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APPENDIX 2.1A

TSP & SO₂ CONCENTRATIONS AT STATIONS 1, 2, AND 3
(MARCH 1977 - DECEMBER 1978)

TABLE A-1

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TSP AND SO₂ CONCENTRATIONS^a AT STATIONS 1, 2 and 3
(MARCH 1977 - DECEMBER 1978)

YEAR	DATE	TSP STATION 1	TSP STATION 2 ^b	TSP STATION 3 ^b	SO ₂ STATION 1 ^b
1977	March	29	10	--	--
	April	04	4	--	--
		16	31	--	--
		19	37	--	--
		22	9	--	--
		25	5	--	--
		28	9	--	--
	May	01	59	--	--
		04	50	--	--
		07	10	--	--
		10	25	--	--
		13	53	--	--
		16	44	--	--
		19	37	--	--
		22	50	--	--
		25	31	--	--
		28	37	--	--
		31	17	--	--
	June	03	24	--	--
		06	9	--	--
		09	11	--	--
		12	11	--	--
		15	26	--	--
		18	15	--	--
		21	25	--	--
		27	31	--	--
		30	15	--	--
	July	03	31	--	--
		06	65	--	--
		09	11	--	--
		12	16	--	--
		15	15	--	--
		18	19	--	--
		21	11	--	--
		24	29	--	--
		27	18	--	--
		30	15	--	--

^aConcentrations represent 24-hour samples and are expressed in $\mu\text{g}/\text{m}^3$.

^bMonitoring was not established for these until late 1977 and early 1978.

TABLE A-1 (continued)

YEAR	DATE	TSP STATION 1	TSP STATION 2 ^b	TSP STATION 3 ^b	SO ₂ STATION 1 ^b	
1977	August	02	14	--	--	--
		05	28	--	--	--
		08	19	--	--	--
		11	22	--	--	--
		14	12	--	--	--
		17	11	--	--	--
		20	25	--	--	--
		23	12	--	--	--
		26	46	--	--	--
	29	16	--	--	--	
	September	01	13	--	--	--
		04	22	--	--	--
		07	14	--	--	--
	October	01	8	--	--	--
		04	18	--	--	--
		07	6	--	--	--
		10	17	--	--	--
		13	17	--	--	--
		19	15	--	--	--
		22	10	--	--	--
		25	22	--	--	--
		28	8	--	--	--
		31	35	--	--	--
		November	03	14	--	--
	06		11	--	--	--
	09		23	--	--	--
	12		6	--	--	--
	15		38	--	--	--
	18		9	--	--	--
	21		17	--	--	--
	24		10	--	--	12
	30		25	--	--	12
	December	03	5	--	--	12
		06	10	--	--	12
09		9	--	--	12	
12		38	--	--	--	
15		14	--	--	12	
18		19	--	--	12	
21		6	--	--	12	
24		11	--	--	12	
27		9	--	--	--	
30		17	--	--	--	

TABLE A-1 (continued)

YEAR	DATE	TSP STATION 1	TSP STATION 2 ^b	TSP STATION 3 ^b	SO ₂ STATION 1 ^b		
1978	January	02	8	—	—	—	
		05	9	—	—	12	
		11	—	—	—	12	
		14	5	—	—	—	
		17	6	—	—	12	
		20	7	6	—	12	
		23	41	39	—	12	
		26	10	8	—	12	
		29	7	8	—	12	
		February	01	16	16	15	12
			04	21	24	26	12
	07		—	4	5	12	
	10		8	5	6	12	
	13		4	3	4	12	
	16		20	17	18	12	
	19		14	14	15	12	
	22		16	12	13	12	
	25		6	6	7	12	
	28		7	9	7	12	
	March		03	6	6	6	12
			06	14	14	12	12
			09	24	22	23	12
		12	18	16	15	12	
		15	11	11	10	12	
		18	21	21	20	12	
		21	13	12	12	12	
		24	9	7	9	12	
		27	16	16	16	12	
		30	30	28	31	12	
		April	02	14	8	2	12
	05		10	8	8	12	
	08		7	7	8	12	
	11		26	25	47	12	
	14		11	7	6	12	
	17		8	8	10	12	
	20		6	5	6	12	
	23		17	16	16	12	
	26		25	17	17	12	
	29	19	15	40	12		

TABLE A-1 (continued)

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YEAR	DATE	TSP STATION 1	TSP STATION 2 ^b	TSP STATION 3 ^b	SO ₂ STATION 1 ^b	
1978	May	02	22	10	10	12
		05	99	14	46	12
		08	18	14	17	12
		11	72	34	40	12
		14	3	5	3	12
		17	22	23	30	12
		20	19	18	21	12
		23	42	43	61	12
		26	55	52	74	12
	29	39	37	40	12	
	June	01	18	23	23	12
		04	21	21	29	12
		07	—	26	60	12
		10	—	65	73	12
		13	8	8	35	12
		16	41	39	39	12
		19	27	22	—	12
		22	17	17	36	12
		25	62	60	64	12
		28	23	22	28	12
		July	01	13	11	12
	04		22	23	24	12
	07		18	18	17	12
	10		8	9	10	12
	13		25	23	24	12
	16		17	34	20	12
	19		24	24	26	12
	22		8	8	10	12
	25		28	29	31	12
	28		35	18	23	12
	31		20	15	—	12
	August	03	14	11	11	12
		06	25	25	39	12
		09	14	13	37	12
		12	37	38	50	12
15		51	49	50	12	
18		30	27	23	12	
21		5	34	35	12	
24		17	15	18	12	
27		12	—	11	12	
30		27	11	17	12	

TABLE A-1 (continued)

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YEAR	DATE	TSP STATION 1	TSP STATION 2 ^b	TSP STATION 3 ^b	SO ₂ STATION 1 ^b		
1978	September	02	44	39	50	12	
		05	30	32	36	12	
		08	38	17	12	12	
		11	31	22	29	12	
		14	—	8	7	12	
		17	9	9	10	12	
		20	6	13	11	12	
		23	23	18	23	12	
		26	7	27	29	12	
		29	27	27	26	12	
		October	02	27	25	27	12
			05	13	31	14	—
			08	11	12	11	12
			11	30	29	30	12
	14		7	11	7	12	
	17		33	23	23	12	
	20		77	61	71	12	
	23		43	9	11	12	
	26		25	9	10	12	
	29		21	21	21	12	
	November		01	45	30	38	12
		04	22	17	44	12	
		07	21	15	17	12	
		10	—	20	29	12	
		13	9	11	10	12	
		16	15	17	26	12	
		19	9	9	9	12	
		22	12	11	11	—	
		25	9	9	8	—	
		28	14	15	17	—	
	December	01	13	14	13	—	
		04	16	19	19	—	
		07	15	15	16	—	
		10	14	15	15	—	
		13	13	12	13	—	
		16	19	—	19	—	
		19	14	14	14	—	
		22	19	20	21	—	
		25	12	12	13	—	
		28	11	10	11	—	
		31	—	—	—	—	

APPENDIX 2.1B

OPTICAL MICROSCOPY AMBIENT AIR PARTICULATE SAMPLES
(TABLES B-1 THROUGH B-24)

Job No. 8837-042

Client Exxon

TABLE B-1

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 4/16/77
Concentration of TSP 31 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	5%	21%	
Combustion Products Coal Dust Coal Soot Fly Ash	<1%	0%	
Biological Pollen Spores Trichomes Wood Fibers	17%	56%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-2

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 5/1/77
Concentration of TSP 59 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 2/9/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	15%	10%	
Combustion Products Coal Dust Coal Soot Fly Ash	1%	10%	
Biological Pollen Spores Trichomes Wood Fibers	1%	62%	Mostly pollen and trichomes.
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-3

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 5/16/77
Concentration of TSP 44 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	< 1%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	< 1%	0%	
Biological Pollen Spores Trichomes Wood Fibers	9%	33% Pollen and Plant Debris 57% Cottonwood Seed Tree Hairs or Balsam Poplar Catkins	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-4

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 5/31/77
Concentration of TSP 17 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	1%	37%	Mostly Clays
Combustion Products Coal Dust Coal Soot Fly Ash	<1%	0%	
Biological Pollen Spores Trichomes Wood Fibers	17%	45%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-5

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 6-15-77
 Concentration of TSP 26 $\mu\text{g}/\text{m}^3$

Analyst RRB
 Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	1%	11%	
Combustion Products Coal Dust Coal Soot Fly Ash	<1%	0%	
Biological Pollen Spores Trichomes Wood Fibers	14%	73% <i>Mostly Insect Parts</i>	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-6

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 6/30/77
Concentration of TSP 1.5 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	5%	7%	
Combustion Products Coal Dust Coal Soot Fly Ash	3%	0%	
Biological Pollen Spores Trichomes Wood Fibers	28%	56%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-7

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 7/6/77
Concentration of TSP 65 µg/m³

Analyst RRB
Date Analyzed 3/3/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	93%	0%	Quartz, calcite, and trace of clay.
Combustion Products Coal Dust Coal Soot Fly Ash	21%	0%	
Biological Pollen Spores Trichomes Wood Fibers	3%	4%	Trace of wood fibers
Miscellaneous			

Note: This sample taken during "dusty" conditions from nearby road construction.

Job No. 8837-042

Client Exxon

TABLE B-8

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 7/12/77
Concentration of TSP 16 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	20%	21%	
Combustion Products Coal Dust Coal Soot Fly Ash	< 1%	0%	
Biological Pollen Spores Trichomes Wood Fibers	14%	46%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-9

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 7/24/77
Concentration of TSP 29 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	14%	33%	
Combustion Products Coal Dust Coal Soot Fly Ash	21%	0%	
Biological Pollen Spores Trichomes Wood Fibers	51%	0%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-10

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 8/5/77
Concentration of TSP 28 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	9%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	5%	0%	
Biological Pollen Spores Trichomes Wood Fibers	54%	32%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-11

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 8/17/77
 Concentration of TSP 11 µg/m³

Analyst RRB
 Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	1%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	0%	0%	
Biological Pollen Spores Trichomes Wood Fibers	36%	6.3%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-12

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 8/29/77
Concentration of TSP 16 µg/m³

Analyst RRB
Date Analyzed 2/22/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	4%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	0%	0%	
Biological Pollen Spores Trichomes Wood Fibers	73%	24%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-13

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 10/4/77
 Concentration of TSP 18 µg/m³

Analyst RRB
 Date Analyzed 2/28/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	53%	9%	Quartz, Calcite, and small amounts of clays.
Combustion Products Coal Dust Coal Soot Fly Ash	20%	9%	Mostly soot.
Biological Pollen Spores Trichomes Wood Fibers	5%	4%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-14

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 10/22/77
Concentration of TSP 10 µg/m³

Analyst RRB
Date Analyzed 3/1/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	38%	45%	Mostly quartz and calcite.
Combustion Products Coal Dust Coal Soot Fly Ash	15%	0%	
Biological Pollen Spores Trichomes Wood Fibers	2%	0%	Trace of stellate hairs and trichomes
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-15

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 11/6/77
Concentration of TSP 11 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 3/1/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	92%	0%	Mostly clays
Combustion Products Coal Dust Coal Soot Fly Ash	4%	0%	
Biological Pollen Spores Trichomes Wood Fibers	4%	0%	Trace trichomes
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-16

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 11/21/77
Concentration of TSP 17 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 3/1/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	76%	20%	Quartz, calcite, and clay
Combustion Products Coal Dust Coal Soot Fly Ash	3%	0%	
Biological Pollen Spores Trichomes Wood Fibers	1%	0%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-17

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 12/9/77
 Concentration of TSP 9 $\mu\text{g}/\text{m}^3$

Analyst OPB
 Date Analyzed 3/3/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	7%	88% Particles of quartz or calcite 30-40 μm diameter.	Trace iron oxides
Combustion Products Coal Dust Coal Soot Fly Ash	4%	0%	
Biological Pollen Spores Trichomes Wood Fibers	<1%	0%	Trace of animal hair like McCrone plate 54, rat hair.
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-18

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 12/24/77
 Concentration of TSP 11 µg/m³

Analyst RRB
 Date Analyzed 3/3/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	97%	0%	Mostly quartz and calcite
Combustion Products Coal Dust Coal Soot Fly Ash	3%	0%	
Biological Pollen Spores Trichomes Wood Fibers	0%	0%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-19

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 1/5/78
Concentration of TSP 9 µg/m³

Analyst ARR
Date Analyzed 6/14/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	1%	39%	Trace Shale
Combustion Products Coal Dust Coal Soot Fly Ash	26%	0%	Sect
Biological Pollen Spores Trichomes Wood Fibers	0%	35%	Trace Wood Fiber and Cotton Fiber
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-20

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 11/23/78
 Concentration of TSP 41 µg/m³

Analyst DRB
 Date Analyzed 6/14/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	Numerous particles less than 1 µm, too small to identify not included in the count below. 7%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	30%	0%	
Biological Pollen Spores Trichomes Wood Fibers	0%	63% Wood Fibers	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-21

OPTICAL MICROSCOPY
 AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
 Site No. 1
 Date Sampled 2/10/78
 Concentration of TSP 8 µg/m³

Analyst RRB
 Date Analyzed 6/14/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	64%	0%	Quartz and Calcite
Combustion Products Coal Dust Coal Soot Fly Ash	36%	0%	Soot
Biological Pollen Spores Trichomes Wood Fibers	0%	0%	
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-22

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 2/25/78
Concentration of TSP 6 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 4/14/78

Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	43%	56%	Clays
Combustion Products Coal Dust Coal Soot Fly Ash	0%	0%	
Biological Pollen Spores Trichomes Wood Fibers	0%	0%	Trace of cotton and wood fibers
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-23

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 3/12/78
Concentration of TSP 18 µg/m³

Analyst RRB
Date Analyzed 6/14/78

Particulate Type	Percent of Total Area Less than 30 µm	Percent of Total Area 30 µm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	1%	0%	
Combustion Products Coal Dust Coal Soot Fly Ash	3%	47%	Soot
Biological Pollen Spores Trichomes Wood Fibers	2%	47%	Wood Fibers
Miscellaneous			

Job No. 8837-042

Client Exxon

TABLE B-24

OPTICAL MICROSCOPY
AMBIENT AIR PARTICULATE SAMPLES

Sample Identification
Site No. 1
Date Sampled 3/27/78
Concentration of TSP 16 $\mu\text{g}/\text{m}^3$

Analyst RRB
Date Analyzed 6/14/78

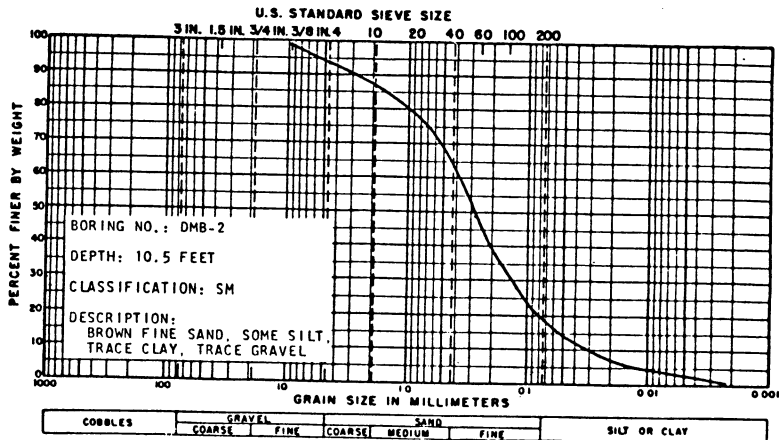
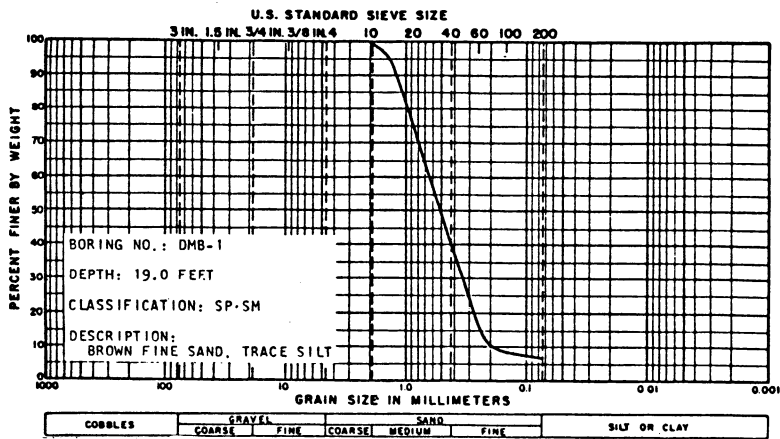
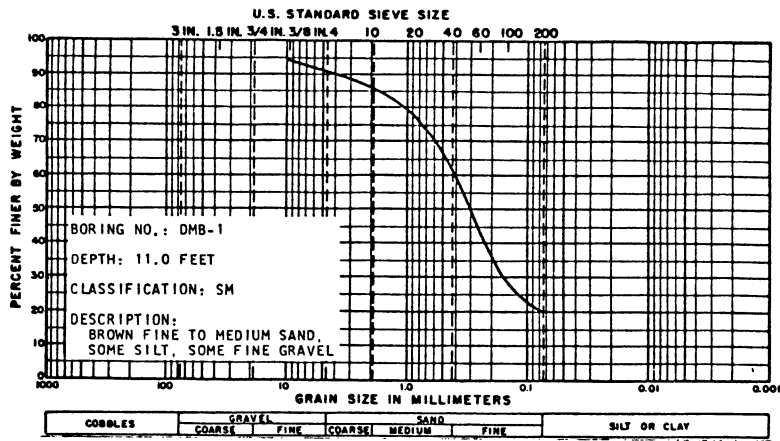
Particulate Type	Percent of Total Area Less than 30 μm	Percent of Total Area 30 μm and greater	Comments
Minerals Quartz Calcite Iron Oxides Clays	7%	44%	Clays
Combustion Products Coal Dust Coal Soot Fly Ash	9%	0%	
Biological Pollen Spores Trichomes Wood Fibers	0%	39%	Wood Fibers
Miscellaneous			

LIST OF APPENDICES

<u>Number</u>	<u>Title</u>
2.2A	PARTICLE SIZE ANALYSES AND CLAY MINERAL ANALYSES
2.2B	BORING LOGS

APPENDIX 2.2A

PARTICLE SIZE ANALYSES AND CLAY MINERAL ANALYSES

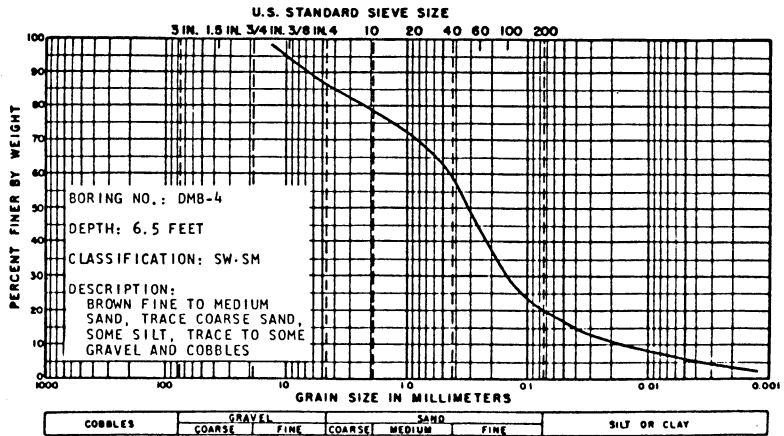
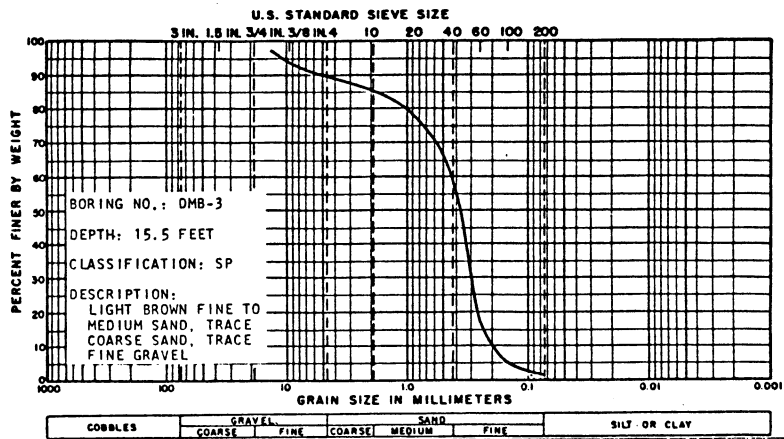
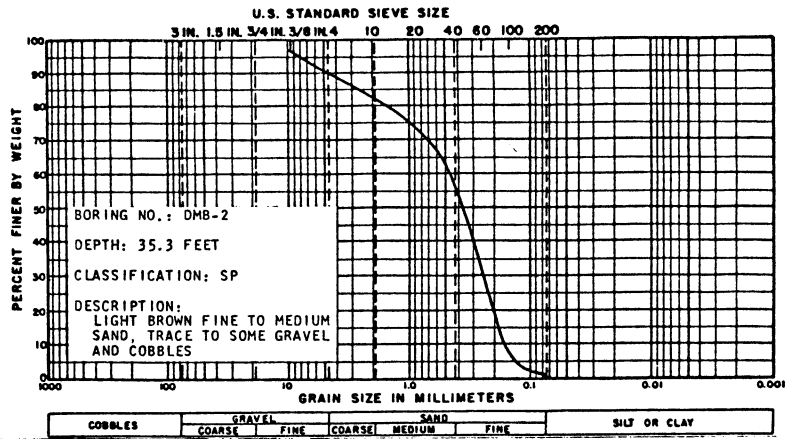


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-1

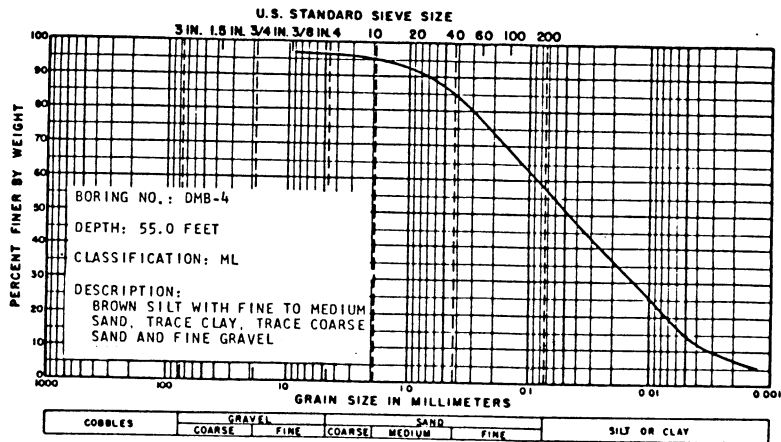
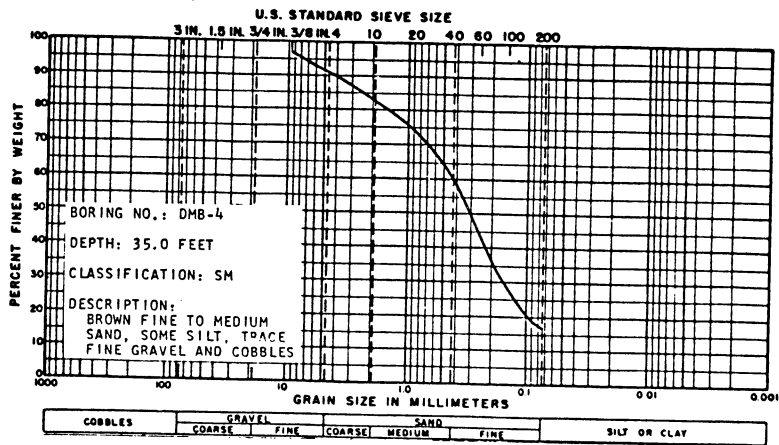
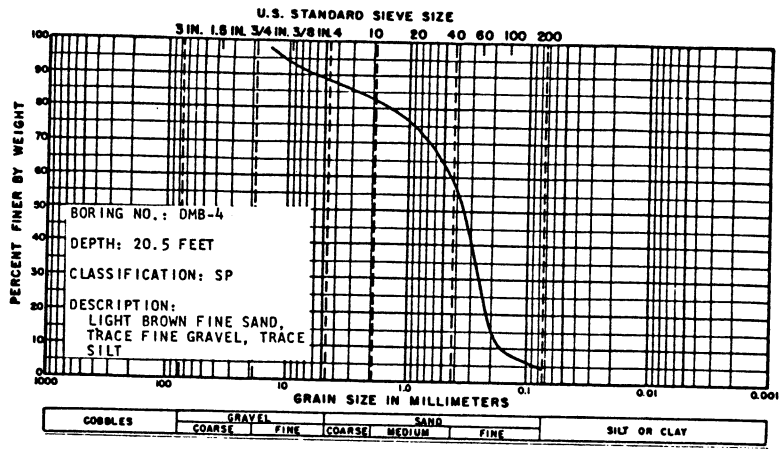


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-2

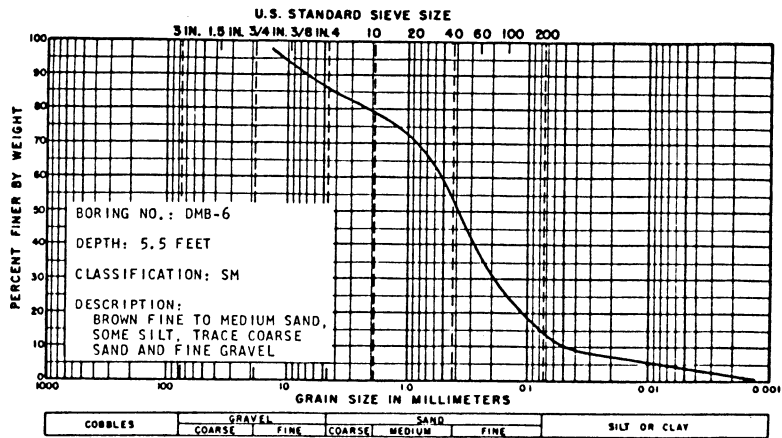
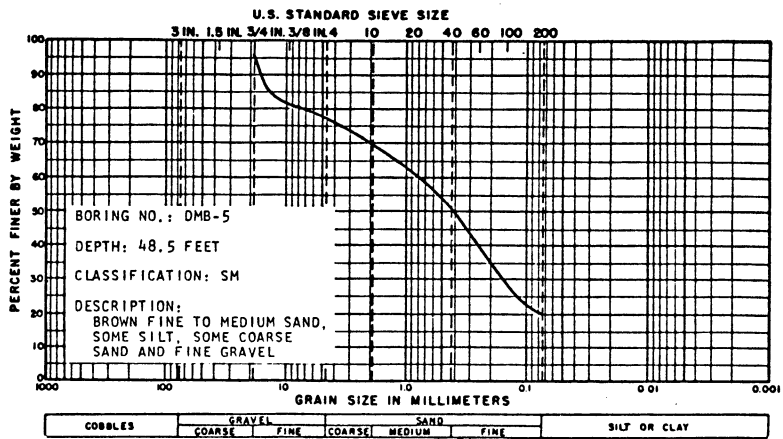
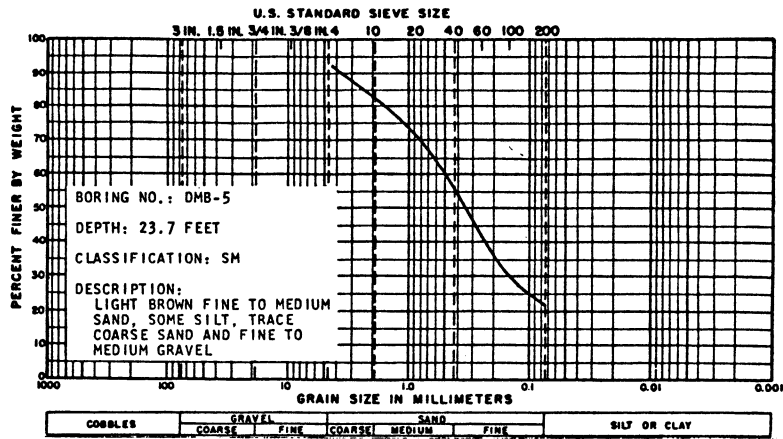


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-3

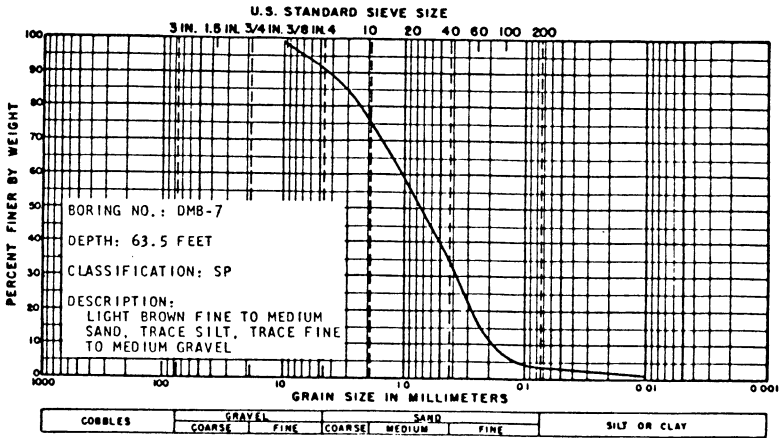
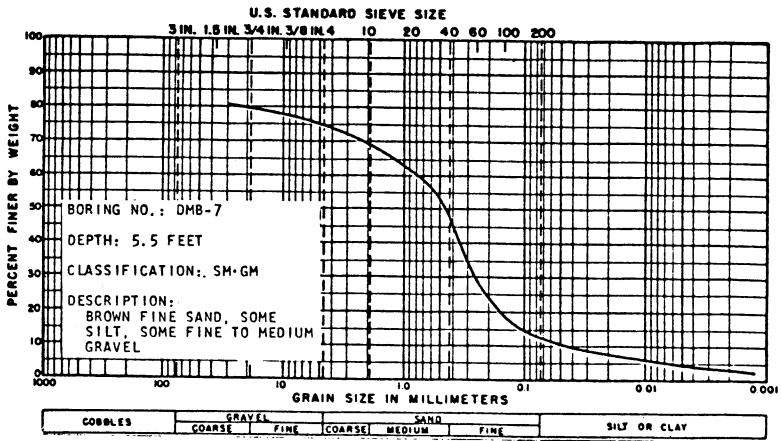
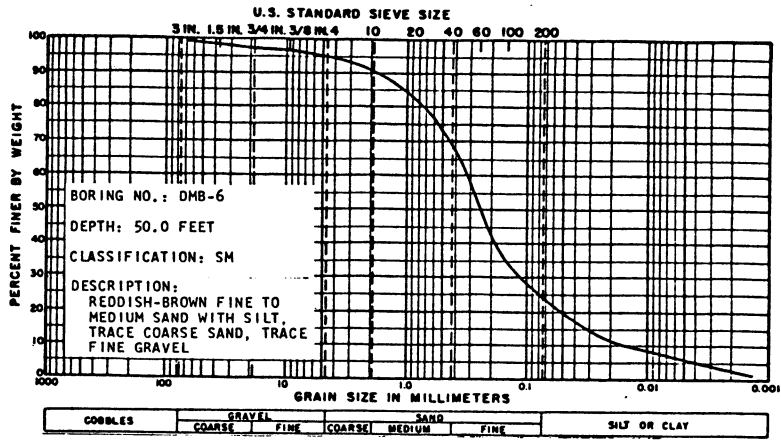


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-4

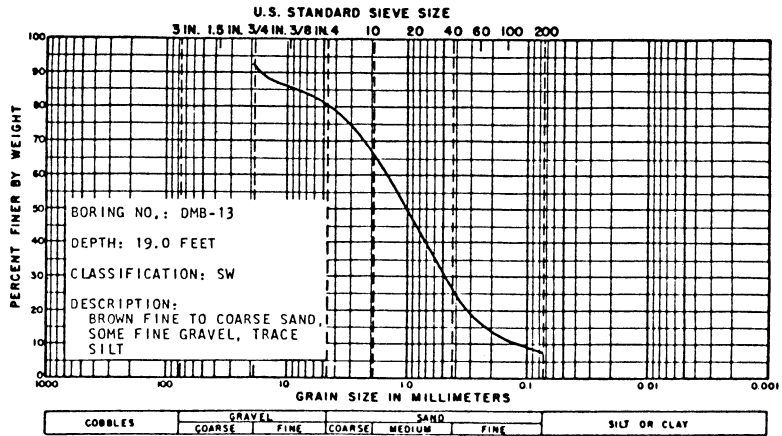
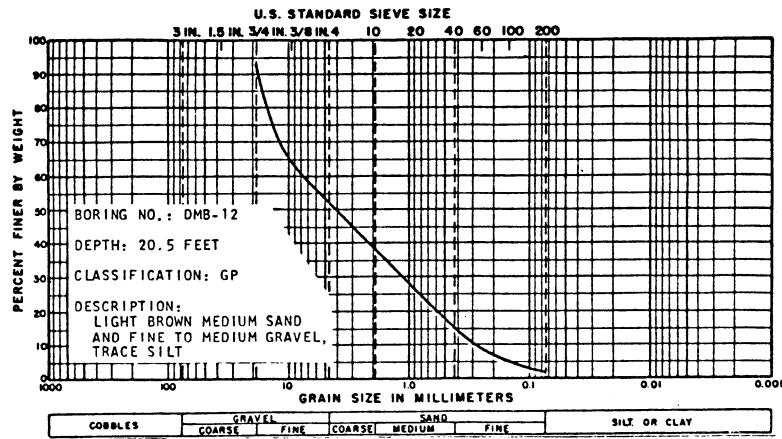
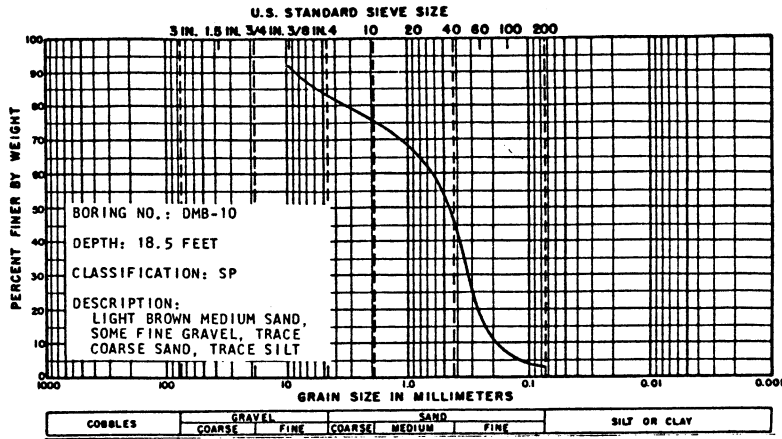


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-5

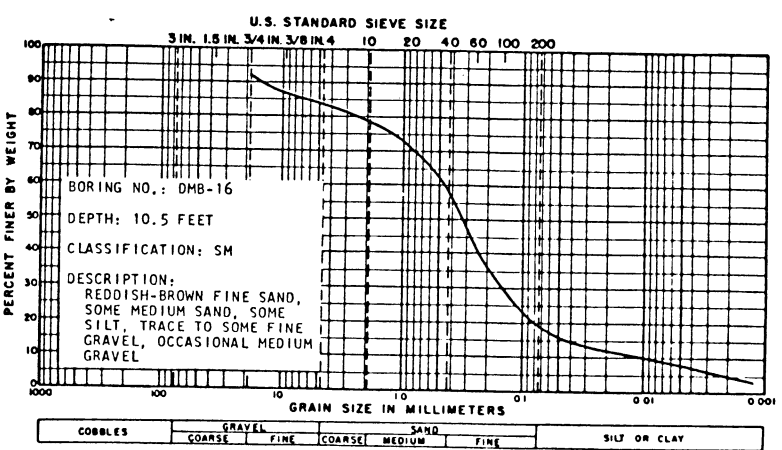
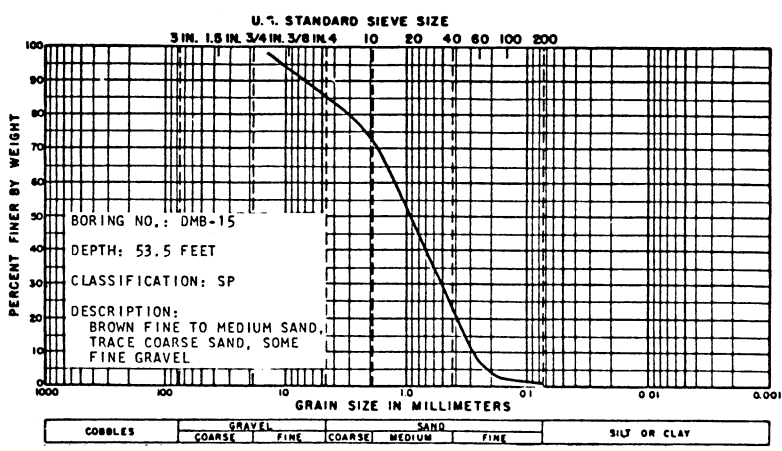
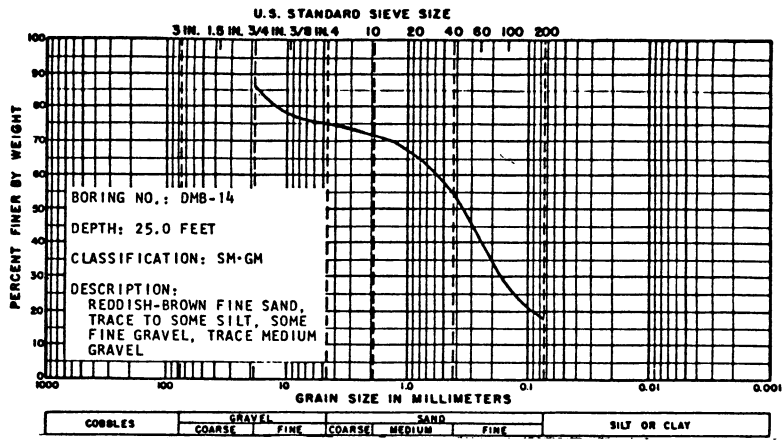


EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-6

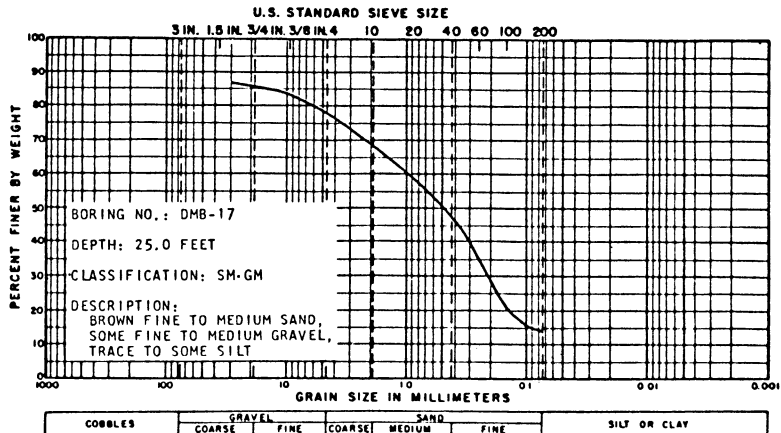
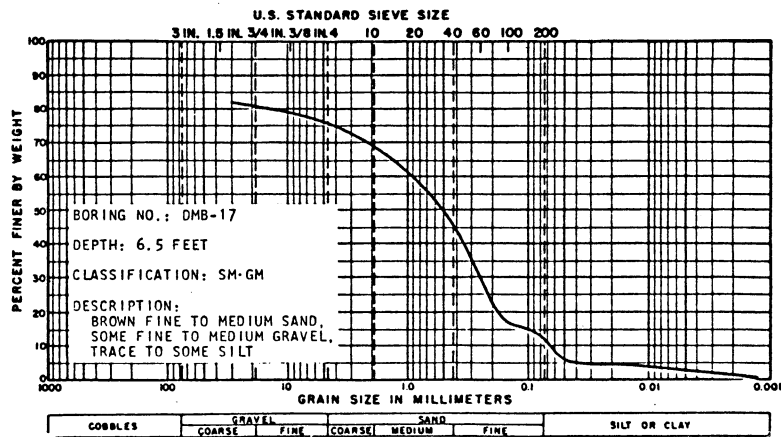
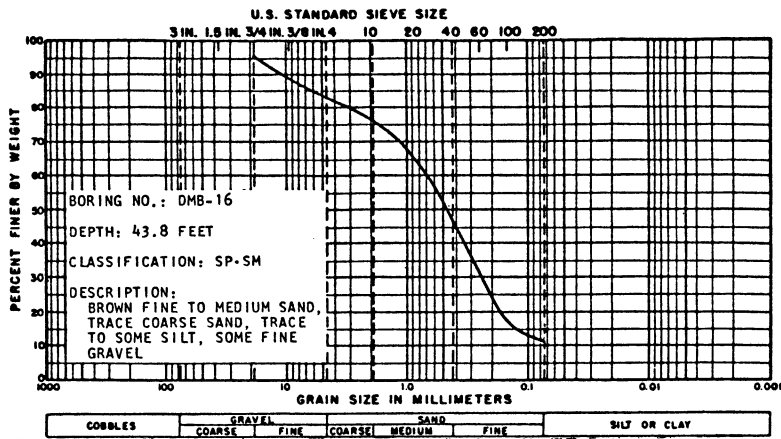


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-7

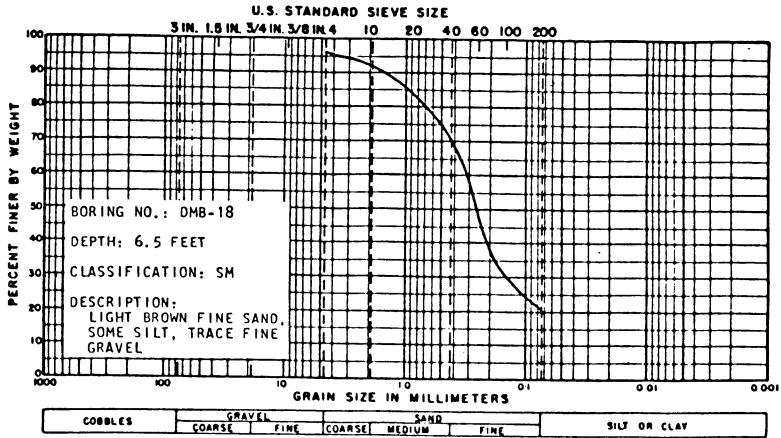
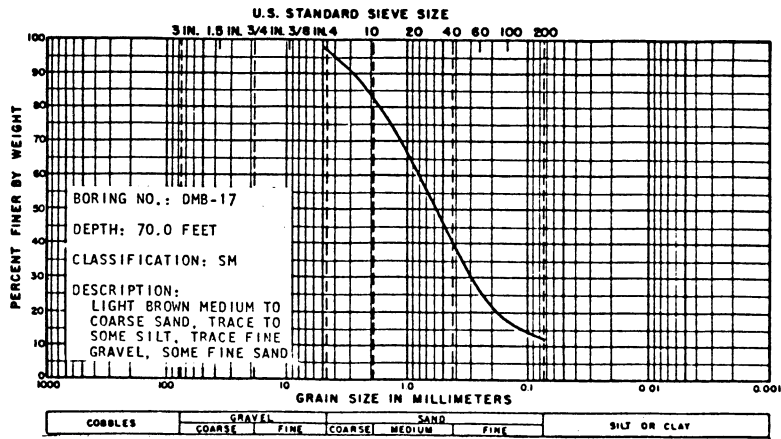
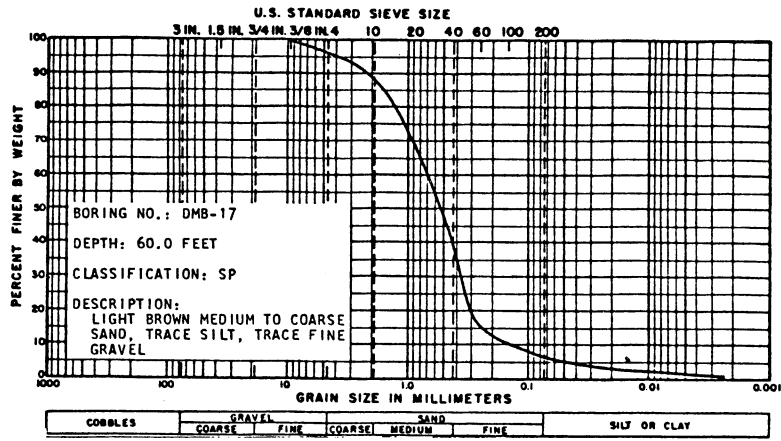


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-8

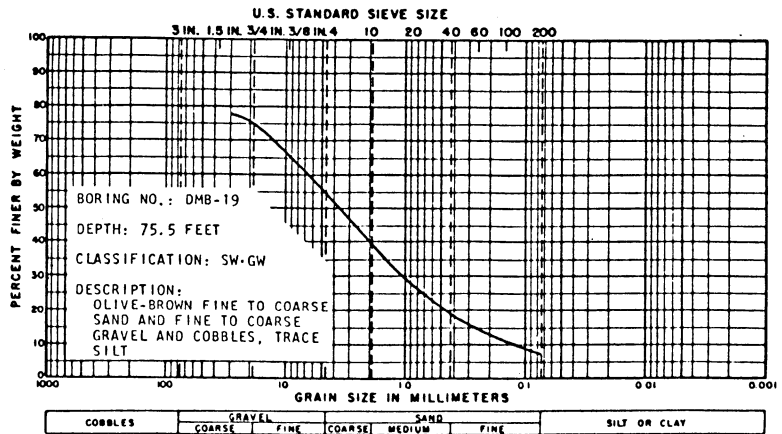
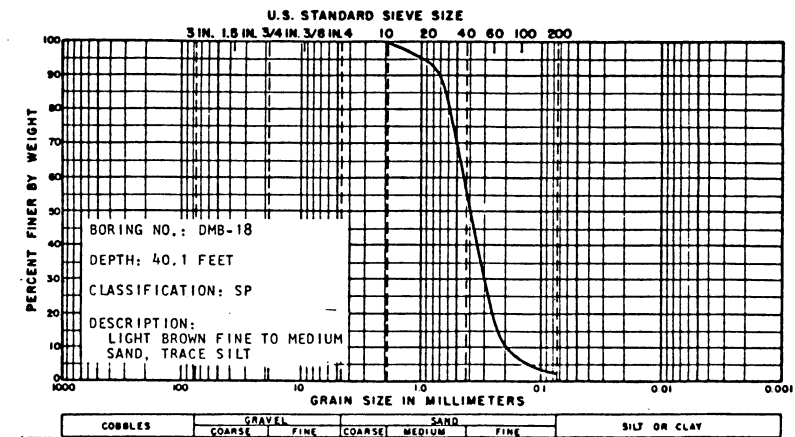
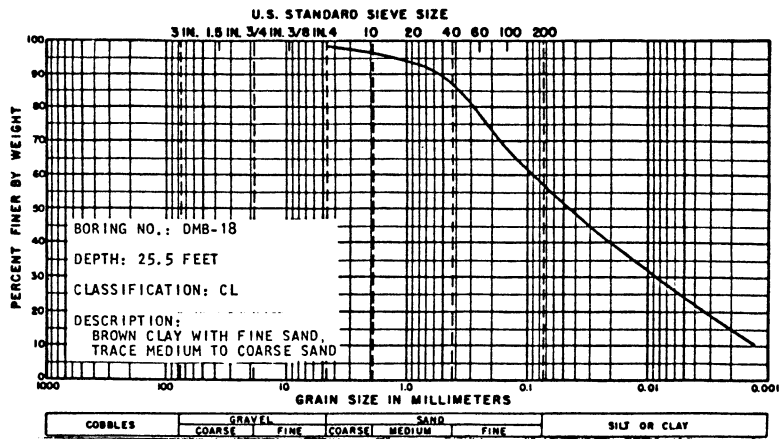


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-9

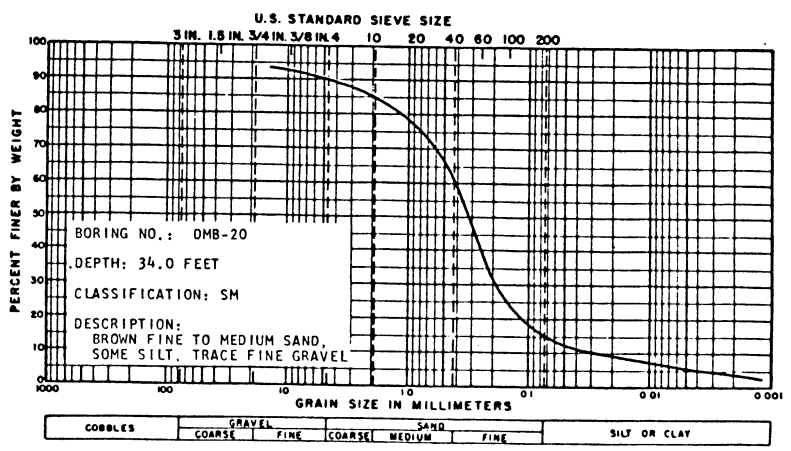
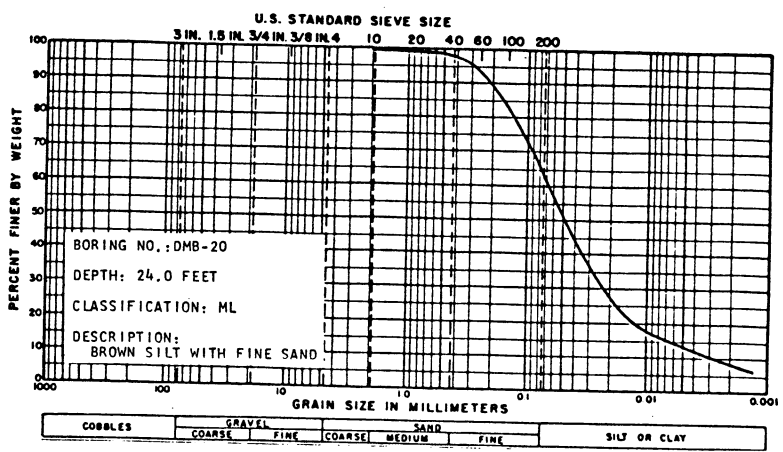
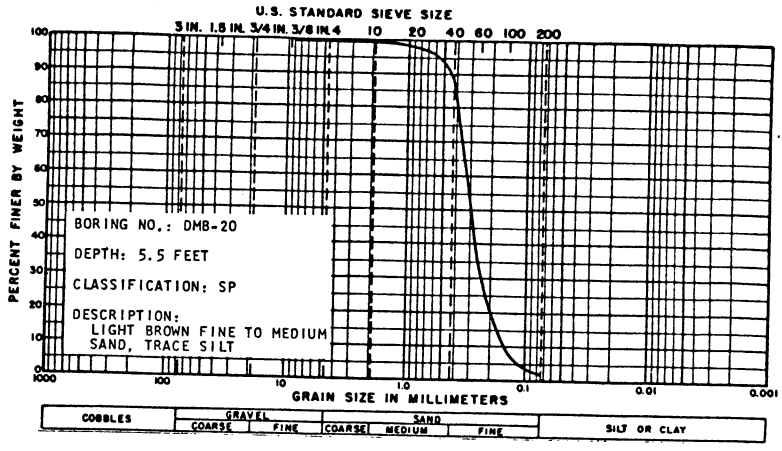


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

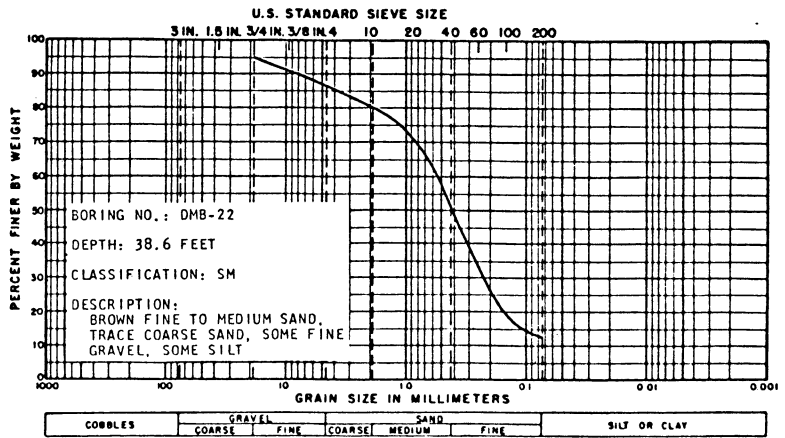
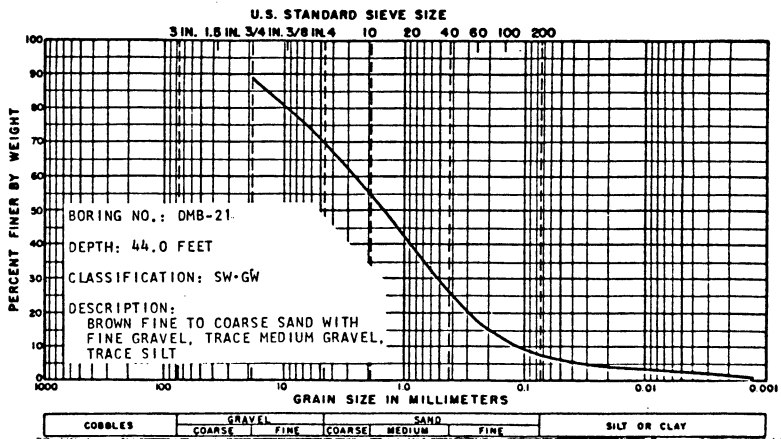
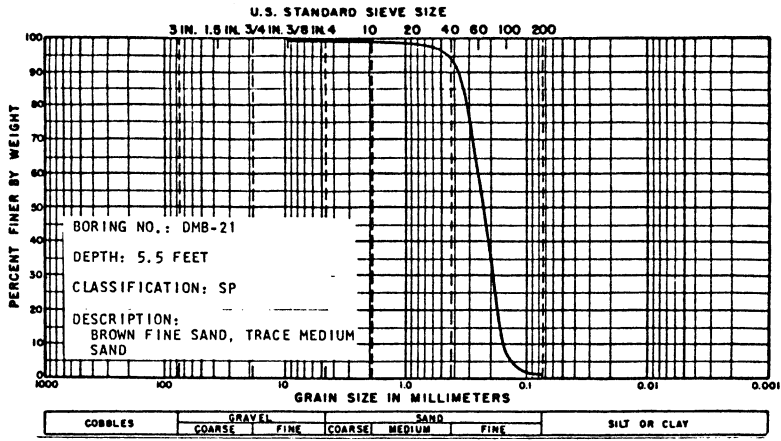
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FIGURE A-10



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PARTICLE SIZE ANALYSES

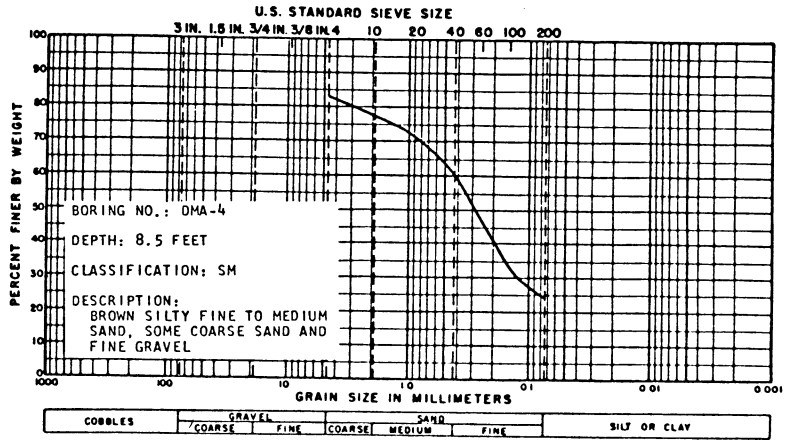
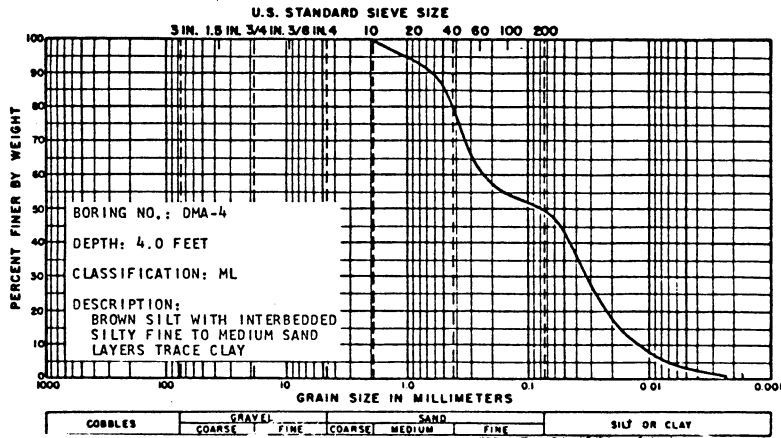
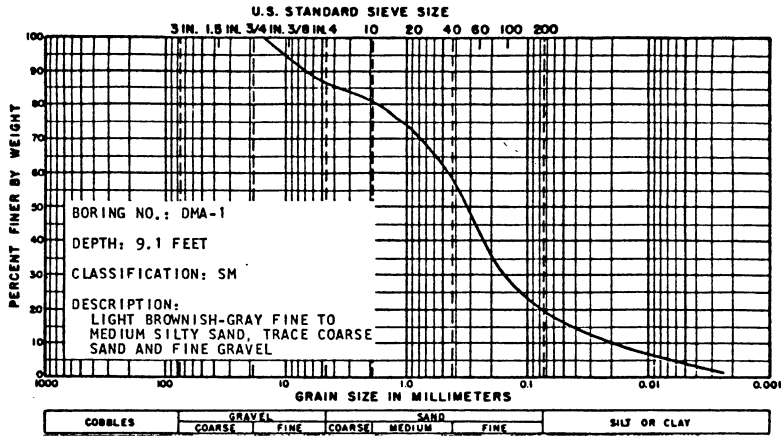


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

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FIGURE A-12

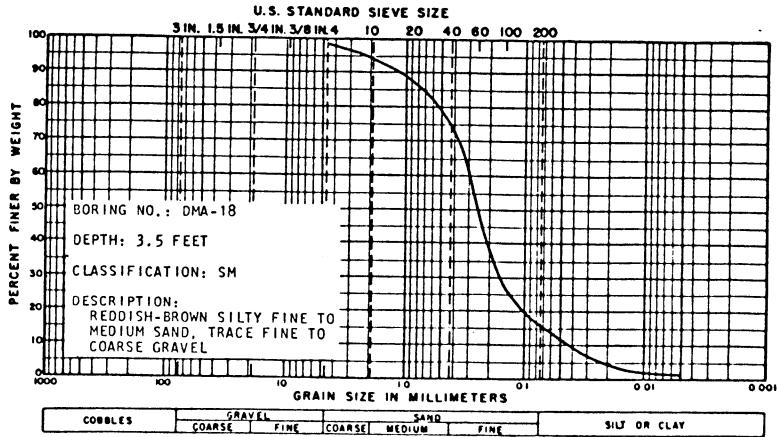
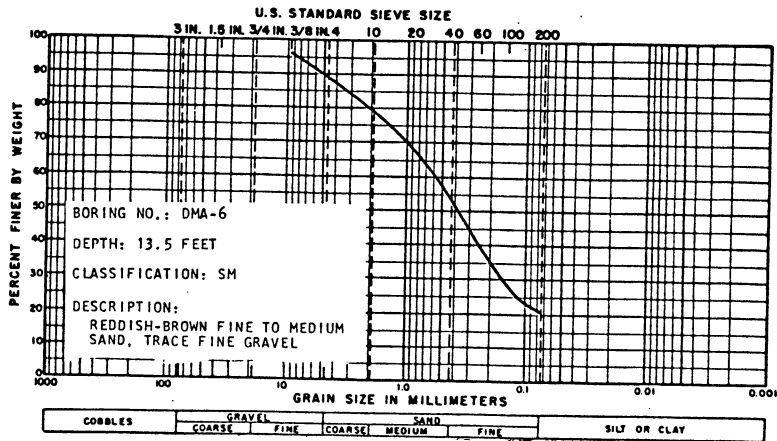
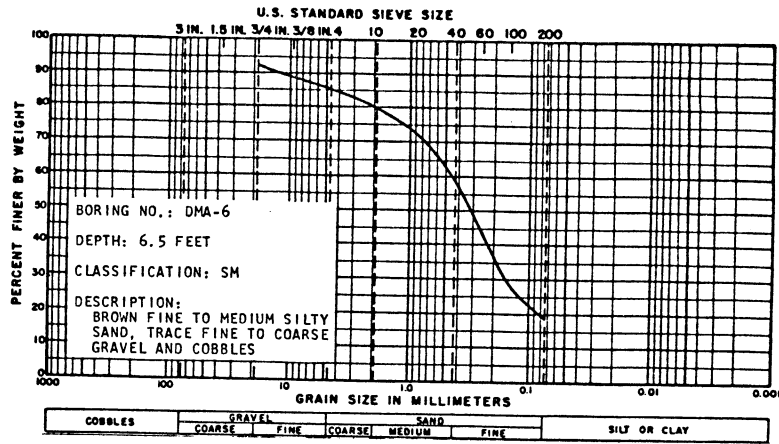


EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-13

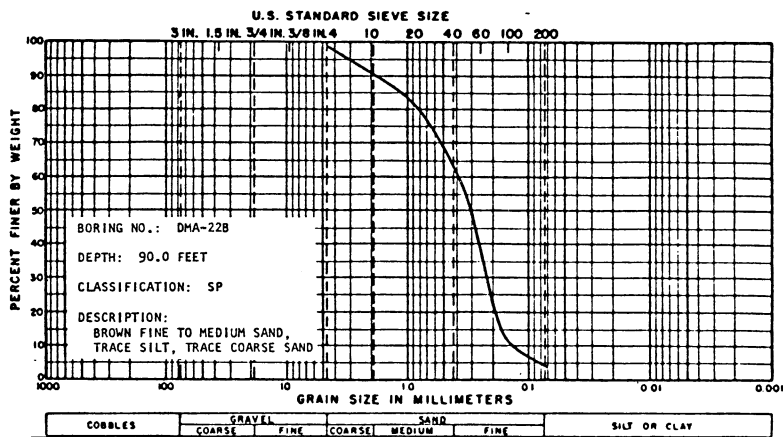
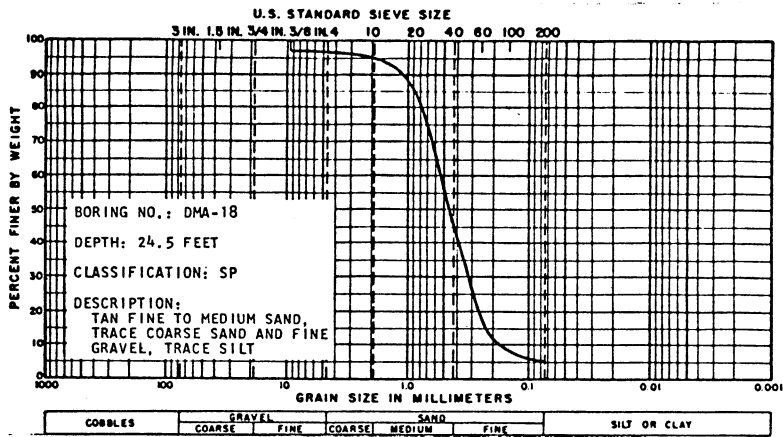


EXXON MINERALS COMPANY, U.S.A.
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PARTICLE SIZE ANALYSES

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FIGURE A-14

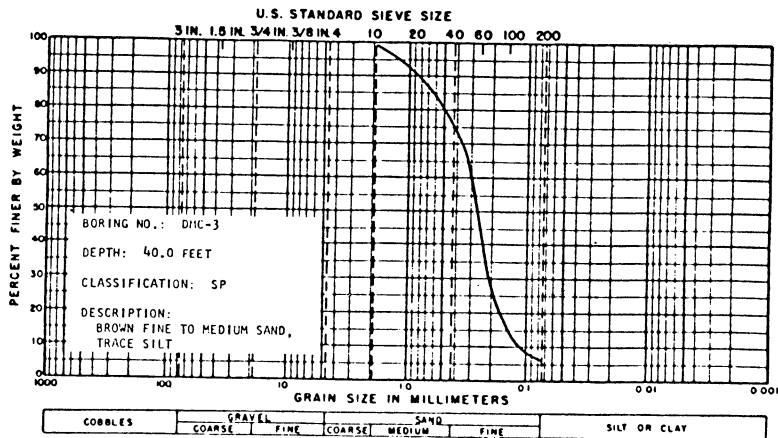
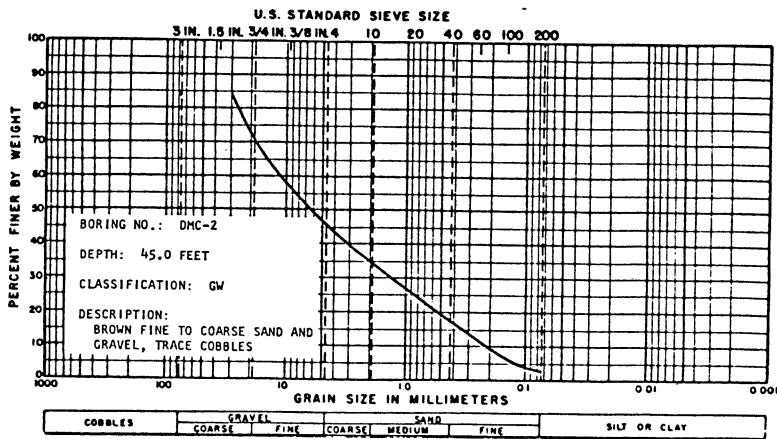
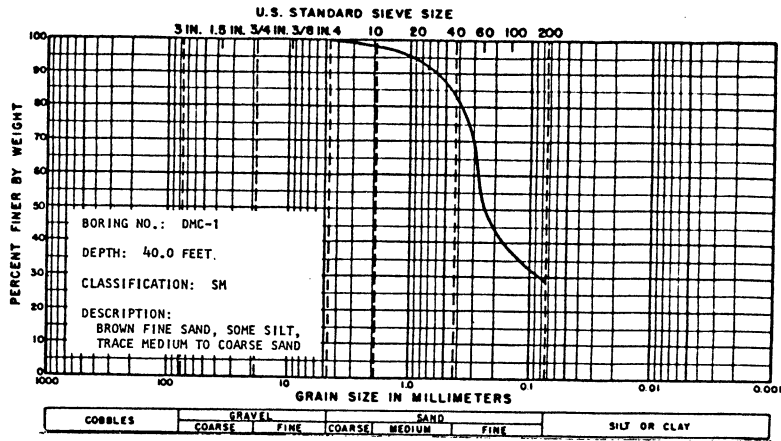


EXXON MINERALS COMPANY, U.S.A.
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PARTICLE SIZE ANALYSES

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FIGURE A-15

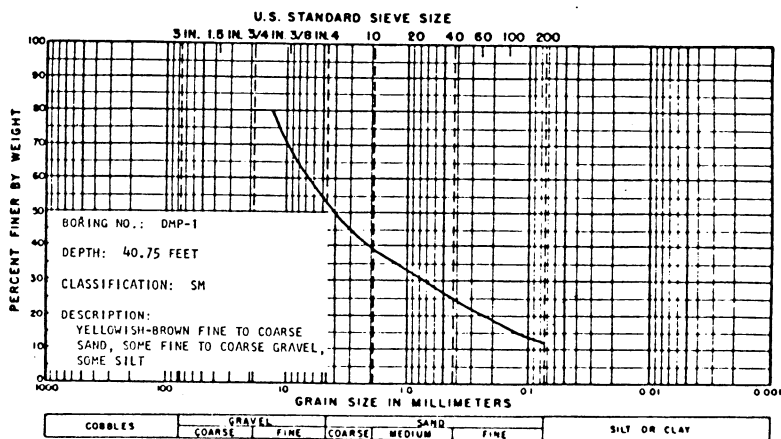
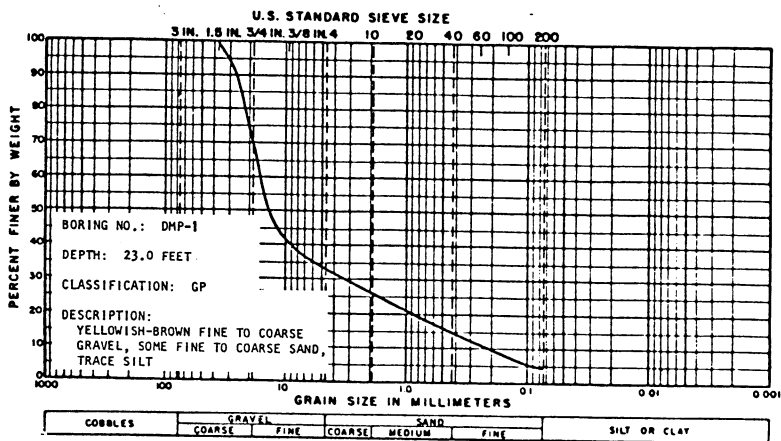
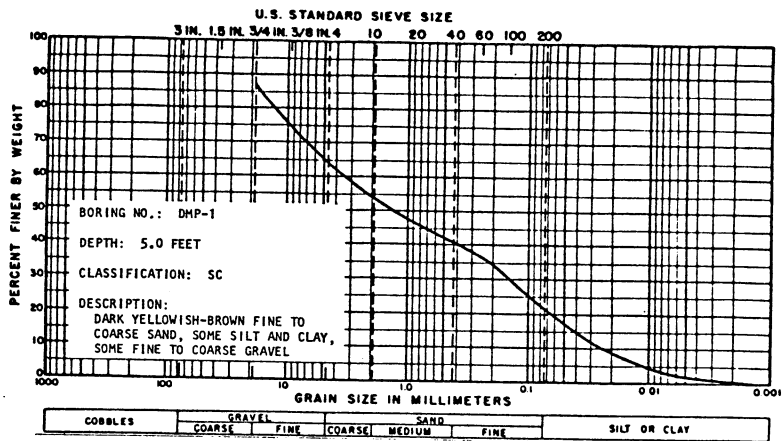


EXXON MINERALS COMPANY, U.S.A.
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PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-16

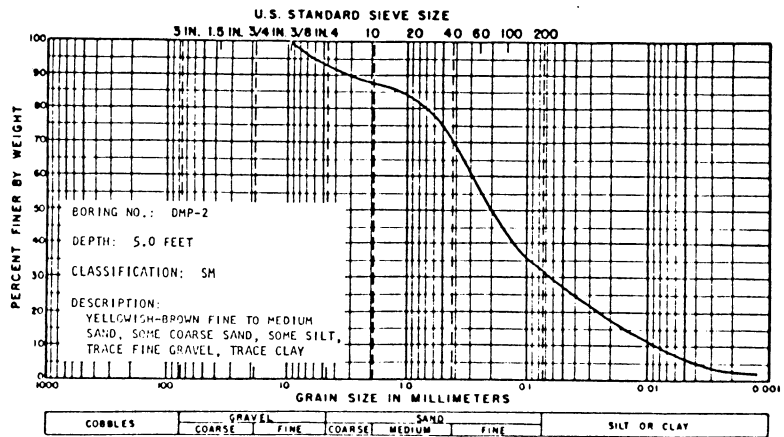
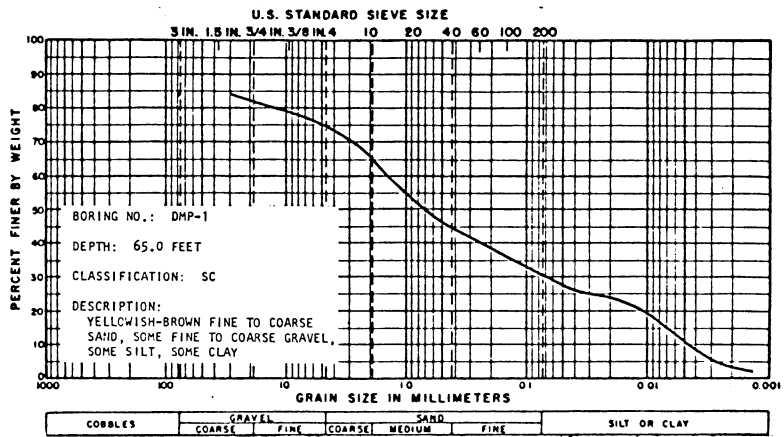
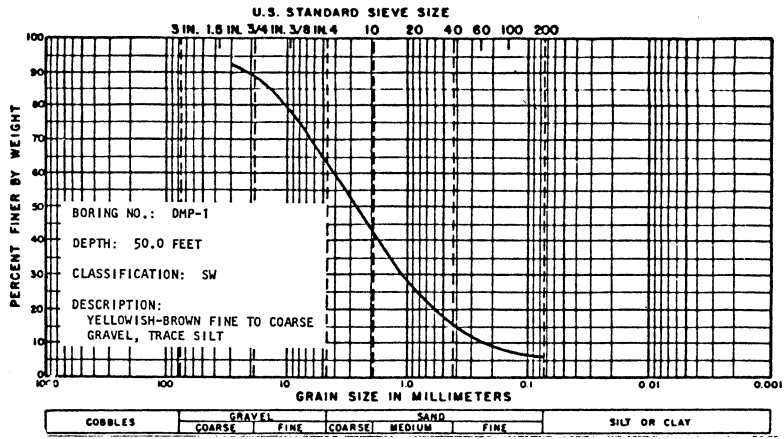


EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-17

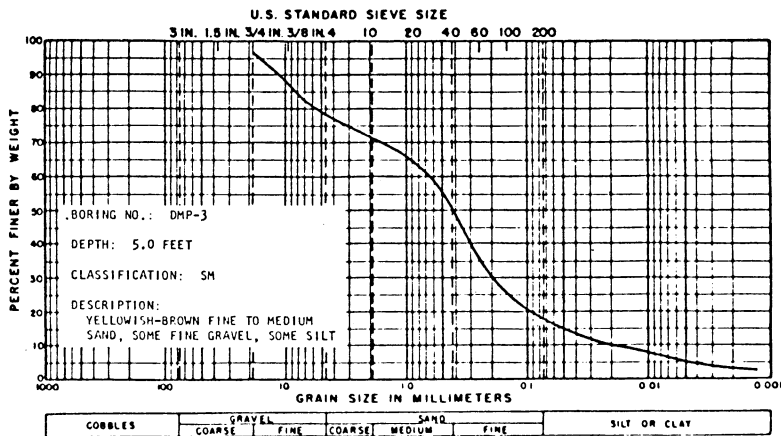
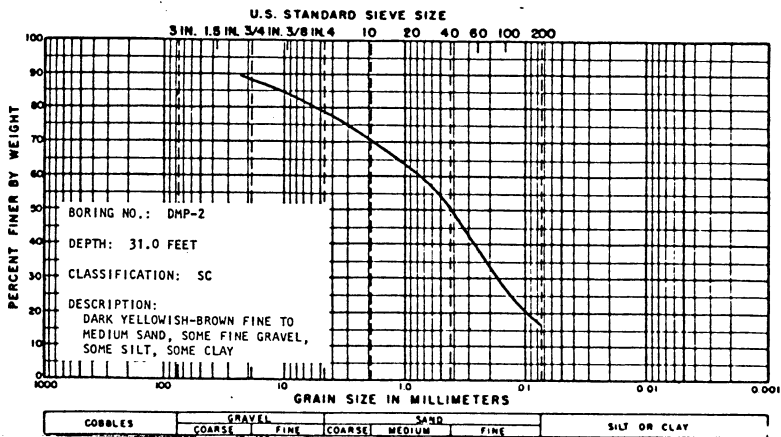
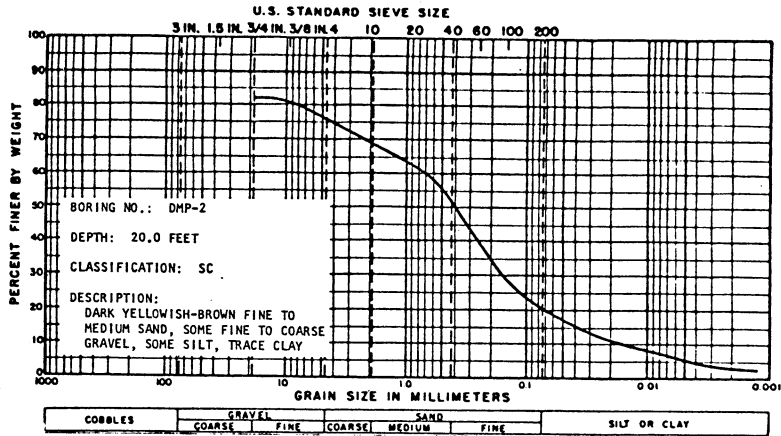


EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-18

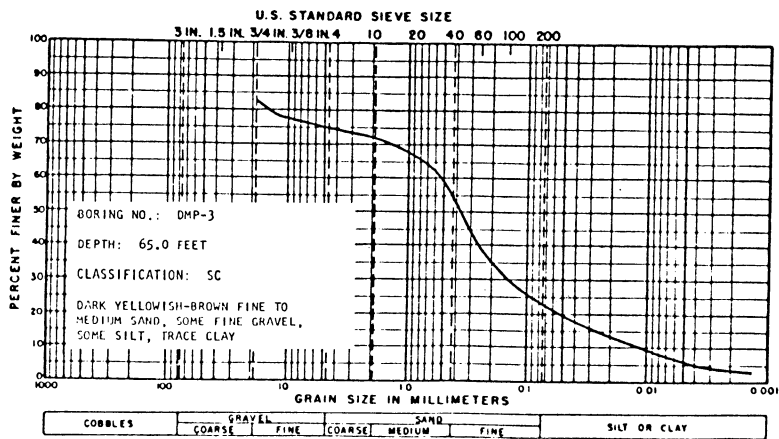
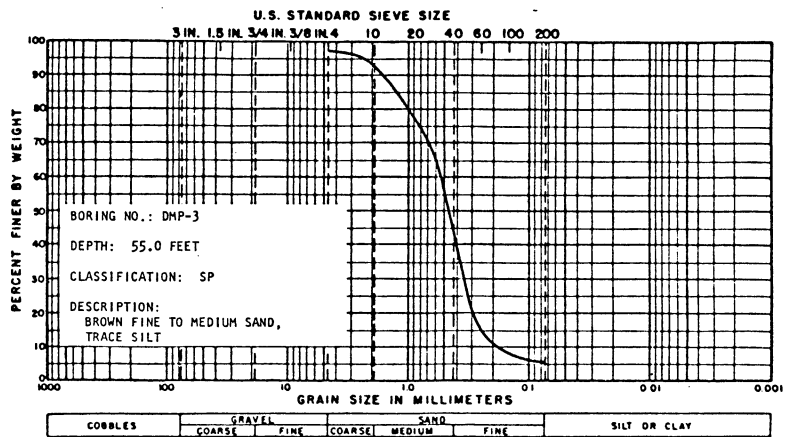
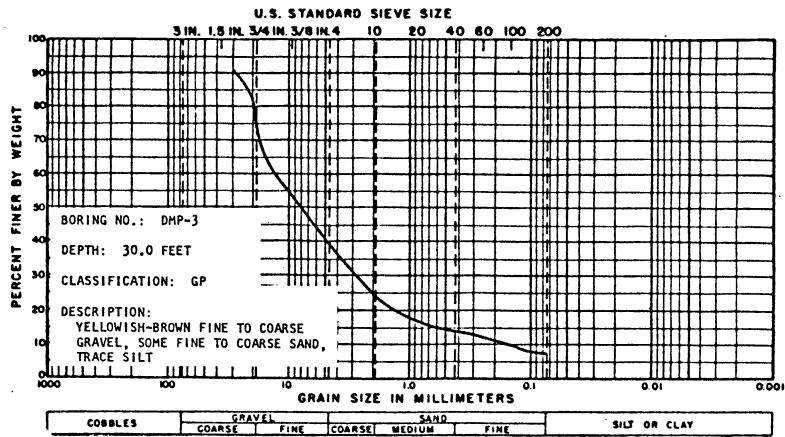


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PARTICLE SIZE ANALYSES

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FIGURE A-19



EXXON MINERALS COMPANY, U.S.A.
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PARTICLE SIZE ANALYSES

CLAY MINERAL ANALYSES

F. Michael Wahl
GEOLOGIST - MINERALOGIST

3111 N. W. 18TH PLACE
GAINESVILLE, FLORIDA 32601

HOME: 904-378-7020
OFFICE: 904-392-2231

September 5, 1978

Mr. Lonnie Norman
DAMES & MOORE
1550 Northwest Highway
Park Ridge, Illinois 60068

Dear Mr. Norman:

The following report of investigation is submitted on completion of clay mineral analyses of 18 samples as received from your company in accordance with job # 8837-044 and your transmittal sheet dated August 8, 1978. All determinations are based on x-ray diffraction analyses. The relative abundances of non-clay minerals present in each sample are also reported.

REPORT OF INVESTIGATION

I. Test Results by Sample

Clay mineralogical results are reported as parts-in-ten of the total clay fraction, and as percentages of the total clay fraction. Reporting as parts-in-ten of the total mineral content is generally preferred to exact percentage listings, because limits of detectability are subject to at least a $\pm 2\%$ deviation.

The total abundance of each clay mineral constituent in the whole sample can only be calculated if the total amount of less-than-two micron material has been determined through hydrometer or other analyses. These more specific calculations can always be determined at a later date, if needed, using the data provided in this report. For the purpose of this report the significant data are type and relative amounts of clay minerals present.

It should be pointed out that the clay mineral content of all samples was extremely low, and that the sand and coarser fractions greatly exceeded the clay fraction.

All analyses were performed using a GE XRD-5 recording diffractometer. Each sample was x-rayed in powder form, as an oriented aggregate, and after exposure to an ethylene glycol atmosphere.

Sample DMA - 1 #3

Montmorillonite	=	9%	1- part-in-ten
Illite	=	43%	4+ parts-in-ten
Chlorite	=	39%	4- parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Moderate

Sample DMA - 4 #1

Montmorillonite	=	74%	7+ parts-in-ten
Illite	=	4%	1- part-in-ten (trace)
Chlorite	=	14%	1+ part-in-ten
Kaolinite	=	8%	1- part-in-ten

(Crystallinity of chlorite is poor)

Non-clay minerals = Quartz - Very abundant
Feldspar - Minor

Sample DMA - 18 #1

Montmorillonite	=	62%	6+ parts-in-ten
Illite	=	22%	2+ parts-in-ten
Chlorite	=	12%	1+ part-in-ten
Kaolinite	=	4%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals - Quartz - Very abundant
Feldspar - minor
Calcite - minor

Sample DMB - 1 #5

Montmorillonite	=	28%	3- parts-in-ten
Illite	=	32%	3+ parts-in-ten
Chlorite	=	34%	3+ parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Dolomite - moderate
Feldspar - minor

Sample DMB - 1 #10

Montmorillonite	=	44%	4+ parts-in-ten
Illite	=	26%	3- parts-in-ten
Chlorite	=	22%	2+ parts-in-ten
Kaolinite	=	8%	1- part-in-ten

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant
Dolomite - abundant
Feldspar - minor

Sample DMB - 2 #4

Montmorillonite	=	13%	1+ part-in-ten
Illite	=	29%	3- parts-in-ten
Chlorite	=	58%	6- parts-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals - Quartz - Very abundant
Feldspar - moderate

Sample DMB - 5 #2

Montmorillonite	=	45%	4-5 parts-in-ten
Illite	=	40%	4 parts-in-ten
Chlorite	=	12%	1+ part-in-ten
Kaolinite	=	3%	1- part-in-ten (Trace)

(Chlorite is moderate to poorly crystallized)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - abundant

Sample DMB - 5 #19

Montmorillonite	=	36%	4- parts-in-ten
Illite	=	28%	3- parts-in-ten
Chlorite	=	27%	3- parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - moderate

Sample DMB - 6 #1

Montmorillonite	=	71%	7+ parts-in-ten
Illite	=	6%	1- part-in-ten
Chlorite	=	18%	2- parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Feldspar - Moderate

Sample DMB - 9 #3

Montmorillonite	=	30%	3 parts-in-ten
Illite	=	47%	5- parts-in-ten
Chlorite	=	17%	2- parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Abundant
Feldspar - Minor

Sample DMB - 10 #7

Montmorillonite	=	15%	1+ part-in-ten
Illite	=	40%	4 parts-in-ten
Chlorite	=	39%	4- parts-in-ten
Kaolinite	=	6%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Dolomite - Moderate
Feldspar - Minor

Sample DMB - 11 #7

Montmorillonite	=	15%	1+ part-in-ten
Illite	=	36%	4- parts-in-ten
Chlorite	=	40%	4 parts-in-ten
Kaolinite	=	9%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Moderate
Dolomite - Minor

Sample DMB - 14 #12

Montmorillonite	=	83%	8+ parts-in-ten
Illite	=	17%	2- parts-in-ten
Chlorite	=	Trace	

Non-clay minerals = Quartz - Very abundant
Feldspar - Minor

Sample DMB - 16 #11

Montmorillonite	=	43%	4+ parts-in-ten
Illite	=	24%	2+ parts-in-ten
Chlorite	=	28%	3- parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant

Sample DMB - 20 #6

Montmorillonite	=	71%	7+ parts-in-ten
Illite	=	13%	1+ part-in-ten
Chlorite	=	10%	1 part-in-ten
Kaolinite	=	6%	1- part-in-ten

(Chlorite is moderate to poorly crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant

Sample DMB - 22 #3

Montmorillonite	=	16%	2- parts-in-ten
Illite	=	48%	5- parts-in-ten
Chlorite	=	36%	4- parts-in-ten
Kaolinite	=	None	

(Chlorite is moderate to well crystallized)

Non-clay minerals = Quartz - Very abundant
Feldspar - Abundant
Dolomite - Minor

Sample DMB - 18 #6

Montmorillonite	=	37%	4- parts-in-ten
Illite	=	37%	4- parts-in-ten
Chlorite	=	21%	2+ parts-in-ten
Kaolinite	=	5%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - Moderate
		Dolomite - Moderate

Sample DMB - 19 #4

Montmorillonite	=	51%	5+ parts-in-ten
illite	=	21%	2+ parts-in-ten
Chlorite	=	24%	2+ parts-in-ten
Kaolinite	=	4%	1- part-in-ten

(Crystallinity of chlorite is moderate)

Non-clay minerals	=	Quartz - Very abundant
		Feldspar - Moderate
		Dolomite - Minor

II. Summary of Test Results

The analyses of all 18 samples shows a fairly consistent clay mineral suite in that montmorillonite, illite, and chlorite are present in all samples. Kaolinite, when present, was never abundant and in some cases its presence is questionable.

Quartz is the dominant non-clay mineral in all samples. Feldspar is also present, but in variable quantities from minor to abundant. Five sample contain dolomite, and one contains a minor amount of calcite.

Signed:

F. Michael Wahl

F. Michael Wahl Ph.D.

SAMPLE DATA SHEETS

Sample DMA-1 #3

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____

_____ 21 7 9 %
_____ 3

B. Illite (8.8°) _____

_____ 32 43 %

C. Chlorite-vermiculite
and Kaolinite (12.5°) _____

_____ 36 48 %

D. Mixed layered
material _____

_____ _____ %
_____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 11 81 % of C 39

Kaolinite (24.9°) 5 19 % of C 9
_____ 2

III. Crystallinity of Chlorite Moderate to well crystallized

IV. Summary

Parts in 10

Montmorillonite 9 % 1-

Illite 43 % 4+

Chlorite 39 % 4-

Kaolinite 9 % 1-

Mixed layered _____ % _____

Sample DMA-4 #1

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____

_____ 149 50 74 %
_____ 3

B. Illite (8.8°) _____

_____ 3 4 %

C. Chlorite-vermiculite
and Kaolinite (12.5°) _____

_____ 15 22 %

D. Mixed layered
material _____

_____ 2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 5 62 % of C 14

Kaolinite (24.9°) 6 38 % of C 8
_____ 2

III. Crystallinity of Chlorite Poor

IV. Summary

Parts in 10

Montmorillonite 74 % 7+

Illite 4 % 1- (Trace)

Chlorite 14 % 1+

Kaolinite 8 % 1-

Mixed layered _____ % _____

Sample DMB-1 #5

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____
 _____ 90 30 28 %
 _____ 3

B. Illite (8.8°) _____
 _____ 34 32 %

C. Chlorite-vermiculite
 and Kaolinite (12.5°) _____
 _____ 43 40 %

D. Mixed layered
 material _____
 _____ _____ %
 _____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 12 86 % of C 34
 Kaolinite (24.9°) 4 14 % of C 6
 _____ 2

III. Crystallinity of Chlorite Moderate

IV. Summary

Parts in 10

Montmorillonite	<u>28</u> %	<u>3-</u>
Illite	<u>32</u> %	<u>3+</u>
Chlorite	<u>34</u> %	<u>3+</u>
Kaolinite	<u>6</u> %	<u>1-</u>
Mixed layered	_____ %	_____

Sample DMB-1 # 10

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____
 _____ 313 104 44 %
 _____ 3

B. Illite (8.8°) _____
 _____ 62 26 %

C. Chlorite-vermiculite and Kaolinite (12.5°) _____
 _____ 69 30 %

D. Mixed layered material _____
 _____ _____ %
 _____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 16 73 % of C 22
 Kaolinite (24.9°) 12 27 % of C 8
 2

III. Crystallinity of Chlorite Moderate To Well Crystallized

IV. Summary

	Parts in 10
Montmorillonite <u>44</u> %	<u>4+</u>
Illite <u>26</u> %	<u>3-</u>
Chlorite <u>22</u> %	<u>2+</u>
Kaolinite <u>8</u> %	<u>1-</u>
Mixed layered _____ %	_____

Sample DMB-2 #4

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____ 19 _____ 6 _____ 13 %
_____ 3 _____

B. Illite (8.8°)

_____ _____ 13 _____ 29 %
_____ _____

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____ _____ 26 _____ 58 %
_____ _____

D. Mixed layered
material

_____ _____ _____ _____ %
_____ 2 _____

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

8 _____ 100 % of C 58

Kaolinite (24.9°)

0 _____ % of C 0
2

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

13 % 1+

Illite

29 % 3-

Chlorite

58 % 6-

Kaolinite

0 % _____

Mixed layered

_____ % _____

Sample DMB-5 # 19

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

81 27 36 %
3

B. Illite (8.8°)

22 28 %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

27 36 %

D. Mixed layered
material

2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

7 74 % of C 27

Kaolinite (24.9°)

5 26 % of C 9
2

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

36 %

4-

Illite

28 %

3-

Chlorite

27 %

3-

Kaolinite

9 %

1-

Mixed layered

_____ %

Sample DMB-9 #3

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____ 88 _____ 29 _____ 30 %
_____ 3 _____

B. Illite (8.8°)

_____ _____ 46 _____ 47 %
_____ _____

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____ _____ _____ 23 _____ 23 %
_____ _____

D. Mixed layered
material

_____ _____ _____ _____ %
_____ 2 _____

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

4 _____ 73 % of C 17

Kaolinite (24.9°)

3 _____ 27 % of C 6
2

III. Crystallinity of Chlorite

Moderate To Poor

IV. Summary

Parts in 10

Montmorillonite

30 % _____ 3

Illite

47 % _____ 5-

Chlorite

17 % _____ 2-

Kaolinite

6 % _____ 1-

Mixed layered

_____ % _____

Sample DMB-10 #7

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____
 _____ 24 8 15 %
 _____ 3

B. Illite (8.8°) _____
 _____ 21 40 %

C. Chlorite-vermiculite
 and Kaolinite (12.5°) _____
 _____ 24 45 %

D. Mixed layered
 material _____
 _____ 2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 12 86 % of C 39
 Kaolinite (24.9°) 4 14 % of C 6
 _____ 2

III. Crystallinity of Chlorite Modicum

IV. Summary

		Parts in 10
Montmorillonite	<u>15</u> %	<u>1+</u>
Illite	<u>40</u> %	<u>4</u>
Chlorite	<u>39</u> %	<u>4</u>
Kaolinite	<u>6</u> %	<u>1-</u>
Mixed layered	_____ %	_____

Sample DMB-14 # 12

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____

_____ 192 64 83 %
_____ 3

B. Illite (8.8°) _____

_____ 13 17 %

C. Chlorite-vermiculite
and Kaolinite (12.5°) _____

_____ Trace %

D. Mixed layered
material _____

_____ _____ %
_____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) _____

_____ % of C Trace

Kaolinite (24.9°) _____

_____ % of C _____
2

III. Crystallinity of Chlorite _____

IV. Summary

Parts in 10

Montmorillonite 83 % 8+

Illite 17 % 2-

Chlorite Tr. % Trace

Kaolinite _____ % _____

Mixed layered _____ % _____

Sample DMB-16 #11

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____ 139 46 43 %
_____ 3

B. Illite (8.8°)

_____ 25 24 %
_____ 24 %

C. Chlorite-vermiculite
and Kaolinite (12.5°)

_____ 35 33 %
_____ 33 %

D. Mixed layered
material

_____ 2 %
_____ 2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

12 86 % of C 28

Kaolinite (24.9°)

4 14 % of C 5

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

43 % 4+

Illite

24 % 2+

Chlorite

28 % 3-

Kaolinite

5 % 1-

Mixed layered

_____ % _____

Sample DMB-19 #4

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

_____ 218 73 51 %
_____ 3

B. Illite (8.8°)

_____ 30 21 %
_____ 21 %

C. Chlorite-vermiculite and Kaolinite (12.5°)

_____ 39 28 %
_____ 28 %

D. Mixed layered material

_____ 2 %
_____ 2 %

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°)

11 85 % of C 24

Kaolinite (24.9°)

4 15 % of C 4
2

III. Crystallinity of Chlorite

Moderate

IV. Summary

Parts in 10

Montmorillonite

51 % 5+

Illite

21 % 2+

Chlorite

29 % 2+

Kaolinite

4 % 1-

Mixed layered

_____ % _____

Sample DMB-20 #6

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____
 _____ 298 99 71 %
 _____ 3

B. Illite (8.8°) _____
 _____ 19 13 %

C. Chlorite-vermiculite and Kaolinite (12.5°) _____
 _____ 22 16 %

D. Mixed layered material _____
 _____ _____ %
 _____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 6 63 % of C 10
 Kaolinite (24.9°) 7 37 % of C 6
 2

III. Crystallinity of Chlorite Moderate to poor

IV. Summary		Parts in 10
Montmorillonite	<u>71</u> %	<u>7+</u>
Illite	<u>13</u> %	<u>1+</u>
Chlorite	<u>10</u> %	<u>1</u>
Kaolinite	<u>6</u> %	<u>1-</u>
Mixed layered	_____ %	_____

Sample DMB-22 #3

Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°) _____
 _____ 41 14 16 %
 _____ 3

B. Illite (8.8°) _____
 _____ 43 48 %

C. Chlorite-vermiculite and Kaolinite (12.5°) _____
 _____ 32 36 %

D. Mixed layered material _____
 _____ _____ %
 _____ 2

II. Relative % Kaolinite and Chlorite

E. Chlorite (25.3°) 8 100 % of C 36
 Kaolinite (24.9°) 0 _____ % of C 0

III. Crystallinity of Chlorite Moderate to weak

IV. Summary

Parts in 10

Montmorillonite	<u>16</u> %	<u>2-</u>
Illite	<u>48</u> %	<u>5-</u>
Chlorite	<u>36</u> %	<u>4-</u>
Kaolinite	<u>-</u> %	_____
Mixed layered	_____ %	_____

APPENDIX 2.2B

BORING LOGS

BORING LOGS

DAMES & MOORE

<u>Boring Logs</u>	<u>Number of Sheets</u>
DMA-1	1
DMA-3	1
DMA-4	1
DMA-5	1
DMA-6	1
DMA-7	1
DMA-10	1
DMA-12	1
DMA-13	1
DMA-14	1
DMA-16	1
DMA-17	1
DMA-18	1
DMA-19	1
DMA-20	1
DMA-22	1
DMA-27	2
DMA-27A	1
DMA-29	1
DMA-29A	1
DMA-30	1
DMA-31	1
DMA-32	1
DMA-32A	3
DMA-33	2
DMA-34	1
DMA-35	1
DMA-36	1
DMA-37	1
DMA-38	1
DMA-39	1
DMA-42	1
DMA-43	1
DMA-44	1
DMA-45	1
DMA-46	1
DMA-47	1
DMA-48	1
DMB-1	1
DMB-1A	2
DMB-2	2
DMB-3	1
DMB-4	2
DMB-5	2
DMB-5A	2

DAMES & MOORE

(continued)

<u>Boring Logs</u>	<u>Number of Sheets</u>
DMB-6	2
DMB-7	2
DMB-8	1
DMB-9	4
DMB-9A	1
DMB-10	2
DMB-11	2
DMB-12	2
DMB-13	1
DMB-14	2
DMB-15	2
DMB-16	2
DMB-17	2
DMB-18	2
DMB-19	3
DMB-20	1
DMB-20A	2
DMB-21	1
DMB-22	2
DMB-23	2
DMB-24	1
DMB-25	2
DMB-26	2
DMB-27	2
DMB-28	2
DMB-29	2
DMI-1	2
DMI-2	2
DMI-3	2
DMI-4	3
DMI-5	2
DMI-7	4
DMI-8	4
DMI-9	2
DMS-1	2
DMS-2	3
DMA-22B	2
DMC-1	1
DMC-2	1
DMC-3	1
DMP-1	1
DMP-2	1
DMP-3	1

KEY TO LOG OF BORINGS:

- INDICATES THE NUMBER OF BLOWS REQUIRED TO DRIVE A STANDARD PENETRATION TEST SAMPLER 1 FOOT WITH A 140 POUND HAMMER FALLING 30 INCHES.
- 21 INDICATES THE DEPTH OF STANDARD PENETRATION TEST (2.0' O.D. SPLIT SPOON SAMPLER).
- * 21 INDICATES THE NUMBER OF BLOWS REQUIRED TO DRIVE A STANDARD PENETRATION TEST SAMPLER 1 FOOT WITH A 300 TO 380 POUND HAMMER FALLING 24 INCHES.
- INDICATES THE NUMBER OF BLOWS REQUIRED TO DRIVE A DAMES & MOORE TYPE U SAMPLER 1 FOOT WITH A 300 TO 380 POUND HAMMER FALLING 24 INCHES.
- 31 INDICATES DEPTH OF SAMPLE OBTAINED WITH A DAMES & MOORE TYPE U SAMPLER (3.25' O.D., 2.42' I.D. SPLIT SPOON SAMPLER).
- INDICATES DEPTH OF DISTURBED SAMPLE.
- INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY.
- SA INDICATES PARTICLE SIZE ANALYSIS.
- HA INDICATES HYDROMETER ANALYSIS.
- K INDICATES PERMEABILITY TEST.
- PH INDICATES SOIL PH.
- X-RAY INDICATES CLAY MINERALOGY DETERMINED BY X-RAY DIFFRACTION ANALYSIS.
- COLOR MUNSELL COLOR CLASSIFICATION OF FINE FRACTION.
- P.C. PERCENTAGE OF CARBONATE PEBBLES IN GRAVELS ESTIMATED BY PEBBLE COUNT.
- T= INDICATES SHEAR STRENGTH TEST RESULT.
- N= INDICATES NORMAL STRESS TEST RESULT.

NOTES:

- 1) ELEVATIONS REFER TO MEAN SEA LEVEL DATUM.
- 2) THE DISCUSSION IN THE TEXT OF THE REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.

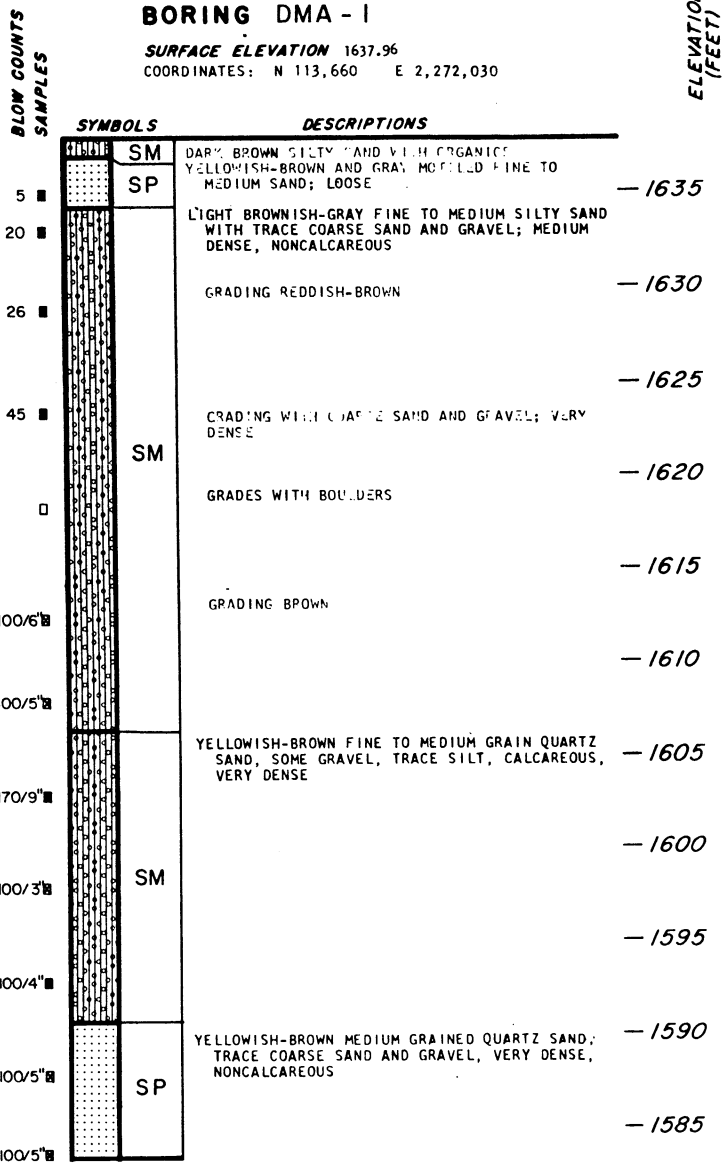
EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

KEY TO LOG OF BORINGS

DAMES & MOORE

FIGURE B

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
0									
5					4.7	105			
10	X-RAY SA, HA				6.2	127			
15	P.C.				5.8	125			
20									
25									
30	P.C.								
35					8.9	127			
40									
45	P.C.				14.7	112			
50									
55									



BORING COMPLETED AT 55.0 FEET ON 3-14-77.
 PIEZOMETER INSTALLED 3-14-77.
 2 INCH PVC FROM 51.0 TO 55.0 FEET.
 GRAVEL PACK: 45.0 TO 55.0 FEET.
 GROUT: 0.0 TO 45.0 FEET.
 PIEZOMETER DRY ON 6-28-78.

