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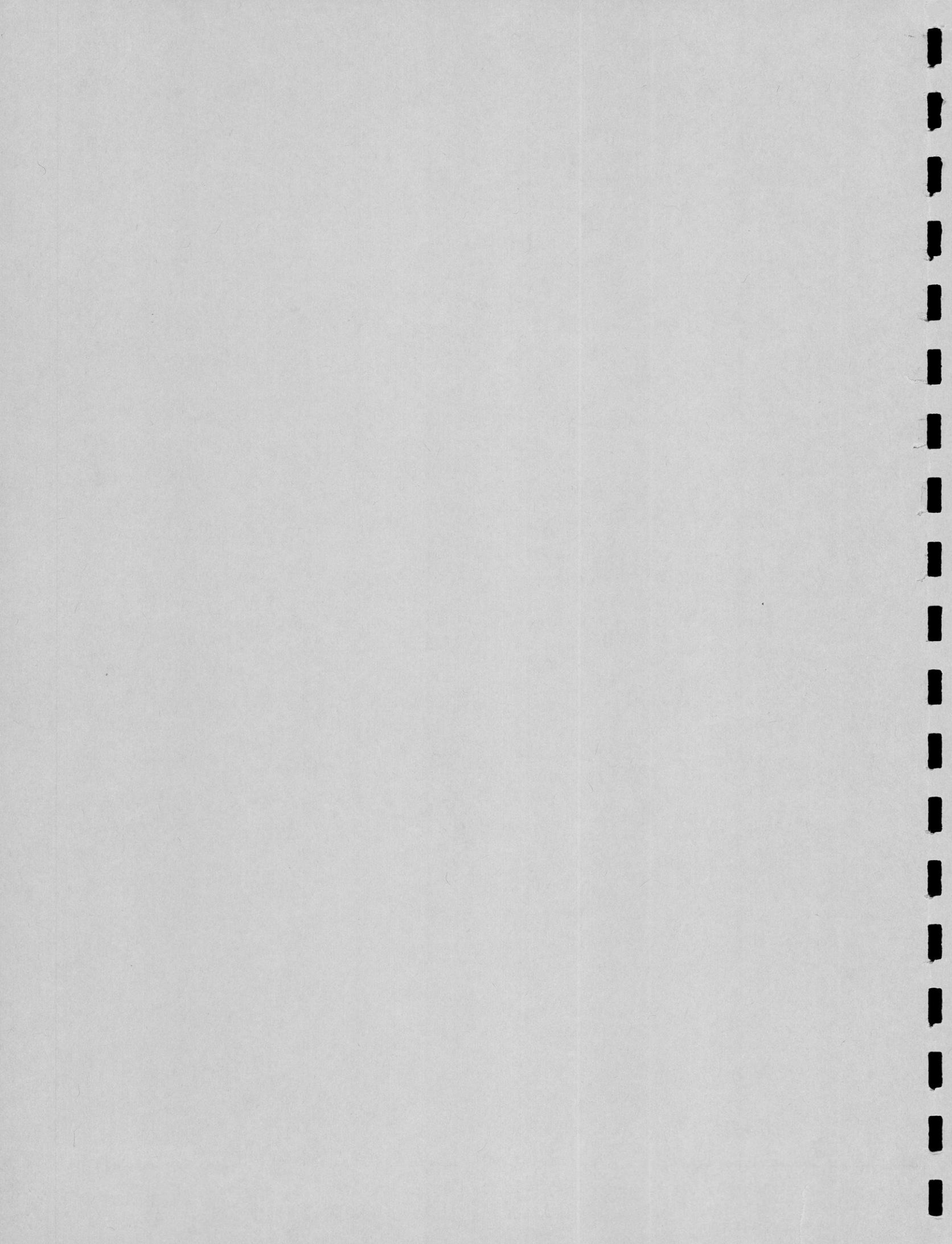
GEOTECHNICAL REVIEW
CRANDON PROJECT
WASTE DISPOSAL SYSTEM
PROJECT REPORT 2
VOLUME 3

STATE DOCUMENTS
DEPOSITORY

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v.2
pt. 3



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Golder Associates

CONSULTING GEOTECHNICAL AND MINING ENGINEERS

GEO TECHNICAL REVIEW
CRANDON PROJECT
WASTE DISPOSAL SYSTEM
PROJECT REPORT 2
VOLUME 3

G41 SERIES BORING LOGS

Submitted to:

Exxon Minerals Company
655 Washington Street
Post Office Box 813
Rhinelander, Wisconsin 54501

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October, 1981

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pt. 3

VOLUME 3

G41 SERIES BORING LOGS

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COOR. N107060 ft. (N32623m)
 E2280500 ft. (E695098m)

BORING LOG G41-A24

SHEET 1 OF 6

SURFACE ELEV. 1614.1 ft. (492.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
0.0		Compact to very dense, brown to red-brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, trace to some silt	SP- SM	-	1	DO	Hydraulic Push	6/18		
				-	2	DO	Hydraulic Push	6/24		
				-	3	DO	Air Hammer	18/18		
				-	4	DO	Air Hammer	9/12		
7.62				Very dense, brown, silty fine to medium SAND to fine to coarse gravelly fine to coarse SAND, trace silt; (materials to these extremes occur in pockets or layers of random thickness at random intervals)	SP to SM	-	5	DO	Air Hammer	18/18
25.0										
11.13										
36.5		CONTINUED								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N107060 ft. (N32623m)
E2280500 ft. (E695098m)

BORING LOG G41-A24

SHEET 2 OF 6

SURFACE ELEV. 1614.1 ft. (492.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	REC./ ATT.	
11.43		CONTINUED							
37.5		Very dense, brown, silty fine to medium SAND to fine to coarse gravelly fine to coarse SAND, trace silt; (materials to these extremes occur in pockets or layers of random thickness at random intervals)	SP to SM	-	6	DO	Air Hammer	18/18	
13.72									
45.0		Dense to very dense, dark brown to brown, fine to coarse gravelly fine to coarse SAND, trace clay with small occasional pockets of fine to medium SAND	SP	-	7	DO	Air Hammer	2 /24	
21.79				-	9	DO	Air Hammer	10/15	
71.5		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N107060 ft. (N32623m)
E2280500 ft. (E695098m)

BORING LOG G41-A24

SHEET 3 OF 6

SURFACE ELEV. 1614.1 ft. (492.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
21.79		CONTINUED						
71.5		Dense to very dense, dark brown to brown, fine to coarse gravelly fine to coarse SAND, trace clay with small occasional patches of fine to medium sand	SP					
23.47								
77.0					-	10	CO	12/12
								24.99
								82.0
								25.91
								85.0
		Very dense, brown, fine to medium SAND, trace silt	SP					
					-	11	DO	Air Hammer 15/18
28.96								
95.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL	GP					
30.18								
99.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N107060 ft. (N32623m)
 E2280500 ft. (E695098m)

BORING LOG G41-A24

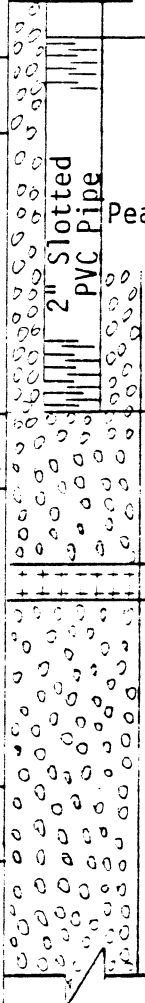
SHEET 4 OF 6

SURFACE ELEV. 1614.1 ft. (492.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC / ATT.	
30.18		CONTINUED						CONTINUED	
99.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL	GP	-	12	DO	Air Hammer	6/24	30.48
	100.0								
32.00		Very dense, light brown to multi-colored, fine to coarse SAND, some fine to coarse gravel	SP	-	13	DO	Air Hammer	10/24	33.53
105.0	110.0								
	34.75								
	114.0								
									35.05
									115.0
									Pea Gravel (to bottom of boring)
38.10		Very dense, brown, SILT, some fine sand, very poorly graded, stratified	ML						
125.0									
39.32		CONTINUED							
129.0									



Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N107060 ft. (N32623m)
 E2280500 ft. (E695098m)
 SURFACE ELEV. 1614.1 ft. (492.97m)

BORING LOG G41-A24

SHEET 5 OF 6

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
39.32 129.0		CONTINUED						
		Very dense, brown, SILT, some fine sand, very poorly graded, stratified	ML	-	15	DO	Air Hammer 15/20	
41.15 135.0		Very dense, light brown, fine to medium SAND	SP	-	16	DO	Air Hammer 24/24	
44.65 146.5		Very dense, orange-brown, fine to medium SAND, trace fine gravel to red-brown, fine sandy SILT; (materials to these extremes occur in randomly sized and spaced intervals with great variations of material in a small interval)	SP to ML	-	17	DO	Air Hammer 18/18	
48.46 159.0		CONTINUED						

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N107060 ft. (N32623m)
 E2280500 ft. (E595098m)
 SURFACE ELEV. 1614.1 ft. (492.97m)

BORING LOG G41-A24

SHEET 6 OF 6

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 6/5/81 DATE COMPLETED 6/9/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6" IN. REC./ATT.	
48.46		CONTINUED						
159.0		Very dense, orange-brown, fine to medium SAND, trace fine gravel to red-brown, fine sandy SILT; (materials to these extremes occur in randomly sized and spaced intervals with great variations of material in a small interval)	SP to ML	-	18	DO	Air Hammer	24/24
51.21								
168.0		Weathered COBBLES, some fine to coarse gravel, some fine to coarse sand	GP					
52.82								
173.3		Weathered to hard, green, metavolcanic TUFF		-	19	DO	Air Hammer	12/16
54.86								
180.0				-	20		Wash Cuttings	

END OF BORING

NOTES

- Elevation of top of protector pipe, 1616.8 ft. (492.30m).

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N116095 ft. (N35386m)
E2281690 ft. (E695461m)

BORING LOG G41-C11

SHEET 1 OF 2

SURFACE ELEV. 1634.4 ft. (498.16m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS			
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC./ATT. (ins.)		
0.30		Soft to firm, brown, clayey SILT, trace fine sand, trace organic matter	ML	-	1	AS	-	-			
1.0		Dense to very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM		43	2	DO	11-20-23	3/18		
					42	3	DO	12-18-24	12/18		
					78	4	DO	28-31-47	18/18		
					50 3"	5	DO	50/3"	3/3		
5.33				Very dense, red-brown, fine to coarse SAND, some silt, trace clay	SM		34 9"	6	DO	56-71-63/3"	8/15
17.5			23 9"			7	DO	40-70-53/3"	7/15		
			223			8	DO	73-150	3/12		
10.36											
34.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N116095 ft. (N35386m)
E2281690 ft. (E695461m)

BORING LOG G41-C11

SHEET 2 OF 2

SURFACE ELEV. 1634.4 ft. (498.16m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)		
10.36		CONTINUED							
34.0		Very dense, red-brown, fine to coarse SAND, some silt, trace clay	SM	104	9	DO	48-50-54	14/18	
				100	3	10	DO	100/3"	3/3
				200	4	11	DO	200/4"	3/4
14.48		Very dense, red-brown, silty fine to coarse SAND	SM	165					
47.5				10					
15.51				12		DO	65-100/4"	8/10	

50.9
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 2 - 12)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked as

COOR. N114775 ft. (N34983m)
E2281895 ft. (E695522m)

BORING LOG G41-C13

SHEET 1 OF 2

SURFACE ELEV. 1617.2 ft. (492.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 3/10/79 DATE COMPLETED 3/10/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 8 IN. (Note 1)		REC./ATT. (ins.)
0.0		Compact, brown, silty, fine to coarse SAND (Boulders to 5' diameter on ground surface)	SM	-	1	AS	-	-	
1.22									
4.0									
					28	D0	13-14-14	10/18	
					18	D0	9-8-10	8/18	
					94	D0	18-31-63	15/18	
					145				
					10"				
		Compact to very dense, brown, fine to coarse gravelly fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP SM to SM		5	D0	45-100/4"	10/10	
					90	D0	39-41-49	15/18	
					163				
					9"				
					7	D0	63-100/3"	9/9	
					112				
					6"	D0	112/6"	6/6	
10.06									
33.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ACB

COOR. N113135 ft. (N34483m)
 E2282080 ft. (E695579m)

BORING LOG G41-C15

SHEET 1 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12 B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)	
0.0		Compact, brown, silty fine to coarse SAND, some fine gravel	SM	-	1	AS	-			
1.07										
3.5		Dense to very dense, light brown, fine to medium SAND, trace silt	SP	14	2	DO	6-6-8	16/18		
						23	3	DO	6-9-14	15/18
						37	4	DO	9-15-22	12/18
						29	5	DO	7-13-16	15/18
5.18		Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay	SM	25	6	DO	9-12-13	12/18		
17.0										
						29	7	DO	12-15-14	2/18
						37	8	DO	11-15-22	14/18
						40	9	DO	13-16-24	15/18
11.13										
36.5		CONTINUED								

▼ 4/13/79 6.37
 ≈ 20.9

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)

BORING LOG G41-C15

SHEET 2 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79
 DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ ATT. (ins.)			
11.13		CONTINUED									
36.5		Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay	SM	32	10	DO	11-13-19	15/18			
						45	11	DO	13-18-27	5/18	
14.02		Very dense, fine sandy SILT, some clay	ML								
46.0						51	12	DO	12-19-32	12/18	
						39	13	DO	12-17-22	6/18	
17.22		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, occasional small cobbles	GM to SM								
56.5						101	14	DO	31-46-55	12/18	
						25	15	DO	27-50-75	16/18	
20.73		CONTINUED									
68.0		CONTINUED									

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OB

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)

BORING LOG G41-C15

SHEET 3 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
20.73		CONTINUED							
68.0		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, occasional small cobbles	GM to SM	125	16	D0	33-43-82	12/18	
22.25									
73.0		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, to gravelly, fine to coarse SAND, trace to some silt, occasional cobbles	SP- SM to SM	181					
				9"	17	DC	71-110/3"	8/9	
				181					
				9"	18	D0	61-120/3"	6/9	
				101					
				9"	20	D0	61-40/3"	8/9	
29.26				156					
				8"	21	D0	56-100/2"	8/8	
96.0		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine gravel, trace to some silt	SP- SM to SM						
31.09				102	22	D0	32-70	12/12	
102.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)

BORING LOG G41-C15

SHEET 4 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
31.09		CONTINUED						
102.0		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine gravel, trace to some silt	SP-SM to SM	169 8"	23	DO	69-100/2"	6/8
				144	24	DO	46-98	11/12
				106	25	DO	41-65	6/12
40.23								
132.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)

BORING LOG G41-C15

SHEET 5 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12 B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
40.23		CONTINUED						
132.0		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine gravel, trace to some silt	SP					
41.15			SM					
135.0			SM					
		Very dense, brown to red-brown, fine to coarse SAND, trace silt (sand becoming finer with depth)		153	26	DO	48-105	12/12
			SP					
			to 159					
			SP-10"					
			SM		27	DO	59-100/4"	9/10
				157				
				9"				
					28	DC	57-100/3"	8/9
50.29								
165.0		Very dense, brown, fine SAND and SILT	SM					
50.90								
167.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked oob

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)

BORING LOG G41-C15

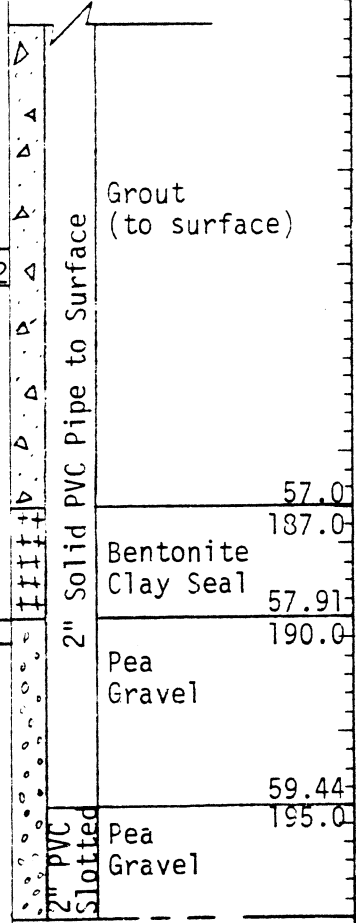
SHEET 6 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12 B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
50.90		CONTINUED						
167.0		Very dense, brown, fine SAND and SILT	SM	114	29	DO	36-78	12/12
55.02				140	30	DO	19-121	12/12
180.5		Hard to very hard, brown SILT, trace fine to coarse sand, trace clay	ML	150	31	DO	75-75/2"	8/8
59.44								
195.0		Very dense, brown, gravelly fine to coarse SAND, trace silt	SP- SM					
60.35								
198.0		CONTINUED						



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CCB

COOR. N113135 ft. (N34483m)
E2282080 ft. (E695579m)



BORING LOG G41-C15

SHEET 7 OF 7

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/7/79

DRILL RIG Joy 12 B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)		
60.35		CONTINUED							CONTINUED	
198.0		Very dense, brown, gravelly fine to coarse SAND, trace silt	SP SM	150 g	32	DO	50-100/3"	6/8	 2" Slotted PVC Pipe	Pea Gravel
62.48 205.0				CL to ML						
64.01		Soft to firm, brown and gray-green CLAY to clayey SILT (residual material)								
210.0		Gray-green, highly weathered metavolcanic TUFF		64 TO	33	DO	27-64- 100 4	16/16	 2" Slotted PVC Pipe	Pea Gravel
66.23				- 34	RC	-	72/72			

217.3 END OF BORING

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 2 - 33)
2. Elevation of top of protector pipe, 1617.3 ft. (492.95m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/7/79	11/12/79	2/14/80	4/25/80	5/22/80*	9/10/80*
DEPTH (m)	6.37	6.55	6.68	6.64	6.89	6.89	7.38
DEPTH (ft.)	20.9	21.5	21.9	2.8	22.6	22.6	24.2

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113150 ft. (N34488m)
E2282085 ft. (695580m)

BORING LOG G41-C15A

SHEET 1 OF 1

SURFACE ELEV. 1615.6 ft. (492.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

1. Boring drilled specifically for performing in situ permeability tests.
2. See log of boring G41-C15 for description of subsurface materials.
3. All permeability tests were falling head tests with water level at top of rods at beginning of test.
4. All holes fully grouted at completion.

TEST NUMBER 1

Advanced hole to 120.0' with 6" bit and Revert mud.
Drove 4" casing from 120.0' to 124.0' and cleaned hole with air.
Casing dropped to 127.0' while cleaning hole.
Sand ran up casing to 100.0'.
Drove 4" casing from 127.0' to 130.0' and cleaned hole with water.
Sand ran up casing to 121.0'.
Casing was cleaned with water to 130.0' three more times and each time sand ran up the casing.
Lowered 2" I.D. wellpoint (#60 stainless steel screen) to 121.0' and pulled up casing to 121.0' then drove wellpoint to 133.0'.
Perforated length of wellpoint was 26" and the 1-13/16" I.D. standpipe rods were 11.0' above ground.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	6.0	15.0	31.17
1.0	14.0	20.0	32.75
2.0	21.0	25.0	33.67
5.0	24.0	30.0	34.17
10.0	29.0		

Drove 4" casing from 121.0' to 145.0'.
Could not advance or extract casing.
Abandoned hole, leaving casing in ground.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113050 ft. (N34457m)
E2281850 ft. (E695509m)

BORING LOG G41-C15B

SHEET 2 OF 2

SURFACE ELEV. 1611.6 ft. (491.22m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/30/79 DATE COMPLETED 3/31/79

DRILL RIG CME 45 DRILLING METHOD Solid Stem Auger and Mud Rotary

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79*	9/10/80*				
DEPTH (m)	6.37	5.15	5.85				
DEPTH (ft.)	20.9	16.9	19.2				

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked DPB

COOR. N114075 ft. (N34770m)
E2282300 ft. (E695647m)

BORING LOG G41-D14

SHEET 1 OF 2

SURFACE ELEV. 1615.1 ft. (492.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/2/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)		
0.15		topsoil and rootmat								
0.5		Very dense, brown to red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	65	1	DO	10-25-40	12/18		
				23	2	DO	7-11-12	12/18		
				100	3	DO	100/3"	3/3		
				24	4	DO	29-17-7	4/18		
				92	5	DO	25-40-52	12/18		
				50	6	DO	18-26-24	12/18		
				55	7	DO	14-26-29	12/18		
				43	8	DO	10-20-23	9/18		
11.28										
37.0				CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114075 ft. (N34770m)
E2282300 ft. (E695647m)

BORING LOG G41-D14

SHEET 2 OF 2

SURFACE ELEV. 1615.1 ft. (492.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/2/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLIOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
11.28 37.0		CONTINUED								
		Very dense, brown to red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	163	9	DO	28-52-111	18/18		
				170	10	DO	44-76-94	18/18		
15.70				33	11	DO	4-29	2/12		
51.5 16.15 53.0		Very dense, brown, fine to medium SAND, some fine to coarse gravel, trace silt	SP-SM	66	12	DO	14-30-36	18/18		

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked JCB

COOR. N112220 ft. (N34204m)
E2282525 ft. (E695715m)

BORING LOG G41-017

SHEET 1 OF 2

SURFACE ELEV. 1649.2 ft. (502.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/6/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
0.15		topsoil and rootmat						
0.5		Compact to very dense, red-brown to brown, fine to coarse gravelly fine to coarse SAND, trace silt	SP SM	24	1	DO	11-13-11	18/18
				22	2	DO	11-12-10	18/18
				30	3	DO	15-15-15	18/18
				94	4	DO	19-32-62	6/18
				100	5	DO	22-44-56	18/18
				205 9'	6	DO	35-105-100/3'	15/15
8.38		Very dense, brown, SILT and fine to coarse SAND, trace fine to coarse gravel, trace clay	ML SM	160 9'	7	DO	60-100/3"	9/9
27.5								
10.06		Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay	SM	178 10'	8	DO	78-100/4"	10/10
33.0								
11.28								
37.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N112220 ft. (N34204m)
E2282525 ft. (E695715m)

BORING LOG G41-D17

SHEET 2 OF 2

SURFACE ELEV. 1649.2 ft. (502.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/6/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)		
11.28		CONTINUED							
37.0		Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay		181 10'	9	DO	81-100/4"	10/10	
			SM 156 10'	10	DO	56-100/4"	10/10		
				156 10'	11	DO	56-100/4"	10/10	
15.48									

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111300 ft. (N33925m)
E2282140 ft. (E695597m)

BORING LOG G41-D18

SHEET 1 OF 3

SURFACE ELEV. 1680.4 ft. (512.18m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/3/79 DATE COMPLETED 3/5/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
0.30		Topsoil and rootmat						
1.0		Dense to very dense, red-brown, fine to coarse gravelly fine to coarse SAND, trace to come silt, trace clay	SM	32	1	DO	11-15-17	18/18
				32	2	DO	21-14-18	18/18
				36	3	DO	16-18-18	12/18
				136	4	DO	12-64-72	10/18
5.49 18.0		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, trace clay	SP-199 SM to SM	150 9"				
				5	DO	50-100/3"	6/9	
				199 9"	6	DO	48-99- ¹⁰⁰ 3"	15/15
10.06 33.0		CONTINUED		241 9"				
				7	DO	141-100/3"	9/9	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 209

COOR. N111300 ft. (N33925m)
E2282140 ft. (E695597m)

BORING LOG G41-D18

SHEET 2 OF 3

SURFACE ELEV. 1680.4 ft. (512.18m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/3/79 DATE COMPLETED 3/5/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)
10.06 33.0		CONTINUED							
		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, trace clay	SP-SM to SM	201 9'	8	DO	100 47-101-3'	15/15	
				237 9'	9	DO	137-100/3'	9/9	
				200 9'	10	DO	100-100/3'	9/9	
				214 9"	11	DO	114-100/3'	7/9	
				260 6"	12	DO	260/6"	3/6	
				200 4"	13	DO	200/4"	0/4	

(Note 2)

65.2
END OF BORING
HOLE GROUTED AT COMPLETION
(See sheet 3 for notes)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N111300 ft. (N33925m)
E2282140 ft. (E695597m)

BORING LOG G41-D18

SHEET 3 OF 3

SURFACE ELEV. 1680.4 ft. (512.18m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/3/79 DATE COMPLETED 3/5/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)
2. Split tube sampler left in bottom of borehole.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jis
Checked as

COOR. N115865 ft. (N35316m)
E2282875 ft. (E695822m)

BORING LOG G41-E11

SHEET 1 OF 2

SURFACE ELEV. 1651.6 ft. (503.41m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/3/79 DATE COMPLETED 3/5/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	SAMPLES					REMARKS	
				BLOWS/FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
0.15		topsoil and rootmat								
0.5		Compact, brown, fine to coarse sandy SILT, trace fine gravel	ML	7	1	DO	3-3-4	18/18		
1.22										
4.0		Compact, brown, silty, fine to coarse SAND, some fine gravel, some clay	SM	18	2	DO	6-8-10	18/18		
				18	3	DO	6-7-11	18/18		
3.84		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP to SP-SM							
12.6				33	4	DO	15-15-18	18/18		
				37	5	DO	13-18-19	18/18		
				116	6	DO	10-16-100	18/18		
				95 8	7	DO	45-50/2"	6/8		
9.91				100						
32.5		Very dense, brown SILT, some fine to coarse gravel, trace fine sand	ML	4"	3	DO	100/4"	3/4		
10.67										
35.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N115865 ft. (N35316m)
E2282875 ft. (E695822m)

BORING LOG G41-E11

SHEET 2 OF 2

SURFACE ELEV. 1651.6 ft. (503.41m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/3/79 DATE COMPLETED 3/5/79

DRILL RIG CMF 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
10.67		CONTINUED						
35.0		Very dense, brown SILT, some fine to coarse gravel, trace fine sand	ML					
11.43								
37.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP-SM	100 4"	9	DO	100/4"	3/4
				100 2"	10	DO	100/2"	0/2
14.48		Very dense, red-brown, silty fine SAND, trace to some fine gravel, trace clay	SM	100 6"	11	DO	100/6"	6/6
47.5								
15.09								

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 24". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked zcb

