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APPENDIX 2.1A

TSP & $SO_2$ CONCENTRATIONS AT STATIONS 1, 2, AND 3
(MARCH 1977 - DECEMBER 1978)

TSP AND $SO_2$ 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 | — | — | — |

[a]Concentrations represent 24-hour samples and are expressed in $\mu g/m^3$.

[b]Monitoring 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 | — | — | — |

| 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 |

| 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 | 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 |

| 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 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 5% | 21% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | <1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 54 $\mu g/m^3$

Analyst QRB
Date Analyzed 2/9/78
1

| Particulate Type | Percent of Total Area Less than 30 μm | Percent of Total Area 30 μm and greater | Comments |
|---|---|---|---|
| Minerals<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 15 % | 10% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 1% | 10% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 1% | 62%<br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | < 1% | 0 % | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | < 1% | 0 % | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 9% | 33% Pollen and Plant Debris<br>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 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 1% | 37% | Mostly Clays |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | <1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 1% | 11% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | <1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 14% | 73%<br>Mostly Insect Parts | |
| 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 5% | 7% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 3% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 93% | 0% | Quartz, calcite, and trace of clay. |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | <1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 3% | 4% | Trace of wood fibers |
| Miscellaneous<br><br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 20% | 21% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | < 1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 GRB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 14% | 33% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | <1% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 9% | 0% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 5% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 ug/m³

Analyst QRB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 1% | 0% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 0% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 36% | 63% | |
| 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 4% | 0% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 0% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 $\mu g/m^3$

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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 53% | 9% | Quartz, Calcite, and small amounts of clays. |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 20% | 9% | Mostly soot. |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 QRB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 38% | 45% | Mostly quartz and calcite. |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 15% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 92% | 0% | Mostly clays |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 4% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 μg/m³

Analyst QRB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 76% | 20% | Quartz, calcite, and clay |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 3% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 ug/m³

Analyst RDB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 7% | 88%<br>Particles of quartz or calcite 30-40 μm diameter. | Trace iron oxides |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 4% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 97% | 0% | Mostly quartz and calcite |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 3% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 QRR
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 1% | 39% | Trace Shale |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 26% | 0% | Soot |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 QRR
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | Numerous particles less than 1 μm, too small to identify not included in the count below.<br>7% | 0% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 30% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>Wood Fibers | 0% | 63%<br>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 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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 64% | 0% | Quartz and Calcite |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 36% | 0% | Soot |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 $\mu g/m^3$

Analyst QRB
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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 43% | 56% | Clays |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 0% | 0% | |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 1% | 0% | |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 3% | 47% | Soot |
| Biological<br>Pollen<br>Spores<br>Trichomes<br>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 µg/m³

Analyst RRB
Date Analyzed 6/14/78

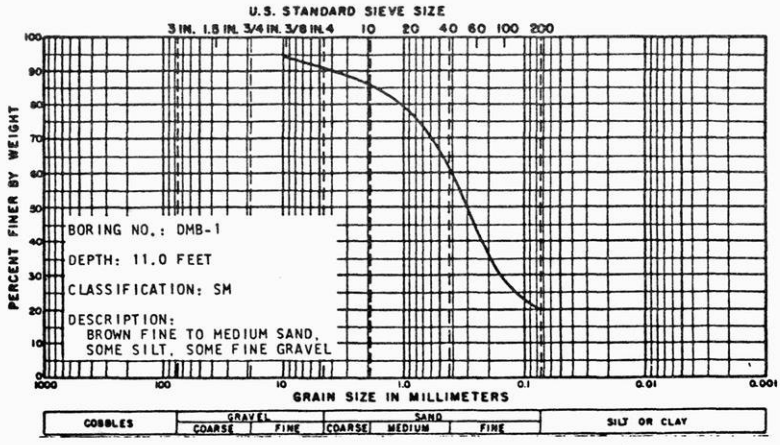
| Particulate Type | Percent of Total Area Less than 30 µm | Percent of Total Area 30 µm and greater | Comments |
|---|---|---|---|
| Minerals<br>Quartz<br>Calcite<br>Iron Oxides<br>Clays | 7% | 44% | Clays |
| Combustion Products<br>Coal Dust<br>Coal Soot<br>Fly Ash | 9% | 0% | |
| Biological<br>Pollen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

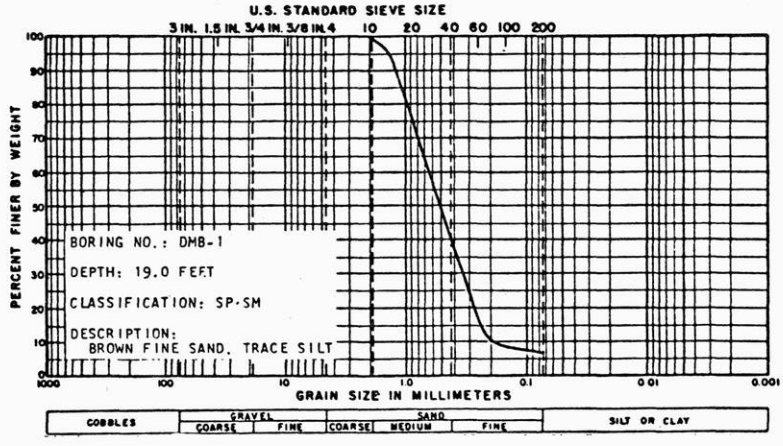
# LIST OF APPENDICES

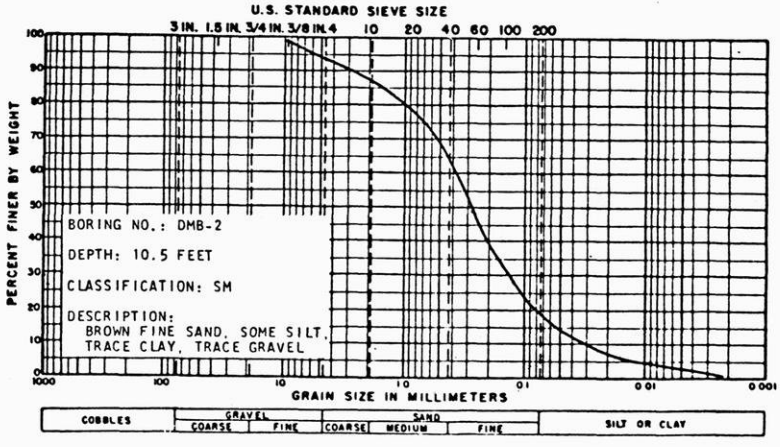

| Number | Title |
|---|---|
| 2.2A | PARTICLE SIZE ANALYSES AND CLAY MINERAL ANALYSES |
| 2.2B | BORING LOGS |

# APPENDIX 2.2A

## PARTICLE SIZE ANALYSES AND CLAY MINERAL ANALYSES



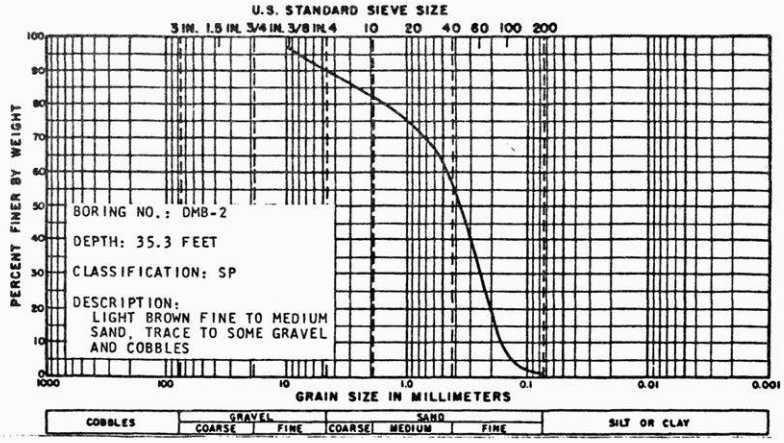



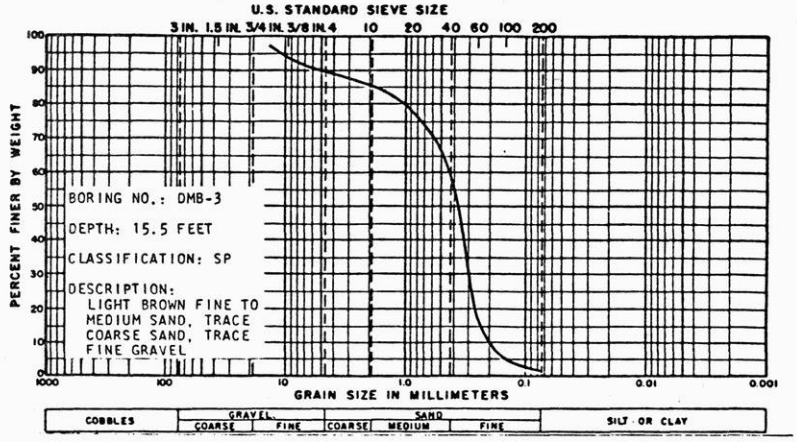



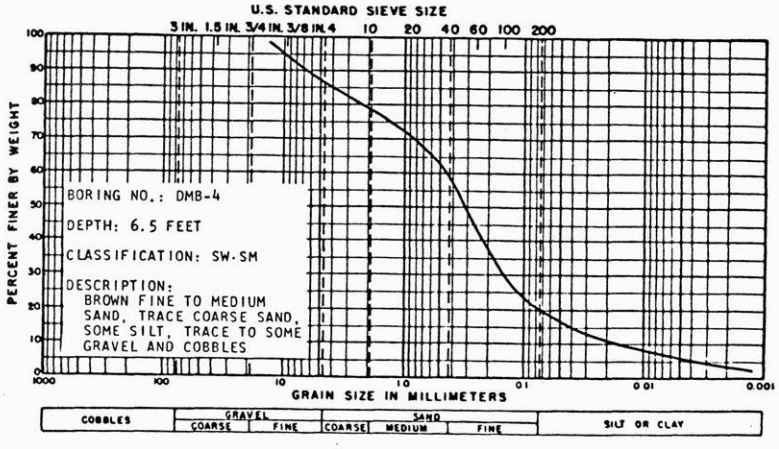

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-1



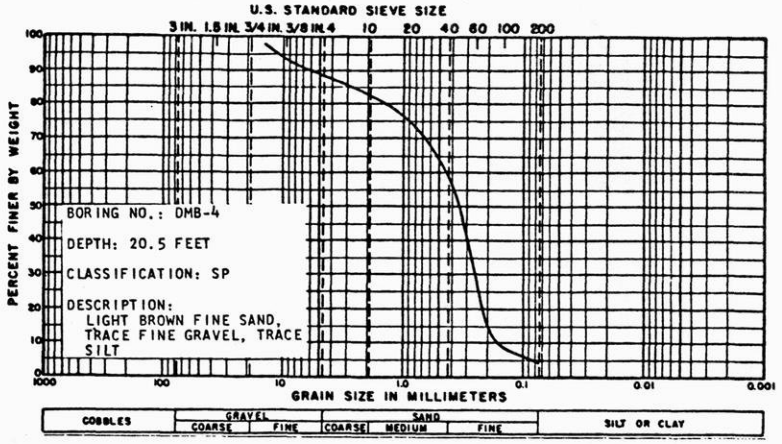



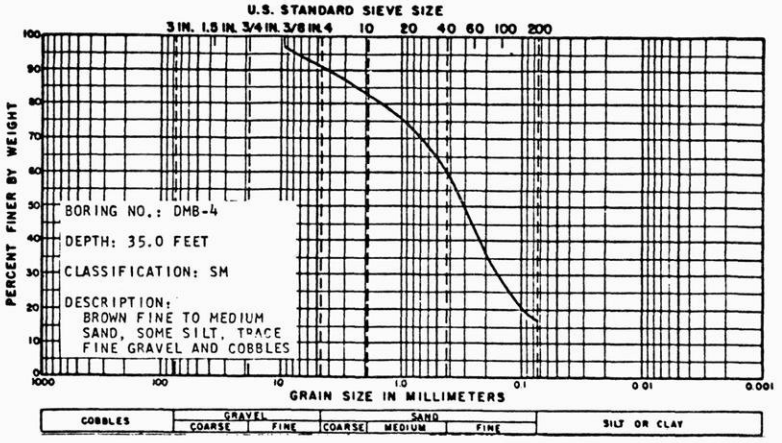



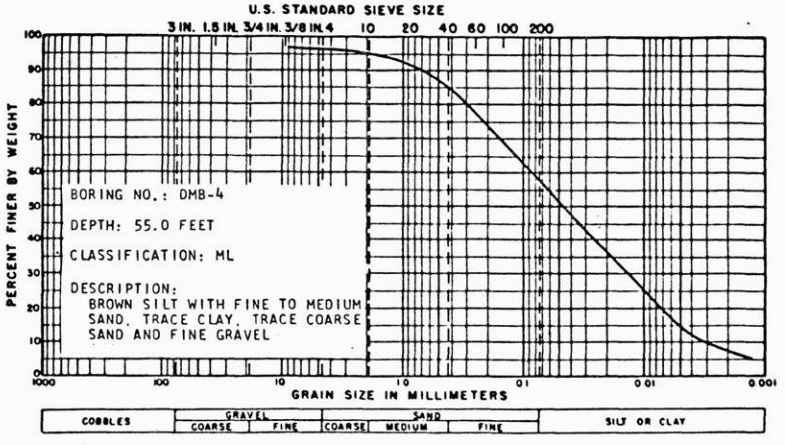

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-2



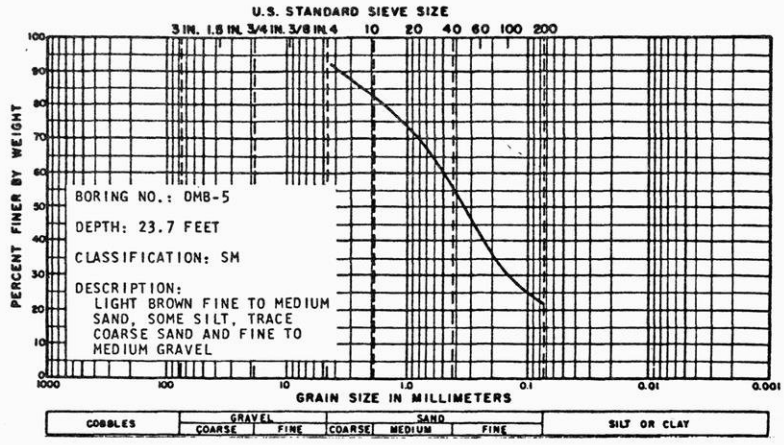



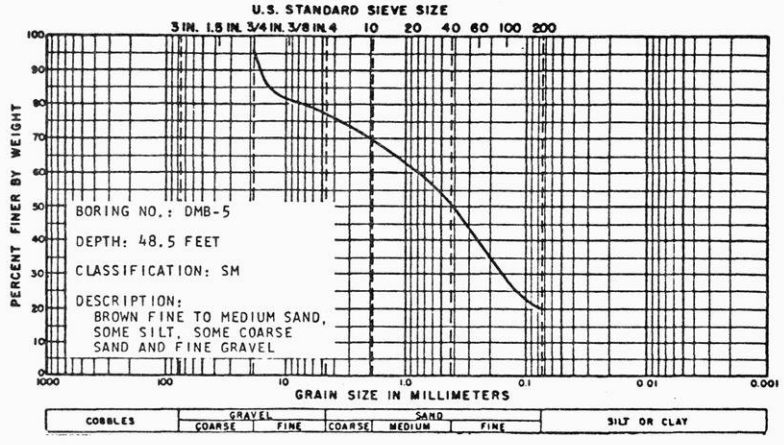

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

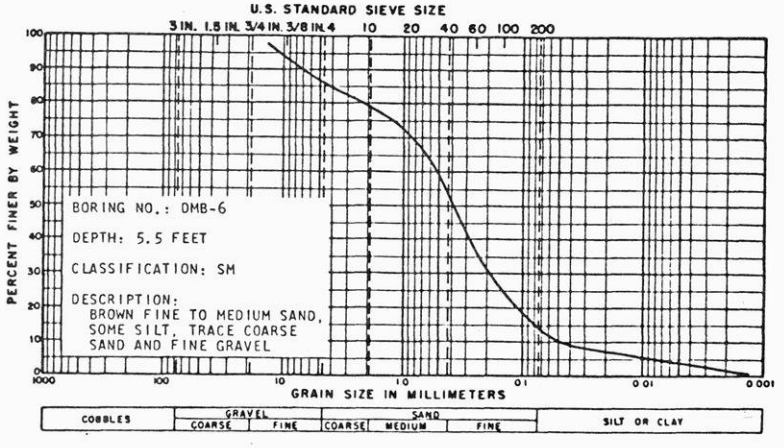
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-3



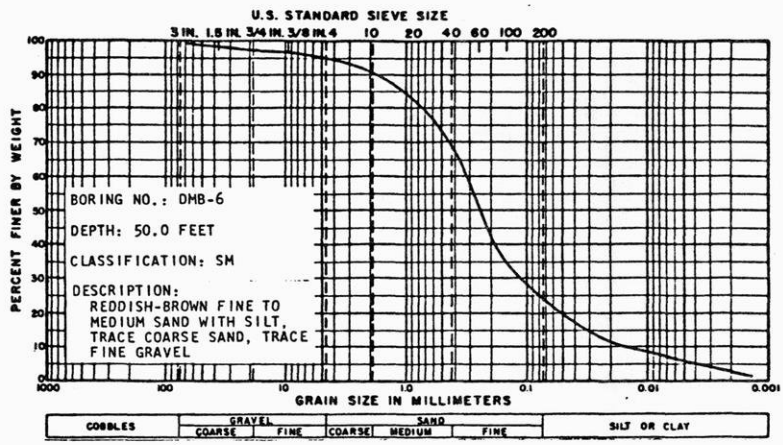



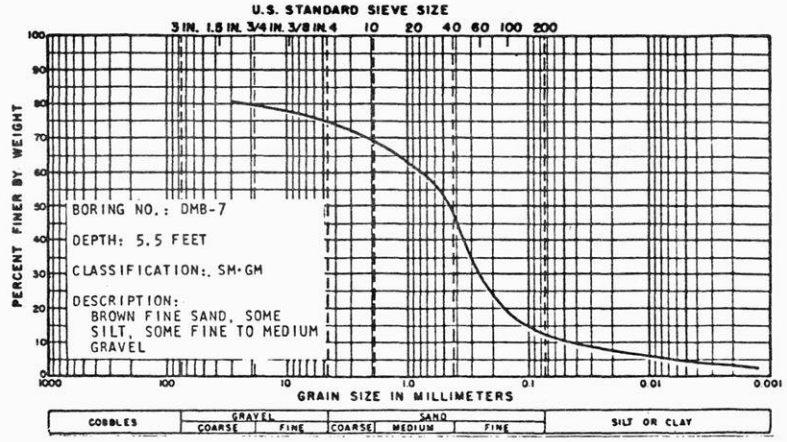



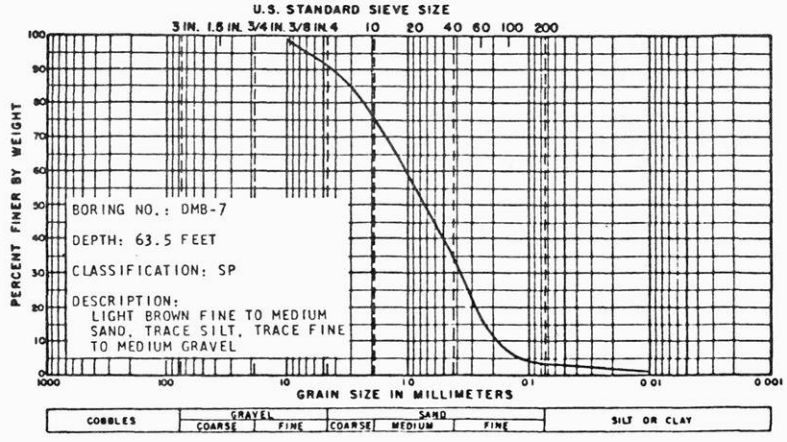

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-4



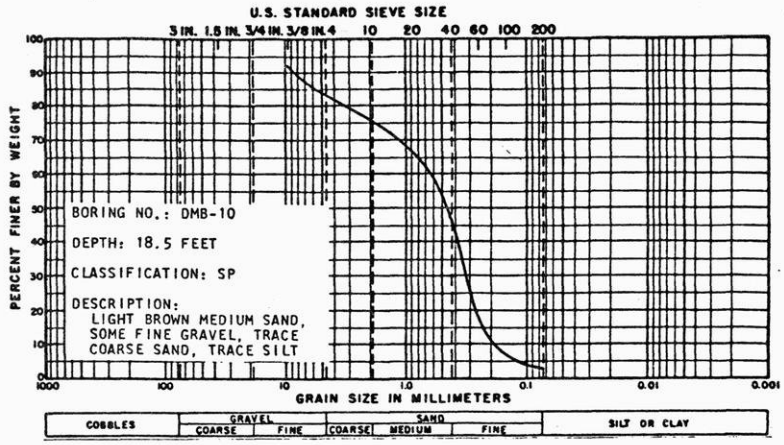



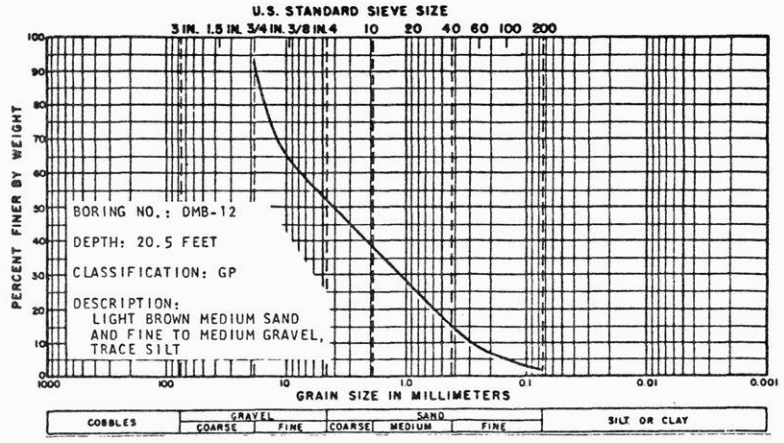



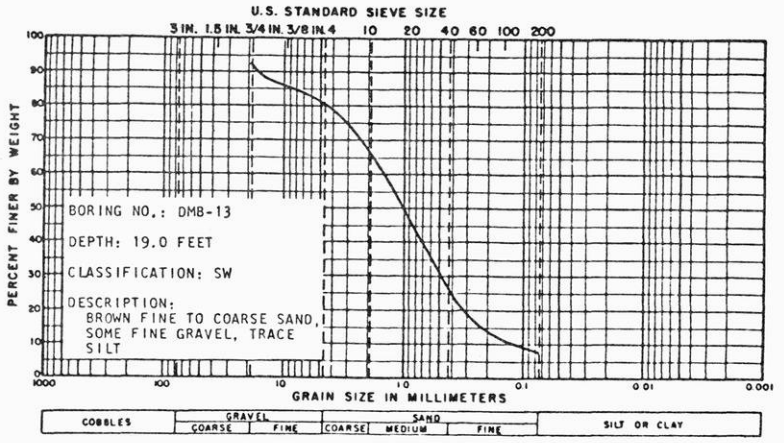

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-5



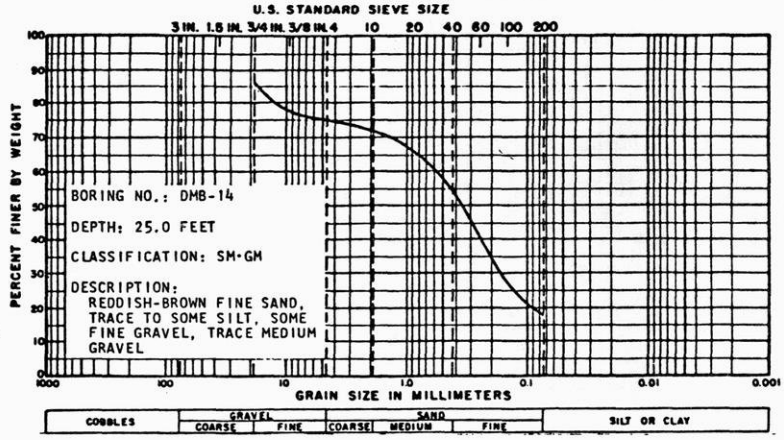



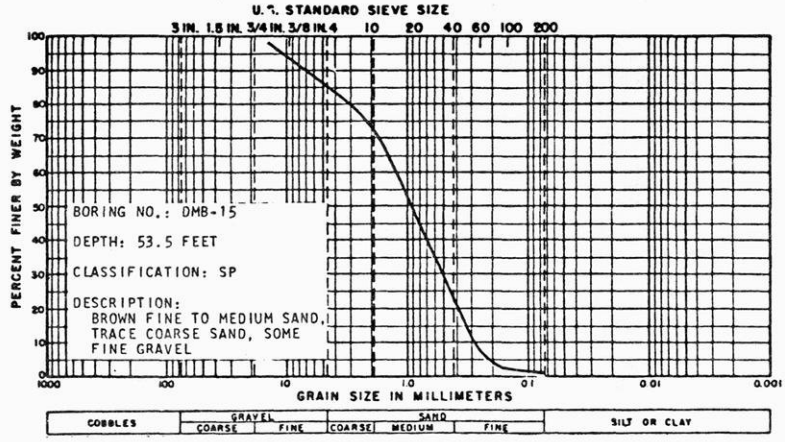

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

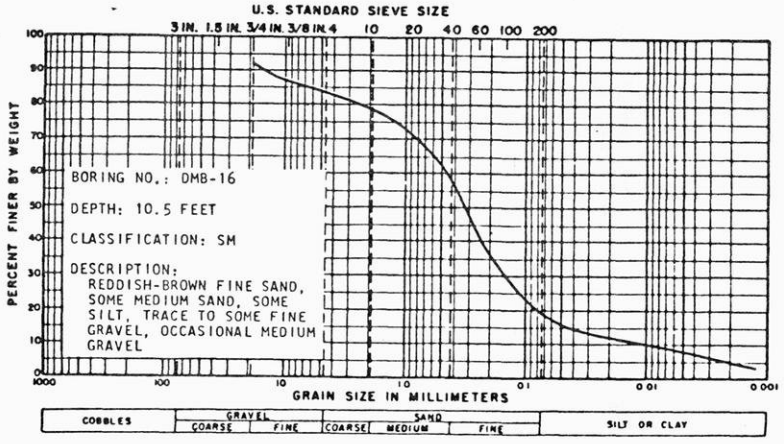
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-6



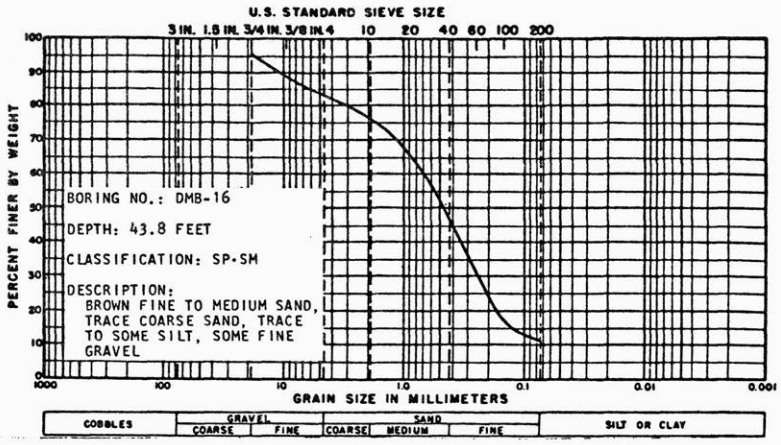



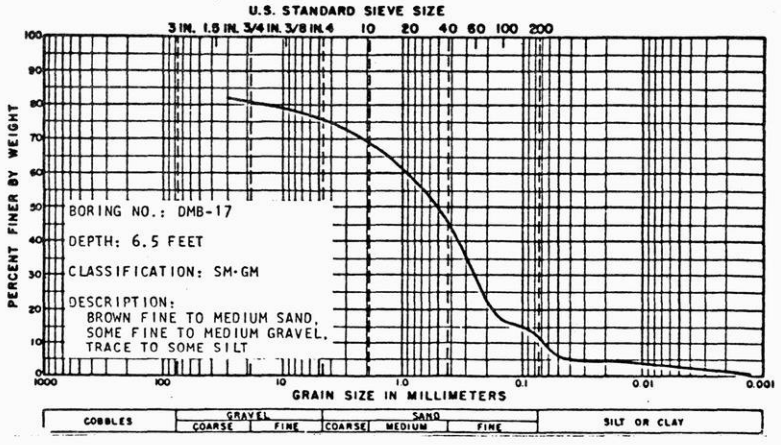

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

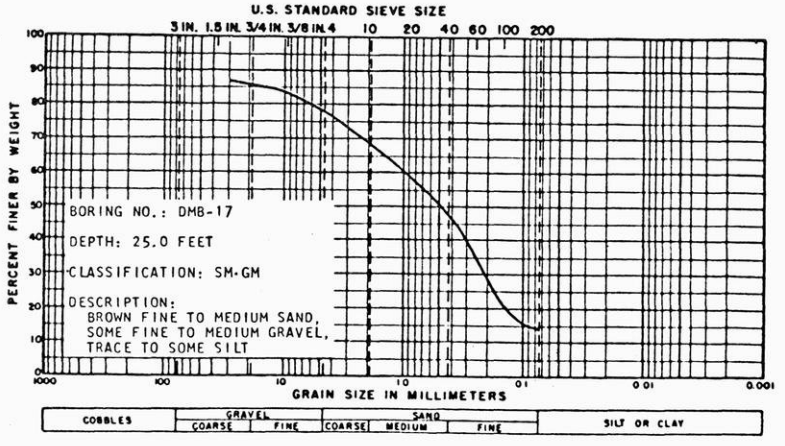
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-7



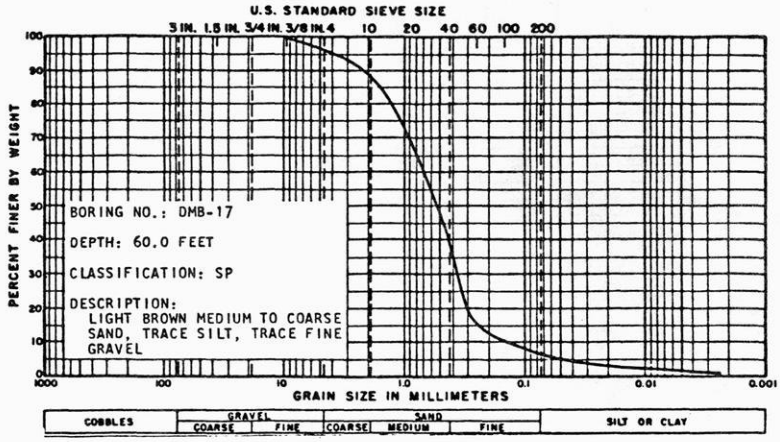



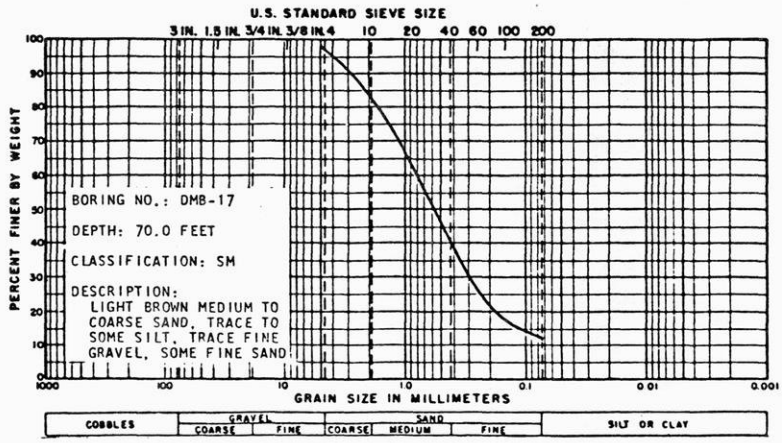

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

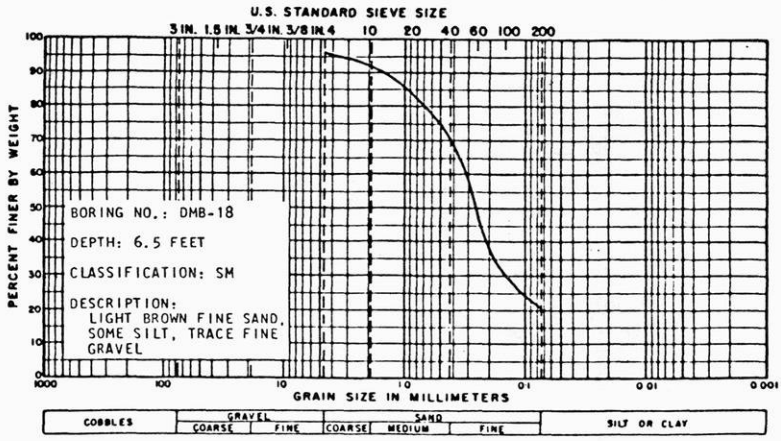
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-8



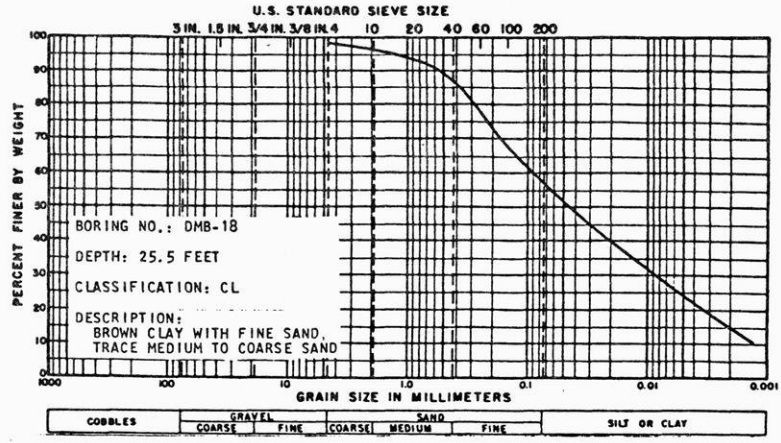



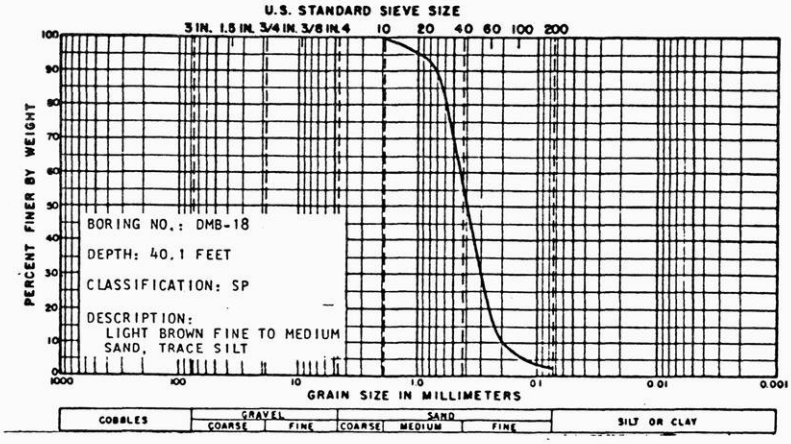



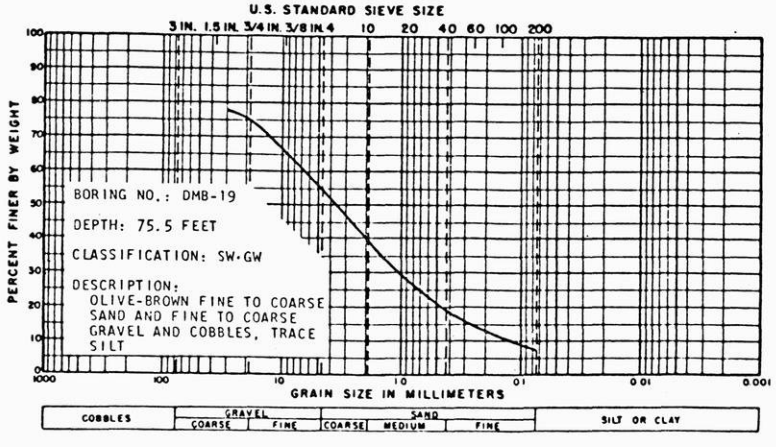

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-9



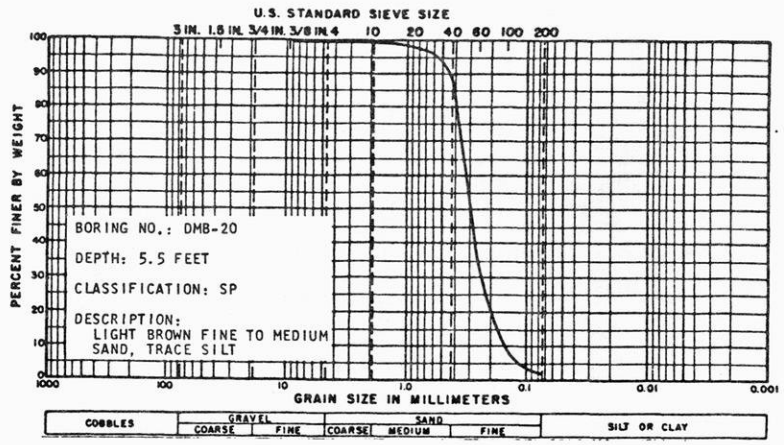



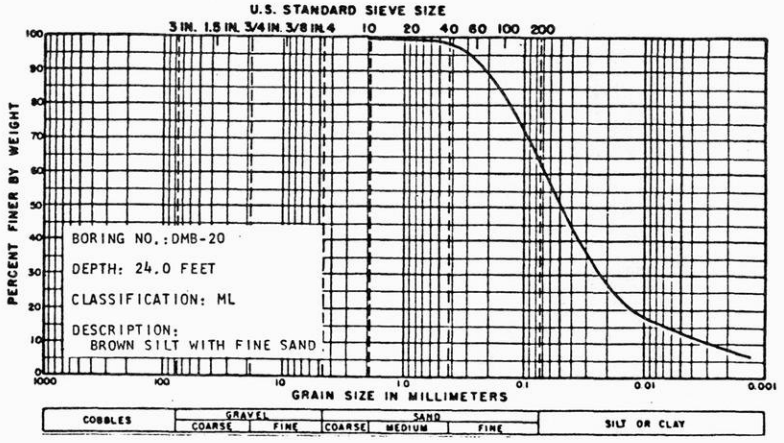

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

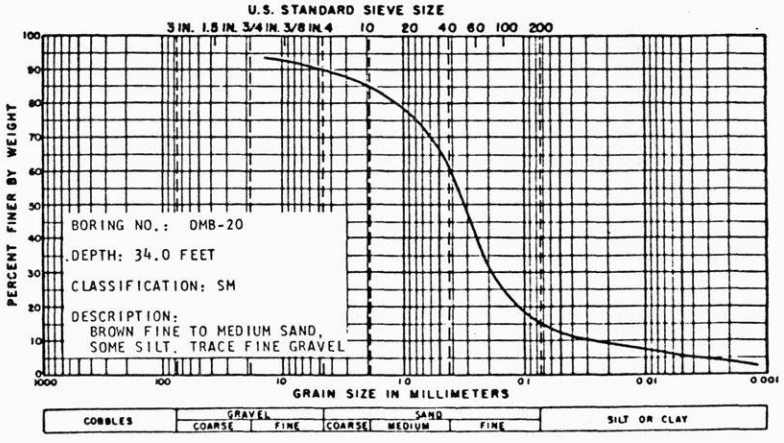
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-10



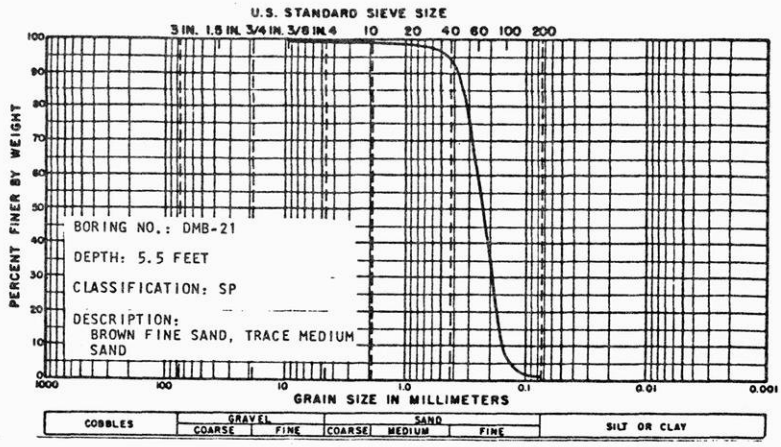



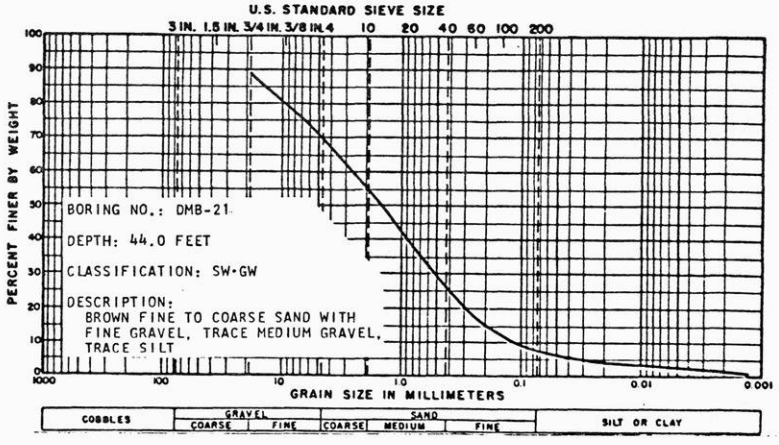

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

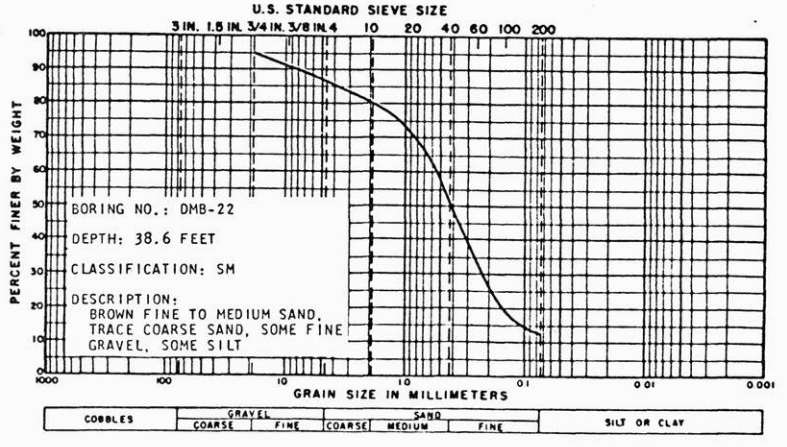
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-11



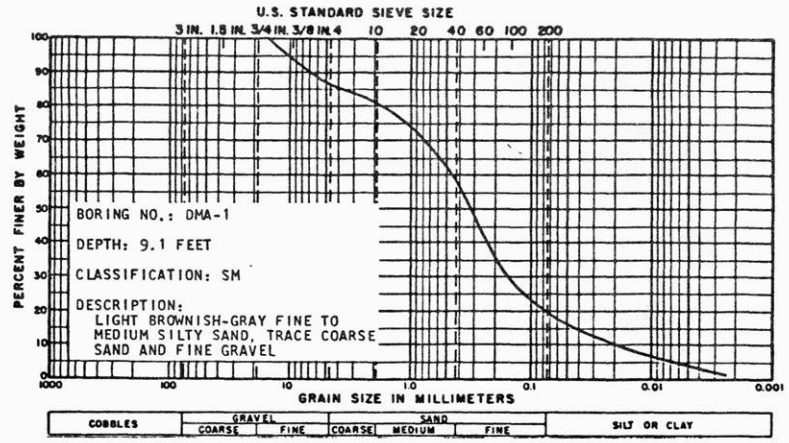



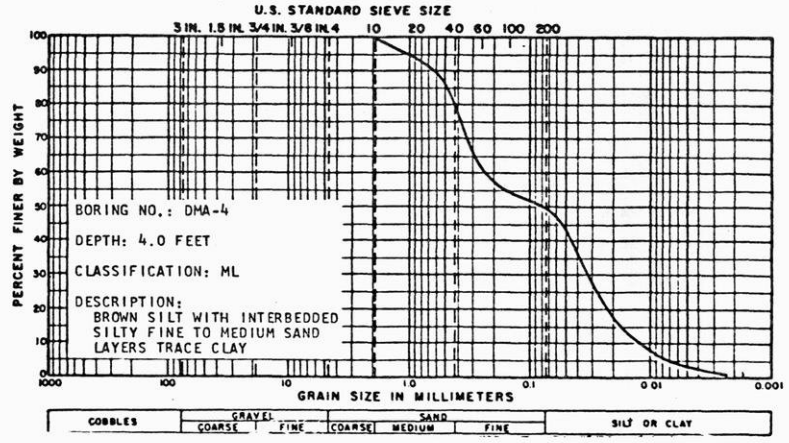

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

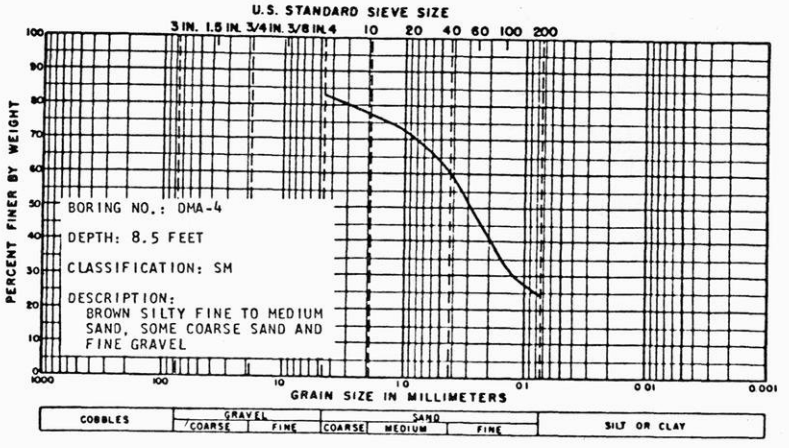
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-12



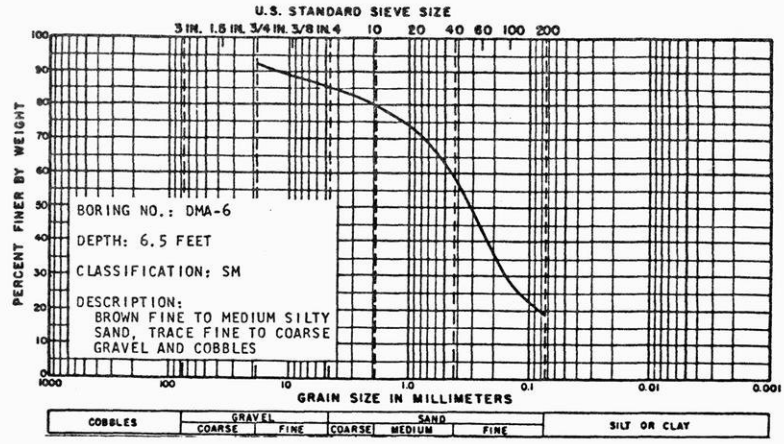



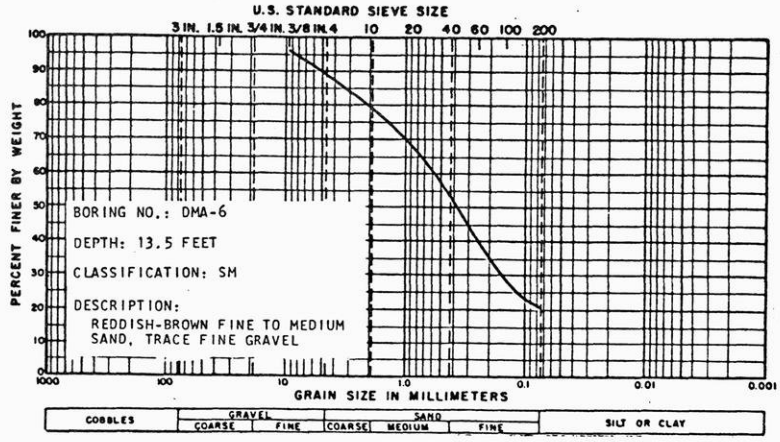

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

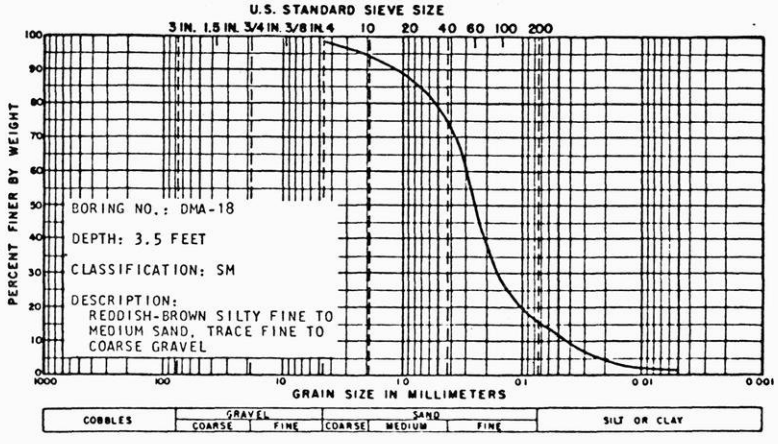
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-13



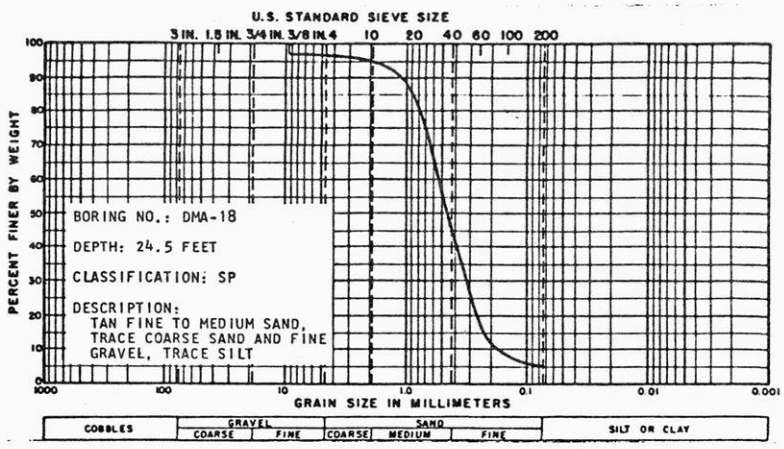



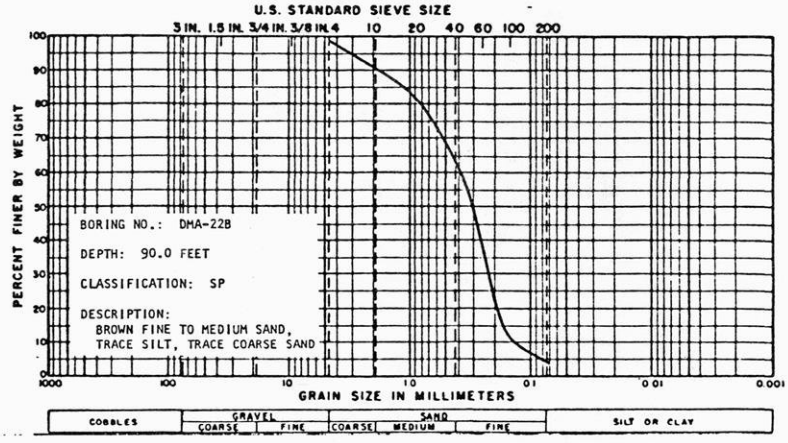

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-14

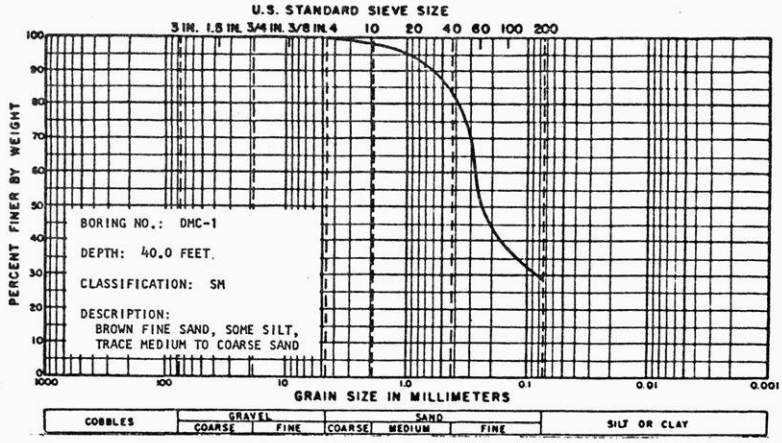


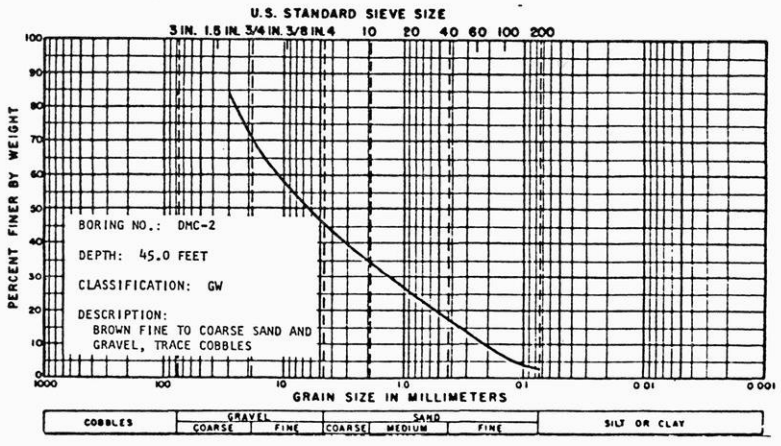



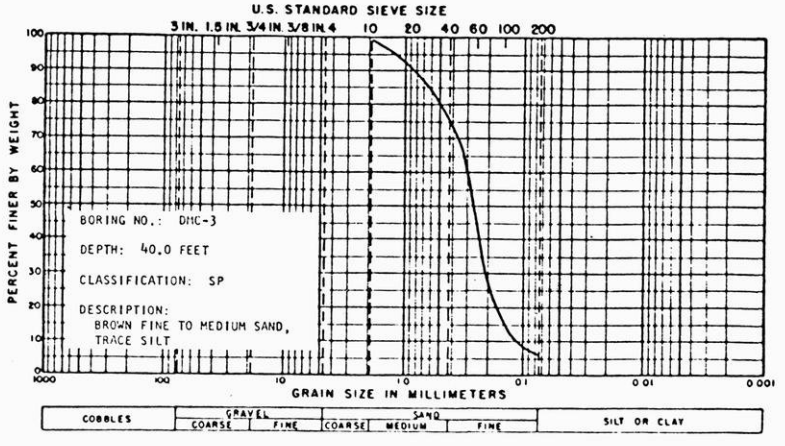

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-15



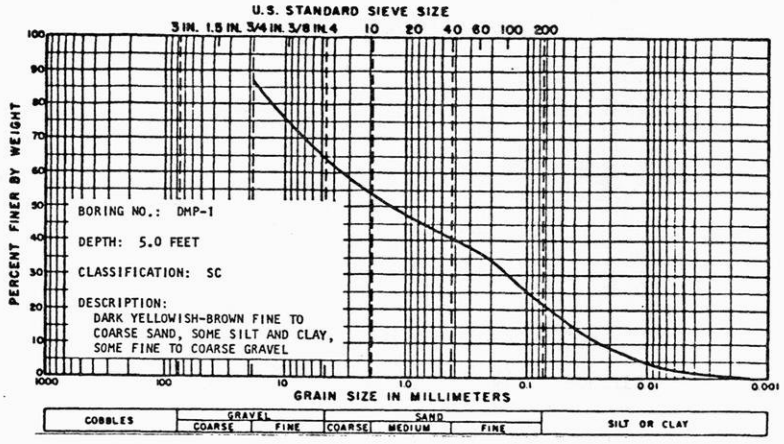



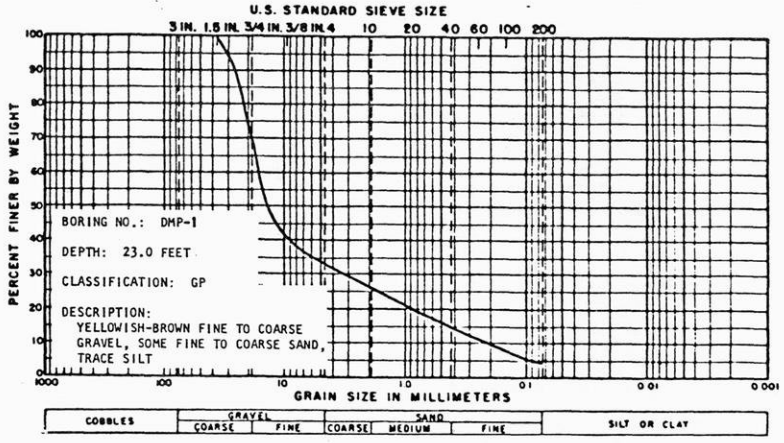



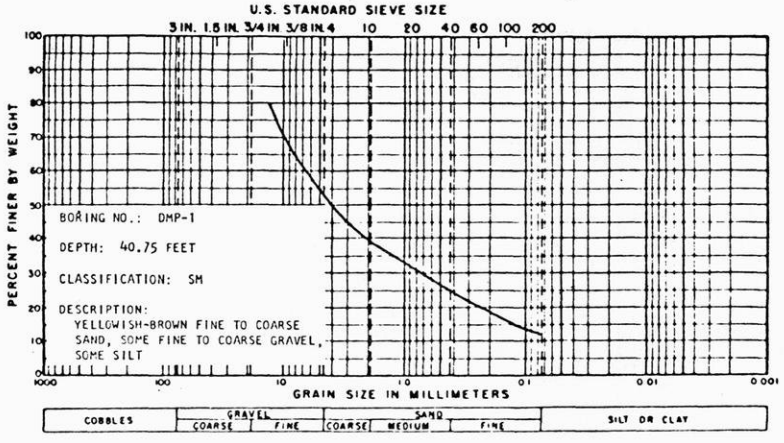

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-16



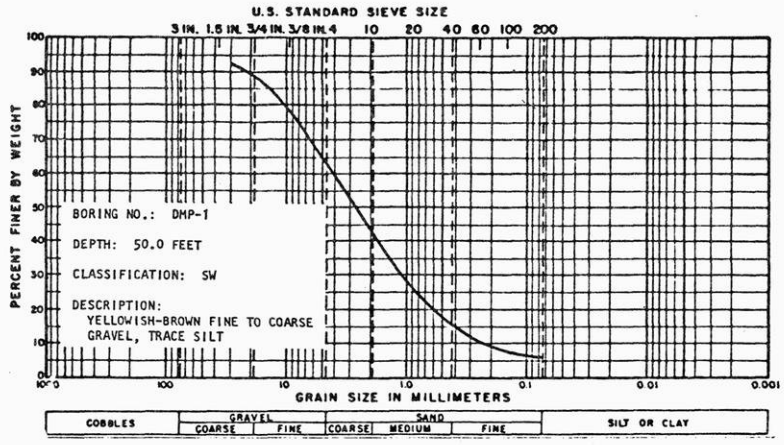



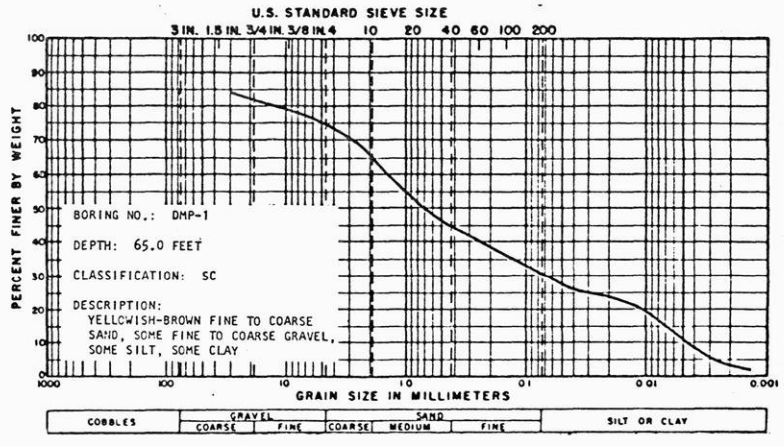



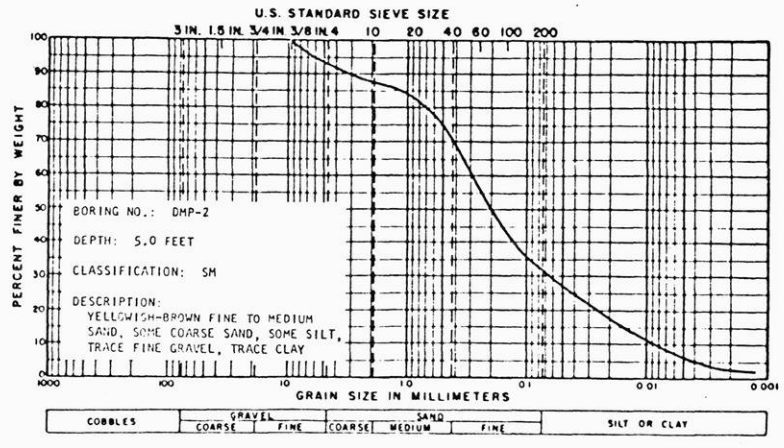

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

PARTICLE SIZE ANALYSES

DAMES & MOORE | FIGURE A-17



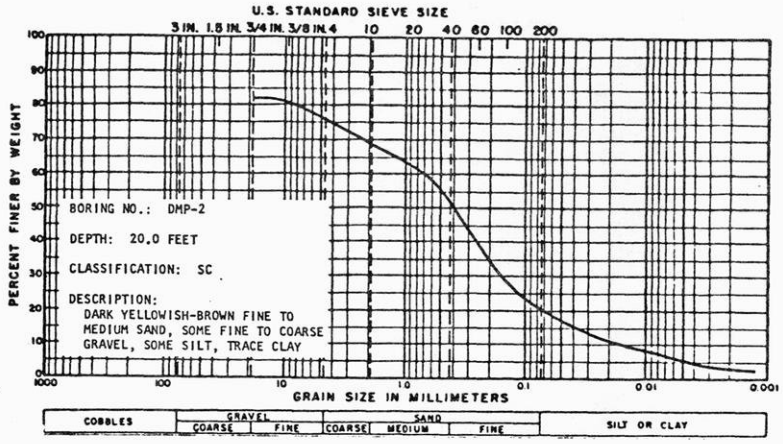



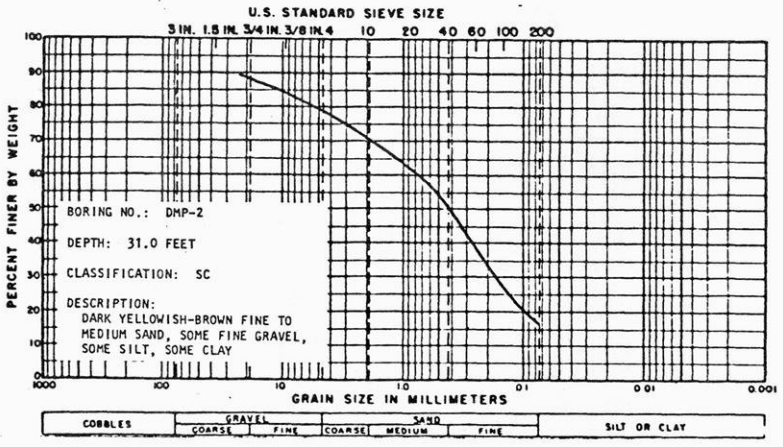

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

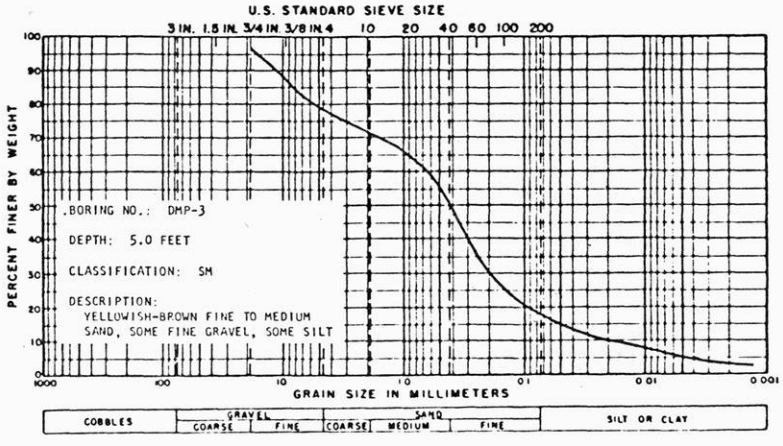
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-18



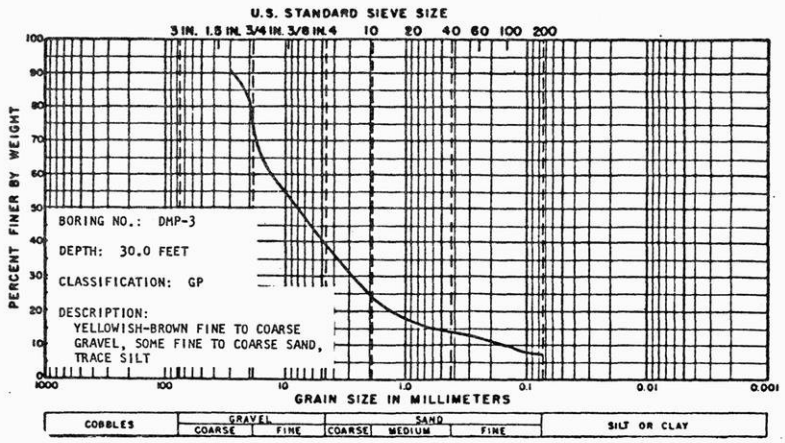



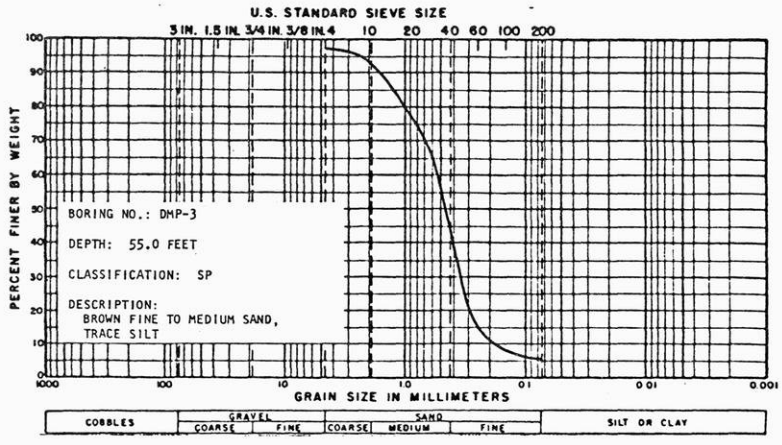

EXXON MINERALS COMPANY, U.S.A.
CRANDON PROJECT

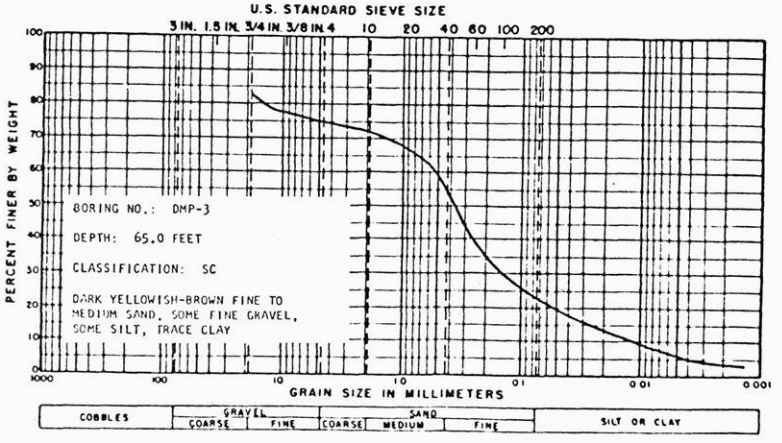
PARTICLE SIZE ANALYSES

DAMES & MOORE

FIGURE A-19




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

DAMES & MOORE | FIGURE A-20

# CLAY MINERAL ANALYSES

F. Michael Wahl
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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 DMA-18 #1 Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

| | | | |
|---|---|---|---|
| | 189 | 63 | 62 % |
| | 3 | | |

B. Illite (8.8°)

| | | |
|---|---|---|
| 22 | 22 | % |

C. Chlorite-vermiculite and Kaolinite (12.5°)

| | | |
|---|---|---|
| 16 | 16 | % |

D. Mixed layered material

| | | | |
|---|---|---|---|
| | | | % |
| | 2 | | |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 10 | 74 | % of C | 12 |
| Kaolinite (24.9°) | 7 / 2 | 26 | % of C | 4 |

III. Crystallinity of Chlorite Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 62 % | 6+ |
| Illite | 22 % | 2+ |
| Chlorite | 12 % | 1+ |
| Kaolinite | 4 % | 1- |
| Mixed layered | % | |

Sample DMB-1 #5 Location Wisconsin

1. Glycolated Slide

| | | | | |
|---|---|---|---|---|
| A. Montmorillonite (5°) | | 90 / 3 | 30 | 28 % |
| 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 / 2 | 14 | % of C | 6 |

III. Crystallinity of Chlorite Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 28 % | 3- |
| Illite | 32 % | 3+ |
| Chlorite | 34 % | 3+ |
| Kaolinite | 6 % | 1- |
| 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°) | 12/2 | 27 | % of C | 8 |

III. Crystallinity of Chlorite Moderate To Well Crystallized

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 44 % | 4+ |
| Illite | 26 % | 3- |
| Chlorite | 22 % | 2+ |
| Kaolinite | 8 % | 1- |
| 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 #2 Location Wisconsin

1. Glycolated Slide

| | | | | |
|---|---|---|---|---|
| A. Montmorillonite (5°) | | | | |
| | 223 / 3 | 74 | 45 | % |
| B. Illite (8.8°) | | | | |
| | | 66 | 40 | % |
| C. Chlorite-vermiculite and Kaolinite (12.5°) | | | | |
| | | 24 | 15 | % |
| D. Mixed layered material | | | | |
| | 2 | | | % |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 8 | 80 | % of C | 12 |
| Kaolinite (24.9°) | 4 / 2 | 20 | % of C | 3 |

III. Crystallinity of Chlorite Moderate To Poor

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 45 % | 4½ |
| Illite | 40 % | 4 |
| Chlorite | 12 % | 1+ |
| Kaolinite | 3 % | 1- Trace |
| 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-6 #1 Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

| | | | |
|---|---|---|---|
| | 199 | 66 | 71 % |
| | 3 | | |

B. Illite (8.8°)

| | | |
|---|---|---|
| 6 | 6 | % |

C. Chlorite-vermiculite and Kaolinite (12.5°)

| | | |
|---|---|---|
| 21 | 23 | % |

D. Mixed layered material

| | | | |
|---|---|---|---|
| | | | % |
| | 2 | | |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 8 | 76 | % of C | 18 |
| Kaolinite (24.9°) | 5 | 24 | % of C | 5 |
| | 2 | | | |

III. Crystallinity of Chlorite Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 71 % | 7+ |
| Illite | 6 % | 1- |
| Chlorite | 18 % | 2- |
| Kaolinite | 5 % | 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 Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 15 % | 1+ |
| Illite | 40 % | 4 |
| Chlorite | 39 % | 4 |
| Kaolinite | 6 % | 1- |
| Mixed layered | % | |

Sample DMB-11 #7 Location Wisconsin

1. Glycolated Slide

| | | | | |
|---|---|---|---|---|
| A. Montmorillonite (5°) | | 16 | 5 | 15 % |
| | | 3 | | |
| B. Illite (8.8°) | | | 12 | 36 % |
| C. Chlorite-vermiculite and Kaolinite (12.5°) | | | 16 | 49 % |
| D. Mixed layered material | | | | % |
| | | 2 | | |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 9 | 82 | % of C | 40 |
| Kaolinite (24.9°) | 4 | 18 | % of C | 9 |
| | 2 | | | |

III. Crystallinity of Chlorite Moderate to poor

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 15 % | 1+ |
| Illite | 36 % | 4- |
| Chlorite | 40 % | 4 |
| Kaolinite | 9 % | 1- |
| 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 % |
| C. Chlorite-vermiculite and Kaolinite (12.5°) | | | 35 | 33 % |
| D. Mixed layered material | | | | % |
| | | 2 | | |

II. Relative % Kaolinite and Chlorite

| | | | |
|---|---|---|---|
| E. Chlorite (25.3°) | 12 | 86 | % of C 28 |
| Kaolinite (24.9°) | 4/2 | 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-18 #6 , Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

| | | | |
|---|---|---|---|
| | 80 | 27 | 37 % |
| | 3 | | |

B. Illite (8.8°)

| | | |
|---|---|---|
| 27 | 37 | % |

C. Chlorite-vermiculite and Kaolinite (12.5°)

| | | |
|---|---|---|
| 18 | 26 | % |

D. Mixed layered material

| | | | |
|---|---|---|---|
| | | | % |
| | 2 | | |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 8 | 80 | % of C | 21 |
| Kaolinite (24.9°) | 4 | 20 | % of C | 5 |
| | 2 | | | |

III. Crystallinity of Chlorite Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 37 % | 4- |
| Illite | 37 % | 4- |
| Chlorite | 21 % | 2+ |
| Kaolinite | 5 % | 1- |
| Mixed layered | % | |

Sample DMB-19 #4 Location Wisconsin

1. Glycolated Slide

| | | | | | |
|---|---|---|---|---|---|
| A. Montmorillonite (5°) | | | | | |
| | | 218 | 73 | [redacted] 51 | % |
| | | 3 | | | |
| B. Illite (8.8°) | | | | | |
| | | | 30 | 21 | % |
| C. Chlorite-vermiculite and Kaolinite (12.5°) | | | | | |
| | | | 39 | 28 | % |
| D. Mixed layered material | | | | | |
| | | | | | % |
| | | 2 | | | |

II. Relative % Kaolinite and Chlorite

| | | | | |
|---|---|---|---|---|
| E. Chlorite (25.3°) | 11 | 85 | % of C | 24 |
| Kaolinite (24.9°) | 4 / 2 | 15 | % of C | 4 |

III. Crystallinity of Chlorite Moderate

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 51 % | 5+ |
| Illite | 21 % | 2+ |
| Chlorite | 19 % | 2+ |
| Kaolinite | 4 % | 1- |
| Mixed layered | % | |

Sample DMB-20 #6 Location Wisconsin

1. Glycolated Slide

A. Montmorillonite (5°)

298 / 3 | 99 | 71 %

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°) | 7/2 | 37 | % of C | 6 |

III. Crystallinity of Chlorite Moderate to poor

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 71 % | 7+ |
| Illite | 13 % | 1+ |
| Chlorite | 10 % | 1 |
| Kaolinite | 6 % | 1- |
| 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 (2) | | % of C | 0 |

III. Crystallinity of Chlorite Moderate to Well

IV. Summary

| | | Parts in 10 |
|---|---|---|
| Montmorillonite | 16 % | 2- |
| Illite | 48 % | 5- |
| Chlorite | 36 % | 4- |
| Kaolinite | - % | |
| Mixed layered | % | |

APPENDIX 2.2B

BORING LOGS

BORING LOGS

DAMES & MOORE

| Boring Logs | Number of Sheets |
|---|---|
| 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)

| Boring Logs | Number of Sheets |
|---|---|
| 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:

21 — 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.