EXXON MINERALS COMPANY, U.S.A.
 GRANDON PROJECT

LOG OF BORING DMA-1
 SHEET 1 OF 1

DAMES & MOORE **FIGURE B-1**

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					5.2	88			
10					7.4	130			
15					5.4	127			
20					6.9	129			
25									
30									
35									
40									
45									

BORING DMA - 3

SURFACE ELEVATION: 1647.51
 COORDINATES: N 115,494 E 2,273,938

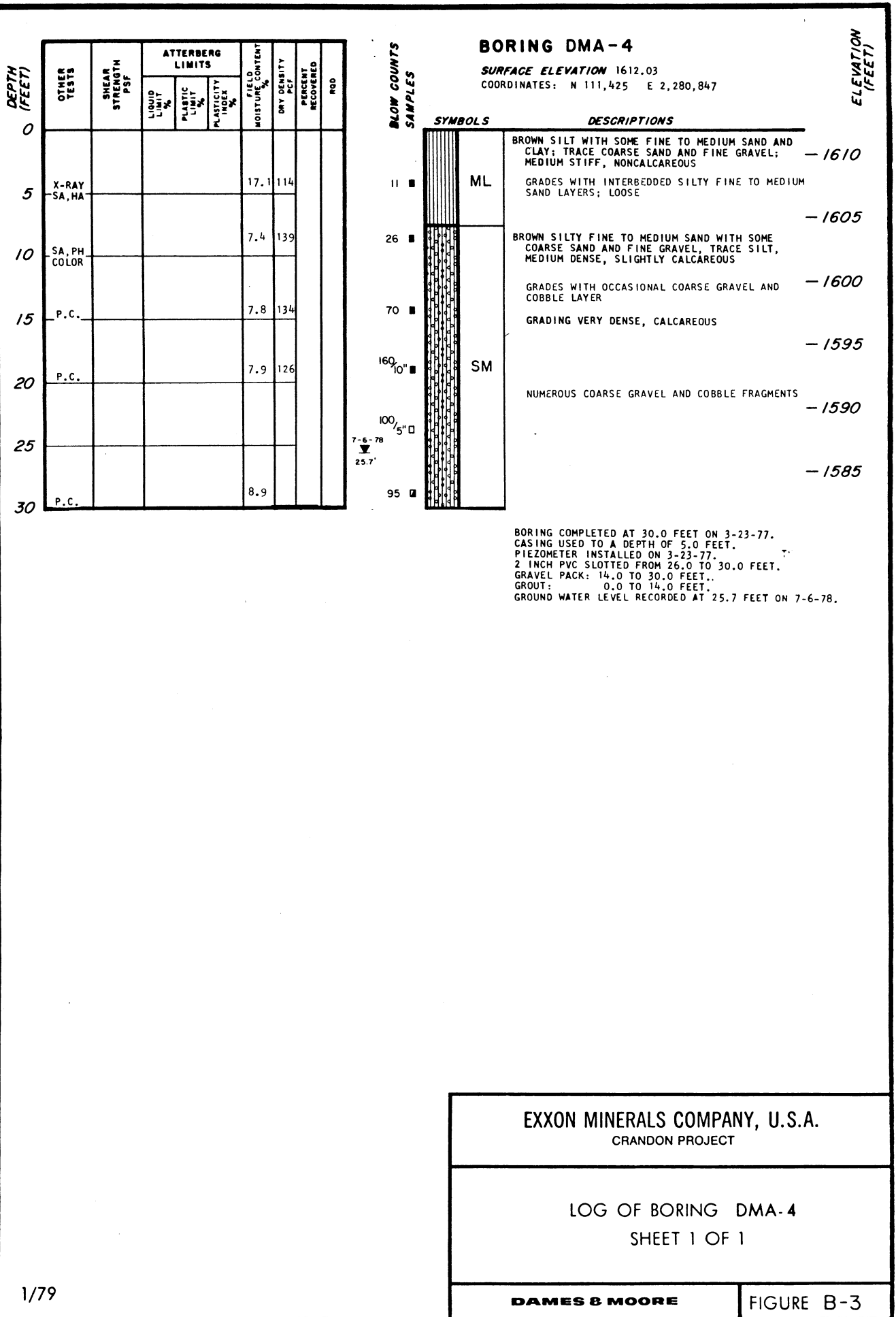
BLOW COUNTS
SAMPLES

ELEVATION
(FEET)

SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
OL	BROWN FINE SAND WITH ORGANICS ORANGISH-BROWN FINE TO MEDIUM SILTY SAND WITH OCCASIONAL COARSE SAND, GRAVEL AND COBBLES; DENSE	— 1645
		— 1640
		— 1635
	GRADES TO VERY DENSE	— 1630
SM	GRADES WITH BOULDERS	— 1625
		— 1620
		— 1615
		— 1610
	GRADING GRAYISH-BROWN	— 1605

BORING COMPLETED AT 45.0 FEET ON 3-11-77.
 PIEZOMETER INSTALLED ON 3-11-77.
 2 INCH PVC SLOTTED FROM 39.0 TO 43.0 FEET.
 GRAVEL PACK: 32.0 TO 45.0 FEET.
 GROUT: 0.0 TO 32.0 FEET.
 PIEZOMETER DRY ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-3 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-2



DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT		DRY DENSITY PCF	PERCENT RECOVERED	NO
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	FIELD MOISTURE %	NO			
0						21.2	102			
5	SA					9.8	116			
10										
15						8.1	121			
20						9.0	119			
25						8.9	121			
30						10.7	120			
35						7.7	122			
40										
45						8.8				
50						9.3				

BORING DMA-5

SURFACE ELEVATION 1639.82
 COORDINATES: N 115,380 E 2,282,390

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
53/10" ■	ML	BROWN CLAYEY SILT TRACE SAND; MEDIUM STIFF, NONCALCAREOUS GRADES WITH 6"-24" COBBLES AND BOULDERS	
19 ■		BROWN FINE SILTY SUBROUNDED QUARTZ SAND WITH SOME COARSE SAND AND FINE GRAVEL; MEDIUM DENSE, SLIGHTLY CALCAREOUS	-1635
		GRADES WITH OCCASIONAL COARSE GRAVEL AND COBBLE LAYER	-1630
25 ■			-1625
80/7" ■		GRADES DENSE TO VERY DENSE, CALCAREOUS	-1620
90/6" ■		GRADING LIGHT BROWN	-1615
150/10" ■	SM	GRADES WITH SHALE FRAGMENTS COBBLES GRADES OUT; OCCASIONAL GRAVEL LAYER	-1610
150/6" ■			-1605
50/0" □			-1600
*95 ■		GRADES OCCASIONAL CLAYEY SILT LAYER; HARD	-1595
*125/6" ■			-1590

BORING COMPLETED AND GROUTED TO 50.0 FEET ON 3-24-77.
 CASING USED TO DEPTH OF 8.0 FEET.
 GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-5
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-4

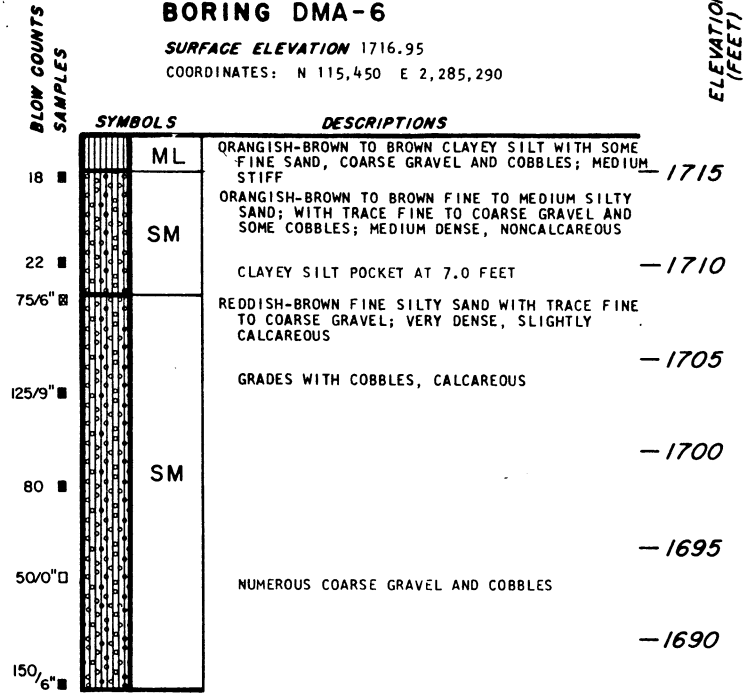
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	SA, P.C.				9.8	123			
10					5.7	125			
15	SA, PH COLOR P.C.				8.1				
20	SA, HA				7.2	134			
25					7.0	126			
30	P.C.				8.9	143			

BORING DMA-6

SURFACE ELEVATION 1716.95

COORDINATES: N 115,450 E 2,285,290

ELEVATION
(FEET)



BORING COMPLETED AND GROUTED TO 30.0 FEET ON 3-25-77.
CASING USED TO A DEPTH OF 8.0 FEET.
GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-6
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-5

DEPTH
(FEET)

BORING DMA-7

SURFACE ELEVATION 1583.81
 COORDINATES: N 112,880 E 2,289,900

ELEVATION
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FLUID CONTENT %	MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %					
0										
5										
10										
15										
20										
25										
30										
35										
40										
45										

5-13-77
0.5'

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
5	OL	BLACK SILT WITH ORGANICS AND TRACE CLAY, ROOTS AND WOOD FRAGMENTS; SOFT	
13		YELLOWISH-BROWN SILTY VERY FINE SAND; LOOSE, NONCALCAREOUS	-1580
		GRADES GREENISH-GRAY; LOCALLY TO FINE SANDY SILT	
9			-1575
		GRADES BROWN; LESS SILT; CALCAREOUS	
3			-1570
		GRAYISH-BROWN SILT WITH TRACE CLAY AND BROWN DRIED MUD-CRACKED SILT STRINGERS AND VERY FINE SAND LENSES; SOFT, CALCAREOUS	
6			-1565
		GRADES WITH SILTY VERY FINE SAND; LOOSE	
4	ML		-1560
2			-1555
2			-1550
4			-1545
43	SW	BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND; SOME COARSE SAND AND FINE GRAVEL; TRACE SILT; DENSE, CALCAREOUS	-1540

BORING COMPLETED AND GROUTED TO 44.5 FEET ON 5-13-77. CASING USED TO A DEPTH OF 13.5 FEET. GROUND WATER ENCOUNTERED AT APPROXIMATELY 0.5 FEET DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-7
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-6

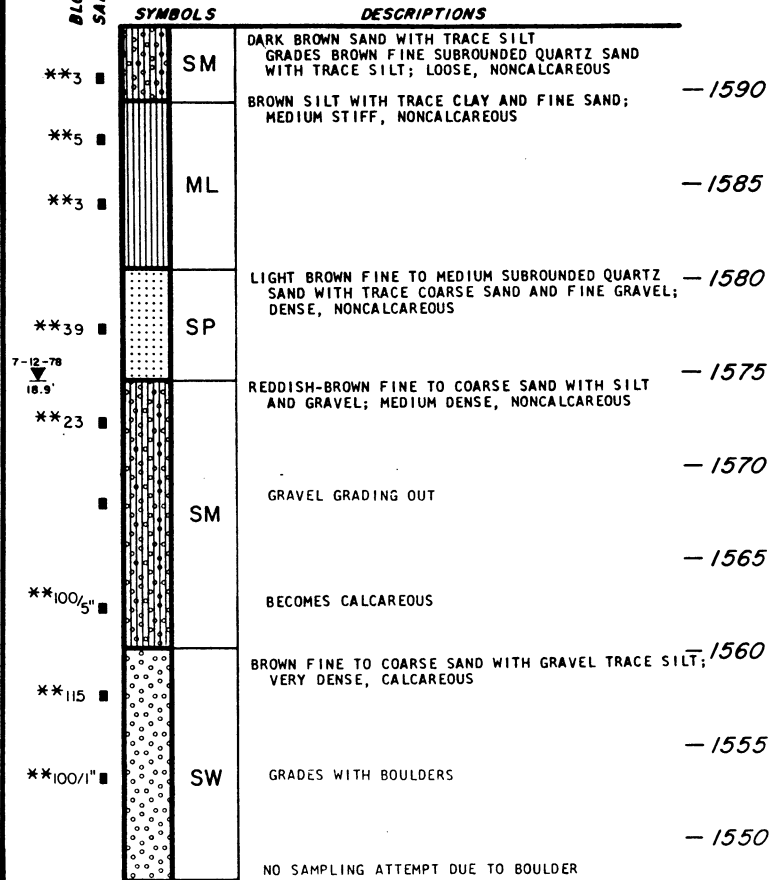
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					10.6	115			
10					23.5	99			
15	P.C.				34.4	85			
20					5.7	117			
25	P.C.				9.9	131			
30					10.9	128			
35	P.C.				7.7				
40									
45									
50									

BORING DMA-10

SURFACE ELEVATION 1593.58

COORDINATES: N 110,510 E 2,275,400

ELEVATION
(FEET)



BORING COMPLETED AT 46.0 FEET ON 3-15-77.
PIEZOMETER INSTALLED ON 3-15-77.
2 INCH PVC SLOTTED FROM 42.0 TO 46.0 FEET.
GRAVEL PACK: 33.0 TO 46.0 FEET.
SAND: 32.0 TO 33.0 FEET.
GROUT: 0.0 TO 32.0 FEET.
GROUND WATER LEVEL RECORDED AT 18.9 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-10
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-7

DEPTH
(FEET)

0
5
10
15
20
25
30
35
40
45

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT		PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF		
					12.4	114		
					7.0	123		
					7.6	121		
					4.2	124		
					14.0	115		
					17.8	113		
					12.4	122		

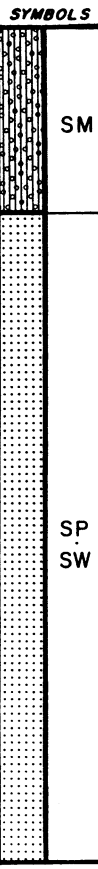
BORING DMA-12

SURFACE ELEVATION 1621.18
COORDINATES: N 117,887 E 2,279,966

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

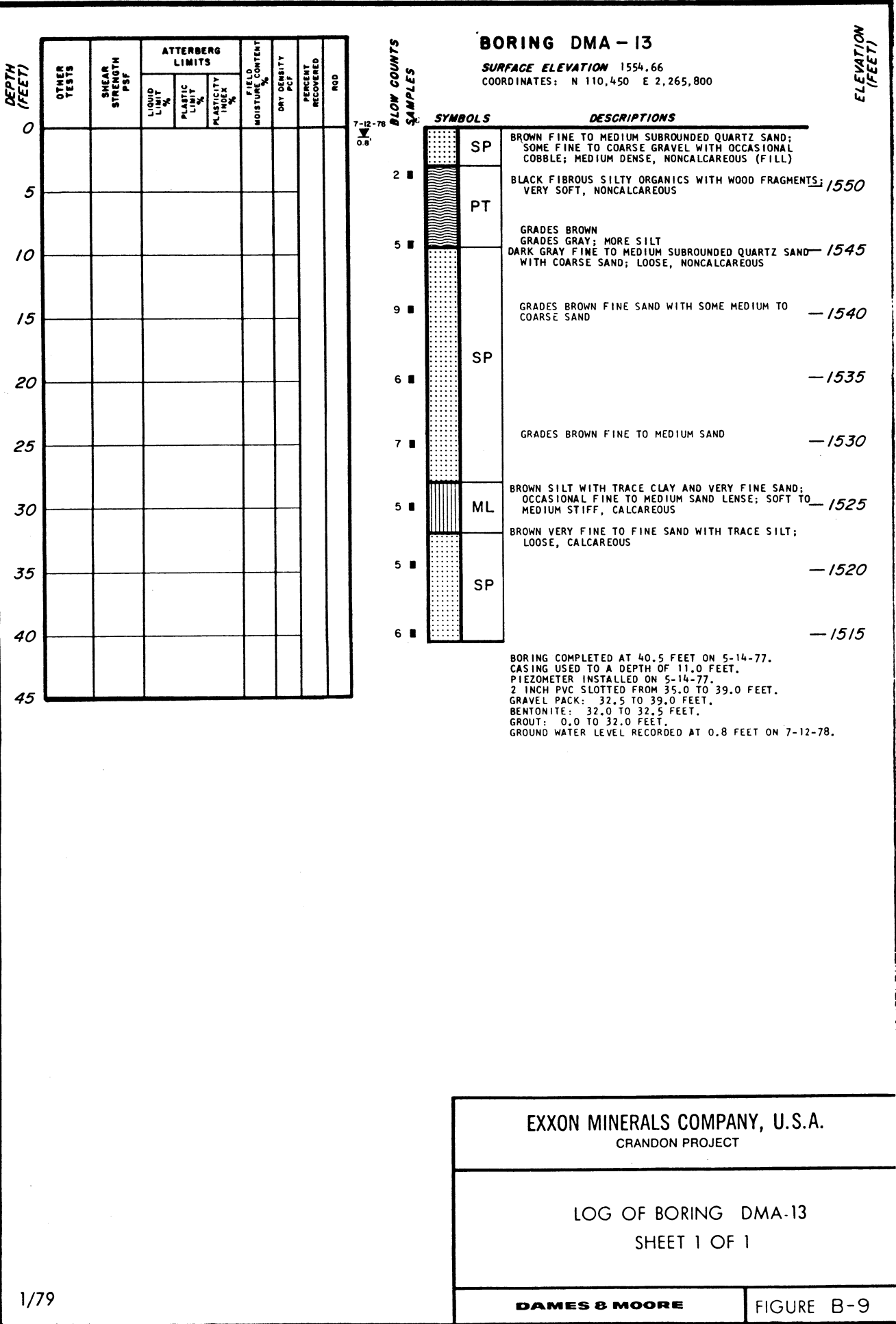
21
35
21
100 6"
7-7-78
29.3'
100 4"
180



SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
	REDDISH-BROWN FINE TO COARSE SAND WITH SILT AND GRAVEL; MEDIUM DENSE, NONCALCAREOUS	-1620
SM		-1615
	BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND AND GRAVEL AND FINE TO MEDIUM SAND WITH GRAVEL; MEDIUM DENSE, CALCAREOUS	-1610
	GRADES WITH BOULDERS	-1605
	GRADES VERY DENSE	-1600
SP SW	BOULDER FROM 28.0 TO 32.0 FEET	-1595
	BOULDER FROM 33.0 TO 35.5 FEET	-1590
	GRADES WITH FINE SAND LAYERS	-1585
	GRADES TO COARSE METAMORPHIC SAND AND GRAVEL	-1580

BORING COMPLETED AT 45.0 FEET ON 3-24-77.
PIEZOMETER INSTALLED ON 3-24-77.
2 INCH PVC SLOTTED FROM 41.0 TO 45.0 FEET.
GRAVEL PACK: 35.0 TO 45.0 FEET.
GROUT: 0.0 TO 35.0 FEET.
GROUND WATER LEVEL RECORDED AT 29.3 FEET ON 7-7-78.

<p>EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT</p>	
<p>LOG OF BORING DMA-12 SHEET 1 OF 1</p>	
<p>DAMES & MOORE</p>	<p>FIGURE B-8</p>



DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									

BORING DMA-14

SURFACE ELEVATION 1601.88
 COORDINATES: N 128,420 E 2,276,320

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

3-16-77
3.0

	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
24	SC	BROWN CLAYEY FINE TO MEDIUM SAND WITH SOME SILT; FINE ROOTS TO 0.5 FEET; MEDIUM DENSE BROWN MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE SILT AND COARSE SAND; MEDIUM DENSE, NONCALCAREOUS	-1600
28	SP	GRADES MEDIUM TO COARSE SAND; TRACE COARSE GRAVEL AND COBBLE FRAGMENTS; SILT GRADES OUT	-1595
13			-1590
31	GW SP	FINE TO COARSE SUBROUNDED QUARTZ SAND WITH METAMORPHIC GRAVEL; WITH INTERBEDDED BROWN FINE TO MEDIUM SAND LAYERS; OCCASIONAL COBBLE; DENSE, NONCALCAREOUS	-1585
66			-1580
17		BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE FINE TO COARSE GRAVEL; MEDIUM DENSE, CALCAREOUS	-1575
13	SP	GRADES LOCALLY SILTY VERY FINE SAND	-1570
19		GRADES SOME CLAY	-1570

BORING COMPLETED AND GROUTED TO 35.0 FEET ON 3-16-77.
 GROUND WATER ENCOUNTERED AT APPROXIMATELY 3.0 FEET DURING DRILLING.
 CASING USED TO A DEPTH OF 10.0 FEET.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-14 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-10

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									

BORING DMA-16

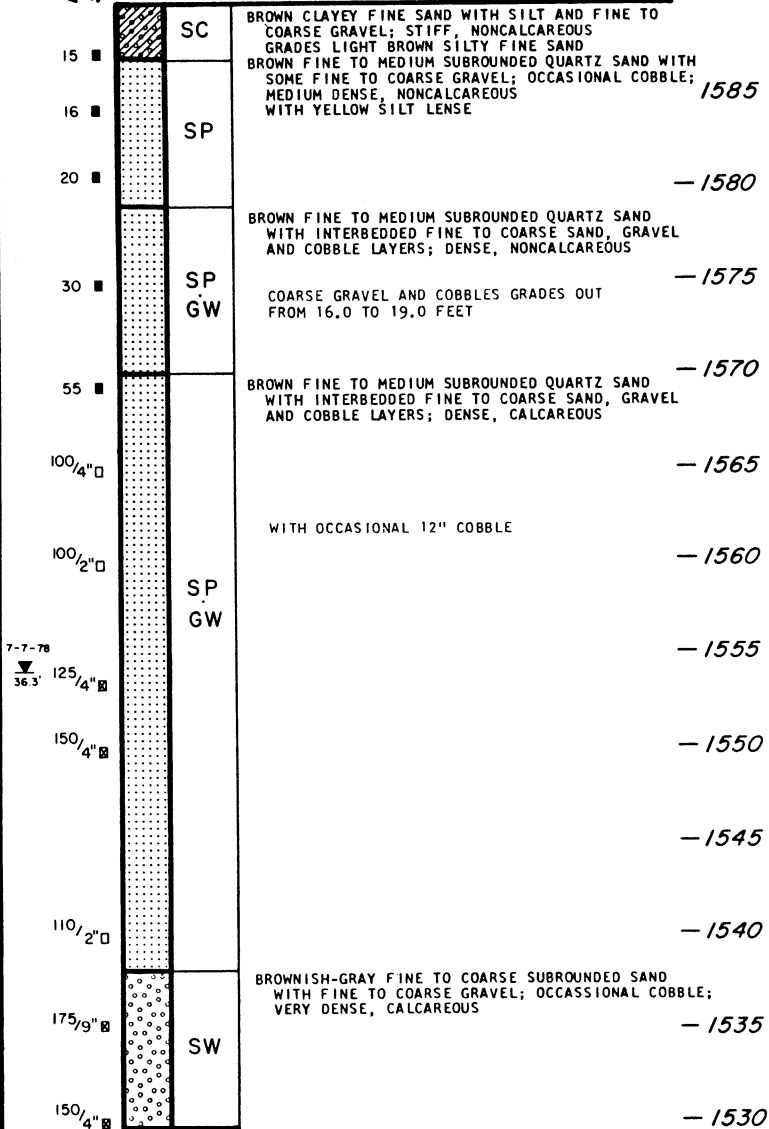
SURFACE ELEVATION 1589.93
 COORDINATES: N 123,793 E 2,271,254

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



BORING COMPLETED AT 60.3 FEET ON 3-17-77.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED ON 3-17-77.
 2 INCH PVC SLOTTED FROM 56.0 TO 60.0 FEET.
 GRAVEL PACK: 52.0 TO 60.0 FEET.
 BENTONITE: 50.0 TO 52.0 FEET.
 GROUT: 0.0 TO 50.0 FEET.
 GROUND WATER LEVEL RECORDED AT 36.3 FEET ON 7-7-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-16
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-11

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					23.9				
					18.7	108			
					25.7				
10					9.7	138			
15					13.7	122			
20					23.9				
25					12.4				
30									
35					18.2	115			
40									

BORING DMA-17

SURFACE ELEVATION: 1563.95
 COORDINATES: N 106,565 E 2,275,547

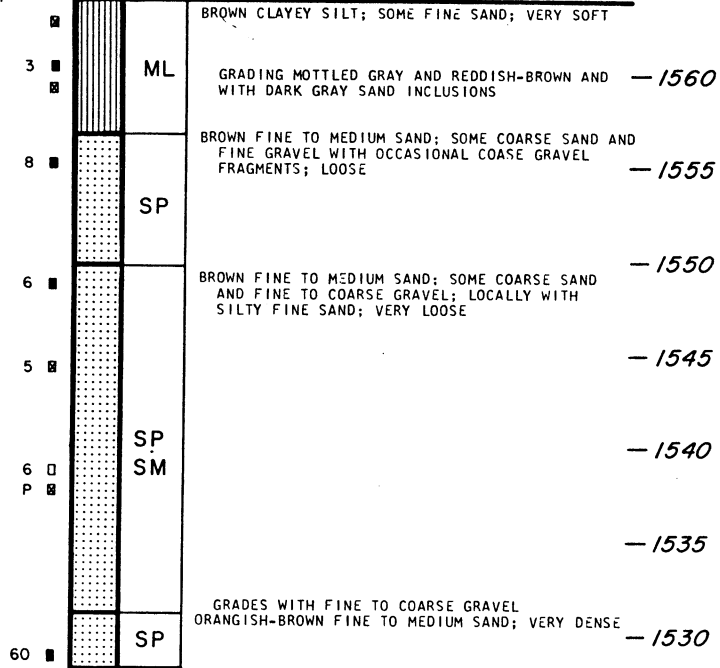
ELEVATION
(FEET)

7-12-78
 +1.3'

BLOW COUNTS
 SAMPLES

SYMBOLS

DESCRIPTIONS



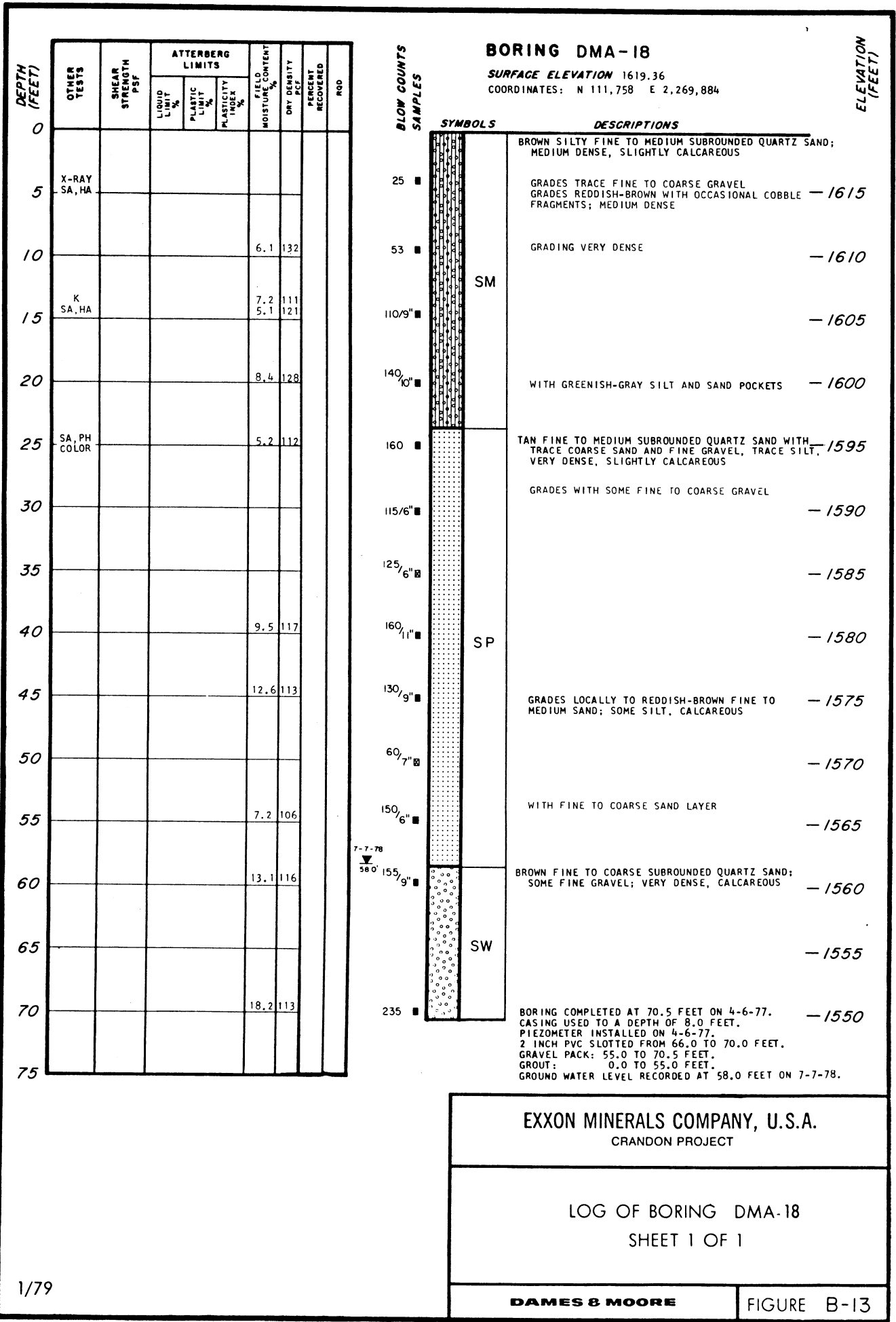
BORING COMPLETED AT 36.0 FEET ON 4-6-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 4-6-77.
 2 INCH PVC SLOTTED FROM 27.5 TO 31.5 FEET.
 GRAVEL PACK: 20.0 TO 24.0 FEET.
 BENTONITE: 19.0 TO 20.0 FEET.
 GROUT: 0.0 TO 19.0 FEET.
 GROUND WATER LEVEL RECORDED AT 1.3 FEET ABOVE GROUND SURFACE ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-17
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-12



DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
0									
5					4.3	112			
10	P.C.				21.4	108			
15	P.C.								
20					9.6	136			
25									
30	P.C.				7.2				

BORING DMA-19

SURFACE ELEVATION 1597.24

COORDINATES: N 115,004 E 2,279,720

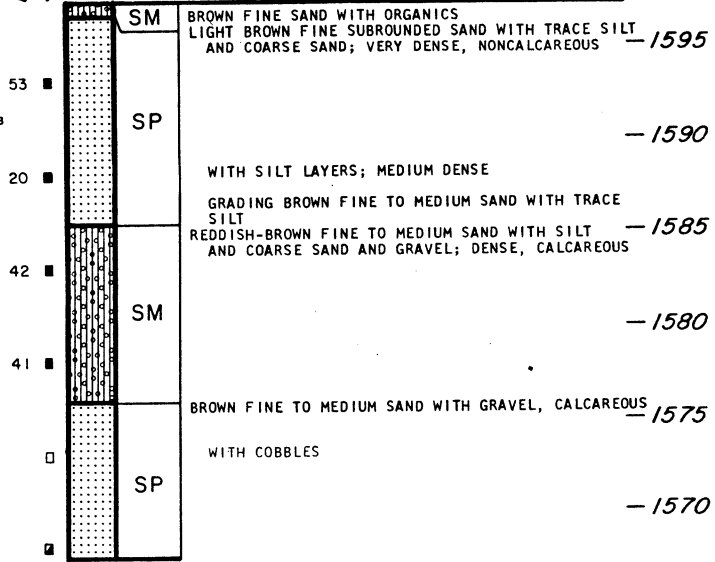
ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

7-6-78
7.3

SYMBOLS

DESCRIPTIONS



BORING COMPLETED AT 30.0 FEET ON 3-21-77.
PIEZOMETER INSTALLED ON 3-21-77.
2 INCH PVC SLOTTED FROM 22.0 TO 26.0 FEET.
GRAVEL PACK: 15.0 TO 26.0 FEET.
GROUT: 0.0 TO 26.0 FEET.
GROUND WATER LEVEL RECORDED AT 7.3 FEET ON 7-6-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-19
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-14

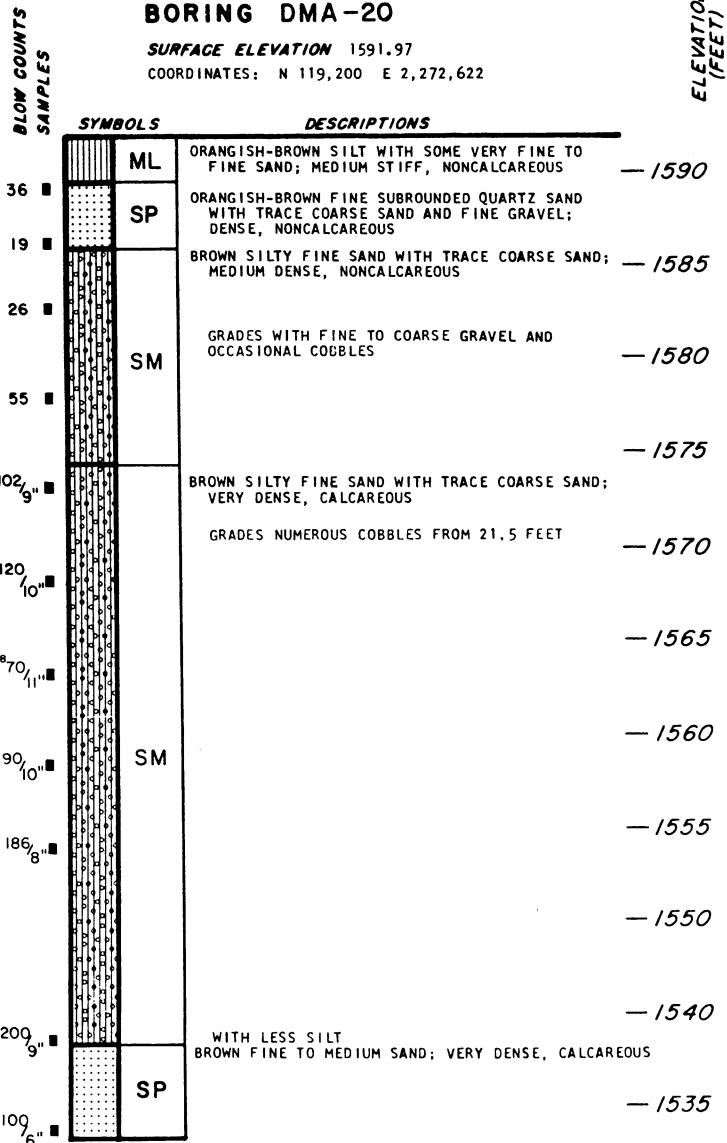
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT		PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE CONTENT %	DRY DENSITY PCF		
0						1.3	114		
5						3.0	118		
10						5.8	130		
15	P.C.					6.4	133		
20	P.C.					8.7	130		
25	P.C.					8.4	129		
30						9.3	137		
35						7.6	137		
40						10.3	137		
45									
50						10.3	137		
55						18.0	109		

BORING DMA-20

SURFACE ELEVATION 1591.97

COORDINATES: N 119,200 E 2,272,622

ELEVATION
(FEET)



BORING COMPLETED AT 54.0 FEET ON 3-28-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 3-28-77.
 2 INCH PVC SLOTTED FROM 50.0 TO 54.0 FEET.
 GRAVEL PACK: 36.0 TO 54.0 FEET.
 GROUT: 0.0 TO 36.0 FEET.
 GROUND WATER LEVEL RECORDED AT 29.7 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-20
 SHEET 1 OF 1

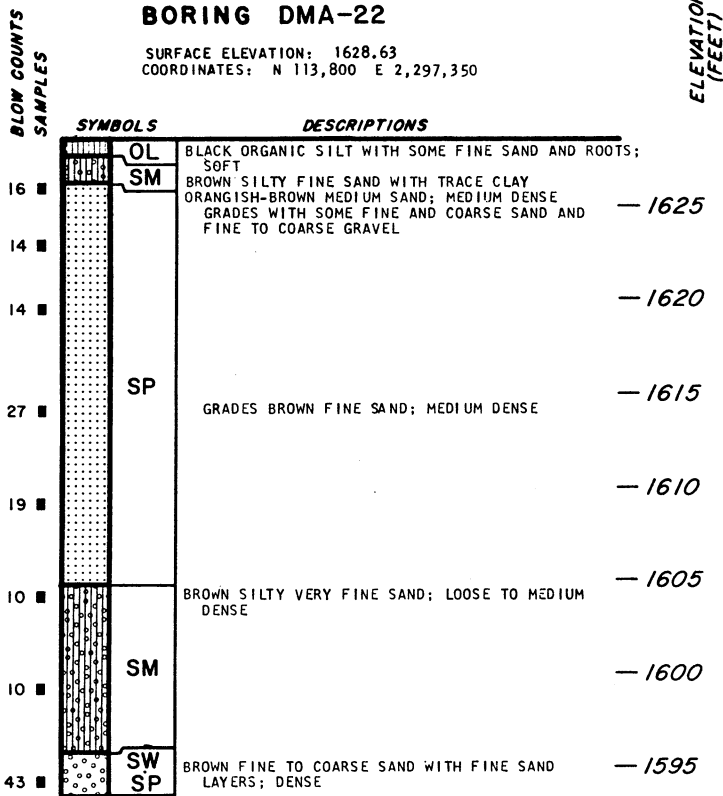
DAMES & MOORE

FIGURE B-15

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					12.2	111			
10									
15					8.9	110			
20									
25					21.1	99			
30									
35									
40									

BORING DMA-22

SURFACE ELEVATION: 1628.63
 COORDINATES: N 113,800 E 2,297,350



BORING COMPLETED AND GROUTED TO 35.5 FEET ON 4-19-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-22
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-16

ELEVATION (FEET)

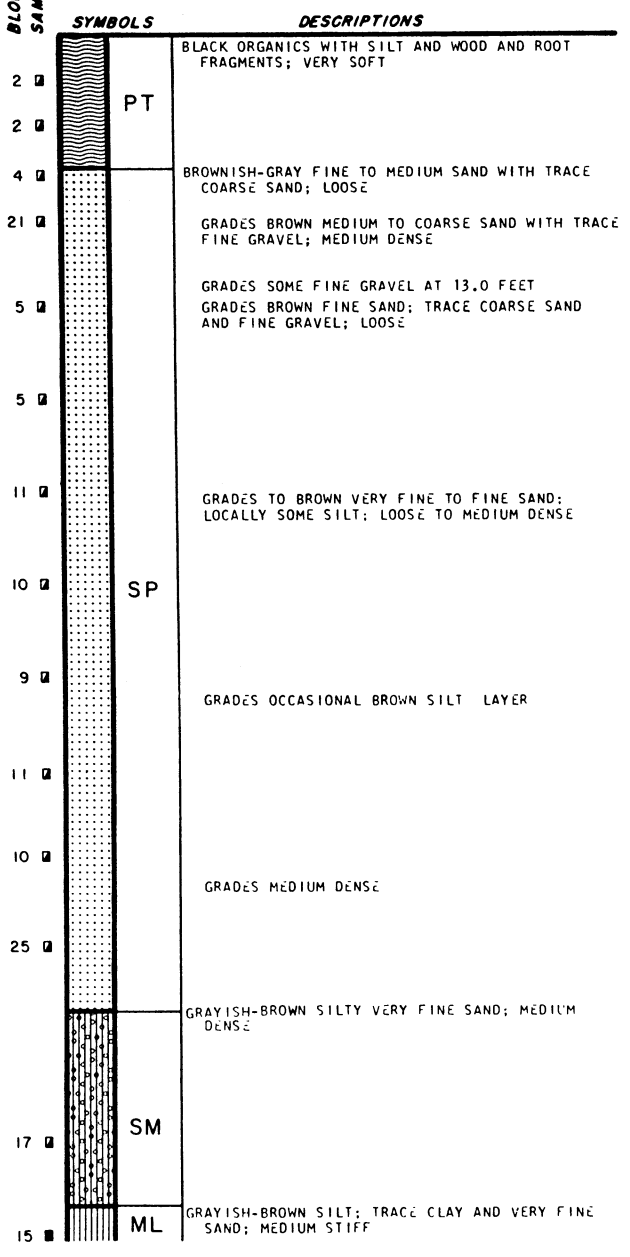
BORING DMA-27

SURFACE ELEVATION: 1540.05
 COORDINATES: N 105,150 E 2,254,020

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									

5-11-77
 0.0'

BLOW COUNTS SAMPLES



BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-27
 SHEET 1 OF 2

DAMES & MOORE **FIGURE B-171**

DEPTH
(FEET)

65
70
75
80
85
90

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				

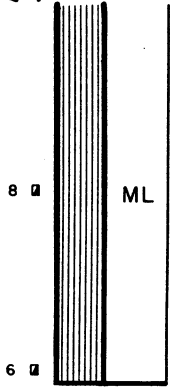
BORING DMA-27 CONTINUED

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



ML GRADES SOME CLAY; OCCASIONAL BROWN MUD-CRACKED SILT STRINGER

BORING COMPLETED AND GROUTED TO 85.5 FEET ON 5-11-77.
CASING USED TO A DEPTH OF 13.5 FEET.
GROUND WATER ENCOUNTERED AT APPROXIMATELY
GROUND SURFACE DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-27
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-17.2

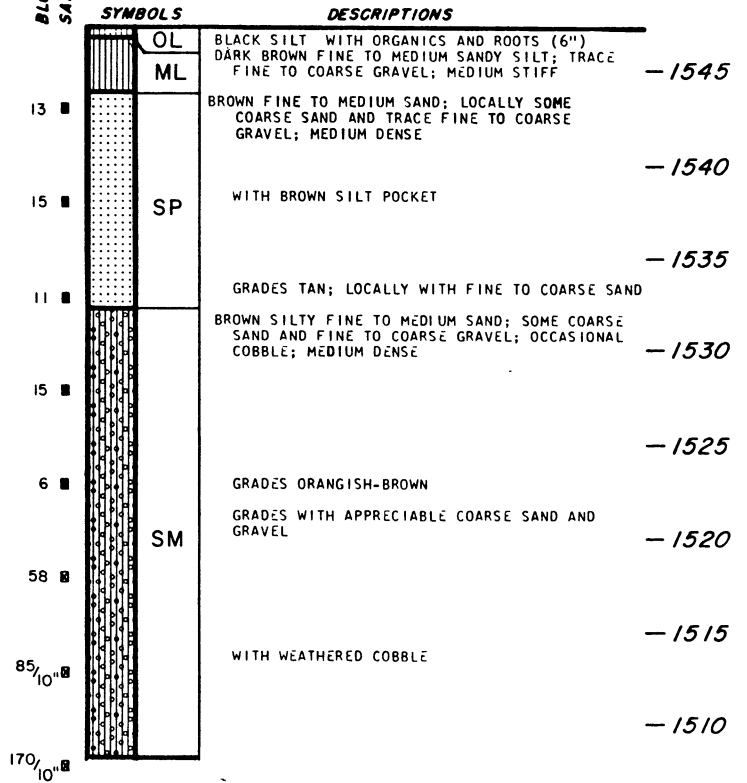
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									

BORING DMA-27A

SURFACE ELEVATION: 1547.11
 COORDINATES: N 104,430 E 2,254,790

BLOW COUNTS
SAMPLES

ELEVATION
(FEET)



BORING COMPLETED AT 39.2 FEET ON 5-4-77.
 CASING USED TO A DEPTH OF 13.0 FEET.
 GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-27A
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-18

DEPTH
(FEET)

BORING DMA-29

SURFACE ELEVATION: 1537.11
 COORDINATES: N 101,230 E 2,251,380

ELEVATION
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15					21.5	107			
20					25.5	101			
25					25.6	97			
30	K SA, HA		34	24	10	35.4	87		
						34.4	89		
35					34.7	88			
40					35.8	87			

7-12-78
 2.4'

BLOW COUNTS
 SAMPLES



SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
PT	BLACK FIBROUS ORGANICS WITH WOOD FRAGMENTS; VERY SOFT	-1535
	WITH SOME SILT	-1530
OL	OLIVE GREEN SILT WITH ORGANICS; VERY SOFT	-1525
SP	GREENISH-BROWN FINE SAND; SOME COARSE SAND; LOOSE	-1520
	GRAY SILT; SOME VERY FINE SAND; SOFT TO MEDIUM STIFF	-1515
	GRADES LOCALLY TO SILTY VERY FINE SAND; LOOSE	-1510
	VERY FINE SAND GRADES OUT	-1505
ML	GRADES BROWN CLAYEY SILT INTERBEDDED WITH BROWN CLAY STRINGERS AND LENSES; SOFT	-1500

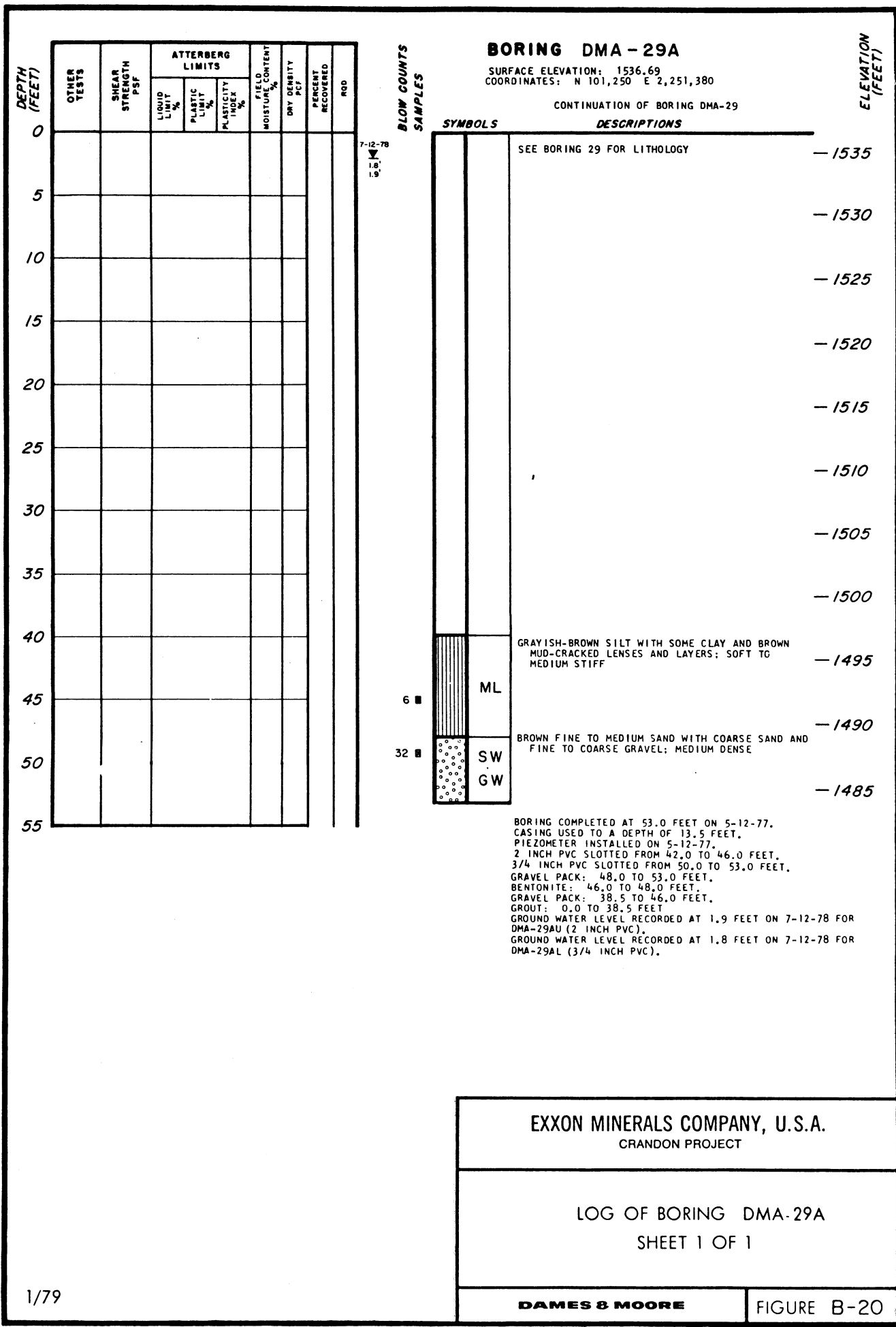
BORING COMPLETED AT 40.0 FEET ON 3-26-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 3-26-77.
 2 INCH PVC SLOTTED FROM 17.0 TO 21.0 FEET.
 GRAVEL PACK: 9.0 TO 40.0 FEET.
 GROUT: 0.0 TO 9.0 FEET.
 GROUND WATER LEVEL RECORDED AT 2.4 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-29
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-19



EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

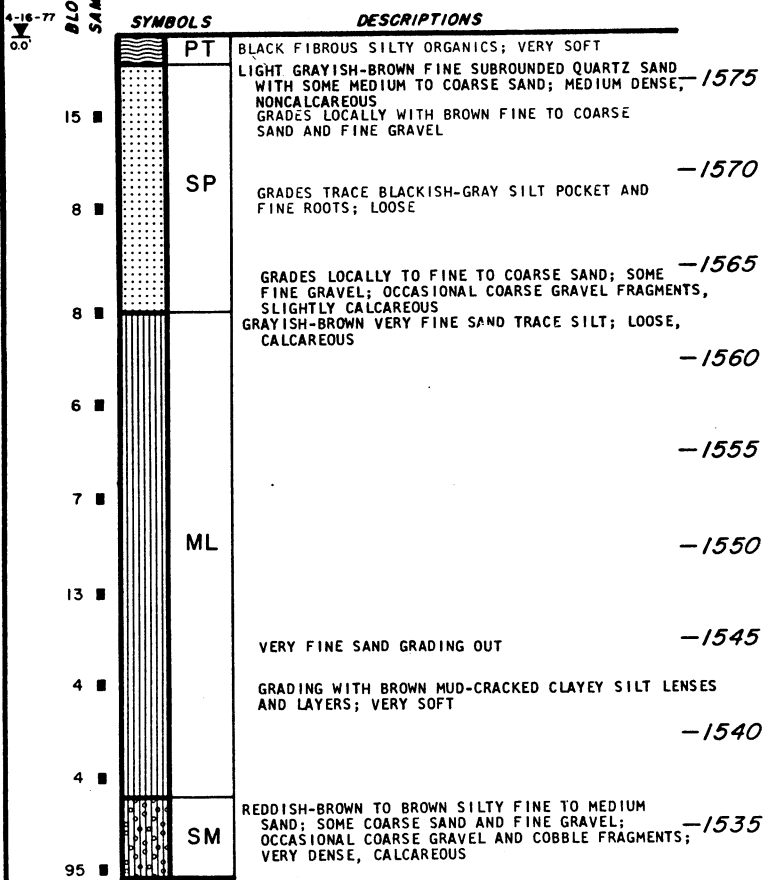
LOG OF BORING DMA-29A
 SHEET 1 OF 1

BORING DMA-30

SURFACE ELEVATION 1577.58
 COORDINATES: N 122,680 E 2,281,010

ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	P.C.								
10					18.1	107			
15									
20					22.1	109			
25									
30					21.0	108			
35	K				31.2	95			
40									
45	P.C.				6.3	148			
50									



4-16-77
0.0

BORING COMPLETED AND GROUTED TO 45.5 FEET ON 4-16-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 GROUND WATER ENCOUNTERED AT APPROXIMATELY GROUND SURFACE DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

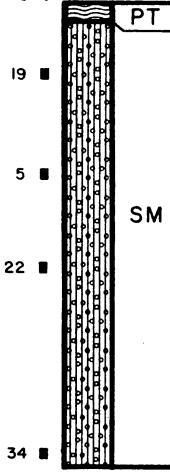
LOG OF BORING DMA-30
 SHEET 1 OF 1

DAMES & MOORE FIGURE B-21

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					12.1	127			
10					9.2	136			
15					9.1	136			
20									
25					8.9	140			

7-12-78
6.7'

BLOW COUNTS
SAMPLES



BORING DMA-31

SURFACE ELEVATION 1592.09
COORDINATES: N 120,160 E 2,281,570

ELEVATION
(FEET)

SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
PT	BLACK FIBROUS SILTY ORGANICS WITH COBBLES; SOFT BROWN FINE TO MEDIUM SILTY SAND; WITH SOME COARSE SAND AND FINE TO COARSE GRAVEL AND OCCASIONAL COBBLE; LOOSE, SLIGHTLY CALCAREOUS GRADES LOCALLY TO SILTY FINE TO COARSE SAND	— 1590
		— 1585
	GRADES VERY LOOSE, CALCAREOUS	— 1580
SM	GRADES WITH FINE TO COARSE GRAVEL; MEDIUM DENSE	— 1575
	18" COBBLE FROM 19.0 FEET	— 1570

BORING COMPLETED AT 25.0 FEET ON 4-18-77.
CASING USED TO A DEPTH OF 8.5 FEET.
PIEZOMETER INSTALLED ON 4-18-77.
2 INCH PVC SLOTTED FROM 21.0 TO 24.0 FEET.
GRAVEL PACK: 15.0 TO 24.0 FEET.
BENTONITE: 14.0 TO 15.0 FEET.
GROUT: 0.0 TO 14.0 FEET.
GROUND WATER LEVEL RECORDED AT 6.7 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-31 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-22

DEPTH (FEET)

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				

BORING DMA-32

SURFACE ELEVATION:
COORDINATES:

ELEVATION (FEET)

BLOW COUNTS
SAMPLES

24 ■
4-26-77
7.0'

70 ■

SYMBOLS	DESCRIPTIONS
OL	BLACK CLAYEY SILT WITH ORGANICS AND FINE ROOTS
SM	BROWN SILTY FINE TO MEDIUM SAND; MEDIUM DENSE
SP	BROWN FINE TO MEDIUM SAND WITH SOME FINE TO COARSE GRAVEL

END OF BORING AT 9.5 FEET DUE TO COBBLES
SEE BORING DMA-32A

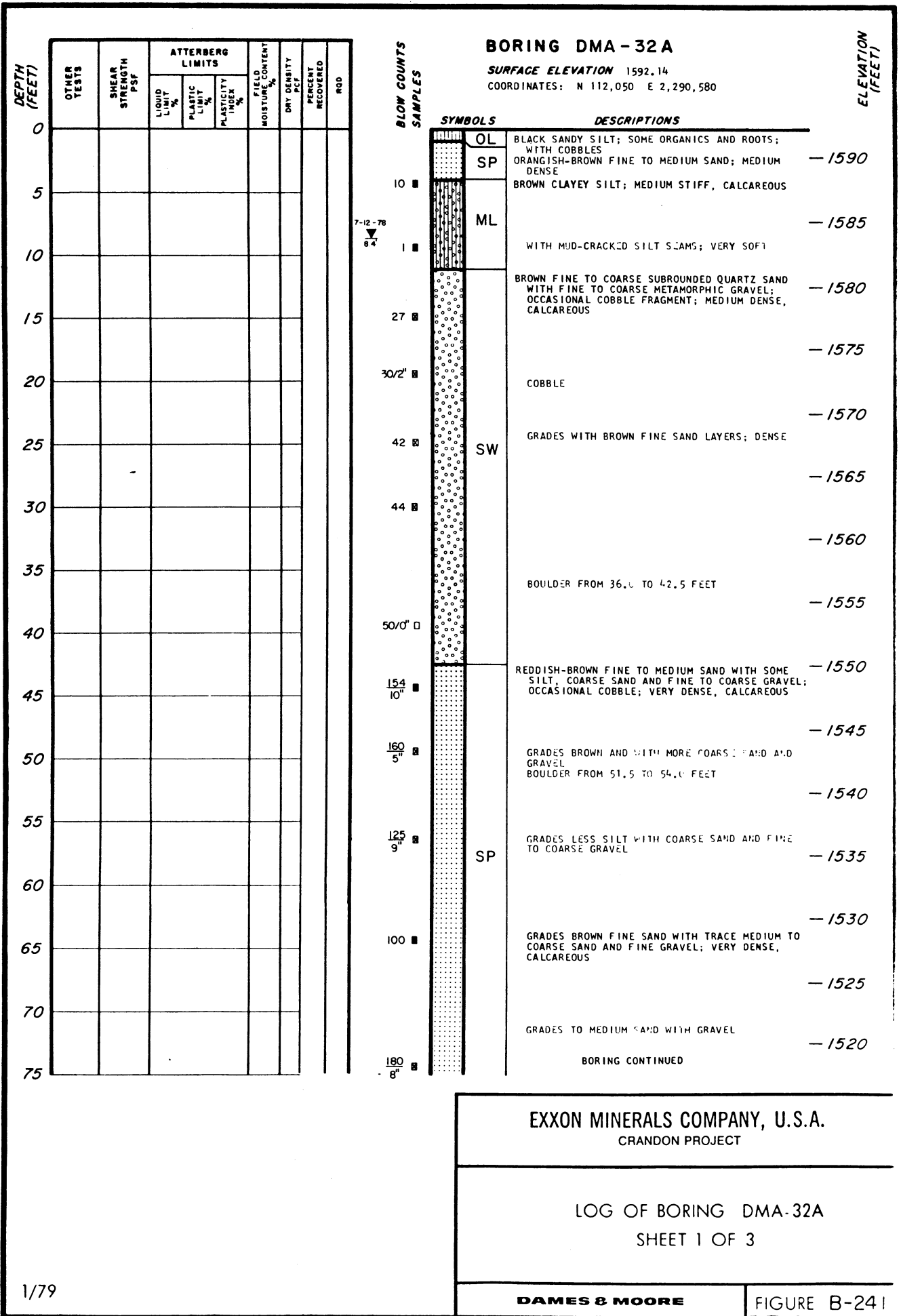
BORING COMPLETED AT 9.5 FEET ON 4-26-77.
NO CASING USED.
GROUND WATER ENCOUNTERED AT 7.0 FEET
DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-32
SHEET 1 OF 1

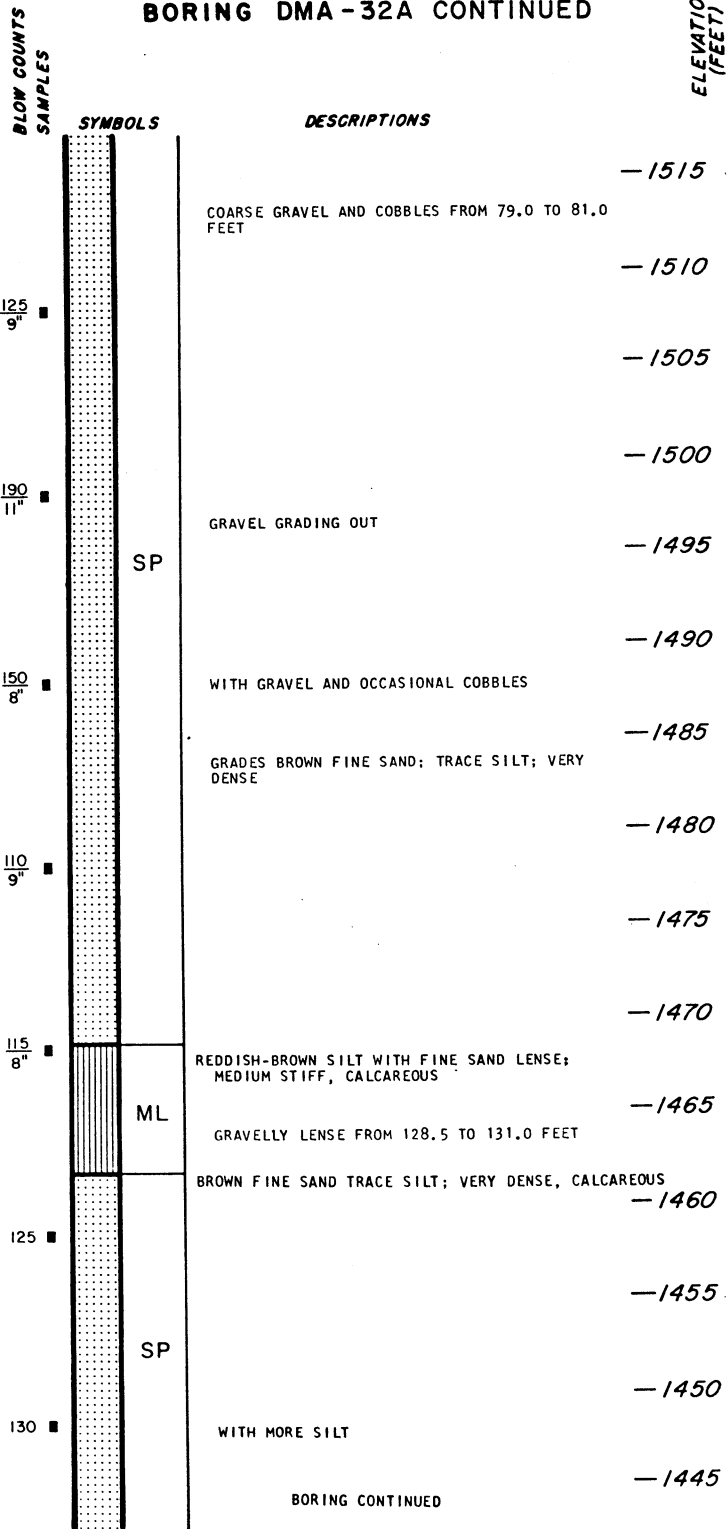
DAMES & MOORE

FIGURE B-23



BORING DMA-32A CONTINUED

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
75									
80									
85									
90									
95									
100									
105									
110									
115									
120									
125									
130									
135									
140									
145									
150									



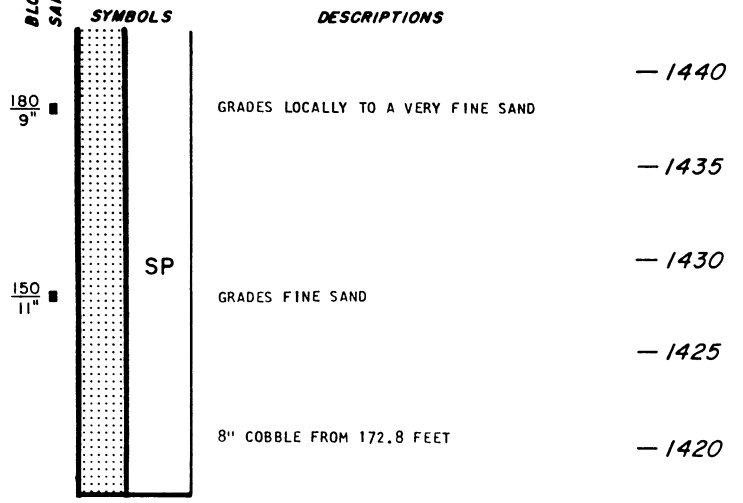
EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-32A
SHEET 2 OF 3

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
150									
155									
160									
165									
170									
175									

BORING DMA-32A CONTINUED

ELEVATION
(FEET)



BORING ABANDONED AT 175.0 FEET ON 4-28-77
 DUE TO STUCK DRILL TOOLS.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED ON 4-30-77.
 2 INCH PVC SLOTTED FROM 33.0 TO 37.0 FEET.
 GRAVEL PACK: 30.0 TO 42.0 FEET.
 BENTONITE: 29.0 TO 30.0 FEET.
 GRAVEL PACK: 28.0 TO 29.0 FEET.
 GROUT: 0.0 TO 28.0 FEET.
 GROUND WATER LEVEL AT 8.4 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-32A SHEET 3 OF 3	
DAMES & MOORE	FIGURE B-243

DEPTH (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT		ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE CONTENT %	DRY DENSITY PCF	
0						41.9	80	
5						21.5	106	
10						20.5	106	
15						19.6	108	
20								
25								
30						20.8	108	
35						23.3	105	
40								
45						20.1	107	
50								
55								
60								
65								
70								

4-8-77
0.0'

BLOW COUNTS SAMPLES

BORING DMA-33

SURFACE ELEVATION: 1537.93
COORDINATES: N 109,525 E 2,251,770

ELEVATION (FEET)

SYMBOLS

DESCRIPTIONS

DEPTH (FEET)	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
0	PT	BLACK FIBROUS SILTY ORGANICS; VERY SOFT	
5		LIGHT BROWN FINE SAND; LOOSE TO MEDIUM DENSE	-1535
12			-1530
11			-1525
3	SP	GRADES VERY LOOSE	-1520
5			-1515
17		GRADES SOME COARSE SAND AND FINE GRAVEL; TRACE SILT; MEDIUM DENSE	-1510
10		GRADES SOME SILT; LOCALLY TO A SILTY VERY FINE SAND; LOOSE	-1505
9		GRAYISH-BROWN SILT; LOCALLY SOME VERY FINE SAND; MEDIUM STIFF	-1500
6			-1495
9			-1490
9	ML		-1485
8		GRADES GRAYISH-BROWN CLAYEY SILT; MEDIUM STIFF	-1480
		GRADES WITH BROWN MUD-CRACKED SILT STRINGERS AND LENSES	-1475
4			-1470

BORING CONTINUED

<p>EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT</p>	
<p>LOG OF BORING DMA-33 SHEET 1 OF 2</p>	
<p>DAMES & MOORE</p>	<p>FIGURE B-25.1</p>

BORING DMA-33 CONTINUED

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	NO.
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
70									
75									
80									
85									
90									

BLOW COUNTS
SAMPLES



DESCRIPTIONS

ELEVATION
(FEET)

— 1465

— 1460

— 1455

— 1450

FINE GRAVEL WITH INTERBEDDED REDDISH-BROWN SILT LAYERS; SOME FINE TO COARSE SAND; MEDIUM DENSE

BORING COMPLETED AND GROUTED TO 50.0 FEET ON 4-8-77.
CASING USED TO A DEPTH OF 8.0 FEET.
GROUND WATER ENCOUNTERED AT APPROXIMATELY GROUND SURFACE DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMA-33
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-252

DEPTH
(FEET)

0
5
10
15
20
25
30
35

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
					14.4	112		
					14.9	121		
					19.2	109		
					30.1	94		
					35.0	88		
					6.3			
K SA, HA					8.4	128		
					7.2	135		

7-12-78
1.0

BLOW COUNTS
SAMPLES

BORING DMA - 34

SURFACE ELEVATION: 1535.92
COORDINATES: N 114,000 E 2,248,050

ELEVATION
(FEET)

SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
PT	BLACK FIBROUS SILTY ORGANICS; VERY SOFT MOTTLED BROWN AND DARK BROWN FINE SAND WITH TRACE MEDIUM TO COARSE SAND; LOOSE	-1535
SP	GRADES GRAY; LOCALLY WITH SILT; VERY LOOSE	-1530
	GRADES TO VERY FINE SAND	
	GRAYISH-BROWN CLAYEY SILT WITH MUD-CRACKED SILT STRINGERS AND LENSES; OCCASIONAL FINE SAND LENSE; VERY SOFT	-1525
ML		-1520
		-1515
SM	REDDISH-BROWN SILTY FINE TO MEDIUM SAND WITH SOME COARSE SAND AND FINE TO COARSE GRAVEL; DENSE	-1510
	GRADES WITH COARSE GRAVEL AND COBBLES FROM 26.0 TO 28.0 FEET	
	GRADES VERY DENSE	-1505

BORING COMPLETED AT 30.5 FEET ON 4-15-77.
CASING USED TO A DEPTH OF 8.0 FEET.
PIEZOMETER INSTALLED ON 4-15-77.
2 INCH PVC SLOTTED FROM 18.0 TO 22.0 FEET.
GRAVEL PACK: 15.0 TO 22.0 FEET.
BENTONITE: 14.0 TO 15.0 FEET.
GROUT: 0.0 TO 14.0 FEET.
GROUND WATER LEVEL RECORDED AT 1.0 FEET ON 7-12-78.

<p>EXXON MINERALS COMPANY, U.S.A. GRANDON PROJECT</p>	
<p>LOG OF BORING DMA-34 SHEET 1 OF 1</p>	
<p>DAMES & MOORE</p>	<p>FIGURE B-26</p>

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	REMARKS
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									

BORING DMA-35

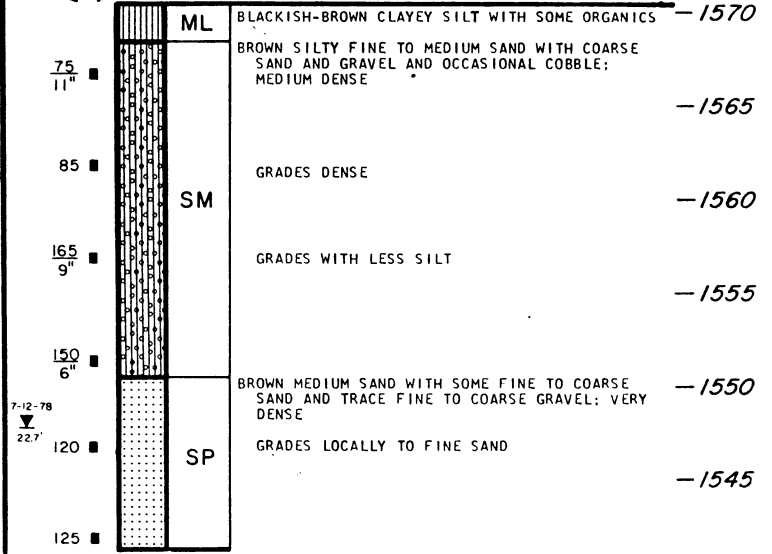
SURFACE ELEVATION: 1570.39
 COORDINATES: N 111,180 E 2,245,820

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



BORING COMPLETED AT 29.5 FEET ON 5-14-77.
 CASING USED TO A DEPTH OF 11.5 FEET.
 PIEZOMETER INSTALLED ON 5-15-77.
 2 INCH PVC SLOTTED FROM 25.0 TO 29.0 FEET.
 GRAVEL PACK: 20.0 TO 29.5 FEET.
 GROUT: 0.0 TO 20.0 FEET.
 GROUND WATER LEVEL RECORDED AT 22.7 FEET ON 7-12-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-35
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-27

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
0									
5									
10									
15									
20									
25									
30									

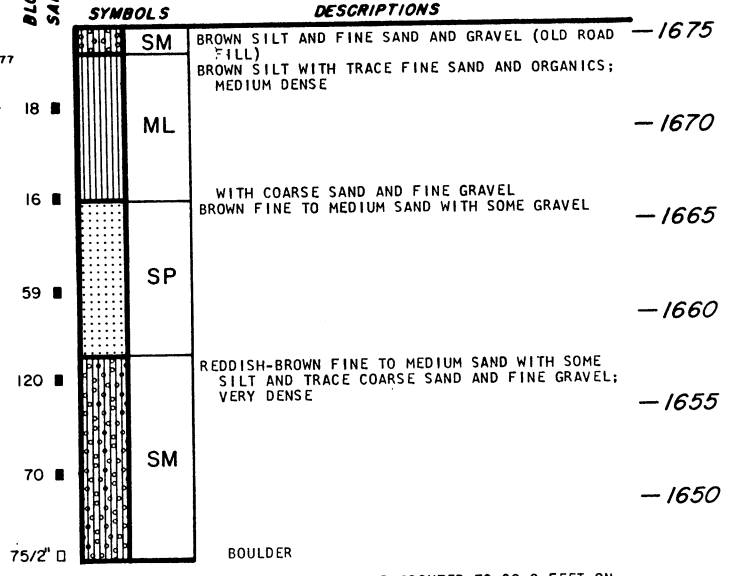
BORING DMA-36

SURFACE ELEVATION: 1675.46
 COORDINATES: N 129,500 E 2,250,180

ELEVATION
(FEET)

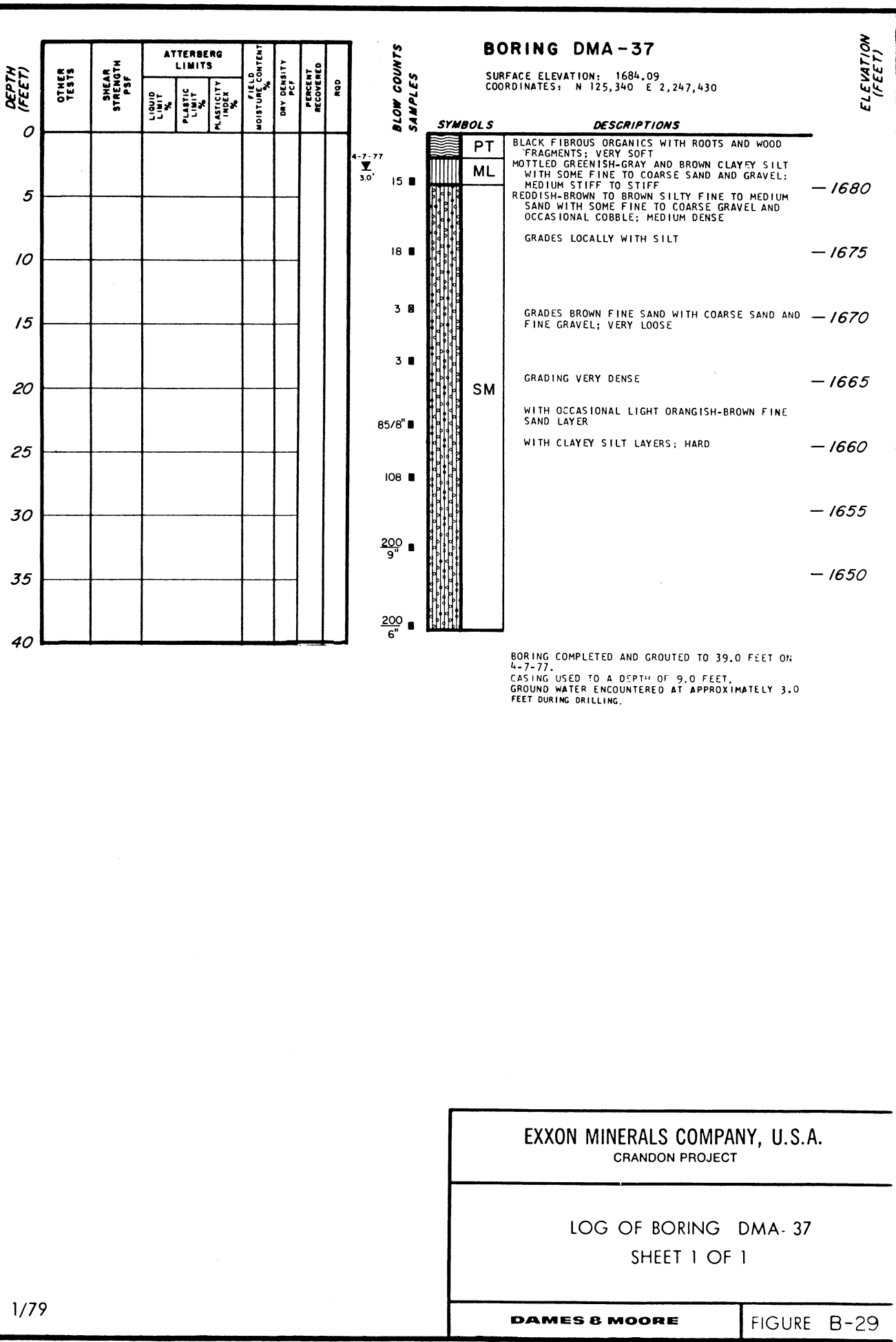
BLOW COUNTS
SAMPLES

3-30-77
3.0'



BORING COMPLETED AND GROUTED TO 29.0 FEET ON 3-30-77.
 GROUND WATER ENCOUNTERED AT 3.0 FEET DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-36 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-28



DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	RQD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									

BORING DMA - 38

SURFACE ELEVATION: 1772.00
 COORDINATES: N 141,150 E 2,249,880

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

	SYMBOLS	DESCRIPTIONS	
0	PT	BLACK FIBROUS ORGANICS; VERY SOFT	
4	SM	MOTTLED GREENISH-BROWN AND ORANGISH-BROWN SILTY FINE TO MEDIUM SAND; GRADES LOCALLY TO SANDY SILT; VERY LOOSE	-1770
7	ML	BROWN SILT WITH TRACE GRAY MOTTLING AND SOME CLAY; TRACE COARSE SAND AND FINE GRAVEL; MEDIUM STIFF	
26	SP	BROWN FINE TO MEDIUM SAND WITH SOME FINE TO COARSE GRAVEL AND OCCASIONAL SILT POCKET; MEDIUM DENSE	-1765
22		REDDISH-BROWN FINE TO MEDIUM SILTY SAND WITH SOME FINE TO COARSE GRAVEL AND OCCASIONAL COBBLE; MEDIUM DENSE	-1760
27	SM	GRADES VERY DENSE	-1755
120 9"			-1750
145			-1745

BORING COMPLETED AT 30.0 FEET ON 5-3-77.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED ON 5-3-77.
 2 INCH PVC SLOTTED FROM 24.5 TO 28.5 FEET.
 GRAVEL PACK: 19.5 TO 30.0 FEET.
 GROUT: 0.0 TO 19.5 FEET.
 PIEZOMETER DRY ON 7-12-78.

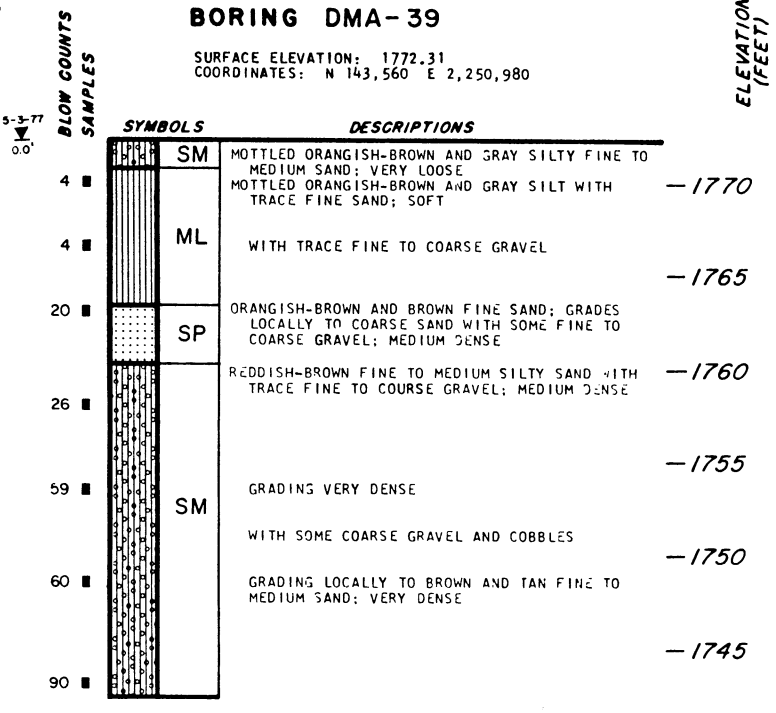
EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-38
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-30

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									



BORING COMPLETED AND GROUTED TO 30.0 FEET ON 5-3-77.
CASING USED TO A DEPTH OF 9.0 FEET.
GROUND WATER ENCOUNTERED AT APPROXIMATELY
GROUND SURFACE DURING DRILLING.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-39 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-31

DEPTH
(FEET)

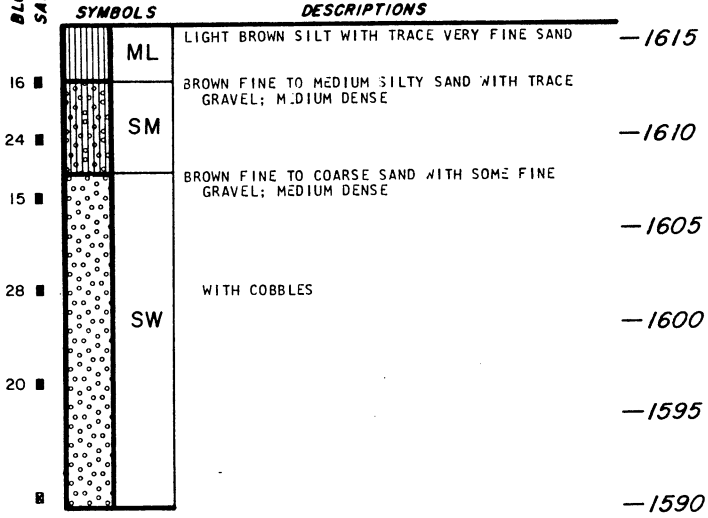
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									

BORING DMA-42

SURFACE ELEVATION: 1615.85
 COORDINATES: N 133,040 E 2,271,020

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES



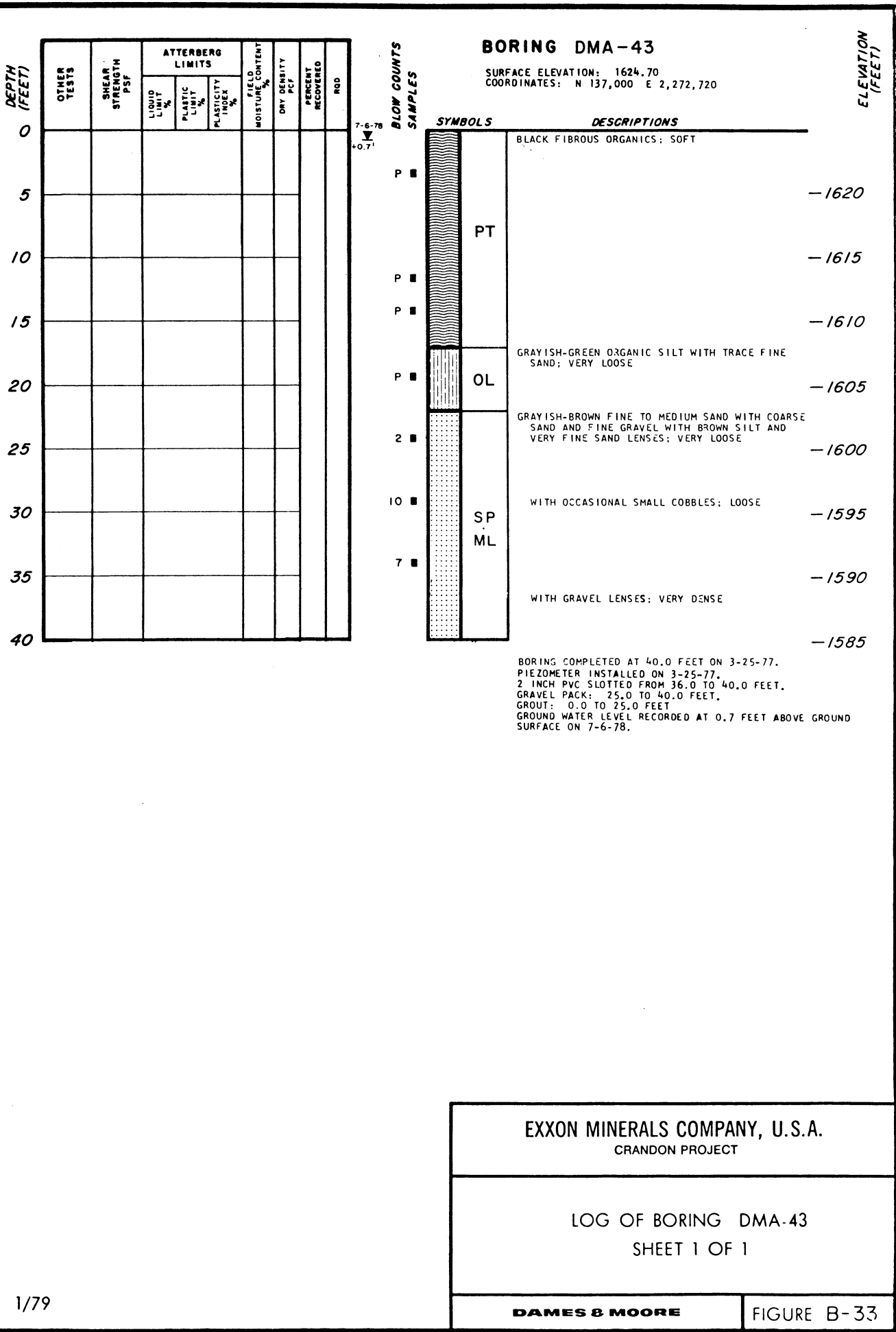
BORING COMPLETED AND GROUTED TO 26.0 FEET ON 3-29-77.
 CASING USED TO A DEPTH OF 10.0 FEET.
 GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-42
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-32



DEPTH
(FEET)

0
5
10
15
20
25
30
35

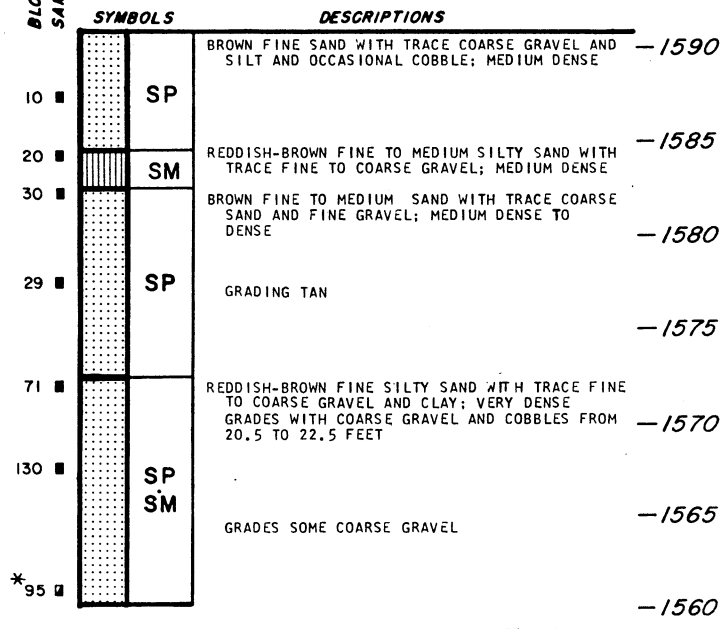
OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %		DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE CONTENT %	DRY DENSITY PCF			
					5.2	105			
SA, HA					6.8	129			
					5.9	124			
					9.6	111			
					9.8	133			
					9.9	130			

BORING DMA-44

SURFACE ELEVATION: 1590.84
 COORDINATES: N 88,280 E 2,259,180

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES



BORING COMPLETED AND GROUTED TO 31.0 FEET ON 3-25-77.
 CASING USED TO A DEPTH OF 7.5 FEET.
 GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-44
 SHEET 1 OF 1

DAMES & MOORE

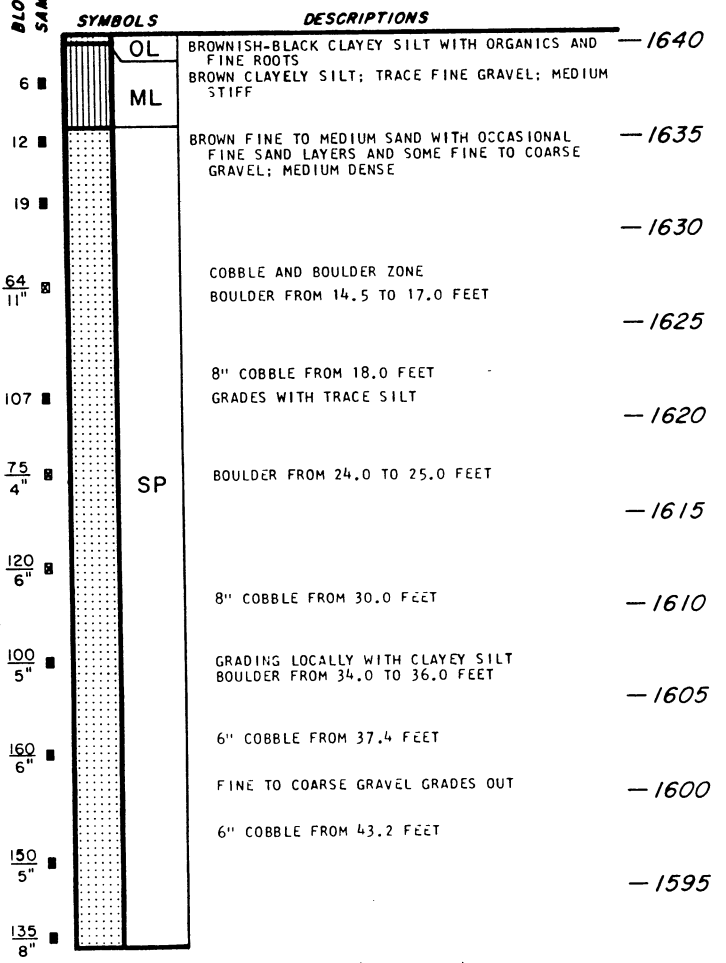
FIGURE B-34

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									

BLOW COUNTS
SAMPLES

BORING DMA - 45
 SURFACE ELEVATION: 1640.61
 COORDINATES: N 100,630 E 2,310,200

ELEVATION
(FEET)



BORING COMPLETED AT 49.2 FEET ON 5-1-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 5-1-77.
 2 INCH PVC SLOTTED FROM 44.0 TO 48.0 FEET.
 GRAVEL PACK: 33.0 TO 48.0 FEET.
 GROUT: 0.0 TO 33.0 FEET.
 PIEZOMETER DRY ON 7-7-78.

EXXON MINERALS COMPANY, U.S.A.
 GRANDON PROJECT

LOG OF BORING DMA-45
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-35

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									
70									
75									

BORING DMA - 46

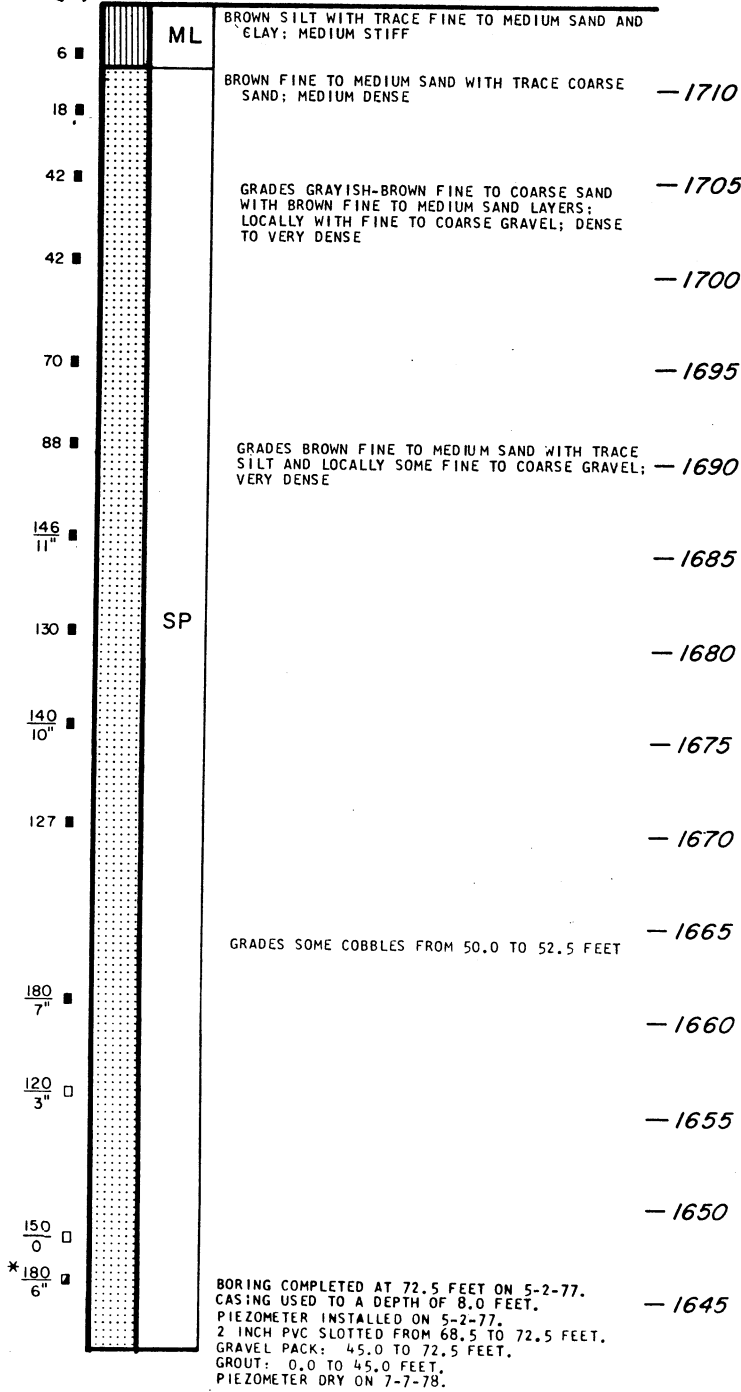
SURFACE ELEVATION: 1714.52
 COORDINATES: N 117,420 E 2,319,400

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



BORING COMPLETED AT 72.5 FEET ON 5-2-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 5-2-77.
 2 INCH PVC SLOTTED FROM 68.5 TO 72.5 FEET.
 GRAVEL PACK: 45.0 TO 72.5 FEET.
 GROUT: 0.0 TO 45.0 FEET.
 PIEZOMETER DRY ON 7-7-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-46
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-36

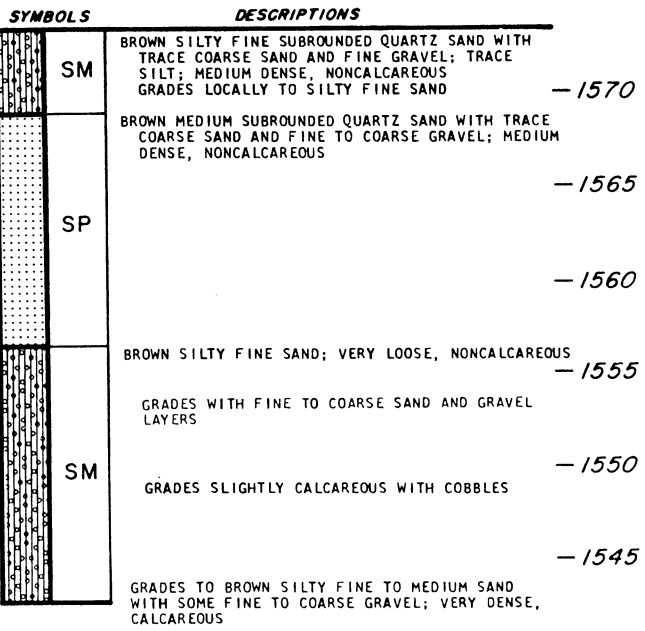
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5					4.7	116			
10					3.7	108			
15					3.1	114			
20					10.9	133			
25					17.7	115			
30					3.5	136			
35									

BORING DMA - 47

SURFACE ELEVATION 1573.62
 COORDINATES: N 121,393 E 2,276,058

ELEVATION (FEET)

BLOW COUNTS SAMPLES



6-8-78
 170'

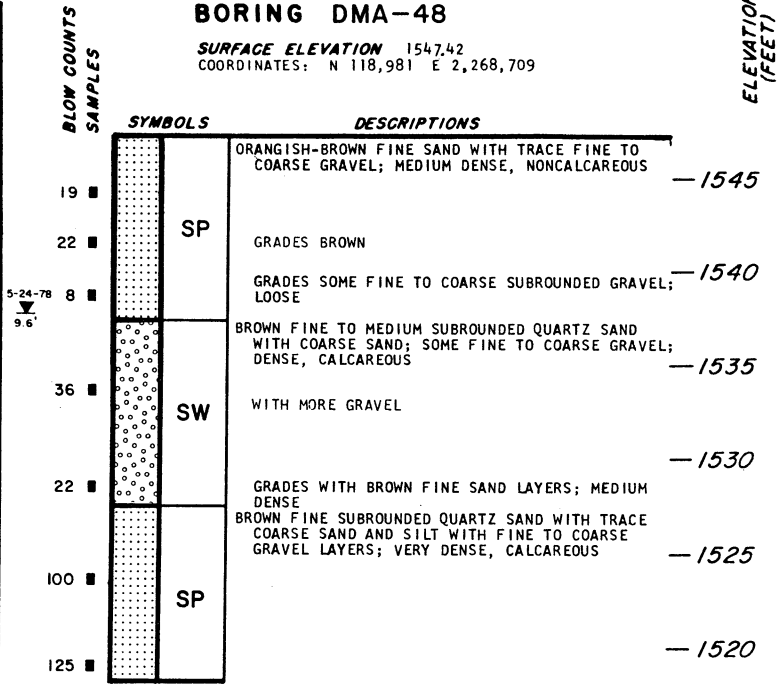
BORING COMPLETED AT 31.0 FEET ON 3-30-77.
 CASING USED TO A DEPTH OF 7.0 FEET.
 PIEZOMETER INSTALLED ON 3-30-77.
 2 INCH PVC SLOTTED FROM 23.0 TO 27.0 FEET.
 GRAVEL PACK: 17.5 TO 31.0 FEET.
 SAND: 17.0 TO 17.5 FEET.
 GROUT: 0.0 TO 17.0 FEET.
 GROUND WATER LEVEL RECORDED AT 17.0 FEET ON 6-8-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMA-47 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-37

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSP	ATTERBERG LIMITS			FIELD		PERCENT RECOVERED	ROD		
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE CONTENT %	DRY DENSITY PCF				
0											
5					6.5	108					
10					8.4	120					
15											
20					10.1	93					
25											
30					14.8	117					

BORING DMA-48

SURFACE ELEVATION 1547.42
 COORDINATES: N 118,981 E 2,268,709



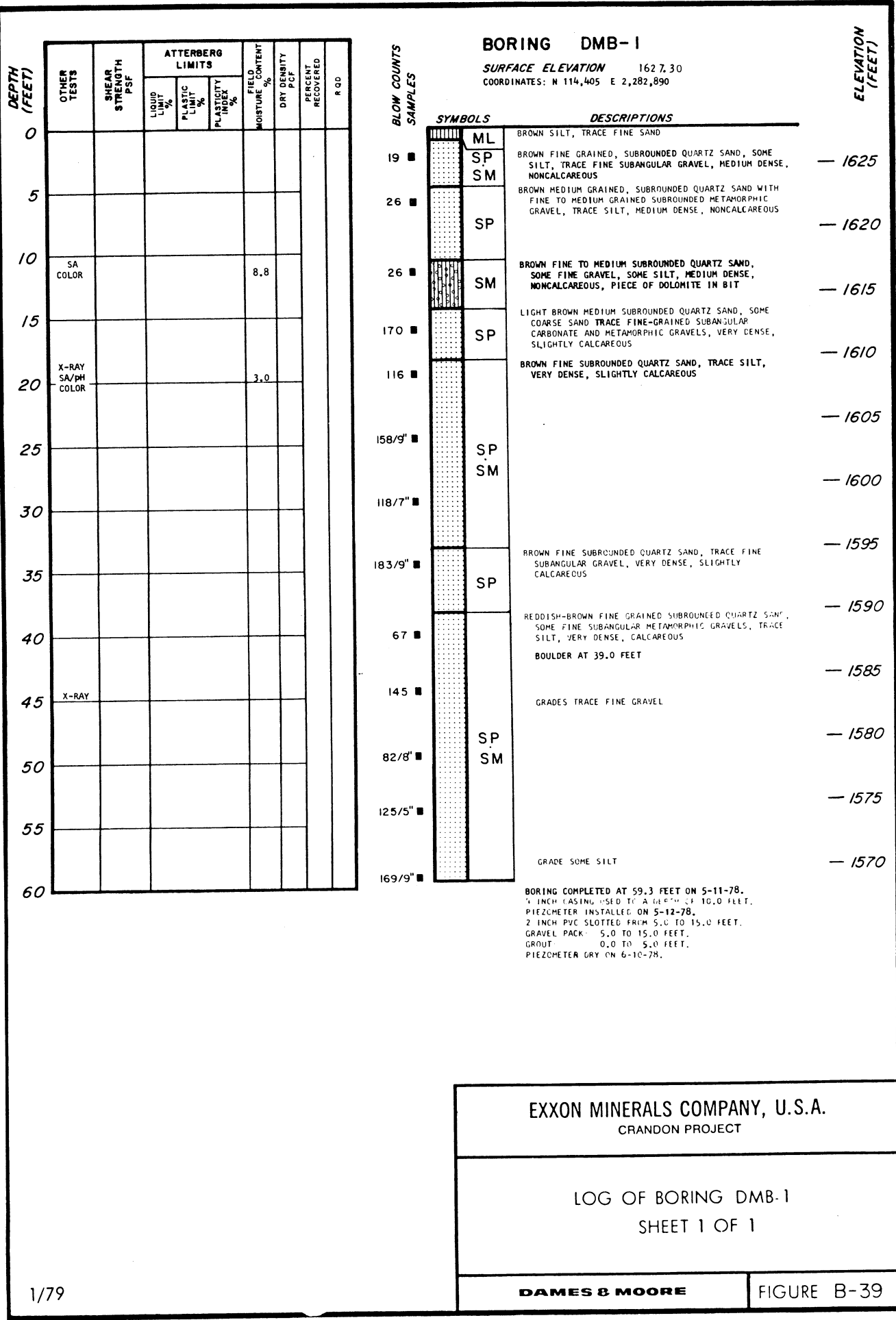
BORING COMPLETED AT 29.5 FEET ON 3-26-77.
 CASING USED TO A DEPTH OF 8.0 FEET.
 PIEZOMETER INSTALLED ON 3-26-77.
 2 INCH PVC SLOTTED FROM 24.0 TO 28.0 FEET.
 GRAVEL PACK: 20.0 TO 28.0 FEET.
 BENTONITE: 18.0 TO 20.0 FEET.
 GROUT: 0.0 TO 18.0 FEET.
 GROUND WATER LEVEL RECORDED AT 9.6 FEET ON 5-24-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-48
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-38



DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
60									
65									
70									
75									
80									

BORING DMB-1A (CONT'D)

BLOW COUNTS
SAMPLES

SYMBOLS
SP
SP
SP SM

DESCRIPTIONS

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
112/9'	SP	REDDISH-BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE OF GRAVEL AND COBBLES TO 1" IN DIAMETER, VERY DENSE, CALCAREOUS	- 1565
120/9'	SP	REDDISH-BROWN, MEDIUM GRAINED, SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS MOIST-WET	- 1560
122/11"	SP SM	REDDISH-BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, CALCAREOUS	- 1555
147/11"			- 1550

BORING COMPLETED AT 79.4 FEET ON 5-16-78.
 4 INCH CASING USED TO A DEPTH OF 10 FEET.
 PIEZOMETER INSTALLED ON 5-16-78.
 2 INCH PVC SLOTTED FROM 69.0 TO 79.0 FEET.
 GRAVEL PACK: 30.0 TO 79.0 FEET.
 SAND: 24.0 TO 30.0 FEET.
 GROUT: 0.0 TO 24.0 FEET.
 GROUND WATER LEVEL RECORDED AT 36.5 FEET ON 6-10-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-1A
 SHEET 2 OF 2

DAMES & MOORE

FIGURE B-402

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT % MOISTURE	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			Liquid Limit %	Plastic Limit %	Plasticity Index %				
0									
5	P.C.								
10	SA, HA				10.4				
15	X-RAY				9.4	123			
20									
25									
30	P.C.								
35	SA, pH COLOR				9.7				
40									
45									
50									
55									
60	P.C.								
65									
70									
75									

BORING DMB-2

SURFACE ELEVATION 1706.28
 COORDINATES N 114,995 E 2,285,800

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

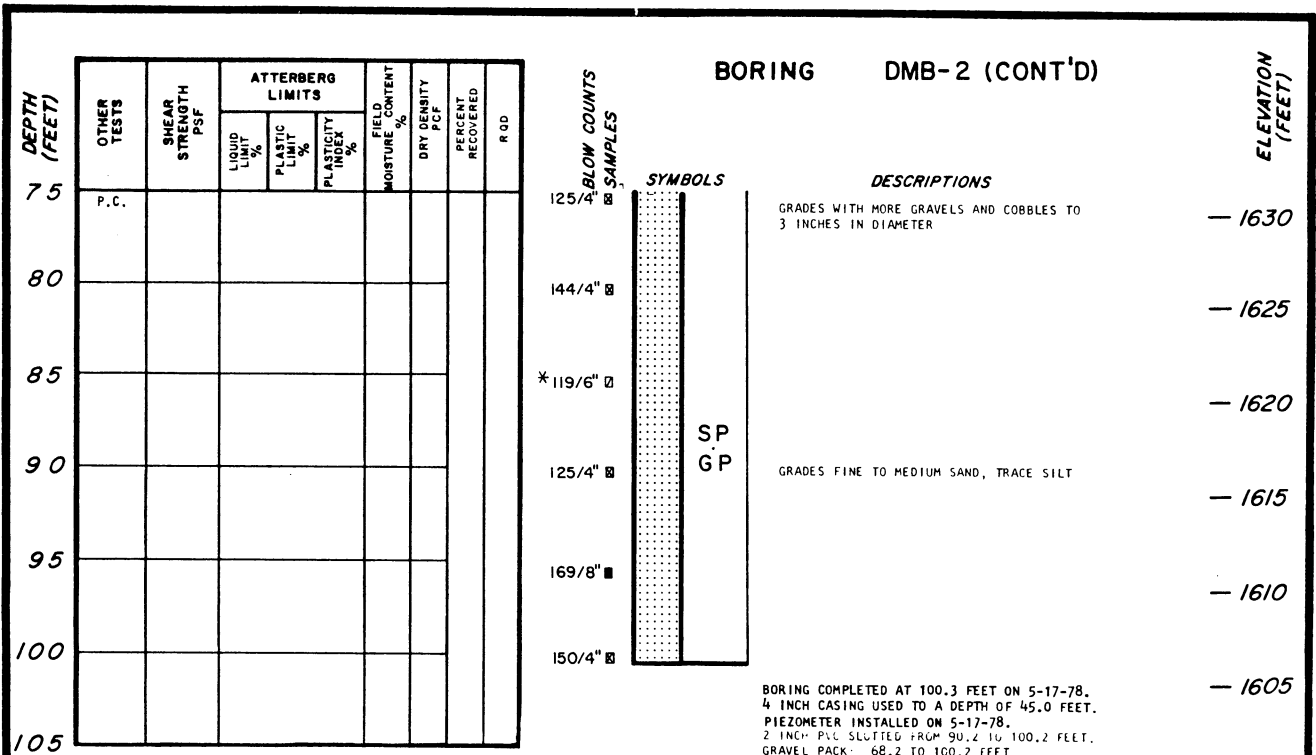
SYMBOLS		DESCRIPTIONS	ELEVATION (FEET)
21		BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, SOME SILT, TRACE SUBANGULAR GRAVEL, MEDIUM DENSE, NONCALCAREOUS, MOIST	- 1705
13		GRADES WITH THIN LAYERS OF COARSE SAND, VERY MOIST	- 1700
7		GRADES WITH MORE GRAVEL, TRACE CLAY	- 1695
46	SM	GRADES SOME SUBANGULAR METAMORPHIC GRAVEL, DENSE	- 1690
56		GRADES WITH COBBLES GRADES SLIGHTLY CALCAREOUS	- 1685
83		GRADES WITH LESS GRAVEL AND COBBLES, NONCALCAREOUS	- 1680
140/10"		LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE TO SOME GRAVEL AND COBBLES, VERY DENSE, CALCAREOUS, MOIST	- 1675
125/9"	SP	GRADES WITH MORE GRAVEL TO 3" IN DIAMETER	- 1670
130/3"	SP GP	BROWN MEDIUM ROUNDED QUARTZ SAND AND SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, VERY MOIST, NONCALCAREOUS	- 1665
135/10"	SP	BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, MOIST, SLIGHTLY CALCAREOUS	- 1660
140/4"		BROWN MEDIUM TO COARSE ROUNDED QUARTZ SAND, SOME GRAVEL, TRACE SILT, SLIGHTLY CALCAREOUS, SOME COBBLES, DAMP	- 1655
200/2"	SP GP	GRADES SAND AND ROUNDED METAMORPHIC GRAVEL AND BOULDERS LARGE PEBBLES IN GRAVEL CALCAREOUS	- 1650
100/1.5" * 200/3"			- 1645
125/5"	SP	LIGHT BROWN FINE TO MEDIUM ROUNDED QUARTZ SAND, TRACE SILT, TRACE GRAVEL, VERY DENSE, WET, CALCAREOUS	- 1640
127/5"	SP GP	BROWN MEDIUM TO COARSE GRAINED SUBROUNDED QUARTZ SAND AND SUBROUNDED METAMORPHIC GRAVEL TO 1 INCH DIAMETER, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS, WET.	- 1635

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-2
SHEET 1 OF 2

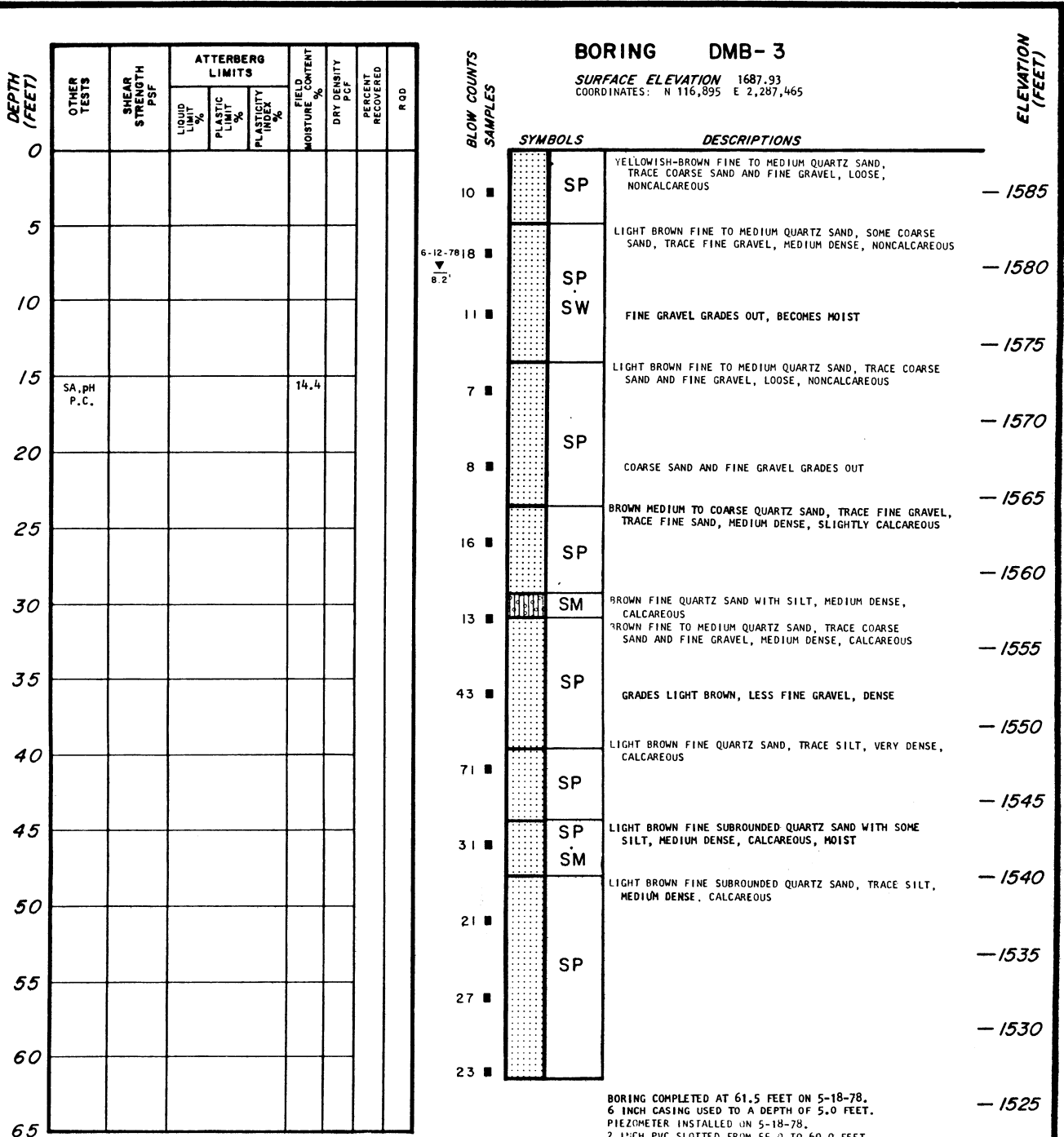
DAMES & MOORE

FIGURE B-4.11



BORING COMPLETED AT 100.3 FEET ON 5-17-78.
 4 INCH CASING USED TO A DEPTH OF 45.0 FEET.
 PIEZOMETER INSTALLED ON 5-17-78.
 2 INCH P.V.C. SPLITTED FROM 90.2 TO 100.2 FEET.
 GRAVEL PACK: 68.2 TO 100.2 FEET.
 SAND: 45.2 TO 68.2 FEET.
 BENTONITE: 45.0 TO 45.2 FEET.
 GROUT: 0.0 TO 45.0 FEET.
 PIEZOMETER DRY CN 6-21-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-2 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-412



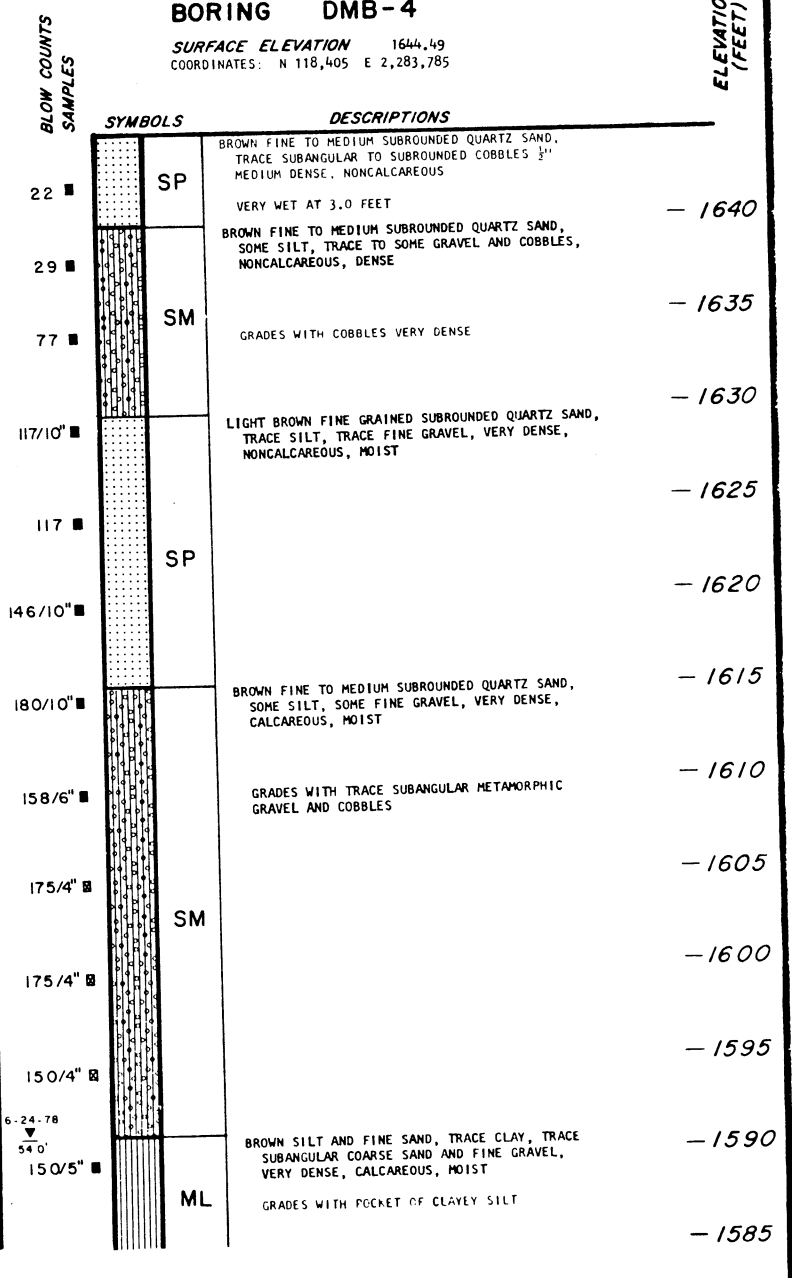
EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-3 SHEET 1 OF 1	
DAMES & MOORE	FIGURE B-42

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	SA, HA COLOR				7.5	130			
10									
15									
20	SA, PH COLOR P.C.				2.7				
25									
30	P.C.								
35	SA, PH, COLOR P.C.				3.6				
40									
45									
50	P.C.								
55	SA, HA COLOR				11.9	131			
60									

BORING DMB-4

SURFACE ELEVATION 1644.49
 COORDINATES: N 118,405 E 2,283,785

ELEVATION
(FEET)



EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-4
 SHEET 1 OF 2

DAMES & MOORE

FIGURE B-431

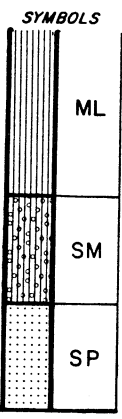
DEPTH
(FEET)

BORING DMB-4 (CONT'D)

ELEVATION
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R Q D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
60									
65									
70	P.C.								
75									
80									
85									

BLOW COUNTS
SAMPLES



DESCRIPTIONS

180 1/4" GRADES WITH COBBLES

152 1/2" ML - 1580

200 2/3" SM - 1575
BROWN FINE GRAINED QUARTZ SAND SOME SILT, VERY DENSE, CALcareous, WET

200 3/4" SP - 1570
REDDISH-BROWN MEDIUM TO COARSE GRAINED QUARTZ SAND, TRACE SILT, TRACE SUBROUNDED WEATHERED METAMORPHIC GRAVEL, CALcareous, VERY DENSE, DAMP

132 1/4" - 1565

BORING COMPLETED AT 80.3 FEET ON 5-22-78.
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 5-23-78.
 2 INCH PVC SLOTTED FROM 69.5 TO 79.5 FEET.
 GRAVEL PACK: 69.5 TO 79.5 FEET.
 SAND: 59.5 TO 69.5 FEET.
 BENTONITE: 59.0 TO 59.5 FEET.
 GROUT: 0.0 TO 59.0 FEET.
 GROUND WATER LEVEL RECORDED AT 54.0 FEET ON 6-24-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-4
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-43.2

