8 86	8 68	8 51	8 34	8 16	7 99
105 N	15 12	87 36	91 53	11 76	140 59	8 92	8 74	8 56	8 38	8 20	8 02
107.5 N	15 18	87 54	91 71	12 02	139 75	8 98	8 80	8 62	8 44	8 26	8 09
110 N	15 27	87 14	91 27	12 25	147 63	9 05	8 86	8 67	8 48	8 29	8 11
Base	15 48	82 59	86 44								
Base	9 50	82 51	86 44								
112.5 N	10 02	87 09	91 26	12 50	148 92	9 07	8 88	8 69	8 50	8 31	8 12
115 N	10 08	87 42	91 61	12 75	145 88	9 15	8 97	8 78	8 59	8 41	8 22
117.5 N	10 12	87 36	91 54	13 00	147 81	9 16	8 97	8 79	8 60	8 41	8 22
120 N	10 16	87 49	91 68	13 24	146 63	9 17	8 98	8 79	8 60	8 42	8 23
122.5 N	10 19	87 55	91 74	13 47	147 63	9 25	9 06	8 87	8 68	8 49	8 30
125 N	10 25	87 35	91 54	13 72	151 12	9 24	9 05	8 85	8 66	8 47	8 27
127.5 N	10 29	86 88	91 04	13 96	160 78	9 37	9 17	8 96	8 76	8 55	8 35
130 N	10 33	86 60	90 75	14 21	165 78	9 38	9 17	8 96	8 75	8 54	8 32
132.5 N	10 38	87 07	91 25	14 47	160 32	9 44	9 23	9 03	8 81	8 62	8 41
135 N	10 43	87 94	92 16	14 72	148 37	9 44	9 25	9 06	8 87	8 68	8 49
137.5 N	10 50	88 12	92 35	14 96	146 93	9 48	9 29	9 10	8 91	8 73	8 54
140 N	10 54	87 54	91 74	15 20	157 09	9 53	9 33	9 13	8 93	8 73	8 53
142.5 N	11 00	87 73	91 95	15 44	156 16	9 63	9 43	9 23	9 03	8 83	8 63
145 N	11 07	89 01	93 29	15 68	138 64	9 67	9 49	9 31	9 14	8 96	8 78
147.5 N	11 12	87 88	92 11	15 92	152 45	9 42	9 22	9 03	8 83	8 64	8 44
150 N	11 18	87 21	91 40	16 16	163 01	9 40	9 19	8 99	8 78	8 57	8 36
152.5 N	11 23	86 60	90 76	16 40	173 95	9 49	9 27	9 04	8 82	8 60	8 38
Base	11 43	82 48	86 44								
Well #1	12 19	86 70	90 86	16 55	174 40	9 59	9 36	9 14	8 92	8 70	8 47
155 N	12 24	86 96	91 13	16 65	170 39	9 55	9 33	9 11	8 90	8 68	8 46
157.5 N	12 33	86 70	90 85	16 90	177 47	9 72	9 49	9 26	9 [illegible]	8 81	8 58
Turn West @ 157.5 N											
2.5 W	12 38	86 50	90 64	16 90	181 66	9 80	9 57	9 34	9 11	8 88	8 65
5 W	12 42	86 55	90 69	16 90	182 20	9 89	9 66	9 43	9 20	8 96	8 73
7.5 W	12 49	86 38	90 51	16 90	185 98	9 98	9 74	9 51	9 27	9 03	8 80
10 W	12 57	86 03	90 14	16 90	192 43	10 07	9 82	9 58	9 33	9 09	8 84
12.5 W	13 05	86 24	90 35	16 90	190 95	10 17	9 93	9 69	9 44	9 20	8 96
15 W	13 12	85 49	89 56	16 90	203 85	10 30	10 04	9 78	9 52	9 26	9 00
17.5 W	13 19	85 47	89 54	16 90	206 49	10 47	10 21	9 94	9 68	9 42	9 15
20 W	13 33	85 06	89 10	16 90	214 26	10 58	10 31	10 04	9 76	9 49	9 22
Base	13 56	82 54	86 44								