31 — 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 FO 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 STENGTH 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

## BORING DMA-1

*SURFACE ELEVATION* 1637.96
COORDINATES: N 113,660 E 2,272,030

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 4.7 | 105 | | |
| 5 | | | | | | | | | |
| 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 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 5 | SM / SP | DARK BROWN SILTY SAND WITH ORGANICS<br>YELLOWISH-BROWN AND GRAY MOTTLED FINE TO MEDIUM SAND; LOOSE | 1635 |
| 20 | SM | LIGHT BROWNISH-GRAY FINE TO MEDIUM SILTY SAND WITH TRACE COARSE SAND AND GRAVEL; MEDIUM DENSE, NONCALCAREOUS | |
| 26 | | GRADING REDDISH-BROWN | 1630 |
| 45 | | GRADING WITH COARSE SAND AND GRAVEL; VERY DENSE | 1625 |
| 0 | | GRADES WITH BOULDERS | 1620 |
| 100/6" | | GRADING BROWN | 1615 |
| 100/5" | | | 1610 |
| 170/9" | SM | YELLOWISH-BROWN FINE TO MEDIUM GRAIN QUARTZ SAND, SOME GRAVEL, TRACE SILT, CALCAREOUS, VERY DENSE | 1605 |
| 100/3" | | | 1600 |
| 100/4" | | | 1595 |
| 100/5" | SP | YELLOWISH-BROWN MEDIUM GRAINED QUARTZ SAND; TRACE COARSE SAND AND GRAVEL, VERY DENSE, NONCALCAREOUS | 1590 |
| 100/5" | | | 1585 |

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.
CRANDON PROJECT

LOG OF BORING DMA-1
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-1

# BORING DMA - 3

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | OL | BROWN FINE SAND WITH ORGANICS | |
| | | | | | | 5.2 | 88 | | | 39 ■ | | ORANGISH-BROWN FINE TO MEDIUM SILTY SAND WITH OCCASIONAL COARSE SAND, GRAVEL AND COBBLES; DENSE | 1645 |
| 5 | | | | | | 7.4 | 130 | | | 31 ■ | | | |
| | | | | | | 5.4 | 127 | | | 46 ■ | | | 1640 |
| 10 | | | | | | | | | | | | | 1635 |
| 15 | | | | | | 6.9 | 129 | | | 123 ■ | | | |
| | | | | | | | | | | | | GRADES TO VERY DENSE | 1630 |
| 20 | | | | | | | | | | 117/6" □ | SM | | |
| | | | | | | | | | | | | GRADES WITH BOULDERS | 1625 |
| 25 | | | | | | | | | | REFUSAL □ | | | |
| | | | | | | | | | | | | | 1620 |
| 30 | | | | | | | | | | 108/6"□ | | | |
| | | | | | | | | | | | | | 1615 |
| 35 | | | | | | | | | | 100/5"⊠ | | | |
| | | | | | | | | | | | | | 1610 |
| 40 | | | | | | | | | | 100/4"⊠ | | | |
| | | | | | | | | | | | | GRADING GRAYISH-BROWN | 1605 |
| 45 | | | | | | | | | | 120/6"⊠ | | | |

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

1/79

DAMES & MOORE

FIGURE B-2

# BORING DMA-4

*SURFACE ELEVATION* 1612.03
COORDINATES: N 111,425 E 2,280,847

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | X-RAY SA, HA | | | | | 17.1 | 114 | | |
| 10 | SA, PH COLOR | | | | | 7.4 | 139 | | |
| 15 | P.C. | | | | | 7.8 | 134 | | |
| 20 | P.C. | | | | | 7.9 | 126 | | |
| 25 | | | | | | | | | |
| 30 | P.C. | | | | | 8.9 | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | BROWN SILT WITH SOME FINE TO MEDIUM SAND AND CLAY; TRACE COARSE SAND AND FINE GRAVEL; MEDIUM STIFF, NONCALCAREOUS | 1610 |
| 11 | ML | GRADES WITH INTERBEDDED SILTY FINE TO MEDIUM SAND LAYERS; LOOSE | |
| | | | 1605 |
| 26 | SM | BROWN SILTY FINE TO MEDIUM SAND WITH SOME COARSE SAND AND FINE GRAVEL, TRACE SILT, MEDIUM DENSE, SLIGHTLY CALCAREOUS | |
| | | GRADES WITH OCCASIONAL COARSE GRAVEL AND COBBLE LAYER | 1600 |
| 70 | | GRADING VERY DENSE, CALCAREOUS | |
| | | | 1595 |
| 160/10" | | | |
| | | NUMEROUS COARSE GRAVEL AND COBBLE FRAGMENTS | 1590 |
| 100/5" | | | |
| 7-6-78 ▼ 25.7' | | | 1585 |
| 95 | | | |

BORING COMPLETED AT 30.0 FEET ON 3-23-77.
CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMETER INSTALLED ON 3-23-77.
2 INCH PVC SLOTTED FROM 26.0 TO 30.0 FEET.
GRAVEL PACK: 14.0 TO 30.0 FEET..
GROUT: 0.0 TO 14.0 FEET.
GROUND WATER LEVEL RECORDED AT 25.7 FEET ON 7-6-78.

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

LOG OF BORING DMA-4
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-3

# BORING DMA-5

**SURFACE ELEVATION** 1639.82

COORDINATES: N 115,380 E 2,282,390

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 21.2 | 102 | | | 53/10" ■ | ML | BROWN CLAYEY SILT TRACE SAND; MEDIUM STIFF, NONCALCAREOUS<br>GRADES WITH 6"-24" COBBLES AND BOULDERS | |
| 5 | SA | | | | | 9.8 | 116 | | | 19 ■ | | BROWN FINE SILTY SUBROUNDED QUARTZ SAND WITH SOME COARSE SAND AND FINE GRAVEL; MEDIUM DENSE, SLIGHTLY CALCAREOUS | 1635 |
| 10 | | | | | | | | | | | | GRADES WITH OCCASIONAL COARSE GRAVEL AND COBBLE LAYER | 1630 |
| 15 | | | | | | 8.1 | 121 | | | 25 ■ | | | 1625 |
| 20 | | | | | | 9.0 | 119 | | | 80/7" ■ | | GRADES DENSE TO VERY DENSE, CALCAREOUS | 1620 |
| 25 | | | | | | 8.9 | 121 | | | 90/6" ■ | | GRADING LIGHT BROWN | 1615 |
| 30 | | | | | | 10.7 | 120 | | | 150/10" ■ | SM | GRADES WITH SHALE FRAGMENTS<br>COBBLES GRADES OUT; OCCASIONAL GRAVEL LAYER | 1610 |
| 35 | | | | | | 7.7 | 122 | | | 150/6" ■ | | | 1605 |
| 40 | | | | | | | | | | 50/0" □ | | | 1600 |
| 45 | | | | | | 8.8 | | | | *95 ◪ | | GRADES OCCASIONAL CLAYEY SILT LAYER; HARD | 1595 |
| 50 | | | | | | 9.3 | | | | *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

1/79

DAMES & MOORE

FIGURE B-4

# BORING DMA-6

*SURFACE ELEVATION* 1716.95

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | ORANGISH-BROWN TO BROWN CLAYEY SILT WITH SOME FINE SAND, COARSE GRAVEL AND COBBLES; MEDIUM STIFF | 1715 |
| 18 ■ | SM | ORANGISH-BROWN TO BROWN FINE TO MEDIUM SILTY SAND; WITH TRACE FINE TO COARSE GRAVEL AND SOME COBBLES; MEDIUM DENSE, NONCALCAREOUS | |
| 22 ■ | | CLAYEY SILT POCKET AT 7.0 FEET | 1710 |
| 75/6" ⊠ | | REDDISH-BROWN FINE SILTY SAND WITH TRACE FINE TO COARSE GRAVEL; VERY DENSE, SLIGHTLY CALCAREOUS | |
| | | | 1705 |
| 125/9" ■ | | GRADES WITH COBBLES, CALCAREOUS | |
| | SM | | 1700 |
| 80 ■ | | | |
| | | | 1695 |
| 50/0" □ | | NUMEROUS COARSE GRAVEL AND COBBLES | |
| | | | 1690 |
| 150/6" ■ | | | |

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

1/79

DAMES & MOORE

FIGURE B-5

# BORING DMA-7

*SURFACE ELEVATION* 1583.81

COORDINATES: N 112,880 E 2,289,900

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 5-13-77 ▼ 0.5' | OL | BLACK SILT WITH ORGANICS AND TRACE CLAY, ROOTS AND WOOD FRAGMENTS; SOFT | |
| | | | | | | | | | | 5 | ML | YELLOWISH-BROWN SILTY VERY FINE SAND; LOOSE, NONCALCAREOUS | |
| 5 | | | | | | | | | | 13 | | GRADES GREENISH-GRAY; LOCALLY TO FINE SANDY SILT | 1580 |
| | | | | | | | | | | | | | 1575 |
| 10 | | | | | | | | | | 9 | | GRADES BROWN; LESS SILT; CALCAREOUS | |
| | | | | | | | | | | 3 | | GRAYISH-BROWN SILT WITH TRACE CLAY AND BROWN DRIED MUD-CRACKED SILT STRINGERS AND VERY FINE SAND LENSES; SOFT, CALCAREOUS | 1570 |
| 15 | | | | | | | | | | | | | |
| | | | | | | | | | | 6 | | GRADES WITH SILTY VERY FINE SAND; LOOSE | 1565 |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | 4 | | | 1560 |
| 25 | | | | | | | | | | | | | |
| | | | | | | | | | | 2 | | | 1555 |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | 2 | | | 1550 |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | 4 | | | 1545 |
| 40 | | | | | | | | | | | | | |
| | | | | | | | | | | 43 | SW | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND; SOME COARSE SAND AND FINE GRAVEL; TRACE SILT; DENSE, CALCAREOUS | 1540 |
| 45 | | | | | | | | | | | | | |

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

1/79

DAMES & MOORE | FIGURE B-6

# BORING DMA-10

*SURFACE ELEVATION* 1593.58

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 10.6 | 115 | | | **3 | SM | DARK BROWN SAND WITH TRACE SILT GRADES BROWN FINE SUBROUNDED QUARTZ SAND WITH TRACE SILT; LOOSE, NONCALCAREOUS | |
| 5 | | | | | | 23.5 | 99 | | | **5 | ML | BROWN SILT WITH TRACE CLAY AND FINE SAND; MEDIUM STIFF, NONCALCAREOUS | 1590 |
| 10 | | | | | | 34.4 | 85 | | | **3 | | | 1585 |
| 15 | P.C. | | | | | 5.7 | 117 | | | **39 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND FINE GRAVEL; DENSE, NONCALCAREOUS | 1580 |
| 20 | | | | | | 9.9 | 131 | | | 7-12-78 ▼ 18.9' **23 | SM | REDDISH-BROWN FINE TO COARSE SAND WITH SILT AND GRAVEL; MEDIUM DENSE, NONCALCAREOUS | 1575 |
| 25 | P.C. | | | | | 10.9 | 128 | | | | | GRAVEL GRADING OUT | 1570 |
| 30 | | | | | | | | | | **100/5" | | BECOMES CALCAREOUS | 1565 |
| 35 | P.C. | | | | | 7.7 | | | | **115 | SW | BROWN FINE TO COARSE SAND WITH GRAVEL TRACE SILT; VERY DENSE, CALCAREOUS | 1560 |
| 40 | | | | | | | | | | **100/1" | | GRADES WITH BOULDERS | 1555 |
| 45 | | | | | | | | | | | | NO SAMPLING ATTEMPT DUE TO BOULDER | 1550 |
| 50 | | | | | | | | | | | | | |

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

1/79

DAMES & MOORE

FIGURE B-7

# BORING DMA-12

*SURFACE ELEVATION* 1621.18

COORDINATES: N 117,887 E 2,279,966

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | REDDISH-BROWN FINE TO COARSE SAND WITH SILT AND GRAVEL; MEDIUM DENSE, NONCALCAREOUS | 1620 |
| | | | | | | 12.4 | 114 | | | 21 | | | |
| 5 | | | | | | 7.0 | 123 | | | 35 | SM | | 1615 |
| | | | | | | 7.6 | 121 | | | | | | |
| 10 | | | | | | | | | | | | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND AND GRAVEL AND FINE TO MEDIUM SAND WITH GRAVEL; MEDIUM DENSE, CALCAREOUS | 1610 |
| | | | | | | 4.2 | 124 | | | 21 | | | |
| 15 | | | | | | | | | | | | GRADES WITH BOULDERS | 1605 |
| 20 | | | | | | | | | | | | | 1600 |
| | | | | | | 14.0 | 115 | | | 100/6" | | GRADES VERY DENSE | |
| 25 | | | | | | | | | | | | | 1595 |
| | | | | | | | | | | | SP SW | BOULDER FROM 28.0 TO 32.0 FEET | |
| | | | | | | | | | | 7-7-78 ▼ 29.3' | | | |
| 30 | | | | | | | | | | | | | 1590 |
| | | | | | | | | | | | | BOULDER FROM 33.0 TO 35.5 FEET | |
| 35 | | | | | | 17.8 | 113 | | | 100/4" | | GRADES WITH FINE SAND LAYERS | 1585 |
| 40 | | | | | | | | | | | | | 1580 |
| | | | | | | 12.4 | 122 | | | 180 | | GRADES TO COARSE METAMORPHIC SAND AND GRAVEL | |
| 45 | | | | | | | | | | | | | |

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.

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

LOG OF BORING DMA-12
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-8

# BORING DMA – 13

*SURFACE ELEVATION* 1554.66
COORDINATES: N 110,450 E 2,265,800

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

7-12-78 ▼ 0.8'

| BLOW COUNTS & SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 2 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND; SOME FINE TO COARSE GRAVEL WITH OCCASIONAL COBBLE; MEDIUM DENSE, NONCALCAREOUS (FILL) | |
| 5 | PT | BLACK FIBROUS SILTY ORGANICS WITH WOOD FRAGMENTS; VERY SOFT, NONCALCAREOUS | 1550 |
| | | GRADES BROWN<br>GRADES GRAY; MORE SILT | |
| 9 | SP | DARK GRAY FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH COARSE SAND; LOOSE, NONCALCAREOUS | 1545 |
| | | GRADES BROWN FINE SAND WITH SOME MEDIUM TO COARSE SAND | 1540 |
| 6 | | | 1535 |
| 7 | | GRADES BROWN FINE TO MEDIUM SAND | 1530 |
| 5 | ML | BROWN SILT WITH TRACE CLAY AND VERY FINE SAND; OCCASIONAL FINE TO MEDIUM SAND LENSE; SOFT TO MEDIUM STIFF, CALCAREOUS | 1525 |
| 5 | SP | BROWN VERY FINE TO FINE SAND WITH TRACE SILT; LOOSE, CALCAREOUS | 1520 |
| 6 | | | 1515 |

BORING COMPLETED AT 40.5 FEET ON 5-14-77.
CASING USED TO A DEPTH OF 11.0 FEET.
PIEZOMETER INSTALLED ON 5-14-77.
2 INCH PVC SLOTTED FROM 35.0 TO 39.0 FEET.
GRAVEL PACK: 32.5 TO 39.0 FEET.
BENTONITE: 32.0 TO 32.5 FEET.
GROUT: 0.0 TO 32.0 FEET.
GROUND WATER LEVEL RECORDED AT 0.8 FEET ON 7-12-78.

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

LOG OF BORING DMA-13
SHEET 1 OF 1

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DAMES & MOORE

FIGURE B-9

# BORING DMA-14

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 3-16-77 ▼ 3.0 | SC | BROWN CLAYEY FINE TO MEDIUM SAND WITH SOME SILT; FINE ROOTS TO 0.5 FEET; MEDIUM DENSE | — 1600 |
| 24 ■ | | BROWN MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE SILT AND COARSE SAND; MEDIUM DENSE, NONCALCAREOUS | |
| 28 ■ | SP | GRADES MEDIUM TO COARSE SAND; TRACE COARSE GRAVEL AND COBBLE FRAGMENTS; SILT GRADES OUT | — 1595 |
| 13 ■ | | | |
| | | | — 1590 |
| | | FINE TO COARSE SUBROUNDED QUARTZ SAND WITH METAMORPHIC GRAVEL; WITH INTERBEDDED BROWN FINE TO MEDIUM SAND LAYERS; OCCASIONAL COBBLE; DENSE, NONCALCAREOUS | |
| 31 ■ | GW SP | | — 1585 |
| 66 ■ | | | |
| | | | — 1580 |
| | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE FINE TO COARSE GRAVEL; MEDIUM DENSE, CALCAREOUS | |
| 17 □ | | | — 1575 |
| 13 ■ | SP | GRADES LOCALLY SILTY VERY FINE SAND | |
| | | | — 1570 |
| 19 ■ | | GRADES SOME CLAY | |

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

1/79

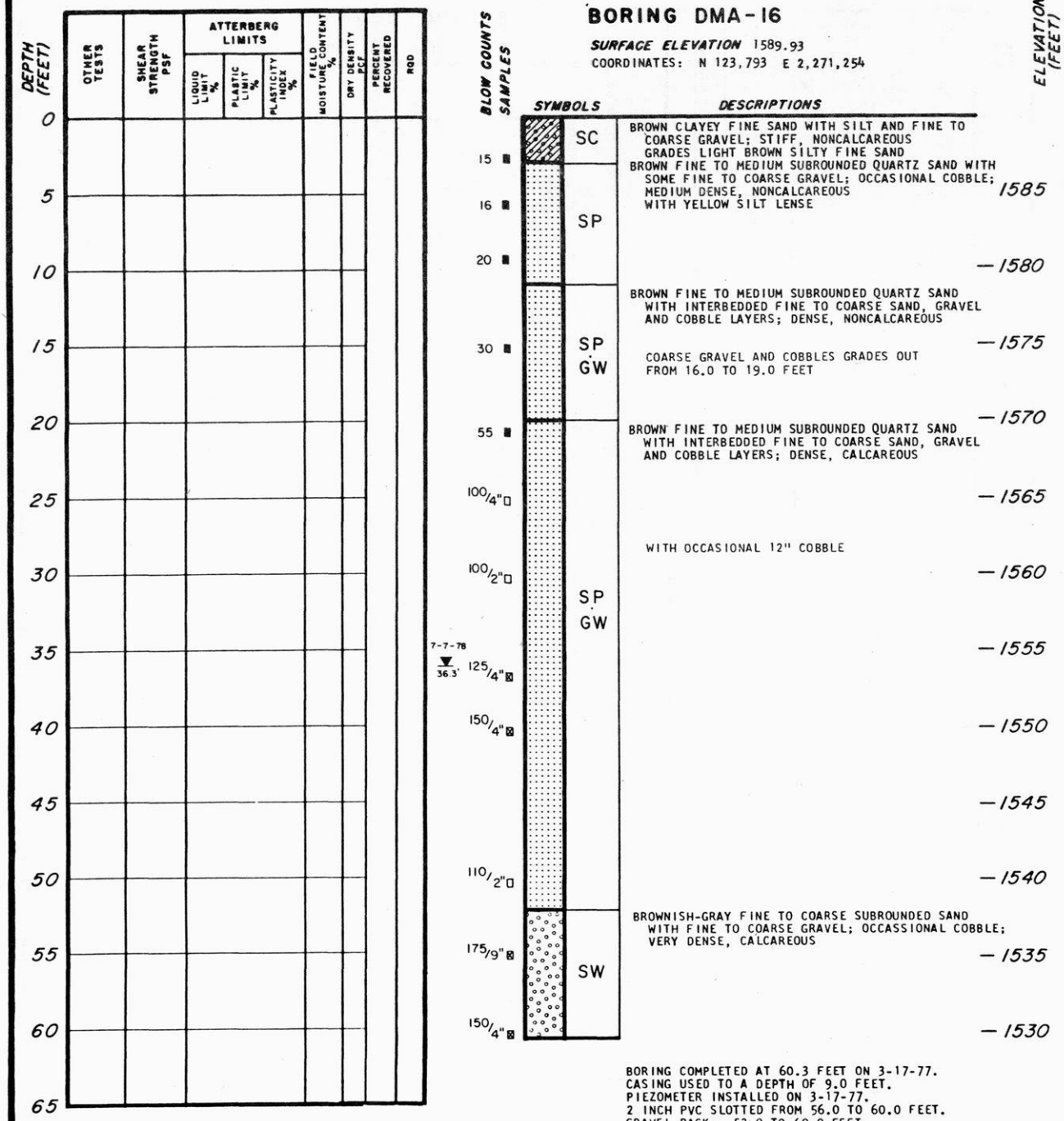
DAMES & MOORE

FIGURE B-10

# BORING DMA-16

*SURFACE ELEVATION* 1589.93

COORDINATES: N 123,793 E 2,271,254




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.

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LOG OF BORING DMA-16
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-11

# BORING DMA-17

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

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

7-12-78 ▼ +1.3'

| BLOW COUNTS | SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|
| | ⊠ | ML | BROWN CLAYEY SILT; SOME FINE SAND; VERY SOFT | |
| 3 | ■ | | | |
| | ⊠ | | GRADING MOTTLED GRAY AND REDDISH-BROWN AND WITH DARK GRAY SAND INCLUSIONS | — 1560 |
| 8 | ■ | SP | BROWN FINE TO MEDIUM SAND; SOME COARSE SAND AND FINE GRAVEL WITH OCCASIONAL COASE GRAVEL FRAGMENTS; LOOSE | — 1555 |
| | | | | — 1550 |
| 6 | ■ | SP SM | BROWN FINE TO MEDIUM SAND; SOME COARSE SAND AND FINE TO COARSE GRAVEL; LOCALLY WITH SILTY FINE SAND; VERY LOOSE | |
| 5 | ⊠ | | | — 1545 |
| | | | | — 1540 |
| 6 | □ | | | |
| P | ⊠ | | | |
| | | | | — 1535 |
| | | SP | GRADES WITH FINE TO COARSE GRAVEL ORANGISH-BROWN FINE TO MEDIUM SAND; VERY DENSE | — 1530 |
| 60 | ■ | | | |

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.
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LOG OF BORING DMA-17
SHEET 1 OF 1

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DAMES & MOORE

FIGURE B-12

# BORING DMA-18

**SURFACE ELEVATION** 1619.36

COORDINATES: N 111,758 E 2,269,884

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | X-RAY SA, HA | | | | | | | | |
| 10 | | | | | | 6.1 | 132 | | |
| 15 | K SA, HA | | | | | 7.2<br>5.1 | 111<br>121 | | |
| 20 | | | | | | 8.4 | 128 | | |
| 25 | SA, PH COLOR | | | | | 5.2 | 112 | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | 9.5 | 117 | | |
| 45 | | | | | | 12.6 | 113 | | |
| 50 | | | | | | | | | |
| 55 | | | | | | 7.2 | 106 | | |
| 60 | | | | | | 13.1 | 116 | | |
| 65 | | | | | | | | | |
| 70 | | | | | | 18.2 | 113 | | |
| 75 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | BROWN SILTY FINE TO MEDIUM SUBROUNDED QUARTZ SAND; MEDIUM DENSE, SLIGHTLY CALCAREOUS | |
| 25 ■ | | GRADES TRACE FINE TO COARSE GRAVEL GRADES REDDISH-BROWN WITH OCCASIONAL COBBLE FRAGMENTS; MEDIUM DENSE | — 1615 |
| 53 ■ | | GRADING VERY DENSE | — 1610 |
| | SM | | |
| 110/9" ■ | | | — 1605 |
| 140/10" ■ | | WITH GREENISH-GRAY SILT AND SAND POCKETS | — 1600 |
| 160 ■ | | TAN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS | — 1595 |
| | | GRADES WITH SOME FINE TO COARSE GRAVEL | |
| 115/6" ■ | | | — 1590 |
| 125/6" ⊠ | | | — 1585 |
| 160/11" ■ | SP | | — 1580 |
| 130/9" ■ | | GRADES LOCALLY TO REDDISH-BROWN FINE TO MEDIUM SAND; SOME SILT, CALCAREOUS | — 1575 |
| 60/7" ⊠ | | | — 1570 |
| 150/6" ■ | | WITH FINE TO COARSE SAND LAYER | — 1565 |
| 7-7-78 ▼ 58.0' 155/9" ■ | | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND; SOME FINE GRAVEL; VERY DENSE, CALCAREOUS | — 1560 |
| | SW | | — 1555 |
| 235 ■ | | BORING COMPLETED AT 70.5 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 66.0 TO 70.0 FEET. GRAVEL PACK: 55.0 TO 70.5 FEET. GROUT: 0.0 TO 55.0 FEET. GROUND WATER LEVEL RECORDED AT 58.0 FEET ON 7-7-78. | — 1550 |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMA-18

SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-13

# BORING DMA-19

*SURFACE ELEVATION* 1597.24

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SM | BROWN FINE SAND WITH ORGANICS | |
| 53 ■ | SP | LIGHT BROWN FINE SUBROUNDED SAND WITH TRACE SILT AND COARSE SAND; VERY DENSE, NONCALCAREOUS | 1595 |
| 7-6-78 ▼ 7.3' | | | 1590 |
| 20 ■ | | WITH SILT LAYERS; MEDIUM DENSE | |
| | | GRADING BROWN FINE TO MEDIUM SAND WITH TRACE SILT | |
| 42 ■ | SM | REDDISH-BROWN FINE TO MEDIUM SAND WITH SILT AND COARSE SAND AND GRAVEL; DENSE, CALCAREOUS | 1585 |
| | | | 1580 |
| 41 ■ | | | |
| | | BROWN FINE TO MEDIUM SAND WITH GRAVEL, CALCAREOUS | 1575 |
| □ | SP | WITH COBBLES | |
| ■ | | | 1570 |

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

1/79

DAMES & MOORE

FIGURE B-14

# BORING DMA-20

*SURFACE ELEVATION* 1591.97

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | ORANGISH-BROWN SILT WITH SOME VERY FINE TO FINE SAND; MEDIUM STIFF, NONCALCAREOUS | 1590 |
| 36 | SP | ORANGISH-BROWN FINE SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND FINE GRAVEL; DENSE, NONCALCAREOUS | |
| 19 | | | |
| | SM | BROWN SILTY FINE SAND WITH TRACE COARSE SAND; MEDIUM DENSE, NONCALCAREOUS | 1585 |
| 26 | | | |
| | | GRADES WITH FINE TO COARSE GRAVEL AND OCCASIONAL COBBLES | 1580 |
| 55 | | | |
| | | | 1575 |
| 102/9" | | BROWN SILTY FINE SAND WITH TRACE COARSE SAND; VERY DENSE, CALCAREOUS | |
| | | GRADES NUMEROUS COBBLES FROM 21.5 FEET | 1570 |
| 120/10" | | | |
| | | | 1565 |
| 7-12-78 ▼ 29.7' 70/11" | | | |
| | | | 1560 |
| 190/10" | SM | | |
| | | | 1555 |
| 186/8" | | | |
| | | | 1550 |
| | | | 1540 |
| 200/9" | | WITH LESS SILT | |
| | SP | BROWN FINE TO MEDIUM SAND; VERY DENSE, CALCAREOUS | |
| 100/6" | | | 1535 |

BORING COMPLETED AT 54.0 FEET ON 3-28-77.
CASING USED TO A DEPTH OF 8.0 FEET.
PIEZOMETER INSTALLED ON3-28-77.
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

1/79

DAMES & MOORE

FIGURE B-15

# BORING DMA-22

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | OL | BLACK ORGANIC SILT WITH SOME FINE SAND AND ROOTS; SOFT | |
| 16 | SM | BROWN SILTY FINE SAND WITH TRACE CLAY | |
| | | ORANGISH-BROWN MEDIUM SAND; MEDIUM DENSE GRADES WITH SOME FINE AND COARSE SAND AND FINE TO COARSE GRAVEL | — 1625 |
| 14 | | | |
| | | | — 1620 |
| 14 | | | |
| | SP | | — 1615 |
| 27 | | GRADES BROWN FINE SAND; MEDIUM DENSE | |
| | | | — 1610 |
| 19 | | | |
| | | | — 1605 |
| 10 | | BROWN SILTY VERY FINE SAND; LOOSE TO MEDIUM DENSE | |
| | SM | | — 1600 |
| 10 | | | |
| | SW SP | BROWN FINE TO COARSE SAND WITH FINE SAND LAYERS; DENSE | — 1595 |
| 43 | | | |

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

1/79

DAMES & MOORE

FIGURE B-16

# BORING DMA-27

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 5-11-77 ▼ 0.0' | | | |
| | | | | | | | | | | 2 | PT | BLACK ORGANICS WITH SILT AND WOOD AND ROOT FRAGMENTS; VERY SOFT | |
| 5 | | | | | | | | | | 2 | | | |
| | | | | | | | | | | 4 | SP | BROWNISH-GRAY FINE TO MEDIUM SAND WITH TRACE COARSE SAND; LOOSE | |
| 10 | | | | | | | | | | 21 | | GRADES BROWN MEDIUM TO COARSE SAND WITH TRACE FINE GRAVEL; MEDIUM DENSE | |
| 15 | | | | | | | | | | 5 | | GRADES SOME FINE GRAVEL AT 13.0 FEET<br>GRADES BROWN FINE SAND; TRACE COARSE SAND AND FINE GRAVEL; LOOSE | |
| 20 | | | | | | | | | | 5 | | | |
| 25 | | | | | | | | | | 11 | | GRADES TO BROWN VERY FINE TO FINE SAND; LOCALLY SOME SILT; LOOSE TO MEDIUM DENSE | |
| 30 | | | | | | | | | | 10 | | | |
| 35 | | | | | | | | | | 9 | | GRADES OCCASIONAL BROWN SILT LAYER | |
| 40 | | | | | | | | | | 11 | | | |
| 45 | | | | | | | | | | 10 | | GRADES MEDIUM DENSE | |
| 50 | | | | | | | | | | 25 | | | |
| 55 | | | | | | | | | | | SM | GRAYISH-BROWN SILTY VERY FINE SAND; MEDIUM DENSE | |
| 60 | | | | | | | | | | 17 | | | |
| 65 | | | | | | | | | | 15 | ML | GRAYISH-BROWN SILT; TRACE CLAY AND VERY FINE SAND; MEDIUM STIFF | |

BORING CONTINUED

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

LOG OF BORING DMA-27
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-171

## BORING DMA-27 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD |
|---|---|---|---|---|---|---|---|---|---|
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |
| 75 | | | | | | | | | |
| 80 | | | | | | | | | |
| 85 | | | | | | | | | |
| 90 | | | | | | | | | |

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

ELEVATION (FEET)

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

6 ▯

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

1/79

DAMES & MOORE

FIGURE B-172

# BORING DMA-27A

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | OL / ML | BLACK SILT WITH ORGANICS AND ROOTS (6") DARK BROWN FINE TO MEDIUM SANDY SILT; TRACE FINE TO COARSE GRAVEL; MEDIUM STIFF | 1545 |
| 13 | SP | BROWN FINE TO MEDIUM SAND; LOCALLY SOME COARSE SAND AND TRACE FINE TO COARSE GRAVEL; MEDIUM DENSE | 1540 |
| 15 | SP | WITH BROWN SILT POCKET | 1535 |
| 11 | SP | GRADES TAN; LOCALLY WITH FINE TO COARSE SAND | |
| | SM | BROWN SILTY FINE TO MEDIUM SAND; SOME COARSE SAND AND FINE TO COARSE GRAVEL; OCCASIONAL COBBLE; MEDIUM DENSE | 1530 |
| 15 | SM | | 1525 |
| 6 | SM | GRADES ORANGISH-BROWN | |
| | SM | GRADES WITH APPRECIABLE COARSE SAND AND GRAVEL | 1520 |
| 58 | SM | | 1515 |
| 85/10" | SM | WITH WEATHERED COBBLE | |
| 170/10" | SM | | 1510 |

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

1/79

DAMES & MOORE

FIGURE B-18

# BORING DMA-29

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | PT | BLACK FIBROUS ORGANICS WITH WOOD FRAGMENTS; VERY SOFT | 1535 |
| 5 | | | | | | | | | | 1 | | WITH SOME SILT | |
| | | | | | | | | | | | | | 1530 |
| 10 | | | | | | | | | | P | OL | OLIVE GREEN SILT WITH ORGANICS; VERY SOFT | |
| | | | | | | | | | | | | | 1525 |
| 15 | | | | | | 21.5 | 107 | | | 10 | SP | GREENISH-BROWN FINE SAND; SOME COARSE SAND; LOOSE | |
| | | | | | | | | | | | ML | GRAY SILT; SOME VERY FINE SAND; SOFT TO MEDIUM STIFF | |
| | | | | | | | | | | | | GRADES LOCALLY TO SILTY VERY FINE SAND; LOOSE | 1520 |
| 20 | | | | | | 25.5 | 101 | | | 8 | | VERY FINE SAND GRADES OUT | |
| | | | | | | | | | | | | | 1515 |
| 25 | | | | | | 25.6 | 97 | | | P | | | |
| | | | | | | | | | | | | | 1510 |
| 30 | K SA,HA | | 34 | 24 | 10 | 35.4 34.4 | 87 89 | | | P | | GRADES BROWN CLAYEY SILT INTERBEDDED WITH BROWN CLAY STRINGERS AND LENSES; SOFT | |
| | | | | | | | | | | | | | 1505 |
| 35 | | | | | | 34.7 | 88 | | | 4 | | | |
| | | | | | | | | | | | | | 1500 |
| 40 | | | | | | 35.8 | 87 | | | 4 | | | |

7-12-78 ▼ 2.4'

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

1/79

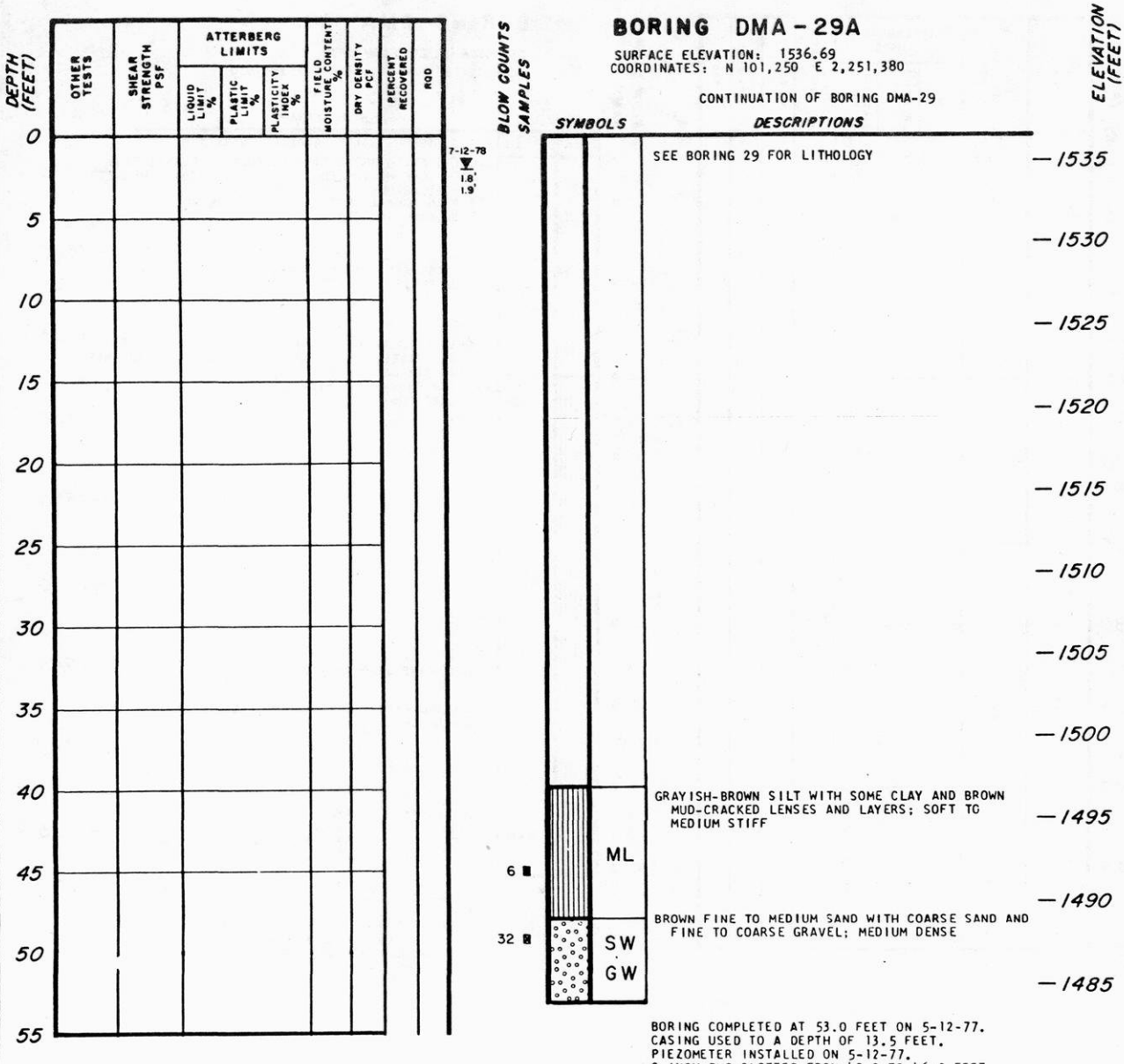
DAMES & MOORE

FIGURE B-19

# BORING DMA-29A

SURFACE ELEVATION: 1536.69
COORDINATES: N 101,250 E 2,251,380

CONTINUATION OF BORING DMA-29




BORING COMPLETED AT 53.0 FEET ON 5-12-77.
CASING USED TO A DEPTH OF 13.5 FEET.
PIEZOMETER INSTALLED ON 5-12-77.
2 INCH PVC SLOTTED FROM 42.0 TO 46.0 FEET.
3/4 INCH PVC SLOTTED FROM 50.0 TO 53.0 FEET.
GRAVEL PACK: 48.0 TO 53.0 FEET.
BENTONITE: 46.0 TO 48.0 FEET.
GRAVEL PACK: 38.5 TO 46.0 FEET.
GROUT: 0.0 TO 38.5 FEET
GROUND WATER LEVEL RECORDED AT 1.9 FEET ON 7-12-78 FOR DMA-29AU (2 INCH PVC).
GROUND WATER LEVEL RECORDED AT 1.8 FEET ON 7-12-78 FOR DMA-29AL (3/4 INCH PVC).

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

LOG OF BORING DMA-29A
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-20

# BORING DMA-30

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | 4-16-77 ▼ 0.0' | | PT | BLACK FIBROUS SILTY ORGANICS; VERY SOFT | |
| 5 | P.C. | | | | | | | | | 15 ■ | SP | LIGHT GRAYISH-BROWN FINE SUBROUNDED QUARTZ SAND WITH SOME MEDIUM TO COARSE SAND; MEDIUM DENSE, NONCALCAREOUS<br>GRADES LOCALLY WITH BROWN FINE TO COARSE SAND AND FINE GRAVEL | 1575 |
| 10 | | | | | | 18.1 | 107 | | | 8 ■ | | GRADES TRACE BLACKISH-GRAY SILT POCKET AND FINE ROOTS; LOOSE | 1570 |
| 15 | | | | | | | | | | 8 ■ | | GRADES LOCALLY TO FINE TO COARSE SAND; SOME FINE GRAVEL; OCCASIONAL COARSE GRAVEL FRAGMENTS, SLIGHTLY CALCAREOUS | 1565 |
| 20 | | | | | | 22.1 | 109 | | | 6 ■ | ML | GRAYISH-BROWN VERY FINE SAND TRACE SILT; LOOSE, CALCAREOUS | 1560 |
| 25 | | | | | | | | | | 7 ■ | | | 1555 |
| 30 | | | | | | 21.0 | 108 | | | 13 ■ | | | 1550 |
| 35 | K | | | | | 31.2 | 95 | | | 4 ■ | | VERY FINE SAND GRADING OUT | 1545 |
| 40 | | | | | | | | | | 4 ■ | | GRADING WITH BROWN MUD-CRACKED CLAYEY SILT LENSES AND LAYERS; VERY SOFT | 1540 |
| 45 | P.C. | | | | | 6.3 | 148 | | | 95 ■ | SM | REDDISH-BROWN TO BROWN SILTY FINE TO MEDIUM SAND; SOME COARSE SAND AND FINE GRAVEL; OCCASIONAL COARSE GRAVEL AND COBBLE FRAGMENTS; VERY DENSE, CALCAREOUS | 1535 |
| 50 | | | | | | | | | | | | | |

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

1/79

DAMES & MOORE

FIGURE B-21

# BORING DMA-31

*SURFACE ELEVATION* 1592.09

COORDINATES: N 120,160 E 2,281,570

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD | BLOW COUNTS SAMPLES |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | |
| 5 | | | | | | 12.1 | 127 | | | 19 |
| 10 | | | | | | 9.2 | 136 | | | 5 |
| 15 | | | | | | 9.1 | 136 | | | 22 |
| 20 | | | | | | | | | | |
| 25 | | | | | | 8.9 | 140 | | | 34 |

7-12-78 ▼ 6.7'

| 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 |
| SM | GRADES VERY LOOSE, CALCAREOUS | |
| | | 1580 |
| | 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

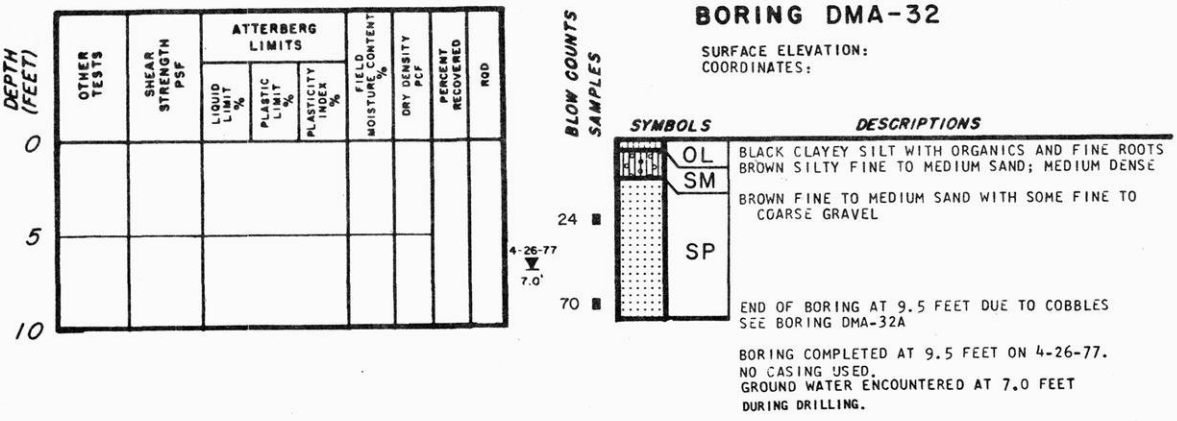
1/79

DAMES & MOORE

FIGURE B-22

# BORING DMA-32

SURFACE ELEVATION:
COORDINATES:

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LOG OF BORING DMA-32
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-23

# BORING DMA-32A

*SURFACE ELEVATION* 1592.14

COORDINATES: N 112,050 E 2,290,580

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | OL | BLACK SANDY SILT; SOME ORGANICS AND ROOTS; WITH COBBLES | |
| | | | | | | | | | | | SP | ORANGISH-BROWN FINE TO MEDIUM SAND; MEDIUM DENSE | —1590 |
| 5 | | | | | | | | | | 10 ■ | | BROWN CLAYEY SILT; MEDIUM STIFF, CALCAREOUS | |
| | | | | | | | | | | | ML | | —1585 |
| | | | | | | | | | | 7-12-78 ▼ 8.4' 1 ■ | | WITH MUD-CRACKED SILT SEAMS; VERY SOFT | |
| 10 | | | | | | | | | | | | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND WITH FINE TO COARSE METAMORPHIC GRAVEL; OCCASIONAL COBBLE FRAGMENT; MEDIUM DENSE, CALCAREOUS | —1580 |
| 15 | | | | | | | | | | 27 ⊠ | | | |
| | | | | | | | | | | | | | —1575 |
| 20 | | | | | | | | | | 30/2" ⊠ | | COBBLE | |
| | | | | | | | | | | | | | —1570 |
| 25 | | | | | | | | | | 42 ⊠ | SW | GRADES WITH BROWN FINE SAND LAYERS; DENSE | |
| | | | | | | | | | | | | | —1565 |
| 30 | | | | | | | | | | 44 ⊠ | | | |
| | | | | | | | | | | | | | —1560 |
| 35 | | | | | | | | | | | | BOULDER FROM 36.5 TO 42.5 FEET | |
| | | | | | | | | | | | | | —1555 |
| 40 | | | | | | | | | | 50/0" □ | | | |
| | | | | | | | | | | | | | —1550 |
| 45 | | | | | | | | | | 154/10" ■ | | REDDISH-BROWN FINE TO MEDIUM SAND WITH SOME SILT, COARSE SAND AND FINE TO COARSE GRAVEL; OCCASIONAL COBBLE; VERY DENSE, CALCAREOUS | |
| | | | | | | | | | | | | | —1545 |
| 50 | | | | | | | | | | 160/5" ⊠ | | GRADES BROWN AND WITH MORE COARSE SAND AND GRAVEL | |
| | | | | | | | | | | | | BOULDER FROM 51.5 TO 54.0 FEET | —1540 |
| 55 | | | | | | | | | | 125/9" ⊠ | SP | GRADES LESS SILT WITH COARSE SAND AND FINE TO COARSE GRAVEL | |
| | | | | | | | | | | | | | —1535 |
| 60 | | | | | | | | | | | | | —1530 |
| 65 | | | | | | | | | | 100 ■ | | GRADES BROWN FINE SAND WITH TRACE MEDIUM TO COARSE SAND AND FINE GRAVEL; VERY DENSE, CALCAREOUS | |
| | | | | | | | | | | | | | —1525 |
| 70 | | | | | | | | | | | | GRADES TO MEDIUM SAND WITH GRAVEL | |
| | | | | | | | | | | | | | —1520 |
| 75 | | | | | | | | | | 180/8" ⊠ | | BORING CONTINUED | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMA-32A

SHEET 1 OF 3

1/79

DAMES & MOORE

FIGURE B-241

## BORING DMA-32A CONTINUED

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | | —1515 |
| | | COARSE GRAVEL AND COBBLES FROM 79.0 TO 81.0 FEET | |
| | | | —1510 |
| 125/9" ■ | | | |
| | | | —1505 |
| | | | —1500 |
| 190/11" ■ | | | |
| | | GRAVEL GRADING OUT | |
| | SP | | —1495 |
| | | | —1490 |
| 150/8" ■ | | WITH GRAVEL AND OCCASIONAL COBBLES | |
| | | | —1485 |
| | | GRADES BROWN FINE SAND; TRACE SILT; VERY DENSE | |
| | | | —1480 |
| 110/9" ■ | | | |
| | | | —1475 |
| | | | —1470 |
| 115/8" ■ | | REDDISH-BROWN SILT WITH FINE SAND LENSE; MEDIUM STIFF, CALCAREOUS | |
| | ML | | —1465 |
| | | GRAVELLY LENSE FROM 128.5 TO 131.0 FEET | |
| | | BROWN FINE SAND TRACE SILT; VERY DENSE, CALCAREOUS | —1460 |
| 125 ■ | | | |
| | | | —1455 |
| | SP | | |
| | | | —1450 |
| 130 ■ | | WITH MORE SILT | |
| | | | —1445 |
| | | BORING CONTINUED | |

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

LOG OF BORING DMA-32A
SHEET 2 OF 3

1/79

DAMES & MOORE

FIGURE B-242

## BORING DMA-32A CONTINUED

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | | — 1440 |
| 180/9" ■ | | GRADES LOCALLY TO A VERY FINE SAND | |
| | | | — 1435 |
| | SP | | — 1430 |
| 150/11" ■ | | GRADES FINE SAND | |
| | | | — 1425 |
| | | 8" COBBLE FROM 172.8 FEET | — 1420 |

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

1/79

DAMES & MOORE

FIGURE B-24.3

# BORING DMA-33

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | ROD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | PT | BLACK FIBROUS SILTY ORGANICS; VERY SOFT | |
| | | | | | | 41.9 | 80 | | | 5 | | LIGHT BROWN FINE SAND; LOOSE TO MEDIUM DENSE | 1535 |
| 5 | | | | | | 21.5 | 106 | | | 12 | | | |
| | | | | | | | | | | | | | 1530 |
| 10 | | | | | | 20.5 | 106 | | | 11 | | | |
| | | | | | | | | | | | | | 1525 |
| 15 | | | | | | 19.6 | 108 | | | 3 | | GRADES VERY LOOSE | |
| | | | | | | | | | | | SP | | |
| | | | | | | | | | | 5 | | | 1520 |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1515 |
| 25 | | | | | | | | | | 17 | | GRADES SOME COARSE SAND AND FINE GRAVEL; TRACE SILT; MEDIUM DENSE | |
| | | | | | | | | | | | | | 1510 |
| 30 | | | | | | 20.8 | 108 | | | 10 | | GRADES SOME SILT: LOCALLY TO A SILTY VERY FINE SAND; LOOSE | |
| | | | | | | | | | | | | | 1505 |
| 35 | | | | | | 23.3 | 105 | | | 9 | | GRAYISH-BROWN SILT; LOCALLY SOME VERY FINE SAND; MEDIUM STIFF | |
| | | | | | | | | | | | | | 1500 |
| 40 | | | | | | | | | | 6 | | | |
| | | | | | | | | | | | | | 1495 |
| 45 | | | | | | 20.1 | 107 | | | 9 | | | |
| | | | | | | | | | | | | | 1490 |
| 50 | | | | | | | | | | 9 | ML | | |
| | | | | | | | | | | | | | 1485 |
| 55 | | | | | | | | | | 8 | | GRADES GRAYISH-BROWN CLAYEY SILT; MEDIUM STIFF | |
| | | | | | | | | | | | | GRADES WITH BROWN MUD-CRACKED SILT STRINGERS AND LENSES | 1480 |
| 60 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1475 |
| 65 | | | | | | | | | | 4 | | | |
| | | | | | | | | | | | | | 1470 |
| 70 | | | | | | | | | | | | | |

4-8-77 ▼ 0.0'

BORING CONTINUED

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

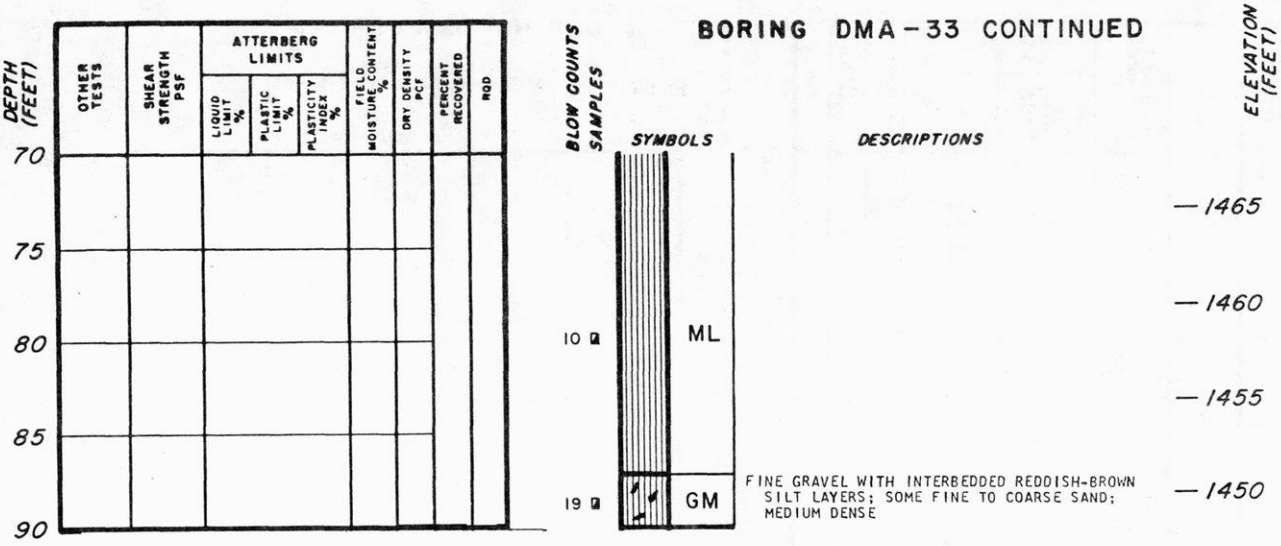
LOG OF BORING DMA-33
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-25.1

## BORING DMA-33 CONTINUED




BORING COMPLETED AND GROUTED TO 90.0 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

1/79

DAMES & MOORE

FIGURE B-252

# BORING DMA-34

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | PT | BLACK FIBROUS SILTY ORGANICS; VERY SOFT MOTTLED BROWN AND DARK BROWN FINE SAND WITH TRACE MEDIUM TO COARSE SAND; LOOSE | 1535 |
| | | | | | | 14.4 | 112 | | | 9 | | | |
| 5 | | | | | | 14.9 | 121 | | | 2 | SP | GRADES GRAY; LOCALLY WITH SILT; VERY LOOSE | 1530 |
| | | | | | | 19.2 | 109 | | | 9 | | GRADES TO VERY FINE SAND | |
| 10 | | | | | | | | | | | | | 1525 |
| | | | | | | 30.1 | 94 | | | 3 | ML | GRAYISH-BROWN CLAYEY SILT WITH MUD-CRACKED SILT STRINGERS AND LENSES; OCCASIONAL FINE SAND LENSE; VERY SOFT | |
| 15 | | | | | | | | | | | | | 1520 |
| | | | | | | 35.0 | 88 | | | 4 | | | |
| 20 | | | | | | | | | | | | | 1515 |
| | | | | | | 6.3 | | | | 24 | | REDDISH-BROWN SILTY FINE TO MEDIUM SAND WITH SOME COARSE SAND AND FINE TO COARSE GRAVEL; DENSE | |
| 25 | | | | | | | | | | | SM | GRADES WITH COARSE GRAVEL AND COBBLES FROM 26.0 TO 28.0 FEET | 1510 |
| | K SA.HA | | | | | 8.4 7.2 | 128 135 | | | 150 | | GRADES VERY DENSE | |
| 30 | | | | | | | | | | | | | 1505 |
| 35 | | | | | | | | | | | | | |

7-12-78 ▼ 1.0'

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.

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

LOG OF BORING DMA-34
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-26

# BORING DMA-35

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BLACKISH-BROWN CLAYEY SILT WITH SOME ORGANICS | 1570 |
| 75/11" | SM | BROWN SILTY FINE TO MEDIUM SAND WITH COARSE SAND AND GRAVEL AND OCCASIONAL COBBLE: MEDIUM DENSE | 1565 |
| 85 | SM | GRADES DENSE | 1560 |
| 165/9" | SM | GRADES WITH LESS SILT | 1555 |
| 150/6" | SM | | |
| 7-12-78 ▼ 22.7' | SP | BROWN MEDIUM SAND WITH SOME FINE TO COARSE SAND AND TRACE FINE TO COARSE GRAVEL; VERY DENSE | 1550 |
| 120 | SP | GRADES LOCALLY TO FINE SAND | 1545 |
| 125 | | | |

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

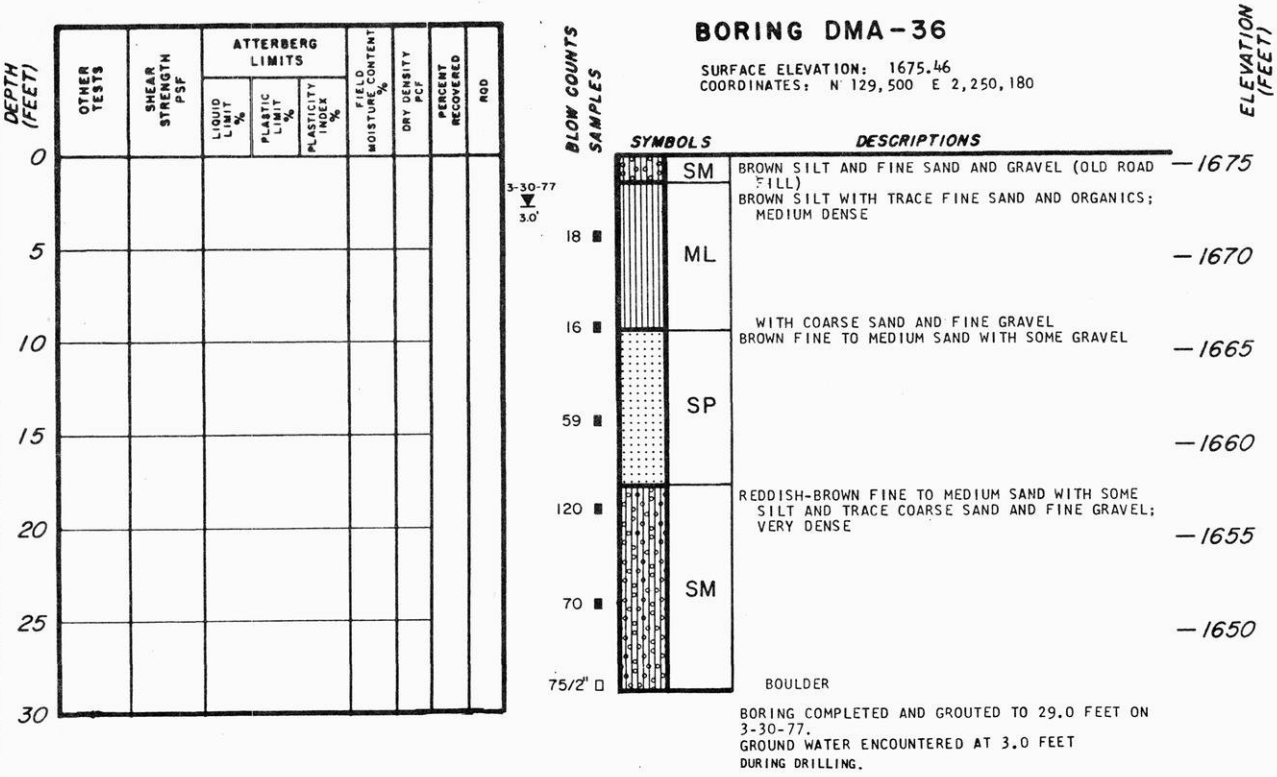
1/79

DAMES & MOORE

FIGURE B-27

# BORING DMA-36

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




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

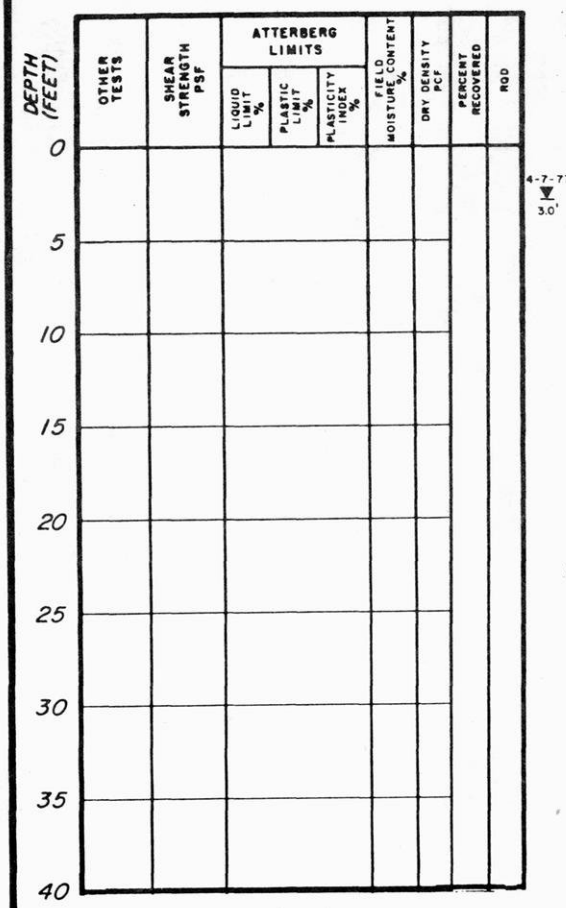
1/79

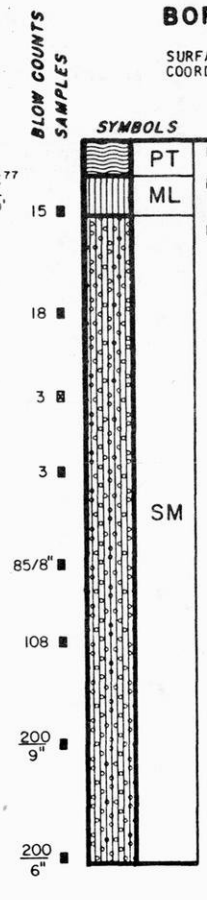
DAMES & MOORE

FIGURE B-28

# BORING DMA-37

SURFACE ELEVATION: 1684.09
COORDINATES: N 125,340 E 2,247,430




DESCRIPTIONS

BLACK FIBROUS ORGANICS WITH ROOTS AND WOOD FRAGMENTS; VERY SOFT

MOTTLED GREENISH-GRAY AND BROWN CLAYEY SILT WITH SOME FINE TO COARSE SAND AND GRAVEL; MEDIUM STIFF TO STIFF

REDDISH-BROWN TO BROWN SILTY FINE TO MEDIUM SAND WITH SOME FINE TO COARSE GRAVEL AND OCCASIONAL COBBLE; MEDIUM DENSE

GRADES LOCALLY WITH SILT

GRADES BROWN FINE SAND WITH COARSE SAND AND FINE GRAVEL; VERY LOOSE

GRADING VERY DENSE

WITH OCCASIONAL LIGHT ORANGISH-BROWN FINE SAND LAYER

WITH CLAYEY SILT LAYERS; HARD

ELEVATION (FEET)
1680
1675
1670
1665
1660
1655
1650

BORING COMPLETED AND GROUTED TO 39.0 FEET ON 4-7-77.
CASING USED TO A DEPTH OF 9.0 FEET.
GROUND WATER ENCOUNTERED AT APPROXIMATELY 3.0 FEET DURING DRILLING.

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

LOG OF BORING DMA-37
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-29

# BORING DMA - 38

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 4 | PT | BLACK FIBROUS ORGANICS; VERY SOFT | |
| | 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 |
| | | | —1760 |
| 22 | SM | REDDISH-BROWN FINE TO MEDIUM SILTY SAND WITH SOME FINE TO COARSE GRAVEL AND OCCASIONAL COBBLE; MEDIUM DENSE | |
| | | | —1755 |
| 27 | | | |
| 120/9" | | GRADES VERY DENSE | —1750 |
| | | | —1745 |
| 145 | | | |

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

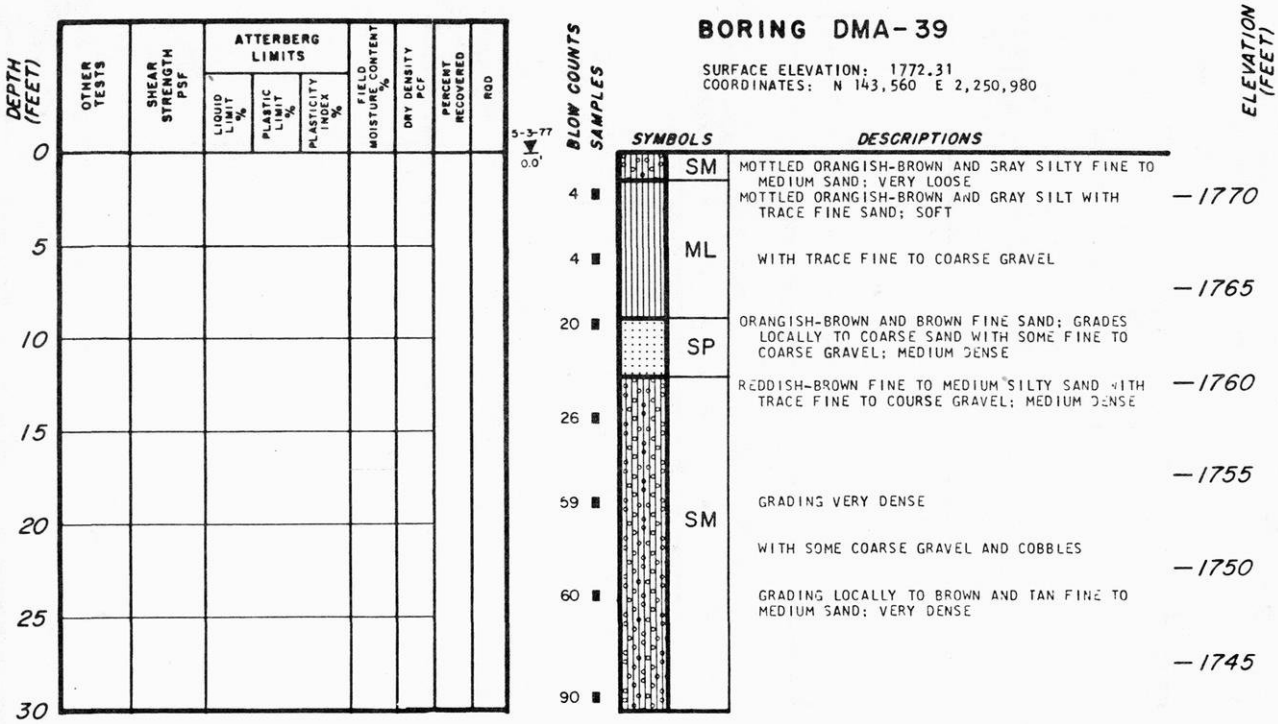
1/79

DAMES & MOORE

FIGURE B-30

# BORING DMA-39

SURFACE ELEVATION: 1772.31
COORDINATES: N 143,560 E 2,250,980




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

1/79

DAMES & MOORE

FIGURE B-31

# BORING DMA-42

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | LIGHT BROWN SILT WITH TRACE VERY FINE SAND | —1615 |
| 16 | SM | BROWN FINE TO MEDIUM SILTY SAND WITH TRACE GRAVEL; MEDIUM DENSE | —1610 |
| 24 | | | |
| 15 | SW | BROWN FINE TO COARSE SAND WITH SOME FINE GRAVEL; MEDIUM DENSE | —1605 |
| 28 | | WITH COBBLES | —1600 |
| 20 | | | —1595 |
| 0 | | | —1590 |

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

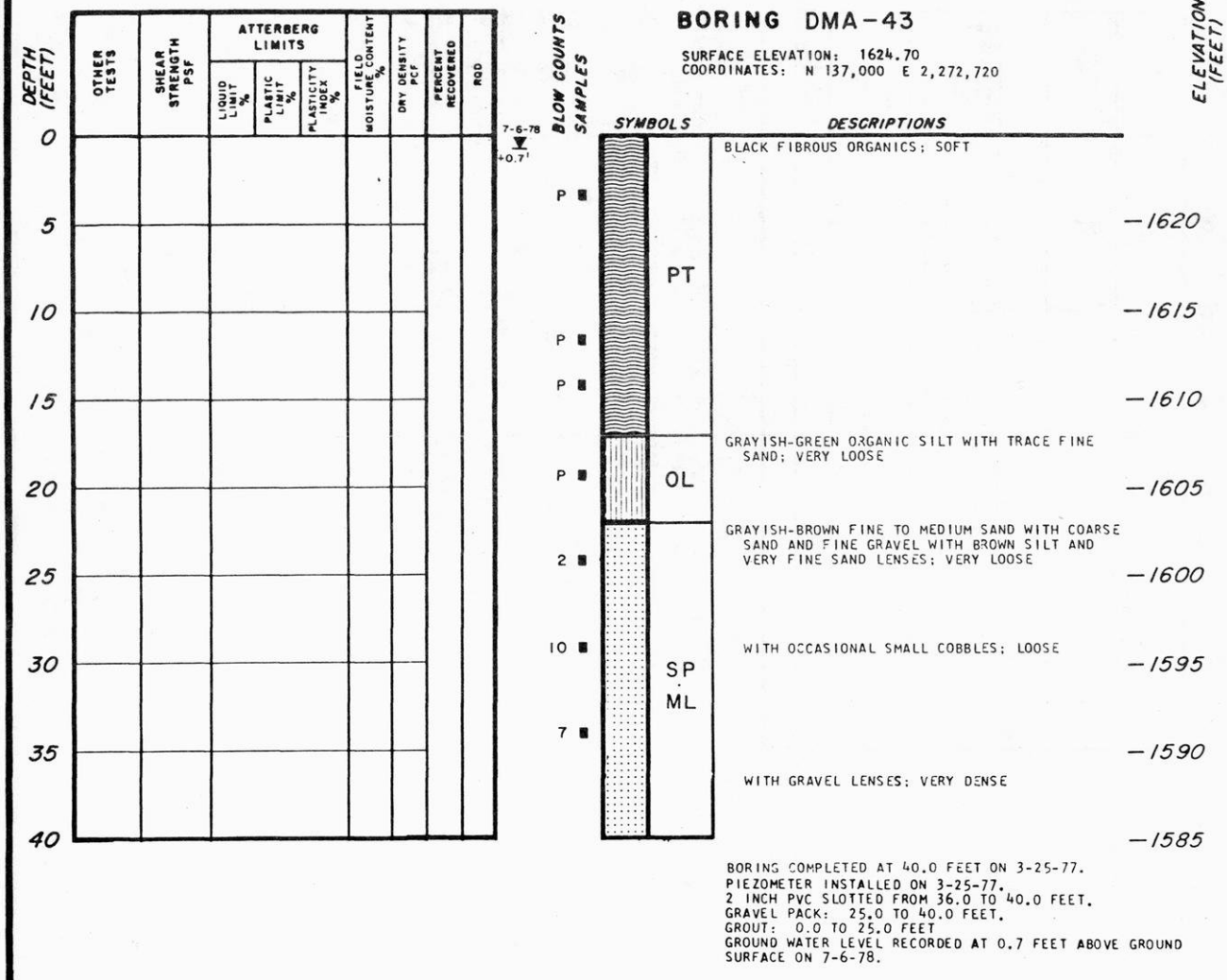
1/79

DAMES & MOORE

FIGURE B-32

## BORING DMA-43

SURFACE ELEVATION: 1624.70
COORDINATES: N 137,000 E 2,272,720




BORING COMPLETED AT 40.0 FEET ON 3-25-77.
PIEZOMETER INSTALLED ON 3-25-77.
2 INCH PVC SLOTTED FROM 36.0 TO 40.0 FEET.
GRAVEL PACK: 25.0 TO 40.0 FEET.
GROUT: 0.0 TO 25.0 FEET
GROUND WATER LEVEL RECORDED AT 0.7 FEET ABOVE GROUND SURFACE ON 7-6-78.