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0		3168				9.3	125		
5	X-RAY								
10									
15									
20									
25	SA, PH COLOR P.C.				7.5	129			
30									
35									
40									
45									
50	SA, PH COLOR P.C.				6.1				
55									
60									
65									
70									
75									

BORING DMB-5

SURFACE ELEVATION 1688.77
 COORDINATES: N 112,135 E 2,285,540

ELEVATION
(FEET)

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
	ML	BLACK SAND AND SILT WITH ROOTS TO 10'	
11			
	SM	BROWN FINE SAND WITH SILT, TRACE COARSE SAND AND FINE GRAVEL, TRACE CLAY, OCCASIONAL COARSE GRAVEL, LOOSE, NONCALCAREOUS	- 1685
40			
	SP	LIGHT BROWN MEDIUM QUARTZ SAND, SOME FINE AND COARSE SAND, TRACE FINE GRAVEL, TRACE SILT	- 1680
48		BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, SOME SILT, VERY DENSE, NONCALCAREOUS	
87			- 1675
119	SM	GRADES SLIGHTLY CALCAREOUS	- 1670
130/9"		GRADES LIGHTER BROWN, LESS SILT, TRACE MEDIUM GRAVEL, CALCAREOUS	- 1665
100/5 1/2"			- 1660
143/8"	SP	BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS	- 1655
150/5"	SP SM	BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, VERY DENSE, CALCAREOUS	- 1650
151/7"		BROWN FINE TO MEDIUM QUARTZ SAND, SOME SILT, SOME COARSE SAND AND FINE GRAVEL, VERY DENSE, CALCAREOUS, MOIST	- 1645
150/6"		GRADES WITH MORE COARSE SAND AND FINE GRAVEL	- 1640
175/5"	SM SW		- 1635
200/5 1/2"			- 1630
200/4"			- 1625
200/4"	SP GM	BROWN FINE TO MEDIUM SAND, SOME MEDIUM GRAVEL, TRACE COARSE SAND, TRACE SILT, VERY DENSE, CALCAREOUS	- 1620
		BOULDER ZONE 72.0 TO 80.0 FEET	- 1615

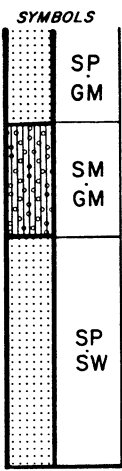
EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-5
 SHEET 1 OF 2

BORING DMB-5 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80									
85									
90	X-RAY								
95									
100									

BLOW COUNTS SAMPLES



SYMBOLS

DESCRIPTIONS

BROWN FINE SAND, SOME SILT WITH COARSE SAND AND FINE TO MEDIUM GRAVEL, VERY DENSE, CALCAREOUS

GRADES WITH MEDIUM SAND AND LESS SILT

ORANGISH-BROWN FINE TO MEDIUM QUARTZ SAND, TRACE SILT, SOME COARSE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS

ELEVATION (FEET)

— 1610

— 1605

— 1600

— 1595

— 1590

BORING COMPLETED AT 98.5 FEET ON 5-23-78.
 CASING USED TO A DEPTH OF 4.0 FEET
 PIEZOMETER INSTALLED ON 5-24-78.
 2 INCH PVC SLOTTED FROM 88.4 TO 98.4 FEET.
 GRAVEL PACK: 68.0 TO 98.4 FEET.
 SAND: 55.0 TO 68.0 FEET.
 GROUT: 0.0 TO 55.0 FEET.
 PIEZOMETER DRY ON 6-24-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-5 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-44.2

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT		PERCENT RECOVERED	R QD	BLOW COUNTS SAMPLES	BORING DMB-5A		ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF				SURFACE ELEVATION	COORDINATES: N 112,130 E 2,285.545	
0										SYMBOLS	DESCRIPTIONS		
5												— 1685	
10												— 1680	
15												— 1675	
20												— 1670	
25												— 1665	
30												— 1660	
35												— 1655	
40												— 1650	
45												— 1645	
50												— 1640	
55												— 1635	
60												— 1630	
65												— 1625	
70												— 1620	
75											(BORING CONTINUED)	— 1615	

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-5A
SHEET 1 OF 2

BORING DMB-5A CONT'D

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %					
75										
80										- 1610
85										- 1605
90										- 1600
95										- 1595
100										- 1590
105										- 1585
110										- 1580
115										- 1575
120										- 1570

1-11-79
99.5'

BLOW COUNTS
SAMPLES

SYMBOLS
SM
SP
SM

DESCRIPTIONS

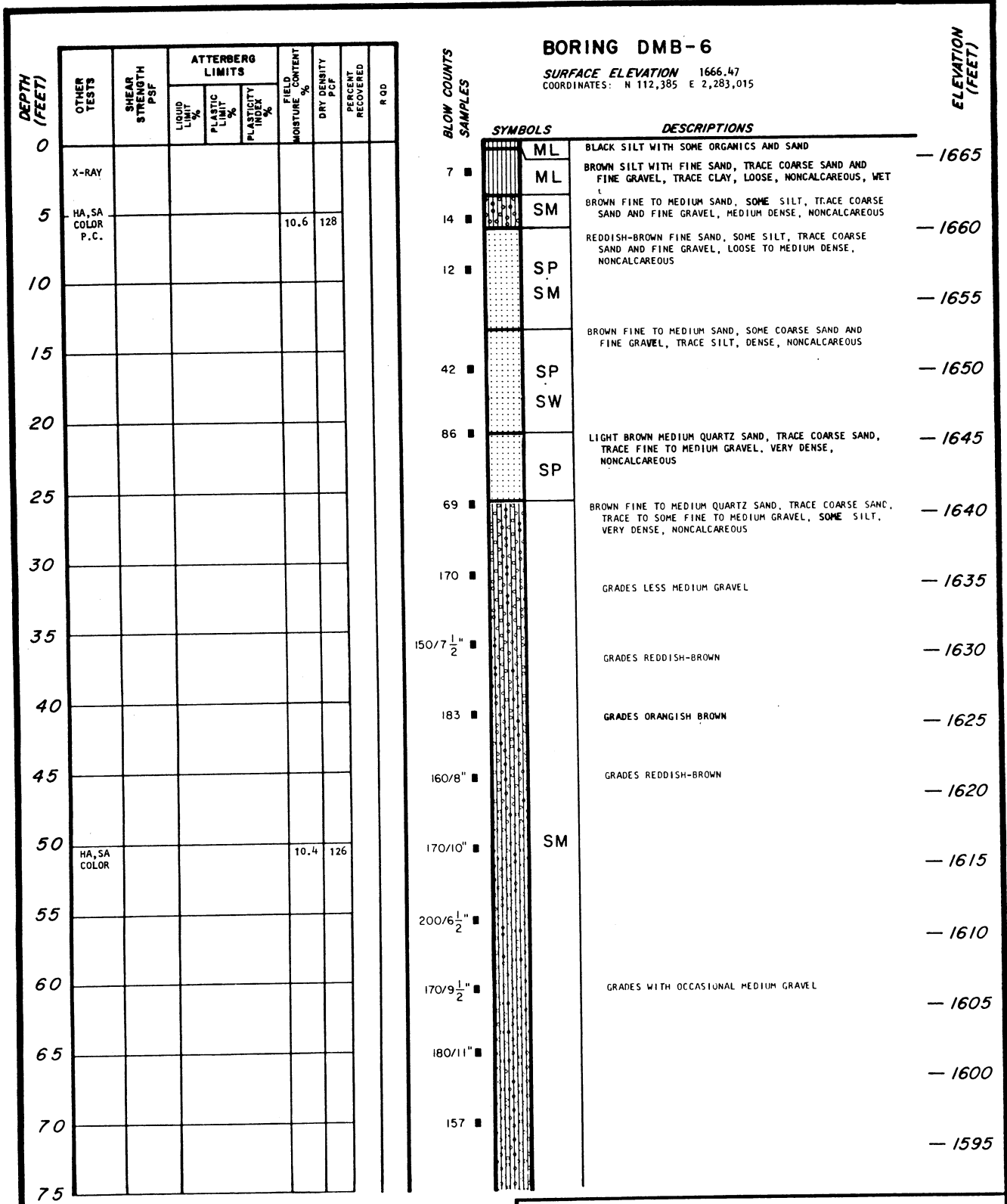
GRAYISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, WITH SILT AND FINE TO MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS

YELLOWISH-BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, WET, VERY DENSE, SLIGHTLY CALCAREOUS

BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, TRACE FINE GRAVEL, WET, VERY DENSE, NONCALCAREOUS

BORING COMPLETED AT 120.2 FEET ON 12-1-78.
CASING USED TO A DEPTH ON 9.0 FEET.
PIEZOMETER INSTALLED 12-4-78.
2 INCH PVC SLOTTED FROM 110.0 TO 120.0 FEET.
GRAVEL PACK: 96.0 TO 120.0 FEET.
SAND: 94.0 TO 96.0 FEET.
BENTONITE: 87.0 TO 94.0 FEET.
GROUT: 0.0 TO 87.0 FEET.
GROUND WATER LEVEL RECORDED AT 99.5 FEET ON 1-11-79.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-5A SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-45 2



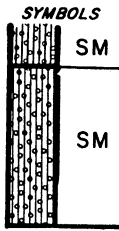
EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-6
SHEET 1 OF 2

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT			R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	
75									
80									
85									
90									

BORING DMB-6 (CONT'D)

120 ■ BLOW COUNTS
 76.4' 6-22-78
 150 ■
 140 ■



DESCRIPTIONS

REDDISH-BROWN FINE TO MEDIUM QUARTZ SAND WITH SOME SILT, TRACE FINE GRAVEL AND COARSE SAND, VERY DENSE, NONCALCAREOUS

— 1590
 — 1585
 — 1580

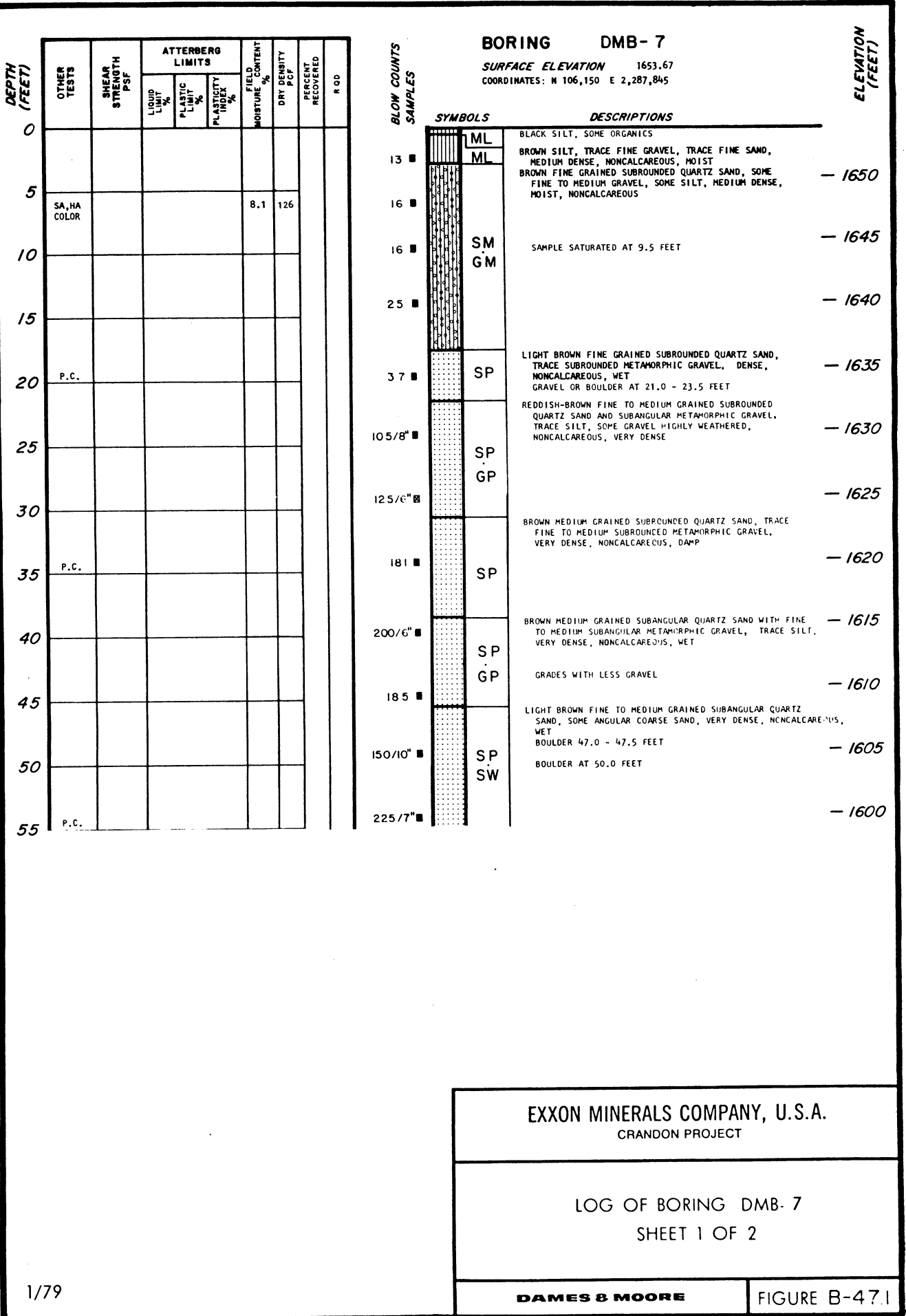
BORING COMPLETED AT 86.0 FEET ON 5-26-78.
 CASING USED TO A DEPTH OF 10.0 FEET.
 PIEZOMETER INSTALLED ON 5-26-78.
 2 INCH PVC SLOTTED FROM 75.5 TO 85.5 FEET.
 GRAVEL PACK. 61.6 TO 85.5 FEET.
 SAND: 53.8 TO 61.6 FEET.
 BENTONITE: 50.0 TO 53.8 FEET.
 GROUT: 0.0 TO 50.0 FEET.
 GROUND WATER LEVEL RECORDED AT 76.4 FEET ON 6-22-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-6
 SHEET 2 OF 2

DAMES & MOORE

FIGURE B-462



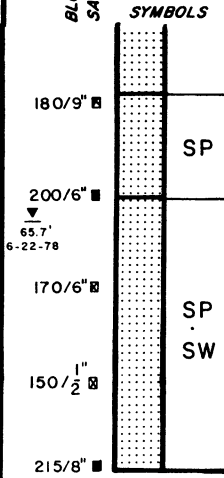
BORING DMB-7 (CONT'D)

DEPTH (FEET)

55
60
65
70
75
80

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
SA, HA COLOR					13.0			

BLOW COUNTS SAMPLES



DESCRIPTIONS

— 1595
BROWN FINE TO MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE FINE TO MEDIUM SUBANGULAR GRAVEL, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS, WET

— 1590
LIGHT BROWN FINE TO MEDIUM SUBANGULAR QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR METAMORPHIC GRAVEL, NONCALCAREOUS, VERY DENSE, WET

— 1585
COBBLE AT 66.0 FEET GRADES POORLY GRADED

— 1580

— 1575

ELEVATION (FEET)

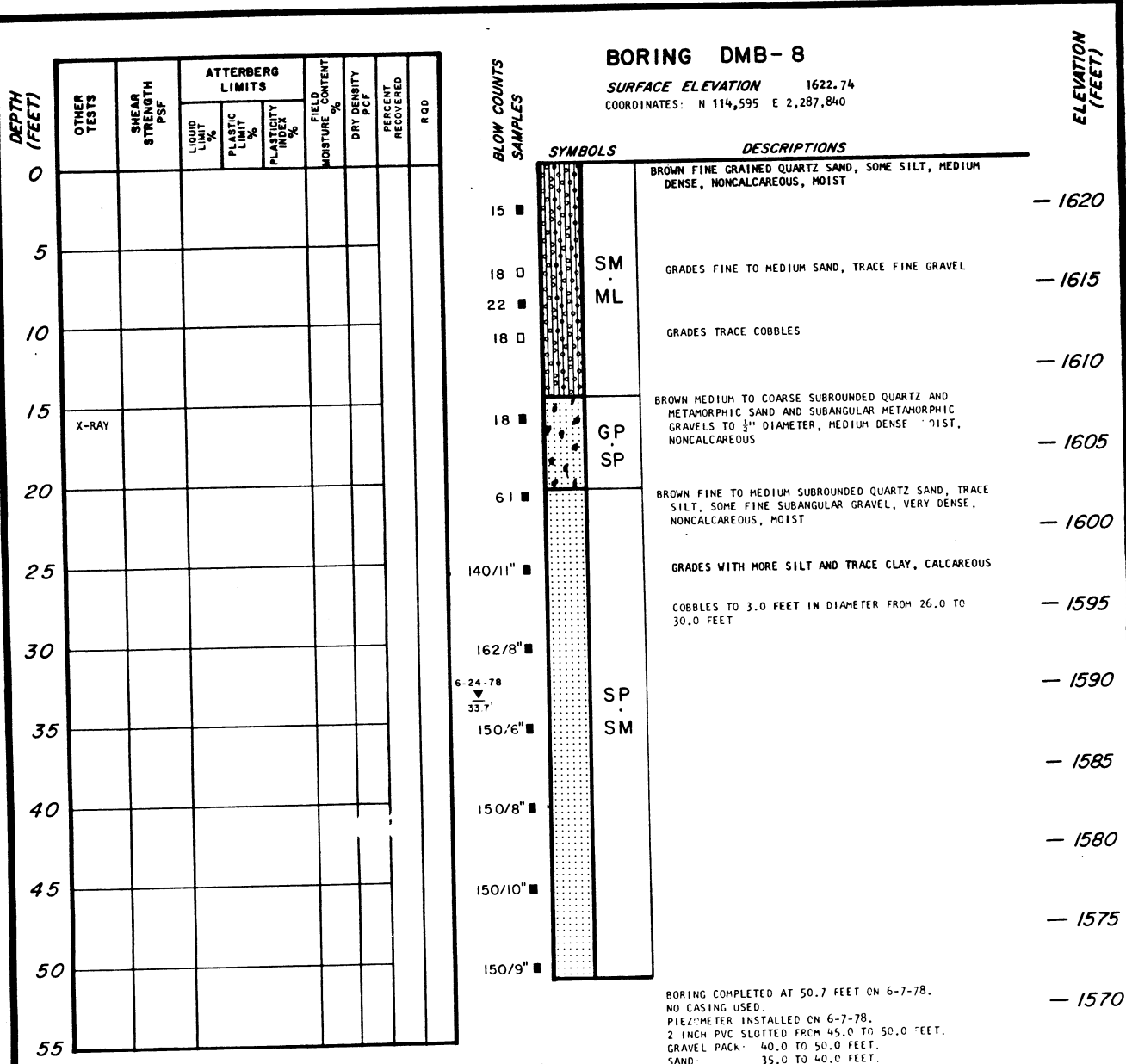
BORING COMPLETED AT 79.2 FEET ON 6-6-78.
6 INCH CASING USED TO A DEPTH OF 11.0 FEET.
PIEZOMETER INSTALLED ON 6-6-78.
2 INCH PVC SLOTTED FROM 69.0 TO 79.0 FEET.
GRAVEL PACK: 59.0 TO 79.0 FEET.
SAND: 55.0 TO 59.0 FEET.
BENTONITE: 53.0 TO 55.0 FEET.
GROUT: 0.0 TO 53.0 FEET.
GROUND WATER LEVEL RECORDED AT 65.7 FEET ON 6-22-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-7
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-472



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-8
SHEET 1 OF 1

DAMES & MOORE FIGURE B-48

DEPTH
(FEET)

0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75

OTHER TESTS	SHEAR STRENGTH PSP	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
P.C.								
P.C.								
P.C.								

BORING DMB-9

SURFACE ELEVATION 1661.61
COORDINATES: N 110,555 E 2,287,235

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

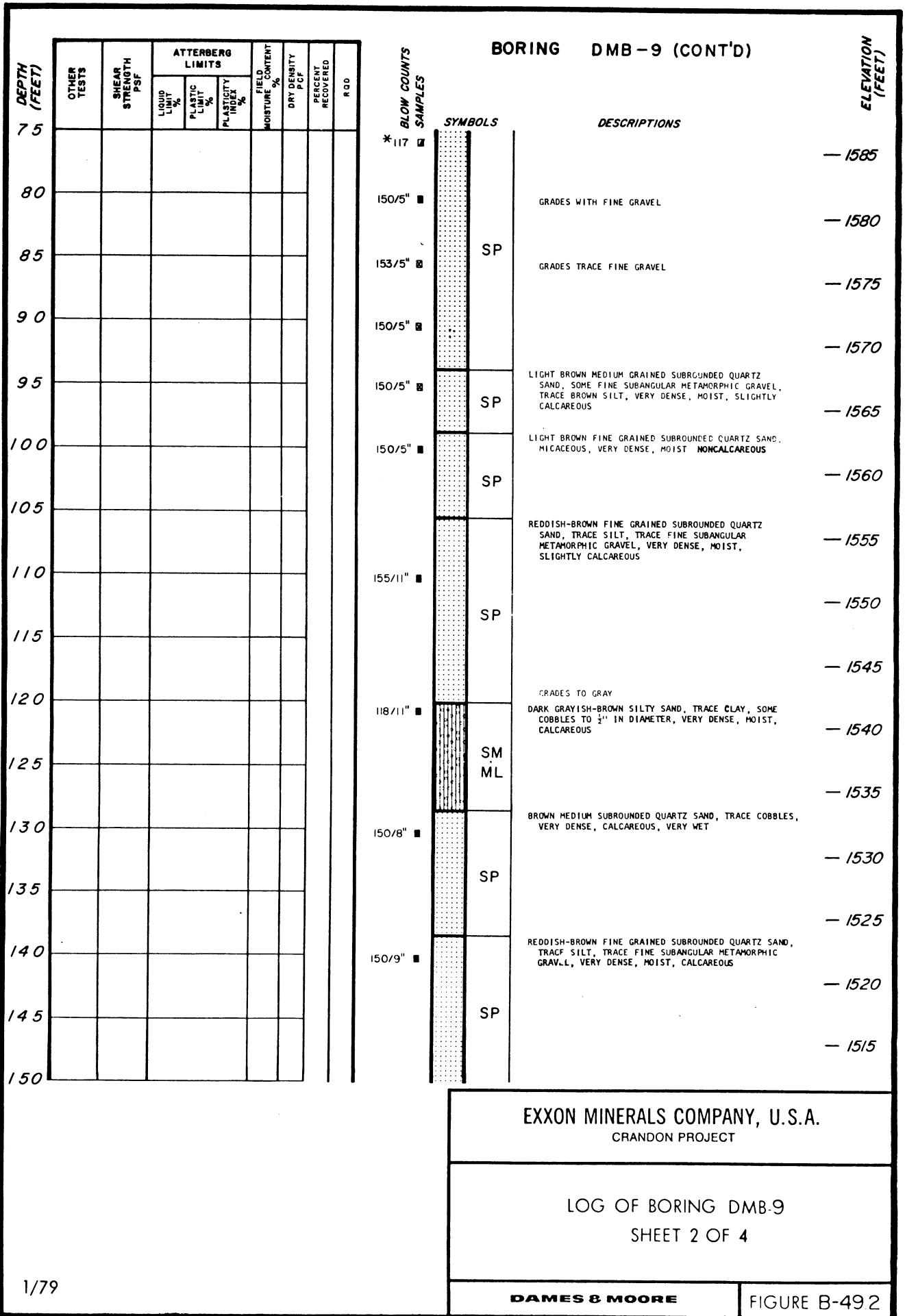
18	SM	BROWN SILTY SAND, SOME GRAVEL, MEDIUM DENSE	- 1660
*14		BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, TRACE SILT, MEDIUM DENSE, VERY MOIST, NONCALCAREOUS	
32		BOULDER AT 7.0 FEET	- 1655
*19	SP	GRADES WITH COBBLES	- 1650
25			
*30		BOULDER AT 14.0 FEET	- 1645
59/8			
*36		GRADES SOME GRAVEL	- 1645
51			
*18	SP	LIGHT BROWN COARSE SUBROUNDED QUARTZ SAND, TRACE SILT, SOME FINE SUBANGULAR METAMORPHIC GRAVEL, NONCALCAREOUS, VERY DENSE	- 1640
128/9			
*190			
176/8		GRADES WITH TRACE SILT AND COBBLES	- 1635
*156			
140/6	SP	BROWN FINE SUBROUNDED QUARTZ SAND WITH SILT, SOME SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, VERY MOIST	- 1630
150/4	SP SM	GRADES WITH LESS SILT	- 1625
150/4		LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, SOME SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, VERY MOIST, NONCALCAREOUS	- 1620
154/4			- 1615
153/9	SP	GRADES WITHOUT SILT	- 1610
181/6		GRADES TRACE CLAY	- 1605
150/6	SP	LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, VERY DENSE, DAMP, NONCALCAREOUS	- 1600
150/5		LIGHT BROWN COARSE GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, NONCALCAREOUS	- 1595
6-27-78 68'4" 70' 71'4"	SP		- 1590

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-9
SHEET 1 OF 4

DAMES & MOORE

FIGURE B-49 I

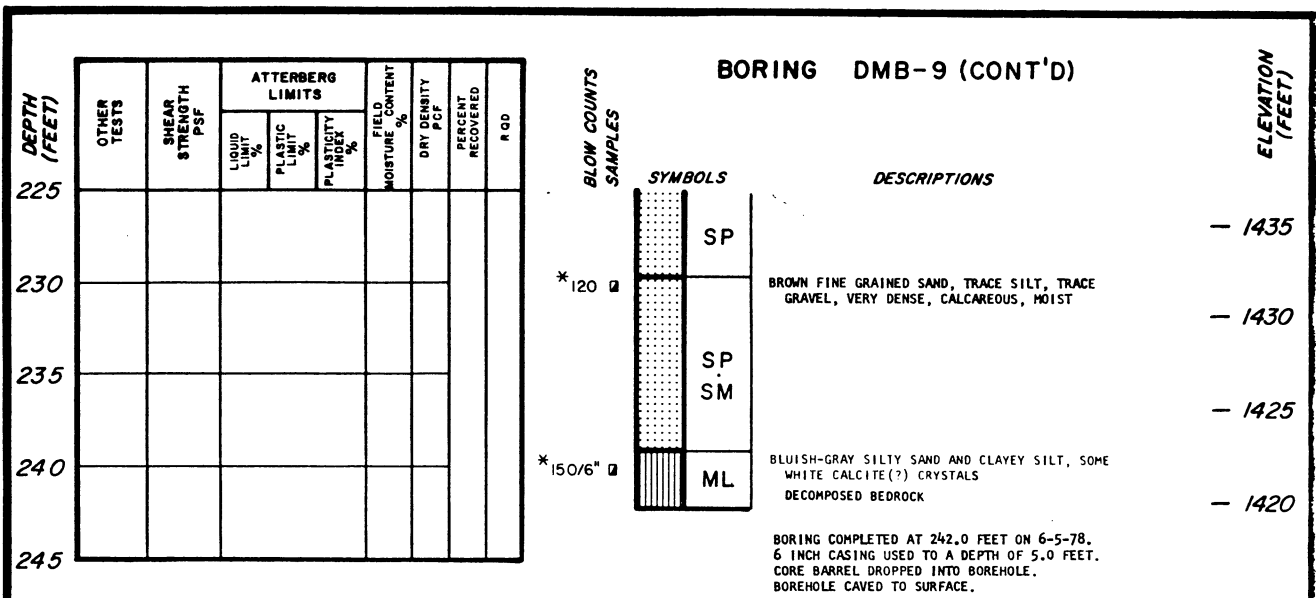


BORING DMB-9 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R QD	BLOW COUNTS	SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %									
150										150/8				- 1510
155													1 FOOT BOULDER AT 155.0 FEET GRADES SOME COBBLES	- 1505
160										176/4		SP		- 1500
165														- 1495
170										154/4			LIGHT BROWN FINE GRAINED MICACEOUS QUARTZ SAND, TRACE SILT, TRACE CLAY, VERY DENSE, MOIST, CALCAREOUS	- 1490
175														- 1485
180										150/4				- 1480
185													GRADES TRACE FINE SUBANGULAR GRAVEL	- 1475
190										163/3		SP		- 1470
195														- 1465
200										150/4 1/2				- 1460
205														- 1455
210										155/1				- 1450
215										*170/5		SM SP	BROWN VERY FINE GRAINED QUARTZ SAND, SOME SILT, TRACE CLAY, VERY DENSE, MOIST, CALCAREOUS	- 1445
220										*140/10		SP	BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, VERY DENSE, CALCAREOUS, WET	- 1440
225														

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-9
SHEET 3 OF 4



EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-9 SHEET 4 OF 4	
DAMES & MOORE	FIGURE B-494

DEPTH
(FEET)

240

245

250

255

260

265

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
240							55	20	
245							77	0	
250							100	20	
255							96	96	
260							100	90	
265							98	89	

BORING DMB-9A

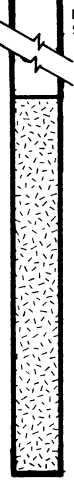
SURFACE ELEVATION 1661.61
 COORDINATES: N 110,555 E 2,287,235

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



NO SAMPLES TAKEN FROM 0.0-240.5 FEET
 SEE LOG FOR DMB-9 — 1660

PROTEROZOIC AMBRIAN GREENSTONE (METAMORPHOSED TUFF), MODERATELY
 FRACTURED, MODERATELY WEATHERED, IRON STAINING ALONG FRACTURES — 1420
 HIGHLY WEATHERED 244.5-245.5 FEET (SEPARATES ALONG BEDDING)

MODERATELY FRACTURED, FRACTURES FOLLOW FOLIATION, LESS
 WEATHERED THAN RUN 2 — 1415

VERY COMPETENT, 45°-60° FRACTURING, SOME FRACTURES HEALED,
 IRON STAINING ON OPEN FRACTURES — 1410

SLIGHTLY WEATHERED INCLINED 45°-60° FRACTURES SPACED 4-10 INCHES
 APART, IRON STAINING ON FRACTURE PLANES, 70° FRACTURE AT 252.4' — 1410

INCLINED FRACTURES 2-10 INCHES APART, 2 FRACTURES STEEPLY
 INCLINED, IRON STAINING ON FRACTURE PLANES — 1405

BORING COMPLETED AT 260.5 FEET ON 6-24-78. — 1400
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 3 PIEZOMETERS INSTALLED ON 6-25-78 AND 6-26-78.

A) 1 INCH PVC SLOTTED FROM 217.0 TO 227.0 FEET.
 GRAVEL PACK: 218.0 TO 243.0 FEET.
 SAND: 215.0 TO 218.0 FEET.
 BENTONITE: 210.0 TO 215.0 FEET.

B) 1 INCH PVC SLOTTED FROM 190.0 TO 200.0 FEET.
 GRAVEL PACK: 183.0 TO 210.0 FEET.
 SAND: 173.5 TO 183.0 FEET.
 BENTONITE: 168.0 TO 173.5 FEET.

C) 1 INCH PVC SLOTTED FROM 152.0 TO 162.0 FEET.
 GRAVEL PACK: 136.0 TO 168.0 FEET.
 SAND: 130.0 TO 136.0 FEET.
 GROUT: 0.0 TO 130.0 FEET.

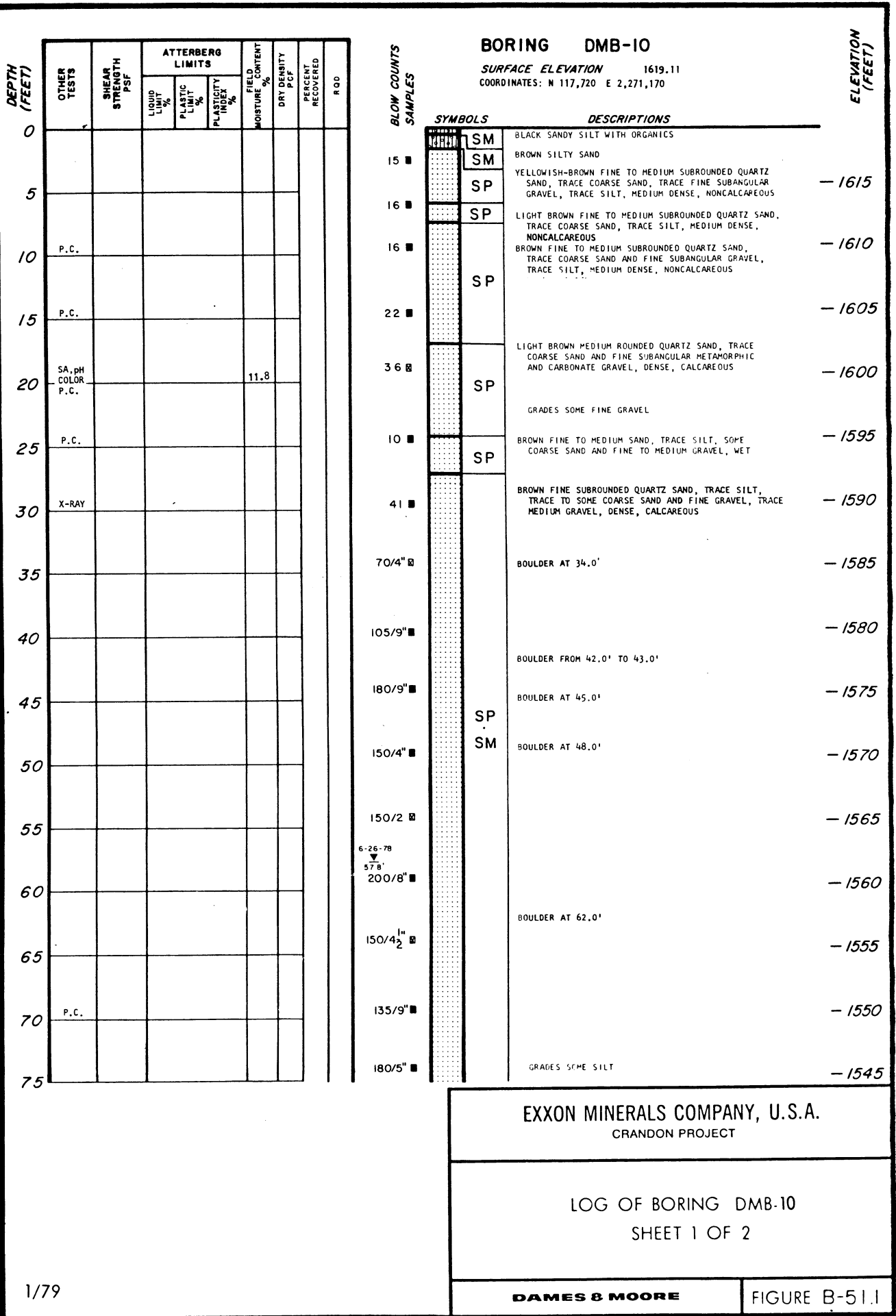
GROUND WATER LEVELS RECORDED AT A) 71.4 FEET.
 B) 68.4 FEET, AND C) 70.0 FEET ON 6-27-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-9A
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-50



BOREING DMB-10

SURFACE ELEVATION 1619.11
 COORDINATES: N 117,720 E 2,271,170

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10	P.C.								
15	P.C.								
20	SA, pH COLOR P.C.				11.8				
25	P.C.								
30	X-RAY								
35									
40									
45									
50									
55									
60									
65									
70	P.C.								
75									

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
	SM	BLACK SANDY SILT WITH ORGANICS	
15	SM	BROWN SILTY SAND	
16	SP	YELLOWISH-BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE FINE SUBANGULAR GRAVEL, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS	- 1615
16	SP	LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS	- 1610
16	SP	BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR GRAVEL, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS	- 1605
22			- 1605
36	SP	LIGHT BROWN MEDIUM ROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR METAMORPHIC AND CARBONATE GRAVEL, DENSE, CALCAREOUS	- 1600
		GRADES SOME FINE GRAVEL	
10	SP	BROWN FINE TO MEDIUM SAND, TRACE SILT, SOME COARSE SAND AND FINE TO MEDIUM GRAVEL, WET	- 1595
41		BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE TO SOME COARSE SAND AND FINE GRAVEL, TRACE MEDIUM GRAVEL, DENSE, CALCAREOUS	- 1590
70/4		BOULDER AT 34.0'	- 1585
105/9			- 1580
		BOULDER FROM 42.0' TO 43.0'	
180/9		BOULDER AT 45.0'	- 1575
	SP		
150/4	SM	BOULDER AT 48.0'	- 1570
150/2			- 1565
6-26-78 57.8'			
200/8			- 1560
		BOULDER AT 62.0'	
150/4 1/2			- 1555
135/9			- 1550
180/5		GRADES SOME SILT	- 1545

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BOREING DMB-10
 SHEET 1 OF 2

DAMES & MOORE

FIGURE B-51.1

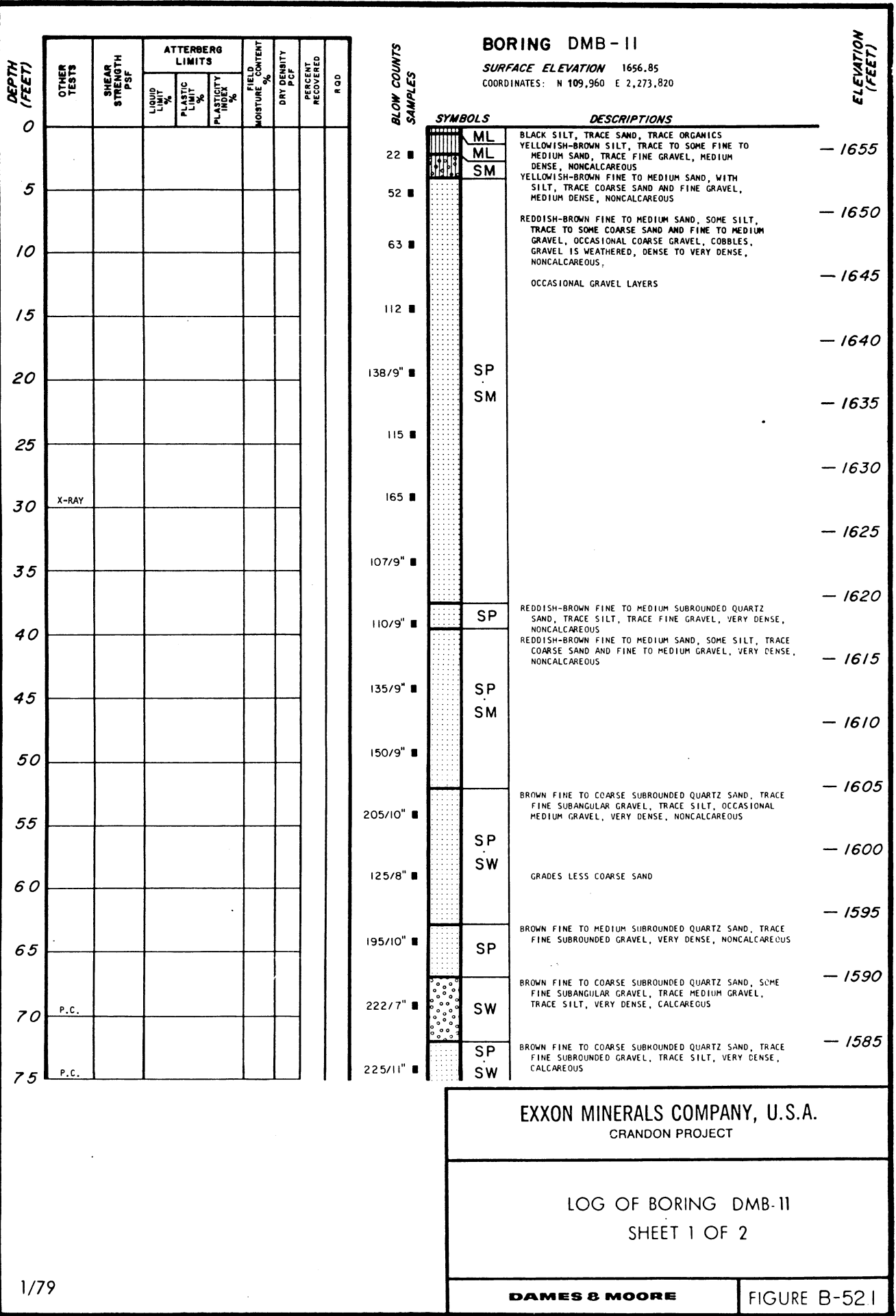
BORING DMB-10 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %								
75													
80									150/45	■			1540
85									200/4	■			1535
90									225/5	■	SP SM		1530
95									185/7	■			1525
100									225/6	■			1520

BOULDER FROM 98.0' TO 99.0'

BORING COMPLETED AT 99.5 FEET ON 6-23-78.
 CASING USED TO A DEPTH OF 25.0 FEET.
 PIEZOMETER INSTALLED 6-23-78.
 2 INCH PVC SLOTTED FROM 89.5 TO 99.5 FEET.
 GRAVEL PACK: 62.0 TO 99.5 FEET.
 SAND: 59.0 TO 62.0 FEET.
 BENTONITE: 54.5 TO 59.0 FEET.
 GROUT: 0.0 TO 54.5 FEET.
 GROUND WATER LEVEL RECORDED AT 57.8 FEET ON 6-26-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-10 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-51.2



BORING DMB-11 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80									
85									
90	P.C.								
95									
100									

BLOW COUNTS
SAMPLES

BLOW COUNTS SAMPLES	SYMBOLS
225/11"	SP
220/10"	SP SW
8-3-78 88.2'	SP
150	SP SW SP
148/10"	SP SW
190	SP

DESCRIPTIONS

BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, OCCASIONAL FINE GRAVEL, VERY DENSE, CALCAREOUS

BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR TO SUBROUNDED GRAVEL, TRACE SILT, OCCASIONAL MEDIUM TO COARSE GRAVEL, VERY DENSE, CALCAREOUS

BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT

BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS

BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT

BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS

BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SUBANGULAR COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS

ELEVATION
(FEET)

- 1580

- 1575

- 1570

- 1565

- 1560

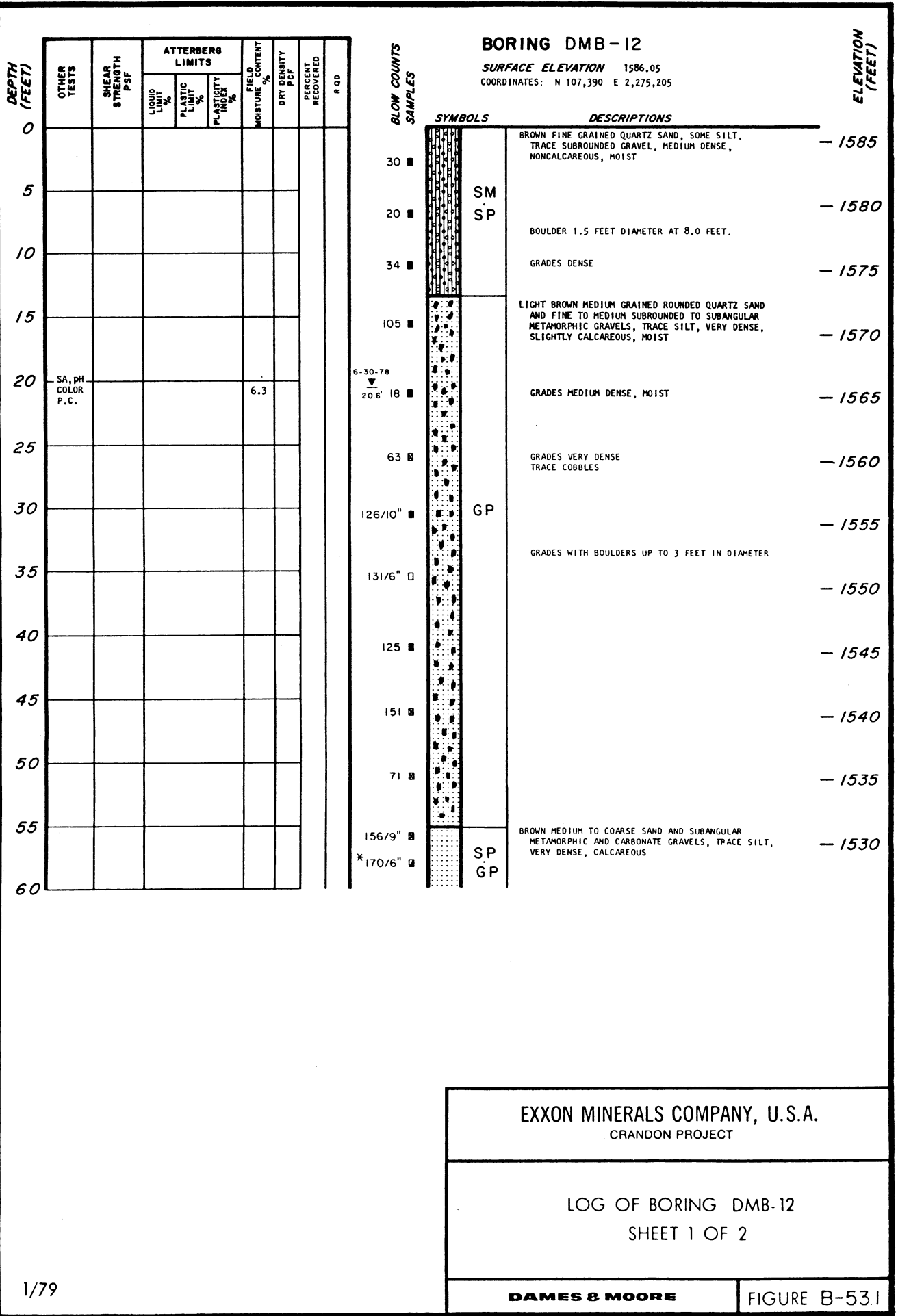
BORING COMPLETED AT 100.0 FEET ON 6-27-78.
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 6-27-78.
 2 INCH PVC SLOTTED FROM 89.5 TO 99.5 FEET.
 GRAVEL PACK: 86.0 TO 99.5 FEET.
 SAND: 84.0 TO 86.0 FEET.
 BENTONITE: 78.0 TO 84.0 FEET.
 GROUT: 0.0 TO 78.0 FEET.
 GROUND WATER LEVEL RECORDED AT 88.2 FEET ON 8-3-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-11
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-52.2



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-12
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-53.1

DEPTH
(FEET)

60

65

70

75

80

85

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R Q D
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				

BORING DMB-12 (CONT'D)

ELEVATION
(FEET)

- 1525

- 1520

- 1515

- 1510

- 1505

BLOW COUNTS
SAMPLES

155/10" ■

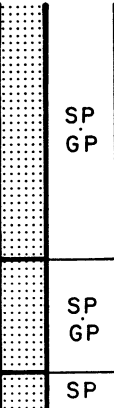
172/10" ■

152/4" □

*107 □

*169/11" □

SYMBOLS



DESCRIPTIONS

GRADES WITH 2.0 TO 3.0 FOOT BOULDERS

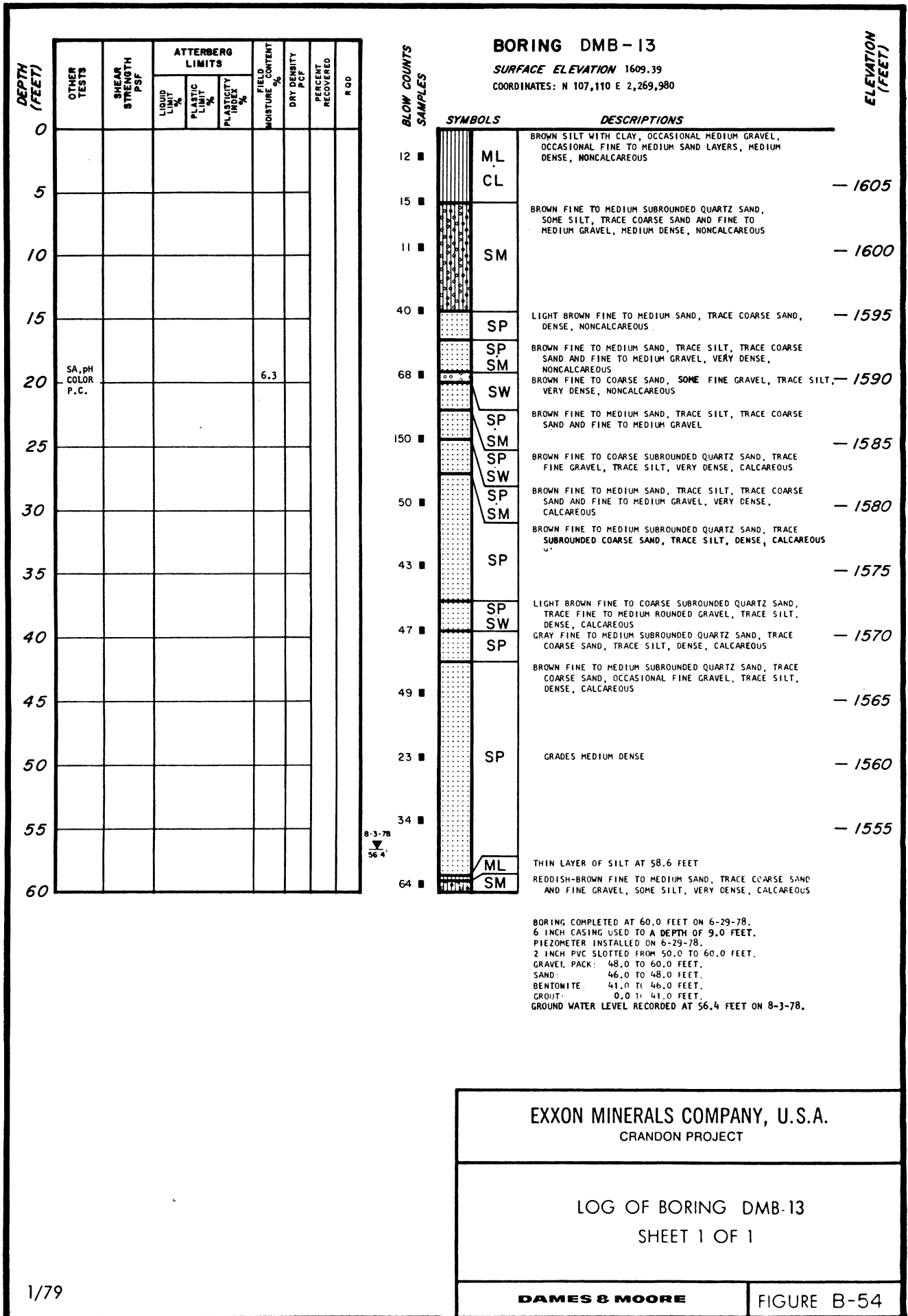
GRADES WITHOUT BOULDERS

LIGHT BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND AND SUBANGULAR METAMORPHIC GRAVELS TO 1/2 INCH IN DIAMETER, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST

LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, CALCAREOUS

BORING COMPLETED AT 81.9 FEET ON 6-27-78.
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 4 INCH CASING USED TO A DEPTH OF 45.0 FEET.
 2 INCH PVC SLOTTED FROM 70.0 TO 80.0 FEET.
 GRAVEL PACK: 70.0 TO 80.0 FEET.
 SAND: 60.0 TO 70.0 FEET.
 BENTONITE: 50.0 TO 60.0 FEET.
 GROUT: 0.0 TO 50.0 FEET.
 GROUND WATER LEVEL RECORDED AT 20.6 FEET ON 6-30-78.

<p>EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT</p>	
<p>LOG OF BORING DMB-12 SHEET 2 OF 2</p>	
<p>DAMES & MOORE</p>	<p>FIGURE B-532</p>



DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT		PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF		
0									
5		1640				6.4	120		
10									
15									
20									
25	SA, pH COLOR P.C.					6.9	131		
30									
35									
40									
45									
50									
55	X-RAY pH								
60									
65									
70									
75									

BORING DMB-14

SURFACE ELEVATION 1638.69
COORDINATES: N 110.075 E 2,270,985

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

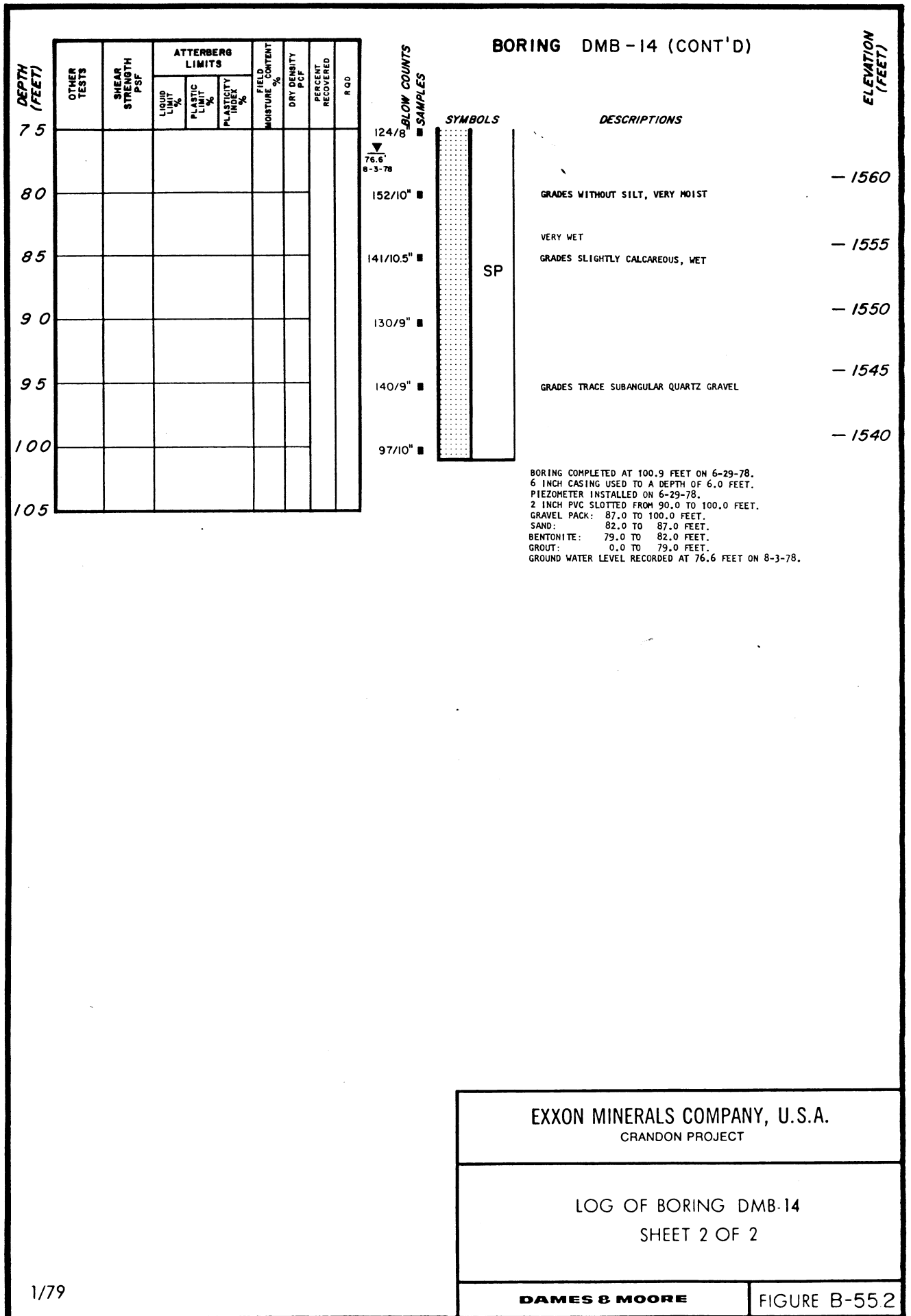
	SYMBOLS	DESCRIPTIONS	
	ML SM	BROWN SILTY SAND WITH TRACE CLAY AND COBBLES, MEDIUM DENSE	
22			
	SP	BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, SOME SUBROUNDED METAMORPHIC GRAVELS, MEDIUM DENSE, NONCALCAREOUS, MOIST	— 1635
21			
	SP	LIGHT BROWN MEDIUM GRAINED SUBANGULAR QUARTZ SAND, TRACE FINE SUBANGULAR GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST	— 1630
77			
	SP GP	LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, WITH FINE TO MEDIUM ANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST	— 1625
124			
	SM	REDDISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE TO SOME SILT, SOME FINE SUBROUNDED GRAVEL, TRACE MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST	— 1620
128			
129/10"			— 1615
150/10"			— 1610
110/10"			— 1605
119/9"	SM		— 1600
140/10"			— 1595
149/9"			— 1590
150/10"			— 1585
109/9"			— 1580
143/9"	SP	YELLOWISH-BROWN MOTTLED RED MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE SUBROUNDED GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST	— 1575
150/8"	SP	LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, NONCALCAREOUS, MOIST	— 1570
			— 1565

EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMB-14
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-55.1



DEPTH
(FEET)

0
5
10
15
20
25
30
35
40
45
50
55
60

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
COLOR SA, pH P.C.					11.3			

BORING DMB-15

SURFACE ELEVATION 1637.52
COORDINATES: N 113,660 E 2,272,025

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

NO SAMPLES TAKEN FROM 0.0 TO 50.0 FEET
SEE LOG FOR DMA-1

— 1635

— 1630

— 1625

— 1620

— 1615

— 1610

— 1605

— 1600

— 1595

— 1590

— 1585

BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE
COARSE SAND, SOME FINE GRAVEL, VERY DENSE,
NONCALCAREOUS

195/9" ■

SP

BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE
COARSE SAND AND FINE GRAVEL, VERY DENSE, NONCALCAREOUS,
MOIST

225/8 1/2" ■

SP

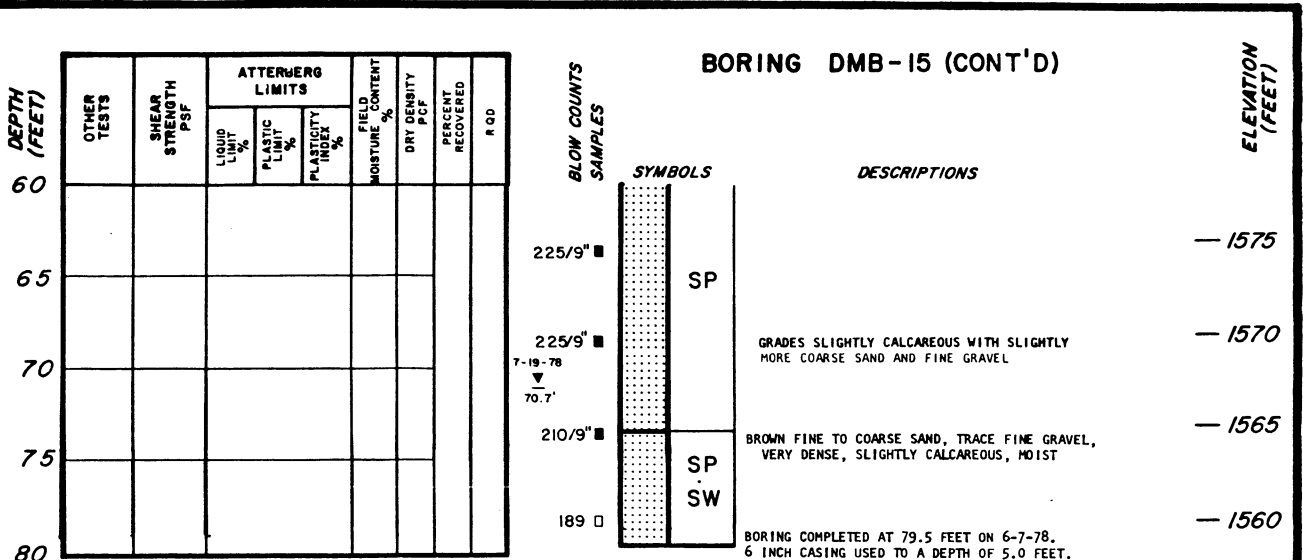
— 1580

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-15
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-56.1



BORING COMPLETED AT 79.5 FEET ON 6-7-78.
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 6-7-78.
 2 INCH PVC SLOTTED FROM 69.5 TO 79.5 FEET.
 GRAVEL PACK: 60.0 TO 79.5 FEET.
 SAND: 55.0 TO 60.0 FEET.
 BENTONITE: 53.0 TO 55.0 FEET.
 GROUT: 0.0 TO 53.0 FEET.
 GROUND WATER LEVEL RECORDED AT 70.7 FEET ON 7-19-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-15 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-562

DEPTH
(FEET)

BORING DMB-16

SURFACE ELEVATION 1674.63
 COORDINATES: N 111,880 E 2,273,475

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %								
0										SM	REDDISH-BROWN FINE SAND WITH SILTY GRAVEL		
5											REDDISH-BROWN FINE SAND, SOME MEDIUM SAND, SOME SILT, TRACE TO SOME FINE GRAVEL, TRACE COARSE SAND, OCCASIONAL MEDIUM GRAVEL, DENSE, NONCALCAREOUS	-1670	
											BOULDER AT 4.5 FEET		
10	SA, HA COLOR				7.7	132			60/8"		GRADES WITH MORE FINE TO MEDIUM GRAVEL BOULDER AT 7.0 FEET	-1665	
15									158/11"			-1660	
20									160/11"			-1655	
25									135/9"	SM GM	GRADES WITH MORE MEDIUM SAND	-1650	
30									175/8"			-1645	
35									150/3"		GRADES WITH MORE GRAVEL	-1640	
40									201"		BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, TRACE COARSE SAND, TRACE TO SOME SILT, DENSE, CALCAREOUS	-1635	
45	SA, pH COLOR P.C.				7.6				140/7"	SP SM	GRADES WITH MORE COARSE SAND AND FINE GRAVEL	-1630	
50									200/10"		REDDISH-BROWN FINE SAND, SOME MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS	-1625	
55	X-RAY								160/5"	SP SM	GRADES WITH OCCASIONAL MEDIUM TO COARSE GRAVEL	-1620	
60									195/8"		BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS	-1615	
65									192/10"			-1610	
70									150/6"	SP		-1605	
75									*175"			-1600	

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-16
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-57.1

BORING DMB-16 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT		DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %								
75												SP		
80										*150			BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND WITH SOME FINE GRAVEL, VERY DENSE, CALCAREOUS	- 1595
85										*175/9"				- 1590
90										*152/10"		SW	OCCASIONAL FINE TO MEDIUM SAND LENSES	- 1585
95										*225				- 1580
100										*160/9"				- 1575

BORING COMPLETED AT 99.2 FEET ON 6-9-78.
 CASING USED TO A DEPTH OF 10.0 FEET.
 PIEZOMETER INSTALLED ON 6-9-78.
 2 INCH PVC SLOTTED FROM 88.5 TO 98.5 FEET.
 GRAVEL PACK: 63.0 TO 98.5 FEET.
 SAND: 59.0 TO 93.0 FEET.
 GROUT: 0.0 TO 59.0 FEET.
 PIEZOMETER DRY ON 6-21-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-16 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-57.2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	HA, SA COLOR				8.2	131			
10									
15	P.C.								
20	P.C.								
25	P.C., SA, PH COLOR				8.2				
30									
35									
40									
45									
50									
55									
60									

BORING DMB-17

SURFACE ELEVATION 1648.95
 COORDINATES: N 108,960 E 2,268,755

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

			BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE TO SOME SILT, SOME SUBANGULAR METAMORPHIC GRAVEL, DENSE, NONCALCAREOUS, MOIST	- 1645
41	■			
5			GRADES MEDIUM DENSE	- 1640
21	■			
10			GRADES DENSE WITH MORE GRAVEL	- 1635
46	■			
15		SM GM	GRADES VERY DENSE FEW COBBLES	- 1630
110/11"	■			
20			GRADES CALCAREOUS	- 1625
150/8"	■			
25			BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, TRACE GRAVEL, VERY DENSE, CALCAREOUS, WET	- 1620
142/6"	■			
30			GRADES TRACE SILT	- 1615
150/5"	■	SP SM		
35			GRADES SOME SILT, SOME FINE SUBANGULAR METAMORPHIC GRAVEL	- 1605
*150/11"	■			
40			BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, MOIST, CALCAREOUS	- 1600
*150/8"	■			
45			VERY MOIST	- 1595
*100/3"	■			
50		SP		- 1590
*118/11"	■			
55				
*122/11"	■			
60				

EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMB-17
SHEET 1 OF 2

DAMES & MOORE

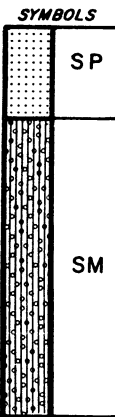
FIGURE B-58.1

BORING DMB-17 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
60	HA, SA COLOR					12.1			
65									
70	SA					11.6			
75									
80									
85									

BLOW COUNTS
SAMPLES

150/8" ■
150/9" ■
150/6" ■
* 106 ■
127/6" ■



DESCRIPTIONS

150/8" ■ LIGHT BROWN MEDIUM TO COARSE SUBROUNDED QUARTZ AND METAMORPHIC SAND, TRACE FINE GRAVEL AND COBBLES, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST

150/9" ■ LIGHT BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE TO SOME SILT, TRACE FINE SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, SLIGHTLY CALCAREOUS, VERY MOIST

150/6" ■ GRADES SOME FINE METAMORPHIC GRAVEL

* 106 ■ GRADES TRACE FINE GRAVEL SOME SMALL COBBLES

ELEVATION
(FEET)

— 1585

— 1580

— 1575

— 1570

— 1565

BORING COMPLETED AT 80.5 FEET ON 6-8-78.
6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMETER INSTALLED ON 6-9-78.
2 INCH PVC SLOTTED FROM 70.0 TO 80.0 FEET.
GRAVEL PACK: 70.0 TO 80.0 FEET.
SAND: 65.0 TO 70.0 FEET.
BENTONITE: 63.0 TO 65.0 FEET.
GROUT: 0.0 TO 63.0 FEET.
PIEZOMETER DRY ON 6-26-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-17
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-58.2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSP	ATTERBERG LIMITS			FIELD CONTENT MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
0									
5	SA				12.0	123			
10									
15									
20									
25	SA, HA X-RAY				16.2				
30									
35									
40	SA COLOR P.C.				13.4				
45									
50									
55									
60									

BORING DMB-18

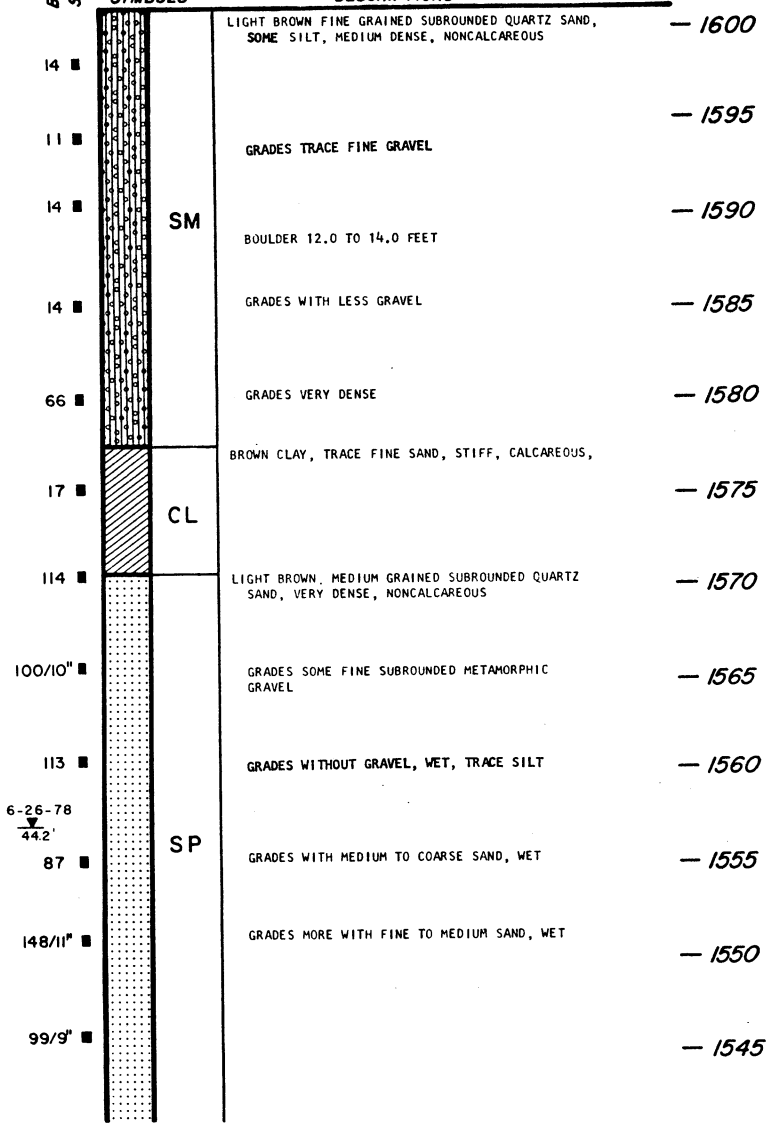
SURFACE ELEVATION 1601.04
COORDINATES: N 110,560 E 2,268,060

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



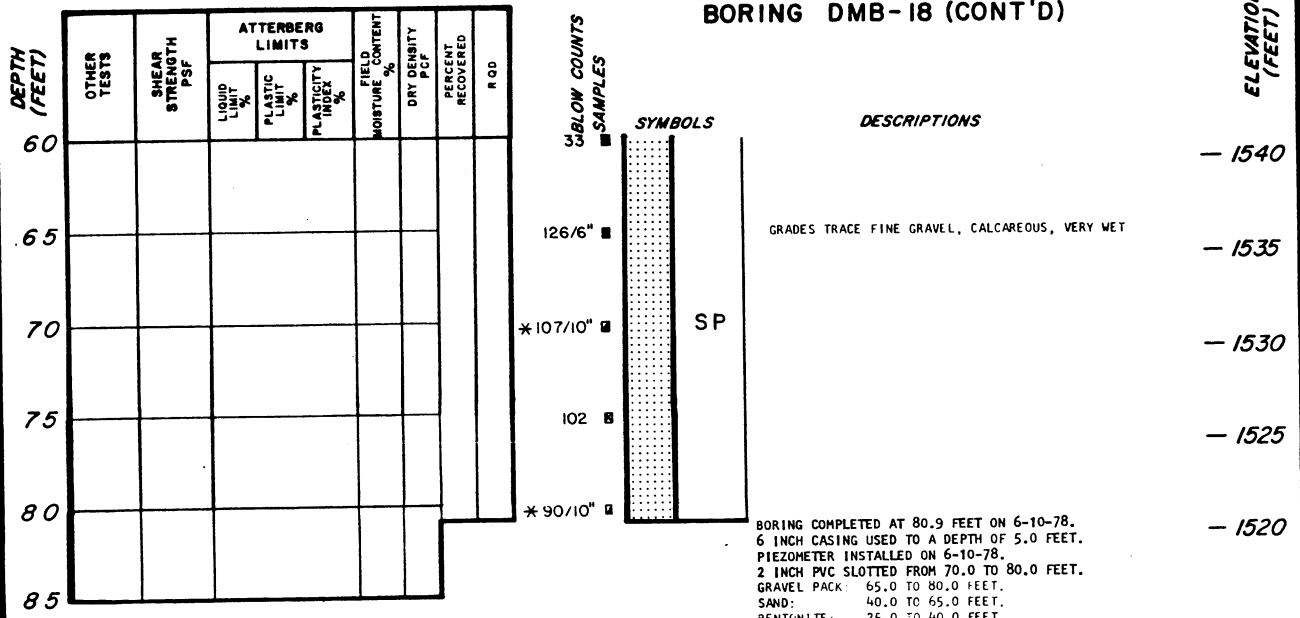
EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-18
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-59.1

BORING DMB-18 (CONT'D)



BORING COMPLETED AT 80.9 FEET ON 6-10-78.
 6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 6-10-78.
 2 INCH PVC SLOTTED FROM 70.0 TO 80.0 FEET.
 GRAVEL PACK: 65.0 TO 80.0 FEET.
 SAND: 40.0 TO 65.0 FEET.
 BENTONITE: 25.0 TO 40.0 FEET.
 GROUT: 0.0 TO 25.0 FEET.
 GROUND WATER LEVEL RECORDED AT 44.2 FEET ON 6-26-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-18 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-59.2

DEPTH
(FEET)

BORING DMB-19

SURFACE ELEVATION 1554.64
 COORDINATES N 110,450 E 2,265,815

ELEVATION
(FEET)

6-26-78
 1.1'

BLOW COUNTS
 SAMPLES

SYMBOLS

DESCRIPTIONS

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R.O.D.
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55	X-RAY								
60									
65									
70									
75									

NO SAMPLES TAKEN FROM 0.0 TO 40.0 FEET
 SEE LOG FOR DMA-13

15 ■

SP

11 ■

BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, MEDIUM DENSE, SLIGHTLY CALCAREOUS, VERY MOIST

8 ■

MH

9 ■

GRAYISH-BROWN SILT WITH CLAY, THIN LENSES OF FINE SAND, MEDIUM STIFF, CALCAREOUS

8 ■

CL

11 ■

REDDISH-BROWN SILTY CLAY, STIFF, SLIGHTLY CALCAREOUS, MOIST

126 □

SW
GW

OLIVE BROWN FINE TO COARSE ANGULAR SAND AND ANGULAR METAMORPHIC GRAVEL AND COBBLES, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS

— 1550

— 1545

— 1540

— 1535

— 1530

— 1525

— 1520

— 1515

— 1510

— 1505

— 1500

— 1495

— 1490

— 1485

— 1480

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-19
 SHEET 1 OF 3

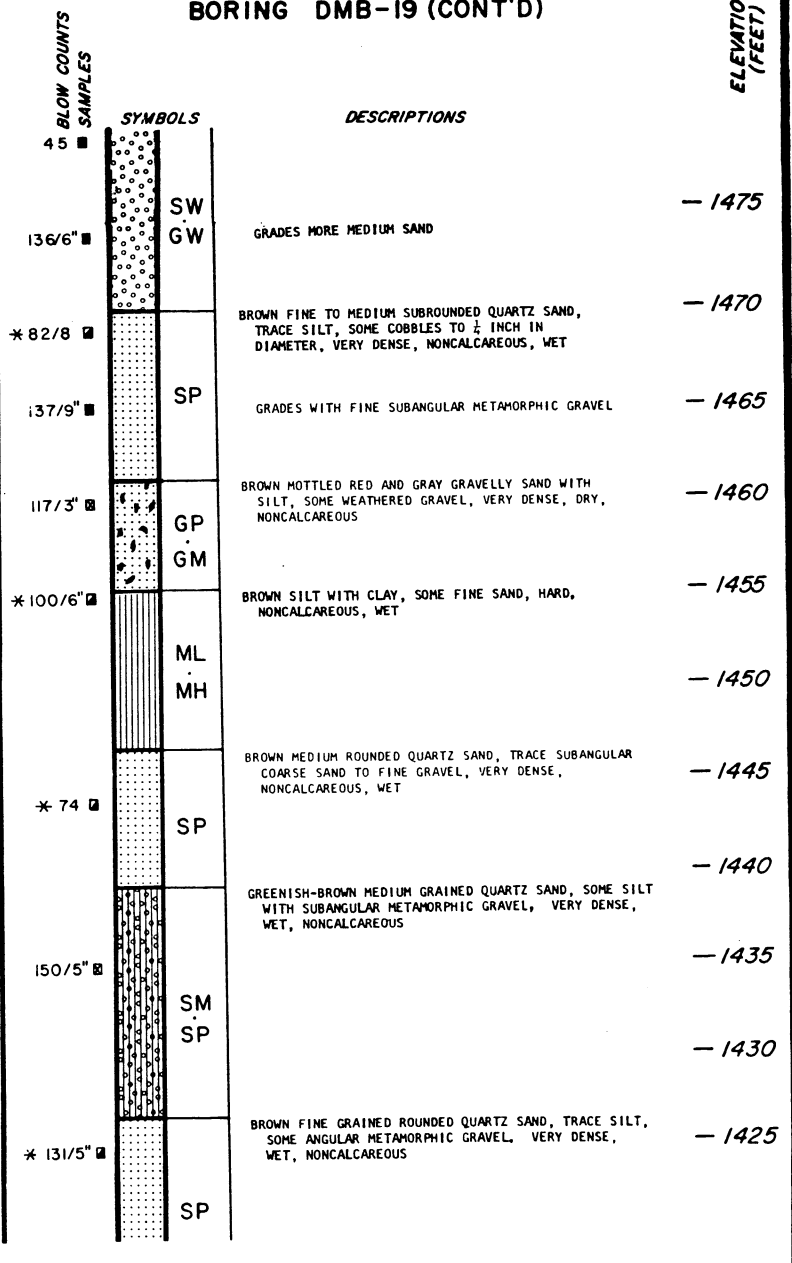
DAMES & MOORE

FIGURE B-60.1

BORING DMB-19 (CONT'D)

ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75	SA, pH COLOR P.C.					6.7			
80									
85									
90									
95									
100									
105									
110									
115									
120									
125									
130									
135									



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-19
SHEET 2 OF 3

DAMES & MOORE

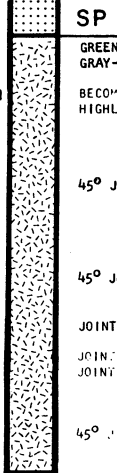
FIGURE B-60.2

BORING DMB-19 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R Q D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
135									
140							93	90	
145							90	90	
150							100	100	
155							100	90	
160							100	100	
165							100	90	

BLOW COUNTS
SAMPLES

SYMBOLS



DESCRIPTIONS

ELEVATION
(FEET)

- 1420
- 1415
- 1410
- 1405
- 1400
- 1395
- 1390

GREENSTONE (METAMORPHOSED TUFF)
GRAY-GREEN, FINE TO MEDIUM GRAINED, MASSIVE, HARD
BECOMES MASSIVE AND MODERATELY WEATHERED ROCK, GRADES
HIGHLY CEMENTED, JOINTING AT 45°

45° JOINTING AT 145.0'

45° JOINTING AT 150.0'

JOINT AT 152.5'
JOINTING 40° AT 154.0'
JOINTING 45° AT 155.0'

45° JOINTING AT 158.5'

BORING COMPLETED AT 160.7 FEET ON 6-21-78.
6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
4 INCH CASING USED TO A DEPTH OF 134.0 FEET.
PIEZOMETER INSTALLED ON 6-21-78.
2 INCH PVC SLOTTED FROM 76.5 TO 86.5 FEET.
SAND: 65.0 TO 86.5 FEET.
GROUT: 0.0 TO 65.0 FEET.
GROUND WATER LEVEL RECORDED AT 1.1 FEET
ABOVE GROUND SURFACE ON 6-26-78.

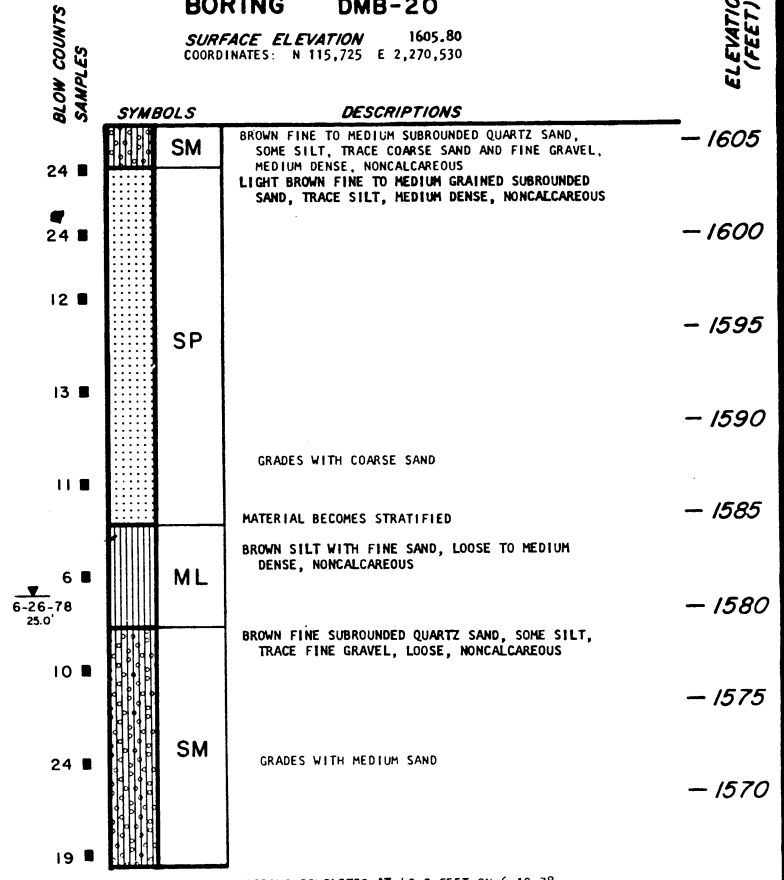
EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-19 SHEET 3 OF 3	
DAMES & MOORE	FIGURE B-60.3

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	SA, HA P.C.				5.5	100			
10									
15					4.6	97			
20									
25	X-RAY SA, HA P.C.				26.7				
30									
35	SA, HA COLOR				10.1	116			
40									

BORING DMB-20

SURFACE ELEVATION 1605.80
 COORDINATES: N 115,725 E 2,270,530

ELEVATION
(FEET)



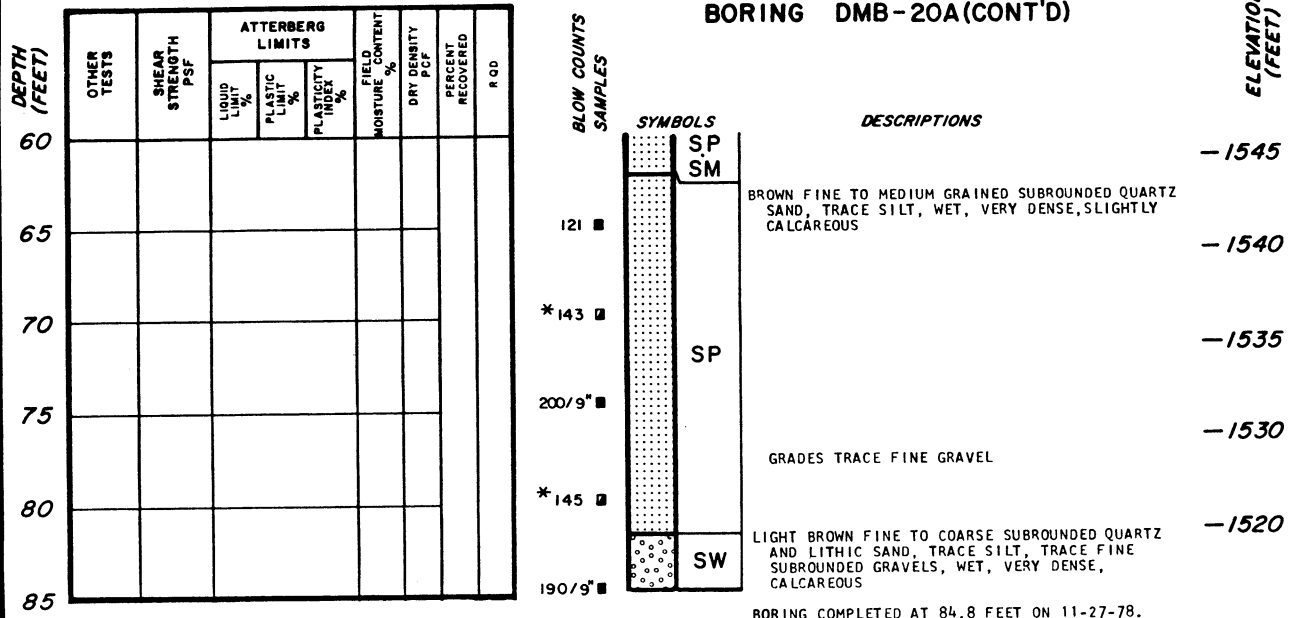
EXXON MINERALS COMPANY, U.S.A.
 GRANDON PROJECT

LOG OF BORING DMB-20
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-61

BORING DMB-20A (CONT'D)



BORING COMPLETED AT 84.8 FEET ON 11-27-78.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED ON 11-28-78.
 2 INCH PVC SLOTTED FROM 79.5 TO 84.5 FEET.
 GRAVEL PACK: 75.0 TO 84.5 FEET.
 SAND: 65.0 TO 75.0 FEET.
 BENTONITE: 60.0 TO 65.0 FEET.
 GROUT: 0.0 TO 60.0 FEET.
 GROUND WATER LEVEL RECORDED AT 43.1 FEET ON 12-8-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-20A SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-62.2

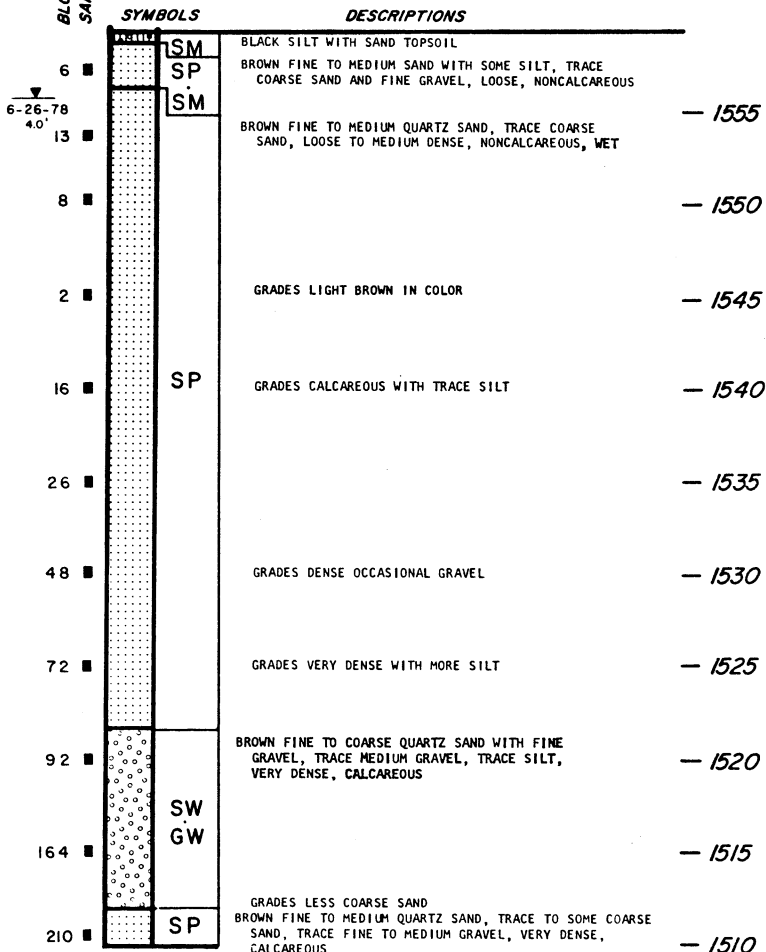
DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	HA, SA				21.0	104			
10									
15									
20									
25									
30									
35									
40									
45	SA, HA COLOR				6.7	137			
50									

BORING DMB-21

SURFACE ELEVATION 1559.32
 COORDINATES: N 112,820 E 2,265,775

ELEVATION
(FEET)



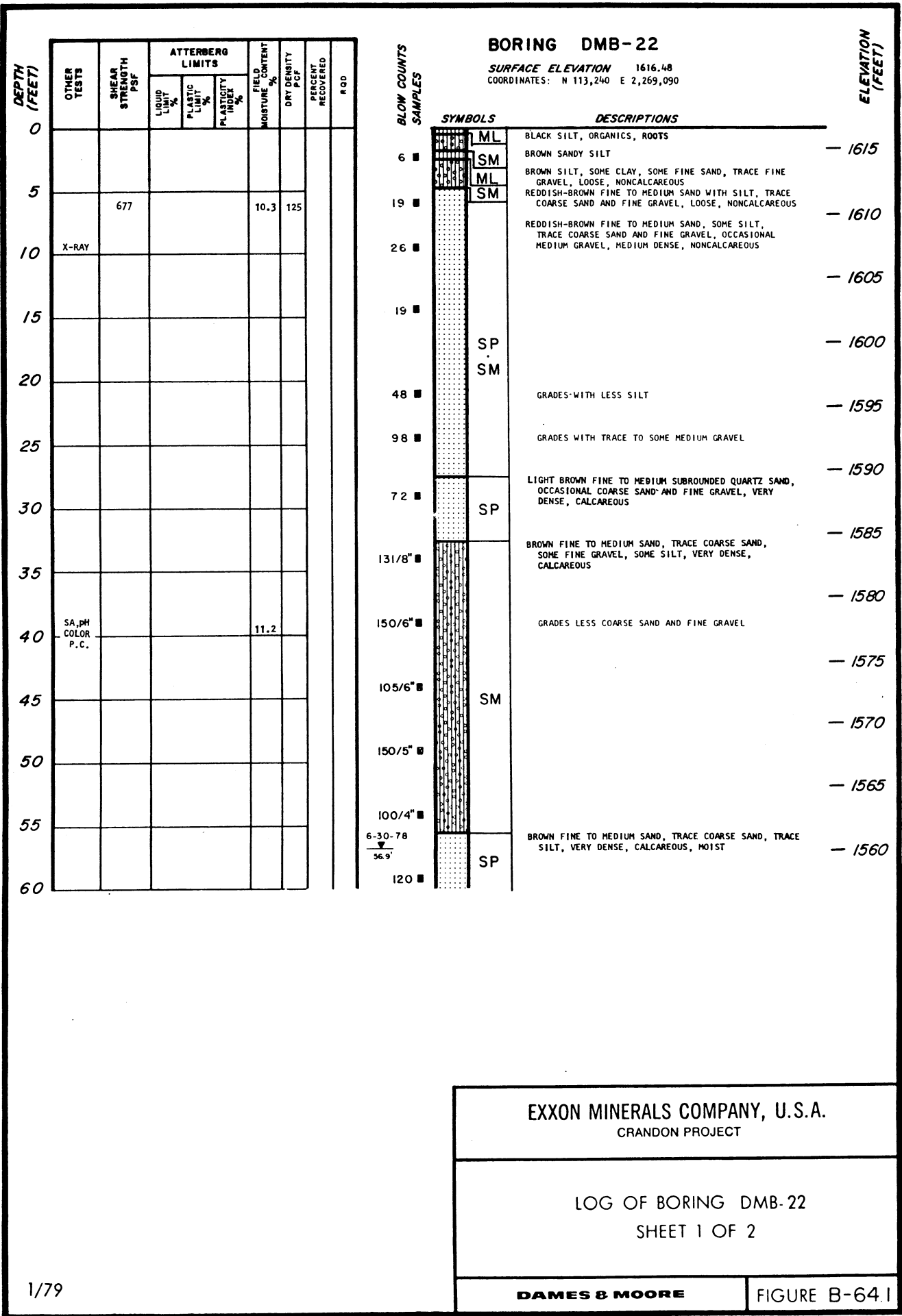
BORING COMPLETED AT 49.5 FEET ON 6-12-78.
 CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 6-12-78.
 2 INCH PVC SLOTTED FROM 38.9 TO 48.9 FEET.
 GRAVEL PACK: 30.0 TO 48.9 FEET.
 SAND: 26.5 TO 30.0 FEET.
 BENTONITE: 23.5 TO 26.5 FEET.
 GROUT: 0.0 TO 23.5 FEET.
 GROUND WATER LEVEL RECORDED AT 4.0 FEET ON 6-26-78.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMB-21
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-63



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-22
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-64.1

BORING DMB - 22 (CONT'D)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
60									
65									
70									
75									
80									

BLOW COUNTS
SAMPLES

BLOW COUNTS SAMPLES	SYMBOLS
165/6	SP SM
190/9	SP SW
145/7	SP SM
170/6	SP SM

DESCRIPTIONS

— 1555
BROWN FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST

— 1550
BROWN MEDIUM TO COARSE SAND, TRACE FINE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS, WET-SATURATED

— 1545
BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, VERY DENSE, CALCAREOUS, WET-SATURATED

— 1540
REDDISH-BROWN FINE TO MEDIUM SAND, TRACE SILT, VERY DENSE, CALCAREOUS

ELEVATION
(FEET)

BORING COMPLETED AT 79.0 FEET ON 6-13-78.
4 INCH CASING USED TO A DEPTH OF 20.0 FEET.
PIEZOMETER INSTALLED ON 6-13-78.
2 INCH PVC SLOTTED FROM 68.6 TO 78.6 FEET.
GRAVEL PACK: 70.0 TO 78.6 FEET.
SAND: 64.0 TO 70.0 FEET.
BENTONITE: 63.0 TO 64.0 FEET.
GROUT: 0.0 TO 63.0 FEET.
GROUND WATER LEVEL RECORDED AT 56.9 FEET ON 6-30-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-22
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-64.2

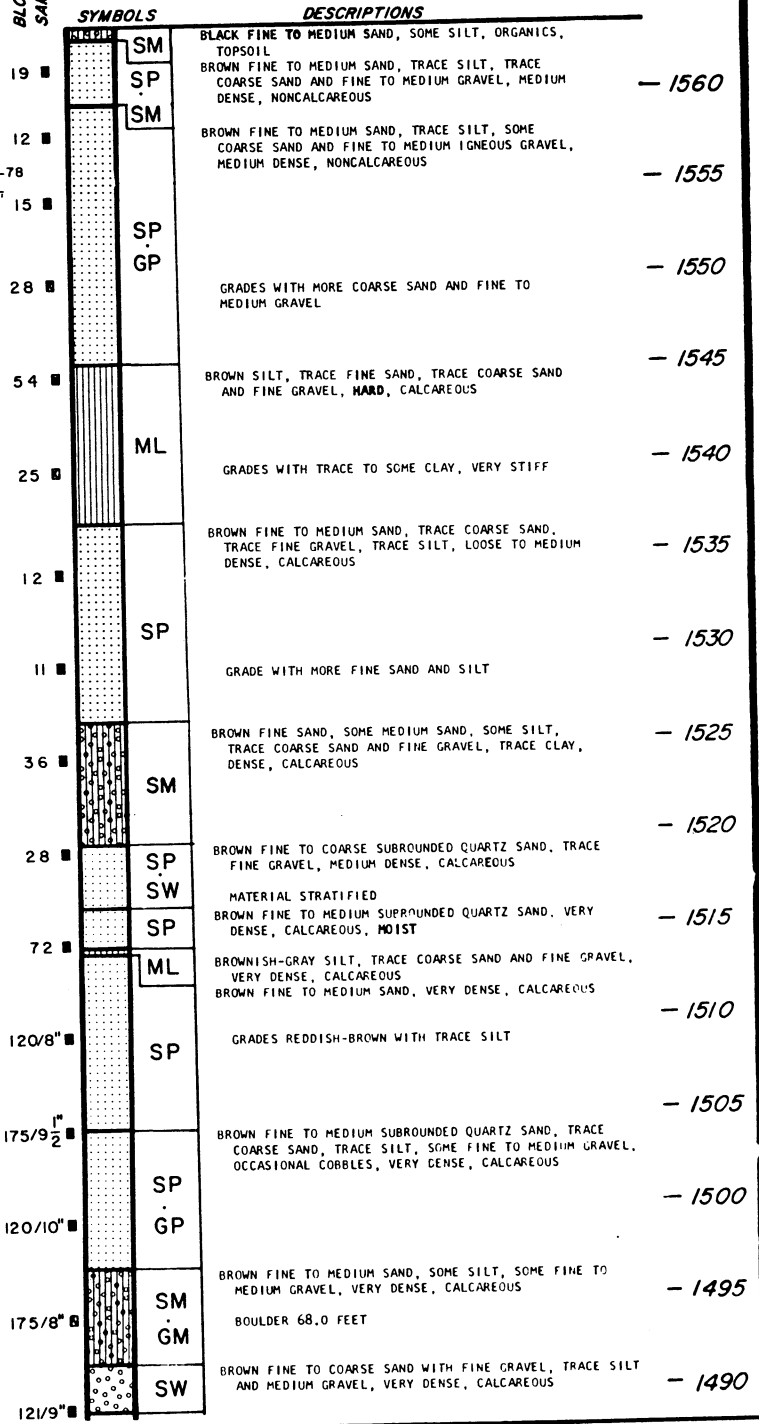
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									
70									
75									

BORING DMB-23

SURFACE ELEVATION 1563.30
 COORDINATES: N 115,900 E 2,268,205

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES



EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMB-23
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-65.1

DEPTH
(FEET)

75
80
85
90
95
100

OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				

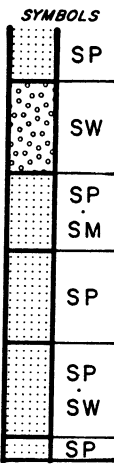
BORING DMB-23 (CONT'D)

SURFACE ELEVATION

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

200/10"
162
170/11"
168/11"
215/8"



SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
SP	BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT, VERY DENSE, CALCAREOUS BOULDER 76.0 FEET	- 1485
SW	BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, OCCASIONAL MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS	- 1480
SP SM	REDDISH-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND, FINE GRAVEL, VERY DENSE, CALCAREOUS	- 1475
SP	BROWN FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE FINE TO MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS	- 1470
SP SW	BROWN MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE TO COARSE SAND, SOME FINE GRAVEL, VERY DENSE, CALCAREOUS	- 1465
SP	BROWN FINE TO MEDIUM SAND, TRACE TO SOME COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS	- 1465

BORING COMPLETED AT 99.2 FEET ON 6-21-78.
 6 INCH CASING USED TO A DEPTH OF 17.0 FEET.
 PIEZOMETER INSTALLED ON 6-21-78.
 2 INCH PVC SLOTTED FROM 89.0 TO 99.0 FEET.
 GRAVEL PACK: 88.0 TO 99.2 FEET.
 SAND: 83.0 TO 88.0 FEET.
 BENTONITE: 81.0 TO 83.0 FEET.
 GRAVEL & SAND: 78.0 TO 81.0 FEET.
 GROUT: 0.0 TO 78.0 FEET.
 GROUND WATER LEVEL RECORDED AT 8.6 FEET ON 6-30-78.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-23
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-65.2

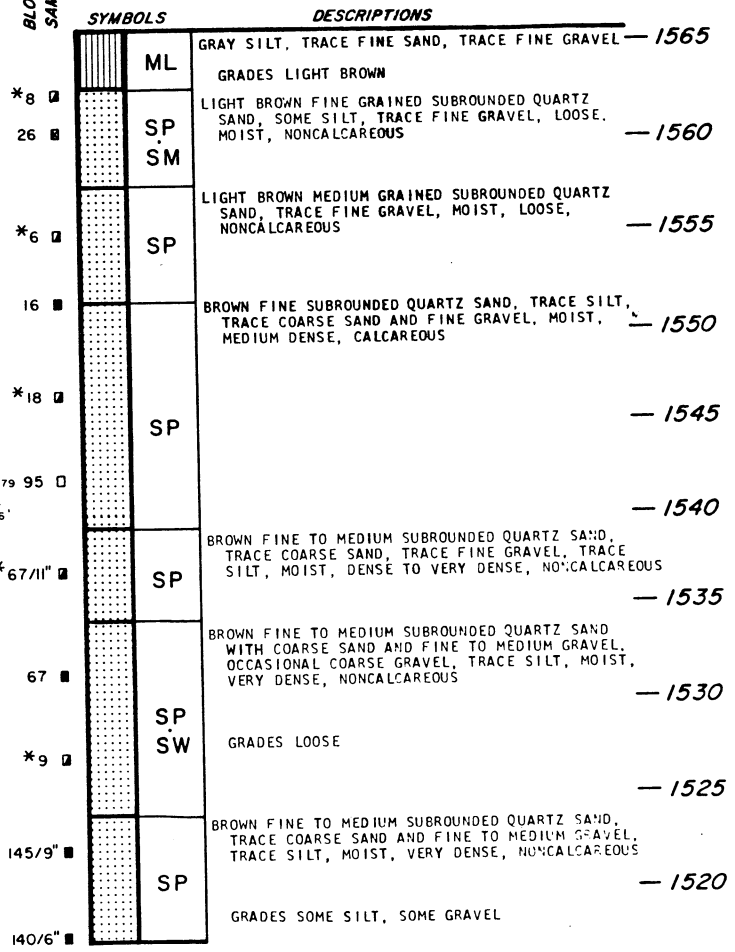
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									

BORING DMB-24

SURFACE ELEVATION 1565.43
 COORDINATES: N 102.060 E 2.271.375

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES



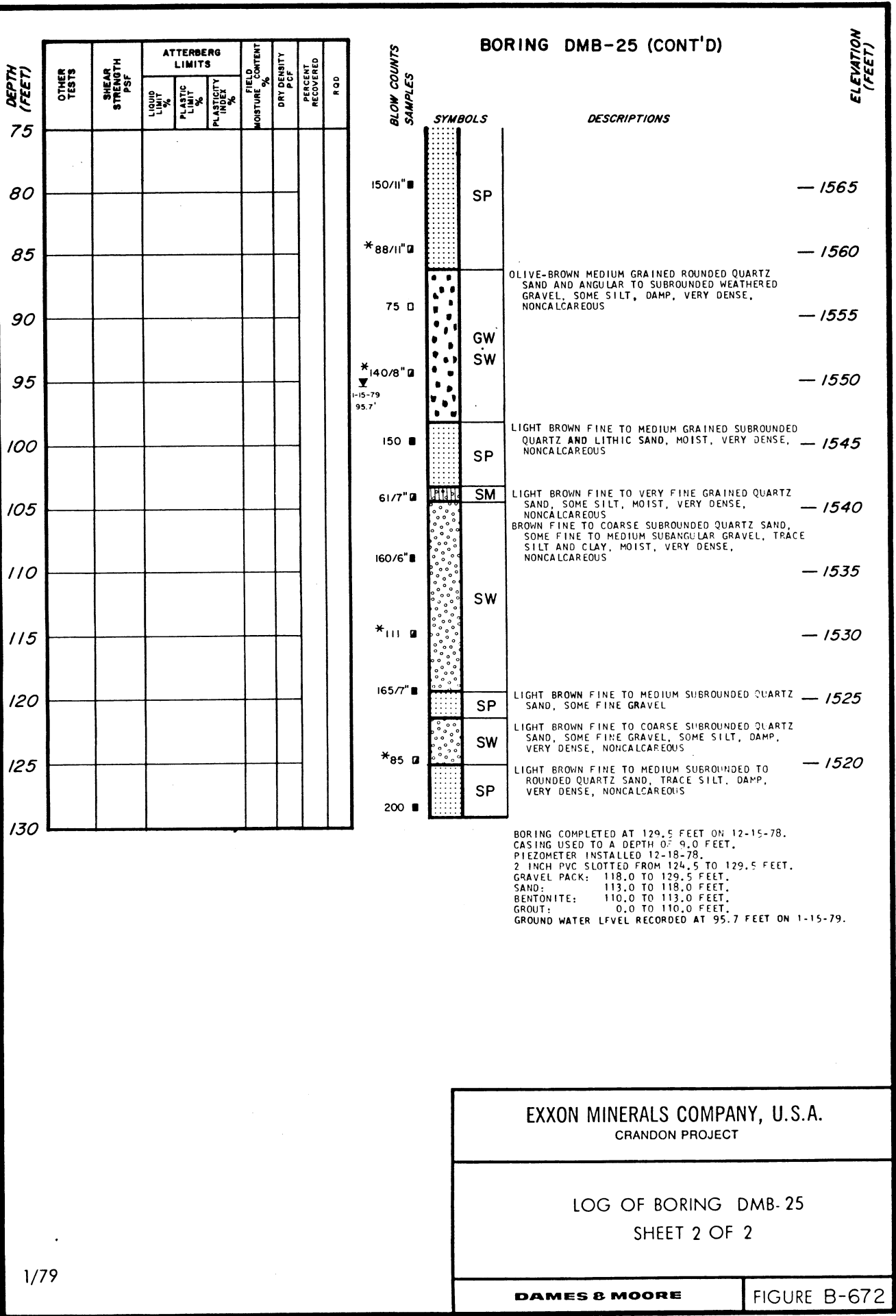
BORING COMPLETED AT 49.0 FEET ON 12-18-78.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED 12-18-78.
 2 INCH PVC SLOTTED FROM 43.2 TO 48.2 FEET.
 GRAVEL PACK: 42.0 TO 48.2 FEET.
 SAND: 39.5 TO 42.0 FEET.
 BENTONITE: 35.0 TO 39.5 FEET.
 GROUT: 0.0 TO 35.0 FEET.
 GROUND WATER LEVEL RECORDED AT 25.6 FEET ON 1-8-79.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-24
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-66



EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMB-25
SHEET 2 OF 2

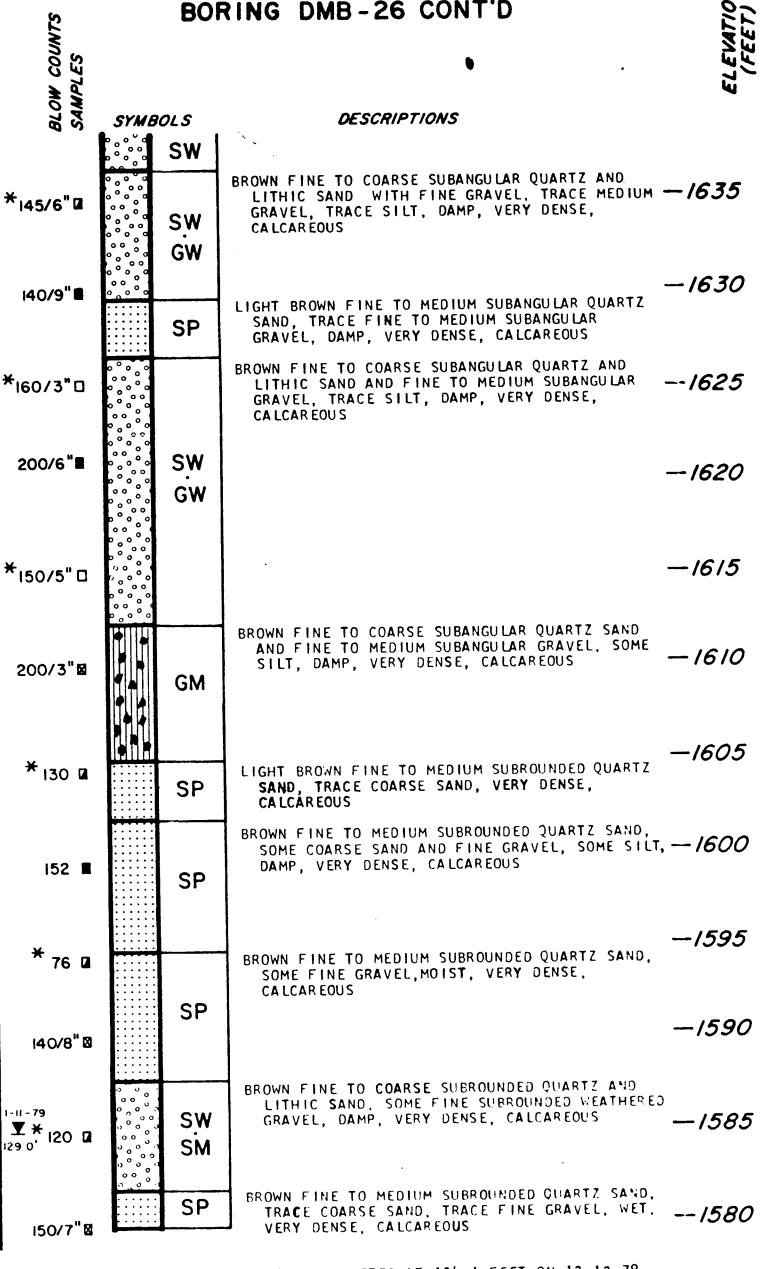
DAMES & MOORE

FIGURE B-672

BORING DMB-26 CONT'D

ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	R QD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80									
85									
90									
95									
100									
105									
110									
115									
120									
125									
130									
135									



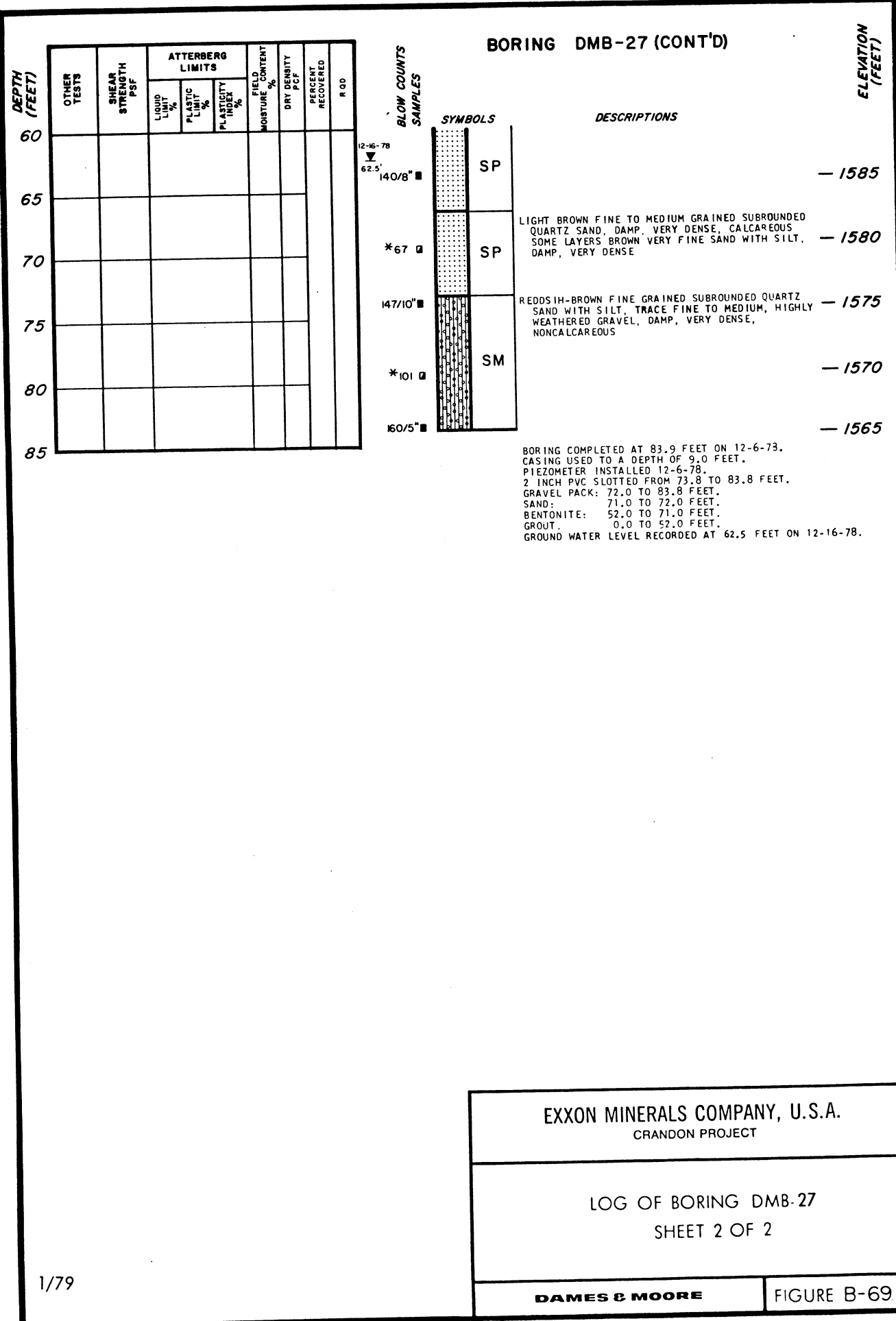
BORING COMPLETED AT 134.1 FEET ON 12-12-78.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED 12-13-78.
 2 INCH PVC SLOTTED FROM 124.0 TO 134.0 FEET.
 GRAVEL PACK: 120.0 TO 134.0 FEET.
 SAND: 117.0 TO 120.0 FEET.
 BENTONITE: 114.0 TO 117.0 FEET.
 GROUT: 0.0 TO 114.0 FEET.
 GROUND WATER LEVEL RECORDED AT 129.0 FEET ON 1-11-79.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