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

SHEET 3 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)		
21.95		CONTINUED								
72.0		Very dense, red-brown, fine to coarse SAND and fine GRAVEL, trace silt, trace clay to fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, occasional boulders	SP SM to SM	190						
				8"						
				16	DO	90-100/2"	8/8			
				180						
				11"						
				17	DO	80-100/5"	8/11			
				200						
				10"						
				18	DO	100-100/4"	8/10			
				165						
				6"	19	DO	165/6"	6/6		
28.19										
92.5		Very dense, red-brown to light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay, occasional silty sand layers	SM	167	20	DO	78-75-92	16/18		
				170						
				8"	21	DO	70-100/2"	8/8		
31.70										
104.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked RCB

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

SHEET 4 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
31.70		CONTINUED							
104.0		Very dense, red-brown to light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay, occasional silty sand layers	SM	175	22	DO	75-100	12/12	
				185 8"					
					23	DO	85-100/2"	7/8	
38.10		Very dense, red-brown to light brown, fine to coarse SAND, trace silt	SP to SP SM						
125.0									
					105	24	DO	27-35-70	12/18
41.15		CONTINUED							
135.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

SHEET 5 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
41.15 135.0		CONTINUED						
				190	25	D0	40-150	10/12
				270	26	D0	70-200	12/12
		Very dense, red-brown to light brown, fine to medium SAND, trace silt	SP to SP- SM	190	27	D0	50-140	0/12
51.21 168.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

SHEET 6 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
51.21		CONTINUED						
168.0		Very dense, red-brown to light brown, fine to medium SAND, trace silt	SP to SP SM	215 9'				
				28	00	115-100/3	9/9	
				251	29	00	85-166	12/12
				185	30	00	45-140	12/12
60.35		CONTINUED						
198.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

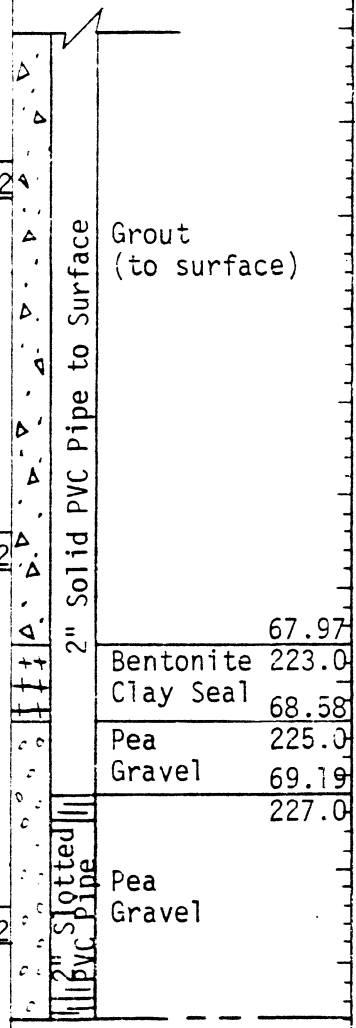
SHEET 7 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
60.35		CONTINUED							
198.0		Very dense, red-brown to light brown, fine to medium SAND, trace silt	SP to SP-SM	210	31	D0	80-130	12/12	
				275	32	D0	75-200	12/12	
67.06		Very dense, red-brown to light brown, fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles	SP-SM to SM	180	33	D0	60-120	12/12	
220.0									
68.88		Very dense, red-brown to light brown, fine to coarse SAND, trace fine gravel, trace silt	SP-SM	220	34	D0	50-170	12/12	
226.0									
71.02		CONTINUED							
233.0		CONTINUED							



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N114395 ft. (N34868m)
E2282890 ft. (E695826m)

BORING LOG G41-E13

SHEET 8 OF 8

SURFACE ELEV. 1627.3 ft. (496.00m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/25/79 DATE COMPLETED 3/6/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)	
71.02		CONTINUED						CONTINUED		
233.0		Very dense, red-brown to light brown, fine to coarse SAND, trace fine gravel, trace silt	SP-SM	170 6"	35	DO	170/6"	2/6	2" Slotted PVC pipe Pea Gravel	
73.30										
240.5		Green-gray, slight to highly weathered metavolcanic TUFF		170 6"	-	NX RC	-	10/24	Pea Gravel	
					-	NX RC	-	34/36		
					-	RC	-	4/6		
76.35					-	NX RC	-	54/54		
250.5		END OF BORING								

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 2 - 23)
Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 20". (Sample 24)
Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 25 - 35)
- Elevation of top of protector pipe, 1629.45 ft. (496.66m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/17/79	11/7/79	1/2/80	4/25/80	5/22/80	6/25/80*	9/10/80*
DEPTH (m)	10.73	9.57	9.69	10.00	10.00	10.00	10.49
DEPTH (ft.)	35.2	31.4	31.8	32.8	32.8	32.8	34.4

DATE	6/10/81						
DEPTH (m)	10.64						
DEPTH (ft.)	34.9						

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 808

COOR. N114385 ft. (N34865m)
E2282895 ft. (E695828m)

BORING LOG G41-E13A

SHEET 1 OF 3

SURFACE ELEV. 1626.7 ft. (495.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/16/79 DATE COMPLETED 3/27/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

1. Boring drilled specifically for performing in situ permeability tests.
2. See log of boring G41-E13 for description of subsurface materials.
3. All permeability tests were falling head tests with water level at top of casing or rods at beginning of test.
4. All holes fully grouted at completion.

TEST NUMBER 1

Drove 4" casing from 0' to 10.0', leaving top of casing 2.0' above ground.
Cleaned hole to 11.0' (1.0' below casing) with air and water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	0.13	5.0	1.00
1.0	0.25	10.0	1.92
2.0	0.46	15.0	2.58

TEST NUMBER 2

Drove 4" casing from 10.0' to 21.0' leaving top of casing level with ground.
Cleaned hole to 22.0' (1.0' below casing) with air and water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.25	10.0	6.00
0.50	0.46	15.0	8.17
1.0	0.83	20.0	9.5
2.0	1.67	25.0	11.25
5.0	3.58	30.0	12.42

TEST NUMBER 3

Advanced hole to 35.0' with 4" bit using air and water.
Drove 4" casing from 21.0' to 42.0' leaving top of casing level with ground.
Cleaned hole to 43.0' (1.0' below casing) using air and water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.42	15.0	19.00
0.50	0.75	20.0	21.83
1.0	1.50	25.0	24.50
2.0	3.50	30.0	27.00
5.0	8.33	14.0 hrs.	34.00
10.0	15.33		

TEST NUMBER 4

Advanced hole to 60.0' with 4" bit using air and water.
Drove 4" casing from 42.0' to 63.0' leaving top of casing level with ground.
Cleaned hole to 64.0' (1.0' below casing) using air and water.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked ACB

COOR. N114385 ft. (N34865m)
E2282895 ft. (E695828m)

BORING LOG G41-E13A

SHEET 2 OF 3

SURFACE ELEV. 1626.7 ft. (495.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/16/79 DATE COMPLETED 3/27/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.50	10.0	17.08
0.50	1.17	15.0	21.75
1.0	2.33	20.0	24.50
2.0	4.75	25.0	26.83
5.0	10.00	30.0	28.42

TEST NUMBER 5

Encountered boulder at 68.0'.
Could not extract casing.
Abandoned hole leaving casing in ground.
Moved 5' south to start new hole (coordinates as given on log heading).
Advanced new hole to 95.0' with 6" bit and Revert mud.
Drove 4" casing from 95.0' to 103.0' leaving top of casing 1.0' above ground.
Cleaned hole to 104.0' (1.0' below casing) using air and water.
Blew water out of hole with air to conduct rising head test.
Sand ran up casing to 89.0' during test, no data obtained.
Cleaned hole to 103.0' using water to conduct falling head test.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	7.0	2.0	30.0
0.50	14.0	3.0	34.0
0.75	22.0	5.0	34.5
1.0	25.0	10.0	35.0
1.5	27.0	* 15.0	35.0

TEST NUMBER 6

Advanced hole to 138.0' using 4" bit and Revert mud.
Drove 2" I.D. wellpoint (#60 stainless steel screen) from 138.0' to 141.0'.
Perforated length of the wellpoint was 26.0" and the 1-13/16" I.D. standpipe rods were 5.25' above ground.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	4.00	16.0	12.25
1.0	5.00	21.0	22.75
2.0	6.58	26.0	24.17
5.0	11.50	31.0	25.25
11.0	17.42		

TEST NUMBER 7

Advanced hole to 188.0' using 4" bit and Revert mud.
Drove 2" I.D. wellpoint (#60 stainless steel screen) from 188.0' to 191.0'.
Perforated length of the wellpoint was 26.0" and the 1-13/16" I.D. standpipe rods were 6.25' above the ground.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked MB

COOR. N114385 ft. (N34865m)
E2282895 ft. (E695828m)

BORING LOG G41-E13A

SHEET 3 OF 3

SURFACE ELEV. 1626.7 ft. (495.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/16/79 DATE COMPLETED 3/27/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	3.7	5.0	4.7
1.0	4.3	10.0	4.9
2.0	4.6	15.0	5.1

Could not extract casing. Abandoned hole, leaving casing in ground.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked OCB

COOR. N113380 ft. (N34558m)
 E2282935 ft. (E695839m)

BORING LOG G41-F15

SHEET 1 OF 2

SURFACE ELEV. 1647.3 ft. (502.08m) PROJECT EXXON CRANDON TAILING DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/2/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
0.30 1.0		Topsoil and rootmat						
		Compact to very dense, red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	30	1	DO	11-15-15	18/18
				46	2	DO	12-22-24	18/18
				139	3	DO	43-61-78	18/18
				182	4	DO	52-130	12/12
				175	5	DO	63-112	12/12
				254	6	DO	84-170	12/12
				268 8"	7	DO	68-200/2"	8/8
9.75 32.0 10.52		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP-SM					
34.5		CONTINUED						

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked ZOB

COOR. N113380 ft. (N34558m)
E2282935 ft. (E695839m)

BORING LOG G41-E15

SHEET 2 OF 2

SURFACE ELEV. 1647.3 ft. (502.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/2/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
10.52		CONTINUED		322				
34.5		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP	8"	8	DO	122-200/2"	8/8
			SM	292				
13.11		Very dense, red-brown, fine to medium SAND, trace to some silt, trace to some fine to coarse gravel		9"	9	DO	92-200/3"	9/9
43.0			SP	146				
15.24			SM	11"	10	DO	46-100/5"	11/11
50.0				200				
				8"	11	DO	25-100-100/2"	14/14

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 1 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC./ ATT. (ins.)	
0.30		Topsoil and rootmat								
0.5		Brown, fine to medium SAND, some gravel, some cobbles	SP							
2.13										
7.0		Brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	-	1	DO	Air Hammer	18/18		
						-	2	DO	Air Hammer	18/18
7.62		Brown, fine to coarse SAND, trace fine gravel, occasional layers of clayey silt	SM to ML							
25.0						-	4	DO	Air Hammer	12/12
8.23		Brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM							
27.0						-	5	DO	Air Hammer	12/12
9.75		CONTINUED								
32.0										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RS

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 2 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ ATT. (ins.)			
9.75		CONTINUED									
32.0		Brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	-	6	DO	Air Hammer	6/6			
10.67											
35.0		Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	-	7	DO	Air Hammer	15/18			
						-	8	DO	Air Hammer	12/18	
						-	9	DO	Air Hammer	12/12	
				-	10	DC	Air Hammer	12/12			
				-	11	DC	Air Hammer	8/12			
				-	12	DO	Air Hammer	6/12			
20.42											
67.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 206

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 3 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)				
20.42		CONTINUED										
67.0		Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM		-	13	DO	Air Hammer	15/18			
							-	14	DO	Air Hammer	12/18	4/18/79
											23.38	
											76.7	
							-	15	DO	Air Hammer	8/18	
							-	16	DO	Air Hammer	12/18	
					-	17	DO	Air Hammer	6/12			
					-	18	DO	Air Hammer	15/18			
					-	19	DO	Air Hammer	0/2			
31.09												
102.0		CONTINUED										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RS

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-F17

SHEET 5 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
41.91		CONTINUED						
137.5		Yellow-brown to brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP SM	-	23	DO	Air Hammer	6/6
	-			24	DO	Air Hammer	18/18	
	-			25	DO	Air Hammer	12/18	
51.21				CONTINUED				
168.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked [Signature]

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 7 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER BIN. (Note 1)	REC./ATT. (ins.)	
60.66		CONTINUED							
199.0		Brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP SM						
				-	29	DO	Air Hammer	12/12	
64.01		Red-brown SILT, some clay, trace fine sand	ML						
210.0				-	30	DO	Air Hammer	12/18	
				-	31	DO	Air Hammer	18/18	
69.80								68.88	
								++	Bentonite 226.0
								++	Clay Seal 69.49
								o o	Pea Gravel 228.0
229.0		CONTINUED							CONTINUED

2" Solid PVC Pipe to Surface
Grout (to surface)
68.88
Bentonite 226.0
Clay Seal 69.49
Pea Gravel 228.0

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 8 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
69.80		CONTINUED							CONTINUED
229.0		Red-brown SILT, some clay trace fine sand	ML						2" Solid PVC Pipe
71.48				-	32	DO	Air Hammer	12/12	
234.5		Red-brown, fine to coarse clayey SAND and SILT, trace fine gravel	ML						2" Slotted PVC Pipe
73.15									
240.0		Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM						2" Slotted PVC Pipe
75.44				-	33	DO	Air Hammer	8/12	
247.5		Greenish-gray, highly weathered metavolcanic TUFF					Drill Cuttings	-	2" Slotted PVC Pipe
77.72									
255.0		Greenish-gray, metavolcanic TUFF							2" Slotted PVC Pipe
79.25				-	34	INX RC	-	57/60	

260.0
END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (Samples 1 - 33)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

BORING LOG G41-E17

SHEET 9 OF 9

SURFACE ELEV. 1666.4 ft. (507.91m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/27/79 DATE COMPLETED 4/2/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES (continued)

2. Elevation of top of protector pipe, 1668.5 ft. (508.56m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79	4/25/80	5/22/80*	9/10/80*		
DEPTH (m)	23.38	22.16	22.43	22.43	22.89		
DEPTH (ft.)	76.7	72.7	73.6	73.6	75.1		

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked JEF

COOR. N110750 ft. (N33756m)
E2283085 ft. (E695886m)

BORING LOG G41-E19

SHEET 1 OF 2

SURFACE ELEV. 1620.9 ft. (494.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/8/79 DATE COMPLETED 3/8/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)		
0.0		Soft, light brown, organic SILT and CLAY, some fine sand to compact light brown, silty, fine to coarse sand	ML to SM	-	1	AS	-	-		
1.52		Very dense, brown to orange-brown, fine to coarse gravelly, fine to coarse SAND, some silt, to fine to coarse SAND, some silt, trace clay, occasional cobbles	SM	20	2	DO	9-10-10	14/18		
5.0				49	3	DO	22-27	12/12		
				100 4"	4	DO	100/4"	0/4		
				97	5	DO	26-48-49	18/18		
				153 11"	6	DO	53-100/5"	4/11		
				133 6"	7	DO	133/6"	4/6		
				144 6"	8	DO	144/6"	0/6		
				155	9	DO	66-89	8/12		
11.28										
37.0				CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N110750 ft. (N33756m)
E2283085 ft. (E695886m)

BORING LOG G41-E19

SHEET 2 OF 2

SURFACE ELEV. 1620.9 ft. (494.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 3/8/79 DATE COMPLETED 3/8/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
11.28		CONTINUED							
37.0		Very dense, brown to orange-brown, fine to coarse gravelly, fine to coarse SAND, some silt, to fine to coarse SAND, some silt, trace clay, occasional cobbles	SM	143	7" 10	DO	93-50/1"	5/7	
				179	6" 11	DO	179/6"	6/6	
				200	4" 12	DO	200/4"	4/4	

50.3
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 2 - 12)

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked TCB

COOR. N110260 ft. (N33608m)
 E2283290 ft. (E695949m)
 SURFACE ELEV. 1645.6 ft. (501.58m)

BORING LOG G41-E19A SHEET 1 OF 9
 PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81
 DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.			
0.0		Compact, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM	-	1	DO	Air Hammer	18/18		
						-	2	DO	Air Hammer	18/18
4.57 15.0		Dense, brown and red-brown, fine to medium SAND, some silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP- SM							
						-	3	DO	Air Hammer	18/18
9.60 31.5		CONTINUED								
						-	4	DO	Air Hammer	4/18

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 2 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
9.60		CONTINUED							
31.5		Dense, brown and red-brown, fine to medium SAND, some silt to fine to coarse SAND, some fine to coarse gravel, trace silt.	SP- SM						
10.67									
35.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM						
				-	5	DO	Air Hammer	12/18	
13.72									
45.0		Very dense, orange-brown and brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP						
				-	6	DO	Air Hammer	15/18	
16.76									
55.0		Very dense, red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM						
				-	7	DO	Air Hammer	18/18	
20.27									
66.5		CONTINUED							

▼ 6/10/81 17.27
⊃ 56.7

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

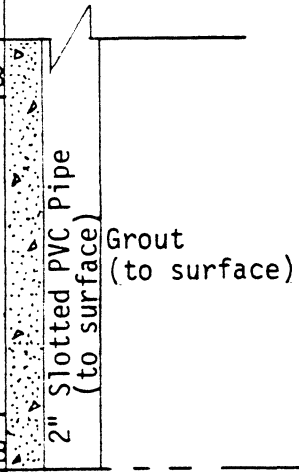
SHEET 3 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.		
20.27		CONTINUED							
66.5		Very dense, red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM						
				-	8	DO	Air Hammer	6/12	
				-	9	DO	Air Hammer	20/24	
				-	10	DO	Air Hammer	18/18	
				-	11	DO	Air Hammer	18/18	
30.94									
101.5		CONTINUED						CONTINUED	



Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
 E2283290 ft. (E695949m)
 SURFACE ELEV. 1645.6 ft. (501.58m)

BORING LOG G41-E19A

SHEET 4 OF 9

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	REC./ ATT.	
30.94		CONTINUED						CONTINUED	
101.5		Very dense, red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM					Grout	
32.00								32.00	
105.0		Very dense, brown to red-brown, fine to coarse gravelly fine to coarse SAND, trace silt	SP- SM					105.0	
								Bentonite Clay Seal	
								32.92	
								108.0	
								2" Solid PVC Pipe	
								Pea Gravel	
								35.05	
35.05								115.0	
115.0		Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt	SP					Pea Gravel	
								38.10	
								38.4	
								125.0	
								Bentonite Clay Seal	
								39.62	
								130.0	
								Pea Gravel (to bottom of boring)	
41.67									
136.5		CONTINUED							

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 5 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
41.61		CONTINUED								
136.5		Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt	SP	-	15	DO	Air Hammer 18/18			
						-	16	DO	Air Hammer 8/12	
49.83		CONTINUED								
163.5										

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 6 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
49.83		CONTINUED							
163.5		Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt	SP						
				-	18	DO	Air Hammer	12/16	
53.34		Very dense, brown to red-brown, fine SAND, trace silt to SILT, trace fine sand, alternating layers of above occur in layers no thicker than 12 inches	SP to ML						
175.0				-	19	DO	Air Hammer	24/24	
59.44		Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
195.0				-	20	DO	Air Hammer	16/18	
60.66									
199.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 7 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ ATT.	
60.66 199.0		CONTINUED						
		Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP	-	21	DO	Air Hammer	15/18
				-	22	DO	Air Hammer	12/12
65.53 215.0		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	23	DO	Air Hammer	12/12
68.58 225.0		Very dense, multi-colored, fine to coarse, sandy fine to coarse GRAVEL, trace silt	GP- GM					
70.56 231.5				CONTINUED				

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 8 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
70.56 231.5		CONTINUED						
71.63 235.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, trace silt	GP- GM	-	24	DO	▼ Air Hammer	10/12
77.42 254.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM	-	25	RC		17/72
79.71 261.5		Highly to slightly weathered, green, metavolcanic TUFF						
		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)

BORING LOG G41-E19A

SHEET 9 OF 9

SURFACE ELEV. 1645.6 ft. (501.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/11/81 DATE COMPLETED 5/15/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ ATT.	
79.71		CONTINUED						
261.5		Highly to slightly weathered, green, metavolcanic TUFF						
84.12				-	26	RC	62/72	

276.0
END OF BORING

NOTES

- Elevation of top of protector pipe, 1649.0 ft. (502.60m).

DATE	6/10/81						
DEPTH (m)	17.27						
DEPTH (ft.)	56.7						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N114845 ft. (N35004m)
E2283660 ft. (E696062m)

BORING LOG G41-F13

SHEET 1 OF 2

SURFACE ELEV. 1670.7 ft. (509.22m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/13/79

DRILL RIG Joy R15 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)				
0.0		Soft, brown SILT, some fine sand, some to trace fine gravel, trace organic matter	ML	4	1	D0	2-1-3	18/18			
0.91											
3.0		Loose to compact, red-brown to brown, fine to medium SAND, some fine to coarse gravel, trace silt	SM	14	2	D0	5-7-7	18/18			
						8	3	D0	3-4-4	18/18	
						14	4	D0	5-5-9	18/18	
5.64		Compact, brown, fine SAND and fine to coarse GRAVEL, trace silt	SP-SM to SM								
18.5				27	5	D0	11-16	1/12			
7.32		Compact to very dense, brown fine to coarse SAND, trace to some fine to coarse gravel, trace silt Boulders and cobbles noted at 27.5'-28.0' and 35.0'-35.5'	SM								
24.0											
						41	6	D0	11-19-22	15/18	
						21	7	D0	12-10-11	12/18	
				28	8	D0	12-16-12	5/18			
11.28											
37.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

COOR. N114845 ft. (N35004m)
 E2283660 ft. (E696062m)

BORING LOG G41-F13

SHEET 2 OF 2

SURFACE ELEV. 1670.7 ft. (509.22m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/13/79

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)		
11.28 37.0		CONTINUED							
		Compact to very dense, brown fine to coarse SAND, trace to some fine to coarse gravel, trace silt Boulders and cobbles noted at 39.5'-40.5' and 48.5'-50.5'		125 6"	9	DO	125/6"	0/6	
				150 11"					
				SM 11"	10	DO	50-100/5"	11/11	
				145 10"	11	DO	45-100/4"	9/10	
17.01				150 9"	12	DO	75-75/3"	6/9	

55.8 END OF BORING
 HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

COORD. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 2 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)
11.13		CONTINUED							
36.5		Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP to SP- SM & SW to SW- SM	-	8	DO	Air Hammer	15/15	
				-	9	DO	Air Hammer	15/15	
				-	10	DO	Air Hammer	14/14	
				-	11	DO	Air Hammer	16/16	
				-	12	DO	Air Hammer	14/16	
				-	13	DO	Air Hammer	12/12	▼ 1/10/80 19.93 ≈ 65.4
20.42				CONTINUED					
67.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

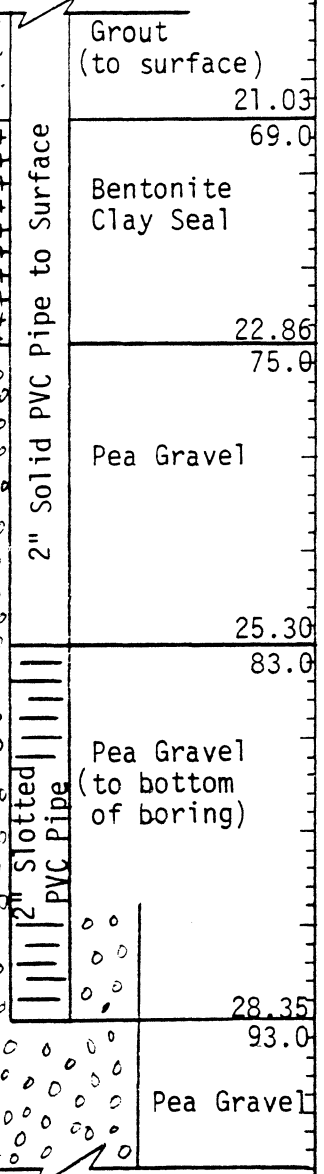
SHEET 3 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ ATT. (ins.)	
20.42		CONTINUED								
67.0		Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP to SP SM & SW to SW SM					Grout (to surface) 21.03		
				-	14	DO	Air Hammer	18/18	69.0	
										22.86
				-	15	DO	Air Hammer	18/18	75.0	
										25.30
				-	16	DO	Air Hammer	18/18	83.0	
										83.0
				-	17	DO	Air Hammer	5/18	93.0	
										93.0
				-	18	DO	Air Hammer	15/18	28.35	
								93.0		
		-	19	DO	Air Hammer	10/15	93.0			
								93.0		
		-	20	DO	Air Hammer	15/18	93.0			
31.09		CONTINUED								
102.0		CONTINUED								



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 4 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
31.09		CONTINUED						
102.0		Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP to SP SM & SW to SW SM	-	21	DO	Air Hammer	13/16
				-	22	DO	Air Hammer	12/12
				-	23	DO	Air Hammer	13/16
41.45				CONTINUED				
136.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107255 ft. (N32692m)
 E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 5 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
41.45		CONTINUED								
136.0		Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP to SP- SM & SW to SW- SM	-	24	DO	Air Hammer	12/14		
44.20										
145.0				Very dense, light brown to brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles and boulders Boulder noted at 148.5'-151.0'	GP to GP- GM	-	25	DO	Air Hammer	14/14
						-	26	DO	Air Hammer	10/12
50.90		CONTINUED								
167.0		CONTINUED								

Job No. 785085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MBB

COOR. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 6 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)		
50.90		CONTINUED								
167.0		Very dense, light brown to brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles and boulders	GP to GP GM	-	27	DO	Air Hammer	4/4		
53.34										
175.0										
		Very dense, red-brown to light brown, fine SAND and SILT to fine SAND, trace silt	SP to ML	-	28	DO	Air Hammer	14/14		
				-	29	DO	Air Hammer	12/12		
				-	30	DO	Air Hammer	15/18		
61.57										
202.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MRB