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

LOG OF BORING DMA-43
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-33

# BORING DMA-44

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| | | | | | | 5.2 | 105 | | |
| 5 | SA,HA | | | | | 6.8 | 129 | | |
| | | | | | | 5.9 | 124 | | |
| 10 | | | | | | | | | |
| | | | | | | 9.6 | 111 | | |
| 15 | | | | | | | | | |
| | | | | | | 9.8 | 133 | | |
| 20 | | | | | | | | | |
| | | | | | | 9.9 | 130 | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | BROWN FINE SAND WITH TRACE COARSE GRAVEL AND SILT AND OCCASIONAL COBBLE; MEDIUM DENSE | —1590 |
| 10 ■ | SP | | |
| | | | —1585 |
| 20 ■ | SM | REDDISH-BROWN FINE TO MEDIUM SILTY SAND WITH TRACE FINE TO COARSE GRAVEL; MEDIUM DENSE | |
| 30 ■ | | BROWN FINE TO MEDIUM SAND WITH TRACE COARSE SAND AND FINE GRAVEL; MEDIUM DENSE TO DENSE | —1580 |
| 29 ■ | SP | GRADING TAN | |
| | | | —1575 |
| 71 ■ | | REDDISH-BROWN FINE SILTY SAND WITH TRACE FINE TO COARSE GRAVEL AND CLAY; VERY DENSE GRADES WITH COARSE GRAVEL AND COBBLES FROM 20.5 TO 22.5 FEET | —1570 |
| 130 ■ | SP SM | | |
| | | GRADES SOME COARSE GRAVEL | —1565 |
| *95 ■ | | | |
| | | | —1560 |

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

1/79

DAMES & MOORE

FIGURE B-34

# BORING DMA-45

SURFACE ELEVATION: 1640.61
COORDINATES: N 100,630 E 2,310,200

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | OL | BROWNISH-BLACK CLAYEY SILT WITH ORGANICS AND FINE ROOTS | 1640 |
| 6 | ML | BROWN CLAYELY SILT; TRACE FINE GRAVEL; MEDIUM STIFF | |
| 12 | | BROWN FINE TO MEDIUM SAND WITH OCCASIONAL FINE SAND LAYERS AND SOME FINE TO COARSE GRAVEL; MEDIUM DENSE | 1635 |
| 19 | | | |
| | | | 1630 |
| 64/11" | | COBBLE AND BOULDER ZONE<br>BOULDER FROM 14.5 TO 17.0 FEET | |
| | | | 1625 |
| 107 | | 8" COBBLE FROM 18.0 FEET<br>GRADES WITH TRACE SILT | |
| | | | 1620 |
| 75/4" | SP | BOULDER FROM 24.0 TO 25.0 FEET | |
| | | | 1615 |
| 120/6" | | 8" COBBLE FROM 30.0 FEET | |
| | | | 1610 |
| 100/5" | | GRADING LOCALLY WITH CLAYEY SILT<br>BOULDER FROM 34.0 TO 36.0 FEET | |
| | | | 1605 |
| 160/6" | | 6" COBBLE FROM 37.4 FEET | |
| | | FINE TO COARSE GRAVEL GRADES OUT | 1600 |
| | | 6" COBBLE FROM 43.2 FEET | |
| 150/5" | | | |
| | | | 1595 |
| 135/8" | | | |

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.

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CRANDON PROJECT

LOG OF BORING DMA-45
SHEET 1 OF 1

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FIGURE B-35

# BORING DMA-46

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 6 ■ | ML | BROWN SILT WITH TRACE FINE TO MEDIUM SAND AND CLAY; MEDIUM STIFF | |
| 18 ■ | | BROWN FINE TO MEDIUM SAND WITH TRACE COARSE SAND; MEDIUM DENSE | 1710 |
| 42 ■ | | GRADES GRAYISH-BROWN FINE TO COARSE SAND WITH BROWN FINE TO MEDIUM SAND LAYERS; LOCALLY WITH FINE TO COARSE GRAVEL; DENSE TO VERY DENSE | 1705 |
| 42 ■ | | | 1700 |
| 70 ■ | | | 1695 |
| 88 ■ | | GRADES BROWN FINE TO MEDIUM SAND WITH TRACE SILT AND LOCALLY SOME FINE TO COARSE GRAVEL; VERY DENSE | 1690 |
| 146/11" ■ | | | 1685 |
| 130 ■ | SP | | 1680 |
| 140/10" ■ | | | 1675 |
| 127 ■ | | | 1670 |
| | | GRADES SOME COBBLES FROM 50.0 TO 52.5 FEET | 1665 |
| 180/7" ■ | | | 1660 |
| 120/3" □ | | | 1655 |
| | | | 1650 |
| 150/0 □ | | | |
| *180/6" ◪ | | BORING COMPLETED AT 72.5 FEET ON 5-2-77.<br>CASING USED TO A DEPTH OF 8.0 FEET.<br>PIEZOMETER INSTALLED ON 5-2-77.<br>2 INCH PVC SLOTTED FROM 68.5 TO 72.5 FEET.<br>GRAVEL PACK: 45.0 TO 72.5 FEET.<br>GROUT: 0.0 TO 45.0 FEET.<br>PIEZOMETER DRY ON 7-7-78. | 1645 |

EXXON MINERALS COMPANY, U.S.A.
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LOG OF BORING DMA-46
SHEET 1 OF 1

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FIGURE B-36

# BORING DMA-47

*SURFACE ELEVATION* 1573.62

COORDINATES: N 121,393 E 2,276,058

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

6-8-78 ▼ 17.0'

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 22 | SM | BROWN SILTY FINE SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND FINE GRAVEL; TRACE SILT; MEDIUM DENSE, NONCALCAREOUS GRADES LOCALLY TO SILTY FINE SAND | 1570 |
| 12 | SP | BROWN MEDIUM SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND FINE TO COARSE GRAVEL; MEDIUM DENSE, NONCALCAREOUS | 1565 |
| 13 | SP | | 1560 |
| 3 | SM | BROWN SILTY FINE SAND; VERY LOOSE, NONCALCAREOUS | 1555 |
| 71 | SM | GRADES WITH FINE TO COARSE SAND AND GRAVEL LAYERS | 1550 |
| 95 | SM | GRADES SLIGHTLY CALCAREOUS WITH COBBLES | 1545 |
| | SM | GRADES TO BROWN SILTY FINE TO MEDIUM SAND WITH SOME FINE TO COARSE GRAVEL; VERY DENSE, CALCAREOUS | |

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

1/79

DAMES & MOORE

FIGURE B-37

# BORING DMA-48

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 19 ■ | SP | ORANGISH-BROWN FINE SAND WITH TRACE FINE TO COARSE GRAVEL; MEDIUM DENSE, NONCALCAREOUS | 1545 |
| 22 ■ | | GRADES BROWN | |
| 8 ■ 5-24-78 ▼ 9.6' | | GRADES SOME FINE TO COARSE SUBROUNDED GRAVEL; LOOSE | 1540 |
| 36 ■ | SW | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH COARSE SAND; SOME FINE TO COARSE GRAVEL; DENSE, CALCAREOUS | 1535 |
| | | WITH MORE GRAVEL | |
| 22 ■ | | GRADES WITH BROWN FINE SAND LAYERS; MEDIUM DENSE | 1530 |
| 100 ■ | SP | BROWN FINE SUBROUNDED QUARTZ SAND WITH TRACE COARSE SAND AND SILT WITH FINE TO COARSE GRAVEL LAYERS; VERY DENSE, CALCAREOUS | 1525 |
| 125 ■ | | | 1520 |

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

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FIGURE B-38

# BORING DMB-1

SURFACE ELEVATION 1627.30

COORDINATES: N 114,405 E 2,282,890

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | | | | | | | | | |
| 10 | SA COLOR | | | | | 8.8 | | | |
| 15 | | | | | | | | | |
| 20 | X-RAY SA/pH COLOR | | | | | 3.0 | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | X-RAY | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BROWN SILT, TRACE FINE SAND | |
| 19 | SP SM | BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, SOME SILT, TRACE FINE SUBANGULAR GRAVEL, MEDIUM DENSE, NONCALCAREOUS | — 1625 |
| 26 | SP | BROWN MEDIUM GRAINED, SUBROUNDED QUARTZ SAND WITH FINE TO MEDIUM GRAINED SUBROUNDED METAMORPHIC GRAVEL, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS | — 1620 |
| 26 | SM | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, SOME SILT, MEDIUM DENSE, NONCALCAREOUS, PIECE OF DOLOMITE IN BIT | — 1615 |
| 170 | SP | LIGHT BROWN MEDIUM SUBROUNDED QUARTZ SAND, SOME COARSE SAND TRACE FINE-GRAINED SUBANGULAR CARBONATE AND METAMORPHIC GRAVELS, VERY DENSE, SLIGHTLY CALCAREOUS | — 1610 |
| 116 | SP SM | BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS | — 1605 |
| 158/9" | | | |
| 118/7" | | | — 1600 |
| 183/9" | SP | BROWN FINE SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR GRAVEL, VERY DENSE, SLIGHTLY CALCAREOUS | — 1595 |
| 67 | SP SM | REDDISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME FINE SUBANGULAR METAMORPHIC GRAVELS, TRACE SILT, VERY DENSE, CALCAREOUS | — 1590 |
| | | BOULDER AT 39.0 FEET | |
| 145 | | GRADES TRACE FINE GRAVEL | — 1585 |
| 82/8" | | | — 1580 |
| 125/5" | | | — 1575 |
| 169/9" | | GRADE SOME SILT | — 1570 |

BORING COMPLETED AT 59.3 FEET ON 5-11-78.
4 INCH CASING USED TO A DEPTH OF 10.0 FEET.
PIEZOMETER INSTALLED ON 5-12-78.
2 INCH PVC SLOTTED FROM 5.0 TO 15.0 FEET.
GRAVEL PACK: 5.0 TO 15.0 FEET.
GROUT: 0.0 TO 5.0 FEET.
PIEZOMETER DRY ON 6-10-78.

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LOG OF BORING DMB-1
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-39

## BORING DMB-1A

*SURFACE ELEVATION* 1627.94

COORDINATES: N 114,405 E 2,282,900

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | NO SAMPLES TAKEN FROM 0.0 TO 63.5 FEET SEE LOG FOR DMB-1 | 1625 |
| 5 | | | | | | | | | | | | | 1620 |
| 10 | | | | | | | | | | | | | 1615 |
| 15 | | | | | | | | | | | | | 1610 |
| 20 | | | | | | | | | | | | | 1605 |
| 25 | | | | | | | | | | | | | 1600 |
| 30 | | | | | | | | | | | | | 1595 |
| 35 | | | | | | | | | | 6-10-78 ▼ 36.5' | | | 1590 |
| 40 | | | | | | | | | | | | | 1585 |
| 45 | | | | | | | | | | | | | 1580 |
| 50 | | | | | | | | | | | | | 1575 |
| 55 | | | | | | | | | | | | | 1570 |
| 60 | | | | | | | | | | | | | |

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LOG OF BORING DMB-1A
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-40.1

## BORING DMB-1A (CONT'D)

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | | — 1565 |
| 112/9" ■ | SP | REDDISH-BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE OF GRAVEL AND COBBLES TO 1" IN DIAMETER, VERY DENSE, CALCAREOUS | |
| 120/9" ■ | SP | REDDISH-BROWN, MEDIUM GRAINED, SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS<br>MOIST-WET | — 1560 |
| 122/11" ■ | SP SM | REDDISH-BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, CALCALCAREOUS | — 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.

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LOG OF BORING DMB-1A
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-402

# BORING DMB-2

*SURFACE ELEVATION* 1706.28

COORDINATES N 114,995 E 2,285,800

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | |
| | | | | | | | | | | 21 ■ | SM | BROWN FINE GRAINED, SUBROUNDED QUARTZ SAND, SOME SILT, TRACE SUBANGULAR GRAVEL, MEDIUM DENSE, NONCALCAREOUS, MOIST | — 1705 |
| 5 | P.C. | | | | | | | | | 13 ■ | | GRADES WITH THIN LAYERS OF COARSE SAND, VERY MOIST | — 1700 |
| 10 | SA,HA | | | | | 10.4 | | | | 7 ■ | | GRADES WITH MORE GRAVEL, TRACE CLAY | — 1695 |
| 15 | X-RAY | | | | | 9.4 | 123 | | | 46 ■ | | GRADES SOME SUBANGULAR METAMORPHIC GRAVEL, DENSE | — 1690 |
| 20 | | | | | | | | | | 56 ■ | | GRADES WITH COBBLES<br>GRADES SLIGHTLY CALCAREOUS | — 1685 |
| 25 | | | | | | | | | | 83 ■ | | GRADES WITH LESS GRAVEL AND COBBLES, NONCALCAREOUS | — 1680 |
| 30 | P.C. | | | | | | | | | 140/10" ■ | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE TO SOME GRAVEL AND COBBLES, VERY DENSE, CALCAREOUS, MOIST | — 1675 |
| 35 | SA,pH COLOR | | | | | 9.7 | | | | 125/9" ■ | | GRADES WITH MORE GRAVEL TO 3" IN DIAMETER | — 1670 |
| 40 | | | | | | | | | | 130/3" ⊠ | SP GP | BROWN MEDIUM ROUNDED QUARTZ SAND AND SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, VERY MOIST, NONCALCAREOUS | — 1665 |
| 45 | | | | | | | | | | 135/10" ⊠ | SP | BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, MOIST, SLIGHTLY CALCAREOUS | — 1660 |
| 50 | | | | | | | | | | 140/4" ⊠ | SP GP | BROWN MEDIUM TO COARSE ROUNDED QUARTZ SAND, SOME GRAVEL, TRACE SILT, SLIGHTLY CALCAREOUS, SOME COBBLES, DAMP | — 1655 |
| 55 | | | | | | | | | | 200/2" □ | | | — 1650 |
| 60 | P.C. | | | | | | | | | 100/1.5" □<br>* 200/3" ⊠ | | GRADES SAND AND ROUNDED METAMORPHIC GRAVEL AND BOULDERS<br>LARGE PEBBLES IN GRAVEL<br>CALCAREOUS | — 1645 |
| 65 | | | | | | | | | | 125/5" ⊠ | SP | LIGHT BROWN FINE TO MEDIUM ROUNDED QUARTZ SAND, TRACE SILT, TRACE GRAVEL, VERY DENSE, WET, CALCAREOUS | — 1640 |
| 70 | | | | | | | | | | 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 |
| 75 | | | | | | | | | | | | | |

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CRANDON PROJECT

LOG OF BORING DMB-2

SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-41.1

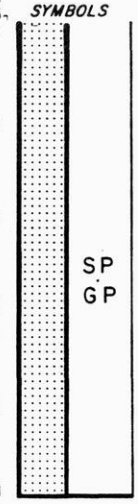
## BORING DMB-2 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 75 | P.C. | | | | | | | | |
| 80 | | | | | | | | | |
| 85 | | | | | | | | | |
| 90 | | | | | | | | | |
| 95 | | | | | | | | | |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |

BLOW COUNTS, SAMPLES

125/4" ⊠
144/4" ⊠
*119/6" ⊠
125/4" ⊠
169/8" ■
150/4" ⊠

SYMBOLS




DESCRIPTIONS

GRADES WITH MORE GRAVELS AND COBBLES TO 3 INCHES IN DIAMETER

GRADES FINE TO MEDIUM SAND, TRACE SILT

ELEVATION (FEET)

— 1630
— 1625
— 1620
— 1615
— 1610
— 1605

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 PVC SLOTTED 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 ON 6-21-78.

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

LOG OF BORING DMB-2
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-41.2

# BORING DMB-3

*SURFACE ELEVATION* 1687.93
COORDINATES: N 116,895 E 2,287,465

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | |
| | | | | | | | | | | 10 | SP | YELLOWISH-BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, LOOSE, NONCALCAREOUS | — 1585 |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | 6-12-78 ▼ 8.2' 18 | SP | LIGHT BROWN FINE TO MEDIUM QUARTZ SAND, SOME COARSE SAND, TRACE FINE GRAVEL, MEDIUM DENSE, NONCALCAREOUS | — 1580 |
| 10 | | | | | | | | | | 11 | SW | FINE GRAVEL GRADES OUT, BECOMES MOIST | — 1575 |
| 15 | SA, pH P.C. | | | | | 14.4 | | | | 7 | SP | LIGHT BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, LOOSE, NONCALCAREOUS | — 1570 |
| 20 | | | | | | | | | | 8 | | COARSE SAND AND FINE GRAVEL GRADES OUT | — 1565 |
| 25 | | | | | | | | | | 16 | SP | BROWN MEDIUM TO COARSE QUARTZ SAND, TRACE FINE GRAVEL, TRACE FINE SAND, MEDIUM DENSE, SLIGHTLY CALCAREOUS | — 1560 |
| 30 | | | | | | | | | | 13 | SM | BROWN FINE QUARTZ SAND WITH SILT, MEDIUM DENSE, CALCAREOUS | |
| | | | | | | | | | | | SP | BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, MEDIUM DENSE, CALCAREOUS | — 1555 |
| 35 | | | | | | | | | | 43 | | GRADES LIGHT BROWN, LESS FINE GRAVEL, DENSE | — 1550 |
| 40 | | | | | | | | | | 71 | SP | LIGHT BROWN FINE QUARTZ SAND, TRACE SILT, VERY DENSE, CALCAREOUS | — 1545 |
| 45 | | | | | | | | | | 31 | SP SM | LIGHT BROWN FINE SUBROUNDED QUARTZ SAND WITH SOME SILT, MEDIUM DENSE, CALCAREOUS, MOIST | — 1540 |
| 50 | | | | | | | | | | 21 | SP | LIGHT BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, MEDIUM DENSE, CALCAREOUS | — 1535 |
| 55 | | | | | | | | | | 27 | | | — 1530 |
| 60 | | | | | | | | | | 23 | | | — 1525 |
| 65 | | | | | | | | | | | | | |

BORING COMPLETED AT 61.5 FEET ON 5-18-78.
6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMETER INSTALLED ON 5-18-78.
2 INCH PVC SLOTTED FROM 55.0 TO 60.0 FEET.
GRAVEL PACK: 50.0 TO 60.0 FEET.
SAND: 40.0 TO 50.0 FEET.
GROUT: 0.0 TO 40.0 FEET.
GROUND WATER LEVEL RECORDED AT 8.2 FEET ON 6-12-78.

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

LOG OF BORING DMB-3
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-42

# BORING DMB-4

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | |
| | | | | | | | | | | 22 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SUBANGULAR TO SUBROUNDED COBBLES 3" MEDIUM DENSE, NONCALCAREOUS | |
| | | | | | | | | | | | | VERY WET AT 3.0 FEET | — 1640 |
| 5 | SA,HA COLOR | | | | | 7.5 | 130 | | | 29 | SM | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, TRACE TO SOME GRAVEL AND COBBLES, NONCALCAREOUS, DENSE | |
| | | | | | | | | | | | | | — 1635 |
| 10 | | | | | | | | | | 77 | | GRADES WITH COBBLES VERY DENSE | |
| | | | | | | | | | | | | | — 1630 |
| 15 | | | | | | | | | | 117/10" | SP | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | |
| 20 | SA,pH COLOR P.C. | | | | | 2.7 | | | | 117 | | | — 1625 |
| | | | | | | | | | | | | | — 1620 |
| 25 | | | | | | | | | | 146/10" | | | |
| 30 | P.C. | | | | | | | | | 180/10" | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, SOME FINE GRAVEL, VERY DENSE, CALCAREOUS, MOIST | — 1615 |
| 35 | SA,pH, COLOR P.C. | | | | | 3.6 | | | | 158/6" | | | — 1610 |
| | | | | | | | | | | | | GRADES WITH TRACE SUBANGULAR METAMORPHIC GRAVEL AND COBBLES | |
| 40 | | | | | | | | | | 175/4" | SM | | — 1605 |
| 45 | | | | | | | | | | 175/4" | | | — 1600 |
| 50 | P.C. | | | | | | | | | 150/4" | | | — 1595 |
| | | | | | | | | | | 6-24-78 ▼ 54.0' | | | |
| 55 | SA,HA COLOR | | | | | 11.9 | 131 | | | 150/5" | ML | BROWN SILT AND FINE SAND, TRACE CLAY, TRACE SUBANGULAR COARSE SAND AND FINE GRAVEL, VERY DENSE, CALCAREOUS, MOIST | — 1590 |
| | | | | | | | | | | | | GRADES WITH POCKET OF CLAYEY SILT | |
| 60 | | | | | | | | | | | | | — 1585 |

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

LOG OF BORING DMB-4
SHEET 1 OF 2

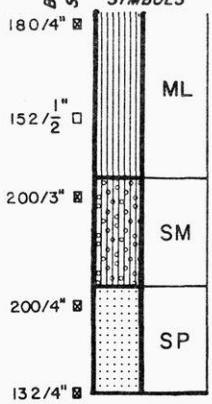
1/79

DAMES & MOORE

FIGURE B-431

## BORING DMB-4 (CONT'D)

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




DESCRIPTIONS

GRADES WITH COBBLES

ELEVATION (FEET)

— 1580

BROWN FINE GRAINED QUARTZ SAND SOME SILT, VERY DENSE, CALCAREOUS, WET — 1575

REDDISH-BROWN MEDIUM TO COARSE GRAINED QUARTZ SAND, TRACE SILT, TRACE SUBROUNDED WEATHERED METAMORPHIC GRAVEL, CALCAREOUS, VERY DENSE, DAMP — 1570

— 1565

BORING COMPLETED AT 80.3 FEET ON 5-22-78.
6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMTER 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

1/79

DAMES & MOORE

FIGURE B-43.2

# BORING DMB-5

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |

| 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 ■ | | | |
| 48 ■ | SP | LIGHT BROWN MEDIUM QUARTZ SAND, SOME FINE AND COARSE SAND, TRACE FINE GRAVEL, TRACE SILT | — 1680 |
| | | 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" ■ | SM · SW | 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" ■ | | | — 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

1/79

DAMES & MOORE

FIGURE B-441

## BORING DMB-5 (CONT'D)

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP GM | | — 1610 |
| 200/2" | | BROWN FINE SAND, SOME SILT WITH COARSE SAND AND FINE TO MEDIUM GRAVEL, VERY DENSE, CALCAREOUS | |
| 200/7" | SM GM | | |
| 200/4½" | | GRADES WITH MEDIUM SAND AND LESS SILT | — 1605 |
| 185/8" | | ORANGISH-BROWN FINE TO MEDIUM QUARTZ SAND, TRACE SILT, SOME COARSE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS | — 1600 |
| 200/3½" | SP SW | | — 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

1/79

DAMES & MOORE

FIGURE B-44.2

## BORING DMB-5A

*SURFACE ELEVATION* 1689.33

COORDINATES: N 112,130 E 2,285,545

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | NO SAMPLES TAKEN FROM 0-100 FEET<br>SEE LOG FOR BORING DMB-5 | |
| 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

1/79

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FIGURE B-45 1

## BORING DMB-5A CONT'D

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | — 1610 |
| 85 | | | | | | | | | | | | | — 1605 |
| 90 | | | | | | | | | | | | | — 1600 |
| 95 | | | | | | | | | | | | | — 1595 |
| 100 | | | | | | | | | | 1-11-79 ▼ 99.5' | | | — 1590 |
| 105 | | | | | | | | | | 150/½" | SM | GRAYISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, WITH SILT AND FINE TO MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS | — 1585 |
| 110 | | | | | | | | | | 200/3" | SP | YELLOWISH-BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, WET, VERY DENSE, SLIGHTLY CALCAREOUS | — 1580 |
| 115 | | | | | | | | | | 100/10" | SM | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, TRACE FINE GRAVEL, WET, VERY DENSE, NONCALCAREOUS | — 1575 |
| 120 | | | | | | | | | | 200/2" | | | — 1570 |

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

1/79

DAMES & MOORE

FIGURE B-452

# BORING DMB-6

*SURFACE ELEVATION* 1666.47
COORDINATES: N 112,385 E 2,283,015

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| | X-RAY | | | | | | | | |
| 5 | HA, SA COLOR P.C. | | | | | 10.6 | 128 | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | HA, SA COLOR | | | | | 10.4 | 126 | | |
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |
| 75 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BLACK SILT WITH SOME ORGANICS AND SAND | 1665 |
| 7 | ML | BROWN SILT WITH FINE SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE CLAY, LOOSE, NONCALCAREOUS, WET | |
| 14 | SM | BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, MEDIUM DENSE, NONCALCAREOUS | 1660 |
| 12 | SP SM | REDDISH-BROWN FINE SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, LOOSE TO MEDIUM DENSE, NONCALCAREOUS | 1655 |
| 42 | SP SW | BROWN FINE TO MEDIUM SAND, SOME COARSE SAND AND FINE GRAVEL, TRACE SILT, DENSE, NONCALCAREOUS | 1650 |
| 86 | SP | LIGHT BROWN MEDIUM QUARTZ SAND, TRACE COARSE SAND, TRACE FINE TO MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS | 1645 |
| 69 | SM | BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND, TRACE TO SOME FINE TO MEDIUM GRAVEL, SOME SILT, VERY DENSE, NONCALCAREOUS | 1640 |
| 170 | | GRADES LESS MEDIUM GRAVEL | 1635 |
| 150/7 1/2" | | GRADES REDDISH-BROWN | 1630 |
| 183 | | GRADES ORANGISH BROWN | 1625 |
| 160/8" | | GRADES REDDISH-BROWN | 1620 |
| 170/10" | | | 1615 |
| 200/6 1/2" | | | 1610 |
| 170/9 1/2" | | GRADES WITH OCCASIONAL MEDIUM GRAVEL | 1605 |
| 180/11" | | | 1600 |
| 157 | | | 1595 |

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

LOG OF BORING DMB-6
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-46.1

## BORING DMB-6 (CONT'D)

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

BLOW COUNTS / SAMPLES

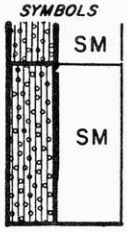
▼ 76.4' 6-22-78

120 ■

150 ■

140 ■

SYMBOLS




DESCRIPTIONS

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

ELEVATION (FEET)

— 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

1/79

DAMES & MOORE

FIGURE B-46.2

## BORING DMB-7

*SURFACE ELEVATION* 1653.67

COORDINATES: N 106,150 E 2,287,845

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | SA,HA COLOR | | | | | 8.1 | 126 | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | P.C. | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | P.C. | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | P.C. | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BLACK SILT, SOME ORGANICS | |
| 13 | ML | BROWN SILT, TRACE FINE GRAVEL, TRACE FINE SAND, MEDIUM DENSE, NONCALCAREOUS, MOIST | |
| | | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME FINE TO MEDIUM GRAVEL, SOME SILT, MEDIUM DENSE, MOIST, NONCALCAREOUS | — 1650 |
| 16 | SM·GM | | |
| 16 | | SAMPLE SATURATED AT 9.5 FEET | — 1645 |
| 25 | | | — 1640 |
| 37 | SP | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE SUBROUNDED METAMORPHIC GRAVEL, DENSE, NONCALCAREOUS, WET | — 1635 |
| | | GRAVEL OR BOULDER AT 21.0 - 23.5 FEET | |
| 105/8" | SP·GP | REDDISH-BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND AND SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, SOME GRAVEL HIGHLY WEATHERED, NONCALCAREOUS, VERY DENSE | — 1630 |
| 125/6" | | | — 1625 |
| 181 | SP | BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE TO MEDIUM SUBROUNDED METAMORPHIC GRAVEL, VERY DENSE, NONCALCAREOUS, DAMP | — 1620 |
| 200/6" | SP·GP | BROWN MEDIUM GRAINED SUBANGULAR QUARTZ SAND WITH FINE TO MEDIUM SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, NONCALCAREOUS, WET | — 1615 |
| 185 | | GRADES WITH LESS GRAVEL | — 1610 |
| 150/10" | SP·SW | LIGHT BROWN FINE TO MEDIUM GRAINED SUBANGULAR QUARTZ SAND, SOME ANGULAR COARSE SAND, VERY DENSE, NONCALCAREOUS, WET | |
| | | BOULDER 47.0 - 47.5 FEET | — 1605 |
| | | BOULDER AT 50.0 FEET | |
| 225/7" | | | — 1600 |

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

LOG OF BORING DMB-7
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-47.1

## BORING DMB-7 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |
| 65 | SA,HA COLOR | | | | | 13.0 | | | |
| 70 | | | | | | | | | |
| 75 | | | | | | | | | |
| 80 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | | — 1595 |
| 180/9" | SP | BROWN FINE TO MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE FINE TO MEDIUM SUBANGULAR GRAVEL, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS, WET | |
| 200/6" | | | — 1590 |
| ▼ 65.7' 6-22-78 | | LIGHT BROWN FINE TO MEDIUM SUBANGULAR QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR METAMORPHIC GRAVEL, NONCALCAREOUS, VERY DENSE, WET | |
| 170/6" | SP · SW | COBBLE AT 66.0 FEET<br>GRADES POORLY GRADED | — 1585 |
| 150/½" | | | — 1580 |
| 215/8" | | | — 1575 |

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

1/79

DAMES & MOORE

FIGURE B-47.2

# BORING DMB-8

*SURFACE ELEVATION* 1622.74

COORDINATES: N 114,595 E 2,287,840

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 15 ■ | SM · ML | BROWN FINE GRAINED QUARTZ SAND, SOME SILT, MEDIUM DENSE, NONCALCAREOUS, MOIST | — 1620 |
| 18 □ | | GRADES FINE TO MEDIUM SAND, TRACE FINE GRAVEL | — 1615 |
| 22 ■ | | | |
| 18 □ | | GRADES TRACE COBBLES | — 1610 |
| 18 ■ | GP · SP | BROWN MEDIUM TO COARSE SUBROUNDED QUARTZ AND METAMORPHIC SAND AND SUBANGULAR METAMORPHIC GRAVELS TO ¾" DIAMETER, MEDIUM DENSE MOIST, NONCALCAREOUS | — 1605 |
| 61 ■ | SP · SM | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, SOME FINE SUBANGULAR GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | — 1600 |
| 140/11" ■ | | GRADES WITH MORE SILT AND TRACE CLAY, CALCAREOUS | |
| | | COBBLES TO 3.0 FEET IN DIAMETER FROM 26.0 TO 30.0 FEET | — 1595 |
| 162/8" ■ | | | |
| 6-24-78 ▼ 33.7' | | | — 1590 |
| 150/6" ■ | | | |
| | | | — 1585 |
| 150/8" ■ | | | |
| | | | — 1580 |
| 150/10" ■ | | | |
| | | | — 1575 |
| 150/9" ■ | | | |
| | | | — 1570 |

BORING COMPLETED AT 50.7 FEET ON 6-7-78.
NO CASING USED.
PIEZOMETER INSTALLED ON 6-7-78.
2 INCH PVC SLOTTED FROM 45.0 TO 50.0 FEET.
GRAVEL PACK: 40.0 TO 50.0 FEET.
SAND: 35.0 TO 40.0 FEET.
BENTONITE: 34.0 TO 35.0 FEET.
GROUT: 0.0 TO 34.0 FEET.
GROUND WATER LEVEL RECORDED AT 33.7 FEET ON 6-24-78.

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

LOG OF BORING DMB-8
SHEET 1 OF 1

1/79

DAMES & MOORE

FIGURE B-48

# BORING DMB-9

SURFACE ELEVATION 1661.61

COORDINATES: N 110,555 E 2,287,235

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | SM | BROWN SILTY SAND, SOME GRAVEL, MEDIUM DENSE | |
| | | | | | | | | | | 18 ■ | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, TRACE SILT, MEDIUM DENSE, VERY MOIST, NONCALCAREOUS | — 1660 |
| 5 | | | | | | | | | | *14 ◪ | | | |
| | P.C. | | | | | | | | | 32 ■ | | BOULDER AT 7.0 FEET | — 1655 |
| 10 | | | | | | | | | | *19 ◪ | SP | | |
| | | | | | | | | | | 25 ■ | | GRADES WITH COBBLES | — 1650 |
| 15 | | | | | | | | | | *30 ◪ | | BOULDER AT 14.0 FEET | |
| | | | | | | | | | | 59/8" ■ | | | — 1645 |
| | | | | | | | | | | *36 ◪ | | GRADES SOME GRAVEL | |
| 20 | P.C. | | | | | | | | | 51 ■ | | LIGHT BROWN COARSE SUBROUNDED QUARTZ SAND, TRACE SILT, SOME FINE SUBANGULAR METAMORPHIC GRAVEL, NONCALCAREOUS, VERY DENSE | — 1640 |
| | | | | | | | | | | *18 ◪ | | | |
| | | | | | | | | | | 128/9" ■ | | | |
| 25 | | | | | | | | | | *190 ◪ | SP | | |
| | | | | | | | | | | 176/8" ■ | | GRADES WITH TRACE SILT AND COBBLES | — 1635 |
| | | | | | | | | | | *156 ◪ | | | |
| 30 | | | | | | | | | | 140/6" ⊠ | | BROWN FINE SUBROUNDED QUARTZ SAND WITH SILT, SOME SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, VERY MOIST | — 1630 |
| | | | | | | | | | | | SP SM | | |
| 35 | | | | | | | | | | 150/4" ⊠ | | GRADES WITH LESS SILT | — 1625 |
| 40 | | | | | | | | | | 150/4" ⊠ | | LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, SOME SUBANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, VERY MOIST, NONCALCAREOUS | — 1620 |
| 45 | | | | | | | | | | 154/4" ⊠ | | | — 1615 |
| 50 | | | | | | | | | | 153/9" ■ | SP | GRADES WITHOUT SILT | |
| | | | | | | | | | | | | | — 1610 |
| 55 | | | | | | | | | | 181/6" ⊠ | | GRADES TRACE CLAY | — 1605 |
| 60 | | | | | | | | | | 150/6" ■ | | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, VERY DENSE, DAMP, NONCALCAREOUS | |
| | | | | | | | | | | | SP | | — 1600 |
| 65 | | | | | | | | | | 150/5" ⊠ | | LIGHT BROWN COARSE GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, NONCALCAREOUS | — 1595 |
| | | | | | | | | | | 6-27-78 ▼ 68.4' | | | |
| 70 | P.C. | | | | | | | | | ▼ 70.0 150/6" ⊠ | SP | | |
| | | | | | | | | | | ▼ 71.4' | | | — 1590 |
| 75 | | | | | | | | | | | | | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-9

SHEET 1 OF 4

1/79

DAMES & MOORE

FIGURE B-49 1

## BORING DMB-9 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | *117 | SP | | 1585 |
| 80 | | | | | | | | | | 150/5" | | GRADES WITH FINE GRAVEL | 1580 |
| 85 | | | | | | | | | | 153/5" | | GRADES TRACE FINE GRAVEL | 1575 |
| 90 | | | | | | | | | | 150/5" | | | 1570 |
| 95 | | | | | | | | | | 150/5" | SP | LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, SOME FINE SUBANGULAR METAMORPHIC GRAVEL, TRACE BROWN SILT, VERY DENSE, MOIST, SLIGHTLY CALCAREOUS | 1565 |
| 100 | | | | | | | | | | 150/5" | SP | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, MICACEOUS, VERY DENSE, MOIST **NONCALCAREOUS** | 1560 |
| 105 | | | | | | | | | | | | | |
| 110 | | | | | | | | | | 155/11" | SP | REDDISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, MOIST, SLIGHTLY CALCAREOUS | 1555 |
| 115 | | | | | | | | | | | | | 1550 |
| 120 | | | | | | | | | | | | | 1545 |
| 125 | | | | | | | | | | 118/11" | SM ML | GRADES TO GRAY<br>DARK GRAYISH-BROWN SILTY SAND, TRACE CLAY, SOME COBBLES TO $\frac{1}{2}$" IN DIAMETER, VERY DENSE, MOIST, CALCAREOUS | 1540 |
| 130 | | | | | | | | | | 150/8" | SP | BROWN MEDIUM SUBROUNDED QUARTZ SAND, TRACE COBBLES, VERY DENSE, CALCAREOUS, VERY WET | 1535 |
| 135 | | | | | | | | | | | | | 1530 |
| 140 | | | | | | | | | | 150/9" | SP | REDDISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, MOIST, CALCAREOUS | 1525 |
| 145 | | | | | | | | | | | | | 1520 |
| 150 | | | | | | | | | | | | | 1515 |

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CRANDON PROJECT

LOG OF BORING DMB-9
SHEET 2 OF 4

1/79

DAMES & MOORE | FIGURE B-492

## BORING DMB-9 (CONT'D)

| DEPTH (FEET) | BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|
| 150 | 150/8" ■ | | | 1510 |
| | | | 1 FOOT BOULDER AT 155.0 FEET | |
| 155 | | | 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 | 150/4½" ⊠ | | | 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 | | | | |

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

EXXON MINERALS COMPANY, U.S.A.
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LOG OF BORING DMB-9
SHEET 3 OF 4

1/79

DAMES & MOORE | FIGURE B-49.3

## BORING DMB-9 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 225 | | | | | | | | | |
| 230 | | | | | | | | | |
| 235 | | | | | | | | | |
| 240 | | | | | | | | | |
| 245 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP | | 1435 |
| *120 | SP | BROWN FINE GRAINED SAND, TRACE SILT, TRACE GRAVEL, VERY DENSE, CALCAREOUS, MOIST | 1430 |
| | SM | | 1425 |
| *150/6" | ML | BLUISH-GRAY SILTY SAND AND CLAYEY SILT, SOME WHITE CALCITE(?) CRYSTALS<br>DECOMPOSED BEDROCK | 1420 |

BORING COMPLETED AT 242.0 FEET ON 6-5-78.
6 INCH CASING USED TO A DEPTH OF 5.0 FEET.
CORE BARREL DROPPED INTO BOREHOLE.
BOREHOLE CAVED TO SURFACE.

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

LOG OF BORING DMB-9
SHEET 4 OF 4

1/79

DAMES & MOORE | FIGURE B-494

# BORING DMB-9A

*SURFACE ELEVATION* 1661.61

COORDINATES: N 110,555 E 2,287,235

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | BLOW COUNTS SAMPLES: PERCENT RECOVERED | BLOW COUNTS SAMPLES: RQD | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | NO SAMPLES TAKEN FROM 0.0-240.5 FEET<br>SEE LOG FOR DMB-9 | — 1660 |
| 240 | | | | | | | | 55 | 20 | | PRECAMBRIAN GREENSTONE (METAMORPHOSED TUFF), MODERATELY FRACTURED, MODERATELY WEATHERED, IRON STAINING ALONG FRACTURES | — 1420 |
| | | | | | | | | 77 | 0 | | HIGHLY WEATHERED 244.5-245.5 FEET (SEPARATES ALONG BEDDING) | |
| 245 | | | | | | | | 100 | 20 | | MODERATELY FRACTURED, FRACTURES FOLLOW FOLIATION, LESS WEATHERED THAN RUN 2 | — 1415 |
| 250 | | | | | | | | 96 | 96 | | VERY COMPETENT, 45°-60° FRACTURING, SOME FRACTURES HEALED, IRON STAINING ON OPEN FRACTURES | — 1410 |
| | | | | | | | | 100 | 90 | | SLIGHTLY WEATHERED INCLINED 45°-60° FRACTURES SPACED 4-10 INCHES APART, IRON STAINING ON FRACTURE PLANES, 70° FRACTURE AT 252.4' | |
| 255 | | | | | | | | 98 | 89 | | INCLINED FRACTURES 2-10 INCHES APART, 2 FRACTURES STEEPLY INCLINED, IRON STAINING ON FRACTURE PLANES | — 1405 |
| 260 | | | | | | | | | | | BORING COMPLETED AT 260.5 FEET ON 6-24-78. | — 1400 |
| 265 | | | | | | | | | | | | |

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

1/79

DAMES & MOORE

FIGURE B-50

# BORING DMB-10

*SURFACE ELEVATION* 1619.11

COORDINATES: N 117,720 E 2,271,170

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | SM | BLACK SANDY SILT WITH ORGANICS | |
| | | | | | | | | | | | SM | BROWN SILTY SAND | |
| 5 | | | | | | | | | | 15 ■ | 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 | |
| 10 | P.C. | | | | | | | | | 16 ■ | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR GRAVEL, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS | — 1610 |
| | P.C. | | | | | | | | | 22 ■ | | | — 1605 |
| 15 | | | | | | | | | | | | | |
| | SA, pH COLOR P.C. | | | | | 11.8 | | | | 36 ⊠ | SP | LIGHT BROWN MEDIUM ROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE SUBANGULAR METAMORPHIC AND CARBONATE GRAVEL, DENSE, CALCAREOUS | — 1600 |
| 20 | | | | | | | | | | | | GRADES SOME FINE GRAVEL | |
| | P.C. | | | | | | | | | 10 ■ | SP | BROWN FINE TO MEDIUM SAND, TRACE SILT, SOME COARSE SAND AND FINE TO MEDIUM GRAVEL, WET | — 1595 |
| 25 | | | | | | | | | | | | | |
| | X-RAY | | | | | | | | | 41 ■ | | BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE TO SOME COARSE SAND AND FINE GRAVEL, TRACE MEDIUM GRAVEL, DENSE, CALCAREOUS | — 1590 |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | 70/4" ⊠ | | BOULDER AT 34.0' | — 1585 |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | 105/9" ■ | | | — 1580 |
| 40 | | | | | | | | | | | | BOULDER FROM 42.0' TO 43.0' | |
| | | | | | | | | | | 180/9" ■ | | BOULDER AT 45.0' | — 1575 |
| 45 | | | | | | | | | | | SP | | |
| | | | | | | | | | | 150/4" ■ | SM | BOULDER AT 48.0' | — 1570 |
| 50 | | | | | | | | | | | | | |
| | | | | | | | | | | 150/2 ⊠ | | | — 1565 |
| 55 | | | | | | | | | | | | | |
| | | | | | | | | | | 6-26-78 ▼ 57.8' 200/8" ■ | | | — 1560 |
| 60 | | | | | | | | | | | | BOULDER AT 62.0' | |
| | | | | | | | | | | 150/4½" ⊠ | | | — 1555 |
| 65 | | | | | | | | | | | | | |
| | P.C. | | | | | | | | | 135/9" ■ | | | — 1550 |
| 70 | | | | | | | | | | | | | |
| | | | | | | | | | | 180/5" ■ | | GRADES SOME SILT | — 1545 |
| 75 | | | | | | | | | | | | | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-10

SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-51.1

## BORING DMB-10 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | | | |
| | | | | | | | | | | 150/4 1/2" ⊠ | | | — 1540 |
| 80 | | | | | | | | | | | | | |
| | | | | | | | | | | 200/4" ⊠ | | | — 1535 |
| 85 | | | | | | | | | | | | | |
| | | | | | | | | | | 225/5" ⊠ | | SP SM | — 1530 |
| 90 | | | | | | | | | | | | | |
| | | | | | | | | | | 185/7" ■ | | | — 1525 |
| 95 | | | | | | | | | | | | | |
| | | | | | | | | | | 225/6" ■ | | BOULDER FROM 98.0' TO 99.0' | — 1520 |
| 100 | | | | | | | | | | | | | |

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

1/79

DAMES & MOORE

FIGURE B-51.2

# BORING DMB-11

*SURFACE ELEVATION* 1656.85

COORDINATES: N 109,960 E 2,273,820

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BLACK SILT, TRACE SAND, TRACE ORGANICS | |
| 22 | ML | YELLOWISH-BROWN SILT, TRACE TO SOME FINE TO MEDIUM SAND, TRACE FINE GRAVEL, MEDIUM DENSE, NONCALCAREOUS | — 1655 |
| | SM | YELLOWISH-BROWN FINE TO MEDIUM SAND, WITH SILT, TRACE COARSE SAND AND FINE GRAVEL, MEDIUM DENSE, NONCALCAREOUS | |
| 52 | | | — 1650 |
| 63 | | REDDISH-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE TO SOME COARSE SAND AND FINE TO MEDIUM GRAVEL, OCCASIONAL COARSE GRAVEL, COBBLES, GRAVEL IS WEATHERED, DENSE TO VERY DENSE, NONCALCAREOUS. | |
| | | OCCASIONAL GRAVEL LAYERS | — 1645 |
| 112 | | | |
| | | | — 1640 |
| 138/9" | SP · SM | | |
| | | | — 1635 |
| 115 | | | |
| | | | — 1630 |
| 165 | | | |
| | | | — 1625 |
| 107/9" | | | |
| | | | — 1620 |
| 110/9" | SP | REDDISH-BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE GRAVEL, VERY DENSE, NONCALCAREOUS | |
| | SP · SM | REDDISH-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS | — 1615 |
| 135/9" | | | |
| | | | — 1610 |
| 150/9" | | | |
| | | | — 1605 |
| 205/10" | SP · SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR GRAVEL, TRACE SILT, OCCASIONAL MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS | |
| | | | — 1600 |
| 125/8" | | GRADES LESS COARSE SAND | |
| | | | — 1595 |
| 195/10" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE FINE SUBROUNDED GRAVEL, VERY DENSE, NONCALCAREOUS | |
| | | | — 1590 |
| 222/7" | SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, SOME FINE SUBANGULAR GRAVEL, TRACE MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | |
| | SP · SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE SUBROUNDED GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | — 1585 |
| 225/11" | | | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-11

SHEET 1 OF 2

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FIGURE B-52.1

## BORING DMB-11 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | — 1580 |
| 80 | | | | | | | | | | 225/11" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, OCCASIONAL FINE GRAVEL, VERY DENSE, CALCAREOUS | |
| | | | | | | | | | | | | | — 1575 |
| 85 | | | | | | | | | | 220/10" | SP · SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE SUBANGULAR TO SUBROUNDED GRAVEL, TRACE SILT, OCCASIONAL MEDIUM TO COARSE GRAVEL, VERY DENSE, CALCAREOUS | |
| | | | | | | | | | | 8-3-78 ▼ 88.2 | | | — 1570 |
| 90 | P.C. | | | | | | | | | 150 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT | |
| | | | | | | | | | | | SP · SW | BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS | — 1565 |
| | | | | | | | | | | | SP | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT | |
| 95 | | | | | | | | | | 148/10" | SP · SW | BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | |
| | | | | | | | | | | | | | — 1560 |
| 100 | | | | | | | | | | 190 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SUBANGULAR COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | |

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

1/79

DAMES & MOORE

FIGURE B-52.2

# BORING DMB-12

*SURFACE ELEVATION* 1586.05

COORDINATES: N 107,390 E 2,275,205

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 30 | SM SP | BROWN FINE GRAINED QUARTZ SAND, SOME SILT, TRACE SUBROUNDED GRAVEL, MEDIUM DENSE, NONCALCAREOUS, MOIST | 1585 |
| 5 | | | | | | | | | | 20 | | | 1580 |
| 10 | | | | | | | | | | | | BOULDER 1.5 FEET DIAMETER AT 8.0 FEET. | |
| | | | | | | | | | | 34 | | GRADES DENSE | 1575 |
| 15 | | | | | | | | | | 105 | GP | LIGHT BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND AND FINE TO MEDIUM SUBROUNDED TO SUBANGULAR METAMORPHIC GRAVELS, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS, MOIST | 1570 |
| 20 | SA, pH COLOR P.C. | | | | | 6.3 | | | | 6-30-78 ▼ 20.6' 18 | | GRADES MEDIUM DENSE, MOIST | 1565 |
| 25 | | | | | | | | | | 63 | | GRADES VERY DENSE TRACE COBBLES | 1560 |
| 30 | | | | | | | | | | 126/10" | | | 1555 |
| | | | | | | | | | | | | GRADES WITH BOULDERS UP TO 3 FEET IN DIAMETER | |
| 35 | | | | | | | | | | 131/6" | | | 1550 |
| 40 | | | | | | | | | | 125 | | | 1545 |
| 45 | | | | | | | | | | 151 | | | 1540 |
| 50 | | | | | | | | | | 71 | | | 1535 |
| 55 | | | | | | | | | | 156/9" | SP GP | BROWN MEDIUM TO COARSE SAND AND SUBANGULAR METAMORPHIC AND CARBONATE GRAVELS, TRACE SILT, VERY DENSE, CALCAREOUS | 1530 |
| 60 | | | | | | | | | | *170/6" | | | |

EXXON MINERALS COMPANY, U.S.A.
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LOG OF BORING DMB-12
SHEET 1 OF 2

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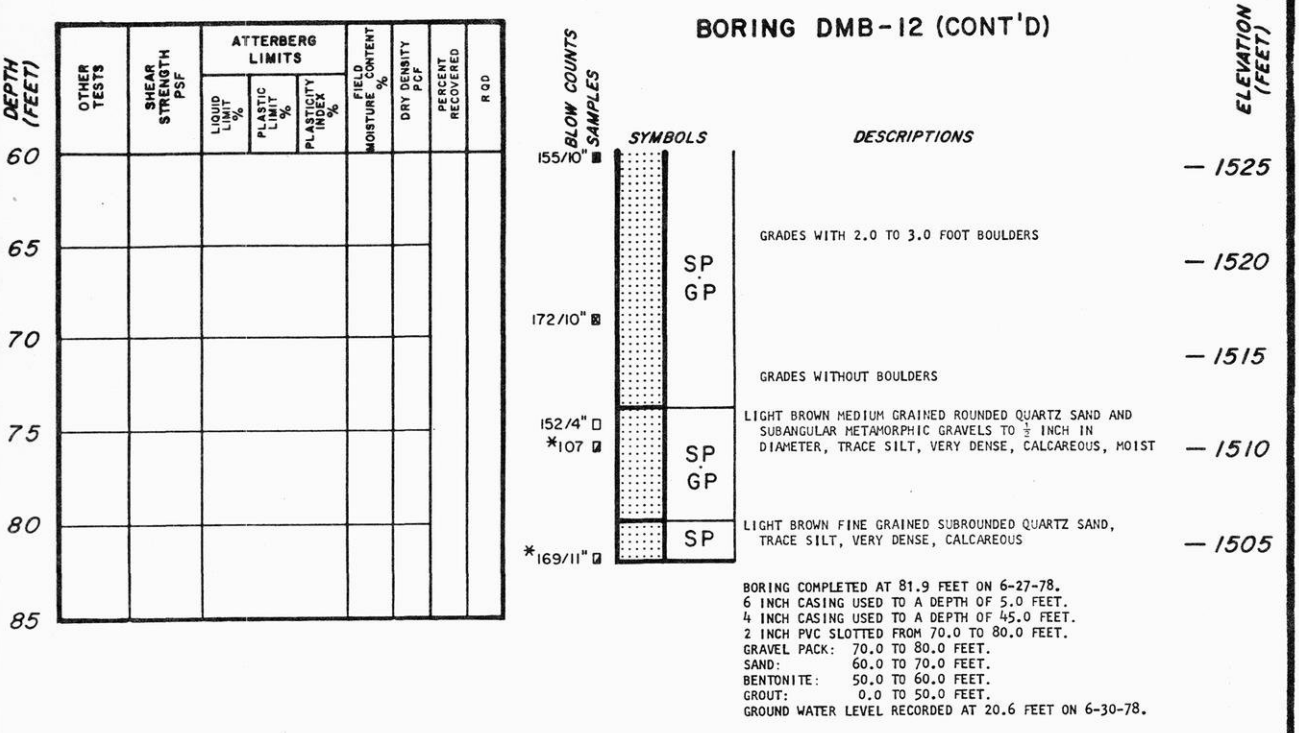
FIGURE B-53.1

## BORING DMB-12 (CONT'D)




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.

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

LOG OF BORING DMB-12
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-532

# BORING DMB-13

*SURFACE ELEVATION* 1609.39

COORDINATES: N 107,110 E 2,269,980

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | SA, pH COLOR P.C. | | | | | 6.3 | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 12 | ML CL | BROWN SILT WITH CLAY, OCCASIONAL MEDIUM GRAVEL, OCCASIONAL FINE TO MEDIUM SAND LAYERS, MEDIUM DENSE, NONCALCAREOUS | — 1605 |
| 15 | SM | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, MEDIUM DENSE, NONCALCAREOUS | |
| 11 | | | — 1600 |
| 40 | SP | LIGHT BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, DENSE, NONCALCAREOUS | — 1595 |
| | SP SM | BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS | |
| 68 | SW | BROWN FINE TO COARSE SAND, SOME FINE GRAVEL, TRACE SILT, VERY DENSE, NONCALCAREOUS | — 1590 |
| | SP SM | BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL | |
| 150 | SP SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | — 1585 |
| 50 | SP SM | BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, VERY DENSE, CALCAREOUS | — 1580 |
| 43 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SUBROUNDED COARSE SAND, TRACE SILT, DENSE, CALCAREOUS | — 1575 |
| 47 | SP SW SP | LIGHT BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE TO MEDIUM ROUNDED GRAVEL, TRACE SILT, DENSE, CALCAREOUS<br>GRAY FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE SILT, DENSE, CALCAREOUS | — 1570 |
| 49 | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, OCCASIONAL FINE GRAVEL, TRACE SILT, DENSE, CALCAREOUS | — 1565 |
| 23 | SP | GRADES MEDIUM DENSE | — 1560 |
| 34 | | | — 1555 |
| 8-3-78 ▼ 56.4' | | | |
| | ML | THIN LAYER OF SILT AT 58.6 FEET | |
| 64 | SM | REDDISH-BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL, SOME SILT, VERY DENSE, CALCAREOUS | |

BORING COMPLETED AT 60.0 FEET ON 6-29-78.
6 INCH CASING USED TO A DEPTH OF 9.0 FEET.
PIEZOMETER INSTALLED ON 6-29-78.
2 INCH PVC SLOTTED FROM 50.0 TO 60.0 FEET.
GRAVEL PACK: 48.0 TO 60.0 FEET.
SAND: 46.0 TO 48.0 FEET.
BENTONITE: 41.0 TO 46.0 FEET.
GROUT: 0.0 TO 41.0 FEET.
GROUND WATER LEVEL RECORDED AT 56.4 FEET ON 8-3-78.

EXXON MINERALS COMPANY, U.S.A.
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LOG OF BORING DMB-13
SHEET 1 OF 1

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FIGURE B-54

# BORING DMB-14

*SURFACE ELEVATION* 1638.69

COORDINATES: N 110,075 E 2,270,985

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML SM | BROWN SILTY SAND WITH TRACE CLAY AND COBBLES, MEDIUM DENSE | |
| | | | | | | | | | | 22 | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, SOME SUBROUNDED METAMORPHIC GRAVELS, MEDIUM DENSE, NONCALCAREOUS, MOIST | 1635 |
| 5 | | 1640 | | | | 6.4 | 120 | | | 21 | SP | | |
| | | | | | | | | | | | | | 1630 |
| 10 | | | | | | | | | | 77 | SP | LIGHT BROWN MEDIUM GRAINED SUBANGULAR QUARTZ SAND, TRACE FINE SUBANGULAR GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | |
| | | | | | | | | | | | | | 1625 |
| 15 | | | | | | | | | | 124 | SP GP | LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, WITH FINE TO MEDIUM ANGULAR METAMORPHIC GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST | |
| 20 | | | | | | | | | | 128 | | REDDISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE TO SOME SILT, SOME FINE SUBROUNDED GRAVEL, TRACE MEDIUM GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | 1620 |
| 25 | SA, pH COLOR P.C. | | | | | 6.9 | 131 | | | 129/10" | | | 1615 |
| | | | | | | | | | | | | | 1610 |
| 30 | | | | | | | | | | 150/10" | | | |
| 35 | | | | | | | | | | 110/10" | | | 1605 |
| 40 | | | | | | | | | | 119/9" | SM | | 1600 |
| 45 | | | | | | | | | | 140/10" | | | 1595 |
| 50 | | | | | | | | | | 149/9" | | | 1590 |
| 55 | X-RAY pH | | | | | | | | | 150/10" | | | 1585 |
| 60 | | | | | | | | | | 109/9" | | | 1580 |
| 65 | | | | | | | | | | 143/9" | SP | YELLOWISH-BROWN MOTTLED RED MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE SUBROUNDED GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | 1575 |
| 70 | | | | | | | | | | 150/8" | SP | LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, NONCALCAREOUS, MOIST | 1570 |
| 75 | | | | | | | | | | | | | 1565 |

EXXON MINERALS COMPANY, U.S.A.

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LOG OF BORING DMB-14

SHEET 1 OF 2

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FIGURE B-55.1

## BORING DMB-14 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | 124/8" | | | |
| | | | | | | | | | | ▼ 76.6' 8-3-78 | | | — 1560 |
| 80 | | | | | | | | | | 152/10" | | GRADES WITHOUT SILT, VERY MOIST | |
| | | | | | | | | | | | | VERY WET | — 1555 |
| 85 | | | | | | | | | | 141/10.5" | SP | GRADES SLIGHTLY CALCAREOUS, WET | |
| 90 | | | | | | | | | | 130/9" | | | — 1550 |
| | | | | | | | | | | | | | — 1545 |
| 95 | | | | | | | | | | 140/9" | | GRADES TRACE SUBANGULAR QUARTZ GRAVEL | |
| 100 | | | | | | | | | | 97/10" | | | — 1540 |
| 105 | | | | | | | | | | | | | |

BORING COMPLETED AT 100.9 FEET ON 6-29-78.
6 INCH CASING USED TO A DEPTH OF 6.0 FEET.
PIEZOMETER INSTALLED ON 6-29-78.
2 INCH PVC SLOTTED FROM 90.0 TO 100.0 FEET.
GRAVEL PACK: 87.0 TO 100.0 FEET.
SAND: 82.0 TO 87.0 FEET.
BENTONITE: 79.0 TO 82.0 FEET.
GROUT: 0.0 TO 79.0 FEET.
GROUND WATER LEVEL RECORDED AT 76.6 FEET ON 8-3-78.

EXXON MINERALS COMPANY, U.S.A.
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LOG OF BORING DMB-14
SHEET 2 OF 2

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DAMES & MOORE

FIGURE B-552

# BORING DMB-15

*SURFACE ELEVATION* 1637.52

COORDINATES: N 113,660 E 2,272,025

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | NO SAMPLES TAKEN FROM 0.0 TO 50.0 FEET SEE LOG FOR DMA-1 | 1635 |
| 5 | | | | | | | | | | | | | 1630 |
| 10 | | | | | | | | | | | | | 1625 |
| 15 | | | | | | | | | | | | | 1620 |
| 20 | | | | | | | | | | | | | 1615 |
| 25 | | | | | | | | | | | | | 1610 |
| 30 | | | | | | | | | | | | | 1605 |
| 35 | | | | | | | | | | | | | 1600 |
| 40 | | | | | | | | | | | | | 1595 |
| 45 | | | | | | | | | | | | | 1590 |
| 50 | COLOR SA, pH P.C. | | | | | 11.3 | | | | 19 5/9" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, SOME FINE GRAVEL, VERY DENSE, NONCALCAREOUS | 1585 |
| 55 | | | | | | | | | | 22 5/8 1/2" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, VERY DENSE, NONCALCAREOUS, MOIST | 1580 |
| 60 | | | | | | | | | | | | | |

EXXON MINERALS COMPANY, U.S.A.
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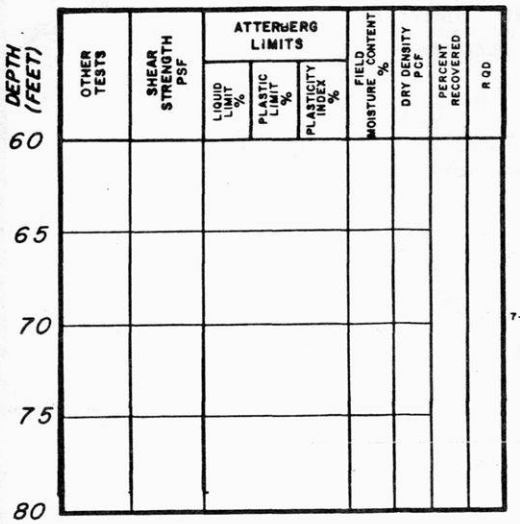
LOG OF BORING DMB-15
SHEET 1 OF 2

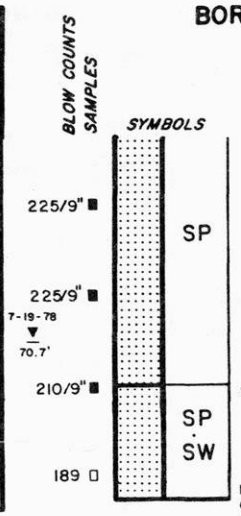
1/79

DAMES & MOORE

FIGURE B-56.1

## BORING DMB-15 (CONT'D)




DESCRIPTIONS

ELEVATION (FEET)

— 1575

— 1570

GRADES SLIGHTLY CALCAREOUS WITH SLIGHTLY MORE COARSE SAND AND FINE GRAVEL

— 1565

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

— 1560

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

1/79

DAMES & MOORE

FIGURE B-562

# BORING DMB-16

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | SM | REDDISH-BROWN FINE SAND WITH SILTY GRAVEL | |
| | | | | | | | | | | 51 | | REDDISH-BROWN FINE SAND, SOME MEDIUM SAND, SOME SILT, TRACE TO SOME FINE GRAVEL, TRACE COARSE SAND, OCCASIONAL MEDIUM GRAVEL, DENSE, NONCALCAREOUS | |
| 5 | | | | | | | | | | 72 | | BOULDER AT 4.5 FEET | 1670 |
| | | | | | | | | | | | | GRADES WITH MORE FINE TO MEDIUM GRAVEL<br>BOULDER AT 7.0 FEET | |
| 10 | SA,HA<br>COLOR | | | | | 7.7 | 132 | | | 60/8" | | | 1665 |
| | | | | | | | | | | 158/11" | | | |
| 15 | | | | | | | | | | | | | 1660 |
| | | | | | | | | | | 160/11" | | | |
| 20 | | | | | | | | | | | SM<br>GM | | 1655 |
| | | | | | | | | | | | | GRADES WITH MORE MEDIUM SAND | |
| 25 | | | | | | | | | | 135/9" | | | 1650 |
| | | | | | | | | | | 175/8" | | | |
| 30 | | | | | | | | | | | | | 1645 |
| | | | | | | | | | | 150/3" | | GRADES WITH MORE GRAVEL | |
| 35 | | | | | | | | | | | | | 1640 |
| | | | | | | | | | | 201 | | | |
| 40 | | | | | | | | | | | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, TRACE COARSE SAND, TRACE TO SOME SILT, DENSE, CALCAREOUS | 1635 |
| | | | | | | | | | | | SP<br>SM | | |
| 45 | SA,pH<br>COLOR<br>P.C. | | | | | 7.6 | | | | 140/7" | | GRADES WITH MORE COARSE SAND AND FINE GRAVEL | 1630 |
| | | | | | | | | | | | | REDDISH-BROWN FINE SAND, SOME MEDIUM SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | |
| 50 | | | | | | | | | | 200/10" | | | 1625 |
| | | | | | | | | | | | SP<br>SM | | |
| 55 | X-RAY | | | | | | | | | 160/5" | | GRADES WITH OCCASIONAL MEDIUM TO COARSE GRAVEL | 1620 |
| | | | | | | | | | | 195/8" | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS | 1615 |
| 60 | | | | | | | | | | | | | |
| | | | | | | | | | | 192/10" | | | 1610 |
| 65 | | | | | | | | | | | SP | | |
| | | | | | | | | | | 150/6" | | | 1605 |
| 70 | | | | | | | | | | | | | |
| | | | | | | | | | | *175 | | | 1600 |
| 75 | | | | | | | | | | | | | |

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

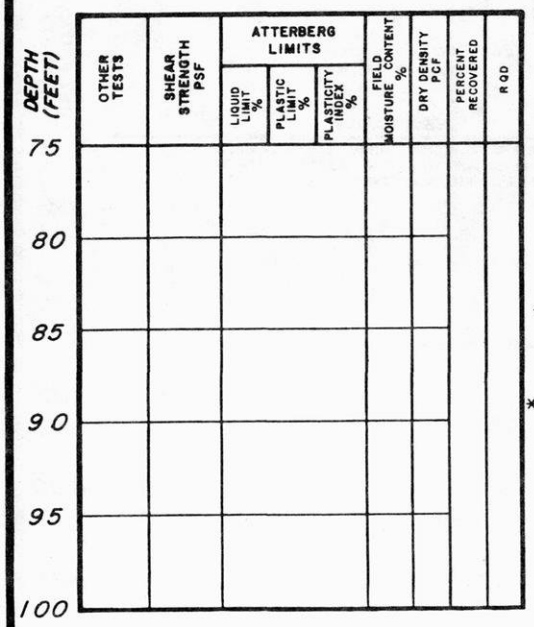
LOG OF BORING DMB-16
SHEET 1 OF 2

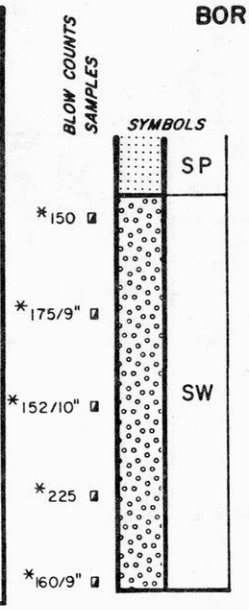
1/79

DAMES & MOORE

FIGURE B-57.1

## BORING DMB-16 (CONT'D)




DESCRIPTIONS

BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND WITH SOME FINE GRAVEL, VERY DENSE, CALCAREOUS

OCCASIONAL FINE TO MEDIUM SAND LENSES

ELEVATION (FEET)

— 1595

— 1590

— 1585

— 1580

— 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 63.0 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

1/79

DAMES & MOORE

FIGURE B-57.2

# BORING DMB-17

*SURFACE ELEVATION* 1648.95

COORDINATES: N 108,960 E 2,268,755

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE TO SOME SILT, SOME SUBANGULAR METAMORPHIC GRAVEL, DENSE, NONCALCAREOUS, MOIST | |
| | | | | | | | | | | 41 ■ | | | — 1645 |
| 5 | HA, SA COLOR | | | | | 8.2 | 131 | | | 21 ■ | | GRADES MEDIUM DENSE | |
| | | | | | | | | | | | | | — 1640 |
| 10 | | | | | | | | | | 46 ■ | | GRADES DENSE WITH MORE GRAVEL | |
| | | | | | | | | | | | | | — 1635 |
| 15 | P.C. | | | | | | | | | 110/11" ■ | SM · GM | GRADES VERY DENSE FEW COBBLES | |
| | | | | | | | | | | | | | — 1630 |
| 20 | P.C. | | | | | | | | | 150/8" ■ | | GRADES CALCAREOUS | |
| | P.C. | | | | | | | | | | | | — 1625 |
| 25 | SA, pH COLOR | | | | | 8.2 | | | | 142/6" ■ | | | |
| | | | | | | | | | | | | | — 1620 |
| 30 | | | | | | | | | | 150/5" ■ | | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, TRACE GRAVEL, VERY DENSE, CALCAREOUS, WET | |
| | | | | | | | | | | | | | — 1615 |
| 35 | | | | | | | | | | *150/11" ■ | | GRADES TRACE SILT | |
| | | | | | | | | | | | SP · SM | | — 1610 |
| 40 | | | | | | | | | | *150/8" ■ | | | |
| | | | | | | | | | | | | | — 1605 |
| 45 | | | | | | | | | | *100/3" ■ | | GRADES SOME SILT, SOME FINE SUBANGULAR METAMORPHIC GRAVEL | |
| | | | | | | | | | | | | | — 1600 |
| 50 | | | | | | | | | | *118/11" ■ | | BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE SILT, VERY DENSE, MOIST, CALCAREOUS | |
| | | | | | | | | | | | | | — 1595 |
| 55 | | | | | | | | | | *122/11" ■ | SP | VERY MOIST | |
| | | | | | | | | | | | | | — 1590 |
| 60 | | | | | | | | | | | | | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-17

SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-58.1

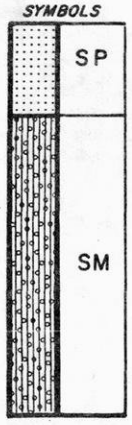
## BORING DMB-17 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 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" ■

SYMBOLS




DESCRIPTIONS

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

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

GRADES SOME FINE METAMORPHIC GRAVEL

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

1/79

DAMES & MOORE

FIGURE B-582

# BORING DMB-18

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, MEDIUM DENSE, NONCALCAREOUS | 1600 |
| 5 | SA | | | | | 12.0 | 123 | | | 14 | | | 1595 |
| | | | | | | | | | | 11 | | GRADES TRACE FINE GRAVEL | |
| 10 | | | | | | | | | | 14 | SM | | 1590 |
| | | | | | | | | | | | | BOULDER 12.0 TO 14.0 FEET | |
| 15 | | | | | | | | | | 14 | | GRADES WITH LESS GRAVEL | 1585 |
| 20 | | | | | | | | | | 66 | | GRADES VERY DENSE | 1580 |
| 25 | SA,HA X-RAY | | | | | 16.2 | | | | 17 | CL | BROWN CLAY, TRACE FINE SAND, STIFF, CALCAREOUS, | 1575 |
| 30 | | | | | | | | | | 114 | | LIGHT BROWN, MEDIUM GRAINED SUBROUNDED QUARTZ SAND, VERY DENSE, NONCALCAREOUS | 1570 |
| 35 | | | | | | | | | | 100/10" | | GRADES SOME FINE SUBROUNDED METAMORPHIC GRAVEL | 1565 |
| 40 | SA COLOR P.C. | | | | | 13.4 | | | | 113 | | GRADES WITHOUT GRAVEL, WET, TRACE SILT | 1560 |
| 45 | | | | | | | | | | 6-26-78 ▼ 44.2' 87 | SP | GRADES WITH MEDIUM TO COARSE SAND, WET | 1555 |
| 50 | | | | | | | | | | 148/11" | | GRADES MORE WITH FINE TO MEDIUM SAND, WET | 1550 |
| 55 | | | | | | | | | | 99/9" | | | 1545 |
| 60 | | | | | | | | | | | | | |

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

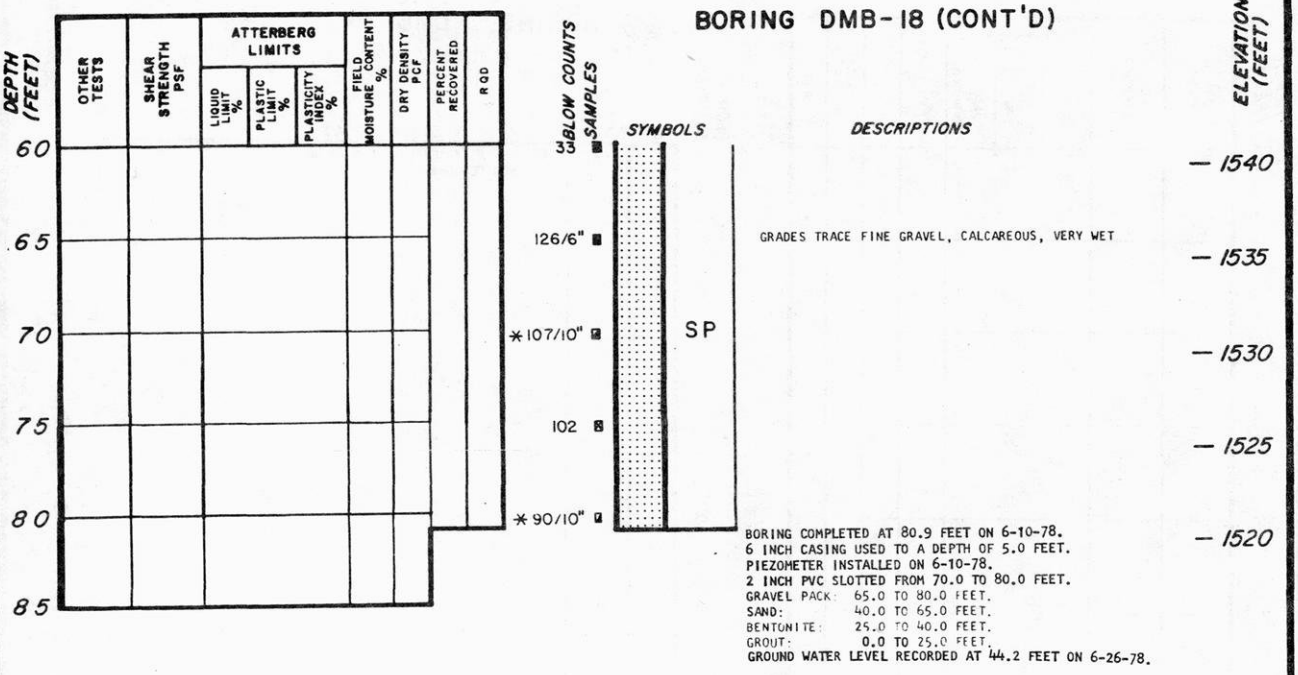
LOG OF BORING DMB-18
SHEET 1 OF 2

1/79

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

1/79

DAMES & MOORE

FIGURE B-59.2

# BORING DMB-19

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 6-26-78 ▼ +1.1' | | NO SAMPLES TAKEN FROM 0.0 TO 40.0 FEET SEE LOG FOR DMA-13 | |
| 5 | | | | | | | | | | | | | 1550 |
| 10 | | | | | | | | | | | | | 1545 |
| 15 | | | | | | | | | | | | | 1540 |
| 20 | | | | | | | | | | | | | 1535 |
| 25 | | | | | | | | | | | | | 1530 |
| 30 | | | | | | | | | | | | | 1525 |
| 35 | | | | | | | | | | | | | 1520 |
| 40 | | | | | | | | | | | | | 1515 |
| 45 | | | | | | | | | | 15 ■ | | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, MEDIUM DENSE, SLIGHTLY CALCAREOUS, VERY MOIST | |
| 50 | | | | | | | | | | 11 ■ | SP | | 1510 |
| 55 | X-RAY | | | | | | | | | 8 ■ | | GRAYISH-BROWN SILT WITH CLAY, THIN LENSES OF FINE SAND, MEDIUM STIFF, CALCAREOUS | 1505 |
| 60 | | | | | | | | | | 9 ■ | MH | | 1500 |
| 65 | | | | | | | | | | 8 ■ | | | 1495 |
| 70 | | | | | | | | | | 11 ■ | CL | REDDISH-BROWN SILTY CLAY, STIFF, SLIGHTLY CALCAREOUS, MOIST | 1490 |
| 75 | | | | | | | | | | 126 □ | SW GW | OLIVE BROWN FINE TO COARSE ANGULAR SAND AND ANGULAR METAMORPHIC GRAVEL AND COBBLES, TRACE SILT, VERY DENSE, SLIGHTLY CALCAREOUS | 1485 |
| | | | | | | | | | | | | | 1480 |

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

LOG OF BORING DMB-19
SHEET 1 OF 3

1/79

DAMES & MOORE

FIGURE B-60.1

## BORING DMB-19 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | SA, pH COLOR P.C. | | | | | | 6.7 | | | 45 ■ | SW · GW | | — 1475 |
| 80 | | | | | | | | | | 136/6" ■ | | GRADES MORE MEDIUM SAND | |
| 85 | | | | | | | | | | ✱82/8 ◪ | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, SOME COBBLES TO ¾ INCH IN DIAMETER, VERY DENSE, NONCALCAREOUS, WET | — 1470 |
| 90 | | | | | | | | | | 137/9" ■ | SP | GRADES WITH FINE SUBANGULAR METAMORPHIC GRAVEL | — 1465 |
| 95 | | | | | | | | | | 117/3" ⊠ | GP · GM | BROWN MOTTLED RED AND GRAY GRAVELLY SAND WITH SILT, SOME WEATHERED GRAVEL, VERY DENSE, DRY, NONCALCAREOUS | — 1460 |
| 100 | | | | | | | | | | ✱100/6" ◪ | ML · MH | BROWN SILT WITH CLAY, SOME FINE SAND, HARD, NONCALCAREOUS, WET | — 1455 |
| 105 | | | | | | | | | | | | | — 1450 |
| 110 | | | | | | | | | | ✱ 74 ◪ | SP | BROWN MEDIUM ROUNDED QUARTZ SAND, TRACE SUBANGULAR COARSE SAND TO FINE GRAVEL, VERY DENSE, NONCALCAREOUS, WET | — 1445 |
| 115 | | | | | | | | | | | | | — 1440 |
| 120 | | | | | | | | | | 150/5" ⊠ | SM · SP | GREENISH-BROWN MEDIUM GRAINED QUARTZ SAND, SOME SILT WITH SUBANGULAR METAMORPHIC GRAVEL, VERY DENSE, WET, NONCALCAREOUS | — 1435 |
| 125 | | | | | | | | | | | | | — 1430 |
| 130 | | | | | | | | | | ✱ 131/5" ◪ | SP | BROWN FINE GRAINED ROUNDED QUARTZ SAND, TRACE SILT, SOME ANGULAR METAMORPHIC GRAVEL, VERY DENSE, WET, NONCALCAREOUS | — 1425 |
| 135 | | | | | | | | | | | | | |

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

LOG OF BORING DMB-19
SHEET 2 OF 3

1/79

DAMES & MOORE

FIGURE B-60.2

## BORING DMB-19 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 135 | | | | | | | | | | | SP | | — 1420 |
| | | | | | | | | | | | | GREENSTONE (METAMORPHOSED TUFF)<br>GRAY-GREEN, FINE TO MEDIUM GRAINED, MASSIVE, HARD | |
| 140 | | | | | | | | | | * 125/1" Ø | | BECOMES MASSIVE AND MODERATELY WEATHERED ROCK, GRADES HIGHLY CEMENTED, JOINTING AT 45° | — 1415 |
| | | | | | | | | 93 | 90 | | | | |
| 145 | | | | | | | | 90 | 90 | | | 45° JOINTING AT 145.0' | — 1410 |
| | | | | | | | | 100 | 100 | | | | |
| | | | | | | | | 100 | 90 | | | | |
| 150 | | | | | | | | | | | | 45° JOINTING AT 150.0' | — 1405 |
| | | | | | | | | | | | | JOINT AT 152.5' | |
| 155 | | | | | | | | 100 | 100 | | | JOINTING 40° AT 154.0'<br>JOINTING 45° AT 155.0' | — 1400 |
| | | | | | | | | 100 | 90 | | | 45° JOINTING AT 158.5' | |
| 160 | | | | | | | | | | | | | — 1395 |
| | | | | | | | | | | | | BORING COMPLETED AT 160.7 FEET ON 6-21-78.<br>6 INCH CASING USED TO A DEPTH OF 5.0 FEET.<br>4 INCH CASING USED TO A DEPTH OF 134.0 FEET.<br>PIEZOMETER INSTALLED ON 6-21-78.<br>2 INCH PVC SLOTTED FROM 76.5 TO 86.5 FEET.<br>SAND: 65.0 TO 86.5 FEET.<br>GROUT: 0.0 TO 65.0 FEET.<br>GROUND WATER LEVEL RECORDED AT 1.1 FEET ABOVE GROUND SURFACE ON 6-26-78. | — 1390 |
| 165 | | | | | | | | | | | | | |

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

LOG OF BORING DMB-19
SHEET 3 OF 3

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DAMES & MOORE

FIGURE B-60.3

# BORING DMB-20

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |

BLOW COUNTS / SAMPLES: 24, 24, 12, 13, 11, 6, 10, 24, 19

6-26-78 25.0'

| SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|
| SM | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, MEDIUM DENSE, NONCALCAREOUS | 1605 |
| SP | LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED SAND, TRACE SILT, MEDIUM DENSE, NONCALCAREOUS | 1600 |
| | | 1595 |
| | | 1590 |
| | GRADES WITH COARSE SAND | |
| | MATERIAL BECOMES STRATIFIED | 1585 |
| ML | BROWN SILT WITH FINE SAND, LOOSE TO MEDIUM DENSE, NONCALCAREOUS | |
| | | 1580 |
| SM | BROWN FINE SUBROUNDED QUARTZ SAND, SOME SILT, TRACE FINE GRAVEL, LOOSE, NONCALCAREOUS | |
| | | 1575 |
| | GRADES WITH MEDIUM SAND | |
| | | 1570 |

BORING COMPLETED AT 40.0 FEET ON 6-10-78.
CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMETER INSTALLED ON 6-10-78.
2 INCH PVC SLOTTED FROM 29.2 TO 39.2 FEET.
GRAVEL PACK: 25.5 TO 39.2 FEET.
BENTONITE: 19.0 TO 25.5 FEET.
GROUT: 0.0 TO 19.0 FEET.
GROUND WATER LEVEL RECORDED AT 25.0 FEET ON 6-26-78.