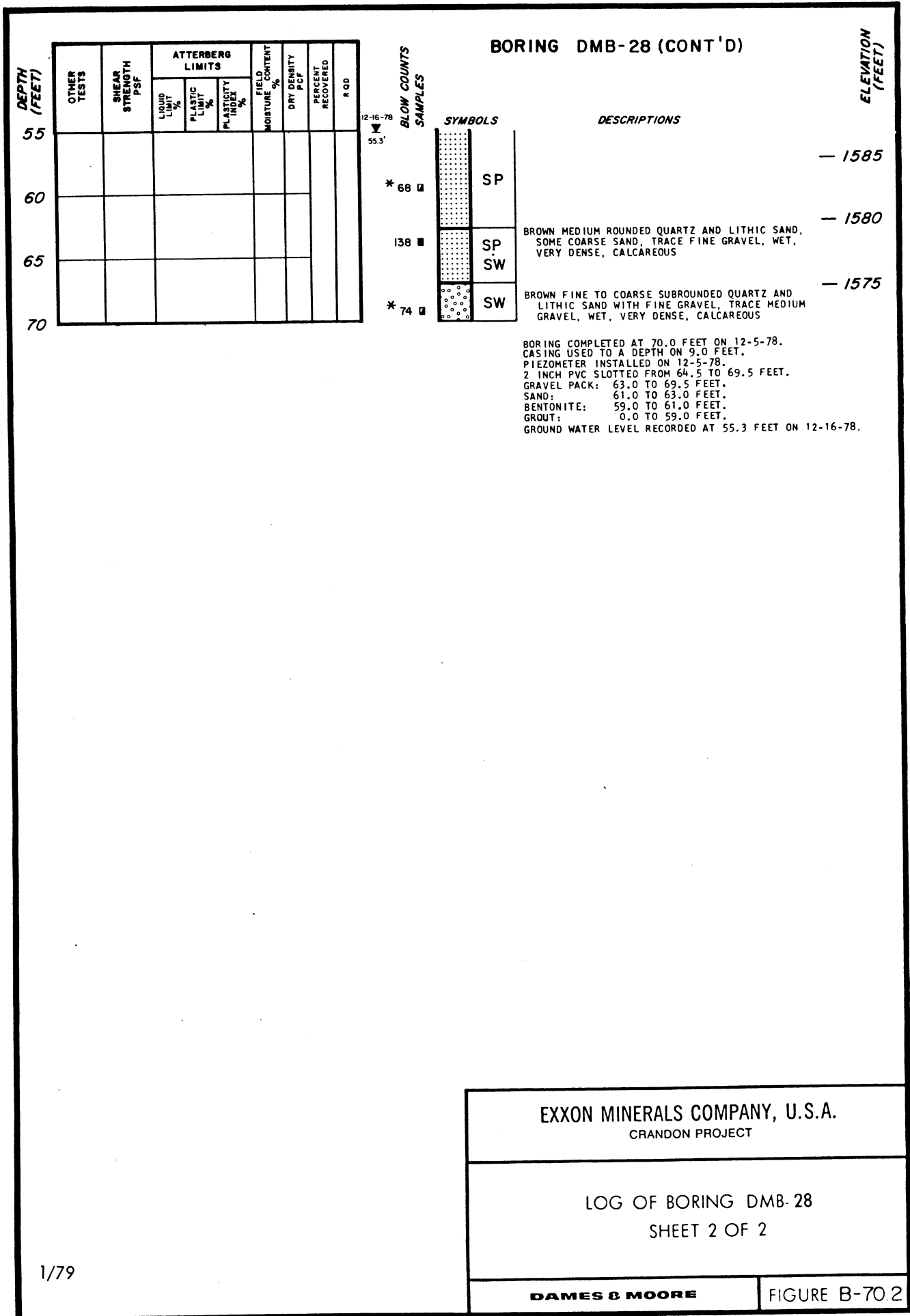
LOG OF BORING DMB-26
 SHEET 2 OF 2

DAMES & MOORE

FIGURE B-68.2



EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-27 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-692



EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-28 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-70.2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %		DRY DENSITY PCF	PERCENT RECOVERED	R.O.D.
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE CONTENT %				
0										
5										
10										
15										
20										
25										
30										
35										
40										
45										
50										
55										

BORING DMB - 29

SURFACE ELEVATION 1629.98
 COORDINATES: N 104,385 E 2,288,110

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
9	SP	BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, SOME FINE TO MEDIUM GRAVEL, MOIST, LOOSE, NONCALCAREOUS	1630
*10		BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH FINE TO MEDIUM GRAVEL, TRACE SILT, MOIST, LOOSE, SLIGHTLY CALCAREOUS	1625
28	SP GP	GRADES WITH MEDIUM TO COARSE GRAVEL	1620
*22			1615
46		GRAYISH-BROWN FINE TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND WITH FINE TO MEDIUM SUBROUNDED GRAVEL, TRACE SILT, DENSE, CALCAREOUS	1610
*38	SW		1605
62		LIGHT BROWN FINE TO MEDIUM ROUNDED QUARTZ SAND, TRACE COARSE SAND, DAMP, VERY DENSE, CALCAREOUS	1600
*32	SP	GRADES WITHOUT COARSE SAND	1595
166/2.5"		GRADES TRACE COARSE SAND	1590
12-2-78 42.6' *65	SP SW	GRAYISH-BROWN FINE TO COARSE ROUNDED QUARTZ AND LITHIC SAND, TRACE FINE TO MEDIUM ANGULAR GRAVEL, MOIST, VERY DENSE, CALCAREOUS	1585
150/4"			1580
*90	SP	LIGHT BROWN FINE GRAINED ROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE FINE GRAVEL, WET, VERY DENSE, NONCALCAREOUS	1575

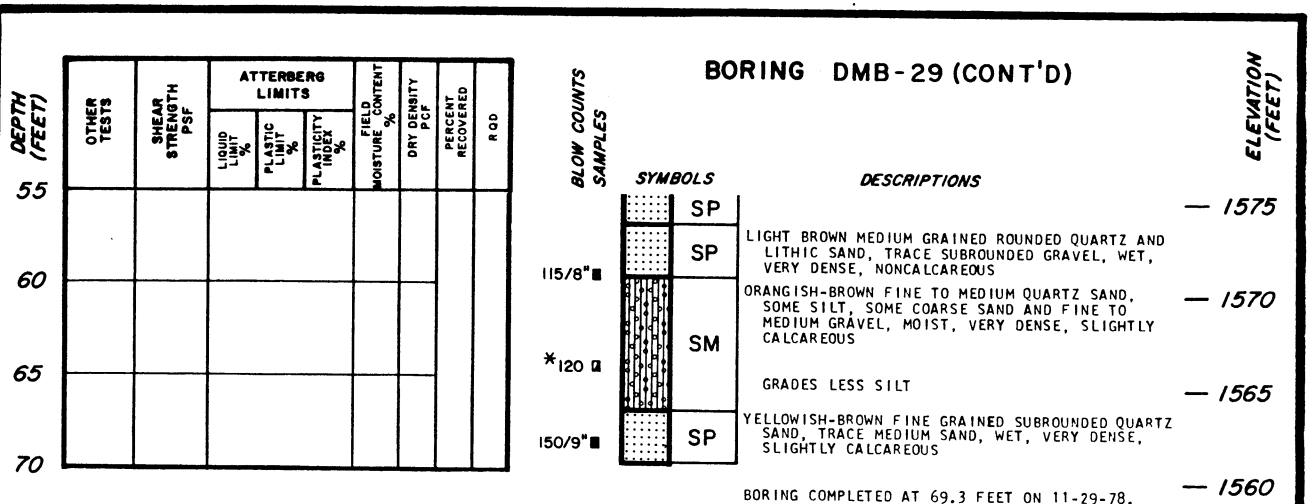
(BORING CONTINUED)

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMB-29
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-71.1



BORING COMPLETED AT 69.3 FEET ON 11-29-78.
 CASING USED TO A DEPTH OF 9.0 FEET.
 PIEZOMETER INSTALLED ON 11-29-78.
 2 INCH PVC SLOTTED FROM 64.3 TO 69.3 FEET.
 GRAVEL PACK: 62.0 TO 69.3 FEET.
 SAND: 61.0 TO 62.0 FEET.
 BENTONITE: 58.0 TO 61.0 FEET.
 GROUT: 0.0 TO 58.0 FEET.
 GROUND WATER LEVEL RECORDED AT 42.6 FEET ON 12-2-78.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMB-29 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-71.2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD CONTENT		PERCENT RECOVERED	ROD
			LIQUID LIMIT L %	PLASTIC LIMIT P %	PLASTICITY INDEX I %	MOISTURE %	DRY DENSITY PCF		
0									
5									
10									
15						15.8			
20									
25									
30									
35		1600/1000 2850/1750 5250/3000				9.7			
40									
45						6.4			
50									
55						11.0			
60		1650/2000 2250/4000 3750/6000				13.7	112		
65								100 100	
70		1660/2000 2580/4000 3730/6000				16.4	116	100 80	
75									

BORING DMI-1

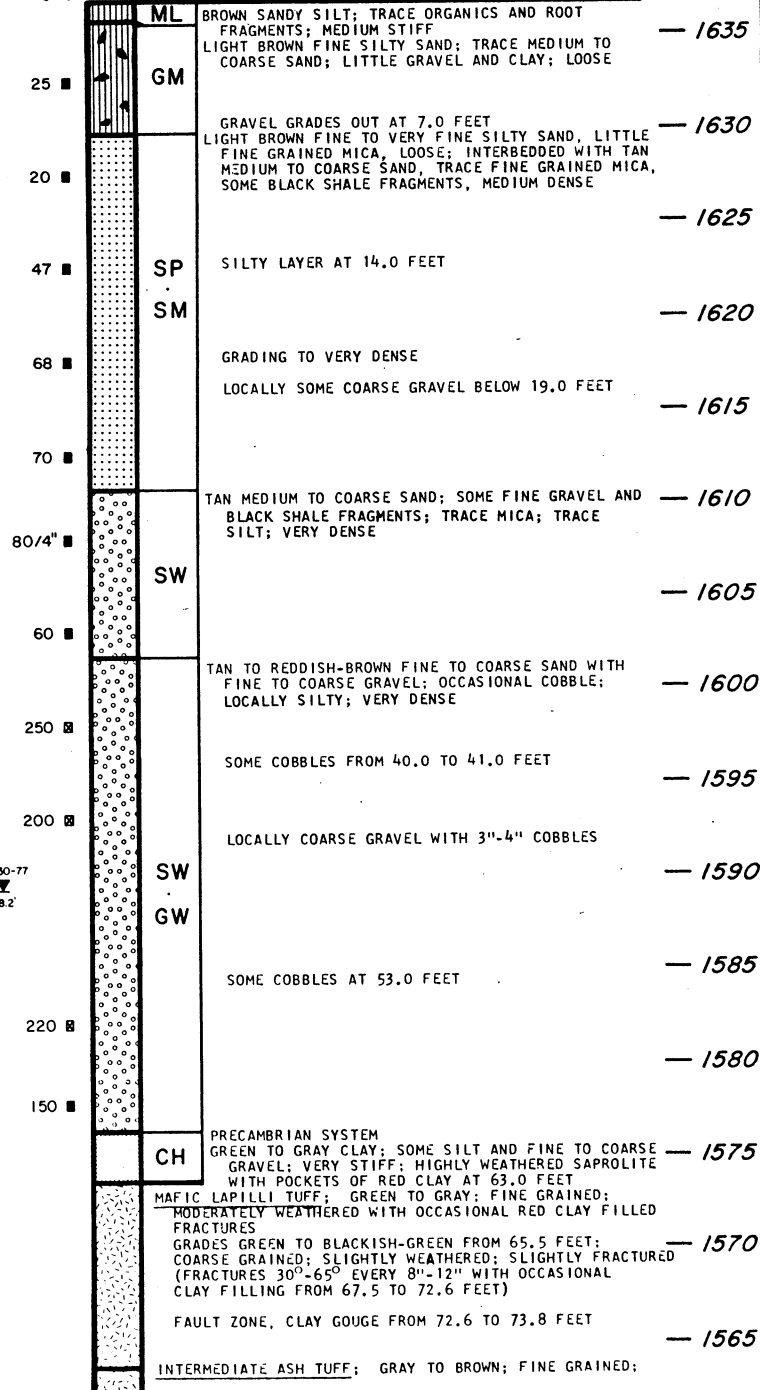
SURFACE ELEVATION 1636.74
COORDINATES: N 116,747 E 2,278,815

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-1
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-72.1

BORING DMI - 1 CONTINUED
















ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH (PSF)	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD			
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %							
75							100	72				
80							100	100				
85							100	80				
90							100	86				
95							100	56				
100							86	56				
105							100	100				
110												

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

	SLIGHT TO MODERATE WEATHERING WITH INTERBEDDED GREEN TO GRAY CLAY FILLINGS FROM 73.0 TO 74.0 FEET; HIGHLY FRACTURED ZONE FROM 73.8 TO 75.2 FEET.	— 1560
	GRADES MOTTLED RED TO WHITISH-GRAY; SLIGHT IRON OXIDE STAINING; SLIGHTLY FRACTURED, 60-300 EVERY 4"-6"; SLIGHT TO MODERATE WEATHERING.	— 1555
	FRACTURE ZONE; STRONG IRON OXIDE STAINING; HIGH CLAY CONTENT FROM 77.9 TO 79.2 FEET	— 1550
	GRADES GRAY; FINE GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED; MODERATE BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES	— 1545
	GRADES LIGHT BROWN TO GRAY AT 83.6 FEET; MODERATE IRON OXIDE STAINING; NUMEROUS CLOSED BREAKS ALONG NEAR VERTICAL BEDDING PLANES	— 1540
	HIGHLY FRACTURED ZONE FROM 88.0 TO 88.6 FEET; SOME CLAY FILLING	— 1535
	GRAY; WEAK IRON OXIDE STAINING FROM 90.0 FEET	— 1530
	NUMEROUS FRACTURES FROM 91.0 TO 95.0 FEET	— 1525
	WHITE CLAY INCLUSION, 1/2" AT 91.9 FEET	— 1520
	SLIGHTLY COARSE GRAINED FROM 92.0 TO 94.0 FEET	— 1515
	FRACTURE ZONE FROM 97.8 TO 99.0 FEET	— 1510
	FAULT ZONE FROM 100.9 TO 102.5 FEET; RED; HIGHLY WEATHERED AND IRON OXIDE STAINED WITH VERY HIGH CLAY CONTENT	— 1505
	MAFIC LAPILLI TUFF; GRAY TO BLACKISH-GRAY; COARSE GRAINED; SLIGHTLY WEATHERED TO UNWEATHERED; SLIGHTLY FRACTURED	— 1500
	NUMEROUS FRACTURES FROM 103.0 TO 104.5 FEET	— 1495
	FRACTURE ZONES AT 106.0 FEET AND 108.5 FEET	— 1490

BORING COMPLETED AT 109.0 FEET ON 6-14-77.
 CASING USED TO A DEPTH OF 63.5 FEET.
 PIEZOMETER INSTALLED ON 6-14-77.
 1 INCH PVC SLOTTED FROM 106.0 TO 108.5 FEET
 GRAVEL PACK: 52.0 TO 109.0 FEET
 GROUT: 0.0 TO 52.0 FEET.
 GROUND WATER LEVEL RECORDED AT 48.2 FEET ON 7-30-77.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMI-1
 SHEET 2 OF 2

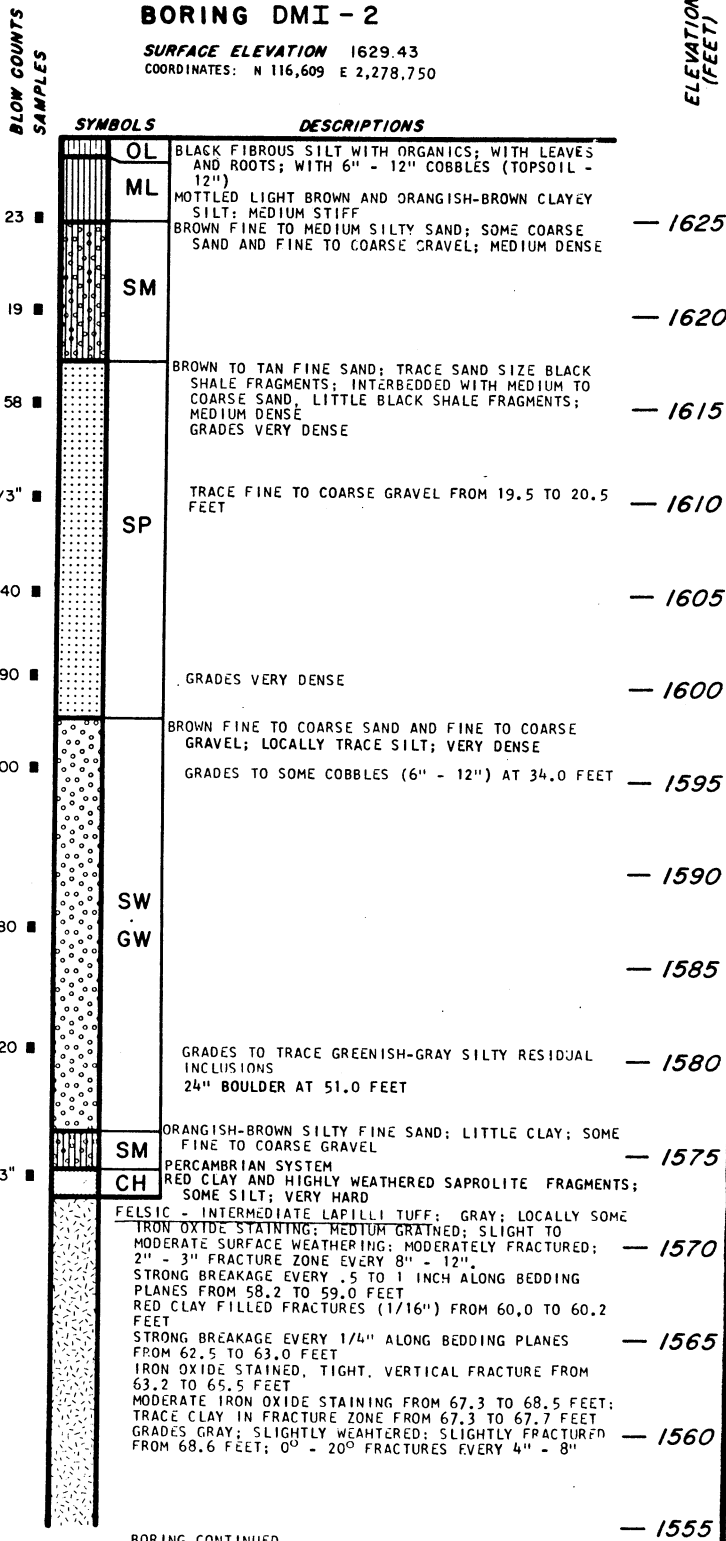
DAMES & MOORE

FIGURE B-72.2

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40					6.8	138			
45									
50									
55									
60							100	10	
65							100	91	
70							100	100	
75									

BORING DMI - 2

SURFACE ELEVATION 1629.43
 COORDINATES: N 116,609 E 2,278,750



BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
 GRANDON PROJECT

LOG OF BORING DMI-2
 SHEET 1 OF 2

DAMES & MOORE

FIGURE B-73.1

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %								
75											LOCALLY WEAK IRON OXIDE STAINING FROM 75.0 FEET; MODERATELY WEATHERED; SOME BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES	— 1550	
80							100	80					
85							100	73			TRACE BRIGHT GREEN MINERAL INCLUSIONS FROM 83.0 FEET INTERMITTENT MODERATE TO STRONG IRON OXIDE STAINING FROM 84.0 FEET; MOTTLED RED, GREEN, AND WHITISH-GRAY; MODERATELY WEATHERED; MODERATELY FRACTURED	— 1545	
90							100	89			STRONG BREAKAGE EVERY .5 TO 1 INCH ALONG BEDDING PLANES FROM 87.0 TO 88.4 FEET	— 1540	
95											NUMEROUS MICROFRACTURES FROM 92.0 TO 96.0 FEET	— 1535	
100							100	77			GRADES WHITISH-GRAY TO GRAY AT 96.0 FEET; VERY FINE GRAINED; MODERATELY WEATHERED; SLIGHTLY FRACTURED; OCCASIONAL BRIGHT GREEN MINERAL INCLUSION; WEAK FRACTURE ZONE FROM 97.5 TO 98.5 FEET; SOME CLAY LINED FRACTURES	— 1530	
105							100	100			1" CLAY FILLED FRACTURE AT 100.6 FEET GRADES GRAY; LOCALLY WEAK IRON OXIDE STAINING FROM 101.0 FEET; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED; OCCASIONAL IRON OXIDE STAINED, TIGHT FRACTURE	— 1525	
110							100	100				— 1520	
115							100	18			GRADES WHITISH-GRAY WITH LOCALLY WEAK IRON OXIDE STAINING FROM 114.0 TO 118.5 FEET; MODERATELY WEATHERED; MODERATELY TO HIGHLY FRACTURED; 1 - 2" CLAY LINED FRACTURE ZONES AT 117.0, 117.5, AND 118.1 FEET	— 1515	
120							100	95			GRADES GRAY; MEDIUM GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED; OCCASIONAL GREEN MINERAL INCLUSIONS	— 1510	
125											60° OPEN FRACTURE AT 122.2 FEET 80° OPEN, IRON OXIDE STAINED FRACTURE AT 123.7 FEET 70° OPEN FRACTURE FROM 124.7 FEET	— 1505	
130							100	96			MODERATE IRON OXIDE STAINING FROM 129.2 TO 130.7 FEET 4" WEAK CLAY LINED FRACTURE ZONE AT 129.7 FEET	— 1500	
135											SOME FRACTURES ALONG NEAR VERTICAL BEDDING PLANES	— 1495	
140							100	79			FRACTURING ALONG BEDDING PLANE EVERY .5 TO 1 INCH	— 1490	
BORING COMPLETED AT 139.0 FEET ON 6-21-77. CASING USED TO A DEPTH OF 58.0 FEET. PIEZOMETER INSTALLED ON 6-21-77. 3/4 INCH PVC SLOTTED FROM 134.0 TO 139.0 FEET. 1 INCH PVC SLOTTED FROM 50.0 TO 53.0 FEET. GRAVEL PACK: 88.0 TO 139.0 FEET. GROUT: 57.0 TO 88.0 FEET. BENTONITE: 53.0 TO 57.0 FEET. GRAVEL PACK: 40.0 TO 53.0 FEET. BENTONITE: 38.0 TO 40.0 FEET. GROUT: 0.0 TO 38.0 FEET. GROUND WATER LEVEL RECORDED AT 41.6 FEET FOR DMI-2U (1 INCH PVC) AND 42.1 FEET FOR DMI-2L (3/4 INCH PVC) ON 7-30-77.													

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-2
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-73.2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH (PSF)	ATTERBERG LIMITS			FIELD MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT RECOVERED	ROD
			LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									
70							100	100	
75							100	70	

BORING DMI - 3

SURFACE ELEVATION 1626.34
COORDINATES: N 116,504 E 2,278,692

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
8	SP	BROWN FINE SAND; TRACE FINE TO COARSE GRAVEL; LOOSE (ROAD FILL - 10")	1625
	ML	DARK BROWN CLAYEY SILT; SOME ORGANICS AND ROOTS (TOPSOIL - 12")	
17	SW	BROWN FINE TO COARSE SAND WITH FINE TO COARSE SAND AND FINE TO COARSE GRAVEL; LOCALLY SOM. SILT;	1620
12	GW	MEDIUM DENSE WITH SOME 3" - 4" COBBLES FROM 4.5 TO 6.0 FEET	
28	SP	BROWN FINE SAND; TRACE SILT; MEDIUM DENSE	1615
		GRADES WITH OCCASIONAL LAYERS OF TAN COARSE SAND	
43	SP	BROWN FINE TO MEDIUM SAND WITH INTERBEDDED FINE TO COARSE SAND WITH LOCAL ZONES OF FINE TO COARSE GRAVEL; DENSE TO VERY DENSE	1610
	SW		1605
65			
160		FINE TO COARSE GRAVEL WITH INTERBEDDED FINE TO COARSE SAND; VERY DENSE	1600
		3"-4" COBBLES	1595
100/0"			1590
250	GW		1585
	SW	COBBLES UP TO 6"	1580
100/5"			1575
175/6"		18" BOULDER FROM 49.5 FEET	1570
		14" BOULDER FROM 52.5 FEET	1565
200/3"		PRECAMBRIAN SYSTEM MOTTLED RED; OLIVE-GREEN AND GRAY RESIDUAL CLAY; SOME SILT; SOME COARSE SAND AND FINE GRAVEL; VERY HARD; SOME FRAGMENTS OF HIGHLY WEATHERED SAPROLITE	1570
150/3"	CH	GRADES SOME WHITE MOTTLING	1565
		FELSIC - INTERMEDIATED LAPILLI TUFF; MAFIC CHLORITIC FRAGMENTS; SUBANGULAR; FELSIC FRAGMENTS; COARSE TUFF - MEDIUM LAPILLI, GENERALLY SUBROUNDED	1560
		HEAVILY IRON OXIDE STAINED FROM 67.3 TO 89.7 FEET; MAFIC FRAGMENTS ALTERED TO CHLORITE AND WEAK CLAYS FRACTURE ZONE FROM 69.0 TO 70.8 FEET	1555
		FRACTURE ZONE FROM 71.5 TO 72.3 FEET	

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

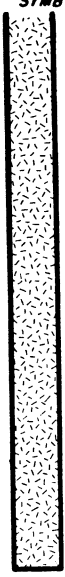
LOG OF BORING DMI-3
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-74.1

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH K.S.F. P.S.F.	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %								
75													— 1650
80							100	57					— 1645
85							100	90					— 1640
90							100	70					— 1635
95							100	100					— 1630
100							100	90					— 1625
105													

BORING DMI - 3 CONTINUED



FRACTURE ZONE FROM 76.3 TO 76.7 FEET — 1650

FRACTURE ZONE FROM 79.3 TO 82.3 FEET — 1645

FRACTURE ZONE FROM 86.5 TO 86.8 FEET — 1640

FRACTURE ZONE FROM 89.3 TO 89.7 FEET — 1635

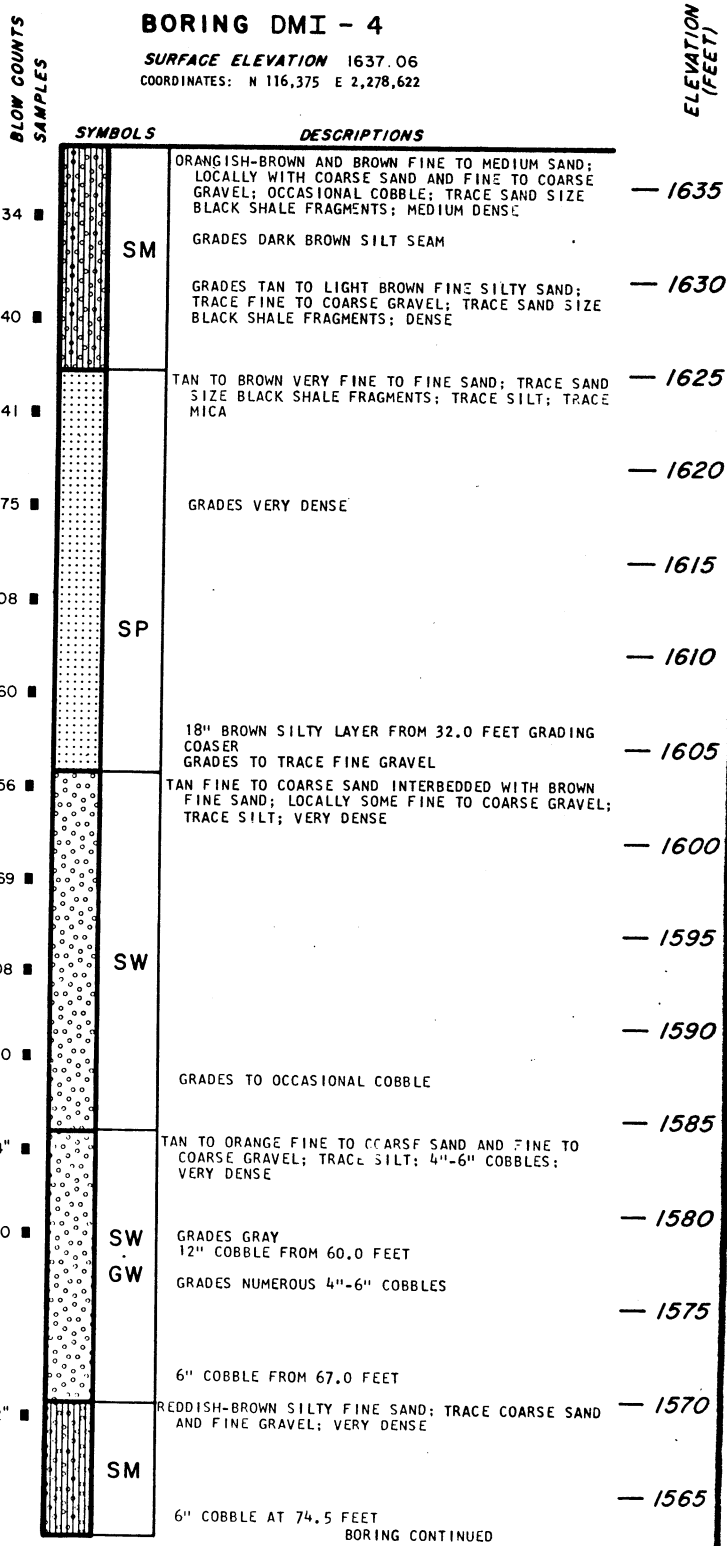
FRACTURE ZONE FROM 97.7 TO 98.0 FEET — 1630

WEAK IRON OXIDE STAINED CHLORITE ALTERED MAFIC FRAGMENTS (ORE PIECES 10 - 14" IN LENGTH) FROM 89.7 TO 105.0 FEET — 1625

BORING COMPLETED AT 105.0 FEET ON 5-24-77.
CASING USED TO A DEPTH OF 67.3 FEET.
GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMI-3 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-74.2

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35					6.9	122			
40									
45									
50					7.6	126			
55									
60					8.4	131			
65									
70					8.9	131			
75									



EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-4
SHEET 1 OF 3

DAMES & MOORE

FIGURE B-75.1

BORING DMI - 4 CONTINUED

ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80							81	50	
85							70	38	
90							16	0	
95							32	20	
100							100	80	
105							91	77	
110							100	87	
115							100	77	
120							100	54	
125							100	75	
130							100	84	
135									
140							100	64	
145							100	76	
150									

BLOW COUNTS SAMPLES

100/3"

SYMBOLS



CH

DESCRIPTIONS

PRECAMBRIAN SYSTEM
RED CLAY; SOME SILT AND FINE TO COARSE SAND; HARD — 1560

GRADES WITH HIGHLY WEATHERED SAPROLITE FRAGMENTS AT 79.5 FEET

INTERMEDIATE ASH TUFF; RED; STRONG IRON OXIDE STAINING; HIGHLY WEATHERED - LOCALLY CLAYEY FRACTURE ZONES EVERY 6"-12" — 1555

VERY HIGH CLAY CONTENT - ROCK BADLY BRCKEN AND WASHED AWAY — 1550

— 1545

— 1540

BASE OF HIGHLY OR INTENSE WEATHERIN AT 98.0 FEET

YELLOWISH-GRAY; FINE GRAINED; MODERATE SURFACE WEATHERING; SLIGHTLY FRACTURED EVERY 12"-18" — 1535

HIGHLY WEATHERED FRACTURE CLAY LINED ZONE FROM 102.5 TO 103.5 FEET; STRONG IRON OXIDE STAINING — 1535

5° CLAY LINED FRACTURE AT 107.5 FEET — 1530

WEATHERED AND FRACTURED IRON OXIDE STAINED ZONE FROM 108.1 TO 108.4 FEET

YELLOW CLAY FILLED FRACTURE ZONE FROM 110.4 TO 110.0 FEET

SOME NEAR VERTICAL FRACTURES FROM 111.0 TO 112.5 FEET — 1525

HIGHLY WEATHERED, FRACTURED AND IRON OXIDE STAINED 112.2 TO 113.0 FEET

SLIGHTLY FRACTURED FROM 115.0 TO 116.0 FEET NEAR HORIZONTAL EVERY 6"-10"

IRON OXIDE STAINED FRACTURE ZONE FROM 117.6 TO 118.3 FEET — 1520

GRADES GRAY; MEDIUM TO COARSE GRAINED FROM 118.3 FEET; SLIGHT TO MODERATE SURFACE WEATHERING

OCCASIONAL IRON OXIDE STAINED VUG FROM 119.0 TO 120.0 FEET

HIGHLY FRACTURED ZONE FROM 120.3 TO 121.3 FEET AND 122.0 TO 122.5 FEET; WITH IRON OXIDE STAINING

NEAR VERTICAL FRACTURES FROM 124.0 TO 125.0 FEET

SLIGHTLY OPEN FRACTURE FROM 125.0 TO 131.0 FEET

SOME CLOSED FRACTURES; MODERATE IRON OXIDE STAINING FROM 126.4 TO 126.8 FEET; 127.2 TO 127.4 FEET AND 131.5 TO 131.7 FEET — 1510

VERTICAL FRACTURE FROM 130.8 TO 131.3 FEET

YELLOW, CLAY LINED FRACTURE ZONE FROM 131.8 TO 132.1 FEET — 1505

MODERATELY FRACTURED EVERY 2"-4"; MODERATE IRON OXIDE STAIN FROM 134.4 TO 136.0 FEET

CLAY AND SILT LINED FRACTURE ZONE FROM 138.2 TO 138.5 FEET — 1500

VERTICAL FRACTURE FROM 139.0 TO 140.0 FEET — 1495

MODERATELY WEATHERED AND FRACTURED ZONE FROM 146.3 TO 147.5 FEET; MODERATE IRON OXIDE STAIN; SOME CLAY FILLING

FINE TO MEDIUM GRAINED FROM 149.0 FEET; SLIGHTLY FRACTURED WITH 45° - 60° FRACTURE EVERY 8"-12"; LOCALLY MODERATE IRON OXIDE STAINING; OCCASIONAL VUGS, PINPOINT TO 1/2" — 1490

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-4
SHEET 2 OF 3

DAMES & MOORE

FIGURE B-752

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD	BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %								
150								100	100			IRON OXIDE STAINING GRADES OUT	— 1485
155												GRADES OCCASIONAL QUARTZ FILLED FRACTURE 1/8"	— 1480
160								100	92				— 1475
165												MODERATELY WEATHFRED; SLIGHTLY TO MODERATELY FRACTURE WITH 20°-75° FRACTURES EVERY 4"-8" WITH IRON OXIDE STAINING	— 1470
170								100	97			3" WEAK FRACTURE ZONE AT 169.0 FEET UNFRACTURED, HIGHLY COMPETENT AT 169.3 FEET BASE OF MODERATE SURFACE WEATHERING AT 171.0 FEET 75° IRON OXIDE STAINED FRACTURE AT 173.7 FEET	— 1465
175													— 1460
180								100	100				— 1455
185												OCCASIONAL STAINED, TIGHT FRACTURE OR VUG FILLING AT 182.0 FEET 60° IRON OXIDE STAINED FRACTURE AT 184.3 FEET	— 1450
190								100	92			NEAR VERTICAL IRON OXIDE STAINED TIGHT AND OPEN FRACTURES FROM 187.2 TO 189.8 FEET	— 1445
195												WEAK FRACTURE ZONE FROM 192.7 TO 193.4 FEET WEAK FRACTURE ZONE FROM 195.5 TO 196.0 FEET; SOME RED CLAY FILLING	— 1440
200								100	92			3" WEAK FRACTURE ZONE AT 198.5 FEET; SOME GRAY CLAY FILLING	— 1435
205												BORING COMPLETED AT 200.5 FEET ON 6-8-77. CASING USED TO A DEPTH OF 79.0 FEET. GROUND WATER LEVEL RECORDED AT 51.4 FEET ON 6-8-77 (2 HOURS UPON COMPLETION).	

EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMI-4
SHEET 3 OF 3

DAMES & MOORE

FIGURE B-75.3

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH TENSILE PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									

BORING DMI - 5

SURFACE ELEVATION 1641.24
 COORDINATES: N 116,392 E 2,278,474

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
ML	BROWN SILT; TRACE FINE SAND; MEDIUM STIFF 12" COBBLE FROM 1.0 FOOT	1640
SP	ORANGISH-BROWN TO BROWN FINE TO MEDIUM SAND; LOCALLY WITH COARSE SAND AND FINE TO COARSE GRAVEL; MEDIUM DENSE 6"-24" (COBBLE AND BOULDERS) STRATA FROM 5.0 TO 11.5 FEET	1635
	BROWN FINE TO COARSE SAND; LOCALLY WITH FINE TO COARSE GRAVEL AND COBBLES; TRACE SILT; DENSE	1630
		1625
		1620
		1615
	12" COBBLE FROM 27.3 FEET	1610
	COBBLES AT 29.0 FEET GRADES WITH INTERBEDDED BROWN FINE TO MEDIUM SAND	1605
SW GW		1600
	CONTINUOUS 3"-4" COBBLES FROM 39.0 TO 42.0 FEET	1595
	COARSE GRAVEL AND COBBLES GRADE OUT FROM 42.0 TO 44.0 FEET	1590
		1585

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-5
SHEET 1 OF 2

DAMES & MOORE

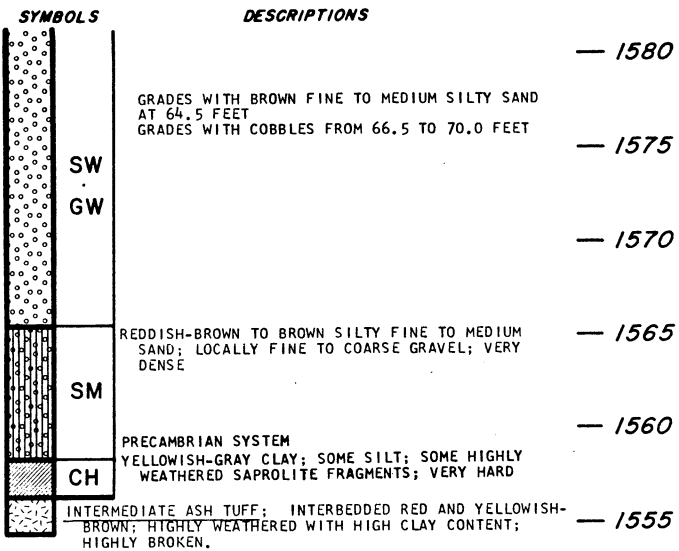
FIGURE B-76.1

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N T/N PSF	ATTERBERG LIMITS			FIELD CONTENT		PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF		
60									
65									
70							10	0	
75							0	0	
80							10	0	
85							68	23	
90									

BLOW COUNTS
SAMPLES

BORING DMI - 5 CONTINUED

ELEVATION
(FEET)



BORING COMPLETED AT 87.0 FEET ON 6-27-77.
CASING USED TO A DEPTH OF 69.0 FEET.
GROUND WATER LEVEL NOT RECORDED.

EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT	
LOG OF BORING DMI-5 SHEET 2 OF 2	
DAMES & MOORE	FIGURE B-76.2

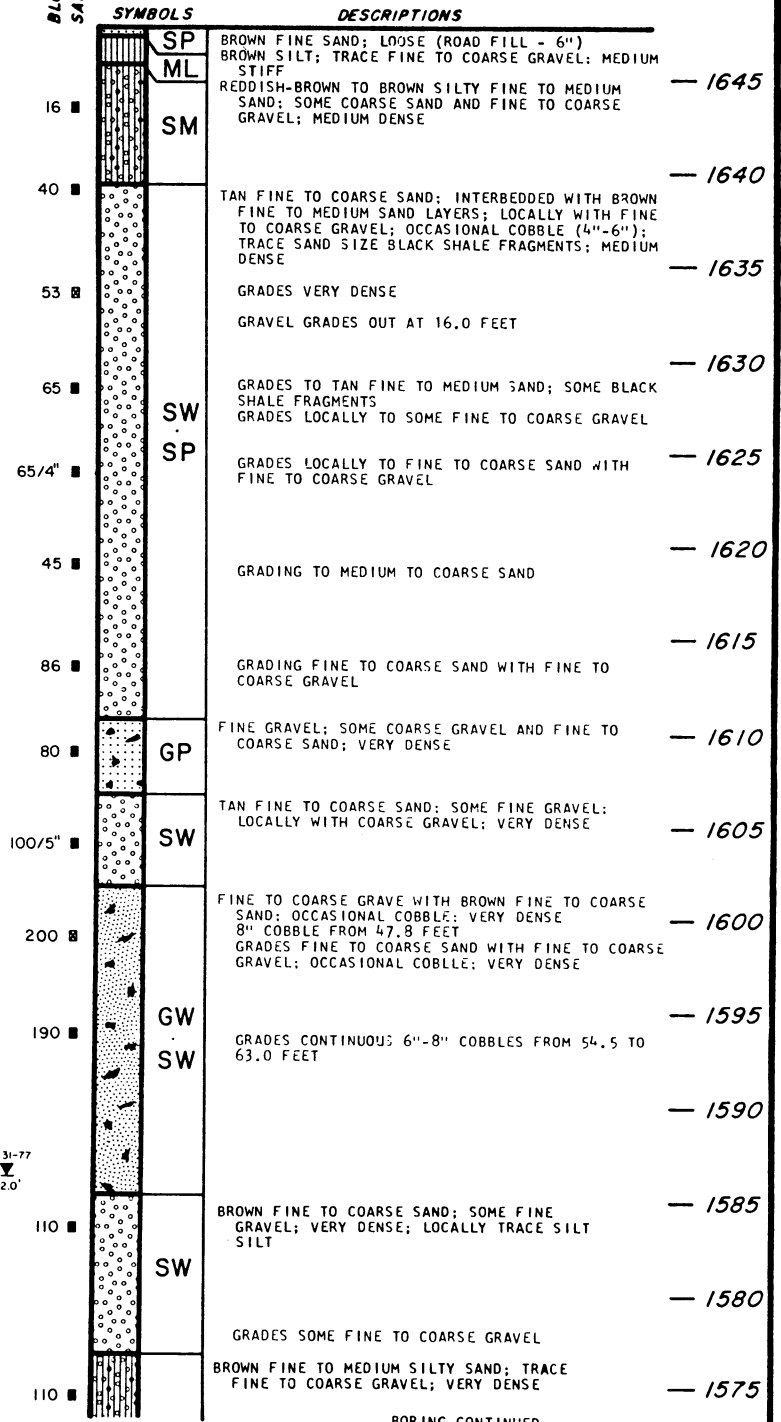
DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35									
40									
45									
50									
55									
60									
65					8.1	122			
70									
75									

BORING DMI - 7

SURFACE ELEVATION 1647.69
 COORDINATES: N 116,413 E 2,278,275

BLOW COUNTS
 SAMPLES

ELEVATION
 (FEET)



5-31-77
 62.0'

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMI-7
 SHEET 1 OF 4

DAMES & MOORE

FIGURE B-77.1

BORING DMI - 7 CONTINUED

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY pcf	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX				
75									
80									
85					6.9				
90									
95							93	38	
100							100	72	
105							64	52	
110							100	92	
115							100	100	
120									
125							100	100	
130							100	80	
135									
140							100	100	
145									
150							100	100	

BLOW COUNTS
SAMPLES

SYMBOLS



DESCRIPTIONS

ELEVATION
(FEET)

GRADES LOCALLY WITH COARSE GRAVEL — 1570

GRADES REDDISH-BROWN SAND; TRACE RED CLAY AND SILT; SOME FINE TO COARSE GRAVEL — 1565

GRAVEL GRADES OUT — 1560

PRECAMBRIAN SYSTEM
RED CLAY; WITH HIGHLY WEATHERED SAPROLITE;
SOME GREENISH-CLAY SILT POCKETS; VERY HARD — 1555

INTERMEDIATE LAPILLI TUFF; SUBANGULAR MAFIC FRAGMENTS
(20%); MEDIUM GRAINED TUFF MATRIX (80%). — 1550

— 1545

FAULT ZONE FROM 106.2 TO 110.0 FEET — 1540

VERY WEAK FRACTURED ZONE FROM 114.0 TO 115.0 FEET — 1535

— 1530

WEAK FRACTURE ZONE FROM 122.3 TO 123.2 FEET — 1525

WEAK FRACTURE ZONE FROM 125.2 TO 126.8 FEET — 1520

NUMEROUS FILLED FRACTURES, 1/16" THICK FROM
128.5 TO 132.0 FEET AND 1/8" TO 1" THICK FROM
134.0 TO 136.5 FEET — 1515

INTERMEDIATE ASH TUFF; COARSE GRAINED; UNIFORM
TEXTURE; OCCASIONAL CHLORITIC FRAGMENTS — 1510

— 1505

— 1500

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-7
SHEET 2 OF 4

DAMES & MOORE

FIGURE B-772

DEPTH
(FEET)

225
230
235
240
245
250
255

OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
						100	100	
						100	100	
						100	100	
						100	100	
						100	100	

BLOW COUNTS
SAMPLES

BORING DMI - 7 CONTINUED

ELEVATION
(FEET)

SYMBOLS

DESCRIPTIONS



— 1420
— 1415
— 1410
— 1405
— 1400
— 1395

OCCASIONAL FILLED FRACTURE, < 1/16" THICK FROM 233.0 TO 236.0 FEET

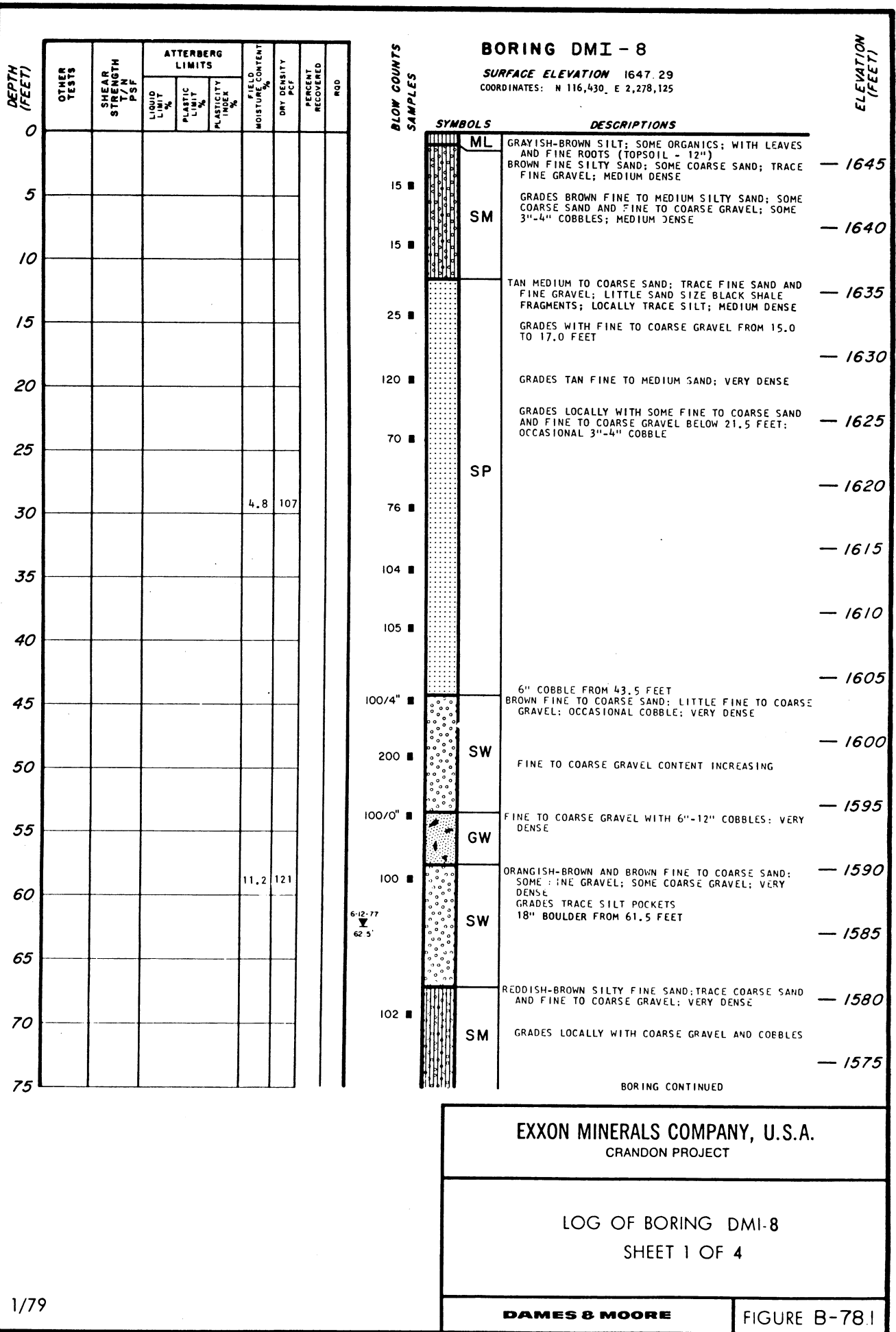
FELSIC - INTERMEDIATE LAPILLI TUFF; MAFIC CHLORITIC ANGULAR FRAGMENTS (30%); COARSE FELSIC ASH (70%)

OCCASIONAL FILLED FRACTURE, < 1/16" THICK FROM 241.0 TO 250.2 FEET

STRONG FRACTURE ZONE FROM 250.2 TO 252.8 FEET

BORING COMPLETED AT 252.8 FEET ON 5-29-77.
CASING USED TO A DEPTH OF 95.0 FEET.
GROUND WATER LEVEL RECORDED AT 62.0 FEET ON 5-31-77.

<p>EXXON MINERALS COMPANY, U.S.A. CRANDON PROJECT</p>	
<p>LOG OF BORING DMI-7 SHEET 4 OF 4</p>	
<p>DAMES & MOORE</p>	<p>FIGURE B-77.4</p>



BORING DMI - 8 CONTINUED

DEPTH
(FEET)

ELEVATION
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRAIN 1/N PSF	ATTERBERG LIMITS			FL. CL. CONTENT MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80									
85									
90									
95									
100							60	0	
105							66	34	
110							44	10	
115							100	76	
120							37	18	
125									
130							90	90	
135							100	17	
140							57	9	
145							100	87	
150							100	60	

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

200/7" ■

SM

120 ■

GRADES ORANGISH-BROWN

— 1570

GRADES WITH INTERBEDDED GREENISH-GRAY RESIDUAL SILT LAYERS AND ROCK FRAGMENTS

— 1565

GRADES REDDISH-BROWN

— 1560

— 1555

— 1550

PRECAMBRIAN SYSTEM
SAPROLITE; HIGHLY WEATHERED; APPEARS TO BE INTERMEDIATE
LAPILLI TUFF

INTERMEDIATE LAPILLI TUFF; RED; STRONG IRON OXIDE STAINING; MODERATE TO HIGH SURFACE WEATHERING; HIGHLY FRACTURED FROM 98.5 TO 111.0 FEET; WITH CLAY LINED FRACTURES; LOCALLY HIGH CLAY CONTENT MODERATELY FRACTURED; COMPETENT FRACTURE FROM 101.0 TO 102.7 FEET

— 1545

— 1540

BASE OF HIGH WEATHERING AT 111.5 FEET
GRADES YELLOWISH-GRAY TO GRAY; FINE TO MEDIUM GRAINED; SLIGHT SURFACE WEATHERING; SLIGHTLY FRACTURED

— 1535

FRACTURE ZONE FROM 113.8 TO 114.4 FEET; SOME CLAY FILLING; MODERATE IRON OXIDE STAINING
LOCALLY MODERATE TO HIGHLY FRACTURED FROM 116.2 FEET

— 1530

— 1525

SLIGHTLY WEATHERED; SLIGHTLY FRACTURED FROM 125.0 FEET

— 1520

RED; HIGHLY WEATHERED; LOCALLY VERY CLAYEY; HIGHLY FRACTURED FROM 129.4 TO 139.7 FEET

— 1515

— 1510

GRADES GRAY; MEDIUM GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED

75° OPEN FRACTURE AT 141.0 FEET
MODERATELY FRACTURED; MODERATE IRON OXIDE STAINING FROM 142.0 TO 143.0 FEET; SOME CLAY FILLING. 1/8"

— 1505

WEAK FRACTURE ZONE FROM 145.5 TO 146.3 FEET; STRONG IRON OXIDE STAINING; TRACE QUARTZ FILLING
70° VERTICAL CLOSED FRACTURES FROM 146.3 TO 148.0 FEET

— 1500

VERTICAL FRACTURES. 1/8"; MODERATE IRON OXIDE STAINING FROM 148.0 FEET; MODERATELY WEATHERED; SOME CLAY FILLING

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-8
SHEET 2 OF 4

DAMES & MOORE

FIGURE B-78.2

BORING DMI - 8 CONTINUED

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	RQD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
150							100	60	
155							100	100	
160							100	80	
165							74	28	
170							100	76	
175							100	92	
180							94	54	
185							100	34	
190							100	52	
195							58	0	
200							60	33	
205							92	92	
210							100	70	
215							100	54	
220							75	34	
225									

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS

ELEVATION
(FEET)

	SLIGHTLY WEATHERED BEDDING PLANE; FRACTURED FROM 150.0 TO 155.0 FEET MODERATELY TO HIGHLY WEATHERED FROM 155.0 TO 159.8 FEET VERTICAL BEDDING PLANE FRACTURES; OPEN AND CLOSED; LOCALLY CLAYEY FROM 158.8 TO 159.8 FEET	— 1495
	TRACE YELLOW STAINING ALONG INFREQUENT FRACTURES FROM 161.0 FEET SLIGHTLY WEATHERED FROM 162.5 FEET; WEAK IRON OXIDE STAINING ALONG WEAK VERTICAL FRACTURE ZONES	— 1485
	MODERATELY FRACTURED; MUCH BREAKAGE ALONG WEAK VERTICAL BEDDING PLANES WITH STRONG IRON OXIDE STAINING	— 1480
	MODERATE TO COARSE GRAINED AT 170.0 FEET ROCK BREAKING WEAKLY ALONG BEDDING PLANES; SOME MICRO-FRACTURES BEGINNING TO APPEAR, ABOUT 5/FOOT FROM 170.0 TO 180.3 FEET MOTTLED GRAY AND WHITISH-GRAY FROM 174.2 FEET; SLIGHTLY WEATHERED	— 1475
		— 1470
	RED; STRONG IRON OXIDE CONTENT; MODERATELY TO HIGHLY WEATHERED; HIGHLY FRACTURED AND WEATHERED ZONES EVERY 6"-18"; OCCASIONAL QUARTZ FILLING; LOCALLY CLAYEY; MICROFRACTURES, 10-20/FOOT FROM 180.3 TO 211.5 FEET	— 1465
		— 1460
	FAULT ZONE FROM 193.3 TO 197.4 FEET	— 1455
	2" QUARTZ INCLUSION FROM 195.0 FEET	— 1450
		— 1445
	2" QUARTZ INCLUSION FROM 201.0 FEET	— 1445
		— 1440
	MOTTLED RED AND GRAY FROM 211.5 TO 230.0 FEET; MODERATELY WEATHERED; MODERATELY FRACTURED ALONG VERTICAL BEDDING PLANES; MODERATE IRON OXIDE STAINING; SEVERAL MICROFRACTURES PER FOOT	— 1435
		— 1430
	WEAK HIGHLY FRACTURED ZONE FROM 217.4 TO 218.7 FEET; SOME CLAY CONTENT	— 1430
	4"-6" WEAK HIGHLY FRACTURED ZONES EVERY 1'-2'	— 1425

BORING CONTINUED

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-8
SHEET 3 OF 4

DAMES & MOORE

FIGURE B-783

BORING DMI - 8 CONTINUED

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	RQD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
225							100	55	
230							100	0	
235							100	94	
240							100	80	
245							88	64	
250							100	96	
255							100	88	
260							100	41	
265							100	87	
							100	65	

BLOW COUNTS
SAMPLES

SYMBOLS



DESCRIPTIONS

HIGHLY FRACTURED ZONE FROM 228.0 TO 230.0 FEET

GRAY; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED FROM 230.0 TO 240.0 FEET; SOME BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES
MODERATE IRON OXIDE STAINING FROM 233.5 TO 236.3 FEET

MOTTLED RED AND GRAY FROM 240.0 TO 251.5 FEET; LOCALLY SLIGHT TO MODERATE IRON OXIDE STAINING; SLIGHTLY TO MODERATELY WEATHERED; MODERATELY FRACTURED, SOME LIMONITE STAINING IN FRACTURES; SOME BREAKAGE ALONG WEAK BEDDING PLANES

COARSE GRAINED FROM 251.5 TO 255.0 FEET; SLIGHTLY FRACTURED, 60°-75° OPEN FRACTURES EVERY 6"-8"

FINE GRAINED FROM 255.0 FEET; SLIGHTLY WEATHERED; MODERATE TO HIGH BREAKAGE ALONG HIGH ANGLE BEDDING PLANES
GRAY CLAY FILLED FRACTURE, 1/16" AT 257.5 FEET

GRAY CLAY FILLED FRACTURE, 1/2" AT 260.5 FEET

BORING COMPLETED AT 264.0 FEET ON 6-12-77.
CASING USED TO A DEPTH OF 98.0 FEET.
GROUND WATER LEVEL RECORDED AT 62.5 FEET UPON COMPLETION.

— 1420

— 1415

— 1410

— 1405

— 1400

— 1395

— 1390

— 1385

ELEVATION
(FEET)

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-8
SHEET 4 OF 4

DAMES & MOORE

FIGURE B-78.4

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH P.S.F.	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5									
10									
15									
20									
25									
30									
35		3600/2500 4400/4500			13.6	115			
40									
45					7.5	127			
50									
55									
60							100	93	
65									
70							100	77	
75									

BORING DMI - 9

SURFACE ELEVATION 1633.82
 COORDINATES: N 116,909 E 2,278.903

ELEVATION
(FEET)

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
7	ML	BROWN SILT WITH ROOTS; MEDIUM STIFF (MODIFIED LOESS)	
	SW SP	COARSE GRAVEL WITH 6"-24" COBBLES AND GOULDERS WITH INTERBEDDED REDDISH-BROWN FINE SILTY SAND; MEDIUM DENSE	1630
10		ORANGISH-BROWN MEDIUM SAND; SOME BROWN FINE TO COARSE SAND; SOME BLACK SHALE FRAGMENTS; LOOSE	1625
27	SP	GRADES TAN; MEDIUM DENSE	1620
82		TAN FINE TO COARSE SAND; LOCALLY SOME FINE TO COARSE GRAVEL; VERY DENSE OCCASIONAL 3"-4" COBBLE	1615
60/3"			1610
60	SW	GRADES WITH OCCASIONAL LAYERS OF FINE SAND	1605
100/2"			1600
96	SP	BROWN FINE TO MEDIUM SAND; TRACE COARSE SAND AND FINE GRAVEL TRACE SILT; VERY DENSE	1595
6'-25-77 41.0'		6" COBBLE FROM 41.0 FEET	
200		FINE TO COARSE GRAVEL WITH FINE TO COARSE SAND WITH COBBLES; TRACE SILT VERY DENSE	1590
		8" COBBLE FROM 44.5 FEET	
200/5"	GW SW	GRADES TRACE YELLOWISH-GRAY AND RED CLAY	1585
200/4"			1580
	CH	PRECAMBRIAN SYSTEM MOTTLED YELLOWISH-GRAY AND RED CLAY; SOME SILT; WITH HIGHLY WEATHERED SAPROLITE FRAGMENTS; VERY HARD	1575
		FELSIC ASH TUFF; GREENISH-GRAY; LOCALLY WITH BROWN MOTTLING; FINE GRAINED; SLIGHTLY TO MODERATELY WEATHERED; SLIGHTLY FRACTURED. SOME BREAKAGE ALONG WEAK NEAR VERTICAL BEDDING PLANES 3" WEAK FRACTURE ZONE FROM 61.1 FEET	1570
		STRONG IRON OXIDE STAINED, WEAK FRACTURE ZONE FROM 65.2 TO 65.9 FEET GRADES GRAY; MEDIUM GRAINED FROM 65.9 FEET; LOCALLY MODERATE IRON OXIDE STAINING	1570
		FELSIC - INTERMEDIATE LAPILLI TUFF; CHLORITIC MAFIC FRAGMENTS (30 - 40"); GENERALLY SUBANGULAR; FELSIC LAPILLI TUFF (60 - 70") NEAR VERTICAL FRACTURE FROM 70.0 TO 71.0 FEET; SOME CLAY FILLING OCCASIONAL CLAY FILLED HORIZONTAL FRACTURE EVERY 2"-6" FROM 71.7 TO 73.0 FEET SLIGHTLY WEATHERED, UNFRACTURED FROM 73.9 FEET	1565
			1560

EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMI-9
SHEET 1 OF 2

DAMES & MOORE

FIGURE B-79.1

DEPTH
(FEET)

75

80

85

90

95

100

105

OTHER TESTS	SHEAR STRENGTH T/N PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	ROD
		LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
						100	100	
						100	100	
						100	97	
						100	100	

BLOW COUNTS
SAMPLES

BORING DMI - 9 CONTINUED

ELEVATION
(FEET)

SYMBOLS

DESCRIPTIONS



80° OPEN FRACTURE FROM 80.0 FEET
DARK GRAY; MEDIUM TO COARSE GRAINED FROM 81.0 FEET — 1555

0° OPEN FRACTURE FROM 83.6 FEET — 1550

70° OPEN FRACTURE FROM 87.7 FEET
0° OPEN FRACTURE FROM 88.2 FEET
WEAK BEDDING PLANE BREAK, NEAR VERTICAL FROM 90.2 TO 90.8 FEET — 1545

45° OPEN, IRON OXIDE STAINED FRACTURE FROM 91.2 FEET
80° OPEN FRACTURE FROM 91.5 FEET

60° OPEN FRACTURE FROM 94.0 FEET — 1540

NEAR VERTICAL FRACTURE FROM 97.2 TO 97.7 FEET

45° OPEN, IRON OXIDE STAINED FRACTURE FROM 99.7 FEET — 1535

— 1530

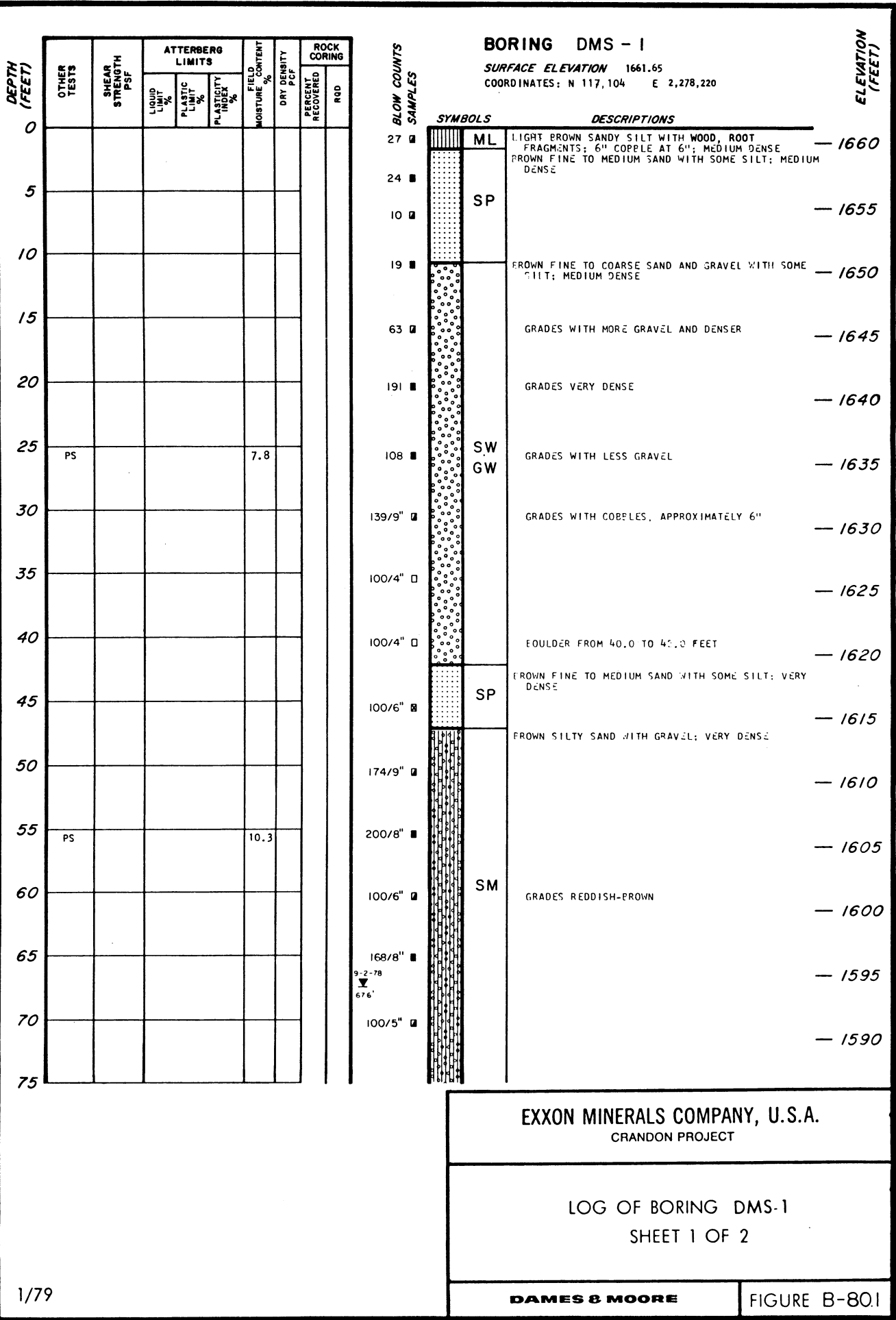
BORING COMPLETED AT 104.0 FEET ON 6-24-77.
GROUND WATER LEVEL RECORDED AT 41.0 FEET ON 6-25-77.

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

LOG OF BORING DMI-9
SHEET 2 OF 2

DAMES & MOORE

FIGURE B-79.2



BORING DMS - 1

SURFACE ELEVATION 1661.65
 COORDINATES: N 117,104 E 2,278,220

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	ROCK CORING	
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %			PERCENT RECOVERED	ROD
0									
5									
10									
15									
25	PS				7.8				
30									
35									
40									
45									
50									
55	PS				10.3				
60									
65									
70									
75									

BLOW COUNTS SAMPLES	SYMBOLS	DESCRIPTIONS	ELEVATION (FEET)
27	ML	LIGHT BROWN SANDY SILT WITH WOOD, ROOT FRAGMENTS; 6" COPPLE AT 6"; MEDIUM DENSE	1660
24		BROWN FINE TO MEDIUM SAND WITH SOME SILT; MEDIUM DENSE	
10	SP		1655
19		BROWN FINE TO COARSE SAND AND GRAVEL WITH SOME SILT; MEDIUM DENSE	1650
63		GRADES WITH MORE GRAVEL AND DENSER	1645
191		GRADES VERY DENSE	1640
108	SW GW	GRADES WITH LESS GRAVEL	1635
139/9"		GRADES WITH COBBLES, APPROXIMATELY 6"	1630
100/4"			1625
100/4"		EOULDER FROM 40.0 TO 45.0 FEET	1620
100/6"	SP	BROWN FINE TO MEDIUM SAND WITH SOME SILT; VERY DENSE	1615
174/9"		BROWN SILTY SAND WITH GRAVEL; VERY DENSE	1610
200/8"			1605
100/6"	SM	GRADES REDDISH-BROWN	1600
168/8"			1595
100/5"			1590

9-2-78
 67.6'

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMS-1
 SHEET 1 OF 2

DAMES & MOORE

FIGURE B-80.1

BORING DMS - I CONT'D

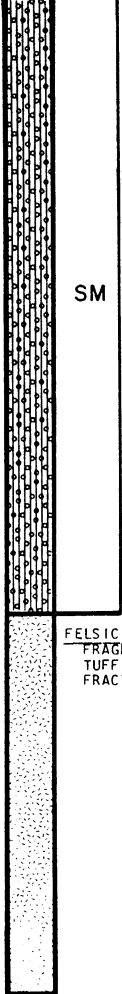
DEPTH
(FEET)

ELEVATION
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT		ROCK CORING	
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF	PERCENT RECOVERED	RQD
75	PS					10.3	136		
80									
85									
90									
95									
100									
105									
110								60	30
115									
120									
125								67	50
130									

BLOW COUNTS
SAMPLES

SYMBOLS



DESCRIPTIONS

BOULDER FROM 77.0 TO 79.5 FEET — 1585

— 1580

— 1575

— 1570

— 1565

— 1560

— 1555

FELSIC - INTERMEDIATED LAPILLI TUFF; MAFIC CHLORITIC FRAGMENTS; SUBANGULAR; FELTIC FRAGMENTS; COARSE TUFF - MEDIUM LAPILLI, GENERALLY SUBROUNDED; FRACTURES THROUGHOUT; HIGHLY TO MODERATELY WEATHERED — 1550

— 1545

— 1540

— 1535

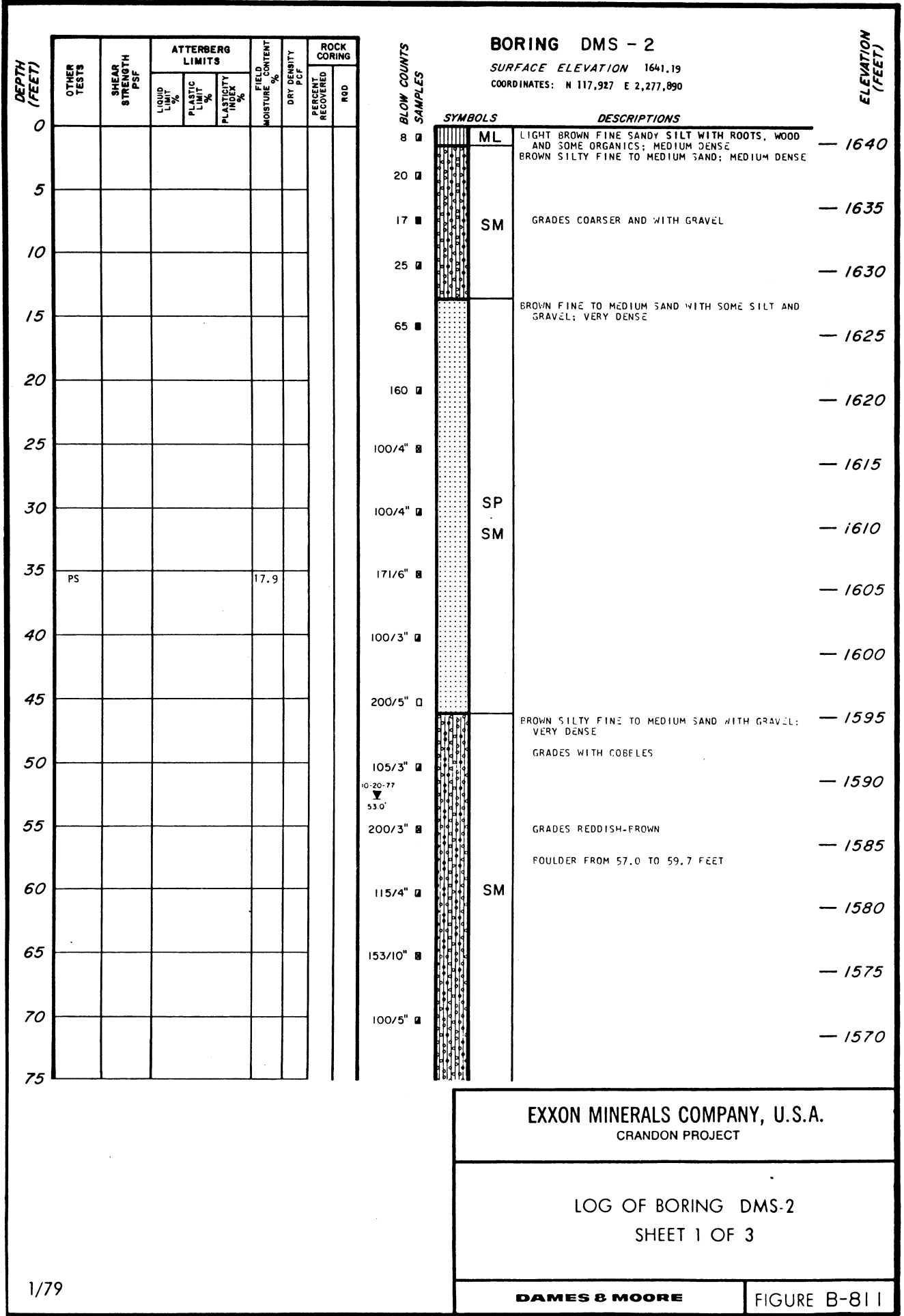
BORING COMPLETED AT 128.0 FEET ON 9-16-77.
 PIEZOMETER INSTALLED ON 9-19-77.
 2 INCH PVC SLOTTED FROM 95.0 TO 105.0 FEET.
 SAND: 50.0 TO 105.0 FEET.
 GROUT: 0.0 TO 50.0 FEET.
 GROUND WATER LEVEL RECORDED AT 67.6 FEET ON 9-2-78.
 NOTE: HIGH CORE LOSSES DUE TO CORE BLOCKAGE IN BARREL DURING CORING.

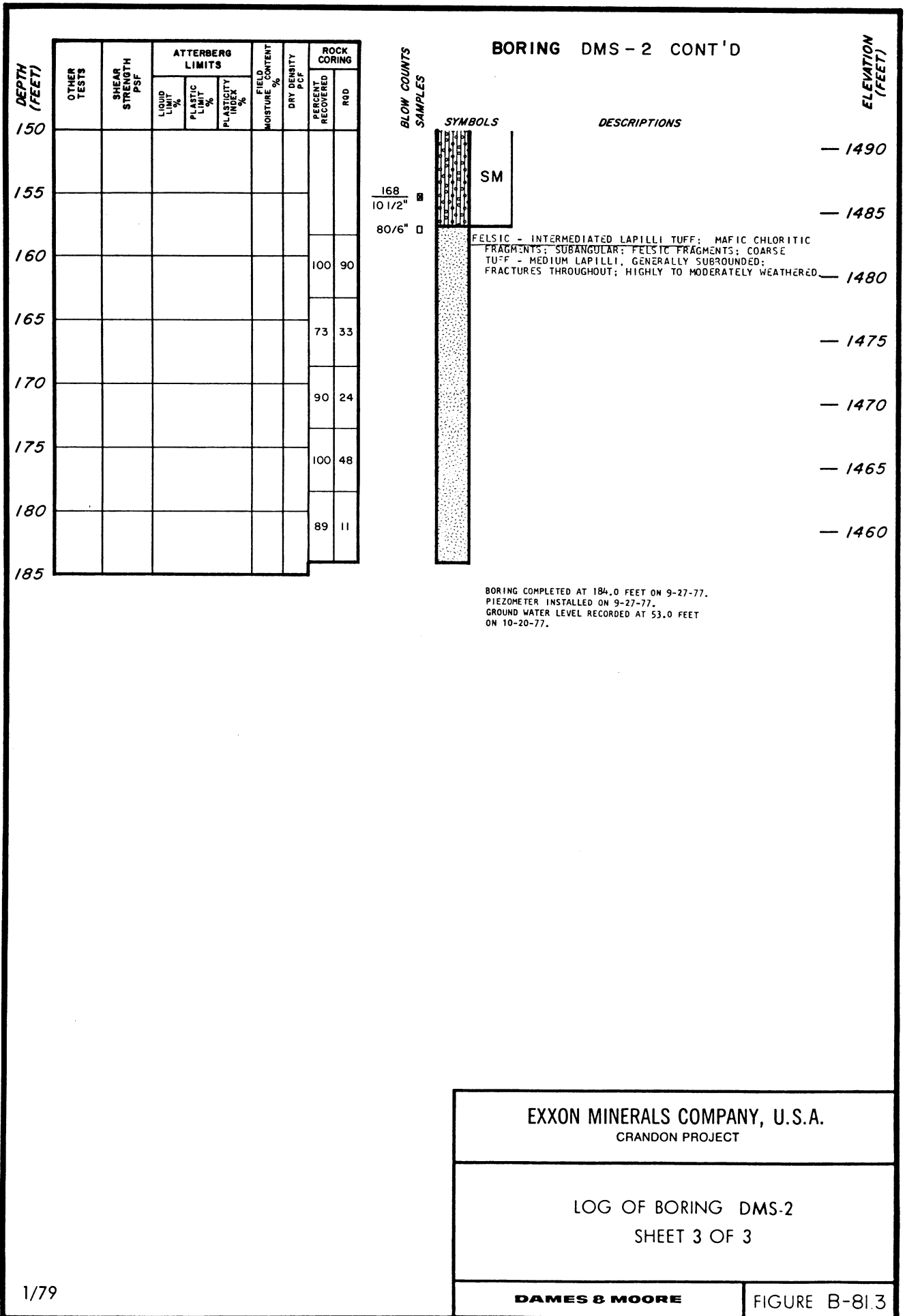
EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMS-1
 SHEET 2 OF 2

DAMES & MOORE

FIGURE B-80.2

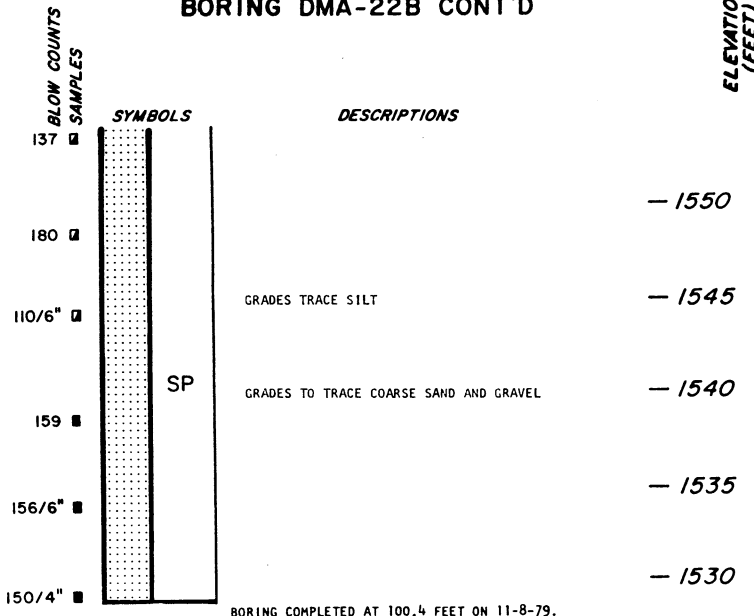




BORING DMA-22B CONT'D

ELEVATION (FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
75									
80									
85									
90	K SA				14.3	116			
95									
100									
105									



BORING COMPLETED AT 100.4 FEET ON 11-8-79.
 CASING USED TO A DEPTH OF 10.0 FEET.
 PIEZOMETER INSTALLED ON 11-8-79.
 2 INCH PVC SLOTTED FROM 90.0 TO 100.0 FEET.
 GRAVEL PACK: 78.8 TO 100.4 FEET.
 SAND: 76.5 TO 78.8 FEET.
 BENTONITE: 73.5 TO 76.5 FEET.
 GROUT: 0.0 TO 73.5 FEET.
 GROUND WATER LEVEL RECORDED AT 25.2 FEET ON 1-9-80.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMA-22B
 SHEET 2 OF 2

DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT		DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %				
0										
5										
10										
15										
20										
25										
30										
35										
40	SA					13.4	108			
45										
50										

BORING DMC-1

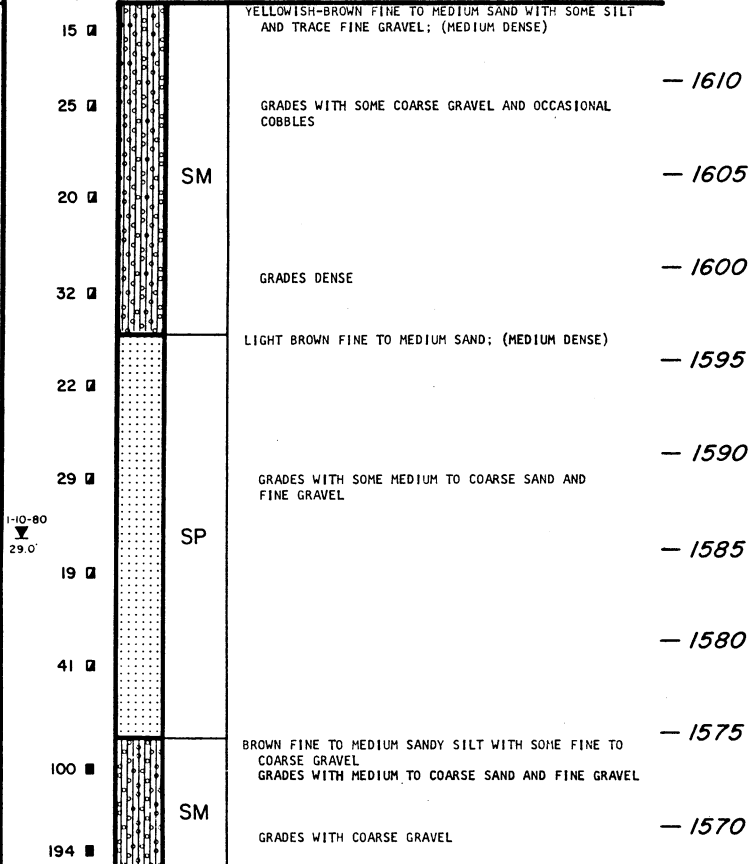
SURFACE ELEVATION 1614.34
 COORDINATES: N 115,120 E 2,292,330

ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

SYMBOLS

DESCRIPTIONS



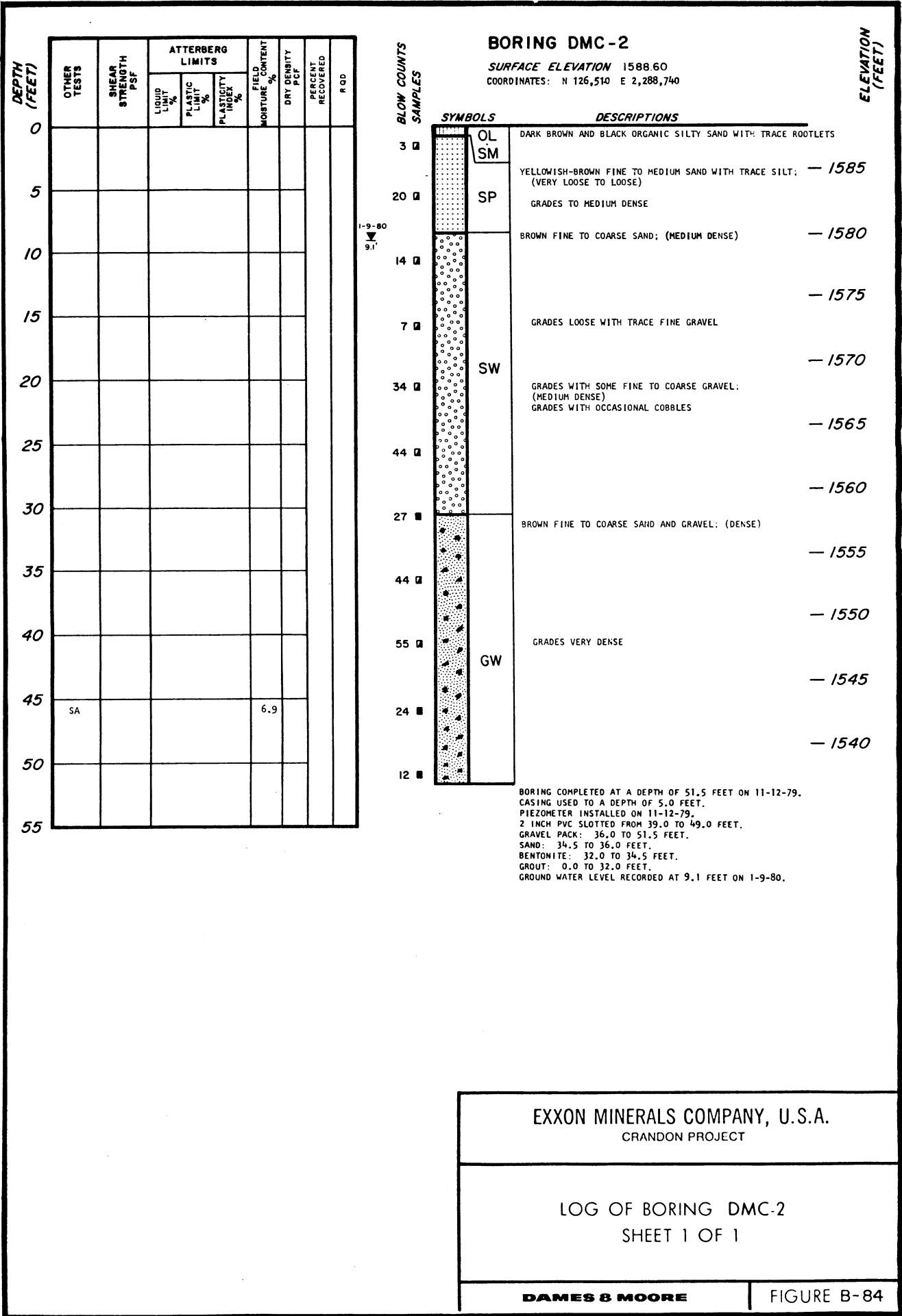
BORING COMPLETED AT A DEPTH OF 47.5 FEET ON 11-13-79.
 CASING USED TO A DEPTH OF 5.0 FEET.
 PIEZOMETER INSTALLED ON 11-13-79.
 2 INCH PVC SLOTTED FROM 37.0 TO 47.0 FEET.
 SAND: 34.0 TO 47.5 FEET.
 BENTONITE: 28.0 TO 34.0 FEET.
 GROUT: 0.0 TO 28.0 FEET.
 GROUND WATER LEVEL RECORDED AT 29.0 FEET ON 1-10-80.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMC-1
 SHEET 1 OF 1

DAMES & MOORE

FIGURE B-83



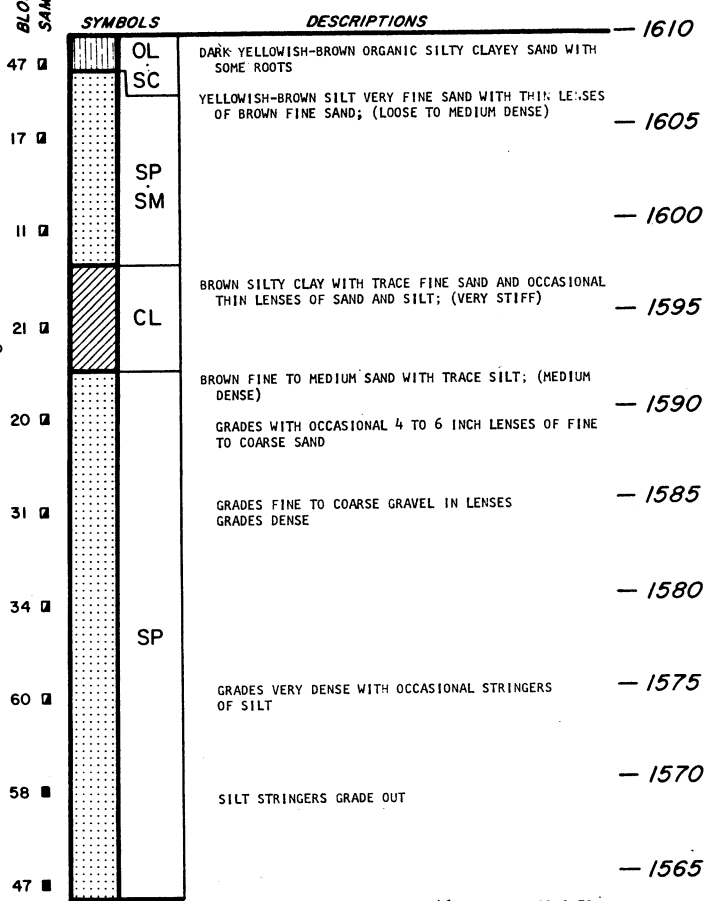
DEPTH
(FEET)

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD CONTENT		PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	MOISTURE %	DRY DENSITY PCF		
0									
5									
10									
15									
20									
25									
30									
35									
40	K SA					15.6	115		
45									
50									

BORING DMC-3

SURFACE ELEVATION 1610.02
 COORDINATES: N 106,940 E 2,291,715

ELEVATION
(FEET)



1-9-80
 18.2'

BORING COMPLETED AT A DEPTH OF 46.5 FEET ON 11-9-79.
 CASING USED TO A DEPTH OF 10.0 FEET.
 PIEZOMETER INSTALLED ON 11-9-79.
 2 INCH PVC SLOTTED FROM 35.0 TO 45.0 FEET.
 GRAVEL PACK: 29.0 TO 46.5 FEET.
 SAND: 26.5 TO 29.0 FEET.
 BENTONITE: 23.0 TO 26.5 FEET.
 GROUT: 0.0 TO 23.0 FEET.
 GROUND WATER LEVEL RECORDED AT 18.2 FEET ON 1-9-80.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMC-3
 SHEET 1 OF 1

DAMES & MOORE FIGURE B-85

ELEVATION (FEET)

BORING DMP-1

SURFACE ELEVATION 1647.62
 COORDINATES: N 116,675- E 2,278,480

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R.O.D.
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	SA, HA				14.5				
10									
15									
20									
25	SA				5.1				
30									
35									
40	SA				10.6				
45									
50	SA				11.1				
55									
60									
65	SA, HA				16.9				
70									
75									

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

10	SC	DARK YELLOWISH-BROWN CLAYEY FINE TO MEDIUM SAND, TRACE FINE GRAVEL, OCCASIONAL SILT AND FINE SAND STRINGERS; (MEDIUM DENSE)	- 1645
100/4"		GRADES VERY DENSE	
95		YELLOWISH-BROWN FINE TO MEDIUM SAND WITH SOME MULTI-COLORED COARSE SAND AND TRACE FINE TO COARSE GRAVEL; (VERY DENSE) GRADES OCCASIONAL BOULDERS	- 1640
36/0"		BOULDER AT 15.0 TO 16.0 FEET	- 1635
60/0"		BOULDER AT 19.0 FEET	- 1630
159		GRADES TO FINE TO COARSE SAND AND GRAVEL TRACE SILT	- 1625
200			- 1620
200			- 1615
127/7"	SP		- 1610
245		YELLOW SILTY SAND WITH LAYER OF ROCK FRAGMENTS	- 1605
50/0"			- 1600
120/4"			- 1595
150/4"			- 1590
186/9"			- 1585
130/3"		GRADES WITH OCCASIONAL LAYERS OF SILTY CLAY (WEATHERED ROCK)	- 1580
200/3"		GRADES ALL WEATHERED ROCK FRAGMENTS	- 1580

1-10-80
 58.3'

BORING COMPLETED AT A DEPTH OF 70.7 FEET ON 10-30-79.
 SURFACE CASING USED TO A DEPTH OF 7.5 FEET.
 PIEZOMETER INSTALLED ON 10-30-79.
 2 INCH PVC SLOTTED FROM 63.7 TO 70.7 FEET.
 GRAVEL PACK: 60.0 TO 70.7 FEET.
 BENTONITE: 57.0 TO 60.0 FEET.
 GROUT: 0.0 TO 57.0 FEET.
 GROUND WATER LEVEL RECORDED AT 58.3 FEET ON 1-10-80.

EXXON MINERALS COMPANY, U.S.A.
 CRANDON PROJECT

LOG OF BORING DMP-1
 SHEET 1 OF 1

DEPTH
(FEET)

0
5
10
15
20
25
30
35
40

DEPTH (FEET)	OTHER TESTS	SHEAR STRENGTH PSF	ATTERBERG LIMITS			FIELD MOISTURE CONTENT %	DRY DENSITY PCF	PERCENT RECOVERED	R O D
			LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %				
0									
5	SA, HA				9.1				
10									
15									
20	SA, HA				9.3				
25									
30	SA				8.1				
35									
40									

BORING DMP-2

SURFACE ELEVATION 1595.58
COORDINATES: N 115,135 E 2,278,685

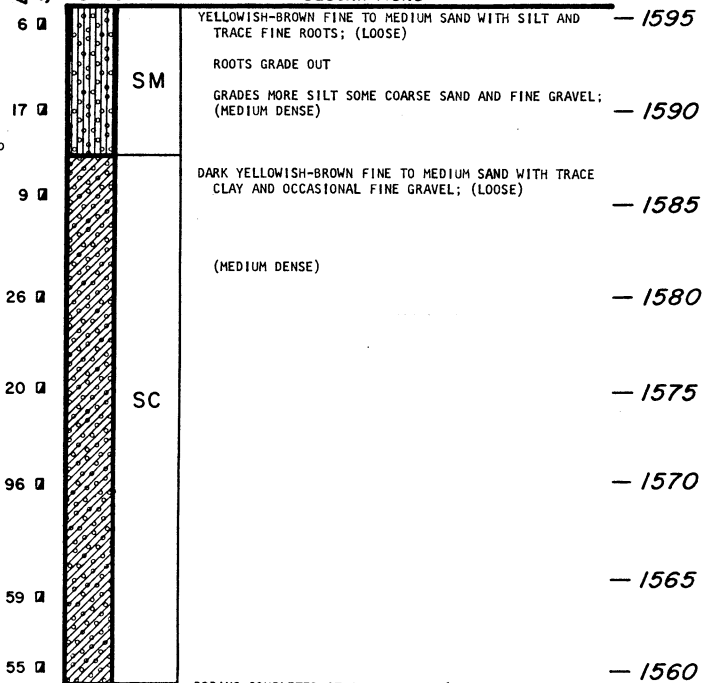
ELEVATION
(FEET)

BLOW COUNTS
SAMPLES

1-10-80
8.9'

SYMBOLS

DESCRIPTIONS



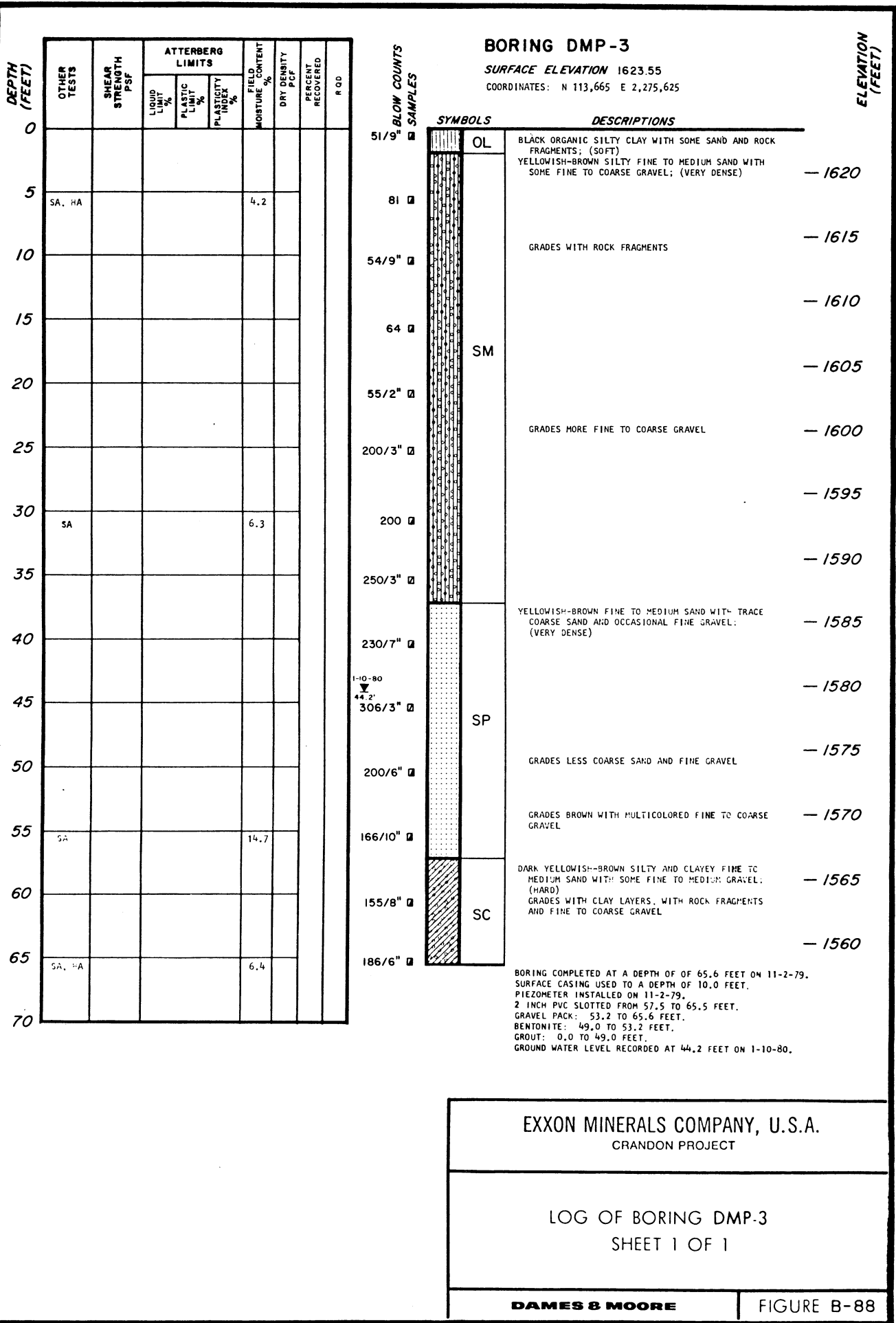
BORING COMPLETED AT A DEPTH OF 36.5 FEET ON 10-31-79.
SURFACE CASING USED TO A DEPTH OF 10.0 FEET.
PIEZOMETER INSTALLED ON 10-31-79.
2 INCH PVC SLOTTED FROM 30.6 TO 35.6 FEET.
GRAVEL PACK: 28.5 TO 36.5 FEET.
BENTONITE: 27.5 TO 28.5 FEET.
GROUT: 0.0 TO 27.5 FEET.
GROUND WATER LEVEL RECORDED AT 8.9 FEET ON 1-10-80.

EXXON MINERALS COMPANY, U.S.A.
GRANDON PROJECT

LOG OF BORING DMP-2
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-87



MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

UNIFIED SOIL CLASSIFICATION SYSTEM

DAMES & MOORE

FIGURE B-89

BORING LOGS
GOLDER ASSOCIATES

<u>Test Pit Logs</u>	<u>Number of Sheets</u>
TP-1	1
TP-2	1
TP-3	1
TP-4	1
TP-5	1
TP-6	1
TP-7	1
TP-8	1
TP-9	1
TP-10	1
TP-11	1
TP-12	1
TP-13	1
TP-14	1
TP-15	1
TP-16	1
TP-17	1
TP-18	1
TP-19	1
TP-20	1
TP-21	1
TP-22	1
TP-TW-41	1

GOLDER ASSOCIATES

(continued)

<u>G40 Series Boring Logs</u>	<u>Number of Sheets</u>
G40-D24	6
G40-E16	2
G40-E22	2
G40-G19	2
G40-G24	3
G40-G26	3
G40-H13	6
G40-H16	9
G40-H27	8
G40-J15	2
G40-J20	3
G40-K13	2
G40-L19	4
Gro-L23	3
G40-M14	3
G40-M15	10
G40-P10	3
G40-P17	3
G40-P20	3
G40-Q7	3
G40-R23	3
G40-S11	3

G41 Series Boring Logs

G41-A24	6
G41-C11	3
G41-C13	2
G41-C15	7
G41-C15A	1
G41-C15B	2
G41-D14	2
G41-D17	2
G41-D18	3
G41-E11	2
G41-E13	8
G41-E13A	3
G41-E15	2
G41-E17	9
G41-E19	2
G41-E19A	9
G41-F13	2
G41-F24	8
G41-G11	3
G41-G12	1
G41-G13	11
G41-G14	4
G41-G14A	6

GOLDER ASSOCIATES

(continued)

<u>G41 Series Boring Logs</u>	<u>Number of Sheets</u>
G41-G14B	5
G41-G14C	2
G41-G14D	2
G41-G14E	2
G41-G14F	3
G41-G15	10
G41-G15A	5
G41-G15B	2
G41-G15C	2
G41-G15C	3
G41-G16	3
G41-G19	3
G41-G21	4
G41-H9	10
G41-H13	4
G41-H17	3
G41-H18	3
G41-H18A	1
G41-H18B	10
G41-J11	3
G41-J14	3
G41-J17	2
G41-J17A	1
G41-J18	3
G41-J19	3
G41-K13	6
G41-K13A	5
G41-K13B	2
G41-K17	3
G41-K21	3
G41-K21A	9
G41-K26	10
G41-L11	3
G41-L13	3
G41-L15	3
G41-L19	3
G41-L23	3
G41-L25	3
G41-M11	5
G41-M15	9
G41-M24	1
G41-N21	5
G41-P16	6
G41-P18	5
G41-P18B	3
G41-P24	11
G41-Q22	10

GOLDER ASSOCIATES

(continued)

<u>Supplemental Logs</u>	<u>Number of Sheets</u>
G40-G7	3
G40-L9	4
G40-P10A	4
G40-S17	5
G40-S17A	2
G40-T30	6
G40-X1	5
G40-X1A	3
G40-Y15	6
G40-Y15A	1
G40-Y21	1
G40-Y22	7
G40-Y26	4
G41-A23	2
G41-B12	4
G41-C15C	1
G41-C32	9
G41-E22	7
G41-E22A	2

LIST OF ABBREVIATIONS

The abbreviations and terms commonly employed on each boring log and test pit log are as follows:

SAMPLE TYPES

AH	Air hammer
AS	Auger sample
CS	Chunk sample
DO	Drive Open
DS	Denison sample
PS	Pitcher sample
RX	Rock core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

<u>Relative Density of Cohesionless Soils</u>	<u>Standard Penetration Resistance N (blows/ft.)</u>
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

Standard Penetration Resistance, "N" = the number of blows required to drive a 2 in. O.D. split spoon sampler one foot using a 140 lb. hammer falling 30 in.

<u>Consistency of Cohesive Soils</u>	<u>Cohesion Cu (psf)</u>
Very Soft	less than 250
Soft	250 to 500
Firm	500 to 1,000
Stiff	1,000 to 2,000
Very Stiff	2,000 to 4,000
Hard	over 4,000

APPROX: N110900 ft. (N33802m)
 COOR. E2285500 ft. (E696620m)
 1680 ft.

SHEET 1 OF 1

TEST PIT LOG TP-1

SURFACE ELEV. Approx. (512.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SITE

DATUM USGS MSL DATE STARTED 11/15/79 DATE COMPLETED 11/16/79

EQUIPMENT John Deere 690 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.305	Topsoil and rootmat	PT	Seep at 3.0' (0.91m)
1.0	Red-brown, fine to coarse SAND, trace to some fine to coarse gravel, trace to some silt, trace clay, occasional cobbles and boulders Thin discontinuous clean fine to coarse sand layers at 3.0'	SM	
1.83			
6.0	Brown, fine to coarse SAND, trace fine gravel, trace silt	SP to SP-SM	Seep at 7.0' (2.13m) Sand cone density at 7.0' (2.13m) $\gamma_d = 138.3$ pcf (2216 kg/m ³) $w\% = 7.2$
2.13			
7.0	Red-brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt, trace clay, occasional cobbles and boulders	SM	
3.09			
10.0	Brown, fine to coarse SAND, trace to some fine to coarse gravel	SP	
4.88			

16.0 END OF PIT

Job No. 786085
 Scale 1"=2.5'

Golder Associates

Drawn jls
 Checked MRB

APPROX. N116000 ft. (N35356m)

COORD. E2285600 ft. (E696650m)

TEST PIT LOG TP-2

SHEET 1 OF 1

SURFACE ELEV. Approx. 1715 ft. (522.73m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SITE

DATUM USGS MSL

DATE STARTED 11/16/79

DATE COMPLETED 11/16/79

EQUIPMENT John Deere 690 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.305	Topsoil and rootmat	PT	
1.0	Brown, fine to coarse SAND, trace fine to coarse gravel, trace silt, occasional cobbles and boulders	SP to SP-SM	
2.13	-----		
7.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles and boulders	SM	Seep at 7.0' (2.13m) Sand cone density at 8.5' (2.59m) $\gamma_d = 122.4$ pcf (1961 kg/m ³) $w\% = 14.6$
4.57			
15.0	END OF PIT		

Job No. 786085
Scale 1"=2.5'

Golder Associates

Drawn jls
Checked MRB

APPROX. N113700 ft. (N34655m)
 COOR. E2275800 ft. (E693663m)
 1620 ft. **TEST PIT LOG TP-4** SHEET 1 OF 1
 SURFACE ELEV. Approx. (493.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 11/29/79 DATE COMPLETED 11/29/79
 EQUIPMENT John Deere 690 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.305	Black rootmat	PT	Light seep at 2.0'-3.5' (0.61m to 1.07m)
1.0 .610	Dark brown, fine to coarse SAND, some silt, trace clay, trace organics	SM	
2.0 1.07	Dark brown to black, organic SILT, some clay, some fine sand	OL	
3.5	Brown, fine to coarse SAND, some silt to SILT, some clay, trace fine sand, occasional cobbles Pockets of each material appear randomly interlayered with each other	SM to ML	Sand cone density at 5.5' (1.68m) $\gamma_d=114.6$ (1836 kg/m ³) $w\%=14.1$

3.66
12.0
END OF PIT

APPROX. N. 112600 ft. (N34320m)
 COOR. E2273700 ft. (E693023m)

SHEET 1 OF 1

TEST PIT LOG TP-5

SURFACE ELEV. Approx. (519.68m) 1705 ft. PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/29/79 DATE COMPLETED 11/29/79

EQUIPMENT John Deere 690 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.152	Black to dark brown, fibrous rootmat	PT	
0.5	Light brown, fine to coarse SAND, some silt, trace clay	SM	
.610 2.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles and boulders Silt layer, maximum 6" thick at 4.0' Pocket of clean sand, some gravel over part of pit, 5' long, 12" thick at 8.0'	SM	

Sand cone density at 6.0' (1.83m)
 $\gamma_d = 110.4$ pcf (1769 kg/m³)
 $w\% = 4.8$

3.35
11.0

END OF PIT

Job No. 786085
 Scale 1"=2.5'

Golder Associates

Drawn jls
 Checked MKB

APPROX. N111100 ft. (N33863m)
 COOR. E2270100 ft. (E691926m) **TEST PIT LOG TP-6** SHEET 1 OF 1
 SURFACE ELEV. ^{1625 ft.} Approx. (495.3m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 11/30/79 DATE COMPLETED 11/30/79
 EQUIPMENT John Deere 690 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
0.152	Black, rootmat and topsoil	PT	
0.5	Brown, fine to coarse SAND, some silt, trace fine gravel to Brown, silty, fine to coarse SAND, gray and orange silt layers at 5.0'	SM	
1.52			Sand cone density at 5.0'(1.52m) $\gamma_d = 118.2$ pcf (1894 kg/m ³) $w\% = 7.9$
5.0	Light brown to red-brown, fine to coarse SAND, trace to some fine gravel, trace silt. Pocket of cobbles in part of the pit from 6.5' to 8.0' Pocket of medium to coarse sand over part of the pit from 8.5' to 10.0'	SP to SP-SM	
3.96			

13.0 END OF PIT

APPROX. N115980 ft. (N35351m) SHEET 1 OF 1
 COOR. E2285270 ft. (E696550m) **TEST PIT LOG** TP-7
 SURFACE ELEV. *Approx. 710 ft. (521.21m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/12/81 DATE COMPLETED 3/12/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.15 0.5	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
.46 1.5	Brown, silty, fine to coarse SAND, some fine to coarse gravel	SM	
1.22 4.0	Brown, fine to coarse SAND, some silt, trace clay, occasional cobbles	SP-SM to SM	
3.05 10.0	Brown to red-brown, fine to coarse SAND, some silt, trace clay, trace fine to coarse gravel, occasional cobbles and boulders	SM	
	END OF PIT *Estimated from topographic map		Slow seep at 4.0' (1.22m) SA-1, 7.5'-8.5' (2.29m-2.59m): % finer than #200 sieve=20.3% (By field sieve analysis)

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N116100 ft. (N35387m)
 COOR. I2285570 ft. (E696642m)
 1709 ft.