COOR. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 7 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/ FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
61.57		CONTINUED							
202.0		Very dense, red-brown to light brown, fine SAND and SILT to fine SAND, trace silt	SP to ML						
				-	31	DO	Air Hammer	16/16	
				-	32	DO	Air Hammer	16/16	
68.49		Greenish-gray, metavolcanic TUFF				Drill Cuttings	-		
224.7				-	-	-			
71.32		CONTINUED							
234.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COORD. N107255 ft. (N32692m)
E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 8 OF 8

SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/8/80

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
71.32		CONTINUED						
234.0		Greenish-gray, metavolcanic TUFF		-	33	HX RC	-	96/96
74.06								

243.0 END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (Samples 2 - 32)
2. Soil sample 1 was obtained from the walls of the drilling mud pit.
3. Elevation of top of protector pipe, 1656.6 ft. (504.93m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	1/10/80	4/25/80	6/28/80	7/9/80	7/17/80	7/25/80	8/2/80
DEPTH (m)	19.93	20.15	20.06	20.09	20.12	20.12	20.09
DEPTH (ft.)	65.4	66.1	65.8	65.9	66.0	66.0	65.9
DATE	8/9/80	8/16/80	8/23/80	9/2/80	9/10/80	6/10/81	
DEPTH (m)	20.09	20.36	20.06	20.09	20.21	20.48	
DEPTH (ft.)	65.9	66.8	65.8	65.9	66.3	67.2	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N116095 ft. (N35385m)
E2284345 ft. (E696269m)

BORING LOG G41-G11

SHEET 2 OF 3

SURFACE ELEV. 1687.1 ft. (514.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC/ATT. (ins.)	
11.28		CONTINUED							
37.0		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles		200	3"10	DO	200/3"	2/3	
				200	3"11	DO	200/3"	2/3	
				SM 200	2"12	DO	200/2"	2/2	
				166	6"13	DO	166/6"	6/6	
				156	14	DO	50-106	9/12	
				139	15	DO	45-94	10/12	
21.95				118	16	DO	44-74	7/12	
72.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N115825 ft. (E35303m)
E2284430 ft. (E696296m)

BORING LOG G41-G12

SHEET 1 OF 1

SURFACE ELEV. 1675.7 ft. (510.76m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/31/79 DATE COMPLETED 3/31/79

DRILL RIG CME 45 DRILLING METHOD Solid Stem Auger and Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)	
0.0		Loose, red-brown, SILT, some fine to medium sand, trace clay	ML	5	1	DO	1-3-2	15/18	(Note 2) Grout	
1.07										
3.5		Compact, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	24	2	DO	7-12-12	10/18	2" Solid PVC Pipe ▼2.77 4/18/79 9.1 3.05 10.0	
2.93										
9.6		Dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM	30	3	DO	8-14-16	8/18	Bentonite Clay Seal 3.96 Pea Gravel 13.0 4.42 14.5	
				36	4	DO	14-20-16	12/18	2" Slotted PVC Pipe Pea Gravel 5.94 19.5	
6.40				167	5	DO	45-92-75	18/18		

21.0 END OF BORING

NOTES

- Standard Penetration Test - Driving 3" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
- Water ponded on ground surface, 3/31/79.
- Elevation of top of protector pipe, 1678.6 ft. (511.64m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79*	9/10/80*				
DEPTH (m)	2.77	4.15	3.63				
DEPTH (ft.)	9.1	13.6	11.9				

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)

BORING LOG G41-G13

SHEET 1 OF 11

SURFACE ELEV. 1709.6 ft. (521.08m) PROJECT: EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
0.0		Compact to very dense, brown to red brown, fine to coarse gravelly fine to coarse SAND, some silt to silty fine to coarse SAND, some fine to coarse gravel, occasional to frequent cobbles	SM					
				- 1	DO	Hydraulic Push	24/24	
						Hydraulic Push		
				- 2	DO		10/13	
				- 3	DO	Air Hammer	17/17	
				- 4	DO	Air Hammer	24/24	
11.13								
36.5		CONTINUED						

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13

SHEET 2 OF 11

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
11.13 36.5		CONTINUED						
		Compact to very dense, brown to red brown, fine to coarse gravelly fine to coarse SAND, some silt to silty fine to coarse SAND, some fine to coarse gravel, occasional to frequent cobbles	SM	-	5	DO	Air Hammer 24/24	
				-	6	DO	Air Hammer 12/18	
16.76 55.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, frequent cobbles	GP	-	7	DO	Air Hammer 23/23	
21.03 69.0		CONTINUED						

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
30.94 101.5		CONTINUED							
		Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse SAND, frequent cobbles	SP						
				-	12	DO	Air Hammer	12/21	
35.05 115.0		Very dense, brown to red-brown, silty, fine to coarse SAND, some fine to coarse gravel, occasional cobbles	SM						
				-	13	DO	Air Hammer	12/21	
				-	14	DO	Air Hammer	18/24	
40.84 134.0		CONTINUED							

▼ 6/10/81 35.79
 117.4

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13

SHEET 5 OF 11

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 5/27/81

DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP

DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
40.84 134.0		CONTINUED						
		Very dense, brown to red-brown, silty, fine to coarse SAND, some fine to coarse gravel, occasional cobbles	SM	-	15	DO	Air Hammer 21/21	
				-	16	DO	Air Hammer 18/18	
				-	17	DO	Air Hammer 10/12	
47.24 155.0		Very dense, light brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP					
49.07 161.0		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly silty fine to coarse SAND, trace clay, frequent cobbles and occasional boulders	SM					
50.75 166.5								
		CONTINUED						

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13

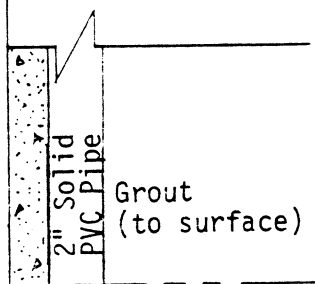
SHEET 6 OF 11

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.				
50.75		CONTINUED									
166.5		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly silty fine to coarse SAND, trace clay, frequent cobbles and occasional boulders	SM	-	18	DO	Air Hammer	10/10			
						-	19	DO	Air Hammer	9/9	
						-	20	DO	Air Hammer	6/9	
60.66											
199.0		CONTINUED									



Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13

SHEET 7 OF 11

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
60.66 199.0		CONTINUED						CONTINUED
		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly silty fine to coarse SAND, trace clay, frequent cobbles and occasional boulders	SM	21	DO	Air Hammer	2/2	2" Solid PVC Pipe Grout (to surface)
	22			DO	Air Hammer	7/8		
	23			DO	Air Hammer	6/8		
69.80 229.0		CONTINUED						67.67 222.0 Bentonite Clay Seal 68.58 225.0 Pea Gravel

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N115260 ft. (N35131m)
E2284725 ft. (E696386m)

BORING LOG G41-G13

SHEET 9 OF 11

SURFACE ELEV. 1709.6 ft. (521.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ ATT.	
80.47 264.0		CONTINUED						
		Very dense, brown to tan, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel	SP					
				-	28	D0	Air Hammer	21/21
83.82 275.0		Very dense, light brown, fine SAND, trace silt to SILT, some fine sand (very poorly graded, above are extremes of materials that occur in random layers)	SP to ML					
				-	29	D0	Air Hammer	10/12
88.09 289.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N115260 ft. (N35131m)
E2284725 ft. (E696386m)

BORING LOG G41-G13

SHEET 10 OF 11

SURFACE ELEV. 1709.6 ft. (521.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
88.09 289.0		CONTINUED						
		Very dense, light brown, fine SAND, trace silt to SILT, some fine sand (very poorly graded, above are extremes of materials that occur in random layers)	SP to ML	-	30	DO	Air Hammer	6/9
89.92 295.0								
		Very dense, brown SILT, trace fine sand	ML	-	31	DO	Air Hammer	12/12
92.96 305.0								
		Very dense, light brown, fine to medium SAND, trace silt with occasional layers of red-brown silt and multi-colored fine gravel	SP with ML and GP	-	32	DO	Air Hammer	12/15
96.32 316.0								
97.23 319.0		Hard, green, metavolcanic TUFF						
		END OF BORING						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N115260 ft. (N35131m)
E2284725 ft. (E696386m)

BORING LOG G41-G13

SHEET 11 OF 11

SURFACE ELEV. 1709.6 ft. (521.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

NOTES

Elevation of top of protector pipe, 1712.4 ft. (521.95m)

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	6/10/81						
DEPTH (m)	35.79						
DEPTH (ft.)	117.4						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked [Signature]

COOR. N113930 ft. (N34726m)
E2284315 ft. (E696260m)

BORING LOG G41-G14

SHEET 1 OF 4

SURFACE ELEV. 1705.1 ft. (519.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/16/79

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)			
0.0		Loose, brown, silty, fine to medium SAND, trace organics	SM	5	1	DO	3-2-3	15/18		
0.76										
2.5		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt Cobbles noted at 19.0'-19.5'	SM	53	2	DO	8-27-26	10/18		
				15	3	DO	5-5-10	15/18		
				66	4	DO	9-12-54	18/18		
				135	5	DO	42-35-100	6/18		
				80	6	DO	13-39-41	6/8		
				115 5"	7	DO	115/5"	4/5		
9.75										
32.0				CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N113930 ft. (N34726m)
E2284315 ft. (E696260m)

BORING LOG G41-G14

SHEET 2 OF 4

SURFACE ELEV. 1705.1 ft. (519.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/16/79

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
9.75		CONTINUED							
32.0				150 4"	8	DO	150/4"	3/4	
				130 3"	9	DO	130/3"	3/3	
		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM						
		Cobbles and boulders noted at 41.0'-51.0' and 62.5'-64.0'		140 4"	11	DO	140/4"	1/4	
				150 8"	12	DO	100-50/2"	6/8	
				170 5"	13	DO	170/5"	5/5	
19.51				150 6"	14	DO	150/6"	5/6	
64.0		See next page							
20.42									
67.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N113930 ft. (N34726m)
E2284315 ft. (E696260m)

BORING LOG G41-G14

SHEET 3 OF 4

SURFACE ELEV. 1705.1 ft. (519.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/16/79

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC/ATT. (ins.)		
20.42 67.0		CONTINUED							
		Very dense, brown, fine gravelly, fine to medium SAND, trace silt to brown-gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt, occasional cobbles from 65'-70'	SP- SM	150 9"					
				15	DO	75-75/3"	8/9		
				150 5"	16	DO	150/5"	5/5	
				150 2"	17	DO	150/2"	0/2	
25.15 82.5		Very dense, gray-brown, medium to coarse SAND, some fine to medium gravel, trace silt	SP- SM	100 8"	18	DO	50-50/2"	8/8	
27.13 89.0		Very dense, green-black to dark brown, organic SILT, some clay, trace fine gravel	OL	102 11"	19	DO	16-41- ⁶⁰ 5"	17/17	
29.41				102	20	DO	18-27-75	18/18	
96.5		END OF BORING HOLE GROUTED AT COMPLETION (See sheet 4 for notes)							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113930 ft. (N34726m)
E2284315 ft. (E696260m)

BORING LOG G41-G14

SHEET 4 OF 4

SURFACE ELEV. 1705.1 ft. (519.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/16/79

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 5-7, 9, 11)

Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 1-4, 8)

Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 12 - 20)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114080 ft. (N34772m)
E2284315 ft. (E696261m)

BORING LOG G41-G14A

SHEET 1 OF 6

SURFACE ELEV. 1706.9 ft. (520.27m) PROJECT EXXON CRANDON TAILING DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/13/79 DATE COMPLETED 11/16/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/ FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
0.0									
		See boring G41-G14 for soil stratigraphy							
30.48				- 1	DO	Air Hammer	6.5 6.5		
100.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP-SM						
32.77									
107.5		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt; frequent cobbles	GP-GM	- 2	DO	Air Hammer	6/12		
									12/4/79 34.17 112.1
35.05									
115.0		Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, some silt, trace to some fine to coarse gravel, occasional to frequent cobbles	SM	- 3	DO	Air Hammer	18/18		
38.10									
125.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114080 ft. (N34772m)
E2284315 ft. (E696261m)

BORING LOG G41-G14A

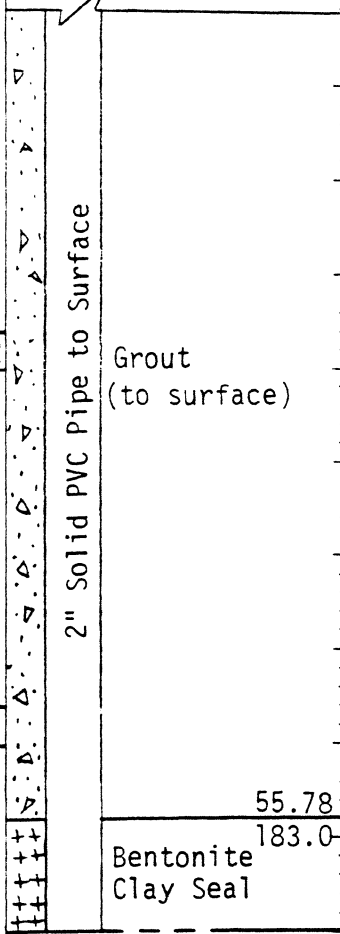
SHEET 3 OF 6

SURFACE ELEV. 1706.9 ft. (520.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/13/79 DATE COMPLETED 11/16/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)		
47.24		CONTINUED								
155.0		Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, some silt, trace to some fine to coarse gravel, occasional to frequent cobbles	SM	-	7	DO	Air Hammer	6/11		
50.29										
165.0				Very dense, red-brown to brown, fine to coarse SAND, some silt, trace to some fine gravel, trace clay, frequent cobbles	SM	-	8	DO	Air Hammer	3/12
						-	9	DO	Air Hammer	4/12
									55.78	
									183.0	
56.69									Bentonite Clay Seal	
186.0		CONTINUED							CONTINUED	



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked [Signature]

COOR. N114080 ft. (N34772m)
E2284315 ft. (E696261m)

BORING LOG G41-G14A

SHEET 4 OF 6

SURFACE ELEV. 1706.9 ft. (520.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/13/79 DATE COMPLETED 11/16/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
56.69		CONTINUED							CONTINUED
186.0		Very dense, red-brown to brown, fine to coarse SAND, some silt, trace to some fine gravel, trace clay, frequent cobbles	SM					++ ++ ++ ++ ++	Bentonite Clay Seal 57.92 190.0
	- 10			DO	Air Hammer	6/12			
58.67		Gravel and cobbles. Unable to retain samples	GP					// // // // //	Caved material (Note 2)
192.5	- 11			DO	Air Hammer	0/12			
	- 12			DO	Air Hammer	0/12			
61.57		Very dense, brown, fine to coarse SAND to fine SAND, trace silt (fineness increasing with depth)	SP to SP-SM					2" Solid PVC Pipe	
202.0	- 13			DO	Air Hammer	18/18			
	- 14			DO	Air Hammer	4/18			
66.45		CONTINUED							CONTINUED
218.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114080 ft. (N34772m)
E2284315 ft. (E696261m)

BORING LOG G41-G14A

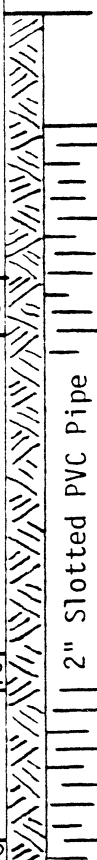
SHEET 5 OF 6

SURFACE ELEV. 1706.9 ft. (520.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/13/79 DATE COMPLETED 11/16/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC/ ATT. (ins.)	
66.45		CONTINUED						CONTINUED		
218.0		Very dense, brown, fine to coarse SAND to fine SAND, trace silt (fineness increasing with depth)	SP to SP SM	-	16	DO	Air Hammer	3/16	Caved Material (Note 2) 67.36	
72.39										221.0
237.5										
73.46		Very dense, fine sandy SILT	ML				Air Hammer		Caved Material (Note 2)	
241.0				-	17	DO		6/12		
							Air Hammer			
				-	18	DO		12/12		



END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)
2. Borehole caved to 190.0 ft. after placement of the PVC well pipe. Pumped 1000 gallons of water down the well pipe to wash caved material. No water return.
3. Elevation of top of protector pipe, 1708.6 ft. (520.79m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jlg
Checked [Signature]

COOR. N114080 ft. (N34772m)
E2284315 ft. (E696261m)

BORING LOG G41-G14A

SHEET 6 OF 6

SURFACE ELEV. 1706.9 ft. (520.27m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/13/79 DATE COMPLETED 11/16/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/4/79	2/12/80	4/25/80	5/15/80	5/20/80	6/26/80*	9/10/80*
DEPTH (m)	34.17	34.26	34.41	34.50	34.38	34.38	34.99
DEPTH (ft.)	112.1	112.4	112.9	113.2	112.8	112.8	114.8

DATE	6/10/81						
DEPTH (m)	35.02						
DEPTH (ft.)	114.9						

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked JAB

COOR. N114055 ft. (N34764m)
E2284315 ft. (E696261m)

BORING LOG G41-G14B

SHEET 1 OF 5

SURFACE ELEV. 1706.8 ft. (520.23m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 8 IN. (Note 1)	
0.0		See borings G41-G14 and G41-G41A for stratigraphy						12/4/79 33.74 110.7
73.46								2" Solid PVC Pipe Grout (to surface)
241.0		Very dense, brown, silty, fine SAND, trace clay	SM	-	1 DO	Air Hammer	18/18	
75.44								
247.5		Very dense, brown, fine sandy SILT	ML	-	2 DO	Air Hammer	18/18	
76.96								Bentonite Clay Seal Pea Gravel
252.5		Very dense, brown to red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles and boulders	SP-SM to SM	-	3 DO	Air Hammer	12/12	
81.23								77.72 255.0
								80.16 263.0
266.5		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114055 ft. (N34764m)
E2284315 ft. (E696261m)

BORING LOG G41-G14B

SHEET 3 OF 5

SURFACE ELEV. 1706.8 ft. (520.23m) PROJECT EXXON CRANDON TAILING DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
91.44 300.0		CONTINUED							
		Very dense, brown to red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles and boulders	SP SM to SM	-	8	DO	Air Hammer	2/8	
93.73 307.5					-	9	DO	Air Hammer	4/4
		Very dense, brown SILT, some fine sand to fine to coarse SAND and SILT, trace fine gravel	SM to ML						
96.01 315.0					-	10	DO	Air Hammer	6/6
		Red-brown and green, highly weathered to weathered metavolcanic TUFF							
101.80 334.0					-	11	DO	Air Hammer	3/3
		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked Hms

COOR. N114055 ft. (N34764m)
E2284315 ft. (E696261m)

BORING LOG G41-G14B

SHEET 4 OF 5

SURFACE ELEV. 1706.8 ft. (520.23m) PROJECT EXXON CARNDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
101.80		CONTINUED						
334.0		Red-brown and green, highly weathered to weathered metavolcanic TUFF						
					12	DO	Air Hammer	2/2
					13	DO	Air Hammer	1.5 1.5

360.1
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)
2. Elevation of top of protector pipe, 1708.9 ft. (520.86m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N114055 ft. (N34764m)
E2284315 ft. (E696261m)

BORING LOG G41-G14B

SHEET 5 OF 5

SURFACE ELEV. 1706.8 ft. (520.23m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/4/79	2/12/80	4/25/80	5/15/80	5/20/80	6/26/80*	9/10/80*
DEPTH (m)	33.74	34.17	34.38	34.50	34.38	34.41	34.99
DEPTH (ft.)	110.7	112.1	112.8	113.2	112.8	112.9	114.8

DATE	6/10/80						
DEPTH (m)	35.02						
DEPTH (ft.)	114.9						

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked CRB

COORD. N114030 ft. (N34757m)
E2284315 ft. (E696261m)

BORING LOG G41-G14C

SHEET 1 OF 2

SURFACE ELEV. 1706.3 ft. (520.09m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/2/79 DATE COMPLETED 12/4/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	
0.0		See borings G41-G14 and G41-G14A for soil strati- graphy						Grout (to surface)
								35.97 118.0
								2" Solid PVC Pipe Bentonite Clay Seal
								37.80 124.0
								Pea Gravel
								39.93 131.0
								2" Slot Pipe Pea Gravel
41.45 136.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N114030 ft. (N34757m)
E2284315 ft. (E696261m)

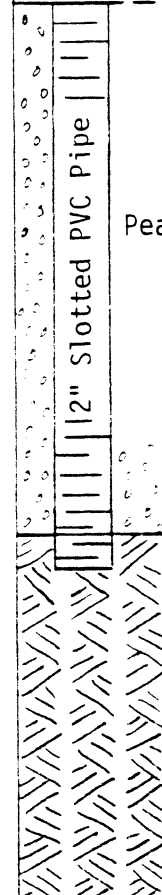
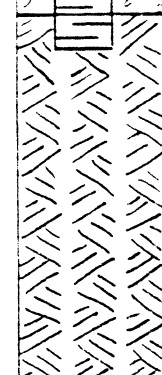
BORING LOG G41-G14C

SHEET 2 OF 2

SURFACE ELEV. 1706.3 ft. (520.09m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/2/79 DATE COMPLETED 12/4/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
41.45		CONTINUED						CONTINUED
136.0		See borings G41-G14 and G41-G14A for soil strati- graphy						 <p>12" Slotted PVC Pipe</p>
								45.72
								150.0
								151.0
48.77								 <p>Caved Material</p>

160.0 END OF BORING
NOTES

Elevation of top of protector pipe, 1708.7 ft. (520.81m).
Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/11/79	2/12/80	4/25/80	5/15/80	5/20/80	6/26/80*	9/10/80*
DEPTH (m)	33.56	33.86	34.02	34.11	33.99	34.05	34.75
DEPTH (ft.)	110.1	111.1	111.6	111.9	111.5	111.7	114.0

DATE	6/10/81						
DEPTH (m)	34.75						
DEPTH (ft.)	114.0						

*pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

COORD. N113855 ft. (N34705m)
E2284315 ft. (E696261m)

BORING LOG G41-G14D

SHEET 1 OF 2

SURFACE ELEV. 1705.6 ft. (519.86m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 12/10/79 DATE COMPLETED 12/11/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	
0.0		See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy						12/19/79 33.59 110.2 Grout (to surface) 64.01 210.0 Bentonite Clay Seal 65.53 215.0 Pea Gravel 67.67 222.0 Pea Gravel
71.32								2" Solid PVC Pipe to Surface 2" Slotted PVC Pipe
234.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113855 ft. (N34705m)
E2284315 ft. (E696261m)

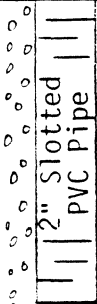


BORING LOG G41-G14D

SHEET 2 OF 2

SURFACE ELEV. 1705.6 ft. (519.86m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/10/79 DATE COMPLETED 12/11/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FOOT	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC / ATT.		
71.32		CONTINUED						CONTINUED	
234.0		See boring G41-G14, G41-G14A and G41-G14B for soil stratigraphy						 2" Slotted PVC Pipe Pea Gravel	
									73.76
									242.0
								 Pea Gravel	
								74.68	
								245.0	
								 Caved Material	
78.33									
257.0		END OF BORING							

NOTES

- Elevation of top of protector pipe, 1707.6 ft. (520.48m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/19/79	4/25/80	5/20/80	6/26/80*	9/10/80*		
DEPTH (m)	33.59	34.02	34.02	34.02	34.63		
DEPTH (ft.)	110.2	111.6	111.6	111.6	113.6		

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked *[Signature]*

COOR. N113830 ft. (N34696m)
E2284315 ft. (E696261m)

BORING LOG G41-G14E

SHEET 1 OF 2

SURFACE ELEV. 1705.6 ft. (519.87m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/7/79 DATE COMPLETED 12/7/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
0.0		See borings G41-G14 and G41-G14A for soil stratigraphy						▼ 12/11/79 33.31 109.3	
								Grout (to surface)	
								38.40	
								126.0	
								Bentonite Clay Seal	
								39.32	
								129.0	
								Pea Gravel	
								40.84	
								134.0	
42.97							2" Slotted PVC Pipe Pea Gravel		
141.0		CONTINUED					CONTINUED		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113830 ft. (N34696m)
E2284315 ft. (E696261m)

BORING LOG G41-G14E

SHEET 2 OF 2

SURFACE ELEV. 1705.6 ft. (519.87m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/7/79 DATE COMPLETED 12/7/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
		CONTINUED						CONTINUED
50.29		See borings G41-G14 and G41-G14A for soil stratigraphy						Pea Gravel
								46.94
								154.0
								Caved Material

165.0

END OF BORING

NOTES

- Elevation of top of protector pipe, 1708.0 ft. (520.60m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/11/79	4/25/80	5/20/80	6/26/80*	9/10/80*		
DEPTH (m)	33.31	33.92	33.89	33.95	34.72		
DEPTH (ft.)	109.3	111.3	111.2	111.4	113.9		

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113805 ft. (N34688m)
E2284315 ft. (E696261m)

BORING LOG G41-G14F

SHEET 1 OF 3

SURFACE ELEV. 1703.5 ft. (519.22m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/4/79 DATE COMPLETED 11/6/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	
0.0								12/11/79 33.07 108.5
		See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy						Grout (to surface) 84.12 276.0
								Bentonite Clay Seal 85.65 281.0
								Pea Gravel 88.39 290.0
								Pea Gravel
91.44								2" Solid PVC Pipe to Surface 2" Slotted PVC Pipe
300.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked [Signature]

COOR. N113805 ft. (N34688m)
E2284315 ft. (E696261m)

BORING LOG G41-G14F

SHEET 2 OF 3

SURFACE ELEV. 1703.5 ft. (519.22m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/4/79 DATE COMPLETED 11/6/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
91.44		CONTINUED						CONTINUED
300.0		See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy						Caved Material (Note 1)
								2" Slotted PVC Pipe
								94.49
								310.0
								Caved Material (Note 1)

101.19
332.0 END OF BORING

NOTES

1. Groundwater observation well was placed at 310.0 ft. on caved material. After placement of the PVC well pipe, the borehole caved to 3000 ft.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JLS
Checked [Signature]

COOR. N113805 ft. (N34688m)
E2284315 ft. (E696261m)

BORING LOG G41-G14F

SHEET 3 OF 3

SURFACE ELEV. 1703.5 ft. (519.22) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
DATUM USGS MSL DATE STARTED 11/4/79 DATE COMPLETED 11/6/79
DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