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

LOG OF BORING DMB-20
SHEET 1 OF 1

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DAMES & MOORE

FIGURE B-61

# BORING DMB-20A

*SURFACE ELEVATION* 1606.20

COORDINATES: N115.720 E 2,270,545

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | NO SAMPLES TAKEN FROM 0-44 FEET SEE LOG FOR BORING DMB-20 | 1605 |
| 5 | | | | | | | | | | | | | 1600 |
| 10 | | | | | | | | | | | | | 1595 |
| 15 | | | | | | | | | | | | | 1590 |
| 20 | | | | | | | | | | | | | 1585 |
| 25 | | | | | | | | | | | | | 1580 |
| 30 | | | | | | | | | | | | | 1575 |
| 35 | | | | | | | | | | | | | 1570 |
| 40 | | | | | | | | | | | | | 1565 |
| 45 | | | | | | | | | | 12-8-78 ▼ 43.1' 6 ■ | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, SOME COARSE SAND AND FINE GRAVEL, WET, LOOSE, CALCAREOUS | 1560 |
| 50 | | | | | | | | | | *20 ◪ | SM | GRADES WITH MORE GRAVEL | 1555 |
| 55 | | | | | | | | | | 69 ⊠ | SM | GRAYISH-BROWN FINE TO MEDIUM SUBROUNDED QUARTZ AND LITHIC SAND, SOME COARSE SAND, SOME FINE TO MEDIUM SUBANGULAR GRAVEL, TRACE SILT, WET, VERY DENSE, NONCALCAREOUS | 1550 |
| 60 | | | | | | | | | | *94 ◪ | S.P SM | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, WET, VERY DENSE, CALCAREOUS | |

(BORING CONTINUED)

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-20A

SHEET 1 OF 2

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FIGURE B-62.1

## BORING DMB-20A(CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |
| 75 | | | | | | | | | |
| 80 | | | | | | | | | |
| 85 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP SM | | −1545 |
| 121 ■ | | BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE SILT, WET, VERY DENSE, SLIGHTLY CALCAREOUS | −1540 |
| *143 ■ | SP | | −1535 |
| 200/9" ■ | | | −1530 |
| | | GRADES TRACE FINE GRAVEL | |
| *145 ■ | | | −1520 |
| 190/9" ■ | SW | LIGHT BROWN FINE TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND, TRACE SILT, TRACE FINE SUBROUNDED GRAVELS, WET, VERY DENSE, CALCAREOUS | |

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

1/79

DAMES & MOORE

FIGURE B-62.2

# BORING DMB-21

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | TOPSOIL | BLACK SILT WITH SAND TOPSOIL | |
| 6 | SM | BROWN FINE TO MEDIUM SAND WITH SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, LOOSE, NONCALCAREOUS | |
| 6-26-78 4.0' | SP | | |
| 13 | SM | BROWN FINE TO MEDIUM QUARTZ SAND, TRACE COARSE SAND, LOOSE TO MEDIUM DENSE, NONCALCAREOUS, WET | 1555 |
| 8 | | | 1550 |
| 2 | | GRADES LIGHT BROWN IN COLOR | 1545 |
| 16 | SP | GRADES CALCAREOUS WITH TRACE SILT | 1540 |
| 26 | | | 1535 |
| 48 | | GRADES DENSE OCCASIONAL GRAVEL | 1530 |
| 72 | | GRADES VERY DENSE WITH MORE SILT | 1525 |
| 92 | SW GW | BROWN FINE TO COARSE QUARTZ SAND WITH FINE GRAVEL, TRACE MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | 1520 |
| 164 | | | 1515 |
| | | GRADES LESS COARSE SAND | |
| 210 | SP | BROWN FINE TO MEDIUM QUARTZ SAND, TRACE TO SOME COARSE SAND, TRACE FINE TO MEDIUM GRAVEL, VERY DENSE, CALCAREOUS | 1510 |

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

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FIGURE B-63

# BORING DMB-22

*SURFACE ELEVATION* 1616.48
COORDINATES: N 113,240 E 2,269,090

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML | BLACK SILT, ORGANICS, ROOTS | |
| | | | | | | | | | | 6 | SM | BROWN SANDY SILT | 1615 |
| | | | | | | | | | | | ML | BROWN SILT, SOME CLAY, SOME FINE SAND, TRACE FINE GRAVEL, LOOSE, NONCALCAREOUS | |
| 5 | | 677 | | | | 10.3 | 125 | | | 19 | SM | REDDISH-BROWN FINE TO MEDIUM SAND WITH SILT, TRACE COARSE SAND AND FINE GRAVEL, LOOSE, NONCALCAREOUS | 1610 |
| 10 | X-RAY | | | | | | | | | 26 | | REDDISH-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, OCCASIONAL MEDIUM GRAVEL, MEDIUM DENSE, NONCALCAREOUS | |
| | | | | | | | | | | | | | 1605 |
| 15 | | | | | | | | | | 19 | | | |
| | | | | | | | | | | | SP SM | | 1600 |
| 20 | | | | | | | | | | 48 | | GRADES WITH LESS SILT | 1595 |
| 25 | | | | | | | | | | 98 | | GRADES WITH TRACE TO SOME MEDIUM GRAVEL | |
| | | | | | | | | | | | | | 1590 |
| 30 | | | | | | | | | | 72 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, OCCASIONAL COARSE SAND AND FINE GRAVEL, VERY DENSE, CALCAREOUS | |
| 35 | | | | | | | | | | 131/8" | | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, SOME FINE GRAVEL, SOME SILT, VERY DENSE, CALCAREOUS | 1585 |
| | | | | | | | | | | | | | 1580 |
| 40 | SA, pH COLOR P.C. | | | | | 11.2 | | | | 150/6" | | GRADES LESS COARSE SAND AND FINE GRAVEL | |
| | | | | | | | | | | | | | 1575 |
| 45 | | | | | | | | | | 105/6" | SM | | |
| | | | | | | | | | | | | | 1570 |
| 50 | | | | | | | | | | 150/5" | | | |
| | | | | | | | | | | | | | 1565 |
| 55 | | | | | | | | | | 100/4" | | | |
| | | | | | | | | | | 6-30-78 ▼ 56.9' | | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST | 1560 |
| 60 | | | | | | | | | | 120 | SP | | |

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LOG OF BORING DMB-22
SHEET 1 OF 2

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FIGURE B-64.1

## BORING DMB-22 (CONT'D)

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

BLOW COUNTS SAMPLES

165/6 1/2"

190/9"

145/7"

170/6"

SYMBOLS

DESCRIPTIONS

| ELEVATION (FEET) | SYMBOLS | DESCRIPTIONS |
|---|---|---|
| — 1555 | SP | |
| | SP SM | BROWN FINE SAND, TRACE MEDIUM TO COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS, MOIST |
| — 1550 | | |
| | SP SW | BROWN MEDIUM TO COARSE SAND, TRACE FINE SAND, TRACE FINE GRAVEL, VERY DENSE, CALCAREOUS, WET-SATURATED |
| — 1545 | | |
| | SP | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, VERY DENSE, CALCAREOUS, WET-SATURATED |
| | SP SM | REDDISH-BROWN FINE TO MEDIUM SAND, TRACE SILT, VERY DENSE, CALCAREOUS |
| — 1540 | | |

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

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FIGURE B-64.2

# BORING DMB-23

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SM | BLACK FINE TO MEDIUM SAND, SOME SILT, ORGANICS, TOPSOIL | |
| 19 ■ | SP | BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, MEDIUM DENSE, NONCALCAREOUS | — 1560 |
| | SM | | |
| 12 ■ | | BROWN FINE TO MEDIUM SAND, TRACE SILT, SOME COARSE SAND AND FINE TO MEDIUM IGNEOUS GRAVEL, MEDIUM DENSE, NONCALCAREOUS | — 1555 |
| 6-30-78 ▼ 8.6 15 ■ | SP·GP | | |
| 28 ■ | | GRADES WITH MORE COARSE SAND AND FINE TO MEDIUM GRAVEL | — 1550 |
| 54 ■ | ML | BROWN SILT, TRACE FINE SAND, TRACE COARSE SAND AND FINE GRAVEL, HARD, CALCAREOUS | — 1545 |
| 25 ■ | | GRADES WITH TRACE TO SOME CLAY, VERY STIFF | — 1540 |
| 12 ■ | SP | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, LOOSE TO MEDIUM DENSE, CALCAREOUS | — 1535 |
| 11 ■ | | GRADE WITH MORE FINE SAND AND SILT | — 1530 |
| 36 ■ | SM | BROWN FINE SAND, SOME MEDIUM SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, TRACE CLAY, DENSE, CALCAREOUS | — 1525 |
| 28 ■ | SP·SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, MEDIUM DENSE, CALCAREOUS | — 1520 |
| | | MATERIAL STRATIFIED | |
| 72 ■ | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, VERY DENSE, CALCAREOUS, MOIST | — 1515 |
| | ML | BROWNISH-GRAY SILT, TRACE COARSE SAND AND FINE GRAVEL, VERY DENSE, CALCAREOUS | |
| | | BROWN FINE TO MEDIUM SAND, VERY DENSE, CALCAREOUS | |
| 120/8" ■ | SP | GRADES REDDISH-BROWN WITH TRACE SILT | — 1510 |
| 175/9½" ■ | SP·GP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE SILT, SOME FINE TO MEDIUM GRAVEL, OCCASIONAL COBBLES, VERY DENSE, CALCAREOUS | — 1505 |
| 120/10" ■ | | | — 1500 |
| 175/8" ■ | SM·GM | BROWN FINE TO MEDIUM SAND, SOME SILT, SOME FINE TO MEDIUM GRAVEL, VERY DENSE, CALCAREOUS | — 1495 |
| | | BOULDER 68.0 FEET | |
| 121/9" ■ | SW | BROWN FINE TO COARSE SAND WITH FINE GRAVEL, TRACE SILT AND MEDIUM GRAVEL, VERY DENSE, CALCAREOUS | — 1490 |

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LOG OF BORING DMB-23
SHEET 1 OF 2

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FIGURE B-65.1

# BORING DMB-23 (CONT'D)

*SURFACE ELEVATION*

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP | BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND, TRACE SILT, VERY DENSE, CALCAREOUS<br>BOULDER 76.0 FEET | |
| 200/10" ■ | SW | BROWN FINE TO COARSE SAND, TRACE FINE GRAVEL, OCCASIONAL MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | — 1485 |
| 162 ■ | SP · SM | REDDISH-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE COARSE SAND, FINE GRAVEL, VERY DENSE, CALCAREOUS | — 1480 |
| 170/11" ■ | SP | BROWN FINE TO MEDIUM SAND, SOME COARSE SAND, TRACE FINE TO MEDIUM GRAVEL, TRACE SILT, VERY DENSE, CALCAREOUS | — 1475 |
| 168/11" ■ | SP · SW | BROWN MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE TO COARSE SAND, SOME FINE GRAVEL, VERY DENSE, CALCAREOUS | — 1470 |
| 215/8" ■ | 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.

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CRANDON PROJECT

LOG OF BORING DMB-23
SHEET 2 OF 2

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FIGURE B-65.2

# BORING DMB-24

*SURFACE ELEVATION* 1565.43
COORDINATES: N 102,060 E 2,271,375

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | GRAY SILT, TRACE FINE SAND, TRACE FINE GRAVEL | 1565 |
| | | GRADES LIGHT BROWN | |
| *8 | SP SM | LIGHT BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, TRACE FINE GRAVEL, LOOSE, MOIST, NONCALCAREOUS | 1560 |
| 26 | | | |
| *6 | SP | LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, MOIST, LOOSE, NONCALCAREOUS | 1555 |
| 16 | SP | BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE COARSE SAND AND FINE GRAVEL, MOIST, MEDIUM DENSE, CALCAREOUS | 1550 |
| *18 | | | 1545 |
| 1-8-79 95 ▼ 25.6' | | | 1540 |
| *67/11" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE FINE GRAVEL, TRACE SILT, MOIST, DENSE TO VERY DENSE, NONCALCAREOUS | 1535 |
| 67 | SP SW | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH COARSE SAND AND FINE TO MEDIUM GRAVEL, OCCASIONAL COARSE GRAVEL, TRACE SILT, MOIST, VERY DENSE, NONCALCAREOUS | 1530 |
| *9 | | GRADES LOOSE | 1525 |
| 145/9" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE TO MEDIUM GRAVEL, TRACE SILT, MOIST, VERY DENSE, NONCALCAREOUS | 1520 |
| 140/6" | | GRADES SOME SILT, SOME GRAVEL | |

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

1/79

DAMES & MOORE

FIGURE B-66

# BORING DMB-25

*SURFACE ELEVATION* 1644.66
COORDINATES: N 105,725 E 2,268,525

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML | YELLOWISH-BROWN SILT WITH FINE SAND, ROOTS | |
| | | | | | | | | | | *3 | SM | ORANGISH-BROWN FINE SUBROUNDED QUARTZ SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, VERY LOOSE, MOIST, NONCALCAREOUS | — 1640 |
| 5 | | | | | | | | | | 31 | | ORANGISH-BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE COARSE SAND AND FINE GRAVEL, OCCASIONAL MEDIUM TO COARSE GRAVEL, DENSE, MOIST, NONCALCAREOUS | |
| 10 | | | | | | | | | | *9 | SP | GRADES LOOSE | — 1635 |
| 15 | | | | | | | | | | 31 | | GRADES DENSE | — 1630 |
| 20 | | | | | | | | | | *50 | | | — 1625 |
| 25 | | | | | | | | | | *95/11" | | ORANGISH-BROWN FINE SAND, SOME SILT, TRACE COARSE SAND AND FINE GRAVEL, OCCASIONAL MEDIUM TO COARSE GRAVEL, VERY DENSE, MOIST, NONCALCAREOUS | — 1620 |
| 30 | | | | | | | | | | 128 | SP SM | | — 1615 |
| 35 | | | | | | | | | | *70 | | | — 1610 |
| 40 | | | | | | | | | | 115 | | GRADES TRACE SILT | — 1605 |
| 45 | | | | | | | | | | *68 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, TRACE SILT, VERY DENSE, MOIST, NONCALCAREOUS | — 1600 |
| 50 | | | | | | | | | | 168/7" | SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, TRACE MEDIUM METAMORPHIC AND CARBONATE GRAVELS, VERY DENSE, MOIST, CALCAREOUS | — 1595 |
| 55 | | | | | | | | | | *110 | | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND AND FINE GRAVEL, MOIST, VERY DENSE, CALCAREOUS | — 1590 |
| 60 | | | | | | | | | | 125/7" | SP | GRADES FINE TO MEDIUM SAND | — 1585 |
| 65 | | | | | | | | | | *85 | | GRADES TRACE COARSE SAND AND FINE GRAVEL | — 1580 |
| 70 | | | | | | | | | | 135/9" | SP | LIGHT BROWN MEDIUM TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND, SOME FINE TO MEDIUM CARBONATE AND CRYSTALLINE GRAVEL, WET, VERY DENSE, CALCAREOUS | — 1575 |
| 75 | | | | | | | | | | *75 | SP | LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, MOIST, VERY DENSE, CALCAREOUS (BORING CONTINUED) | — 1570 |

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

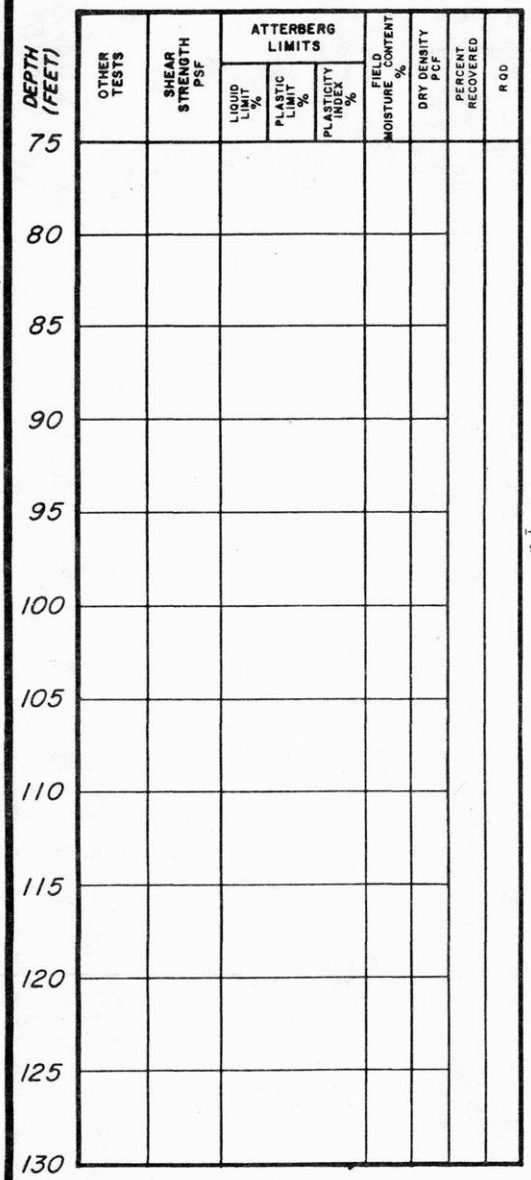
LOG OF BORING DMB-25
SHEET 1 OF 2

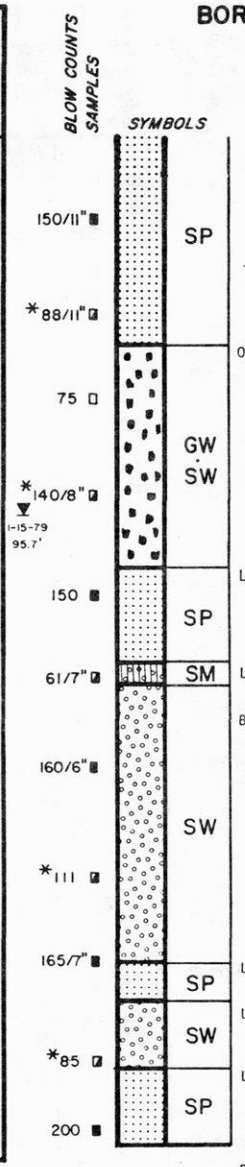
1/79

DAMES & MOORE

FIGURE B-67.1

# BORING DMB-25 (CONT'D)




DESCRIPTIONS

ELEVATION (FEET)

— 1565

— 1560

OLIVE-BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND AND ANGULAR TO SUBROUNDED WEATHERED GRAVEL, SOME SILT, DAMP, VERY DENSE, NONCALCAREOUS

— 1555

— 1550

LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ AND LITHIC SAND, MOIST, VERY DENSE, NONCALCAREOUS — 1545

LIGHT BROWN FINE TO VERY FINE GRAINED QUARTZ SAND, SOME SILT, MOIST, VERY DENSE, NONCALCAREOUS — 1540

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

— 1535

— 1530

LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL — 1525

LIGHT BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, SOME SILT, DAMP, VERY DENSE, NONCALCAREOUS

— 1520

LIGHT BROWN FINE TO MEDIUM SUBROUNDED TO ROUNDED QUARTZ SAND, TRACE SILT, DAMP, VERY DENSE, NONCALCAREOUS

BORING COMPLETED AT 129.5 FEET ON 12-15-78.
CASING USED TO A DEPTH OF 9.0 FEET.
PIEZOMETER INSTALLED 12-18-78.
2 INCH PVC SLOTTED FROM 124.5 TO 129.5 FEET.
GRAVEL PACK: 118.0 TO 129.5 FEET.
SAND: 113.0 TO 118.0 FEET.
BENTONITE: 110.0 TO 113.0 FEET.
GROUT: 0.0 TO 110.0 FEET.
GROUND WATER LEVEL RECORDED AT 95.7 FEET ON 1-15-79.

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

LOG OF BORING DMB-25
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-672

# BORING DMB-26

*SURFACE ELEVATION* 1712.98
COORDINATES: N 105,520 E 2,282,250

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | *4 | SP SM | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME SILT, SOME COARSE SAND AND FINE GRAVEL, MOIST, LOOSE, NONCALCAREOUS | —1710 |
| 5 | | | | | | | | | | 25 | | GRADES WITH FINE GRAVEL, MEDIUM DENSE | —1705 |
| 10 | | | | | | | | | | *19 | | | |
| 15 | | | | | | | | | | 12 | SP | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, TRACE SILT, MOIST, MEDIUM DENSE, NONCALCAREOUS | —1700 |
| 20 | | | | | | | | | | *12 | | GRADES TRACE FINE GRAVEL | —1695 |
| 25 | | | | | | | | | | 105/10" | | GRADES VERY DENSE | —1690 |
| 30 | | | | | | | | | | *137 | | BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, TRACE SILT, MOIST, VERY DENSE, CALCAREOUS | —1685 |
| 35 | | | | | | | | | | 147/6" | | | —1680 |
| 40 | | | | | | | | | | *125/8" | | | —1675 |
| 45 | | | | | | | | | | 135/1" | SM | GRAYISH-BROWN FINE GRAINED QUARTZ SAND WITH SUBANGULAR GRAVEL, SOME SILT AND CLAY, WET, VERY DENSE, CALCAREOUS | —1670 |
| 50 | | | | | | | | | | *132 | SP SW | BROWN FINE TO COARSE SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, TRACE SILT, MOIST, VERY DENSE, NONCALCAREOUS | —1665 |
| 55 | | | | | | | | | | 150/3" | | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ AND LITHIC SAND, SOME FINE TO MEDIUM GRAVEL, SOME SILT, WET, VERY DENSE, CALCAREOUS | —1660 |
| 60 | | | | | | | | | | *150/5" | SP SM | GRADES WITH MEDIUM SUBROUNDED GRAVEL | —1655 |
| 65 | | | | | | | | | | 160/4" | | | —1650 |
| 70 | | | | | | | | | | *160/3" | | | —1645 |
| 75 | | | | | | | | | | 140/6" | SW | BROWN FINE TO COARSE GRAINED SUBANGULAR QUARTZ AND LITHIC SAND, SOME FINE SUBROUNDED GRAVEL, TRACE SILT, MOIST, VERY DENSE, SLIGHTLY CALCAREOUS | —1640 |

(BORING CONTINUED)

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

LOG OF BORING DMB-26
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-68.1

## BORING DMB-26 CONT'D

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SW | | |
| *145/6" | SW GW | BROWN FINE TO COARSE SUBANGULAR QUARTZ AND LITHIC SAND WITH FINE GRAVEL, TRACE MEDIUM GRAVEL, TRACE SILT, DAMP, VERY DENSE, CALCAREOUS | —1635 |
| 140/9" | | | —1630 |
| | SP | LIGHT BROWN FINE TO MEDIUM SUBANGULAR QUARTZ SAND, TRACE FINE TO MEDIUM SUBANGULAR GRAVEL, DAMP, VERY DENSE, CALCAREOUS | |
| *160/3" | SW GW | BROWN FINE TO COARSE SUBANGULAR QUARTZ AND LITHIC SAND AND FINE TO MEDIUM SUBANGULAR GRAVEL, TRACE SILT, DAMP, VERY DENSE, CALCAREOUS | —1625 |
| 200/6" | | | —1620 |
| *150/5" | | | —1615 |
| 200/3" | GM | BROWN FINE TO COARSE SUBANGULAR QUARTZ SAND AND FINE TO MEDIUM SUBANGULAR GRAVEL, SOME SILT, DAMP, VERY DENSE, CALCAREOUS | —1610 |
| | | | —1605 |
| *130 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, VERY DENSE, CALCAREOUS | |
| 152 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME COARSE SAND AND FINE GRAVEL, SOME SILT, DAMP, VERY DENSE, CALCAREOUS | —1600 |
| | | | —1595 |
| *76 | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, MOIST, VERY DENSE, CALCAREOUS | |
| 140/8" | | | —1590 |
| 1-11-79 ▼ *120 129.0' | SW SM | BROWN FINE TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND, SOME FINE SUBROUNDED WEATHERED GRAVEL, DAMP, VERY DENSE, CALCAREOUS | —1585 |
| 150/7" | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE COARSE SAND, TRACE FINE GRAVEL, WET, VERY DENSE, CALCAREOUS | —1580 |

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

1/79

DAMES & MOORE

FIGURE B-68.2

# BORING DMB-27

*SURFACE ELEVATION* 1649.04

COORDINATES: N 108,675 E 2,283,695

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | *3 | SM | BROWN FINE SAND WITH SILT, TRACE FINE GRAVEL, TRACE ROOTS, WET, VERY LOOSE, NONCALCAREOUS | |
| 5 | | | | | | | | | | 19 | SP SM | LIGHT BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE FINE TO MEDIUM GRAVEL, MOIST, MEDIUM DENSE, NONCALCAREOUS | — 1645 |
| 10 | | | | | | | | | | *25 | SP | LIGHT BROWN FINE SUBROUNDED QUARTZ SAND, TRACE SILT, TRACE FINE GRAVEL, MOIST, MEDIUM DENSE, NONCALCAREOUS | — 1640 |
| 15 | | | | | | | | | | 90/7.5" | | | — 1635 |
| 20 | | | | | | | | | | *92 | | GRADES SOME SILT | — 1630 |
| 25 | | | | | | | | | | 145/5" | SP SM | LIGHT BROWN FINE TO MEDIUM ROUNDED QUARTZ SAND, SOME LIGHT BROWN SILT, TRACE FINE TO MEDIUM SUBROUNDED TO SUBANGULAR GRAVEL, DAMP, VERY DENSE, CALCAREOUS | — 1625 |
| 30 | | | | | | | | | | *170/6" | | | — 1620 |
| 35 | | | | | | | | | | 150/10" | | GRADES WITH SILT | — 1615 |
| 40 | | | | | | | | | | *130 | SP GP | LIGHT BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND AND MEDIUM SUBROUNDED, WEATHERED GRAVEL, TRACE SILT, DAMP, VERY DENSE, NONCALCAREOUS | — 1610 |
| 45 | | | | | | | | | | 140/6" | | | — 1605 |
| 50 | | | | | | | | | | *116 | SP | BROWN MEDIUM GRAINED ROUNDED QUARTZ SAND, TRACE SUBROUNDED GRAVEL, TRACE SILT, MOIST, VERY DENSE, NONCALCAREOUS | — 1600 |
| 55 | | | | | | | | | | 200/3" | SP SM | BROWN FINE TO MEDIUM GRAINED ROUNDED QUARTZ SAND, SOME LIGHT BROWN SILT, SOME SUBROUNDED GRAVEL, DAMP, VERY DENSE, NONCALCAREOUS | — 1595 |
| 60 | | | | | | | | | | *112/9" | SP | BROWN MEDIUM GRAINED SUBROUNDED QUARTZ SAND, TRACE FINE TO COARSE SAND, TRACE FINE GRAVEL, MOIST, VERY DENSE, NONCALCAREOUS | — 1590 |

(BORING CONTINUED)

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-27

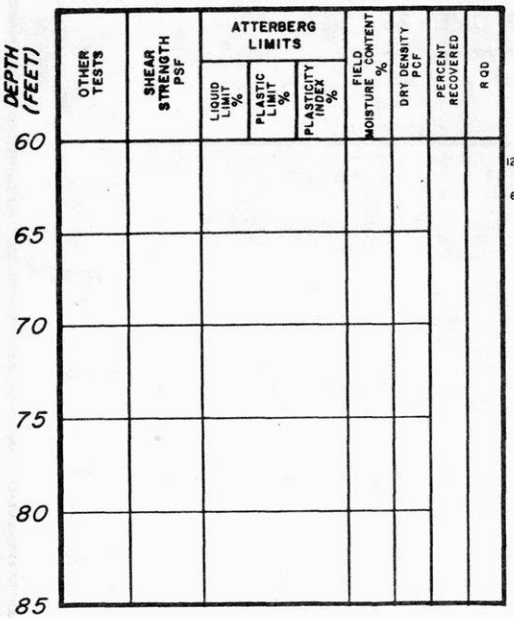
SHEET 1 OF 2

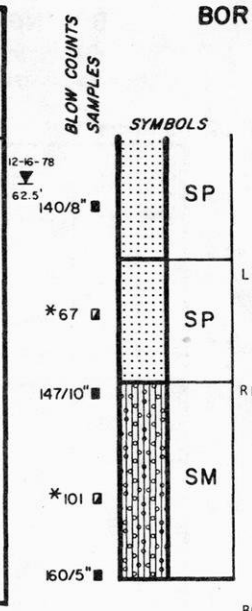
1/79

DAMES & MOORE

FIGURE B-69.1

## BORING DMB-27 (CONT'D)




DESCRIPTIONS

ELEVATION (FEET)

LIGHT BROWN FINE TO MEDIUM GRAINED SUBROUNDED QUARTZ SAND, DAMP, VERY DENSE, CALCAREOUS SOME LAYERS BROWN VERY FINE SAND WITH SILT, DAMP, VERY DENSE — 1585

REDDSIH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND WITH SILT, TRACE FINE TO MEDIUM, HIGHLY WEATHERED GRAVEL, DAMP, VERY DENSE, NONCALCAREOUS — 1580 — 1575 — 1570 — 1565

BORING COMPLETED AT 83.9 FEET ON 12-6-78.
CASING USED TO A DEPTH OF 9.0 FEET.
PIEZOMETER INSTALLED 12-6-78.
2 INCH PVC SLOTTED FROM 73.8 TO 83.8 FEET.
GRAVEL PACK: 72.0 TO 83.8 FEET.
SAND: 71.0 TO 72.0 FEET.
BENTONITE: 52.0 TO 71.0 FEET.
GROUT. 0.0 TO 52.0 FEET.
GROUND WATER LEVEL RECORDED AT 62.5 FEET ON 12-16-78.

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

LOG OF BORING DMB-27
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-69.2

# BORING DMB-28

*SURFACE ELEVATION* 1642.13

COORDINATES: N 106,840 E 2,285,425

| DEPTH (FEET) | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|
| 0 | *3 | ML | YELLOWISH-BROWN SILT, TRACE TO SOME FINE SAND, TRACE FINE GRAVEL, VERY SOFT, DAMP, NONCALCAREOUS | — 1640 |
| 5 | 40 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME FINE GRAVEL, MOIST, MEDIUM DENSE, NONCALCAREOUS | — 1635 |
| 10 | *19 | | GRADES TRACE SILT, MEDIUM DENSE | |
| 15 | 125/5" | SM | GRAYISH-BROWN FINE TO MEDIUM SAND, SOME SILT, SOME FINE GRAVEL, WET, VERY DENSE | — 1630 |
| 20 | *32 | SP SW | LIGHT BROWN FINE TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND, SOME FINE GRAVEL, MOIST, MEDIUM DENSE, NONCALCAREOUS | — 1625 |
| 25 | 125/11" | SP GP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ AND LITHIC SAND WITH FINE TO MEDIUM GRAVEL, OCCASIONAL COARSE GRAVEL, TRACE SILT, DAMP, VERY DENSE, NONCALCAREOUS | — 1620 |
| 30 | *62 | | | — 1615 |
| 35 | 62 | SP SW | BROWN FINE TO COARSE GRAINED SUBROUNDED QUARTZ AND LITHIC SAND, OCCASIONAL FINE GRAVEL, WET, VERY DENSE, NONCALCAREOUS | — 1610 |
| 40 | *37 | | | — 1605 |
| 45 | 30 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, WET, DENSE, NONCALCAREOUS | — 1600 |
| | | SW | BROWN FINE TO COARSE SUBROUNDED SAND, SOME FINE GRAVEL, WET, DENSE, NONCALCAREOUS | — 1595 |
| 50 | *41 | SP | LIGHT BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, TRACE FINE GRAVEL, WET, DENSE, NONCALCAREOUS | — 1590 |
| 55 | 106/8" | | | |

(BORING CONTINUED)

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

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMB-28

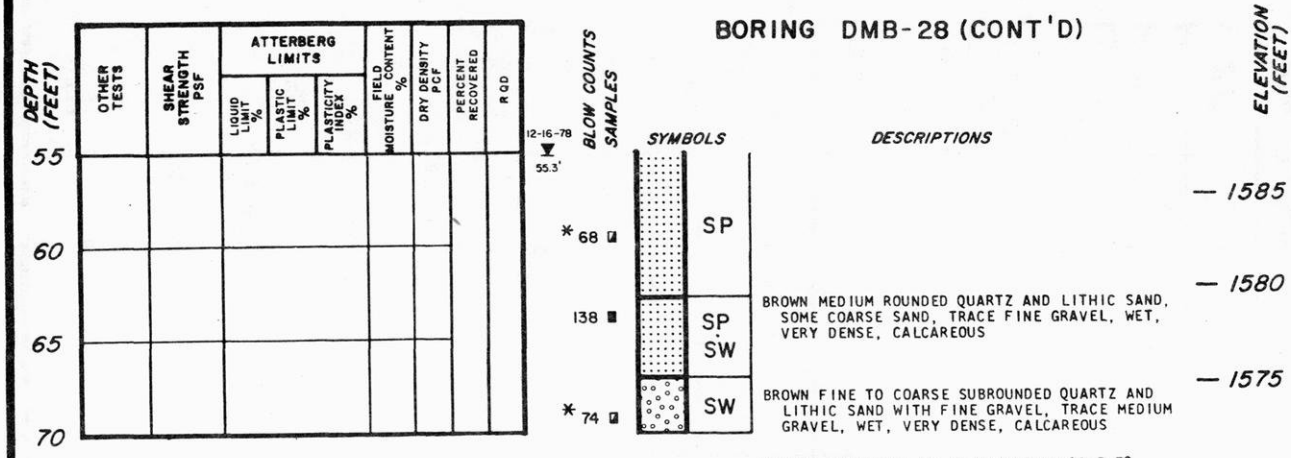
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-70.1

## BORING DMB-28 (CONT'D)




BORING COMPLETED AT 70.0 FEET ON 12-5-78.
CASING USED TO A DEPTH ON 9.0 FEET.
PIEZOMETER INSTALLED ON 12-5-78.
2 INCH PVC SLOTTED FROM 64.5 TO 69.5 FEET.
GRAVEL PACK: 63.0 TO 69.5 FEET.
SAND: 61.0 TO 63.0 FEET.
BENTONITE: 59.0 TO 61.0 FEET.
GROUT: 0.0 TO 59.0 FEET.
GROUND WATER LEVEL RECORDED AT 55.3 FEET ON 12-16-78.

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

LOG OF BORING DMB-28
SHEET 2 OF 2

1/79

DAMES & MOORE

FIGURE B-70.2

# BORING DMB-29

*SURFACE ELEVATION* 1629.98

COORDINATES: N 104,385 E 2,288,110

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | 1630 |
| | | | | | | | | | | 9 ■ | SP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND, SOME SILT, SOME FINE TO MEDIUM GRAVEL, MOIST, LOOSE, NONCALCAREOUS | |
| 5 | | | | | | | | | | *10 ◪ | | | 1625 |
| | | | | | | | | | | | SP·GP | BROWN FINE TO MEDIUM SUBROUNDED QUARTZ SAND WITH FINE TO MEDIUM GRAVEL, TRACE SILT, MOIST, LOOSE, SLIGHTLY CALCAREOUS | |
| 10 | | | | | | | | | | 28 ■ | | GRADES WITH MEDIUM TO COARSE GRAVEL | 1620 |
| 15 | | | | | | | | | | *22 ◪ | | | 1615 |
| 20 | | | | | | | | | | 46 ■ | SW | GRAYISH-BROWN FINE TO COARSE SUBROUNDED QUARTZ AND LITHIC SAND WITH FINE TO MEDIUM SUBROUNDED GRAVEL, TRACE SILT, DENSE, CALCAREOUS | 1610 |
| 25 | | | | | | | | | | *38 ◪ | | | 1605 |
| 30 | | | | | | | | | | 62 ■ | SP | LIGHT BROWN FINE TO MEDIUM ROUNDED QUARTZ SAND, TRACE COARSE SAND, DAMP, VERY DENSE, CALCAREOUS | 1600 |
| 35 | | | | | | | | | | *32 ◪ | | GRADES WITHOUT COARSE SAND | 1595 |
| 40 | | | | | | | | | | 166/2.5" ■ | | GRADES TRACE COARSE SAND | 1590 |
| | | | | | | | | | | 12-2-78 ▼ 42.6' | | | |
| 45 | | | | | | | | | | *65 ◪ | SP·SW | GRAYISH-BROWN FINE TO COARSE ROUNDED QUARTZ AND LITHIC SAND, TRACE FINE TO MEDIUM ANGULAR GRAVEL, MOIST, VERY DENSE, CALCAREOUS | 1585 |
| 50 | | | | | | | | | | 150/4" ⊠ | | | 1580 |
| 55 | | | | | | | | | | *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

1/79

DAMES & MOORE

FIGURE B-71.1

## BORING DMB-29 (CONT'D)

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP | | — 1575 |
| | SP | LIGHT BROWN MEDIUM GRAINED ROUNDED QUARTZ AND LITHIC SAND, TRACE SUBROUNDED GRAVEL, WET, VERY DENSE, NONCALCAREOUS | |
| 115/8" ■ | SM | ORANGISH-BROWN FINE TO MEDIUM QUARTZ SAND, SOME SILT, SOME COARSE SAND AND FINE TO MEDIUM GRAVEL, MOIST, VERY DENSE, SLIGHTLY CALCAREOUS | — 1570 |
| *120 ■ | | GRADES LESS SILT | — 1565 |
| 150/9" ■ | SP | YELLOWISH-BROWN FINE GRAINED SUBROUNDED QUARTZ SAND, TRACE MEDIUM SAND, WET, VERY DENSE, SLIGHTLY CALCAREOUS | |
| | | | — 1560 |

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

1/79

DAMES & MOORE

FIGURE B-71.2

# BORING DMI-1

*SURFACE ELEVATION* 1636.74

COORDINATES: N 116,747 E 2,278,815

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML | BROWN SANDY SILT; TRACE ORGANICS AND ROOT FRAGMENTS; MEDIUM STIFF | |
| | | | | | | | | | | | | LIGHT BROWN FINE SILTY SAND; TRACE MEDIUM TO COARSE SAND; LITTLE GRAVEL AND CLAY; LOOSE | — 1635 |
| 5 | | | | | | | | | | 25 ■ | GM | | |
| | | | | | | | | | | | | GRAVEL GRADES OUT AT 7.0 FEET | — 1630 |
| 10 | | | | | | | | | | 20 ■ | | LIGHT BROWN FINE TO VERY FINE SILTY SAND, LITTLE FINE GRAINED MICA, LOOSE; INTERBEDDED WITH TAN MEDIUM TO COARSE SAND, TRACE FINE GRAINED MICA, SOME BLACK SHALE FRAGMENTS, MEDIUM DENSE | |
| | | | | | | | | | | | | | — 1625 |
| 15 | | | | | | 15.8 | | | | 47 ■ | SP SM | SILTY LAYER AT 14.0 FEET | |
| | | | | | | | | | | | | | — 1620 |
| 20 | | | | | | | | | | 68 ■ | | GRADING TO VERY DENSE | |
| | | | | | | | | | | | | LOCALLY SOME COARSE GRAVEL BELOW 19.0 FEET | — 1615 |
| 25 | | | | | | | | | | 70 ■ | | | |
| | | | | | | | | | | | | TAN MEDIUM TO COARSE SAND; SOME FINE GRAVEL AND BLACK SHALE FRAGMENTS; TRACE MICA; TRACE SILT; VERY DENSE | — 1610 |
| 30 | | | | | | | | | | 80/4" ■ | SW | | |
| | | 1600/1000 2850/1750 5250/3000 | | | | | | | | | | | — 1605 |
| 35 | | | | | | 9.7 | | | | 60 ■ | | | |
| | | | | | | | | | | | | TAN TO REDDISH-BROWN FINE TO COARSE SAND WITH FINE TO COARSE GRAVEL; OCCASIONAL COBBLE; LOCALLY SILTY; VERY DENSE | — 1600 |
| 40 | | | | | | | | | | 250 ⊠ | | | |
| | | | | | | | | | | | | SOME COBBLES FROM 40.0 TO 41.0 FEET | — 1595 |
| 45 | | | | | | 6.4 | | | | 200 ⊠ | | | |
| | | | | | | | | | | | | LOCALLY COARSE GRAVEL WITH 3"-4" COBBLES | |
| | | | | | | | | | | 7-30-77 ▼ 48.2' | SW GW | | — 1590 |
| 50 | | | | | | | | | | | | | |
| | | | | | | | | | | | | SOME COBBLES AT 53.0 FEET | — 1585 |
| 55 | | | | | | 11.0 | | | | 220 ⊠ | | | |
| | | 1650/2000 2250/4000 3750/6000 | | | | | | | | | | | — 1580 |
| 60 | | | | | | 13.7 | 112 | | | 150 ■ | | | |
| | | | | | | | | | | | CH | PRECAMBRIAN SYSTEM | |
| | | | | | | | | | | | | GREEN TO GRAY CLAY; SOME SILT AND FINE TO COARSE GRAVEL; VERY STIFF; HIGHLY WEATHERED SAPROLITE WITH POCKETS OF RED CLAY AT 63.0 FEET | — 1575 |
| 65 | | | | | | | | 100 | 100 | | | MAFIC LAPILLI TUFF; GREEN TO GRAY; FINE GRAINED; MODERATELY WEATHERED WITH OCCASIONAL RED CLAY FILLED FRACTURES | |
| | | 1660/2000 2580/4000 3730/6000 | | | | 16.4 | 116 | | | | | GRADES GREEN TO BLACKISH-GREEN FROM 65.5 FEET; COARSE GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED (FRACTURES 30°-65° EVERY 8"-12" WITH OCCASIONAL CLAY FILLING FROM 67.5 TO 72.6 FEET) | — 1570 |
| 70 | | | | | | | | 100 | 80 | | | FAULT ZONE, CLAY GOUGE FROM 72.6 TO 73.8 FEET | |
| | | | | | | | | | | | | | — 1565 |
| 75 | | | | | | | | | | | | INTERMEDIATE ASH TUFF; GRAY TO BROWN; FINE GRAINED; | |

**EXXON MINERALS COMPANY, U.S.A.**

CRANDON PROJECT

LOG OF BORING DMI-1

SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-72.1

## BORING DMI - 1 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 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

ELEVATION (FEET)

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, 0°-30° EVERY 4'-6"; SLIGHT TO MODERATE WEATHERING.
FRACTURE ZONE; STRONG IRON OXIDE STAINING; HIGH CLAY CONTENT FROM 77.9 TO 79.2 FEET — 1555
GRADES GRAY; FINE GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED; MODERATE BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES
GRADES LIGHT BROWN TO GRAY AT 83.6 FEET; MODERATE IRON OXIDE STAINING; NUMEROUS CLOSED BREAKS ALONG NEAR VERTICAL BEDDING PLANES — 1550

HIGHLY FRACTURED ZONE FROM 88.0 TO 88.6 FEET; SOME CLAY FILLING
GRAY; WEAK IRON OXIDE STAINING FROM 90.0 FEET
NUMEROUS FRACTURES FROM 91.0 TO 95.0 FEET
WHITE CLAY INCLUSION, 1/2" AT 91.9 FEET — 1545
SLIGHTLY COARSE GRAINED FROM 92.0 TO 94.0 FEET

FRACTURE ZONE FROM 97.8 TO 99.0 FEET — 1540

FAULT ZONE FROM 100.9 TO 102.5 FEET; RED; HIGHLY WEATHERED AND IRON OXIDE STAINED WITH VERY HIGH CLAY CONTENT — 1535

MAFIC LAPILLI TUFF; GRAY TO BLACKISH-GRAY; COARSE GRAINED; SLIGHTLY WEATHERED TO UNWEATHERED; SLIGHTLY FRACTURED.
NUMEROUS FRACTURES FROM 103.0 TO 104.5 FEET
FRACTURE ZONES AT 106.0 FEET AND 108.5 FEET — 1530

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

1/79

DAMES & MOORE

FIGURE B-72.2

# BORING DMI-2

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/SQ FT | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | OL | BLACK FIBROUS SILT WITH ORGANICS; WITH LEAVES AND ROOTS; WITH 6" - 12" COBBLES (TOPSOIL - 12") | |
| | | | | | | | | | | | ML | MOTTLED LIGHT BROWN AND ORANGISH-BROWN CLAYEY SILT; MEDIUM STIFF | |
| 5 | | | | | | | | | | 23 | | BROWN FINE TO MEDIUM SILTY SAND; SOME COARSE SAND AND FINE TO COARSE GRAVEL; MEDIUM DENSE | 1625 |
| | | | | | | | | | | | SM | | |
| 10 | | | | | | | | | | 19 | | | 1620 |
| 15 | | | | | | | | | | 58 | | BROWN TO TAN FINE SAND; TRACE SAND SIZE BLACK SHALE FRAGMENTS; INTERBEDDED WITH MEDIUM TO COARSE SAND, LITTLE BLACK SHALE FRAGMENTS; MEDIUM DENSE | 1615 |
| | | | | | | | | | | | | GRADES VERY DENSE | |
| 20 | | | | | | | | | | 100/3" | SP | TRACE FINE TO COARSE GRAVEL FROM 19.5 TO 20.5 FEET | 1610 |
| 25 | | | | | | | | | | 40 | | | 1605 |
| 30 | | | | | | | | | | 90 | | GRADES VERY DENSE | 1600 |
| 35 | | | | | | | | | | 200 | | BROWN FINE TO COARSE SAND AND FINE TO COARSE GRAVEL; LOCALLY TRACE SILT; VERY DENSE | |
| | | | | | | | | | | | | GRADES TO SOME COBBLES (6" - 12") AT 34.0 FEET | 1595 |
| 40 | | | | | | | | | | 7-30-77 ▼ 41.6' ▼ 42.1' | | | 1590 |
| | | | | | | 6.8 | 138 | | | 80 | SW GW | | |
| 45 | | | | | | | | | | | | | 1585 |
| 50 | | | | | | | | | | 120 | | GRADES TO TRACE GREENISH-GRAY SILTY RESIDUAL INCLUSIONS | 1580 |
| | | | | | | | | | | | | 24" BOULDER AT 51.0 FEET | |
| 55 | | | | | | | | | | | SM | ORANGISH-BROWN SILTY FINE SAND; LITTLE CLAY; SOME FINE TO COARSE GRAVEL | 1575 |
| | | | | | | | | | | 65/3" | | PERCAMBRIAN SYSTEM | |
| | | | | | | | | | | | CH | RED CLAY AND HIGHLY WEATHERED SAPROLITE FRAGMENTS; SOME SILT; VERY HARD | |
| 60 | | | | | | | | 100 | 10 | | | FELSIC - INTERMEDIATE LAPILLI TUFF; GRAY; LOCALLY SOME IRON OXIDE STAINING; MEDIUM GRAINED; SLIGHT TO MODERATE SURFACE WEATHERING; MODERATELY FRACTURED: 2" - 3" FRACTURE ZONE EVERY 8" - 12". STRONG BREAKAGE EVERY .5 TO 1 INCH ALONG BEDDING PLANES FROM 58.2 TO 59.0 FEET | 1570 |
| | | | | | | | | | | | | RED CLAY FILLED FRACTURES (1/16") FROM 60.0 TO 60.2 FEET | |
| 65 | | | | | | | | 100 | 91 | | | STRONG BREAKAGE EVERY 1/4" ALONG BEDDING PLANES FROM 62.5 TO 63.0 FEET | 1565 |
| | | | | | | | | | | | | IRON OXIDE STAINED, TIGHT, VERTICAL FRACTURE FROM 63.2 TO 65.5 FEET | |
| 70 | | | | | | | | 100 | 100 | | | MODERATE IRON OXIDE STAINING FROM 67.3 TO 68.5 FEET; TRACE CLAY IN FRACTURE ZONE FROM 67.3 TO 67.7 FEET | 1560 |
| | | | | | | | | | | | | GRADES GRAY; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED FROM 68.6 FEET; $0^{o}$ - $20^{o}$ FRACTURES EVERY 4" - 8" | |
| 75 | | | | | | | | | | | | BORING CONTINUED | 1555 |

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

LOG OF BORING DMI-2
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-73.1

## BORING DMI - 2 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/SQ FT PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | BLOW COUNTS SAMPLES: PERCENT RECOVERED | BLOW COUNTS SAMPLES: RQD | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | LOCALLY WEAK IRON OXIDE STAINING FROM 75.0 FEET; MODERATELY WEATHERED; SOME BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES | |
| 80 | | | | | | | | 100 | 80 | | | — 1550 |
| 85 | | | | | | | | 100 | 73 | | TRACE BRIGHT GREEN MINERAL INCLUSIONS FROM 83.0 FEET<br>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 | | | | | | | | 100 | 77 | | NUMEROUS MIRCOFRACTURES FROM 92.0 TO 96.0 FEET | — 1535 |
| 100 | | | | | | | | 100 | 100 | | 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<br>1" CLAY FILLED FRACTURE AT 100.6 FEET<br>GRADES GRAY; LOCALLY WEAK IRON OXIDE STAINING FROM 101.0 FEET; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED; OCCASIONAL IRON OXIDE STAINED, TIGHT FRACTURE | — 1530 |
| 105 | | | | | | | | | | | | — 1525 |
| 110 | | | | | | | | | | | | — 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<br>60° OPEN FRACTURE AT 122.2 FEET<br>80° OPEN, IRON OXIDE STAINED FRACTURE AT 123.7 FEET<br>70° OPEN FRACTURE FROM 124.7 FEET | — 1510 |
| 125 | | | | | | | | 100 | 96 | | | — 1505 |
| 130 | | | | | | | | | | | MODERATE IRON OXIDE STAINING FROM 129.2 TO 130.7 FEET<br>4" WEAK CLAY LINED FRACTURE ZONE AT 129.7 FEET<br>SOME FRACTURES ALONG NEAR VERTICAL BEDDING PLANES | — 1500 |
| 135 | | | | | | | | 100 | 79 | | | — 1495 |
| 140 | | | | | | | | | | | 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

1/79

DAMES & MOORE

FIGURE B-73.2

# BORING DMI-3

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

| DEPTH (FEET) | BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|
| 0 | | SP | BROWN FINE SAND; TRACE FINE TO COARSE GRAVEL; LOOSE (ROAD FILL - 10") | — 1625 |
| | 8 | ML | DARK BROWN CLAYEY SILT; SOME ORGANICS AND ROOTS (TOPSOIL - 12") | |
| 5 | 17 | SW GW | BROWN FINE TO COARSE SAND WITH FINE TO COARSE SAND AND FINE TO COARSE GRAVEL; LOCALLY SOME SILT; MEDIUM DENSE WITH SOME 3" - 4" COBBLES FROM 4.5 TO 6.0 FEET | — 1620 |
| 10 | 12 | | | |
| | | SP | BROWN FINE SAND; TRACE SILT; MEDIUM DENSE | — 1615 |
| 15 | 28 | | GRADES WITH OCCASIONAL LAYERS OF TAN COARSE SAND | |
| | | SP SW | BROWN FINE TO MEDIUM SAND WITH INTERBEDDED FINE TO COARSE SAND WITH LOCAL ZONES OF FINE TO COARSE GRAVEL; DENSE TO VERY DENSE | — 1610 |
| 20 | 43 | | | |
| | | | | — 1605 |
| 25 | 65 | | | |
| | | | FINE TO COARSE GRAVEL WITH INTERBEDDED FINE TO COARSE SAND; VERY DENSE | — 1600 |
| 30 | 160 | | 3"-4" COBBLES | |
| | | | | — 1595 |
| 35 | 100/0" | | | |
| | | | | — 1590 |
| 40 | 250 | GW SW | COBBLES UP TO 6" | |
| | | | | — 1585 |
| 45 | 100/5" | | | |
| | | | | — 1580 |
| 50 | 175/6" | | 18" BOULDER FROM 49.5 FEET | |
| | | | 14" BOULDER FROM 52.5 FEET | — 1575 |
| 55 | 200/3" | | PRECAMBRIAN SYSTEM | |
| | | CH | 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 |
| 60 | 150/3" | | GRADES SOME WHITE MOTTLING | |
| | | | | — 1565 |
| 65 | | | FELSIC - INTERMEDIATED LAPILLI TUFF; MAFIC CHLORITIC FRAGMENTS; SUBANGULAR; FELSIC FRAGMENTS; COARSE TUFF - MEDIUM LAPILLI, GENERALLY SUBROUNDED | — 1560 |
| 70 | | | 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 | |
| | | | FRACTURE ZONE FROM 71.5 TO 72.3 FEET | — 1555 |
| 75 | | | BORING CONTINUED | |

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 70 | | | | | | | | 100 | 100 |
| 75 | | | | | | | | 100 | 70 |

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

LOG OF BORING DMI-3
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-74.1

## BORING DMI - 3 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | 100 | 57 |
| 80 | | | | | | | | 100 | 90 |
| 85 | | | | | | | | 100 | 70 |
| 90 | | | | | | | | 100 | 100 |
| 95 | | | | | | | | 100 | 90 |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

FRACTURE ZONE FROM 76.3 TO 76.7 FEET

FRACTURE ZONE FROM 79.3 TO 82.3 FEET

FRACTURE ZONE FROM 86.5 TO 86.8 FEET

FRACTURE ZONE FROM 89.3 TO 89.7 FEET

FRACTURE ZONE FROM 97.7 TO 98.0 FEET

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

ELEVATION (FEET)

— 1650

— 1645

— 1640

— 1635

— 1630

— 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

1/79

DAMES & MOORE

FIGURE B-74.2

# BORING DMI - 4

**SURFACE ELEVATION** 1637.06

COORDINATES: N 116,375 E 2,278,622

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | | | 1635 |
| 5 | | | | | | | | | | 34 | SM | ORANGISH-BROWN AND BROWN FINE TO MEDIUM SAND; LOCALLY WITH COARSE SAND AND FINE TO COARSE GRAVEL; OCCASIONAL COBBLE; TRACE SAND SIZE BLACK SHALE FRAGMENTS; MEDIUM DENSE | |
| 10 | | | | | | | | | | 40 | | GRADES DARK BROWN SILT SEAM | 1630 |
| 15 | | | | | | | | | | 41 | SP | GRADES TAN TO LIGHT BROWN FINE SILTY SAND; TRACE FINE TO COARSE GRAVEL; TRACE SAND SIZE BLACK SHALE FRAGMENTS; DENSE | 1625 |
| 20 | | | | | | | | | | 75 | | TAN TO BROWN VERY FINE TO FINE SAND; TRACE SAND SIZE BLACK SHALE FRAGMENTS; TRACE SILT; TRACE MICA | 1620 |
| 25 | | | | | | | | | | 108 | | GRADES VERY DENSE | 1615 |
| 30 | | | | | | | | | | 60 | | | 1610 |
| 35 | | | | | | 6.9 | 122 | | | 56 | | 18" BROWN SILTY LAYER FROM 32.0 FEET GRADING COASER<br>GRADES TO TRACE FINE GRAVEL | 1605 |
| 40 | | | | | | | | | | 69 | SW | TAN FINE TO COARSE SAND INTERBEDDED WITH BROWN FINE SAND; LOCALLY SOME FINE TO COARSE GRAVEL; TRACE SILT; VERY DENSE | 1600 |
| 45 | | | | | | | | | | 108 | | | 1595 |
| 50 | | | | | | 7.6 | 126 | | | 70 | | | 1590 |
| 55 | | | | | | | | | | 70/4" | | GRADES TO OCCASIONAL COBBLE | 1585 |
| 60 | | | | | | 8.4 | 131 | | | 90 | SW<br>GW | TAN TO ORANGE FINE TO COARSE SAND AND FINE TO COARSE GRAVEL; TRACE SILT; 4"-6" COBBLES; VERY DENSE | 1580 |
| 65 | | | | | | | | | | | | GRADES GRAY<br>12" COBBLE FROM 60.0 FEET | |
| 70 | | | | | | 8.9 | 131 | | | 110/2" | SM | GRADES NUMEROUS 4"-6" COBBLES | 1575 |
| 75 | | | | | | | | | | | | 6" COBBLE FROM 67.0 FEET | 1570 |
| | | | | | | | | | | | | REDDISH-BROWN SILTY FINE SAND; TRACE COARSE SAND AND FINE GRAVEL; VERY DENSE | 1565 |
| | | | | | | | | | | | | 6" COBBLE AT 74.5 FEET<br>BORING CONTINUED | |

6-8-77 ▼ 51.4'

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMI-4

SHEET 1 OF 3

1/79

DAMES & MOORE

FIGURE B-75.1

## BORING DMI – 4 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | CH | PRECAMBRIAN SYSTEM<br>RED CLAY; SOME SILT AND FINE TO COARSE SAND; HARD | 1560 |
| | | | | | | | | | | 100/3" | | GRADES WITH HIGHLY WEATHERED SAPROLITE FRAGMENTS AT 79.5 FEET | |
| 80 | | | | | | | | 81 | 50 | | | INTERMEDIATE ASH TUFF; RED; STRONG IRON OXIDE STAINING; HIGHLY WEATHERED - LOCALLY CLAYEY FRACTURE ZONES EVERY EVERY 6"-12" | 1555 |
| 85 | | | | | | | | 70 | 38 | | | VERY HIGH CLAY CONTENT - ROCK BADLY BROKEN AND WASHED AWAY | 1550 |
| 90 | | | | | | | | 16 | 0 | | | | 1545 |
| 95 | | | | | | | | 32 | 20 | | | | 1540 |
| 100 | | | | | | | | 100 | 80 | | | BASE OF HIGHLY OR INTENSE WEATHERIN AT 98.0 FEET<br>YELLOWISH-GRAY; FINE GRAINED; MODERATE SURFACE WEATHERING; SLIGHTLY FRACTURED EVERY 12"-18" | |
| 105 | | | | | | | | 91 | 77 | | | HIGHLY WEATHERED FRACTURE CLAY LINED ZONE FROM 102.5 TO 103.5 FEET; STRONG IRON OXIDE STAINING | 1535 |
| 110 | | | | | | | | 100 | 87 | | | 5° CLAY LINED FRACTURE AT 107.5 FEET<br>WEATHERED AND FRACTURED IRON OXIDE STAINED ZONE FROM 108.1 TO 108.4 FEET<br>YELLOW CLAY FILLED FRACTURE ZONE FROM 110.4 TO 110.0 FEET<br>SOME NEAR VERTICAL FRACTURES FROM 111.0 TO 112.5 FEET | 1530 |
| 115 | | | | | | | | 100 | 77 | | | HIGHLY WEATHERED, FRACTURED AND IRON OXIDE STAINED 112.2 TO 113.0 FEET<br>SLIGHTLY FRACTURED FROM 115.0 TO 116.0 FEET<br>NEAR HORIZONTAL EVERY 6"-10" | 1525 |
| 120 | | | | | | | | 100 | 54 | | | IRON OXIDE STAINED FRACTURE ZONE FROM 117.6 TO 118.3 FEET<br>GRADES GRAY; MEDIUM TO COARSE GRAINED FROM 118.3 FEET; SLIGHT TO MODERATE SURFACE WEATHERING<br>OCCASIONAL IRON OXIDE STAINED VUG FROM 119.0 TO 120.0 FEET | 1520 |
| 125 | | | | | | | | 100 | 75 | | | HIGHLY FRACTURED ZONE FROM 120.3 TO 121.3 FEET AND 122.0 TO 122.5 FEET; WITH IRON OXIDE STAINING<br>NEAR VERTICAL FRACTURES FROM 124.0 TO 125.0 FEET<br>SLIGHTLY OPEN FRACTURE FROM 125.0 TO 131.0 FEET<br>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 | 1515 |
| 130 | | | | | | | | 100 | 84 | | | VERTICAL FRACTURE FROM 130.8 TO 131.3 FEET<br>YELLOW, CLAY LINED FRACTURE ZONE FROM 131.8 TO 132.1 FEET | 1510 |
| 135 | | | | | | | | 100 | 64 | | | MODERATELY FRACTURED EVERY 2"-4"; MODERATE IRON OXIDE STAIN FROM 134.4 TO 136.0 FEET | 1505 |
| 140 | | | | | | | | | | | | CLAY AND SILT LINED FRACTURE ZONE FROM 138.2 TO 138.5 FEET<br>VERTICAL FRACTURE FROM 139.0 TO 140.0 FEET | 1500 |
| 145 | | | | | | | | 100 | 76 | | | MODERATELY WEATHERED AND FRACTURED ZONE FROM 146.3 TO 147.5 FEET; MODERATE IRON OXIDE STAIN; SOME CLAY FILLING<br>FINE TO MEDIUM GRAINED FROM 148.0 FEET; SLIGHTLY FRACTURED WITH 45° - 60° FRACTURE EVERY 8"-12"; LOCALLY MODERATE IRON OXIDE STAINING; OCCASIONAL VUGS, PINPOINT TO 1/2" | 1495<br>1490 |
| 150 | | | | | | | | | | | | | |

BORING CONTINUED

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

LOG OF BORING DMI-4
SHEET 2 OF 3

1/79

DAMES & MOORE

FIGURE B-752

## BORING DMI - 4 CONTINUED

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

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

LOG OF BORING DMI-4
SHEET 3 OF 3

1/79

DAMES & MOORE

FIGURE B-75.3

# BORING DMI - 5

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | ML | BROWN SILT; TRACE FINE SAND; MEDIUM STIFF<br>12" COBBLE FROM 1.0 FOOT | 1640 |
| 16 ■ | SP | ORANGISH-BROWN TO BROWN FINE TO MEDIUM SAND; LOCALLY WITH COARSE SAND AND FINE TO OCARSE GRAVEL; MEDIUM DENSE<br>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 |
| 46 ■ | | | 1625 |
| 42 ⊠ | | GRADES WITH NUMEROUS 3"-4" COBBLES | 1620 |
| | | 12" COBBLE FROM 27.3 FEET | 1615 |
| 70 ■ | | COBBLES AT 29.0 FEET<br>GRADES WITH INTERBEDDED BROWN FINE TO MEDIUM SAND | 1610 |
| 100/2" ■ | SW GW | | 1605 |
| 100/3" ■ | | CONTINUOUS 3"-4" COBBLES FROM 39.0 TO 42.0 FEET | 1600 |
| 150/4" ⊠ | | COARSE GRAVEL AND COBBLES GRADE OUT FROM 42.0 TO 44.0 FEET | 1595 |
| | | | 1590 |
| 200/2" ⊠ | | | 1585 |
| 200/3" ⊠ | | | |

BORING CONTINUED

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

LOG OF BORING DMI-5
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-76.1

## BORING DMI - 5 CONTINUED

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

| SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|
| | | — 1580 |
| SW GW | GRADES WITH BROWN FINE TO MEDIUM SILTY SAND AT 64.5 FEET<br>GRADES WITH COBBLES FROM 66.5 TO 70.0 FEET | — 1575 |
| | | — 1570 |
| SM | REDDISH-BROWN TO BROWN SILTY FINE TO MEDIUM SAND; LOCALLY FINE TO COARSE GRAVEL; VERY DENSE | — 1565 |
| | PRECAMBRIAN SYSTEM | — 1560 |
| CH | YELLOWISH-GRAY CLAY; SOME SILT; SOME HIGHLY WEATHERED SAPROLITE FRAGMENTS; VERY HARD | |
| | INTERMEDIATE ASH TUFF; INTERBEDDED RED AND YELLOWISH-BROWN; HIGHLY WEATHERED WITH HIGH CLAY CONTENT; HIGHLY BROKEN. | — 1555 |

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

1/79

DAMES & MOORE

FIGURE B-76.2

# BORING DMI - 7

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

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

| BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | SP | BROWN FINE SAND; LOOSE (ROAD FILL - 6") | |
| | ML | BROWN SILT; TRACE FINE TO COARSE GRAVEL: MEDIUM STIFF | |
| 16 ■ | SM | REDDISH-BROWN TO BROWN SILTY FINE TO MEDIUM SAND; SOME COARSE SAND AND FINE TO COARSE GRAVEL; MEDIUM DENSE | 1645 |
| | | | 1640 |
| 40 ■ | | TAN FINE TO COARSE SAND; INTERBEDDED WITH BROWN FINE TO MEDIUM SAND LAYERS; LOCALLY WITH FINE TO COARSE GRAVEL; OCCASIONAL COBBLE (4"-6"); TRACE SAND SIZE BLACK SHALE FRAGMENTS; MEDIUM DENSE | 1635 |
| 53 ⊠ | | GRADES VERY DENSE | |
| | | GRAVEL GRADES OUT AT 16.0 FEET | 1630 |
| 65 ■ | SW | GRADES TO TAN FINE TO MEDIUM SAND; SOME BLACK SHALE FRAGMENTS | |
| | SP | GRADES LOCALLY TO SOME FINE TO COARSE GRAVEL | |
| 65/4" ■ | | GRADES LOCALLY TO FINE TO COARSE SAND WITH FINE TO COARSE GRAVEL | 1625 |
| | | | 1620 |
| 45 ■ | | GRADING TO MEDIUM TO COARSE SAND | |
| | | | 1615 |
| 86 ■ | | GRADING FINE TO COARSE SAND WITH FINE TO COARSE GRAVEL | |
| 80 ■ | GP | FINE GRAVEL; SOME COARSE GRAVEL AND FINE TO COARSE SAND; VERY DENSE | 1610 |
| 100/5" ■ | SW | TAN FINE TO COARSE SAND; SOME FINE GRAVEL: LOCALLY WITH COARSE GRAVEL; VERY DENSE | 1605 |
| 200 ⊠ | | FINE TO COARSE GRAVE WITH BROWN FINE TO COARSE SAND; OCCASIONAL COBBLE; VERY DENSE | 1600 |
| | | 8" COBBLE FROM 47.8 FEET | |
| | | GRADES FINE TO COARSE SAND WITH FINE TO COARSE GRAVEL; OCCASIONAL COBLLE; VERY DENSE | |
| 190 ■ | GW SW | GRADES CONTINUOUS 6"-8" COBBLES FROM 54.5 TO 63.0 FEET | 1595 |
| | | | 1590 |
| 5-31-77 ▼ 62.0' | | | |
| | | | 1585 |
| 110 ■ | SW | BROWN FINE TO COARSE SAND; SOME FINE GRAVEL; VERY DENSE; LOCALLY TRACE SILT SILT | |
| | | | 1580 |
| | | GRADES SOME FINE TO COARSE GRAVEL | |
| 110 ■ | | BROWN FINE TO MEDIUM SILTY SAND; TRACE FINE TO COARSE GRAVEL; VERY DENSE | 1575 |
| | | BORING CONTINUED | |

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

LOG OF BORING DMI-7
SHEET 1 OF 4

1/79

DAMES & MOORE

FIGURE B-77.1

## BORING DMI - 7 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | | GRADES LOCALLY WITH COARSE GRAVEL | |
| | | | | | | | | | | | | | — 1570 |
| 80 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 85 | | | | | | 6.9 | | | | 60 ■ | SM SW | GRADES REDDISH-BROWN SAND; TRACE RED CLAY AND SILT; SOME FINE TO COARSE GRAVEL | — 1565 |
| | | | | | | | | | | | | GRAVEL GRADES OUT | |
| 90 | | | | | | | | | | | | | — 1560 |
| | | | | | | | | | | | | PRECAMBRIAN SYSTEM | |
| | | | | | | | | | | | CH | RED CLAY; WITH HIGHLY WEATHERED SAPROLITE; SOME GREENISH-CLAY SILT POCKETS; VERY HARD | — 1555 |
| 95 | | | | | | | | 93 | 38 | | | INTERMEDIATE LAPILLI TUFF; SUBANGULAR MAFIC FRAGMENTS (20%); MEDIUM GRAINED TUFF MATRIX (80%). | |
| | | | | | | | | | | | | | — 1550 |
| 100 | | | | | | | | 100 | 72 | | | | |
| | | | | | | | | | | | | | — 1545 |
| 105 | | | | | | | | 64 | 52 | | | FAULT ZONE FROM 106.2 TO 110.0 FEET | |
| | | | | | | | | | | | | | — 1540 |
| 110 | | | | | | | | 100 | 92 | | | VERY WEAK FRACTURED ZONE FROM 114.0 TO 115.0 FEET | |
| | | | | | | | | | | | | | — 1535 |
| 115 | | | | | | | | 100 | 100 | | | | |
| | | | | | | | | | | | | | — 1530 |
| 120 | | | | | | | | | | | | WEAK FRACTURE ZONE FROM 122.3 TO 123.2 FEET | |
| | | | | | | | | | | | | | — 1525 |
| 125 | | | | | | | | 100 | 100 | | | WEAK FRACTURE ZONE FROM 125.2 TO 126.8 FEET | |
| | | | | | | | | | | | | | — 1520 |
| 130 | | | | | | | | 100 | 80 | | | 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 |
| 135 | | | | | | | | | | | | INTERMEDIATE ASH TUFF; COARSE GRAINED; UNIFORM TEXTURE; OCCASIONAL CHLORITIC FRAGMENTS | |
| | | | | | | | | 100 | 100 | | | | — 1510 |
| 140 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | — 1505 |
| 145 | | | | | | | | 100 | 100 | | | | |
| | | | | | | | | | | | | | — 1500 |
| 150 | | | | | | | | | | | | BORING CONTINUED | |

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

LOG OF BORING DMI-7
SHEET 2 OF 4

1/79

DAMES & MOORE

FIGURE B-77.2

## BORING DMI - 7 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 150 | | | | | | | | 100 | 100 |
| 155 | | | | | | | | 100 | 100 |
| 160 | | | | | | | | | |
| 165 | | | | | | | | 98 | 98 |
| 170 | | | | | | | | | |
| 175 | | | | | | | | 94 | 86 |
| 180 | | | | | | | | | |
| 185 | | | | | | | | 100 | 100 |
| 190 | | | | | | | | | |
| 195 | | | | | | | | 100 | 100 |
| 200 | | | | | | | | | |
| 205 | | | | | | | | 100 | 100 |
| 210 | | | | | | | | 100 | 100 |
| 215 | | | | | | | | 100 | 100 |
| 220 | | | | | | | | 100 | 100 |
| 225 | | | | | | | | | |

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

ELEVATION (FEET)

INTERMEDIATE LAPILLI TUFF: MAFIC CHLORITIC FRAGMENTS (40 TO 60%); MEDIUM GRAINED ASH MATRIX (40 TO 60%) — 1495

OCCASIONAL FILLED FRACTURE, 1/16" THICK FROM 150.0 TO 178.0 FEET

— 1490

— 1485

— 1480

— 1475

— 1470

VERY WEAK FRACTURE ZONES FROM 178.0 TO 178.5 FEET AND FROM 182.5 TO 183.0 FEET

INTERMEDIATE ASH TUFF: VARIABLE TEXTURE; LOCALLY LAPILLI TUFF. — 1465

OCCASIONAL FILLED FRACTURED, 1/16" THICK FROM 182.0 TO 195.0 FEET

— 1460

— 1455

INTERMEDIATE LAPILLI TUFF: MAFIC ANGULAR CHLORITIC FRAGMENTS (50%); MEDIUM GRAINED ASH MATRIX (50%)

— 1450

— 1445

— 1440

INTERMEDIATE ASH TUFF: FINE GRAINED, LAMINATED TEXTURED FROM 209.0 TO 224.0 FEET; MEDIUM GRAINED, MASSIVE FROM 224.0 TO 230.0 FEET; COARSE GRAINED, MASSIVE FROM 230.0 TO 237.0 FEET: — 1435

OCCASIONAL FILLED FRACTURES, 1/16" THICK FROM 202.0 TO 212.0 FEET

SEVERAL FRACTURES EVERY 1/2" TO 1" FROM 212.0 TO 215.0 FEET

— 1430

FRACTURE ZONE FROM 219.0 TO 220.0 FEET

BROKEN ZONE FROM 222.0 TO 223.5 FEET — 1425

OCCASIONAL FILLED FRACTURE, 1/16" TO 1/8" THICK FROM 224.5 TO 226.0 FEET

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

LOG OF BORING DMI-7
SHEET 3 OF 4

1/79

DAMES & MOORE

FIGURE B-77.3

## BORING DMI - 7 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 225 | | | | | | | | 100 | 100 | | | | — 1420 |
| 230 | | | | | | | | 100 | 100 | | | OCCASIONAL FILLED FRACTURE, < 1/16" THICK FROM 233.0 TO 236.0 FEET | — 1415 |
| 235 | | | | | | | | 100 | 100 | | | FELSIC - INTERMEDIATE LAPILLI TUFF; MAFIC CHLORITIC ANGULAR FRAGMENTS (30%); COARSE FELSIC ASH (70%) | — 1410 |
| 240 | | | | | | | | | | | | OCCASIONAL FILLED FRACTURE, < 1/16" THICK FROM 241.0 TO 250.2 FEET | — 1405 |
| 245 | | | | | | | | 100 | 100 | | | | — 1400 |
| 250 | | | | | | | | 100 | 100 | | | STRONG FRACTURE ZONE FROM 250.2 TO 252.8 FEET | — 1395 |
| 255 | | | | | | | | | | | | | |

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.