TEST PIT LOG TP-8

SHEET 1 OF 1

SURFACE ELEV. *Approx. (520.90m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/12/81 DATE COMPLETED 3/12/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30 1.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel	SM	
3.66 12.0	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	Moderate seep at 8.0' (2.44m) SA-1, 9.0'-10.0' (2.74m-3.05m): % finer than #200 sieve=17.4% SA-2, 11.0'-12.0' (3.35m-3.66m): % finer than #200 sieve=17.1% (Both results by field sieve analyses)
	END OF PIT *Estimated from elevation of adjacent boring G41-J11		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N115960 ft. (N35345m) SHEET 1 OF 1
 COOR. E2284920 ft. (E696444m) **TEST PIT LOG** TP-9
 SURFACE ELEV. *Approx. (520.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/12/81 DATE COMPLETED 3/12/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
1.07	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace organics, occasional cobbles and boulders	SM	
3.5	Cobbles and fine to coarse gravel	GP	Heavy seep starting at 4.0' (1.22m) forced abandonment of test pit
5.0	<p style="text-align: center;">END OF PIT</p> <p>*Estimated from topographic map</p>		

APPROX. N116080 ft. (N35381m)
 COOR. E2284160 ft. (E696212m) **TEST PIT LOG** TP-10 SHEET 1 OF 1
 SURFACE ELEV. *Approx. (516.64m) 1695 ft. PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/13/81 DATE COMPLETED 3/13/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.61 2.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
3.05 10.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	
	END OF PIT *Estimated from topographic map		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N115720 ft. (N35271m)
 COOR. E2283900 ft. (E696133m)

TEST PIT LOG TP-11

SHEET 1 OF 1

SURFACE ELEV. *Approx. (512.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/81 DATE COMPLETED 3/13/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.61 2.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
3.66 12.0	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
	<p style="text-align: center;">END OF PIT</p> <p>*Estimated from topographic map</p>		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N115820 ft. (N35302m)

COORD. E2283800 ft. (E696102m)

TEST PIT LOG TP-12

SHEET 1 OF 1

SURFACE ELEV. *Approx. (516.64m)

1695 ft.

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 3/13/81

DATE COMPLETED 3/13/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30	Brown, silty, fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
1.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
2.59	END OF PIT *Estimated from topographic map		
8.5			

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked *dlw*

APPROX. N115320 ft. (N35120m)
 COOR. E2283920 ft. (E696139m)
 1674 ft.

TEST PIT LOG TP-13

SHEET 1 OF 1

SURFACE ELEV. *Approx. (510.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/81 DATE COMPLETED 3/13/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30 1.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
1.52 5.0	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	
3.05 10.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	
	END OF PIT *Estimated from topographic map		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N114480 ft. (N34894m)

COORD. E2283040 ft. (E695871m)

TEST PIT LOG TP-14

SHEET 1 OF 1

SURFACE ELEV. *Approx. ^{1635 ft.}(498.35m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/13/81 DATE COMPLETED 3/13/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
			Topsoil previously removed in this area
	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
			Slight seep at 8.0' (2.44m)
2.74			
9.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders with pockets of brown fine to coarse SAND, some silt	SM with SP-SM	
3.05			
10.0			
	END OF PIT *Estimated from topographic map		

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked [Signature]

APPROX. N114860 ft. (N35009m)

COORD. E2282840 ft. (E695810m)

TEST PIT LOG TP-15

SHEET 1 OF 1

SURFACE ELEV. *Approx. (500.79m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 3/13/81

DATE COMPLETED 3/13/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
1.52 5.0	Brown, silty fine to coarse SAND, some fine to coarse gravel, trace organics	SM	
3.05 10.0	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	
	END OF PIT *Estimated from topographic map		

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked [Signature]

APPROX. N115920 ft. (N35332m)
 COOR. E2284090 ft. (E696191m) **TEST PIT LOG** TP-16 SHEET 1 OF 1
 1683 ft.
 SURFACE ELEV. *Approx. (512.38m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/13/81 DATE COMPLETED 3/13/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
2.44 8.0	END OF PIT *Estimated from topographic map		

APPROX. N113860 ft. (N34705m) SHEET 1 OF 1
 COOR. E2282880 ft. (E695822m) **TEST PIT LOG** TP-17
 SURFACE ELEV. *Approx. (497.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/14/81 DATE COMPLETED 3/14/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30	Black PEAT	OL	
1.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
.91 3.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
3.05 10.0	END OF PIT *Estimated from topographic map		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn MRB
 Checked [Signature]

APPROX. N113400 ft. (N34564m)
 COOR. E2282860 ft. (E695816m) **TEST PIT LOG** TP-18 SHEET 1 OF 1
 SURFACE ELEV. *Approx. (502.01m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/14/81 DATE COMPLETED 3/14/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30 1.0	Brown, silty fine to coarse SAND, some fine to coarse gravel, trace organics	SM	
3.05 10.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles and boulders	SM	
	END OF PIT *Estimated from topographic map and elevation of adjacent boring G41-E15		

APPROX. N112460 ft. (N34278m)

COOR. E2283060 ft. (E695877m)

TEST PIT LOG TP-19

SHEET 1 OF 1

SURFACE ELEV. *Approx. (507.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/81 DATE COMPLETED 3/14/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.91 3.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
1.52 5.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles and boulders	SM	Slight seep at 4.0' (1.22m)
2.13 7.0	Red-brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP-SM	
	<p style="text-align: center;">END OF PIT</p> <p>*Estimated from topographic map and elevation of adjacent boring G41-E17</p>		

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked [Signature]

APPROX. N112200 ft. (N34199m)

COORD. E2285500 ft. (E696620m)

TEST PIT LOG TP-20

SHEET 1 OF 1

1685 ft.

SURFACE ELEV. *Approx. (519.59m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/81 DATE COMPLETED 3/14/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.30 1.0	Brown, silty fine to coarse SAND, some fine to coarse gravel, trace organics	SM	
	Red-brown, fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles and boulders	SM	
2.74 9.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles and boulders with pockets of brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP with SP-SM	
3.66 12.0	END OF PIT *Estimated from topographic map and elevation of adjacent boring G41-J17		

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked [Signature]

APPROX. N109240 ft. (N33296m)

COORD. E2288320 ft. (E697480m)

TEST PIT LOG TP-21

SHEET 1 OF 1

SURFACE ELEV. *Approx. (526.39m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 3/14/81

DATE COMPLETED 3/14/81

EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
0.30 1.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
3.35 11.0	Brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders with occasional pockets of brown, fine to coarse SAND, trace to some silt, trace fine to coarse gravel	SP with SP-SM	
	END OF PIT *Estimated from elevation of adjacent boring G41-N21		

Job No. 786085

Scale 1" = 2.5'

Golder Associates

Drawn MRB

Checked *[Signature]*

APPROX. N107600 ft. (N32796m)
 COOR. E2288700 ft. (E697596m) 1682 ft. **TEST PIT LOG** TP-22 SHEET 1 OF 1
 SURFACE ELEV. *Approx. (512.67m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/14/81 DATE COMPLETED 3/14/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.3 1.0	Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics	SM	
1.83 6.0	Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	
3.35 11.0	Brown, fine to coarse GRAVEL and fine to coarse SAND, trace to some silt, frequent cobbles and boulders	SP-SM to GP-GM	
3.66 12.0	Brown, fine to coarse gravelly, fine to coarse SAND, some silt	SM	
	END OF PIT *Estimated from elevation of adjacent boring G41-P24		

APPROX. N114150 ft. (N34793m)
 COOR. E2284250 ft. (E696239m) 1705 ft.
TEST PIT LOG TP-TW-41 SHEET 1 OF 1
 SURFACE ELEV. *Approx. (519.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 5/23/81 DATE COMPLETED 5/23/81
 EQUIPMENT John Deere 410 Backhoe

DEPTH METER FEET	DESCRIPTION	UNIFIED CLASS.	REMARKS
.46	Dark reddish brown silty, fine to coarse SAND, some fine gravel, trace cobbles	SM	
1.5	Light brown, fine to coarse SAND, some silt, trace to some fine gravel	SM	Bulk Sample from 2.0' to 3.0' (0.61m-0.91m)
1.22 4.0	Brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay, trace cobbles	SM	Bulk Sample from 4.0' to 6.0' (1.22m-1.83m) with cobbles removed
2.44 8.0	Brown and red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace cobbles	SM	
4.88 16.0	END OF PIT *Estimated from topographic map		

Job No. 786085
 Scale 1" = 2.5'

Golder Associates

Drawn JFC
 Checked [Signature]

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 1 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel	SM	-	1	AS	-	-	
				25	2	DO	10-10-15	18/18	
2.29 7.5		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt, occasional cobbles	SP- SM	74	3	DO	7-21-53	18/18	
				143	4	DO	41-102	12/12	
				196	5	DO	63-133	9/12	
				188	6	DO	45-143	11/12	
6.86 22.5		Very dense, brown, silty, fine to coarse SAND, trace fine gravel to fine to coarse SAND, some silt, trace fine to coarse gravel, occasional cobbles	SM	186 9"	7	DO	61-125/3"	6/9	
				155 10"	8	DO	55-100/4"	7/10	
10.97 36.0									

CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRE

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 2 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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)	
10.97 36.0		CONTINUED						
		Very dense, brown, silty, fine to coarse SAND, trace fine gravel to fine to coarse SAND, some silt, trace fine to coarse gravel, occasional cobbles	SM	154 10"	9	DO	54-100/4"	10/10
				167 10"	10	DO	67-100/4"	9/10
14.48 47.5		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP SM	144 11"	11	DO	44-100/5"	9/11
				152	12	DO	52-100	7/12
16.00 52.5		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt Boulder noted at 54.0'-55.4'	SP	181 11"	13	DO	44-81- $\frac{100}{5}$ "	13/17
				154	14	DO	54-100	8/12
21.03 69.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 3 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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.)	
21.03		CONTINUED								
69.0		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP	185 10"	15	DO	38-85- <u>100</u> 4"	15/16		
				166	16	DO	51-115	8/12	▼ 1-7-80 ≈	23.10 75.8
				189 10"	17	DO	67-89- <u>100</u> 4"	14/16		
				152	18	DO	57-95	10/12		
				120	19	DO	42-78	10/12		
				100 5"	20	DO	55-100/5"	10/11		
				159	21	DO	49-110	7/12		
31.39				CONTINUED						
103.0				CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 4 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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.)	
31.39		CONTINUED								
103.0		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP	162	22	DO	37-125	9/12		
						144	11"			
						23	DO	44-100/5"	8/11	
				191	10"	24	DO	91-100/4"	8/10	
41.76										
137.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MRB

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 5 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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.)	
41.76		CONTINUED							
137.0		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP	191 10"	25	DO	91-100/4"	8/10	2" Solid PVC Pipe to Surface
44.20									
145.0									
		Very dense, brown, fine to coarse SAND, trace fine gravel, trace to some silt	SP SM	178 8"	26	DO	78-100/2"	5/8	Grout (to surface)
				164 9"	27	DO	64-100/3"	8/9	Bentonite Clay Seal
51.21								49.07	
168.0		CONTINUED						161.0	
								50.90	
								167.0	
								CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MLB

COOR. N108060 ft. (N32937m)
E2266940 ft. (E690964m)

BORING LOG G40-D24

SHEET 6 OF 6

SURFACE ELEV. 1629.9 ft. (496.80m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/12/79 DATE COMPLETED 12/20/79

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.)
51.21		CONTINUED						CONTINUED	
168.0		Very dense, brown, fine to coarse SAND, trace fine gravel, trace to some silt	SP4 SM	165 9"	28	D0	65-100/3"	9/9	2" Solid PVC Pipe Pea Gravel
53.34				53.04					
175.0		Very dense, brown, fine to medium SAND, some silt (residual material)	SM	150 5"	29	D0	150/5"	3/5	2" Slotted PVC Pipe Pea Gravel
55.93				174.0					
183.5		Gray, metavolcanic TUFF							Pea Gravel
57.45				56.08					
188.5		END OF BORING			30	AX RC	-	13/18	

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24 in. (Samples 2 - 29)
2. Elevation of top of protector pipe, 1632.3 ft. (497.52m).

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

DATE	1/7/80	6/11/80	7/26/80	9/10/80	6/10/81		
DEPTH (m)	23.10	23.16	23.13	23.23	23.32		
DEPTH (ft.)	75.8	76.0	75.9	76.2	76.5		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COORD. N113255 ft. (N34520m)
E2267520 ft. (E691141m)

BORING LOG G40-E16

SHEET 1 OF 2

SURFACE ELEV. 1574.4 ft. (479.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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 6IN. (Note 1)		REC./ATT. (ins.)	
0.15		Topsoil and rootmat								
0.5		Compact to very dense, light brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP SM	11	1	DO	3-5-6	12/18		
						37	2	DO	14-18-19	18/18
						35	3	DO	9-14-21	15/18
						45	4	DO	14-17-28	14/18
				70	5	DO	22-29-41	2/18		
				25	6	DO	9-12-13	12/18		
				21	7	DO	10-12-9	12/18		
10.36										
34.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113255 ft. (N34520m)
E2267520 ft. (E691141m)

BORING LOG G40-E16

SHEET 2 OF 2

SURFACE ELEV. 1574.4 ft. (479.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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		Compact to very dense, light brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP-SM	30	8	DO	12-12-18	14/18		
						54	9	DO	12-22-32	18/18
						35	10	DO	18-18-17	10/18
15.70				185	11	DO	40-85-100	14/18		

51.5 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 JB

COOR. N109650 ft. (N33422m)
E2267465 ft. (E691125m)

BORING LOG G40-E22

SHEET 1 OF 2

SURFACE ELEV. 1594.1 ft. (484.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/9/80 DATE COMPLETED 1/10/80

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		Compact to very dense, brown, fine to coarse SAND, some silt, trace fine gravel to fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	1	AS	-	-			
				23	2	DO	11-10-13	18/18			
				12	3	DO	4-5-7	18/18			
				18	4	DO	5-8-10	18/18			
				24	5	DO	10-12-12	18/18			
				114	6	DO	27-57-57	18/18			
8.38				Very dense, brown to light brown, fine SAND, trace silt to fine to coarse SAND, trace silt	SP SP-SM	88	7	DO	25-38-53	12/18	
27.5						154	8	DO	39-115	7/12	
11.13											
36.5		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked M.C.G.

COOR. N109650 ft. (N33422m)
E2267465 ft. (E691125m)

BORING LOG G40-E22

SHEET 2 OF 2

SURFACE ELEV. 1594.1 ft. (484.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/9/80 DATE COMPLETED 1/10/80

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.)
11.13		CONTINUED							
36.5		Very dense, brown to light brown, fine SAND, trace silt to fine to coarse SAND, trace silt	SP to SP-SM	85	9	D0	28-38-47	16/18	
				115	10	D0	23-44-71	15/18	
15.70				67	11	D0	21-27-40	16/18	

51.5
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 - 11)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COORD. N111340 ft. (N33937m)
E2269350 ft. (E691699m)

BORING LOG G40-G19

SHEET 1 OF 2

SURFACE ELEV. 1649.9 ft. (502.90m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/21/79 DATE COMPLETED 3/21/79

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 SAND, some fine to coarse gravel, some silt, trace clay Boulder at 22.5'-23.5'	SM						
				67	1	DO	54-28-39	10/18	
				102	2	DO	35-79-23	6/18	
				46	3	DO	24-21-25	8/18	
				189	4	DO	58-89-100	12/15	
				179	5	DO	79-100/3"	8/9	
				200	6	DO	200/4"	4/4	
				200	7	DO	200/5"	3/5	
				200	8	DO	200/5"	5/5	
11.28									
37.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N111340 ft. (N33937m)
E2269350 ft. (E691699m)

BORING LOG G40-G19

SHEET 2 OF 2

SURFACE ELEV. 1649.9 ft. (502.90m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/21/79 DATE COMPLETED 3/21/79

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.)
11.28 37.0		CONTINUED							
		Dense to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay		200 5"	9	DO	200/5"	5/5	
				200 4"	10	DO	200/4"	4/4	
			SM	200 3"	11	DO	200/3"	3/3	
				200 4"	12	DO	200/4"	4/4	
				200 4"	13	DO	200/4"	4/4	
19.96				162 6"	14	DO	162/6"	6/6	

65.5
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 ...

COOR. N107830 ft. (N32867m)
E2268850 ft. (E691548m)

BORING LOG G40-G24

SHEET 1 OF 3

SURFACE ELEV. 1658.7 ft. (505.57m) 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 FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1) REC./ATT. (ins.)	
0.0		Compact, brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace organics	SM	-	1	AS	-	-
				21	2	DO	10-12-9	8/18
2.29 7.5				40 7"	3	DO	15-25/1"	7/7
		Very dense, brown to red-brown, fine to coarse SAND, some silt, trace fine gravel to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles and boulders Boulder noted at 10.5'-13.0'	SP- SM to SM to SW- SM	90	4	DO	25-44-46	18/18
				114	5	DO	26-38-76	18/18
				151	6	DO	41-110	12/12
				151	7	DO	43-108	10/12
10.36								
34.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107830 ft. (N32867m)
E2268850 ft. (E691548m)

BORING LOG G40-G24

SHEET 2 OF 3

SURFACE ELEV. 1658.7 ft. (505.57m) 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 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, brown to red-brown, fine to coarse SAND, some silt, trace fine gravel to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles and boulders	SP- SM to SM to SW- SM	130	8	DO	28-54-76	15/18		
						148	9	DO	26-48-100	18/18
						119	10	DO	27-56-63	18/18
				147	11	DO	37-110	12/12		
16.76		Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP	153	12	DO	43-110	10/12		
55.0										
						198	13	DO	39-78-120	10/18
				186	14	DO	33-86- $\frac{100}{4}$	8/16		
				10"						
20.73		CONTINUED								
68.0										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107830 ft. (N32867m)
E2268850 ft. (E691548m)

BORING LOG G40-G24

SHEET 3 OF 3

SURFACE ELEV. 1658.7 ft. (505.57m) 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 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 medium SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP	135 11"	15	DO	35-100/5"	7/11	
				148 11"	16	DO	48-100/5"	3/11	
				147 11"	17	DO	42-105/5"	3/11	
				190 9"	18	DO	90-100/3"	4/9	
				142 10"	19	DO	42-100/4"	6/10	
				143 11"	20	DO	43-100/5"	6/11	
				179 9"	21	DO	75-104/3"	5/9	
30.72									

100.8 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 - 21)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COORD. N106690 ft. (N32518m)
E2268660 ft. (E691490m)

BORING LOG G40-G26

SHEET 1 OF 3

SURFACE ELEV. 1678.7 ft. (511.65m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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.)	
0.0		Compact, brown, silty, fine to coarse SAND to fine to coarse SAND, some silt	SM	-	1	AS	-	-
				17	2	DO	6-10-7	18/18
2.29 7.5		Dense to very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace to some silt, occasional cobbles	SP-SM					
				25	3	DO	10-10-15	18/18
				186	4	DO	39-83-103	18/18
				130	5	DO	32-54-76	8/18
6.86 22.5		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 and boulders	SM					
				171	6	DO	39-71-100	18/18
				172 11"				
				←	7	DO	72-100/5"	10/11
				155 5"				
				←	8	DO	55-100/5"	10/11
10.97 36.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N106690 ft. (N32518m)
E2268660 ft. (E691490m)

BORING LOG G40-G26

SHEET 3 OF 3

SURFACE ELEV. 1678.7 ft. (511.65m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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.)	
21.64 71.0		CONTINUED						
		Very dense, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP-SM					
				146	16	DO	46-100	12/12
				150	17	DO	29-55-95	14/18
25.15 82.5		Very dense, brown, fine to coarse SAND, trace silt, trace fine gravel	SP					
				181 17"	18	DO	44-81-100 5"	17/17
				150 20"	19	DO	50-100/4"	7/10
				189 8"	20	DO	89-100/2"	7/8
30.78 101.0				155	21	DO	55-100	12/12

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- 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 MBB

COORD. N115275 ft. (N35135m)

E2269330 ft. (E691693m)

BORING LOG G40-H13

SHEET 1 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 3/14/79

DATE COMPLETED 3/21/79

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.)				
0.15 0.5		topsoil and roofmat		8	1	DO	1-4-4	12/18			
		Loose to compact, red-brown, fine to medium SAND, trace to some fine gravel, trace silt	SP-SM to SM	16	2	DO	5-8-8	18/18			
2.44 8.0											
		Dense to very dense, red-brown, fine to coarse SAND, trace to some fine to coarse gravel, trace to some silt, occasional cobbles and boulders (layer of fine to medium sand, trace silt at 20.0') Boulders and cobbles noted at 14.0'-15.0' and 24.0'-24.5'	SP-SM to SM	43	3	DO	12-18-25	18/18			
						95	4	DO	20-45-50	18/18	
						85	5	DO	15-25-60	14/18	
				140	6	DO	40-100	4/12			
				225	7	DO	75-150	12/12			
11.28 37.0				180	8	DO	50-130	10/12			
		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ab

COORD. N1. 75 ft. (N35135m)
E22693.0 ft. (E691693m)

BORING LOG G40-H13

SHEET 2 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/21/79

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 6IN. (Note 1)	
11.28		CONTINUED						
37.0		Dense to very dense, red-brown, fine to coarse SAND, trace to some fine to coarse gravel, trace to some silt, occasional cobbles and boulders	SP- SM to SM					
		Boulders and cobbles noted at 49.0'-50.0' and 51.0'-51.5'						
				142	9	DO	50-67-75	18/18
				155	10	DO	55-100	3/12
				205 9"				
				11	DO		55-150/3"	6/9
16.15								
53.0		Very dense, light brown, fine to coarse SAND, trace to some silt, occasional cobbles	SP- SM to SM					
				100 4"	12	DO	35-35- 4"	100 8/10
				172 9"	13	DO	35-72- 3"	100 9/9
				170	14	DO	50-120	6/12
				174	15	DO	44-130	4/12
21.79								
71.5		CONTINUED						

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N115275 ft. (N35135m)
E2269330 ft. (E691693m)

BORING LOG G40-H13

SHEET 3 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/21/79

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.)
21.79		Very dense, light brown, fine to coarse SAND, trace to some silt, occasional cobbles SP-SM to SM		172					
71.5									
22.25				11"	16	DO	72-100/5"	3/10	
73.0									
		Very dense, light brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	200	3"	17	DO	200/3"	0/3
				165	6"	18	DO	165/6"	1/6
				320	10"	19	DO	80-240/4"	3/10
				270	20	DO	70-200	10/12	
				75	2"	21	DO	75/2"	1/2
32.61									
107.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

COORD. N115275 ft. (N35135m)
E2269330 ft. (E691693m)

BORING LOG G40-H13

SHEET 4 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/21/79

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.)	
32.61		CONTINUED								
107.0		Very dense, light brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	175	22	D0	44-70-105	18/18		
						150 3"	23	D0	150/3"	0/3
						230 8"	24	D0	120-110/2"	8/8
42.67		CONTINUED								
140.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked acb

COOR. N115275 ft. (N35135m)
 E2269330 ft. (E691693m)

BORING LOG G40-H13

SHEET 5 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/21/79

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.)	
42.67		CONTINUED							
140.0		Very dense, light brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	320	25	DO	46-120-200	14/18	
				250	26	DO	38-100-150	8/16	
				310	27	DO	160-150/3"	6/9	
52.12		CONTINUED							
171.0									

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked oob

COOR. N115275 ft. (N35135m)

E2269330 ft. (E691693m)

BORING LOG G40-H13

SHEET 6 OF 6

SURFACE ELEV. 1762.2 ft. (537.12m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/21/79

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.)		
52.12		CONTINUED								
171.0		Very dense, light brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, occasional cobbles and boulders	SM	255	7"	28	D0	155-100/1"	4/7	
				200	1"	29	D0	200/1"	0/1	
				250	4"	30	D0	250/4"	3/4	
59.53										

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 1-19, 23 and 24)
- Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 20-22 and 25-30)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 1 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	SAMPLES				GROUNDWATER OBSERVATION WELL	
				BLOWS / FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)		REC./ ATT. (ins.)
0.0		Compact to dense, brown, silty, fine to coarse SAND, trace clay, organic matter throughout	SM	-	1	AS	-	-	
2.13				21	2	DO	6-11-10	18/18	
7.0				14	3	DO	5-7-7	16/18	
		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM		17	DO	11-9-8	12/13	
					26	5	DO	12-13-13	0/18
					30	6	DO	16-14-16	14/18
					116 10'	7	DO	30-86/4"	6/10
8.38									
27.5		Very dense, brown, fine to coarse SAND, trace silt	SP		56	DO	17-21-35	12/18	
9.91									
32.5		Very dense, brown, fine to coarse gravelly fine to coarse SAND to fine to coarse SAND, some fine to medium gravel, trace to some silt, occasional cobbles and boulders	SP- SM to SM	150 9'	9	DO	50-100/3"	9/9	
11.13									
36.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CB

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 2 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

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		Very dense, brown, fine to coarse gravelly fine to coarse SAND to fine to coarse SAND, some fine to medium gravel, trace to some silt, occasional cobbles and boulders	SP-SM to	110					
			SM	4" 10	DO	110/4"	3/4		
13.41		Very dense, light brown, fine to medium SAND, some silt, trace fine gravel, trace clay		121	11	DO	26-49-72	12/18	
44.0				172	6"	12	DO	172/6"	0/6
			SM	158	10"	13	DO	58-100/4"	6/10
17.69		Very dense, brown, silty fine to coarse SAND, some fine to medium gravel to fine to coarse gravelly fine to coarse SAND, some silt		163	10"				
58.0			SM	14	DO	63-100/4"	10/10		
20.57				87	15	DO	30-57	12/12	
67.5		Very dense, brown, fine to medium SAND, trace silt	SP	154	16	DO	55-99	12/12	
21.79									
71.5		CONTINUED							

▼ 4/19/79 17.34
56.9

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CB

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 3 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

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.)	
21.79		Very dense, brown, fine to medium SAND, trace silt	SP	152 10"	17	D0	52-100/4"	8/10		
22.10										
72.5		Very dense, brown to red-brown, fine to coarse SAND, trace fine gravel, trace to some silt	SP SM	167 10"	18	D0	62-105/4"	10/10		
		Very dense, brown to red-brown, fine to coarse SAND, trace silt	SP	144 10"	19	D0	44-100/4"	10/10		
26.67										
87.5										
		Very dense, brown to red-brown, fine to coarse SAND, trace silt	SP	169 9"	20	D0	69-100/3"	9/9		
		Very dense, brown to red-brown, fine to coarse SAND, trace silt	SP	181 10"	21	D0	81-100/4"	10/10		
		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SP	122 6"	22	D0	122/6"	6/6		
32.00										
105.0										
32.61										
107.0		CONTINUED.								CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 6 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

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)	
52.43		CONTINUED						
172.0		Stiff, brown SILT and fine to medium SAND to SILT, some fine to medium sand	SM to ML					
53.34								
175.0		Very dense red-brown, fine to coarse SAND, some fine to medium gravel, some silt, trace clay	SM	115				
				6" 30	DO	115/6"	4/6	
				150	31	DO	40-110	12/12
				130	32	DO	29-101	12/12
59.44		Very dense, red-brown, fine to coarse SAND, some silt, trace to some clay, trace fine to coarse gravel, occasional cobbles and boulders	SM					
195.0								
62.18		CONTINUED						
204.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked OB

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 7 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

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.)	
62.18		CONTINUED								
204.0		Very dense, red-brown, fine to coarse SAND, some silt, trace to some clay, trace fine to coarse gravel, occasional cobbles and boulders	SM	152 10"	33	DO	40-52- $\frac{100}{4}$ "	16/16		
						172 8"	34	DO	72-100/2"	8/8
						142 10"	35	DO	38-42- $\frac{100}{4}$ "	16/16
71.63										
235.0		Very dense, red-brown, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse gravelly fine to coarse SAND and SILT	SP SM to SM							
72.85										
239.0		CONTINUED.								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 8 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

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)	
72.85		CONTINUED		115				
239.0		Very dense, red-brown, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse gravelly fine to coarse SAND and SILT	SP-SM to SM	6	36	DO	115/6"	6/6
				-	37	NX RC	-	90 90
79.86								
262.0		Green-gray, weathered, metavolcanic TUFF		-	-	-	Drill Cuttings	-
81.69								(Note 2)

268.0 END OF BORING

NOTES

1. Penetration test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 2 - 36)
2. Rock core barrel and drilling rod left in borehole at 158.0 ft. (48.16m) to 268.0 ft. (81.69m). Borehole caved to 158.0'.

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCO

COOR. N113260 ft. (N34522m)
E2269110 ft. (E691626m)

BORING LOG G40-H16

SHEET 9 OF 9

SURFACE ELEV. 1617.1 ft. (492.88m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/14/79 DATE COMPLETED 3/28/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

NOTES (continued)

3. Elevation of top of protector pipe, 1619.5 ft. (493.61m).

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

DATE	4/19/79	11/12/79	7/26/80	9/10/80			
DEPTH (m)	17.34	17.01	17.22	17.25			
DEPTH (ft.)	56.9	55.8	56.5	56.6			

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked JEF

COOR. N105930 ft. (N32287m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 1 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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.)	
0.0		Compact, brown, silty, fine to coarse SAND, trace fine to coarse gravel to fine to coarse SAND, some silt, trace fine to coarse gravel	SM	-	1	AS	-	-	
				13	2	DO	7-5-8	18/18	
2.29 7.5		Dense to very dense, light brown to brown, fine to coarse SAND, trace to some fine to coarse gravel, trace to some silt, occasional cobbles and boulders	SP- SM						
				26	3	DO	7-11-15	18/18	
				88	4	DO	30-36-52	18/18	
				87	5	DO	28-41-46	18/18	
				93	6	DO	20-33-60	18/18	
8.38 27.5		Very dense, brown, fine to coarse SAND and SILT, trace clay	SM	158 11"	7	DO	58-100/5"	10/11	
9.91 32.5		See next page							
10.52 34.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N105930 ft. (N32287m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 2 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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.)
10.52		CONTINUED		163					
34.5		Very dense, brown, fine to medium SAND, some silt to fine to coarse SAND, some silt, trace fine to coarse gravel	SM	10"	8	DO	63-100/4"	8/10	
				125	6"	9	DO	125/6"	6/6
				162	9"	10	DO	62-100/3"	6/9
				148	10"	11	DO	48-100/4"	6/10
				141	10"	12	DO	41-100/4"	10/10
								1/7/80 15.94 52.3	
19.05		Very dense, light brown to brown, fine to coarse SAND, trace to some silt, trace fine gravel to fine to coarse SAND, some fine gravel, trace silt	SP to SP-SM	152	14	DO	52-100/5"	11/11	
62.5				163	13	DO	26-53-110	18/18	
21.18		CONTINUED							
69.5									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked PRB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 3 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 12/11/79

DATE COMPLETED 12/20/79

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.)	
21.18		CONTINUED							
69.5		<p>Very dense, light brown to brown, fine to coarse SAND, trace to some silt, trace fine gravel to fine to coarse SAND, some fine gravel, trace silt</p> <p>Boulder noted at 75.0'-76.7'</p>							
			185 10"	15	DO	35-85- <u>100</u> 4"	14/16		
			30 0"	16	DO	30/0"	0/0		
			185 11"	17	DO	35-85- <u>100</u> 5"	15/17		
			103 6"	18	DO	103/6"	5/6		
			162 11"	19	DO	58-104/5"	10/11		
			160 11"	20	DO	60-100/5"	10/11		
			157	21	DO	53-104	10/12		
31.39									
103.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn Jls
Checked MLB

COOR. N105930 ft. (N32887m)
 E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 4 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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)	
31.39 103.0		CONTINUED						
		Very dense, light brown to brown, fine to coarse SAND, trace to some silt, trace fine gravel to fine to coarse SAND, some fine gravel, trace silt	SP to SP- SM	135	22	D0	38-55-80	16/18
				168 11"	23	D0	34-68- 100 5"	17/17
				105 5"	24	D0	105/5"	5/5
38.1 125.0		Very dense, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel	SM					
41.61 136.5		CONTINUED						

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MLB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

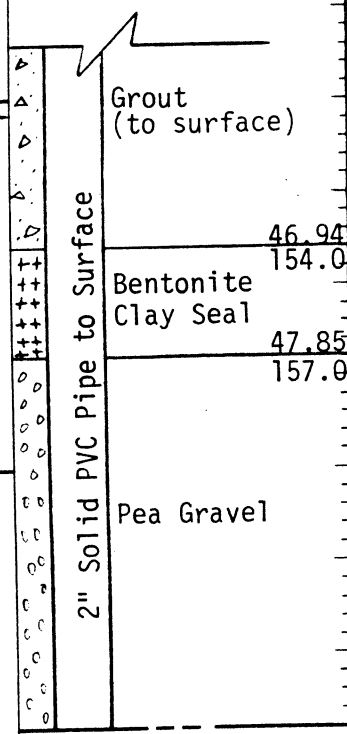
SHEET 5 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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.)
41.61		CONTINUED							
136.5		Very dense, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel	SM	100 4"	25	DO	100/4"	3/4	
				100 5"	26	DO	100/5"	5/5	
				40 0"	27	DO	40/0"	0/0	
50.90								Grout (to surface) 46.94	
								Bentonite Clay Seal 154.0	
								47.85	
								157.0	
								Pea Gravel	
167.0		CONTINUED						CONTINUED	



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 6 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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.)
50.90		CONTINUED						CONTINUED	
167.0		Very dense, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel	SM	100 5"	28	DO	100/5"	3/5	2" Solid PVC Pipe Pea Gravel 52.12
				167 8"	29	DO	90-77/2"	7/8	2" Slotted PVC Pipe Pea Gravel 171.0
				100 1"	30	DO	100/1"	1/1	Pea Gravel (to bottom of boring) 55.17
57.91		Very dense, brown, silty, fine to coarse SAND, trace fine gravel	SM					181.0	
190.0									
60.35		CONTINUED							
198.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 7 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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, brown, silty, fine to coarse SAND, trace fine gravel	SM	105			5.5"		
	5.5"			31	DO	105/5.5"	5.5"		
62.48									
205.0									
		Greenish-gray, highly weathered to weathered metavolcanic TUFF		100					
	5"			32	DO	100/5"	5/5		
				100					
				4"	33	DO	100/4"	4/4	
				100					
				3"	34	DO	100/3"	0/3	
70.71		CONTINUED							
232.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

BORING LOG G40-H27

SHEET 8 OF 8

SURFACE ELEV. 1602.1 ft. (488.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/11/79 DATE COMPLETED 12/20/79

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.)	
70.71		CONTINUED							
232.0		Greenish-gray, highly weathered to weathered metavolcanic TUFF		40 0"	35	DO	40/0"	0/0	
					-	-	-	Drill Cuttings	-
76.2									

250.0 END OF BORING

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 35)
2. Elevation of top of protector pipe, 1604.0 ft. (488.91m).

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

DATE	1/7/80	6/28/80	7/26/80	9/10/80			
DEPTH (m)	15.94	16.00	16.00	16.03			
DEPTH (ft.)	52.3	52.5	52.5	52.6			

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N113810 ft. (N34689m)
E2270150 ft. (E691943m)

BORING LOG G40-J15

SHEET 1 OF 2

SURFACE ELEV. 1603.6 ft. (488.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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.)	
0.0		Soft, brown, highly organic, clayey SILT and PEAT	PT	-	1 AS	-	-	2" Solid PVC Pipe Grout	
1.83		Compact, gray-green, fine to medium SAND, trace to some silt, occasional layer of firm gray-green silty clay with trace fine sand	SM to CL	-	2 TO	Push	-		
6.0				13	3 DO	3-5-8	12/18		
				16	4 DO	10-9-7	9/18		
4.88				Soft to stiff, gray-green, SILT, some clay	CL	-	5 TO		Push
16.0		9	6 DO			3-4-5	18/18		
		12	7 DO			3-5-7	18/18		
8.84		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	SM			76	8 DO		44-42-34
29.0									
10.21		CONTINUED						Bentonite Clay Seal 8.23 27.0	
33.5								Pea Gravel 9.75 32.0	
								CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WCB

COOR. N113810 ft. (N34689m)
E2270150 ft. (E691943m)

BORING LOG G40-J15

SHEET 2 OF 2

SURFACE ELEV. 1603.6 ft. (488.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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.)		
10.21		CONTINUED						CONTINUED			
33.5		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	SM	52	9	DO	30-30-22	10/18	2" Solid PVC Pipe Pea Gravel 11.28		
									37.0		
										2" Slotted PVC Pipe ▼ 4/18/79 12.62 41.4	
						44	11	DO	68-24-20	6/18	14.33
											47.0
15.70				48	12	DO	19-56-92	4/18	Pea Gravel		

51.5 END OF BORING

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 3, 4 and 6 - 12)
- Elevation of top of protector pipe, 1605.6 ft. (489.39m).

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

DATE	4/18/79	11/11/79	11/12/79	6/12/80	7/26/80	9/10/80	
DEPTH (m)	12.62	12.22	11.73	12.16	12.25	12.31	
DEPTH (ft.)	41.4	40.1	38.5	39.9	40.2	40.4	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

COOR. N111140 ft. (N33876m)
E2269905 ft. (E691869m)

BORING LOG G40-J20

SHEET 1 OF 3

SURFACE ELEV. 1629.7 ft. (496.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/10/80 DATE COMPLETED 1/14/80

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		Compact, brown, silty, fine to coarse SAND, trace to some fine to coarse gravel	SM	-	1	AS	-	-	
				14	2	DO	3-5-9	18/18	
2.29 7.5		Compact to very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt to fine to coarse SAND, trace fine gravel, trace silt	SP to SP-SM	16	3	DO	5-8-8	16/18	
				69	4	DO	16-26-43	8/18	
				111	5	DO	20-44-67	16/18	
				84	6	DO	26-49-35	18/18	
8.38 27.5		Very dense, light brown to brown, fine to medium SAND, some silt to fine to coarse SAND, some silt, trace fine to coarse gravel	SM	120	7	DO	35-85	12/12	
10.52 34.5				CONTINUED					

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N111140 ft. (N33876m)
E2269905 ft. (E691869m)

BORING LOG G40-J20

SHEET 2 OF 3

SURFACE ELEV. 1629.7 ft. (496.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/10/80 DATE COMPLETED 1/14/80

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)	
10.52		CONTINUED						
34.5		Very dense, light brown to brown, fine to medium SAND, some silt to fine to coarse SAND, some silt, trace fine to coarse gravel	SM	145	8	D0	27-55-90	18/18
				79	9	D0	20-32-47	15/18
12.95		Very dense, brown to light brown, fine SAND, trace silt to fine to coarse SAND, some fine gravel, trace silt	SP to SP-SM	130	10	D0	30-100/4"	8/10
42.5				184	11	D0	84-100/3"	8/9
				132	12	D0	32-100/4"	10/10
				147	13	D0	47-100/4"	8/10
				156	14	D0	56-100/2"	8/8
20.42		CONTINUED						
67.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COORD. N111140 ft. (N33876m)
E2269905 ft. (E691869m)

BORING LOG G40-J20

SHEET 3 OF 3

SURFACE ELEV. 1629.7 ft. (496.72m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/10/80 DATE COMPLETED 1/14/80

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.)		
20.42		CONTINUED							
67.0		Very dense, brown to light brown, fine SAND, trace silt to fine to coarse SAND, some fine gravel, trace silt	SP to SP-SM						
				109	15	DO	35-74	10/12	
23.16									
				136	16	DO	41-95	10/12	

76.0
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 MRB

COOR. N115130 ft. (N35091m)
E2270885 ft. (E692167m)

BORING LOG G40-K13

SHEET 1 OF 2

SURFACE ELEV. 1600.9 ft. (487.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

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.)		
0.30 1.0		Fibrous, brown organic matter	PT	-	1	AS	-	(Note 2)	
		Loose, green-brown, fine to coarse SAND, some silt	SM		2	TO	Push 22/30	Grout	
					3	TO	Push 29/30		
					5	4	DO		3-3-2 18/18
					1	5	DO		1/12"-1/12" 18/18
4.27 14.0		Very soft, gray-green, silty CLAY, trace fine sand (thin seams of fine to medium sand)	CL		6	TO	Push 24/30	2" Solid PVC Pipe Bentonite Clay Seal	
6.71 22.0					40	7	DO		10-23-17 18/18
		Compact to dense, brown to gray-brown, fine to medium SAND, some gravel, some silt	SM		39	8	DO	13-18-21 12/18	Pea Gravel
10.36 34.0									
		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked oeb

COOR. N115130 ft. (N35091m) E2270885 ft. (E692167m) **BORING LOG** G40-K13 SHEET 2 OF 2
 SURFACE ELEV. 1600.9 ft. (487.97m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 3/1/79 DATE COMPLETED 3/1/79
 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.)		
10.36		CONTINUED						CONTINUED 10.36			
34.0		Compact to dense, brown to gray-brown, fine to medium SAND, some gravel some silt	SM	19	9	DO	10-10-9	12/18	34.0		
										37.5	
										11.43	
						15	10	DO	10-6-9	8/18	13.41
											44.0
15.32				35	11	DO	17-20-15	8/18	Bentonite Clay Seal		
50.25		END OF BORING		100	3	DO	100/3"	3/3			

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 4, 5 and 7 - 12)
2. Water ponded on ground surface, 4/18/79.
3. Elevation of top of protector pipe, 1603.8 ft. (488.84m).

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

DATE	3/20/79	11/11/79	11/12/79	9/10/80			
DEPTH (m)	11.43	10.36	10.67	10.85			
DEPTH (ft.)	37.5	34.0	35.0	35.6			

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked MB

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

BORING LOG G40-L19

SHEET 1 OF 4

SURFACE ELEV. 1671.3 ft. (509.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/17/79 DATE COMPLETED 3/20/79

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		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	71	1	DO	17-19-52	8/18
				17	2	DO	9-9-8	12/18
				13	3	DO	8-7-6	12/18
				21	4	DO	9-10-11	10/18
				43	5	DO	22-23-20	5/18
				43	6	DO	20-21-22	9/18
				104	7	DO	34-49-55	12/18
9.91								
32.5		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CB

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

BORING LOG G40-L19

SHEET 2 OF 4

SURFACE ELEV. 1671.3 ft. (509.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/17/79 DATE COMPLETED 3/20/79

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.)	
9.91		CONTINUED							
32.5		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay							
			200 9"	8	DO	72-100- ¹⁰⁰ ₃	13/15		
			218	9	DO	87-131	8/12		
			200 4"	10	DO	200/4"	4/4		
			171 9"	11	DO	71-100/3"	7/9		
			100 3"	12	DO	100/3"	3/3		
			163	13	DO	59-104	9/12		
			189 10"	14	DO	89-100/4"	9/10		
20.42									
67.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

BORING LOG G40-L19

SHEET 3 OF 4

SURFACE ELEV. 1671.3 ft. (509.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/17/79 DATE COMPLETED 3/20/79

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.)			
20.42		CONTINUED									
67.0		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	193	15	DO	61-81-112	9/18			
						151	16	DO	69-60-91	9/18	
						200 3"	17	DO	200/3"	0/3	
						202 10"	18	DO	102-100/4"	10/10	
26.82		Very dense, brown, fine to coarse SAND, some silt, trace fine to coarse gravel	SM	200 6"	19	DO	200/6"	6/6			
88.0											
						212 6"	20	DO	212/6"	6/6	
						200 4"	21	DO	200/4"	4/4	
30.94		CONTINUED									
101.5		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OB

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

BORING LOG G40-L19

SHEET 4 OF 4

SURFACE ELEV. 1671.3 ft. (509.42m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/17/79 DATE COMPLETED 3/20/79

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.)		
30.94 101.5		CONTINUED							
		Very dense, brown, fine to coarse SAND, some silt, trace fine to coarse gravel	SM	230 6"	22	DO	230/6"	6/6	
				212 6"	23	DO	212/6"	6/6	

36.73
120.5
END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

- Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 5-23)
- Penetration Test - Driving 3" O.D. sampler with 300 lb. hammer freely falling 20". (Samples 1-4)

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RS

COOR. N108920 ft. (N33200m)
E2271065 ft. (E692222m)

BORING LOG G40-L23

SHEET 1 OF 3

SURFACE ELEV. 1639.3 ft. (499.65m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/80 DATE COMPLETED 1/15/80

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.)	
0.0										
					1	AS	-	-		
				17	2	DO	7-7-10	18/18		
				66	3	DO	15-26-40	18/18		
		Compact to very dense, red-brown to brown, fine to coarse SAND, some silt, trace fine to coarse gravel to fine to coarse SAND, some fine to coarse gravel, some silt, occasional to frequent cobbles	SM	109	4	DO	26-83	10/12		
				133	5	DO	28-54-79	17/18		
				114	6	DO	31-52-62	18/18		
				113	7	DO	46-67	10/12		
				117	8	DO	32-85	9/12		
11.13										
36.5				CONTINUED						

COOR. N108920 ft. (N33200m)
E2271065 ft. (E692222m)

BORING LOG G40-L23

SHEET 2 OF 3

SURFACE ELEV. 1639.3 ft. (499.65m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/80 DATE COMPLETED 1/15/80

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)	
11.13		CONTINUED						
36.5		Compact to very dense, red-brown to brown, fine to coarse SAND, some silt, trace fine to coarse gravel to fine to coarse SAND, some fine to coarse gravel, some silt, occasional to frequent cobbles	SM	147 9"	9	DO	47-100/3"	6/9
				142	10	DO	25-59-83	18/18
				140	11	DO	52-88	10/12
				98	12	DO	31-67	8/12
16.76		Very dense, light brown to brown, fine SAND, trace silt to fine to coarse SAND, trace silt	SP to SP- SM	143 10"	13	DO	43-100/4"	8/10
55.0				142 10"	14	DO	42-100/4"	7/10
20.27		CONTINUED						
66.5								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked mfb

COOR. N108920 ft. (N33200m)
E2271065 ft. (E692222m)

BORING LOG G40-L23

SHEET 3 OF 3

SURFACE ELEV. 1639.3 ft. (499.65m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/80 DATE COMPLETED 1/15/80

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)	
20.27 66.5		CONTINUED						
		Very dense, light brown to brown, fine SAND, trace silt to fine to coarse SAND, trace silt		15 9"	DO	51-100/3"	6/9	Grout (to surface) 21.64
				16 8"	DO	74-50/2"	6/8	Bentonite Clay Seal 71.0 22.56
				17 11"	DO	41-100/5"	10/11	Pea Gravel 74.0 23.38 2/11/80
				18 10"	DO	47-100/4"	10/10	Pea Gravel 76.7 23.47 77.0
				19 11"	DO	45-100/5"	9/11	Pea Gravel 26.52 87.0

90.9 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 - 19)
2. Elevation of top of protector pipe, 1641.2 ft. (500.24m).

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

DATE	2/11/80	7/10/80	5/20/80	7/26/80	8/11/80	9/10/80	
DEPTH (m)	23.38	23.38	23.47	23.41	23.44	23.47	
DEPTH (ft.)	76.7	76.7	77.0	76.8	76.9	77.0	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N114595 ft. (N34928m)
E2271820 ft. (E692452m)

BORING LOG G40-M14

SHEET 1 OF 3

SURFACE ELEV. 1649.6 ft. (502.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/15/79 DATE COMPLETED 3/16/79

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 0.5		Topsoil and rootmat									
		Compact to very dense, red to red-brown, fine to coarse SAND, some silt, some gravel, trace clay	SM		42	1	DO	19-23-19	12/18		
					17	2	DO	9-9-8	12/18		
						40	3	DO	23-17-23	11/18	
						100 6"	4	DO	100/6"	6/6	
						108 6"	5	DO	108/6"	6/6	
						178 6"	6	DO	173/6"	6/6	
						100 4"	7	DO	100/4"	4/4	
				147 6"	8	DO	147/6"	6/6			
10.97 36.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked oob

COOR. N114595 ft. (N34928m)
E2271820 ft. (E692452m)

BORING LOG G40-M14

SHEET 2 OF 3

SURFACE ELEV. 1649.6 ft. (502.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/15/79 DATE COMPLETED 3/16/79

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.)	
10.97		CONTINUED						
36.0		Compact to very dense, red to red-brown, fine to coarse SAND, some silt, some gravel, trace clay	SM	200	9	DO	200/1"	0/1
13.72				183	10	DO	83-100/4"	10/10
45.0				100	4"	11 DO	100/4"	4/4
				SP 153	6"	12 DO	153/6"	6/6
				151	6"	13 DO	151/6"	6/6
				174	6"	14 DO	174/6"	6/6
21.18		CONTINUED						
69.5								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn - jls
Checked - AB

COOR. N114595 ft. (N34928m)
E2271820 ft. (E692452m)

BORING LOG G40-M14

SHEET 3 OF 3

SURFACE ELEV. 1649.6 ft. (502.79m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/15/79 DATE COMPLETED 3/16/79

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.)	
21.18 69.5		CONTINUED		183 6"	15	D0	183/6" 6/6	
		Very dense, brown, fine to coarse SAND, trace silt, trace gravel, occasional boulders		216 6"	16	D0	216/6" 6/6	
			SP	112 6"	17	D0	112/6" 6/6	
				431	18	D0	145-286 12/12	
				300 5"	19	D0	300/5" 5/5	
28.96 95.0				300 0"	20	D0	300/0" 0/0	

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 JB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 1 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)		REC./ ATT. (ins.)
0.08		Topsoil and rootmat.							
0.25		Compact, brown, fine SAND, some silt, trace clay, occasional cobbles	SM	-	1a	AS	-	-	
				-	1b	AS	-	-	
2.13					27	2	DO	8-16-11	18/18
7.0			Dense to very dense, brown to red-brown, fine to coarse SAND, some gravel, some silt, trace clay	SM	57	3	DO	18-22-35	18/18
					30	4	DO	17-11-19	12/18
					63	5	DO	23-25-38	10/18
					75	6	DO	16-33-42	4/18
					102	7	DO	45-41-61	15/18
					118 6"	8	DO	118/6"	6/6
10.36									
34.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked als

COORD. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 2 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)		REC./ ATT. (ins.)
10.36 34.0		CONTINUED							
		Dense to very dense, brown to red-brown, fine to coarse SAND, some gravel, some silt, trace clay	SM	142					
				10	10	DO	42-100/4"	8/10	
				107	11	DO	39-68	12/12	
14.48 47.5		Compact to very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SP	140	12	DO	48-92	10/12	
				108	13	DO	39-35-73	12/18	
				68	14	DO	28-30-38	8/18	
				95	15	DO	28-38-57	16/18	
20.73 68.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 3 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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. (Note 1)		REC/ATT. (ins.)
20.73		CONTINUED							
68.0		Compact to very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SP					▼ 4/18/79 21.25 69.7	
				82	16	D0	23-33-49		12/18
				12	17	D0	6-5-7		15/18
				35	18	D0	15-14-21		16/18
26.67		Very dense, brown, fine SAND to fine to coarse SAND, trace silt	SP						
87.5				38	19	D0	9-13-25	15/18	
				90	20	D0	26-38-52	18/18	
				60	21	D0	22-24-36	18/18	
				145	22	D0	24-48-97	18/18	
31.39		CONTINUED							
103.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ms

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 4 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)	
31.39		CONTINUED						
103.0		Very dense, brown, fine SAND to fine to coarse SAND, trace silt	SP	161 10'				
				23	DO	61-100/4"	10/10	
				138 9'				
				24	DO	63-75/3"	8/9	
				153 10'				
				25	DO	53-100/4"	6/10	
41.0		CONTINUED						
134.5								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 5 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)	REC./ ATT. (ins.)	
41.0		CONTINUED							
134.5		Very dense, brown, fine SAND to fine to coarse SAND, trace silt	SP						
41.91									
137.5		Stiff, brown SILT, trace fine sand to stiff, brown SILT, some fine sand, trace fine gravel	ML	75	26	DO	16-21-54	16/18	
45.42									
149.0		Very dense, brown to red- brown, fine to coarse SAND, some silt	SM	162 9"					
				27	DO	62-100/3"	6/9		
				120	28	DO	26-94	12/12	
50.29									
165.0		Very dense, brown to red- brown, fine SAND, trace silt	SP to SP- SM						
51.51									
169.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 008

COORD. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 6 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)		REC./ ATT. (ins.)
51.51		CONTINUED		125					
169.0		Very dense, brown to red-brown, fine SAND, trace to silt	SP to SP- SM	7	29	DO	100-25/1"	7/7	
				10	30	DO	55-100/4"	6/10	
				11	31	DO	56-135	8/12	
				9	32	DO	60-75/3"	9/9	
62.64									
205.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 7 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

DEPTH METER FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GRQUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. (Note 1)	
62.64		CONTINUED						
205.5		Very dense, brown to red-brown, fine SAND, trace silt	SP to SP- SM	130 9"	33	DO	60-70/3"	3/9
68.58		Very dense, brown, silty fine SAND with thin silt layers to stiff brown SILT with seams of silt and fine sand	SM to ML	127 9"	34	DO	77-50/3"	9/9
225.0								
72.85		CONTINUED		140 8"	35	DO	90-50/2"	6/8
239.0								

Job No. 785085
Scale 1"=5'

Golder Associates

Drawn ils
Checked JB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 8 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)	REC./ ATT. (ins.)	
72.85		CONTINUED		128					
239.0		Very dense, brown, silty fine SAND with thin silt layers to stiff brown SILT with seams of silt and fine sand	SM to ML	10					
				36	DO	28-100/4"	10/10		
76.20		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM	135					
250.0				10					
				37	DO	35-100/4"	0/10		
82.91		CONTINUED		128					
272.0				11					
				38	DO	28-100/5"	11/11		
								79.25	
								Bentonite 260.0	
								Clay Seal 80.47	
								264.0	
								Pea Gravel	
								CONTINUED	

2" Solid PVC Pipe to Surface

2" Slotted PVC Pipe

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

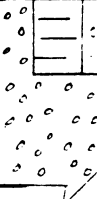
BORING LOG G40-M15

SHEET 9 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 8 IN. (Note 1)		REC./ATT. (ins.)
82.91		CONTINUED						CONTINUED	
272.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM	-	39	BX RC	-	24/24	 Pea Gravel 83.52 274.0
86.87									
285.0		Hard, red and green CLAY (residual material)	CH	-	-	-	Drill Cuttings	-	
93.12									
305.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

COORD. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

BORING LOG G40-M15

SHEET 10 OF 10

SURFACE ELEV. 1637.6 ft. (499.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/28/79 DATE COMPLETED 4/11/79

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 6 IN. (Note 1)	
93.12		CONTINUED						
305.5		Hard, red and green CLAY (residual material)	CH	-	-	-	Drill Cuttings	-
94.49								(Note 2)

310.0
END OF BORING

NOTES

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

Penetration Test - Driving 2" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 10 - 22)

Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 23 - 38)
- Split tube sampler left in bottom of borehole.
- Elevation of top of protector pipe, 1639.2 ft. (499.63m).

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

DATE	4/18/79	11/12/79	6/12/80	7/26/80	9/10/80		
DEPTH (m)	21.25	20.42	20.73	20.85	20.88		
DEPTH (ft.)	69.7	67.0	68.0	68.4	68.5		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked 203

COOR. N117145 ft. (N35706m)
E2273040 ft. (E692823m)

BORING LOG G40-P10

SHEET 1 OF 3

SURFACE ELEV. 1634.0 ft. (498.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/19/79

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				-	1	AS	-	-			
		Compact 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, boulders on ground surface Cobbles and boulders noted at 23.0'-24.0' and 27.0'-27.7'	SM	15	2	DO	8-7-8	18/18			
						33	3	DO	13-13-20	18/18	
						97	4	DO	16-37-60	18/18	
				150 10"	5	DO	50-100/4"	6/10			
				173 11"	6	DO	73-100/5"	6/11			
8.44 27.7		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP to SP SM								
				170	7	DO	34-75-95	18/18			
10.97 36.0				185 10"	8	DO	85-100/4"	6/10			
		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked M.B.B.

COOR. N117145 ft. (N35706m)
E2273040 ft. (E692823m)

BORING LOG G40-P10

SHEET 2 OF 3

SURFACE ELEV. 1634.0 ft. (498.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/19/79

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.)			
10.97		CONTINUED								
36.0		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP to SP-SM							
				155	9	DO	32-65-90	18/18		
						107	10	DO	27-47-60	18/18
						198				
						9"	11	DO	88-110/3"	6/9
						240				
				9"	12	DO	120-120/3"	5/9		
				210						
				6"	13	DO	210/6"	3/6		
				250						
				6"	14	DO	200-50/1"	4/6		
				240						
				9"	15	DO	140-100/3"	4/9		
21.58										
70.8		END OF BORING HOLE GROUTED AT COMPLETION								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked M.B.B.

COOR. N117145 ft. (N35706m)
E2273040 ft. (E692823m)

BORING LOG G40-P10

SHEET 3 OF 3

SURFACE ELEV 634.0 ft. (498.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/19/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Sample 11)

Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 10)

Penetration Test - Driving 3" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 12 - 15)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked _____

Coord. N112710 ft. (N34355m)
E2273490 ft. (E692961m)

BORING LOG G40-P17

SHEET 1 OF 3

SURFACE ELEV. 1707.9 ft. (520.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/6/79

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)	
0.0		Dense, brown, silty, fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some silt	SM	-	1	AS	-	-
				43	2	DO	8-21-22	12/18
				28	3	DO	15-16-12	18/18
				45	4	DO	13-20-25	18/18
4.06				Dense to very dense, brown, fine to coarse SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt Boulder noted at 27.0'-28.5'	SP- SM	128	5	DO
16.0		34	6			DO	26-20-14	18/18
8.38		Very dense, brown, silty, fine to coarse SAND, to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM			195	7	DO
27.5								
10.36		CONTINUED						
34.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MAB

COOR. N112710 ft. (N34355m)
E2273490 ft. (E692961m)

BORING LOG G40-P17

SHEET 2 OF 3

SURFACE ELEV. 1707.9 ft. (520.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/6/79

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		138 9"	8	DO	38-100/3"	7/9	
		Very dense, brown, silty, fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM						
12.95 42.5		Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt	SP	193 9"	10	DO	93-100/3"	7/9	
14.48 47.5		Very dense, brown, silty, fine to coarse SAND, trace fine gravel to fine to coarse gravelly, fine to coarse SAND, some silt, frequent cobbles and boulders	SM	130 5"	11	DO	130/5"	3/5	
				50 0"	12	DO	50/0"	0/0	
				100 4"	13	DO	100/4"	2/4	
				150 5"	14	DO	150/5"	3/5	
20.73 68.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked mbb

COOR. N112710 ft. (N34355m)
E2273490 ft. (E692961m)

BORING LOG G40-P17

SHEET 3 OF 3

SURFACE ELEV. 1707.9 ft. (520.58m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/5/79 DATE COMPLETED 12/6/79

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)	
20.73 68.0		CONTINUED						
		Very dense, brown, silty, fine to coarse SAND, trace fine gravel to fine to coarse gravelly, fine to coarse SAND, some silt, frequent cobbles and boulders	SM	150 5"	15	DO	150/5"	0/5
			SM	140 6"	16	DO	140/6"	4/6
				50 0"	17	DO	50/0"	0/0
				150 6"	18	DO	150/6"	5/6
				210	19	DO	72-138	5/12
28.19 92.5		Very dense, brown, fine to coarse SAND and fine to coarse gravel, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt	SP to SW	112 5"	20	DO	112/5"	3/5
30.63			SP to SW	125 6"	21	DO	125/6"	3/6

100.5 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 - 21)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COORD. N111070 ft. (N33854m)
E2273515 ft. (E692969m)

BORING LOG G40-P20

SHEET 1 OF 3

SURFACE ELEV. 1641.1 ft. (500.21m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/3/80

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.)	
0.0		Compact, brown, fine to coarse SAND, some silt, trace fine to coarse gravel	SM	-	1	AS	-	-	
				21	2	DO	8-9-12	18/18	
2.29 7.5		Dense to very dense, brown, fine to coarse SAND, trace to some silt, trace fine gravel to fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP SM						
				31	3	DO	10-15-16	16/18	
				36	4	DO	12-19-17	15/18	
				44	5	DO	29-21-23	13/18	
				22	6	DO	10-10-12	16/18	
8.38 27.5		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel	SM						
				19	7	DO	9-10-9	18/18	
10.36 34.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

COOR. N111070 ft. (N33854m)
E2273515 ft. (E692969m)

BORING LOG G40-P20

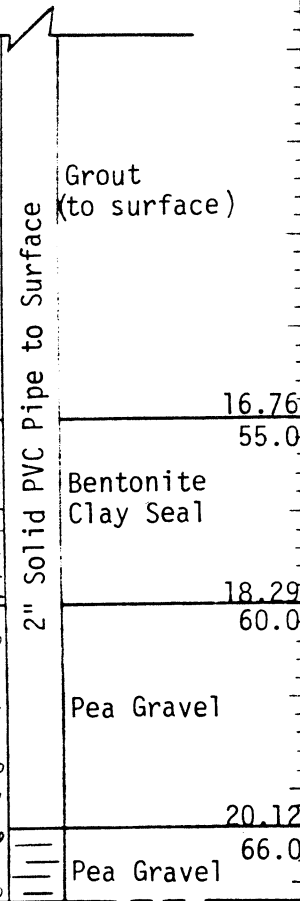
SHEET 2 OF 3

SURFACE ELEV. 1641.1 ft. (500.21m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/3/80

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 8 IN. (Note 1)	
10.36		CONTINUED		157				
34.0		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel	SM	11"	8	DO	57-100/5"	11/11
				180	9	DO	53-80-100/5"	17/17
12.95		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles	SP to SP-SM	144	10	DO	44-100/5"	8/11
42.5				147	11	DO	42-105	9/12
				168	12	DO	68-100/4"	7/10
				205	13	DO	105-100/4'	6/10
				172	14	DO	72-100/2.5'	5/8.5
20.73								
68.0		CONTINUED						



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N111070 ft. (N33854m)
E2273515 ft. (E692969m)

BORING LOG G40-P20

SHEET 3 OF 3

SURFACE ELEV. 1641.1 ft. (500.21m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/2/80 DATE COMPLETED 1/3/80

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						CONTINUED			
68.0		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles	SP to SP- SM	45	15	DO	19-24-21	12/18			
										Pea Gravel	
						97	16	DO	16-36-61	17/18	23.16
											76.0
24.69				151	17	DO	41-110	12/12	Pea Gravel		
81.0											

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)
2. Elevation of top of protector pipe, 1643.3 ft. (500.88m).

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

DATE	1/16/80	6/12/80	9/10/80			
DEPTH (m)	21.46	21.12	21.24			
DEPTH (ft.)	70.4	69.3	69.7			

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N119050 ft. (N36287m)
E2274350 ft. (E693223m)

BORING LOG G40-07

SHEET 1 OF 3

SURFACE ELEV. 1608.1 ft. (490.14m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/16/80 DATE COMPLETED 1/17/80

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.)
0.0		Brown, silty, fine to coarse SAND, trace fine gravel, trace organics	SM	-	1	AS	-	-	
1.37									
4.5		Compact, brown, fine to coarse SAND, trace to some silt	SP- SM	22	2	DO	8-10-12	18/18	
3.81									
12.5									
6.86		Dense to very dense, brown silty fine to coarse SAND, some fine to coarse gravel to silty, fine to coarse gravelly, fine to coarse SAND	SM	31 8"	4	DO	13-18/2"	7/8	
22.5									
6.86									
11.13		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, trace silt	SP to SP-128 SM	105 9"	5	DO	20-55-50 3"	12/15	
36.5									
11.13									
				133 11"	6	DO	33-100/5"	9/11	
					7	DO	28-100/5"	9/11	
					97	8	DO	22-75	10/12

CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

COOR. N119050 ft. (N36287m)
E2274350 ft. (E693223m)

BORING LOG G40-Q7

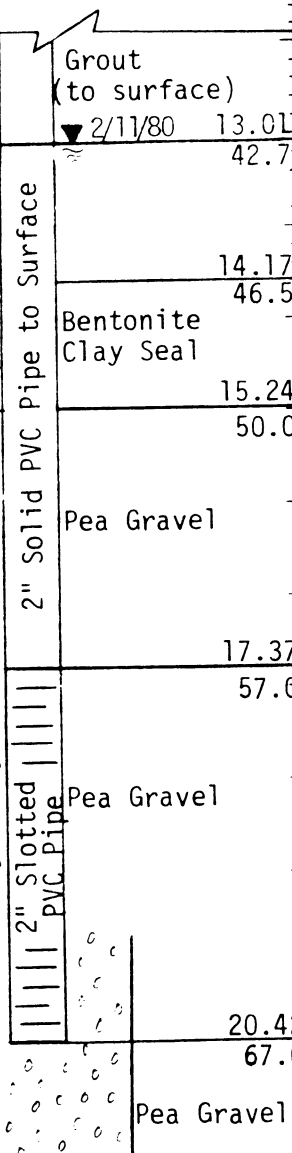
SHEET 2 OF 3

SURFACE ELEV. 1608.1 ft. (490.14m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/16/80 DATE COMPLETED 1/17/80

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 36.5		CONTINUED								
		Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, trace silt	SP to SP	103 9"	9	DO	25-53- $\frac{50}{3}$	12/15	Grout (to surface) ▼ 2/11/80 13.01	
			SM						42.7	
				144	10	DO	18-46-98	15/18	14.17	
									46.5	
15.24 50.0		Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay to fine to coarse gravelly, fine to coarse SAND, some silt, occasional cobbles Boulder noted at 61.0'-62.5'		96	11	DO	33-63	11/12	15.24	
									50.0	
					44	12	DO	10-20-24	17/18	17.37
				SM	50 6"	13	DO	50/6"	5/6	57.0
					65 10"	14	DO	30-65- $\frac{100}{4}$	15/16	20.42
21.49				100 6"	15	DO	100/6"	4/6	67.0	
70.5		END OF BORING HOLE GROUTED AT COMPLETION								



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N119050 ft. (N35287m)

E2274350 ft. (E693223m)

BORING LOG G40-07

SHEET 3 OF 3

SURFACE ELEV. 1608.1 ft. (490.14m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/16/80 DATE COMPLETED 1/17/80

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

NOTES

1. Penetration Test - Driving 3" O.D. samples with 360 lb. hammer freely falling 24". (Samples 2 - 15)
2. Elevation of top of protector pipe, 1609.9 ft. (490.70m).

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

DATE	2/11/80	5/19/80	8/12/80	9/10/80	6/10/81		
DEPTH (m)	13.01	13.50	13.08	13.08	13.29		
DEPTH (ft.)	42.7	44.3	42.9	42.9	43.6		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DAB

COOR. N108770 ft. (N33153m)

E2274805 ft. (E693361m)

BORING LOG G40-R23

SHEET 1 OF 3

SURFACE ELEV. 1620.3 ft. (493.87m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/3/80 DATE COMPLETED 1/8/80

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 fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, some silt	SM	-	1	AS	-	-	
				26	2	DO	9-12-14	18/18	
				59	3	DO	12-14-45	12/18	
3.81 12.5		Very dense, brown, fine to medium SAND, trace silt, to fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles	SP to SP- SM						
				59	4	DO	9-16-43	4/18	
				76	5	DO	18-28-48	18/18	
				88	6	DO	28-45-43	18/18	
				100 4"	7	DO	100/4"	0/4	
10.36 34.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked mbe

COOR. N108770 ft. (N33153m)
E2274805 ft. (E693361m)

BORING LOG G40-R23

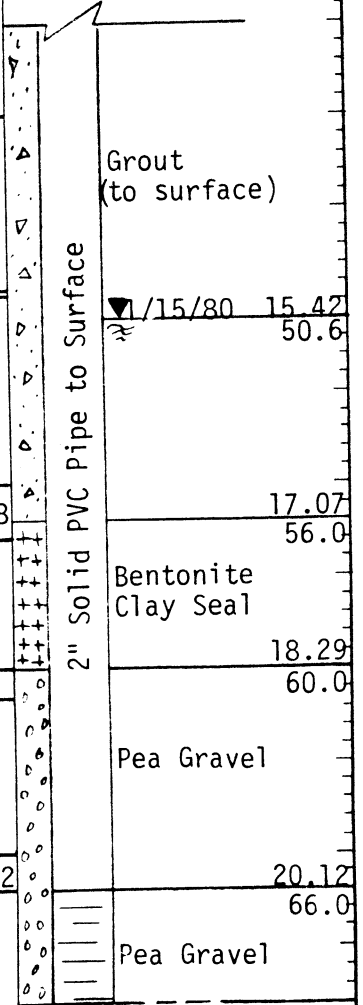
SHEET 2 OF 3

SURFACE ELEV. 1620.3 ft. (493.87m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/3/80 DATE COMPLETED 1/8/80

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.)
10.36		CONTINUED							
34.0		Very dense, brown, fine to medium SAND, trace silt, to fine to coarse SAND, some fine to coarse gravel, trace silt, occasional cobbles Boulder noted at 45.0'-46.5' and 48.8'-49.8'	SP to SP- SM	158 9"	8	DO	20-55-103 3"	12/15	
	174 8"			9	DO	74-100/2"	6/8		
				- 10	DO	Boulder	0/0		
14.48		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	115 1"	11	DO	115/1"	1/1	
47.5									
				139	12	DO	10-44-95	12/18	
				160 9"	13	DO	60-100/3"	7/9	
19.05		Very dense, brown, fine to medium SAND, trace to some silt to fine to coarse SAND, trace to some silt, trace fine gravel	SP- SM						
62.5				134	14	DO	39-95	12/12	
21.03		CONTINUED							
69.0		CONTINUED							



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RKB

COOR. N108770 ft. (N33153m)
E2274805 ft. (E693361m)

BORING LOG G40-R23

SHEET 3 OF 3

SURFACE ELEV. 1620.3 ft. (493.87m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/3/80 DATE COMPLETED 1/8/80

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		CONTINUED						CONTINUED			
69.0		Very dense, brown, fine to medium SAND, trace to some silt to fine to coarse SAND, trace to some silt, trace fine gravel	SP-SM	34	15	DO	39-95	12/12	2" Slotted PVC Pipe	Pea Gravel	
						96	16	DO	31-65	12/12	23.16
											76.0
24.69				87	17	DO	24-63	12/12		Pea Gravel	
81.0		END OF BORING									

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 17)
2. Elevation of top of protector pipe, 1622.45 ft. (494.52m).

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

DATE	1/15/80	2/11/80	5/20/80	6/11/80	7/26/80	8/12/80	9/10/80
DEPTH (m)	15.42	15.54	15.42	15.51	15.42	15.51	15.51
DEPTH (ft.)	50.6	51.0	50.6	50.9	50.6	50.9	50.9

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked mlb

COOR. N116240 ft. (N35430m)
E2275365 ft. (E693533m)

BORING LOG G40-S11

SHEET 1 OF 3

SURFACE ELEV. 1639.9 ft. (499.84m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 11/26/79 DATE COMPLETED 11/27/79

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)	
0.0		Compact, brown, fine SAND, some silt, trace clay	SM	-	1	AS	-	-
				11	2	DO	2-4-7	18/18
2.29 7.5		Compact, brown, fine to coarse SAND, trace fine gravel, trace silt	SP					
				15	3	DO	8-7-8	9/18
				25	4	DO	9-12-13	12/18
5.33 17.5		Compact to dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM					
				21	5	DO	10-10-11	18/18
				34	6	DO	13-13-21	14/18
				61	7	DO	27-28-33	14/18
10.06 33.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N116240 ft. (N35430m)
E2275365 ft. (E693533m)

BORING LOG G40-S11

SHEET 2 OF 3

SURFACE ELEV. 1639.9 ft. (499.84m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/26/79 DATE COMPLETED 11/27/79

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.)		
10.06		CONTINUED								
33.0		Compact to dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM							
10.97				71	8	DO	28-31-40	15/18		
36.0		Very dense, brown, gravelly, fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP to SP- SM							
				154	9	DO	32-122	8/12		
						137	10	DO	37-100	7/12
						162	11	DO	50-112	7/12
				217	12	DO	80-137	8/12		
				137	13	DO	52-67-70	12/18		
20.42				86	14	DO	24-36-50	14/18		
67.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MJB

COOR. N116240 ft. (N35430m)
E2275365 ft. (E693533m)

BORING LOG G40-S11

SHEET 3 OF 3

SURFACE ELEV. 1639.9 ft. (499.84m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/26/79 DATE COMPLETED 11/27/79

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.)		
20.42		CONTINUED							
67.0		Very dense, brown, gravelly, fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP to SP-SM	158	15	DO	33-53-105	14/18	
				198	16	DO	30-73-125	14/18	
				220 9"	17	DO	110-110/3"	8/9	

80.8
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 MLB

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 6IN. 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 25.0		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
11.13								
36.5		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 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 37.5		CONTINUED						
		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
				-	7	DO	Air Hammer	2 /24
				-	8	DO	Air Hammer	15/18
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					
				-	9	DO	Air Hammer	10/15
21.79 71.5		CONTINUED						

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

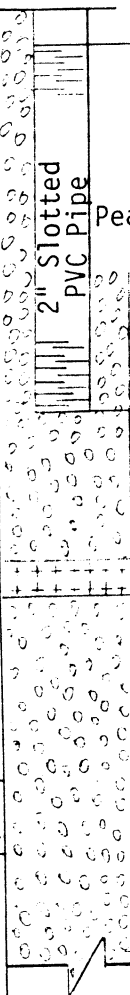
SHEET 4 OF 6

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.		
30.18 99.0		CONTINUED						CONTINUED	
		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL	GP	-	12	D0	Air Hammer	6/24	30.48 100.0
									Pea Gravel
32.00 105.0		Very dense, light brown to multi-colored, fine to coarse SAND, some fine to coarse gravel	SP	-	13	D0	Air Hammer	10/24	33.53 110.0
									Pea Gravel
									34.75 114.0
									35.05 115.0
									Pea Gravel (to bottom of boring)
38.10 125.0		Very dense, brown, SILT, some fine sand, very poorly graded, stratified	ML						
39.32 129.0		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 5 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.	
39.32 129.0		CONTINUED						
41.15 135.0		Very dense, brown, SILT, some fine sand, very poorly graded, stratified	ML	-	15	DO	Air Hammer 15/20	
44.65 146.5		Very dense, light brown, fine to medium SAND	SP	-	16	DO	Air Hammer 24/24	
48.46 159.0		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	-	17	DO	Air Hammer 18/18	
		CONTINUED						

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 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 6IN. 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	-	19	DO	Air Hammer	12/16
52.82								
173.3		Weathered to hard, green, metavolcanic TUFF		-	20		Wash Cuttings	
54.86								

180.0
 END OF BORING

NOTES

- Elevation of top of protector pipe, 1616.8 ft. (492.80m).

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 6 IN. (Note 1)	REC/ATT. (ins.)		
0.30 1.0		Soft to firm, brown, clayey SILT, trace fine sand, trace organic matter	ML	-	1	AS	-	-		
		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 17.5		Very dense, red-brown, fine to coarse SAND, some silt, trace clay	SM		134 9"	6	DO	56-71-63/3"	8/15	
					123 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 JOB

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

BORING LOG G41-C13

SHEET 2 OF 2

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

DATUM USGS MSL 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 6 IN. (Note 1) REC./ATT. (ins.)		
10.06		CONTINUED							
33.0		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						
11.58									
38.0		Very dense, red-brown, fine gravelly, silty fine to coarse SAND to silty, fine to coarse SAND, some fine gravel, trace clay	SM	129 8"	10	DO	79-50/2"	8/8	
				145 6"	11	DO	145/6"	5/6	
				140 6"	12	DO	140/6"	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 - 12)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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	
				25	6	DO	9-12-13	12/18	
5.18		Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay	SM						
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							

▼ 4/18/79 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 6 IN. (Note 1)	REC./ ATT. (ins.)	
11.13 36.5		CONTINUED							
		Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay	SM	32	10	D0	11-13-19	15/18	
				45	11	D0	13-18-27	5/18	
14.02 46.0		Very dense, fine sandy SILT, some clay	ML	51	12	D0	12-19-32	12/18	
				39	13	D0	12-17-22	6/18	
17.22 56.5				Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, occasional small cobbles	GM to SM	101	14	D0	31-46-55
		25	15			D0	27-50-75	16/18	
20.73 68.0		CONTINUED							

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked 703

COORD. 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	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 ils
Checked JOB

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		Very dense, brown to red-brown, fine to coarse SAND, trace silt (sand becoming finer with depth)	SM					
				153	26	DO	48-105	12/12
				159				
				SP-10"				
			SM		27	DO	59-100/4"	9/10
				157				
				9"				
					28	DO	57-100/3"	8/9
50.29		Very dense, brown, fine SAND and SILT						
165.0			SM					
50.90								
167.0		CONTINUED						

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

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

BORING LOG G41-C15

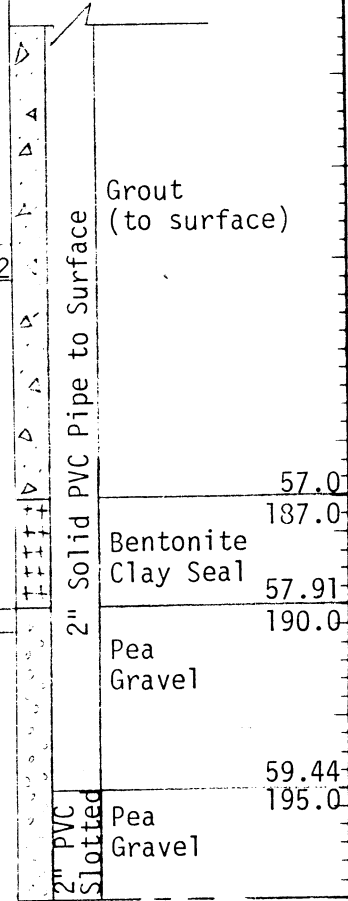
SHEET 6 OF 7

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)		REC./ ATT. (ins.)
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	8	31	DO	75-75/2"	8/8
59.44				195.0					
60.35		Very dense, brown, gravelly fine to coarse SAND, trace silt	SP- SM						
198.0				CONTINUED					



Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WCB

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 1 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

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		Very loose, black PEAT and silty fine to medium SAND, trace clay to very loose, dark brown, silty fine SAND with organic matter	PT to SM	-	1	AS	-	-	(Note 2)	
				2	2	DO	1-1/12"	18/18	Grout	
2.44		Compact, gray, fine SAND, some silt	SM	85	3	DO	8/30/55	18/18	2" Solid PVC Pipe	
8.0				17	4	DO	5/7/10	8/18		
6.40		Very dense, gray, fine to coarse gravelly fine to coarse SAND, some silt, trace clay	GP- GM	30	5	DO	8/13/17	18/18	4.88	
21.0									16.0	
								Bentonite Clay Seal		
								5.79		
								19.0		
								6.37m 4/18/79		
								20.9'		
								6.55		
								21.5		
								Pea Gravel		
8.08				91	6	DO	27/15/76	8/18	2" Stotted PVC pipe	

26.5
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 - 6)
- Water ponded on ground surface, 3/30/79.
- Elevation of top of protector pipe, 1694.7 ft. (516.55m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

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 DFB

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 6 IN. (Note 1)	REC./ATT. (ins.)	
0.15 0.5		topsoil and rootmat							
				65	1	DO	10-25-40	12/18	
				23	2	DO	7-11-12	12/18	
				100 3	3	DO	100/3"	3/3	
		Very dense, brown to red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	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. 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						
		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
				33	11	DO	4-29	2/12
15.70 51.5 16.15 53.C		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 jls
Checked JCB

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

BORING LOG G41-D17

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 0.5		Topsoil and rootmat							
		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	6/13	
				100	5	DO	22-44-56	18/18	
				205 9'					
8.38 27.5		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	
				178 10'	8	DO	78-100/4"	10/10	
10.06 33.0		Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay	SM						
11.28 37.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JLS
Checked OB

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 6IN. (Note 1) REC/ATT. (ins.)		
11.28 37.0		CONTINUED							
		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
50.8

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 ab

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 6IN. (Note 1) REC/ATT. (ins.)	
0.30 1.0		Topsoil and rootmat						
		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	12/13
				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
				241 9'	7	DO	141-100/3"	9/9
10.06 33.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

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		201 9'	8	DO	47-101-3' 100	15/15	
				237 9'	9	DO	137-100/3'	9/9	
				CP SM to SM 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 ARB

COOR. 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 jls
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 6IN. (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	
3.84		Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP to SP-SM	18	3	DO	6-7-11	18/18	
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 4"	8	DO	100/4"	3/4	
32.5		Very dense, brown SILT, some fine to coarse gravel, trace fine sand	ML						
10.67									
35.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OB

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	100 4"	9	DO	100/4"	3/4
11.43								
37.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SR SM	100 2"	10	DO	100/2"	0/2
14.48								
47.5		Very dense, red-brown, silty fine SAND, trace to some fine gravel, trace clay	St	100 6"	11	DO	100/6"	6/6
15.09								
49.5		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 ACB

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

BORING LOG G41-E13

SHEET 1 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.)
0.30 1.0		Topsoil and rootmat		-	1	AS	-		
		Compact to very dense, brown to light brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles	SM		27	2	DO	4-14-13	18/18
					35	3	DO	12-11-24	18/18
					148	4	DO	48-100	12/12
					169	5	DO	24-57-112	16/18
					156	6	DO	27-60-96	16/18
					165	7	DO	50-65-100	16/18
					115	8	DO	30-55-60	13/18
11.28 37.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

BORING LOG G41-E13

SHEET 2 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)	
11.28 37.0		CONTINUED						
				145	9	DO	62-62-83	10/18
				87	10	DO	30-37-50	12/18
				200				
		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	5"	11	DO	200/5"	5/6
			SM	210				
			to	10"				
					12	DO	110-100/4"	9/10
			SM	200				
				9"				
					13	DO	100-100/3"	8/9
				125				
				6"	14	DO	125/6"	6/6
				180				
				9"	15	DO	80-100/3"	9/9
21.95								
72.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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 6IN. (Note 1)	
21.95 72.0		CONTINUED						
		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		190 8"				
			SP SM to SM	16	DO	90-100/2"	8/8	
				180 11"				
				17	DO	80-100/5"	8/11	
				200 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		167	DO	78-75-92	16/18	
			SM					
				170 8"				
				21	DO	70-100/2"	8/8	
31.70 104.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CB

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)	
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	D0	75-100	12/12
				185 3"	23	D0	85-100/2"	7/3
38.10		Very dense, red-brown to light brown, fine to coarse SAND, trace silt	SP to SP SM	105	24	D0	27-35-70	12/18
125.0								
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 6IN. (Note 1)	
41.15 135.0		CONTINUED						
				190	25	DO	40-150	10/12
		Very dense, red-brown to light brown, fine to medium SAND, trace silt	SP to SP- SM	270	26	DO	70-200	12/12
				190	27	DO	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 6IN. (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	D0	115-100/3'	9/9	
				251	29	D0	35-166	12/12
				185	30	D0	45-140	12/12
60.35		CONTINUED						
198.0		CONTINUED						

Job No. 786035
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

BORING LOG G41-E13

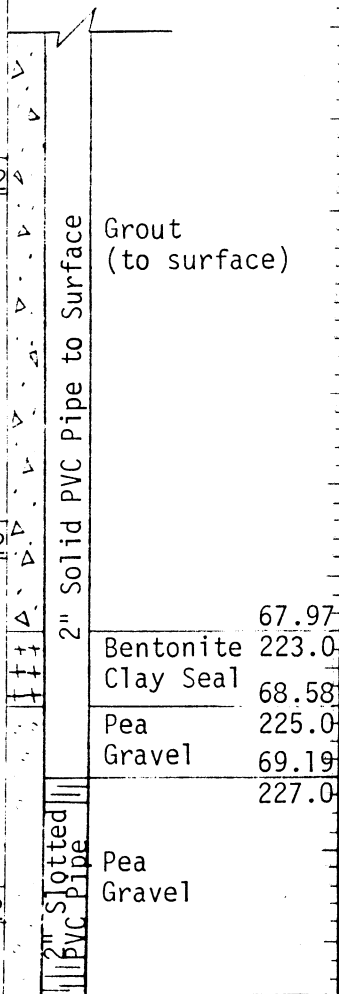
SHEET 7 OF 8

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 6IN. (Note 1)	
60.35		CONTINUED						
198.0		Very dense, red-brown to light brown, fine to medium SAND, trace silt	SP to SP- SM	210	31	DO	80-130	12/12
				275	32	DO	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	DO	60-120	12/12
220.0								
68.85		Very dense, red-brown to light brown, fine to coarse SAND, trace fine gravel, trace silt	SP- SM	220	34	DO	50-170	12/12
226.0								
71.02		CONTINUED						
233.0								



Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

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.)					
71.02 233.0		CONTINUED						CONTINUED					
		Very dense, red-brown to light brown, fine to coarse SAND, trace fine gravel, trace silt	SP-SM	170				2" Slotted PVC Pipe	72.24 237.0				
				6"	35	DO	170/6"			2/6			
73.30 240.5				Green-gray, slight to highly weathered metavolcanic TUFF		-	36			NX RC	-	10/24	Pea Gravel
						-	37			NX RC	-	34/36	
						-	38			RC	-	4/6	
76.35 250.5		END OF BORING			-	39	NX RC	-	54/54				

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 JCS

COOR. N114385 ft. (N34865m)
E2282895 ft. (E695323m)

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 TCB

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 JCB

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		Topsoil and rootmat							
1.0		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"	8/3	
9.75									
32.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP-SM						
10.52									
34.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

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)	
10.52 34.5		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP SM	322 8"	8	DO	122-200/2"	8/8
			SM	292 9"	9	DO	92-200/3"	9/9
13.11 43.0			Very dense, red-brown, fine to medium SAND, trace to some silt, trace to some fine to coarse gravel	SP SM	146 11"	10	DO	46-100/5"
15.24 50.0		SM		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 AS

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

BORING LOG G41-F17

SHEET 1 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.)	
0.30		Topsoil and rootmat							
0.5		Brown, fine to medium SAND, some gravel, some cobbles	SP						
2.13									
7.0				-	1	DO	Air Hammer	18/18	
		Brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	-	2	DO	Air Hammer	18/18	
				-	3	DO	Air Hammer	3/13	
7.62									
25.0		Brown, fine to coarse SAND, trace fine gravel, occasional layers of clayey silt	SM to ML	-	4	DO	Air Hammer	12/12	
8.23									
27.0									
		Brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	-	5	DO	Air Hammer	12/12	
9.75									
32.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AS

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)	
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	-			Air Hammer	15/18
							Air Hammer	12/18
							Air Hammer	12/12
							Air Hammer	12/12
							Air Hammer	8/12
							Air Hammer	6/12
20.42								
67.0		CONTINUED						

Job No. 736085
 Scale 1"=5'

Golder Associates

Drawn ils
 Checked JCB

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 6IN. (Note 1)		REC/ATT. (ins.)	
20.42 67.0		CONTINUED								
		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 JB

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

BORING LOG G41-E17

SHEET 4 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)	
31.09		CONTINUED						
102.0		Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM					
				-	20	DO	Air Hammer	8/13
				-	21	DO	Air Hammer	6/12
38.10								
125.0		Brown, coarse GRAVEL, some fine sand, some silt	GM					
				-	22	DO	Air Hammer	6/6
41.15								
135.0		Yellow-brown to brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt	SP SM					
41.91								
137.5		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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

SHEET 5 OF 9

BORING LOG G41-F17

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								
168.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked als

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 6IN. (Note 1)		REC/ATT. (ins.)
60.66 199.0		CONTINUED							
		Brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP- SM	-	29	DO	Air Hammer	12/12	
64.01 210.0									
		Red-brown SILT, some clay, trace fine sand	ML	-	30	DO	Air Hammer	12/13	
					-	31	DO	Air Hammer	18/18
69.80 229.0		CONTINUED							
								68.88 Bentonite 226.0 Clay Seal 69.49 Pea Gravel 228.0	
								2" Solid PVC Pipe to Surface Grout (to surface)	
								CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JLB

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 6IN. (Note 1)		REC/ATT. (ins.)
69.80		CONTINUED						CONTINUED	
229.0		Red-brown SILT, some clay trace fine sand	ML					2" Solid PVC Pipe	
71.43									
234.5		Red-brown, fine to coarse clayey SAND and SILT, trace fine gravel	ML		32	DO	Air Hammer	12/12	71.63
73.15									235.0
240.0		Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM					2" Slotted PVC Pipe	74.68
75.44									245.0
247.5		Greenish-gray, highly weathered metavolcanic TUFF					Drill Cuttings		
77.72									
255.0		Greenish-gray, metavolcanic TUFF			34	NX RC			57/60
79.25									

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 as

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 JAB

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				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	
		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	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 JLB

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)	
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	

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 JB

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
				-	4	DO	Air Hammer	4/18
9.60 31.5		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 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 6IN. 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		Very dense, orange-brown and brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP					
45.0				-	6	DO	Air Hammer	15/18
16.76		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					
55.0				-	7	DO	Air Hammer	18/18
20.27		CONTINUED						
66.5								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

BORING LOG G41-E19A

SHEET 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 6IN. REC/AT.		
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	
30.94									
101.5		CONTINUED						CONTINUED	

2" Slotted PVC Pipe
(to surface)
Grout
(to surface)

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

BORING LOG G41-E19A

SHEET 4 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.		
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	105.0								
		Very dense, brown to red-brown, fine to coarse gravelly fine to coarse SAND, trace silt	SP SM	-	12	D0	Air Hammer	15/18	2" Solid PVC Pipe Pea Gravel
35.05		Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt	SP					2" Slotted PVC Pipe Pea Gravel	
115.0									
								Pea Gravel	
								Bentonite Clay Seal	
								Pea Gravel (to bottom of boring)	
41.61		CONTINUED							
136.5									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

BORING LOG G41-E19A

SHEET 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.	
41.61 136.5		CONTINUED						
		Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt	SP	-	15	D0	Air Hammer 18/18	
				-	16	D0	Air Hammer 8/12	
				-	17	D0	Air Hammer 12/12	
49.83 163.5		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 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 6IN. 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		CONTINUED							
199.0									

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 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.	
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 6IN. REC./ATT.	
70.56 231.5		CONTINUED						
		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, trace silt	GP- GM	-	24	DO	10/12	
71.63 235.0								
		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM					
					-	25	RC	17/72
77.42 254.0		Highly to slightly weathered, green, metavolcanic TUFF						
79.71 261.5		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 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 6IN. REC/ATT.	
79.71 261.5		CONTINUED						
		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 6IN. (Note 1)		REC. / ATT. (ins.)	
0.0		Soft, brown SILT, some fine sand, some to trace fine gravel, trace organic matter	ML	4	1	DO	2-1-3	18/18		
0.91		Loose to compact, red-brown to brown, fine to medium SAND, some fine to coarse gravel, trace silt	SM	14	2	DO	5-7-7	18/18		
3.6				8	3	DO	3-4-4	18/18		
				14	4	DO	5-5-9	18/18		
5.64				Compact, brown, fine SAND and fine to coarse GRAVEL, trace silt	SP SM to SM	27	5	DO	11-16	1/12
18.5		Compact to very dense, brown fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SM	41	6	DO	11-19-22	15/18		
7.32				21	7	DO	12-10-11	12/18		
24.0										
						28	8	DO	12-16-12	5/18
11.28		Boulders and cobbles noted at 27.5'-28.0' and 35.0'-35.5'								
37.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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	
			SM	150 11"	10	DO	50-100/5"	11/11	
				145 10"	11	DO	45-100/4"	9/10	
				150 9"	12	DO	75-75/3"	6/9	

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. N107255 ft. (N32692m)

E2283465 ft. (E696001m)

BORING LOG G41-F24

SHEET 1 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.)
0.0		Compact, brown, fine to coarse SAND, some silt, trace fine gravel	SM					(Note 2)	
				-	1	pit	-		-
2.29		Dense, brown, fine to coarse gravelly, fine to coarse SAND, trace to some silt	SP SM						
7.5				-	2	DO	Air Hammer		3/18
				-	3	DO	Air Hammer		2/18
5.33									
17.5		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						
				-	4	DO	Air Hammer		18/18
							Air Hammer		
				-	5	DO			10/12
							Air Hammer		
				-	6	DO		14/14	
						Air Hammer			
				-	7	DO		12/12	
11.13									
36.5		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AKB

COOR. 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 6IN. (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										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

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

BORING LOG G41-F24

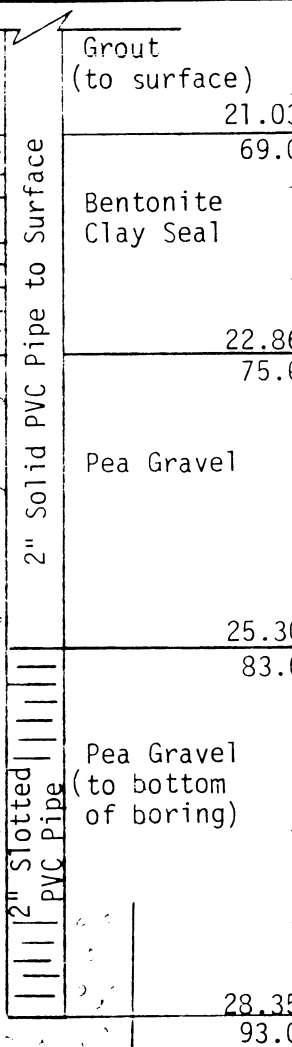
SHEET 3 OF 8

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	
				-	15	DO	Air Hammer	18/18	75.0	
				-	16	DO	Air Hammer	18/18	83.0	
				-	17	DO	Air Hammer	5/18	83.0	
				-	18	DO	Air Hammer	15/18	93.0	
		-	19	DO	Air Hammer	10/15	93.0			
		-	20	DO	Air Hammer	15/18	93.0			
31.09										
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								
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	SAMPLES				GROUNDWATER OBSERVATION WELL	
				BLOWS / FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6IN. (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	
50.90						-	26	DO	Air Hammer
167.0		CONTINUED							

Job No. 786085
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 6 IN. (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	D0	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	D0	Air Hammer	14/14	
61.57									
202.0									
61.57				-	30	D0	Air Hammer	15/18	
202.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MAB

COOR. N107255 (NAD 83) (51M)
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.)
61.57 202.0		CONTINUED							
		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	
68.49 224.7		Greenish-gray, metavolcanic TUFF							
				-	-	-	Drill Cuttings	-	
71.32 234.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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. 73C085
Scale 1"=5'

Golder Associates

Drawn Jls
Checked MKB

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

BORING LOG G41-G11

SHEET 1 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 6IN. (Note 1)	REC/ATT. (ins.)	
0.0 0.61 2.0		Loose to compact, red-brown, silty fine to coarse SAND, some fine to coarse gravel, some clay, organic matter in top 6"	SM	-	1	AS	-	-	
2.74 9.0		Dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel	SM		31	2	DO	15-14-17	18/18
					42	3	DO	13-21-21	10/18
					49	4	DO	21-25-24	12/18
6.55 21.5		Dense to very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM		60	5	DO	36-28-32	14/18
					84	6	DO	32-40-44	12/18
					30 2"	7	DO	30/2"	2/2
		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles	SM		71 7"	8	DO	41-30/1"	6/7
					200 4"	9	DO	200/4"	2/4
11.28 37.0		CONTINUED							

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

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 6IN. (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	
						118	16	DO	44-74	7/12	
21.95		CONTINUED									
72.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

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

BORING LOG G41-G11

SHEET 3 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)	
21.95		CONTINUED						
72.0		Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles	SM					
				34	17	DO	36-48	8/12
24.84				94	18	DO	30-42-52	12/18

81.5
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 - 13)

Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 25". (Samples 14 - 18)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ...jls
Checked ...

COOR. N115325 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 6 IN. (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)	
1.07										Grout
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
				36	4	DO	14-20-16	12/18	13.0 4.42 14.5	
									Pea Gravel	
									5.94	
5.40				167	5	DO	45-92-75	18/18	19.5	

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 MB

COORD. 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 6IN. 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	
				- 2	DO	Hydraulic Push	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
 PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

SHEET 2 OF 11

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.	
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
				-	7	DO	Air Hammer	23/23
16.76 55.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, frequent cobbles	GP					
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)
 DATUM USGS MSL
 DRILL RIG Schramm Rotadrill T64HP

BORING LOG G41-G13

SHEET 4 OF 11

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATE STARTED 5/27/81 DATE COMPLETED 6/4/81

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.		
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	
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 6IN.	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

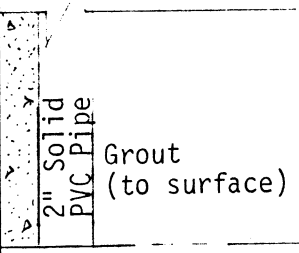
COOR. N115260 ft. (N35131m)
 E2284725 ft. (E696386m)
 SURFACE ELEV. 1709.6 ft. (521.08m)

BORING LOG G41-G13
 PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

SHEET 6 OF 11

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.		
50.75 166.5		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	-	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)

BORING LOG G41-G13

SHEET 7 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.	
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					Grout (to surface)
				21	D0	Air Hammer	2/2	
				22	D0	Air Hammer	7/8	
								2" Solid PVC Pipe
				23	D0	Air Hammer	6/8	
								67.67 222.0
								Bentonite Clay Seal
								68.58 225.0
								Pea Gravel
69.80 229.0		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

SHEET 8 OF 11

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.	
69.80 229.0		CONTINUED						CONTINUED
71.32 234.0		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	- 24	DO	Air Hammer 5/9		2" Solid PVC Pipe Pea Gravel
				- 25	DO	Air Hammer 15/21		
		Very dense, brown to tan, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel	SP	- 26	DO	Air Hammer 21/21		2" Slotted PVC Pipe Pea Gravel (to bottom of boring)
				- 27	DO	Air Hammer 24/24		
80.47 264.0		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 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 6IN. 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	DO	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	DO	Air Hammer	10/12
88.09 289.0		CONTINUED						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COORD. 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 JFB

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 6IN. (Note 1)	
0.0		Loose, brown, silty, fine to medium SAND, trace organics	SM	5	1	DO	3-2-3	15/18
0.76				53	2	DO	8-27-26	10/18
2.5		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	15	3	DO	5-5-10	15/18
				66	4	DO	9-12-54	18/18
		Cobbles noted at 19.0'-19.5'		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		CONTINUED						
32.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. 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 32.0		CONTINUED							
		Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt Cobbles and boulders noted at 41.0'-51.0' and 62.5'-64.0'	SM	150 4"	8	DO	150/4"	3/4	
				130 3"	9	DO	130/3"	3/3	
				140 4"	11	DO	140/4"	1/4	
				150 8"	12	DO	100-50/2"	6/3	
				170 5"	13	DO	170/5"	5/5	
19.51 64.0		See next page		150 6"	14	DO	150/6"	5/6	
20.42 67.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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'		150 9"					
			SP SM	15	D0	75-75/3"	8/9		
				150 5"	16	D0	150/5"	5/5	
				150 2"	17	D0	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"	13	D0	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	D0	16-41- ⁶⁰ 5"	17/17	
29.41 96.5		END OF BORING HOLE GROUTED AT COMPLETION (See sheet 4 for notes)		102	20	D0	18-27-75	18/18	

Job No. 706085
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
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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 6IN. (Note 1)	
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		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt; frequent cobbles	GP-GM					
107.5					2	DO	Air Hammer	6/12
35.05		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					
115.0					3	DO	Air Hammer	18/18
38.10		CONTINUED						
125.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
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COORD. 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 6IN. (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
						-	9	DO	Air Hammer
56.69								55.78	
186.0		CONTINUED						183.0	
								Bentonite Clay Seal	
								CONTINUED	

2" Solid PVC Pipe to Surface

Grout (to surface)

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
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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 6IN. (Note 1)	
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			Air Hammer		Bentonite Clay Seal 57.92 190.0
	-			10	DO		6/12	
58.67								
192.5		Gravel and cobbles. Unable to retain samples	GP			Air Hammer		Caved material (Note 2)
	-			11	DO		0/12	
61.57		Very dense, brown, fine to coarse SAND to fine SAND, trace silt (fineness increasing with depth)	SP to SP-SM			Air Hammer		2" Solid PVC Pipe
202.0	-			12	DO		0/12	
	-			13	DO		18/18	
	-			14	DO		4/18	
						Air Hammer		
	-	15	DO		12/18			
66.45								
218.0		CONTINUED						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 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 PLUMP 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 6IN. (Note 1)		REC./ATT. (ins.)
0.0		See borings G41-G14 and G41-G41A for stratigraphy						12/4/79 33.74 110.7	
73.46		Very dense, brown, silty, fine SAND, trace clay	SM	-	1	DO	Air Hammer	18/18	Grout (to surface)
241.0									
75.44		Very dense, brown, fine sandy SILT	ML	-	2	DO	Air Hammer	18/18	2" Solid PVC Pipe
247.5									
76.96		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	77.72 255.0 Bentonite Clay Seal
252.5									
81.23									
266.5		CONTINUED							80.16 263.0 Pea Gravel

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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

BORING LOG G41-G14B

SHEET 2 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)	REC./ ATT. (ins.)	
81.25		CONTINUED							CONTINUED
266.5		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	-	5 DO	Air Hammer	3/6		2" Solid PVC Pipe Pea Gravel 82.91 272.0
				-	6 DO	Air Hammer	7/14		2" Slotted PVC Pipe Pea Gravel 89.00 292.0
				-	7 DO	Air Hammer	5/5		Pea Gravel (to bottom of boring)
91.44				CONTINUED					
300.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AMS

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 6IN. (Note 1)	
91.44		CONTINUED						
300.0		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	-	8	DO	Air Hammer	2/8
93.73			SM					
307.5		Very dense, brown SILT, some fine sand to fine to coarse SAND and SILT, trace fine gravel	SM	-	9	DO	Air Hammer	4/4
96.01			to ML					
315.0		Red-brown and green, highly weathered to weathered metavolcanic TUFF		-	10	DO	Air Hammer	6/6
				-	11	DO	Air Hammer	3/3
101.80		CONTINUED						
334.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AKMS

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
109.76								

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 ils
Checked [Signature]

COOR. 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	112.3	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 JAB

COOR. 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 iSL 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.	
0.0								Grout (to surface)
		See borings G41-G14 and G41-G14A for soil strati- graphy						12/11/79 33.56 110.1
								35.97- 118.0
								2" Solid PVC Pipe Bentonite Clay Seal
								37.30- 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 ils
Checked [Signature]

COOR. 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 stratigraphy						12" Slotted PVC Pipe
								Pea Gravel
								45.72 150.0 151.0
48.77								Caved Material

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.