NOTES (continued)

2. Elevation of top of protector pipe, 1706.9 ft. (520.27).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/11/79	4/25/80	5/20/80	6/26/80*	9/10/80*		
DEPTH (m)	33.07	33.38	32.74	33.38	33.95		
DEPTH (ft.)	108.5	109.5	107.4	109.5	111.4		

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked JAB

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 1 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)	
0.0		See Boring G41-G15A for detailed descriptions.	SM to GM	-	1	DO	Air Hammer	12/12		
13.72				-	2	DO	Air Hammer	6/6		
45.0				-	3	DO	Air Hammer	6/6		
				Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to brown, fine to coarse GRAVEL and fine to coarse SAND, some silt						
						-	4	DO	Air Hammer	3/3
18.90										
62.0				Very dense, red-brown, silty, fine to coarse SAND, some fine gravel, trace clay to fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	5	DO	Air Hammer	12/12
		-	6			DO	Air Hammer	10/12		
		-	7			DO	Air Hammer	10/12		
23.47										
77.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ZB

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 2 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)
23.47 77.0		CONTINUED							
		Very dense, red-brown, silty, fine to coarse SAND, some fine gravel, trace clay to fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	8	DO	Air Hammer	8/12	
				-	9	DO	Air Hammer	10/12	
27.43 90.0					-	10	DO	Air Hammer	12/12
				Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay	SM	-	11	DO	Air Hammer
		-	12			DO	Air Hammer	6/6	
								▼ 4/18/79 30.39 ≈ 99.7	
32.31 106.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 4 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
41.76		CONTINUED						
137.0		Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay	SM					
				← 16	DO	Air Hammer	2/2	
				- 17	DO	Air Hammer	12/12	
48.77		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt to fine to coarse SAND, some fine to coarse gravel	SP to SP- SM					
160.0				- 18	DO	Air Hammer	5/12	
51.21		CONTINUED						
168.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RS

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 5 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)	
51.21		CONTINUED							
168.0		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt to fine to coarse SAND, some fine to coarse gravel	SP to SP- SM	-	19	DO	Air Hammer	2/2	
				-	20	DO	Air Hammer	6/6	
				-	21	DO	Air Hammer	6/6	
60.05									
197.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 6 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
60.05		CONTINUED						
197.0		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt to fine to coarse SAND, some fine to coarse gravel	SP to SP- SM					
				-	22	DO	Air Hammer	0/6
64.01								
210.0		Very dense, brown, fine to coarse SAND, some silt	SP- SM					
65.53				-	23	DO	Air Hammer	8/12
215.0				-	24	DO	Air Hammer	12/12
		Very dense, brown, fine to coarse SAND, trace silt	SP					
68.58				-	25	DO	Air Hammer	6/6
225.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WCB

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

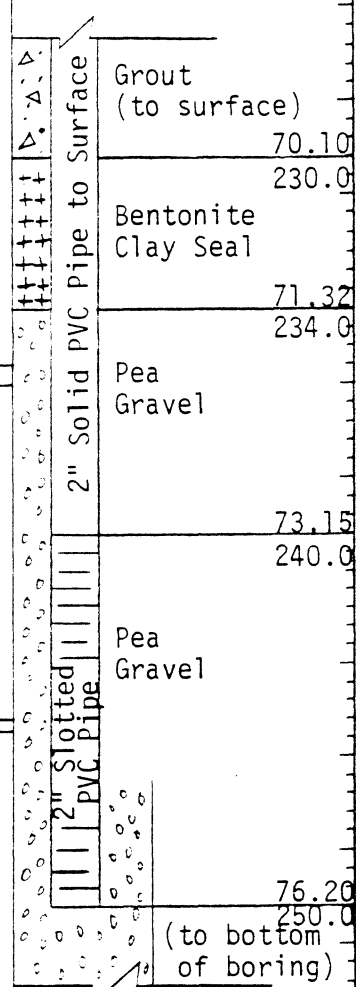
SHEET 7 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
68.58		CONTINUED						
225.0		Very dense, brown, fine to coarse SAND, trace silt	SP					Grout (to surface)
70.10	70.10							
230.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay to silty, fine to coarse SAND, some fine to coarse gravel, trace clay	SM					Bentonite Clay Seal
71.32	71.32							
234.0	234.0							
					26	DO	Air Hammer	6/6
								Pea Gravel
								73.15
								240.0
								Pea Gravel
					27	DO	Air Hammer	4/4
								76.20
								250.0
								(to bottom of boring)
77.72					28	DO	Air Hammer	0/4
255.0		Stiff to hard, brown, SILT, some clay	ML					
79.25	79.25							
260.0		CONTINUED						



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N113415 ft. (N34569m)
E2284420 ft. (E696292m)

BORING LOG G41-G15

SHEET 8 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER BIN. (Note 1)		REC./ATT. (ins.)
79.25		CONTINUED							
260.0		Stiff to hard, brown, SILT, some clay	ML	-	29	DO	Air Hammer	4/4	
82.30									
270.0				Very dense, brown, silty, fine to coarse SAND to stiff to hard, brown, SILT with some fine to coarse sand, weathered green gravel throughout	SM to ML	-	30	DO	Air Hammer
						-	31	DO	Air Hammer
88.39		CONTINUED							
290.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JLB

COOR. N113415 ft. (N34569m)
E2284420 ft (E696292m)

BORING LOG G41-G15

SHEET 9 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
88.39		CONTINUED						
290.0		Very dense, brown, silty, fine to coarse SAND to stiff to hard, brown, SILT with some fine to coarse sand, weathered green gravel throughout	SM to ML					
				32	DO	Air Hammer	0/3	
				33	DO	Air Hammer	2/2	
				34	DO	Air Hammer	2/2	
97.54								
320.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113415 ft. (N34569m)
E2284420 ft (E696292m)

BORING LOG G41-G15

SHEET 10 OF 10

SURFACE ELEV. 1691.5 ft. (515.56m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/2/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
97.54		CONTINUED						
320.0		Very dense, brown, silty, fine to coarse SAND to stiff to hard, brown, SILT with some fine to coarse sand, weathered green gravel throughout	SM to ML					
99.06								
325.0		Green, residual CLAY and weathered metavolcanic TUFF				Drill Cuttings		
103.02								

338.0 END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer.
(All samples)
2. Elevation of top of protector pipe, 1694.2 ft. (516.40m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79	12/3/79	4/25/80	5/20/80	5/26/80*	9/10/80*
DEPTH (m)	30.39	29.60	29.38	29.44	29.44	29.66	30.21
DEPTH (ft.)	99.7	97.1	96.4	96.6	96.6	97.3	99.1

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113480 ft. (N34588m)
E2284390 ft. (E696283m)

BORING LOG G41-G15A

SHEET 1 OF 5

SURFACE ELEV. 1692.8 ft. (515.95m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
0.0		Brown, SAND and GRAVEL, some cobbles and boulders	SP to GP						
1.22									
4.0		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	1	DO	Push	18/18	
				-	2	DO	Push	12/12	
4.57									
15.0		Brown, fine to coarse gravelly, silty, fine to coarse SAND	SM	-	3	DO	Push	12/17	
6.10									
20.0		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	4	DO	Push	12/12	
				-	5	DO	Push	5/6	
9.45									
31.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RCB

COOR. N113480 ft. (N34588m)
E2284390 ft. (E696283m)

BORING LOG G41-G15A

SHEET 2 OF 5

SURFACE ELEV. 1692.8 ft. (515.95m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
9.45		CONTINUED						
31.0		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	6	DO	Push	3/3
11.58				-	7	DO	Push	2/2
38.0		Brown, fine to coarse sandy, fine to coarse GRAVEL, some silt, some clay	GM					
13.11								
43.0								
20.12		Brown to red-brown, fine to coarse SAND, some silt, some to trace fine to coarse gravel, trace clay to brown, fine to coarse GRAVEL and fine to coarse SAND, some silt	SM to GM					
66.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113480 ft. (N34588m)
E2284390 ft. (E696283m)

BORING LOG G41-G15A

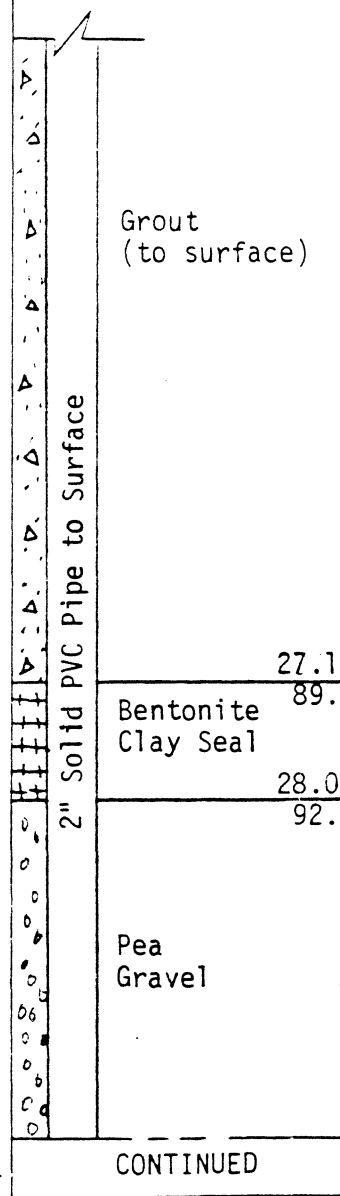
SHEET 3 OF 5

SURFACE ELEV. 1692.8 ft. (515.95m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
20.12		CONTINUED							
66.0		Brown to red-brown, fine to coarse SAND, some silt, some to trace fine to coarse gravel, trace clay to brown, fine to coarse GRAVEL and fine to coarse SAND, some silt	SM to GM					Grout (to surface)	
								27.13	
								89.0	
								28.04	
								92.0	
29.26									
96.0		Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM					Pea Gravel	
30.79									
101.0		CONTINUED						CONTINUED	



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

COOR. N113480 ft. (N34588m)
E2284390 ft. (E696283m)

BORING LOG G41-G15A

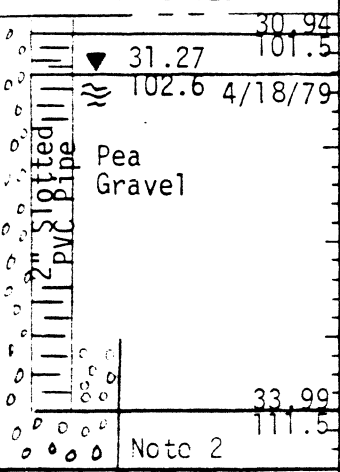
SHEET 4 OF 5

SURFACE ELEV. 1692.8 ft. (515.95m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER BIN. (Note 1)		REC./ ATT. (ins.)
30.79		CONTINUED						CONTINUED	
101.0		Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	8	D0	Air Hammer	18/18	30.94 101.5
				-	9	D0	Air Hammer	18/18	102.6 4/18/79
33.22									
109.0		Red-brown, silty fine to coarse SAND, trace fine to coarse gravel, trace clay	SM						
34.44				-	10	D0	Air Hammer	18/18	Note 2 111.5
113.0		END OF BORING							



NOTES

- Penetration Test - 3" O.D. sampler pushed with drilling rig. (Samples 1 - 7)
Penetration Test - 3" O.D. sampler driven with air hammer. (Samples 8 - 10)
- PERMEABILITY TEST NUMBER 1
Drove 6" casing from 96.0' to 111.5' leaving 2.0' above ground.
Cleaned hole to 111.5' with water.
Blew water out of hole to conduct rising head permeability test.
After 40 minutes, water had risen 1.0' in the hole to 110.5'.
Drove 3" O.D. split tube sampler from 111.5' to 113.0'.
Filled 6" casing with water (2.0' above ground) to conduct falling head test.
After 15 minutes, water level in casing dropped 0.02'. Test terminated.
- Elevation of top of protector pipe, 1695.7 ft. (516.85m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked *FB*

COORD. N113480 ft. (N34588m)
E2284390 ft. (E696283m)

BORING LOG G41-G15A

SHEET 5 OF 5

SURFACE ELEV. 1692.8 ft. (515.95m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/9/79	11/12/79	12/3/79	4/25/80	5/20/80	6/26/80*
DEPTH (m)	31.27	29.81	29.93	29.57	30.11	30.08	30.21
DEPTH (ft.)	102.6	97.8	98.2	97.0	98.8	98.7	99.1

DATE	9/10/80*						
DEPTH (m)	30.85						
DEPTH (ft.)	101.2						

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DAB

COOR. N113440 ft. (N34577m)
E2284385 ft. (E696282m)

BORING LOG G41-G15B

SHEET 1 OF 2

SURFACE ELEV. 1692.1 ft. (515.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/13/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Casing and Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
								4/17/79 31.27	
								102.6	
								GROUT (to surface) 43.59	
								Bentonite Clay Seal 143.0	
								44.50	
								146.0	
		See borings G41-G15 and G41-G15A for soil stratigraphy							
		Boulder encountered in this hole at 147'							
								48.16	
								158.0	
48.77								Pea Gravel	
160.0								2" Slotted PVC Pipe	
		Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt	GP- GM		-	1	00	Air Hammer	18/18
					-	2	00	Air Hammer	18/18
51.82								51.21	
								168.0	
								51.82	
170.0		END OF BORING						170.0	

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)
2. Mud Rotary to 141.0'. Advanced 6" casing to 147.0' and encountered boulder. Drilled past boulder but could not advance casing.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked 203

COOR. N113440 ft. (N34577m)
E2284385 ft. (E696282m)

BORING LOG G41-G15B

SHEET 2 OF 2

SURFACE ELEV. 1692.1 ft. (515.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/13/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Casing and Mud Rotary

NOTES (continued)

3. Elevation of top of protector pipe, 1694.7 ft. (516.55m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/17/79	11/9/79	11/12/79	12/3/79	4/25/80	5/20/80	6/26/80*
DEPTH (m)	31.27	29.69	30.02	29.60	29.96	29.93	29.93
DEPTH (ft.)	102.6	97.4	98.5	97.1	98.3	98.2	98.2

DATE	9/10/80*						
DEPTH (m)	30.54						
DEPTH (ft.)	100.2						

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DAB

COOR. N113440 ft. (N34577m)
E2284405 ft. (E696289m)

BORING LOG G41-G15C

SHEET 1 OF 2

SURFACE ELEV. 1692.0 ft. (515.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

1. Boring drilled specifically for performing in situ permeability tests.
2. See log of borings G41-G15 and G41-G15A for description of subsurface materials.
3. All permeability tests were falling head tests with water level at top of casing at beginning of test.
4. All holes fully grouted at completion.

TEST NUMBER 1

Advanced hole to 15.0' with 6" bit using air and water.
Drove 4" casing from 15.0' to 20.0', leaving top of casing 1.0' above ground.
Cleaned hole to 21.0' (1.0' below casing) with air and water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	1.5	10.0	4.5
0.50	2.0	15.0	5.5
1.0	2.2	20.0	6.5
2.0	2.4	25.0	7.5
5.0	3.2		

Lost casing shoe in hole when pulling casing. Abandoned hole and moved 5' east to start new hole.

TEST NUMBER 2

Advanced hole to 35.0' with 6" bit using air and water.
Drove 4" casing from 35.0' to 41.0', leaving top of casing 1.0' above ground.
Cleaned hole to 42.0' (1.0' below casing) with air and water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.08	10.0	1.25
0.50	0.17	15.0	1.92
1.0	0.21	20.0	2.50
2.0	0.33	14.0 hrs.	38.17
5.0	0.67		

TEST NUMBER 3

Advanced hole to 58.0' with 6" bit using air and water.
Drove 4" casing from 58.0' to 62.0'.
Bit broke inside casing while cleaning hole to 63.0'.
Could not extract casing.
Abandoned hole, leaving casing in ground.
Moved 10' south to start new hole (coordinates as given on log heading).
Advanced new hole to 55.0' with 6" bit using air and water.
Drove 4" casing from 55.0' to 61.5', leaving top of casing 1.5' above ground.
Cleaned hole to 62.5' (1.0' below casing) with water.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked ACB

COOR. N113440 ft. (N34577m)
E2284405 ft. (E696289m)

BORING LOG G41-G15C

SHEET 2 OF 2

SURFACE ELEV. 1692.0 ft. (515.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	3.5	20.0	52.2
0.50	10.0	25.0	55.1
1.0	15.0	30.0	57.4
2.0	21.5	35.0	59.0
5.0	31.9	40.0	60.0
10.0	42.5	45.0	61.0
15.0	48.2	50.0	61.7

TEST NUMBER 4

Advanced hole to 78.0' with 6" bit using air and water.
Drove 4" casing from 78.0 to 82.0', leaving top of casing 2.0' above ground.
Cleaned hole to 83.0' (1.0' below casing) with water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
1.0	0.08	15.0	0.33
2.0	0.08	15.0 hrs.	31.0
5.0	0.25		

TEST NUMBER 5

Advanced hole to 140' using 6" bit and Revert mud.
Drove 4" casing from 140.0' to 145.0', leaving top of casing 2.0' above ground.
Cleaned hole to 146.0' (1.0' below casing) with water.

Time (min.)	Drop (ft.)	* Time (min.)	Drop (ft.)
0.25	0.04	10.0	1.58
0.50	0.13	15.0	2.00
1.0	0.25	20.0	2.50
2.0	0.50	14.33 hrs.	10.00
5.0	1.08		

Could not extract casing. Abandoned hole, leaving casing in ground.

Job No. 786085
Scale _____

Golder Associates

Drawn ils
Checked JCB

COOR. N112790 ft. (N34378m)
E2284390 ft. (E696284m)

BORING LOG G41-G16

SHEET 1 OF 3

SURFACE ELEV. 1685.7 ft. (513.8m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/26/79 DATE COMPLETED 2/26/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
0.0		Dense to very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM						
				35	1	DO	15-17-18	16/18	
				44	2	DO	18-24-20	14/18	
				38	3	DO	17-15-23	12/18	
				105 6"	4	DO	105/6"	4/6	
				119 9"	5	DO	69-50/3"	7/9	
				205 6"	6	DO	205/6"	6/6	
		200 4"	7	DO	200/4"	4/4			
9.91 32.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JIS
Checked [Signature]

COOR. N112790 ft. (N34378m)
E2284390 ft. (E696284m)

BORING LOG G41-G16

SHEET 2 OF 3

SURFACE ELEV. 1685.7 ft. (513.8m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/26/79 DATE COMPLETED 2/26/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
9.91		CONTINUED							
32.5		Dense to very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	200					
10.67				4"	8	DO	200/4"	4/4	
35.0									
				200					
				3"	9	DO	200/3"	0/3	
		Very dense, brown to brown and gray, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	300					
				3"	10	DO	300/3"	2/3	
				250					
				5"	11	DO	250/5"	4/5	
				195					
				6"	12	DO	195/6"	5/6	
17.07									
56.0									
				SP	200				
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SM to SM	3"	13	DO	200/3"	0/3	
19.35									
63.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JOB

COOR. N112790 ft. (N34378m)
E2284390 ft. (E696284m)

BORING LOG G41-G16

SHEET 3 OF 3

SURFACE ELEV. 1685.7 ft. (513.8m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/26/79 DATE COMPLETED 2/26/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
19.35 63.5		CONTINUED						
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP-SM to SM	200 9"	14	DO	121-79/3"	7/9
				200 5"	15	DO	200/5"	4/5
22.98 75.4				200 4"	16	DO	200/4"	0/4

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked TCB

COOR. N110880 ft. (N33797m)
E2284280 ft. (E696250m)

BORING LOG G41-G19

SHEET 1 OF 3

SURFACE ELEV. 1696.6 ft. (517.11m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/9/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)		
0.0		Compact, brown, silty, fine to medium SAND to fine to medium SAND, some silt, organic fibers throughout, boulders on ground surface	SM	-	1	AS	-	-		
1.22										
4.0		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, some silt	GP-GM	54	2	DO	10-29-25	10/18		
2.13										
7.0		Loose to compact, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	10	3	DO	3-3-7	8/18		
3.96										
13.0										
		Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM	18	5	DO	8-9-9	10/18		
				113	6	DO	20-93	12/12		
				140	7	DO	40-100	10/12		
				154	8	DO	54-100/5"	10/11		
10.06		Very dense, brown to red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM							
33.0										
11.28				80	9	DO	24-32-48	16/18		
37.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

COOR. N110880 ft. (N33797m)
E2284280 ft. (E696250m)

BORING LOG G41-G19

SHEET 2 OF 3

SURFACE ELEV. 1696.6 ft. (517.11m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/9/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
11.28		CONTINUED						
37.0		Very dense, brown to red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	135 10'	10	DO	35-100/4"	10/10
				140	11	DO	39-101	10/12
14.63				136 6"	12	DO	136/6"	6/6
48.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace to some silt, trace clay	SP- SM to SM	169 6"	13	DO	169/6"	3/6
				130 3"	14	DO	130/3"	0/3
				111 6"	15	DO	111/6"	3/6
20.42		CONTINUED						
67.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

COOR. N110880 ft. (N33797m)
E2284280 ft. (E696250m)

BORING LOG G41-G19

SHEET 3 OF 3

SURFACE ELEV. 1696.6 ft. (517.11m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/9/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)		
20.42 67.0		CONTINUED							
		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace to some silt, trace clay	SP SM to SM	166 9"	16	DO	66-100/3"	5/9	
				150 1"	17	DO	150/1"	0/1	
23.47									
77.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	191 6"	18	DO	191/6"	2/6	
				150 4"	19	DO	150/4"	2/4	
				120 6"	20	DO	120/6"	/6	

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 2 - 20)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N109495 ft. (N33375m)
E2284265 ft. (E696246m)

BORING LOG G41-G21

SHEET 1 OF 4

SURFACE ELEV. 1664.8 ft. (507.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/5/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)	
0.0		Brown, fine to coarse SAND, some fine gravel, some silt	SM	-	1	AS	-	-		
1.52		Compact to very dense, brown, fine to coarse sandy, fine to coarse GRAVEL, some silt to fine to coarse gravelly, fine to coarse SAND, some silt, frequent cobbles and boulders	GM to SM	14	2	DO	3-6-8	18/18		
5.0										
						14	3	DO	7-7-7	12/18
						$\frac{122}{8''}$	4	DO	60-60-60/2'	8/14
						$\frac{138}{7''}$				
							5	DO	36-88-50/1'	10/13
						$\frac{150}{5.5''}$	6	DO	150/5.5"	$\frac{5.5}{5.5}$
						$\frac{125}{5''}$	7	DO	125/5"	4/5
9.91		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM	$\frac{110}{6''}$	8	DO	110/6"	5/6		
32.5										
11.13		CONTINUED								
36.5										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MRB

COOR. N109495 ft. (N33375m)
E2284265 ft. (E696246m)

BORING LOG G41-G21

SHEET 2 OF 4

SURFACE ELEV. 1664.8 ft. (507.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/5/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)
11.13		CONTINUED							
36.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM	125 5"	9	D0	125/5"	5/5	2" Solid PVC Pipe to Surface
		Boulder noted at 41.0'-42.2' and 47.0'-48.5'		150 4.5"	10	D0	150/4.5"	0/4.5	
14.8		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP	100 6"	11	D0	100/6"	5/6	
48.5				120 8"	12	D0	80-40/2"	6/8	
16.00		Very dense, brown, silty, fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, some silt	SM	125 5"	13	D0	125/5"	4/5	Bentonite Clay Seal
52.5		Boulder noted at 56.0'-59.5'		182 8"	14	D0	82-100/2"	6/8	
17.37								57.0	Pea Gravel
								20.42	
21.03		CONTINUED						67.0	CONTINUED
69.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N109495 ft. (N33375m)
E2284265 ft. (E696246m)

BORING LOG G41-G21

SHEET 3 OF 4

SURFACE ELEV. 1664.8 ft. (507.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/3/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)	
21.03 69.0		CONTINUED						CONTINUED		
		Very dense, brown, silty, fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, some silt	SM	200 6"	15	DO	200/6"	5/6		
				127 5"	16	DO	127/5"	1/5		
					100 4.5"	17	DO	100/4.5"		4/4.5
25.15 82.5		Very dense, brown, fine to medium SAND, trace silt	SP- SM	190 9"	18	DO	90-100/3"	6/9		
26.67 87.5		Very dense, brown, silty, fine to coarse SAND, trace fine to coarse gravel, to fine to coarse SAND, some fine to coarse gravel, some silt		90 9"	19	DO	40-50/3"	7/9	27.43	
				SM	190 8"	20	DO	90-100/2"	7/8	90.0
					100 5"	21	DO	100/5"	5/5	30.18
30.63 100.5		END OF BORING							Gravel 99.0	

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 21)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn Jls
Checked MRB

COOR. N109495 ft. (N33375m)
E2284265 ft. (E696246m)

BORING LOG G41-G21

SHEET 4 OF 4

SURFACE ELEV. 1664.8 ft. (507.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/5/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

NOTES (continued)

- 2. Elevation of top of protector pipe, 1666.9 ft. (508.07m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	1/2/80	4/25/80	6/28/80	7/9/80	7/17/80	8/2/80	8/9/80
DEPTH (m)	22.31	21.92	22.43	22.56	22.62	22.62	22.68
DEPTH (ft.)	73.2	71.9	73.6	74.0	74.2	74.2	74.4

DATE	8/16/80	8/23/80	9/2/80				
DEPTH (m)	22.71	22.71	22.71				
DEPTH (ft.)	74.5	74.5	74.5				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DAB

COOR. N117330 ft. (N35762m)
 E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 1 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
0.0		Compact to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM	-	1	DO	Hydraulic Push 12/24			
						-	2	DO	Hydraulic Push 12/24	
						-	3	DO	Air Hammer 18/18	
7.92 26.0		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt to fine to coarse gravelly fine to coarse SAND, trace silt	SP-SM							
						-	4	DO	Air Hammer 18/18	
10.4 34.0		CONTINUED								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 2 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
10.4		CONTINUED							
34.0		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt to fine to coarse gravelly fine to coarse SAND, trace silt	SP- SM	-	5	DO	Air Hammer	12/12	
						-	6	DO	Air Hammer
16.76		Very dense, brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles	SM						
55.0						-	7	DO	Air Hammer
20.3		CONTINUED							
66.5									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 3 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
20.3 66.5		CONTINUED							
		Very dense, brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles	SM						
				-	8	DO	Air Hammer	21/21	
25.91 85.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, trace silt	GP						
				-	9	DO	Air Hammer	24/24	
28.96 95.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP to SM						
				-	10	DO	Air Hammer	12/12	
30.18 99.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N117330 ft. (N35762m)
 E2285000 ft. (E696469m)
 SURFACE ELEV. 1702.0 ft. (518.78m)