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

LOG OF BORING DMI-7
SHEET 4 OF 4

1/79

DAMES & MOORE

FIGURE B-77.4

# BORING DMI - 8

*SURFACE ELEVATION* 1647.29

COORDINATES: N 116,430 E 2,278,125

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML | GRAYISH-BROWN SILT; SOME ORGANICS; WITH LEAVES AND FINE ROOTS (TOPSOIL - 12") | |
| | | | | | | | | | | | | BROWN FINE SILTY SAND; SOME COARSE SAND; TRACE FINE GRAVEL; MEDIUM DENSE | — 1645 |
| 5 | | | | | | | | | | 15 | SM | | |
| | | | | | | | | | | | | GRADES BROWN FINE TO MEDIUM SILTY SAND; SOME COARSE SAND AND FINE TO COARSE GRAVEL; SOME 3"-4" COBBLES; MEDIUM DENSE | — 1640 |
| 10 | | | | | | | | | | 15 | | | |
| | | | | | | | | | | | | TAN MEDIUM TO COARSE SAND; TRACE FINE SAND AND FINE GRAVEL; LITTLE SAND SIZE BLACK SHALE FRAGMENTS; LOCALLY TRACE SILT; MEDIUM DENSE | — 1635 |
| 15 | | | | | | | | | | 25 | | | |
| | | | | | | | | | | | | GRADES WITH FINE TO COARSE GRAVEL FROM 15.0 TO 17.0 FEET | — 1630 |
| 20 | | | | | | | | | | 120 | | | |
| | | | | | | | | | | | | GRADES TAN FINE TO MEDIUM SAND; VERY DENSE | |
| | | | | | | | | | | | | GRADES LOCALLY WITH SOME FINE TO COARSE SAND AND FINE TO COARSE GRAVEL BELOW 21.5 FEET; OCCASIONAL 3"-4" COBBLE | — 1625 |
| 25 | | | | | | | | | | 70 | | | |
| | | | | | | | | | | | SP | | — 1620 |
| 30 | | | | | | 4.8 | 107 | | | 76 | | | |
| | | | | | | | | | | | | | — 1615 |
| 35 | | | | | | | | | | 104 | | | |
| | | | | | | | | | | | | | — 1610 |
| 40 | | | | | | | | | | 105 | | | |
| | | | | | | | | | | | | | — 1605 |
| 45 | | | | | | | | | | 100/4" | | 6" COBBLE FROM 43.5 FEET | |
| | | | | | | | | | | | | BROWN FINE TO COARSE SAND; LITTLE FINE TO COARSE GRAVEL; OCCASIONAL COBBLE; VERY DENSE | |
| 50 | | | | | | | | | | 200 | SW | | — 1600 |
| | | | | | | | | | | | | FINE TO COARSE GRAVEL CONTENT INCREASING | |
| 55 | | | | | | | | | | 100/0" | GW | | — 1595 |
| | | | | | | | | | | | | FINE TO COARSE GRAVEL WITH 6"-12" COBBLES; VERY DENSE | |
| 60 | | | | | | 11.2 | 121 | | | 100 | | | — 1590 |
| | | | | | | | | | | | | ORANGISH-BROWN AND BROWN FINE TO COARSE SAND; SOME FINE GRAVEL; SOME COARSE GRAVEL; VERY DENSE | |
| | | | | | | | | | | 6-12-77 ▼ 62.5' | SW | GRADES TRACE SILT POCKETS | |
| 65 | | | | | | | | | | | | 18" BOULDER FROM 61.5 FEET | — 1585 |
| | | | | | | | | | | | | REDDISH-BROWN SILTY FINE SAND; TRACE COARSE SAND AND FINE TO COARSE GRAVEL; VERY DENSE | — 1580 |
| 70 | | | | | | | | | | 102 | | | |
| | | | | | | | | | | | SM | GRADES LOCALLY WITH COARSE GRAVEL AND COBBLES | — 1575 |
| 75 | | | | | | | | | | | | BORING CONTINUED | |

**EXXON MINERALS COMPANY, U.S.A.**

CRANDON PROJECT

LOG OF BORING DMI-8

SHEET 1 OF 4

1/79

DAMES & MOORE

FIGURE B-78.1

## BORING DMI - 8 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRAIN T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | | | | | GRADES ORANGISH-BROWN | |
| | | | | | | | | | | | | | 1570 |
| | | | | | | | | | | | | GRADES WITH INTERBEDDED GREENISH-GRAY RESIDUAL SILT LAYERS AND ROCK FRAGMENTS | |
| 80 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1565 |
| 85 | | | | | | | | | | 200/7" ■ | | | |
| | | | | | | | | | | | SM | | 1560 |
| 90 | | | | | | | | | | 120 ■ | | GRADES REDDISH-BROWN | |
| | | | | | | | | | | | | | 1555 |
| 95 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1550 |
| 100 | | | | | | | | 60 | 0 | | | PRECAMBRIAN SYSTEM<br>SAPROLITE: HIGHLY WEATHERED; APPREARS TO BE INTERMEDIATE LAPILLI TUFF | |
| | | | | | | | | 66 | 34 | | | 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<br>MODERATELY FRACTURED; COMPETENT FRACTURE FROM 101.0 TO 102.7 FEET | 1545 |
| 105 | | | | | | | | | | | | | |
| | | | | | | | | 44 | 10 | | | | 1540 |
| 110 | | | | | | | | | | | | | |
| | | | | | | | | 100 | 76 | | | BASE OF HIGH WEATHERING AT 111.5 FEET<br>GRADES YELLOWISH-GRAY TO GRAY; FINE TO MEDIUM GRAINED; SLIGHT SURFACE WEATHERING; SLIGHTLY FRACTURED<br>FRACTURE ZONE FROM 113.8 TO 114.4 FEET; SOME CLAY FILLING; MODERATE IRON OXIDE STAINING<br>LOCALLY MODERATE TO HIGHLY FRACTURED FROM 116.2 FEET | 1535 |
| 115 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1530 |
| 120 | | | | | | | | 37 | 18 | | | | |
| | | | | | | | | | | | | | 1525 |
| 125 | | | | | | | | | | | | | |
| | | | | | | | | 90 | 90 | | | SLIGHTLY WEATHERED; SLIGHTLY FRACTURED FROM 125.0 FEET | |
| | | | | | | | | | | | | | 1520 |
| 130 | | | | | | | | 100 | 17 | | | RED; HIGHLY WEATHERED; LOCALLY VERY CLAYEY; HIGHLY FRACTURED FROM 129.4 TO 139.7 FEET | |
| | | | | | | | | | | | | | 1515 |
| 135 | | | | | | | | 57 | 9 | | | | |
| | | | | | | | | | | | | | 1510 |
| 140 | | | | | | | | | | | | | |
| | | | | | | | | 100 | 87 | | | GRADES GRAY; MEDIUM GRAINED; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED<br>75° OPEN FRACTURE AT 141.0 FEET<br>MODERATELY FRACTURED; MODERATE IRON OXIDE STAINING FROM 142.0 TO 143.0 FEET; SOME CLAY FILLING, 1/8" | 1505 |
| 145 | | | | | | | | | | | | | |
| | | | | | | | | 100 | 60 | | | WEAK FRACTURE ZONE FROM 145.5 TO 146.3 FEET; STRONG IRON OXIDE STAINING; TRACE QUARTZ FILLING<br>70°-VERTICAL CLOSED FRACTURES FROM 146.3 TO 148.0 FEET<br>VERTICAL FRACTURES, 1/8"; MODERATE IRON OXIDE STAINING FROM 148.0 FEET; MODERATELY WEATHERED; SOME CLAY FILLING | 1500 |
| 150 | | | | | | | | | | | | BORING CONTINUED | |

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

LOG OF BORING DMI-8
SHEET 2 OF 4

1/79

DAMES & MOORE

FIGURE B-78.2

## BORING DMI - 8 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 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)

— 1495

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

— 1490

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 APPREAR, 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

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

WEAK HIGHLY FRACTURED ZONE FROM 217.4 TO 218.7 FEET; SOME CLAY CONTENT

— 1430

4"-6" WEAK HIGHLY FRACTURED ZONES EVER 1'-2'

— 1425

BORING CONTINUED

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

LOG OF BORING DMI-8
SHEET 3 OF 4

1/79

DAMES & MOORE

FIGURE B-783

## BORING DMI - 8 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | BLOW COUNTS SAMPLES: PERCENT RECOVERED | BLOW COUNTS SAMPLES: RQD | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 225 | | | | | | | | 100 | 55 | | | 1420 |
| | | | | | | | | 100 | 0 | | HIGHLY FRACTURED ZONE FROM 228.0 TO 230.0 FEET | |
| 230 | | | | | | | | 100 | 94 | | GRAY; SLIGHTLY WEATHERED; SLIGHTLY FRACTURED FROM 230.0 TO 240.0 FEET; SOME BREAKAGE ALONG NEAR VERTICAL BEDDING PLANES | 1415 |
| | | | | | | | | | | | MODERATE IRON OXIDE STAINING FROM 233.5 TO 236.3 FEET | |
| 235 | | | | | | | | 100 | 80 | | | 1410 |
| 240 | | | | | | | | 88 | 64 | | 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 | 1405 |
| 245 | | | | | | | | 100 | 96 | | | 1400 |
| 250 | | | | | | | | 100 | 88 | | COARSE GRAINED FROM 251.5 TO 255.0 FEET; SLIGHTLY FRACTURED, 60°-75° OPEN FRACTURES EVERY 6"-8" | 1395 |
| 255 | | | | | | | | 100 | 41 | | FINE GRAINED FROM 255.0 FEET; SLIGHTLY WEATHERED; MODERATE TO HIGH BREAKAGE ALONG HIGH ANGLE BEDDING PLANES | |
| | | | | | | | | 100 | 87 | | GRAY CLAY FILLED FRACTURE, 1/16" AT 257.5 FEET | 1390 |
| 260 | | | | | | | | 100 | 65 | | GRAY CLAY FILLED FRACTURE, 1/2" AT 260.5 FEET | |
| 265 | | | | | | | | | | | | 1385 |

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.

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

LOG OF BORING DMI-8
SHEET 4 OF 4

1/79

DAMES & MOORE

FIGURE B-78.4

# BORING DMI - 9

*SURFACE ELEVATION* 1633.82
COORDINATES: N 116,909 E 2,278,903

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | ML | BROWN SILT WITH ROOTS; MEDIUM STIFF (MODIFIED LOESS) | |
| | | | | | | | | | | 7 | SW SP | COARSE GRAVEL WITH 6"-24" COBBLES AND GOULDERS WITH INTERBEDDED REDDISH-BROWN FINE SILTY SAND; MEDIUM DENSE | — 1630 |
| 5 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | 10 | SP | ORANGISH-BROWN MEDIUM SAND; SOME BROWN FINE TO COARSE SAND; SOME BLACK SHALE FRAGMENTS; LOOSE | — 1625 |
| 15 | | | | | | | | | | 27 | | GRADES TAN; MEDIUM DENSE | — 1620 |
| 20 | | | | | | | | | | 82 | SW | TAN FINE TO COARSE SAND; LOCALLY SOME FINE TO COARSE GRAVEL; VERY DENSE<br>OCCASIONAL 3"-4" COBBLE | — 1615 |
| 25 | | | | | | | | | | 60/3" | | | — 1610 |
| 30 | | | | | | | | | | 60 | | GRADES WITH OCCASIONAL LAYERS OF FINE SAND | — 1605 |
| 35 | | 3600/2500<br>4400/4500 | | | | 13.6 | 115 | | | 100/2" | | | — 1600 |
| 40 | | | | | | | | | | 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<br>FINE TO COARSE GRAVEL WITH FINE TO COARSE SAND WITH COBBLES; TRACE SILT VERY DENSE | |
| 45 | | | | | | 7.5 | 127 | | | 200 | GW SW | 8" COBBLE FROM 44.5 FEET | — 1590 |
| 50 | | | | | | | | | | 200/5" | | GRADES TRACE YELLOWISH-GRAY AND RED CLAY | — 1585 |
| 55 | | | | | | | | | | 200/4" | | | — 1580 |
| | | | | | | | | | | | CH | PRECAMBRIAN SYSTEM<br>MOTTLED YELLOWISH-GRAY AND RED CLAY; SOME SILT; WITH HIGHLY WEATHERED SAPROLITE FRAGMENTS; VERY HARD | |
| 60 | | | | | | | | 100 | 93 | | | FELSIC ASH TUFF; GREENISH-GRAY; LOCALLY WITH BROWN MOTTLING; FINE GRAINED; SLIGHTLY TO MODERATELY WEATHERED; SLIGHTLY FRACTURED.<br>SOME BREAKAGE ALONG WEAK NEAR VERTICAL BEDDING PLANES<br>3" WEAK FRACTURE ZONE FROM 61.1 FEET | — 1575 |
| 65 | | | | | | | | | | | | STRONG IRON OXIDE STAINED, WEAK FRACTURE ZONE FROM 65.2 TO 65.9 FEET<br>GRADES GRAY; MEDIUM GRAINED FROM 65.9 FEET; LOCALLY MODERATE IRON OXIDE STAINING | — 1570 |
| 70 | | | | | | | | 100 | 77 | | | FELSIC - INTERMEDIATE LAPILLI TUFF; CHLORITIC MAFIC FRAGMENTS (30 - 40%), GENERALLY SUBANGULAR; FELSIC LAPILLI TUFF (60 - 70%)<br>NEAR VERTICAL FRACTURE FROM 70.0 TO 71.0 FEET; SOME CLAY FILLING<br>OCCASIONAL CLAY FILLED HORIZONTAL FRACTURE EVERY 2"-6" FROM 71.7 TO 73.0 FEET<br>SLIGHTLY WEATHERED, UNFRACTURED FROM 73.9 FEET | — 1565 |
| 75 | | | | | | | | | | | | | — 1560 |

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

LOG OF BORING DMI-9
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-79.1

## BORING DMI - 9 CONTINUED

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH T/N PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 75 | | | | | | | | 100 | 100 |
| 80 | | | | | | | | 100 | 100 |
| 85 | | | | | | | | 100 | 97 |
| 90 | | | | | | | | | |
| 95 | | | | | | | | 100 | 100 |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |

BLOW COUNTS SAMPLES

SYMBOLS

DESCRIPTIONS

ELEVATION (FEET)

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 — 1545
WEAK BEDDING PLANE BREAK, NEAR VERTICAL FROM 90.2 TO 90.8 FEET
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

1/79

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: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | ROCK CORING: PERCENT RECOVERED | ROCK CORING: RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 27 | ML | LIGHT BROWN SANDY SILT WITH WOOD, ROOT FRAGMENTS; 6" COBBLE AT 6"; MEDIUM DENSE | 1660 |
| | | | | | | | | | | 24 | | BROWN FINE TO MEDIUM SAND WITH SOME SILT; MEDIUM DENSE | |
| 5 | | | | | | | | | | 10 | SP | | 1655 |
| 10 | | | | | | | | | | 19 | | BROWN FINE TO COARSE SAND AND GRAVEL WITH SOME SILT; MEDIUM DENSE | 1650 |
| 15 | | | | | | | | | | 63 | | GRADES WITH MORE GRAVEL AND DENSER | 1645 |
| 20 | | | | | | | | | | 191 | | GRADES VERY DENSE | 1640 |
| 25 | PS | | | | | 7.8 | | | | 108 | SW GW | GRADES WITH LESS GRAVEL | 1635 |
| 30 | | | | | | | | | | 139/9" | | GRADES WITH COBBLES, APPROXIMATELY 6" | 1630 |
| 35 | | | | | | | | | | 100/4" | | | 1625 |
| 40 | | | | | | | | | | 100/4" | | BOULDER FROM 40.0 TO 43.0 FEET | 1620 |
| 45 | | | | | | | | | | 100/6" | SP | BROWN FINE TO MEDIUM SAND WITH SOME SILT; VERY DENSE | 1615 |
| 50 | | | | | | | | | | 174/9" | | BROWN SILTY SAND WITH GRAVEL; VERY DENSE | 1610 |
| 55 | PS | | | | | 10.3 | | | | 200/8" | | | 1605 |
| 60 | | | | | | | | | | 100/6" | SM | GRADES REDDISH-BROWN | 1600 |
| 65 | | | | | | | | | | 168/8" | | | 1595 |
| | | | | | | | | | | 9-2-78 ▼ 67.6' | | | |
| 70 | | | | | | | | | | 100/5" | | | 1590 |
| 75 | | | | | | | | | | | | | |

**EXXON MINERALS COMPANY, U.S.A.**

CRANDON PROJECT

LOG OF BORING DMS-1

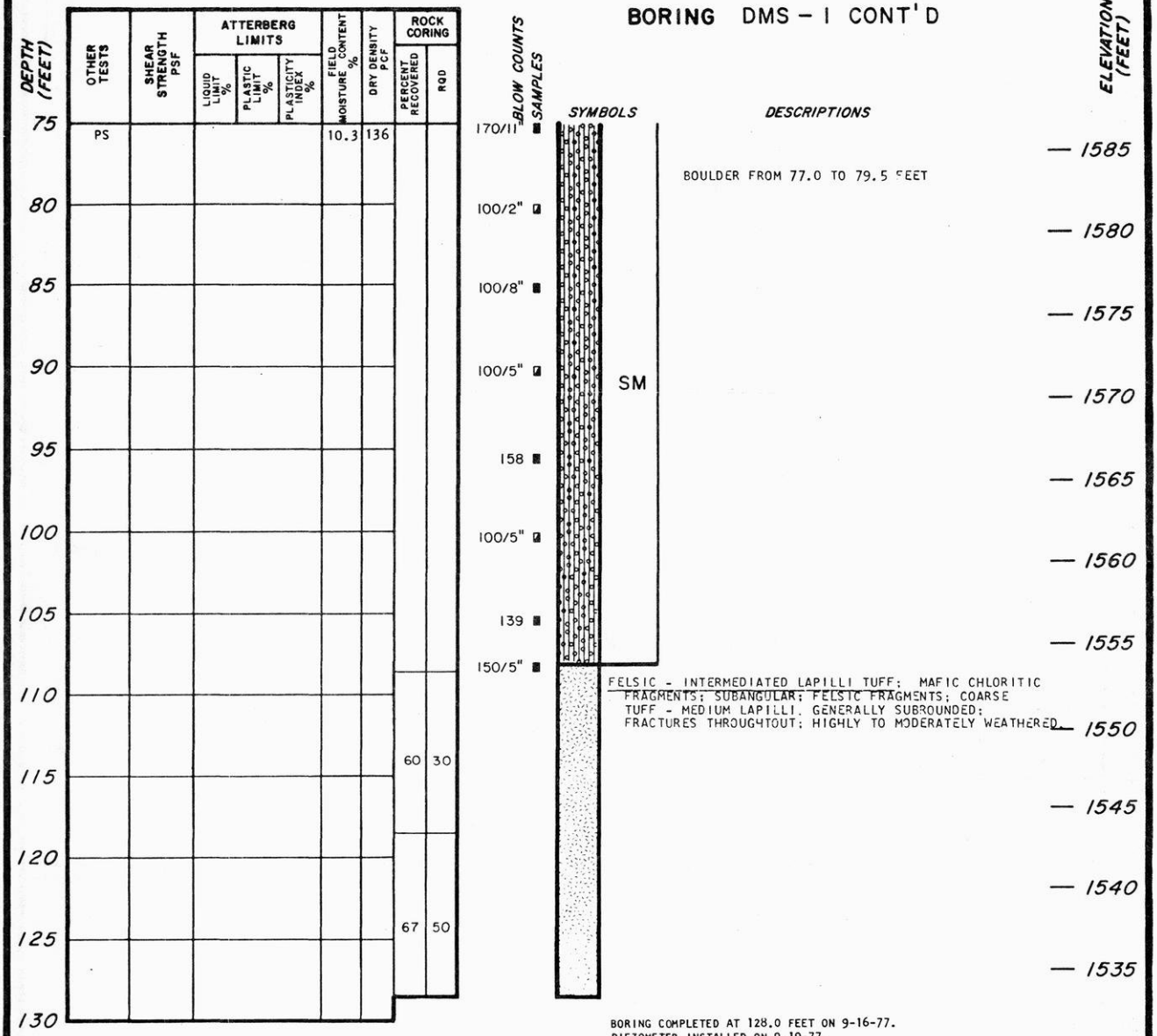
SHEET 1 OF 2

1/79

DAMES & MOORE

FIGURE B-80.1

## BORING DMS – 1 CONT'D




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

1/79

DAMES & MOORE

FIGURE B-80.2

# BORING DMS - 2

*SURFACE ELEVATION* 1641.19

COORDINATES: N 117,927 E 2,277,890

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | ROCK CORING: PERCENT RECOVERED | ROCK CORING: RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 8 | ML | LIGHT BROWN FINE SANDY SILT WITH ROOTS, WOOD AND SOME ORGANICS; MEDIUM DENSE | 1640 |
| | | | | | | | | | | | | BROWN SILTY FINE TO MEDIUM SAND; MEDIUM DENSE | |
| 5 | | | | | | | | | | 20 | | | |
| | | | | | | | | | | 17 | SM | GRADES COARSER AND WITH GRAVEL | 1635 |
| 10 | | | | | | | | | | 25 | | | 1630 |
| 15 | | | | | | | | | | 65 | | BROWN FINE TO MEDIUM SAND WITH SOME SILT AND GRAVEL; VERY DENSE | 1625 |
| 20 | | | | | | | | | | 160 | | | 1620 |
| 25 | | | | | | | | | | 100/4" | | | 1615 |
| 30 | | | | | | | | | | 100/4" | SP SM | | 1610 |
| 35 | PS | | | | | 17.9 | | | | 171/6" | | | 1605 |
| 40 | | | | | | | | | | 100/3" | | | 1600 |
| 45 | | | | | | | | | | 200/5" | | | |
| 50 | | | | | | | | | | 105/3" | | BROWN SILTY FINE TO MEDIUM SAND WITH GRAVEL; VERY DENSE | 1595 |
| | | | | | | | | | | | | GRADES WITH COBBLES | |
| | | | | | | | | | | 10-20-77 ▼ 53.0' | | | 1590 |
| 55 | | | | | | | | | | 200/3" | | GRADES REDDISH-BROWN | 1585 |
| | | | | | | | | | | | | BOULDER FROM 57.0 TO 59.7 FEET | |
| 60 | | | | | | | | | | 115/4" | SM | | 1580 |
| 65 | | | | | | | | | | 153/10" | | | 1575 |
| 70 | | | | | | | | | | 100/5" | | | 1570 |
| 75 | | | | | | | | | | | | | |

**EXXON MINERALS COMPANY, U.S.A.**

CRANDON PROJECT

LOG OF BORING DMS-2

SHEET 1 OF 3

1/79

DAMES & MOORE

FIGURE B-811

## BORING DMS - 2 CONT'D

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | ROCK CORING: PERCENT RECOVERED | ROCK CORING: RQD | BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 75 | PS | | | | | 10.1 | 134 | | | 147/10" ■ | | | 1565 |
| 80 | | | | | | | | | | | | BOULDER FROM 80.0 TO 81.0 FEET | 1560 |
| 85 | | | | | | | | | | 100/6" ⊠ | | | 1555 |
| 90 | | | | | | | | | | 100/5" ◪ | | GRADES WITH COBBLES | 1550 |
| 95 | | | | | | | | | | 100/5" ⊠ | | | 1545 |
| 100 | | | | | | | | | | 100/2" ◪ | | BOULDER FROM 97.0 TO 98.0 FEET | 1540 |
| 105 | | | | | | | | | | 140/3" ⊠ | | | 1535 |
| 110 | | | | | | | | | | 100/2" □ | | BOULDER FROM 105.5 TO 108.5 FEET | 1530 |
| 115 | | | | | | | | | | 100/3" ⊠ | | | 1525 |
| 120 | | | | | | | | | | 100/2" ⊠ | SM | | 1520 |
| 125 | | | | | | | | | | | | | 1515 |
| 130 | | | | | | | | | | *□ | | | 1510 |
| 135 | | | | | | | | | | 100/4" ⊠ | | | 1505 |
| 140 | | | | | | | | | | | | | 1500 |
| 145 | | | | | | | | | | 100 / 4 1/2" ⊠ | | | 1495 |
| 150 | | | | | | | | | | | | GRADES WITH LESS GRAVEL<br>BORING CONTINUED | |

* INDICATES DENNISON SAMPLE

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

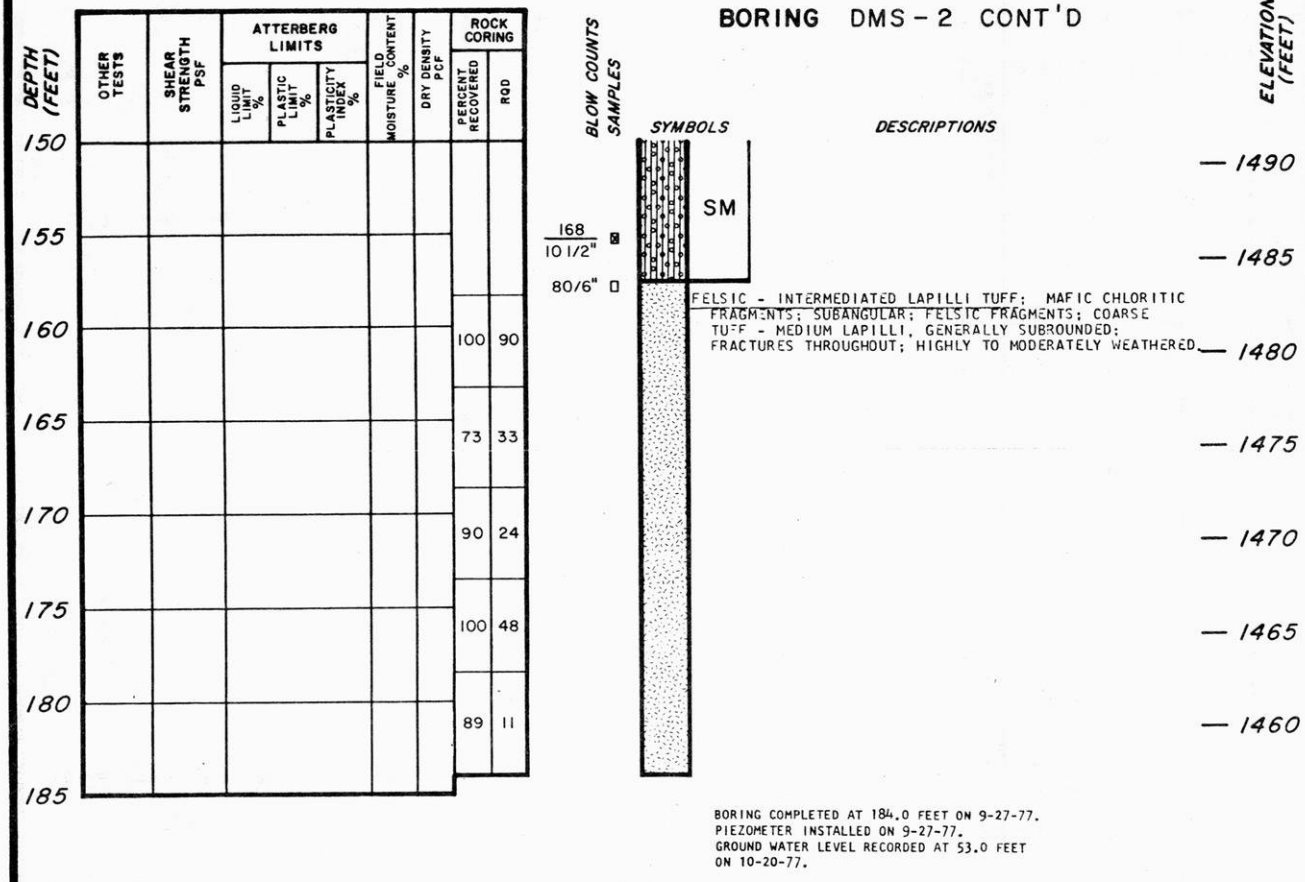
LOG OF BORING DMS-2
SHEET 2 OF 3

1/79

DAMES & MOORE

FIGURE B-81.2

## BORING DMS-2 CONT'D




BORING COMPLETED AT 184.0 FEET ON 9-27-77.
PIEZOMETER INSTALLED ON 9-27-77.
GROUND WATER LEVEL RECORDED AT 53.0 FEET ON 10-20-77.

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

LOG OF BORING DMS-2
SHEET 3 OF 3

1/79

DAMES & MOORE

FIGURE B-81.3

# BORING DMA-22B

*SURFACE ELEVATION* 1629.19

COORDINATES: N 113,800 E 2,297,350

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | | OL | BLACK ORGANIC SILT WITH SOME FINE SAND AND ROOTS; SOFT | |
| | | | | | | | | | | | SM | BROWN SILTY FINE SAND WITH TRACE CLAY | |
| | | | | | | | | | | | | ORANGISH-BROWN MEDIUM SAND; MEDIUM DENSE GRADES WITH SOME FINE AND COARSE SAND AND FINE TO COARSE GRAVEL | 1625 |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | 1620 |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | SP | | |
| 15 | | | | | | | | | | | | | 1615 |
| | | | | | | | | | | | | GRADES BROWN FINE SAND; MEDIUM DENSE | |
| 20 | | | | | | | | | | | | | 1610 |
| | | | | | | | | | | 1-9-80 ▼ 25.2' | | | 1605 |
| 25 | | | | | | | | | | | | BROWN SILTY VERY FINE SAND; LOOSE TO MEDIUM DENSE | |
| | | | | | | | | | | | SM | | |
| 30 | | | | | | | | | | | | | 1600 |
| | | | | | | | | | | | SW | | |
| 35 | | | | | | | | | | | SP | BROWN FINE TO COARSE SAND WITH FINE SAND LAYERS; DENSE | 1595 |
| | | | | | | | | | | 105 | SW | YELLOWISH-BROWN FINE TO COARSE SAND WITH FINE GRAVEL AND TRACE SILT; (VERY DENSE) | |
| | | | | | | | | | | | | BROWN FINE TO MEDIUM SAND WITH TRACE SILT; (VERY DENSE) | |
| 40 | | | | | | | | | | 91 | | | 1590 |
| | | | | | | | | | | | | | 1585 |
| 45 | | | | | | | | | | 119 | | GRADES TRACE COARSE SAND | |
| | | | | | | | | | | | | | 1580 |
| 50 | | | | | | | | | | 114 | | | |
| | | | | | | | | | | | SP | | 1575 |
| 55 | | | | | | | | | | 91 | | 12 INCH LAYER OF MULTICOLORED SAND AND FINE TO COARSE GRAVEL AT 56.0 FEET | |
| | | | | | | | | | | | | | 1570 |
| 60 | | | | | | | | | | 65 | | | |
| | | | | | | | | | | | | | 1565 |
| 65 | | | | | | | | | | 175/10" | | | |
| | | | | | | | | | | | | | 1560 |
| 70 | | | | | | | | | | 172/11" | | GRADES WITH FINE GRAVEL IN THIN LENSES | |
| | | | | | | | | | | | | | 1555 |
| 75 | | | | | | | | | | | | | |

EXXON MINERALS COMPANY, U.S.A.

CRANDON PROJECT

LOG OF BORING DMA-22B

SHEET 1 OF 2

DAMES & MOORE

FIGURE B-82.1

## BORING DMA-22B CONT'D

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

BLOW COUNTS / SAMPLES

137
180
110/6"
159
156/6"
150/4"

SYMBOLS

SP

DESCRIPTIONS

GRADES TRACE SILT

GRADES TO TRACE COARSE SAND AND GRAVEL

ELEVATION (FEET)

1550
1545
1540
1535
1530

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

DAMES & MOORE

FIGURE B-82.2

# BORING DMC-1

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

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

| BLOW COUNTS | SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|
| 15 | ▯ | SM | YELLOWISH-BROWN FINE TO MEDIUM SAND WITH SOME SILT AND TRACE FINE GRAVEL; (MEDIUM DENSE) | |
| | | | | — 1610 |
| 25 | ▯ | | GRADES WITH SOME COARSE GRAVEL AND OCCASIONAL COBBLES | |
| | | | | — 1605 |
| 20 | ▯ | | | |
| | | | | — 1600 |
| 32 | ▯ | | GRADES DENSE | |
| | | SP | LIGHT BROWN FINE TO MEDIUM SAND; (MEDIUM DENSE) | — 1595 |
| 22 | ▯ | | | |
| | | | | — 1590 |
| 29 | ▯ | | GRADES WITH SOME MEDIUM TO COARSE SAND AND FINE GRAVEL | |
| 1-10-80 ▼ 29.0' | | | | — 1585 |
| 19 | ▯ | | | |
| | | | | — 1580 |
| 41 | ▯ | | | |
| | | | | — 1575 |
| 100 | ■ | SM | BROWN FINE TO MEDIUM SANDY SILT WITH SOME FINE TO COARSE GRAVEL<br>GRADES WITH MEDIUM TO COARSE SAND AND FINE GRAVEL | |
| | | | | — 1570 |
| 194 | ■ | | GRADES WITH COARSE GRAVEL | |

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

# BORING DMC-2

*SURFACE ELEVATION* 1588.60

COORDINATES: N 126,510 E 2,288,740

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | SA | | | | | 6.9 | | | |
| 50 | | | | | | | | | |
| 55 | | | | | | | | | |

1-9-80 ▼ 9.1'

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 3 | OL SM | DARK BROWN AND BLACK ORGANIC SILTY SAND WITH TRACE ROOTLETS | |
| 20 | SP | YELLOWISH-BROWN FINE TO MEDIUM SAND WITH TRACE SILT; (VERY LOOSE TO LOOSE) | 1585 |
| | | GRADES TO MEDIUM DENSE | |
| 14 | SW | BROWN FINE TO COARSE SAND; (MEDIUM DENSE) | 1580 |
| | | | 1575 |
| 7 | | GRADES LOOSE WITH TRACE FINE GRAVEL | |
| | | | 1570 |
| 34 | | GRADES WITH SOME FINE TO COARSE GRAVEL; (MEDIUM DENSE) GRADES WITH OCCASIONAL COBBLES | |
| | | | 1565 |
| 44 | | | |
| | | | 1560 |
| 27 | GW | BROWN FINE TO COARSE SAND AND GRAVEL; (DENSE) | |
| | | | 1555 |
| 44 | | | |
| | | | 1550 |
| 55 | | GRADES VERY DENSE | |
| | | | 1545 |
| 24 | | | |
| | | | 1540 |
| 12 | | | |

BORING COMPLETED AT A DEPTH OF 51.5 FEET ON 11-12-79.
CASING USED TO A DEPTH OF 5.0 FEET.
PIEZOMETER INSTALLED ON 11-12-79.
2 INCH PVC SLOTTED FROM 39.0 TO 49.0 FEET.
GRAVEL PACK: 36.0 TO 51.5 FEET.
SAND: 34.5 TO 36.0 FEET.
BENTONITE: 32.0 TO 34.5 FEET.
GROUT: 0.0 TO 32.0 FEET.
GROUND WATER LEVEL RECORDED AT 9.1 FEET ON 1-9-80.

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

LOG OF BORING DMC-2
SHEET 1 OF 1

DAMES & MOORE | FIGURE B-84

# BORING DMC-3

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| | | | — 1610 |
| 47 | OL / SC | DARK YELLOWISH-BROWN ORGANIC SILTY CLAYEY SAND WITH SOME ROOTS | |
| | | YELLOWISH-BROWN SILT VERY FINE SAND WITH THIN LENSES OF BROWN FINE SAND; (LOOSE TO MEDIUM DENSE) | — 1605 |
| 17 | SP SM | | |
| | | | — 1600 |
| 11 | | | |
| | | BROWN SILTY CLAY WITH TRACE FINE SAND AND OCCASIONAL THIN LENSES OF SAND AND SILT; (VERY STIFF) | — 1595 |
| 21 | CL | | |
| 1-9-80 ▼ 18.2' | | | |
| | | BROWN FINE TO MEDIUM SAND WITH TRACE SILT; (MEDIUM DENSE) | — 1590 |
| 20 | | GRADES WITH OCCASIONAL 4 TO 6 INCH LENSES OF FINE TO COARSE SAND | |
| | | GRADES FINE TO COARSE GRAVEL IN LENSES | — 1585 |
| 31 | | GRADES DENSE | |
| | | | — 1580 |
| 34 | SP | | |
| | | GRADES VERY DENSE WITH OCCASIONAL STRINGERS OF SILT | — 1575 |
| 60 | | | |
| | | | — 1570 |
| 58 | | SILT STRINGERS GRADE OUT | |
| | | | — 1565 |
| 47 | | | |

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

# BORING DMP-1

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

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD | BLOW COUNTS SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | | 10 | SC | DARK YELLOWISH-BROWN CLAYEY FINE TO MEDIUM SAND, TRACE FINE GRAVEL, OCCASIONAL SILT AND FINE SAND STRINGERS; (MEDIUM DENSE) | 1645 |
| 5 | SA, HA | | | | | 14.5 | | | | 100/4" | | GRADES VERY DENSE | 1640 |
| 10 | | | | | | | | | | 95 | | YELLOWISH-BROWN FINE TO MEDIUM SAND WITH SOME MULTI-COLORED COARSE SAND AND TRACE FINE TO COARSE GRAVEL; (VERY DENSE) GRADES OCCASIONAL BOULDERS | 1635 |
| 15 | | | | | | | | | | 36/0" | | BOULDER AT 15.0 TO 16.0 FEET | 1630 |
| 20 | | | | | | | | | | 60/0" | | BOULDER AT 19.0 FEET | |
| | SA | | | | | 5.1 | | | | 159 | | GRADES TO FINE TO COARSE SAND AND GRAVEL TRACE SILT | 1625 |
| 25 | | | | | | | | | | 200 | | | 1620 |
| 30 | | | | | | | | | | 200 | SP | | 1615 |
| 35 | | | | | | | | | | 127/7" | | | 1610 |
| 40 | SA | | | | | 10.6 | | | | 245 | | YELLOW SILTY SAND WITH LAYER OF ROCK FRAGMENTS | 1605 |
| 45 | | | | | | | | | | 50/0" | | | 1600 |
| 50 | SA | | | | | 11.1 | | | | 120/4" | | | 1595 |
| 55 | | | | | | | | | | 150/4" | | | 1590 |
| 60 | | | | | | | | | | 1-10-80 ▼ 58.3' 186/9" | | | 1585 |
| 65 | SA, HA | | | | | 16.9 | | | | 130/3" | | GRADES WITH OCCASIONAL LAYERS OF SILTY CLAY (WEATHERED ROCK) | 1580 |
| 70 | | | | | | | | | | 200/3" | | GRADES ALL WEATHERED ROCK FRAGMENTS | |
| 75 | | | | | | | | | | | | | |

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

DAMES & MOORE | FIGURE B-86

# BORING DMP-2

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

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

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 6 | SM | YELLOWISH-BROWN FINE TO MEDIUM SAND WITH SILT AND TRACE FINE ROOTS; (LOOSE) | — 1595 |
| | | ROOTS GRADE OUT | |
| 17 | | GRADES MORE SILT SOME COARSE SAND AND FINE GRAVEL; (MEDIUM DENSE) | — 1590 |
| 1-10-80 ▼ 8.9' | | | |
| 9 | SC | DARK YELLOWISH-BROWN FINE TO MEDIUM SAND WITH TRACE CLAY AND OCCASIONAL FINE GRAVEL; (LOOSE) | — 1585 |
| 26 | | (MEDIUM DENSE) | — 1580 |
| 20 | | | — 1575 |
| 96 | | | — 1570 |
| 59 | | | — 1565 |
| 55 | | | — 1560 |

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.
CRANDON PROJECT

LOG OF BORING DMP-2
SHEET 1 OF 1

DAMES & MOORE | FIGURE B-87

# BORING DMP-3

*SURFACE ELEVATION* 1623.55

COORDINATES: N 113,665 E 2,275,625

| DEPTH (FEET) | OTHER TESTS | SHEAR STRENGTH PSF | ATTERBERG LIMITS: LIQUID LIMIT % | ATTERBERG LIMITS: PLASTIC LIMIT % | ATTERBERG LIMITS: PLASTICITY INDEX % | FIELD MOISTURE CONTENT % | DRY DENSITY PCF | PERCENT RECOVERED | RQD |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | |
| 5 | SA, HA | | | | | 4.2 | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | SA | | | | | 6.3 | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | SA | | | | | 14.7 | | | |
| 60 | | | | | | | | | |
| 65 | SA, HA | | | | | 6.4 | | | |
| 70 | | | | | | | | | |

| BLOW COUNTS / SAMPLES | SYMBOLS | DESCRIPTIONS | ELEVATION (FEET) |
|---|---|---|---|
| 51/9" | OL | BLACK ORGANIC SILTY CLAY WITH SOME SAND AND ROCK FRAGMENTS; (SOFT) | |
| 81 | SM | YELLOWISH-BROWN SILTY FINE TO MEDIUM SAND WITH SOME FINE TO COARSE GRAVEL; (VERY DENSE) | — 1620 |
| 54/9" | | GRADES WITH ROCK FRAGMENTS | — 1615 |
| 64 | | | — 1610 |
| 55/2" | | | — 1605 |
| 200/3" | | GRADES MORE FINE TO COARSE GRAVEL | — 1600 |
| 200 | | | — 1595 |
| 250/3" | | | — 1590 |
| 230/7" | SP | YELLOWISH-BROWN FINE TO MEDIUM SAND WITH TRACE COARSE SAND AND OCCASIONAL FINE GRAVEL; (VERY DENSE) | — 1585 |
| 1-10-80 ▼ 44.2' 306/3" | | | — 1580 |
| 200/6" | | GRADES LESS COARSE SAND AND FINE GRAVEL | — 1575 |
| 166/10" | | GRADES BROWN WITH MULTICOLORED FINE TO COARSE GRAVEL | — 1570 |
| 155/8" | SC | DARK YELLOWISH-BROWN SILTY AND CLAYEY FINE TO MEDIUM SAND WITH SOME FINE TO MEDIUM GRAVEL; (HARD) | — 1565 |
| 186/6" | | GRADES WITH CLAY LAYERS, WITH ROCK FRAGMENTS AND FINE TO COARSE GRAVEL | — 1560 |

BORING COMPLETED AT A DEPTH OF OF 65.6 FEET ON 11-2-79.
SURFACE CASING USED TO A DEPTH OF 10.0 FEET.
PIEZOMETER INSTALLED ON 11-2-79.
2 INCH PVC SLOTTED FROM 57.5 TO 65.5 FEET.
GRAVEL PACK: 53.2 TO 65.6 FEET.
BENTONITE: 49.0 TO 53.2 FEET.
GROUT: 0.0 TO 49.0 FEET.
GROUND WATER LEVEL RECORDED AT 44.2 FEET ON 1-10-80.

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

LOG OF BORING DMP-3
SHEET 1 OF 1

DAMES & MOORE

FIGURE B-88

| MAJOR DIVISIONS | | | GRAPHIC SYMBOL | LETTER SYMBOL | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | 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 — MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE | 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 — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | 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

| Test Pit Logs | Number of Sheets |
|---|---|
| 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)

| G40 Series Boring Logs | Number of Sheets |
|---|---|
| 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)

| G41 Series Boring Logs | Number of Sheets |
|---|---|
| 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)

| Supplemental Logs | Number of Sheets |
|---|---|
| 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 |

| Relative Density of Cohesionless Soils | Standard Penetration Resistance N (blows/ft.) |
|---|---|
| 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.

| Consistency of Cohesive Soils | Cohesion Cu (psf) |
|---|---|
| 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)

# TEST PIT LOG TP-1

SHEET 1 OF 1

SURFACE ELEV. Approx. 5512.06m) 1680 ft. 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 | |
| 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<br><br>Thin discontinuous clean fine to coarse sand layers at 3.0' | SM | Seep at 3.0' (0.91m) |
| 1.83 | | | |
| 6.0 | Brown, fine to coarse SAND, trace fine gravel, trace silt | SP to SP-SM | Seep at 7.0' (2.13m) |
| 2.13 | | | Sand cone density at 7.0' (2.13m) |
| 7.0 | Red-brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt, trace clay, occasional cobbles and boulders | SM | $\gamma_d$=138.3 pcf (2216 kg/m$^3$)<br>w%=7.2 |
| 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)
COOR. 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 | | | Seep at 7.0' (2.13m) |
| 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 | 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. N114200 ft. (N34808m)
COOR. E2282900 ft. (E695827m)

# TEST PIT LOG TP-3

SHEET 1 OF 1

1620 ft.
SURFACE ELEV. Approx. (493.78m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 |
|---|---|---|---|
| .457 | Topsoil and rootmat | PT | |
| 1.5 | Red-brown, fine to coarse SAND, trace to some silt, trace fine to coarse gravel, trace clay, occasional cobbles and boulders<br><br>Occasional layers of gray-brown SILT, trace fine to coarse sand, trace clay | SP-SM | |
| 2.13 | | | |
| 7.0 | Brown, fine to coarse SAND, trace fine to coarse gravel, trace silt | SP to SP-SM | Stratified |
| 2.74 | | | Heavy seep at 9.0' (2.74m) |
| 9.0 | Dark brown, fine to coarse SAND, trace fine to coarse gravel, trace silt, occasional cobbles and bouldes | SP | |
| 5.18 | | | |
| 17.0 | 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 | |
| 1.0 | Dark brown, fine to coarse SAND, some silt, trace clay, trace organics | SM | |
| .610 | | | Light seep at 2.0'-3.5' (0.61m to 1.07m) |
| 2.0 | Dark brown to black, organic SILT, some clay, some fine sand | OL | |
| 1.07 | | | |
| 3.5 | Brown, fine to coarse SAND, some silt to SILT, some clay, trace fine sand, occasional cobbles<br><br>Pockets of each material appear randomly interlayered with each other | SM to ML | Sand cone density at 5.5'(1.68m)<br>$\gamma_d$=114.6 (1836 kg/m$^3$)<br>w%=14.1 |
| 3.66 | | | |
| 12.0 | END OF PIT | | |

Job No. 786085
Scale 1"=2.5'

Golder Associates

Drawn jls
Checked MAS

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

# TEST PIT LOG TP-5

SHEET 1 OF 1

SURFACE ELEV. ~~Approx.~~ 1705 ft. (519.68m) 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, fiberous 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<br><br>Silt layer, maximum 6" thick at 4.0'<br><br>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)<br>$\gamma_d$=110.4 pcf (1769 kg/m$^3$)<br>w%= 4.8 |
| 3.35 | | | |
| 11.0 | END OF PIT | | |

Job No. 786085
Scale 1"=2.5'

Golder Associates

Drawn jls
Checked MAC

APPROX. N111100 ft. (N33863m)
COOR. E2270100 ft. (E691926m)

# TEST PIT LOG TP-6

SHEET 1 OF 1

SURFACE ELEV. Approx. 1625 ft. (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 |
|---|---|---|---|
| .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 | | |

Job No. 786085
Scale 1"=2.5'

Golder Associates

Drawn jls
Checked MKB

APPROX. N115980 ft. (N35351m)
COOR. E2285270 ft. (E696550m)

# TEST PIT LOG TP-7

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1710 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 | |
| | Brown, fine to coarse SAND, some silt, trace clay, occasional cobbles | SP-SM to SM | |
| 1.22 / 4.0 | | | Slow seep at 4.0' (1.22m) |
| | Brown to red-brown, fine to coarse SAND, some silt, trace clay, trace fine to coarse gravel, occasional cobbles and boulders | SM | SA-1, 7.5'-8.5' (2.29m-2.59m): % finer than #200 sieve=20.3% (By field sieve analysis) |
| 3.05 / 10.0 | END OF PIT | | |

*Estimated from topographic map

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

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

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N115960 ft. (N35345m)
COOR. E2284920 ft. (E696444m)

# TEST PIT LOG TP-9

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1707 ft. (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 | |
| 1.0 | | | |
| | Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace organics, occasional cobbles and boulders | SM | |
| 1.07 | | | |
| 3.5 | Cobbles and fine to coarse gravel | GP | Heavy seep starting at 4.0' (1.22m) forced abandonment of test pit |
| 1.52 | | | |
| 5.0 | END OF PIT | | |
| | *Estimated from topographic map | | |

Job No 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N116080 ft. (N35381m)
COOR. E2284160 ft. (E696212m)

# TEST PIT LOG TP-10

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1695 ft. (516.64m) 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 |
|---|---|---|---|
| | Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics | SM | |
| .61 / 2.0 | | | |
| | Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | |
| 3.05 / 10.0 | END OF PIT<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

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

# TEST PIT LOG TP-11

SHEET 1 OF 1

SURFACE ELEV. 1680 ft. *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 |
|---|---|---|---|
| | Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics | SM | |
| .61 / 2.0 | | | |
| | Brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders | SM | |
| 3.66 / 12.0 | END OF PIT<br><br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N115820 ft. (N35302m)
COOR. E2283800 ft. (E696102m)
1695 ft.

# TEST PIT LOG TP-12

SHEET 1 OF 1

SURFACE ELEV. *Approx. (516.64m) 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 | | | |
| 8.5 | END OF PIT<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

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 | Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics | SM | |
| 1.0 | | | |
| | Brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | |
| 1.52 | | | |
| 5.0 | | | |
| | Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | |
| 3.05 | | | |
| 10.0 | END OF PIT<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N114480 ft. (N34894m)
COOR. 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<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N114860 ft. (N35009m)
COOR. E2282840 ft. (E695810m)

# TEST PIT LOG TP-15

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1643 ft. (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 |
|---|---|---|---|
| | Brown, silty fine to coarse SAND, some 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 | END OF PIT<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. COOR. N115920 ft. (N35332m) E2284090 ft. (E696191m)

# TEST PIT LOG TP-16

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1683 ft. (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 |
|---|---|---|---|
| 2.44 | Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders | SM | |
| 8.0 | END OF PIT<br><br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N113860 ft. (N34705m)
COOR. E2282880 ft. (E695822m)

# TEST PIT LOG TP-17

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1632 ft. (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<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N113400 ft. (N34564m)
COOR. E2282860 ft. (E695816m)

# TEST PIT LOG TP-18

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1647 ft. (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 | |
| | Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles and boulders | SM | |
| 3.05 / 10.0 | END OF PIT<br><br>*Estimated from topographic map and elevation of adjacent boring G41-E15 | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N112460 ft. (N34278m)
COOR. E2283060 ft. (E695877m)

# TEST PIT LOG TP-19

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1666 ft. (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 |
|---|---|---|---|
| | 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, trace clay, occasional cobbles and boulders | SM | Slight seep at 4.0' (1.22m) |
| 1.52 / 5.0 | Red-brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt | SP-SM | |
| 2.13 / 7.0 | END OF PIT<br><br>*Estimated from topographic map and elevation of adjacent boring G41-E17 | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N112200 ft. (N34199m)
COOR. E2285500 ft. (E696620m)

# TEST PIT LOG TP-20

SHEET 1 OF 1

SURFACE ELEV. 1685 ft. *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 | Brown, silty fine to coarse SAND, some fine to coarse gravel, trace organics | SM | |
| 1.0 | 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<br><br>*Estimated from topographic map and elevation of adjacent boring G41-J17 | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N109240 ft. (N33296m)
COOR. E2288320 ft. (E697480m)

# TEST PIT LOG TP-21

SHEET 1 OF 1

SURFACE ELEV. *Approx. 1727 ft. (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 | Brown, silty fine to coarse SAND, trace fine to coarse gravel, trace organics | SM | |
| 1.0 | 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 | |
| 3.35 | | | |
| 11.0 | END OF PIT<br><br>*Estimated from elevation of adjacent boring G41-N21 | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

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 | 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 | |
| 1.83 | | | |
| 6.0 | Brown, fine to coarse GRAVEL and fine to coarse SAND, trace to some silt, frequent cobbles and boulders | SP-SM to GP-GM | |
| 3.35 | | | |
| 11.0 | Brown, fine to coarse gravelly, fine to coarse SAND, some silt | SM | |
| 3.66 | | | |
| 12.0 | END OF PIT<br><br>*Estimated from elevation of adjacent boring G41-P24 | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn MRB
Checked

APPROX. N1141[illegible]50 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 / 1.22 | Light brown, fine to coarse SAND, some silt, trace to some fine gravel | SM | Bulk Sample from 2.0' to 3.0' (o.61m-0.91m) |
| 4.0 / 2.44 | 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 |
| 8.0 / 4.88 | Brown and red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace cobbles | SM | |
| 16.0 | END OF PIT<br>*Estimated from topographic map | | |

Job No. 786085
Scale 1" = 2.5'

Golder Associates

Drawn JFC
Checked

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 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 | 188 | 6 | DO | 45-143 | 11/12 | |
| | | | | 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 MKC

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

# BORING LOG G40-D24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.97 | | CONTINUED | | | | | | | |
| 36.0 | | 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 | |
| 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<br>Boulder noted at 54.0'-55.4' | SP | 152 | 12 | DO | 52-100 | 7/12 | |
| | | | | 181 / 11" | 13 | DO | 44-81-100/5" | 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 MKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 38-85-100/4" | 15/16 | |
| | | | | 166 | 16 | DO | 51-115 | 8/12 | ▼ 1-7-80 23.10 ≈ 75.8 |
| | | | | 189/10" | 17 | DO | 67-89-100/4" | 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 | | | | | | | | | |
| 103.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MSG

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.39 | | CONTINUED | | | | | | | |
| 103.0 | | | | | | | | | |
| | | | | 162 | 22 | DO | 37-125 | 9/12 | |
| | | Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt | SP | | | | | | |
| | | | | 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 jls
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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 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 | 2" Solid PVC Pipe to Surface |
| | | | | | | | | | 49.07 |
| | | | | | | | | | 161.0 Bentonite Clay Seal |
| | | | | | | | | | 50.90 |
| 51.21 | | | | | | | | | 167.0 |
| 168.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 51.21 | | CONTINUED | | | | | | | CONTINUED |
| 168.0 | | Very dense, brown, fine to coarse SAND, trace fine gravel, trace to some silt | SP-SM | 165 / 9" | 28 | DO | 65-100/3" | 9/9 | 2" Solid PVC Pipe; Pea Gravel; 53.04 |
| 53.34 | | | | | | | | | 174.0 |
| 175.0 | | Very dense, brown, fine to medium SAND, some silt (residual material) | SM | 150 / 5" | 29 | DO | 150/5" | 3/5 | 2" Slotted PVC Pipe; Pea Gravel; 56.08 |
| 55.93 | | | | | | | | | 184.0 |
| 183.5 | | Gray, metavolcanic TUFF | | - | 30 | AX RC | - | 13/18 | Pea Gravel |
| 57.45 | | | | | | | | | |
| 188.5 | | END OF BORING | | | | | | | |

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 MCB

COOR. 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. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Topsoil and rootmat | | 11 | 1 | DO | 3-5-6 | 12/18 | |
| 0.5 | | | | | | | | | |
| | | | | 37 | 2 | DO | 14-18-19 | 18/18 | |
| | | Compact to very dense, light brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt | SP SM | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

1. 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. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | - | 1 | AS | - | - | |
| | | 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 | 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 / 27.5 | | 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 | |
| | | | | 154 | 8 | DO | 39-115 | 7/12 | |
| 11.13 / 36.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKG

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | 28-38-47 | 16/18 | |
| | | | | 115 | 10 | DO | 23-44-71 | 15/18 | |
| 15.70 | | | | 67 | 11 | DO | 21-27-40 | 16/18 | |
| 51.5 | | END OF BORING<br>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 MRB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.30 | | Topsoil and rootmat | | | | | | | |
| 1.0 | | | | 67 | 1 | DO | 54-28-39 | 10/18 | |
| | | | | 102 | 2 | DO | 35-79-23 | 6/18 | |
| | | | | 46 | 3 | DO | 24-21-25 | 8/18 | |
| | | Dense to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay<br><br>Boulder at 22.5'-23.5' | SM | 189/9" | 4 | DO | 58-89-100/3" | 12/15 | |
| | | | | 179/6" | 5 | DO | 79-100/3" | 8/9 | |
| | | | | 200/4" | 6 | DO | 200/4" | 4/4 | |
| | | | | 200/5" | 7 | DO | 200/5" | 3/5 | |
| | | | | 200/5" | 8 | DO | 200/5" | 5/5 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 / 37.0 | | CONTINUED | | | | | | | |
| | | Dense to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 200/5" | 9 | DO | 200/5" | 5/5 | |
| | | | | 200/4" | 10 | DO | 200/4" | 4/4 | |
| | | | | 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 / 65.5 | | | | 162/6" | 14 | DO | 162/6" | 6/6 | |

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | 90 | 4 | DO | 25-44-46 | 18/18 | |
| | | 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<br>Boulder noted at 10.5'-13.0' | SP-SM to SM to SW-SM | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| 34.0 | | | | 130 | 8 | DO | 28-54-76 | 15/18 | |
| | | 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 | 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 | | | | | | | | | |
| 55.0 | | | | 153 | 12 | DO | 43-110 | 10/12 | |
| | | Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt | SP | 198 | 13 | DO | 39-78-120 | 10/18 | |
| | | | | 186 / 10" | 14 | DO | 33-86-100/4" | 8/16 | |
| 20.73 | | | | | | | | | |
| 68.0 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>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 MKB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 MCB

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

# BORING LOG G40-G26



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.97 | | CONTINUED | | | | | | | |
| 36.0 | | | | - | 9 | DO | No Recovery | 0/0 | |
| | | | | 179 / 10" | 10 | DO | 54-125/4" | 7/10 | |
| | | 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 | 155 | 11 | DO | 45-110 | 10/12 | |
| | | Boulder noted at 38.5'-39.5' | | 200 | 12 | DO | 42-90-110 | 18/18 | |
| | | | | 150 | 13 | DO | 50-100 | 9/12 | |
| | | | | 145 | 14 | DO | 37-60-85 | 18/18 | |
| 20.57 | | | | | | | | | |
| 67.5 | | Very dense, fine to coarse SAND, trace fine to coarse gravel, trace to some silt | SP-SM | 170 / 10" | 15 | DO | 70-100/4" | 7/10 | |
| 21.64 | | | | | | | | | |
| 71.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | 181 / 17" | 18 | DO | 44-81-100/5" | 17/17 | |
| | | Very dense, brown, fine to coarse SAND, trace silt, trace fine gravel | SP | 150 / 10" | 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
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 MKB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Topsoil and rootmat | | 8 | 1 | DO | 1-4-4 | 12/18 | |
| 0.5 | | 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' | | 43 | 3 | DO | 12-18-25 | 18/18 | |
| | | | SP-SM to SM | 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 | |
| | | | | 180 | 8 | DO | 50-130 | 10/12 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N1[illegible]75 ft. (N35135m)
E2269330 ft. (E691693m)

# BORING LOG G40-H13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br><br>Boulders and cobbles noted at 49.0'-50.0' and 51.0'-51.5' | SP-SM to SM | 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 | 35-85-100/4" | 8/10 | |
| | | | | 172/9" | 13 | DO | 35-72-100/3" | 9/9 | |
| | | | | 170 | 14 | DO | 50-120 | 6/12 | |
| 21.79 | | | | 174 | 15 | DO | 44-130 | 4/12 | |
| 71.5 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [illegible]

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 / 71.5 | | | | | | | | | |
| 22.25 / 73.0 | | Very dense, light brown, fine to coarse SAND, trace to some silt, occasional cobbles SP-SM to SM | | 172 / 11" | 16 | DO | 72-100/5" | 3/10 | |
| | | | | 200 / 3" | 17 | DO | 200/3" | 0/3 | |
| | | 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 | 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

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 32.61 / 107.0 | | CONTINUED | | | | | | | |
| | | 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 | DO | 44-70-105 | 18/18 | |
| | | | | 150/3" | 23 | DO | 150/3" | 0/3 | |
| | | | | 230/8" | 24 | DO | 120-110/2" | 8/8 | |
| 42.67 / 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 42.67 / 140.0 | | CONTINUED | | | | | | | |
| | | | | 320 | 25 | DO | 46-120-200 | 14/18 | |
| | | 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 | 250/6" | 26 | DO | 38-100-150/4" | 8/16 | |
| | | | | 310/9" | 27 | DO | 160-150/3" | 6/9 | |
| 52.12 / 171.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 52.12 | | CONTINUED | | | | | | | |
| 171.0 | | | | 255 / 7" | 28 | DO | 155-100/1" | 4/7 | |
| | | 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 / 1" | 29 | DO | 200/1" | 0/1 | |
| | | | | 250 / 4" | 30 | DO | 250/4" | 3/4 | |
| 59.53 | | | | | | | | | |
| 195.3 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

1. 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 DCB

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. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact to dense, brown, silty, fine to coarse SAND, trace clay, organic matter throughout | SM | - | 1 | AS | - | - | |
| | | | | 21 | 2 | DO | 6-11-10 | 18/18 | |
| 2.13 | | | | | | | | | |
| 7.0 | | Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | 14 | 3 | DO | 5-7-7 | 16/18 | |
| | | | | 17 | 4 | DO | 11-9-8 | 12/18 | |
| | | | | 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 | 8 | 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 JCB

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

# BORING LOG G40-H16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 SM | 110/4" | 10 | DO | 110/4" | 3/4 | |
| 13.41 | | | | | | | | | |
| 44.0 | | | | 121 | 11 | DO | 26-49-72 | 12/18 | |
| | | Very dense, light brown, fine to medium SAND, some silt, trace fine gravel, trace clay | SM | 172/6" | 12 | DO | 172/6" | 0/6 | |
| | | | | 158/10" | 13 | DO | 58-100/4" | 6/10 | ▼ 4/19/79 17.34 ≈ 56.9 |
| 17.69 | | | | | | | | | |
| 58.0 | | Very dense, brown, silty fine to coarse SAND, some fine to medium gravel to fine to coarse gravelly fine to coarse SAND, some silt | SM | 163/10" | 14 | DO | 63-100/4" | 10/10 | |
| | | | | 87 | 15 | DO | 30-57 | 12/12 | |
| 20.57 | | | | | | | | | |
| 67.5 | | Very dense, brown, fine to medium SAND, trace silt | SP | | | | | | |
| 21.79 | | | | 154 | 16 | DO | 55-99 | 12/12 | |
| 71.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G40-H16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 / 72.5 | | Very dense, brown, fine to medium SAND, trace silt | SP | 152 / 10" | 17 | DO | 52-100/4" | 8/10 | |
| 26.67 / 87.5 | | Very dense, brown to red-brown, fine to coarse SAND, trace fine gravel, trace to some silt | SP SM | 167 / 10" | 18 | DO | 62-105/4" | 10/10 | |
| | | | | 144 / 10" | 19 | DO | 44-100/4" | 10/10 | Grout (to surface) |
| | | | | 169 / 9" | 20 | DO | 69-100/3" | 9/9 | |
| | | | | 181 / 10" | 21 | DO | 81-100/4" | 10/10 | |
| 32.00 / 105.0 | | Very dense, brown to red-brown, fine to coarse SAND, trace silt | SP | 122 / 6" | 22 | DO | 122/6" | 6/6 | 2" Solid PVC Pipe to Surface |
| 32.61 / 107.0 | | Very dense, brown, fine to coarse SAND, some fine gravel, trace silt | SP | | | | | | 31.70 / 104.0 Bentonite Clay Seal |
| | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G40-H16

SHEET 4 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.61 | | CONTINUED | | | | | | | CONTINUED |
| 107.0 | | Very dense, brown, fine to coarse SAND, some fine gravel, trace silt | SP | 164/10" | 23 | DO | 64-100/4" | 8/10 | Bentonite Clay Seal 33.53 / 110.0 |
| 34.90 | | | | | | | | | |
| 114.5 | | Very dense, brown, fine to medium SAND, trace fine gravel, trace to some silt, occasional boulders | SP-SM | 156/10" | 24 | DO | 56-100/4" | 8/10 | 2" Solid PVC Pipe; Pea Gravel |
| | | | | 96 | 25 | DO | 31-65 | 10/12 | |
| 41.15 | | | | | | | | | |
| 135.0 | | Stiff, brown fine SAND, some silt to SILT, some fine to medium sand | | | | | | | |
| 42.52 | | | | | | | | | |
| 139.5 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G40-H16