Job No. 736035
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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

BORING LOG G41-G14D

SHEET 1 OF 2

SURFACE ELEV 1705.6 ft. (519.36m) 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 FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
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								
234.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked clms

COORD. 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 6IN. REC/ATT.		
71.32		CONTINUED						CONTINUED	
234.0		See boring G41-G14, G41-G14A and G41-G14B for soil stratigraphy						 Pea Gravel 73.76 242.0 Pea Gravel 74.68 245.0	
									Caved Material

78.33
257.0 END OF BORING

NOTES

1. 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 6IN. REC./ATT.	
0.0								▼ 12/11/79 33.31 109.3
		See borings G41-G14 and G41-G14A for soil stratigraphy						38.40 126.0 Bentonite Clay Seal 39.32 129.0 Pea Gravel 40.84 134.0 Pea Gravel
42.97								2" Solid PVC pipe 2" Slotted PVC Pipe
141.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JTs
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.	
		CONTINUED						CONTINUED
		See borings G41-G14 and G41-G14A for soil stratigraphy						2" Slotted PVC Pipe
								Pea Gravel
								46.94
								154.0
								Caved Material
50.29								
165.0		END OF BORING						

NOTES

1. 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 6IN. REC/ATT	
0.0								▼12/11/79 33.07 108.5
		See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy						Grout (to surface)
								34.12 276.0
								Bentonite Clay Seal
								35.65 281.0
								2" Solid PVC Pipe to Surface Pea Gravel
								38.39 290.0
								2" Slotted PVC pipe Pea Gravel
91.44								
300.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked [Signature]

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

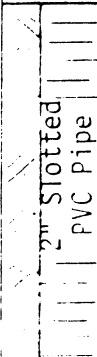

BORING LOG G41-G14F

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 6IN. REC/ATT.	
91.44		CONTINUED						CONTINUED
300.0		See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy						Caved Material (Note 1) 
								94.49 310.0
101.19								Caved Material (Note 1) 

332.0 END OF BORING

NOTES

- 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 6IN. (Note 1)	REC./ ATT. (ins.)	
0.0		See Boring G41-G15A for detailed descriptions. 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 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 to GM	-	1	DO	Air Hammer	12/12	
13.72 45.0				-	2	DO	Air Hammer	6/6	
				-	3	DO	Air Hammer	6/6	
				-	4	DO	Air Hammer	3/3	
13.90 62.0				-	5	DO	Air Hammer	12/12	
				-	6	DO	Air Hammer	10/12	
23.47 77.0				-	7	DO	Air Hammer	10/12	

CONTINUED

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JS

COOR. N113415 ft. (N34569m)
E2234420 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)	
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
				-	11	DO	Air Hammer	12/12
		Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay	SM	-	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 6 IN. (Note 1)		REC./ ATT. (ins.)
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 AB

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)	
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 JOB

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					
68.53				- 25	DO	Air Hammer	6/6	
225.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WB

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 6IN. (Note 1)	
68.58 225.0		CONTINUED						
70.10 230.0		Very dense, brown, fine to coarse SAND, trace silt	SP					Grout (to surface) 70.10 230.0
71.32 234.0								Bentonite Clay Seal 71.32 234.0
					26	DO	Air Hammer 6/6	2" Solid PVC Pipe to Surface Pea Gravel
73.15 240.0		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					73.15 240.0
					27	DO	Air Hammer 4/4	2" Slotted PVC Pipe Pea Gravel
76.20 250.0								76.20 250.0 (to bottom of boring)
77.72 255.0					28	DO	Air Hammer 0/4	
79.25 260.0		Stiff to hard, brown, SILT, some clay	ML					
		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 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 6IN. (Note 1)		REC./ATT. (ins.)
79.25		CONTINUED							
260.0		Stiff to hard, brown, SILT, some clay	ML	-	29	D0	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	D0
88.39									
290.0		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 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 8 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 203

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 6IN. (Note 1)	REC./ ATT. (ins.)	
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							
103.02							Drill Cuttings		
338.6									

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 RCB

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 6IN. (Note 1)	
0.0		Brown, SAND and GRAVEL, some cobbles and boulders	SP to GP					
1.22		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	1	DO	Push	18/13
4.0				-	2	DO	Push	12/12
4.57		Brown, fine to coarse gravelly, silty, fine to coarse SAND	SM					
15.0				-	3	DO	Push	12/17
6.10		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM					
20.0				-	4	DO	Push	12/12
9.45		CONTINUED						
31.0				-	5	DO	Push	5/6

Job No 736085
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 6IN. (Note 1)	
9.45		CONTINUED						
31.0		Brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	-	6	00	Push	3/3
11.58				-	7	00	Push	2/2
38.0		Brown, fine to coarse sandy, fine to coarse GRAVEL, some silt, some clay	GM					
13.11								
43.0								
		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					
20.12								
66.0		CONTINUED						

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked JOB

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 6IN. (Note 1)	
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								27.13
89.0								Bentonite Clay Seal 89.0
28.04								28.04
92.0								92.0
29.26								Pea Gravel
96.0		Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM					
30.79								
101.0		CONTINUED						CONTINUED

2" Solid PVC Pipe to Surface

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

BORING LOG G41-G15A

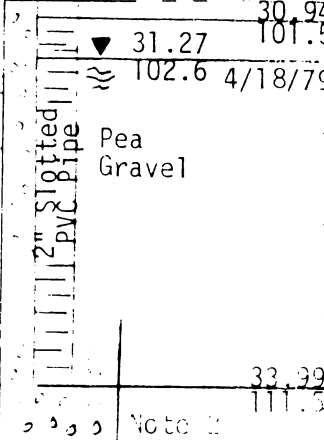
SHEET 4 OF 5

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 8 IN. (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	DO	Air Hammer	18/18	30.94 101.5
				-	9	DO	Air Hammer	18/18	102.6 4/18/79
33.22		Red-brown, silty fine to coarse SAND, trace fine to coarse gravel, trace clay	SM						33.99 111.5
109.0				-	10	DO	Air Hammer	19/19	Note 2
34.44									
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	30.03	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 6IN. (Note 1)	
								▼ 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						2" Solid PVC Pipe to Surface
		Boulder encountered in this hole at 147'						Pea Gravel
								48.16
48.77								158.0
160.0		Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt	GP GM	-	1	DO	Air Hammer	18/18
								2" Sighted PVC Pipe
					-	2	DO	Air Hammer
								51.21
51.82								168.0
170.0		END OF BORING						51.82
								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 jls
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)

- 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 DBB

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.	33.17
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 jls
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	S ¹	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 JTs
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	8	DO	200/4"	4/4			
10.67	4"										
35.0		Very dense, brown to brown and gray, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SM	200	9	DO	200/3"	0/3			
	3"										
	300			10					DO	300/3"	2/3
	3"										
		250	11	DO	250/5"	4/5					
	5"										
		195	12	DO	195/6"	5/6					
	6"										
17.07		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP- SM to SM	200	13	DO	200/3"	0/3			
56.0	3"										
19.35		CONTINUED									
63.5											

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

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 6IN. (Note 1)	
19.35 63.5'		CONTINUED						
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP SM	200 9"	14	DO	121-79/3"	7/9
			SM	200 5"	15	DO	200/5"	4/5
22.98 75.4'				200 4"	6	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 JOB

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 6 IN. (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						
2.13			GM	54	2	DO	10-29-25	10/18	
7.0		Loose to compact, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay							
					10	3	DO	3-3-7	8/18
3.96		Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM						
13.0					22	4	DO	17-10-12	10/18
					13	5	DO	8-9-9	10/18
					113	6	DO	20-93	12/12
			SM						
					140	7	DO	40-100	10/12
					154				
					11"	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					80	9	DO	24-32-43	16/18
11.28									
37.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ocb

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 JQY 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.)		
11.28 37.0		CONTINUED							
		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 43.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace to some silt, trace clay	SP S _{ii} to SM	136 6"	12	DO	136/6"	6/6	
				169 6"	13	DO	169/6"	3/6	
		CONTINUED		130 3"	14	DO	130/3"	0/3	
20.42 67.0				111 6"	15	DO	111/6"	3/6	

Job No 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Date 7/83

COORD. 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 6IN. (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"	13	DO	191/6"	2/6
				150 4"	19	DO	150/4"	2/4
27.58 90.5				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 6IN. (Note 1)	
0.0		Brown, fine to coarse SAND, some fine gravel, some silt	SM	-	1 AS	-	-	
1.52 5.0		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	
				14	3 DO	7-7-7	12/13	
				122 3"	4 DO	60-60-60	3/14	
				138 7"				
					5 DO	36-33-50	10/13	
				150 5.5"	6 DO	150/5.5"	5.5 5.5	
				125 5"	7 DO	125/5"	4/5	
9.91 32.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles	SM	110 6"	8 DO	110/6"	5/6	
11.13 36.5		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked 11/16

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 6IN. (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 Boulder noted at 41.0'-42.2' and 47.0'-48.5'	SM	125 5"	9	DO	125/5"	5/5	<p>2" Solid PVC Pipe to Surface</p> <p>Grout (to surface)</p> <p>Bentonite Clay Seal</p> <p>Pea Gravel</p>
				150 4.5"	10	DO	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	DO	100/6"	5/6	
48.5									
16.00		Very dense, brown, silty, fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, some silt Boulder noted at 56.0'-59.5'	SM	120 8"	12	DO	80-40/2"	6/8	
52.5									
				125 5"	13	DO	125/5"	4/5	
				182 8"	14	DO	82-100/2"	6/8	
								17.37	
								57.0	
								20.42	
								67.0	
21.03									
69.0		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RRB

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	2" Solid PVC Pipe 1/2' 80 22.31 73.2 Pea Gravel
				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	2" Slotted PVC Pipe
26.67 87.5				90 9"	19	DO	40-50/3"	7/9	
		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	SM	190 8"	20	DO	90-100/2"	7/8	Pea Gravel
				100 5"	21	DO	100/5"	5/5	
30.63 100.5		END OF BORING						Gravel 30.18 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 *[Signature]*

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 JEF

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 6 IN. REC./ATT.	
10.4 34.0		CONTINUED						
		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	8/8	
16.76 55.0		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	-	7	DO Air Hammer	16/16	
20.3 66.5				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 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 6IN. REC./ ATT.	
20.3		CONTINUED						
66.5		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
				-	9	DO	Air Hammer	24/24
25.91								
85.0		Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, trace silt	GP	-	10	DO	Air Hammer	12/12
28.96		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP to SM					
95.0								
30.18		CONTINUED						
99.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

BORING LOG G41-H9

SHEET 4 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.			
30.18 99.0		CONTINUED								
		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt	SP to SM	-	11	DO	Air Hammer	24/24		
35.05 115.0		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	-	12	DO	Air Hammer	24/24		
40.08 131.5		CONTINUED								
				-	14	DO	Air Hammer	16/16		

▼ 5/26/81 33.69
110.5

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 6IN. 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				CONTINUED				
166.5								

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		CONTINUED							
166.5		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	-	18	DO	Air Hammer	6/6	
				-	19	DO	Air Hammer	12/12	
				-	20	DO	Air Hammer	12/12	
59.42		Very dense, orange-brown, fine to medium SAND, trace silt	SP-SM						2" Solid PVC Pipe (to surface) Grout (to surface)
195.0									
61.42				-	21	DO	Air Hammer	9/9	
201.5		CONTINUED							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 6IN. REC./ATT.	
61.42		CONTINUED						CONTINUED
201.5		Very dense, orange-brown, fine to medium SAND, trace silt	SP- SM					Grout
62.48		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM					63.03 207.0
205.0								Bentonite Clay Seal 64.01 210.0
65.53		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					2" Solid PVC Pipe
215.0				- 22 D0 Air Hammer	11/11			Pea Gravel
				- 23 D0 Air Hammer	18/18			
72.09								70.10 230.0
236.5		CONTINUED						2" Slotted PVC Pipe Pea Gravel (to bottom of boring)
								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 8 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.		
72.09		CONTINUED						CONTINUED	
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	-	25	D0	Air Hammer	18/18	
74.67							Air Hammer	18/18	
245.0									
		Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt	SP-SM	-	26	D0	Air Hammer	18/18	
							Air Hammer	18/18	
80.77		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	D0	Air Hammer	18/18	
265.0							Air Hammer	18/18	
82.75				-	28	D0	Air Hammer	18/18	
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 6IN. 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
				-	30	DO	Air Hammer	18/18
				-	31	DO	Air Hammer	18/18
89.92 295.0		Very dense, brown, fine to coarse gravelly fine to coarse SAND, some silt	SM					
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 6IN. REC./ATT.	
92.66		CONTINUED						
304.0		Very dense, brown, fine to coarse gravelly fine to coarse SAND, some silt	SM					
94.64		Weathered to sound, green, metavolcanic TUFF		-	32	Cuttings		
310.5								
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

COOR. 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		Topsoil and rootmat		15	1	DO	6-11-4	10/18	
0.3		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		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						
12.5				99	4	DO	25-65-34	12/13	
				172	5	DO	65-84-83	14/13	
				110	6	DO	55-55	12/12	
8.38		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay	SM	160					
27.5				7	DO	110-50/2"	8/8		
9.60									
31.5		CONTINUED							

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

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 6IN. (Note 1) REC/ATT. (ins.)		
9.60 31.5		CONTINUED							
		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 42.5		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	
				155 8"	11	DO	105-50/2"	6/8	
16.00 52.5		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	
16.76 55.0				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 0"	13	DO	150/0"
18.29 60.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 60.0		CONTINUED							
		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 Sil	150 0"	14	DO	150/0"	0/0	
				140 9"	16	DO	90-50/3"	7/9	
				210 9"	17	DO	120-90/3"	6/9	
				135 5"	18	DO	135/5"	4/5	
26.67 87.5				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 4"	19	DO	150/4"
28.19 92.5		CONTINUED							

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. 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 6IN. (Note 1) REC/ATT. (ins.)	
28.19 92.0		CONTINUED						
		Very dense, brown fine to coarse SAND and fine to coarse GM GRAVEL, some silt to fine to coarse to coarse gravelly, fine to coarse SM SAND, some silt, trace clay		167 10"				
				20	DO	62-105/4"	9/10	
				174 10"	21	DO	45-50-124/4"	9/16
31.94 104.3				158 10"				
					22	DO	53-100/4"	3/10

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 30". (Samples 7 - 22)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked 008

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

BORING LOG G41-H17

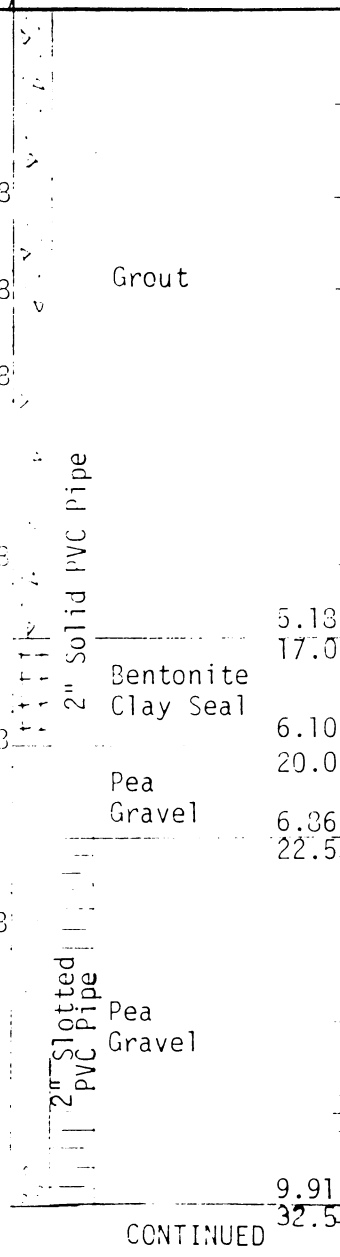
SHEET 1 OF 3

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 6IN. (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	00	3-3-3	14/18	Grout
				12	2	00	3-4-8	16/18	
				15	3	00	9-9-6	18/18	
				15	4	00	5-6-9	14/18	
5.79		Very dense, brown, fine to coarse SAND, some silt, trace gravel	SM	56	5	00	18-16-40	18/18	Bentonite Clay Seal
19.0									
6.86		Compact to very dense, fine to coarse sandy, fine to coarse GRAVEL, trace silt Boulder noted at 36.0'-37.0'	GP	122	6	00	20-64-58	16/18	Pea Gravel
22.5									
9.91		CONTINUED		19	7	00	8-8-11	0/18	CONTINUED
32.5									



Job No. 786085
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	GP	92/8'	8	DO	10-17-75 2"	0/14	10.06 ++++ Bentonite 33.0 ++++ Clay Seal 10.67 ++++ 35.0
11.28 37.0		Boulder noted at 36.0'-37.0'			70	9 DO	48-35-35	9/18	Grout (to bottom of boring)
					127	10 DO	27-100	5/12	
					150 3"	11 DO	150/5"	2/5	
		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, frequent cobbles and boulders	SM						
					150 4"	12 DO	150/4"	4/4	
					147 6"	13 DO	147/6"	4/6	
17.37 57.0					125 6"	14 DO	125/6"	3/6	
		Very dense, brown, silty, fine to coarse SAND, occasional cobbles	SM						
					138 6"	15 DO	138/6"	4/6	
20.12 66.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WJ

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 6IN. (Note 1)	
20.12		CONTINUED						
66.0		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
22.25		Boulder noted at 71.5'-73.0'						
73.0		Very dense, brown, fine to coarse SAND and fine to coarse	SP	150 3"	17	DO	150/3"	3/3
22.65		GRAVEL, trace silt						
74.3								

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 jls
Checked RB

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

BORING LOG G41-H18

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 6IN. (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	4/13	Grout 2" Solid PVC Pipe Bentonite Clay Seal 2" Pea Gravel 2" Slotted PVC Pipe Pea Gravel Bent. Clay Seal Grout (to bottom of boring)
				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	
				183	6	DO	71-112	4/12	
7.01		Dense to very dense, brown, fine to medium sandy, fine to coarse GRAVEL, trace silt	GP						
23.0									
				38	7	DO	30-22-16	6/13	
10.06		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP						
33.0									
10.67		CONTINUED							
35.0									

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 6IN. (Note 1)		REC./ ATT. (ins.)	
10.67		CONTINUED								
35.0		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		
11.13										
36.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP	150	9	DO	37-113	8/12		
						156	10	DO	56-100	6/12
						100 3"	11	DO	100/3"	3/3
		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	100 3"	12	DO	100/3"	3/3		
17.68										
58.0						100 3"	13	DO	100/3"	3/3
		CONTINUED		200 6"	14	DO	200/6"	6/6		
20.73										
68.0										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

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 BIN. (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	16	DO	100/4"	4/4	
75.3									

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 JCS

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 6IN. (Note 1)	
0.0				-	1a	AS	-	-
		Very loose, brown to black, highly organic, fibrous PEAT (heavily rooted)	PT					
3.96				2	1b	DO	0-1-1	0/13
13.0		Compact, gray, fine to medium SAND and SILT, trace clay, some organic matter to 13.5'	SM	13	2	DO	3-3-5	3/13
5.09				21	3	DO	10-11-10	10/13
16.7		Compact, gray, fine to coarse SAND and SILT, some fine gravel, trace clay	SM					
5.79				15	4	DO	11-7-8	15/13
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					
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	9/10/80						
DEPTH (m)	0.41						
DEPTH (ft.)	1.35						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked RS

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 6IN. 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	
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	-	6	DO	Air Hammer	18/24	
17.98 59.0		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 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 6IN. 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

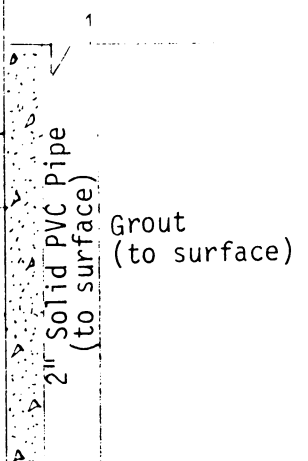
DATE STARTED 5/27/81

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		CONTINUED						
94.0		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	-	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						CONTINUED



Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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


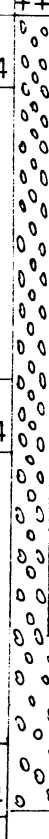
BORING LOG G41-H18B

SHEET 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.			
39.32 129.0		CONTINUED						CONTINUED		
		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	 2" Solid PVC Pipe Grout (to surface) 41.76 137.0 Bentonite Clay Seal 42.67 140.0	
				-	15	DO	Air Hammer	24/24		Pea Gravel
44.20 145.0		Very dense, brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse sand, trace silt	SP						 2" Slotted PVC Pipe 44.81 147.0 Pea Gravel 47.85 157.0 Pea Gravel (to bottom of boring)	
				-	16	DO	Air Hammer	24/24		Pea Gravel
				-	17	DO	Air Hammer	24/24		Pea Gravel
49.99 164.0		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 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 6IN. 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	
				-	19	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 6IN. REC./ATT.						
57.61 189.0		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM	-	20	D0	Air Hammer	24/24					
59.44 195.0							Very dense, brown, fine to medium SAND, trace silt	SP	-	21	D0	Air Hammer	18/18
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	D0						Air Hammer	18/18
68.28 224.0							CONTINUED					Air Hammer	15/18

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 6IN. REC/ATT.	
84.28		CONTINUED						
276.5		Very dense, dark brown, SILT, trace fine sand, trace clay	ML					
85.34		Weathered, green and red, metavolcanic TUFF						
280.0								
86.26								
283.0		Sound, green, metavolcanic TUFF		-	29	RC	Rotary	13/60
87.78								
288.0								

END OF BORING

NOTES

1. 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	6/10/81						
DEPTH (m)	28.59						
DEPTH (ft.)	93.8						

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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	BLOWS / FOOT	SAMPLES			REMARKS	
					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)	M	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-J11

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 6IN. (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 Occasional cobbles noted at 36.0-39.0'	SP- SM	100 4"	8	DO	100/4"	4/4
			SM	115 4.5"	9	DO	115/4.5"	2/4.5
				150 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 Occasional cobbles noted at 46.0'-49.0' Scattered boulders noted at 49.0'-54.0' and 56.0'-57.0'	GM to SM	120 0"	11	DO	120/0"	0/0
			SM	150 7"	12	DO	125-50/1"	5/7
				150 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 2"	14	DO	200/2"	0.5/2
19.96 65.5			SM					
		CONTINUED						

Job No 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WB

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 6IN. (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' - 73.0' 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								
99.7								

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 736035
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. 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 6IN. (Note 1)	
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	30-100	12/12
				183 10"	6	DO	35-83-100 4"	16/16
				150 4"	7	DO	150/4"	3/4
8.38 27.5		Very dense, red-brown, fine to medium SAND, trace to some gravel, trace to some silt	SP SM to SM	200 6"	8	DO	200/6"	6/6
11.13 36.5				CONTINUED				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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

BORING LOG G41-J14

SHEET 2 OF 3

SURFACE ELEV 1689.2 ft. (514.33m) 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	SP-SM to SM	200 4"	9	DO	200/4"	2/4	
		Boulder noted at 39.0'-40.0'							
13.72' 45.0				200 3"	10	DO	200/3"	1/3	
				200 5"	11	DO	200/5"	4/5	
		Very dense, red-brown, fine to medium SAND, trace to some silt, trace to some gravel	SP-SM to SM	200 4"	12	DO	200/4"	4/4	
		Cobble noted at 58.5'-59.2'		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 6IN. (Note 1)	
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	
	200							
24.45		END OF BORING HOLE GROUTED AT COMPLETION		6	17	DO	200/3"	0/3
80.2								

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 by jls
Checked by CS

COOR. 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 6IN. (Note 1) REC/ATT. (Ins.)	
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. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 208

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. 736085
Scale _____

Golder Associates

Drawn jls
Checked RCB

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

BORING LOG 641-113

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 6IN. (Note 1)	
0.0		Peat, rootmat and topsoil	PT					
0.91				32	1	DO	5-20-12	12/13
3.0				48	2	DO	9-22-26	12/13
				46	3	DO	12-20-26	13/13
		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		64	4	DO	16-13-46	12/13
				25	5	DO	13-12-13	18/13
7.01				87	6	DO	14-32-55	11/18
23.0			SP					
		Dense to very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt		38	7	DO	14-20-13	9/18
10.06								
33.0		CONTINUED						

2" Solid PVC Pipe

2" Slotted PVC Pipe

Grout

Bentonite
Clay Seal

Pea
Gravel

Pea
Gravel

4/13/79

CONTINUED

4.57
15.0

5.49
13.0

7.01
23.0

9.45
31.0

10.06
33.0

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 BIN. (Note 1)	
20.42		CONTINUED						
67.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt	SP SM	195 6	15	D0	195/6"	6 / 6
21.49								
70.5		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 as

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 6IN. (Note 1) REC./ATT. (ins.)	
0.15 0.5		topsoil and rootmat						
		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 27.5		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
9.91 32.5				CONTINUED				

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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

BORING LOG G41-J19

SHEET 2 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.)		
9.91 32.5		CONTINUED							
				183 11"	8	DO	83-100/5"	11/11	
				100 3'	9	DO	100/3"	3/3	
		Very dense, brown to orange-brown, silty fine to coarse SAND, trace fine to coarse gravel	SM	181 6"	10	DO	181/6"	6/6	
				153 6"	11	DO	153/6"	6/6	
		Cobble noted at 40.0'-40.5'							
				200 4'	12	DO	200/4"	4/4	
				100 4'	13	DO	100/4"	4/4	
				100 4'	14	DO	100/4"	4/4	
20.13 66.0		CONTINUED							

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				
75.5				6"	16	DO	100/6"	6/6

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 [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 6IN. (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 00	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 00	Air Hammer	6/6	
44.50 146.0		CONTINUED			3 00	Air Hammer	12/12	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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 6IN. (Note 1)	
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	10/12
				-	7	DO	Air Hammer	0/0
55.17 181.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 703

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 6IN. (Note 1)	
55.17 181.0		CONTINUED						
57.91 190.0		Very dense, brown, fine gravelly, fine to coarse SAND, some silt, occasional cobbles	GP GM	-	3 DO	Air Hammer	12/12	
59.44 195.0		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt	SM SM	-	9 DO	Air Hammer	18/18	
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

COORD. 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)
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	Air Hammer	6/6
								72.39
								237.5
								Bentonite Clay Seal
								73.15
								240.0
								Pea Gravel
74.07		CONTINUED						
243.0								

2" Solid PVC Pipe to Surface

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MB

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 6IN. (Note 1)	
74.07 243.0		CONTINUED						CONTINUED
75.44 247.5		Very dense, red-brown, silty fine to coarse SAND, trace to some fine gravel	SM	-	13	DO	Air Hammer 12/12	2" Solid PVC Pipe Pea Gravel
78.86 262.0		Very dense, brown, fine to coarse SAND, some fine gravel, trace silt, trace clay	SM	-	14	DO	Air Hammer 18/18	
82.91 272.0		Very dense, brown, fine to coarse SAND, trace silt, trace clay	SM	-	15	DO	Air Hammer 18/18	2" Slotted PVC Pipe Pea Gravel
84.43 277.0		Greenish-gray, highly weathered metavolcanic TUFF		-	16	DO	Air Hammer 6/6	Pea Gravel (to bottom of boring)
		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 209

COOR. 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 6IN. (Note 1)	
84.43 277.0		CONTINUED 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. (E696760m)

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)	
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 [Signature]

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	SM		9	DO	Air Hammer	0/3
		Boulder noted at 42.5'-44.5'						
					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		12	DO	Air Hammer	7/7
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. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

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 98.0		CONTINUED							
		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) 31.55 Bentonite Clay Seal 103.5 32.16 Pea Gravel 105.5 33.10 4/18/79 2" 108.6 33.32 109.3
33.99 111.5									
		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	2" Slotted PVC Pipe Pea Gravel 36.36 119.3
37.24 122.2									

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. 736035
Scale 1"=5'

Golder Associates

Drawn jls
Checked [Signature]

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	4/13/79	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 RB

COOR. N114850 ft. (N35007m)
E2286070 ft. (E696795m)

BORING LOG G41-K13R

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)		REC./ATT. (ins.)
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					Pea Gravel
6.10				8"	4	DO	20-32-100/2"	10/14	
20.0		END OF BORING		100					Pea Gravel (Note 4)
				6"	5	DO	100/6"	6/6	

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. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 203

COOR. 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 DHB

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	SAMPLES				REMARKS	
				BLOWS / FOOT	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 703

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 6 IN. (Note 1) REC/ATT. (ins.)		
10.82		CONTINUED							
35.5		<p>Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, frequent cobbles and boulders</p> <p>Boulders noted at 34.0'-37.5', 56.0'-57.0' and 59.0'-62.5'</p>	SP SM	162 10					
				9	DO	42-120/4"	4/10		
				86	10	DO	26-6C	4/12	
				150 11			150/4"	0/4	
				200 11			12	DO	110-90/5"
				200 4"	14	DO	200/4"	2/4	
19.81		CONTINUED							
65.0									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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)	
19.81		CONTINUED						
65.0		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	
24.17				150				
79.3				4"	17	DO	150/4"	3/4

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 WB

COORD. 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 6 IN. (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	
				43	5	DO	18-22-21	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	162					
17.5				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 AKG

COOR. 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)	
9.75		CONTINUED						
32.0		Very dense, brown to light brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, frequent cobbles	SP-8"	206	8	DO	100 50-106-2"	14/14
11.43			SM					
37.5		Very dense, brown to light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt, frequent cobbles 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-11"	171	9	DO	71-100/5"	11/11
			SP-10"	100	10	DO	100/0"	0/0
			SP-5"	110	11	DO	110/5"	0/5
			SP-1"	106	11A	DO	106/1"	0/1
			SP-6"	150	12	DO	150/6"	3/6
			SP-3"	135	13	DO	135/3"	0/3
19.20		CONTINUED						
63.0		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn ils
Checked MRR

COOR. 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 BIN. (Note 1)	REC./ ATT. (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	7/13		
				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 MBB

COOR. N109730 ft. (N33446m)
 E2285890 ft. (E696742m)
 SURFACE ELEV. 1680.4 ft. (512.17m)
 DATUM USGS MSL
 DRILL RIG Schramm Rotadrill T64HP

BORING LOG G41-K21A

SHEET 1 OF 9

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

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		
				-	7	DO	Air Hammer 15/18		
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						
21.03 69.0		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 4 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.	
31.70		CONTINUED						
104.0		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					
				- 12	DO	Air Hammer	18/18	
35.05		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					
115.0				- 13	DO	Air Hammer	18/18	
				- 14	DO	Air Hammer	18/18	
42.37		CONTINUED						
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	
47.24				Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP	-	17	DO
155.0		-	18			DO	Air Hammer 10/18	
53.04		CONTINUED						
174.0		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 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 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.	
82.75 271.5		CONTINUED						
		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						
90.83 298.0				-	30	RC	Rotary	6/36

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 6IN. 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		
				-				Air Hammer	
				-	2	DO		18/18	
4.72 15.5		Dense, multi-colored, fine to coarse GRAVEL and cobbles	GP				Air Hammer		
				-	3	DO		6/12	
7.62 25.0		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				Air Hammer		
				-	4	DO		0/6	
				-	4a	DO		12/18	
11.43 37.5		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 6IN. 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	
								6/10/81 29.82 97.8 2" Solid PVC Pipe Grout (to surface)	
32.46 106.5		CONTINUED						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 6IN. 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	D0	Air Hammer 15/18	<p>2" Solid PVC Pipe Grout (to surface)</p>
	-			13	D0	Air Hammer 12/18		
	-			14	D0	Air Hammer 18/18		
39.62		Very dense, dark gray, SILT, trace fine sand, small organic particles throughout	ML					40.84
130.0								134.0
								Bentonite Clay Seal 41.76
								137.0
42.37								Pea Gravel
139.0		CONTINUED						CONTINUED

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. 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	D0	Air Hammer	15/18
				-	20	D0	Air Hammer	18/18
				-	21	D0	Air Hammer	18/18
63.70		CONTINUED						
209.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

BORING LOG G41-K26

SHEET 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.	
63.70 209.0		CONTINUED						
		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	
72.85 239.0		CONTINUED						

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 MSI 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.	
72.85 239.0		CONTINUED							
		Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP						
				-	25	D0	Air Hammer	18/18	
75.29 247.0		Very dense, red-brown, silty fine to coarse SAND, some fine gravel	SM						
				-	26	D0	Air Hammer	0/18	
				-	27	D0	Air Hammer	24/24	
80.16 263.0		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						
				-	28	D0	Air Hammer	24/24	
82.30 270.0		Very dense, brown to multi-colored, fine to coarse sandy, fine to coarse GRAVEL, trace silt	GP						
83.52 274.0									
		CONTINUED							

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 Rotadri11 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.		
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	
91.29		Very dense, brown and red-brown, varved SILT, trace fine sand with thin (1/16") discontinuous seams of clayey SILT	ML	-	31	DO	Air Hammer	18/18	
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

COOR. 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		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		
3.0				12	3	DO	4-6-6	14/18		
				20	4	DO	5-12-8	15/18		
				70	5	DO	34-36	4/12		
				137	6	DO	33-43-94	12/18		
5.49		Very dense, brown to red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay	SM	153	7	DO	89-64/3"	8/9		
18.0										
					8	-	No Recovery	-		
					9	-	No Recovery	-		
10.97										
36.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JB

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 6 IN. (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 6IN. (Note 1) REC./ATT. (ins.)	
20.42		CONTINUED						
67.0		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	179 9'	16	DO	79-100/3"	6/9
22.10				200 6'	17	DO	200/6"	3/6
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
27.58				110 6'	20	DO	110/6"	4/6

90.5
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 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 MB

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 6IN. (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. 786085
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 BIN. (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		Very dense, red-brown, fine to coarse SAND and SILT, trace fine gravel, trace clay	SM	141	14	DO	39-102	8/12	
19.20									
63.0		Very dense, red-brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel, trace clay	SM	146	10	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-L13

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	BLOWS / FOOT	SAMPLES				REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 8IN. (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									
78.0		Very dense, light brown, fine SAND, trace silt	SP SM	77	19	D0	23-31-46	10/13	
25.30									
33.0		Very dense, red-brown, silty fine to coarse SAND, some fine to medium gravel	SM						
26.37				93	20	D0	36-32-61	12/13	

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. 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	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 8 IN. (Note 1) REC/ATT. (ins.)		
0.15 0.5		Dark red topsoil and rootmat		6	1	DO	3-2-4	18/18	
		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	12/13	
				100	5	DO	22-44-56	12/13	
				145	6	DO	45-100	9/12	
				150 10"					
9.45 31.0		CONTINUED			7	DO	45-50- $\frac{100}{4}$ "	16/16	

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		
16.76		Very dense, brown, fine to coarse SAND and SILT, some fine gravel, occasional cobbles	SM	150 3"	13	DO	150/3"	1/3		
55.0										
						100 2"	14	DO	100/2"	2/2
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 6IN. (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

- 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 jls
Checked OCB

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)	
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
				14	3	DO	5-10-4	18/18
4.38								
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	5	DO	100/6"	6/6
				135	6	DO	45-90	8/12
9.49		CONTINUED						
31.0								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked OCB

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'		150	7	DO	50-100	8/12		
			SM	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		102	6"	12	DO	102/6"	6/6	
			SM	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 65.0		CONTINUED Very dense, brown, fine to coarse SAND, some silt, some clay, trace fine gravel, frequent cobbles and boulders	SM	100 1"	14 DO	100/1"	0/1	

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 MB

COOR. 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		Dense, light brown, fine to coarse SAND, trace fine gravel, trace silt	SP	28	2	DO	4-12-16	12/18			
4.0											
2.29		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	DO	5-10-10	18/18			
7.5											
						17	4	DO	12-9-8	18/18	
5.34		Dense to very dense, light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt	SP	53	5	DO	9-28-25	8/18			
17.5											
						29	6	DO	9-12-17	16/18	
						53 8"	7	DO	18-35/2"	5/8	
9.45											
31.0											
10.36		See next page									
34.0		CONTINUED									

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked 2/3/80

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	12/18	
				210	14	DO	60-150	12/12	
20.73 68.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

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 6 IN. (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 mab

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	
5.33				23	4	DO	5-10-13	18/18	
17.5									
				20	5	DO	6-6-14	17/18	
		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	89 9"	6	DO	26-63/3"	9/9	
		Cobble noted at 26.0'-26.5'							
				63	7	DO	29-32-31	14/18	
10.36									
34.0		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 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 6IN. REC./ATT.	
10.36		CONTINUED						
34.0		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	DO	48-120/6"	10/12
	208			9	DO	88-107- $\frac{100}{4}$ "	8/16	
	225			10	DO	225/4.5"	2/4.5	
	400			12	DO	400/4"	4/4	
	140			11	DO	40-100	0/12	
17.53		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	13	DO	68-100/4"	7/10
57.5				152	14	DO	48-104	6/12
20.42				CONTINUED				
67.0		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		CONTINUED								
67.0		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		
26.06				150 0"	18	DO	150/0"	0/0		

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					6/10/81 0.97 3.2 2" Solid PVC Pipe (to surface) Grout (to surface)	
				-	1	D0	Hydraulic Push		12/18
				-	2	D0	Hydraulic Push		24/24
5.18									
17.0		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	D0	Hydraulic Push	15/18	
7.92		Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded	SP						
26.0				-	4	D0	Hydraulic Push	12/18	
11.43									
37.5		CONTINUED						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 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 37.5		CONTINUED							CONTINUED		
		Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded	SP	-	5	DO	Hydraulic Push	15/18		Grout 11.89 39.0	
											Bentonite Clay Seal 12.80 42.0
						-	6	DO	Air Hammer	18/18	15.24 50.0
						-	7	DO	Air Hammer	18/18	18.29 60.0
19.51 64.0		Very dense, brown, fine SAND, some silt, very poorly graded	SM							2" Solid PVC Pipe Pea Gravel	
						-	8	DO	Air Hammer	18/18	Pea Gravel (to bottom of boring)
21.79 71.5		CONTINUED								2" Slotted PVC Pipe	

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 8IN. 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	D0	Air Hammer	18/18	
26.82									
88.0									
		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	D0	Air Hammer	18/18	
32.46									
106.5									
		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 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.		
32.46 106.5		CONTINUED							
		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
			-			15	DO	Air Hammer	18/18
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 6 IN. 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		Sound, green, metavolcanic TUFF						
156.5								
48.46		Green and red, weathered metavolcanic TUFF						
159.0								
48.92								
160.5								

END OF BORING

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 25.0		Dense, orange-brown, fine to medium SAND, trace fine gravel, trace silt, trace clay, very weakly cemented	SP-SM					
				-	4	DO	Air Hammer 16/16	
9.60 31.5		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 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 6 IN. 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		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				Air Hammer	
				-	5	DO		12/12
				-	6	DO	Air Hammer	4/4
16.76		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel	SM					
55.0								
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		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
22.86								
75.0		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
26.52								
87.0		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay, occasional cobbles	SM	-	10	DO	Air Hammer	18/18
28.65								
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 6 IN. 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 6 IN. 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
				-	14	DO	Air Hammer	15/18
				-	15	DO	Air Hammer	18/18
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					
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	
		Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay	SM	-	18	DO	Air Hammer	12/18	
53.34									
175.0									
		CONTINUED		-	19	DO	Air Hammer	18/18	
55.32									
181.5									

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

BORING LOG G41-M15

SHEET 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
				-	24	DO	Air Hammer	18/18
72.24		Hard, Red, CLAY and green ROCK FRAGMENTS (weathered meta-volcanic tuff)						
237.0								
74.37		CONTINUED						
244.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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 6IN. 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 6IN. (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	
									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	24	3	DO	11-11-13	18/18	8.0	
12.5				84	4	DO	19-24-60	18/13		
						152	5	DO	21-71-81	18/18
						184	6	DO	84-100/3"	7/9
8.38		Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM						Pea Gravel	
27.5				150	7	DO	50-100/3"	7/9	6.55	
9.39								21.5		
30.8		END OF BORING							9.39	
									30.8	

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 Jls

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	SAMPLES				GROUNDWATER OBSERVATION WELL		
				BLOWS / FOOT	NUMBER	TYPE	HAMMER BLOWS PER 6IN. (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	DO	6-12-57	12/18		
						12	3	DO	6-6-6	7/18
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							
				120	4	DO	22-65-55	12/18		
						101	5	DO	14-27-74	12/18
				141 16"	6	DO	20-57- ⁸⁴ / ₄ "	4/16		
				157 9"	7	DO	57-100/3"	4/9		
10.36 34.0		CONTINUED								

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MAB

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 6IN. (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	<p>Grout (to surface)</p> <p>2" Solid PVC Pipe to Surface</p> <p>Bentonite Clay Seal</p>			
						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	16.76			
18.29									55.0			
60.0		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	0"	13	DO	100/0"	0/0			
20.88				100	14	DO	16-47-53	18/18				
68.5		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 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 6IN. (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	D0	15-25-50	18/18	Bentonite Clay Seal	
			54	16	D0	18-19-35	18/18		23.16
			50	17	D0	15-22-28	18/18	76.0	
			65	18	D0	25-35-30	18/18	Pea Gravel	
			115 6"	19	D0	115/6"	6/6		2" Solid PVC Pipe
			195 9"	20	D0	87-108/3"	9/9		
28.19			Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt	SP SM to SM	112 6"	21	D0	112/6"	5/6
92.5									98.0
31.09		CONTINUED						Caved Material	
102.0		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WLB

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		CONTINUED						CONTINUED	
102.0		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		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	
125.0									
41.45		CONTINUED						CONTINUED	
136.0		CONTINUED						CONTINUED	

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked NRB

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 6IN. (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 Caved Material 45.23 148.4
45.87						200 6"	26	DO	200/6"

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	3/23/80	9/2/80	9/10/80		
DEPTH (m)	41.73	41.76	41.79	41.79	41.98		
DEPTH (ft.)	136.9	137.0	137.1	137.1	137.4		

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MAR

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

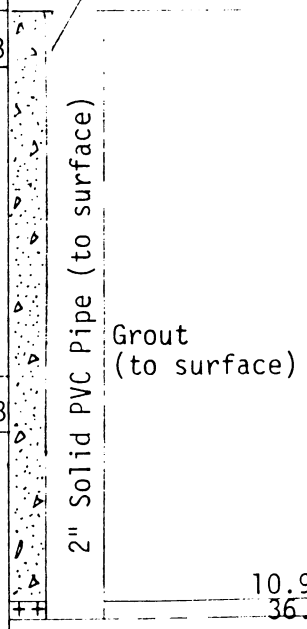
SHEET 1 OF 6

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 6IN. REC/ATT.		
0.0		Compact, light brown, fine to medium SAND, trace silt	SP						
				-	1	DO	Air Hammer	12/18	6/10/81
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		CONTINUED						10.97 36.0	



Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

BORING LOG G41-P16

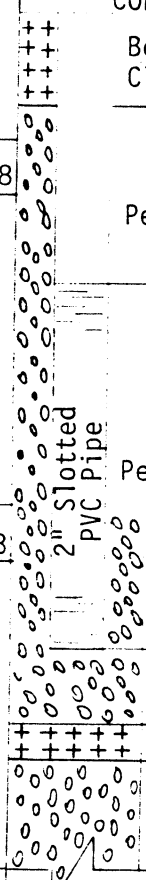
SHEET 2 OF 6

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 39.0	
				-	5	DO	Air Hammer	18/18	Pea Gravel 13.41 44.0
13.72		Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM					Pea Gravel 16.46 54.0	
45.0				-	6	DO	Air Hammer	18/18	Pea Gravel 17.07 57.0
				-	7	DO	Air Hammer	18/18	Pea Gravel (to bottom of boring) 58.0
21.79								++ ++ ++ ++ 17.68 57.0	
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 6IN. 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
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 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 6IN. 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								
145.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles	SM	-	16	D0	Air Hammer	6/18
48.46								
159.0		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 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 6 IN. REC/ATT.	
48.46 159.0		CONTINUED						
		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 6 IN. (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									
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	
8.23				13	6	DO	2-2-11	18/18	
27.0		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	
				16	8	DO	39-11-5	3/18	
11.28									
37.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked WCB

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)	
11.28 37.0		CONTINUED						
		Compact to very dense, red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay	SM	15	9	D0	8-7-8	3/18
				60	10	D0	25-27-33	18/18
				140 10"				
15.70 51.5				11	D0	30-40- ¹⁰⁰ _{4"}	10/16	
		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	139	12	D0	17-47-92	18/18
				134	13	D0	12-24-110	1/18
				155	14	D0	60-90-65	9/18
20.88 68.5		CONTINUED						

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

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 8IN. (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 SM	92	15	D0	21-37-55	5/13	→
21.95									
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	12/16	Grout (to surface)
		Boring abandoned at 90.0' because of uncontrollable caving. Relocated hole 5' to the south. See notes 2 and 5.		149	17	D0	33-59-90	18/18	2" Solid PVC Pipe to Surface
		Boring abandoned at 90.0' because of uncontrollable caving. Relocated hole 5' to the south. See notes 2 and 5.		156	18	D0	47-56-100	18/18	
27.43		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	112 9'	19	D0	35-77/3"	0/9	28.04
90.0									
		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	190	20	D0	63-30-110	14/13	Bentonite Clay Seal
									28.96
									95.0
		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		182	21	D0	68-120	8/12	Pea Gravel
									30.48
31.39		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							Pea Gravel
									100.0
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 8 IN. (Note 1)		REC./ ATT. (ins.)
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	130	22	D0	24-40-90	0/18	2" Slotted PVC Pipe Pea Gravel (to bottom of boring) 33.53 110.0
33.99									
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.)							38.10 125.0 (Note 3)
39.62									

END OF BORING

(See sheet 5 for notes)

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 8IN. (Note 1)		REC./ ATT. (ins.)
0.0		Very loose, dark brown ROOT MAT, SILT and SAND	PT	3	1	DO	1-2-1	6/18	4/19/79 0.15
0.61									
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
		-	5			DO	Push	10/13	
		-	6			TO	Push	24/24	
		4	7			DO	2-2-2	18/18	
8.84									2" Solid PVC Pipe to Surface
29.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RB

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

BORING LOG G41-P13B

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 6IN. (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	D0	3-4-4	15/13	Grout 9.14	
10.21										Bentonite 30.0 Clay Seal 10.06
33.5		Compact, light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	22	9	D0	6-12-10	8/13	Pea Gravel 10.67 35.0	
										Pea Gravel
						22	10	D0	7-3-14	7/13
13.56									Caved Material	
44.5		END OF BORING							(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 RB

COORD. 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	3/2/80	3/9/80	8/16/80	3/20/80	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 SKB

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									
		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		
				-	4	DO	Air Hammer	3/18	
						-	5	DO	Air Hammer 12/12
		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				Air Hammer		
				-	6A	DO		0/12	
				-	6B	DO		10/10	
				-	7	DO	Air Hammer 15/15		
10.36									
34.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MCB

COOR. 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 8IN. (Note 1)	
10.36		CONTINUED						
34.0		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
							Air Hammer	
				-	9	DO		12/12
12.95								(Note 3)
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				Air - Hammer	
				-	10	DO		6/12
							Air - Hammer	
				-	11	DO		12/12
				-	12	DO	Air Hammer	2/3
							Air - Hammer	
				-	13	DO		9/9
				-	14	DO	Air Hammer	6/7
20.42		CONTINUED						
67.0								

Job No. 786085
 Scale 1"=5'

Golder Associates

Drawn jls
 Checked [Signature]

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 6 IN. (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	<p>Grout (to surface)</p> <p>2" Solid PVC Pipe to Surface</p> <p>27.43</p> <p>▼ 27.65 90.0</p> <p>90.7 1/10/80</p> <p>Bentonite Clay Seal</p> <p>28.96</p> <p>95.0</p> <p>Pea Gravel</p>
				-	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	-	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	-	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 MKB

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			Air Hammer		Solid 2" Slotted PVC Pipe 31.39 103.0 34.44 113.0 Pea Gravel (to bottom of boring)		
	-			21	DO		0/12		Pea Gravel	
									Air Hammer	
	-			22	DO		10/13		Pea Gravel	
									Air Hammer	
				-	23	DO	12/12	Pea Gravel (to bottom of boring)		
						Air Hammer				
				-	24	DO	6/9			
40.54		CONTINUED								
133.0										

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MSB

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)		REC/ATT. (ins.)
40.54 133.0		CONTINUED							
		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	-	25	DO	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	DO	Air Hammer	0/4	
						-	26B	DO	Air Hammer
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	DO	Air Hammer
50.29 165.0		CONTINUED							

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

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 to GP	-	28	D0	Air Hammer	4/14
				-	29	D0	Air Hammer	5/12
				-	30	D0	Air Hammer	12/14
56.39 185.0		Very dense, light brown, fine to coarse SAND, trace fine gravel, trace silt	SP					
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 MLB

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 MRS

COOR. 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 6IN. (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	DO	Air Hammer	18/18	
74.68 245.0									
		Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt	SP	-	36	DO	Air Hammer	15/15	
						-	37	DO	Air Hammer
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-SM						
81.84 268.5				CONTINUED					

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MLB

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 6IN. (Note 1)	
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
				-	41	DO	Air Hammer	8/15
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								
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 MEB

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)	REC./ ATT. (ins.)	
101.80 334.0		CONTINUED							
		Gray-green, highly weathered to weathered metavolcanic TUFF							
				-	45	HX RC	-	58/60	

105.16
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 MKB

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		- 4	DO	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 6IN. 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 3 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.	
20.27 66.5		CONTINUED						
		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	-	8	DO	Air Hammer	4/18
				-	9	DO	Air Hammer	8/18
				-	10	DO	Air Hammer	6/18
				-	11	DO	Air Hammer ↓	3/12
30.94 101.5		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.		
30.94 101.5		CONTINUED								
		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	D0	Air Hammer	8/12		
				-	13	D0	Air Hammer	0/18		
38.56 126.5		Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth.	SP							
				-	14	D0	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 6IN. REC/ATT.		
41.61 136.5		CONTINUED							
		Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth.	SP	-	15	DO	Air Hammer	18/18	2" Solid PVC Pipe to Surface Grout (to surface)
				-	16	DO	Air Hammer	18/18	
				-	17	DO	Air Hammer	5/17	
49.83 163.5		CONTINUED						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	
				-	18	DO	Air Hammer		15/15	Bentonite Clay Seal	167.0
											51.82
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	Pea Gravel	170.0	
				-	19	DO	Air Hammer		18/18		53.93
											177.0
									Pea Gravel	57.00	
									Pea Gravel (to bottom of boring)	187.0	
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

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/AT.	
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 9 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.	
79.71		CONTINUED						
261.5		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		Very dense, multi-colored, fine to coarse sandy, fine to coarse GRAVEL, some gravel decomposed	GP					
277.5				-	29	D0	Air Hammer	15/18
88.09		CONTINUED						
289.0								

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. 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 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.	
88.09 289.0		CONTINUED						
		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	6/10/81					
DEPTH (m)	6.87					
DEPTH (ft.)	22.5					

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N118955 ft. (N36257m)
 E2268700 ft. (E691500m)

BORING LOG G40-G7

SHEET 1 OF 3

SURFACE ELEV. 1548.4 ft. (471.94m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/12/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
9.14 30.0		Refer to boring DMA-48 for stratigraphy between 0-30 feet						
		Compact, brown, fine to coarse SAND, some gravel, trace silt	SP-SM	-	1	DO AIR HAMMER	20/20	
				-	2	DO AIR HAMMER	20/24	
				-	3	DO AIR HAMMER	18/18	
17.53 57.5		CONTINUED						

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N118955 ft. (N36257m)
E2268700 ft. (E691500m)

BORING LOG G40-G7

SHEET 2 OF 3

SURFACE ELEV. 1548.4 ft. (471.94m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/12/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
17.53 57.5		CONTINUED						
18.81 61.7		Compact, brown, fine to coarse SAND, some gravel, trace silt	SP-SM	-	4	DO AIR HAMMER	20/20	
24.38 80.0		Dense, brown, fine to medium SAND, trace silt	SP	-	5	DO AIR HAMMER	18/18	
24.90 81.7		Stiff, brown SILT	ML	-	6	DO AIR HAMMER	17/21	
26.67 87.5		Brown, fine to coarse, gravelly SAND, trace silt	SP					
		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COORD. N118955 ft. (N36257m)
E2268700 ft. (E691500m)

BORING LOG G40-G7

SHEET 3 OF 3

SURFACE ELEV. 1548.4 ft. (471.94m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/12/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
26.67 87.5		CONTINUED							
		Brown, fine to coarse, gravelly SAND, trace silt	SP	-	7	DO	AIR HAMMER	20/24	
				-	8	DO	AIR HAMMER	5/11	
				-	9	DO	AIR HAMMER	-	
				-	10	WO	-	-	
35.66 117.0 36.27 119.0		Top of weathered rock, very dense, green bedrock	-						
		END OF BORING							

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N117745 ft. (N35888m)
E2271185 ft. (E692258m)

BORING LOG G40-L9

SHEET 1 OF 4

SURFACE ELEV. 1621.0 ft. (494.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/5/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
30.48		Refer to boring DMB-10 for stratigraphy between 0-100 feet						
100.0		Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM	-	1	DO AIR HAMMER	3/8	
32.00								
105.0		Very dense, brown, fine to medium SAND	SP	-	2	DO AIR HAMMER	8/12	
35.05								
115.0		Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM	-	3	DO AIR HAMMER	5/5	
38.10								
125.0		Very dense, orange-brown, fine to coarse SAND, trace silt, trace fine gravel	SP					
38.86								
127.5		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N117745 ft. (N35888m)
 E2271185 ft. (E692258m)

BORING LOG G40-L9

SHEET 2 OF 4

SURFACE ELEV. 1621.0 ft. (494.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/5/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC./ATT.		
38.86		CONTINUED							
127.5		Very dense, orange-brown, fine to coarse SAND, trace silt, trace fine gravel	SP	-	4	DO AIR HAMMER	18/18		
41.15									
135.0		Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel with lens of gray clayey silt and fine to medium sand at 150.0'	SM	-	5	DO AIR HAMMER	14/18		
47.24									
155.0				Very dense, brown, fine to coarse SAND, some silt	SM	-	6	DO AIR HAMMER	8/8
49.23									
161.5		CONTINUED							
				-	7	DO AIR HAMMER	6/6		

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N117745 ft. (N35888m)
 E2271185 ft. (E692258m)

BORING LOG G40-L9

SHEET 3 OF 4

SURFACE ELEV. 1621.0 ft. (494.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/5/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			REMARKS	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
49.23		CONTINUED							
161.5		Very dense, brown, fine to coarse SAND, some silt	SM						
50.29									
165.0		Very dense, brown, silty, fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some silt, trace clay	SM	-	8	DO AIR HAMMER	6/8		
						-	9	DO AIR HAMMER	12/12
56.39		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel	SM						
185.0									
				-	10	DO AIR HAMMER	4/4		
59.44		CONTINUED							
195.0									

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COORD. N117745 ft. (N35888m)
E2271185 ft. (E692258m)

BORING LOG G40-L9

SHEET 4 OF 4

SURFACE ELEV. 1621.0 ft. (494.08m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/5/82 DATE COMPLETED 1/13/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			REMARKS
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
59.44		CONTINUED						
195.0		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel	SM					
60.20								
197.5		Very dense, brown, fine to medium SAND, trace silt to fine sand and silt	SM					
				-	11 DO	AIR HAMMER	0/6	
				-	11A DO	AIR HAMMER	2/12	
62.79								
206.0		Green weathered bedrock						
64.01								
210.0		END OF BORING						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N116745 ft. (N35584m)
E2272895 ft. (E692779m)

BORING LOG G40-P10A

SHEET 1 OF 4

SURFACE ELEV. 1651.4 ft. (503.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
21.34		Drilled to depth of 70 feet before sampling						
70.0				- 1	DO	AIR HAMMER	15/18	
								Grout (to surface) 23.77
								Bentonite Clay Seal 78.0 24.38
				- 2	DO	AIR HAMMER	18/18	80.0
								2" Solid PVC Pipe (to surface) Pea Gravel
		Dense to very dense, brown, fine to coarse SAND, trace silt, trace to some fine to coarse gravel	SP-SM					26.21 86.0
				- 3	DO	AIR HAMMER	15/18	Pea Gravel
								2" Slotted PVC Pipe Pea Gravel
30.18								29.26 96.0
99.0		CONTINUED						CONTINUED

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N116745 ft. (N35584m)
E2272895 ft. (E692779m)

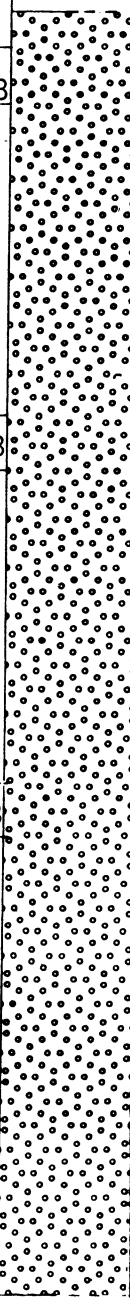
BORING LOG G40-P10A

SHEET 2 OF 4

SURFACE ELEV. 1651.4 ft. (503.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
30.18 99.0		CONTINUED						CONTINUED
		Dense to very dense, brown, fine to coarse SAND, trace silt, trace to some fine to coarse gravel	SP-SM	-	4	DOAIR HAMMER	18/18	
				-	5	DOAIR HAMMER	18/18	
35.05 115.0		Very dense, red-brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	-	6	DOAIR HAMMER	0/18	
				-	7	DOAIR HAMMER	7/7	
38.71 127.0		Very dense, red-brown, silty, fine to coarse gravelly fine to coarse SAND to silty, fine to coarse SAND and GRAVEL	SM	-	7	DOAIR HAMMER	7/7	Pea Gravel
				-				
40.84 134.0		CONTINUED						CONTINUED

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COORD. N. 745 ft. (N35584m)
 E2272895 ft. (E692779m)

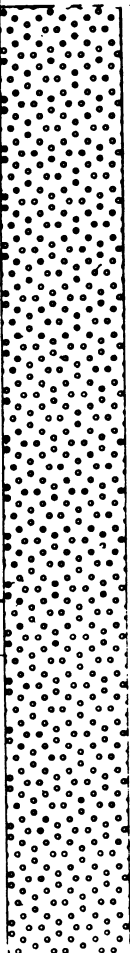
BORING LOG G40-P10A

SHEET 3 OF 4

SURFACE ELEV. 1651.4 ft. (503.33m) PROJECT EXXON CRANDON TAILINGS-DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
40.84 134.0		CONTINUED						CONTINUED
		Very dense, red-brown, silty, fine to coarse gravelly, fine to coarse SAND to silty, fine to coarse SAND and GRAVEL	SM	-	8	DO AIR HAMMER	7/18	
44.20 145.0		Very dense, brown, silty, fine to coarse gravelly fine to coarse SAND	SM	-	9	DO AIR HAMMER	18/18	
46.94 154.0		Green, weathered bedrock						
48.77 160.0		END OF BORING				DRILL CUTTINGS	-	

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N116745 ft. (N35584m)
E2272895 ft. (E692779m)

BORING LOG G40-P10A

SHEET 4 OF 4

SURFACE ELEV. 1651.4 ft. (503.33m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1656.3 ft. (504.85m).

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

DATE	1/22/82	2/5/82	2/23/82				
DEPTH (M)	24.96	24.84	24.99				
DEPTH (ft.)	81.9	81.5	82.0				

Job No. 814-1296

Scale 1"=5'

Golder Associates

Drawn CAB

Checked MTF

COOR. N112295 ft. (N34227m)
 E2275770 ft. (E693656m)

BORING LOG G40-S17

SHEET 1 OF 5

SURFACE ELEV. 1595.7 ft. (486.36m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS - FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
0.0		Brown, fine to coarse SAND, some silt, some fine gravel and cobbles	SM	-	1	DO	Air Hammer	4/18
				-	2	DO	Air Hammer	0/18
9.14						-	3	DO
30.0		Brown fine to coarse SAND and GRAVEL, trace silt	SP- SM					
11.13		CONTINUED						
36.5								

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn SKB
 Checked JVK

COOR. N112295 ft. (N34227m)

E2275770 ft. (E693656m)

BORING LOG G40-S17

SHEET 2 OF 5

SURFACE ELEV. 1595.7 ft. (486.36m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION W/ELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
11.43 37.5		CONTINUED Brown fine to coarse SAND and GRAVEL, trace silt						
				-	4	DO	AIR HAMMER	14/18
		Multicolored fine to coarse GRAVEL some fine to coarse SAND, trace silt to brown GRAVEL and fine to coarse sand, trace silt	GP to GM					
				-	5	DO	AIR HAMMER	18/18
18.29 60.0		Tan fine SAND, some fine gravel, some silt	SM					
				-	6	DO	AIR HAMMER	18/18
21.03 69.0		CONTINUED						

Job No. 814-1296
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N112295 ft. (N34227m)
E2275770 ft. (E693656m)

BORING LOG G40-S17

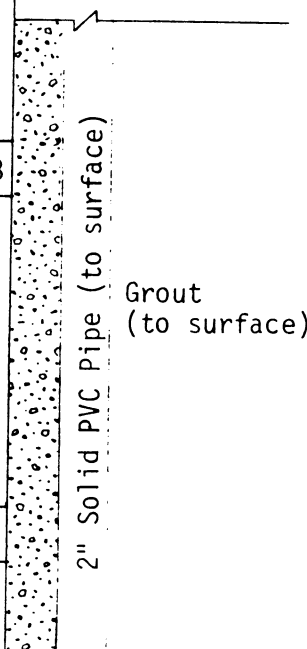
SHEET 3 OF 5

SURFACE ELEV. 1595.7 ft. (486.36m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
21.03 69.0		CONTINUED						
		Tan fine SAND, some fine gravel, some silt	SM	-	7	DO	AIR HAMMER	4/18
24.38 80.0								
		Tan, fine to medium SAND, some fine gravel, trace silt	SP	-	8	DO	AIR HAMMER	18/18
28.65 94.0								
		Red brown fine to coarse sand, some fine gravel, some silt	SM	-	9	DO	AIR HAMMER	18/18
31.70 104.0								
		CONTINUED						



Grout
(to surface)

2" Solid PVC Pipe (to surface)

CONTINUED

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N112295 ft. (N34227m)
E2275770 ft. (E693656m)

BORING LOG G40-S17

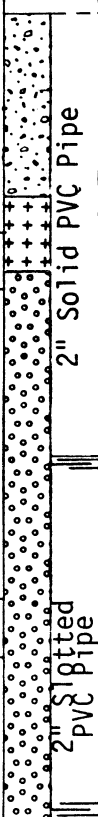
SHEET 4 OF 5

SURFACE ELEV. 1595.7 ft. (486.36m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC./ATT.		
31.70 104.0		CONTINUED						CONTINUED	
		Red brown fine to coarse sand, some fine gravel, some silt	SM	-	11	DO	AIR HAMMER	18/18	Grout
									32.22 Bentonite 109.0 Clay Seal 33.83 111.0 Pea Gravel
35.81 117.5		Tan, fine to medium SAND and SILT	SM	-	12	DO	AIR HAMMER	18/18	35.36 116.0 Pea Gravel
37.34 122.5		Brown to red brown fine to coarse SAND, some silt, some fine gravel	SM	-	13	DO	AIR HAMMER	6/6	38.41 126.0 Pea Gravel
42.37 139.0		CONTINUED							CONTINUED



Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N112295 ft. (N34227m)
E2275770 ft. (E693656m)

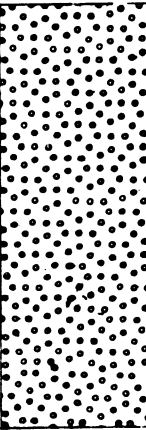
BORING LOG G40-S17

SHEET 5 OF 5

SURFACE ELEV. 1595.7 ft. (486.36m) PROJECT EXXON CRANDON TAILINGS* DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
42.37		CONTINUED							
139.0		Brown to red brown fine to coarse SAND, some silt, some fine gravel	SM	-	14	DO	AIR HAMMER	6/6	 Pea Gravel
45.93				-	15	DO	AIR HAMMER	8/8	
150.7		END OF BORING						150.7	

NOTES:

1. Elevation of top of protector pipe, 1598.7 ft. (487.29m).

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

DATE	2/11/82	2/23/82				
DEPTH (M)	5.65	5.96				
DEPTH (ft.)	18.6	19.6				

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N112335 ft. (N34240m)
E2275790 ft. (E693662m)

BORING LOG G40-S17A

SHEET 1 OF 2

SURFACE ELEV. 1595.9 ft. (486.43m) PROJECT EXXON CRANDON TAILINGS-DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/18/81 DATE COMPLETED 12/18/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Air and Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
0.0		Red brown, fine to coarse SAND, little fine to coarse gravel, some silt	SM	-	1	D0	Air Hammer 24/24	0.0		
				-	2	D0	P.H.	18/18	Grout	
				-	3	D0	P.H.	18/18		
						-	4	D0	P.H.	16/18
						-	5	D0	P.H.	12/18
						-	6	D0	P.H.	18/18
9.14								4.27		
								14.0		
								4.88		
								16.0		
								6.40		
								21.0		
								7.93		
								26.0		
								9.14		
30.0		END OF BORING						30.0		

2" Solid PVC Pipe

2" Slotted PVC Pipe

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked MTF

COOR. N112335 ft. (N34240m)
E2275790 ft. (E693662m)

BORING LOG G40-S17A

SHEET 2 OF 2

SURFACE ELEV. 1595.9 ft. (486.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/18/81 DATE COMPLETED 12/18/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Air and Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1599.7 ft. (487.59m).*

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

DATE	2/11/82	2/23/82					
DEPTH (M)	5.65	5.76					
DEPTH (ft.)	18.6	18.9					

*The protector pipe was not set in grout due to snow. If this is to be accomplished later on, the protector pipe elevation may change.

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

SHEET 1 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
0.0		Dense, tan, fine SAND, with 1/2" lenses of gray clay	SP						
				-	1	DO	P.H.	24/24	
2.29		Dense, brown, fine to coarse SAND, trace fine gravel, trace silt	SP						
7.5				-	2	DO	P.H.	20/24	
4.57		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravel, trace silt	SM						
15.0				-	3	DO	P.H.	12/24	
				-	4	DO	P.H.	5/10	
11.13		CONTINUED							
36.5									

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

SHEET 2 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	REC./ ATT.		
11.13		CONTINUED								
36.5		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravel, trace silt	SM	-	5	DO	AIR HAMMER	22/24		
13.72										
45.0		Very dense, tan, fine to coarse SAND to silty, fine SAND, generally finer with depth	SP to SM	-	6	DO	AIR HAMMER	12/12		
						-	7	DO	AIR HAMMER	19/24
21.34		CONTINUED								
70.0										

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

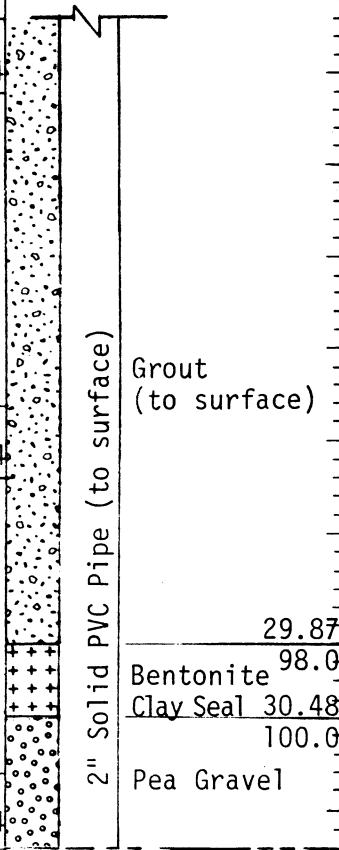
SHEET 3 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
21.34 70.0		CONTINUED							
				-	8	DO	AIR HAMMER	24/24	
				-	9	DO	AIR HAMMER	20/24	
		Very dense, tan, fine to coarse SAND to silty, fine SAND, generally finer with depth	SP to SM						
				-	10	DO	AIR HAMMER	19/24	
31.55 103.5		CONTINUED							



Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

SHEET 4 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
31.55		CONTINUED						CONTINUED	
103.5		Very dense, tan, fine to coarse SAND to silty, fine SAND, generally finer with depth	SP to SM					32.00 105.0	
				- 12	DO	AIR HAMMER	21/22	2" Solid PVC Pipe	Pea Gravel
				- 13	DO	AIR HAMMER	24/24	Pea Gravel (to bottom of boring)	
				- 14	DO	AIR HAMMER	18/18		
42.37		CONTINUED							
139.0									

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

SHEET 5 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
42.37 139.0		CONTINUED						
45.42 149.0		Very dense, tan, fine to coarse SAND, to silty, fine SAND, generally finer with depth	SP to SM	-	15	DO	AIR HAMMER	24/24
47.55 156.0		Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel	SM	-	16	DO	AIR HAMMER	14/18
49.38 162.0		Green weathered bedrock						
		END OF BORING						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N105765 ft. (N32238m)
E2278410 ft. (E694461m)

BORING LOG G40-T30

SHEET 6 OF 6

SURFACE ELEV. 1590.4 ft. (484.75m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 2/9/82 DATE COMPLETED 2/11/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1593.3 ft. (485.64m).

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

DATE	2/23/82						
DEPTH (M)	3.77						
DEPTH (ft.)	12.4						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121515 ft. (N37038m)
 E2277990 ft. (E694332m)

BORING LOG G40-X1

SHEET 1 OF 5

SURFACE ELEV. 1616.6 ft. (492.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
0.0								
				-	1	DO	AIR HAMMER	15/24
				-	2	DO	AIR HAMMER	10/10
		Dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM					
				-	3	DO	AIR HAMMER	10/10
				-	4	DO	AIR HAMMER	5/5
11.13 36.5		CONTINUED						

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N121515 ft. (N37038m)
E2277990 ft. (E694332m)

BORING LOG G40-X1

SHEET 2 OF 5

SURFACE ELEV. 1616.6 ft. (492.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
11.13		CONTINUED							
36.5		Dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	5	DO	AIR HAMMER	24/24	
15.55									
51.0		Dense, fine to coarse SAND, some clay, some gravel, trace silt	SC	-	6	DC	AIR HAMMER	11/11	
21.79									
71.5		CONTINUED							

20.42
Bentonite 67.0
Clay Seal 21.03
69.0
Pea Gravel

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121515 ft. (N37038m)
E2277990 ft. (E694332m)


BORING LOG G40-X1

SHEET 3 OF 5

SURFACE ELEV. 1616.6 ft. (492.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / 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		Dense, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay	SM	-	8	DO	AIR HAMMER	12/12	 2" Slotted PVC Pipe 2" Solid PVC Pipe	Pea Gravel
23.77				22.86						
78.0		Dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	9	DO	AIR HAMMER	18/18	75.0	Pea Gravel
25.30				25.91						
83.0		Dense, red-brown, fine to medium SAND, some clay to brown, fine to coarse SAND, some gravel, trace silt	SM	-	10	DO	AIR HAMMER	17/21	85.0	Pea Gravel (to bottom of boring)
29.72										
97.5		Dense, fine to coarse SAND, some gravel, trace silt	SP-SM	-	11	DO	AIR HAMMER			
32.46										
106.5		CONTINUED								

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121515 ft. (N37038m)
E2277990 ft. (E694332m)

BORING LOG G40-X1

SHEET 4 OF 5

SURFACE ELEV. 1616.6 ft. (492.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / 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		Dense, fine to coarse SAND, some gravel, trace silt	SP-SM						
33.53		Dense, red-brown, fine to coarse, silty SAND, some gravel, trace clay	SM						
110.0				-	12	DO	AIR HAMMER	-	
						-	13	DO	AIR HAMMER
40.08		Weathered rock, dark green, highly weathered bedrock							
131.5									
41.15		CONTINUED							
135.0									

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121515 ft. (N37038m)
E2277990 ft. (E694332m)

BORING LOG G40-X1

SHEET 5 OF 5

SURFACE ELEV. 1616.6 ft. (492.73m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/14/82 DATE COMPLETED 1/15/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
41.15 135.0		CONTINUED						
43.59 143.0		Weathered rock, dark green, highly weathered bedrock		-	14	DO	-	-

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1619.7 ft. (493.68m).

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

DATE	1/22/82	2/5/82	2/23/82				
DEPTH (M)	10.05	10.00	10.14				
DEPTH (ft.)	33.0	32.8	33.3				

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121930 ft. (N37164m)
E2277830 ft. (E694283m)

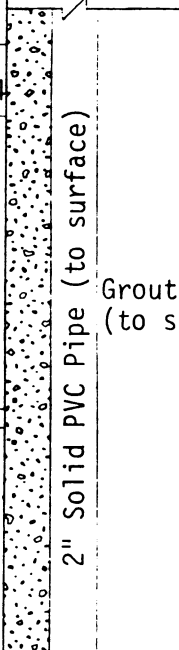
BORING LOG G40-X1A

SHEET 1 OF 3

SURFACE ELEV. 1578.9 ft. (481.25m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/13/82 DATE COMPLETED 1/14/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
0.0		Loose, brown, fine SAND, some silt, some to trace clay	SM	-	1	DO	AIR HAMMER	20/24	 <p>2" Solid PVC Pipe (to surface) Grout (to surface)</p>
				-	2	DO	AIR HAMMER	22/24	
4.57 15.0		Compact, brown and red-brown, fine to coarse SAND, trace to some fine gravel, trace to some clay, trace silt	SM to SC	-	3	DO	AIR HAMMER	18/24	
				-	4	DO	AIR HAMMER	5/6	
11.13 36.5		CONTINUED						CONTINUED	

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121930 ft. (N37164m)
E2277830 ft. (E694283m)

BORING LOG G40-X1A

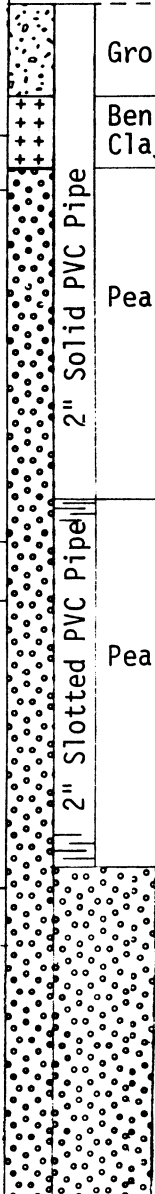
SHEET 2 OF 3

SURFACE ELEV. 1578.9 ft. (481.25m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/13/82 DATE COMPLETED 1/14/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
11.13		CONTINUED						CONTINUED
36.5		Compact, brown and red-brown, fine to coarse SAND, trace to some fine gravel, trace some clay, trace silt	SM to SC					Grout 11.89
	-			5	DO	AIR HAMMER	18/18	Bentonite 39.0 Clay Seal 12.50
								41.0
15.55		Loose, reddish brown fine to coarse SAND, some silt, trace to some fine gravel, trace clay	SM					Pea Gravel 15.24
51.0	-			6	DO	AIR HAMMER	19/21	50.0
19.20		Decomposed rock						Pea Gravel 18.29
63.0								60.0
20.73		Weathered rock						Pea Gravel
68.0								
21.03		CONTINUED						CONTINUED
69.0								

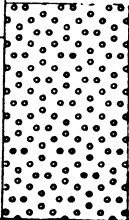


Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N121930 ft. (N37164m)
 E2277830 ft. (E694283m) **BORING LOG** G40-X1A SHEET 3 OF 3
 SURFACE ELEV. 1578.9 ft. (481.25m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 1/13/82 DATE COMPLETED 1/14/82
 DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN.	REC./ ATT.		
21.03		CONTINUED							CONTINUED	
69.0		Weathered rock, very dense, green bedrock		-	8	WO	-	-		Pea Gravel
22.86										
75.0										

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1581.7 ft. (482.11m).

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

DATE	1/22/82	2/5/82	2/23/82				
DEPTH (M)	1.58	2.32	1.59				
DEPTH (ft.)	5.2	4.8	5.2				

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N113655 ft. (N34643m)
E2279180 ft. (E694695m)

BORING LOG G40-Y15

SHEET 1 OF 6

SURFACE ELEV. 1593.4 ft. (485.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
0.0 0.46		Brown, fine to medium SAND, some silt (Fill material)	SM Pt					
1.5 0.61 2.0		Dark brown peat, woody						
3.2 10.5		Dense, gray green fine to medium SAND, trace to some silt	SP- SM					
				-	2	DO	AIR HAMMER	24/24
		Dark gray green organic silty clay, both color darkens and silt content decreases with depth	CL					
				-	3	DO	AIR HAMMER	21/48
8.67 28.5		Brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM					
				-	4	DO	AIR HAMMER	12/24
10.36 34.0		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N113655 ft. (N34643m)
E2279180 ft. (E694695m)

BORING LOG G40-Y15

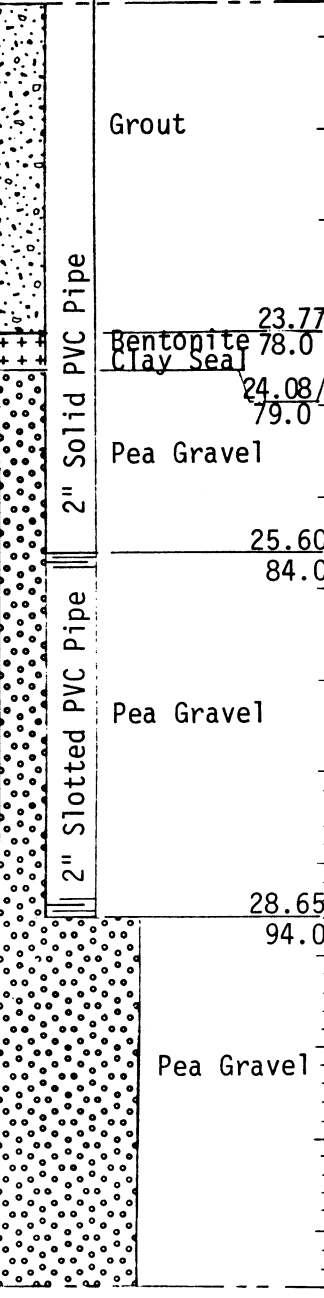
SHEET 3 OF 6

SURFACE ELEV. 1593.4 ft. (485.68m) PROJECT EXXON CRANDON TAILINGS* DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL			
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.				
21.03 69.0		CONTINUED						CONTINUED			
		Yellow brown, fine to coarse SAND, trace fine gravel, trace silt	SP	-	8	DO		24/24	Grout		
						-	9	DO	AIR HAMMER	22/22	Pea Gravel
						-	10	DO	AIR HAMMER	20/21	Pea Gravel
				-	11	DO	AIR HAMMER	24/24	Pea Gravel		
31.70 104.0		CONTINUED							CONTINUED		



Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn SKB
Checked JVK

COOR. N113655 ft. (N34643m)
 E2279180 ft. (E694695m)


BORING LOG G40-Y15

SHEET 4 OF 6

SURFACE ELEV. 1593.4 ft. (485.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
31.70		CONTINUED						CONTINUED
104.0		Yellow brown, fine to coarse SAND, trace fine gravel, trace silt	SP					 Pea Gravel (to bottom of boring)
	-			12	DO	AIR HAMMER	20/20	
	-			13	DO	AIR HAMMER	18/18	
	-			14	DO	AIR HAMMER	18/18	
42.37		CONTINUED						
139.0		CONTINUED						

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn SKB
 Checked JVK

COOR. N113655 ft. (N34643m)
 E2279180 ft. (E694695m) **BORING LOG** G40-Y15 SHEET 5 OF 6
 SURFACE ELEV. 1593.4 ft. (485.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81
 DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
42.37		CONTINUED								
139.0		Yellow brown, fine to coarse SAND trace fine gravel, trace silt	SP	-	15	DO	AIR HAMMER	24/27		
						-	16	DO	AIR HAMMER	24/24
						-	17	DO	AIR HAMMER	24/24
51.21		Dark green, competent TUFF		-	-	-	DRILL CUTTINGS	-		
168.0										
53.34		END OF BORING								
175.0										

COOR. N113655 ft. (N34643m)
E2279180 ft. (E694695m)

BORING LOG G40-Y15

SHEET 6 OF 6

SURFACE ELEV. 1593.4 ft. (485.68m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/14/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1596.9 ft. (486.74m).

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

DATE	1/7/82	1/22/82	2/5/82	2/23/82			
DEPTH (M)	2.37	2.24	2.16	2.38			
DEPTH (ft.)	7.8	7.4	7.1	7.8			

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N113665 ft. (N34645m)
E2279170 ft. (E694692m)

BORING LOG G40-Y15A

SHEET 1 OF 1

SURFACE ELEV. 1593.7 ft. (485.77m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/17/81 DATE COMPLETED 12/17/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Air Rotary to 8', clean water rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC./ATT.		
0.0		Brown, fine to medium SAND, some silt (Fill material)	SM					0.0	
0.58									
1.92		Dark brown peat	Pt	-	1 AS	PRESSURE HYDRAULIC	18/36	0.91	
2.29									3.0
7.5									1.52
3.81		Grey green fine to medium SAND, trace to some silt	SP-SM	-	2 DO	PRESSURE HYDRAULIC	18/36	5.0	
12.5									
3.81		Dark gray green organic silty clay	OL	-	3 DO	LOST SAMPLE	0/24	3.05	
6.1									10.0
20.0									
6.1				-	4 DO	P.H.	23/24		
6.1				-	5 DO	P.H.	22/24		
20.0								6.10	

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1596.6 ft. (486.63m).

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

DATE	1/7/82	1/22/82	2/5/82			
DEPTH (M)	0.56	0.47	0.32			
DEPTH (ft.)	1.9	1.5	1.1			

Job No. 814-1296

Scale 1"=5'

Golder Associates

Drawn SKB

Checked JVK

COOR. N110730 ft. (N33750m)
 E2278040 ft. (E694349m) **BORING LOG** G40-Y21 SHEET 1 OF 1
 SURFACE ELEV. 1592.8 ft. (485.48m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
 DATUM USGS MSL DATE STARTED 12/28/81 DATE COMPLETED 12/28/81
 DRILL RIG Schramm Rotadrill DRILLING METHOD Air Hammer

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ATT.	
0.0		Brown, fine to coarse SAND, some fine gravel, trace silt	SW-SM					0.0 Grout 2.74 9.0 Bentonite Clay Seal 3.35 Pea Gravel 11.0 3.66 12.0 Pea Gravel 5.18 17.0 Pea Gravel 6.10 20.0	
	-			1	DO	AIR HAMMER	20/24		
	-			2	DO	AIR HAMMER	18/24		
	-			3	DO	AIR HAMMER	24/24		
	-			4	DO	P.H.	6/36		

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1596.5 ft. (486.62m).

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

DATE	1/7/82	1/22/82	2/10/82	2/23/82			
DEPTH (M)	3.33	3.33	3.04	3.21			
DEPTH (ft.)	10.9	10.9	10.0	10.5			

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N108880 ft. (N33187m)
E2278310 ft. (E694431m)

BORING LOG G40-Y22

SHEET 1 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.			
0.0		Compact, brown, fine to medium SAND, some silt, occasional gravel	SM	-	1	DO	P.H.	24/24		
1.52										
5.0		Compact, brown, sandy GRAVEL, trace silt	GP							
3.66						-	2	DO	P.H.	14/24
12.0		Dense, brown, fine to coarse SAND, trace silt	SP							
						-	3	DO	P.H.	24/24
						-	4	DO	P.H.	24/24
10.67 35.0		CONTINUED								

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108880 ft. (N33187m)
 E2278310 ft. (E694431m)

BORING LOG G40-Y22

SHEET 2 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
10.67		CONTINUED							
35.0		Dense, brown, fine to coarse SAND, trace silt	SP	-	5	DO	P.H.	15/24	
						-	6	DO	P.H.
17.68		Dense, brown, fine SAND, trace silt	SP						
58.0						-	7	DO	AIR HAMMER
20.57		CONTINUED							
67.5									

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N108880 ft. (N33187m)
E2278310 ft. (E694431m)

BORING LOG G40-Y22

SHEET 3 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	START PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.	
20.57 67.5		CONTINUED						
		Dense, brown, fine SAND, trace silt	SP	-	8	DO	AIR HAMMER	17/24
24.38 80.0		Very dense, sandy GRAVEL, some clay	GC	-	9	DO	AIR HAMMER	11/14
26.67 87.5		Very dense, brown, fine to coarse SAND, trace silt	SP-SM	-	10	DO	AIR HAMMER	15/19
30.48 100.0 30.94 101.5		Dense, brown, fine to medium SAND, trace silt	SP					
		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108880 ft. (N33187m)
 E2278310 ft. (E694431m)

BORING LOG G40-Y22

SHEET 4 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS 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		Dense, brown, fine to medium SAND, trace silt	SP	-	11	DO	AIR HAMMER	14/14
				-	12	DO	AIR HAMMER	16/20
				-	13	DO	AIR HAMMER	17/18
				-	14	DO	AIR HAMMER	18/18
39.93		Dense, brown, fine to coarse SAND, trace silt to fine SAND, trace silt with occasional fine gravel	SP					
131.0								
41.61		CONTINUED						
136.5								

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COORD. N108880 ft. (N33187m)
E2278310 ft. (E694431m)

BORING LOG G40-Y22

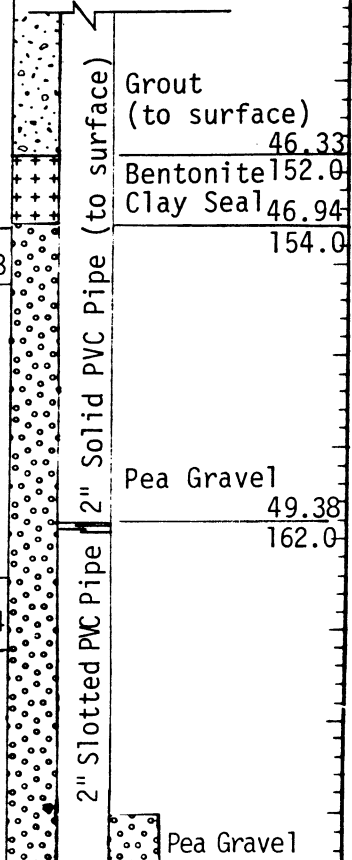
SHEET 5 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
41.61 136.5		CONTINUED							
		Dense, brown, fine to coarse SAND, trace silt to fine SAND, trace silt with occasional fine gravel	SP	-	15	DO	AIR HAMMER	18/18	
46.63 153.0		Dense, brown, fine to coarse SAND, some gravel, trace clay to fine to medium SAND, trace silt	SP	-	16	DO	AIR HAMMER	18/18	
48.77 160.0		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt, with areas free of the gravel	SP	-	17	DO	AIR HAMMER	20/24	
52.27 171.5		CONTINUED							



Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108880 ft. (N33187m)
E2278310 ft. (E694431m)


BORING LOG G40-Y22

SHEET 6 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
52.27 171.5		CONTINUED							
		Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt, with areas free of the gravel	SP						
	-			18	DO	AIR HAMMER	18/21		52.43 172.0
57.94 190.1		Green, weathered rock							
59.74 196.0		END OF BORING							

Pea Gravel

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108880 ft. (N33187m)
E2278310 ft. (E694431m)

BORING LOG G40-Y22

SHEET 7 OF 7

SURFACE ELEV. 1609.1 ft. (490.46m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/19/82 DATE COMPLETED 1/22/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1612.7 ft. (491.55m).

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

DATE	2/5/82	2/23/82					
DEPTH (M)	9.94	10.11					
DEPTH (ft.)	32.6	33.2					

Job No 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N106680 ft. (N32516m)
E2278800 ft. (E694580m)

BORING LOG G40-Y26

SHEET 1 OF 4

SURFACE ELEV. 1590.7 ft. (484.85m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/18/82 DATE COMPLETED 1/20/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC./ATT.		
0.0		Dense, tan, silty fine to medium SAND	SM	-	1	DO	P.H. 13/18		
1.52		Dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt to very dense, fine to coarse gravelly fine to coarse SAND, trace silt	SP	-	2	DO	P.H. 11/18		
5.0				-	3	DO	AIR HAMMER	12/18	
7.62					-	4	DO	P.H.	0/18
25.0		Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel	SM						
10.67		Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt	SP						
35.0									
11.28									
37.0		CONTINUED							

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N106680 ft. (N32516m)
E2278800 ft. (E694580m)

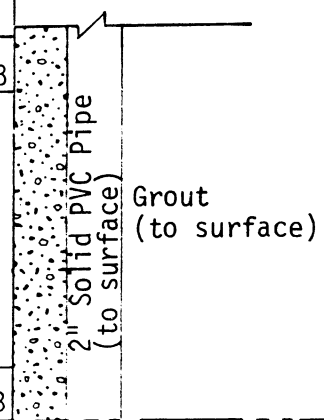
BORING LOG G40-Y26

SHEET 2 OF 4

SURFACE ELEV. 1590.7 ft. (484.85m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSI DATE STARTED 1/18/82 DATE COMPLETED 1/20/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
11.28 37.0		CONTINUED						
		Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt	SP	-	5	DO	AIR HAMMER	18/18
13.72 45.0		Very dense, brown, fine to coarse SAND, some silt, trace fine gravel	SM	-	6	DO	AIR HAMMER	12/12
16.76 55.0		Very dense, brown, gravelly, fine to coarse SAND, trace silt to fine to coarse SAND, some silt, trace fine gravel	SP to SM	-	7	DO	AIR HAMMER	18/18
								
21.79 71.5		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N106680 ft. (N32516m)
 E2278800 ft. (E694580m)

BORING LOG G40-Y26

SHEET 3 OF 4

SURFACE ELEV. 1590.7 ft. (484.85m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/18/82 DATE COMPLETED 1/20/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC/ATT.		
21.79		CONTINUED						CONTINUED	
71.5		Very dense, brown, gravelly, fine to coarse SAND, trace silt, to fine to coarse SAND, some silt, trace fine gravel	SP to SM	-	9	DO	AIR HAMMER	12/18	Grout
25.91									
85.0		Very dense, tan, fine to medium SAND, trace silt	SP	-	10	DO	AIR HAMMER	16/16	2" Solid PVC Pipe
26.21									
28.96		Very dense, brown, fine to coarse SAND, trace silt, trace fine gravel, to tan, fine to coarse SAND	SP	-	11	DO	AIR HAMMER	18/18	2" Slotted PVC Pipe
95.0									
32.46		CONTINUED							CONTINUED
106.5									

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N106680 ft. (N32516m)
E2278800 ft. (E694580m)

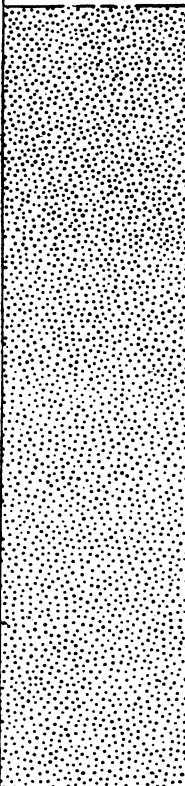
BORING LOG G40-Y26

SHEET 4 OF 4

SURFACE ELEV. 1590.7 ft. (484.85m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/18/82 DATE COMPLETED 1/20/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
32.46		CONTINUED						CONTINUED	
106.5		Very dense, brown, fine to coarse SAND, trace silt, trace fine gravel, to tan, fine to coarse SAND	SP	-	12	DO AIR HAMMER	4/6		Sand and gravel cave-in
35.66									
117.0		Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay	SM	-	13	DO AIR HAMMER	18/18		
38.10									
125.0		Green weathered bedrock							
39.01									
128.0									

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1593.6 ft. (485.73m).

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

DATE	2/5/82	2/23/82					
DEPTH (M)	2.91	3.09					
DEPTH (ft.)	9.6	10.1					

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108070 ft. (N32940m)
 E2280288 ft. (E695033m)

BORING LOG G41-A23

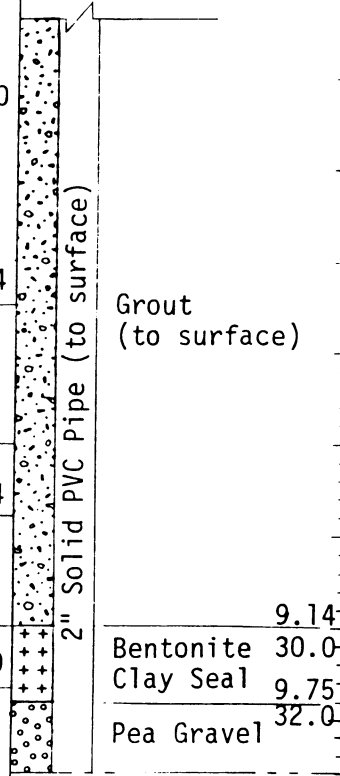
SHEET 1 OF 2

SURFACE ELEV. 1608.0 ft. (490.11m) PROJECT EXXON CRANDON TAILINGS-DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/18/82 DATE COMPLETED 1/18/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Air & Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. / REC./ATT.			
0.0		Compact, brown, clayey SILT	ML	-	1	DO	P.H. 24/24			
1.52										
5.0		Compact to dense, brown, fine to coarse SAND, trace silt, occasional gravel	SP	-	2	DO	P.H. 18/24			
						-	3	DO	P.H. 16/24	
						-	4	DO	P.H. 10/10	
						-	5	DO	P.H. 14/14	
						-	6	DO	P.H. 22/24	
						-	7	DO	P.H. 13/19	
10.36								9.14		
34.0								Bentonite Clay Seal 30.0		
								Pea Gravel 9.75		
								32.0		



Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

CONTINUED

CONTINUED

COORD. N108070 ft. (N32940m)
E2280288 ft. (E695033m)

BORING LOG G41-A23

SHEET 2 OF 2

SURFACE ELEV. 1608.0 ft. (490.11m) PROJECT EXXON CRANDON TAILINGS-DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/18/82 DATE COMPLETED 1/18/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Air & Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
10.36		CONTINUED						CONTINUED	
34.0		Compact to dense, brown, fine to coarse SAND, trace silt, occasional gravel	SP	-	8	DO	P.H.	11/24	Pea Gravel 11.43 37.5
				-	9	DO	P.H.	11/24	Pea Gravel 13.11 43.0
				-	10	DO	P.H.	10/24	Pea Gravel



END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1611.4 ft. (491.16m).

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

DATE	2/5/82	2/23/82				
DEPTH (M)	7.35	7.52				
DEPTH (ft.)	24.1	24.7				

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N116120 ft. (N35393m)
E2280610 ft. (E695131m)

BORING LOG G41-B12

SHEET 1 OF 4

SURFACE ELEV. 1610.7 ft. (490.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/28/81 DATE COMPLETED 12/31/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.		
0.0		Compact, brown, silty, fine to medium SAND	SM	-	1	DO	AIR HAMMER	4/12		
1.52										
5.0		Compact, brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, trace clay	SP	-	2	DO	P.H.	14/18		
5.33										
17.5		Very dense, multi-colored, fine to coarse GRAVEL, some fine to coarse sand to fine to coarse sandy, fine to coarse GRAVEL, trace silt, trace clay	GP-GC	-	3	DO	AIR HAMMER	0/19		
						-	4	DO	AIR HAMMER	6/12
10.67										
35.0										
11.13										
36.5										

CONTINUED

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N116120 ft. (N35393m)
E2280610 ft. (E695131m)

BORING LOG G41-B12

SHEET 2 OF 4

SURFACE ELEV. 1610.7 ft. (490.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/28/81 DATE COMPLETED 12/31/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / 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							
		Dense to very dense, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SM	-	5	DO	AIR HAMMER	18/18	<p>2" Solid PVC Pipe (to surface)</p> <p>Grout (to surface)</p> <p>20.12 Bentonite Clay Seal 66.0 20.73 68.0 Pea Gravel</p>
	-			6	DO	AIR HAMMER	12/12		
	-			7	DO	AIR HAMMER	8/12		
	-			8	DO	AIR HAMMER	18/18		
21.79 71.5		CONTINUED						CONTINUED	

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N116120 ft. (N35393m)
 E2280610 ft. (E695131m)

BORING LOG G41-B12

SHEET 3 OF 4

SURFACE ELEV. 1610.7 ft. (490.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/28/81 DATE COMPLETED 12/31/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.			
21.79		CONTINUED						CONTINUED		
71.5		Dense to very dense, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay	SP-SM					2" Slotted PVC Pipe 2" PVC Pipe	Pea Gravel	
	-			9	DO	AIR HAMMER	9/12		22.86	
									75.0	Pea Gravel
		Very dense, brown to red, fine to coarse SAND, some to trace silt, trace fine gravel	SM						25.91	
				-	10	DO	AIR HAMMER	0/12	85.0	
28.96									Pea Gravel	
95.0										
		Very dense, red-brown silty fine to coarse SAND, trace fine gravel								
				-	11	DO	AIR HAMMER	18/18		
32.00										
105.0										
32.46										
106.5		CONTINUED							CONTINUED	

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N116120 ft. (N35393m)
E2280610 ft. (E695131m)

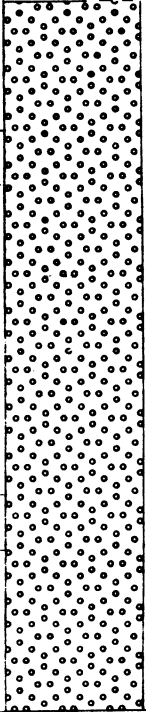
BORING LOG G41-B12

SHEET 4 OF 4

SURFACE ELEV. 1610.7 ft. (490.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/28/81 DATE COMPLETED 12/31/81

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
32.46		CONTINUED						CONTINUED	
106.5		Very dense, red-brown, silty fine to coarse SAND, trace fine gravel	SM	-	12	DO	AIR HAMMER	11/12	 Pea Gravel
34.44									
113.0		Green and brown, severely weathered rock		-	13	DO	AIR HAMMER	3/3	
38.40									
126.0									

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1614.0 ft. (491.93m).

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

DATE	1/7/82	1/22/82	2/5/82	2/23/82			
DEPTH (M)	5.53	5.65	5.61	5.85			
DEPTH (ft.)	18.2	18.6	18.4	19.2			

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N113160 ft. (N34491m)
E2281790 ft. (E695490m)

BORING LOG G41-C15C

SHEET 1 OF 1

SURFACE ELEV. 1611.4 ft. (491.14m)

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL

DATE STARTED 1/18/82

DATE COMPLETED 1/18/82

DRILL RIG Schramm Rotadrill

DRILLING METHOD Air Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL		
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC/ATT.			
0.0		Very loose, dark brown, organic SILT, trace clay	OL						Grout		
2.44											
8.0		Loose, gray-brown, fine to medium SAND, trace silt	SP-SM	-	1	DO	P.H.	11/24	2.59	Bentonite Clay Seal	
										8.5	
										3.20	Pea Gravel
										10.5	
									3.96	Pea Gravel	
									13.0		
					-	2	DO	P.H.	12/24	5.49	Pea Gravel
									18.0		
6.71					-	3	DO	P.H.	10/24		Pea Gravel
22.0											

END OF BORING

NOTES:

1. Elevation of top of PVC observation well pipe, 1613.9 ft. (491.92m).

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

DATE	1/22/82	2/5/82	2/23/82				
DEPTH (M)	1.70	1.26	1.44				
DEPTH (ft.)	5.6	4.2	4.7				

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COORD. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 1 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
0.0		Dense brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse SAND, some silt, trace fine to coarse gravel with red-brown, fine to medium SAND, trace fine gravel at approximately 10.0'-15.0'	SM	-	1	DO	P.H.	24/24
				-	2	DO	P.H.	17/18
				-	3	DO	P.H.	20/24
				-	4	DO	P.H.	18/18
10.67								
35.0		See Sheet 2 for description						
11.13								
36.5		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
 E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 2 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
11.13		CONTINUED						
36.5		Very dense, light brown to tan, fine to coarse SAND, trace to some fine gravel, trace silt with a lens of fine to medium SAND at 50.0'-50.9'	SP	-	5	DO	AIR HAMMER	18/18
				-	6	DO	AIR HAMMER	13/16
				-	7	DO	AIR HAMMER	3/3
16.76		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	SM					
55.0				-	8	DO	AIR HAMMER	3/6
21.79		CONTINUED						
71.5								

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 3 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS 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 to coarse SAND, some fine to coarse gravel, some silt to fine to coarse, gravelly, Fine to coarse SAND, some silt	SM					
22.86								
75.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt	SP	-	9	DO AIR HAMMER	8/10	
25.91								
85.0		Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt	SM	-	10	DO AIR HAMMER	4/4	
28.96								
95.0		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP- SM	-	11	DO AIR HAMMER	6/6	
32.00								
105.0		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
 E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 4 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC/ATT.		
32.00 105.0		CONTINUED							
		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP- SM	-	12	DO	AIR HAMMER	3/8	
				-	13	DO	AIR HAMMER	18/18	
				-	14	DO	AIR HAMMER	15/18	
41.91 137.5		CONTINUED							

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 5 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
41.91		CONTINUED						
137.5		Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt	SP-SM	-	15	DO	AIR HAMMER	6/6
44.96								
147.5		Very dense, tan to yellow, fine to coarse SAND, trace silt	SP	-	16	DO	AIR HAMMER	8/12
48.01								
157.5		Dense, red, fine to coarse SAND, some silt, some fine to coarse gravel, some clay	SM	-	17	DO	P.H.	0/18
51.05								
167.5		Very dense, tan, fine to coarse SAND, trace silt	SP					
51.82								
170.0		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

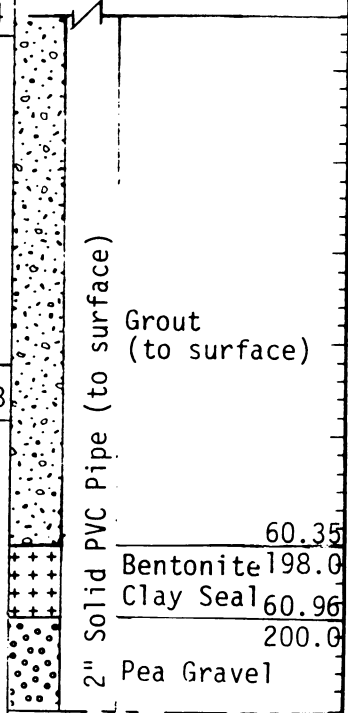
SHEET 6 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.		
51.82		CONTINUED							
170.0		Very dense, tan, fine to coarse SAND, trace silt	SP SM	-	18	DO	AIR HAMMER	8/12	
54.10									
177.5									
54.10		Very dense, tan, fine to coarse SAND, trace to some fine to coarse gravel with red-brown gravel approximately 194.0'-196.0', trace silt	SP	-	19	DO	AIR HAMMER	18/24	
60.96									
200.0									
61.72		Very dense, tan, fine to medium SAND, trace silt	SP	-	20	DO	AIR HAMMER	16/18	
202.5									
		CONTINUED							



Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 7 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC./ATT.	
61.72 202.5		CONTINUED						CONTINUED
		Very dense, tan, fine to medium SAND, trace silt	SP					
	- 21			DO AIR HAMMER	12/12	Pea Gravel		
	- 22			DO AIR HAMMER	18/18	64.92 213.0 Pea Gravel		
	- 23			DO AIR HAMMER	18/18	67.97 223.0		
69.34 227.5		Very dense, brown, fine to coarse SAND, some silt, some fine gravel	SM					Pea Gravel (to bottom of boring)
	- 24			DO AIR HAMMER	12/18			
72.09 236.5		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 8 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
72.09		CONTINUED						
236.5		Very dense, brown, fine to coarse SAND, some silt, some fine gravel	SM					
73.46								
241.0		Green and tan severely weathered ROCK		-	25	DO	AIR HAMMER	12/12
79.86		END OF BORING						
262.0								

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

BORING LOG G41-C32

SHEET 9 OF 9

SURFACE ELEV. 1739.8 ft. (530.30m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/29/82 DATE COMPLETED 2/9/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

NOTES:

1. Elevation of top of protector pipe, 1744.1 ft. (531.61m).

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

DATE	2/23/82						
DEPTH (M)	47.20						
DEPTH (ft.)	154.9						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N109970 ft. (N33519m)
 E2282570 ft. (E695729m)

BORING LOG G41-E22

SHEET 1 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES				GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	REC./ ATT.	
0.0		Brown, fine to coarse SAND, some silt, some fine to coarse gravel	SP- SM	-	1	DO	AIR HAMMER	-	
				-	2	DO	AIR HAMMER	-	
				-	3	DO	AIR HAMMER	14/24	
				-	4	DO	AIR HAMMER	12/12	
				-	5	DO	P.H.	15/24	
				-	6	DO	AIR HAMMER	12/14	
10.06		Very dense to dense, brown, fine to coarse SAND, some clay, some fine to medium gravel	SC						
33.0									
11.13									
36.5		CONTINUED							

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N109970 ft. (N33519m)
 E2282570 ft. (E695729m)

BORING LOG G41-E22

SHEET 2 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS-DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
11.13 36.5		CONTINUED						
		Very dense to dense, brown, fine to coarse SAND, some clay, some fine to medium gravel	SC		- 7	DOAIR HAMMER	17/17	
					- 8	DOAIR HAMMER	15/15	
					- 9	DOAIR HAMMER	6/6	
21.03 69.0		CONTINUED						

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N109970 ft. (N33519m)
E2282570 ft. (E695729m)

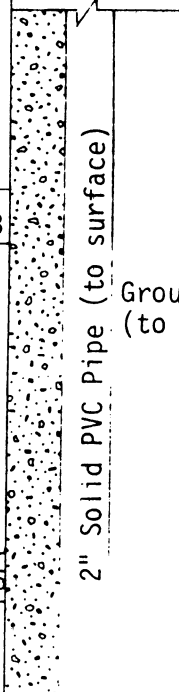
BORING LOG G41-E22

SHEET 3 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
21.03		CONTINUED							
69.0		Very dense to dense, brown, fine to coarse SAND, trace fine gravel, trace silt, some clay, some fine to medium gravel	SP-SM	-	10	DO	AIR HAMMER	12/12	 <p>2" Solid PVC Pipe (to surface) Grout (to surface)</p>
22.86				-	11	DO	AIR HAMMER	22/22	
75.0		Compact, brown, fine SAND, trace to some silt	SP to SM	-	12	DO	AIR HAMMER	18/18	
				-	13	DO	AIR HAMMER	16/16	
31.70									
104.0		CONTINUED						CONTINUED	

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COORD. N109970 ft. (N33519m)
E2282570 ft. (E695729m)

BORING LOG G41-E22

SHEET 4 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN. REC/ATT.		
31.70 104.0		CONTINUED							
		Compact, brown, fine SAND, trace to some silt	SP to SM					Grout 32.92	
				-	14	DO	AIR HAMMER	16/17	Bentonite 108.0 Clay Seal 33.53 110.0
									Pea Gravel 35.05 115.0
				-	15	DO	AIR HAMMER	18/18	Pea Gravel 38.10 125.0
								Pea Gravel	
42.37 139.0		CONTINUED						CONTINUED	

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N109970 ft. (N33519m)
 E2282570 ft. (E695729m)

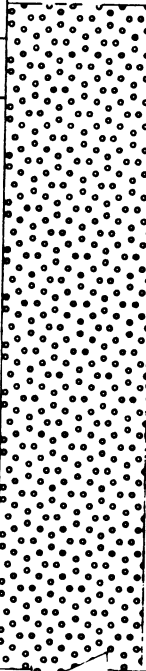
BORING LOG G41-E22

SHEET 5 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL	
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.		
42.37		CONTINUED						CONTINUED	
139.0		Compact, brown, fine SAND, trace to some silt	SP to SM	-	17	DO	AIR HAMMER		 Pea Gravel (to bottom of boring)
	-			18	DO	AIR HAMMER	14/15		
	-			19	DO	AIR HAMMER	10/10		
	-			20	DO	AIR HAMMER	9/20		
53.04		CONTINUED							
174.0		CONTINUED							

Job No. 814-1296
 Scale 1"=5'

Golder Associates

Drawn CAB
 Checked MTF

COOR. N109970 ft. (N33519m)
E2282570 ft. (E695729m)

BORING LOG G41-E22

SHEET 6 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
53.04 174.0		CONTINUED						
		Compact, brown, fine SAND, trace to some silt	SP to SM	-	21	DO	AIR HAMMER	10/15
				-	22	DO	AIR HAMMER	11/15
				-	23	DO	AIR HAMMER	13/18
62.94 206.5		CONTINUED						

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N109970 ft. (N33519m)
E2282570 ft. (E695729m)

BORING LOG G41-E22

SHEET 7 OF 7

SURFACE ELEV. 1609.8 ft. (490.66m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 12/29/81 DATE COMPLETED 1/4/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

DEPTH METERS / FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS.	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6IN. REC./ATT.	
62.94 206.5		CONTINUED						
		Compact, brown, fine SAND, trace to some silt	SP to SM	-	24	DO	AIR HAMMER	11/11
66.53 215.0		Fine to coarse SAND, some silt	SM					
66.45 218.0		Green, moderately weathered bedrock						
68.28 224.0				-	25	DO	AIR HAMMER	10/10

END OF BORING

NOTES:

1. Elevation of top of protector pipe, 1612.7 ft. (491.54m).

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

DATE	1/12/82	1/22/82	2/5/82	2/23/82			
DEPTH (M)	6.61	6.35	6.29	6.45			
DEPTH (ft.)	21.7	20.8	20.7	21.2			

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked JVK

COOR. N109955 ft. (N33514m)
E2282590 ft. (E695735m)

BORING LOG G41-E22A

SHEET 2 OF 2

SURFACE ELEV. 1609.5 ft. (490.57m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 1/6/82 DATE COMPLETED 1/6/82

DRILL RIG Schramm Rotadrill DRILLING METHOD Air & Mud Rotary

DEPTH METERS FEET	STRAT. PLOT	DESCRIPTION	UNIFIED CLASS	BLOWS / FOOT	SAMPLES			GROUNDWATER OBSERVATION WELL
					NUMBER	TYPE	HAMMER BLOWS PER 6 IN.	
11.13		CONTINUED						CONTINUED
36.5		Very dense, brown, fine to coarse SAND, some silt, trace clay, trace fine gravel	SM					Pea Gravel 11.58
12.83				-	5	DO AIR HAMMER	13/13	Pea Gravel 12.83
42.1								42.1

END OF BORING

NOTES:

- 2" Slotted PVC Pipe from 33.0 - 38.0 feet.
- Elevation of top of protector pipe, 1613.7 ft. (491.86m).

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

DATE	1/12/82	1/22/82	2/5/82	2/23/82			
DEPTH (M)	6.23	5.75	5.68	5.87			
DEPTH (ft.)	20.5	18.9	18.7	19.3			

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

BORING LOGS

BRAUN ENGINEERING TESTING

<u>Boring Logs</u>	<u>Number of Sheets</u>
BE 211-1	8
BE 211-2	8
BE 211-3	9
BE 213-1	4
BE 213-2	4
BE 213-3	5
BE 216-1	6
BE 216-2	6
BE 216-3	7

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 3-3-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes	
0.0	0.0	SM	SILTY SAND, some coarse gravel & boulders, brown, wet				Bore hole advanced with tri-cone roller bit & revert drilling fluid. Six inch diameter casing driven to 4-1/2 feet. 3-inch OD sampler driven with 250# hammer falling 24 inches.	
				7		1		
				9				
				6				
4.0	13.0				6			2
				8				
				9				
		SW & GP	SAND & GRAVEL, some boulders, brown, moist to wet					
				43		3		
				53				
				56		4		
				100				
				67		5		
7.6	25.0			101				
			Continued on next page					Crew Chief: Ron Kwilinski

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued) LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4'
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
7.6	25.0						Page 2 of 8
		SW & GP	SAND & GRAVEL, some boulders, brown, wet				
				72		6	
				140			
10.4	34.0						
		SP to SM	SAND to SILTY SAND, fine grained, with coarse gravel, a few boulders, reddish brown, moist	60		7	
			Boulder from 38' to 41'	154			
				125/6"		8	
14.9	49.0						
15.2	50.0	SP	SAND, fine to medium grained,**	86		9	
			**with medium to coarse gravel, brown, wet	100			
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">LOCATION: At Staked Location</td> <td style="width: 50%; padding: 2px;">SCALE: 25.4 mm = 1.22 m 1" = 4'</td> </tr> </table>	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'		

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes	
15.2	50.0	SP	SAND, fine to medium grained, with medium to coarse gravel, a few boulders, brown, wet				*No Recovery	
				150/1"		*		
18.0	59.0	SP to SM	SAND TO SILTY SAND, fine grained, with medium to coarse gravel, reddish brown, wet to waterbearing	100	6"	10		
				120	6"	11		
21.0	69.0	SM		36 79		12		
22.9	75.0			200	5"	13		
			Continued on next page					

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
22.9	75.0	SP to SM	SAND TO SILTY SAND, fine grained, with medium to coarse gravel, brown, waterbearing				Page 4 of 8
						14	
25.6	84.0						
		SM	SILTY SAND, with coarse gravel, brown, moist Boulder encountered at 87'	95 100		15	
27.1	89.0						
		SP	SAND, fine grained, with coarse gravel, brown, moist			16	
28.7	94.0						
		GP	COARSE GRAVEL & BOULDERS			*	*No Recovery
30.2	99.0						
30.5	100.0	SM	SILTY SAND, fine grained, with*** ***coarse gravel, reddish brown, moist Continued on next page			17	

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0	SM	SILTY SAND, with medium to coarse gravel, reddish brown, moist				Page 5 of 8
				118/6"		18	
			Boulder encountered at 120'	135/6"		19	
38.1	125.0		Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
38.1	125.0	SM	SILTY SAND, with coarse gravel, reddish brown, moist				Page 6 of 8
						20	
						21	
						22	
45.7	150.0		Continued on next page				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
45.7	150.0						Page 7 of 8
47.9	157.0	SM	SILTY SAND, with coarse gravel, brown to reddish brown, moist				
		SP	SAND, fine to medium grained, with coarse gravel, brown, moist			23	
				133/6"			
51.2	168.0						
		SM to ML	SILTY SAND TO SANDY SILT, with coarse gravel, reddish brown, moist			24	
				118/6"			
53.3	175.0						
			Continued on next page				

(Corrected Log 5/6/81)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-1 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
	DATE: 3-12-81	

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
53.3	175.0						Page 8 of 8
		SM to SM-SC	SILTY SAND TO SILTY CLAYEY SAND, with coarse gravel, reddish brown, moist				
				100		25	
				211			
57.3	188.0						
			Bedrock, weathered, red				
				100		26	
				130			
61.1	200.5						
				400/6"		27	
			Drilling fluid level down 3' immediately after completion. Water level not measured due to the presence of drilling fluid.				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-2 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 2-19-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
0.0	0.0						Page 1 of 8
2.1	7.0	CL	SILTY SANDY CLAY, gray, wet	10 12 15		24	Bore hole advanced with tri-cone roller bits & Revert drilling fluid. Six inch diameter casing driven to 8 feet
4.0	13.0	SM-SC	SILTY CLAYEY SAND, a trace of fine gravel, brownish gray, wet	19 31 33		25	3-inch OD sampler driven with 250# hammer falling 24 inches.
6.7	22.0	SM	SILTY SAND, some fine to medium gravel, brown, moist	60 69 53		26	
7.6	25.0	SP	SAND, a little fine to medium gravel, orange-brown, moist	57 49 53		27	
			Continued on next page	100/3"		28	Crew Chief: William Donahue

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin			BORING: BE 211-2 (Continued)					
			LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'				
DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes	
15.2	50.0						Page 3 of 8	
15.8	52.0	SP	SAND, a little fine to medium gravel, a few boulders, orange-brown, moist					
		CL with SM	SILTY CLAY varved with fine SILTY SAND, some fine to medium gravel, a few cobbles, red, moist			33		
				100/6"				
18.9	62.0					34		
		SM & GP	SILTY SAND & GRAVEL, a few cobbles, reddish brown, moist					
				59		35		
				100/4"				
						36		
				100/4"				
22.9	75.0					37		
			Continued on next page					

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-2 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0						Page 5 of 8
		SM & GP	SILTY SAND & GRAVEL, a few cobbles & boulders, reddish brown, waterbearing			42	
34.1	112.0			57 62 79			
		SP	SAND, a trace of fine gravel, brown, waterbearing			43	
38.1	125.0			100/ 2-1/2"			
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-2 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
38.1	125.0						Page 6 of 8
40.8	134.0	SP	SAND, a trace of fine gravel, brown, waterbearing	100	4"	44	
44.2	145.0	GP	GRAVEL & BOULDERS	100	6"	*	*No Recovery
45.7	150.0	SP & GP	SAND & GRAVEL, brown, wet	29		45	
			Continued on next page	67			
				52			

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-2 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
45.7	150.0						Page 7 of 8
46.3	152.0	SP & GP	SAND & GRAVEL, brown, wet				
		CL	SANDY CLAY, a few cobbles, reddish brown, moist to wet				
				79			
				100/3"		46	
				67			
				43		47	
				93			
53.3	175.0						
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-2 (Continued)
	LOCATION: At Staked Location
	SCALE: 25.4 mm = 1.22 m 1" = 4'
	DATE: 2-25-81

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
53.3	175.0						Page 8 of 8
53.9	177.0	CL	SANDY CLAY, a few cobbles, reddish brown, moist to wet				
		SP	SAND, orange-brown, waterbearing				
			(Evidence of higher water pressure at 177')	1496	6"	48	
55.8	183.0						
		SM	SILTY SAND, some fine to medium gravel, reddish brown				
				259		49	
56.8	186.5			750	3"		
			Bedrock				
57.5	188.5						
			Water level not measured due to the presence of drilling fluid.				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 3-19-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
0.0	0.0						Page 1 of 9
		SM	SILTY SAND, brown, moist				Bore hole advanced with tri-cone roller bits & Revert drilling fluid to the 197 foot depth. Six inch diameter casing driven to 8 feet. 3 inch OD sampler driven with 250# hammer falling 24 inches.
				29			
				30		93	
				35			
				31			
				42		94	
				49			
3.7	12.0						
		GP	GRAVEL, with a few cobbles				
				100/3"		95	
5.2	17.0						
		SM & GP	SILTY SAND & GRAVEL, brown, moist				
				92			
6.7	22.0			100/2"		96	
		SP	SAND, mostly fine to medium grained, brown, moist				
7.6	25.0			52			
				60		97	
				76			
			Continued on next page				Crew Chief: Ron Kwilinski

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued) LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4'
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
15.2	50.0						Page 3 of 9
15.8	52.0	SP & GP	SAND & GRAVEL				
		SM	SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist				
				57 63 100	3"	103	
				76 83 100	3"	104	
				59 100	3"	105	
			Layer of olive CLAYEY SILT at 70'	100	5"	106	
22.9	75.0		Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
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(See Report and Standard Plates for evaluation and descriptive terminology.)