BORING LOG G41-H9

SHEET 5 OF 10

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
40.08		CONTINUED						
131.5		Very dense, gray-brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, frequent cobbles and occasional boulders	SM	-	15	DO	Air Hammer	6/18
				-	16	DO	Air Hammer	15/15
				-	17	DO	Air Hammer	7/7
50.75								
166.5		CONTINUED						

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

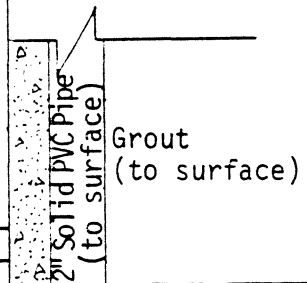
COOR. N117330 ft. (N35762m)
 E2285000 ft. (E696469m)
 SURFACE ELEV. 1702.0 ft. (518.78m)

BORING LOG G41-H9

SHEET 6 OF 10

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81
 DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
50.75 166.5		CONTINUED							
		Very dense, gray-brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, frequent cobbles and occasional boulders	SM	-	18	DO	Air Hammer	6/6	
				-	19	DO	Air Hammer	12/12	
				-	20	DO	Air Hammer	12/12	
59.42 195.0		Very dense, orange-brown, fine to medium SAND, trace silt	SP-SM						
				-	21	DO	Air Hammer	9/9	
61.42 201.5		CONTINUED							



Job No. 736085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N117330 ft. (N35762m)
 E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 7 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
61.42 201.5		CONTINUED						CONTINUED	
62.48 205.0		Very dense, orange-brown, fine to medium SAND, trace silt	SP- SM					Grout	
65.53 215.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM					63.03 207.0 Bentonite Clay Seal 64.01 210.0	
					-	22	DO Air Hammer	11/11	2" Solid PVC Pipe
									Pea Gravel
					-	23	DO Air Hammer	18/18	
									2" Slotted PVC Pipe
									Pea Gravel (to bottom of boring)
					-	24	DO Air Hammer	18/18	
72.09 236.5		Very dense, brown to red- brown, fine to coarse SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP					70.10 230.0	
		CONTINUED						CONTINUED	

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N117330 ft. (N35762m)
 E2285000 ft. (E696469m)
 SURFACE ELEV. 1702.0 ft. (518.78m)

BORING LOG G41-H9

SHEET 8 OF 10

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
72.09 236.5		CONTINUED						CONTINUED	
		Very dense, brown to red-brown, fine to coarse SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP					<p>Pea Gravel 73.15 240.0 Pea Gravel (to bottom of boring)</p>	
				-	25	DO	Air Hammer		18/18
74.67 245.0		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt	SP-SM						
				-	26	DO	Air Hammer	18/18	
80.77 265.0		Very dense to hard, dark brown to red-brown, fine sandy SILT, trace clay to silty fine SAND (very poorly graded, some stratification evident)	SM to ML						
				-	27	DO	Air Hammer	18/18	
82.75 271.5									
		CONTINUED							

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 9 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
82.75 271.5		CONTINUED							
		Very dense to hard, dark brown to red-brown, fine sandy SILT, trace clay to silty fine SAND (very poorly graded, some stratification evident)	SM to ML						
				-	29	DO	Air Hammer	18/18	
89.92 295.0		Very dense, brown, fine to coarse gravelly fine to coarse SAND, some silt	SM						
				-	30	DO	Air Hammer	18/18	
92.66 304.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)

BORING LOG G41-H9

SHEET 10 OF 10

SURFACE ELEV. 1702.0 ft. (518.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/14/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ ATT.	
92.66		CONTINUED						
304.0		Very dense, brown, fine to coarse gravelly fine to coarse SAND, some silt	SM					
94.64								
310.5		Weathered to sound, green, metavolcanic TUFF		1	32	Cuttings		
96.01								
315.0		END OF BORING						

NOTES

- Elevation of top of protector pipe, 1704.8 ft. (519.63m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	5/26/81	6/10/81					
DEPTH (m)	33.69	33.67					
DEPTH (ft.)	110.5	110.5					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N114700 ft. (N34960m)
E2284975 ft. (E696462m)

BORING LOG G41-H13

SHEET 1 OF 4

SURFACE ELEV. 1715.2 ft. (522.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/7/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)		
0.24 0.3		Topsoil and rootmat		15	1	DO	6-11-4	10/18	
		Compact, brown to dark brown, silty, fine to coarse SAND, some fine to coarse gravel, trace organic matter	SM	27	2	DO	10-13-14	12/18	
				15	3	DO	6-7-8	2/18	
3.81 12.5				Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt Cobbles noted at 27.0'-28.0'	SP SM to SM	99	4	DO	25-65-34
		172	5			DO	65-84-88	14/18	
		110	6			DO	55-55	12/12	
8.38 27.5		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay	SM			160	8		
				7	DO	110-50/2"	8/8		
9.60 31.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked RLB

COOR. N114700 ft. (N34960m)
E2284975 ft. (E696462m)

BORING LOG G41-H13

SHEET 2 OF 4

SURFACE ELEV. 1715.2 ft. (522.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/7/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
9.60		CONTINUED							
31.5		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay Cobbles noted at 32.0'-32.5', 34.0'-34.4' and 38.0'-38.5'	SM	135 6"	8	DO	135/6"	5/6	
				200 9"	9	DO	135-65/3"	8/9	
12.95		Very dense, red-brown to brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel Cobble and boulders noted at 46.5'-47.0' and 48.0'-54.0'	SM	149 8"	10	DO	105-44/2"	7/8	
42.5				155 8"	11	DO	105-50/2"	6/8	
16.00		Very dense, brown to red-brown and gray, silty, fine to coarse SAND, some fine to coarse gravel	SM	200 5.5"	12	DO	200/5.5"	4.5 5.5	
52.5									
16.76		Very dense, light brown to red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, frequent cobbles and boulders	SP-SM to SM	150 0"	13	DO	150/0"	0/0	
55.0									
18.29									
60.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCS

COOR. N114700 ft. (N34960m)
E2284975 ft. (E696462m)

BORING LOG G41-H13

SHEET 3 OF 4

SURFACE ELEV. 1715.2 ft. (522.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
18.29		CONTINUED							
60.0		Very dense, light brown to red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, frequent cobbles and boulders	SP-SM to SM	150	14	DO	150/0"	0/0	
				140	15	DO	85-95-55/2"	11/14	
				140	16	DO	90-50/3"	7/9	
				210	17	DO	120-90/3"	6/9	
				185	18	DO	185/5"	4/5	
26.67		Very dense, brown fine to coarse SAND and fine to coarse GRAVEL, some silt to fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	GM to SM	150	19	DO	150/4"	3/4	
87.5									
28.19									
92.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COORD. N114700 ft. (N34960m)
E2284975 ft. (E696462m)

BORING LOG G41-H13

SHEET 4 OF 4

SURFACE ELEV. 1715.2 ft. (522.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/9/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
28.19 92.0		CONTINUED							
		Very dense, brown fine to coarse SAND and fine to coarse GRAVEL, some silt to fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	GM	167 10"					
				20	DO	62-105/4"	9/10		
				174 10"	21	DO	45-50-124/4"	9/16	
				158 10"					
31.94 104.8					22	DO	58-100/4"	8/10	

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1 - 6)
- Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 30". (Samples 7 - 22)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked [Signature]

COOR. N112145 ft. (N34181m)
E2284960 ft. (E696456m)

BORING LOG G41-H17

SHEET 1 OF 3

SURFACE ELEV. 1684.5 ft. (513.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/28/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL (Note 2)			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)		
0.0		Loose to compact, brown, fine to coarse gravelly, fine to coarse SAND, trace silt, occasional cobbles	SP	6	1	D0	3-3-3	14/18	Grout		
				12	2	D0	3-4-8	16/18			
				15	3	D0	9-9-6	18/18			
				15	4	D0	5-6-9	14/18			
5.79								5.18	2" Solid PVC Pipe		
19.0		Very dense, brown, fine to coarse SAND, some silt, trace gravel	SM	56	5	D0	18-16-40	18/18		17.0	
6.86										6.10	
22.5		Compact to very dense, fine to coarse sandy, fine to coarse GRAVEL, trace silt Boulder noted at 36.0'-37.0'	GP	122	6	D0	20-64-58	16/18	20.0	2" Slotted PVC Pipe	
9.91											6.86
32.5						19	7	D0	8-8-11		0/18
		CONTINUED							9.91		
									32.5	CONTINUED	

Job No. 7S6085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCS

COOR. N112145 ft. (N34181m)
E2284960 ft. (E696456m)

BORING LOG G41-H17

SHEET 2 OF 3

SURFACE ELEV. 1684.5 ft. (513.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/28/78

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ATT. (ins.)		
9.91 32.5		CONTINUED							CONTINUED	
		Compact to very dense, fine to coarse sandy, fine to coarse GRAVEL, trace silt Boulder noted at 36.0'-37.0'	GP	92	8	DO	10-17-75	2	0/14	10.06 ++++ Bentonite 33.0 ++++ Clay Seal 10.67 ++++ 35.0
				70	9	DO	48-35-35		9/18	Grout (to bottom of boring)
11.28 37.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, frequent cobbles and boulders	SM	127	10	DO	27-100		5/12	
				150	11	DO	150/5"		2/5	
				150	12	DO	150/4"		4/4	
				147	13	DO	147/6"		4/6	
17.37 57.0		Very dense, brown, silty, fine to coarse SAND, occasional cobbles	SM	125	14	DO	125/6"		3/6	
				138	15	DO	138/6"		4/6	
20.12 66.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WOB

COOR. N112145 ft. (N34181m).
E2284960 ft. (E696456m)

BORING LOG G41-H17

SHEET 3 OF 3

SURFACE ELEV. 1684.5 ft. (513.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 2/28/79

DRILL RIG CME 75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) (ins.)	
20.12 66.0		CONTINUED						
		Very dense, brown, silty, fine to coarse SAND, occasional cobbles	SM	162 7 1/2"	16	DO	112- 50 1 1/2"	6/7 1/2
		Boulder noted at 71.5'-73.0'						
22.25 73.0				150				
22.65 74.3		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP	3"	17	DO	150/3"	3/3

END OF BORING

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 24". (All samples)
2. Elevation of top of protector pipe, 1687.0 ft. (514.20m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	3/20/79	11/12/79	7/17/80	9/10/80			
DEPTH (m)	DRY	DRY	DRY	DRY			
DEPTH (ft.)	DRY	DRY	DRY	DRY			

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked RB

COOR. N111430 ft. (N33963m)
E2285125 ft. (E696507m)

BORING LOG G41-H12

SHEET 1 OF 3

SURFACE ELEV. 1684.3 ft. (513.37m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL (Note 3)			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC/ATT. (ins.)		
0.15		topsoil and rootmat									
0.5		Compact to dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt	SM	47	1	DO	18-26-21	4/18	Grout 2" Solid PVC Pipe Bentonite Clay Seal Pea Gravel Pea Gravel Pea Gravel		
				30	2	DO	15-14-16	8/18			
				23	3	DO	28-16-7	12/18			
				35	4	DO	16-19-16	7/18			
				42	5	DO	16-19-23	9/18			
7.01				Dense to very dense, brown, fine to medium sandy, fine to coarse GRAVEL, trace silt	GP	183	6	DO		71-112	4/12
23.0											
10.06		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP	38	7	DO	30-22-16	6/18	Bent. Clay Seal		
33.0											
10.67											
35.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111430 ft. (N33963m)
E2285125 ft. (E696507m)

BORING LOG G41-H18

SHEET 2 OF 3

SURFACE ELEV. 1684.3 ft. (513.37m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
10.67		CONTINUED							
35.0 11.13		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP	65	8	DO	20-38-27	4/18	
36.5	150			9	DO	37-113	8/12		
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP	156	10	DO	56-100	6/12	
				100 3"	11	DO	100/3"	3/3	
				100 3"	12	DO	100/3"	3/3	
17.68 58.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	100 3"	13	DO	100/3"	3/3	
				200 6"	14	DO	200/6"	6/6	
20.73 68.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111430 ft. (N33963m)
E2285125 ft. (E696507m)

BORING LOG G41-H18

SHEET 3 OF 3

SURFACE ELEV. 1684.3 ft. (513.37m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
20.73		CONTINUED							
68.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	200					
				9"					
				15	DO	100-100/3"	9/9		
22.95				100					
75.3				4"	16	DO	100/4"	4/4	

END OF BORING

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
- First borehole was abandoned and grouted after 3.5' of drill rod and a tricone drill bit were lost at 55' depth. The abandoned borehole is within 5 ft. of G41-H18.
- Elevation of top of protector pipe, 1686.4 ft. (514.03m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	3/20/79	11/12/79	9/10/80				
DEPTH (m)	DRY	DRY	DRY				
DEPTH (ft.)	DRY	DRY	DRY				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N111590 ft. (N34013m)
E2285065 ft. (E696488m)

BORING LOG G41-H18A

SHEET 1 OF 1

SURFACE ELEV. 1680.4 ft. (512.18m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/30/79 DATE COMPLETED 3/30/79

DRILL RIG CME 45 DRILLING METHOD Wash Boring

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL (Note 2)
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
0.0		Very loose, brown to black, highly organic, fibrous PEAT (heavily rooted)	PT	-	1a	AS	-	-	Bentonite Clay Seal 0.30 9/10/80 1.0 0.41 1.0 Caved Material 2" Solid PVC Pipe 4.27 Bentonite Clay Seal 14.0 4.88 Pea Gravel 16.0 5.18 17.0 Pea Gravel 6.10 20.0 Caved Material
3.96				2	1b	DO	0-1-1.	0/18	
13.0		Compact, gray, fine to medium SAND and SILT, trace clay, some organic matter to 13.5'	SM	13	2	DO	8-8-5	3/18	
5.09		Compact, gray, fine to coarse SAND and SILT, some fine gravel, trace clay	SM	21	3	DO	10-11-10	10/18	2" Slotted 17.0 Pea Gravel
16.7									
19.0		Compact, light brown, medium to coarse SAND and fine to medium GRAVEL, to fine to coarse gravelly, fine to coarse SAND, trace silt	SP	15	4	DO	11-7-8	15/18	
6.55									
21.5									

END OF BORING

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1b - 4)
- Groundwater observation well inaccessible due to water on the ground surface, 4/18/79.
- Elevation of top of protector pipe, 1684.5 ft. (513.42m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	DEPTH (m)	DEPTH (ft.)				
9/10/80	0.41	1.35				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked RB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 1 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
0.0		Compact to dense, brown, fine to coarse SAND, some fine gravel, some silt, to fine to coarse gravelly fine to coarse SAND, some silt	SM	-	1	DO	Air Hammer 24/24			
						-	2	DO	Air Hammer 24/24	
						-	3	DO	Air Hammer 24/24	
7.32 24.0		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 2 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
7.32 24.0		CONTINUED							
		Compact to dense, brown, fine to coarse SAND, some fine gravel, some silt, to fine to coarse gravelly fine to coarse SAND, some silt	SM						
				-	4	DO	Air Hammer	24/24	
10.67 35.0		Compact to dense, light brown, fine to medium SAND, trace silt to fine to coarse SAND and fine to coarse GRAVEL	SP						
				-	5	DO	Air Hammer	12/24	
				-	6	DO	Air Hammer	18/24	
16.76 55.0		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM						
17.98 59.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 3 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
17.98 59.0		CONTINUED						
		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM		-	7 DO	Air Hammer	18/24
					-	8 DO	Air Hammer	24/24
					-	9 DO	Air Hammer	24/24
					-	10 DO	Air Hammer	20/24
28.65 94.0		CONTINUED						▼ 6/10/81 28.59 ≈ 93.8

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

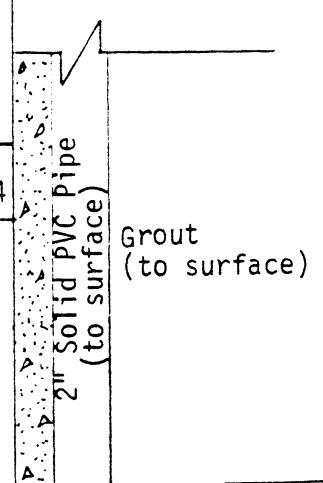
SHEET 4 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
28.65 94.0		CONTINUED						
		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, and fine to coarse GRAVEL, some silt, trace clay	SM					
				-	11	DO	Air Hammer	24/24
32.00 105.0		Very dense, light brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP					
				-	12	DO	Air Hammer	24/24
35.05 115.0		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some fine to coarse gravel, some silt, some stratification in this layer	SM					
				-	13	DO	Air Hammer	24/24
39.32 129.0		CONTINUED						



COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 5 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
39.32		CONTINUED						CONTINUED	
129.0		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some fine to coarse gravel, some silt, some stratification in this layer	SM	-	14	DO	Air Hammer 24/24	<p>2" Solid PVC Pipe Grout (to surface) 41.76 137.0 Bentonite Clay Seal 42.67 140.0</p>	
44.20				-	15	DO	Air Hammer 24/24		Pea Gravel
145.0				Very dense, brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse sand, trace silt	SP	-	16		DO
49.99		-	17			DO	Air Hammer 24/24	Pea Gravel (to bottom of boring) 47.85 157.0	
164.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 6 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.		
49.99 164.0		CONTINUED							
		Very dense, brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse sand, trace silt	SP	-	18	DO	Air Hammer	24/24	
56.39 185.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM						
57.61 189.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 7 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 5/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.		
57.61 189.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	-	20	DO	Air Hammer	24/24		
59.44 195.0										
62.48 205.0		Very dense, brown, fine to medium SAND, trace silt	SP	-	21	DO	Air Hammer	18/18		
62.48 205.0										
62.48 205.0		Very dense, brown to dark brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay, some stratification evident in this layer	SM	-	22	DO	Air Hammer	18/18		
62.48 205.0										
62.48 205.0						-	23	DO	Air Hammer	15/18
68.28 224.0		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 8 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
68.28		CONTINUED								
224.0		Very dense, brown to dark brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay, some stratification evident in this layer	SM							
				-	24	D0	Air Hammer	6/12		
				-	25	D0	Air Hammer	12/12		
76.66										
251.5		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 9 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ ATT.		
76.66		CONTINUED							
251.5		Very dense, brown to dark brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay, some stratification evident in this layer	SM						
78.94		Very dense, dark brown, SILT, trace fine sand, trace clay	ML						
259.0				-	27	DO	Air Hammer	12/12	
				-	28	DO	Air Hammer	18/18	
84.28		CONTINUED							
276.5									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111455 ft. (N33957m)
E2285099 ft. (E696270m)

BORING LOG G41-H18B

SHEET 10 OF 10

SURFACE ELEV. 1683.8 ft. (513.1m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/27/81 DATE COMPLETED 6/3/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ ATT.	
84.28		CONTINUED						
276.5		Very dense, dark brown, SILT, trace fine sand, trace clay	ML					
85.34								
280.0		Weathered, green and red, metavolcanic TUFF						
86.26								
283.0		Sound, green, metavolcanic TUFF		-	29	RC	Rotary	13/60
87.78								
288.0								

END OF BORING

NOTES

- End of top of protector pipe, 1687.2 ft. (514.26m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	DEPTH (m)	DEPTH (ft.)					
6/10/81	28.59	93.8					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRE

COOR. N116010 ft. (N35360m)
E2285580 ft. (E696646m)

BORING LOG G41-J11

SHEET 1 OF 3

SURFACE ELEV. 1709.0 ft. (520.89m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	SAMPLES					REMARKS
				BLOWS / FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
0.15 0.5		Firm, dark brown SILT, some fine sand, trace organic matter (topsoil)	MI	5	1	DO	1-2-3	7/8	
				18	2	DO	5-9-9	18/18	
				11	3	DO	4-5-6	18/18	
		Compact to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP- SM to SM	39	4	DO	11-20-19	18/18	
		Occasional cobbles noted at 24.0'-29.0'		159	5	DO	15-75-84	18/18	
				155 8'	6	DO	55-100/2"	8/8	
				120 5'	7	DO	120/5"	5/5	
9.75 32.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N116010 ft. (N35360m)
E2285580 ft. (E696646m)

BORING LOG G41-111

SHEET 2 OF 3

SURFACE ELEV. 1709.0 ft. (520.89m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
9.75 32.0		CONTINUED							
		Compact to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP- SM	100 to 4"	8	DO	100/4"	4/4	
		Occasional cobbles noted at 36.0-39.0'	SM						
				150 to 5"	10	DO	150/5"	5/5	
12.95 42.5		Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt	GM to SM	120 to 7"	11	DO	120/0"	0/0	
		Occasional cobbles noted at 46.0'-49.0'							
		Scattered boulders noted at 49.0'-54.0' and 56.0'-57.0'							
				150 to 6"	13	DO	150/6"	6/6	
18.59 61.0		Very dense, brown to gray-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP- SM	200 to 2"	14	DO	200/2"	0.5/2	
19.96 65.5		CONTINUED							

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

COOR. N116010 ft. (N35360m)
E2285580 ft. (E696646m)

BORING LOG G41-J11

SHEET 3 OF 3

SURFACE ELEV. 1709.0 ft. (520.89m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/7/79 DATE COMPLETED 3/9/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
19.96		CONTINUED							
65.5		Very dense, brown to gray-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt Cobbles and boulders noted at: 64.5'-69.0' 69.0'-72.0' 75.0'-78.0' 91.0'-96.0'		150	15	DO	150/1"	0/1	
				200	16	DO	200/3.5"	1.0/3.5	
			SP. SM to SM	150	17	DO	150/4"	0/4	
				150	18	DO	105-145/2"	2/8	
				150	19	DO	150/5"	3/5	
				150	20	DO	150/4"	0/4	
				200	21	DO	150-50/1"	3/7	
30.39									

NOTES

1. Penetration Test Driving 3" O.D. sampler with 300 lb. hammer freely falling 30". (All samples)

END OF BORING
HOLE GROUTED AT COMPLETION

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked zcb

COORD. N114110 ft. (N34781m)
E2285890 ft. (E696741m)

BORING LOG G41-J14

SHEET 1 OF 3

SURFACE ELEV. 1689.2 ft. (514.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 3/1/79

DRILL RIG Mobile B61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
0.15 0.5		topsoil and rootmat							
		Compact to dense, red-brown, fine to medium SAND, trace to some gravel, trace to some silt, occasional cobbles	SP- SM to SM	29	1	DO	9-14-15	14/18	
				79	2	DO	17-14-65	12/18	
				32	3	DO	14-11-21	16/18	
				28	4	DO	11-17	0/12	
5.33 17.5		Very dense, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace to some silt	SP SM to SM	180	5	DO	80-100	12/12	
				183 10"	6	DO	35-83-100 4"	16/16	
8.38 27.5		Very dense, red-brown, fine to medium SAND, trace to some gravel, trace to some silt	SP SM to SM	150 4"	7	DO	150/4"	3/4	
				200 6"	8	DO	200/6"	6/6	
11.13 36.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

COOR. N114110 ft. (N34781m)
E2285890 ft. (E696741m)

BORING LOG G41-J14

SHEET 2 OF 3

SURFACE ELEV. 1689.2 ft. (514.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 3/1/79

DRILL RIG Mobile B61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAI. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC/ATT. (ins.)	
11.13 36.5		CONTINUED						
		Very dense, red-brown, fine to medium SAND, trace to some gravel, trace to some silt Boulder noted at 39.0'-40.0'	SP-SM	200				
			to	4"	9	DO	200/4"	2/4
			SM					
				200				
13.72 45.0				3"	10	DO	200/3"	1/3
		Very dense, red-brown, fine to medium SAND, trace to some silt, trace to some gravel Cobble noted at 58.5'-59.2'	SP-SM	200				
			to	4"	12	DO	200/4"	4/4
			SM					
				200				
				1"	13	DO	200/1"	0/1
			200					
			4"	14	DO	200/4"	3/4	
			200					
			3"	15	DO	200/3"	3/3	
21.79 71.5		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RS

COOR. N114110 ft. (N34781m)
E2285890 ft. (E696741m)

BORING LOG G41-J14

SHEET 3 OF 3

SURFACE ELEV. 1689.2 ft. (514.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/27/79 DATE COMPLETED 3/1/79

DRILL RIG Mobile B61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC/ATT. (ins.)	
21.79		CONTINUED						
71.5		Very dense, red-brown, fine to medium SAND, trace to some silt, trace to some gravel	SP- SM to SM	200				
	6			16	DO	200/6"	6/6	
24.45				200	17	DO	200/3"	0/3
80.2				6				

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COORD. N112090 ft. (N34165m)
E2285520 ft. (E696628m)

BORING LOG G41-J17

SHEET 1 OF 2

SURFACE ELEV. 1689.2 ft. (514.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/5/79 DATE COMPLETED 4/5/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)			
0.15 0.5		topsoil and rootmat								
		Compact to very dense, brown, fine gravelly, fine to coarse SAND, some silt, trace clay Cobbles and boulders noted at 7.0'-12.0'	SM	-	1	DO	Air Hammer 12/12			
				-	2	DO	Air Hammer 2/6			
				-	3	DO	Air Hammer 3/6			
				-	4	DO	Air Hammer 12/12			
8.38 27.5				Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	5	DO	Air Hammer 6/12	
						-	6	DO	Air Hammer 12/12	
11.28 37.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

COOR. N112090 ft. (N34165m)
E2285520 ft. (E696628m)

BORING LOG G41-J17

SHEET 2 OF 2

SURFACE ELEV. 1689.2 ft. (514.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/5/79 DATE COMPLETED 4/5/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
11.28		CONTINUED						
37.0		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	7	DO	Air Hammer	4/6
12.19								

40.0

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N112110 ft. (N34171m)
E2285530 ft. (E696628m)