SHEET 5 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.52 | | CONTINUED | | | | | | | CONTINUED |
| 139.5 | | | | 115 | 26 | DO | 31-50-65 | 18/18 | Pea Gravel; 2" Solid PVC Pipe; 44.20 |
| | | | | | | | | | 145.0 |
| | | | | 128 | 27 | DO | 30-98 | 12/12 | Pea Gravel; 2" Slotted PVC Pipe; 47.24 |
| | | Stiff, brown fine SAND, some silt to SILT, some fine to medium sand | SM to ML | | | | | | 155.0 |
| | | | | | | | | | Pea Gravel; 48.16 |
| | | | | | | | | | 158.0 |
| | | | | | | | | | (Note 2) |
| | | | | 98 | 28 | DO | 14-26-72 | 18/18 | |
| | | | | 154/10" | | | | | |
| | | | | | 29 | DO | 54-100/4" | 10/10 | |
| 52.43 | | | | | | | | | |
| 172.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked ACB

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

# BORING LOG G40-H16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 52.43 | | CONTINUED | | | | | | | |
| 172.0<br>53.34 | | Stiff, brown SILT and fine to medium SAND to SILT, some fine to medium sand | SM to ML | | | | | | |
| 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 | |
| 59.44 | | | | | | | | | |
| 195.0 | | Very dense, red-brown, fine to coarse SAND, some silt, trace to some clay, trace fine to coarse gravel, occasional cobbles and boulders | SM | 130 | 32 | DO | 29-101 | 12/12 | |
| 62.18 | | | | | | | | | |
| 204.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AB

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

# BORING LOG G40-H16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 62.18 | | CONTINUED | | | | | | | |
| 204.0 | | | | | | | | | |
| | | | | 152/10" | 33 | DO | 40-52-100/4" | 16/16 | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace to some clay, trace fine to coarse gravel, occasional cobbles and boulders | SM | | | | | | |
| | | | | 172/8" | 34 | DO | 72-100/2" | 8/8 | |
| | | | | 142/10" | 35 | DO | 38-42-100/4" | 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 DCB

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

# BORING LOG G40-H16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 72.85 | | CONTINUED | | 115 6" | 36 | DO | 115/6" | 6/6 | |
| 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 | - | 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 JCD

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

**BORING LOG** G40-H16



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 | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.52 | | CONTINUED | | 163/10" | 8 | DO | 63-100/4" | 8/10 | |
| 34.5 | | Very dense, brown, fine to medium SAND, some silt to fine to coarse SAND, some silt, trace fine to coarse gravel | SM | 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 | |
| | | | | | | | | | ▼ 1/7/80 15.94 |
| | | | | 141/10" | 12 | DO | 41-100/4" | 10/10 | ≈ 52.3 |
| | | | | 163 | 13 | DO | 26-53-110 | 18/18 | |
| 19.05 | | | | | | | | | |
| 62.5 | | 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 | 152/11" | 14 | DO | 52-100/5" | 11/11 | |
| 21.18 | | | | | | | | | |
| 69.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked PCB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

# BORING LOG G40-H27



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.18 | | CONTINUED | | | | | | | |
| 69.5 | | | | 185/10" | 15 | DO | 35-85-100/4" | 14/16 | |
| | | | | 30/0" | 16 | DO | 30/0" | 0/0 | |
| | | 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 | 185/11" | 17 | DO | 35-85-100/5" | 15/17 | |
| | | | | 103/6" | 18 | DO | 103/6" | 5/6 | |
| | | Boulder noted at 75.0'-76.7' | | 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 MCB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

# BORING LOG G40-H27



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | 38-55-80 | 16/18 | |
| | | | | 168/11" | 23 | DO | 34-68-100/5" | 17/17 | |
| 38.1 / 125.0 | | Very dense, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel | SM | 105/5" | 24 | DO | 105/5" | 5/5 | |
| 41.61 / 136.5 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.61 | | CONTINUED | | | | | | | |
| 136.5 | | | | 100 / 4" | 25 | DO | 100/4" | 3/4 | |
| | | | | 100 / 5" | 26 | DO | 100/5" | 5/5 | |
| | | Very dense, brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel | SM | | | | | | |
| | | | | 40 / 0" | 27 | DO | 40/0" | 0/0 | |
| 50.90 | | | | | | | | | |
| 167.0 | | CONTINUED | | | | | | | CONTINUED |

Grout (to surface)

46.94
154.0

Bentonite Clay Seal

47.85
157.0

2" Solid PVC Pipe to Surface

Pea Gravel

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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; 171.0; 2" Slotted PVC Pipe; Pea Gravel 55.17; 181.0 Pea Gravel (to bottom of boring) |
| | | | | 167/8" | 29 | DO | 90-77/2" | 7/8 | |
| 57.91 | | | | 100/1" | 30 | DO | 100/1" | 1/1 | |
| 190.0 | | Very dense, brown, silty, fine to coarse SAND, trace fine gravel | SM | | | | | | |
| 60.35 | | | | | | | | | |
| 198.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N105930 ft. (N32887m)
E2269650 ft. (E691790m)

# BORING LOG G40-H27



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.35 | | CONTINUED | | | | | | | |
| 198.0 | | Very dense, brown, silty, fine to coarse SAND, trace fine gravel | SM | 105 / 5.5" | 31 | DO | 105/5.5" | 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 | | | | | | | | | |
| 232.0 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Soft, brown, highly organic, clayey SILT and PEAT | PT | - | 1 | AS | - | - | |
| 1.83 | | | | - | 2 | TO | Push | - | |
| 6.0 | | 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 | 13 | 3 | DO | 3-5-8 | 12/18 | |
| | | | | 16 | 4 | DO | 10-9-7 | 9/18 | |
| 4.88 | | | | | | | | | |
| 16.0 | | Soft to stiff, gray-green, SILT, some clay | CL | - | 5 | TO | Push | 30/30 | |
| | | | | 9 | 6 | DO | 3-4-5 | 18/18 | |
| | | | | 12 | 7 | DO | 3-5-7 | 18/18 | |
| 8.84 | | | | | | | | | |
| 29.0 | | 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 | SM | 76 | 8 | DO | 44-42-34 | 12/18 | |
| 10.21 | | | | | | | | | |
| 33.5 | | CONTINUED | | | | | | | CONTINUED |

Grout

2" Solid PVC Pipe

8.23

27.0

Bentonite Clay Seal

9.75

32.0

Pea Gravel

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N113810 ft. (N34689m)
E2270150 ft. (E691943m)

# BORING LOG G40-J15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC. / ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| | | | | 98 | 10 | DO | 30-28-70 | 10/18 | Pea Gravel; ▼ 4/18/79 12.62; 41.4 |
| | | | | 44 | 11 | DO | 68-24-20 | 6/18 | 2" Slotted PVC Pipe; 14.33; 47.0 |
| 15.70 | | | | 48 | 12 | DO | 19-56-92 | 4/18 | Pea Gravel |
| 51.5 | | END OF BORING | | | | | | | |

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 3, 4 and 6 - 12)
2. 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 MB

COOR. N111140 ft. (N33876m)
E2269905 ft. (E691869m)

# BORING LOG G40-J20



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | 27-55-90 | 18/18 | |
| | | | | 79 | 9 | DO | 20-32-47 | 15/18 | |
| 12.95 | | | | | | | | | |
| 42.5 | | | | 130/10" | 10 | DO | 30-100/4" | 8/10 | |
| | | | | 184/9" | 11 | DO | 84-100/3" | 8/9 | |
| | | Very dense, brown to light brown, fine SAND, trace silt to fine to coarse SAND, some fine gravel, trace silt | SP to SP-SM | 132/10" | 12 | DO | 32-100/4" | 10/10 | |
| | | | | 147/10" | 13 | DO | 47-100/4" | 8/10 | |
| | | | | 156/8" | 14 | DO | 56-100/2" | 8/8 | |
| 20.42 | | | | | | | | | |
| 67.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RKB

COOR. N111140 ft. (N33876m)
E2269905 ft. (E691869m)

# BORING LOG G40-J20



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>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 MKG

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.30 | | Fiberous, brown organic matter | PT | - | 1 | AS | - | - | (Note 2) |
| 1.0 | | 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 | |
| 4.27 | | | | | | | | | |
| 14.0 | | Very soft, gray-green, silty CLAY, trace fine sand (thin seams of fine to medium sand) | CL | 1 | 5 | DO | 1/12"-1/12" | 18/18 | 2" Solid PVC Pipe |
| 6.71 | | | | | | | | | 6.10 |
| 22.0 | | | | - | 6 | TO | Push | 24/30 | 20.0 Bentonite Clay Seal |
| | | Compact to dense, brown to gray-brown, fine to medium SAND, some gravel, some silt | SM | 40 | 7 | DO | 10-23-17 | 18/18 | 7.62 25.0 Pea Gravel |
| | | | | 39 | 8 | DO | 13-18-21 | 12/18 | |
| 10.36 | | | | | | | | | |
| 34.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 ▼ 3/20/79 11.43 |
| | | | | 15 | 10 | DO | 10-6-9 | 8/18 | 37.5 2" Slotted PVC Pipe; Pea Gravel |
| | | | | 35 | 11 | DO | 17-20-15 | 8/18 | 13.41 44.0 Bentonite Clay Seal |
| 15.32 | | | | 100/3" | 12 | DO | 100/3" | 3/3 | |
| 50.25 | | END OF BORING | | | | | | | |

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 203

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 acb

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

# BORING LOG G40-L19



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 9.91 | | CONTINUED | | | | | | | |
| 32.5 | | | | 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 | |
| | | Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 20.42 | | CONTINUED | | | | | | | |
| 67.0 | | | | 193 | 15 | DO | 61-81-112 | 9/18 | |
| | | Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 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 | | | | | | | | | |
| 88.0 | | | | 200/6" | 19 | DO | 200/6" | 6/6 | |
| | | Very dense, brown, fine to coarse SAND, some silt, trace fine to coarse gravel | SM | 212/6" | 20 | DO | 212/6" | 6/6 | |
| | | | | 200/4" | 21 | DO | 200/4" | 4/4 | |
| 30.94 | | | | | | | | | |
| 101.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N111060 ft. (N33852m)
E2271025 ft. (E692210m)

# BORING LOG G40-L19



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

1. 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | AS | - | - | |
| | | | | 17 | 2 | DO | 7-7-10 | 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 | 66 | 3 | DO | 15-26-40 | 18/18 | |
| | | | | 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 | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N108920 ft. (N33200m)
E2271065 ft. (E692222m)

# BORING LOG G40-L23



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 16.76 | | | | | | | | | |
| 55.0 | | Very dense, light brown to brown, fine SAND, trace silt to fine to coarse SAND, trace silt | SP to SP-SM | 98 | 12 | DO | 31-67 | 8/12 | |
| | | | | 143/10" | 13 | DO | 43-100/4" | 8/10 | |
| | | | | 142/10" | 14 | DO | 42-100/4" | 7/10 | |
| 20.27 | | | | | | | | | |
| 66.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKG

COOR. N108920 ft. (N33200m)
E2271065 ft. (E692222m)

# BORING LOG G40-L23



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.27 | | CONTINUED | | | | | | | |
| 66.5 | | Very dense, light brown to brown, fine SAND, trace silt to fine to coarse SAND, trace silt | SP to SP-SM | 151 9" | 15 | DO | 51-100/3" | 6/9 | Grout (to surface) 21.64 |
| | | | | 124 8" | 16 | DO | 74-50/2" | 6/8 | 71.0 Bentonite Clay Seal 22.56 |
| | | | | 141 11" | 17 | DO | 41-100/5" | 10/11 | 74.0 Pea Gravel 2/11/80 23.38 76.7 23.47 77.0 |
| | | | | 147 10" | 18 | DO | 47-100/4" | 10/10 | Pea Gravel |
| | | | | 145 11" | 19 | DO | 45-100/5" | 9/11 | 26.52 87.0 Pea Gravel |
| 27.68 | | | | | | | | | |
| 90.9 | | END OF BORING HOLE GROUTED AT COMPLETION | | | | | | | |

2" Solid PVC Pipe to Surface

2" Slotted PVC Pipe

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 MRB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Topsoil and rootmat | | | | | | | |
| | | | | 42 | 1 | DO | 19-23-19 | 12/18 | |
| | | | | 17 | 2 | DO | 9-9-8 | 12/18 | |
| | | | | 40 | 3 | DO | 23-17-23 | 11/18 | |
| | | Compact to very dense, red to red-brown, fine to coarse SAND, some silt, some gravel, trace clay | SM | 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 acb

COOR. N114595 ft. (N34928m)
E2271820 ft. (E692452m)

# BORING LOG G40-M14



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.97 | | CONTINUED | | | | | | | |
| 36.0 | | Compact to very dense, red to red-brown, fine to coarse SAND, some silt, some gravel, trace clay | SM | 200/1" | 9 | DO | 200/1" | 0/1 | |
| 13.72 | | | | 183/10" | 10 | DO | 83-100/4" | 10/10 | |
| 45.0 | | | | 100/4" | 11 | DO | 100/4" | 4/4 | |
| | | Very dense, brown, fine to coarse SAND, trace silt, trace gravel, occasional boulders | 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 | | | | | | | | | |
| 69.5 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 21.18 / 69.5 | | CONTINUED | | 183 / 6" | 15 | DO | 183/6" | 6/6 | |
| | | | | 216 / 6" | 16 | DO | 216/6" | 6/6 | |
| | | Very dense, brown, fine to coarse SAND, trace silt, trace gravel, occasional boulders | SP | 112 / 6" | 17 | DO | 112/6" | 6/6 | |
| | | | | 431 | 18 | DO | 145-286 | 12/12 | |
| | | | | 300 / 5" | 19 | DO | 300/5" | 5/5 | |
| 28.96 / 95.0 | | | | 300 / 0" | 20 | DO | 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | 57 | 3 | DO | 18-22-35 | 18/18 | |
| | | | | 30 | 4 | DO | 17-11-19 | 12/18 | |
| | | Dense to very dense, brown to red-brown, fine to coarse SAND, some gravel, some silt, trace clay | SM | 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 jls
Checked JCB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

# BORING LOG G40-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| 34.0 | | 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 JCB

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

# BORING LOG G40-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.73 | | CONTINUED | | | | | | | |
| 68.0 | | | | | | | | | ▼ 4/18/79 21.25 |
| | | | | | | | | | ≈ 69.7 |
| | | | | 82 | 16 | DO | 23-33-49 | 12/18 | |
| | | Compact to very dense, brown, fine to coarse SAND, some fine gravel, trace silt | SP | | | | | | |
| | | | | 12 | 17 | DO | 6-5-7 | 15/18 | |
| | | | | 35 | 18 | DO | 15-14-21 | 16/13 | |
| 26.67 | | | | | | | | | |
| 87.5 | | | | 38 | 19 | DO | 9-13-25 | 15/13 | |
| | | | | 90 | 20 | DO | 26-38-52 | 18/18 | |
| | | Very dense, brown, fine SAND to fine to coarse SAND, trace silt | SP | | | | | | |
| | | | | 60 | 21 | DO | 22-24-36 | 18/13 | |
| | | | | 145 | 22 | DO | 24-48-97 | 18/18 | |
| 31.39 | | | | | | | | | |
| 103.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked acs

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

# BORING LOG G40-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.39 | | CONTINUED | | | | | | | |
| 103.0 | | | | | | | | | |
| | | | | 161/10" | 23 | DO | 61-100/4" | 10/10 | |
| | | Very dense, brown, fine SAND to fine to coarse SAND, trace silt | SP | | | | | | |
| | | | | 138/9" | 24 | DO | 63-75/3" | 8/9 | |
| | | | | 153/10" | 25 | DO | 53-100/4" | 6/10 | |
| 41.0 | | | | | | | | | |
| 134.5 | | CONTINUED | | | | | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.0 | | CONTINUED | | | | | | | |
| 134.5<br>41.91 | | Very dense, brown, fine SAND to fine to coarse SAND, trace silt | SP | | | | | | |
| 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 | | | | 162 9" | | | | | |
| 149.0 | | | | | 27 | DO | 62-100/3" | 6/9 | |
| | | Very dense, brown to red-brown, fine to coarse SAND, some silt | SM | 120 | 28 | DO | 26-94 | 12/12 | |
| 50.29 | | | | | | | | | |
| 165.0<br>51.51 | | Very dense, brown to red-brown, fine SAND, trace silt | SP to SP-SM | | | | | | |
| 169.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 51.51 | | CONTINUED | | | | | | | |
| | | | | 125 / 7" | 29 | DO | 100-25/1" | 7/7 | |
| 169.0 | | | | | | | | | |
| | | | | 155 / 10" | | | | | |
| | | | | | 30 | DO | 55-100/4" | 6/10 | |
| | | Very dense, brown to red-brown, fine SAND, trace to silt | SP to SP-SM | | | | | | |
| | | | | 191 | 31 | DO | 56-135 | 8/12 | |
| | | | | 135 / 9" | | | | | |
| | | | | | 32 | DO | 60-75/3" | 9/9 | |
| 62.64 | | | | | | | | | |
| 205.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | 127 / 9" | 34 | DO | 77-50/3" | 9/9 | |
| 68.58 | | | | | | | | | |
| 225.0 | | Very dense, brown, silty fine SAND with thin silt layers to stiff brown SILT with seams of silt and fine sand | SM to ML | 140 / 8" | 35 | DO | 90-50/2" | 6/8 | |
| 72.85 | | | | | | | | | |
| 239.0 | | CONTINUED | | | | | | | |

Job No. 785085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 72.85 | | CONTINUED | | | | | | | |
| 239.0 | | | | 128/10' | | | | | |
| | | | | | 36 | DO | 28-100/4" | 10/10 | |
| | | Very dense, brown, silty fine SAND with thin silt layers to stiff brown SILT with seams of silt and fine sand | SM to ML | | | | | | Grout (to surface) |
| 76.20 | | | | 135/10' | | | | | |
| | | | | | 37 | DO | 35-100/4" | 0/10 | |
| 250.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay | SM | 128/11' | | | | | 79.25 |
| | | | | | 38 | DO | 28-100/5" | 11/11 | Bentonite Clay Seal 260.0 80.47 |
| | | | | | | | | | 264.0 |
| 82.91 | | | | | | | | | Pea Gravel |
| 272.0 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe to Surface

2" PVC Slotted Pipe

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N113660 ft. (N34644m)
E2271735 ft. (E692426m)

# BORING LOG G40-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | Pea Gravel (to bottom of boring) |
| 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

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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

1. 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)

2. Split tube sampler left in bottom of borehole.

3. 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 jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | SM | 15 | 2 | DO | 8-7-8 | 18/18 | |
| | | | | 33 | 3 | DO | 13-13-20 | 18/18 | |
| | | Cobbles and boulders noted at 23.0'-24.0' and 27.0'-27.7' | | 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 | |
| | | | | 185/10" | 8 | DO | 85-100/4" | 6/10 | |
| 10.97 | | | | | | | | | |
| 36.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MBB

COOR. N117145 ft. (N35706m)
E2273040 ft. (E692823m)

# BORING LOG G40-P10



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.97 | | CONTINUED | | | | | | | |
| 36.0 | | | | 155 | 9 | DO | 32-65-90 | 18/18 | |
| | | | | | | | | | |
| | | | SP to SP-SM | 107 | 10 | DO | 27-47-60 | 18/18 | |
| | | Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt | | 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<br>HOLE GROUTED AT COMPLETION | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N117145 ft. (N35706m)
E2273040 ft. (E692823m)

**BORING LOG** G40-P10

SHEET 3 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

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

Coor. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 4.06 | | | | 45 | 4 | DO | 13-20-25 | 18/18 | |
| 16.0 | | Dense to very dense, brown, fine to coarse SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt<br>Boulder noted at 27.0'-28.5' | SP-SM | 128/11" | 5 | DO | 19-48-80/5" | 17/17 | |
| | | | | 34 | 6 | DO | 26-20-14 | 18/18 | |
| 8.38 | | | | | | | | | |
| 27.5 | | 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 | 51-70-125 | 16/18 | |
| 10.36 | | | | | | | | | |
| 34.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N112710 ft. (N34355m)
E2273490 ft. (E692961m)

# BORING LOG G40-P17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 188/9" | 9 | DO | 88-100/3" | 7/9 | |
| 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 MRB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 20.73 | | CONTINUED | | | | | | | |
| 68.0 | | | | 150/5" | 15 | DO | 150/5" | 0/5 | |
| | | 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 | 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 | | | | 112/5" | 20 | DO | 112/5" | 3/5 | |
| | | 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 | | | | | | |
| | | | | 125/6" | 21 | DO | 125/6" | 3/6 | |
| 30.63 | | | | | | | | | |
| 100.5 | | END OF BORING<br>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 MKB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 MCB

COOR. N111070 ft. (N33854m)
E2273515 ft. (E692969m)

# BORING LOG G40-P20

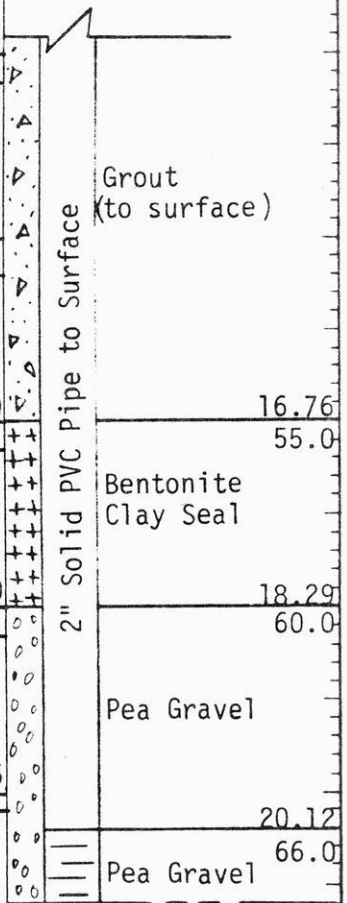
SHEET 2 OF 3

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC. / ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| | | | | 157 / 11" | 8 | DO | 57-100/5" | 11/11 | |
| 34.0 | | Very dense, brown, fine to coarse SAND, some silt, trace fine gravel | SM | | | | | | |
| | | | | 180 / 11" | 9 | DO | 53-80-100/5" | 17/17 | |
| 12.95 | | | | | | | | | |
| 42.5 | | | | 144 / 11" | 10 | DO | 44-100/5" | 8/11 | |
| | | 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 | 147 | 11 | DO | 42-105 | 9/12 | |
| | | | | 168 / 10" | 12 | DO | 68-100/4" | 7/10 | |
| | | | | 205 / 10" | 13 | DO | 105-100/4' | 6/10 | |
| | | | | 172 / 8.5' | 14 | DO | 72-100/2.5' | 5/8.5 | |
| 20.73 | | | | | | | | | |
| 68.0 | | CONTINUED | | | | | | | CONTINUED |




Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N111070 ft. (N33854m)
E2273515 ft. (E692969m)

# BORING LOG G40-P20



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 1/15/80 21.46 (70.4); 2" Slotted PVC Pipe; Pea Gravel; 23.16; 76.0; Pea Gravel |
| | | | | 97 | 16 | DO | 16-36-61 | 17/18 | |
| 24.69 | | | | 151 | 17 | DO | 41-110 | 12/12 | |
| 81.0 | | END OF BORING<br>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 MKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | 9 | 3 | DO | 4-4-5 | 18/18 | |
| 3.81 | | | | | | | | | |
| 12.5 | | 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 | |
| | | | | 105/9" | 5 | DO | 20-55-50/3" | 12/15 | |
| 6.86 | | | | | | | | | |
| 22.5 | | Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, trace silt | SP to SP-SM | 133/11" | 6 | DO | 33-100/5" | 9/11 | |
| | | | | 128/11" | 7 | DO | 28-100/5" | 9/11 | |
| | | | | 97 | 8 | DO | 22-75 | 10/12 | |
| 11.13 | | | | | | | | | |
| 36.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N119050 ft. (N36287m)
E2274350 ft. (E693223m)

# BORING LOG G40-Q7



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | |
| 36.5 | | Very dense, light brown to borwn, fine to medium SAND, trace silt to fine to coarse SAND, trace silt | SP to SP-SM | 103 / 9" | 9 | DO | 25-53-50/3" | 12/15 | Grout (to surface) ▼ 2/11/80 13.0 |
| | | | | 144 | 10 | DO | 18-46-98 | 15/18 | 42.7 |
| | | | | | | | | | 14.17 Bentonite Clay Seal 46.5 |
| 15.24 | | | | | | | | | 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<br><br>Boulder noted at 61.0'-62.5' | SM | 96 | 11 | DO | 33-63 | 11/12 | 50.0 Pea Gravel |
| | | | | 44 | 12 | DO | 10-20-24 | 17/18 | 17.37 |
| | | | | 50 / 6" | 13 | DO | 50/6" | 5/6 | 57.0 Pea Gravel |
| | | | | 165 / 10" | 14 | DO | 30-65-100/4" | 15/16 | 20.42 |
| 21.49 | | | | 100 / 6" | 15 | DO | 100/6" | 4/6 | 67.0 Pea Gravel |
| 70.5 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

2" Solid PVC Pipe to Surface

2" Slotted PVC Pipe

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N119050 ft. (N35287m)
E2274350 ft. (E693223m)

# BORING LOG G40-07



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 | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 jls
Checked MKE

COOR. N108770 ft. (N33153m)
E2274805 ft. (E693361m)

# BORING LOG G40-R23



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | SP to SP-SM | 158/9" | 8 | DO | 20-55-103/3" | 12/15 | |
| | | | | 174/8" | 9 | DO | 74-100/2" | 6/8 | |
| | | Boulder noted at 45.0'-46.5' and 48.8'-49.8' | | - | 10 | DO | Boulder | 0/0 | |
| 14.48 | | | | | | | | | |
| 47.5 | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | 115/1" | 11 | DO | 115/1" | 1/1 | Grout (to surface) |
| | | | | 139 | 12 | DO | 10-44-95 | 12/18 | 1/15/80 15.42 |
| | | | | 160/9" | 13 | DO | 60-100/3" | 7/9 | 50.6 |
| 19.05 | | | | | | | | | 17.07 |
| 62.5 | | 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 | 134 | 14 | DO | 39-95 | 12/12 | 56.0 Bentonite Clay Seal 18.29 |
| 21.03 | | | | | | | | | 60.0 Pea Gravel 20.12 |
| 69.0 | | CONTINUED | | | | | | | 66.0 Pea Gravel CONTINUED |

2" Solid PVC Pipe to Surface

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 134 | 15 | DO | 39-95 | 12/12 | 2" Slotted PVC Pipe; Pea Gravel |
| | | | | 96 | 16 | DO | 31-65 | 12/12 | 23.16 |
| | | | | | | | | | 76.0 Pea Gravel |
| 24.69 | | | | 87 | 17 | DO | 24-63 | 12/12 | |
| 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 [illegible]

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 MCC

COOR. N116240 ft. (N35430m)
E2275365 ft. (E693533m)

# BORING LOG G40-S11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | 154 | 9 | DO | 32-122 | 8/12 | |
| | | | | 137 | 10 | DO | 37-100 | 7/12 | |
| | | Very dense, brown, gravelly, fine to coarse SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt | SP to SP-SM | 162 | 11 | DO | 50-112 | 7/12 | |
| | | | | 217 | 12 | DO | 80-137 | 8/12 | |
| | | | | 137 | 13 | DO | 52-67-70 | 12/18 | |
| | | | | 86 | 14 | DO | 24-36-50 | 14/18 | |
| 20.42 | | | | | | | | | |
| 67.0 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 24.63 | | | | 220/9" | 17 | DO | 110-110/3" | 8/9 | |
| 80.8 | | END OF BORING<br>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 MCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Hydraulic Push | 6/18 | |
| | | 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 | | | | | | |
| | | | | - | 2 | DO | Hydraulic Push | 6/24 | |
| | | | | - | 3 | DO | Air Hammer | 18/18 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 4 | DO | | 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

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

# BORING LOG G41-A24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.43 | | CONTINUED | | | | | | | |
| 37.5 | | Very dense, brown, silty fine to medium SAND to fine to coarse gravelly fine to coarse SAND, trace silt; (materials to these extremes occur in pockets or layers of random thickness at random intervals) | SP to SM | - | 6 | DO | Air Hammer | 18/18 | |
| 13.72 | | | | | | | | | |
| 45.0 | | | | - | 7 | DO | Air Hammer | 2 /24 | |
| | | 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 | - | 8 | DO | Air Hammer | 15/18 | |
| | | | | - | 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)

# BORING LOG G41-A24

SHEET 3 OF 6

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | |
| 71.5 | | Dense to very dense, dark brown to brown, fine to coarse gravelly fine to coarse SAND, trace clay with small occasional patches of fine to medium sand | SP | | | | | | Grout (to surface) |
| 23.47 | | | | | | | | | |
| 77.0 | | | | | | | Air Hammer | | |
| | | | | - | 10 | DO | | 12/12 | |
| | | | | | | | | | 24.99 / 82.0 Bentonite Clay Seal 25.91 / 85.0 |
| | | Very dense, brown, fine to medium SAND, trace silt | SP | | | | | | 2" Solid PVC Pipe (to surface) |
| | | | | - | 11 | DO | Air Hammer | 15/18 | Pea Gravel |
| 28.96 | | | | | | | | | |
| 95.0 | | Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL | GP | | | | | | |
| 30.18 | | | | | | | | | |
| 99.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-A24

SHEET 4 OF 6

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.18 | | CONTINUED | | | | | | | CONTINUED |
| 99.0 | | Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL | GP | - | 12 | DO | Air Hammer | 6/24 | 30.48 / 100.0 Pea Gravel; 2" Slotted PVC Pipe |
| 32.00 | | | | | | | | | |
| 105.0 | | Very dense, light brown to multi-colored, fine to coarse SAND, some fine to coarse gravel | SP | - | 13 | DO | Air Hammer | 10/24 | 33.53 / 110.0 Pea Gravel; 34.75 / 114.0; 35.05 / 115.0 Pea Gravel (to bottom of boring) |
| | | | | - | 14 | DO | Air Hammer | 12/24 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 39.32 | | CONTINUED | | | | | | | |
| 129.0 | | Very dense, brown, SILT, some fine sand, very poorly graded, stratified | ML | - | 15 | DO | Air Hammer | 15/20 | |
| 41.15 | | | | | | | | | |
| 135.0 | | Very dense, light brown, fine to medium SAND | SP | - | 16 | DO | Air Hammer | 24/24 | |
| 44.65 | | | | | | | | | |
| 146.5 | | Very dense, orange-brown, fine to medium SAND, trace fine gravel to red-brown, fine sandy SILT; (materials to these extremes occur in randomly sized and spaced intervals with great variations of material in a small interval) | SP to ML | - | 17 | DO | Air Hammer | 18/18 | |
| 48.46 | | | | | | | | | |
| 159.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-A24

SHEET 6 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 208

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

# BORING LOG G41-C11

SHEET 2 OF 2

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

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

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| 34.0 | | | | 104 | 9 | DO | 48-50-54 | 14/18 | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace clay | SM | 100/3" | 10 | DO | 100/3" | 3/3 | |
| | | | | 200/4" | 11 | DO | 200/4" | 3/4 | |
| 14.48 | | | | | | | | | |
| 47.5 | | Very dense, red-brown, silty fine to coarse SAND | SM | 165/10" | | | | | |
| 15.51 | | | | | 12 | DO | 65-100/4" | 8/10 | |
| 50.9 | | 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 - 12)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked acb

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

# BORING LOG G41-C13

SHEET 1 OF 2

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

DATUM USGS 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, silty, fine to coarse SAND (Boulders to 5' diameter on ground surface) | SM | - | 1 | AS | - | - | |
| 1.22 | | | | | | | | | |
| 4.0 | | | | 28 | 2 | DO | 13-14-14 | 10/18 | |
| | | | | 18 | 3 | DO | 9-8-10 | 8/18 | |
| | | | | 94 | 4 | DO | 18-31-63 | 15/18 | |
| | | | | 145/10" | | | | | |
| | | Compact to very dense, brown, fine to coarse gravelly fine to coarse SAND to fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP-SM to SM | | 5 | DO | 45-100/4" | 10/10 | |
| | | | | 90 | 6 | DO | 39-41-49 | 15/18 | |
| | | | | 163/9" | | | | | |
| | | | | | 7 | DO | 63-100/3" | 9/9 | |
| | | | | 112/6" | 8 | DO | 112/6" | 6/6 | |
| 10.06 | | | | | | | | | |
| 33.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-C13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | 129 / 8" | 10 | DO | 79-50/2" | 8/8 | |
| | | Very dense, red-brown, fine gravelly, silty fine to coarse SAND to silty, fine to coarse SAND, some fine gravel, trace clay | SM | 145 / 6" | 11 | DO | 145/6" | 5/6 | |
| | | | | 140 / 6" | 12 | DO | 140/6" | 6/6 | |
| 15.39 | | | | | | | | | |
| 50.5 | | 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 JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, silty fine to coarse SAND, some fine gravel | SM | - | 1 | AS | - | - | |
| 1.07 | | | | | | | | | |
| 3.5 | | Dense to very dense, light brown, fine to medium SAND, trace silt | SP | 14 | 2 | DO | 6-6-8 | 16/18 | |
| | | | | 23 | 3 | DO | 6-9-14 | 15/18 | |
| | | | | 37 | 4 | DO | 9-15-22 | 12/18 | |
| | | | | 29 | 5 | DO | 7-13-16 | 15/18 | |
| 5.18 | | | | | | | | | |
| 17.0 | | Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay | SM | 25 | 6 | DO | 9-12-13 | 12/18 | ▼ 4/18/79 6.37 |
| | | | | | | | | | ≈ 20.9 |
| | | | | 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 | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-C15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | |
| 36.5 | | Dense to very dense, silty fine SAND, trace clay to fine SAND, some silt, trace clay | SM | 32 | 10 | DO | 11-13-19 | 15/18 | |
| | | | | 45 | 11 | DO | 13-18-27 | 5/18 | |
| 14.02 | | | | | | | | | |
| 46.0 | | Very dense, fine sandy SILT, some clay | ML | 51 | 12 | DO | 12-19-32 | 12/18 | |
| | | | | 39 | 13 | DO | 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 | DO | 31-46-55 | 12/18 | |
| | | | | 125 | 15 | DO | 27-50-75 | 16/18 | |
| 20.73 | | | | | | | | | |
| 68.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-C15

SHEET 3 OF 7

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

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

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 20.73 | | | | | | | | | |
| 68.0 | | Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, some silt, occasional small cobbles | GM to SM | 125 | 16 | DO | 33-43-82 | 12/18 | |
| 22.25 | | | | | | | | | |
| 73.0 | | | | 181 / 9" | 17 | DO | 71-110/3" | 8/9 | |
| | | | | 181 / 9" | 18 | DO | 61-120/3" | 6/9 | |
| | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, to gravelly, fine to coarse SAND, trace to some silt, occasional cobbles | SP-SM to SM | 220 | 19 | DO | 85-135 | 10/12 | |
| | | | | 101 / 9" | 20 | DO | 61-40/3" | 8/9 | |
| | | | | 156 / 8" | 21 | DO | 56-100/2" | 8/8 | |
| 29.26 | | | | | | | | | |
| 96.0 | | Very dense, brown to red-brown, fine to coarse SAND, trace to some fine gravel, trace to some silt | SP-SM to SM | 102 | 22 | DO | 32-70 | 12/12 | |
| 31.09 | | | | | | | | | |
| 102.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-C15



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-C15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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-SM to SM | | | | | | |
| 41.15 | | | | | | | | | |
| 135.0 | | | | 153 | 26 | DO | 48-105 | 12/12 | |
| | | Very dense, brown to red-brown, fine to coarse SAND, trace silt (sand becoming finer with depth) | SP to SP-SM | 159 10" | | | | | |
| | | | | | 27 | DO | 59-100/4" | 9/10 | |
| | | | | 157 9" | | | | | |
| | | | | | 28 | DO | 57-100/3" | 8/9 | |
| 50.29 | | | | | | | | | |
| 165.0 | | Very dense, brown, fine SAND and SILT | SM | | | | | | |
| 50.90 | | | | | | | | | |
| 167.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-C15

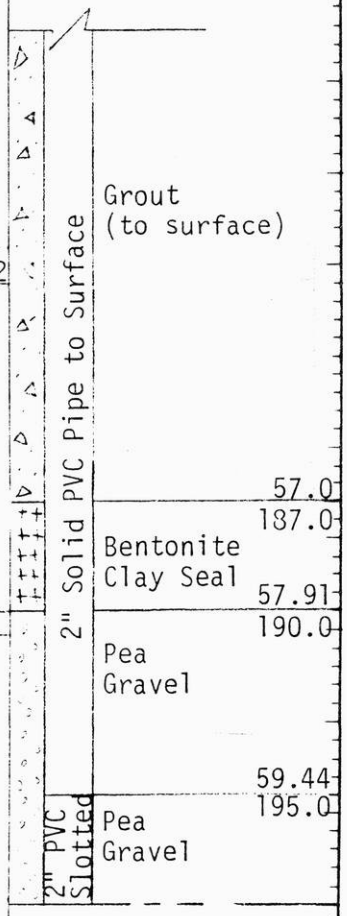
SHEET 6 OF 7

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 50.90 | | CONTINUED | | | | | | | |
| 167.0 | | | | | | | | | |
| | | | | 114 | 29 | DO | 36-78 | 12/12 | |
| | | Very dense, brown, fine SAND and SILT | SM | | | | | | |
| 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 | | Very dense, brown, gravelly fine to coarse SAND, trace silt | SP-SM | | | | | | |
| 60.35 | | | | | | | | | |
| 198.0 | | CONTINUED | | | | | | | |




Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-C15

SHEET 7 OF 7

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

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

DRILL RIG Joy 12 B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES: REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.35 | | CONTINUED | | | | | | | CONTINUED |
| 198.0 | | Very dense, brown, gravelly fine to coarse SAND, trace silt | SP-SM | 150/9" | 32 | DO | 50-100/3" | 6/8 | 2" Slotted PVC Pipe; Pea Gravel |
| 62.48 | | | | | | | | | 62.48 |
| 205.0 | | Soft to firm, brown and gray-green CLAY to clayey SILT (residual material) | CL to ML | | | | | | 205.0 |
| 64.01 | | | | | | | | | |
| 210.0 | | Gray-green, highly weathered metavolcanic TUFF | | 164/10" | 33 | DO | 27-64-100/4" | 16/16 | Pea Gravel |
| | | | | - | 34 | RC | - | 72/72 | |
| 66.23 | | | | | | | | | |
| 217.3 | | END OF BORING | | | | | | | |

NOTES

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

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

| DATE | 4/18/79 | 11/7/79 | 11/12/79 | 2/14/80 | 4/25/80 | 5/22/80* | 9/10/80* |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 6.37 | 6.55 | 6.68 | 6.84 | 6.89 | 6.89 | 7.38 |
| DEPTH (ft.) | 20.9 | 21.5 | 21.9 | 2.8 | 22.6 | 22.6 | 24.2 |

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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 DB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 8.0 | | Compact, gray, fine SAND, some silt | SM | 85 | 3 | DO | 8/30/55 | 18/18 | |
| | | | | 17 | 4 | DO | 5/7/10 | 8/18 | 4.88 |
| | | | | | | | | | 16.0 Bentonite Clay Seal 5.79 |
| | | | | | | | | | 19.0 |
| 6.40 | | | | 30 | 5 | DO | 8/13/17 | 18/18 | ▼ 6.37m 4/18/79 20.9' 6.55 |
| 21.0 | | Very dense, gray, fine to coarse gravelly fine to coarse SAND, some silt, trace clay | GP-GM | | | | | | 21.5 Pea Gravel |
| | | | | 91 | 6 | DO | 27/15/76 | 8/18 | |
| 8.08 | | | | | | | | | |
| 26.5 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

2" Solid PVC Pipe

2" Slotted PVC Pipe

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 2 - 6)
2. Water ponded on ground surface, 3/30/79.
3. Elevation of top of protector pipe, 1694.7 ft. (516.55m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 DTB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 12/1 | |
| | | | | 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 JDB

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

END OF BORING
HOLE GROUTED AT COMPLETION

NOTES

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCS

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Topsoil and rootmat | | | | | | | |
| 0.5 | | | | 24 | 1 | DO | 11-13-11 | 18/18 | |
| | | | | 22 | 2 | DO | 11-12-10 | 18/18 | |
| | | Compact to very dense, red-brown to brown, fine to coarse gravelly fine to coarse SAND, trace silt | SP-SM | 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" | 6 | DO | 35-100-100/3" | 15/15 | |
| 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 | |
| 10.06 | | | | | | | | | |
| 33.0 | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay | SM | 178/10" | 8 | DO | 78-100/4" | 10/10 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-D17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 / 37.0 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay | SM | 181/10" | 9 | DO | 81-100/4" | 10/10 | |
| | | | | 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<br>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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 12/18 | |
| | | | | 136 | 4 | DO | 12-64-72 | 10/18 | |
| 5.49 / 18.0 | | | | 150/9' | | | | | |
| | | | | | 5 | DO | 50-100/3" | 6/9 | |
| | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, trace clay | SP-SM to SM | 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 203

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

# BORING LOG G41-D18



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.06 / 33.0 | | CONTINUED | | | | | | | |
| | | | | 201 / 9" | 8 | DO | 100 47-101- 3" | 15/15 | |
| | | | | 237 / 9" | 9 | DO | 137-100/3" | 9/9 | |
| | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, trace clay | SP-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 | |
| 19.87 | | | | | | | | | (Note 2) |
| 65.2 | | END OF BORING<br>HOLE GROUTED AT COMPLETION<br>(See Sheet 3 for notes) | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DB

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

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. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Topsoil and rootmat | | | | | | | |
| 0.5 | | Compact, brown, fine to coarse sandy SILT, trace fine gravel | ML | 7 | 1 | DO | 3-3-4 | 18/18 | |
| 1.22 | | | | | | | | | |
| 4.0 | | Compact, brown, silty, fine to coarse SAND, some fine gravel, some clay | SM | 18 | 2 | DO | 6-8-10 | 18/18 | |
| | | | | 18 | 3 | DO | 6-7-11 | 18/18 | |
| 3.84 | | | | | | | | | |
| 12.6 | | | | 33 | 4 | DO | 15-15-18 | 18/18 | |
| | | Dense to very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP to SP-SM | 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 | | | | | | | | | |
| 32.5 | | Very dense, brown SILT, some fine to coarse gravel, trace fine sand | ML | 100/4" | 8 | DO | 100/4" | 3/4 | |
| 10.67 | | | | | | | | | |
| 35.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-E11



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 | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.67 | | CONTINUED | | | | | | | |
| 35.0 | | Very dense, brown SILT, some fine to coarse gravel, trace fine sand | ML | | | | | | |
| 11.43 | | | | 100 4" | 9 | DO | 100/4" | 3/4 | |
| 37.5 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP-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 | SM | 100 6" | 11 | DO | 100/6" | 6/6 | |
| 15.09 | | | | | | | | | |
| 49.5 | | END OF BORING<br>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 DCB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.30 / 1.0 | | Topsoil and rootmat | | - | 1 | AS | - | - | |
| | | | | 27 | 2 | DO | 4-14-13 | 18/18 | |
| | | Compact to very dense, brown to light brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles | SM | 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 | |
| | | | | | | | | | ▼ 4/17/79 10.73 |
| | | | | 115 | 8 | DO | 30-55-60 | 13/18 | 35.2 |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC/ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 / 37.0 | | CONTINUED | | | | | | | |
| | | | | 145 | 9 | DO | 62-62-83 | 10/18 | |
| | | | | 87 | 10 | DO | 30-37-50 | 12/18 | |
| | | Very dense, red-brown, fine to coarse SAND and fine GRAVEL, trace silt, trace clay to fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, occasional boulders | SP-SM | 200/5" | 11 | DO | 200/5" | 5/6 | |
| | | | SM | 210/10" | 12 | DO | 110-100/4" | 9/10 | |
| | | | | 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 DB

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

# BORING LOG G41-E13



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.70 | | CONTINUED | | | | | | | |
| 104.0 | | Very dense, red-brown to light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay, occasional silty sand layers | SM | 175 | 22 | DO | 75-100 | 12/12 | |
| | | | | 185/3" | 23 | DO | 85-100/2" | 7/3 | |
| 38.10 | | | | | | | | | |
| 125.0 | | Very dense, red-brown to light brown, fine to coarse SAND, trace silt | SP to SP-SM | 105 | 24 | DO | 27-35-70 | 12/18 | |
| 41.15 | | | | | | | | | |
| 135.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-E13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 DCB

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

# BORING LOG G41-E13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 51.21 / 168.0 | | CONTINUED | | | | | | | |
| | | | | 215 / 9' | 28 | DO | 115-100/3 | 9/9 | |
| | | Very dense, red-brown to light brown, fine to medium SAND, trace silt | SP to SP-SM | 251 | 29 | DO | 85-166 | 12/12 | |
| | | | | 185 | 30 | DO | 45-140 | 12/12 | |
| 60.35 / 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.35 / 198.0 | | CONTINUED | | | | | | | |
| | | | | 210 | 31 | DO | 80-130 | 12/12 | |
| | | Very dense, red-brown to light brown, fine to medium SAND, trace silt | SP to SP-SM | | | | | | |
| | | | | 275 | 32 | DO | 75-200 | 12/12 | |
| 67.06 / 220.0 | | | | | | | | | |
| | | 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 | |
| 68.88 / 226.0 | | | | | | | | | |
| | | 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 | |
| 71.02 / 233.0 | | CONTINUED | | | | | | | CONTINUED |

Grout (to surface) 67.97

2" Solid PVC Pipe to Surface

Bentonite Clay Seal 223.0 / 68.58

Pea Gravel 225.0 / 69.19

2" Slotted PVC Pipe 227.0

Pea Gravel

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-E13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 71.02 | | CONTINUED | | | | | | | CONTINUED |
| 233.0 | | Very dense, red-brown to light brown, fine to coarse SAND, trace fine gravel, trace silt | SP-SM | 170 / 6" | 35 | DO | 170/6" | 2/6 | 2"Slotted PVC Pipe; Pea Gravel; 72.24; 237.0 |
| 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 | |
| | | | | - | 39 | NX RC | - | 54/54 | |
| 76.35 | | | | | | | | | |
| 250.5 | | END OF BORING | | | | | | | |

NOTES

1. 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)

2. 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 JCB

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

# BORING LOG G41-E13A

SHEET 1 OF 3

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

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

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

TEST NUMBER 1

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

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

TEST NUMBER 2

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

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

TEST NUMBER 3

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

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

TEST NUMBER 4

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

| 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 (cordinates 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.

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-E15

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 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 | |
| | | | | 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" | 11/11 | |
| | | | | 200 / 8" | 11 | DO | 25-100-100/2" | 14/14 | |
| 15.24 / 50.0 | | END OF BORING<br>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. N112385 ft. (N34255m)
E2283005 ft. (E695861m)

# BORING LOG G41-E17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 8/13 | |
| 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | - | 7 | DO | Air Hammer | 15/18 | |
| | | Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | - | 8 | DO | Air Hammer | 12/18 | |
| | | | | - | 9 | DO | Air Hammer | 12/12 | |
| | | | | - | 10 | DO | Air Hammer | 12/12 | |
| | | | | - | 11 | DO | Air Hammer | 8/12 | |
| | | | | - | 12 | DO | Air Hammer | 6/12 | |
| 20.42 | | | | | | | | | |
| 67.0 | | CONTINUED | | | | | | | |

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-E17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.42 / 67.0 | | CONTINUED | | | | | | | |
| | | | | - | 13 | DO | Air Hammer | 15/18 | |
| | | | | - | 14 | DO | Air Hammer | 12/18 | ▼ 4/18/79 23.38 / 76.7 |
| | | Red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | - | 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 DCB

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

# BORING LOG G41-E17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 JCB

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

# 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC/ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.91 | | CONTINUED | | | | | | | |
| 137.5 | | | | - | 23 | DO | Air Hammer | 6/6 | |
| | | Yellow-brown to brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | SP SM | - | 24 | DO | Air Hammer | 18/13 | |
| | | | | - | 25 | DO | Air Hammer | 12/18 | |
| 51.21 | | | | | | | | | |
| 168.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 51.21 | | CONTINUED | | | | | | | |
| 168.0 | | Yellow-brown to brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | SP-SM | | | | | | |
| | | | | - | 26 | DO | Air Hammer | 8/13 | |
| 53.34 | | | | | | | | | |
| 175.0 | | | | | | | | | |
| | | | | - | 27 | DO | Air Hammer | 2/6 | |
| | | Brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP-SM | | | | | | |
| | | | | - | 28 | DO | Air Hammer | 8/12 | |
| 60.66 | | | | | | | | | |
| 199.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-E17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 60.66 / 199.0 | | 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 | 2" Solid PVC Pipe to Surface; Grout (to surface) 68.88 |
| | | | | - | 31 | DO | Air Hammer | 18/18 | Bentonite 226.0; Clay Seal 69.49; Pea Gravel 228.0 |
| 69.80 / 229.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-E17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 69.80 | | CONTINUED | | | | | | | CONTINUED |
| 229.0 | | Red-brown SILT, some clay trace fine sand | ML | | | | | | 2" Solid PVC Pipe; Pea Gravel |
| 71.43 | | | | - | 32 | DO | Air Hammer | 12/12 | 71.63 |
| 234.5 | | Red-brown, fine to coarse clayey SAND and SILT, trace fine gravel | ML | | | | | | 235.0 |
| 73.15 | | | | | | | | | 2" Slotted PVC Pipe; Pea Gravel |
| 240.0 | | Brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | SM | | | | | | 74.68 |
| | | | | - | 33 | DO | Air Hammer | 8/12 | 245.0 |
| 75.44 | | | | | | | | | |
| 247.5 | | Greenish-gray, highly weathered metavolcanic TUFF | | - | - | - | Drill Cuttings | - | Pea Gravel |
| 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

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

**BORING LOG** G41-E17



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.

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 5.0 | | | | 20 | 2 | DO | 9-10-10 | 14/18 | |
| | | | | 49 | 3 | DO | 22-27 | 12/12 | |
| | | | | 100 / 4" | 4 | DO | 100/4" | 0/4 | |
| | | 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 | 97 | 5 | DO | 26-48-49 | 18/18 | |
| | | | | 153 / 11" | 6 | DO | 53-100/5" | 4/11 | |
| | | | | 133 / 6" | 7 | DO | 133/6" | 4/6 | |
| | | | | 144 / 6" | 8 | DO | 144/6" | 0/6 | |
| | | | | 155 | 9 | DO | 66-89 | 8/12 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 / 37.0 | | CONTINUED | | | | | | | |
| | | 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 | |
| 15.33 / 50.3 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

1. 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

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

# BORING LOG G41-E19A

SHEET 1 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | Compact, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay | SM | - | 1 | DO | Air Hammer | 18/18 | |
| | | | | - | 2 | DO | Air Hammer | 18/18 | |
| 4.57 | | | | | | | | | |
| 15.0 | | Dense, brown and red-brown, fine to medium SAND, some silt to fine to coarse SAND, some fine to coarse gravel, trace silt | SP-SM | - | 3 | DO | Air Hammer | 18/18 | |
| 9.60 | | | | - | 4 | DO | Air Hammer | 4/18 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 9.60 | | CONTINUED | | | | | | | |
| 31.5 | | Dense, brown and red-brown, fine to medium SAND, some silt to fine to coarse SAND, some fine to coarse gravel, trace silt | SP-SM | | | | | | |
| 10.67 | | | | | | | | | |
| 35.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | - | 5 | DO | Air Hammer | 12/18 | |
| 13.72 | | | | | | | | | |
| 45.0 | | Very dense, orange-brown and brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP | - | 6 | DO | Air Hammer | 15/18 | |
| 16.76 | | | | | | | | | |
| 55.0 | | Very dense, red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders | SM | - | 7 | DO | Air Hammer | 18/18 | ▼ 6/10/81 17.27 ≈ 56.7 |
| 20.27 | | | | | | | | | |
| 66.5 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.27 | | CONTINUED | | | | | | | |
| 66.5 | | | | | | | Air Hammer | | |
| | | | | - | 8 | DO | | 6/12 | |
| | | | | | | | | | |
| | | | | - | 9 | DO | Air Hammer | 20/24 | |
| | | 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 | | | | | | |
| | | | | - | 10 | DO | Air Hammer | 18/18 | 2" Slotted PVC Pipe (to surface) Grout (to surface) |
| | | | | | | | | | |
| 30.94 | | | | - | 11 | DO | Air Hammer | 18/18 | |
| 101.5 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N110260 ft. (N33608m)
E2283290 ft. (E695949m)
SURFACE ELEV. 1645.6 ft. (501.58m)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-E19A

SHEET 4 OF 9

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
DATE STARTED 5/11/81 DATE COMPLETED 5/15/81
DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.94 | | CONTINUED | | | | | | | CONTINUED |
| 101.5 | | Very dense, red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles and boulders | SM | | | | | | Grout 32.00 |
| 32.00 | | | | | | | | | 105.0 |
| 105.0 | | | | | | | | | Bentonite Clay Seal 32.92 |
| | | Very dense, brown to red-brown, fine to coarse gravelly fine to coarse SAND, trace silt | SP-SM | - | 12 | DO | Air Hammer | 15/18 | 108.0 |
| | | | | | | | | | 2" Solid PVC Pipe |
| | | | | | | | | | Pea Gravel |
| 35.05 | | | | | | | | | 35.05 |
| 115.0 | | | | | | | | | 115.0 |
| | | | | - | 13 | DO | Air Hammer | 18/18 | 2" Slotted PVC Pipe |
| | | Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt | SP | | | | | | Pea Gravel 38.10 |
| | | | | | | | | | 38.4 125.0 |
| | | | | | | | | | 126.0 |
| | | | | | | | | | Bentonite Clay Seal 39.62 |
| | | | | - | 14 | DO | Air Hammer | 15/18 | 130.0 |
| | | | | | | | | | Pea Gravel (to bottom of boring) |
| 41.61 | | | | | | | | | |
| 136.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-E19A

SHEET 5 OF 9

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.61 / 136.5 | | CONTINUED | | | | | | | |
| | | | | - | 15 | DO | Air Hammer | 18/18 | |
| | | Very dense, light red-brown to orange-brown, fine SAND, trace silt to fine to medium SAND, trace fine gravel, trace silt | SP | | | | | | |
| | | | | | | | Air Hammer | | |
| | | | | - | 16 | DO | | 8/12 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 17 | DO | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 175.0 | | 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 | - | 19 | DO | Air Hammer | 24/24 | |
| | | | | - | 20 | DO | Air Hammer | 16/18 | |
| 59.44 | | | | | | | | | |
| 195.0 | | Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | | | | | | |
| 60.66 | | | | | | | | | |
| 199.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-E19A

SHEET 7 OF 9

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

DATUM USGS 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.66 | | CONTINUED | | | | | | | |
| 199.0 | | | | - | 21 | DO | Air Hammer | 15/18 | |
| | | Very dense, light brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | | | | | | |
| | | | | - | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 70.56 | | CONTINUED | | | | | —Air Hammer | | |
| 231.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 79.71 | | CONTINUED | | | | | | | |
| 261.5 | | Highly to slightly weathered, green, metavolcanic TUFF | | - | 26 | RC | | 62/72 | |
| 84.12 | | | | | | | | | |
| 276.0 | | END OF BORING | | | | | | | |

NOTES

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 3.[illegible] | | | | | | | | | |
| | | 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 | |
| | | | | 8 | 3 | DO | 3-4-4 | 18/18 | |
| | | | | 14 | 4 | DO | 5-5-9 | 18/18 | |
| 5.64 | | | | | | | | | |
| 18.5 | | Compact, brown, fine SAND and fine to coarse GRAVEL, trace silt | SP SM to SM | 27 | 5 | DO | 11-16 | 1/12 | |
| 7.32 | | | | | | | | | |
| 24.0 | | Compact to very dense, brown fine to coarse SAND, trace to some fine to coarse gravel, trace silt<br><br>Boulders and cobbles noted at 27.5'-28.0' and 35.0'-35.5' | SM | 41 | 6 | DO | 11-19-22 | 15/18 | |
| | | | | 21 | 7 | DO | 12-10-11 | 12/18 | |
| | | | | 28 | 8 | DO | 12-16-12 | 5/18 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-F13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 / 37.0 | | CONTINUED | | 125 / 6" | 9 | DO | 125/6" | 0/6 | |
| | | Compact to very dense, brown fine to coarse SAND, trace to some fine to coarse gravel, trace silt | SM | 150 / 11" | 10 | DO | 50-100/5" | 11/11 | |
| | | Boulders and cobbles noted at 39.5'-40.5' and 48.5'-50.5' | | 145 / 10" | 11 | DO | 45-100/4" | 9/10 | |
| | | | | 150 / 9" | 12 | DO | 75-75/3" | 6/9 | |
| 17.01 / 55.8 | | END OF BORING<br>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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, fine to coarse SAND, some silt, trace fine gravel | SM | - | 1 | pit | - | - | (Note 2) |
| 2.29 | | | | | | | | | |
| 7.5 | | Dense, brown, fine to coarse gravelly, fine to coarse SAND, trace to some silt | SP-SM | - | 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 | |
| | | | | - | 5 | DO | Air Hammer | 10/12 | |
| | | | | - | 6 | DO | Air Hammer | 14/14 | |
| | | | | - | 7 | DO | Air Hammer | 12/12 | |
| 11.13 | | | | | | | | | |
| 36.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked AEB

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

# BORING LOG G41-F24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 67.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MCB

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

# BORING LOG G41-F24

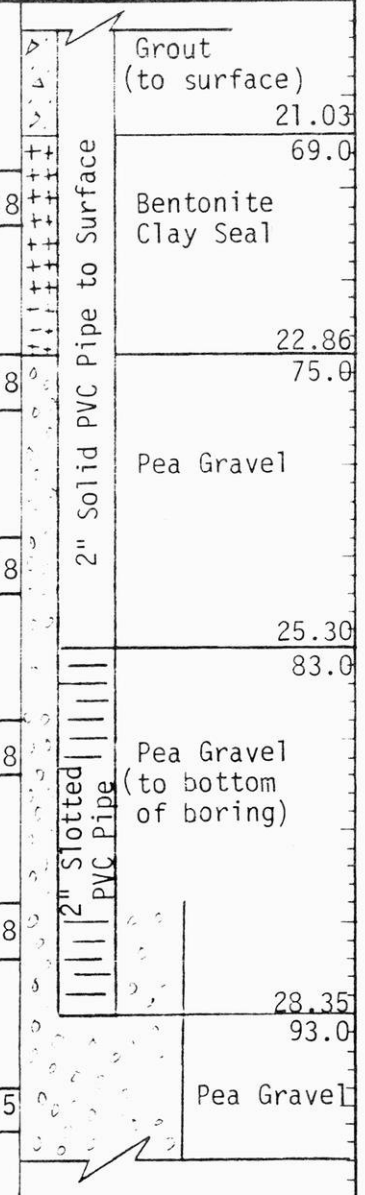


SURFACE ELEV. 1653.5 ft. (503.99m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | - | 14 | DO | Air Hammer | 18/18 | |
| | | | | - | 15 | DO | Air Hammer | 18/18 | |
| | | | | - | 16 | DO | Air Hammer | 18/18 | |
| | | | | - | 17 | DO | Air Hammer | 5/18 | |
| | | | | - | 18 | DO | Air Hammer | 15/18 | |
| | | | | - | 19 | DO | Air Hammer | 10/15 | |
| | | | | - | 20 | DO | Air Hammer | 15/18 | |
| 31.09 | | | | | | | | | |
| 102.0 | | CONTINUED | | | | | | | |




Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MSB

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

# BORING LOG G41-F24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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<br><br>Boulder noted at 148.5'-151.0' | GP to GP-GM | - | 25 | DO | Air Hammer | 14/14 | |
| | | | | - | 26 | DO | Air Hammer | 10/12 | |
| 50.90 | | | | | | | | | |
| 167.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

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

# BORING LOG G41-F24



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

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

# BORING LOG G41-F24



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 71.32 | | CONTINUED | | | | | | | |
| 234.0 | | Greenish-gray, metavolcanic TUFF | | - | 33 | HX RC | - | 96/96 | |
| 74.06 | | | | | | | | | |
| 243.0 | | END OF BORING | | | | | | | |

NOTES

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

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

| DATE | 1/10/80 | 4/25/80 | 6/28/80 | 7/9/80 | 7/17/80 | 7/25/80 | 8/2/80 |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 19.93 | 20.15 | 20.06 | 20.09 | 20.12 | 20.12 | 20.09 |
| DEPTH (ft.) | 65.4 | 66.1 | 65.8 | 65.9 | 66.0 | 66.0 | 65.9 |

| DATE | 8/9/80 | 8/16/80 | 8/23/80 | 9/2/80 | 9/10/80 | 6/10/81 | |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 20.09 | 20.36 | 20.06 | 20.09 | 20.21 | 20.48 | |
| DEPTH (ft.) | 65.9 | 66.8 | 65.8 | 65.9 | 66.3 | 67.2 | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked PKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | 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 | - | - | |
| 0.61 | | | | | | | | | |
| 2.0 | | 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 | |
| 2.74 | | | | | | | | | |
| 9.0 | | Dense to very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | SM | 49 | 4 | DO | 21-25-24 | 12/18 | |
| | | | | 60 | 5 | DO | 36-28-32 | 14/18 | |
| | | | | 84 | 6 | DO | 32-40-44 | 12/18 | |
| 6.55 | | | | | | | | | |
| 21.5 | | Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles | SM | 30/2" | 7 | DO | 30/2" | 2/2 | |
| | | | | 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

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

# BORING LOG G41-G11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 | | CONTINUED | | | | | | | |
| 37.0 | | | | 200 / 3" | 10 | DO | 200/3" | 2/3 | |
| | | | | 200 / 3" | 11 | DO | 200/3" | 2/3 | |
| | | Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles | 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 | | | | | | | | | |
| 72.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-G11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 21.95 / 72.0 | | CONTINUED | | | | | | | |
| | | Very dense, brown to red-brown, fine to coarse SAND, trace to some fine to coarse gravel, some silt, trace clay, occasional cobbles | SM | 84 | 17 | DO | 36-48 | 8/12 | |
| 24.84 / 81.5 | | | | 94 | 18 | DO | 30-42-52 | 12/18 | |
| | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

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

# BORING LOG G41-G12

SHEET 1 OF 1

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

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

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

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS/FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Loose, red-brown, SILT, some fine to medium sand, trace clay | ML | 5 | 1 | DO | 1-3-2 | 15/18 | (Note 2) Grout |
| 1.07 | | | | | | | | | |
| 3.5 | | Compact, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | 24 | 2 | DO | 7-12-12 | 10/18 | 2" Solid PVC Pipe ▼2.77 4/18/79 9.1 |
| 2.93 | | | | | | | | | 3.05 |
| 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 | 10.0 Bentonite Clay Seal 3.96 Pea Gravel 13.0 |
| | | | | 36 | 4 | DO | 14-20-16 | 12/18 | 4.42 14.5 2" Slotted PVC Pipe Pea Gravel 5.94 |
| | | | | 167 | 5 | DO | 45-92-75 | 18/18 | 19.5 |
| 6.40 | | | | | | | | | |
| 21.0 | | END OF BORING | | | | | | | |

NOTES

1. Standard Penetration Test - Driving 3" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
2. Water ponded on ground surface, 3/31/79.
3. 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 DB

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

# BORING LOG G41-G13

SHEET 1 OF 11

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-G13

SHEET 2 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 / 36.5 | | CONTINUED | | | | | | | |
| | | Compact to very dense, brown to red brown, fine to coarse gravelly fine to coarse SAND, some silt to silty fine to coarse SAND, some fine to coarse gravel, occasional to frequent cobbles | SM | - | 5 | DO | Air Hammer | 24/24 | |
| | | | | - | 6 | DO | Air Hammer | 12/18 | |
| 16.76 / 55.0 | | Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, frequent cobbles | GP | - | 7 | DO | Air Hammer | 23/23 | |
| 21.03 / 69.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-G13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.03 | | CONTINUED | | | | | | | |
| 69.0 | | Very dense, multi-colored, fine to coarse sandy fine to coarse GRAVEL, frequent cobbles | GP | - | 8 | DO | Air Hammer | 27/27 | |
| 23.62 | | | | | | | | | |
| 77.5 | | | | - | 9 | DO | Air Hammer | 9/9 | |
| | | 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 | - | 10 | DO | Air Hammer | 24/24 | |
| 30.94 | | | | - | 11 | DO | Air Hammer | 12/16 | |
| 101.5 | | 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)
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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | ▼ 6/10/81 35.79 / 117.4 |
| | | | | - | 13 | DO | Air Hammer | 12/21 | |
| | | Very dense, brown to red-brown, silty, fine to coarse SAND, some fine to coarse gravel, occasional cobbles | SM | | | | | | |
| | | | | - | 14 | DO | Air Hammer | 18/24 | |
| 40.84 / 134.0 | | 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 5 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 40.84 | | CONTINUED | | | | | | | |
| 134.0 | | 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 | |
| 47.24 | | | | | | | | | |
| 155.0 | | Very dense, light brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP | - | 17 | DO | Air Hammer | 10/12 | |
| 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)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-G13

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 50.75 / 166.5 | | CONTINUED | | | | | | | |
| | | | | - | 18 | DO | Air Hammer | 10/10 | |
| | | 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 | - | 19 | DO | Air Hammer | 9/9 | |
| | | | | - | 20 | DO | Air Hammer | 6/9 | |
| 60.66 / 199.0 | | CONTINUED | | | | | | | 2" Solid PVC Pipe; Grout (to surface); 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 7 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: NUMBER | TYPE | HAMMER BLOWS PER 6IN. | REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.66 | | CONTINUED | | | | | | | CONTINUED |
| 199.0 | | | | | 21 | DO | Air Hammer | 2/2 | |
| | | | | | 22 | DO | Air Hammer | 7/8 | Grout (to surface) |
| | | 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 | | 23 | DO | Air Hammer | 6/8 | 2" Solid PVC Pipe |
| | | | | | | | | | 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)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-G13

SHEET 8 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 69.80 | | CONTINUED | | | | | | | CONTINUED |
| 229.0 | | 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 |
| 71.32 | | | | | | | | | |
| 234.0 | | | | - | 25 | DO | Air Hammer | 15/21 | |
| | | | | | | | | | 75.29 |
| 247.0 | | 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 | |
| | | | | | | | | | 77.72 |
| 255.0 | | | | | | | | | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 80.47 | | CONTINUED | | | | | | | |
| 264.0 | | 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

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

# BORING LOG G41-G13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 88.09 | | CONTINUED | | | | | | | |
| 289.0 | | 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 | - | 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 | | Hard, green, metavolcanic TUFF | | | | | | | |
| 97.23 | | | | | | | | | |
| 319.0 | | 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



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 GPB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC. / ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Loose, brown, silty, fine to medium SAND, trace organics | SM | 5 | 1 | DO | 3-2-3 | 15/18 | |
| 0.76 | | | | | | | | | |
| 2.5 | | | | 53 | 2 | DO | 8-27-26 | 10/18 | |
| | | | | 15 | 3 | DO | 5-5-10 | 15/18 | |
| | | Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | 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 | | | | | | | | | |
| 32.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14



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

Job No. 766085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-G14



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

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

DRILL RIG Joy R-15 DRILLING METHOD Mud Rotary

NOTES

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

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

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JDS

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14A

SHEET 2 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 38.10 / 125.0 | | CONTINUED | | | | | | | |
| | | | | - | 4 | DO | Air Hammer | 12/12 | |
| | | 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 | | | | | | |
| | | | | - | 5 | DO | Air Hammer | 12/12 | |
| | | | | - | 6 | DO | Air Hammer | 2/4 | |
| 47.24 / 155.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 47.24 | | CONTINUED | | | | | | | |
| 155.0 | | Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay to fine to coarse SAND, some silt, trace to some fine to coarse gravel, occasional to frequent cobbles | SM | - | 7 | DO | Air Hammer | 6/11 | |
| 50.29 | | | | | | | | | |
| 165.0 | | Very dense, red-brown to brown, fine to coarse SAND, some silt, trace to some fine gravel, trace clay, frequent cobbles | SM | - | 8 | DO | Air Hammer | 3/12 | Grout (to surface) |
| | | | | - | 9 | DO | Air Hammer | 4/12 | 2" Solid PVC Pipe to Surface |
| | | | | | | | | | 55.78 |
| 56.69 | | | | | | | | | 183.0 Bentonite Clay Seal |
| 186.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | - | 10 | DO | Air Hammer | 6/12 | Bentonite Clay Seal 57.92 |
| 58.67 | | | | | | | | | 190.0 |
| 192.5 | | Gravel and cobbles. Unable to retain samples | GP | - | 11 | DO | Air Hammer | 0/12 | Caved material (Note 2) |
| 61.57 | | | | - | 12 | DO | Air Hammer | 0/12 | |
| 202.0 | | Very dense, brown, fine to coarse SAND to fine SAND, trace silt (fineness increasing with depth) | SP to SP-SM | - | 13 | DO | Air Hammer | 18/18 | 2" Solid PVC Pipe |
| | | | | - | 14 | DO | Air Hammer | 4/18 | |
| | | | | - | 15 | DO | Air Hammer | 12/18 | |
| 66.45 | | | | | | | | | |
| 218.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14A

SHEET 5 OF 6

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

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

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

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

NOTES

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jlg
Checked

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

# BORING LOG G41-G14A



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

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

DRILL RIG Drilltech D40K DRILLING METHOD Mud Rotary

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

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

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

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

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked GAB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | See borings G41-G14 and G41-G41A for stratigraphy | | | | | | | 12/4/79 33.74 |
| 73.46 | | | | | | | | | 110.7 |
| 241.0 | | Very dense, brown, silty, fine SAND, trace clay | SM | - | 1 | DO | Air Hammer | 18/18 | Grout (to surface) |
| 75.44 | | | | | | | | | |
| 247.5 | | Very dense, brown, fine sandy SILT | ML | - | 2 | DO | Air Hammer | 18/18 | |
| 76.96 | | | | | | | | | |
| 252.5 | | Very dense, brown to red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles and boulders | SP-SM to SM | - | 3 | DO | Air Hammer | 12/12 | 2" Solid PVC Pipe |
| | | | | - | 4 | DO | Air Hammer | 12/12 | 77.72 255.0 Bentonite Clay Seal 80.16 263.0 Pea Gravel |
| 81.23 | | | | | | | | | |
| 266.5 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES: REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 81.25 / 266.5 | | CONTINUED | | | | | | | CONTINUED |
| | | Very dense, brown to red-brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional to frequent cobbles and boulders | SP-SM to SM | - | 5 | DO | Air Hammer | 3/6 | 2" Solid PVC Pipe; Pea Gravel; 82.91 / 272.0; 2" Slotted PVC Pipe; Pea Gravel; 89.00 / 292.0; Pea Gravel (to bottom of boring) |
| | | | | - | 6 | DO | Air Hammer | 7/14 | |
| | | | | - | 7 | DO | Air Hammer | 5/5 | |
| 91.44 / 300.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 to SM | - | 8 | DO | Air Hammer | 2/8 | |
| 93.73 | | | | | | | | | |
| 307.5 | | Very dense, brown SILT, some fine sand to fine to coarse SAND and SILT, trace fine gravel | SM to ML | - | 9 | DO | Air Hammer | 4/4 | |
| 96.01 | | | | | | | | | |
| 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 | | | | | | | | | |
| 334.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 101.80 | | CONTINUED | | | | | | | |
| 334.0 | | | | - | 12 | DO | Air Hammer | 2/2 | |
| | | Red-brown and green, highly weathered to weathered metavolcanic TUFF | | | | | | | |
| | | | | - | 13 | DO | Air Hammer | 1.5/1.5 | |
| 109.76 / 360.1 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 | 112.8 | 112.9 | 114.8 |

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

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

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn JEF
Checked EAB

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 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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | See borings G41-G14 and G41-G14A for soil stratigraphy | | | | | | | Grout (to surface) |
| | | | | | | | | | 12/11/79 33.56 / 110.1 |
| | | | | | | | | | 35.97 / 118.0 Bentonite Clay Seal |
| | | | | | | | | | 37.30 / 124.0 Pea Gravel |
| | | | | | | | | | 39.93 / 131.0 |
| 41.45 / 136.0 | | CONTINUED | | | | | | | 2" Solid PVC Pipe; 2" Slot Pipe; Pea Gravel; CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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; Caved Material |
| 48.77 | | | | | | | | | |
| 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. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6 IN. | SAMPLES: REC. / ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy | | | | | | | ▼ 12/19/79 33.59<br>110.2<br>Grout (to surface)<br>64.01<br>210.0<br>Bentonite Clay Seal<br>65.53<br>215.0<br>Pea Gravel<br>67.67<br>222.0<br>2" Solid PVC Pipe to Surface<br>2" Slotted PVC Pipe<br>Pea Gravel |
| 71.32 | | | | | | | | | |
| 234.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14D

SHEET 2 OF 2

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

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

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

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

NOTES

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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | ▼ 12/11/79 33.31<br>109.3<br>Grout (to surface)<br>38.40<br>126.0<br>Bentonite Clay Seal<br>39.32<br>129.0<br>Pea Gravel<br>40.84<br>134.0<br>Pea Gravel<br>2" Solid PVC Pipe<br>2" Slotted PVC Pipe |
| | | See borings G41-G14 and G41-G14A for soil stratigrapny | | | | | | | |
| 42.97<br>141.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | 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

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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC/ATT | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | ▼12/11/79 33.07 108.5 |
| | | | | | | | | | Grout (to surface) |
| | | | | | | | | | 34.12 |
| | | | | | | | | | 276.0 |
| | | See borings G41-G14, G41-G14A and G41-G14B for soil stratigraphy | | | | | | | Bentonite Clay Seal |
| | | | | | | | | | 35.65 |
| | | | | | | | | | 281.0 |
| | | | | | | | | | 2" Solid PVC Pipe to Surface |
| | | | | | | | | | Pea Gravel |
| | | | | | | | | | 88.39 |
| | | | | | | | | | 290.0 |
| | | | | | | | | | 2" Slotted PVC Pipe |
| | | | | | | | | | Pea Gravel |
| 91.44 | | | | | | | | | |
| 300.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14F

SHEET 2 OF 3

SURFACE ELEV 17035 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 91.44 | | CONTINUED | | | | | | | CONTINUED |
| 300.0 | | | | | | | | | 2" Slotted PVC Pipe; Caved Material (Note 1) |
| | | | | | | | | | 94.49 / 310.0 |
| | | See Borings G41-G14, G41-G14A and G41-G13B for soil stratigraphy | | | | | | | Caved Material (Note 1) |
| 101.19 | | | | | | | | | |
| 332.0 | | END OF BORING | | | | | | | |

NOTES

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G14F



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.