22.9	75.0	SM	SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist				Page 4 of 9
						107	
						108	
						109	
						110	
30.5	100.0						

Continued on next page

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0						Page 5 of 9
33.2	109.0	SM	SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist				
34.1	112.0	GP	FINE GRAVEL, brown, wet	100/3"		111	
38.1	125.0	SM	SILTY SAND, a little fine to medium gravel, brown, moist	100/4"		112	
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued)		
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">LOCATION: At Staked Location</td> <td style="width:50%;">SCALE: 25.4 mm = 1.22 m 1" = 4'</td> </tr> </table>	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'		

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes	
38.1	125.0	SM	SILTY SAND, a little fine to medium gravel, brown-reddish brown at 148', moist				Page 6 of 9	
					73			
					100	2"		113
					100	4"		114
45.7	150.0			100	3"	115		
			Continued on next page					

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
45.7	150.0						Page 7 of 9
		SM	SILTY SAND, a little fine to medium gravel, a few cobbles, reddish brown				
				100	4"	116	
			Boulder encountered from 169' to 175'				
53.3	175.0						
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
53.3	175.0	SM	SILTY SAND, a little fine to medium gravel, a few cobbles, reddish brown, moist				NW Casing driven to 193'.
						73 79 100/3"	117
55.5	182.0	CL	SILTY SANDY CLAY, brown, moist to wet				
						100/3"	118
						100/4"	119
58.5	192.0		Bedrock, reddish orange from 197' to 202' & silver-gray from 202' to 220-1/2' Fractured from 207' to 209' Normal to fast rate of advance Water pressure -- Normal Minimal loss of water				Bore hole extended from 197' to 220-1/2' with NQ diamond bit & "Q" series wire line coring equipment.
62.5	205.0						
Continued on next page							

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 211-3 (Continued) LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 4-3-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
62.5	205.0		Bedrock, silver-gray Recovery: 197' - 202' 23.3% 14" 202' - 205-1/2' 63.3% 26 1/2" 205-1/2'-210-1/2' 90.0% 54" 210-1/2'-215-1/2' 98.3% 59" 215-1/2'-220-1/2' 89.2% 53 1/2" Diamond bit plugged at 202'				Page 9 of 9
67.2	220.5		Water level not measured due to the presence of drilling fluid.				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-1 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 2-7-81
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DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
0.0	0.0						Page 1 of 4
		SM-SC	SILTY CLAYEY SAND, brown, frozen to 2-1/2' then moist				Bore hole advanced with tri-cone roller bits & Revert drilling fluid.
						1	Six-inch diameter casing driven to 8 feet
						2	3-inch OD sampler driven with 250# hammer falling 24 inches.
4.0	13.0						
		SP-SM	SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, brown, moist				
			Continuous boulders from 14-1/2' to 19'			3	
7.6	25.0					4	
			Continued on next page				Crew Chief: William Donahue

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-1 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
7.6	25.0						Page 2 of 4
8.8	29.0	SP-SM	SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, brown, moist				
		SP-SM & GP	SLIGHTLY SILTY SAND & GRAVEL, some boulders, brown, moist to wet	100	4"	5	
			Continuous boulder from 48' to 65'	168	6"	6	
				97 85 76		7	
				100	0"	*	*No Penetration
15.2	50.0			100	0"	*	*No Penetration
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-1 (Continued)
	LOCATION: At Staked Location
	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
15.2	50.0						Page 3 of 4
		SP-SM & GP	SLIGHTLY SILTY SAND & GRAVEL, some boulders, brown, moist to wet Large boulder from 54' to 66'				
19.8	65.0						
		SP	COARSE GRAVEL & COBBLES				
21.3	70.0			100	1"	*	*No Recovery
		SP-SM	SLIGHTLY SILTY SAND, some fine to medium gravel, brown, wet to waterbearing (Water pressure evident at 70')				
22.9	75.0			50		8	
				54			
				72			
			Continued on next page				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-1 (Continued) LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 2-13-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
22.9	75.0						Page 4 of 4
23.5	77.0	SP-SM	SLIGHTLY SILTY SAND, some fine to medium gravel, brown, wet to waterbearing				
			COBBLES			9	
25.3	83.0						
		CL	SILTY CLAY, a trace of fine gravel, red, moist to wet			10	
26.8	88.0						
			Bedrock				
			Water pressure noted at 88'				
28.2	92.5						
			Water level not measured due to the presence of drilling fluid.				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation
Proposed Mine Facility
Crandon, Wisconsin

BORING: BE 213-2

LOCATION:
At Staked
Location

SCALE:
25.4 mm = 1.22 m
1" = 4'

DATE: 2-16-81

DEPTH METERS 0.0	DEPTH FEET 0.0	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes Page 1 of 4
		SM-SC	SILTY CLAYEY SAND, a few boulders, brown, frozen to 2' then moist				Bore hole advanced with tri-cone roller bits & Revert drilling fluid.
						8	
						11	Six-inch diameter casing driven to 8 feet.
						12	
						10	3-inch OD sampler driven with 250# hammer falling 24 inches.
						10	
						10	
						15	
4.9	16.0					16	
						15	
		SP-SM	SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, light brown, moist				
						12	
						15	
						13	
						14	
						15	
7.6	25.0					29	
						33	
						42	
			Continued on next page				Crew Chief: William Donahue

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation
Proposed Mine Facility
Crandon, Wisconsin

BORING: BE 213-2 (Continued)

LOCATION: At Staked Location

SCALE: 25.4 mm = 1.22 m
1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
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15.2	50.0	GP	GRAVEL, fine to coarse, some boulders & Cobbles, moist to wet				Page 3 of 4
			Large boulder from 52' - 57'				
				100/2"		*	*No Recovery
				100/2"		*	*No Recovery
22.3	73.0						

22.9	75.0	SP-SM	SLIGHTLY SILTY SAND, a trace of fine gravel, brown, moist	100/4"		20	
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Continued on next page

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-2 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
DATE: 2-17-81	

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
22.9	75.0						Page 4 of 4
		SP-SM	SLIGHTLY SILTY SAND, a trace of fine gravel, brown, moist				
				100/3-1/2"		21	
26.2	86.0			100/4"		22	
		CL	SILTY CLAY, a trace of fine gravel, reddish brown, moist				
28.3	93.0			100/5"		23	
			Bedrock				
29.0	95.0		Water level not measured due to the presence of drilling fluid.				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 3-13-81
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DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes Page 1 of 5
0.0	0.0						
		SP to SP-SM	SAND TO SLIGHTLY SILTY SAND, fine grained, with coarse gravel, brown, moist				Bore hole advanced with tri-cone roller bits & Revert drilling fluid.
						8	
						14	
						16	28
							Six-inch diameter casing driven to 4-1/2 feet.
						13	
						12	
						13	29
							3-inch OD sampler driven with 250# hammer falling 24 inches.
						33	
						39	
						36	30
5.5	18.0						
		SM	SILTY SAND, fine grained, brown, moist, waterbearing				
			Loss of drilling fluid from 15 feet			46	
						75	
						79	31
7.3	24.0						
7.6	25.0	SP	SAND, fine grained, with medium**			50	
			**gravel, brown, waterbearing			104	32
			Continued on next page				
							Crew Chief: William Donahue

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
7.6	25.0						Page 2 of 5
8.8	29.0	SP	SAND, fine to medium grained, with medium to coarse gravel, brown, waterbearing				
				50 100		33	
10.4	34.0	SP	SAND, fine grained, brown, waterbearing				
				53 118		34	
		SP	SAND, fine to medium grained, with medium to coarse gravel, some boulders, brown, moist				
				67 100		35	
			Boulder encountered at 44'				
				200/4"		36	
15.2	50.0			70 100		37	
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 (Continued) LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4'
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DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes	
15.2	50.0	SP	SAND, fine to medium grained, with coarse gravel & boulders, brown, moist				Page 3 of 5	
					120	6"		38
					200	5"		39
					200	2"		*
22.3	73.0	SM	SILTY SAND, a little medium gravel, brown to reddish brown, moist					
22.9	75.0			38		40		
			Continued on next page	78				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
22.9	75.0						Page 4 of 5
		SM	SILTY SAND, a little medium gravel, brown to reddish brown, moist	88 112		41	Bore hole extended from 89' to 100' with tri-cone roller bits & Revert drilling fluid.
25.3	83.0						
		CL	SILTY CLAY, a trace of fine to medium gravel, reddish brown, moist	52 95		42	
27.1	89.0						
			Bedrock Normal rate of advance Water pressure -- Normal Minimal loss of water from 100 to 110' High loss of water from 110' to 115'	200/5"		43	
				200/5"		44	
30.5	100.0			500/5"		45	
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 213-3 (Continued)		
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">LOCATION: At Staked Location</td> <td style="width:50%;">SCALE: 25.4 mm = 1.22 m 1" = 4'</td> </tr> </table>	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'		
	DATE: 3-24-81		

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0						Page 5 of 5
			Diamond Bit plugged at the 101-1/2 foot depth. Recovery: 100' - 105' ---- 10% 105' - 110' ---- 57.5% 110' - 115' 0%	6"	34 1/2"		NW Casing driven to 89' Bore hole extended from 100' to 115' with NQ diamond bit & "Q" series wire line coring equipment.
35.1	115.0		Drilling fluid level down 25' immediately after completion. Water level not measured due to the presence of drilling fluid.				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-1 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 3-2-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
0.0	0.0						Page 1 of 6
2.1	7.0	ML	SANDY CLAYEY SILT, brown, moist			50	Bore hole advanced with tri-cone roller bits & Revert drilling fluid. Six-inch diameter casing driven to 8 feet.
4.3	14.0	SM	SILTY SAND, fine grained, brown, moist			51	3-inch OD sampler driven with 250# hammer falling 24 inches.
5.5	18.0	ML with SM	CLAYEY SILT, brown with intrusions of orange-brown SILTY SAND, moist to wet			52	
6.7	22.0	SM	SILTY SAND, fine grained, brown, moist			53	
7.6	25.0	SP & GP	SAND & GRAVEL, brown, moist to wet			54	
			Continued on next page		100/4"		Crew Chief: William Donahue

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-1 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
7.6	25.0						Page 2 of 6
11.3	37.0	SP & GP	SAND & GRAVEL, a few cobbles, brown, moist Boulder 27' - 29'	96		55	
				84			
				73			
11.3	37.0	SP & GP	SAND & GRAVEL, a few cobbles, brown, moist Boulder 27' - 29'	49		56	
				53			
				74			
15.2	50.0	SM	SILTY SAND, some fine to medium gravel, brown	100/6"		57	
				59			
				67			
15.2	50.0	SM	SILTY SAND, some fine to medium gravel, brown	59		58	
				67			
				67			
15.2	50.0	SM	SILTY SAND, some fine to medium gravel, brown	59		59	
				43			
				49			
			Continued on next page				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-1 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
15.2	50.0						Page 3 of 6
		SM & GP	SILTY SAND & GRAVEL, some cobbles & boulders, brown, moist to wet				
				100	/3"	*	*No Recovery
				97			
				100	/3"	60	
			(Boulder encountered from 62' to 67')				
				87			
				72			
				100	/2"	61	
				92			
				83			
22.9	75.0			87		62	
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation
Proposed Mine Facility
Crandon, Wisconsin

BORING: BE 216-1 (Continued)

LOCATION:
At Staked
Location

SCALE:
25.4 mm = 1.22 m
1" = 4'

DEPTH METERS 22.9	DEPTH FEET 75.0	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes Page 4 of 6
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SM & GP SILTY SAND & GRAVEL, some cobbles & boulders, brown, moist to wet

97
100/4"

63

100/3"

64

82
87
100/3"

65

(Boulder from 91' to 94')

100/4"

*

*No Recovery

72
79
100/3"

66

Continued on next page

30.5 100.0

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-1 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0		SILTY SAND & GRAVEL, some cobbles & boulders, brown, moist to wet (Boulder from 103' to 107')				Page 5 of 6
		SM & GP		49			
				57		67	
				69			
				52			
				59		68	
				78			
38.1	125.0						
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-1 (Continued)
	LOCATION: At Staked Location
	SCALE: 25.4 mm = 1.22 m 1" = 4'
	DATE: 3-10-81

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
38.1	125.0	SM	SILTY SAND, some fine to medium gravel, reddish brown, moist				Page 6 of 6
				54 57 78		69	
			Boulder from 136' to 138'				
				69 73 72		70	
45.4	149.0						
			Bedrock				
46.2	151.5						
			Water level not measured due to the presence of drilling fluid.				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-2 LOCATION: At Staked Location SCALE: 25.4 mm = 1.22 m 1" = 4' DATE: 3-11-81
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(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
0.0	0.0						Page 1 of 6
4.0	13.0	SM	SILTY SAND, a trace of fine gravel, brown, moist				Bore hole advanced with tri-cone roller bits & Revert drilling fluid. Six-inch diameter casing driven to 8 feet. 3-inch OD sampler driven with 250# hammer falling 24 inches.
				39		71	
				53			
				64			
7.0	23.0	SP & GP	SAND & GRAVEL, mostly medium to coarse grained, moist to wet				Redrilled bore hole 5' NW of staked location due to caving conditions at the 52 foot depth.
				42		72	
				45			
				59			
7.6	25.0	GP	GRAVEL, brown, moist				*No Recovery Crew Chief: William Donahue
				29		73	
				28			
				31			
				30			
				26		74	
				35			
			Continued on next page	100/3"		*	

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-2 (Continued)		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;"> LOCATION: At Staked Location </td> <td style="width: 50%; padding: 2px;"> SCALE: 25.4 mm = 1.22 m 1" = 4' </td> </tr> </table>	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'		

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
15.2	50.0	SP & GP	SAND & GRAVEL, some boulders, brown, moist				Page 3 of 6
			Loss of water at 52', Caving conditions	100	4"	79	
18.6	61.0			100	3"	80	
		SM	SILTY SAND, a little fine gravel, a few boulders, brown, moist				
				59		81	
				100	4"		
				78		82	
				85			
				97			
22.9	75.0			100	3"	83	
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-2 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
22.9	75.0						Page 4 of 6
		SM	SILTY SAND, a little fine gravel, brown, moist				
				99			
				100/	1"	84	
				69			
				76		85	
				93			
				100/	4"	86	
				100/	4"	87	
30.5	100.0						
			Continued on next page				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-2 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0	SM	SILTY SAND, a little fine gravel, brown, moist	59		88	Page 5 of 6
				63			
				47			
				79			
				93	100/3"	89	
				63			
				94	100/2"	90	
38.1	125.0		Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-2 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
	DATE: 3-18-81	

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
38.1	125.0						Page 6 of 6
39.3	129.0	SM	SILTY SAND, a little fine gravel, brown, moist				
42.1	138.0	CH	FAT CLAY, red, moist to wet	87	100/4"	91	
				100/4"			
42.8	140.5		Bedrock	100/3"		92	
			Water level not measured due to the presence of drilling fluid.				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation
Proposed Mine Facility
Crandon, Wisconsin

BORING: BE 216-3

LOCATION:
At Staked Location

SCALE:
25.4 mm = 1.22 m
1" = 4'

DATE: 4-6-81

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS 0.0	DEPTH FEET 0.0	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
			Boulders				Page 1 of 7 Bore hole advanced with tri-cone roller bits & Revert drilling fluid to the 150 foot depth. Six inch diameter casing driven to 8 feet. 3 inch OD sampler driven with 250# hammer falling 24 inches
.92	3.0						
		ML	SANDY SILT, brown, wet	10		120	
				5			
				6			
2.4	8.0						
		SM	SILTY SAND, brown, wet	17		121	
				6			
				4			
				5			
				6		122	
				10			
6.1	20.0						
		SP	SAND, mostly fine to medium grained, brown, moist	23			
				45		123	
				67			
7.6	25.0						
			Continued on next page				Crew Chief: William Donahue

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-3 (Continued)	
	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
7.6	25.0	SP	SAND, mostly fine to medium grained, a few cobbles, brown, moist				Page 2 of 7
				87		124	
				100/2"			
9.9	32.5			87		125	
				69			
				73			
		SM	SILTY SAND, a trace of fine gravel, a few cobbles & boulders, brown, moist				
						126	
				92		127	
				100/0"			
				63		128	
				69			
				100/2"			
15.2	50.0						
			Continued on next page				

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
15.2	50.0	GP	GRAVEL, medium, moist to wet				Page 3 of 7
				100	3"	129	
				100	4"	130	
18.0	59.0	SM	SILTY SAND, a trace of fine gravel, brown, moist				
				67			
				78			
				100	2"	131	
				71			
				53			
				89			
				100	4"	132	
				100	4"	133	
22.9	75.0						
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
30.5	100.0	SP	SAND, mostly fine to medium grained, some fine to medium gravel, a few cobbles, brown, moist to wet	84	2"	138	Page 5 of 7
				97			
				100			
				93	3"	139	
				100			
				100	6"	140	
38.1	125.0						
			Continued on next page				

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-3 (Continued)		
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">LOCATION: At Staked Location</td> <td style="width:50%;">SCALE: 25.4 mm = 1.22 m 1" = 4'</td> </tr> </table>	LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'		

DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
38.1	125.0						Page 6 of 7
38.7	127.0	SP	SAND, mostly fine to medium grained, some fine to medium gravel, brown, moist to wet				
		SM	SILTY SAND, some fine to medium gravel, a few boulders, reddish brown, moist				
						100/4"	141
						53 93 100/2"	142
45.7	150.0						
Continued on next page							

(See Report and Standard Plates for evaluation and descriptive terminology.)

LOG OF BORING



PROJECT: DS81-04 Soil Borings & Piezometer Installation Proposed Mine Facility Crandon, Wisconsin	BORING: BE 216-3 (Continued)
LOCATION: At Staked Location	SCALE: 25.4 mm = 1.22 m 1" = 4'
DATE: 4-14-81	

(See Report and Standard Plates for evaluation and descriptive terminology.)

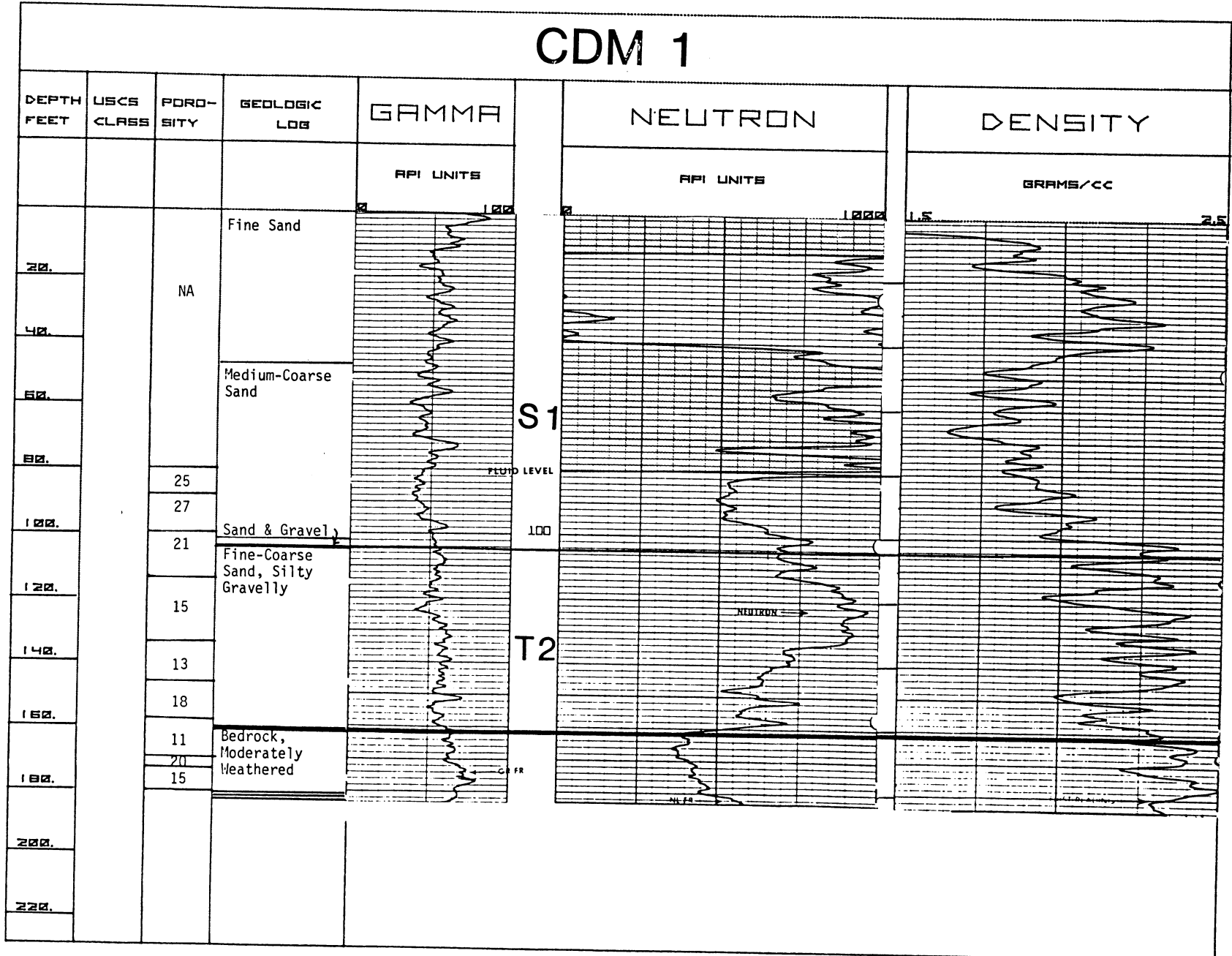
DEPTH METERS	DEPTH FEET	ASTM D2487 Symbol	Description of Materials (ASTM: D2488)	BPF	WL	Sample Number	Tests or Notes
45.7	150.0		Bedrock, reddish orange Normal rate of advance Increased pressure needed to drill from 169-1/2' to 178-1/2' Minimal loss of drilling fluid. Water pressure -- normal Recovery: 152' - 154-1/2' 93.3% 154-1/2'-159-1/2' 100% 159-1/2'-164-1/2' 100% 164-1/2'-169-1/2' 97.5% 169-1/2'-174-1/2' 100% 174-1/2'-178-1/2' 0%*				Page 7 of 7 NW casing driven to 152'. Bore hole extended from 152' to 178-1/2' with NQ Diamond Bit & "Q" series wire line coring equipment. *NQ core barrel abandoned in bore hole
54.4	178.5		Water level not measured due to the presence of drilling fluid.				

BORING LOGS

CAMP DRESSER & McKEE

<u>Boring Logs</u>	<u>Number of Sheets</u>
CDM 1	1
CDM 2	1
CDM 3	1
CDM 4	1
CDM 5	1
CDM 6	1
CDM 7	1
CDM 8	1
CDM 9	1
CDM 10	1
CDM 11	1
CDM 12	1
CDM 13	1
CDM 14	1
CDM 15	1
CDM 16	1

CDM 1



S1

T2

FLUID LEVEL

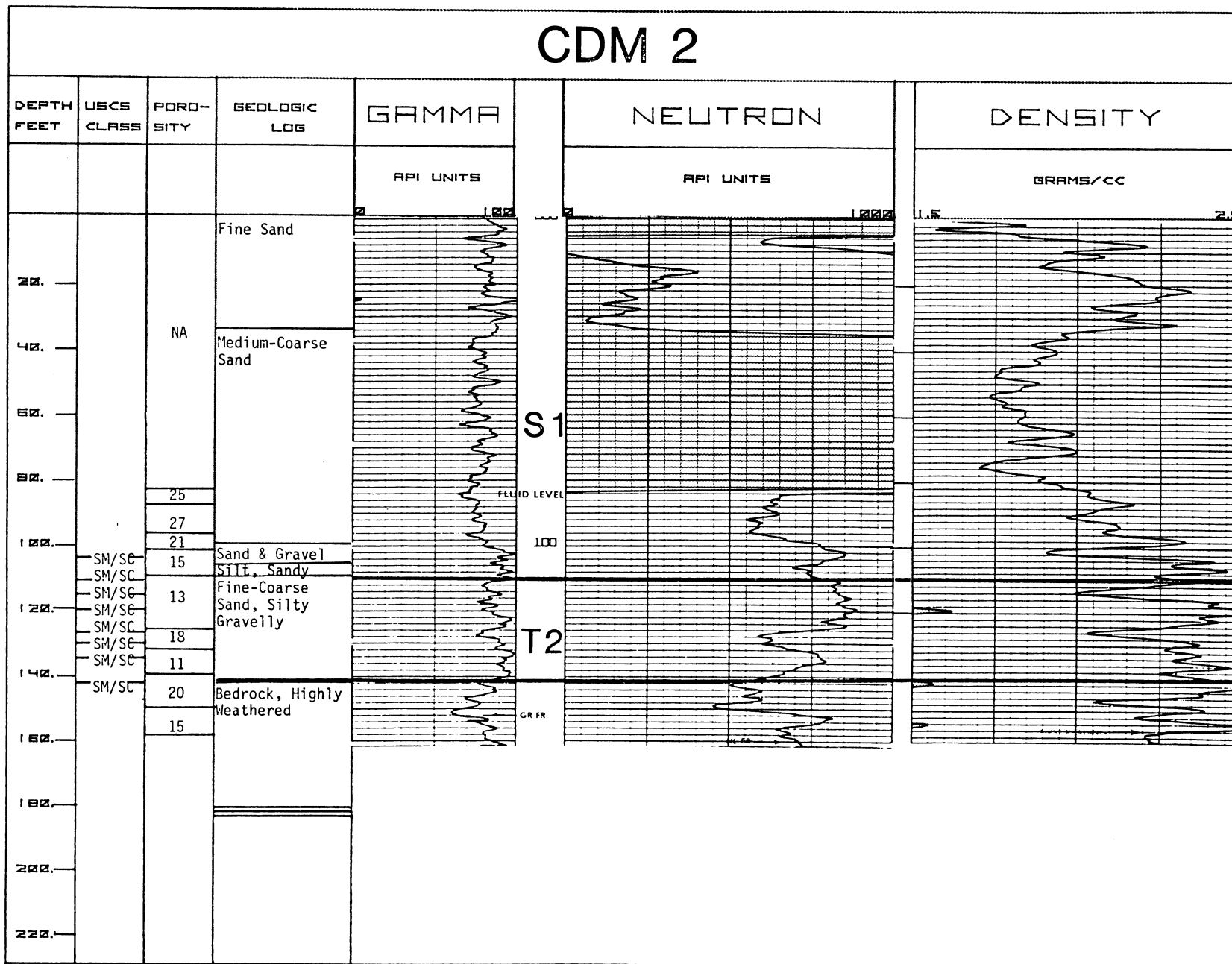
NEUTRON

G R

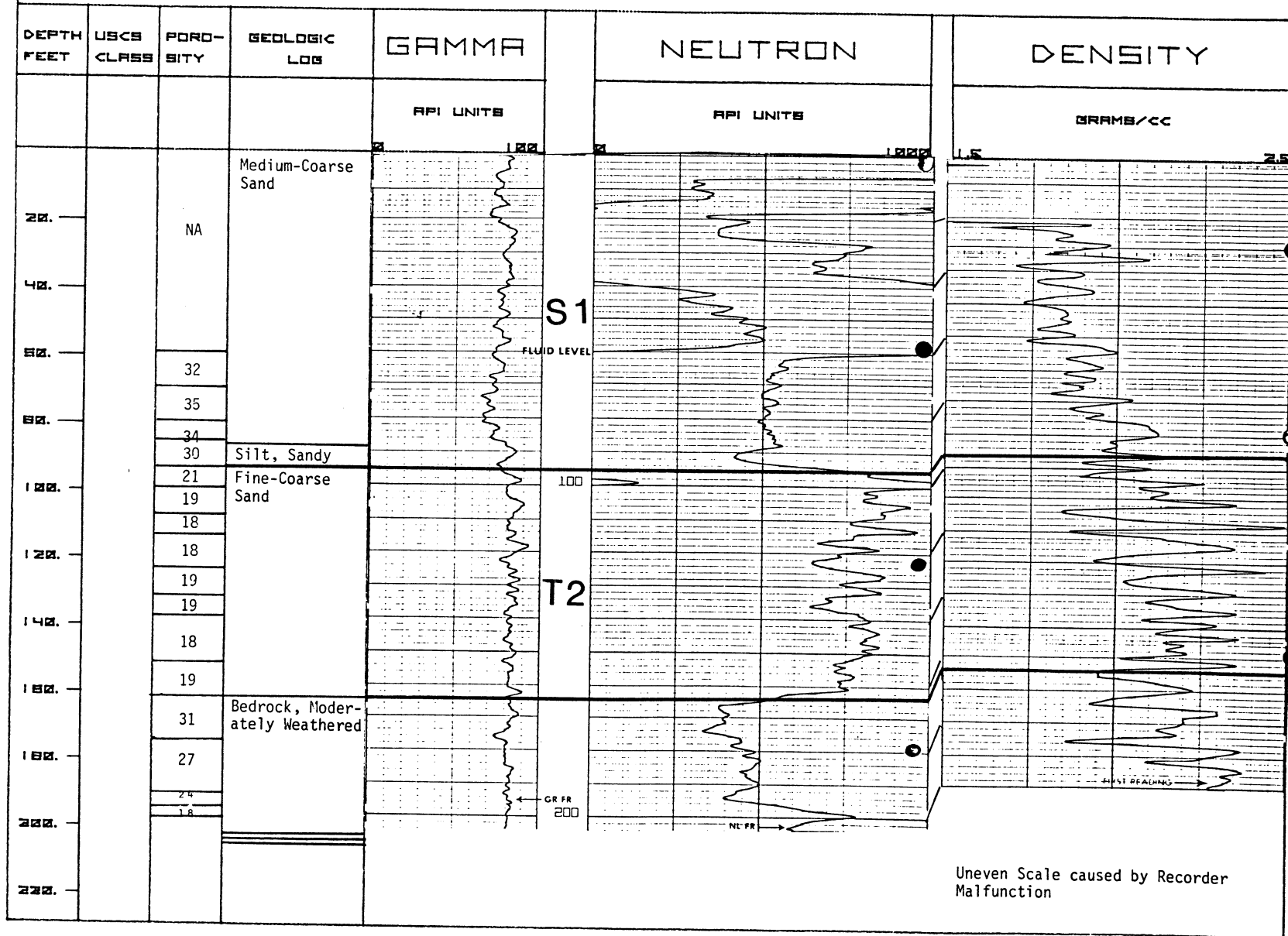
N L

D E

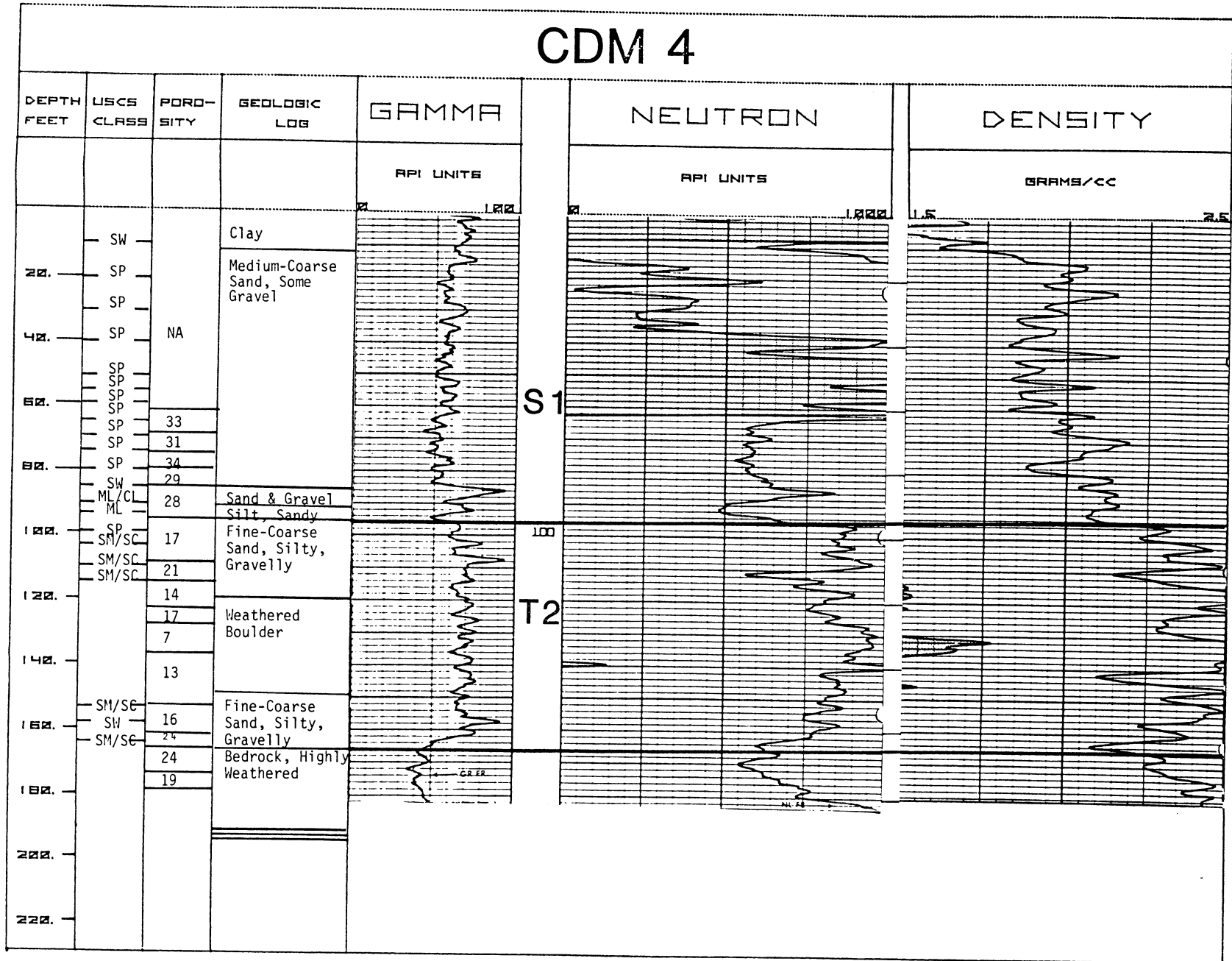
CDM 2



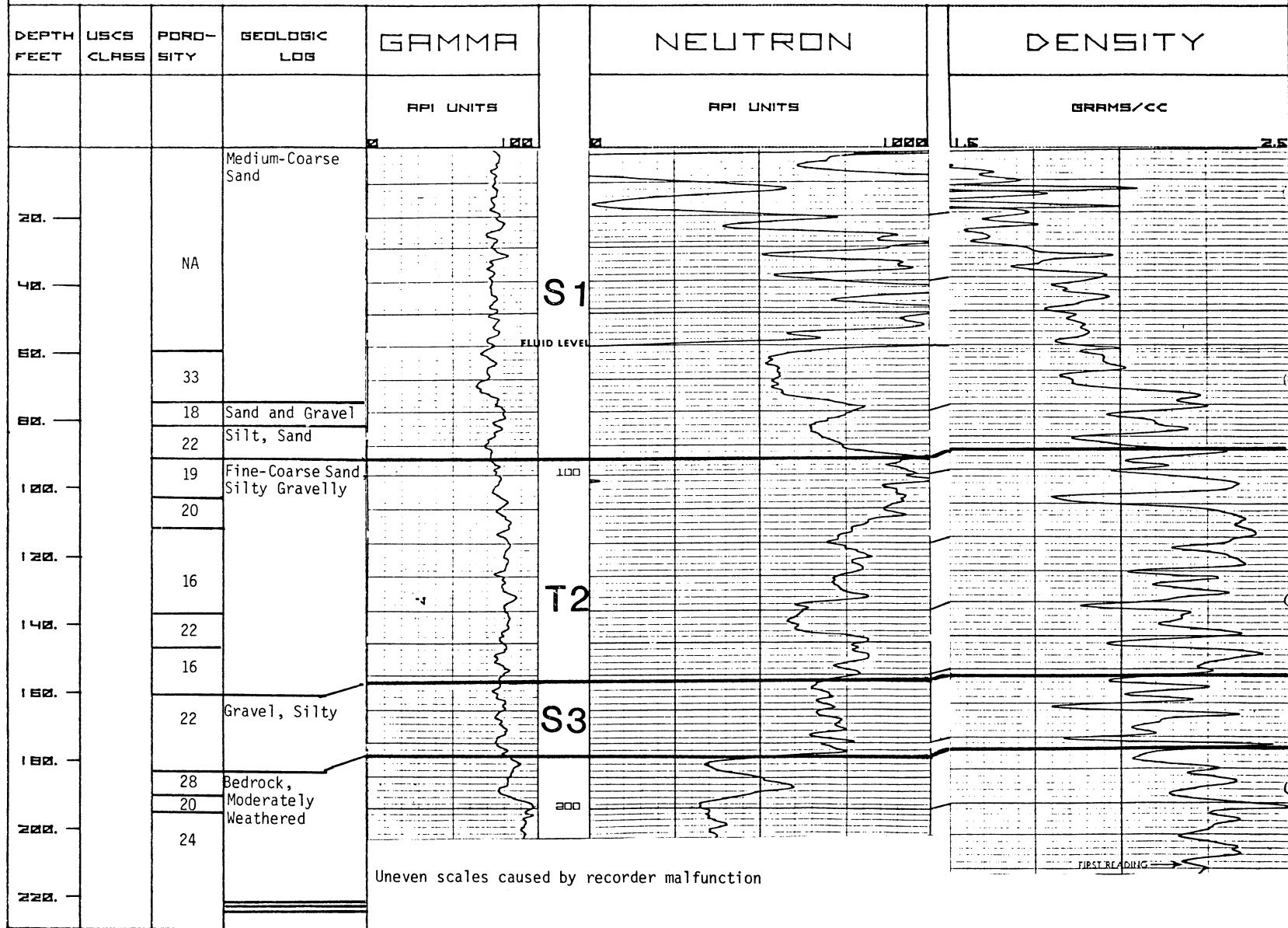
CDM 3



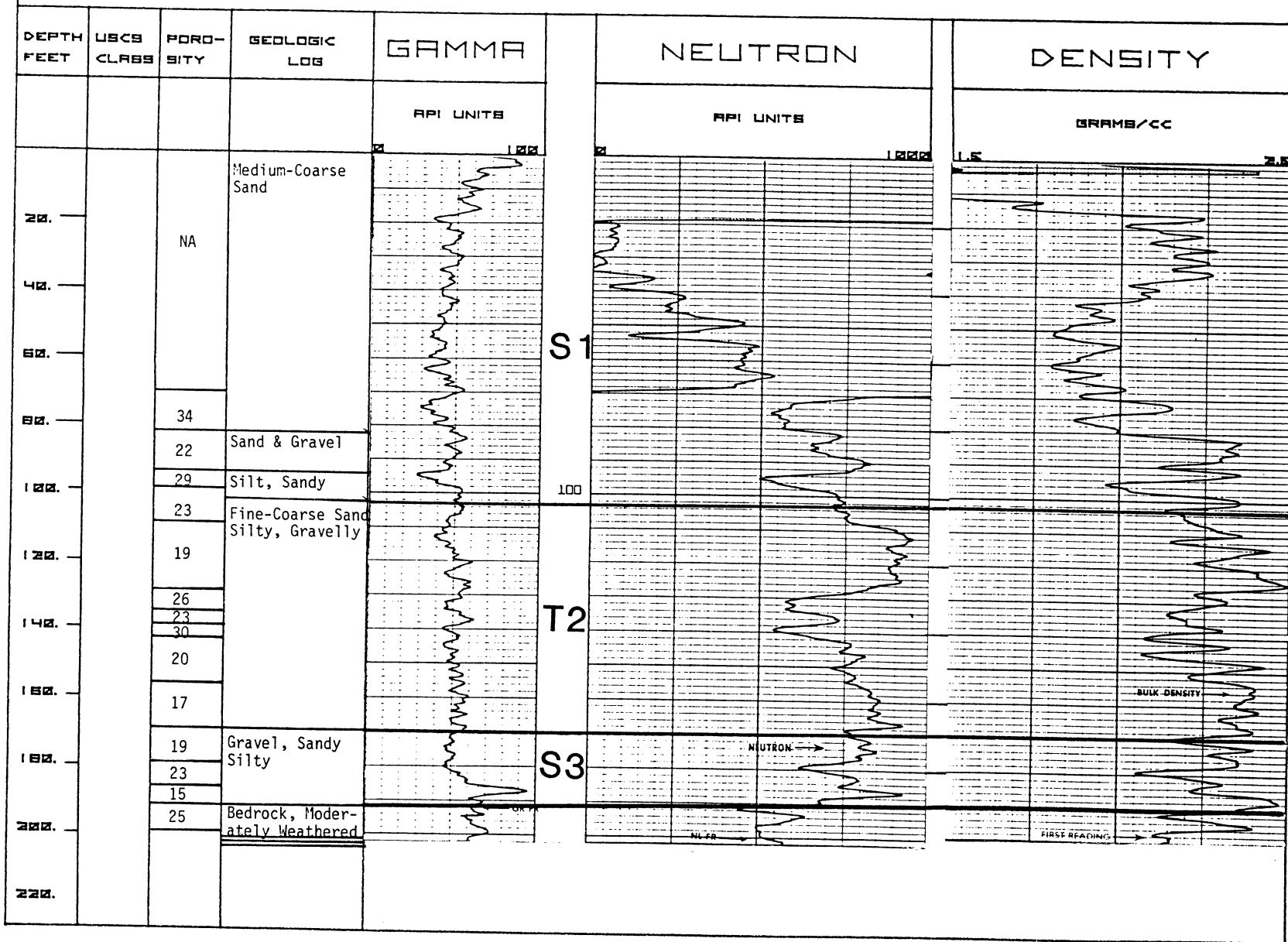
CDM 4



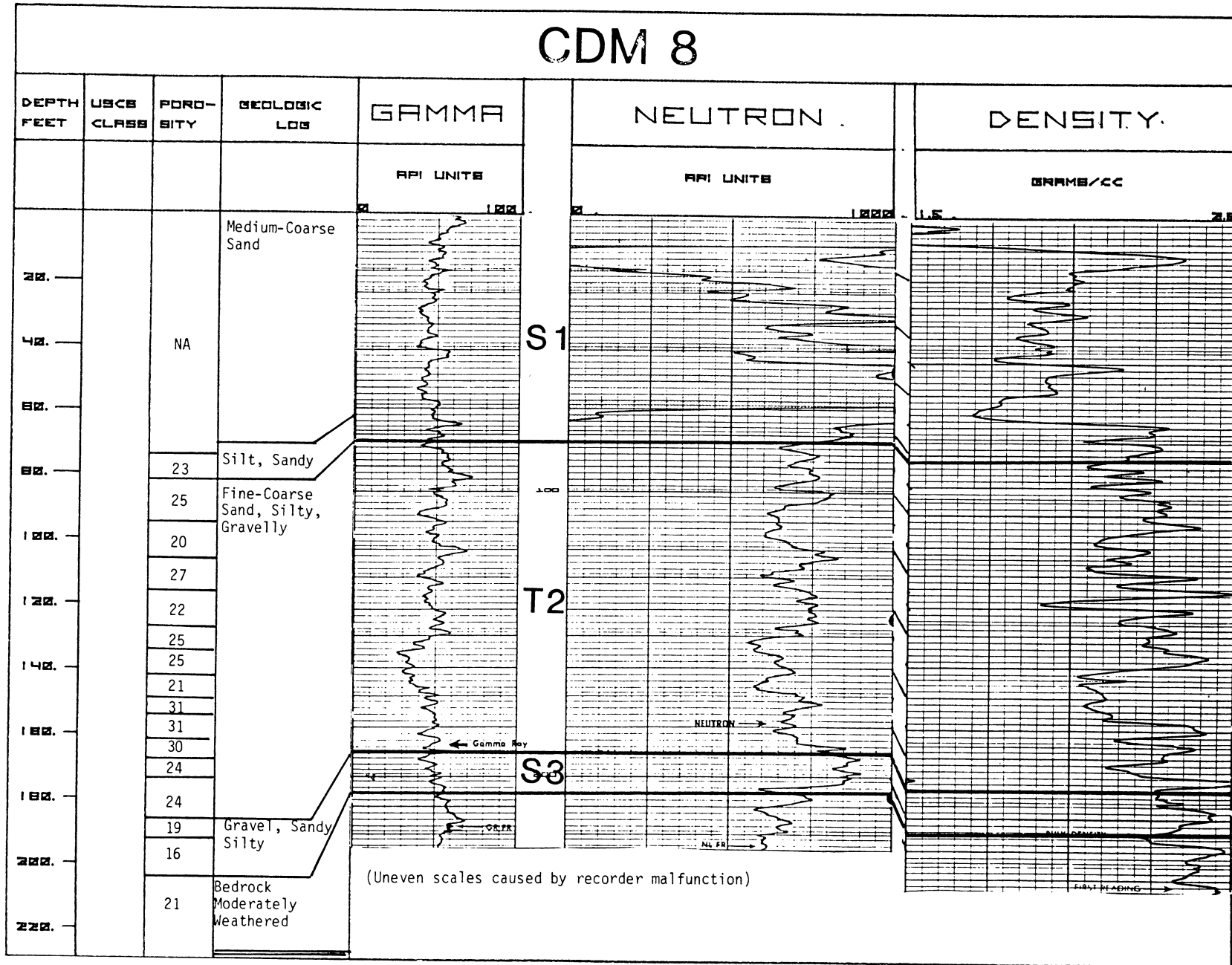
CDM 5



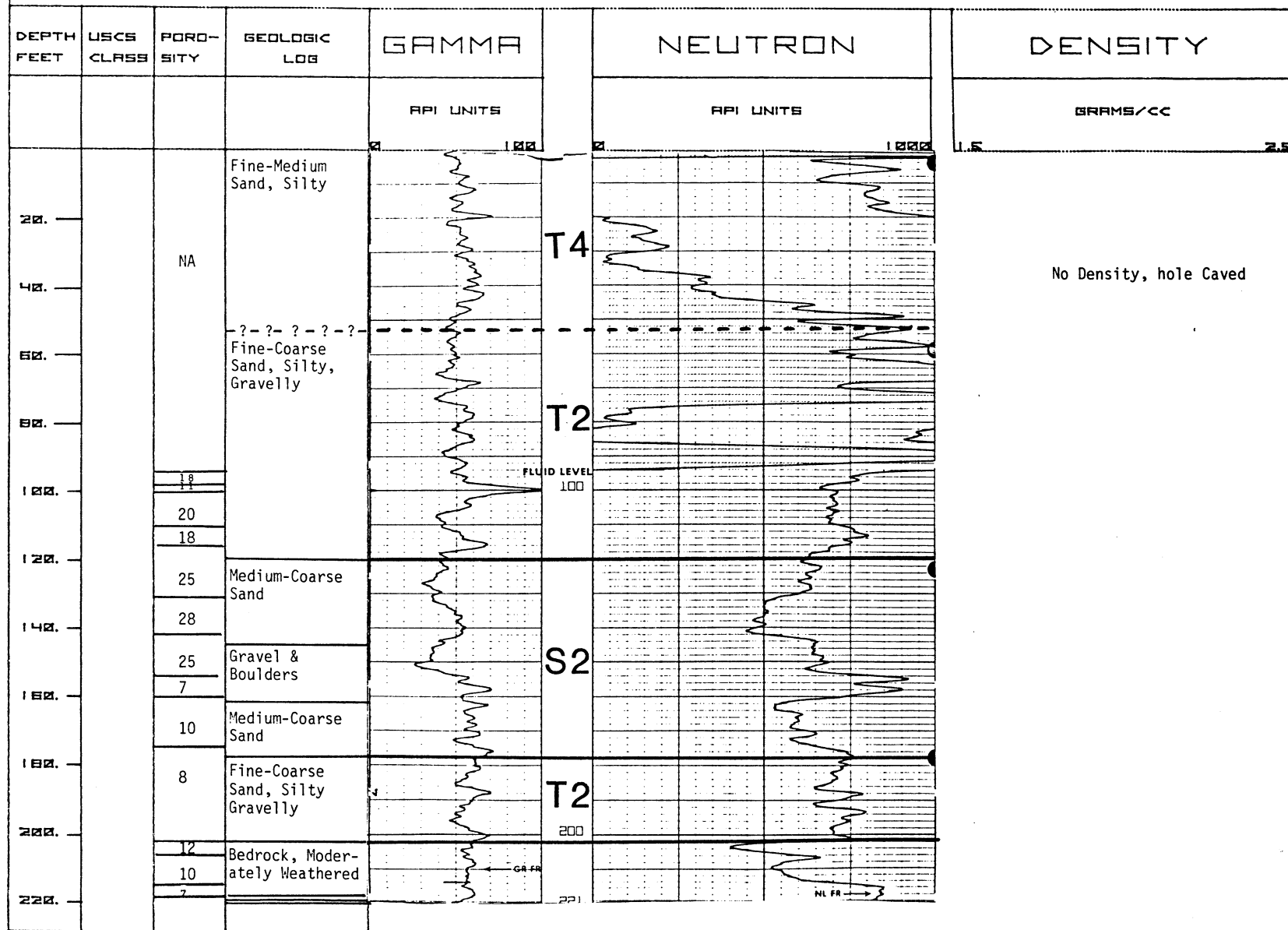
CDM 7



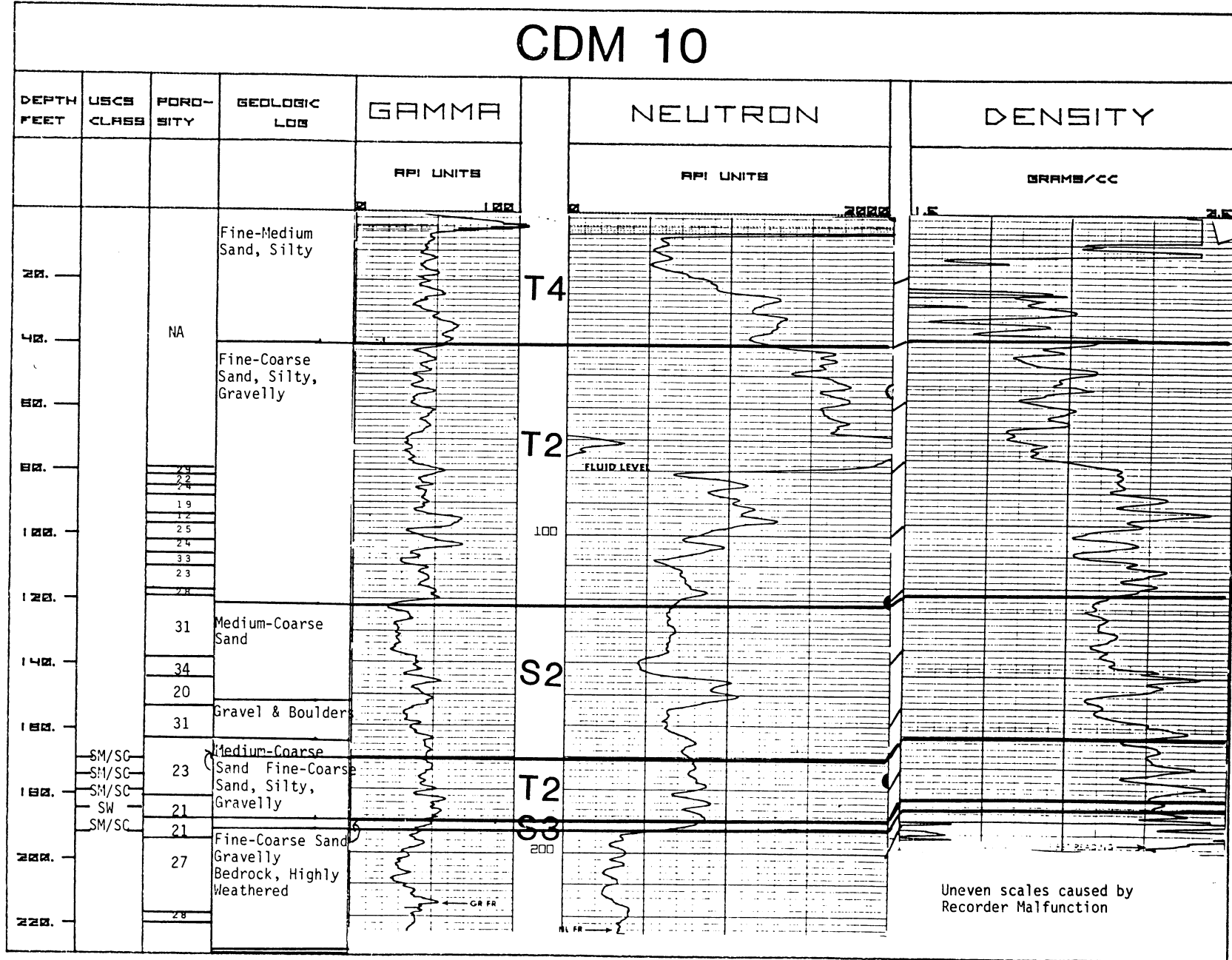
CDM 8



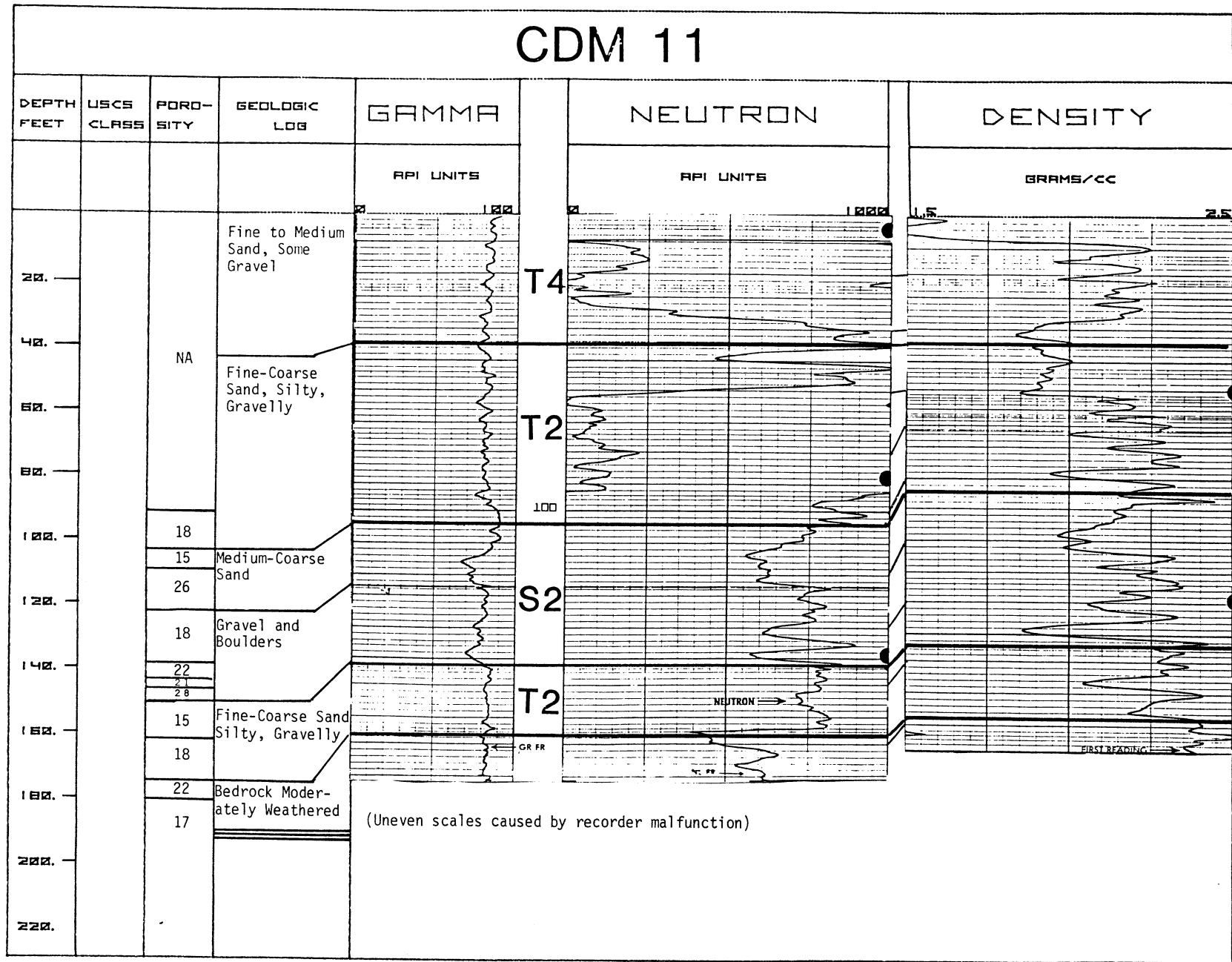
CDM 9



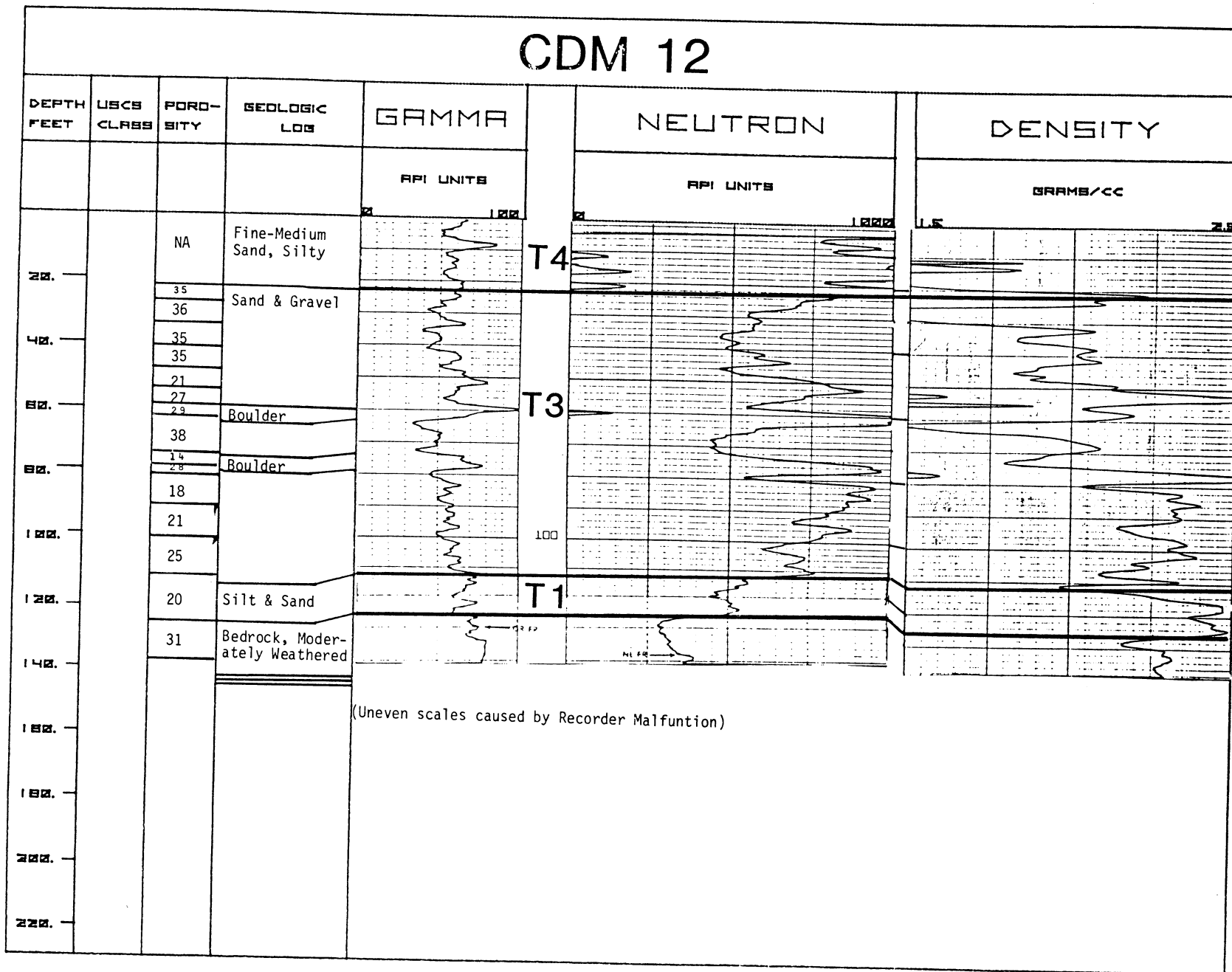
CDM 10



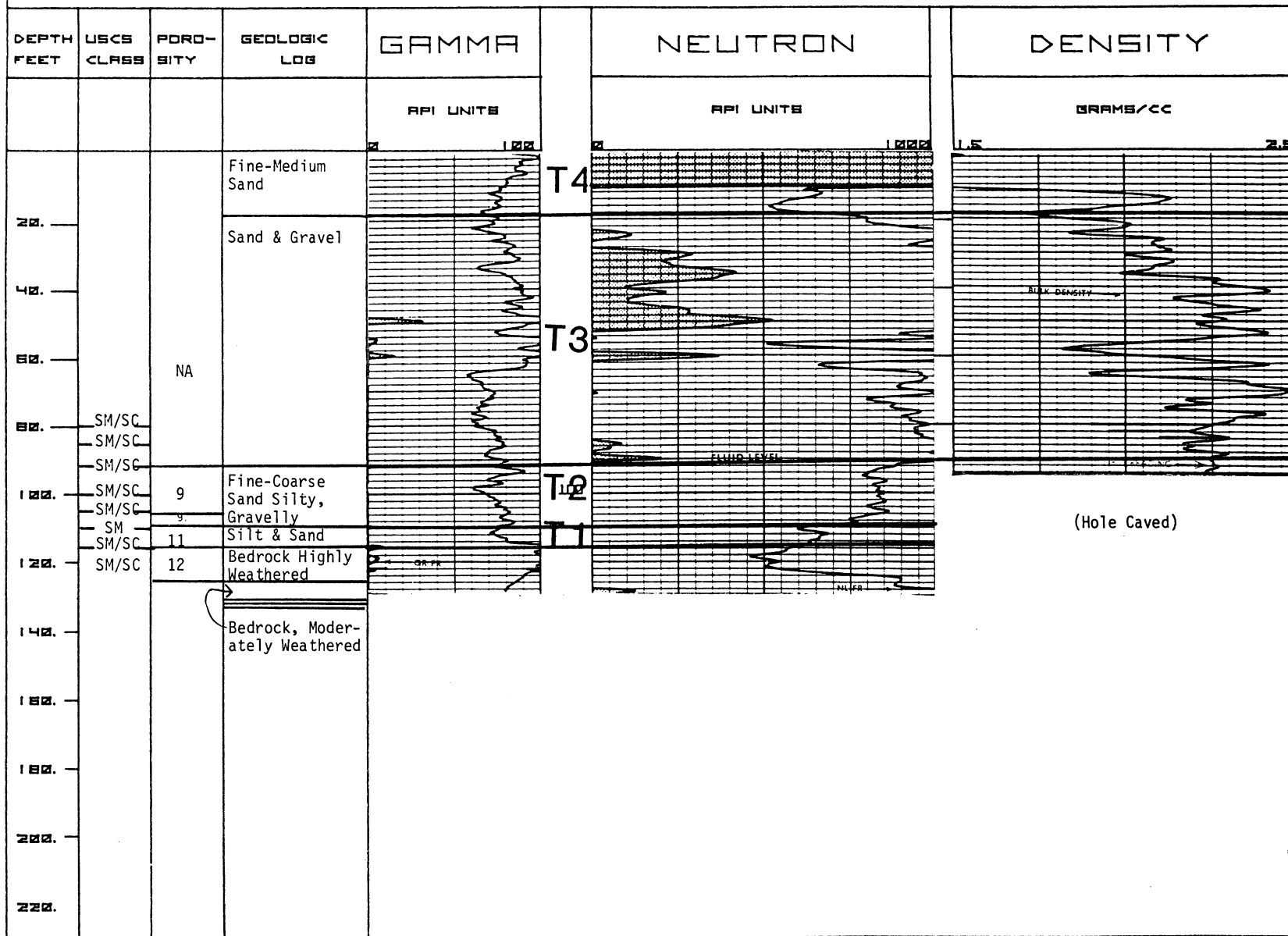
CDM 11



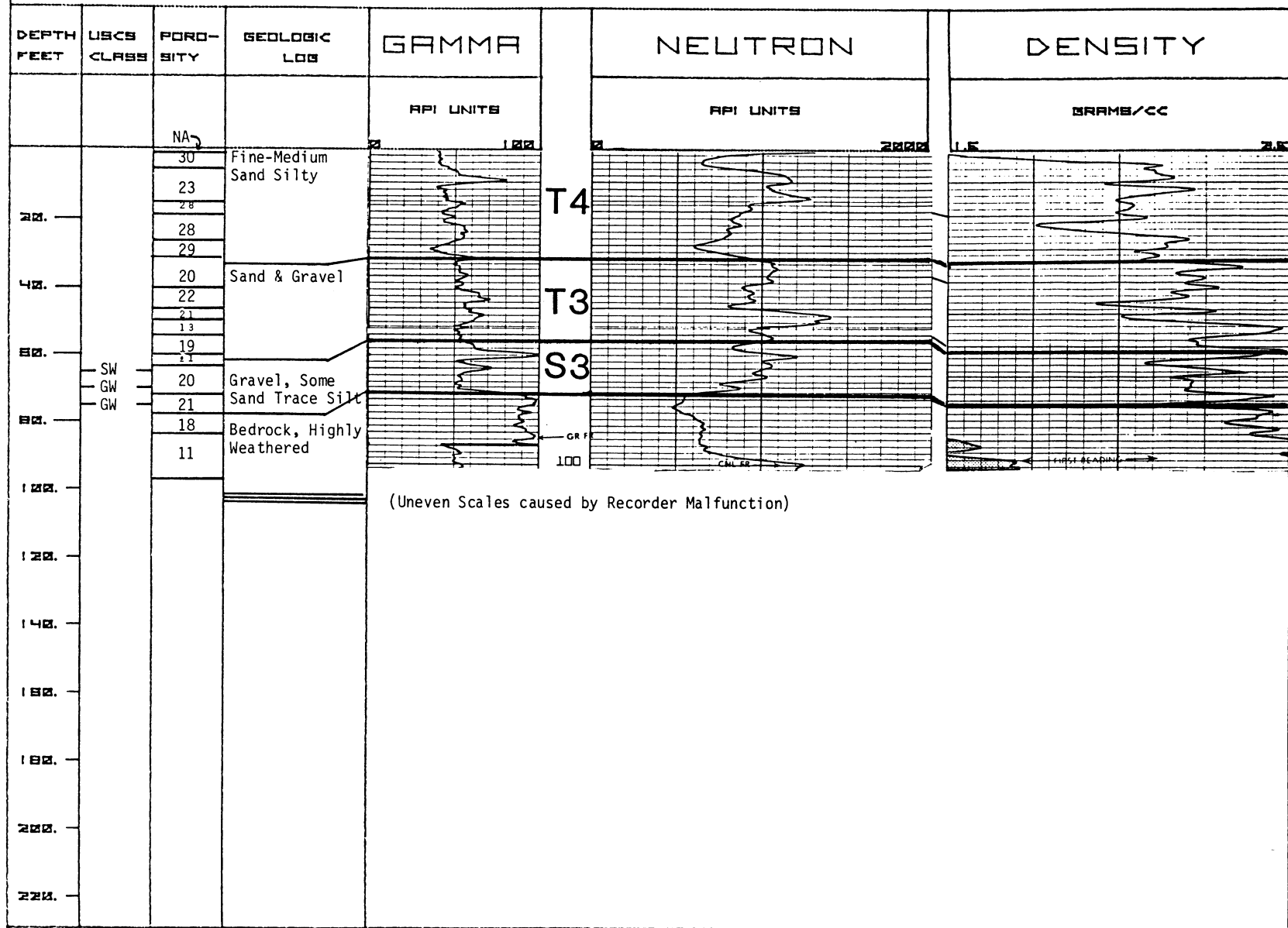
CDM 12



CDM 13



CDM 14



CDM 15

DEPTH FEET	USCS CLASS	PORO- SITY	GEOLOGIC LOG	GAMMA	NEUTRON	DENSITY
				API UNITS	API UNITS	GRAMS/CC
20.	SM/SC SW SP		Fine - Coarse Sand, some Silt, some Gravel			
40.	SM/SC				(NO GEOPHYSICAL LOGS RUN)	
60.	SM/SC SM/SC SM/SC SM/SC SM/SC SM/SC			T2		
80.	SM/SC SW		Boulder			
100.	SM/SC SW SP		Fine - Medium Sand			
	SM/SC		Sand and Gravel	S2?		
	SM/SC		Fine Sand			
	SM/SC		Silt and Sand			
120.	SM/SC SM/SC		Fine - Coarse Sand, some Silt some Gravel	T2		
140.	SM/SC GM/GC SW		Sand and Gravel			
	SM/SC		Fine - Coarse Sand, Silty, Gravelly			
160.	SM/SC		Boulder			
	SM/SC		Fine - Coarse Sand, Silty, Gravelly			
180.			Bedrock			
200.						
220.						

CDM 16

DEPTH FEET	USCS CLASS	PORO- SITY	GEOLOGIC LOG	GAMMA		NEUTRON		DENSITY	
				API UNITS		API UNITS		GRAMS/CC	
				1.00	1.000	1.000	1.5	2.5	
	SP	NA	Fine Sand Some Silt						
	SP	39	Medium Sand						
	ML	44	Silt, Trace Sand						
200.	GW	43	Gravel, Trace Sand						
	SW	34	Medium-Coarse Sand						
	SP	35							
	SP	42	Sand & Gravel						
400.	SW								
	SW								
	SW								
	SP								
600.			Fine Sand						
	SM/SC		Sand, Silty						
	ML/CL								
	SP								
800.	SP		Fine-Medium Sand						
	SP		Fine Sand Trace Silt						
	SM/SC								
	SM/SC		Fine Sand, Some Silt						
1000.	SM/SC								
	SP								
	SP								
1200.	SM/SC		Fine Sand, Silty						
	SP								
	ML/CL		Silt, Sandy						
	ML/CL								
	SM/SC								
1400.	SM/SC		Fine Sand, Silty						
	SP		Fine Sand, Trace Silt						
	SM/SC								
	SP								
1600.	SP								
	ML/CL		Silt, Sandy						
			Bedrock						
1800.									
2000.									
2200.									

S4

BORING LOGS
SOIL TESTING SERVICES

<u>Boring Logs</u>	<u>Number of Sheets</u>
STS B1	3
STS B2	1
STS B3	1
STS B4	1
STS B5	1
STS B6	1
STS B7	1
STS B8	1
STS B9	1
STS B10	1
STS B11	1
STS TP-1	1
STS TP-2	1
STS TP-3	1
STS TP-4	1
STS TP-5	1
STS TP-6	1
STS TP-7	1
STS TP-8	1
STS TP-9	1
STS TP-10	1
STS TP-11	1
STS TP-12	1
STS TP-13	1
STS LSL-1	2
STS LSL-2	1
STS LSL-3	1
STS LSL-4	2
STS LSL-5	1
STS LSL-6	1

LOG OF BORING NO. 1

OWNER				ARCHITECT-ENGINEER						
SITE				PROJECT NAME						
Exxon Minerals U.S.A.				Crandon Mine Development						
Crandon Mine Development				Prospecting Project						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS./FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----△ STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
1	1	SS		SURFACE ELEVATION ↴						
2	2	SS		Brown silty very fine to fine sand (SM-ML) - trace of gravel trace of clay - with a trace of roots to 1.5 feet - moist - loose to medium dense		8				
5	3	SS		Brown silty clayey fine to medium sand (SC) - with lenses of silty fine sand - some gravel - moist - dense						
4	4	SS		Brown silty fine to coarse sand (SM) - with pockets and lenses of sandy silt (ML) - some fine to coarse gravel - moist - extremely dense						
5	5	SS		Note: Broken stone at tip of of sample						
10	6	SS		Cobble and boulder layer - cobbles average $\frac{1}{4}$ inch in size, interbedded with brown fine to medium sand (SP) - with a trace of silt						
15	7	SS		Note: Broken stones in samples at 10 and 15 feet						
20	8	SS								
25	9	SS		Brown fine to coarse sand (SW) - trace of silt - a little to some fine to coarse gravel - grades finer with depth - moist - extremely dense						
30	10	SS		Note: Boulder encountered at 18.5 to 20.0 feet Occasional boulders or cobbles encountered at 22.7 to 32.3 feet						
35	11	SS	LS							
40	12	SS		Brown silty fine to medium sand (SM) - with pockets and lenses of sandy silt (ML) - with a little clay - trace of gravel - moist - extremely dense						
42				Continued	121.9					

33"
 53"
 16 1/3"
 107 1/2"
 52"
 27 1/2"
 154"
 65 1/2"
 BNCG
 109 1/2"
 204 1/3"
 187 1/4"

WATER LEVEL OBSERVATIONS			
WL			
WL	B.C.R.		A.C.R.
WL			

SOIL TESTING SERVICES
 OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED	1-21-80
BORING COMPLETED	1-25-80
RIG W-B	FOREMAN EVH
DRAWN JPJ	APPROVED TWW
JOB # 8736 A	SHEET 1 of 3

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 2

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER						
SITE Crandon Mine Development				PROJECT NAME Prospecting Project						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
						STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
5	1	SS		Yellowish brown silty very fine to fine sand (SM) - trace of gravel - trace of medium to coarse sand - moist - loose		5				
	2	SS		Brown silty fine sand (SM) - trace of medium to coarse sand - trace of gravel - moist - medium dense			21			
5	3	SS						21		
	4	SS		Brown fine to medium sand (SP) - trace of silt - trace to a little gravel - grades fine to coarse from 8 to 10 feet - moist to wet - medium dense to very dense - Note: Broken stone in sample at 8 feet			17			
10	5	SS								73
	6	SS								57
	7	SS		Brown fine to coarse sand (SW-SP) - trace of silt - some fine to medium gravel - trace of decomposed gravel fragments - with pockets of fine sand to 14 feet - grades to sandy gravel at 30 to 32 feet with numerous cobbles and boulders - moist to wet - extremely dense Note: Boulder or cobbles encountered at 20 to 20.4 feet 1.5 foot boulders between 21.0 and 25.0 feet 0.5 foot boulders between 25.0 and 28.0 feet 1.1 foot boulders between 28.0 and 30.0 feet 1.4 foot boulders between 30.0 and 35.8 feet						61
15	8	SS								57 1/2"
	9	SS								105 1/2"
20	10	SS								103 1/3"
	11	SS		Brown fine to coarse sand (SW-SP) - trace of silt - some fine to medium gravel - trace of decomposed gravel fragments - with pockets of fine sand to 14 feet - grades to sandy gravel at 30 to 32 feet with numerous cobbles and boulders - moist to wet - extremely dense Note: Boulder or cobbles encountered at 20 to 20.4 feet 1.5 foot boulders between 21.0 and 25.0 feet 0.5 foot boulders between 25.0 and 28.0 feet 1.1 foot boulders between 28.0 and 30.0 feet 1.4 foot boulders between 30.0 and 35.8 feet						103 1/2"
	12	SS								8 NCCG
25	13	SS								174 1/2 SET
	14	SS								102 1/4"
30	15	SS								198 1/4"
	16	SS		End of Boring Boring terminated in fine to coarse sand Boring advanced to 10.0 feet by solid stem auger Boring advanced from 10.0 to 40.5 feet by roller bit and Revert drilling mud 15 feet of HW casing used Frost encountered to 0.5 feet						101 1/3"
35	15	SS								8 NCCG
40	16	SS								147 1/2"
40.5	16	SS							157 SET	

WATER LEVEL OBSERVATIONS		
WL		
WL	B.C.R.	ACR
WL		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBLAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-25-80
BORING COMPLETED	1-28-80
FIG W-8	FOREMAN EVH
DRAWN JPJ	APPROVED TWW
JOB = 8736 A	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 4

OWNER Exxon Minerals U.S.A.	ARCHITECT-ENGINEER
SITE Crandon Mine Development	PROJECT NAME Prospecting Project

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT.				
							1	2	3	4	5
							PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
							STANDARD "N" PENETRATION (BLOWS./FT.)				
							10	20	30	40	50
					SURFACE ELEVATION ↘						
	1	SS			Brown silty very fine sand (SM) - trace of roots, trace of medium sand to fine gravel - moist - loose		⊗ 5				
	2	SS			Brown silty fine to medium sand (SM) - trace of fine gravel - moist - medium dense to dense			⊗ 1/6"			⊗ 25/6"
5	3	SS					⊗ 20				
	4	SS			Dark reddish brown fine sand (SP) - with a 1 inch lense of brown silty fine sand - some gravel and broken rock fragments - moist - dense				⊗ 38		
	5	SS						⊗ 26			
10	6	SS						⊗ 32			
					Brown silty fine sand (SM) - a little to some fine gravel - with 1/2 inch seams of fine sand (SP) - grades fine to medium at 15 feet - moist - medium dense to very dense Note: Occasional boulders encountered from 12 feet						
15	7	SS									⊗ 80
					Brown fine to coarse sand and gravel (SP-GP) - trace of silt - some broken stone fragments - moist - extremely dense						⊗ 55/6"
20	8	SS									⊗ 55/6"
21					End of Boring Boring terminated in fine to coarse sand Boring advanced to 10.0 feet by solid stem auger Boring advanced from 10.0 to 21.0 feet by roller bit and Revert drilling mud 10 feet of NW casing used						

WATER LEVEL OBSERVATIONS		
WL		
WL	B.C.R.	A.C.R.
WL		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-18-80
BORING COMPLETED	1-18-80
RIG W-8	FOREMAN EVII
DRAWN JPJ	APPROVED TWW
JOB # 8736 A	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 5

OWNER Exxon Minerals U.S.A.			ARCHITECT-ENGINEER																																
SITE Crandon Mine Development			PROJECT NAME Prospecting Project																																
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL																														
SURFACE ELEVATION ↘					UNIT DRY WT. LBS./FT. 3																														
					UNCONFINED COMPRESSIVE STRENGTH TONS./FT. ²																														
					<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:20%;">1</td> <td style="width:20%;">2</td> <td style="width:20%;">3</td> <td style="width:20%;">4</td> <td style="width:20%;">5</td> </tr> <tr> <td colspan="5" style="text-align: center;">○</td> </tr> <tr> <td colspan="2">PLASTIC LIMIT %</td> <td colspan="2">WATER CONTENT %</td> <td>LIQUID LIMIT %</td> </tr> <tr> <td colspan="2">X</td> <td colspan="2">●</td> <td>△</td> </tr> <tr> <td colspan="5" style="text-align: center;">STANDARD "N" PENETRATION (BLOWS/FT.)</td> </tr> <tr> <td style="width:20%;">10</td> <td style="width:20%;">20</td> <td style="width:20%;">30</td> <td style="width:20%;">40</td> <td style="width:20%;">50</td> </tr> </table>	1	2	3	4	5	○					PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %	X		●		△	STANDARD "N" PENETRATION (BLOWS/FT.)					10	20	30	40	50
1	2	3	4	5																															
○																																			
PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %																															
X		●		△																															
STANDARD "N" PENETRATION (BLOWS/FT.)																																			
10	20	30	40	50																															
1	SS				<p>Brown silty fine to medium sand (SM) - trace of clayey sand seams (SC) to 8 feet - trace of coarse sand - a little gravel - moist - medium dense to dense - color changes to rusty brown at 2 feet</p>																														
2	SS																																		
3	SS																																		
4	SS																																		
5	SS																																		
6	SS																																		
7	SS																																		
8	SS																																		
9	SS																																		
10	SS																																		
11	SS																																		
12	SS						<p>Brown fine to coarse sand (SP) - trace of silt - some gravel - trace of pockets of fine sand at 40.2 feet - moist to wet - very dense to extremely dense Note: Broken stone observed in sample at 35 feet</p>																												
13																																			
14																																			
15																																			
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38																																			
39																																			
40																																			
41																																			
End of Boring Boring terminated in fine to coarse sand Boring advanced to 8.0 feet by solid stem auger Boring advanced from 8.0 to 41.0 feet by roller bit and Revert 15 feet of HW casing used Frost encountered to 1.0 feet																																			
WATER LEVEL OBSERVATIONS			SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303																																
WL						BORING STARTED	1-29-80																												
WL	B.C.H.	A.C.H.				BORING COMPLETED	1-29-80																												
WL						RIG	W-B																												
			DRAWN	JPJ																															
			FOREMAN	EVH																															
			APPROVED	TWW																															
			JOB #	8736 A																															
			SHEET	1 of 1																															

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 6

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER						
SITE Crandon Mine Development				PROJECT NAME Prospecting Project						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
						X	●	△		
						STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
				SURFACE ELEVATION ↴						
	1	PA		Dark brown very fine sandy silt (ML) - trace of roots - trace of gravel - wet						
	2	SS								
5	3	SS		Rusty brown silty fine sand (SM) - a little medium to coarse sand - trace of gravel - trace of clay and clayey sand seams - moist - medium dense to dense Note: Broken stone in sample at 8.0 feet						24 25 30
	4	SS								
	5	SS								23
10	6	SS								35
15	7	SS		Brown fine to coarse sand (SP) - some gravel - trace to a little silt - grades coarser with depth - moist - dense to extremely dense						85" BACG
20	8	SS								103" 5"
20.4				End of Boring Boring terminated in fine to coarse sand Boring advanced to 20.4 feet by solid stem auger Frost encountered to 0.7 feet						

WATER LEVEL OBSERVATIONS	
WL	
WL	BCR. ACR
WL	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-30-80
BORING COMPLETED	1-30-80
RIG W-8	FOREMAN EVH
DRAWN JPJ	APPROVED TWW
JOB # 8736 A	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

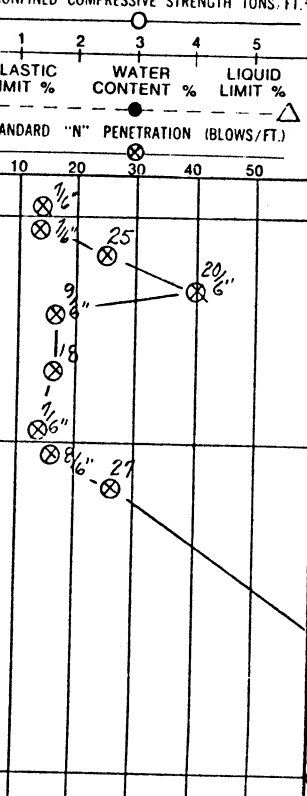
LOG OF BORING NO. 7

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER										
SITE Crandon Mine Development				PROJECT NAME Prospecting Project										
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT ²							
							1	2	3	4	5			
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----△ STANDARD "N" PENETRATION (BLOWS FT)							
SURFACE ELEVATION ↴							10 20 30 40 50							
1	1	SS			Brown silty very fine to fine sand (SM-ML) - some fine to medium gravel - trace of roots - moist - medium dense		14							
2	2	SS			Rusty brown silty fine sand (SM) - trace of medium to coarse sand - a little gravel - moist - very dense to dense Note: Broken stone in sample at 2 feet		20							
3	3	SS			Brown to rusty brown silty fine to coarse sand (SM) and gravel - moist - medium dense		15							
4	4	SS												
5	5	SS												
6	6	SS												
10														
15														
7	7	SS			Brown fine to coarse sand (SW) - some fine to coarse gravel - trace to a little silt - with pieces of weathered gravel at 20 feet - grades coarser with depth - moist - dense to extremely dense									
8	8	SS												
21.5														
End of Boring Boring terminated in fine to coarse sand Boring advanced to 8.0 feet by solid stem auger Boring advanced from 8.0 to 21.5 feet by roller bit and Revert 10 feet of HW casing used														
WATER LEVEL OBSERVATIONS							BORING STARTED		1-29-80					
WL						BORING COMPLETED		1-29-80						
WL	B.C.R.			A.C.R.		BIG		W-8						
WL						DRAWN		JPJ						
							JOB #		8736 A					
							FOREMAN		EVH					
							APPROVED		TWW					
							SHEET		1 of 1					
							The stratification lines represent the approximate boundary between soil types and the transition may be gradual.							

LOG OF BORING NO. 8

OWNER Exxon Minerals U.S.A.	ARCHITECT-ENGINEER
SITE Crandon Mine Development	PROJECT NAME Prospecting Project

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. 2				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							X		△		
							STANDARD "N" PENETRATION (BLOWS/FT.)				
							10	20	30	40	50
					SURFACE ELEVATION ↴						
	1	SS			Yellowish brown mottled grayish brown silty very fine sand (SM) - trace of roots - trace of gravel - a little medium to coarse sand - moist - medium dense - color changes to brown at 0.5 feet						
	1A	SS									
	2	SS									
	3	SS			Rusty brown silty fine sand (SM) - a little medium to coarse sand - a little to some gravel - trace of fine sand pockets at 8 feet - moist - dense to medium dense						
	4	SS									
	5	SS									
	5A	SS									
	6	SS									
	7	SS			Brown fine to medium sand (SP) - trace of silt - trace to a little gravel - grades to fine sand (SP) at 15 feet - moist to wet - medium dense to extremely dense Note: Cobble or boulder at 20 feet						
	8	SS									
					End of Boring Boring terminated in fine to medium sand Boring advanced to 8.0 feet by solid stem auger Boring advanced from 8.0 to 20.0 feet by roller bit and Revert 10 feet of NW casing used						



WATER LEVEL OBSERVATIONS		
WL		
WL	BCR	ACR
WL		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-29-80
BORING COMPLETED	1-29-80
RIG W-8	FOREMAN EVH
DRAWN JPJ	APPROVED TWW
JOB 8736 A	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 9

OWNER Exxon Minerals U.S.A.			ARCHITECT-ENGINEER							
SITE Crandon Mine Development			PROJECT NAME Prospecting Project							
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. ²				
						1	2	3	4	5
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----△ STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
0				SURFACE ELEVATION ↘						
1	1	SS		Dark brown silty fine sand (SM) - trace of roots to 1.5 feet - trace of gravel - moist - medium dense - color changes to brown at 2 feet				23		
2	2	SS						26		
5	3	SS						24		
4	4	SS		Brown silty fine to medium sand (SM) - a little to some gravel - trace of clay - moist - medium dense				28		
5	5	SS						8 1/2		
5A	5A	SS								
10	6	SS						1 1/2"		
15	7	SS		Light brown fine sand (SP) - moist - dense to extremely dense						39
20										
20.9	8	SS		Brown fine to coarse sand (SP) - a little fine gravel - wet - extremely dense						100, 4"
				End of Boring Boring terminated in fine to coarse sand Boring advanced to 10.0 feet by solid stem auger Boring advanced from 10.0 to 20.9 feet by roller bit and Revert Boulders or obstructions encountered from 0 to 2 feet 10 feet of NW casing used						
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		1-17-80		
W.L. B.C.R. A.C.R.						BORING COMPLETED		1-18-80		
W.L.						RIG W-B		FOREMAN EVH		
				DRAWN JPJ		APPROVED TWW				
				JOB # 8736 A		SHEET 1 of 1				
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.										

LOG OF BORING NO. 10

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER							
SITE Crandon Mine Development				PROJECT NAME Prospecting Project							
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT. 2					
						1	2	3	4	5	
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X - - - - - ● - - - - - △ - - - - - STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50					
				SURFACE ELEVATION ↴							
	1A	SS		Dark brown slightly organic silty topsoil (OL-ML) - trace of gravel - a little very fine sand - trace of roots - moist - medium dense							10
	2	SS		Brown very fine sandy silt (ML) - trace of clay - trace of fine gravel - trace of roots to 2 feet - moist - medium dense							22
	3	SS									19
	4	SS									19
	5	SS		Brown silty fine to medium sand (SM) - trace to a little gravel - trace of coarse sand - becomes slightly silty at 10 feet - moist - medium dense							17
	6	SS									18
	7	SS		Brown fine to coarse sand (SP) - trace of silt - trace to a little gravel - moist to wet - extremely dense to very dense							75 3"
	8	SS		End of Boring Boring terminated in fine to coarse sand Boring advanced to 10.0 feet by solid stem auger Boring advanced from 10.0 to 21.5 feet by roller bit and Revert 10 feet of NW casing used							72

WATER LEVEL OBSERVATIONS		
WL		
WL	BCR.	ACR.
WL		

SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED	1-18-80
		BORING COMPLETED	1-18-80
		RIG W-8	FOREMAN EVH
		DRAWN JPJ	APPROVED TWW
		JOB # 8736 A	SHEET 1 OF 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER								
SITE Crandon Mine Development				PROJECT NAME Prospecting Project								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2						
						1	2	3	4	5		
						PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %				
						X		STANDARD "N" PENETRATION (BLOWS/FT.)				
								10	20	30	40	50
				SURFACE ELEVATION ↴								
	1	S		Black sandy silty topsoil (OL) - some roots and stems - moist								
	2	S		Yellowish brown silty very fine sand (SM) - trace of gravel - moist								
	3	S		Brown silty very fine to fine sand (SM) - trace of gravel - moist								
	5											
	4	S		Reddish brown clayey fine to medium sand (SC) - trace of fine gravel - trace to a little silt - moist								
	8.5											

WATER LEVEL OBSERVATIONS		
WL		
WL	BCR	ACR
WL		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-28-80
BORING COMPLETED	1-28-80
BIG	FOREMAN WW
DRAWN JPJ	APPROVED TWW
JOB # 8736 A	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Exxon Minerals U.S.A.			ARCHITECT-ENGINEER								
SITE Crandon Mine Development			PROJECT NAME Prospecting Project								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT. ²				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %		
							X	●	△		
							STANDARD "N" PENETRATION (BLOWS FT)				
							10	20	30	40	50
					SURFACE ELEVATION ↴						
	1	S			Black silty sandy topsoil (OL) - trace of roots - moist						
	2	S			Yellowish brown silty very fine to fine sand (SM) - trace of clay - trace of roots - trace of gravel						
	5	S			Brown silty clayey very fine sand (SM-SC) - trace of gravel - moist						
	8	S			Rusty brown silty fine sand (SM) - trace of gravel - with pockets sandy silt and clayey sand						
WATER LEVEL OBSERVATIONS						SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		1-28-80	
WL					BORING COMPLETED			1-28-80			
WL	B.C.R.		A.C.R.		BIG			FOREMAN WW			
WL					DRAWN JPJ		APPROVED TWW				
						JOB # 8736 A		SHEET 1 of 1			
						The stratification lines represent the approximate boundary between soil types and the transition may be gradual.					

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER						
SITE Crandon Mine Development				PROJECT NAME Prospecting Project						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS./FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
1				SURFACE ELEVATION 7						
2		S		Brown silty sandy topsoil (OL) - trace of roots - moist						
3		S		Yellowish brown silty very fine sand (SM-ML) - trace of roots - trace of gravel and cobbles - moist						
5		S		Yellowish brown fine sand (SP) - with pockets of silty fine sand (SM) - moist - dense						
6										

WATER LEVEL OBSERVATIONS	
WL	
WL	BCR ACR
WL	

SOIL TESTING SERVICES
 OF WIS., INC.
 540 LAMBEAU STREET
 GREEN BAY, WIS. 54303

BORING STARTED	1-28-80
BORING COMPLETED	1-28-80
RIG	FOREMAN WW
DRAWN JPJ	APPROVED TWW
JOB #	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Exxon Minerals U.S.A.		ARCHITECT-ENGINEER	
SITE Crandon Mine Development		PROJECT NAME Prospecting Project	

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X		●		△
						STANDARD "N" PENETRATION (BLOWS FT.)				
						10	20	30	40	50
X				SURFACE ELEVATION ↴						
	1	S		Black silty sandy topsoil (OL) - some roots - moist						
	2	S		Yellowish brown silty very fine sand (SM-ML) - trace of gravel trace of roots						
	5	3	S	Brown fine sand (SP-SM) - trace to a little silt - a little gravel - with irregular layers and pockets of reddish brown silty sandy clay						
	6									

WATER LEVEL OBSERVATIONS		SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303	BORING STARTED	1-28-80
WL			BORING COMPLETED	1-28-80
WL	B.C.R. A.C.R.		RIG	FOREMAN WW
WL		DRAWN JPJ	APPROVED TWW	
		JOB # 8736 A	SHEET 1 of 1	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER						
SITE Crandon Mine Development				PROJECT NAME Prospecting Project						
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X-----		●-----		△-----
						STANDARD "N" PENETRATION (BLOWS/FT.)				
						10	20	30	40	50
X				SURFACE ELEVATION ↓						
	1	S		Black silty sandy topsoil (OL) - some roots - moist						
	2	S		Yellowish brown very fine sandy silt (ML) - trace of gravel - trace of cobbles - moist						
	5	3	S	Reddish brown silty fine sand (SM) - trace of clay with pockets of fine sand and clayey sand - moist - dense						
	6.5									
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		1- -80		
WL			BORING COMPLETED			1- -90				
WL	B.C.R.		A.C.R.			DRAWN JPJ		FOREMAN WW		
WL						APPROVED TWW		SHEET 1 of 1		
				The stratification lines represent the approximate boundary between soil types and the transition may be gradual.						

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER							
SITE Crandon Mine Development				PROJECT NAME Prospecting Project							
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT.					
						1	2	3	4	5	
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %	
						X		●		△	
						STANDARD "N" PENETRATION (BLOWS/FT.)					
						10	20	30	40	50	
1		S		SURFACE ELEVATION ↴							
2		S		Black silty topsoil (OL) - trace of roots - moist							
5				Yellowish brown sandy silt (ML) - trace of roots - some gravel - moist							
6.5		S		Reddish brown silty fine sand (SM) - trace of clay - with pockets of fine to medium sand and gravel - some cobbles - moist							
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		1-29-80			
WL			BORING COMPLETED			1-29-80					
WL	B.C.R.		A.C.R.			RIG		FOREMAN WW			
WL						DRAWN JPJ		APPROVED TWW			
						JOB 8736 A		SHEET 1 of 1			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.											

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER								
SITE Crandon Mine Development				PROJECT NAME Prospecting Project								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. 2						
						1	2	3	4	5		
						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----△ STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50						
SURFACE ELEVATION ↴												
2	S			Black silty sandy topsoil (OL) - some roots - moist								
3	S			Brown silty very fine to fine sand (SM) - trace of gravel - moist								
5				Reddish brown silty fine sand (SM) - trace of clay - some gravel and cobbles - moist								
6												
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303				BORING STARTED		1-29-80		
WL								BORING COMPLETED		1-29-80		
WL	BCR		ACR					RIG		FOREMAN WW		
WL								DRAWN JPJ		APPROVED TWW		
								JOB # 8736 A		SHEET 1 of 1		
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.												

OWNER Exxon Minerals U.S.A.	ARCHITECT-ENGINEER
SITE Crandon Mine Development	PROJECT NAME Prospecting Project

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. 3							
							1	2	3	4	5			
							PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %					
X					SURFACE ELEVATION ↴									
	2	S			Black silty topsoil (OL) - trace of roots - moist									
					Yellowish brown silty very fine sand (SM-ML) - trace of roots - trace of cobbles - moist									
	3	S			Reddish brown silty fine sand (SM) - a little gravel - with pockets and seams of fine to medium sand - moist									

WATER LEVEL OBSERVATIONS	
W.L.	
W.L.	B.C.R. A.C.R.
W.L.	

SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED	1-29-80
		BORING COMPLETED	1-29-80
		BIG	FOREMAN WW
		DRAWN JPJ	APPROVED TWW
		JOB #: 8736 A	SHEET 1 of 1

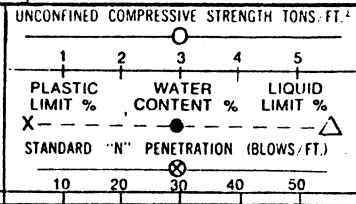
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

OWNER Exxon Minerals U.S.A.		ARCHITECT-ENGINEER									
SITE Crandon Mine Development		PROJECT NAME Prospecting Project									
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS FT.				
							1	2	3	4	5
							X	-	●	-	△
							STANDARD "N" PENETRATION (BLOWS FT.)				
					10	20	30	40	50		
1					SURFACE ELEVATION →						
2	5				Black silty topsoil (OL) - with some roots - moist						
3	5				Yellowish brown silty very fine sand (SM-ML) - trace of gravel - trace of roots - moist						
5					Brown fine sand (SP) - trace of silt - with pockets of silty fine sand - trace of clay - trace of cobbles - moist						
WATER LEVEL OBSERVATIONS						SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		1-29-80	
WL					BORING COMPLETED			1-29-80			
WL	B.C.R.			A.C.R.	BIG			FOREMAN	WW		
WL					DRAWN			JPJ	APPROVED	TWW	
						JOB #		8736 A	SHEET		1 of 1
						The stratification lines represent the approximate boundary between soil types and the transition may be gradual.					

OWNER Exxon Minerals U.S.A.				ARCHITECT-ENGINEER								
SITE Crandon Mine Development				PROJECT NAME Prospecting Project								
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL			UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS·FT. ²				
								1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %		
							X	●		△		
							STANDARD "N" PENETRATION (BLOWS·FT.)					
							10	20	30	40	50	
X				SURFACE ELEVATION ↴								
	1	S		Black silty topsoil (OL) - with some very fine sand - trace of roots - moist								
	2	S		Yellowish brown very fine sandy silt (ML) - trace of roots - moist								
	3	S		Brown silty fine sand (SM) - trace of gravel - trace of cobbles - trace of clay - moist								
	5											
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS 54303				BORING STARTED		1- -80		
WL								BORING COMPLETED		1- -80		
WL	BCR. A.C.R.							RIG		FOREMAN WW		
WL								DRAWN JPJ		APPROVED TWW		
				JOB - 8736 A		SHEET 1 of 1						
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.												

OWNER Exxon Minerals U.S.A.	ARCHITECT-ENGINEER
SITE Crandon Mine Development	PROJECT NAME Prospecting Project

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS. FT. 2				
						1	2	3	4	5
1				SURFACE ELEVATION 7						
	1	S		Black silty sandy topsoil (OL) - with roots and stems - moist						
	2	S		Yellowish brown very fine sandy silt (ML) - trace of roots - trace of gravel - moist						
	3	S		Rusty brown silty fine sand (SM) - some gravel - dense						
	4	S		Reddish brown silty fine sand (SM) - trace of clay - some gravel and cobbles - moist - dense						
	5	S		Brown fine to medium sand (SP) - trace of silt - some gravel and cobbles - moist -						



WATER LEVEL OBSERVATIONS	
WL	
WL	BCR ACR
WL	

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	1-28-80
BORING COMPLETED	1-28-80
RIG	FOREMAN WW
DRAWN JPJ	APPROVED TWW
JOB 8736 A	SHEET 1 OF 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. STS LSL-1

OWNER EXXON Minerals Company	ARCHITECT-ENGINEER
SITE Little Sand Lake	PROJECT NAME Sediment Sampling

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.²					
							1	2	3	4	5	
							PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %	
							STANDARD "N" PENETRATION (BLOWS/FT.)					
							10	20	30	40	50	
					SURFACE ELEVATION ↘							
		PA			Ice							
5					Water							
10												
	1	ST										
15	2	ST										
	3	ST			Black and green organic silt (OL) - fibrous - wet - very loose							
20	4	ST										
	5	ST										
25	6	ST			Grayish brown mottled black organic silt (OH) - trace of fibers - wet - soft							
	7	ST										
	8	ST										
30	9	ST				73.1	X			△		●
	10	ST			Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand seams - wet - soft to firm							
35	11	ST										
	12	ST										
40					CONTINUED							

WATER LEVEL OBSERVATIONS		
W.L.		
W.L.	B.C.R.	A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	3-18-82
BORING COMPLETED	3-18-82
RIG CME 55	FOREMAN TT
DRAWN KOO	APPROVED TWJ
JOB # 11728	SHEET 1 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. STS LSL-1 Continued

OWNER EXXON Minerals Company				ARCHITECT-ENGINEER									
SITE Little Sand Lake				PROJECT NAME Sediment Sampling									
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL			UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ¹					
				SURFACE ELEVATION ↴	1	2		3	4	5	PLASTIC LIMIT % X	WATER CONTENT % ●	LIQUID LIMIT % △
				CONTINUED				10	20	30	40	50	STANDARD "N" PENETRATION (BLOWS/FT.)
40													
	13	ST											
	14	ST		Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand seams - wet - soft to firm			88.6			●			
	15	ST											
	16	ST											
	17	SS	LS	Brown sandy gravel (GP) - wet - dense						⊗ 26		44	
	18	SS										⊗	
				End of Boring Boring advanced to 52.0 feet by roller bit and wash water 28.0 feet of HW casing used									

WATER LEVEL OBSERVATIONS		
W.L.	B.C.R.	A.C.R.
W.L.		
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED		3-18-82
BORING COMPLETED		3-18-82
RIG	CME 55	FOREMAN
DRAWN	K00	APPROVED
JOB #	11728	TWW
		SHEET 2 of 2

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. STS LSL-2

OWNER EXXON Minerals Company	ARCHITECT-ENGINEER
SITE Little Sand Lake	PROJECT NAME Sediment Sampling

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X		●		△
						STANDARD "N" PENETRATION (BLOWS/FT.)				
						10		20		30
				SURFACE ELEVATION ↘						
				Ice						
5				Water						
10										
15	1	SS								
				Black organic silt (OL) - wet - very loose						
20	2	SS								
	3	ST								
	4	ST								
25	5	OS			80.0					
	6	OS								
30	7	ST	NR	Grayish brown mottled black silty clay (CL) - trace of organics and fibers - trace of sand - wet - firm						
	8	ST								
	9	ST								
35	10	ST	NR							
	11	ST								
40	12	BL		Brown fine to medium sand (SP) - trace of silt - trace of clay - wet - medium dense				15		
40.5				End of Boring Boring advanced to 40.5 feet by roller bit and wash water 39.0 feet of HW casing used						

WATER LEVEL OBSERVATIONS		
W.L.		
W.L.	B.C.R.	A.C.R.
W.L.		

SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED	3-22-82
		BORING COMPLETED	3-22-82
		RIG CME 55	FOREMAN JT
		DRAWN KQQ	APPROVED TWW
		JOB # 11728	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. STS LSL-3

OWNER EXXON Minerals Company	ARCHITECT-ENGINEER
SITE Little Sand Lake	PROJECT NAME Sediment Sampling

DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²					
						1	2	3	4	5	
						○					
						X-----●-----△					
						STANDARD "N" PENETRATION (BLOWS/FT.)					
						10	20	30	40	50	
X				SURFACE ELEVATION ↴							
				Ice							
5				Water							
10											
15	1	ST		Black organic silt (OL) - fibrous - wet - very loose							
	2	ST									
	3	ST									
20	4	SS									
	5	SS									
25	6	SS		Greenish brown organic silt (OH) - trace of fibers - wet - very loose							
	7	ST		Grayish brown organic clayey silt (OL to ML) - trace of fibers - trace of sand - wet - firm							
30	8	ST			67.1						
	9	ST									
35	10	ST		Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm							
	11	ST									
	12	ST				87.8					
40	13	ST									
	14	SS		Brown fine to medium sand (SP) - trace of silt - wet - medium dense							
45	14A	SS									
	15	BL									
				End of Boring Boring advanced to 45.0 feet by roller bit and wash water 45.0 feet of HW casing used							

WATER LEVEL OBSERVATIONS		
W.L.		
W.L.	B.C.R.	A.C.R.
W.L.		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	3-19-82
BORING COMPLETED	3-19-82
RIG CME 55	FOREMAN TT
DRAWN KOQ	APPROVED TWW
JOB # 11728	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. STS LSL-4

OWNER EXXON Minerals Company				ARCHITECT-ENGINEER									
SITE Little Sand Lake				PROJECT NAME Sediment Sampling									
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL		UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS./FT. 2						
							1	2	3	4	5		
							PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X-----●-----△ STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50						
				SURFACE ELEVATION ↘									
				ICE									
5		PA		Water									
10													
15	1	SS	LS	Black organic silt (OL) - fibrous - wet - very loose			ROD	WEIGHT					
	2	SS					ROD	WEIGHT					
20	3	SS					ROD	WEIGHT					
	4	SS					ROD	WEIGHT					
	5	OS											
25	6	OS		Greenish gray organic silt (OH) - trace of fibers - trace of sand - wet - firm									
	7	ST											
30	8	ST											
	9	ST		Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm									
	10	ST	LS				81.0 [⊙]	X	---	△	●		
35	11	ST											
	12	ST											
40	13	ST	LS										
	14	ST											
43				CONTINUED									
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303		BORING STARTED		3-20-82					
WL			BORING COMPLETED			3-21-82							
WL	B.C.R.		RIG			CME 55							
WL	A.C.R.		FOREMAN			TT							
				DRAWN		KOO		APPROVED		TWM			
				JOB		11728		SHEET		1 of 2			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.													

LOG OF BORING NO. STS LSL-4 Continued

OWNER EXXON Minerals Company				ARCHITECT-ENGINEER																												
SITE Little Sand Lake				PROJECT NAME Sediment Sampling																												
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL			UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²																								
				SURFACE ELEVATION ↘				<table border="1" style="width:100%; border-collapse: collapse; text-align:center;"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td> </tr> <tr> <td>PLASTIC LIMIT %</td><td colspan="2">WATER CONTENT %</td><td colspan="2">LIQUID LIMIT %</td> </tr> <tr> <td>X</td><td colspan="2">●</td><td colspan="2">△</td> </tr> <tr> <td colspan="5">STANDARD "N" PENETRATION (BLOWS/FT.)</td> </tr> <tr> <td>10</td><td>20</td><td>30</td><td>40</td><td>50</td> </tr> </table>					1	2	3	4	5	PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %		X	●		△		STANDARD "N" PENETRATION (BLOWS/FT.)				
1	2	3	4	5																												
PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %																													
X	●		△																													
STANDARD "N" PENETRATION (BLOWS/FT.)																																
10	20	30	40	50																												
40				CONTINUED																												
45	15 ST 15A ST			Brown silty fine to medium sand (SM) - trace of gravel - wet - medium dense																												
47	16 BL												⊗ 37																			
				End of Boring Boring advanced to 47.5 feet by roller bit and wash water 47.0 feet of HW casing used							⊙ ORGANIC CONTENT																					
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303				BORING STARTED		3-20-82																						
WL								BORING COMPLETED		3-21-82																						
WL	B.C.R.		A.C.R.					RIG	CME 55	FOREMAN	TT																					
WL								DRAWN	KOO	APPROVED	TWW																					
				JOB # 11728		SHEET 2 of 2																										
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.																																

LOG OF BORING NO. STS LSL-5

OWNER EXXON Minerals Company				ARCHITECT-ENGINEER																					
SITE Little Sand Lake				PROJECT NAME Sediment Sampling																					
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2																		
							<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="text-align:center;">1</td> <td style="text-align:center;">2</td> <td style="text-align:center;">3</td> <td style="text-align:center;">4</td> <td style="text-align:center;">5</td> </tr> <tr> <td style="text-align:center;">PLASTIC LIMIT %</td> <td style="text-align:center;">WATER CONTENT %</td> <td style="text-align:center;">LIQUID LIMIT %</td> <td colspan="2"></td> </tr> <tr> <td style="text-align:center;">X</td> <td style="text-align:center;">●</td> <td style="text-align:center;">△</td> <td colspan="2"></td> </tr> <tr> <td colspan="5" style="text-align:center;">STANDARD "N" PENETRATION (BLOWS/FT.)</td> </tr> <tr> <td style="text-align:center;">10</td> <td style="text-align:center;">20</td> <td style="text-align:center;">30</td> <td style="text-align:center;">40</td> <td style="text-align:center;">50</td> </tr> </table>	1	2	3	4	5	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %			X	●	△			STANDARD "N" PENETRATION (BLOWS/FT.)		
1	2	3	4	5																					
PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %																							
X	●	△																							
STANDARD "N" PENETRATION (BLOWS/FT.)																									
10	20	30	40	50																					
X					SURFACE ELEVATION ↴																				
		PA			Ice																				
3					Water																				
10																									
	1	SS			Black organic silt (OL) - fibrous - wet - very loose																				
15																									
	2	SS			Greenish brown organic silt (OH) - trace of fibers - trace of sand - wet - firm																				
	3	OS																							
	4	ST																							
20	4A	ST		LS																					
	5	ST			Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm	78.5	●																		
25																									
	6	SS																							
	7	SS																							
	8	SS																							
30	9	SS				84.5	●																		
	10	SS			Brown clayey sand (SC) - trace of gravel - wet																				
	11	BL			Brown silty fine to coarse sand (SM) - trace of gravel - wet - loose		⊗ 7																		
35																									
36					End of Boring Boring advanced to 36.0 feet by roller bit and wash water 18.0 feet of HW casing used																				
WATER LEVEL OBSERVATIONS				SOIL TESTING SERVICES OF WIS., INC. 540 LAMBEAU STREET GREEN BAY, WIS. 54303																					
W.L.								BORING STARTED	3-21-82																
W.L.	B.C.R.	A.C.R.						BORING COMPLETED	3-21-82																
W.L.					RIG	CME 55	FOREMAN	TT																	
						DRAWN	KOO	APPROVED	TWW																
						JOB #	11728	SHEET	1 of 1																
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.																									