BORING LOG G41-J17A

SHEET 1 OF 1

SURFACE ELEV. 1688.9 ft. (514.76m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/4/79
DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

1. Boring drilled specifically for performing in situ permeability tests.
2. See log of boring G41-J17 for description of subsurface materials.
3. Permeability test was falling head test with water level at top of casing at beginning of test.
4. Hole fully grouted at completion

TEST NUMBER 1

Advanced hole to 17.0' with 6" bit using air.
Drove 4" casing from 17.0' to 18.0', leaving top of casing 2.5' above ground.
Cleaned hole to 19.0' (1.0' below casing) with water.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	0.08	15.0	0.42
1.0	0.13	20.0	0.50
5.0	0.23	25.0	0.58
10.0	0.33	30.0	0.67

Advanced hole to 30.0', encountered boulders. Abandoned hole.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked JLB

COOR. N111215 ft. (N33899m)
E2285495 ft. (E696621m)

BORING LOG G41-118

SHEET 1 OF 3

SURFACE ELEV. 1679.7 ft. (511.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/13/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
0.0		Peat, rootmat and topsoil	PT						
0.91				32	1	DO	5-20-12	12/18	Grout
3.0				48	2	DO	9-22-26	12/18	
				46	3	DO	12-20-26	13/18	
		Dense, red-brown, silty fine to coarse SAND, some clay, SM trace fine gravel to fine to coarse SAND, some silt, some fine gravel, trace clay	SM	64	4	DO	16-18-46	12/18	
				25	5	DO	13-12-13	18/18	
7.01									2" Solid PVC Pipe
23.0				87	6	DO	14-32-55	11/18	
		Dense to very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP						2" Slotted PVC Pipe
				38	7	DO	14-20-18	9/18	
10.06									4/18/79
33.0		CONTINUED							31.0
									10.06
									33.0
									CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WOB

COOR. N111215 ft. (N33899m)
E2285495 ft. (E696621m)

BORING LOG G41-J18

SHEET 3 OF 3

SURFACE ELEV. 1679.7 ft. (511.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/13/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
20.42 67.0		CONTINUED						
21.49 70.5		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP SM	195 6"	15 DO	195/6"	6 / 6	

END OF BORING

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)
2. Elevation of top of protector pipe, 1683.1 ft. (513.00m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/7/79	11/12/79*	9/10/80*			
DEPTH (m)	9.45	8.87	8.84	9.11			
DEPTH (ft.)	31.0	29.1	29.0	29.9			

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N110780 ft. (N33766m)
E2285680 ft. (E696677m)

BORING LOG G41-J19

SHEET 1 OF 3

SURFACE ELEV. 1686.5 ft. (514.05m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/14/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
0.15		topsoil and rootmat							
0.5		Compact to dense, red-brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM	20	1	DO	8-7-13	9/18	
				31	2	DO	9-12-19	12/18	
				15	3	DO	11-6-9	7/18	
				27	4	DO	6-12-15	9/18	
				36	5	DO	10-15-21	12/18	
				61	6	DO	16-26-35	13/18	
8.38		Very dense, brown to orange-brown, silty fine to coarse SAND, trace fine to coarse gravel	SM	91	7	DO	34-39-52	18/18	
27.5									
9.91		CONTINUED							
32.5									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N110780 ft. (N33766m)
E2285680 ft. (E696677m)

BORING LOG G41-J19

SHEET 3 OF 3

SURFACE ELEV. 1686.5 ft. (514.05m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/14/79

DRILL RIG Mobile B-61 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRA. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
20.13		CONTINUED						
66.0		Very dense, brown to orange-brown, silty fine to coarse SAND, trace fine to coarse gravel		SM 200 8"	15	DO	100-100/2"	8/8
23.03					100 6"	16	DO	100/6"

75.5
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 1 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
0.0		For soil stratigraphy, see boring G41-K13A						▼ 4/18/79 29.69 97.4
36.58 120.0		Very dense, yellow-brown, fine to coarse SAND, trace silt, trace fine gravel, trace clay Boulder noted at 125.0'-129.5'	SM	-	1	DO	Air Hammer 9/9	
39.47 129.5		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	-	2	DO	Air Hammer 6/6	
44.50				-	3	DO	Air Hammer 12/12	
146.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked WZB

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 2 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC/ATT. (ins.)	
44.50 146.0		CONTINUED								
		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM		4	DO	Air Hammer	6/6		
					-	5	DO	Air Hammer	12/12	
51.05 167.5				Very dense, brown, fine gravelly, fine to coarse SAND, some silt, occasional cobbles	GP GM		-	6	DO	Air Hammer
55.17 181.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 708

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 3 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
55.17		CONTINUED						
181.0		Very dense, brown, fine gravelly, fine to coarse SAND, some silt, occasional cobbles	GP- GM					
57.91								
190.0		Very dense, yellow-brown, fine to coarse SAND, some silt	SM	-	8	DO Air Hammer	12/12	
59.44								
195.0		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SW- SM					
64.01								
210.0		Very dense, brown, fine to medium SAND and SILT	SM	-	10	DO Air Hammer	6/6	
65.53								
215.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 4 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
65.53		CONTINUED						
215.0		Very dense, brown fine to medium SAND and SILT	SM					Grout (to surface) 2" Solid PVC Pipe to Surface
66.45		Very dense, brown, fine to medium SAND, trace silt	SP-SM					
218.0								
				-	11	DO	Air Hammer 6/12	
69.50		Very dense, red-brown, silty fine to coarse SAND, trace to some fine gravel	SM					
228.0						-	12	DO
								72.39
								Bentonite Clay Seal 237.5
								73.15
								240.0
								Pea Gravel
74.07								CONTINUED
243.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114755 ft. (N34977m)

E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 5 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
74.07 243.0		CONTINUED							CONTINUED
		Very dense, red-brown, silty fine to coarse SAND, trace to some fine gravel	SM	-	13	DO	Air Hammer	12/12	
75.44 247.5		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt, trace clay	SM	-	14	DO	Air Hammer	18/18	
78.86 262.0		Very dense, brown, fine to coarse SAND, trace silt, trace clay	SM	-	15	DO	Air Hammer	18/18	
82.91 272.0		Greenish-gray, highly weathered metavolcanic TUFF		-	16	DO	Air Hammer	6/6	
84.43 277.0		CONTINUED							Pea Gravel (to bottom of boring)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

BORING LOG G41-K13

SHEET 6 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
84.43		CONTINUED						
277.0		Greenish-gray, highly weathered metavolcanic TUFF		-	-	-	Drill Cuttings	-
86.87								

285.0

END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)
2. Elevation of top of protector pipe, 1702.9 ft. (519.05m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79	12/3/79	4/25/80	5/21/80	6/26/80*	9/10/80*
DEPTH (m)	29.69	32.06	32.00	32.28	32.89	32.28	32.89
DEPTH (ft.)	97.4	105.2	105.0	105.9	107.9	105.9	107.9

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114770 ft. (N34982m)
E2285955 ft. (E596760m)

BORING LOG G41-K13A

SHEET 1 OF 5

SURFACE ELEV. 1699.9 ft. (518.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note: 1) REC./ATT. (ins.)	
0.15 0.5		topsoil and rootmat		-	1	DO	Air Hammer 18/18	
		Dense to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay Boulders noted at: 22.5'-25.0' 25.0'-26.0'	SM	-	2	DO	Air Hammer 18/18	
				-	3	DO	Air Hammer 12/12	
				-	4	DO	Air Hammer 6/18	
				-	5	DO	Air Hammer 2/6	
				-	6	DO	Air Hammer 6/9	
7.92 26.0		Very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, occasional cobbles and boulders	SM	-	7	DO	Air Hammer 3/3	
				-	8	DO	Air Hammer 4/4	
11.13 36.5				CONTINUED				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

BORING LOG G41-K13A

SHEET 2 OF 5

SURFACE ELEV. 1699.9 ft. (518.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FFET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
11.13 36.5		CONTINUED						
		Very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, occasional cobbles and boulders Boulder noted at 42.5'-44.5'	SM					
				9	DO	Air Hammer	0/3	
				10	DO	Air Hammer	3/3	
				11	DO	Air Hammer	3/3	
16.76 55.0		Hard, red-brown SILT, trace clay and fine gravel	ML					
17.52 57.5		Very dense, brown, fine to coarse SAND, some fine gravel, some clay, trace silt	SM					
				13	DO	Air Hammer	6/6	
				14	DO	Air Hammer	2/2	
20.12 66.0		CONTINUED						

Job No. 7S6085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

BORING LOG G41-K13A

SHEET 3 OF 5

SURFACE ELEV. 1699.9 ft. (518.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
20.12		CONTINUED						
66.0		Very dense, brown, fine to coarse SAND, some fine gravel, some clay, trace silt, occasional cobbles	SM		15	DO	Air Hammer	4/4
21.34								
70.0		Very dense, brown, fine GRAVEL and fine to coarse SAND, some silt	GM		16	DO	Air Hammer	6/6
22.86								
75.0		Very dense, green-gray, fine to coarse gravelly, fine to coarse SAND, trace silt, trace clay, occasional cobbles	SP SM		17	DO	Air Hammer	0/2
		Very dense, red-brown to brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles	SM		18	DO	Air Hammer	7/7
26.67					19	DO	Air Hammer	6/6
87.5								
					20	DO	Air Hammer	12/12
29.87		CONTINUED						
98.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

BORING LOG G41-K13A

SHEET 4 OF 5

SURFACE ELEV. 1699.9 ft. (518.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)
29.87		CONTINUED							
98.0		Very dense, red-brown to brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles	SM	-	21	D0	Air Hammer	18/18	Grout (to surface).
									Bentonite Clay Seal
									103.5
									32.16
									Pea Gravel
									105.5
									33.10 4/18/79
									2" Solid PVC Pipe to Surface
									108.6
									33.32
									109.3
33.99		Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt Boulder noted at 120.0'-121.5'	SP SM	-	22	D0	Air Hammer	6/6	
111.5									
									2" Slotted PVC Pipe
									Pea Gravel
									18/18
									36.36
									119.3
37.24									Note 2
122.2									

END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (All samples)
2. Permeability test was falling head test with water level at top of casing at beginning of test. See page 5 for permeability test number 1.

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

BORING LOG G41-K13A

SHEET 5 OF 5

SURFACE ELEV. 1699.9 ft. (518.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/31/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES (continued)

PERMEABILITY TEST NUMBER 1

Drove 4" casing from 116.0' to 120.0', leaving top of casing 2.67' above ground.
Cleaned hole to 120.0' with water and encountered boulder.
Advanced hole from 120.0' to 121.5' with 4" bit through boulder.
Cleaned hole to 122.17' (0.67' past boulder) with water. Performed falling head permeability test.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.5	0.04	20.0	1.46
1.0	0.13	25.0	1.67
2.0	0.21	30.0	1.83
5.0	0.46	35.0	1.96
10.0	0.79	40.0	2.08
15.0	1.17		

3. Elevation of top of protector pipe, 1703.0 ft. (519.07m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/18/79	11/12/79	12/3/79	4/25/80	5/21/80	6/26/80*	9/10/80*
DEPTH (m)	33.10	32.06	31.85	32.19	32.80	32.16	32.83
DEPTH (ft.)	108.6	105.1	104.5	105.6	107.6	105.5	107.7

*Pump Test and Recovery Period Between these Dates. For Pump Test Data, Refer to PUMP TEST AND ANALYSIS, Project Report No. 4.

Job No. 786085
Scale _____

Golder Associates

Drawn jls
Checked 203

COOR. N114850 ft. (N35007m)
E2286070 ft. (E696795m)

BORING LOG G41-K13B

SHEET 1 OF 2

SURFACE ELEV. 1696.8 ft. (517.20m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/28/79

DRILL RIG CME 45 DRILLING METHOD Solid Stem Auger

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL (Note 2)
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
0.43		Topsoil and rootmat						
1.4		Compact, light brown, fine to coarse sandy SILT, trace clay	ML SM	2	1 DO	1-1-1	18/18	Grout
2.74				27	2 DO	6-12-15	18/18	
9.0		Compact to stiff, red-brown SILT, trace fine to medium sand, trace clay	CL ML	20	3 DO	4-5-15	12/18	Bentonite Clay Seal
3.66								
12.0		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	132	8"			Pea Gravel
6.10				4	DO	20-32-100/2"	10/14	Pea Gravel
				100	6"	100/6"	6/6	(Note 4)

20.0 END OF BORING

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
- Elevation of top of protector pipe, 1698.8 ft. (517.79m).
- Encountered boulder at 18.0'. Moved 10' and started new hole (Coordinates as given on log heading).
- PERMEABILITY TEST NUMBER 1
Advanced hole to 19.5' using solid stem auger.
Drove 4" casing from 19.5' to 20.5', leaving top of casing 5.0' above ground.
Cleaned hole to 20.0' (0.5' above bottom of casing) with water.
Performed falling head permeability test.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.04	10.0	1.17
0.50	0.08	15.0	1.50
1.0	0.17	20.0	1.75
2.0	0.33	25.0	1.92
5.0	0.63	30.0	2.08

Job No. 796085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COORD. N114850 ft. (N35007m)
E2286070 ft. (E696795m)

BORING LOG G41-K13B

SHEET 2 OF 2

SURFACE ELEV. 1696.8 ft. (517.20m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 3/28/79

DRILL RIG CME 45 DRILLING METHOD Solid Stem Auger

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/17/79	11/12/79	9/10/79				
DEPTH (m)	DRY	DRY	DRY				
DEPTH (ft.)	DRY	DRY	DRY				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DAS

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

BORING LOG G41-K17

SHEET 1 OF 3

SURFACE ELEV. 1688.7 ft. (514.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/12/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC/ATT. (ins.)		
0.15 0.5		Loose, dark brown SILT, some medium to coarse gravel, trace fine sand, trace organic matter	MI	9	1	DO	1-1-8	18/18	
				9	2	DO	5-4-5	18/18	
		Loose to compact, brown to red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SM	13	3	DO	8-9-4	18/18	
				9	4	DO	5-4-5	18/18	
				17	5	DO	8-7-10	18/18	
				22	6	DO	9-10-12	15/18	
8.38 27.5		Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt. frequent cobbles and boulders Boulders noted at 31.0'-32.0' and 34.0'-37.5'	SP SM	150 11"	7	DO	50-100/5"	9/11	
10.82 35.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

BORING LOG G41-K17

SHEET 2 OF 3

SURFACE ELEV. 1688.7 ft. (514.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/12/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC/ATT. (ins.)		
10.82 35.5		CONTINUED							
		Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, frequent cobbles and boulders Boulders noted at 34.0'-37.5', 56.0'-57.0' and 59.0'-62.5'	SP SM	162 10					
				9	DO	42-120/4"	4/10		
				86	10	DO	26-60	4/12	
				150 4"	11	DO	150/4"	0/4	
				200 11"					
				12	DO	110-90/5"	8/11		
				200 4"	14	DO	200/4"	2/4	
19.81 65.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

BORING LOG G41-K17

SHEET 3 OF 3

SURFACE ELEV. 1688.7 ft. (514.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/9/79 DATE COMPLETED 3/12/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
19.81 65.0		CONTINUED						
		Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, numerous cobbles and boulders	SP	200				
			SM	3"	15	DO	200/3"	1/3
				150				
				5"	16	DO	150/5"	5/5
				150				
24.17				4"	17	DO	150/4"	3/4

79.3
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 30". (All samples)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N109385 ft. (N33341m)
 E2286215 ft. (E696840m)

BORING LOG G41-K21

SHEET 1 OF 3

SURFACE ELEV. 1673.7 ft. (510.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/14/79 DATE COMPLETED 11/15/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS			
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)		
0.0		Compact, brown, fine to coarse SAND, some silt, trace clay, trace organics, boulders on surface	SM	-	1	AS	-	-			
1.52		Compact, brown, fine to coarse SAND, some silt, trace to some fine gravel, frequent cobbles Cobble noted at 17.0'-17.5'	SM	14	2	DO	7-7-7	18/18			
5.0											
						15	3	DO	8-8-7	15/18	
						7	4	DO	4-3-4	18/18	
5.33		Very dense, brown to light brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, frequent cobbles Boulders noted at 18.0'-19.0' and 26.5'-30.0'	SP-SM	43	5	DO	18-22-21	18/18			
17.5											
						162 10"					
						6	DO	12-62-100/4"	16/16		
				197 9"	7	DO	93-104/3"	8/9			
9.75											
32.0		CONTINUED									

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MRB

COORD. N109385 ft. (N33341m)
E2286215 ft. (E696840m)

BORING LOG G41-K21

SHEET 2 OF 3

SURFACE ELEV. 1673.7 ft. (510.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/14/79 DATE COMPLETED 11/15/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
9.75 32.0		CONTINUED						
		Very dense, brown to light brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, frequent cobbles	SP-	206 8"	8	DO	100 50-106-2"	14/14
			SM					
11.43 37.5		Very dense, brown to light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt, frequent cobbles	SP	171 11"	9	DO	71-100/5"	11/11
			SP to SP-SM					
		Cobbles and boulders noted at: 45.0'-45.5' 46.0'-46.5' 47.5'-48.5' 51.0'-51.5' 59.7'-60.5'	SP	100 0"	10	DO	100/0"	0/0
			SM					
				110 5"	11	DO	110/5"	0/5
				106 1"	11A	DO	106/1"	0/1
				150 6"	12	DO	150/6"	3/6
				135 3"	13	DO	135/3"	0/3
19.20 63.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COORD. N109385 ft. (N33341m)
E2286215 ft. (E696840m)

BORING LOG G41-K21

SHEET 3 OF 3

SURFACE ELEV. 1673.7 ft. (510.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/14/79 DATE COMPLETED 11/15/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC/AT. (ins.)		
19.20		CONTINUED							
63.0		Very dense, brown to light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt, occasional cobbles	SP to SP- SM	163	14	DO	44-71-92	7/18	
				210					
				10"	15	DO	110-100/4"	9/10	
23.10				205			100		
75.5				7.5"	16	DO	105-1.5"	6/7.5	

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 16)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N109730 ft. (N33446m)
 E2285890 ft. (E696742m)
 SURFACE ELEV. 1680.4 ft. (512.17m)

BORING LOG G41-K21A

SHEET 1 OF 9

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.			
0.0		Compact to very dense, brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles	SM							
				-	1	DO	Air Hammer	18/18		
						-	2	DO	Air Hammer	18/18
				-	3	DO	Air Hammer	18/18		
				-	4	DO	Air Hammer	8/18		
11.13										
36.5		CONTINUED								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 2 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
11.13 36.5		CONTINUED							
		Compact to very dense, brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles	SM						
				-	5	DO	Air Hammer	14/14	
				-	6	DO	Air Hammer	8/13	
16.76 55.0		Very dense, multi-colored to dark brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles	SP						
				-	7	DO	Air Hammer	15/18	
21.03 69.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 4 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
31.70 104.0		CONTINUED						
		Very dense, multi-colored to dark brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles	SP					
				-	12	DO	Air Hammer	18/18
35.05 115.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay, occasional cobbles	SM					
				-	13	DO	Air Hammer	18/18
42.37 139.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
 E2285890 ft. (E696742m)
 SURFACE ELEV. 1680.4 ft. (512.17m)

BORING LOG G41-K21A

SHEET 5 OF 9

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
42.37		CONTINUED						
139.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay, occasional cobbles	SM					
	-			15	DO	Air Hammer	12/12	
	-			16	DO	Air Hammer	12/12	
	-			17	DO	Air Hammer	10/18	
47.24		Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP					
155.0	-			18	DO	Air Hammer	10/18	
53.04		CONTINUED						
174.0								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N109730 ft. (N33446m)
 E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 6 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
53.04 174.0		CONTINUED							
		Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	19	D0	Air Hammer	10/18	
				-	20	D0	Air Hammer	10/18	
				-	21	D0	Air Hammer	9/12	
63.70 209.0		CONTINUED							

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 7 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
63.70 209.0		CONTINUED							
		Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	22	DO	▼	12/12	
68.58 225.0		Very dense, brown to red-brown, fine SAND, trace silt to SILT, trace fine sand; (these are extremes of materials that occur in layers of random thicknesses)	SP to ML						
				-	23	DO	▼	12/12	
74.37 244.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 8 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
74.37 244.0		CONTINUED							
		Very dense, brown to red-brown, fine SAND, trace silt to SILT, trace fine sand; (these are extremes of materials that occur in layers of random thicknesses)	SP to ML						
				-	26	DO	Air Hammer	15/15	
				-	27	DO	Air Hammer	18/18	
80.77 265.0		Very dense, light red-brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	28	DO	Air Hammer	18/18	
82.75 271.5		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

BORING LOG G41-K21A

SHEET 9 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
82.75		CONTINUED							
271.5		Very dense, light red-brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP	-	29	DO	Air Hammer	18/18	
87.78									
288.0		Sound, green-gray, metavolcanic TUFF		-	30	RC	Rotary	6/36	
90.83									
298.0		END OF BORING							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N32389m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 1 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
0.0		Compact to dense, red brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly fine to coarse SAND, some silt	SM	-	1	DO	Air Hammer 18/18			
				-	2	DO	Air Hammer 18/18			
4.72				Dense, multi-colored, fine to coarse GRAVEL and cobbles	GP	-	3	DO	Air Hammer 6/12	
15.5										
7.62		Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse sand, occasional to frequent cobbles	SP	-	4	DO	Air Hammer 0/6			
25.0				-	4a	DO	Air Hammer 12/18			
11.43		CONTINUED								
37.5										

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N32389m)
 E2286445 ft. (E696909m)
 SURFACE ELEV. 1686.1 ft. (513.93m)
 DATUM USGS MSL
 DRILL RIG Schramm Rotadrill T64HP

BORING LOG G41-K26

SHEET 2 OF 10

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATE STARTED 4/29/81 DATE COMPLETED 5/11/81
 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
11.43		CONTINUED							
37.5		Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles	SP						
				-	5	DO	Air Hammer	12/18	
							Air Hammer		
								0/12	
					-	6a	DO	Air Hammer	0/18
					-	7	DO	Air Hammer	15/18
					-	8	DO	Air Hammer	15/18
21.79									
.71.5		CONTINUED							

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N106260 ft. (N32389m)
 E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 3 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

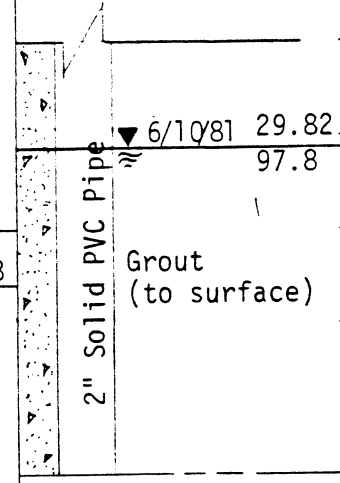
DATE STARTED 4/29/81

DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP

DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.		
21.79 71.5		CONTINUED								
		Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles	SP							
				-	9	DO	Air Hammer	12/18		
				-	10	DO	Air Hammer	6/12		
32.46 106.5		CONTINUED								



Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N106260 ft. (N32389m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 4 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
32.46		CONTINUED						CONTINUED
106.5		Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles	SP	-	12	DO	Air Hammer 15/18	2" Solid PVC Pipe Grout (to surface)
39.62		Very dense, dark gray, SILT, trace fine sand, small organic particles throughout	ML	-	13	DO	Air Hammer 12/18	40.84 134.0 Bentonite Clay Seal 41.76 137.0 Pea Gravel
130.0								
42.37		CONTINUED						CONTINUED
139.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 6 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
53.04		CONTINUED							
174.0		Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	19	DO	Air Hammer	15/18	
				-	20	DO	Air Hammer	18/18	
				-	21	DO	Air Hammer	18/18	
63.70		CONTINUED							
209.0									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 7 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
63.70		CONTINUED							
209.0		Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	22	D0	Air Hammer	15/18	
				-	23	D0	Air Hammer	18/18	
				-	24	D0	Air Hammer	18/18	
72.85		CONTINUED							
239.0									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 8 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
72.85		CONTINUED						
239.0		Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP					
				- 25	D0	Air Hammer	18/18	
75.29		Very dense, red-brown, silty fine to coarse SAND, some fine gravel	SM					
247.0				- 26	D0	Air Hammer	0/18	
				- 27	D0	Air Hammer	24/24	
80.16		Very dense, brown to red-brown, fine sandy SILT to fine SAND, trace silt; (these are extremes of materials that occur in layers of random thicknesses)	SP to ML					
263.0				- 28	D0	Air Hammer	24/24	
82.30		Very dense, brown to multi-colored, fine to coarse sandy, fine to coarse GRAVEL, trace silt	GP					
270.0								
83.52		CONTINUED						
274.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 9 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT: EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.		
83.52		CONTINUED							
274.0		Very dense, brown to multi-colored, fine to coarse sandy, fine to coarse GRAVEL, trace silt	GP	-	29	DO	Air Hammer	15/18	
85.34									
280.0		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP	-	30	DO	Air Hammer	18/18	
						-	31	DO	Air Hammer
91.29		Very dense, brown and red-brown, varved SILT, trace fine sand with thin (1/16") discontinuous seams of clayey SILT	ML						
299.5									
92.66		CONTINUED							
304.0									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 10 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
92.66 304.0		CONTINUED						
		Very dense, brown and red-brown, varved SILT, trace fine sand with thin (1/16") discontinuous seams of clayey SILT	ML	-	32	DO	Air Hammer	18/18
94.49 310.0								
		Firm, red-brown, CLAY, with some green sand and gravel sized rock fragments	CL	-	33	DO	Air Hammer	24/24
97.23 319.0								
		Sound, green-gray, metavolcanic TUFF		-	34	RC		53/60
100.58 330.0								

END OF BORING

NOTES

1. Elevation of top of protector pipe, 1688.2 ft. (514.58m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	DEPTH (m)	DEPTH (ft.)					
6/10/81	29.82	97.8					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N115895 ft. (N35324m)
E2286690 ft. (E696984m)