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | See Boring G41-G15A for detailed descriptions. | | - | 1 | DO | Air Hammer | 12/12 | |
| 13.72 | | | | | | | | | |
| 45.0 | | | | - | 2 | DO | Air Hammer | 6/6 | |
| | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to brown, fine to coarse GRAVEL and fine to coarse SAND, some silt | SM to GM | - | 3 | DO | Air Hammer | 6/6 | |
| | | | | - | 4 | DO | Air Hammer | 3/3 | |
| 13.90 | | | | | | | | | |
| 62.0 | | | | | | | | | |
| | | Very dense, red-brown, silty, fine to coarse SAND, some fine gravel, trace clay to fine to coarse SAND, some fine gravel, some silt, trace clay | SM | - | 5 | DO | Air Hammer | 12/12 | |
| | | | | - | 6 | DO | Air Hammer | 10/12 | |
| | | | | - | 7 | DO | Air Hammer | 10/12 | |
| 23.47 | | | | | | | | | |
| 77.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-G15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 23.47 / 77.0 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown, silty, fine to coarse SAND, some fine gravel, trace clay to fine to coarse SAND, some fine gravel, some silt, trace clay | SM | - | 8 | DO | Air Hammer | 8/12 | |
| | | | | - | 9 | DO | Air Hammer | 10/12 | |
| 27.43 / 90.0 | | | | - | 10 | DO | Air Hammer | 12/12 | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay | SM | - | 11 | DO | Air Hammer | 12/12 | |
| | | | | | | | | | ▼ 4/18/79 30.39 |
| | | | | - | 12 | DO | Air Hammer | 6/6 | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.31 / 106.0 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine to coarse gravel, trace clay | SM | - | 13 | DO | Air Hammer | 12/12 | |
| 35.97 / 118.0 | | | | | | | | | |
| | | Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay | SM | - | 14 | DO | Air Hammer | 12/12 | |
| | | | | - | 15 | DO | Air Hammer | 6/6 | |
| 41.76 / 137.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.76 | | CONTINUED | | | | | | | |
| 137.0 | | | | - | 16 | DO | Air Hammer | 2/2 | |
| | | Very dense, red-brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay | SM | | | | | | |
| | | | | - | 17 | DO | Air Hammer | 12/12 | |
| 48.77 | | | | | | | | | |
| 160.0 | | 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 | - | 18 | DO | Air Hammer | 5/12 | |
| 51.21 | | | | | | | | | |
| 168.0 | | 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 5 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 51.21 | | CONTINUED | | | | | | | |
| 168.0 | | | | - | 19 | DO | Air Hammer | 2/2 | |
| | | 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 | - | 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 JDB

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

# BORING LOG G41-G15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 60.05 / 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 | - | 23 | DO | Air Hammer | 8/12 | |
| 65.53 / 215.0 | | Very dense, brown, fine to coarse SAND, trace silt | SP | - | 24 | DO | Air Hammer | 12/12 | |
| | | | | - | 25 | DO | Air Hammer | 6/6 | |
| 68.53 / 225.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 68.58 / 225.0 | | CONTINUED | | | | | | | |
| | | Very dense, brown, fine to coarse SAND, trace silt | SP | | | | | | |
| 70.10 / 230.0 | | | | | | | | | Grout (to surface) 70.10 / 230.0 |
| | | | | | | | | | Bentonite Clay Seal 71.32 / 234.0 |
| | | | | - | 26 | DO | Air Hammer | 6/6 | |
| | | 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 | | | | | | Pea Gravel 73.15 / 240.0 |
| | | | | - | 27 | DO | Air Hammer | 4/4 | Pea Gravel |
| 77.72 / 255.0 | | | | - | 28 | DO | Air Hammer | 0/4 | 2" Slotted PVC Pipe 76.20 / 250.0 (to bottom of boring) |
| | | Stiff to hard, brown, SILT, some clay | ML | | | | | | |
| 79.25 / 260.0 | | CONTINUED | | | | | | | |

2" Solid PVC Pipe to Surface

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 79.25 | | CONTINUED | | | | | | | |
| 260.0 | | Stiff to hard, brown, SILT, some clay | ML | - | 29 | DO | Air Hammer | 4/4 | |
| 82.30 | | | | | | | | | |
| 270.0 | | | | - | 30 | DO | Air Hammer | 3/3 | |
| | | 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 | - | 31 | DO | Air Hammer | 4/4 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 88.39 | | CONTINUED | | | | | | | |
| 290.0 | | | | - | 32 | DO | Air Hammer | 0/3 | |
| | | 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 | - | 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 JDB

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

# BORING LOG G41-G15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 97.54 / 320.0 | | CONTINUED<br>Very dense, brown, silty, fine to coarse SAND to stiff to hard, brown, SILT with some fine to coarse sand, weathered green gravel throughout | SM to ML | | | | | | |
| 99.06 / 325.0 | | Green, residual CLAY and weathered metavolcanic TUFF | | - | - | - | Drill Cuttings | - | |
| 103.02 / 338.0 | | END OF BORING | | | | | | | |

NOTES

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

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

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

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-G15A

SHEET 1 OF 5

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

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, SAND and GRAVEL, some cobbles and boulders | SP to GP | | | | | | |
| 1.22 | | | | | | | | | |
| 4.0 | | Brown, fine to coarse SAND, some fine gravel, some silt, trace clay | SM | - | 1 | DO | Push | 18/18 | |
| | | | | - | 2 | DO | Push | 12/12 | |
| 4.67 | | | | | | | | | |
| 15.0 | | Brown, fine to coarse gravelly, silty, fine to coarse SAND | SM | - | 3 | DO | Push | 12/17 | |
| 6.10 | | | | | | | | | |
| 20.0 | | Brown, fine to coarse SAND, some fine gravel, some silt, trace clay | SM | - | 4 | DO | Push | 12/12 | |
| | | | | - | 5 | DO | Push | 5/6 | |
| 9.45 | | | | | | | | | |
| 31.0 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-G15A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 9.45 | | CONTINUED | | | | | | | |
| 31.0 | | Brown, fine to coarse SAND, some fine gravel, some silt, trace clay | SM | - | 6 | DO | Push | 3/3 | |
| 11.58 | | | | - | 7 | DO | Push | 2/2 | |
| 38.0 | | Brown, fine to coarse sandy, fine to coarse GRAVEL, some silt, some clay | GM | | | | | | |
| 13.11 | | | | | | | | | |
| 43.0 | | 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 JCB

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

# BORING LOG G41-G15A

SHEET 3 OF 5

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

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 29.26 | | | | | | | | | 27.13 / 89.0 Bentonite Clay Seal |
| 96.0 | | Red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | | | | | | 28.04 / 92.0 Pea Gravel |
| 30.79 | | | | | | | | | 2" Solid PVC Pipe to Surface |
| 101.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 ▼ 31.27 / 102.6 4/18/79 |
| 33.22 | | | | - | 9 | DO | Air Hammer | 18/18 | 2" Slotted PVC Pipe; Pea Gravel |
| 109.0 | | Red-brown, silty fine to coarse SAND, trace fine to coarse gravel, trace clay | SM | | | | | | 33.99 / 111.5 |
| 34.44 | | | | - | 10 | DO | Air Hammer | 18/18 | Note 2 |
| 113.0 | | END OF BORING | | | | | | | |

NOTES

1. 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)

2. 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.

3. Elevation of top of protector pipe, 1695.7 ft. (516.85m).

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | See borings G41-G15 and G41-G15A for soil stratigraphy<br>Boulder encountered in this hole at 147' | | | | | | | ▼4/17/79 31.27<br>102.6 Grout (to surface)<br>43.59<br>143.0 Bentonite Clay Seal<br>44.50<br>146.0 Pea Gravel<br>2" Solid PVC Pipe to Surface |
| 48.77 | | | | | | | | | 48.16<br>158.0 Pea Gravel<br>2" Slotted PVC Pipe |
| 160.0 | | Brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt | GP-GM | - | 1 | DO | Air Hammer | 18/18 | |
| | | | | - | 2 | DO | Air Hammer | 18/18 | 51.21<br>168.0 |
| 51.82 | | | | | | | | | 51.82<br>170.0 |
| 170.0 | | END OF BORING | | | | | | | |

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 JDB

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

# BORING LOG G41-G15B



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

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Casing and Mud Rotary

NOTES (continued)

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

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

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

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

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked DHB

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

# BORING LOG G41-G15C

SHEET 1 of 2

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

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

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

TEST NUMBER 1

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

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

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

TEST NUMBER 2

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

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

TEST NUMBER 3

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

Job No. 786085
Scale

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-G15C



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.

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | 35 | 1 | DO | 15-17-18 | 16/18 | |
| | | | | 44 | 2 | DO | 18-24-20 | 14/18 | |
| | | Dense to very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel, trace clay | SM | 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 jls
Checked

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

# BORING LOG G41-G16



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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked BCB

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

# BORING LOG G41-G16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 19.35 / 63.5 | | CONTINUED | | | | | | | |
| | | | | 200 / 9" | 14 | DO | 121-79/3" | 7/9 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP-SM to SM | 200 / 5" | 15 | DO | 200/5" | 4/5 | |
| 22.98 / 75.4 | | END OF BORING | | 200 / 4" | 16 | DO | 200/4" | 0/4 | |
| | | HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

1. 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 JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, silty, fine to medium SAND to fine to medium SAND, some silt, organic fibers throughout, boulders on ground surface | SM | - | 1 | AS | - | - | |
| 1.22 | | | | | | | | | |
| 4.0 | | Very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, some silt | GP-GM | 54 | 2 | DO | 10-29-25 | 10/18 | |
| 2.13 | | | | | | | | | |
| 7.0 | | | | 10 | 3 | DO | 3-3-7 | 8/18 | |
| | | Loose to compact, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 22 | 4 | DO | 17-10-12 | 10/18 | |
| 3.96 | | | | | | | | | |
| 13.0 | | | | 13 | 5 | DO | 8-9-9 | 10/18 | |
| | | | | 113 | 6 | DO | 20-93 | 12/12 | |
| | | Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | SM | | | | | | |
| | | | | 140 | 7 | DO | 40-100 | 10/12 | |
| | | | | 154/11" | 8 | DO | 54-100/5" | 10/11 | |
| 10.06 | | | | | | | | | |
| 33.0 | | Very dense, brown to red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay | SM | 80 | 9 | DO | 24-32-48 | 16/18 | |
| 11.28 | | | | | | | | | |
| 37.0 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-G19



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

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-G19



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | 191/6" | 13 | DO | 191/6" | 2/6 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 150/4" | 19 | DO | 150/4" | 2/4 | |
| | | | | 120/6" | 20 | DO | 120/6" | /6 | |
| 27.58 / 90.5 | | 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, fine to coarse SAND, some fine gravel, some silt | SM | - | 1 | AS | - | - | |
| 1.52 | | | | | | | | | |
| 5.0 | | | | 14 | 2 | DO | 3-6-8 | 18/18 | |
| | | | | 14 | 3 | DO | 7-7-7 | 12/18 | |
| | | 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 | 122/3" | 4 | DO | 60-60-60/2" | 8/14 | |
| | | | | 138/7" | | | | | |
| | | | | - | 5 | DO | 36-88-50/1" | 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 jls
Checked

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RCG

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | CONTINUED |
| 21.03 / 69.0 | | 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 | ▼ 1/2/80 22.31 |
| | | | | 127/5" | 16 | DO | 127/5" | 1/5 | 73.2 Pea Gravel |
| | | | | 100/4.5" | 17 | DO | 100/4.5" | 4/4.5 | 2" Solid PVC Pipe |
| 25.15 / 82.5 | | Very dense, brown, fine to medium SAND, trace silt | SP-SM | 190/9" | 18 | DO | 90-100/3" | 6/9 | |
| 26.67 / 87.5 | | Very dense, brown, silty, fine to coarse SAND, trace fine to coarse gravel, to fine to coarse SAND, some fine to coarse gravel, some silt | SM | 90/9" | 19 | DO | 40-50/3" | 7/9 | 27.43 / 90.0 Pea Gravel |
| | | | | 190/8" | 20 | DO | 90-100/2" | 7/8 | 2" Slotted PVC Pipe |
| 30.63 / 100.5 | | END OF BORING | | 100/5" | 21 | DO | 100/5" | 5/5 | 30.18 / 99.0 Gravel |

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

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

# BORING LOG G41-G21



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 | | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Hydraulic Push | 12/24 | |
| | | Compact to very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, occasional cobbles | SM | - | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.4 | | CONTINUED | | | | | | | |
| 34.0 | | | | - | 5 | DO | Air Hammer | 12/12 | |
| | | 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 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 95.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP to SM | | | | | | |
| 30.18 | | | | | | | | | |
| 99.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H9



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.18 | | CONTINUED | | | | | | | |
| 99.0 | | | | - | 11 | DO | Air Hammer | 24/24 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP to SM | | | | | | ▼ 5/26/81 33.69 ≈ 110.5 |
| | | | | - | 12 | 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 | - | 13 | DO | Air Hammer | 24/24 | |
| | | | | - | 14 | DO | Air Hammer | 16/16 | |
| 40.08 | | | | | | | | | |
| 131.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)
SURFACE ELEV. 1702.0 ft. (518.78m)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-H9



PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
DATE STARTED 5/14/81 DATE COMPLETED 5/26/81
DRILLING METHOD Mud Rotary

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

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N117330 ft. (N35762m)
E2285000 ft. (E696469m)
SURFACE ELEV. 1702.0 ft. (518.78m)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-H9

SHEET 6 OF 10

PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM
DATE STARTED 5/14/81 DATE COMPLETED 5/26/81
DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 195.0 | | Very dense, orange-brown, fine to medium SAND, trace silt | SP-SM | - | 21 | DO | Air Hammer | 9/9 | 2" Solid PVC Pipe (to surface) Grout (to surface) |
| 61.42 | | | | | | | | | |
| 201.5 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H9



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

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H9



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | Air Hammer | 18/18 | Pea Gravel 73.15 240.0 Pea Gravel (to bottom of boring) |
| 74.67 | | | | | | | | | |
| 245.0 | | | | - | 26 | DO | Air Hammer | 18/18 | |
| | | Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt | SP-SM | - | 27 | DO | Air Hammer | 18/18 | |
| 80.77 | | | | | | | | | |
| 265.0 | | Very dense to hard, dark brown to red-brown, fine sandy SILT, trace clay to silty fine SAND (very poorly graded, some stratification evident) | SM to ML | - | 28 | DO | Air Hammer | 18/18 | |
| 82.75 | | | | | | | | | |
| 271.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H9

SHEET 9 OF 10

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 82.75 | | CONTINUED | | | | | | | |
| 271.5 | | 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 | |
| 89.92 | | | | | | | | | |
| 295.0 | | Very dense, brown, fine to coarse gravelly fine to coarse SAND, some silt | SM | - | 31 | DO | Air Hammer | 18/18 | |
| 92.66 | | | | | | | | | |
| 304.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H9

SHEET 10 OF 10

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

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

NOTES

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 12.5 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt<br><br>Cobbles noted at 27.0'-28.0' | SP-SM to SM | 99 | 4 | DO | 25-65-34 | 12/13 | |
| | | | | 172 | 5 | DO | 65-84-88 | 14/13 | |
| | | | | 110 | 6 | DO | 55-55 | 12/12 | |
| 8.38 | | | | | | | | | |
| 27.5 | | Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay | SM | 160/8" | 7 | DO | 110-50/2" | 8/8 | |
| 9.60 | | | | | | | | | |
| 31.5 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-H13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 9.60 / 31.5 | | CONTINUED | | | | | | | |
| | | Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay<br>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 | | | | 149/8" | 10 | DO | 105-44/2" | 7/8 | |
| | | Very dense, red-brown to brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel<br>Cobble and boulders noted at 46.5'-47.0' and 48.0'-54.0' | SM | 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" | 0/0 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 18.29 / 60.0 | | CONTINUED | | | | | | | |
| | | | | 150 / 0" | 14 | DO | 150/0" | 0/0 | |
| | | 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 / 3" | 15 | DO | 85-95-55/2" | 11/14 | |
| | | | | 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 | | | | 150 / 4" | 19 | DO | 150/4" | 3/4 | |
| 28.19 / 92.5 | | 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 | | | | | | |
| | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 28.19 / 92.0 | | CONTINUED | | | | | | | |
| | | | | 167 / 10" | 20 | DO | 62-105/4" | 9/10 | |
| | | 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 | 174 / 10" | 21 | DO | 45-50-124/4" | 9/16 | |
| | | | | 158 / 10" | 22 | DO | 53-100/4" | 3/10 | |
| 31.94 / 104.8 | | 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 jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Loose to compact, brown, fine to coarse gravelly, fine to coarse SAND, trace silt, occasional cobbles | SP | 6 | 1 | DO | 3-3-3 | 14/18 | Grout |
| | | | | 12 | 2 | DO | 3-4-8 | 16/18 | |
| | | | | 15 | 3 | DO | 9-9-6 | 13/18 | |
| | | | | 15 | 4 | DO | 5-6-9 | 14/18 | 2" Solid PVC Pipe |
| 5.79 | | | | | | | | | 5.18 |
| 19.0 | | Very dense, brown, fine to coarse SAND, some silt, trace gravel | SM | 56 | 5 | DO | 18-16-40 | 13/18 | 17.0 Bentonite Clay Seal |
| 6.86 | | | | | | | | | 6.10 |
| 22.5 | | Compact to very dense, fine to coarse sandy, fine to coarse GRAVEL, trace silt<br>Boulder noted at 36.0'-37.0' | GP | 122 | 6 | DO | 20-64-58 | 16/18 | 20.0 Pea Gravel |
| | | | | 19 | 7 | DO | 8-8-11 | 0/18 | 6.86 22.5 2" Slotted PVC Pipe |
| 9.91 | | | | | | | | | Pea Gravel 9.91 |
| 32.5 | | CONTINUED | | | | | | | 32.5 CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | CONTINUED |
| 9.91 / 32.5 | | Compact to very dense, fine to coarse sandy, fine to coarse GRAVEL, trace silt<br>Boulder noted at 36.0'-37.0' | GP | 92/8" | 8 | DO | 10-17-75/2" | 0/14 | 10.06<br>Bentonite Clay Seal 33.0<br>10.67<br>35.0 |
| 11.28 / 37.0 | | | | 70 | 9 | DO | 48-35-35 | 9/18 | Grout (to bottom of boring) |
| | | | | 127 | 10 | DO | 27-100 | 5/12 | |
| | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, frequent cobbles and boulders | SM | 150/5" | 11 | DO | 150/5" | 2/5 | |
| | | | | 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 003

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.12 | | CONTINUED | | | | | | | |
| 66.0 | | Very dense, brown, silty, fine to coarse SAND, occasional cobbles<br><br>Boulder noted at 71.5'-73.0' | SM | 162 / 7½" | 16 | DO | 112-50/1½" | 6/7½ | |
| 22.25 | | | | 150 | | | | | |
| 73.0 | | Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | SP | 3" | 17 | DO | 150/3" | 3/3 | |
| 22.65 | | | | | | | | | |
| 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 3) |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Topsoil and rootmat | | | | | | | |
| | | Compact to dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt | SM | 47 | 1 | DO | 18-26-21 | 4/13 | Grout |
| | | | | 30 | 2 | DO | 15-14-16 | 8/18 | 2" Solid PVC Pipe |
| | | | | 23 | 3 | DO | 28-16-7 | 12/18 | 3.05 Bentonite Clay Seal 10.0 / 3.66 |
| | | | | 35 | 4 | DO | 16-19-16 | 7/18 | 12.0 Pea Gravel 5.18 |
| | | | | 42 | 5 | DO | 16-19-23 | 9/18 | 17.0 Pea Gravel |
| 7.01 / 23.0 | | Dense to very dense, brown, fine to medium sandy, fine to coarse GRAVEL, trace silt | GP | 183 | 6 | DO | 71-112 | 4/12 | 2" Slotted PVC Pipe 8.23 / 27.0 Pea Gravel 9.14 |
| 10.06 / 33.0 | | Very dense, brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt | SP | 38 | 7 | DO | 30-22-16 | 6/18 | Bent. Clay Seal 3.75 / 32.0 |
| 10.67 / 35.0 | | CONTINUED | | | | | | | Grout (to bottom of boring) |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-H18



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 10.67 | | | | | | | | | |
| 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 | | | | 150 | 9 | DO | 37-113 | 8/12 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP | 156 | 10 | DO | 56-100 | 6/12 | |
| | | | | 100/3" | 11 | DO | 100/3" | 3/3 | |
| | | | | 100/3" | 12 | DO | 100/3" | 3/3 | |
| 17.68 | | | | | | | | | |
| 58.0 | | | | 100/3" | 13 | DO | 100/3" | 3/3 | |
| | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel | SM | | | | | | |
| | | | | 200/6" | 14 | DO | 200/6" | 6/6 | |
| 20.73 | | | | | | | | | |
| 68.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | 100 / 4" | 16 | DO | 100/4" | 4/4 | |
| 22.95 / 75.3 | | END OF BORING | | | | | | | |

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
2. 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.
3. Elevation of top of protector pipe, 1686.4 ft. (514.03m).

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

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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

# BORING LOG G41-H18A

SHEET 1 OF 1

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

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

DRILL RIG CME 45 DRILLING METHOD Wash Boring

| DEPTH METER FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | TYPE | HAMMER BLOWS PER 6 IN. (Note 1) | REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 2) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | Bentonite Clay Seal 0.30 1.0 |
| | | | | - | 1a | AS | - | - | 9/10/80 0.41 1.0 |
| | | Very loose, brown to black, highly organic, fiberous PEAT (heavily rooted) | PT | | | | | | Caved Material |
| | | | | 2 | 1b | DO | 0-1-1 | 0/13 | 2" Solid PVC Pipe |
| 3.96 13.0 | | Compact, gray, fine to medium SAND and SILT, trace clay, some organic matter to 13.5' | SM | 13 | 2 | DO | 3-8-5 | 3/13 | 4.27 14.0 Bentonite Clay Seal 4.88 16.0 Pea Gravel |
| 5.09 16.7 | | Compact, gray, fine to coarse SAND and SILT, some fine gravel, trace clay | SM | 21 | 3 | DO | 10-11-10 | 10/13 | 5.18 17.0 Pea Gravel |
| 5.79 19.0 | | Compact, light brown, medium to coarse SAND and fine to medium GRAVEL, to fine to coarse gravelly, fine to coarse SAND, trace silt | SP | 15 | 4 | DO | 11-7-8 | 15/13 | 6.10 20.0 Caved Material |
| 6.55 21.5 | | | | | | | | | |

2" Slotted

END OF BORING

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (Samples 1b - 4)
2. Groundwater observation well inaccessible due to water on the ground surface, 4/18/79.
3. 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 jls
Checked [illegible]

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Air Hammer | 24/24 | |
| | | 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 | | | | | | |
| | | | | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 7.32 | | CONTINUED | | | | | | | |
| 24.0 | | 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 | - | 4 | DO | Air Hammer | 24/24 | |
| 10.67 | | | | | | | | | |
| 35.0 | | Compact to dense, light brown, fine to medium SAND, trace silt to fine to coarse SAND and fine to coarse GRAVEL | SP | - | 5 | DO | Air Hammer | 12/24 | |
| | | | | - | 6 | DO | Air Hammer | 18/24 | |
| 16.76 | | 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 | | | | | | |
| 55.0 | | | | | | | | | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 17.98 / 59.0 | | CONTINUED | | | | | | | |
| | | | | - | 7 | DO | Air Hammer | 18/24 | |
| | | | | - | 8 | DO | Air Hammer | 24/24 | |
| | | 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 | | | | | | |
| | | | | - | 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



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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6 IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 1 2" Solid PVC Pipe (to surface) Grout (to surface) |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 39.32 | | CONTINUED | | | | | | | CONTINUED |
| 129.0 | | Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some fine to coarse gravel, some silt, some stratification in this layer | SM | - | 14 | DO | Air Hammer | 24/24 | Grout (to surface) |
| | | | | - | 15 | DO | Air Hammer | 24/24 | 2" Solid PVC Pipe; Bentonite Clay Seal 41.76 / 137.0 – 42.67 / 140.0; 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 | - | 16 | DO | Air Hammer | 24/24 | 2" Slotted PVC Pipe; Pea Gravel 44.81 / 147.0 – 47.85 / 157.0 |
| | | | | - | 17 | DO | Air Hammer | 24/24 | Pea Gravel (to bottom of boring) |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 57.61 | | | | | | | | | |
| 189.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel | SM | - | 20 | DO | Air Hammer | 24/24 | |
| 59.44 | | | | | | | | | |
| 195.0 | | Very dense, brown, fine to medium SAND, trace silt | SP | - | 21 | DO | 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 | DO | Air Hammer | 18/18 | |
| | | | | - | 23 | DO | Air Hammer | 15/18 | |
| 68.28 | | | | | | | | | |
| 224.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H18B



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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 68.28 | | CONTINUED | | | | | | | |
| 224.0 | | | | | | | Air Hammer | | |
| | | | | - | 24 | DO | ▼ | 6/12 | |
| | | 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 | | | | | | |
| | | | | | | | Air Hammer | | |
| | | | | - | 25 | DO | ▼ | 12/12 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 26 | DO | ▼ | 12/12 | |
| 76.66 | | | | | | | | | |
| 251.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H18B

SHEET 9 OF 10

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

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

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

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

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

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

# BORING LOG G41-H18B

SHEET 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 84.28 | | CONTINUED | | | | | | | |
| 276.5<br>85.34 | | Very dense, dark brown, SILT, trace fine sand, trace clay | ML | | | | | | |
| 280.0<br>86.26 | | Weathered, green and red, metavolcanic TUFF | | | | | | | |
| 283.0<br>87.78 | | Sound, green, metavolcanic TUFF | | - | 29 | RC | Rotary | 13/60 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Firm, dark brown SILT, some fine sand, trace organic matter (topsoil) | ML | 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<br><br>Occasional cobbles noted at 24.0'-29.0' | SP SM to SM | 39 | 4 | DO | 11-20-19 | 18/18 | |
| | | | | 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 JDB

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

# BORING LOG G41-111



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 9.75 / 32.0 | | | | 100 / 4" | 8 | DO | 100/4" | 4/4 | |
| | | Compact to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt<br><br>Occasional cobbles noted at 36.0-39.0' | SP-SM to SM | 115 / 4.5" | 9 | DO | 115/4.5" | 2/4.5 | |
| | | | | 150 / 5" | 10 | DO | 150/5" | 5/5 | |
| 12.95 / 42.5 | | | | 120 / 0" | 11 | DO | 120/0" | 0/0 | |
| | | Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt<br><br>Occasional cobbles noted at 46.0'-49.0'<br>Scattered boulders noted at 49.0'-54.0' and 56.0'-57.0' | GM to 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 to SM | 200 / 2" | 14 | DO | 200/2" | 0.5/2 | |
| 19.96 / 65.5 | | CONTINUED | | | | | | | |

Job No 736085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-J11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 19.96 / 65.5 | | CONTINUED | | | | | | | |
| | | | | 150 / 1" | 15 | DO | 150/1" | 0/1 | |
| | | | | 200 / 3.5" | 16 | DO | 200/3.5" | 1.0 / 3.5 | |
| | | Very dense, brown to gray-brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP-SM to SM | | | | | | |
| | | Cobbles and boulders noted at:<br>64.5'-69.0'<br>69.0'-72.0'<br>75.0'-73.0'<br>91.0'-96.0' | | 150 / 4" | 17 | DO | 150/4" | 0/4 | |
| | | | | 150 / 8" | 18 | DO | 105-145/2" | 2/8 | |
| | | | | 150 / 5" | 19 | DO | 150/5" | 3/5 | |
| | | | | 150 / 4" | 20 | DO | 150/4" | 0/4 | |
| | | | | 200 / 7" | 21 | DO | 150-50/1" | 3/7 | |
| 30.39 / 99.7 | | END OF BORING<br>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 JCB

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-J14



SURFACE ELEV 1689.2 ft. (514.38m) 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 / 36.5 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown, fine to medium SAND, trace to some gravel, trace to some silt<br><br>Boulder noted at 39.0'-40.0' | SP-SM to SM | 200/4" | 9 | DO | 200/4" | 2/4 | |
| 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<br><br>Cobble noted at 58.5'-59.2' | SP-SM to SM | 200/4" | 12 | DO | 200/4" | 4/4 | |
| | | | | 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 JCB

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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Topsoil and rootmat | | | | | | | |
| | | | | - | 1 | DO | Air Hammer | 12/12 | |
| | | Compact to very dense, brown, fine gravelly, fine to coarse SAND, some silt, trace clay<br><br>Cobbles and boulders noted at 7.0'-12.0' | SM | - | 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 JCB

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

# BORING LOG G41-J17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (Ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 | | CONTINUED | | | | | | | |
| 37.0<br>12.19 | | 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 | |
| 40.0 | | END OF BORING<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

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

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-J17A

SHEET 1 OF 1

SURFACE ELEV. 1688.9 ft. (514.76m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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

DRILL RIG Schramm Rotadrill DRILLING METHOD Cased/Rotary

GENERAL NOTES

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

TEST NUMBER 1

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

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

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

Job No. 786085
Scale

Golder Associates

Drawn jls
Checked DCB

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

# BORING LOG G41-J18

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Peat, rootmat and topsoil | PT | | | | | | |
| 0.91 | | | | 32 | 1 | DO | 5-20-12 | 12/18 | |
| 3.0 | | | | 48 | 2 | DO | 9-22-26 | 12/18 | Grout |
| | | Dense, red-brown, silty fine to coarse SAND, some clay, trace fine gravel to fine to coarse SAND, some silt, some fine gravel, trace clay | SM | 46 | 3 | DO | 12-20-26 | 13/18 | 2" Solid PVC Pipe |
| | | | | 64 | 4 | DO | 16-18-46 | 12/18 | 4.57 15.0 Bentonite Clay Seal 5.49 18.0 |
| | | | | 25 | 5 | DO | 13-12-13 | 18/18 | Pea Gravel |
| 7.01 | | | | | | | | | 7.01 |
| 23.0 | | Dense to very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | SP | 87 | 6 | DO | 14-32-55 | 11/18 | 23.0 2" Slotted PVC Pipe Pea Gravel |
| | | | | 38 | 7 | DO | 14-20-18 | 9/18 | ▼4/18/79 9.45 31.0 |
| 10.06 | | | | | | | | | 10.06 |
| 33.0 | | CONTINUED | | | | | | | 33.0 CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-J18

SHEET 2 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.06 / 33.0 | | CONTINUED | | | | | | | CONTINUED |
| | | Dense to very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | SP | 56 | 8 | DO | 22-26-30 | 18/18 | Pea Gravel 10.97 |
| 11.58 / 38.0 | | | | 113 | 9 | DO | 33-46-67 | 18/18 | Bentonite Clay Seal 11.89 / 36.0 / 39.0 Grout (to bottom of boring) |
| | | Brown, silty, fine to medium SAND, trace clay | SM | | | | | | |
| | | (Some stratification in strata) | | 139 | 10 | DO | 31-49-90 | 18/18 | |
| | | | | 82 | 11 | DO | 17-27-55 | 18/18 | |
| 16.15 / 53.0 | | | | | | | | | |
| | | | | 170 | 12 | DO | 52-118 | 12/12 | |
| | | Very dense, brown, fine to coarse SAND, trace to some silt, trace clay | SP-SM to SM | 144 | 13 | DO | 39-105 | 12/12 | |
| 19.20 / 63.0 | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt | SP-SM | 100/3" | 14 | DO | 100/3" | 3/3 | |
| 20.42 / 67.0 | | CONTINUED | | | | | | | |

Job No 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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

# BORING LOG G41-J18



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.42 | | CONTINUED | | | | | | | |
| 67.0 | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt | SP SM | 195 / 6" | 15 | DO | 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Topsoil and rootmat | | | | | | | |
| 0.5 | | | | | | | | | |
| | | | | 20 | 1 | DO | 8-7-13 | 9/18 | |
| | | | | 31 | 2 | DO | 9-12-19 | 12/18 | |
| | | Compact to dense, red-brown, fine to coarse SAND, some silt, some fine to coarse gravel | SM | 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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

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 | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 20.13 / 66.0 | | CONTINUED | | | | | | | |
| | | 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 | |
| | | | | 100 / 6" | 16 | DO | 100/6" | 6/6 | |
| 23.03 / 75.5 | | END OF BORING<br>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 DOB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC. / ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | For soil stratigraphy, see boring G41-K13A | | | | | | | ▼ 4/18/79 29.69 ≈ 97.4 |
| 36.58 / 120.0 | | | | - | 1 | DO | Air Hammer | 9/9 | |
| | | Very dense, yellow-brown, fine to coarse SAND, trace silt, trace fine gravel, trace clay<br>Boulder noted at 125.0'-129.5' | SM | | | | | | |
| 39.47 / 129.5 | | | | - | 2 | DO | Air Hammer | 6/6 | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | | | | | | |
| | | | | - | 3 | DO | Air Hammer | 12/12 | |
| 44.50 / 146.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

# BORING LOG G41-K13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 55.17 / 181.0 | | Very dense, brown, fine gravelly, fine to coarse SAND, some silt, occasional cobbles | GP-GM | | | | | | |
| 57.91 / 190.0 | | Very dense, yellow-brown, fine to coarse SAND, some silt | SM | - | 8 | DO | Air Hammer | 12/12 | |
| 59.44 / 195.0 | | Very dense, brown, fine to coarse SAND, some fine gravel, trace silt | SW-SM | - | 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 JDB

COOR. N114755 ft. (N34977m)
E2285965 ft. (E696764m)

# BORING LOG G41-K13

SHEET 4 OF 6

SURFACE ELEV. 1699.7 ft. (518.06m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/3/79 DATE COMPLETED 4/9/79

DRILL RIG Schramm Rotadrill DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 65.53 | | CONTINUED | | | | | | | |
| 215.0 | | Very dense, brown fine to medium SAND and SILT | SM | | | | | | |
| 66.45 | | | | | | | | | |
| 218.0 | | Very dense, brown, fine to medium SAND, trace silt | SP-SM | | | | | | Grout (to surface) |
| | | | | - | 11 | DO | Air Hammer | 6/12 | |
| 69.50 | | | | | | | | | |
| 228.0 | | | | | | | | | 2" Solid PVC Pipe to Surface |
| | | Very dense, red-brown, silty fine to coarse SAND, trace to some fine gravel | SM | - | 12 | DO | Air Hammer | 6/6 | |
| | | | | | | | | | 72.39 / 237.5 Bentonite Clay Seal |
| | | | | | | | | | 73.15 / 240.0 Pea Gravel |
| 74.07 | | | | | | | | | |
| 243.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 74.07 | | CONTINUED | | | | | | | CONTINUED |
| 243.0 | | Very dense, red-brown, silty fine to coarse SAND, trace to some fine gravel | SM | - | 13 | DO | Air Hammer | 12/12 | |
| 75.44 | | | | | | | | | |
| 247.5 | | Very dense, brown, fine to coarse SAND, some fine gravel, trace silt, trace clay | SM | - | 14 | DO | Air Hammer | 18/18 | Pea Gravel; 2" Solid PVC Pipe |
| 78.86 | | | | | | | | | |
| 262.0 | | Very dense, brown, fine to coarse SAND, trace silt, trace clay | SM | - | 15 | DO | Air Hammer | 18/18 | 79.25 / 260.0 Pea Gravel; 2" Slotted PVC Pipe |
| 82.91 | | | | | | | | | 82.30 / 270.0 |
| 272.0 | | Greenish-gray, highly weathered metavolcanic TUFF | | - | 16 | DO | Air Hammer | 6/6 | Pea Gravel (to bottom of boring) |
| 84.43 | | | | | | | | | |
| 277.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 84.43<br>277.0 | | CONTINUED<br><br>Greenish-gray, highly weathered metavolcanic TUFF | | - | - | - | Drill Cuttings | - | |
| 86.87<br>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

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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES: REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Topsoil and rootmat | | - | 1 | DO | Air Hammer | 18/18 | |
| | | | | - | 2 | DO | Air Hammer | 18/18 | |
| | | Dense to very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | - | 3 | DO | Air Hammer | 12/12 | |
| | | Boulders noted at: 22.5'-25.0' 25.0'-26.0' | | - | 4 | DO | Air Hammer | 6/18 | |
| | | | | - | 5 | DO | Air Hammer | 2/6 | |
| 7.92 / 26.0 | | | | - | 6 | DO | Air Hammer | 6/9 | |
| | | 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

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

# BORING LOG G41-K13A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 / 36.5 | | CONTINUED | | | | | | | |
| | | | | | 9 | DO | Air Hammer | 0/3 | |
| | | Very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, occasional cobbles and boulders | SM | | 10 | DO | Air Hammer | 3/3 | |
| | | Boulder noted at 42.5'-44.5' | | | 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

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

# BORING LOG G41-K13A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.12 / 66.0 | | CONTINUED | | | | | | | |
| | | Very dense, brown, fine to coarse SAND, some fine gravel, some clay, trace silt, occasional cobbles | SM | - | 15 | DO | Air Hammer | 4/4 | |
| 21.34 / 70.0 | | Very dense, brown, fine GRAVEL and fine to coarse SAND, some silt | GM | - | 16 | DO | Air Hammer | 6/6 | |
| 22.86 / 75.0 | | Very dense, green-gray, fine to coarse gravelly, fine to coarse SAND, trace silt, trace clay, occasional cobbles | SP SM | - | 17 | DO | Air Hammer | 0/2 | |
| | | | | - | 18 | DO | Air Hammer | 7/7 | |
| 26.67 / 87.5 | | Very dense, red-brown to brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles | SM | - | 19 | DO | Air Hammer | 6/6 | |
| | | | | - | 20 | DO | Air Hammer | 12/12 | |
| 29.87 / 98.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

# BORING LOG G41-K13A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 29.87 / 98.0 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown to brown, fine to coarse SAND, some silt, some fine gravel, occasional cobbles | SM | - | 21 | DO | 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" Solid PVC Pipe to Surface ≈108.6 – 33.32 |
| 33.88 / 111.5 | | | | - | 22 | DO | Air Hammer | 6/6 | 109.3 |
| | | Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt<br>Boulder noted at 120.0'-121.5' | SP SM | - | 23 | DO | Air Hammer | 18/18 | 2" Slotted PVC Pipe; Pea Gravel 36.36 – 119.3; Note 2 |
| 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.

COOR. N114770 ft. (N34982m)
E2285955 ft. (E696760m)

**BORING LOG** G41-K13A



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.

COOR. N114850 ft. (N35007m)
E2286070 ft. (E696795m)

# BORING LOG G41-K13B



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 2) |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| | | | | 27 | 2 | DO | 6-12-15 | 18/18 | |
| 2.74 | | | | | | | | | 2.13 |
| 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 | 7.0 Bentonite Clay Seal 3.05 |
| 3.66 | | | | | | | | | 10.0 |
| 12.0 | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 132/8" | 4 | DO | 20-32-100/2" | 10/14 | Pea Gravel |
| | | | | 100/6" | 5 | DO | 100/6" | 6/6 | 4.57 Slotted Pipe 15.0 Pea Gravel (Note 4) |
| 6.10 | | | | | | | | | |
| 20.0 | | END OF BORING | | | | | | | |

2" Solid PVC Pipe

2" PVC

NOTES

1. Standard Penetration Test - Driving 2" O.D. sampler with 140 lb. hammer freely falling 30". (All samples)
2. Elevation of top of protector pipe, 1698.8 ft. (517.79m).
3. Encountered boulder at 18.0'. Moved 10' and started new hole (Coordinates as given on log heading).
4. 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

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 DHS

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

# BORING LOG G41-K17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Loose, dark brown SILT, some medium to coarse gravel, trace fine sand, trace organic matter | ML | 9 | 1 | DO | 1-1-8 | 18/13 | |
| | | | | 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<br>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 JCB

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

# BORING LOG G41-K17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.82 | | CONTINUED | | | | | | | |
| 35.5 | | | | 162/10 | 9 | DO | 42-120/4" | 4/10 | |
| | | Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, frequent cobbles and boulders | SP SM | 86 | 10 | DO | 26-60 | 4/12 | |
| | | Boulders noted at 34.0'-37.5', 56.0'-57.0' and 59.0'-62.5' | | 150/1" | 11 | DO | 150/4" | 0/4 | |
| | | | | 200/11" | 12 | DO | 110-90/5" | 8/11 | |
| | | | | 200/4" | 14 | DO | 200/4" | 2/4 | |
| 19.81 | | | | | | | | | |
| 65.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N112155 ft. (N34185m)
E2286325 ft. (E696873m)

# BORING LOG G41-K17



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 19.81 / 65.0 | | CONTINUED | | | | | | | |
| | | Very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, numerous cobbles and boulders | SP SM | 200 / 3" | 15 | DO | 200/3" | 1/3 | |
| | | | | 150 / 5" | 16 | DO | 150/5" | 5/5 | |
| | | | | 150 / 4" | 17 | DO | 150/4" | 3/4 | |
| 24.17 / 79.3 | | END OF BORING<br>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 DCB

COOR. N109385 ft. (N33341m)
E2286215 ft. (E696840m)

# BORING LOG G41-K21

SHEET 1 OF 3

SURFACE ELEV. 1673.7 ft. (510.13m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/14/79 DATE COMPLETED 11/15/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, fine to coarse SAND, some silt, trace clay, trace organics, boulders on surface | SM | - | 1 | AS | - | - | |
| 1.52 | | | | | | | | | |
| 5.0 | | Compact, brown, fine to coarse SAND, some silt, trace to some fine gravel, frequent cobbles<br><br>Cobble noted at 17.0'-17.5' | SM | 14 | 2 | DO | 7-7-7 | 18/18 | |
| | | | | 15 | 3 | DO | 8-8-7 | 15/18 | |
| | | | | 7 | 4 | DO | 4-3-4 | 18/18 | |
| 5.33 | | | | | | | | | |
| 17.5 | | Very dense, brown to light brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt, frequent cobbles<br><br>Boulders noted at 18.0'-19.0' and 26.5'-30.0' | SP-SM | 43 | 5 | DO | 18-22-21 | 18/18 | |
| | | | | 162/10" | 6 | DO | 12-62-100/4" | 16/16 | |
| | | | | 197/9" | 7 | DO | 93-104/3" | 8/9 | |
| 9.75 | | | | | | | | | |
| 32.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [illegible]

COOR. N109385 ft. (N33341m)
E2286215 ft. (E696840m)

# BORING LOG G41-K21



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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-SM | 206/8" | 8 | DO | 100 50-106-2" | 14/14 | |
| 11.43 | | | | | | | | | |
| 37.5 | | | | 171/11" | 9 | DO | 71-100/5" | 11/11 | |
| | | | | 100/0" | 10 | DO | 100/0" | 0/0 | |
| | | Very dense, brown to light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt, frequent cobbles | SP to SP-SM | 110/5" | 11 | DO | 110/5" | 0/5 | |
| | | Cobbles and boulders noted at:<br>45.0'-45.5'<br>46.0'-46.5'<br>47.5'-48.5'<br>51.0'-51.5'<br>59.7'-60.5' | | 106/1" | 11A | DO | 106/1" | 0/1 | |
| | | | | 150/6" | 12 | DO | 150/6" | 3/6 | |
| | | | | 135/3" | 13 | DO | 135/3" | 0/3 | |
| 19.20 | | | | | | | | | |
| 63.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N109385 ft. (N33341m)
E2286215 ft. (E696840m)

# BORING LOG G41-K21



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | 205 / 7.5" | 16 | DO | 100 / 105-1.5" | 6/7.5 | |
| 23.10 / 75.5 | | END OF BORING<br>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 MAG

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

# BORING LOG G41-K21A

SHEET 1 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Air Hammer | 18/18 | |
| | | | | - | 2 | DO | Air Hammer | 18/18 | |
| | | 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 | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | |
| 36.5 | | | | | | | Air Hammer | | |
| | | | | - | 5 | DO | ▼ | 14/14 | |
| | | 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 | | | | | | |
| | | | | | | | Air Hammer | | |
| | | | | - | 6 | DO | ▼ | 8/13 | |
| 16.76 | | | | | | | | | |
| 55.0 | | | | | | | | | |
| | | Very dense, multi-colored to dark brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles | SP | - | 7 | DO | Air Hammer | 15/18 | |
| 21.03 | | | | | | | | | |
| 69.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

# BORING LOG G41-K21A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 21.03 / 69.0 | | CONTINUED | | | | | | | |
| | | | | | | | Air Hammer | | |
| | | | | - | 8 | DO | | 14/14 | |
| | | | | - | 9 | DO | Air Hammer | 24/24 | |
| | | 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 | - | 10 | DO | Air Hammer | 20/20 | |
| | | | | - | 11 | DO | Air Hammer | 18/18 | |
| 31.70 / 104.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

# BORING LOG G41-K21A



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC. / ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 115.0 | | | | - | 13 | DO | Air Hammer | 18/18 | |
| | | 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 | - | 14 | DO | Air Hammer | 18/18 | |
| 42.37 | | | | | | | | | |
| 139.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)
SURFACE ELEV. 1680.4 ft. (512.17m)
DATUM USGS MSL
DRILL RIG Schramm Rotadrill T64HP

# BORING LOG G41-K21A

SHEET 5 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | Air Hammer | | |
| 139.0 | | | | - | 15 | DO | | 12/12 | |
| | | 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 | | | | Air Hammer | | |
| | | | | - | 16 | DO | | 12/12 | |
| 47.24 | | | | | | | | | |
| 155.0 | | | | - | 17 | DO | Air Hammer | 10/18 | |
| | | Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | | | | | | |
| | | | | - | 18 | DO | Air Hammer | 10/18 | |
| 53.04 | | | | | | | | | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 53.04 | | CONTINUED | | | | | | | |
| 174.0 | | | | | | | | | |
| | | | | - | 19 | DO | Air Hammer | 10/18 | |
| | | Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 20 | DO | Air Hammer | 10/18 | |
| | | | | - | 21 | DO | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 63.70 | | CONTINUED | | | | | Air Hammer | | |
| 209.0 | | | | - | 22 | DO | ▼ | 12/12 | |
| | | Very dense, brown to red-brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | | | | Air Hammer | | |
| | | | | - | 23 | DO | ▼ | 12/12 | |
| 68.58 | | | | | | | | | |
| 225.0 | | Very dense, brown to red-brown, fine SAND, trace silt to SILT, trace fine sand; (these are extremes of materials that occur in layers of random thicknesses) | SP to ML | | | | Air Hammer | | |
| | | | | - | 24 | DO | ▼ | 12/12 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 25 | DO | ▼ | 12/12 | |
| 74.37 | | | | | | | | | |
| 244.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

# BORING LOG G41-K21A

SHEET 8 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 74.37 | | CONTINUED | | | | | | | |
| 244.0 | | Very dense, brown to red-brown, fine SAND, trace silt to SILT, trace fine sand; (these are extremes of materials that occur in layers of random thicknesses) | SP to ML | - | 26 | DO | Air Hammer | 15/15 | |
| | | | | - | 27 | DO | Air Hammer | 18/18 | |
| 80.77 | | | | | | | | | |
| 265.0 | | Very dense, light red-brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 28 | DO | Air Hammer | 18/18 | |
| 82.75 | | | | | | | | | |
| 271.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N109730 ft. (N33446m)
E2285890 ft. (E696742m)

# BORING LOG G41-K21A

SHEET 9 OF 9

SURFACE ELEV. 1680.4 ft. (512.17m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 5/18/81 DATE COMPLETED 5/26/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 82.75 | | CONTINUED | | | | | | | |
| 271.5 | | Very dense, light red-brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 29 | DO | Air Hammer | 18/18 | |
| 87.78 | | | | | | | | | |
| 288.0 | | Sound, green-gray, metavolcanic TUFF | | - | 30 | RC | Rotary | 6/36 | |
| 90.83 | | | | | | | | | |
| 298.0 | | END OF BORING | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N32389m)
E2286445 ft. (E696909m)

# BORING LOG G41-K26

SHEET 1 OF 10

SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/29/81 DATE COMPLETED 5/11/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | |
| | | | | - | 4 | DO | Air Hammer | 0/6 | |
| | | | | - | 4a | DO | Air Hammer | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.43 | | CONTINUED | | | | | | | |
| 37.5 | | | | | | | | | |
| | | | | - | 5 | DO | Air Hammer | 12/18 | |
| | | | | | | | —Air Hammer | | |
| | | | | - | 6 | DO | | 0/12 | |
| | | 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 | - | 6a | DO | Air Hammer | 0/18 | |
| | | | | - | 7 | DO | Air Hammer | 15/18 | |
| 21.79 | | | | - | 8 | DO | Air Hammer | 15/18 | |
| 71.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N32389m)
E2286445 ft. (E696909m)

# BORING LOG G41-K26

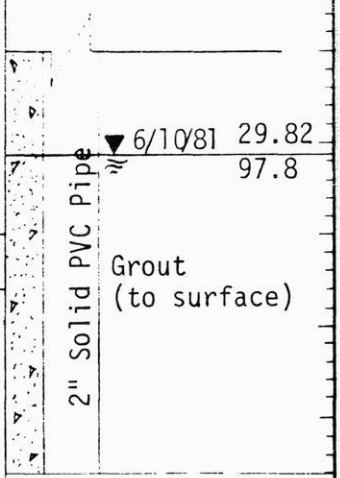


SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | |
| 71.5 | | | | - | 9 | DO | Air Hammer | 12/18 | |
| | | 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 | - | 10 | DO | Air Hammer | 6/12 | |
| | | | | - | 11 | DO | Air Hammer | 18/18 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.46 | | CONTINUED | | | | | | | CONTINUED |
| 106.5 | | Very dense, light brown to multi-colored, fine to coarse SAND, trace fine gravel to fine to coarse gravelly fine to coarse SAND, occasional to frequent cobbles | SP | - | 12 | DO | Air Hammer | 15/18 | 2" Solid PVC Pipe; Grout (to surface) |
| | | | | - | 13 | DO | Air Hammer | 12/18 | |
| 39.62 | | | | | | | | | |
| 130.0 | | Very dense, dark gray, SILT, trace fine sand, small organic particles throughout | ML | - | 14 | DO | Air Hammer | 18/18 | 40.84; 134.0 Bentonite Clay Seal 41.76; 137.0 Pea Gravel |
| 42.37 | | | | | | | | | |
| 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

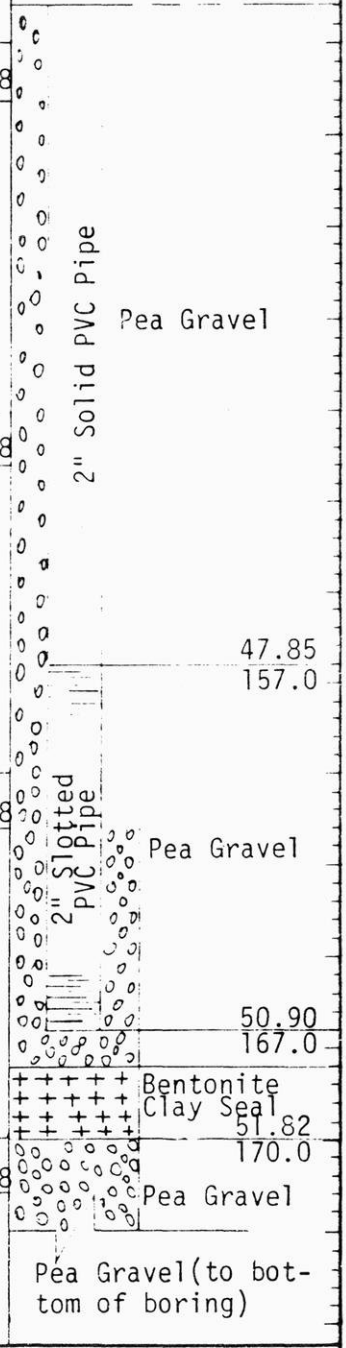


SURFACE ELEV. 1686.1 ft. (513.93m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | | | CONTINUED |
| 139.0 | | Very dense, dark gray, SILT, trace fine sand, small organic particles throughout | ML | - | 15 | DO | Air Hammer | 3/18 | |
| 44.35 | | | | | | | | | |
| 145.5 | | Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 16 | DO | Air Hammer | 18/18 | |
| | | | | - | 17 | DO | Air Hammer | 18/18 | |
| | | | | - | 18 | DO | Air Hammer | 18/18 | |
| 53.04 | | | | | | | | | |
| 174.0 | | CONTINUED | | | | | | | |




Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

# BORING LOG G41-K26



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 53.04 | | CONTINUED | | | | | | | |
| 174.0 | | | | - | 19 | DO | Air Hammer | 15/18 | |
| | | Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 20 | DO | Air Hammer | 18/18 | |
| | | | | - | 21 | DO | Air Hammer | 18/18 | |
| 63.70 | | | | | | | | | |
| 209.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

# BORING LOG G41-K26



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 63.70 | | CONTINUED | | | | | | | |
| 209.0 | | | | - | 22 | DO | Air Hammer | 15/18 | |
| | | | | - | 23 | DO | Air Hammer | 18/18 | |
| | | Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | | | | | | |
| | | | | - | 24 | DO | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 72.85 | | CONTINUED | | | | | | | |
| 239.0 | | Very dense, light brown to brown, fine SAND, trace silt to fine to medium SAND, trace silt | SP | - | 25 | DO | Air Hammer | 18/18 | |
| 75.29 | | | | | | | | | |
| 247.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine gravel | SM | - | 26 | DO | Air Hammer | 0/18 | |
| | | | | - | 27 | DO | 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 | DO | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 83.52 | | CONTINUED | | | | | | | |
| 274.0 | | Very dense, brown to multi-colored, fine to coarse sandy, fine to coarse GRAVEL, trace silt | GP | - | 29 | DO | Air Hammer | 15/18 | |
| 85.34 | | | | | | | | | |
| 280.0 | | Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine gravel, trace silt | SP | - | 30 | DO | Air Hammer | 18/18 | |
| | | | | - | 31 | DO | Air Hammer | 18/18 | |
| 91.29 | | | | | | | | | |
| 299.5 | | Very dense, brown and red-brown, varved SILT, trace fine sand with thin (1/16") discontinuous seams of clayey SILT | ML | | | | | | |
| 92.66 | | | | | | | | | |
| 304.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N106260 ft. (N23289m)
E2286445 ft. (E696909m)

# BORING LOG G41-K26



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 92.66 | | CONTINUED | | | | | | | |
| 304.0 | | 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 | 6/10/81 | | | | | | |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 29.82 | | | | | | |
| DEPTH (ft.) | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 | | Peat | PT | | | | | | |
| 0.5 | | Compact, brown, fine to medium SAND and SILT, organic fibers throughout | SM | - | 1 | AS | - | - | |
| 0.91 | | | | | | | | | |
| 3.0 | | Compact to very dense, brown to red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | 46 | 2 | DO | 10-12-34 | 16/18 | |
| | | | | 12 | 3 | DO | 4-6-6 | 14/18 | |
| | | | | 20 | 4 | DO | 5-12-8 | 15/18 | |
| | | | | 70 | 5 | DO | 34-36 | 4/12 | |
| 5.49 | | | | | | | | | |
| 18.0 | | Very dense, brown to red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | | 137 | 6 | DO | 33-43-94 | 12/18 | |
| | | | SM | 153/9" | 7 | DO | 89-64/3" | 8/9 | |
| | | | | - | 8 | - | No Recovery | - | |
| | | | | - | 9 | - | No Recovery | - | |
| 10.97 | | | | | | | | | |
| 36.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.97 | | CONTINUED | | | | | | | |
| 36.0 | | | | 181 / 6" | 10 | DO | 181/6" | 6/6 | |
| | | Very dense, brown to red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | 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

COOR. N115895 ft. (N35324m)
E2286690 ft. (E696984m)

# BORING LOG G41-L11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 20.42 / 67.0 | | CONTINUED | | | | | | | |
| | | Very dense, brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | 179 / 9" | 16 | DO | 79-100/3" | 6/9 | |
| 22.10 / 72.5 | | | | 200 / 6" | 17 | DO | 200/6" | 3/6 | |
| | | Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, some silt | GM to SM | 172 / 6" | 18 | DO | 172/6" | 5/6 | |
| | | | | 182 / 9" | 19 | DO | 82-100/3" | 6/9 | |
| | | | | 110 / 6" | 20 | DO | 110/6" | 4/6 | |
| 27.58 / 90.5 | | END OF BORING<br>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 JCB

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 5.0 | | | | 17 | 3 | DO | 7-10-7 | 15/18 | |
| | | | | 29 | 4 | DO | 10-14-15 | 18/18 | |
| | | | | 52 | 5 | DO | 17-28-24 | 18/18 | |
| | | Compact to very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, occasional cobbles | SM | 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 ACB

COOR. N114665 ft. (N34950m)
E2286795 ft. (E697016m)

# BORING LOG G41-L13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 141/10" | 11 | DO | 22-41-100/4" | 10/16 | |
| 13.11 | | | | | | | | | |
| 43.0 | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay | SM | 130/9" | 12 | DO | 30-100/3" | 7/9 | |
| | | | | 170/6" | 13 | DO | 170/6" | 6/6 | |
| 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 | |
| | | | | 146/10" | 15 | DO | 46-100/4" | 10/10 | |
| 19.20 | | | | | | | | | |
| 63.0 | | Very dense, red-brown, fine to coarse SAND, some silt, trace to some fine to coarse gravel, trace clay | SM | 133 | 16 | DO | 18-44-89 | 10/18 | |
| 20.57 | | | | | | | | | |
| 67.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N114665 ft. (N34950m)
E2286795 ft. (E697016m)

# BORING LOG G41-L13



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | 22-34-44 | 12/18 | |
| | | | | 93 | 18 | DO | 33-51-42 | 12/18 | |
| 23.77 | | | | | | | | | |
| 78.0 | | Very dense, light brown, fine SAND, trace silt | SP-SM | 77 | 19 | DO | 23-31-46 | 10/13 | |
| 25.30 | | | | | | | | | |
| 33.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine to medium gravel | SM | 93 | 20 | DO | 36-32-61 | 12/13 | |
| 26.37 | | | | | | | | | |
| 86.5 | | END OF BORING<br>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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.15 / 0.5 | | Dark red topsoil and rootmat | | 6 | 1 | DO | 3-2-4 | 18/18 | |
| | | | | 6 | 2 | DO | 2-2-4 | 18/18 | |
| | | Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay<br><br>Boulders noted at 25.0'-26.0' and 27.0'-28.0' | SM | 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" | 7 | DO | 45-50-100/4" | 16/16 | |
| 9.45 / 31.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N113575 ft. (N34617m)
E2286755 ft. (E697004m)

# BORING LOG G41-L15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 9.45 | | CONTINUED | | | | | | | |
| 31.0<br>10.36 | | Compact to very dense, red-brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt, trace clay | SM | | | | | | |
| 34.0 | | | | 75 | 8 | DO | 57-45-30 | 18/18 | |
| | | Very dense, brown, fine to coarse SAND, some fine gravel, trace silt | SP-SM | 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<br>55.0 | | | | | | | | | |
| | | Very dense, brown, fine to coarse SAND and SILT, some fine gravel, occasional cobbles | SM | 150/3" | 13 | DO | 150/3" | 1/3 | |
| | | | | 100/2" | 14 | DO | 100/2" | 2/2 | |
| 19.96<br>65.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N113575 ft. (N34617m)
E2286755 ft. (E697004m)

# BORING LOG G41-L15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>HOLE GROUTED AT COMPLETION | | | | | | | |

NOTES

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

   Penetration Test - Driving 2" O.D. sampler with 300 lb. hammer freely falling 24". (Samples 7 - 16)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay, trace organic matter, occasional cobbles | SM | 14 | 1 | DO | 8-6-8 | 12/18 | |
| | | | | 12 | 2 | DO | 5-6-6 | 18/18 | |
| 4.38 | | | | 14 | 3 | DO | 5-10-4 | 18/18 | |
| 10.0 | | Dense to very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, frequent cobbles and boulders | SM | 61 | 4 | DO | 11-50 | 12/12 | |
| | | | | 100/6" | 5 | DO | 100/6" | 6/6 | |
| 9.49 | | | | 135 | 6 | DO | 45-90 | 8/12 | |
| 31.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DCB

COOR. N111060 ft. (N33852m)
E2286820 ft. (E697024m)

# BORING LOG G41-L19



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 9.49 / 31.0 | | CONTINUED | | | | | | | |
| | | | | 150 | 7 | DO | 50-100 | 8/12 | |
| | | Dense to very dense, brown, fine to coarse SAND, some fine gravel, some silt, trace clay, frequent cobbles and boulders<br><br>Boulders noted at:<br>38.5'-40.0'<br>46.0'-47.0'<br>52.0'-53.0' | 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 | | | | 102 / 6" | 12 | DO | 102/6" | 6/6 | |
| | | Very dense, brown, fine to coarse SAND, some silt, some clay, trace fine gravel, numerous cobbles and boulders | SM | | | | | | |
| 19.81 / 65.0 | | | | 100 / 2" | 13 | DO | 100/2" | 0/2 | |
| | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N111060 ft. (N33852m)
E2286820 ft. (E697024m)

# BORING LOG G41-L19



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 19.81 / 65.0 | | CONTINUED | | | | | | | |
| 21.06 / 69.1 | | 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<br>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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Brown, fine to coarse SAND, some silt, trace fine gravel, boulders at surface | SM | - | 1 | AS | - | - | |
| 1.22 / 4.0 | | Dense, light brown, fine to coarse SAND, trace fine gravel, trace silt | SP | 28 | 2 | DO | 4-12-16 | 12/18 | |
| 2.29 / 7.5 | | Compact, brown, silty, fine to coarse SAND, some fine to coarse gravel to fine to coarse SAND, some silt, some fine to coarse gravel | SM | 20 | 3 | DO | 5-10-10 | 18/18 | |
| | | | | 17 | 4 | DO | 12-9-8 | 18/18 | |
| 5.34 / 17.5 | | Dense to very dense, light brown, fine to coarse SAND, trace to some fine to coarse gravel, trace silt | SP | 53 | 5 | DO | 9-28-25 | 8/18 | |
| | | | | 29 | 6 | DO | 9-12-17 | 16/18 | |
| | | | | 53/8" | 7 | DO | 18-35/2" | 5/8 | |
| 9.45 / 31.0 | | | | | | | | | |
| 10.36 / 34.0 | | See next page<br>CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [illegible]

COOR. N108275 ft. (N33002m)
E2286580 ft. (E696952m)

# BORING LOG G41-L23



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 / 34.0 | | CONTINUED | | 175 / 7" | 8 | DO | 75-100/1" | 4/7 | |
| | | | | 176 / 6.5" | 9 | DO | 76-100/.5" | 6/6.5 | |
| | | 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 | SM | 125 / 6" | 10 | DO | 125-6" | 6/6 | |
| | | Cobbles and boulders noted at 31.0'-35.2' | | 120 / 6" | 11 | DO | 120/6" | 3/6 | |
| | | | | 185 / 7" | 12 | DO | 110-75/1" | 3/7 | |
| 18.59 / 61.0 | | | | 180 | 13 | DO | 50-80-100 | 12/18 | |
| | | 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 | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 / 11" | 17 | DO | 110-180/5" | 6/11 | |
| 24.66 | | | | | | | | | |
| 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 MSB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, fine sandy clayey SILT | ML | - | 1 | AS | - | - | |
| 1.22 | | | | | | | | | |
| 4.0 | | Compact, brown, silty, fine to coarse SAND, trace fine gravel | SM | 13 | 2 | DO | 4-7-6 | 10/18 | |
| 2.29 | | | | | | | | | |
| 7.5 | | Compact, brown, fine to coarse SAND, trace fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt | SP | 7 | 3 | DO | 3-3-4 | 18/18 | |
| | | | | 23 | 4 | DO | 5-10-13 | 18/18 | |
| 5.33 | | | | | | | | | |
| 17.5 | | Dense to very dense, brown, silty fine to coarse SAND, trace fine gravel, trace clay to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles<br><br>Cobble noted at 26.0'-26.5' | SM | 20 | 5 | DO | 6-6-14 | 17/18 | |
| | | | | 89/9" | 6 | DO | 26-63/3" | 9/9 | |
| | | | | 63 | 7 | DO | 29-32-31 | 14/18 | |
| 10.36 | | | | | | | | | |
| 34.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked PKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | SM | 168 | 8 | DO | 48-120/6" | 10/12 | |
| | | | | 208/12" | 9 | DO | 88-107-100/4" | 8/16 | |
| | | | | 225/4.5' | 10 | DO | 225/4.5" | 2/4.5 | |
| | | Cobbles and boulders noted at 46.0'-46.8' and 47.5'-48.5' | | 140 | 11 | DO | 40-100 | 0/12 | |
| | | | | 400/4" | 12 | DO | 400/4" | 4/4 | |
| 17.53 | | | | | | | | | |
| 57.5 | | Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt to fine to coarse GRAVEL and fine to coarse SAND, trace silt, occasional to frequent cobbles | SW to SP | 168/10" | 13 | DO | 68-100/4" | 7/10 | |
| | | | | 152 | 14 | DO | 48-104 | 6/12 | |
| 20.42 | | | | | | | | | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>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 MPB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | ▼ 6/10/81 0.97 3.2 |
| | | | | - | 1 | DO | Hydraulic Push | 12/18 | |
| | | Compact, light brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine to coarse gravel, trace silt | SP | - | 2 | DO | Hydraulic Push | 24/24 | Grout (to surface) |
| 5.18 | | | | | | | | | |
| 17.0 | | Dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace silt with silt layer varying from ¼" to ½" thick | SP-SM | - | 3 | DO | Hydraulic Push | 15/18 | 2" Solid PVC Pipe (to surface) |
| 7.92 | | | | | | | | | |
| 26.0 | | Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded | SP | - | 4 | DO | Hydraulic Push | 12/18 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.43 | | CONTINUED | | | | | | | CONTINUED |
| 37.5 | | | | | | | | | Grout 11.89 |
| | | | | - | 5 | DO | Hydraulic Push | 15/18 | 39.0 Bentonite Clay Seal 12.80 |
| | | | | | | | | | 42.0 2" Solid PVC Pipe Pea Gravel |
| | | Dense to very dense, light brown, fine SAND, trace silt, fineness increasing with increasing depth, very poorly graded | SP | - | 6 | DO | Air Hammer | 18/18 | 15.24 50.0 2" Slotted PVC Pipe Pea Gravel |
| | | | | - | 7 | DO | Air Hammer | 18/18 | 18.29 60.0 Pea Gravel (to bottom of boring) |
| 19.51 | | | | | | | | | |
| 64.0 | | Very dense, brown, fine SAND, some silt, very poorly graded | SM | - | 8 | DO | Air Hammer | 18/18 | |
| 21.79 | | | | | | | | | |
| 71.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N116270 ft. (N34550m)
E2287725 ft. (E697330m)

# BORING LOG G41-M11



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | |
| 71.5 | | Very dense, brown, fine SAND, some silt, very poorly graded | SM | | | | | | |
| 22.56 | | | | | | | | | |
| 74.0 | | | | - | 9 | DO | Air Hammer | 18/18 | |
| | | Very dense, light brown, fine SAND, trace silt, very poorly graded | SP-SM | | | | | | |
| 26.82 | | | | | | | | | |
| 88.0 | | | | - | 10 | DO | Air Hammer | 18/18 | |
| | | 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 | | | | | | |
| | | | | - | 11 | DO | Air Hammer | 2/18 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.46 | | CONTINUED | | | | | | | |
| 106.5 | | Very dense, brown to red-brown, silty fine to coarse SAND, some fine to coarse gravel to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles and boulders | SM | - | 12 | DO | Air Hammer | 17/17 | |
| 34.75 | | | | | | | | | |
| 114.0 | | | | - | 13 | DO | Air Hammer | 3/6 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly fine to coarse SAND, some silt, occasional cobbles | SW-SM to SM | - | 14 | DO | Air Hammer | 12/18 | |
| | | | | - | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC/ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 43.13 | | CONTINUED | | | | | | | |
| 141.5 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to | SW-SM to SM | | | | | | |
| 43.89 | | fine to coarse gravelly fine | | | | | | | |
| 144.0 | | to coarse SAND, some silt, occasional cobbles | | | | | Air Hammer | | |
| | | | | - | 16 | DO | | 17/17 | |
| | | Very dense, gray-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay | SM | | | | | | |
| 47.70 | | | | | | | | | |
| 156.5 | | Sound, green, metavolcanic TUFF | | | | | Air Hammer | | |
| 48.46 | | | | | | | | | |
| 159.0 | | Green and red, weathered | | | | | | | |
| 48.92 | | metavolcanic TUFF | | - | 17 | DO | | 13/13 | |
| 160.5 | | | | | | | | | |

END OF BORING

NOTES

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC. / ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Air Hammer | 18/18 | |
| | | Compact, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, frequent cobbles | SM | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | Air Hammer | | |
| 35.0 | | | | - | 5 | DO | | 12/12 | |
| | | Very dense, orange to multi-colored, fine to coarse gravelly fine to coarse SAND, trace clay to fine to coarse sandy fine to coarse GRAVEL, trace clay | SP to GP | | | | | | |
| | | | | | 6 | DO | Air Hammer | 4/4 | |
| | | | | - | | | | | |
| 16.76 | | | | | | | | | |
| 55.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel | SM | | | | | | |
| 17.98 | | | | | | | | | |
| 59.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

# BORING LOG G41-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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, ½" 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 28.65 | | CONTINUED | | | | | | | |
| 94.0 | | Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel, trace clay, occasional cobbles | SM | | | | | | |
| 30.78 | | | | - | 11 | DO | Air Hammer | 14/18 | |
| 101.0 | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 36.27 / 119.0 | | CONTINUED | | | | | | | |
| | | Very dense, gray to brown, fine to coarse SAND, trace fine to coarse gravel, trace clay and/or trace silt | SP | - | 13 | DO | Air Hammer | 15/18 | |
| 38.40 / 126.0 | | | | - | 14 | DO | Air Hammer | 15/18 | |
| | | 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 | - | 15 | DO | Air Hammer | 18/18 | |
| 45.42 / 149.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

# BORING LOG G41-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 45.42 | | CONTINUED | | | | | | | |
| 149.0 | | Very dense, tan to multi-colored, fine to coarse gravelly fine to coarse SAND, trace silt to fine to coarse GRAVEL and fine to coarse SAND, occasional cobbles | SP to GP | - | 16 | DO | Air Hammer | 18/18 | |
| 47.24 | | | | | | | | | |
| 155.0 | | Very dense, brown to tan, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt | SP-SM | - | 17 | DO | Air Hammer | 18/18 | |
| | | | | - | 18 | DO | Air Hammer | 12/18 | |
| 53.34 | | | | | | | | | |
| 175.0 | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay | SM | | | | | | |
| 55.32 | | | | - | 19 | DO | Air Hammer | 18/18 | |
| 181.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

# BORING LOG G41-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 55.32 | | CONTINUED | | | | | | | |
| 181.5 | | Very dense, red-brown, silty fine to coarse SAND, some fine to coarse gravel, trace clay | SM | | | | | | |
| 56.39 | | | | | | | | | |
| 185.0 | | | | - | 20 | DO | Air Hammer | 18/18 | |
| | | Very dense, dark brown to red-brown, SILT, trace fine sand, trace clay to SILT, some clay | ML to CL | - | 21 | DO | Air Hammer | 10/18 | |
| | | | | - | 22 | DO | Air Hammer | 36/36 | |
| 65.99 | | | | | | | | | |
| 216.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

# BORING LOG G41-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC/ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 65.99 | | CONTINUED | | | | | | | |
| 216.5 | | | | | | | | | |
| | | | | - | 23 | DO | Air Hammer | 24/36 | |
| | | Very dense, dark brown to red-brown, SILT, trace fine sand, trace clay to SILT, some clay | ML to CL | | | | | | |
| | | | | - | 24 | DO | Air Hammer | 18/18 | |
| 72.24 | | | | | | | | | |
| 237.0 | | Hard, Red, CLAY and green ROCK FRAGMENTS (weathered meta-volcanic tuff) | | | | | | | |
| 74.37 | | | | | | | | | |
| 244.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113155 ft. (N334490m)
E2287645 ft. (E697276m)

# BORING LOG G41-M15



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 74.37 | | CONTINUED | | | | | | | |
| 244.0 | | Hard, Red, CLAY and green ROCK FRAGMENTS (weathered meta-volcanic tuff) | | - | 25 | RC | | 72/108 | |
| 77.42 | | | | | | | | | |
| 254.0 | | END OF BORING | | | | | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC/ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 2) |
|---|---|---|---|---|---|---|---|---|---|
| 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 1.52 |
| | | | | 28 | 2 | DO | 6-11-17 | 18/18 | Bentonite Clay Seal 5.0 – 2.44 |
| | | | | | | | | | 8.0 |
| | | | | 24 | 3 | DO | 11-11-13 | 18/18 | |
| 3.81 / 12.5 | | 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 | 84 | 4 | DO | 19-24-60 | 18/13 | Pea Gravel 6.55 |
| | | | | 152 | 5 | DO | 21-71-81 | 18/18 | 21.5 |
| | | | | 184 / 9" | 6 | DO | 84-100/3" | 7/9 | Pea Gravel |
| 8.38 / 27.5 | | Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel | SM | 150 / 9" | 7 | DO | 50-100/3" | 7/9 | 9.39 |
| 30.8 | | END OF BORING | | | | | | | 30.8 |

2" Solid PVC Pipe

2" Slotted PVC Pipe

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 7)
2. Groundwater observation well dry at completion of installation.