LOG OF BORING NO. STS LSL-6

OWNER				ARCHITECT-ENGINEER							
SITE				PROJECT NAME							
Little Sand Lake				Sediment Sampling							
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST. RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. 2					
						1	2	3	4	5	
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %	
						X		●		△	
						STANDARD "N" PENETRATION (BLOWS/FT.)					
						10 20 30 40 50					
SURFACE ELEVATION ↘											
		PA		Ice							
5				Water							
10											
	1	SS		Brown and black organic silt (OL) - fibrous - wet - very loose							
	2	SS									
15											
	3	SS		Greenish brown organic silt (OH) - trace to a little fiber - trace of sand - wet - soft							
	4	OS									
	5	ST			41.8	◎					
20											
	6	SS									
	7	OS									
25											
	8	SS		Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm							
	9	SS									
	10	OS									
30					86.8						
	11	ST									
	12	SS		Brown clayey fine to medium sand (SC) - trace of gravel - wet - medium dense						⊗ 23	
35											
36	13	BL		Brown fine to coarse sand (SP) - trace of silt - a little gravel - wet - medium dense						⊗ 38	
				End of Boring Boring advanced to 36.0 feet by roller bit and wash water 34.0 feet of HW casing used						◎ ORGANIC CONTENT	

1074
1153
X 62.6

WATER LEVEL OBSERVATIONS		
WL		
WL	B.C.R.	A.C.R.
WL		

SOIL TESTING SERVICES
OF WIS., INC.
540 LAMBEAU STREET
GREEN BAY, WIS. 54303

BORING STARTED	3-20-82	
BORING COMPLETED	3-20-82	
RIG	CME 55	FOREMAN TT
DRAWN	K00	APPROVED TWW
JOB #	11728	SHEET 1 of 1

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BORING LOGS

SOIL TESTING SERVICES
(Continued)

<u>BORING LOGS</u>	<u>NUMBER OF SHEETS</u>
STS TP-84-11	1
STS TP-84-12	1
STS TP-84-13	1
STS TP-84-14	1
STS TP-84-15	1
STS TP-84-16	1
STS TP-84-17	1
STS TP-84-20	1
STS TP-84-21	1
STS TP-84-22	1
STS TP-84-23	1
STS TP-84-24	1
STS TP-84-30	1
STS TP-84-31	1
STS TP-84-32	1
STS TP-84-33	1
STS SAF-1	1
STS SAF-2	1
STS SAF-3	1
STS SAF-4	1
STS SAF-5	1
STS SAF-6	1
STS SAF-7	1
STS SAF-8	1
STS SAF-9	1
STS SAF-10	1
STS SAF-11	1
STS SAF-12	1
STS SAF-13	1
STS SAF-14	1
STS SAF-15	1
STS SAF-16	1

BORING LOGS

SOIL TESTING SERVICES
(Continued)

<u>BORING LOGS</u>	<u>NUMBER OF SHEETS</u>
STS EX-1	2
STS EX-2	3
STS EX-3	2
STS EX-4	2
STS EX-5	2
STS EX-6	3
STS EX-7	2
STS EX-8	3
STS EX-9	4
STS EX-10	4
STS EX-11	4
STS EX-12	4
STS EX-13	3
STS EX-14	4
STS EX-15	3
STS EX-16	2
STS RP-1	1
STS RP-2	1
STS RP-3	1
STS RP-4	1
STS RP-5	1
STS RP-6	1
STS RP-7	1
STS RP-8	1
STS RP-9	1
STS RP-10	1
STS RP-11	1
STS RP-12	1
STS RP-13	1
STS RP-14	1
STS RP-15	1
STS TP-84-1	1
STS TP-84-2	1
STS TP-84-3	1
STS TP-84-4	1
STS TP-84-5	1
STS TP-84-6	1
STS TP-84-7	1
STS TP-84-8	1
STS TP-84-9	1
STS TP-84-10	1



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-1

Feet N-104151 E-2273714 **Meters** N-31745 E-693029

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY
0					
1		1	SS		
10					
2		2	SS		
20					
3		3	SS		
30					
4		4	SS		
40					
5		5	SS		
50					
6		6	SS		
60					
7		7	SS		
70					
8		8	SS		
80					
9		9	SS		
90					

SURFACE ELEVATION 1555.48-ft. 474.111-m

Brown silty fine to coarse sand (SM) - trace to little gravel

5-24-84 ▽

Brown slightly silty fine to coarse gravel (GP-GM) - little fine to coarse sand - boulders from 26 to 28.5' - coarse drift

Brown slightly silty fine to coarse sand (SM-SP) some gravel - coarse drift

Continued

PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
		15			40	
BU		17			13	
		22			-	
	CD	12			8	
BL		10			-	6x10 ⁻³
		8			6	
	CD	11			6	
		13			-	
		13			-	

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 2-28-84		STS OFFICE Green Bay	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-29-84		DRAWN BY SHEET 1 OF 2	
									RIG Denny's Drilling		APP'D. BY JAS STS JOB NO. 12959	
									FOREMAN Denny			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-1

PROJECT NAME
Piezometer Installations

Feet
N-104151 E-2273714
Meters
N-31745 E-693029

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
WELL INSTALLATION TOP STANDPIPE EL. +												
SURFACE ELEVATION					155.48-ft.	474.111-m						
Continued												
90												
	10	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - coarse drift		CD	13			9	
100												
	11	SS				AU		14			-	6x10 ⁻³
110												
	12	SS			Reddish brown silty fine to coarse sand (SM) - trace gravel - basal till			16			32	
120												
	13	SS				AL	BT	13			-	9x10 ⁻⁵
130												
132.8	14	SS			Bedrock - sample logged by Exxon							
End of boring in bedrock Boring advanced to 132.8' by rock bit and bentonite mud.												

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 2-28-84		STS OFFICE Green Bay	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-29-84		DRAWN BY SD	SHEET 2 OF 2
									RIG Denny's Drilling		APP'D. BY JAS	STS JOB NO. 12959
									FOREMAN Denny			



STS Consultants Ltd.

OWNER

Exxon Minerals Company

PROJECT NAME

Piezometer Installations

LOG OF BORING NUMBER

EX-2
Feet
N-110340 E-2262240

Meters
N-33632 E-689532

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1592.11-ft. 485.276-m

5-24-84

Brown silty fine to coarse sand (SM) - trace to some gravel - glacial till

Brown silty fine to medium sand (SM) - coarse drift

Brown slightly silty fine to medium sand (SM-SP) - coarse drift

Brown very fine sandy silt (ML) - lacustrine

Continued

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY
0					
1		1	SS		
10					
2		2	SS		
20					
3		3	SS		
30					
4		4	SS		
40					
5		5	SS		
50					
6		6	SS		
60					
7		7	SS		
70					
8		8	SS		
80					
9		9	SS		
90					

PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
		-			16	
		6			16	
		8			-	
	T	10			-	
CL		10			21	
		11			16	
	CD	16			-	
		17			6	5x10 ⁻³
AU		17			6	5x10 ⁻³
	CD	18			8	

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 3-26-84		STS OFFICE 540 Lambeau Street Green Bay, WI. 494-9656	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-28-84		DRAWN BY SD SHEET 1 OF 3	
						RIG Denny's Drilling		APP'D. BY JAS STS JOB NO. 12959	
						FOREMAN Denny			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-2

Feet
N-110340 E-2262240

Meters
N-33632 E-689532

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						SURFACE ELEVATION 1592.11-ft. 485.276-m							
						Continued							
90		10	SS			Brown very fine sandy silt (ML) - lacustrine		L	22			55	
100		11	SS			Reddish brown silty clay (CL) - includes varves of gray silt and very fine sand - lacustrine		L	14			85	
110		12	SS			Reddish brown silty fine to coarse sand (SM) - trace gravel - glacial till			11			24	
120		13	SS					T	12			-	
130		14	SS						11			-	
140		15	SS						10			30	
150		16	SS			Brown silty fine to medium sand (SM) - fine drift	AL	FD	14			14	7x10 ⁻⁴
160		17	SS						21			31	
170						Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED		STS OFFICE		
WL-T PIPE	DATE	TIME	WL-T PIPE	DATE	TIME	WL-T PIPE	DATE	TIME					
									3-26-84	540 Lambeau Street Green Bay, WI. 414-494-9656			
									3-28-84	DRAWN BY SD SHEET 2 OF 3			
									Denny's Drilling	APP'D. BY JAS STS JOB NO. 12959			
									Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-2

Feet
N-110340 E-2262240

Meters
N-33632 E-689532

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
170				SURFACE ELEVATION 1592.11-ft. 485.276-m							
				Continued							
180	18	SS		Reddish brown silty clay (CL-CH) - varves of gray silt and high plasticity clay - lacustrine		L	25			96	
190	19	SS		Grayish brown silty fine to coarse sand (SM) - little gravel - weathered boulders - basal till		BT	9			-	
192				End of boring on bedrock Boring advanced to 192' by rock bit and bentonite mud.							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-26-84	STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-28-84		DRAWN BY SD	SHEET 3	OF 3	
						RIG Denny' Drilling		APP'D. BY JAS	STS JOB NO. 12959		
						FOREMAN Denny					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-3

PROJECT NAME
Piezometer Installations

Feet
N-110285 E-2263941
Meters
N-33615 E-690051

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. +							
					SURFACE ELEVATION 1559.09-ft. 475.212-m							
1	1	SS			Brown slightly silty fine to coarse sand (SM-SP)- some gravel			7			6	
10					5-24-84 ▽	CL						
2	2	SS			Brown fine sand (SP) - fine drift		FD	22			2	
20												
3	3	SS			Reddish brown silty clay (CL) - varves of gray sandy silt (ML) - lacustrine		L	29			75	
30												
4	4	SS			Reddish brown silty fine sand (SM) - varves of gray silt and red clay - lacustrine		L	20			34	
40												
5	5	SS			Brown slightly silty fine sand (SM-SP) - fine drift	BU	FD	19			--	2x10 ⁻³
50												
6	6	SS						18			7	
60												
7	7	SS			Brown silty fine to coarse sand (SM) - trace gravel, glacial till, boulder from 64.0 to 65.0 feet		T	12			45	
70												
8	8	SS			Brown slightly silty fine to coarse sand (SM-SP) - waterbearing - coarse drift	BL	CD	11			8	1x10 ⁻³
80												
9	9	SS						12			-	
90												
Continued												

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-29-84	STS OFFICE 540 Lambeau Green Bay, WI 54303		
WL.T. PIPE	DATE	TIME	WL.T. PIPE	DATE	TIME	BORING COMPLETED 3-31-84	DRAWN BY SMD	SHEET 1 OF 2		
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959		
						FOREMAN Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER

EX-3 Continued

Feet Meters
M-110285 E-2263941 N-33615 E-690051

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	WELL INSTALLATION TOP STANDPIPE EL. +	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					1559.09-ft. 475.212-m							
90	10	SS		Brown slightly silty fine to coarse sand (SM-SP) - waterbearing - coarse drift			CD	15			--	
100	11	SS		Brown silty fine sand (SM) - fine drift		AU	FD	18			23	
110	12	SS			19				--	1x10 ⁻³		
120	13	SS			20				24			
130	14	SS		Reddish brown silty fine to coarse sand (SM) - trace to a little gravel - basal till		AL	BT	14			--	
140	15	SS			10				29	3x10 ⁻⁴		
150	16	SS			11				40			
160				Weathered bedrock - cuttings logged by Exxon								
162				End of Boring in Bedrock Boring advanced to 162.0 feet with rockbit and bentonite mud								

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 3-29-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-31-84		DRAWN BY SMD SHEET 2 OF 2	
						RIG Denny's Drilling		APP'D. BY JAS STS JOB NO. 12959	
						FOREMAN Denny			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-4

Feet
N-119912 E-2274288
Meters
N-36549 E-693204

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						WELL INSTALLATION TOP STANDPIPE EL. +							
						SURFACE ELEVATION 1573.87-ft. 479.717-m							
		1	SS			Brown silty fine to medium sand (SM) - trace of fine gravel			8			25	
		2	SS			Brown slightly silty fine sand (SM-SP) - trace of fine gravel			9			10	
10		3	SS						6			4	
		4	SS			Brown fine to coarse sand (SP) - trace to some fine gravel - coarse drift 5-24-84	CL	CD	7			5	
20			NR										
30		5	SS						10			11	
		6	SS			Brown slightly silty fine to coarse sand (SM-SP) - trace to some fine gravel - glacial till	BU	T	11			10	7x10 ⁻⁴
40		7	SS			Boulders from 42.0 to 43.0 feet and 47.0 to 48.0 feet			5			10	
		8	SS						9			7	
50		9	SS			Brown slightly silty fine gravel (GM-GP) - some fine to coarse sand		CD	8			6	
		10	SS			Brown slightly silty fine sand (SM-SP) - trace of fine gravel		CD	13			9	
60		11	SS			Brown silty fine sand (SM)		CD	13			16	1x10 ⁻³
		12	SS			Driller's note: Obstruction at 60.0 feet probable boulder	Bl.		13			12	
70		13	SS			Brown slightly silty fine to coarse sand (SM-SP) - trace of fine gravel - coarse drift		CD	12			9	
		14	SS						13			6	
80		15	SS						12			7	
		16	SS			Brown slightly silty fine sand (SM-SP)		FD	21			7	
90						CONTINUED							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR	ACR	BORING STARTED			STS OFFICE	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	540 Lambeau Street Green Bay, Wi. 54303	
						BORING COMPLETED	2-2-84
						RIG	Denny's Drilling
						FOREMAN	Denny
						DRAWN BY	JAS SHEET 1 OF 2
						APP'D. BY	JAS STS JOB NO. 12959



STS Consultants Ltd.

OWNER

Exxon Minerals Company

LOG OF BORING NUMBER

EX-4 Continued

PROJECT NAME

Piezometer Installations

Feet Meters

M-119912 E-2274288

N-36549 E-693204

SITE LOCATION

Crandon, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						SURFACE ELEVATION 1573.87-ft. 479.717-m							
						CONTINUED	AU		21			5	1x10 ⁻³
100		17	SS					FD	17			8	
		18	SS			Brown slightly silty fine sand (SM-SP)-fine drift			15			8	
		19	SS						21			63	
110		20	SS			Reddish brown silty clay (CL), seams of fine sand		BL					
		21	SS			Reddish brown fine to coarse sand (SM) - trace of fine gravel - glacial till	AL	BT	10			28	7x10 ⁻⁴
117		22	SS			Weathered bedrock							
						End of boring in bedrock Boring advanced to 117.0 feet by rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED	STS OFFICE
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME		
						1-30-84	540 Lambeau Street Green Bay, Wi. 54303
						2-2-84	DRAWN BY JAS SHEET 2 OF 2
						RIG Denny's Drilling	APP'D. BY JAS STS JOB NO. 12959
						FOREMAN Denny	



STS Consultants Ltd.

OWNER

Exxon Minerals Company

LOG OF BORING NUMBER

EX-5

PROJECT NAME

Piezometer Installation

Feet:
N-119857 E-2276790

Meters
N-36533 E-693967

SITE LOCATION

Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. +							
					SURFACE ELEVATION 1632.50-ft. 497.587-m							
10	1	SS						15			36	
20	2	SS			Brown silty fine to medium sand (SM) - trace to some gravel - glacial till		T	6			26	
30	3	SS						5			16	
40	4	SS			Brown slightly silty fine to medium sand (SM-SP) - trace to some gravel		T	8			7	
50	5	SS						8			13	
60	6	SS						8			13	
70	7	SS			Brown silty fine to coarse sand (SM) - trace of fine gravel - glacial till	CL	T	10			20	
80	8	SS						10			17	
90	9	SS						9			23	
	10	SS			CONTINUED			11			20	

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED	1-30-84	STS OFFICE	540 Lambeau Street Green Bay, Wi. 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-1-84	DRAWN BY	JAS	SHEET 1 OF 2
						RIG	Lusiers	APP'D. BY	JAS	STS JOB NO. 12959
						FOREMAN	Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-5 Continued

PROJECT NAME
Piezometer Installations

Feet: N-119857 E-2276790
Meters: N-36533 E-693967

SITE LOCATION

Crandon, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1632.50-ft. 497.587-m

CONTINUED

Brown silty fine to coarse sand (SM) - trace of fine gravel

Brown fine to coarse sand and gravel (GP and SP) coarse drift

Brown slightly silty fine to coarse sand (SM-SP) - trace of fine gravel

Reddish brown silty fine to coarse sand (SM) - trace of fine gravel - glacial till

Weathered bedrock
Bedrock core logged by Exxon

End of boring in bedrock
Boring advanced to 156.0 feet by rock bit and bentonite mud - Boring advanced from 156.0 to 186.0 feet by diamond bit and core barrel

PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
	T	8			14	
BL	CD	10			4	1x10 ⁻²
		9			2	
	CD	11			10	
	BT	11			26	
		10			27	
AU						2x10 ⁻⁶
AL						1x10 ⁻⁷

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED	1-30-84	STS OFFICE		540 Lambeau Street Green Bay, Wi. 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-1-84	DRAWN BY	JAS	SHEET	2 OF 2
						RIG	Lusiers	APP'D. BY	JAS	STS JOB NO.	12959
						FOREMAN	Keith				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-6

Feet
N-120340 E-2289928
Meters
N-36680 E-697972

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
1	SS			SURFACE ELEVATION 1606.94-ft. 489.796-m							
10	2	SS		Brown fine to coarse sand (SP) - some gravel - coarse drift		CD	19			-	
20	3	SS		5-24-84 ▽	BU		5			4	
30	4	SS					16			-	
40	5	SS		Brown fine sand (SP) - fine drift		FD	13			-	
50	6	SS					24			3	
60	7	SS		Brown fine sandy silt (ML) - varves of fine sand - lacustrine		L	31			-	
70	8	SS		Brown slightly silty fine sand (SM-SP) - fine drift		FD	17			64	
80	9	SS		Brown fine sand (SP) - fine drift	BL	FD	20			9	
90							21			4	2x10 ⁻³

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-3-84	STS OFFICE 540 Lambeau Street Green Ba, WI. 414-494-9656			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-5-84	DRAWN BY SD	SHEET 1 OF 3			
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959			
						FOREMAN					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER

EX-6

PROJECT NAME
Piezometer Installations

Feet
N-120340 E-2289928

Meters
N-36680 E-697972

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. +							
					SURFACE ELEVATION 1606.94-ft. 489.796-m							
					Continued							
90	10	SS			Brown silty fine sand (SM) - occasional silt lenses - fine drift		FD	22			27	
100	11	SS			Dark brown clayey silt (ML) - lacustrine		L	23			-	
110	12	SS						25			96	
120	13	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - coarse drift	AU	CD	10			7	4x10 ⁻³
130	14	SS						11			-	
140	15	SS			Brown fine to coarse gravel (GP) - some fine to coarse sand - coarse drift		CD	17			4	
150	16	SS			Brown slightly silty fine to coarse gravel (GP-GM) - some fine to coarse sand - coarse drift		CD	11			6	
160	17	SS			Brown slightly silty fine to coarse sand (SP-SM) some gravel - coarse drift - boulder from 161' to 164.5'		CD	13			6	
					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 3-3-84		STS OFFICE 540 Lambeau Street	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-5-84		Green Bay, WI. 414-494-9656	
									RIG Denny's Drilling		DRAWN BY SD SHEET 2 OF 3	
									FOREMAN Denny		APP'D. BY JAS STS JOB NO. 12959	



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-6
Feet: N-120340 E-2289928
Meters: N-36680 E-697972

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
170				SURFACE ELEVATION 1606.94-ft. 489.796-m							
180	18	SS		Brown to greenish gray slightly silty fine to coarse gravel (GM-GP) - some fine to coarse sand - basal till	AL	BT	8			-	3x10 ⁻⁴
190	19	SS					10			9	
196				Weathered bedrock - cuttings logged by Exxon							
				End of boring Boring advanced to 196' by rock bit and bentonite mud.							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-3-84	STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-5-84	DRAWN BY SD	SHEET 3	OF 3	
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959		
						FOREMAN Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-7

Feet
N-117862 E-2286791
Meters
N-35924 E-697015

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. +							
					SURFACE ELEVATION 1580.35-ft. 481.692-m							
					Reddish brown silty fine sand (SM) - trace gravel fill							
					Black peat (PT) and organic silt - bog deposit 5-24-84							
10					Brown fine sand (SP) - waterbearing - fine drift	CL	FD					
20												
30					Brown slightly silty fine to medium sand (SM-SP) - trace gravel - waterbearing - coarse drift							
40												
50							CD					
60	1	SS						22			9	
70						BU						1x10 ⁻³
80												
90					Brown silty fine to medium sand (SM) - trace gravel, occasional 1/4" thick clay seams, boulders from 142.0 to 142.5 feet - glacial till							
					Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 2-9-84	STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-10-84		DRAWN BY SMD	SHEET 1 OF 2
						RIG Lusiers		APP'D. BY JAS	STS JOB NO. 12959
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-7 Continued

PROJECT NAME
Piezometer Installations

Feet Meters
N-117862 E-2286791 N-35924 E-697015

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

PIEZOMETER ID

GEOLOGIC UNIT

WATER CONTENT, %

UNIT DRY WEIGHT
(LBS/FT³)

LIQUID/PLASTIC LIMIT
LL/PL

PERCENT PASSING
#200 SIEVE

PERMEABILITY, K
(CM/SEC)

DEPTH FEET
ELEVATION

SAMPLE NO.

SAMPLE TYPE

SAMPLE DISTANCE
RECOVERY

SURFACE ELEVATION 1580.35-ft. 481.692-m

100

110

120

2 SS

130

140

150

160

3 SS

169

Brown silty fine to medium sand (SM) - trace gravel, occasional 1/4" thick clay seams, boulder from 142.0 to 142.5 feet - glacial till

BL

T

13

41

1x10⁻³

Weathered bedrock - core logged by Exxon

AL

10

12

9x10⁻⁴

End of Boring
Boring advanced to 163.0 feet with rock bit and bentonite mud
Boring advanced from 163.0 to 169.0 feet with carbide bit and core barrel

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 2-9-84	STS OFFICE 540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-10-84		DRAWN BY SMD SHEET 2 OF 2		
						RIG Lusiers		APP'D. BY JAS STS JOB NO. 12959		
						FOREMAN Keith				



OWNER
Exxon Minerals Company

LOG OF BORING NUMBER

EX-8

PROJECT NAME
Piezometer Installations

Feet Meters
N-116362 E-2287655 N-35467 E-697279

STS Consultants Ltd.

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						SURFACE ELEVATION 1586.46-ft. 483.554-m							
1		1	SS			Brown fine to medium sand (SP) - trace coarse sand and gravel. 5-24-84 ▽	BU	CD	4			3	x10 ⁻³
2		2	SS						16			-	
20		3	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - coarse drift		CD	21			10	
30		4	SS			Brown fine sand (SP) - fine drift		FD	22			-	
40		5	SS						25			3	
50		6	SS						22			-	
60		7	SS			Brown silty fine sand (SM) - fine drift		FD	23			-	
70		8	SS				BL		21			13	2x10 ⁻³
80		9	SS						22			-	
90													

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 3-12-84		STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-14-84		DRAWN BY SD SHEET 1 OF 3		
									RIG Denny's Drilling		APP'D. BY JAS STS JOB NO. 12959		
									FOREMAN Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER

EX-8
 Feet Meters
 N-116362 E-2287655 N-35467 E-697279

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
90				Continued							
				SURFACE ELEVATION 1586.46-ft. 483.554-m							
10	SS			Brown to reddish brown silty fine to coarse sand (SM) - some gravel - glacial till		T	8			30	
11	SS			Brown slightly silty fine to coarse sand (SM-SP) - little gravel - glacial till	AU		9			-	2x10 ⁻⁴
12	SS					T	10			11	
13	SS						10			-	
14	SS						10			11	
15	SS			Brown silty fine to coarse sand (SM) - little gravel - glacial till - boulders from 145 to 146', 148 to 149', and 150 to 151'.		T	10			21	
16	SS			Reddish brown silty fine to coarse sand (SM) - some gravel - basal till	AL	BT	9			-	
17	SS						10			19	1x10 ⁻⁴
				Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	3-12-84	STS OFFICE			540 Lambeau Street Green Bay, WI. 414-494-9656		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	3-14-84	DRAWN BY	SD	SHEET	2	OF	3	
						RIG	Denny's Drilling	APP'D. BY	JAS	STS JOB NO.	12959			
						FOREMAN	Denny							



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-8

PROJECT NAME
Piezometer Installations

Feet Meters
N-116362 E-2287655 N-35467 E-697279

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
				WELL INSTALLATION TOP STANDPIPE EL. +							
				SURFACE ELEVATION 1586.46-ft. 483.554-m							
				Continued							
170				Reddish brown silty fine to coarse sand (SM) - some gravel - basal till							
174	18	SS		Weathered bedrock - sample logged by Exxon			11				
				End of boring in bedrock Boring advanced to 175' with rock bit and bentonite mud.							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-12-84	STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-14-84		DRAWN BY SD		SHEET 3	OF 3
						RIG Denny's Drilling		APP'D. BY JAS		STS JOB NO. 12959	
						FOREMAN Denny					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-9

PROJECT NAME
Piezometer Installations

Feet
N-116461 E-2284725

Meters
N-35497 E-696386

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION 1708.86-ft. 520.862-m							
	A	SS			Brown fine to coarse sand (SP) - coarse drift		CD	5			3	
10	1	SS			Reddish brown silty fine to coarse sand (SM) - some gravel, glacial till		T					
20	2	SS						6			13	
30	3	SS						4			17	
40	4 4A	SS SS						6			--	
50	5	SS			Brown slightly silty fine to coarse sand (SM-SP)- some gravel - coarse drift		T	6			11	
60	6	SS						9			--	
70	7	SS						11			6	
80	8	SS			Brown fine to coarse gravel (GP) and fine to coarse sand (SP) - coarse drift			5			--	
90												

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 3-16-84			STS OFFICE 540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-21-84	DRAWN BY SMD	SHEET 1 OF 4			
									RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959			
									FOREMAN Denny					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-9 Continued

PROJECT NAME
Piezometer Installations

Feet
N-116461 E-2284725
Meters
N-35497 E-696386

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. +							
					SURFACE ELEVATION 1708.86-ft. 520.862-m							
90	9	SS			Brown fine to coarse gravel (GP) and fine to coarse sand (SP) - coarse drift			8			4	
100	10	SS			Reddish brown silty fine to coarse sand (SM) - some gravel - glacial till		T	8			20	
110		SS						7			--	
120	12	SS						9			19	
130	13	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - waterbearing - coarse drift		CD	11			6	
140	14	SS						13			9	
150	15	SS						9			--	
160	16	SS			Reddish brown silty fine to coarse sand (SM) - a little gravel - glacial till		T	9			21	
170					Continued							

5-24-84 ▽



The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-16-84	STS OFFICE 540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-21-84	DRAWN BY SMD		SHEET 2 OF 4	
						RIG Denny's Drilling	APP'D. BY JAS		STS JOB NO. 12959	
						FOREMAN Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-9

PROJECT NAME
Piezometer Installations

Feet Meters
N-116461 E-2284725 N-35497 E-696386

SITE LOCATION

Crandon Project

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						WELL INSTALLATION TOP STANDPIPE EL. +							
						SURFACE ELEVATION 1708.86-ft. 520.862-m							
170		17	SS		LS	Reddish brown silty fine to coarse sand (SM) - a little gravel - glacial till		T	10			--	
		17A	SS										
180		18	SS			Dark reddish brown slightly silty fine to coarse sand (SM-SP) - some gravel - coarse drift	BL	CD	10			11	2x10 ⁻⁶
190		19	SS						14			--	
200		20	SS			Brown silty fine to coarse sand (SM) - trace gravel - coarse drift		CD	14			13	
210		21	SS						21			--	
220		22	SS			Brown silty fine to medium sand (SM) - fine drift		FD	20			--	
230		23	SS						18			--	
240		24	SS				AU		20			--	6x10 ⁻³
250						Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-16-84	STS OFFICE 540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-21-84	DRAWN BY SMD	SHEET 3 OF 4		
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959		
						FOREMAN Denny				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-9 Continued

PROJECT NAME
Piezometer Installations

Feet
N-116461 E-2284725
Meters
N-35497 E-696386

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					WELL INSTALLATION TOP STANDPIPE EL. + SURFACE ELEVATION 1708.86-ft. 520.862-m							
250	25	SS			Brown silty fine to medium sand (SM) - fine drift		FD	17			17	
260	26	SS			Reddish brown fine to coarse sandy silt (ML) - trace gravel - basal till		BT	13			--	
270					Bedrock							
280					End of Boring in Bedrock Boring advanced to 280.0 feet with rock bit and bentonite mud							2x10 ⁻⁸

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-16-84	STS OFFICE 540 Lambeau Green Bay, WI 54303				
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-21-84		DRAWN BY SMD SHEET 4 OF 4				
						RIG Denny's Drilling		APP'D. BY JAS STS JOB NO. 12959				
						FOREMAN Denny						



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER

EX-10

Feet
N-115111 E-2284239
Meters
N-35086 E-696237

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION 1674.93-ft. 510.520-m							
10	1	SS			Brown silty fine to medium sand (SM) - trace gravel		CD	19			-	
20	2	SS			Reddish brown fine to coarse sand (SP) - little gravel - coarse drift		CD	15			37	
30	3	SS						8			4	
40	4	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - coarse drift		CD	5			6	
50	5	SS			Reddish brown silty fine to coarse sand (SM) - trace to little gravel - glacial till		T	9			24	
60	6	SS						10			24	
70	7	SS						9			-	
80	8	SS					BU	12			-	

5-24-84 ▽

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 3-13-84		STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-15-84	DRAWN BY SD	SHEET 1 OF 4	
									RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959	
									FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER

EX-10
 Feet: N-115111 E-2284239
 Meters: N-35086 E-696237

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
SURFACE ELEVATION				1674.93-ft. 510.520-m							
Continued											
90											
9	SS			Reddish brown silty fine to coarse sand (SM) - trace to little gravel - glacial till	BU	T	14			25	
100											
10	SS										
110											
11	SS										
120											
12	SS										
130											
13	SS										
140											
14	SS										
150											
15	SS										
160											
16	SS										
170											
Continued											

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.											
WL	BCR			ACR			BORING STARTED 3-13-84	STS OFFICE 540 Lambeau Street			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-15-84	Green Bay, WI. 414-494-9656				
						RIG Lusiers	DRAWN BY SD	SHEET 2 OF 4			
						FOREMAN Keith	APP'D. BY JAS	STS JOB NO. 12959			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-10

Feet
N-115111 E-2284239
Meters
N-35086 E-696237

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
				WELL INSTALLATION TOP STANDPIPE EL. +							
				SURFACE ELEVATION 1674.93-ft. 510.520-m							
				Continued	AL						1x10 ⁻⁵
250				Weathered bedrock							
256				End of boring Boring advanced to 256' with rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-13-84	STS OFFICE 540 Lambeau Street Green Bay, WI. 414-494-9656			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-15-84	DRAWN BY SD	SHEET 4 OF 4			
						RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959			
						FOREMAN Keith					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-11

PROJECT NAME
Piezometer Installations

Feet
N-113254 E-2283698
Meters
N-34520 E-696073

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1682.05-ft. 512.690-m

Brown to reddish brown silty fine to coarse sand (SM) - trace to some gravel - glacial till

Continued

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
		1	SS						15			20	
10		2	SS						5			22	
20		3	SS			Brown to reddish brown silty fine to coarse sand (SM) - trace to some gravel - glacial till		T	9			17	
30		4	SS						9			26	
40		5	SS						9			22	
		6	SS						9			22	
50		7	SS						8			24	
		8	SS						8			22	
60		9	SS						9			20	
		10	SS						8			16	
70		11	SS						17			--	
80													
		12	SS						9			25	
90													

11 10 9 8 7 6 5 4 3 2 1
 0 10 20 30 40 50 60 70 80 90

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-20-84	STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-24-84	DRAWN BY SMD	SHEET 1 OF 4	
						RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959	
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER

EX-11 Continued

PROJECT NAME
Piezometer Installations

Feet
N-113254 E-2283698

Meters
N-34520 E-696073

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
					SURFACE ELEVATION 1682.05-ft. 512.690-m							
90												
	13	SS						11			--	
100												
	14	SS			Brown to reddish brown silty fine to coarse sand (SM) - trace to some gravel - glacial till		T	9			--	
110												
	15	SS						9			--	
120												
	16	SS						10			15	
130												
	17	SS						11			--	
140							BU					1x10 ⁻⁴
	18	SS						9			--	
150												
	19	SS						8			18	
160												
	20	SS			Brown slightly silty fine to coarse sand (SM-SP)- some gravel - coarse drift		CD	6			7	
170												

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-20-84	STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-24-84	DRAWN BY SMD SHEET 2 OF 4		
						RIG Lusiers	APP'D. BY JAS STS JOB NO. 12959		
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-11 Continued

PROJECT NAME
Piezometer Installations

Feet
N-113254 E-2283698
Meters
N-34520 E-696073

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1682.05-ft. 512.690-m

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
170												
180	21	SS			Brown slightly silty fine to coarse sand (SM-SP)- some gravel - coarse drift	BL	CD	11			--	6x10 ⁻³
190	22	SS		12						6		
200	23	SS		20						--		
210	24	SS			Brown fine sand (SP) - fine drift	AU	FD	21			4	
220	25	SS		22						--		
230	26	SS			Reddish brown silty fine to medium sand (SM) - lacustrine	L		23			--	1x10 ⁻³
240	27	SS		22						22		
250	28	SS					23				--	

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-20-84	STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-24-84	DRAWN BY SMD	SHEET 3 OF 4	
						RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959	
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-11 Continued

PROJECT NAME
Piezometer Installations

Feet
N-113254 E-2283698
Meters
N-34520 E-696073

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

PIEZOMETER ID

GEOLOGIC UNIT

WATER CONTENT, %

UNIT DRY WEIGHT
(LBS/FT³)

LIQUID/PLASTIC LIMIT
LL/PL

PERCENT PASSING
#200 SIEVE

PERMEABILITY, K
(CM/SEC)

DEPTH FEET
ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

SURFACE ELEVATION 1682.05-ft. 512.690-m

250

Reddish brown silty fine to medium sand (SM) - lacustrine

29 SS

Reddish brown silty clay (CL) with varves of gray silt (ML) - lacustrine

L

27

96

260

30 SS

Brown slightly silty fine to coarse sand (SM-SP)- some gravel - coarse drift

AL

CD

10

11

2x10⁻³

270

31 SS

Reddish brown silty clay (CL) with varves of gray silt - lacustrine

L

26

98

280

285

Weathered bedrock - cuttings logged by Exxon

End of Boring in Bedrock
Boring advanced to 285.0 feet with rock bit and bentonite mud

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 3-20-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-24-84		DRAWN BY SMD SHEET 4 OF 4	
						RIG Lusiers		APP'D. BY JAS STS JOB NO. 12959	
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER

EX-12

PROJECT NAME
Piezometer Installations

Feet Meters
N-113,156 E-2,284,707 N-34,490 E-696,380

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
SURFACE ELEVATION 1687.76-ft. 514.430-m				WELL INSTALLATION TOP STANDPIPE EL. +							
10	1	SS		Brown slightly silty fine to coarse sand (SM-SP)- trace gravel - glacial till		T	12			8	
20	2	SS		Reddish brown to brown silty fine to coarse sand (SM) - a little gravel - glacial till boulder from 14.0 to 15.0 feet		T	8			31	
30	3	SS					7			20	
40	4	SS		Grayish brown silty fine to coarse gravel (GM) - coarse drift		CD	15			14	
50	5	SS		Grayish brown fine to coarse gravel and sand (GW-SW), trace silt - coarse drift		CD	8			2	
60	6	SS					6			3	
70	7	SS		Reddish brown silty fine to coarse sand (SM) - trace to some gravel - glacial till		T	12			43	
80	8	SS					13			15	
90				Continued							

2000
PUC009

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-2-84	STS OFFICE 540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME		BORING COMPLETED 3-5-84	DRAWN BY SMD SHEET 1 OF 4			
							RIG Lusiers	APP'D. BY JAS STS JOB NO. 12959			
							FOREMAN Keith				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-12 Continued

Feet
N-113,156 E-2,284,707
Meters
N34,490 E-696,380

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1687.76 ft. 514.430-m

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
90	9	SS						20			14	
100	10	SS						11			--	
110	11	SS			Reddish brown silty fine to coarse sand (SM) - trace to some gravel - glacial till	BU	T	11			25	
120	12	SS						7			--	
130	13	SS						10			--	
140	14	SS						9			14	
150	15	SS						9			--	
160	16	SS						8			--	
170					Brown slightly silty fine to coarse sand (SM-SP) and gravel - coarse drift							

Continued

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR		ACR			BORING STARTED 3-2-84	STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-5-83	DRAWN BY SMD	SHEET 2 OF 4
						RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959
						FOREMAN Keith		



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER

EX-12 Continued

Feet Meters
N-113,156 E-2,284,707 N-34,490 E-696,380

SITE LOCATION

Crandon Project

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
				WELL INSTALLATION TOP STANDPIPE EL. +							
				SURFACE ELEVATION 1687.76-ft. 514,430-m							
170	17	SS					11			--	
180	18	SS		Brown slightly silty fine to coarse sand (SM-SP) and gravel - coarse drift	BL	CD	9			--	
190	19	SS					11			7	
200	20	SS		Brown slightly silty fine sand (SM-SP) - fine drift		FD	21			6	
210	21	SS					10			25	
220	22	SS		Brown silty fine to coarse sand (SM), trace to a little gravel - glacial till		T	9			17	
230	23	SS			AU		13			--	3x10 ⁻³
240	24	SS		Reddish brown silty fine sand (SM) - fine drift		FD	20			17	
250				Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED 3-2-84	STS OFFICE 540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME		BORING COMPLETED 3-5-84	DRAWN BY SMD SHEET 3 OF 4			
							RIG Lusiers	APP'D. BY JAS STS JOB NO. 12959			
							FOREMAN Keith				



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-12 Continued

Feet
N-113,156 E-2,284,707 N-34,490 E-696,380
Meters

SITE LOCATION

Crandon Project

WELL INSTALLATION
TOP STANDPIPE EL. +

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1687.76-ft. 514,430-m

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
250													
		25	SS		LS	Reddish brown silty fine sand (SM) - fine drift		FD	--			--	
260													
		26	SS						13			--	
270													
		27	SS			Reddish brown silty fine to coarse sand (SM), trace gravel - glacial till		T	11			25	
280													
		28	SS			Grayish brown very fine sandy silt (ML) with varves of reddish brown silty clay (CH) - high plasticity - lacustrine		L	21			62	
290							AL						2x10 ⁻⁴
		29	SS						26			96	
300													
						Weathered bedrock							
305						End of Boring in Bedrock Boring advanced to 305.0 feet with rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 3-2-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 3-5-84		DRAWN BY SMD SHEET 4 OF 4	
						RIG Lusiers		APP'D. BY JAS STS JOB NO. 12959	
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-13

PROJECT NAME
Piezometer Installations

Feet
N-111,555 E-2,283,499
Meters
N-34,002 E-696-01

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY (CM/SEC)
					SURFACE ELEVATION 1657.32-ft. 505.152-m							
10	1A	SS			Reddish brown fine to coarse gravel and sand (GW-SW), coarse drift		CD	12			-	
	2A	SS						14		4		
20	3A	SS			Reddish brown silty fine to coarse sand (SM), a little gravel, glacial till		T	5			46	
	4A	SS						11		11		
30	5A	SS			Reddish brown slightly silty fine to coarse sand (SM-SP) some gravel, glacial till		T	9			11	
	6A	SS						7		17		
40	7A	SS						11		19		
50	8A	SS			Reddish brown silty fine to coarse sand (SM), trace to a little gravel, glacial till		T	10			21	
60	9A	SS						9		-		
70	10A	SS			Continued	DL		11			15	
80	11A	SS						11		-		
90												

5-24-84 ▽

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL			BCR			ACR			BORING STARTED 2-15-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-22-84	DRAWN BY	SHEET 1 OF 3	
									RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959	
									FOREMAN Ken			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-13

PROJECT NAME
Piezometer Installations

Feet
N-111,555 E-2,283,499
Meters
N34,002 E-696,012

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
WELL INSTALLATION TOP STANDPIPE EL. +												
SURFACE ELEVATION 1657.32-ft. 505,152-m												
100	12A	SS			Reddish brown silty fine to coarse sand (SM), trace to a little gravel, glacial till	CL	T	11			24	
110	13A	SS						11			13	6x10 ⁻⁴
120	14A	SS						11			16	
130	15A	SS						11			-	
140	16A	SS			Brown slightly silty fine to coarse sand (SM-SP), some gravel, coarse drift	CD	9				6	
150	17A	SS						12			-	3x10 ⁻⁴
160	1	SS			Brown slightly silty fine to coarse gravel (GM-GP), some fine-coarse sand, coarse drift	CD	11				6	
170	2	SS						12			6	
Continued												

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-15-84	STS OFFICE	540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY		SHEET 2 OF 3		
						RIG	Lusiers	APP'D. BY	JAS			
						FOREMAN	Ken		STS JOB NO. 12959			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-13

PROJECT NAME
Piezometer Installations

Feet Meters
N-111,555 E-2,283,499 N-34,002 E-696,012

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY (CM/SEC)
					SURFACE ELEVATION 1657.32-ft. 505,152-m							
180	3	SS			Brown slightly silty fine to coarse sand (SM-SP), trace gravel, fine drift		FD	18			6	
190	4	SS				BL		19			6	8x10 ⁻⁴
200	5	SS			Reddish brown silty fine to coarse sand (SM), trace to some gravel, glacial till		T	12			27	
210	6	SS						10			25	
220	7A 7B	SS SS			Reddish brown slightly silty fine to coarse sand (SM), trace gravel, glacial till		T	16			6	
230	8	SS			Reddish brown silty clay (CL) with varves of grayish brown clayey silt (ML) and red clay (CH), lacustrine	AL	L	26			69	5x10 ⁻⁴
235					Bedrock End of boring in bedrock Boring advanced to 235 feet with rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-15-84	STS OFFICE	540 Lambeau Green Bay, WI 54303		
WL.T. PIPE	DATE	TIME	WL.T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY	SHEET 3 OF 3			
						RIG	Lusiers	APP'D. BY	JAS	STS JOB NO. 12959		
						FOREMAN	Ken					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

PROJECT NAME
Piezometer Installations

LOG OF BORING NUMBER
EX-14

Feet
N-110251 E-2286304
Meters
N-33605 E-696867

SITE LOCATION
Crandon, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)	
				SURFACE ELEVATION 1682.67-ft. 512.879-m								
	1	SS		Yellowish brown clayey silt (ML) with thin seams of fine sand		T	21			69		
10	2	SS		Reddish brown silty fine to coarse sand (SM), some gravel, glacial till		T	6			21		
20	3	SS		Brown slightly silty fine to coarse sand (SM-SP), some gravel, glacial till		T	9			8		
30	4	SS		Brown silty fine to coarse sand (SM), a little gravel, glacial till, boulders from 30-31' and 39-40'		T	7			19		
40	5	SS					T	6			13	
50	6	SS		Brown slightly silty fine to coarse sand (SM-SP), some gravel, coarse drift, boulders from 50-52', 62-63' and 79-80'		CD	10			7		
60	7	SS						11			6	
70	8	SS						6			6	
80	9	SS					10			7		
90				Continued								

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-17-84	STS OFFICE	540 Lambeau Green Bay, WI 54303		
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY	SHEET 1 OF 4			
						RIG	Denny's Drilling	APP'D. BY	JAS	STS JOB NO. 12959		
						FOREMAN	Denny					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-14

PROJECT NAME
Piezometer Installations

Feet
N-110251 E-2286304
Meters
N-33605 E-696867

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						WELL INSTALLATION TOP STANDPIPE EL. +							
						SURFACE ELEVATION 1682.67-ft. 512.879-m							
						Continued							
90		10	SS			5-24-84 ▽ Brown slightly silty fine to coarse sand (SM-SP), some gravel, coarse drift, boulders from 50-52', 62-63' and 79-80'	BU	CD	8			-	
100		11	SS						11			6	
110		12	SS						17			-	
120		13	SS						9			17	
130		14	SS			Reddish brown silty fine to coarse sand (SM), trace to a little gravel, glacial till, boulder from 141-142'		T	10			-	
140		15	SS						8			14	
150		16	SS						7			-	
160		17	SS				BL		8			-	5x10 ⁻⁵
170						Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-17-84	STS OFFICE	540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY	SHEET 2 OF 4				
						RIG	Denny's Drilling	APP'D. BY	JAS	STS JOB NO. 12959			
						FOREMAN	Denny						



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-14

PROJECT NAME
Piezometer Installations

Feet
N-110251 E-2286304
Meters
N-33605 E-696867

SITE LOCATION
Crandon, Wisconsin

WELL INSTALLATION
TOP STANDPIPE EL. +

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)		
170					Continued									
180	18	SS			Reddish brown silty fine to coarse sand (SM), trace to a little gravel, glacial till, boulder from 141-142'		T	10			16			
190	19	SS			Brown slightly silty fine sand (SM-SP), fine drift	AU	FD	17			6			
200	20	SS							16			-		2x10 ⁻³
210	21	SS							14			-		
220	22	SS						18			11			
230	23	SS			Brown silty fine sand (SM), fine drift		FD	19			22			
240	24	SS						17			-			
250	25	SS			Brown very fine sandy silt (ML), fine drift		FD	20			52			
					Continued									

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR		ACR			BORING STARTED	2-17-84	STS OFFICE	540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY	SHEET 3 OF 4			
						RIG	Denny's Drilling	APP'D. BY	JAS	STS JOB NO. 12959		
						FOREMAN	Denny					



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
EX-14

PROJECT NAME
Piezometer Installations

Feet
N-110251 E-2286304
Meters
N-33605 E-696867

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	WELL INSTALLATION TOP STANDPIPE EL. +	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
250												
260	26	SS		Reddish brown fine sandy silt (ML) with varves of red clayey silt with moderate plasticity, lacustrine			L	20			-	
270	27	SS		Brown silty fine to coarse sand (SM) with thin seams of fine sandy silt, trace gravel, transition zone between lacustrine and basal till		AL	L	14			14	7x10 ⁻⁵
280	28	SS		Dark brown silty fine to coarse sand (SM), some gravel, trace clay, basal till			BT	8			18	
283				Bedrock								
				End of boring in bedrock Boring advanced to 283 feet with rock bit and bentonite mud								

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-17-84	STS OFFICE				540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-22-84	DRAWN BY		SHEET 4		OF 4				
						RIG	Denny's Drilling	APP'D. BY		JAS		STS JOB NO. 12959				
						FOREMAN	Denny									



STS Consultants Ltd.

OWNER Exxon Minerals

LOG OF BORING NUMBER EX-15

PROJECT NAME Piezometer Installations

Feet N-112443 E-2280005 Meters N-34273 E-694947

SITE LOCATION Crandon, Wisconsin

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						WELL INSTALLATION TOP STANDPIPE EL. + SURFACE ELEVATION 1626.64-ft. 495.801-m							
10													
20						Brown silty fine to medium sand (SM), trace to some gravel, glacial till		T					
30													
40						5-24-84 ▽	BL						
50													
60		1	SS			Brown fine sand (SP), trace silt, fine drift		FD		19		3	
70													
80						Brown silty fine to coarse sand (SM), trace to some gravel, glacial till, boulder at 86-87'		T					
Continued													

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally

WL	BCR			ACR			BORING STARTED 2-8-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-10-84	DRAWN BY	SHEET 1 OF 3
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959
						FOREMAN Denny		



STS Consultants Ltd.

OWNER

Exxon Minerals

LOG OF BORING NUMBER

EX-15

PROJECT NAME

Piezometer Installations

Feet

N-112443

E-2280005

Meters

N-34273

E-694947

SITE LOCATION

Crandon, Wisconsin

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	WELL INSTALLATION TOP STANDPIPE EL. +	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
100							Brown silty fine to coarse sand (SM), trace to some gravel, glacial till, boulder at 86-87'		T					
110							Dark grayish brown silty medium to coarse sand (SM), some gravel, coarse drift	AU	CD				11	4x10 ⁻³
120		2	SS											
130														
140														
150							Reddish brown silty fine to coarse sand (SM), trace to some gravel, basal till, boulder from 151-152'		BT					
160														
170														
Continued														

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-8-84	STS OFFICE	540 Lambeau Green Bay, WI 54303				
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-10-84	DRAWN BY	SHEET 2 OF 3					
						RIG	Denny's Drilling	APP'D. BY	JAS					
						FOREMAN	Ken	STS JOB NO.	12959					



STS Consultants Ltd.

OWNER
Exxon Minerals

LOG OF BORING NUMBER
EX-15

PROJECT NAME
Piezometer Installations

Feet
N-112443 E-2280005
Meters
N-34273 E-694947

SITE LOCATION
Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	WELL INSTALLATION TOP STANDPIPE EL. +	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
						SURFACE ELEVATION : 1626.64-ft. 495.801-m							
180						Reddish brown silty fine to coarse sand (SM), trace to some gravel, basal till, boulder from 151-152'		BT					
190	3	SS				Reddish brown clayey silt (ML), with varves of fine silty sand and silty clay, lacustrine		L	22			90	
200						Reddish brown silty fine to coarse sand (SM), trace to some gravel, basal till grading to clayey silt (ML) above bedrock		BT					
210													
220								AL					2x10 ⁻²
230	4	SS				Bedrock			14			74	
235						End of boring in bedrock Boring advanced to 235 feet with rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 2-8-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-10-84	DRAWN BY	SHEET 3 OF 3	
						RIG Denny's Drilling	APP'D. BY JAS	STS JOB NO. 12959	
						FOREMAN Ken			



STS Consultants Ltd.

OWNER

Exxon Minerals

LOG OF BORING NUMBER

EX-16

PROJECT NAME

Piezometer Installations

Feet

N-113316

E-2282043

Meters

N-34539

E-695568

SITE LOCATION

Crandon, Wisconsin

DEPTH FEET	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY (CM/SEC)
						WELL INSTALLATION TOP STANDPIPE EL. +							
						SURFACE ELEVATION 1614.70-ft. 492.162-m							
10													
20													
30						5-24-84 ▽ Brown fine sand (SP), trace coarse sand, fine drift		FD					
40													
50													
60							BL						9x10 ⁻⁶
70		1	SS			Brown silty fine to medium sand (SM), trace gravel, glacial till		T	14			22	
80													
90						Continued							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL	BCR			ACR			BORING STARTED	2-9-84	STS OFFICE	540 Lambeau Green Bay, WI 54303			
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED	2-9-84	DRAWN BY	SMD	SHEET	1	OF	2
						RIG	Lusiers	APP'D. BY	JAS	STS JOB NO.	12959		
						FOREMAN	Keith						



STS Consultants Ltd.

OWNER Exxon Minerals

LOG OF BORING NUMBER EX-16

PROJECT NAME Piezometer Installations

Feet N-113316 E-2282043 Meters N-34539 E-695568

SITE LOCATION Crandon, Wisconsin

DEPTH FEET ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PIEZOMETER ID	GEOLOGIC UNIT	WATER CONTENT, %	UNIT DRY WEIGHT (LBS/FT ³)	LIQUID/PLASTIC LIMIT LL/PL	PERCENT PASSING #200 SIEVE	PERMEABILITY, K (CM/SEC)
				SURFACE ELEVATION 1614.70-ft. 492.162-m							
100				Brown silty fine to medium sand (SM), trace gravel, glacial till		T					
110	2	SS		Brown slightly silty fine to coarse sand (SM-SP) some gravel, coarse drift	AU	CD	13			9	6x10 ⁻³
120											
130				Brown slightly silty fine sand (SM-SP), trace gravel, fine drift		FD					
140	3	SS			AL		21			6	1x10 ⁻³
145				End of boring at 145 feet in fine drift Boring advanced to 145 feet by rock bit and bentonite mud							

The stratification lines represent the approximate boundary between soil types. In situ, the transition may be gradual. Water levels were measured at the times indicated. Water levels may vary seasonally.

WL		BCR		ACR		BORING STARTED 2-9-84		STS OFFICE 540 Lambeau Green Bay, WI 54303	
WL-T. PIPE	DATE	TIME	WL-T. PIPE	DATE	TIME	BORING COMPLETED 2-9-84	DRAWN BY SMD	SHEET 2 OF 2	
						RIG Lusiers	APP'D. BY JAS	STS JOB NO. 12959	
						FOREMAN Keith			



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-1

PROJECT NAME
Reclaim Pond Borings

Feet
N-115604 E-2280542
Meters
N-35236 E-695111

SITE LOCATION

Crandon Project

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X-----●-----△				
						10	20	30	40	50
						STANDARD PENETRATION		BLOWS / FT.		
						⊗		10 20 30 40 50		
				SURFACE ELEVATION 1634.71-ft. 498.261-m						
5				Brown silty fine to coarse sand (SM) - some gravel - very dense - boulder from 18.0 to 19.0 feet						
10										
15										
20	1	3" SS								
25	2	3" SS		Brown slightly silty fine to coarse gravel (GM-GP) - some fine to coarse sand - very dense - cobble from 21.3 to 21.7 feet						⊗ 62
27.5	3	3" SS		End of Boring Boring advanced to 27.5 feet with roller bit and Revert drilling mud 10.0 feet of HW casing used Borehole grouted upon completion						⊗ 105 1/2 BNCG.
							Note:	300 lb.	Hammer used	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED 2-21-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL	BCR ARC	BORING COMPLETED 2-22-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL		RIG Bomb FOREMAN EVH	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-2

PROJECT NAME
Reclaim Pond Borings

Feet Meters
N-115652 E-2281119 N-35251 E-695286

SITE LOCATION

Crandon Project

DEPTH ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

DESCRIPTION OF MATERIAL
SURFACE ELEVATION 1642.51-ft. 500.638-m

UNIT DRY WT.
LBS./FT³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
1	2	3	4	5
PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
X-----●-----△				
10	20	30	40	50
⊗ STANDARD PENETRATION			BLOWS / FT.	
10	20	30	40	50

5				
10				
15				
20				
25	1	SS		
30	2	SS		
34	3	SS		

Reddish brown to brown silty fine to coarse sand (SM) - little gravel - extremely dense

End of Boring
Boring advanced to 34.0 feet with roller bit and Revert drilling mud
12.0 feet of HW casing used
Borehole grouted upon completion

Note:	300	1b.	Hammer	used					

⊗ 50/6"
⊗ 100/2'
⊗ 100/6"
⊗ 100/6"

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED	3-8-84	STS OFFICE	540 Lambeau Green Bay, WI 54303
WL	BCR	ARC	BORING COMPLETED	3-8-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL		RIG DR-2	FOREMAN	BZ	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-4

PROJECT NAME
Reclaim Pond Borings

Feet
N-115903 E-2282534
Meters
N-35327 E-695718

SITE LOCATION

Crandon Project

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
							1	2	3	4	5
							PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %	
							10	20	30	40	50
							STANDARD PENETRATION		BLOWS / FT.		
							10	20	30	40	50
					SURFACE ELEVATION 1659.07-ft. 505.686-m						
5					Brown silty fine to coarse sand (SM) - little to some gravel - very dense to extremely dense - cobbles from 16.5 to 17.0 feet and 21.5 to 22.0 feet						
10											
15											
20											
25	1	SS									
30	2	SS									
33.7	3	SS			Brown slightly silty fine to coarse sand (SM-SP) - some gravel - extremely dense						
					End of Boring Boring advanced to 33.7 feet with roller bit and Revert drilling mud 7.0 feet of HW casing used Borehole grouted upon completion		Note:	300	lb. Hammer	used	

⊗ 71
⊗ 110/6"
⊗ 100/2'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED 3-7-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL	BCR ARC	BORING COMPLETED 3-7-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL		RIG DR-2 FOREMAN BZ	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-6

PROJECT NAME
Reclaim Pond Borings

Feet Meters
N-115346 E-2281381 N-35158 E-695366

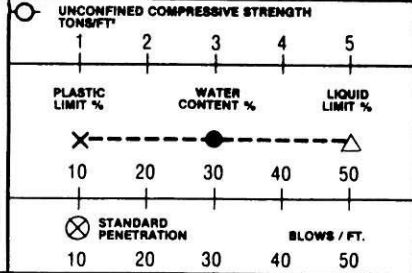
SITE LOCATION

Crandon Project

DEPTH
ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

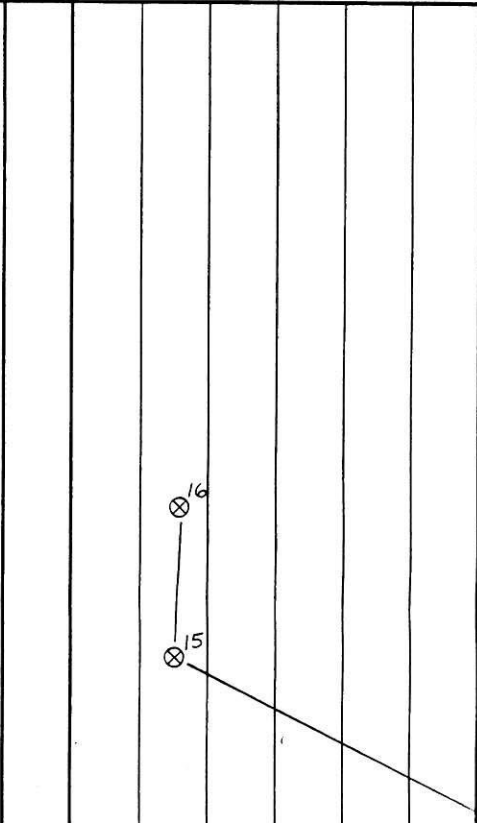
DESCRIPTION OF MATERIAL

UNIT DRY WT.
LBS./FT.



5				
10				
15				
20	1	SS		
25				
27.5	3	SS		

Brown silty fine to coarse sand (SM) - trace to some gravel - medium dense to very dense - boulder from 13.5 to 14.5 feet



End of Boring
Boring advanced to 27.5 feet with roller bit and Revert drilling mud
7.0 feet of HW casing used
Borehole grouted upon completion

Note: 300 lb. Hammer used

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED 3-10-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL BCR ARC	BORING COMPLETED 3-10-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL	RIG DR-2 FOREMAN BZ	APP'D BY JAS STS JOB NO. 12911



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-7

PROJECT NAME
Reclaim Pond Borings

Feet
N-115410 E-2281782
Meters
N-35177 E-695489

SITE LOCATION
Crandon Project

DEPTH	ELEVATION	DESCRIPTION OF MATERIAL
5		Brown silty fine to coarse sand (SM) - trace to some gravel - very dense to extremely dense
10	1	3" SS
15	2	3" SS
20	3	3" SS
21.5		End of Boring Boring advanced to 21.5 feet with roller bit and Revert drilling mud 7.0 feet of HW casing used Borehole grouted upon completion

UNIT DRY WT. LBS./FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
	1	2	3	4	5
X	PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
	10	20	30	40	50
X	STANDARD PENETRATION			BLOWS / FT.	
	10	20	30	40	50

⊗ 104
⊗ 100/2" B.N.C.G.
⊗ 51

Note: 300 lb. Hammer used

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED 3-12-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL BCR ARC	BORING COMPLETED 3-12-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL	RIG DR-2 FOREMAN EVH	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-8

PROJECT NAME
Reclaim Pond Borings

Feet
N-115562 E-2282668
Meters
N-35223 E-695759

SITE LOCATION

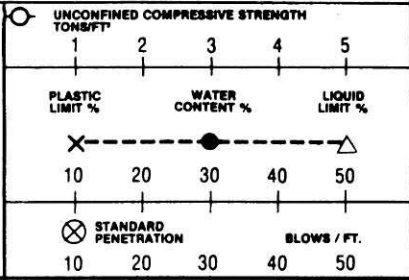
Crandon Project

DEPTH
ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

DESCRIPTION OF MATERIAL

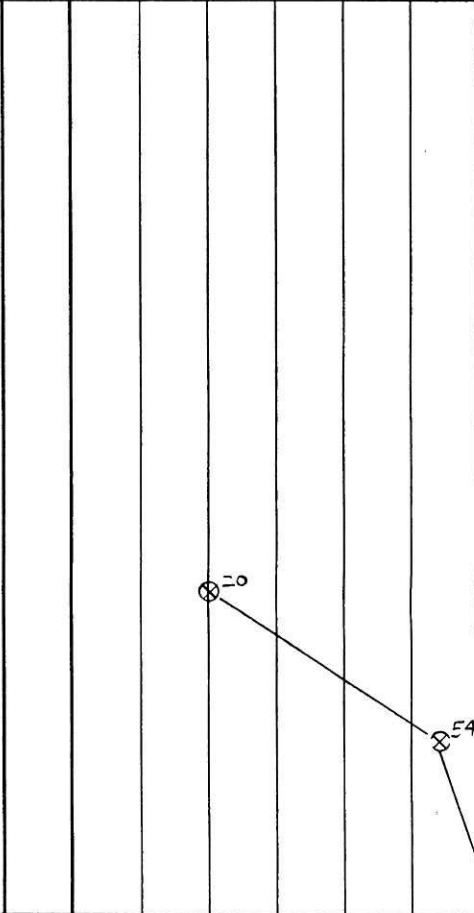
SURFACE ELEVATION 1654.91-ft. 504.418-m

UNIT DRY WT.
LBS./FT³



5			
10			
15			
20	1	3" SS	
25	2	3" SS	
30	3	3" SS	
30.5			

Brown silty fine to coarse sand (SM) - trace to some gravel - medium dense to extremely dense - cobble from 14.0 to 14.5 feet



End of Boring
Boring advanced to 30.5 feet with roller bit and
Revert drilling mud
7.0 feet of HW casing used
Borehole grouted upon completion

Note: 300 lb. Hammer used

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED 3-2-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL BCR ARC	BORING COMPLETED 3-2-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL	RIG DR-2 FOREMAN EVH	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-10

PROJECT NAME
Reclaim Pond Borings

Feet Meters
N-114892 E-2281336 N-35019 E-695353

SITE LOCATION

Crandon Project

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
							1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %	
						X	-----	●	-----	△	
						10	20	30	40	50	
						STANDARD PENETRATION		BLOWS / FT.			
						10	20	30	40	50	
0					SURFACE ELEVATION 1625.80-ft. 495.545-m						
1	1	SS			Brown fine sandy silt (ML) - trace gravel - trace of roots - dense - topsoil					32	
5	2	SS			Brown silty fine to coarse sand (SM) - little gravel - dense to very dense					58	
10	3	SS								41	
11.5					End of Boring Boring advanced to 11.5 feet with power auger Borehole grouted upon completion		Note:	300 lb. Hammer	used		

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED	3-9-84	STS OFFICE	540 Lambeau Green Bay, WI 54303
WL	BCR	ARC	BORING COMPLETED 3-9-84	DRAWN BY	SMD SHEET NO. 1 OF 1
WL		RIG DR-2	FOREMAN BZ	APP'D BY	JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-11

PROJECT NAME
Reclaim Pond Borings

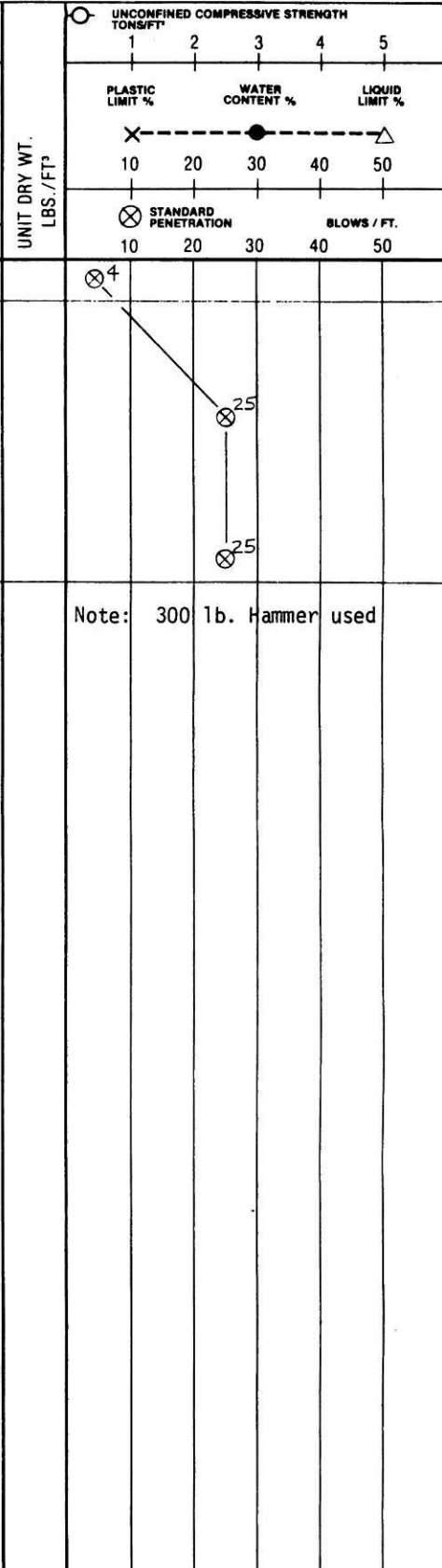
Feet
N-115033 E-2282358
Meters
N-35062 E-695664

SITE LOCATION

Crandon Project

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY
1	1	3" SS		
5	2	3" SS		
10	3	3" SS		
11.5				

DESCRIPTION OF MATERIAL	
SURFACE ELEVATION	1630.33-ft. 496.926-m
Brown fine sandy silt (ML) - little gravel - trace roots - loose - topsoil	
Brown silty fine to coarse sand (SM) - some gravel - medium dense	
End of Boring Boring advanced to 11.5 feet with power auger Borehole grouted upon completion	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED 3-1-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL BCR ARC	BORING COMPLETED 3-1-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL	RIG DR-2 FOREMAN EVH	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-13

PROJECT NAME
Reclaim Pond Borings

Feet Meters
N-114509 E-2282328 N-34902 E-695655

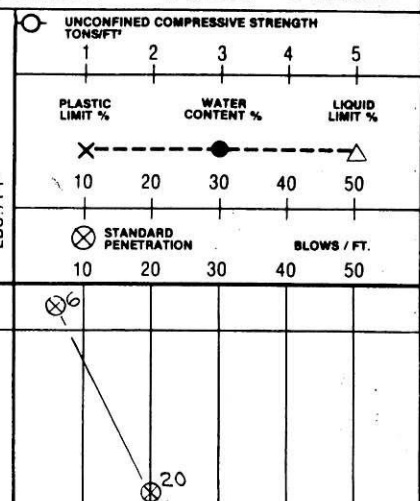
SITE LOCATION

Crandon Project

DEPTH	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY
1		3"	SS		
5					
7.5		3"	SS		

DESCRIPTION OF MATERIAL	
SURFACE ELEVATION 1620.30-ft. 493.868-m	
Brown fine sandy silt (ML) - trace gravel, trace clay, trace roots - loose - topsoil	
Brown silty fine to coarse sand (SM) - little gravel - medium dense	
End of Boring Boring advanced to 6.0 feet with power auger Borehole grouted upon completion	

UNIT DRY WT. LBS./FT³



Note: 300 lb. Hammer used

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED 3-1-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL BCR ARC	BORING COMPLETED 3-1-84	DRAWN BY SMD SHEET NO. 1 OF 1
WL	RIG DR-2 FOREMAN EVH	APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Company

LOG OF BORING NUMBER
RP-14

PROJECT NAME
Reclaim Pond Borings

Feet Meters
N-115863 E-2281985 N-35315 E-695550

SITE LOCATION

Crandon Project

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X		●		△
						10	20	30	40	50
						STANDARD PENETRATION		BLOWS / FT.		
						10	20	30	40	50
5				Brown silty fine to coarse sand (SM) - some gravel - very dense						
10										
15	1	3" SS								⊗ 54
20	2	3" SS		Brown slightly silty fine to coarse sand (SM-SP) - some gravel - extremely dense						⊗ 91
23.8	3	3" SS		Brown silty fine to coarse sand (SM) - some gravel - extremely dense						⊗ 105/4"
				End of Boring Boring advanced to 23.0 feet with roller bit and Revert drilling mud 13.0 feet of HW casing used Borehole grouted upon completion		Note:	300	1b.	Hammer	used

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL		BORING STARTED 2-29-84	STS OFFICE 540 Lambeau Green Bay, WI 54303
WL	BCR	ARC	BORING COMPLETED 2-29-84
WL		RIG DR-2 FOREMAN EVH	DRAWN BY SMD SHEET NO. 1 OF 1
			APP'D BY JAS STS JOB NO. 12991



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-1

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,913 E 2,283,588 Feet
N 34,416 E 696,039 Meters

UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
1	2	3	4	5
PLASTIC LIMIT %	WATER CONTENT %		LIQUID LIMIT %	
X	●		△	
10	20	30	40	50
⊗ STANDARD PENETRATION	BLOWS / FT.			
10	20	30	40	50

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
⊗					SURFACE ELEVATION 1683.25 - ft. 513.06 - Meters	
					Black silty organic topsoil (OL) with roots	
2					Light brown silt (ML) with a trace of fine sand and fine gravel	
4					Brown fine to medium sand (SM to GM) with a little silt and fine to medium gravel, and a trace cobbles (Bag sample from 3' to 3.5')	
6					Brown fine to medium sand (SM) with a little fine to medium gravel, trace cobbles and silt	
8					Brown fine to medium sand (SM) with some silt, little fine to medium gravel, trace cobbles (Bag sample from 8' - 8.5')	
10					Brown fine to medium sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles - saturated (Bag sample from 12' - 12.5')	
12					Test Pit advanced to 12.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 10.0'	BORING STARTED 6/6/84	STS OFFICE 111 Pflingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/6/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573

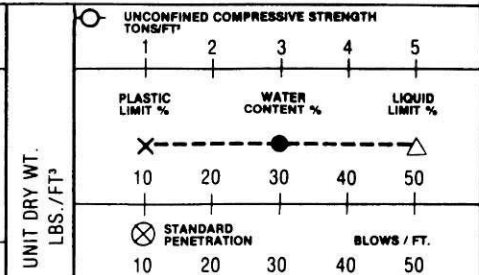


STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA
PROJECT NAME
Crandon Project

LOG OF
TP-84-2
ARCHITECT—ENGINEER

SITE LOCATION
N 113,127 E 2,283,560 Feet
N 34,481 E 696,030 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
				SURFACE ELEVATION 1683.05 - ft. 512.99 Meters	
				Black organic silty topsoil (OL) with a little roots	
2				Light brown silt (ML to SM) with some sand, trace fine gravel	
4				Brown fine to coarse sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles (Bag sample 3' - 3.5')	
6					
8				Brown fine to medium sand (SM) with a little silt, trace fine to medium gravel and cobbles (Bag sample 8' - 8.5')	
10					
12				Brown fine to medium sand (SP to SM) with a trace of fine to medium gravel and silt (Bag sample 11'-11.5')	
14				Test Pit advanced to 14.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/7/84	STS OFFICE 111 Pfingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/7/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573

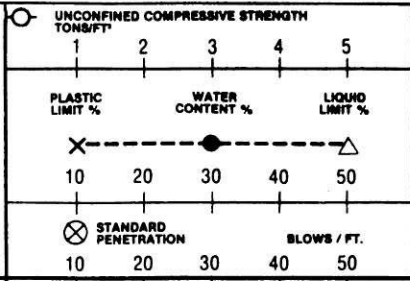


STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA
PROJECT NAME
Crandon Project

LOG OF
TP-84-3
ARCHITECT-ENGINEER

SITE LOCATION
N 112,598 E 2,283,690 Feet
N 34,320 E 693,070 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.
					SURFACE ELEVATION 1677.12-ft. 511.19-Meters	
					Black silty organic topsoil (OL) with roots	
					Light brown silt (ML) with a trace of fine sand and gravel	
2					Brown fine to coarse sand (SM to GM) with a little to some silt, little fine to medium gravel, cobbles, and boulders (Bag sample from 3' to 3.5')	
4						
6						
8					Brown fine to medium sand (SM to GM) with a little silt, fine to medium gravel, trace cobbles (Bag sample from 8 to 8.5')	
10						
12					Brown fine to medium sand (SP to SM) with a little fine to medium gravel, trace cobbles and silt (Bag sample from 12.5 to 13.0')	
14					Test Pit advanced to 13.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/6/84	STS OFFICE 111 Pfingsten Road Norbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/6/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

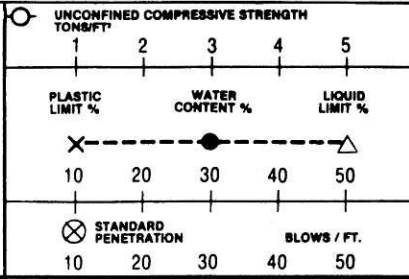
OWNER
Exxon Minerals Co., USA

LOG OF
tp-84-4

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 113,452 E 2,283,577 Feet
N 34,580 E 696,036 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
					SURFACE ELEVATION 1678.12-ft. 511.49-Meters	
					Black silty organic topsoil (OL) with roots	
2					Light brown silt (ML) with a trace of sand and fine gravel	
4					Brown fine to medium sand (SM to GM) with a little silt and gravel, trace cobbles and boulders (Bag sample from 3.0 - 3.5')	
6						
8					Brown fine to coarse sand (SP to GP) with some fine to medium gravel, trace cobbles and boulders (Bag sample from 6 - 6.5')	
10						
12					Brown fine to medium sand (SM to GM) with some fine to coarse gravel, little silt, trace cobbles (Bag sample from 10-10.5', 11-11.5')	
14						
15					Test Pit advanced to 15.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/5/84	STS OFFICE 111 Pfingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/5/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PST STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

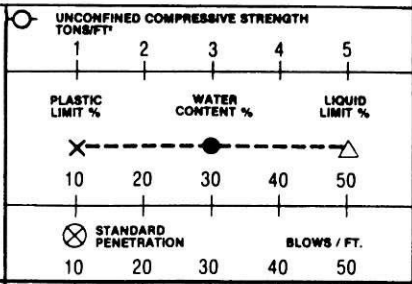
LOG OF
TP-84-5

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,969 E 2,283,762 feet
N 34,433 E 696,092 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
⊗					SURFACE ELEVATION 1682.07-ft. 512.70-Meters	
					Black organic silty topsoil (OL) with roots	
					Light brown silt (ML) with a trace of fine sand and gravel	
2						
4					Brown fine to coarse sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles and boulders (Bag sample from 3 - 3.5')	
6						
8					Brown fine to medium sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles (Bag sample from 7 - 7.5')	
10						
12					Brown fine to medium sand (SM to GM) with a little fine to medium gravel, trace silt (Bag sample from 11 - 11.5')	
14					Test Pit advanced to 14.0 feet using backhoe	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/6/84	STS OFFICE 111 Pfingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/6/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-6

PROJECT NAME

ARCHITECT—ENGINEER

Crandon Project

SITE LOCATION

N 112,598 E 2,283,926 feet
N 34,320 E 696,142 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²					
						1	2	3	4	5	
						PLASTIC LIMIT %			WATER CONTENT %		LIQUID LIMIT %
						X	●	△			
						10	20	30	40	50	
						STANDARD PENETRATION			BLOWS / FT.		
						10	20	30	40	50	
				SURFACE ELEVATION 1675.83-ft. 510.79-Meters							
				Black organic silty topsoil (OL) with roots							
2				Light brown silt (ML to SM) with some fine sand, trace fine gravel							
4				Brown fine to medium sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles and boulders - becoming saturated @ 9.0' (Bag sample 3 - 3.5', 7.5-8.0')							
6											
8											
10											
12				Brown fine to medium sand (SM to GM) with a little fine to medium gravel, trace silt, cobbles and boulders (Bag sample 10.5 - 11.0')							
13				Test Pit advanced to 13.0 feet using backhoe							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/7/84	STS OFFICE 111 Pfingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/7/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

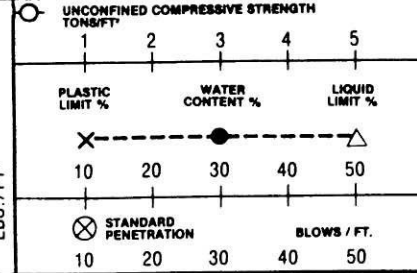
OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-7

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 113,188 E 2,283,816 feet
N 34,500 E 696,109 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
0					SURFACE ELEVATION 1681.38-ft. 512.49-Meters	
2					Black silty organic topsoil (OL) with roots	
4					Light brown silt (ML) with a trace of sand, gravel and roots (water bearing)	
6					Brown medium to coarse sand (SM to GM) with a little silt and gravel, trace cobbles (Bag sample from 3.5-4.0', 6-6.5')	
8						
10					Brown fine to medium sand (SP) with a trace silt, cobbles and boulders	
12					Brown fine to medium sand (SM to GM) with a little silt and fine to medium gravel, trace cobbles (Bag sample from 11-11.5')	
					Test Pit advanced to 12.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/5/84	STS OFFICE 111 Pfinsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/5/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

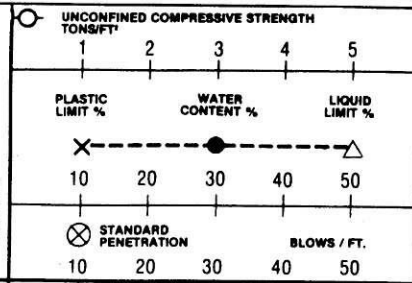
LOG OF
TP-84-8

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,848 E 2,283,916 feet
N 34,396 E 696,139 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
				SURFACE ELEVATION 1679.97-ft. 512.06-Meters	
				Black silty organic topsoil (OL) with roots	
				Grayish brown clayey silt (CL-ML) with a trace of sand and fine gravel	
2				Brown sandy silt (MLtoSM) with a trace of fine gravel - water bearing	
4					
6					
8				Brown fine to medium sand (SM to GM) with some fine to coarse gravel, trace silt, cobbles and boulders (Bag sample from 3-3.5', 10-10.5')	
10					
12					
13					
				Test Pit advanced to 13.0 feet using backhoe	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6/5/84	STS OFFICE 111 Pfingsten Road Northbrook, Illinois 60062
WL BCR ACR	BORING COMPLETED 6/5/84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

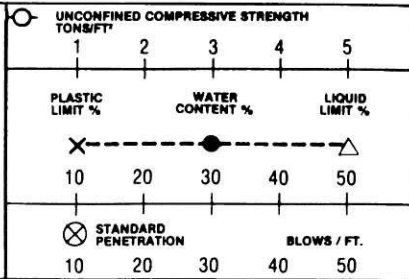
OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-9

ARCHITECT—ENGINEER

SITE LOCATION
N 113,074 E 2,283,906 Feet
N 34,465 E 696,136 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
⊗					SURFACE ELEVATION 1681.38 ft. 512.49 Meters	
					Black organic silty topsoil (OL) - with roots	
2					Light gray to brown silt (ML to SM) - with some sand - trace of fine gravel	
4					Brown fine to coarse sand (SM) - with some silt - a little fine to medium gravel - trace of cobbles and boulders (bag sample from 3.0 to 3.5')	
6						
8					Brown fine to medium sand (SP to SM) - with a little fine to medium gravel - trace of silt (bag sample from 7.5 to 8.0')	
10					Brown very fine sand (SM) - with a little silt - trace of fine to medium gravel - trace of cobbles (bag sample from 11.0 to 11.5')	
12						
13.5					Test Pit advanced to 13.5 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-7-84	STS OFFICE 111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED 6-7-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

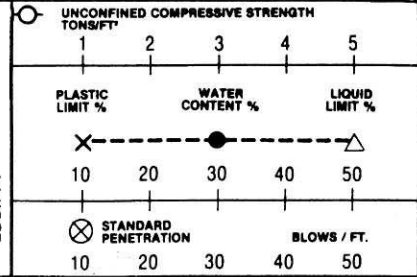
OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-10

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,027 E 2,284,008 Feet
N 34,146 E 696,167 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
					SURFACE ELEVATION 1665.47 ft. 507.64 Meters	

Black organic silty topsoil (OL) - with roots

2
Light brown silt (ML to SM) - with some fine sand - a little fine to medium gravel - trace of cobbles (bag sample from 0.75 to 2.0')

4
Brown fine to medium sand (SM) - with some silt - a little fine to medium gravel - trace of cobbles (bag sample from 3.0 to 3.5')

6
8
Brown fine to medium sand (SM to GM - with a little silt and fine to medium gravel (bag sample from 7.0 to 7.5')

10
12
12.5
Brown fine sand (SM) - with a little silt and fine to medium gravel bag sample from 12.0 to 12.5 feet

Test Pit advanced to 12.5 feet using backhoe

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-7-84	STS OFFICE 111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED 6-7-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-11

PROJECT NAME
Crandon Project

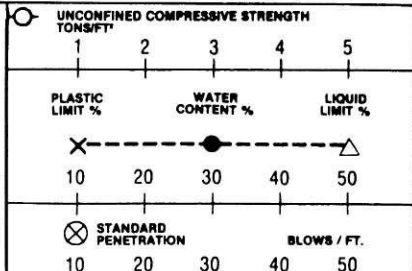
ARCHITECT—ENGINEER

SITE LOCATION
N 112,605 E 2,283,499 Feet
N 34,322 E 696,012 Meters

DEPTH ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

DESCRIPTION OF MATERIAL

UNIT DRY WT.
LBS./FT³



SURFACE ELEVATION 1676.98 Ft. 511.14 Meters

Black organic topsoil (OL) - with roots

Light brown silt (ML to SM) with some sand - trace of fine gravel

2
4
6
8
10
12
13.5

Brown fine to medium sand (SM) - with a little silt and fine to medium gravel - trace of cobbles and boulders (bag samples from 3.0 to 3.5', 8.5 to 9.0', 13.0 to 13.5')

Test Pit advanced to 13.5 feet using Backhoe

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED	6-7-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED	6-7-84	DRAWN BY	KJC SHEET NO. 1 OF 1
WL	RIG Backhoe	FOREMAN BP	APP'D BY	PAT STS JOB NO. 23573



STS Consultants Ltd.

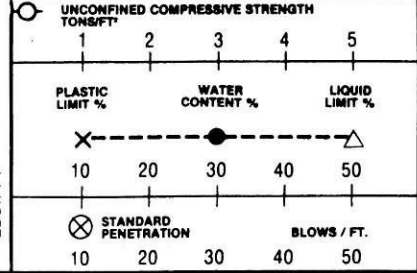
OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-12

ARCHITECT—ENGINEER

SITE LOCATION
N 112,296 E 2,283,729 Feet
N 34,228 E 696,082 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
1					SURFACE ELEVATION 1671.84 ft. 509.58 Meters	
2					Black organic silty topsoil (OL) - with roots	
3					Light brown silt (ML to SM) with some fine sand-trace gravel	
4					Brown fine to medium sand (SM) - with a little silt and fine to medium gravel - trace of cobbles and boulders	
6						
8						
10					Brown fine to medium sand (SM to GM) - with some fine to medium gravel - a little silt - trace of cobbles and boulders (bag samples from 4.0 to 4.5', 7.5 to 8.0')	
12						
14						
14.5					Brown fine to medium sand (SM) - with a little silt and fine to medium gravel - trace of cobbles (bag sample from 14.0 to 14.5')	
					Test Pit advanced to 14.5 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-6-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062	
WL	BCR	ACR	BORING COMPLETED	6-6-84	DRAWN BY	KJC SHEET NO. 1 OF 1
WL		RIG	Backhoe	FOREMAN	BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

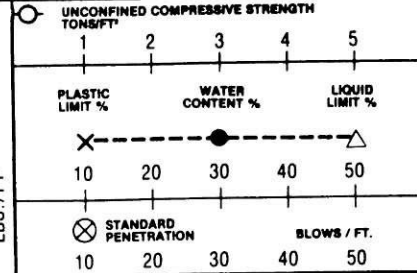
OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-13

ARCHITECT-ENGINEER

SITE LOCATION
N 112,011 E 2,283,693 Feet
N 34,141 E 696,071 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
0					SURFACE ELEVATION 1663.37 ft. 507.00 Meters	
					Black organic silty topsoil (OL) - with roots	
2					Light gray and brown silt (ML to SM) - with some sand - trace of fine gravel	
4					Brown fine to medium sand (SM to GM) - with some silt and fine to coarse gravel - trace of cobbles and boulders (bag samples from 4.0 to 4.5', 7.5 to 8.0')	
6						
8					Brown fine to medium sand (SM) - with some silt - a little fine to medium gravel - trace of cobbles and boulders (bag sample from 10.5 to 11.0')	
10						
12					Test Pit advanced to 14.0 feet using backhoe	
14						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-6-84	STS OFFICE 111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED 6-6-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-14

ARCHITECT-ENGINEER

SITE LOCATION
N 112,326 E 2,283,969 Feet
N 34,237 E 696,155 Meters

DEPTH	ELEVATION	DESCRIPTION OF MATERIAL
0		SURFACE ELEVATION 1671.43 ft. 509.45 Meters

UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
1	2	3	4	5
PLASTIC LIMIT %				
WATER CONTENT %				
LIQUID LIMIT %				
X		●		△
10	20	30	40	50
STANDARD PENETRATION				
BLOWS / FT.				
10	20	30	40	50

DEPTH	ELEVATION	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²	PLASTIC LIMIT %	WATER CONTENT %	LIQUID LIMIT %	STANDARD PENETRATION BLOWS / FT.
0		Black organic topsoil (OL) - with roots						
1		Light brown silt (ML) - with a trace of sand and fine gravel						
2		Brown sandy silt (ML to SM) - with a trace of gravel (bag sample 3.0 to 3.5')						
4								
6		Brown fine to medium sand (SM to GM) - with some silt and fine to medium gravel - trace of cobbles and boulders (seepage encountered at 6.0 feet) (bag sample from 7.5 to 8.0')						
8								
10		Brown fine to medium sand (SM) - with a little silt and fine to medium gravel - trace of boulders and cobbles (bag sample from 10.5 to 11.0')						
12								
13		Test Pit advanced to 13.0 feet using backhoe						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	BORING STARTED	6-6-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062
WL	BCR	ACR	BORING COMPLETED	6-6-84
WL	RIG	Backhoe	FOREMAN	BP
	DRAWN BY	KJC	SHEET NO.	1 OF 1
	APP'D BY	PAT	STS JOB NO.	23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-15

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,342 E 2,284,241 Feet
N 34,242 E 696,238

DEPTH	ELEVATION	DESCRIPTION OF MATERIAL
2		Black organic silty topsoil (OL) - with roots
4		Light brown silt (ML) - with a trace of sand and gravel
6		Brown fine to medium sand (SM) - with some silt - a little fine to coarse gravel - trace of cobbles and boulders (bag sample from 3.0 to 3.5')
8		
10		Brown fine to medium sand (SM)-with a little silt and fine to medium gravel - trace of cobbles and boulders (bag samples from 8.5 to 9.0', 13.0 to 13.5')
12		
13.5		Test Pit advanced to 13.5 feet using backhoe

UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²	PLASTIC LIMIT %					WATER CONTENT %					LIQUID LIMIT %				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	X														
	10	20	30	40	50										
STANDARD PENETRATION	BLOWS / FT.														
	10	20	30	40	50										

DEPTH	ELEVATION	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
2		Black organic silty topsoil (OL) - with roots	
4		Light brown silt (ML) - with a trace of sand and gravel	
6		Brown fine to medium sand (SM) - with some silt - a little fine to coarse gravel - trace of cobbles and boulders (bag sample from 3.0 to 3.5')	
8			
10		Brown fine to medium sand (SM)-with a little silt and fine to medium gravel - trace of cobbles and boulders (bag samples from 8.5 to 9.0', 13.0 to 13.5')	
12			
13.5		Test Pit advanced to 13.5 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-6-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062
WL	BCR	ACR	BORING COMPLETED	6-6-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL		RIG	Backhoe FOREMAN BP	APP'D BY PAT	STS JOB NO. 23573



STS Consultants Ltd.

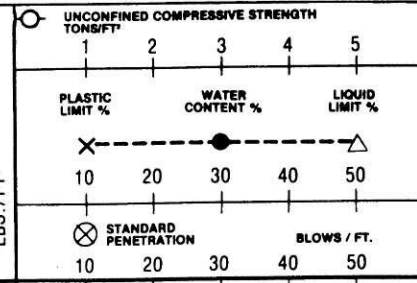
OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-16

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 112,369 E 2,283,513 Feet
N 34,250 E 696,016 Meters



DEPTH ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY
DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1667.58 ft. 508.28 Meters

Black organic silty topsoil (OL) - with roots

Grayish brown silt (ML) - with a trace of sand and fine gravel (becoming light brown at 1.5 feet)

Brown fine to medium sand (SM) - with some silt - a little fine to coarse gravel - trace of cobbles and boulders (bag sample from 3.5 to 4.0')

Brown fine to medium sand (SM) - with a little silt and fine to coarse gravel - trace of cobbles and boulders (bag samples from 8.0 to 8.5', 14.0 to 14.5')

Test Pit advanced to 14.5 feet using backhoe

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-6-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062	
WL	BCR	ACR	BORING COMPLETED	6-6-84	DRAWN BY	KJC SHEET NO. 1 OF 1
WL		RIG	Backhoe	FOREMAN	BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-17

ARCHITECT-ENGINEER

SITE LOCATION
N 112,060 E 2,283,503 Feet
N 34,156 E 696,013 Meters

DEPTH
ELEVATION

SAMPLE NO.

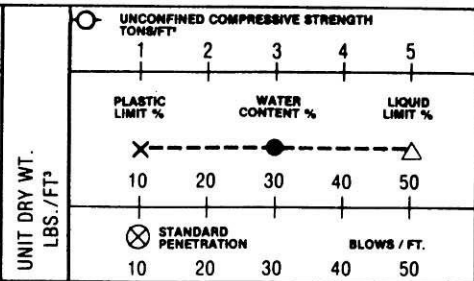
SAMPLE TYPE

SAMPLE DISTANCE

RECOVERY

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1659.69 ft. 505.87 Meters



1				Black organic silty topsoil (OL) - with roots					
2				Light brown silt (ML to SM) - with some sand - trace of fine gravel					
4									
6				Brown fine to coarse sand (SM) - with a little silt and fine to medium gravel - trace of cobbles and boulders (bag sample from 4.5 to 5.0')					
8									
10				Brown fine to coarse sand (SM to GM) - with a little gravel - trace of silt - trace of cobbles and boulders (bag sample from 9.5 to 10.0')					
12				Light brown fine to medium sand (SM) - with a trace of silt and gravel (bag sample from 12.5 to 13.0')					
13				Test Pit advanced to 13.0 feet using backhoe					

UNIT DRY WT. LBS./FT³									
UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)									
PLASTIC LIMIT %									
WATER CONTENT %									
LIQUID LIMIT %									
STANDARD PENETRATION (BLOWS / FT.)									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-7-84	STS OFFICE	111 Pflingsten Road Northbrook, IL. 60062	
WL	BCR	ACR	BORING COMPLETED	6-7-84	DRAWN BY	KJC SHEET NO. 1 OF 1
WL		RIG	Backhoe FOREMAN	BP	APP'D BY	PAT STS JOB NO. 23573



STS Consultants Ltd.

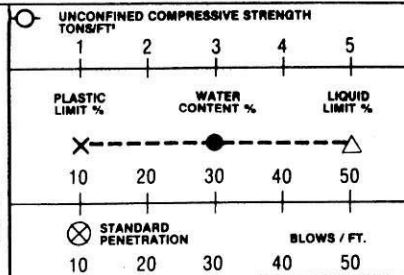
OWNER
Exxon Minerals Co., USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-20

ARCHITECT-ENGINEER

SITE LOCATION
N 114,135 E 2,284,353 Feet
N 34,788 E 696,272 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
					SURFACE ELEVATION 1707.26 ft. 520.37 Meters	
					Black organic silty topsoil (OL) - with roots	
2					Light brown silt (ML to SM) - with some sand - trace of fine gravel	
4						
6						
8					Brown fine to medium sand (SM to GM) - with some fine to medium gravel - a little silt - trace of cobbles and boulders (bag sample form 5.0 to 5.5')	
10						
12						
14					Brown fine sand (SP to SM) - with a little gravel - trace of silt and cobbles (bag sample from 13.0 to 13.5')	
					Test Pit advanced to 14.0 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-8-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062
WL	BCR	ACR	BORING COMPLETED	6-8-84	DRAWN BY KJC
WL		RIG	Backhoe	FOREMAN	BP
				APP'D BY	PAT
				SHEET NO.	1 OF 1
				STS JOB NO.	23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co., USA

LOG OF
TP-84-21

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION

N 113,426 E 2,284,396 Feet
N 34,572 E 696,285 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X	●	○	△	
						10	20	30	40	50
						STANDARD PENETRATION		BLOWS / FT.		
						⊗	⊗	⊗	⊗	⊗
						10	20	30	40	50
				SURFACE ELEVATION 1691.35 ft. 515.52 Meters						
				Black organic silty topsoil (OL) - with roots						
2				Light brown silt (ML to SM) - with some sand - trace of fine gravel						
4				Brown fine to medium sand (SM) - with a little silt and fine to coarse gravel - trace of cobbles and boulders (bag sample from 2.5 to 3.0')						
6										
8				Light brown fine sand (SP to SM) - with a trace of silt and fine to medium gravel (bag sample from 8.0 to 8.5')						
10				Brown very fine sand (SM) - with a little silt - trace of fine gravel (bag sample from 9.0 to 9.5')						
12										
14				Test Pit advanced to 14.0 feet using backhoe						

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BORING STARTED	6-8-84	STS OFFICE	111 Pfingsten Road Northbrook, IL. 60062	
WL	BCR	ACR	BORING COMPLETED	6-8-84	DRAWN BY	KJC
WL		RIG	Backhoe	FOREMAN	BP	APP'D BY
					PAT	SHEET NO. 1 OF 1
						STS JOB NO. 23573



STS Consultants Ltd.

OWNER

Exxon Minerals Co., USA

LOG OF

TP-84-22

PROJECT NAME

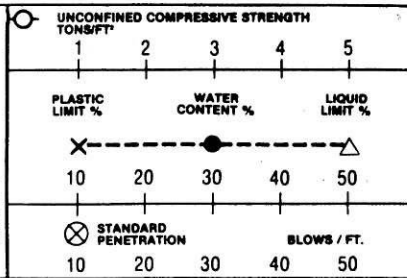
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION

N 112,887 E 2,284,372 Feet
N 34,408 E 696,278 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT ²													
						1	2	3	4	5									
				SURFACE ELEVATION 1685.77 513.82 Meters															
				Black organic silty topsoil (OL) - with roots															
				Grayish brown silt (ML to SM) - with some fine sand - trace of fine gravel															
2																			
4																			
6				Brown fine to medium sand (SM) - with a little silt and fine to medium gravel - trace of cobbles and boulders (bag sample from 3.5 to 4.0')															
8																			
10																			
12				Brown fine to coarse sand (SM to GM) - with some fine to coarse gravel - trace of silt - trace of cobbles and boulders (bag sample from 9.5 to 10.0')															
				Brown fine to medium sand (SM) - with a little silt and fine gravel - trace of cobbles and boulders															
14				Brown fine sand (SM) - with a little fine gravel - trace to a little silt (bag sample from 13.0 to 13.5')															
				Test Pit advanced to 14.0 feet using backhoe															



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	Dry	BCR	ACR	BORING STARTED	6-8-84	STS OFFICE	111 Pflingsten Road Northbrook, IL. 60062
WL				BORING COMPLETED	6-8-84	DRAWN BY	KJC SHEET NO. 1 OF 1
WL				RIG Backhoe	FOREMAN BP	APP'D BY	PAT STS JOB NO. 23573



STS Consultants Ltd.

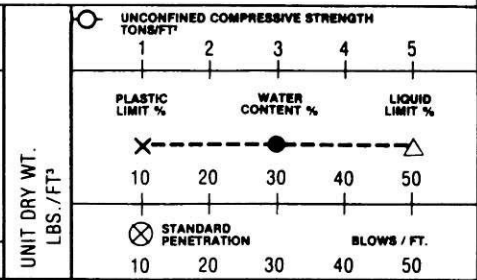
OWNER
Exxon Minerals Co. USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-23

ARCHITECT—ENGINEER

SITE LOCATION
N 111,391 E 2,284,405 Feet
N 33,952 E 696,288 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.
2				Black organic silty topsoil (OL) with roots	
4				Light brown silt (ML to SH) with some sand, trace fine gravel	
6				Brown fine to medium sand (SM) with a little silt and fine to medium gravel, trace cobbles (intermittent pockets of saturated silt) (bag samples from 4 to 4.5')	
8					
10					
12				Brown fine to medium sand (SM) with some silt, little fine to medium gravel, trace boulders and cobbles (bag samples from 11.5 to 12')	
				Test Pit advanced to 12 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-8-84	STS OFFICE 111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED 6-8-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER

Exxon Minerals Co. USA

LOG OF

TP-84-24

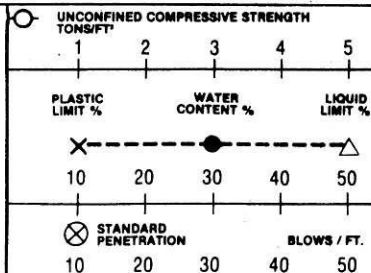
PROJECT NAME

Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION

N 111,850 E 2,284,362 Feet
N 34,092 E 696,275 Meters



DEPTH	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY
2					
4					
6					
8					
10					
12					
14					

DESCRIPTION OF MATERIAL					
SURFACE ELEVATION 1692.82 ft. 515.97 Meters					
Black organic silty topsoil (OL) with roots					
Light brown silt (ML to SM) with some sand, trace fine gravel					
Brown fine to medium sand (SM) with a little silt and fine to medium gravel, trace cobbles and boulders (bag samples from 4 to 4.5', seepage encountered at 5')					
Brown fine sand (SM) with a little silt and fine gravel, trace cobbles (bag samples from 8 to 8.5')					
Brown fine sand (SP to SM) with a trace of silt and fine gravel (bag sample from 11 to 11.5')					
Brown fine sand (SM) with a little silt and fine to coarse gravel, trace of cobbles and boulders.					
Test Pit advanced to 14 feet using backhoe					

UNIT DRY WT. LBS./FT³

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-8-84	STS OFFICE 111 Pfingsten Road Northbrook, IL. 60062
WL BCR ACR	BORING COMPLETED 6-8-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co. USA

PROJECT NAME
Crandon Project

LOG OF
TP-84-30

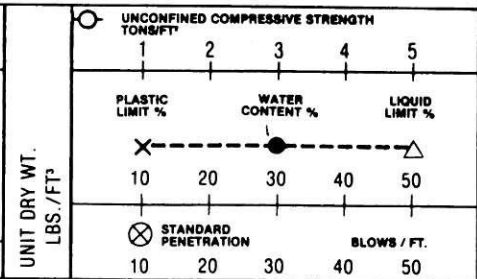
ARCHITECT—ENGINEER

SITE LOCATION
N 111,326 E 2,283,025 Feet
N 33,932 E 695,867 Meters

DEPTH ELEVATION
SAMPLE NO.
SAMPLE TYPE
SAMPLE DISTANCE
RECOVERY

DESCRIPTION OF MATERIAL

SURFACE ELEVATION 1627.83 ft. 496.16 meters



Black organic silty topsoil (OL) with roots

Grayish brown silt (ML) with a trace of sand and fine gravel

Brown fine to coarse sand (SP to SM) with a little fine to coarse gravel, trace silt and cobbles (bag sample from 3 to 3.5', seepage encountered at 5')

Brown fine to medium sand (SM) with a little silt and fine to medium gravel, trace cobbles and boulders (bag sample from 8 to 8.5', 13.5 to 14')

Test Pit advanced to 14 feet using backhoe

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-6-84	STS OFFICE 111 Pfingsten Poad Northbrook, IL., 60062
WL BCR ACR	BORING COMPLETED 6-6-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

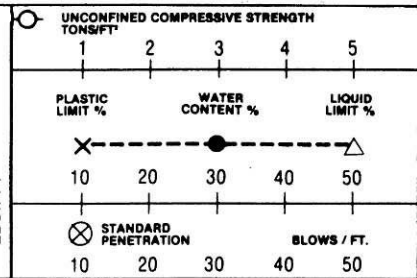
OWNER
Exxon Minerals Co. USA

LOG OF
TP-84-31

PROJECT NAME
Crandon Project

ARCHITECT—ENGINEER

SITE LOCATION
N 111,283 E 2,283,400 Feet
N 33,919 E 695,982 Meters



DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
0					SURFACE ELEVATION 1635.10 Ft. 498.38 Meters	
2					Black organic silty topsoil (OL) with roots	
4					Light brown silt (ML) with a trace of fine sand, gravel, cobbles and boulders	
6					Brown fine to medium sand (SM) with some silt, little gravel, trace cobbles and boulders (bag sample from 3 to 3.5')	
8					Brown fine to medium sand (SM to GM) with some fine to coarse gravel, little silt, trace cobbles and boulders (bag sample from 7.5 to 8', 14 to 14.5')	
10						
12						
14						
14.5					Test Pit advanced to 14.5 feet using backhoe	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-6-84	STS OFFICE 111 Pfingsten Road Northbrook, IL., 60062
WL BCR ACR	BORING COMPLETED 6-8-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573



STS Consultants Ltd.

OWNER
Exxon Minerals Co. USA

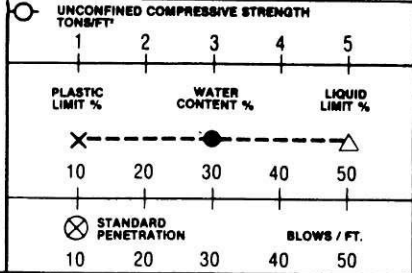
PROJECT NAME
Crandon Project

LOG OF
TP-84-32

ARCHITECT—ENGINEER

SITE LOCATION
N 111,278 E 2,283,911 Feet
N 33,918 E 696,138 Meters

DEPTH ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT ³
⊗					SURFACE ELEVATION 1663.91 ft. 507.16 meters	



2					Black organic silty topsoil (OL) with roots	
4					Light brown silt (ML) with a trace of sand and fine gravel	
6					Brown fine to medium sand (SM) with some silt, little fine to coarse gravel, trace cobbles (bag sample 3 to 3.5')	
8					Brown silty fine to medium sand (SM) with a little fine to coarse gravel and cobbles, trace boulders (bag sample 7 to 7.5')	
10					Reddish brown fine sand (SM) with a little silt and gravel, trace cobbles and boulders (bag sample 13.5 to 14')	
12						
14						

Test Pit advanced to 14 feet using backhoe

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry	BORING STARTED 6-6-84	STS OFFICE 111 Pfingsten Road Northbrook, IL., 60062
WL BCR ACR	BORING COMPLETED 6-6-84	DRAWN BY KJC SHEET NO. 1 OF 1
WL	RIG Backhoe FOREMAN BP	APP'D BY PAT STS JOB NO. 23573

STS Job 12692
August, 1983

EXXON MINERALS COMPANY

CRANDON PROJECT

Soil Absorption Field
Soil Profile Descriptions

Test Pit	Depth		Profile Descriptions
	cm.	ft.	
STS-SAF-1	0-3	0.0-0.1	Black silt loam
	3-5	0.1-0.4	Grayish brown loam
	5-57	0.4-1.8	Yellowish brown silt loam with blocky structure
	57-113	1.8-3.7	Brown sandy loam with cobbles and boulders, massive, fragile
	113-165	3.7-5.4	Yellowish red sandy loam with cobbles and boulders, pockets of brown sandy loam with few fine yellowish brown mottles, massive.
	165-418	5.4-13.7	Brown to light yellowish brown medium to coarse sand, occasional strong brown loamy sand laminae (5-15 cm)
STS-SAF-2	0-3	0.0-0.1	Black loam
	3-5	0.1-0.4	Grayish brown loam
	5-57	0.4-1.8	Yellowish brown silty loam with blocky structure
	57-88	1.8-2.9	Brown sandy loam, massive, fragile
	88-189	2.9-6.2	Reddish brown sandy loam with cobble and boulders, massive
	189-372	6.2-12.2	Brown to light yellowish brown medium and coarse sand
STS-SAF-3	0-3	0.0-0.4	Very dark gray silt loam
	3-21	0.4-0.7	Dark brown silt loam with blocky structure
	21-52	0.7-1.7	Dark yellowish brown loam with blocky structure
	52-79	1.7-2.6	Yellowish brown loam, massive, fragile
	79-302	2.6-9.9	Brown sandy loam with yellowish red and grayish brown lenticular silt inclusions, cobbles and boulders, grayish brown and yellowish brown mottles below 207 cm, massive
	302-326	9.9-10.7	Yellowish brown coarse loamy sand
STS-SAF-4	0-3	0.0-0.1	Black loam
	3-15	0.1-0.5	Grayish brown loam
	15-43	0.5-1.4	Yellowish brown silt loam with few to common grayish brown and strong brown mottles
	43-70	1.4-2.3	Brown sandy loam with brown to strong brown mottles, massive, fragile
	70-305	2.3-10.0	Reddish brown sandy loam with cobbles and boulders, grayish brown and yellowish red mottles, massive
STS-SAF-5	0-3	0.0-0.1	Black silt loam
	3-5	0.1-0.4	Brown silt loam
	5-61	0.4-2.0	Brown to strong brown silt loam
	61-149	2.0-4.9	Reddish brown silt loam and sandy loam, coarse brown and strong brown mottles, massive
	149-262	4.9-8.6	Yellowish brown fine to medium sand
	262-357	8.6-11.7	Yellowish brown loamy coarse sand and gravel with cobbles and boulders
STS-SAF-6	0-3	0.0-0.1	Black loam
	3-5	0.1-0.4	Grayish brown loam
	5-52	0.4-1.7	Yellowish brown silt loam
	52-110	1.7-3.5	Brown sandy loam, massive, fragile
	110-372	3.6-12.2	Brown to reddish brown sandy loam with cobbles and boulders, common fine sandy loam and loam pockets with coarse yellowish brown and grayish brown mottles, massive
	372-457	12.2-15.0	Yellowish brown loamy coarse sand with gravel seams
STS-SAF-7	0-3	0.0-0.1	Black loam
	3-9	0.1-0.3	Grayish brown loam
	9-49	0.3-1.6	Yellowish brown silt loam
	49-91	1.6-3.0	Brown sandy loam, massive, fragile
	91-277	3.0-9.1	Brown to reddish brown sandy loam with cobbles and boulders, massive
	277-369	9.1-12.1	Dark yellowish brown coarse sand and gravel
STS-SAF-8	0-12	0.0-0.4	Black silt loam
	12-25	0.4-1.0	Dark brown silt loam
	25-67	1.0-2.2	Brown silt loam
	67-134	2.2-4.4	Brown silt loam with many coarse brown and yellowish red mottles
	134-335	4.4-11.0	Brown and reddish brown sandy loam with cobbles and boulders, common coarse grayish brown and yellowish brown mottles, massive

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STS Job 12692
August, 1983

Page 2

Soil Absorption Field
Soil Profile Descriptions

St Pit	Depth		Profile Descriptions
	cm.	ft.	
S-SAF-9	0-3	0.0-0.1	Black loam
	3-15	0.1-0.5	Grayish brown loam
	15-82	0.5-2.7	Yellowish brown silt loam
	82-101	2.7-3.3	Brown sandy loam, massive, fragic
	101-277	3.3-9.1	Brown to reddish brown sandy loam with cobbles and boulders and a sand seam at 165 to 200 cm, common coarse grayish brown and yellowish red mottles at 100 to 130 cm
	277-334	9.1-14.6	Light yellowish brown medium and coarse sand with occasional fine sand laminae
STS-SAF-10	0-3	0.0-0.1	Black silt loam
	3-18	0.1-0.6	Grayish brown loam
	18-91	0.6-3.0	Yellowish brown silt loam
	91-122	3.0-4.0	Brown sandy loam, massive, fragic
	122-253	4.0-8.3	Brown to reddish brown sandy loam with cobbles and boulders, occasional silt and sand pockets, with a sand seam from 165 to 215 cm, massive
	253-436	8.3-14.3	Light yellowish brown medium to coarse sand and gravel
STS-SAF-11	0-3	0.0-0.1	Black loam
	3-15	0.1-1.5	Grayish brown loam
	15-82	0.5-1.7	Yellowish brown silt loam
	82-101	2.7-3.3	Brown sandy loam, massive, fragic
	101-335	3.5-11.0	Brown to reddish brown sandy loam with cobbles and boulders, massive
	335-421	11.0-13.8	Light yellowish brown medium to coarse sand
STS-SAF-12	0-3	0.0-0.1	Black loam
	3-9	0.1-0.3	Grayish brown loam
	9-49	0.3-1.6	Yellowish brown silt loam
	49-61	1.5-2.0	Brown sandy loam, massive, fragic
	61-213	2.0-7.0	Brown to reddish brown sandy loam with cobbles and boulders, occasional sand inclusions, massive
	213-494	7.0-16.2	Light yellowish brown medium to coarse sand and gravel with occasional fine sand and loamy fine sand seams.
STS-SAF-13	0-3	0.0-0.1	Black loam
	3-5	0.1-0.4	Grayish brown loam
	5-46	0.4-1.5	Yellowish brown silt loam
	46-73	1.5-2.4	Brown sandy loam, massive, fragic
	73-372	2.4-12.2	Brown to reddish brown sandy loam with cobbles and boulders, few coarse grayish brown and yellowish red mottles from 73 to 100 cm, occasional sand pockets, massive
	372-419	12.2-13.7	Light yellowish brown sand and gravel
STS-SAF-14	0-3	0.0-0.1	Black loam
	3-9	0.1-3.0	Grayish brown loam
	9-46	0.3-1.5	Yellowish brown silt loam
	46-73	1.5-2.4	Brown sandy loam, massive, fragic
	73-427	2.4-14.0	Brown to reddish brown sandy loam with cobbles and boulders, sand seam at 160 to 200 cm, massive
STS-SAF-15	0-3	0.0-1.0	Black loam
	3-9	0.1-0.3	Grayish brown loam
	9-43	0.3-1.4	Yellowish brown silt loam
	43-61	1.5-2.0	Brown sandy loam, massive, fragic
	61-335	2.0-11.0	Brown to reddish brown sandy loam with cobbles and boulders, few medium yellowish red mottles, massive
STS-SAF-16	0-3	0.0-0.1	Black loam
	3-5	0.1-0.4	Grayish brown loam
	5-67	0.4-2.2	Yellowish brown silt loam
	67-98	2.2-3.2	Brown sandy loam, massive, fragic
	98-207	3.2-6.8	Brown to reddish brown sandy loam with cobbles and boulders, massive
	207-350	6.8-11.5	Light yellowish brown medium to coarse sand and gravel with occasional loamy sand laminae