1.2 × 0.01

Page 2

Job# 1153

	TIME	READ (S.D)	DRIFT CORR. MGALS	B/L = N82,500 KFT N OF B/L	(-3000.00) ELEV. FT.	Bouguer Gravity ρ = 1.8 g/cc	1.9	-90.00 2.0	2.1	2.2	2.3 g/cc
Base	836	82.35	86.44	166	12130	470	454	439	423	408	392
0-0 N/S E/W	920	8311	8725	140	10073	410	397	384	371	359	346
2.5N	928	8319	8733	165	10160	419	406	393	380	367	354
5 N	937	8504	8928	189	7578	425	415	405	396	386	376
7.5 N	943	8402	8821	218	9426	443	431	419	407	395	383
10N	950	8325	8740	238	10993	469	455	441	427	413	399
12.5N	956	8453	8875	263	9551	496	483	471	459	447	435
15N	1007	8475	8898	288	9839	534	521	508	496	483	471
Base	1019	8233	8644								
17.5 N	1038	8490	8915	313	10108	564	551	538	525	513	500
20 N	1045	8530	8958	338	10044	597	584	571	559	546	533
22.5 N	1054	8580	9011	363	9745	623	611	598	586	574	561
25 N	1103	8550	8980	388	10734	657	643	630	616	602	589
27.5 N	1109	8684	9121	413	9235	686	674	662	651	639	627
30 N	1113	8737	9177	437	8931	715	704	692	681	669	658
32.5N	1118	8770	9212	463	8847	738	727	716	704	693	682
35 N	1127	8736	9177	487	9839	768	756	743	731	718	706
37.5 N	1135	8589	9023	512	12564	803	787	771	754	738	722
40 N	1140	8614	9049	537	12466	816	800	784	768	752	737
42.5 N	1146	8855	9303	562	9201	832	821	809	797	785	774
45 N	1150	8761	9204	587	10815	843	829	815	801	787	774
Base	1208	8227	8644								
47.5 N	1236	8606	9040	602	13493	866	848	831	814	797	780
50 N	1242	8649	9084	636	13211	882	865	848	831	815	798
52.5N	1247	8779	9221	661	11361	882	868	853	839	824	810
55 N	1252	8788	9230	686	11306	882	867	853	838	824	809
57.5 N	1257	8781	9222	711	11447	878	863	849	834	820	805
60 N	1302	8761	9200	736	11794	875	860	845	830	815	800
62.5 N	1306	8747	9185	761	11990	869	853	838	823	807	792
65 N	1312	8753	9191	785	12030	872	857	841	826	811	795
67.5 N	1318	8738	9175	810	12209	863	848	832	816	801	785
70 N	1323	8756	9193	835	12201	875	860	844	828	813	797
72.5 N	1334	8766	9203	860	12073	870	855	840	824	809	793
Base	1353	8236	8644								
(75N)				885	(10990)						
77.5 N	1412	8871	9307	909	10775	871	858	844	830	816	803
80 N	1418	8827	9260	934	11444	866	852	837	823	808	793
82.5 N	1423	8793	9223	959	12151	874	859	843	828	812	797
85 N	1428	8774	9202	984	12492	872	856	840	824	808	792
87.5 N	1432	8780	9207	1008	12633	881	865	849	833	817	801
90 N	1437	8760	9185	1031	12958	877	861	844	828	811	795
92.5 N	1444	8744	9167	1055	13279	877	860	843	826	809	792
95 N	1452	8749	9171	1078	13219	872	855	838	821	804	787