BORING LOG G41-L11

SHEET 1 OF 3

SURFACE ELEV. 1708.5 ft. (520.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/14/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC/ATT. (ins.)			
0.15		Peat	PT								
0.5		Compact, brown, fine to medium SAND and SILT, organic fibers throughout	SM	-	1	AS	-	-			
0.91											
3.0		Compact to very dense, brown to red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	46	2	DO	10-12-34	16/18			
						12	3	DO	4-6-6	14/18	
						20	4	DO	5-12-8	15/18	
						70	5	DO	34-36	4/12	
5.49		Very dense, brown to red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM								
18.0											
						137	6	DO	33-43-94	12/18	
						153	7	DO	89-64/3"	8/9	
					8	-	No Recovery	-			
					9	-	No Recovery	-			
10.97											
36.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N115895 ft. (N35324m)
 E2286690 ft. (E696984m)

BORING LOG G41-111

SHEET 2 OF 3

SURFACE ELEV. 1708.5 ft. (520.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/14/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC/ATT. (ins.)		
10.97 36.0		CONTINUED							
		Very dense, brown to red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay		181 6"	10	DO	181/6"	6/6	
			SM 163 6"	11	DO	163/6"	5/6		
			146 6"	12	DO	146/6"	5/6		
			161 6"	13	DO	161/6"	2/6		
17.07 56.0		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	159	14	DO	76-83	12/12	
				107	15	DO	41-66	10/12	
20.42 67.0			CONTINUED						

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MB

COOR. N115895 ft. (N35324m)
E2286690 ft. (E696984m)

BORING LOG G41-L11

SHEET 3 OF 3

SURFACE ELEV. 1708.5 ft. (520.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/79 DATE COMPLETED 3/14/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)			
20.42 67.0		CONTINUED									
		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	179 9'	16	DO	79-100/3"	6/9			
				200 6"	17	DO	200/6"	3/6			
22.10 72.5				Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, some silt	GM to SM	172 6"	18	DO	172/6"	5/6	
						182 9'	19	DO	82-100/3"	6/9	
						110 6"	20	DO	110/6"	4/6	

90.5
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 2 - 9)
- Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 9 - 20)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N114665 ft. (N34950m)
E2286795 ft. (E697016m)

BORING LOG G41-L13

SHEET 1 OF 3

SURFACE ELEV. 1711.5 ft. (521.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/12/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
0.15		Soft, black, organic SILT & CLAY	PT	-	1	AS	-	-		
0.5		Compact, brown, fine to coarse SAND, some fine to medium gravel, trace silt	SM	-	2	AS	-	-		
1.52		Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, occasional cobbles	SM	17	3	DO	7-10-7	15/18		
5.0				29	4	DO	10-14-15	18/18		
				52	5	DO	17-28-24	18/18		
				41	6	DO	18-20-21	16/18		
				137	7	DO	51-86	10/12		
				136	8	DO	51-85	10/12		
				145	9	DO	50-95	9/12		
10.36										
34.0				CONTINUED						

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N114665 ft. (N34950m)
E2286795 ft. (E697016m)

BORING LOG G41-L13

SHEET 2 OF 3

SURFACE ELEV. 1711.5 ft. (521.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 3/12/79 DATE COMPLETED 3/12/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC/ATT. (ins.)		
10.36		CONTINUED								
34.0		Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, occasional cobbles	SM	183	10	DO	78-105	8/12		
11.73										
38.5		Dense, brown, silty fine SAND to hard, brown, clayey SILT, some fine to coarse gravel	SM to ML	141	11	DO	22-41-100	10/16		
13.11										
43.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM	130	9	DO	30-100/3"	7/9		
15.85										
52.0										
19.20		Very dense, red-brown, fine to coarse SAND and SILT, trace fine gravel, trace clay	SM	141	14	DO	39-102	8/12		
63.0										
20.57										
67.5		Very dense, red-brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel, trace clay	SM	146	15	DO	46-100/4"	10/10		
20.57										
67.5		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N114665 ft. (N34950m)
E2286795 ft. (E697016m)

BORING LOG G41-113

SHEET 3 OF 3

SURFACE ELEV. 1711.5 ft. (521.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/79 DATE COMPLETED 3/12/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	SAMPLES				REMARKS	
				BLOWS / FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)
20.57		CONTINUED							
67.5		Very dense, red-brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel, trace clay	SM	78	17	D0	22-34-44	12/18	
				93	18	D0	33-51-42	12/18	
23.77		Very dense, light brown, fine SAND, trace silt	SP-SM						
78.0				77	19	D0	28-31-46	10/18	
25.30		Very dense, red-brown, silty fine to coarse SAND, some fine to medium gravel	SM						
83.0				93	20	D0	36-32-61	12/18	
26.37									

86.5
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 3 - 15)

Penetration Test - Driving 2" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 16 - 20)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113575 ft. (N34617m)
E2286755 ft. (E697004m)

BORING LOG G41-L15

SHEET 1 OF 3

SURFACE ELEV. 1705.3 ft. (519.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/3/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	SAMPLES			REMARKS		
				BLOWS / FOOT	NUMBER	TYPE		HAMMER BLOWS PER 6IN. (Note 1)	REC/ATT. (ins.)
0.15		Dark red topsoil and rootmat		6	1	DO	3-2-4	18/18	
0.5		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay Boulders noted at 25.0'-26.0' and 27.0'-28.0'	SM	6	2	DO	2-2-4	18/18	
	14			3	DO	5-5-9	18/18		
	25			4	DO	20-15-10	12/18		
	100			5	DO	22-44-56	12/18		
	145			6	DO	45-100	9/12		
	150								
	10"								
9.45				7	DO	45-50-100	16/16		
31.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N113575 ft. (N34617m)
E2286755 ft. (E697004m)

BORING LOG G41-L15

SHEET 2 OF 3

SURFACE ELEV. 1705.3 ft. (519.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/3/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC/ATT. (ins.)		
9.45		CONTINUED							
31.0		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, trace clay	SM						
10.36									
34.0		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SP- SM	75	8	DO	57-45-30	18/18	
				135	9	DO	42-60-75	18/18	
				100	4"	10	DO	100/4"	4/4
				100	1"	11	DO	100/1"	0/1
				100	1"	12	DO	100/1"	1/1
				150	3"	13	DO	150/3"	1/3
16.76		Very dense, brown, fine to coarse SAND and SILT, some fine gravel, occasional cobbles	SM	100	2	DO	100/2"	2/2	
55.0									
19.96		CONTINUED							
65.5									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N113575 ft. (N34617m)
E2286755 ft. (E697004m)

BORING LOG G41-L15

SHEET 3 OF 3

SURFACE ELEV. 1705.3 ft. (519.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/2/79 DATE COMPLETED 3/3/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
19.96		CONTINUED						
65.5		Very dense, brown, fine to coarse SAND and SILT, some fine gravel, occasional cobbles	SM	100 4	15	DO	100/4"	4/4
22.65				100 3	16	DO	100/3"	2/3

74.3

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1 - 6)

Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 24". (Samples 7 - 16)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked ACB

COOR. N111060 ft. (N33852m)
E2286820 ft. (E697024m)

BORING LOG G41-L19

SHEET 1 OF 3

SURFACE ELEV. 1686.4 ft. (514.0m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/1/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC/ATT. (ins.)		
0.0		Compact, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, trace organic matter, occasional cobbles	SM	14	1	DO	8-6-8	12/18	
				12	2	DO	5-6-6	18/18	
4.88				14	3	DO	5-10-4	18/18	
16.0		Dense to very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, frequent cobbles and boulders	SM	61	4	DO	11-50	12/12	
				100 6"	5	DO	100/6"	6/6	
9.49				135	6	DO	45-90	8/12	
31.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JLS
Checked JCB

COOR. N111060 ft. (N33852m)
E2286820 ft. (E697024m)

BORING LOG G41-119

SHEET 2 OF 3

SURFACE ELEV. 1686.4 ft. (514.0m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/1/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) REC./ATT. (ins.)			
9.49 31.0		CONTINUED								
		Dense to very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, frequent cobbles and boulders Boulders noted at: 38.5'-40.0' 46.0'-47.0' 52.0'-53.0'	SM	150	7	DO	50-100	8/12		
				100	4"	8	DO	100/4"	0/12	
				100	2"	9	DO	100/2"	2/2	
				102	4"	10	DO	102/4"	3/4	
				110	6"	11	DO	110/6"	4/6	
17.37 57.0		Very dense, brown, fine to coarse SAND, some silt, some clay, trace fine gravel, numerous cobbles and boulders	SM	102	6"	12	DO	102/6"	6/6	
				100	2"	13	DO	100/2"	0/2	
19.81 65.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111060 ft. (N33852m)
E2286820 ft. (E697024m)

BORING LOG G41-L19

SHEET 3 OF 3

SURFACE ELEV. 1686.4 ft. (514.0m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/1/79

DRILL RIG CME-75 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
19.81		CONTINUED						
65.0		Very dense, brown, fine to coarse SAND, some silt, some clay, trace fine gravel, frequent cobbles and boulders	SM	100				
21.06				1	14	DO	100/1"	0/1

69.1

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1 - 5 and 8 - 14)

Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 30". (Samples 6 and 7)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked rob

COORD. N108275 ft. (N33002m)
E2286580 ft. (E696952m)

BORING LOG G41-L23

SHEET 1 OF 3

SURFACE ELEV. 1677.6 ft. (511.32m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC./ATT. (ins.)
0.0		Brown, fine to coarse SAND, some silt, trace fine gravel, boulders at surface	SM	-	1	AS	-	-	
1.22 4.0		Dense, light brown, fine to coarse SAND, trace fine gravel, trace silt	SP	28	2	D0	4-12-16	12/18	
2.29 7.5		Compact, brown, silty, fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some silt, some fine to coarse gravel	SM	20	3	D0	5-10-10	18/18	
				17	4	D0	12-9-8	18/18	
5.34 17.5		Dense to very dense, light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP	53	5	D0	9-28-25	8/18	
				29	6	D0	9-12-17	16/18	
				53 8"	7	D0	18-35/2"	5/8	
9.45 31.0									
10.36 34.0		See next page CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N108275 ft. (N33002m)
E2286580 ft. (E696952m)

BORING LOG G41-L23

SHEET 2 OF 3

SURFACE ELEV. 1677.6 ft. (511.32m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)
10.36 34.0		CONTINUED		175 7"	8	DO	75-100/1"	4/7	
		Very dense brown, silty, fine to coarse SAND, trace fine to coarse gravel to fine to coarse SAND, some silt, some fine to coarse gravel, occasional cobbles Cobbles and boulders noted at 31.0'-35.2'	SM	176 6.5"	9	DO	76-100/5"	6/6.5	
	125 6"			10	DO	125-6"	6/6		
	120 6"			11	DO	120/6"	3/6		
	185 7"			12	DO	110-75/1"	3/7		
18.59 61.0				Very dense, brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SW to SP	180	13	DO	50-80-100
	20.73 68.0	210	14			DO	60-150	12/12	
		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N108275 ft. (N33002m)
E2286580 ft. (E696952m)

BORING LOG G41-L23

SHEET 3 OF 3

SURFACE ELEV. 1677.6 ft. (511.32m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 11/30/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)
20.73		CONTINUED							
68.0		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SW to SP	240	15	DO	90-150	6/12	
				242					
				11"	16	DO	87-155/5"	6/11	
				280					
24.66				11"	17	DO	110-180/5"	6/11	

80.9
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 17)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

COOR. N106640 ft. (N32503m)
E2286975 ft. (E697071m)

BORING LOG G41-L25

SHEET 1 OF 3

SURFACE ELEV. 1693.7 ft. (516.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/4/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)
0.0		Compact, brown, fine sandy clayey SILT	ML	-	1	AS	-	-	
1.22									
4.0		Compact, brown, silty, fine to coarse SAND, trace fine gravel	SM	13	2	DO	4-7-6	10/18	
2.29									
7.5		Compact, brown, fine to coarse SAND, trace fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SP	7	3	DO	3-3-4	18/18	
				23	4	DO	5-10-13	18/18	
5.33									
17.5		Dense to very dense, brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles	SM	20	5	DO	6-6-14	17/18	
				89 9"	6	DO	26-63/3"	9/9	
				63	7	DO	29-32-31	14/18	
10.36									
34.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRS

COOR. N106640 ft. (N32503m)
E2286975 ft. (E697071m)

BORING LOG G41-L25

SHEET 2 OF 3

SURFACE ELEV. 1693.7 ft. (516.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/4/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
10.36 34.0		CONTINUED							
		Dense to very dense, brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles Cobbles and boulders noted at 46.0'-46.8' and 47.5'-48.5'	SM	168	8	D0	48-120/6"	10/12	
	208 12"			9	D0	88-107- $\frac{100}{4}$ "	8/16		
	225 4.5'			10	D0	225/4.5"	2/4.5		
				140	11	D0	40-100	0/12	
				400 4"	12	D0	400/4"	4/4	
17.53 57.5		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse GRAVEL and fine to coarse SAND, trace silt, occasional to frequent cobbles	SW to SP	168 10"	13	D0	68-100/4"	7/10	
20.42 67.0				152	14	D0	48-104	6/12	
		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N106640 ft. (N32503m)
 E2286975 ft. (E697071m)

BORING LOG G41-L25

SHEET 3 OF 3

SURFACE ELEV. 1693.7 ft. (516.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/3/79 DATE COMPLETED 12/4/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
20.42 67.0		CONTINUED							
		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse GRAVEL and fine to coarse SAND, trace silt, occasional to frequent cobbles	SW to SP	190 9"	15	DO	40-150/3"	0/9	
				185 8"	16	DO	75-110/2"	4/8	
				160 7.5"	17	DO	110-50/1.5"	5/7.5	
				150 0"	18	DO	150/0"	0/0	

26.06
85.5

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 18)

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MRB

COOR. N116270 ft. (N35440m)
E2287725 ft. (E697300m)

BORING LOG G41-M11

SHEET 1 OF 5

SURFACE ELEV. 1582.8 ft. (482.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/28/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.				
0.0		Compact, light brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine to coarse gravel, trace silt	SP		-	1	DO Hydraulic Push	12/18	6/10/81 0.97 3.2 Grout (to surface) 2" Solid PVC Pipe (to surface)		
5.18		Dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt with silt layer varying from 1/4" to 1/2" thick	SP-SM		-	3	DO Hydraulic Push	15/18			
17.0											
7.92		Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded	SP		-	4	DO Hydraulic Push	12/18			
26.0											
11.43											
37.5		CONTINUED						CONTINUED			

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N116270 ft. (N34550m)
 E2287725 ft. (E697330m)

BORING LOG G41-M11

SHEET 2 OF 5

SURFACE ELEV. 1582.8 ft. (482.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/28/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
11.43		CONTINUED						CONTINUED	
37.5		Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded	SP					Grout 11.89	
				-	5	DO	Hydraulic Push	15/18	39.0
									2" Solid PVC Pipe
									Bentonite Clay Seal 12.80
									42.0
								2" Pea Gravel	
								15.24	
								50.0	
								2" Slotted PVC Pipe	
								Pea Gravel	
								18.29	
								60.0	
								Pea Gravel (to bottom of boring)	
19.51		Very dense, brown, fine SAND, some silt, very poorly graded	SM						
64.0				-	8	DO	Air Hammer	18/18	
21.79		CONTINUED							
71.5		CONTINUED							

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N116270 ft. (N34550m)
E2287725 ft. (E697330m)

BORING LOG G41-M11

SHEET 3 OF 5

SURFACE ELEV. 1582.8 ft. (482.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/28/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
21.79		CONTINUED							
71.5		Very dense, brown, fine SAND, some silt, very poorly graded	SM						
22.56									
74.0		Very dense, light brown, fine SAND, trace silt, very poorly graded	SP SM	-	9	DO	Air Hammer	18/18	
26.82		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles and boulders	SM	-	10	DO	Air Hammer	18/18	
88.0									
				-	11	DO	Air Hammer	2/18	
32.46		CONTINUED							
106.5									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N116270 ft. (N34550m)
E2287725 ft. (E697330m)

BORING LOG G41-M11

SHEET 4 OF 5

SURFACE ELEV. 1582.8 ft. (482.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/28/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
32.46		CONTINUED								
106.5		Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles and boulders	SM	-	12	DO	Air Hammer	17/17		
34.75										
114.0						-	13	DO	Air Hammer	3/6
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles	SW-SM to SM							
						-	14	DO	Air Hammer	12/18
43.13										
141.5		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N116270 ft. (N34550m)
E2287725 ft. (E697330m)

BORING LOG G41-M11

SHEET 5 OF 5

SURFACE ELEV. 1582.8 ft. (482.44m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/28/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
43.13		CONTINUED						
141.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles	SW SM to SM					
43.89								
144.0								
		Very dense, gray-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM					
47.70								
156.5		Sound, green, metavolcanic TUFF Green and red, weathered metavolcanic TUFF						
48.46								
159.0								
48.92								
160.5		END OF BORING						

Air Hammer

Air Hammer

NOTES

- Elevation of top of protector pipe, 1585.75 ft. (483.34m).

DATE	6/10/81						
DEPTH (m)	0.97						
DEPTH (ft.)	3.2						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N34490m)
 E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 1 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
0.0		Compact, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, frequent cobbles	SM	-	1	DO	Air Hammer 18/18	
				-	2	DO	Air Hammer 24/24	
				-	3	DO	Air Hammer 5/12	
7.62				Dense, orange-brown, fine to medium SAND, trace fine gravel, trace silt, trace clay, very weakly cemented	SP- SM	-	4	DO
25.0								
9.60		CONTINUED						
31.5								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 2 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
9.60		CONTINUED						
31.5		Dense, orange-brown, fine to medium SAND, trace fine gravel, trace silt, trace clay, very weakly cemented	SP-SM					
10.67								
35.0								
						Air Hammer		
				-	5	DO	12/12	
		Very dense, orange to multi-colored, fine to coarse gravelly fine to coarse SAND, trace clay to fine to coarse sandy fine to coarse GRAVEL, trace clay	SP to GP					
					6	DO	Air Hammer 4/4	
16.76								
55.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM					
17.98								
59.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 3 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
17.98		CONTINUED						
59.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	-	7	DO	Air Hammer	21/21
19.81	65.0							
22.86		Very dense, brown, fine to medium SAND, trace silt, 1/2" thick fine sand and silt lens at 71'	SP	-	8	DO	Air Hammer	12/18
75.0								
26.52		Very dense, brown SILT, trace fine sand, very poorly graded, silt is coarse and sand is very fine	ML	-	9	DO	Air Hammer	36/36
87.0								
28.65		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay, occasional cobbles	SM	-	10	DO	Air Hammer	18/18
94.0								
		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 4 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
28.65 94.0		CONTINUED						
		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay, occasional cobbles	SM					
30.78 101.0				-	11	DO	Air Hammer	14/18
		Very dense, gray to brown, fine to coarse SAND, trace fine to coarse gravel, trace clay and/or trace silt	SP					
				-	12	DO	Air Hammer	15/18
36.27 119.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 5 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
36.27 119.0		CONTINUED							
		Very dense, gray to brown, fine to coarse SAND, trace fine to coarse gravel, trace clay and/or trace silt	SP	-	13	DO	Air Hammer	15/18	
38.40 126.0		Very dense, tan to multi-colored, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse GRAVEL and fine to coarse SAND, occasional cobbles	SP to GP	-	14	DO	Air Hammer	15/18	
45.42 149.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 6 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
45.42		CONTINUED							
149.0		Very dense, tan to multi-colored, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse GRAVEL and fine to coarse SAND, occasional cobbles	SP to GP	-	16	DO	Air Hammer	18/18	
47.24									
155.0		Very dense, brown to tan, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP-SM	-	17	DO	Air Hammer	18/18	
						-	18	DO	Air Hammer
53.34		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM						
175.0									
55.32				-	19	DO	Air Hammer	18/18	
181.5		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
 E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 7 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.			
55.32		CONTINUED								
181.5		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM							
56.39										
185.0		Very dense, dark brown to red-brown, SILT, trace fine sand, trace clay to SILT, some clay	ML to CL							
				-	20	DO	Air Hammer	18/18		
				-	21	DO	Air Hammer	10/18		
65.99										
216.5		CONTINUED								

Job No. 786085
 Scale 1" = 5'

Golder Associates

Drawn SKB
 Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 8 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
65.99		CONTINUED						
216.5		Very dense, dark brown to red-brown, SILT, trace fine sand, trace clay to SILT, some clay	ML to CL					
				- 23	DO	Air Hammer	24/36	
72.24								
237.0		Hard, Red, CLAY and green ROCK FRAGMENTS (weathered meta-volcanic tuff)						
74.37								
244.0		CONTINUED						

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 9 OF 9

SURFACE ELEV. 1653.0 ft. (503.82m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 5/8/81 DATE COMPLETED 5/13/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
74.37		CONTINUED						
244.0		Hard, Red, CLAY and green ROCK FRAGMENTS (weathered meta-volcanic tuff)		-	25	RC	72/108	
77.42		END OF BORING						
254.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N107900 ft. (N32888m)
E2287176 ft. (E697133m)

BORING LOG G41-M24

SHEET 1 OF 1

SURFACE ELEV. 1653.1 ft. (503.87m) PROJECT EXXON CRANDON TAILING DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/4/79 DATE COMPLETED 12/5/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS/ FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL (Note 2)
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
0.0		Compact to dense, brown, silty, fine to coarse SAND, some fine gravel to fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	1	AS	-	-	Grout
	28			2	DO	6-11-17	18/18	1.52	
								5.0	
	24			3	DO	11-11-13	18/18	2.44	
3.81		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt, occasional to frequent cobbles	SP						Pea Gravel
12.5	84			4	DO	19-24-60	18/18	8.0	
	152			5	DO	21-71-81	18/18	6.55	
	184							21.5	
8.38		Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM						Pea Gravel
27.5	150								
9.39	150			7	DO	50-100/3"	7/9	9.39	
30.8		END OF BORING							30.8

2" Solid PVC Pipe

2" Slotted PVC Pipe

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 7)
2. Groundwater observation well dry at completion of installation.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

BORING LOG G41-N21

SHEET 1 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
0.0		Compact to very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay to fine to coarse GRAVEL and fine to coarse SAND, trace silt, frequent cobbles and boulders	SP SM to SM	-	1	AS	-	-		
				69	2	D0	6-12-57	12/18		
				12	3	D0	6-6-6	7/18		
				120	4	D0	22-65-55	12/18		
3.81 12.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, trace silt, occasional to frequent cobbles and boulders	SP to SP SM		101	5	D0	14-27-74	12/18	
				141 16"	6	D0	20-57- ⁸⁴ / ₄ "	4/16		
				157 9"	7	D0	57-100/3"	4/9		
10.36 34.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

BORING LOG G41-N21

SHEET 2 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)	
10.36		CONTINUED							
34.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, trace silt, occasional to frequent cobbles and boulders	SP- to SP- SM	59	8	DO	20-26-33	12/18	Grout (to surface)
	140			11"	9	DO	40-100/5"	4/11	
	100			3"	10	DO	100/3"	2/3	
	110			3"	11	DO	110/3"	3/3	
	159			12	DO	16-143	5/12		
18.29		Very dense, brown, clayey SILT, some fine to coarse gravel, trace fine sand to clayey, silty, fine to coarse SAND, some fine to coarse gravel	ML- CL	100	13	DO	100/0"	0/0	2" Solid PVC Pipe to Surface
60.0				100	14	DO	16-47-53	18/18	
20.88		CONTINUED							
68.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COORD. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

BORING LOG G41-N21

SHEET 3 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ATT. (ins.)		
20.88		CONTINUED						CONTINUED			
68.5		Very dense, brown, clayey SILT, some fine to coarse gravel, trace fine sand to clayey, silty, fine to coarse SAND, some fine to coarse gravel	ML- CL	75	15	D0	15-25-50	18/18	Bentonite Clay Seal		
										23.16	
						54	16	D0	18-19-35	18/18	76.0
						50	17	D0	15-22-28	18/18	
				.65	18	D0	25-35-30	18/18			
				<u>115</u> <u>6"</u>	19	D0	115/6"	6/6			
28.19		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP- SM to SM	<u>195</u> <u>9"</u>	20	D0	87-108/3"	9/9	29.87		
92.5											
						112 <u>6"</u>	21	D0	112/6"	5/6	98.0
31.09		CONTINUED							CONTINUED		
102.0		CONTINUED							CONTINUED		

2" Solid PVC Pipe

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

BORING LOG G41-N21

SHEET 4 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC./ATT. (ins.)
31.09 102.0		CONTINUED						CONTINUED	
		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP SM to SM	154 2"	22	D0	154/2"	2/2	Caved Material
				150 3"	23	D0	150/3"	0/3	
				150 3"	24	D0	150/3"	2/3	
38.10 125.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, trace silt, occasional cobbles	SP to SW					2" Solid PVC Pipe	
41.45 136.0		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

BORING LOG G41-N21

SHEET 5 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79
 DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)	
41.45		CONTINUED								
136.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, trace silt, occasional cobbles	SP to SW	200 6"	25	DO	200/6"	4/6	12-18-79 41.51 Caved 136.2 42.21 138.5	
45.87				200 6"	26	DO	200/6"	3/6	45.23 148.4	

150.5 END OF BORING

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 26)
2. End of top of protector pipe, 1729.5 ft. (527.15m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	12/18/79	4/25/80	6/28/80	7/9/80	7/17/80	7/25/80	8/2/80
DEPTH (m)	41.51	42.00	41.67	41.70	41.70	41.70	41.73
DEPTH (ft.)	136.2	137.8	136.7	136.8	136.8	136.8	136.9

DATE	8/9/80	8/16/80	8/23/80	9/2/80	9/10/80		
DEPTH (m)	41.73	41.76	41.79	41.79	41.88		
DEPTH (ft.)	136.9	137.0	137.1	137.1	137.4		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

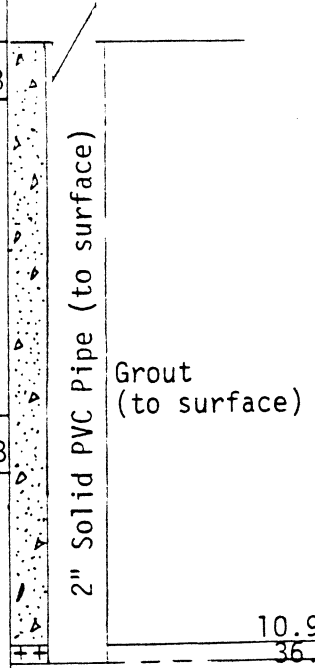
SHEET 1 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
0.0		Compact, light brown, fine to medium SAND, trace silt	SP						
				-	1	DO	Air Hammer	12/18	6/10/81 1.80 5.9
2.44 8.0		Compact to dense, brown, fine to medium SAND, some silt to fine to coarse SAND, some fine to coarse gravel, trace to some silt	SM to SP SM						
				-	2	DO	Air Hammer	18/18	
				-	3	DO	Air Hammer	18/18	
7.62 25.0		Dense, brown, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse GRAVEL and fine to coarse SAND, trace silt	SP to GP						
				-	4	DO	Air Hammer	12/18	
11.13 36.5								10.97 36.0	



CONTINUED

CONTINUED

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

SHEET 2 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	REC./ ATT.		
11.13		CONTINUED							CONTINUED	
36.5		Dense, brown, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse GRAVEL and fine to coarse SAND, trace silt	SP to GP						++ ++ ++ Bentonite Clay Seal 11.89	
				-	5	DO	Air Hammer	18/18		39.0
										Pea Gravel 13.41
13.72		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM						44.0	
45.0				-	6	DO	Air Hammer	18/18		2" Slotted PVC Pipe 16.46
										Pea Gravel 54.0
									17.07	
									17.68 57.0	
									58.0	
									Pea Gravel (to bottom of boring)	
21.79										
71.5		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

SHEET 3 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
21.79		CONTINUED							
71.5		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	9	DO	Air Hammer 18/18		
						-	10	DO	Air Hammer 18/18
30.18		CONTINUED							
99.0									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

SHEET 4 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
30.18 99.0		CONTINUED								
		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	11	DO	Air Hammer	18/18		
32.00 105.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP-SM	-	12	DO	Air Hammer	18/18		
						-	13	DO	Air Hammer	18/18
40.84 134.0		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

SHEET 5 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
40.84		CONTINUED						
134.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP-SM					
				-	15	D0	Air Hammer	18/18
44.20		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles	SM					
145.0				-	16	D0	Air Hammer	6/18
48.46		CONTINUED						
159.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

SHEET 6 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ ATT.	
48.46		CONTINUED						
159.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles	SM	-	17	DO	Air Hammer	12/18
50.29								
165.0		Hard, brown, CLAY, some green weathered rock fragments (weathered metavolcanic tuff)		-	18	DO	Air Hammer	18/18
53.34								
175.0		Hard, red, CLAY, some green weathered rock fragments (weathered metavolcanic tuff)		-	19	DO	Air Hammer	12/12
55.17								
181.0		END OF BORING						

NOTES

- Elevation of top of protector pipe, 1592.4 ft. (485.63m).