Page 1

Job# 1153

	TIME	READ(SD)	DRIFT CORR MGALS	B/L = N82,500 KFT N OF B/L	ELEV FT	Bouguer Gravity -90.00 ρ = 1.8 g/cc	1.9	2.0	2.1	2.2	2.3 g/cc
Base ON/OW	1155	82.28	86.44								
85W	1218	80.51	84.59	129	216.86	9.72	9.44	9.17	8.88	8.61	8.34
82.5W	1226	79.60	83.63	130	231.40	9.79	9.50	9.20	8.91	8.61	8.32
80W	1234	79.38	83.40	130	233.33	9.70	9.40	9.10	8.81	8.51	8.21
77.5W	1251	79.20	83.22	130	236.40	9.74	9.44	9.13	8.83	8.53	8.23
75 W	1301	79.21	83.23	131	235.13	9.66	9.36	9.06	8.76	8.46	8.16
72.5W	1309	79.23	83.25	131	233.02	9.53	9.23	8.93	8.63	8.34	8.04
70 W	1318	79.65	83.69	131	224.19	9.34	9.05	8.77	8.48	8.19	7.91
67.5W	1327	81.11	85.23	131	198.85	9.08	8.82	8.57	8.31	8.06	7.81
Base	1350	82.26	86.44								
65W	1406	81.28	85.39	132	194.26	8.91	8.66	8.41	8.16	7.92	7.67
62.5	1413	81.79	85.92	132	184.71	8.76	8.52	8.29	8.05	7.82	7.58
60W	1419	81.50	85.61	133	187.37	8.64	8.40	8.16	7.92	7.68	7.44
57.5W	1427	82.82	86.99	134	165.69	8.47	8.26	8.05	7.84	7.63	7.41
55W	1433	82.06	86.18	134	176.90	8.46	8.23	8.01	7.78	7.56	7.33
52.5W	1437	80.59	84.63	134	198.83	8.47	8.21	7.96	7.71	7.45	7.20
50W	1444	81.75	85.84	135	179.01	8.27	8.04	7.81	7.58	7.35	7.12
47.5W	1449	82.44	86.56	135	165.95	8.06	7.85	7.63	7.42	7.21	7.00
45W	1454	82.31	86.42	136	166.08	7.93	7.71	7.50	7.29	7.08	6.87
42.5W	1500	82.10	86.19	137	169.29	7.92	7.71	7.49	7.27	7.06	6.84
40W	1509	82.37	86.46	137	162.66	7.72	7.51	7.30	7.10	6.89	6.68
37.5W	1515	82.52	86.61	138	158.91	7.60	7.40	7.20	6.99	6.79	6.59
35W	1521	82.42	86.50	139	158.68	7.47	7.27	7.07	6.87	6.66	6.46
32.5W	1543	82.53	86.59	139	155.97	7.37	7.17	6.97	6.77	6.57	6.37
30W	1537	82.31	86.36	139	156.90	7.21	7.01	6.81	6.61	6.41	6.20
Base	1600	82.41	86.44								
27.5W	1610	82.22	86.24	139	154.79	6.94	6.74	6.54	6.34	6.15	5.95
25W	1618	83.72	87.82	139	127.15	6.55	6.39	6.23	6.06	5.90	5.74
22.5W	1624	82.47	86.51	139	143.34	6.39	6.21	6.03	5.84	5.66	5.48
20 W	1630	82.40	86.44	139	139.23	6.03	5.85	5.67	5.50	5.32	5.14
Base	1638	82.40	86.44								
Base	836	82.35	86.44								
17.5W	845	82.97	87.09	139	125.00	5.67	5.51	5.35	5.19	5.03	4.87
15W	850	84.08	88.26	139	104.27	5.36	5.23	5.10	4.97	4.83	4.70
12.5W	855	83.33	87.48	140	111.55	5.10	4.96	4.81	4.67	4.53	4.39
10 W	900	83.23	87.37	140	110.00	4.88	4.74	4.60	4.46	4.32	4.18
7.5W	904	82.94	87.07	140	112.81	4.78	4.64	4.49	4.35	4.20	4.06
5W	909	83.07	87.20	140	106.87	4.49	4.35	4.21	4.08	3.94	3.81
2.5W	915	83.02	87.15	140	104.76	4.29	4.15	4.02	3.89	3.75	3.62
0-0 W/N	920	83.11	87.25	140	100.73	4.10	3.97	3.84	3.71	3.59	3.46
Base	1019	82.33	86.44								