DATE	6/10/81					
DEPTH (m)	1.80					
DEPTH (ft.)	5.9					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

BORING LOG G41-P18

SHEET 1 OF 5

SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC./ATT. (ins.)	
0.34		Topsoil and rootmat		4	1	DO	1-2-2	18/18		
1.1		Very loose, red-brown to brown, silty fine SAND, some organic matter	SM						▼ 4/19/79	
0.91										0.55 1.8
3.0		Very loose, brown to red- brown SILT, some to trace clay, trace fine sand	ML	4	2	DO	2-2-2	18/18		
				2	3	DO	2-1-1	18/18		
				2	4	DO	1-1-1	18/18		
				2	5	DO	1-1-1	18/18		
				13	6	DO	2-2-11	18/18		
8.23		Compact to very dense, red- brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	33	7	DO	8-18-15	18/18		
27.0				16	8	DO	39-11-5	3/18		
11.28										
37.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 703

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

BORING LOG G41-P18

SHEET 2 OF 5

SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
11.28		CONTINUED							
37.0		Compact to very dense, red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM						
				15	9	DO	8-7-8	3/18	
				60	10	DO	25-27-33	18/18	
				140					
				10"					
15.70		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt Boulders noted at 51.5'-53.0' and 58.5'-59.5'	SP-SM						
51.5				11	DO	30-40-100	10/16		
				139	12	DO	17-47-92	18/18	
				134	13	DO	12-24-110	1/18	
				155	14	DO	60-90-65	9/18	
20.88		CONTINUED							
68.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111645 ft. (N34030m)
 E2288825 ft. (E697635m)

BORING LOG G41-P18

SHEET 3 OF 5

SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ATT. (ins.)		
20.88		CONTINUED								
68.5		Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt	SP	92	15	D0	21-37-55	5/18	2" Solid PVC Pipe to Surface	
21.95	SM									
72.0		Very dense, red-brown to light brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	160 10"	16	D0	37-60-100 4"	12/16		Grout (to surface)
				149	17	D0	33-59-90	18/18		
		Boring abandoned at 90.0' because of uncontrollable caving. Relocated hole 5' to the south. See notes 2 and 5.	SM	156	18	D0	47-56-100	18/18		
27.43										
90.0				112 9'	19	D0	35-77/3"	0/9		
		Very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to fine to coarse SAND, some silt, trace fine gravel, trace clay, frequent boulders	SM						28.04	
									Bentonite Clay Seal 92.0	
									28.96	
									95.0	
									Pea Gravel	
									30.48	
									100.0	
									Pea Gravel	
31.39										
103.0		CONTINUED							CONTINUED	

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

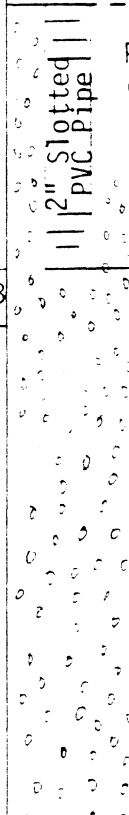
BORING LOG G41-P18

SHEET 4 OF 5

SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
31.39		CONTINUED						CONTINUED
103.0		Very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to fine to coarse SAND, some silt, trace fine gravel, trace clay, frequent boulders	SM					 2" Slotted PVC Pipe Pea Gravel (to bottom of boring)
33.99				130	22	D0	24-40-90	
111.5		Very dense, brown to red-brown SAND, GRAVEL and BOULDERS. (Unable to sample, unable to advance hole beyond 130'. See notes for details.)						
39.62								38.10
130.0		END OF BORING (See sheet 5 for notes)						125.0 (Note 3)

Job No. 786035
Scale 1"=5'

Golder Associates

Drawn jls
Checked JTB

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

BORING LOG G41-P18

SHEET 5 OF 5

SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPLETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (All samples)
2. Original borehole was abandoned and grouted due to uncontrollable caving. Abandoned borehole is 90 ft. deep and is 5 ft. to the south of the coordinates listed.
3. Lost 100 gallons of drilling mud in two hours below 125 ft.
4. Sample at 120 ft. depth could not be obtained due to caving of the borehole and to sand running up the casing above 120 ft. Due to the difficulty of advancing the borehole to 130 ft., the borehole was abandoned.
5. Soil samples 1 to 20 were obtained in the original borehole. Samples 21 and 22 were obtained in the relocated hole.
6. Elevation of top of protector pipe, 1591.5 ft. (485.09).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/19/79	1/2/80	2/11/80	4/25/80	7/9/80	7/17/80	7/25/80
DEPTH (m)	0.55	0.43	0.49	0.49	0.49	0.52	0.52
DEPTH (ft.)	1.8	1.4	1.6	1.6	1.6	1.7	1.7

DATE	8/2/80	8/9/80	8/16/80	8/22/80	9/2/80	9/10/80	
DEPTH (m)	0.55	0.55	0.58	0.58	0.58	0.61	
DEPTH (ft.)	1.8	1.8	1.9	1.9	1.9	2.0	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

BORING LOG G41-P18B

SHEET 1 OF 3

SURFACE ELEV. 1589.1 ft. (484.34m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/29/79 DATE COMPLETED 3/29/79
 DRILL RIG CME-45 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL (Note 2)		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)	
0.0 0.61		Very loose, dark brown ROOT MAT, SILT and SAND	PT	3	1	DO	1-2-1	6/18	4/19/79 0.15 0.5	
2.0		Loose to compact, red-brown, fine to medium SAND, trace silt	SP- SM	22	2	DO	6-9-13	10/18		
3.35				7	3	DO	6-3-4	18/18		
11.0				Soft to firm, light brown SILT, some to trace clay, trace fine sand	ML	-	4	TO	Push	0/24
		-	5			DO	Push	10/18		
		-	6			TO	Push	24/24		
						4	7	DO	2-2-2	18/18
8.84										
29.0		CONTINUED							CONTINUED	

2" Solid PVC Pipe to Surface

Grout
(to surface)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MB

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

BORING LOG G41-P18B

SHEET 2 OF 3

SURFACE ELEV. 1589.1 ft. (484.34m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/29/79 DATE COMPLETED 3/29/79

DRILL RIG CME-45 DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC/ATT. (ins.)		
8.84		CONTINUED						CONTINUED		
29.0		Soft to firm, light brown SILT, some to trace clay, trace fine sand	ML	8	3	DO	3-4-4	15/13	Grout 9.14	
10.21										Bentonite Clay Seal 30.0
33.5		Compact, light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	22	9	DO	6-12-10	8/18	Pea Gravel 10.06 33.0	
										Pea Gravel 10.67 35.0
13.56						22	10	DO	7-8-14	7/18
44.5		END OF BORING							Caved Material (Note 3)	

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1-3 and 7-10)
Penetration Test - 2" O.D. sampler pushed with drilling rig. (Sample 5)
- Water ponded on ground surface, 3/29/79.
- PERMEABILITY TEST NUMBER 1
Drove 3" casing from 41.0' to 44.5', leaving top of casing 5.5' above ground.
Cleaned hole to 44.3' (0.2' above bottom of casing) with water.
Performed falling head permeability test.

Time (min.)	Drop (ft.)	Time (min.)	Drop (ft.)
0.25	0.02	15.0	0.63
0.50	0.04	20.0	0.75
1.0	0.08	25.0	0.92
2.0	0.13	30.0	0.96
5.0	0.33	35.0	1.00
10.0	0.50		

Sand ran up casing 5.0' to 39.5' during permeability test.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 223

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

BORING LOG G41-P18B

SHEET 3 OF 3

SURFACE ELEV. 1589.1 ft. (484.34m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/29/79 DATE COMPLETED 3/29/79

DRILL RIG CME-45 DRILLING METHOD Mud Rotary

NOTES (continued)

4. Elevation of top of protector pipe, 1591.3 ft. (485.02m).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	4/19/79	1/2/80	2/13/80	5/17/80	7/9/80	7/17/80	7/25/80
DEPTH (m)	0.15	FROZEN	FROZEN	-0.18	-0.06	0.00	0.00
DEPTH (ft.)	0.5	FROZEN	FROZEN	-0.6	-0.2	0.0	0.0

DATE	8/2/80	8/9/80	8/16/80	8/20/80	8/22/80	9/2/80	9/10/80
DEPTH (m)	0.00	0.03	0.03	0.09	0.03	0.03	0.09
DEPTH (ft.)	0.0	0.1	0.1	0.3	0.1	0.1	0.3

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DAB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 1 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	REC./ ATT. (ins.)	
0.0		Compact, brown, fine to medium SAND and organic SILT to fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	1 pit	-	-	(Note 2)	
1.83				-	2 pit	-	-		
6.0									
6.86		Compact to dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt to fine to coarse gravelly, fine to coarse SAND, trace to some silt, frequent cobbles	SP SM	-	3 DO	Air Hammer	6/6		
22.5				-	4 DO	Air Hammer	3/18		
						-	5 DO	Air Hammer	12/12
6.86		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles	SM	-	6A DO	Air Hammer	0/12		
22.5				-	6B DO	Air Hammer	10/10		
						-	7 DO	Air Hammer	15/15
10.36		CONTINUED							
34.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MRB

COORD. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 2 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC / ATT. (ins.)
10.36 34.0		CONTINUED							
		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles Boulder noted at 37.5'-38.5'	SM	8	DO	Air Hammer	6/6	(Note 3)	
				-	9	DO	Air Hammer		12/12
12.95 42.5		Very dense light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles Boulder noted at 44.5'-45.5'	SP to GP						
				-	10	DO	Air Hammer		6/12
				-	11	DO	Air Hammer		12/12
				-	12	DO	Air Hammer	2/3	
				-	13	DO	Air Hammer	9/9	
				-	14	DO	Air Hammer	6/7	
20.42 67.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 3 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC / ATT. (ins.)
20.42 67.0		CONTINUED							
		Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles	SP to GP	-	15	DO	Air Hammer	4/6	Grout (to surface)
				-	16	DO	Air Hammer	6/7	
				-	17	DO	Air Hammer	7/13	
25.15 82.5		Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel	SM					2" Solid PVC Pipe to Surface	
				-	18	DO	Air Hammer		12/12
26.67 87.5		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, occasional cobbles	SP SM					27.43 ▼27.65 90.0 ≈90.7 1/10/80 Bentonite Clay Seal 28.96 95.0 Pea Gravel	
				-	19	DO	Air Hammer		9/12
				-	20	DO	Air Hammer		4/12
30.18 99.0		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 4 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)		
30.18		CONTINUED						CONTINUED			
99.0		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, occasional cobbles	SP SM	-	21	DO	Air Hammer	0/12	Solid Pea Gravel		
										31.39	
						-	22	DO	Air Hammer	10/13	103.0
											2" Slotted PVC Pipe 34.44
						-	23	DO	Air Hammer	12/12	
									Pea Gravel (to bottom of boring)		
					-	24	DO	Air Hammer	6/9		
40.54		CONTINUED									
133.0											

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 5 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1) (ins.)	
40.54 133.0		CONTINUED						
		Very dense, light brown to borwn, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, occasional cobbles	SP- SM	-	25	D0	Air Hammer 2/12	
43.43 142.5		Very dense, light brown, fine to coarse gravelly, fine to coarse SAND, some silt	SW- SM	-	26A	D0	Air Hammer 0/4	
							Air Hammer	
				-	26B	D0	8/12	
47.24 155.0		Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse sandy, fine to coarse GRAVEL, trace silt, occasional cobbles	SP to GP				Air Hammer	
						-	27	D0
50.29 165.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 6 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
50.29 165.0		CONTINUED						
		Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse sandy, fine to coarse GRAVEL, trace silt, occasional cobbles	SP	-	28	DO	Air Hammer	4/14
			to GP					
				-	29	DO	Air Hammer	5/12
56.39 185.0		Very dense, light brown, fine to coarse SAND, trace fine gravel, trace silt	SP	-	30	DO	Air Hammer	12/14
59.44 195.0		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM					
60.65 199.0			CONTINUED					

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 7 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)		REC/ATT. (ins.)	
60.65 199.0		CONTINUED								
		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	-	31	DO	Air Hammer	5/5		
				-	32	DO	Air Hammer	2/2		
64.77 212.5				Very dense, light brown to brown, fine to medium SAND, trace to some silt	SP SM	-	33	DO	Air Hammer	10/12
						-	34	DO	Air Hammer	10/13
71.02 233.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COORD. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 8 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	REC./ ATT. (ins.)	
71.02 233.0		CONTINUED							
		Very dense, light brown to brown, fine to medium SAND, trace to some silt	SP- SM						
				-	35	D0	Air Hammer	18/18	
74.68 245.0		CONTINUED							
		Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	36	D0	Air Hammer	15/15	
				-	37	D0	Air Hammer	18/18	
80.77 265.0		Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SP to SP- SM						
81.84 268.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 9 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC/ATT. (ins.)	
81.84		CONTINUED								
268.5		Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SP to SP- SM	-	38	DO	Air Hammer	12/18		
						-	39	DO	Air Hammer	18/18
						-	40	DO	Air Hammer	13/16
89.92		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt, trace clay to fine to coarse GRAVEL and fine to coarse SAND, some silt, trace clay	SM							
295.0						-	41	DO	Air Hammer	8/15
92.35		CONTINUED								
303.0										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 10 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC/ ATT. (ins.)
92.35 303.0		CONTINUED							
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt, trace clay to fine to coarse GRAVEL and fine to coarse SAND, some silt, trace clay	SM						
				-	42	DO	Air Hammer	18/18	
96.62 317.0		Gray-green highly weathered to weathered, metavolcanic TUFF							
				-	43	DO	Air Hammer	0/1	
101.80 334.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

BORING LOG G41-P24

SHEET 11 OF 11

SURFACE ELEV. 1682.0 ft. (512.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

DRILL RIG Drilltech D40K DRILLING METHOD _____

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. (Note 1)	
101.80		CONTINUED						
334.0		Gray-green, highly weathered to weathered metavolcanic TUFF						
105.16				-	45	HX RC	-	58/60

345.0 END OF BORING

NOTES

1. Penetration Test - 3" O.D. sampler driven with air hammer. (Samples 3 - 44)
2. Soil samples 1 and 2 were obtained from the walls of the drilling mud pit.
3. Could not extract 40 ft. of 6" casing. Abandoned casing from 3.0 ft. to 43.0 ft.
4. Elevation of top of protector pipe, 1684.4 ft. (513.40).

Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	1/10/80	2/14/80	4/25/80	5/19/80	6/28/80	7/9/80	7/17/80
DEPTH (m)	27.65	27.83	27.86	27.83	27.77	27.80	27.80
DEPTH (ft.)	90.7	91.3	91.4	91.3	91.1	91.2	91.2

DATE	7/25/80	8/2/80	8/9/80	8/16/80	8/18/80	8/23/80	9/2/80
DEPTH (m)	27.83	27.83	27.86	27.89	27.92	27.89	27.89
DEPTH (ft.)	91.3	91.3	91.4	91.5	91.6	91.5	91.5

DATE	9/10/80	6/10/81					
DEPTH (m)	27.95	28.47					
DEPTH (ft.)	91.7	93.4					

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRE

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 1 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
0.0		Compact, tan, SILT, trace fine sand	ML					
1.52 5.0		Compact, light brown, fine SAND, trace silt	SP	- 1	DO	Hydraulic Push 15/18		
2.44 8.0		Compact, brown, fine to coarse gravelly, fine to coarse SAND, trace silt with occasional silt lenses throughout strata	SP- SM	- 2	DO	Hydraulic Push 12/18		
4.88 16.0		Compact to dense, brown, SILT, some fine sand to fine SAND, trace silt, very poorly graded. (These occur in alternating layers of various thicknesses.)	ML to SP	- 3	DO	Hydraulic Push 18/18		
								▼ 6/10/81 6.86 22.5
9.60 31.5		CONTINUED				Hydraulic Push 24/24		

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 2 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
9.60 31.5		CONTINUED						
		Compact to dense, brown, SILT, some fine sand to fine SAND, trace silt, very poorly graded. These occur in alternating layers of various thicknesses.	ML to SP					
				-	5	DO	Air Hammer	18/18
13.41 44.0		Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP					
				-	6	DO	Air Hammer	18/18
16.46 54.0		Very dense, brown to multi-colored, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy, fine to coarse GRAVEL	SP to GP					
				-	7	DO	Air Hammer	12/18
20.27 66.5		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 4 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
30.94		CONTINUED								
101.5		Very dense, brown to multi-colored, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy, fine to coarse GRAVEL	SP to GP							
				-	12	DO	Air Hammer	8/12		
						-	13	DO	Air Hammer	0/18
					-	13a	DO	Air Hammer	15/18	
38.56		Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth.	SP							
126.5										
					-	14	DO	Air Hammer	18/18	
41.61										
136.5		CONTINUED								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 5 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
41.61		CONTINUED							
136.5		Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth.	SP					2" Solid PVC Pipe to Surface Grout (to surface)	
	-			15	D0	Air Hammer	18/18		
	-			16	D0	Air Hammer	18/18		
	-			17	D0	Air Hammer	5/17		
49.83		CONTINUED							
163.5									CONTINUED

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-022

SHEET 8 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
69.04 226.5		CONTINUED							
		Very dense, brown to multi-colored, fine to coarse gravelly fine to coarse SAND to fine to coarse sandy fine to coarse GRAVEL	SP to GP						
				-	24	DO	Air Hammer	18/18	
				-	25	DO	Air Hammer	18/18	
74.98 246.0		Very dense, light brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine to coarse gravel, trace silt	SP						
				-	26	DO	Air Hammer	5/18	
				-	27	DO	Air Hammer	10/18	
79.71 261.5		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 6 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
49.83 163.5		CONTINUED						CONTINUED	
		Very dense, brown, fine SAND and SILT, very poorly graded. Fineness increasing with increasing depth.	ML					2" Solid PVC Pipe Grout 50.90 167.0 Bentonite Clay Seal 51.82 170.0 Pea Gravel	
				-	18	DO	Air Hammer		15/15
53.34 175.0		Very dense, brown to light brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SP					2" Slotted PVC Pipe 53.93 177.0 Pea Gravel 57.00 187.0 Pea Gravel (to bottom of boring)	
				-	19	DO	Air Hammer		18/18
				-	20	DO	Air Hammer		26/26
60.66 199.0		CONTINUED							

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 7 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
60.66 199.0		CONTINUED						
		Very dense, brown to light brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt	SP	-	21	DO	Air Hammer	18/24
				-	22	DO	Air Hammer	15/18
66.14 217.0		Very dense, brown to multi-colored, fine to coarse gravelly fine to coarse SAND to fine to coarse sandy fine to coarse GRAVEL	SP to GP	-	23	DO	Air Hammer	12/24
69.04 226.5				CONTINUED				

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64Hp DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
79.71 261.5		CONTINUED						
		Very dense, light brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine to coarse gravel, trace silt	SP					
				-	28	D0	Air Hammer	18/18
84.58 277.5		Very dense, multi-colored, fine to coarse sandy, fine to coarse GRAVEL, some gravel decomposed	GP					
				-	29	D0	Air Hammer	15/18
88.09 289.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

BORING LOG G41-Q22

SHEET 10 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.	
88.09		CONTINUED						
289.0		Very dense, multi-colored, fine to coarse sandy, fine to coarse GRAVEL, some gravel decomposed	GP	-	30	DO	Air Hammer	16/16
90.83								
298.0		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP	-	31	DO	Air Hammer	18/18
94.03								
308.5		Partially weathered, green- gray, metavolcanic TUFF		-	32	RC		72/84
96.47								

316.5

END OF BORING

NOTES

1. Elevation of top of protector pipe, 1615.6 ft. (492.43m).

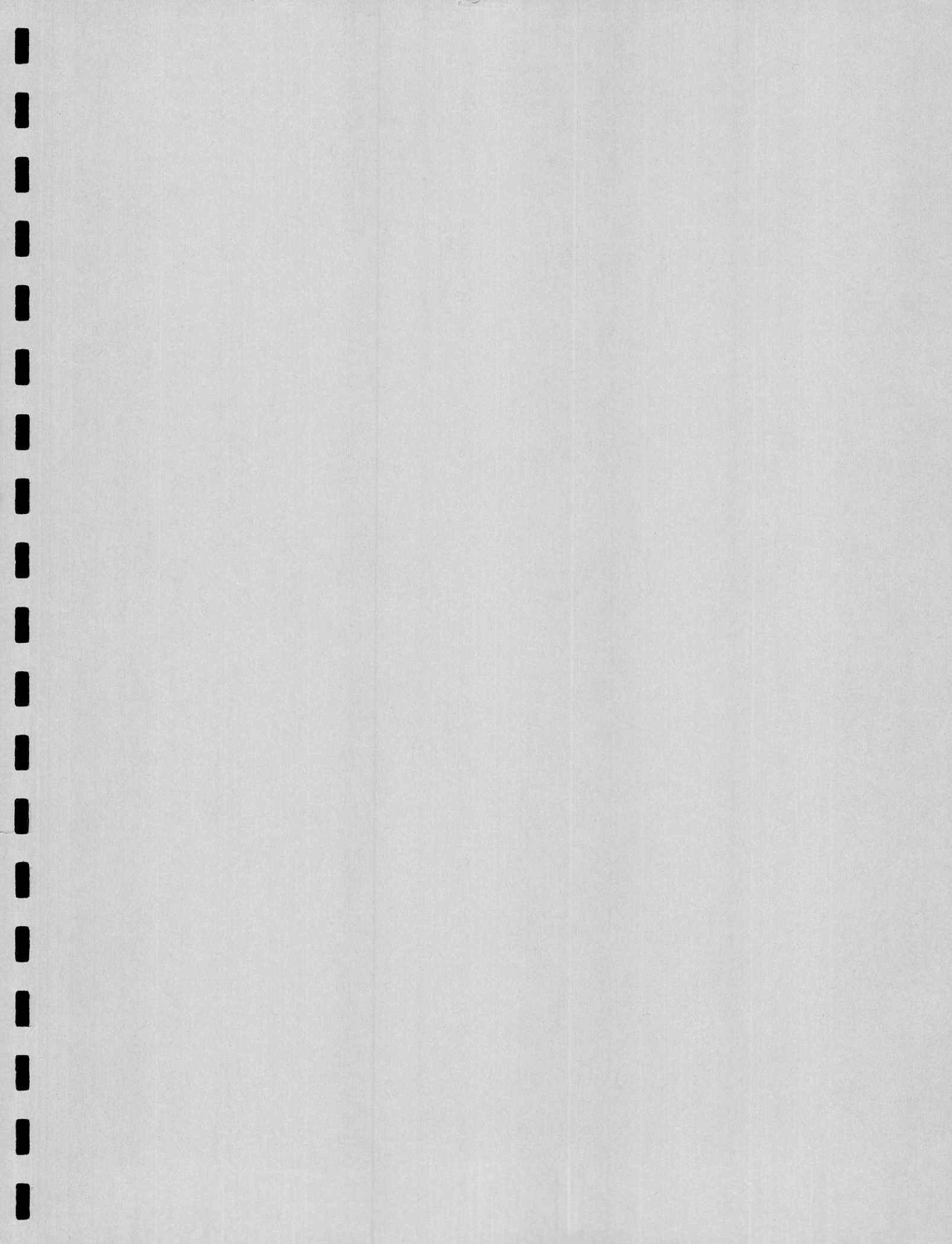
Table of Water Level Readings by Date. Readings Indicate Depth Below Ground Surface.

DATE	DEPTH (m)	DEPTH (ft.)					
6/10/81	6.87	22.5					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB



UW-STEVENS POINT



3 1775 620572 0