Job No. 786085
Scale 1"=5'

**Golder Associates**

Drawn jls
Checked

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

# BORING LOG G41-N21

SHEET 1 OF 5

SURFACE ELEV. 1727.4 ft. (526.50m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 11/27/79 DATE COMPLETED 12/1/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| 34.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravelly, fine to coarse SAND, trace silt, occasional to frequent cobbles and boulders | SP to SP-SM | 59 | 8 | DO | 20-26-33 | 12/18 | Grout (to surface) |
| | | | | 140/11" | 9 | DO | 40-100/5" | 4/11 | |
| | | | | 100/3" | 10 | DO | 100/3" | 2/3 | |
| | | | | 110/3" | 11 | DO | 110/3" | 3/3 | |
| | | | | 159 | 12 | DO | 16-143 | 5/12 | 2" Solid PVC Pipe to Surface |
| 18.29 | | | | 100/0" | 13 | DO | 100/0" | 0/0 | |
| 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 | 14 | DO | 16-47-53 | 18/18 | Bentonite Clay Seal |
| 20.88 | | | | | | | | | 16.76 |
| 68.5 | | CONTINUED | | | | | | | 55.0 |
| | | | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [illegible]

COOR. N109170 ft. (N33275m)
E2288410 ft. (E697508m)

# BORING LOG G41-N21



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.88 | | CONTINUED | | | | | | | CONTINUED |
| 68.5 | | Very dense, brown, clayey SILT, some fine to coarse gravel, trace fine sand to clayey, silty, fine to coarse SAND, some fine to coarse gravel | ML CL | 75 | 15 | DO | 15-25-50 | 18/18 | Bentonite Clay Seal |
| | | | | 54 | 16 | DO | 18-19-35 | 18/18 | 23.16 |
| | | | | 50 | 17 | DO | 15-22-28 | 18/18 | 76.0 |
| | | | | 65 | 18 | DO | 25-35-30 | 18/18 | Pea Gravel |
| | | | | 115/6" | 19 | DO | 115/6" | 6/6 | 2" Solid PVC Pipe |
| 28.19 | | | | | | | | | |
| 92.5 | | Very dense, brown, fine to coarse SAND, trace fine to coarse gravel, trace to some silt | SP SM to SM | 195/9" | 20 | DO | 87-108/3" | 9/9 | |
| | | | | 112/6" | 21 | DO | 112/6" | 5/6 | 29.87 |
| | | | | | | | | | 98.0 Caved Material |
| 31.09 | | | | | | | | | |
| 102.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked PKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | 154/2" | 2/2 | Caved Material |
| | | | | 150 / 3" | 23 | DO | 150/3" | 0/3 | |
| 38.10 | | | | | | | | | |
| 125.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse gravelly fine to coarse SAND, trace silt, occasional cobbles | SP to SW | 150 / 3" | 24 | DO | 150/3" | 2/3 | 2" Solid PVC Pipe |
| 41.45 | | | | | | | | | |
| 136.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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; Solid; 2" Slotted PVC Pipe; Caved Material; 42.21; 138.5; 45.23; 148.4 |
| 45.87 | | | | 200/6" | 26 | DO | 200/6" | 3/6 | |
| 150.5 | | END OF BORING | | | | | | | |

NOTES

1. Penetration Test - Driving 3" O.D. sampler with 360 lb. hammer freely falling 24". (Samples 2 - 26)
2. End of top of protector pipe, 1729.5 ft. (527.15m).

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

| DATE | 12/18/79 | 4/25/80 | 6/28/80 | 7/9/80 | 7/17/80 | 7/25/80 | 8/2/80 |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 41.51 | 42.00 | 41.67 | 41.70 | 41.70 | 41.70 | 41.73 |
| DEPTH (ft.) | 136.2 | 137.8 | 136.7 | 136.8 | 136.8 | 136.8 | 136.9 |

| DATE | 8/9/80 | 8/16/80 | 8/23/80 | 9/2/80 | 9/10/80 | | |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 41.73 | 41.76 | 41.79 | 41.79 | 41.88 | | |
| DEPTH (ft.) | 136.9 | 137.0 | 137.1 | 137.1 | 137.4 | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

# BORING LOG G41-P16

SHEET 1 OF 6

SURFACE ELEV. 1588.7 ft. (484.24m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/22/81 DATE COMPLETED 4/27/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, light brown, fine to medium SAND, trace silt | SP | - | 1 | DO | Air Hammer | 12/18 | ▼ 6/10/81 1.80 / 5.9 |
| 2.44 / 8.0 | | Compact to dense, brown, fine to meidum 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 | 2" Solid PVC Pipe (to surface) / Grout (to surface) |
| 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 | 10.97 / 36.0 |
| 11.13 / 36.5 | | CONTINUED | | | | | | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | - | 5 | DO | Air Hammer | 18/18 | Bentonite Clay Seal 11.89 / 39.0; Pea Gravel 13.41 / 44.0 |
| 13.72 | | | | | | | | | |
| 45.0 | | | | - | 6 | DO | Air Hammer | 18/18 | 2" Slotted PVC Pipe; Pea Gravel 16.46 / 54.0; Pea Gravel 17.07 / 57.0 |
| | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | - | 7 | DO | Air Hammer | 18/18 | 17.68 / 58.0 Pea Gravel (to bottom of boring) |
| 21.79 | | | | - | 8 | DO | Air Hammer | 18/18 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | |
| 71.5 | | | | | | | | | |
| | | | | - | 9 | DO | Air Hammer | 18/18 | |
| | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | | | | | | |
| | | | | - | 10 | DO | Air Hammer | 18/18 | |
| 30.18 | | | | | | | | | |
| 99.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

# BORING LOG G41-P16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.18 | | CONTINUED | | | | | | | |
| 99.0 | | Very dense, red-brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | - | 11 | DO | Air Hammer | 18/18 | |
| 32.00 | | | | | | | | | |
| 105.0 | | | | - | 12 | DO | Air Hammer | 18/18 | |
| | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP-SM | - | 13 | DO | Air Hammer | 18/18 | |
| | | | | - | 14 | DO | Air Hammer | 18/18 | |
| 40.84 | | | | | | | | | |
| 134.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N113755 ft. (N34673m)
E2288760 ft. (E697615m)

# BORING LOG G41-P16



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 40.84 | | CONTINUED | | | | | | | |
| 134.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace to some silt | SP-SM | - | 15 | DO | 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 | DO | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC / ATT | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 48.46 | | CONTINUED | | | | | | | |
| 159.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay, occasional cobbles | SM | - | 17 | DO | Air Hammer | 12/18 | |
| 50.29 | | | | | | | | | |
| 165.0 | | Hard, brown, CLAY, some green weathered rock fragments (weathered metavolcanic tuff) | | - | 18 | DO | Air Hammer | 18/18 | |
| 53.34 | | | | | | | | | |
| 175.0 | | Hard, red, CLAY, some green weathered rock fragments (weathered metavolcanic tuff) | | - | 19 | DO | Air Hammer | 12/12 | |
| 55.17 | | | | | | | | | |
| 181.0 | | END OF BORING | | | | | | | |

NOTES

1. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.34 | | Topsoil and rootmat | | 4 | 1 | DO | 1-2-2 | 18/18 | ▼ 4/19/79 0.55 |
| 1.1 | | Very loose, red-brown to brown, silty fine SAND, some organic matter | SM | | | | | | ≈ 1.8 |
| 0.91 | | | | | | | | | |
| 3.0 | | | | 4 | 2 | DO | 2-2-2 | 18/18 | |
| | | Very loose, brown to red-brown SILT, some to trace clay, trace fine sand | ML | 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 JCB

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 | | CONTINUED | | | | | | | |
| 37.0 | | | | | | | | | |
| | | | | 15 | 9 | DO | 8-7-8 | 3/18 | |
| | | Compact to very dense, red-brown, fine to coarse SAND, some fine gravel, some silt, trace clay | SM | | | | | | |
| | | | | 60 | 10 | DO | 25-27-33 | 18/18 | |
| | | | | 140/10" | | | | | |
| 15.70 | | | | | 11 | DO | 30-40-100/4" | 10/16 | |
| 51.5 | | | | | | | | | |
| | | | | 139 | 12 | DO | 17-47-92 | 18/13 | |
| | | Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt<br><br>Boulders noted at 51.5'-53.0' and 58.5'-59.5' | SP-SM | | | | | | |
| | | | | 134 | 13 | DO | 12-24-110 | 1/18 | |
| | | | | 155 | 14 | DO | 60-90-65 | 9/18 | |
| 20.88 | | | | | | | | | |
| 68.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

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 COMPETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS/FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.88 | | CONTINUED | | | | | | | |
| 68.5 | | Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt | SP-SM | 92 | 15 | DO | 21-37-55 | 5/18 | |
| 21.95 | | | | | | | | | |
| 72.0 | | | | 160/10" | | | | | |
| | | | | | 16 | DO | 37-60-100/4" | 12/16 | Grout (to surface) |
| | | Very dense, red-brown to light brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | | | | | | |
| | | | | 149 | 17 | DO | 33-59-90 | 18/18 | |
| | | | | 156 | 18 | DO | 47-56-100 | 18/18 | |
| | | Boring abandoned at 90.0' because of uncontrollable caving. Relocated hole 5' to the south. See notes 2 and 5. | | 112/9" | | | | | |
| 27.43 | | | | | | | | | |
| 90.0 | | | | | 19 | DO | 35-77/3" | 0/9 | |
| | | Very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to fine to coarse SAND, some silt, trace fine gravel, trace clay, frequent boulders | SM | 190 | 20 | DO | 63-80-110 | 14/18 | |
| | | | | 182 | 21 | DO | 68-120 | 8/12 | |
| 31.39 | | | | | | | | | |
| 103.0 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe to Surface

28.04
92.0
Bentonite Clay Seal
28.96
95.0
Pea Gravel
30.48
100.0
Pea Gravel

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

# BORING LOG G41-P18



SURFACE ELEV. 1588.9 ft. (484.29m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/6/79 DATE COMPETED 3/27/79

DRILL RIG Joy 12B DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.39 | | CONTINUED | | | | | | | CONTINUED |
| 103.0 | | Very dense, red-brown, fine to coarse gravelly, fine to coarse SAND, some silt, trace clay to fine to coarse SAND, some silt, trace fine gravel, trace clay, frequent boulders | SM | | | | | | 2" Slotted PVC Pipe; Pea Gravel (to bottom of boring) |
| 33.99 | | | | 130 | 22 | DO | 24-40-90 | 0/18 | 33.53 / 110.0 |
| 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 | | | | | | | | | |
| 130.0 | | END OF BORING | | | | | | | |

(See sheet 5 for notes)

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked DRB

COOR. N111645 ft. (N34030m)
E2288825 ft. (E697635m)

# BORING LOG G41-P18



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

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 COMPETED 3/29/79

DRILL RIG CME-45 DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL (Note 2) |
|---|---|---|---|---|---|---|---|---|---|
| 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 ≈ 0.5 |
| 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 | 0/24 | |
| | | | | - | 5 | DO | Push | 10/13 | |
| | | | | - | 6 | TO | Push | 24/24 | 2" Solid PVC Pipe to Surface; Grout (to surface) |
| | | | | 4 | 7 | DO | 2-2-2 | 18/18 | |
| 8.84 | | | | | | | | | |
| 29.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked JCB

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

# BORING LOG G41-P18B



SURFACE ELEV. 1589.1 ft. (484.34m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/29/79 DATE COMPETED 3/29/79

DRILL RIG CME-45 DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 8.84 | | CONTINUED | | | | | | | CONTINUED |
| 29.0 | | Soft to firm, light brown SILT, some to trace clay, trace fine sand | ML | 8 | 3 | DO | 3-4-4 | 15/13 | Grout 9.14 |
| 10.21 | | | | | | | | | Bentonite Clay Seal 30.0 |
| 33.5 | | Compact, light brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | 22 | 9 | DO | 6-12-10 | 8/13 | 2" Solid PVC Pipe 10.06 |
| | | | | | | | | | Pea Gravel 33.0 |
| | | | | 22 | 10 | DO | 7-8-14 | 7/13 | 2" Slotted PVC Pipe 10.67 |
| 13.56 | | | | | | | | | Pea Gravel 35.0 |
| 44.5 | | END OF BORING | | | | | | | Caved Material 12.13 40.0 (Note 3) |

NOTES

1. 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)
2. Water ponded on ground surface, 3/29/79.
3. 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 jts
Checked DRB

COOR. N111390 ft. (N33952m)
E2288820 ft. (E697634m)

# BORING LOG G41-P18B

SHEET 3 OF 3

SURFACE ELEV. 1589.1 ft. (484.34m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 3/29/79 DATE COMPLETED 3/29/79

DRILL RIG CME-45 DRILLING METHOD Mud Rotary

NOTES (continued)

4. Elevation of top of protector pipe, 1591.3 ft. (485.02m).

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

| DATE | 4/19/79 | 1/2/80 | 2/13/80 | 5/17/80 | 7/9/80 | 7/17/80 | 7/25/80 |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 0.15 | FROZEN | FROZEN | -0.18 | -0.06 | 0.00 | 0.00 |
| DEPTH (ft.) | 0.5 | FROZEN | FROZEN | -0.6 | -0.2 | 0.0 | 0.0 |

| DATE | 8/2/80 | 8/9/80 | 8/16/80 | 8/20/80 | 8/22/80 | 9/2/80 | 9/10/80 |
|---|---|---|---|---|---|---|---|
| DEPTH (m) | 0.00 | 0.03 | 0.03 | 0.09 | 0.03 | 0.03 | 0.09 |
| DEPTH (ft.) | 0.0 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.3 |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn JEF
Checked GW

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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) |
| | | | | - | 2 | pit | - | - | |
| 1.83 | | | | | | | | | |
| 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 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 5 | DO | | 12/12 | |
| 6.86 | | | | | | | | | |
| 22.5 | | 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, occasional cobbles | SM | | | | Air Hammer | | |
| | | | | - | 6A | DO | | 0/12 | |
| | | | | - | 6B | DO | | 10/10 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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<br>Boulder noted at 37.5'-38.5' | SM | - | 8 | DO | Air Hammer | 6/6 | |
| | | | | - | 9 | DO | Air Hammer | 12/12 | |
| 12.95 | | | | | | | | | |
| 42.5 | | Very dense light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles<br>Boulder noted at 44.5'-45.5' | SP to GP | - | 10 | DO | Air Hammer | 6/12 | (Note 3) |
| | | | | - | 11 | DO | Air Hammer | 12/12 | |
| | | | | - | 12 | DO | Air Hammer | 2/3 | |
| | | | | - | 13 | DO | Air Hammer | 9/9 | |
| | | | | - | 14 | DO | Air Hammer | 6/7 | |
| 20.42 | | | | | | | | | |
| 67.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked CAG

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.42 / 67.0 | | CONTINUED | | | | | | | |
| | | Very dense, light brown to brown, fine to coarse SAND, some fine to coarse gravel, trace silt to fine to coarse sandy fine to coarse GRAVEL, trace silt, frequent cobbles | SP to GP | - | 15 | DO | Air Hammer | 4/6 | Grout (to surface) |
| | | | | - | 16 | DO | Air Hammer | 6/7 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 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 | | | | Air Hammer | | |
| | | | | - | 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 | | | | Air Hammer | | 27.43 |
| | | | | - | 19 | DO | Air Hammer | 9/12 | 27.65 / 90.7 1/10/80 Bentonite Clay Seal 90.0 |
| | | | | | | | Air Hammer | | 28.96 |
| | | | | - | 20 | DO | Air Hammer | 4/12 | 95.0 Pea Gravel |
| 30.18 / 99.0 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe to Surface

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked [illegible]

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.18 | | CONTINUED | | | | | | | CONTINUED |
| 99.0 | | Very dense, light brown to brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, occasional cobbles | SP-SM | - | 21 | DO | Air Hammer | 0/12 | Solid: Pea Gravel |
| | | | | - | 22 | DO | Air Hammer | 10/13 | 31.39 / 103.0 Pea Gravel; 2" Slotted PVC Pipe |
| | | | | - | 23 | DO | Air Hammer | 12/12 | 34.44 / 113.0 Pea Gravel (to bottom of boring) |
| | | | | - | 24 | DO | Air Hammer | 6/9 | |
| 40.54 | | | | | | | | | |
| 133.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MRB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24

SHEET 5 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 40.54 | | CONTINUED | | | | | | | |
| 133.0 | | Very dense, light brown to borwn, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, occasional cobbles | SP-SM | - | 25 | 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 | 8/12 | |
| 47.24 | | | | | | | | | |
| 155.0 | | Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse sandy, fine to coarse GRAVEL, trace silt, occasional cobbles | SP to GP | - | 27 | DO | Air Hammer | 8/13 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 50.29 | | CONTINUED | | | | | | | |
| 165.0 | | 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 | - | 28 | DO | Air Hammer | 4/14 | |
| | | | | - | 29 | DO | Air Hammer | 5/12 | |
| 56.39 | | | | | | | | | |
| 185.0 | | Very dense, light brown, fine to coarse SAND, trace fine gravel, trace silt | SP | - | 30 | DO | Air Hammer | 12/14 | |
| 59.44 | | | | | | | | | |
| 195.0 | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | | | | | | |
| 60.65 | | | | | | | | | |
| 199.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MCG

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.65 / 199.0 | | CONTINUED | | | | | | | |
| | | | | - | 31 | DO | Air Hammer | 5/5 | |
| | | Very dense, red-brown, fine to coarse SAND, some silt, trace fine gravel, trace clay | SM | | | | | | |
| | | | | - | 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 | | | | Air Hammer | | |
| | | | | - | 33 | DO | \ | 10/12 | |
| | | | | | | | Air Hammer | | |
| | | | | - | 34 | DO | \ | 10/13 | |
| 71.02 / 233.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MAS

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 71.02 | | CONTINUED | | | | | | | |
| 233.0 | | 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 | 18/18 | |
| 80.77 | | | | | | | | | |
| 265.0 | | Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt | SP to SP-SM | | | | | | |
| 81.84 | | | | | | | | | |
| 268.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked RKB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 81.84 | | CONTINUED | | | | | | | |
| 268.5 | | Very dense, light brown to brown, fine to coarse SAND, some fine gravel, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt | SP to SP-SM | - | 38 | DO | Air Hammer | 12/18 | |
| | | | | - | 39 | DO | Air Hammer | 18/18 | |
| | | | | - | 40 | DO | Air Hammer | 13/16 | |
| 89.92 | | | | | | | | | |
| 295.0 | | 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 | - | 41 | DO | Air Hammer | 8/15 | |
| 92.35 | | | | | | | | | |
| 303.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1"=5'

Golder Associates

Drawn jls
Checked MKB

COOR. N107550 ft. (N32781m)
E2288660 ft. (E697584m)

# BORING LOG G41-P24



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 92.35 | | CONTINUED | | | | | | | |
| 303.0 | | 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 | |
| | | | | - | 44 | DO | Air Hammer | 1/1 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. (Note 1) | SAMPLES REC./ATT. (ins.) | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 MKG

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| | | | | - | 4 | DO | Hydraulic Push | 24/24 | |
| 9.60 | | | | | | | | | |
| 31.5 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 9.60 | | CONTINUED | | | | | | | |
| 31.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.27 | | CONTINUED | | | | | | | |
| 66.5 | | | | | | | | | |
| | | | | - | 8 | DO | Air Hammer | 4/18 | |
| | | | | - | 9 | DO | Air Hammer | 8/18 | |
| | | 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 | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.94 | | CONTINUED | | | | | | | |
| 101.5 | | | | | | | Air Hammer | | |
| | | | | - | 12 | DO | | 8/12 | |
| | | 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 | | | | | | |
| | | | | - | 13 | DO | Air Hammer | 0/18 | |
| | | | | - | 13a | DO | Air Hammer | 15/18 | |
| 38.56 | | | | | | | | | |
| 126.5 | | Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth. | SP | - | 14 | DO | Air Hammer | 18/18 | |
| 41.61 | | | | | | | | | |
| 136.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

# BORING LOG G41-Q22

SHEET 5 OF 10

SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.61 / 136.5 | | CONTINUED | | | | | | | |
| | | | | - | 15 | DO | Air Hammer | 18/18 | 2" Solid PVC Pipe to Surface; Grout (to surface) |
| | | | | - | 16 | DO | Air Hammer | 18/18 | |
| | | Very dense, brown, fine SAND, trace silt, very poorly graded. Fineness increasing with increasing depth. | SP | | | | | | |
| | | | | - | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 49.83 | | CONTINUED | | | | | | | CONTINUED |
| 163.5 | | Very dense, brown, fine SAND and SILT, very poorly graded. Fineness increasing with increasing depth. | ML | - | 18 | DO | Air Hammer | 15/15 | Grout 50.90 / 167.0; Bentonite Clay Seal 51.82 / 170.0; 2" Solid PVC Pipe; Pea Gravel |
| 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 | - | 19 | DO | Air Hammer | 18/18 | 53.93 / 177.0; 2" Slotted PVC Pipe; Pea Gravel |
| | | | | - | 20 | DO | Air Hammer | 26/26 | 57.00 / 187.0; Pea Gravel (to bottom of boring) |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 60.66 | | CONTINUED | | | | | | | |
| 199.0 | | | | - | 21 | DO | Air Hammer | 18/24 | |
| | | Very dense, brown to light brown, fine to medium SAND, trace silt to fine to coarse gravelly, fine to coarse SAND, trace silt | SP | - | 22 | DO | Air Hammer | 15/18 | |
| 66.14 | | | | | | | | | |
| 217.0 | | | | - | 23 | DO | Air Hammer | 12/24 | |
| | | 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 | | | | | | |
| 69.04 | | | | | | | | | |
| 226.5 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

# BORING LOG G41-Q22



SURFACE ELEV. 1612.3 ft. (491.43m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

DATUM USGS MSL DATE STARTED 4/30/81 DATE COMPLETED 5/8/81

DRILL RIG Schramm Rotadrill T64HP DRILLING METHOD Mud Rotary

| DEPTH METER / FEET | STRAT. PLOT | DESCRIPTION | UNIFIED CLASS. | BLOWS / FOOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 69.04 | | CONTINUED | | | | | | | |
| 226.5 | | | | | | | | | |
| | | | | - | 24 | DO | Air Hammer | 18/18 | |
| | | 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 | | | | | | |
| | | | | - | 25 | DO | Air Hammer | 18/18 | |
| 74.98 | | | | | | | | | |
| 246.0 | | | | | | | | | |
| | | | | - | 26 | DO | Air Hammer | 5/18 | |
| | | Very dense, light brown, fine to medium SAND, trace silt to fine to coarse SAND, trace fine to coarse gravel, trace silt | SP | | | | | | |
| 79.71 | | | | - | 27 | DO | Air Hammer | 10/18 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | DO | Air Hammer | 18/18 | |
| 84.58 | | | | | | | | | |
| 277.5 | | Very dense, multi-colored, fine to coarse sandy, fine to coarse GRAVEL, some gravel decomposed | GP | - | 29 | DO | Air Hammer | 15/18 | |
| 88.09 | | | | | | | | | |
| 289.0 | | CONTINUED | | | | | | | |

Job No. 786085
Scale 1" = 5'

Golder Associates

Drawn SKB
Checked MRB

COOR. N108460 ft. (N33059m)
E2289190 ft. (E697747m)

# BORING LOG G41-Q22



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 88.09 | | CONTINUED | | | | | | | |
| 289.0 | | Very dense, multi-colored, fine to coarse sandy, fine to coarse GRAVEL, some gravel decomposed | GP | - | 30 | DO | Air Hammer | 16/16 | |
| 90.83 | | | | | | | | | |
| 298.0 | | Very dense, brown, fine to medium SAND, trace silt to fine to coarse SAND, some fine to coarse gravel, trace silt | SP | - | 31 | DO | Air Hammer | 18/18 | |
| 94.03 | | | | | | | | | |
| 308.5 | | Partially weathered, green-gray, metavolcanic TUFF | | - | 32 | RC | | 72/84 | |
| 96.47 | | | | | | | | | |
| 316.5 | | END OF BORING | | | | | | | |

NOTES

1. Elevation of top of protector pipe, 1615.6 ft. (492.43m).

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

| DATE | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 9.14 | | Refer to boring DMA-48 for stratigraphy between 0-30 feet | | | | | | | |
| 30.0 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 17.53 | | CONTINUED | | | | | | | |
| 57.5 | | Compact, brown, fine to coarse SAND, some gravel, trace silt | SP-SM | - | 4 | DO | AIR HAMMER | 20/20 | |
| 18.81 | | | | | | | | | |
| 61.7 | | Dense, brown, fine to medium SAND, trace silt | SP | - | 5 | DO | AIR HAMMER | 18/18 | |
| 24.38 | | | | | | | | | |
| 80.0 | | Stiff, brown SILT | ML | - | 6 | DO | AIR HAMMER | 17/21 | |
| 24.90 | | | | | | | | | |
| 81.7 | | Brown, fine to coarse, gravelly SAND, trace silt | SP | | | | | | |
| 26.67 | | | | | | | | | |
| 87.5 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 26.67 | | CONTINUED | | | | | | | |
| 87.5 | | | | - | 7 | DO | AIR HAMMER | 20/24 | |
| | | Brown, fine to coarse, gravelly SAND, trace silt | SP | - | 8 | DO | AIR HAMMER | 5/11 | |
| | | | | - | 9 | DO | AIR HAMMER | - | |
| 35.66 | | | | | | | | | |
| 117.0 | | Top of weathered rock, very | - | | | | | | |
| 36.27 | | dense, green bedrock | | - | 10 | WO | - | - | |
| 119.0 | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | Refer to boring DMB-10 for stratigraphy between 0-100 feet | | | | | | | |
| 30.48 | | | | | | | | | |
| 100.0 | | | | - | 1 | DO | AIR HAMMER | 3/8 | |
| | | Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel | SM | | | | | | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| | | | | - | 6 | DO | AIR HAMMER | 8/8 | |
| 47.24 | | | | | | | | | |
| 155.0 | | Very dense, brown, fine to coarse SAND, some silt | SM | - | 7 | DO | AIR HAMMER | 6/6 | |
| 49.23 | | | | | | | | | |
| 161.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| 185.0 | | Very dense, brown, fine to coarse SAND, some silt, trace fine gravel | SM | - | 10 | DO | AIR HAMMER | 4/4 | |
| 59.44 | | | | | | | | | |
| 195.0 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 59.44 | | CONTINUED | | | | | | | |
| 195.0<br>60.20 | | Very dense, brown, fine to coarse SAND, some silt, trace fine gravel | SM | | | | | | |
| 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 | 12/12 | |
| 62.79 | | | | | | | | | |
| 206.0<br>64.01 | | Green weathered bedrock | | | | | | | |
| 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

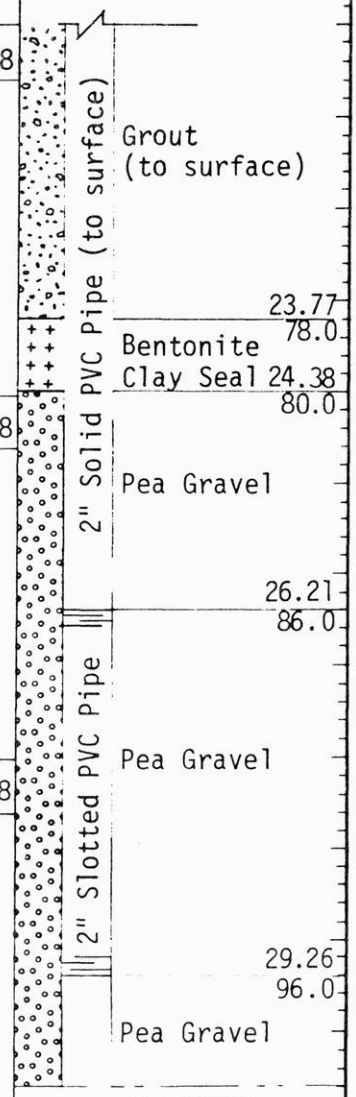
SHEET 1 OF 4

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.34 | | Drilled to depth of 70 feet before sampling | | | | | | | |
| 70.0 | | | | - | 1 | DO | AIR HAMMER | 15/18 | |
| | | | | - | 2 | DO | AIR HAMMER | 18/18 | |
| | | Dense to very dense, brown, fine to coarse SAND, trace silt, trace to some fine to coarse gravel | SP-SM | - | 3 | DO | AIR HAMMER | 15/18 | |
| 30.18 | | | | | | | | | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.18 | | CONTINUED | | | | | | | CONTINUED |
| 99.0 | | Dense to very dense, brown, fine to coarse SAND, trace silt, trace to some fine to coarse gravel | SP-SM | - | 4 | DO | AIR HAMMER | 18/18 | |
| | | | | - | 5 | DO | AIR 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 | DO | AIR HAMMER | 0/18 | Pea Gravel |
| 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 | DO | AIR HAMMER | 7/7 | |
| 40.84 | | | | | | | | | |
| 134.0 | | CONTINUED | | | | | | | CONTINUED |

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N. 745 ft. (N35584m)
E22/2895 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 40.84 | | CONTINUED | | | | | | | CONTINUED |
| 134.0 | | 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 | Pea Gravel |
| 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 | | | 10 | WO | DRILL CUTTINGS | - | |
| 48.77 | | | | | | | | | |
| 160.0 | | 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 4 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

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | Air Hammer | 4/18 | |
| | | Brown, fine to coarse SAND, some silt, some fine gravel and cobbles | SM | | | | | | |
| | | | | - | 2 | DO | Air Hammer | 0/18 | |
| 9.14 | | | | | | | | | |
| 30.0 | | | | - | 3 | DO | Air Hammer | 12/18 | |
| | | Brown fine to coarse SAND and GRAVEL, trace silt | SP-SM | | | | | | |
| 11.13 | | | | | | | | | |
| 36.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| | | CONTINUED | | | | | | | |
| 11.43<br>37.5 | | 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<br>60.0 | | | | - | 6 | DO | AIR HAMMER | 18/18 | |
| | | Tan fine SAND, some fine gravel, some silt | SM | | | | | | |
| 21.03<br>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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.03 | | CONTINUED | | | | | | | |
| 69.0 | | 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 | |
| | | | | - | 9 | DO | AIR HAMMER | 18/18 | |
| 28.65 | | | | | | | | | |
| 94.0 | | Red brown fine to coarse sand, some fine gravel, some silt | SM | - | 10 | DO | AIR HAMMER | 18/18 | |
| 31.70 | | | | | | | | | |
| 104.0 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe (to surface)

Grout (to surface)

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.70 | | CONTINUED | | | | | | | CONTINUED |
| 104.0 | | Red brown fine to coarse sand, some fine gravel, some silt | SM | - | 11 | DO | AIR HAMMER | 18/18 | Grout; 2" Solid PVC Pipe; 32.22 Bentonite 109.0 Clay Seal 33.83; 111.0 Pea Gravel; 35.36 |
| 35.81 | | | | | | | | | |
| 117.5 | | Tan, fine to medium SAND and SILT | SM | - | 12 | DO | AIR HAMMER | 18/18 | 116.0 Pea Gravel; 2" Slotted PVC Pipe |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | AIR HAMMER | | |
| 139.0 | | | | - | 14 | DO | | 6/6 | |
| | | Brown to red brown fine to coarse SAND, some silt, some fine gravel | SM | | | | | | Pea Gravel |
| | | | | - | 15 | DO | AIR HAMMER | 8/8 | |
| 45.93 / 150.7 | | | | | | | | | 45.93 / 150.7 |

END OF BORING

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | 0.0 |
| | | | | - | 1 | DO | Air Hammer | 24/24 | |
| | | | | | | | | | |
| | | | | - | 2 | DO | P.H. | 18/18 | Grout |
| | | | | | | | | | |
| | | | | - | 3 | DO | P.H. | 18/18 | |
| | | Red brown, fine to coarse SAND, little fine to coarse gravel, some silt | SM | | | | | | 4.27 |
| | | | | | | | | | 14.0 |
| | | | | - | 4 | DO | P.H. | 16/18 | Bentonite Clay Seal 4.88 |
| | | | | | | | | | 16.0 |
| | | | | | | | | | Pea Gravel |
| | | | | - | 5 | DO | P.H. | 12/18 | 6.40 |
| | | | | | | | | | 21.0 |
| | | | | | | | | | Pea Gravel |
| | | | | - | 6 | DO | P.H. | 18/18 | 7.93 |
| | | | | | | | | | 26.0 |
| | | | | | | | | | Pea Gravel |
| 9.14 | | | | | | | | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Dense, tan, fine SAND, with ½" lenses of gray clay | SP | | | | | | |
| | | | | - | 1 | DO | P.H. | 24/24 | |
| 2.29 | | | | | | | | | |
| 7.5 | | Dense, brown, fine to coarse SAND, trace fine gravel, trace silt | SP | | | | | | |
| | | | | - | 2 | DO | P.H. | 20/24 | |
| 4.57 | | | | | | | | | |
| 15.0 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt to fine to coarse gravel, trace silt | SM | | | | | | |
| | | | | - | 3 | DO | P.H. | 12/24 | |
| | | | | - | 4 | DO | P.H. | 5/10 | |
| 11.13 | | | | | | | | | |
| 36.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | - | 6 | DO | AIR HAMMER | 12/12 | |
| | | Very dense, tan, fine to coarse SAND to silty, fine SAND, generally finer with depth | SP to SM | - | 7 | DO | AIR HAMMER | 19/24 | |
| 21.34 | | | | | | | | | |
| 70.0 | | 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

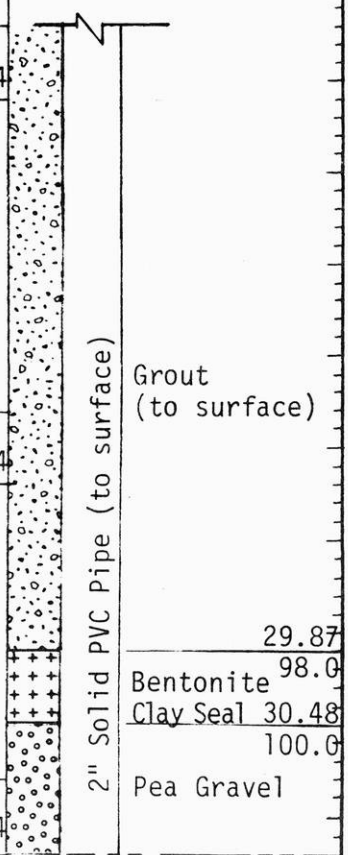
SHEET 3 OF 6

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.34 | | CONTINUED | | | | | | | |
| 70.0 | | | | - | 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 | | | | - | 11 | DO | AIR HAMMER | 18/24 | |
| 103.5 | | CONTINUED | | | | | | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.55 / 103.5 | | CONTINUED | | | | | | | CONTINUED |
| | | Very dense, tan, fine to coarse SAND to silty, fine SAND, generally finer with depth | SP to SM | - | 12 | DO | AIR HAMMER | 21/22 | 32.00 / 105.0 2" Solid PVC Pipe; Pea Gravel; 35.05 / 115.0 |
| | | | | - | 13 | DO | AIR HAMMER | 24/24 | Pea Gravel (to bottom of boring) |
| | | | | - | 14 | DO | AIR HAMMER | 18/18 | |
| 42.37 / 139.0 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | | | |
| 139.0 | | Very dense, tan, fine to coarse SAND, to silty, fine SAND, generally finer with depth | SP to SM | - | 15 | DO | AIR HAMMER | 24/24 | |
| 45.42 | | | | | | | | | |
| 149.0 | | Very dense, brown, silty, fine to coarse SAND, some fine to coarse gravel | SM | - | 16 | DO | AIR HAMMER | 14/18 | |
| 47.55 | | | | | | | | | |
| 156.0 | | Green weathered bedrock | | | | | | | |
| 49.38 | | | | | | | | | |
| 162.0 | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | - | 6 | DO | AIR HAMMER | 11/11 | |
| | | Dense, fine to coarse SAND, some clay, some gravel, trace silt | SC | | 7 | DO | AIR HAMMER | 2/2 | |
| 21.79 | | | | | | | | | |
| 71.5 | | CONTINUED | | | | | | | |

Grout (to surface)

2" Solid PVC Pipe (to surface)

20.42

Bentonite Clay Seal 67.0 / 21.03

69.0

Pea Gravel

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | Pea Gravel |
| 23.77 | | | | | | | | | 22.86 |
| 78.0 | | Dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | | | | | | 75.0 Pea Gravel |
| 25.30 | | | | - | 9 | DO | AIR HAMMER | 18/18 | |
| 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 | 25.91 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 | | | | | | | |

2" Solid PVC Pipe

2" Slotted PVC Pipe

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.46 | | CONTINUED | | | | | | | |
| 106.5 | | Dense, fine to coarse SAND, some gravel, trace silt | SP-SM | | | | | | |
| 33.53 | | | | | | | | | |
| 110.0 | | | | - | 12 | DO | AIR HAMMER | - | |
| | | Dense, red-brown, fine to coarse, silty SAND, some gravel, trace clay | SM | - | 13 | DO | AIR HAMMER | - | |
| 40.08 | | | | | | | | | |
| 131.5 | | Weathered rock, dark green, highly weathered bedrock | | | | | | | |
| 41.15 | | | | | | | | | |
| 135.0 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.15 | | CONTINUED | | | | | | | |
| 135.0 | | Weathered rock, dark green, highly weathered bedrock | | | | | | | |
| | | | | - | 14 | DO | - | - | |
| 43.59 | | | | | | | | | |
| 143.0 | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | - | 1 | DO | AIR HAMMER | 20/24 | |
| | | Loose, brown, fine SAND, some silt, some to trace clay | SM | - | 2 | DO | AIR HAMMER | 22/24 | |
| 4.57 | | | | | | | | | |
| 15.0 | | | | - | 3 | DO | AIR HAMMER | 18/24 | |
| | | Compact, brown and red-brown, fine to coarse SAND, trace to some fine gravel, trace to some clay, trace silt | SM to SC | - | 4 | DO | AIR HAMMER | 5/6 | 2" Solid PVC Pipe (to surface); Grout (to surface) |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | CONTINUED |
| 36.5 | | | | | | | | | Grout 11.89 |
| | | | | | | | | | Bentonite Clay Seal 39.0 / 12.50 |
| | | | | - | 5 | DO | AIR HAMMER | 18/18 | 41.0 |
| | | Compact, brown and red-brown, fine to coarse SAND, trace to some fine gravel, trace some clay, trace silt | SM to SC | | | | | | Pea Gravel |
| | | | | | | | | | 2" Solid PVC Pipe |
| 15.55 | | | | | | | | | 15.24 |
| 51.0 | | | | | | | | | 50.0 |
| | | | | - | 6 | DO | AIR HAMMER | 19/21 | Pea Gravel |
| | | Loose, reddish brown fine to coarse SAND, some silt, trace to some fine gravel, trace clay | SM | | | | | | 2" Slotted PVC Pipe |
| | | | | | | | | | 18.29 |
| | | | | - | 7 | DO | AIR HAMMER | 21/21 | 60.0 |
| 19.20 | | | | | | | | | Pea Gravel |
| 63.0 | | Decomposed rock | | | | | | | |
| 20.73 | | | | | | | | | |
| 68.0 | | Weathered rock | | | | | | | |
| 21.03 | | | | | | | | | |
| 69.0 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0<br>0.46 | | Brown, fine to medium SAND, some silt (Fill material) | SM | | | | | | |
| 1.5<br>0.61 | | Dark brown peat, woody | Pt | | | | | | |
| 2.0 | | Dense, gray green fine to medium SAND, trace to some silt | SP-SM | | | | | | |
| 3.2<br>10.5 | | | | - | 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<br>28.5 | | | | | | | | | |
| | | Brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | - | 4 | DO | AIR HAMMER | 12/24 | |
| 10.36<br>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 2 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | | CONTINUED | | | | | | | |
| 34.0 | | Brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | | | | | | |
| 12.19 | | | | | | | | | |
| 40.0 | | Dense, multicolored, fine to coarse GRAVEL and cobbles, trace silt | GP | - | 5 | DO | AIR HAMMER | 18/30 | |
| 13.72 | | | | | | | | | |
| 45.0 | | Tan, clayey, silty fine to medium SAND | SM-ML | | | | | | |
| | | | | - | 6 | DO | AIR HAMMER | 6/30 | |
| 16.76 | | | | | | | | | |
| 55.0 | | Yellow brown, fine to coarse SAND, trace fine gravel, trace silt | SP | | | | | | |
| | | | | - | 7 | DO | AIR HAMMER | 24/24 | |
| 21.03 | | | | | | | | | |
| 69.0 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe (to surface)

Grout (to surface)

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.03 | | CONTINUED | | | | | | | CONTINUED |
| 69.0 | | | | - | 8 | DO | | 24/24 | Grout |
| | | | | - | 9 | DO | AIR HAMMER | 22/22 | 2" Solid PVC Pipe; Bentonite Clay Seal 23.77 / 78.0 / 24.08 / 79.0; Pea Gravel |
| | | Yellow brown, fine to coarse SAND, trace fine gravel, trace silt | SP | - | 10 | DO | AIR HAMMER | 20/21 | 2" Slotted PVC Pipe; 25.60 / 84.0; Pea Gravel |
| | | | | - | 11 | DO | AIR HAMMER | 24/24 | 28.65 / 94.0; 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.70 | | CONTINUED | | | | | | | CONTINUED |
| 104.0 | | | | | | | | | |
| | | | | - | 12 | DO | AIR HAMMER | 20/20 | Pea Gravel (to bottom of boring) |
| | | Yellow brown, fine to coarse SAND, trace fine gravel, trace silt | SP | - | 13 | DO | AIR HAMMER | 18/18 | |
| | | | | - | 14 | DO | AIR HAMMER | 18/18 | |
| 42.37 | | | | | | | | | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | | | |
| 139.0 | | | | - | 15 | DO | AIR HAMMER | 24/27 | |
| | | Yellow brown, fine to coarse SAND, trace fine gravel, trace silt | SP | - | 16 | DO | AIR HAMMER | 24/24 | |
| | | | | - | 17 | DO | AIR HAMMER | 24/24 | |
| 51.21 | | | | | | | | | |
| 168.0 | | Dark green, competent TUFF | | - | - | - | DRILL CUTTINGS | - | |
| 53.34 | | | | | | | | | |
| 175.0 | | END OF BORING | | | | | | | |

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0<br>0.58 | | Brown, fine to medium SAND, some silt (Fill material) | SM | | | | | | GROUT 0.0 |
| 1.92 | | Dark brown peat | Pt | - | 1 | AS | PRESSURE HYDRAULIC | 18/36 | 0.91<br>2" Solid PVC Pipe<br>Bentonite Clay Seal 3.0<br>1.52 |
| 2.29 | | | | - | 2 | DO | PRESSURE HYDRAULIC | 18/36 | 5.0<br>2" Slotted PVC Pipe<br>Pea Gravel |
| 7.5<br>3.81 | | Grey green fine to medium SAND, trace to some silt | SP-SM | - | 3 | DO | LOST SAMPLE | 0/24 | 3.05<br>10.0 |
| 12.5 | | Dark gray green organic silty clay | OL | - | 4 | DO | P.H. | 23/24 | Pea Gravel |
| 6.1 | | | | - | 5 | DO | P.H. | 22/24 | 6.10 |
| 20.0 | | | | | | | | | 20.0 |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | 0.0 |
| | | | | - | 1 | DO | AIR HAMMER | 20/24 | Grout |
| | | | | - | 2 | DO | AIR HAMMER | 18/24 | 2.74 |
| | | Brown, fine to coarse SAND, some fine gravel, trace silt | SW-SM | | | | | | 9.0 Bentonite Clay Seal 3.35 |
| | | | | - | 3 | DO | AIR HAMMER | 24/24 | Pea Gravel 11.0 |
| | | | | | | | | | 3.66 12.0 Pea Gravel |
| | | | | - | 4 | DO | P.H. | 6/36 | 5.18 17.0 Pea Gravel |
| 6.10 | | | | | | | | | 6.10 |
| 20.0 | | | | | | | | | 20.0 |

2" Solid PVC Pipe

2" Slotted PVC Pipe

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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | |
| | | | | - | 3 | DO | P.H. | 24/24 | |
| | | Dense, brown, fine to coarse SAND, trace silt | SP | | | | | | |
| | | | | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 10.67 | | CONTINUED | | | | | | | |
| 35.0 | | | | - | 5 | DO | P.H. | 15/24 | |
| | | Dense, brown, fine to coarse SAND, trace silt | SP | - | 6 | DO | P.H. | 18/24 | |
| 17.68 | | | | | | | | | |
| 58.0 | | Dense, brown, fine SAND, trace silt | SP | - | 7 | DO | AIR HAMMER | 16/24 | |
| 20.57 | | | | | | | | | |
| 67.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 20.57 | | CONTINUED | | | | | | | |
| 67.5 | | 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 | | Dense, brown, fine to medium SAND, trace silt | SP | | | | | | |
| 101.5 | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 30.94 | | CONTINUED | | | | | | | |
| 101.5 | | | | - | 11 | DO | AIR HAMMER | 14/14 | |
| | | | | - | 12 | DO | AIR HAMMER | 16/20 | |
| | | Dense, brown, fine to medium SAND, trace silt | SP | | | | | | |
| | | | | - | 13 | DO | AIR HAMMER | 17/18 | |
| 39.93 | | | | | | | | | |
| 131.0 | | Dense, brown, fine to coarse SAND, trace silt to fine SAND, trace silt with occasional fine gravel | SP | - | 14 | DO | AIR HAMMER | 18/18 | |
| 41.61 | | | | | | | | | |
| 136.5 | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC/ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 41.61 | | CONTINUED | | | | | | | |
| 136.5 | | 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 | | | | | | | CONTINUED |

Grout (to surface) 46.33

Bentonite Clay Seal 46.94 – 152.0

2" Solid PVC Pipe (to surface)

2" Slotted PVC Pipe 154.0

Pea Gravel 49.38 – 162.0

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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 52.27 | | CONTINUED | | | | | | | 52.43 |
| 171.5 | | | | | | | | | 172.0 |
| | | | | - | 18 | DO | AIR HAMMER | 18/21 | |
| | | Very dense, brown, fine to coarse gravelly, fine to coarse SAND, trace silt, with areas free of the gravel | SP | | | | | | Pea Gravel |
| 57.94 | | | | - | 19 | DO | AIR HAMMER | 14/14 | |
| 190.1 | | Green, weathered rock | | | | | | | |
| 59.74 | | | | | | | | | |
| 196.0 | | END OF BORING | | | | | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Dense, tan, silty fine to medium SAND | SM | - | 1 | DO | P.H. | 13/18 | |
| 1.52 | | | | | | | | | |
| 5.0 | | 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 | |
| | | | | - | 3 | DO | AIR HAMMER | 12/18 | |
| 7.62 | | | | | | | | | |
| 25.0 | | Very dense, brown, fine to coarse SAND, some silt, some fine to coarse gravel | SM | - | 4 | DO | P.H. | 0/18 | |
| 10.67 | | | | | | | | | |
| 35.0 | | Very dense, brown, fine to coarse SAND, trace fine gravel, trace silt | SP | | | | | | |
| 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.28 | | CONTINUED | | | | | | | |
| 37.0 | | 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 | 2" Solid PVC Pipe (to surface) Grout (to surface) |
| 21.79 | | | | - | 8 | DO | AIR HAMMER | 15/18 | |
| 71.5 | | CONTINUED | | | | | | | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | 26.21 / 86.0 Bentonite Clay Seal 26.82 / 88.0 Pea Gravel 28.35 / 93.0 |
| 28.96 | | | | | | | | | |
| 95.0 | | 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" Solid PVC Pipe; 2" Slotted PVC Pipe; Sand and gravel cave-in 31.39 / 103.0 Sand and gravel cave-in |
| 32.46 | | | | | | | | | |
| 106.5 | | CONTINUED | | | | | | | 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 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown, clayey SILT | ML | - | 1 | DO | P.H. | 24/24 | |
| 1.52 | | | | | | | | | |
| 5.0 | | | | - | 2 | DO | P.H. | 18/24 | |
| | | | | - | 3 | DO | P.H. | 16/24 | |
| | | | | - | 4 | DO | P.H. | 10/10 | |
| | | Compact to dense, brown, fine to coarse SAND, trace silt, occasional gravel | SP | - | 5 | DO | P.H. | 14/14 | |
| | | | | - | 6 | DO | P.H. | 22/24 | |
| | | | | - | 7 | DO | P.H. | 13/19 | |
| 10.36 | | | | | | | | | |
| 34.0 | | CONTINUED | | | | | | | CONTINUED |

Grout (to surface)

2" Solid PVC Pipe (to surface)

Bentonite Clay Seal 9.14 – 30.0

Pea Gravel 9.75 – 32.0

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

COOR. N108070 ft. (N32940m)
E2280288 ft. (E695033m)

# BORING LOG G41-A23

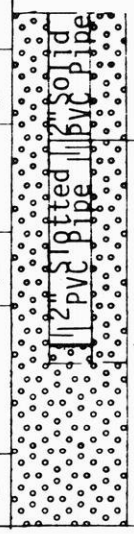


SURFACE ELEV. 1608.0 ft. (490.11m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 |
| | | | | - | 9 | DO | P.H. | 11/24 | Pea Gravel |
| | | | | - | 10 | DO | P.H. | 10/24 | Pea Gravel |
| 14.63 | | | | | | | | | |
| 48.0 | | END OF BORING | | | | | | | |




11.43
37.5
13.11
43.0

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | – | 1 | DO | AIR HAMMER | 4/12 | |
| | | Compact, brown, silty, fine to medium SAND | SM | | | | | | |
| 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 | | | | | | | | | |
| | | | | – | 3 | DO | AIR HAMMER | 0/19 | |
| | | 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 | | | | | | |
| | | | | – | 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

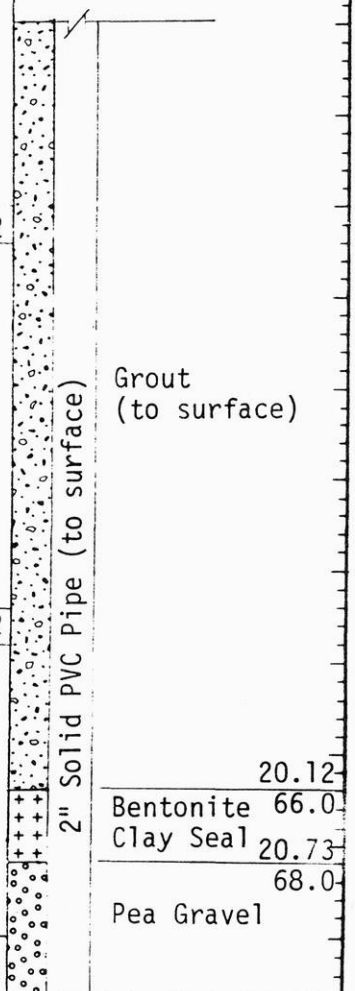


SURFACE ELEV. 1610.7 ft. (490.92m) PROJECT EXXON CRANDON TAILINGS DISPOSAL SYSTEM

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | |
| 36.5 | | | | - | 5 | DO | AIR HAMMER | 18/18 | |
| | | Dense to very dense, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SM | - | 6 | DO | AIR HAMMER | 12/12 | |
| | | | | - | 7 | DO | AIR HAMMER | 8/12 | |
| 21.79 | | | | - | 8 | DO | AIR HAMMER | 18/18 | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC. / ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | CONTINUED |
| 71.5 | | | | | | | | | Pea Gravel |
| | | | | | | | | | 22.86 |
| | | | | | | | | | 75.0 |
| | | | | | | | | | Pea Gravel |
| | | | | - | 9 | DO | AIR HAMMER | 9/12 | |
| | | | | | | | | | 25.91 |
| | | Dense to very dense, fine to coarse SAND, some fine to coarse gravel, some silt, trace clay | SP-SM | | | | | | 85.0 |
| | | | | - | 10 | DO | AIR HAMMER | 0/12 | |
| 28.96 | | | | | | | | | Pea Gravel |
| 95.0 | | Very dense, brown to red, fine to coarse SAND, some to trace silt, trace fine gravel | SM | - | 11 | DO | AIR HAMMER | 18/18 | |
| 32.00 | | | | | | | | | |
| 105.0 | | Very dense, red-brown silty fine to coarse SAND, trace fine gravel | | | | | | | |
| 32.46 | | | | | | | | | |
| 106.5 | | CONTINUED | | | | | | | CONTINUED |

2" Slotted PVC Pipe

2" Solid PVC Pipe

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Very loose, dark brown, organic SILT, trace clay | OL | | | | | | 2" Solid PVC Pipe; Grout |
| 2.44 | | | | | | | | | 2.59 |
| 8.0 | | | | - | 1 | DO | P.H. | 11/24 | Bentonite Clay Seal 8.5 – 3.20 |
| | | Loose, gray-brown, fine to medium SAND, trace silt | SP-SM | | | | | | 10.5 Pea Gravel; 2" Slotted PVC Pipe |
| | | | | - | 2 | DO | P.H. | 12/24 | 3.96 – 13.0 Pea Gravel |
| | | | | | | | | | 5.49 – 18.0 Pea Gravel; 2" Solid PVC Pipe |
| 6.71 | | | | - | 3 | DO | P.H. | 10/24 | |
| 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

COOR. 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | - | 1 | DO | P.H. | 24/24 | |
| | | | | - | 2 | DO | P.H. | 17/18 | |
| | | 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 | - | 3 | DO | P.H. | 20/24 | |
| | | | | - | 4 | DO | P.H. | 18/18 | |
| 10.67 | | | | | | | | | |
| 35.0 11.13 | | See Sheet 2 for description | | | | | | | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 / 36.5 | | CONTINUED | | | | | | | |
| | | 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 | |
| 16.76 / 55.0 | | 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 | - | 7 | DO | AIR HAMMER | 3/3 | |
| 21.79 / 71.5 | | CONTINUED | | - | 8 | DO | AIR HAMMER | 3/6 | |

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MIF

COOR. N102500 ft. (N31243m)
E2282115 ft. (E695590m)

# BORING LOG G41-C32



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 21.79 | | CONTINUED | | | | | | | |
| 71.5<br>22.86 | | 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 | | | | | | |
| 75.0<br>25.91 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP | - | 9 | DO | AIR HAMMER | 8/10 | |
| 85.0<br>28.96 | | Very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt | SM | - | 10 | DO | AIR HAMMER | 4/4 | |
| 95.0<br>32.00 | | 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 | |
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 32.00 | | CONTINUED | | | | | | | |
| 105.0 | | | | - | 12 | DO | AIR HAMMER | 3/8 | |
| | | 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 | - | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | - | 19 | DO | AIR HAMMER | 18/24 | |
| | | 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 | - | 20 | DO | AIR HAMMER | 16/18 | Grout (to surface); 2" Solid PVC Pipe (to surface); 60.35; Bentonite Clay Seal 198.0 / 60.96; 200.0 Pea Gravel |
| 60.96 | | | | | | | | | |
| 200.0 | | Very dense, tan, fine to medium SAND, trace silt | SP | | | | | | |
| 61.72 | | | | | | | | | |
| 202.5 | | CONTINUED | | | | | | | 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6 IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 61.72 | | CONTINUED | | | | | | | CONTINUED |
| 202.5 | | | | - | 21 | DO | AIR HAMMER | 12/12 | 2" Solid PVC Pipe; Pea Gravel |
| | | | | - | 22 | DO | AIR HAMMER | 18/18 | 64.92 / 213.0 |
| | | Very dense, tan, fine to medium SAND, trace silt | SP | | | | | | 2" Slotted PVC Pipe; Pea Gravel |
| | | | | - | 23 | DO | AIR HAMMER | 18/18 | 67.97 / 223.0 |
| 69.34 | | | | | | | | | |
| 227.5 | | | | | | | | | Pea Gravel (to bottom of boring) |
| | | Very dense, brown, fine to coarse SAND, some silt, some fine gravel | SM | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 72.09 | | CONTINUED | | | | | | | |
| 236.5 | | Very dense, brown, fine to coarse SAND, some silt, some fine gravel | SM | | | | | | |
| 73.46 | | | | | | | | | |
| 241.0 | | | | - | 25 | DO | AIR HAMMER | 12/12 | |
| | | Green and tan severely weathered ROCK | | | | | | | |
| 79.86 | | | | | | | | | |
| 262.0 | | END OF BORING | | | | | | | |

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | | |
| | | | | - | 1 | DO | AIR HAMMER | - | |
| | | | | - | 2 | DO | AIR HAMMER | - | |
| | | | | - | 3 | DO | AIR HAMMER | 14/24 | |
| | | Brown, fine to coarse SAND, some silt, some fine to coarse gravel | SP-SM | - | 4 | DO | AIR HAMMER | 12/12 | |
| | | | | - | 5 | DO | P.H. | 15/24 | |
| | | | | - | 6 | DO | AIR HAMMER | 12/14 | |
| 10.06 | | | | | | | | | |
| 33.0 | | Very dense to dense, brown, fine to coarse SAND, some clay, some fine to medium gravel | SC | | | | | | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 11.13 | | CONTINUED | | | | | | | |
| 36.5 | | | | - | 7 | DO | AIR HAMMER | 17/17 | |
| | | Very dense to dense, brown, fine to coarse SAND, some clay, some fine to medium gravel | SC | - | 8 | DO | AIR HAMMER | 15/15 | |
| | | | | - | 9 | DO | AIR 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 | |
| 22.86 | | | | | | | | | |
| 75.0 | | | | - | 11 | DO | AIR HAMMER | 22/22 | |
| | | Compact, brown, fine SAND, trace to some silt | SP to SM | - | 12 | DO | AIR HAMMER | 18/18 | 2" Solid PVC Pipe (to surface) Grout (to surface) |
| | | | | - | 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

COOR. 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. | SAMPLES: BLOWS / FOOT | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: HAMMER BLOWS PER 6IN. | SAMPLES: REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 31.70 / 104.0 | | CONTINUED | | | | | | | |
| | | Compact, brown, fine SAND, trace to some silt | SP to SM | - | 14 | DO | AIR HAMMER | 16/17 | |
| | | | | - | 15 | DO | AIR HAMMER | 18/18 | |
| | | | | - | 16 | DO | AIR HAMMER | 15/15 | |
| 42.37 / 139.0 | | CONTINUED | | | | | | | |

Grout

32.92 / 108.0

Bentonite Clay Seal

33.53 / 110.0

2" Solid PVC Pipe

Pea Gravel

35.05 / 115.0

2" Slotted PVC Pipe

Pea Gravel

38.10 / 125.0

Pea Gravel

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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 42.37 | | CONTINUED | | | | | | | CONTINUED |
| 139.0 | | | | - | 17 | DO | AIR HAMMER | | Pea Gravel (to bottom of boring) |
| | | Compact, brown, fine SAND, trace to some silt | SP to SM | - | 18 | DO | AIR HAMMER | 14/15 | |
| | | | | - | 19 | DO | AIR HAMMER | 10/10 | |
| | | | | - | 20 | DO | AIR HAMMER | 9/20 | |
| 53.04 | | | | | | | | | |
| 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 53.04 | | CONTINUED | | | | | | | |
| 174.0 | | | | | | | | | |
| | | | | - | 21 | DO | AIR HAMMER | 10/15 | |
| | | Compact, brown, fine SAND, trace to some silt | SP to SM | - | 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



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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 62.94 | | CONTINUED | | | | | | | |
| 206.5 | | | | - | 24 | DO | AIR HAMMER | 11/11 | |
| | | Compact, brown, fine SAND, trace to some silt | SP to SM | | | | | | |
| 66.53 | | | | | | | | | |
| 215.0 | | Fine to coarse SAND, some silt | SM | | | | | | |
| 66.45 | | | | | | | | | |
| 218.0 | | Green, moderately weathered bedrock | | | | | | | |
| 68.28 | | | | - | 25 | DO | AIR HAMMER | 10/10 | |
| 224.0 | | 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 1 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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | | Compact, brown SILT, some fine to coarse gravel, some fine to coarse sand | ML | - | 1 | DO | P.H. | 17/21 | 0.0 Grout |
| 1.07 | | | | | | | | | |
| 3.5 | | | | - | 2 | DO | AIR HAMMER | 15/21 | |
| | | Compact, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | SP-SM | - | 3 | DO | AIR HAMMER | 12/12 | 7.93 Bentonite Clay Seal 8.53 26.0 28.0 Pea Gravel 10.06 |
| 10.06 | | | | | | | | | |
| 33.0 | | Very dense, brown, fine to coarse SAND, some silt, trace clay, trace fine gravel | SM | - | 4 | DO | AIR HAMMER | 18/18 | 33.0 Pea Gravel |
| 11.13 | | | | | | | | | |
| 36.5 | | CONTINUED | | | | | | | CONTINUED |

2" Solid PVC Pipe

See Note 1

Job No. 814-1296
Scale 1"=5'

Golder Associates

Drawn CAB
Checked MTF

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 NUMBER | SAMPLES TYPE | SAMPLES HAMMER BLOWS PER 6IN. | SAMPLES REC./ATT. | GROUNDWATER OBSERVATION WELL |
|---|---|---|---|---|---|---|---|---|---|
| 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 38.0 Pea Gravel |
| 12.83 | | | | - | 5 | DO | AIR HAMMER | 13/13 | 12.83 |
| 42.1 | | END OF BORING | | | | | | | 42.1 |

NOTES:

1. 2" Slotted PVC Pipe from 33.0 - 38.0 feet.
2. 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

| Boring Logs | Number of Sheets |
|---|---|
| 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

BRAUN ENGINEERING TESTING

**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

| 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 |
| | | SM | SILTY SAND, some coarse gravel & boulders, brown, wet | 7<br>9<br>6 | | 1 | Bore hole advanced with tri-cone roller bit & revert drilling fluid.<br><br>Six inch diameter casing driven to 4-1/2 feet.<br><br>3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 6<br>8<br>9 | | 2 | |
| 4.0 | 13.0 | | | | | | |
| | | SW & GP | SAND & GRAVEL, some boulders, brown, moist to wet | 43<br>53 | | 3 | |
| | | | | 56<br>100 | | 4 | |
| 7.6 | 25.0 | | | 67<br>101 | | 5 | |
| | | | Continued on next page | | | | Crew Chief: Ron Kwilinski |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 8 |
| | | SW & GP | SAND & GRAVEL, some boulders, brown, wet | 72/140 | | 6 | |
| 10.4 | 34.0 | | | | | | |
| | | SP to SM | SAND to SILTY SAND, fine grained, with coarse gravel, a few boulders, reddish brown, moist | 60/154 | | 7 | |
| | | | Boulder from 38' to 41' | 125/6" | | 8 | |
| 14.9 | 49.0 | | | | | | |
| 15.2 | 50.0 | SP | SAND, fine to medium grained,** | 86/100 | | 9 | |
| | | | **with medium to coarse gravel, brown, wet | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 3 of 8 |
| | | SP | SAND, fine to medium grained, with medium to coarse gravel, a few boulders, brown, wet | | | | |
| | | | | 150/1" | | * | *No Recovery |
| 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 | SILTY SAND, fine grained, with medium to coarse gravel, brown, moist | 36/79 | | 12 | |
| 22.9 | 75.0 | | | | | | |
| | | | | 200/5" | | 13 | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 8 |
| | | SP to SM | SAND TO SILTY SAND, fine grained, with medium to coarse gravel, brown, waterbearing | 120/4" | | 14 | |
| 25.6 | 84.0 | | | | | | |
| | | SM | SILTY SAND, with coarse gravel, brown, moist<br><br>Boulder encountered at 87' | 95/100 | | 15 | |
| 27.1 | 89.0 | | | | | | |
| | | SP | SAND, fine grained, with coarse gravel, brown, moist | 200/6" | | 16 | |
| 28.7 | 94.0 | | | | | | |
| | | GP | COARSE GRAVEL & BOULDERS | 200/6" | | * | *No Recovery |
| 30.2 | 99.0 | | | | | | |
| 30.5 | 100.0 | SM | SILTY SAND, fine grained, with*** | 200/3" | | 17 | |
| | | | ***coarse gravel, reddish brown, moist<br><br>Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 30.5 | DEPTH FEET 100.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 5 of 8 |
| | | SM | SILTY SAND, with medium to coarse gravel, reddish brown, moist | | | | |
| | | | | 118/6" | | 18 | |
| | | | Boulder encountered at 120' | 135/6" | | 19 | |
| 38.1 | 125.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 |
| | | SM | SILTY SAND, with coarse gravel, reddish brown, moist | | | | |
| | | | | 214/6" | | 20 | |
| | | | | 300/5" | | 21 | |
| 45.7 | 150.0 | | | 300/5" | | 22 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>1" = 4' |

| 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 |
| | | SM | SILTY SAND, with coarse gravel, brown to reddish brown, moist | | | | |
| 47.9 | 157.0 | | | | | | |
| | | SP | SAND, fine to medium grained, with coarse gravel, brown, moist | | | | |
| | | | | 133/6" | | 23 | |
| 51.2 | 168.0 | | | | | | |
| | | SM to ML | SILTY SAND TO SANDY SILT, with coarse gravel, reddish brown, moist | | | | |
| | | | | 118/6" | | 24 | |
| 53.3 | 175.0 | | | | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

(Corrected Log 5/6/81)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 | 100/211 | | 25 | |
| 57.3 | 188.0 | | Bedrock, weathered, red | 100/130 | | 26 | |
| 61.1 | 200.5 | | | 400/6" | | 27 | |
| | | | Drilling fluid level down 3' immediately after completion.<br><br>Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

(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 |
| | | CL | SILTY SANDY CLAY, gray, wet | | | | Bore hole advanced with tri-cone roller bits & Revert drilling fluid. |
| | | | | 10<br>12<br>15 | | 24 | Six inch diameter casing driven to 8 feet. |
| 2.1 | 7.0 | | | | | | |
| | | SM-SC | SILTY CLAYEY SAND, a trace of fine gravel, brownish gray, wet | | | | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 19<br>31<br>33 | | 25 | |
| 4.0 | 13.0 | | | | | | |
| | | SM | SILTY SAND, some fine to medium gravel, brown, moist | 60<br>69<br>53 | | 26 | |
| | | | | 57<br>49<br>53 | | 27 | |
| 6.7 | 22.0 | | | | | | |
| | | SP | SAND, a little fine to medium gravel, orange-brown, moist | | | | |
| 7.6 | 25.0 | | | 100/3" | | 28 | |
| | | | Continued on next page | | | | Crew Chief: William Donahue |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| | |
|---|---|
| **PROJECT:** DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | **BORING:** BE 211-2 (Continued)<br>**LOCATION:** At Staked Location<br>SCALE: 25.4 mm = 1.22 m<br>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 8 |
| | | SP | SAND, a little fine to medium gravel, a few boulders, orange-brown, moist | | | | |
| | | | | 100/4" | | 29 | |
| | | | | 100/4" | | 30 | |
| | | | | 100/3" | | 31 | |
| | | | | 100/4" | | 32 | |
| 15.2 | 50.0 | | | | | * | *Boulder Encountered |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 3 of 8 |
| | | SP | SAND, a little fine to medium gravel, a few boulders, orange-brown, moist | | | | |
| 15.8 | 52.0 | | | | | | |
| | | CL with SM | SILTY CLAY varved with fine SILTY SAND, some fine to medium gravel, a few cobbles, red, moist | 100/6" | | 33 | |
| | | | | 100/5" | | 34 | |
| 18.9 | 62.0 | | | | | | |
| | | SM & GP | SILTY SAND & GRAVEL, a few cobbles, reddish brown, moist | 59 100/4" | | 35 | |
| | | | | 100/4" | | 36 | |
| 22.9 | 75.0 | | | 100/4" | | 37 | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| | |
|---|---|
| **PROJECT:** DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | **BORING:** BE 211-2 (Continued)<br>**LOCATION:** At Staked Location<br>SCALE: 25.4 mm = 1.22 m<br>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 8 |
| | | SM & GP | SILTY SAND & GRAVEL, a few cobbles & boulders, reddish brown, moist | | | | |
| | | | | 89<br>100/3" | | 38 | |
| | | | Waterbearing at 83' | | | | |
| | | | | 57<br>63<br>69 | | 39 | |
| | | | | 64<br>69<br>72 | | 40 | |
| | | | | 100/4" | | 41 | |
| 30.5 | 100.0 | | | | | * | *Boulder Encountered |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 | | | | |
| | | | | 57<br>62<br>79 | | 42 | |
| 34.1 | 112.0 | | | | | | |
| | | SP | SAND, a trace of fine gravel, brown, waterbearing | | | | |
| | | | | 100/<br>2-1/2" | | 43 | |
| 38.1 | 125.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 6 of 8 |
| | | SP | SAND, a trace of fine gravel, brown, waterbearing | 100/4" | | 44 | |
| 40.8 | 134.0 | GP | GRAVEL & BOULDERS | 100/6" | | * | *No Recovery |
| 44.2 | 145.0 | SP & GP | SAND & GRAVEL, brown, wet | 29 | | | |
| 45.7 | 150.0 | | | 67 | | 45 | |
| | | | | 52 | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 45.7 | DEPTH FEET 150.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | 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

BRAUN ENGINEERING TESTING

**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

| 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 | 149 6/6" | | 48 | |
| | | | (Evidence of higher water pressure at 177') . | | | | |
| 55.8 | 183.0 | | | | | | |
| | | SM | SILTY SAND, some fine to medium gravel, reddish brown | 259 750/3" | | 49 | |
| 56.8 | 186.5 | | | | | | |
| 57.5 | 188.5 | | Bedrock | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

(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 |
|---|---|---|---|---|---|---|---|
| | | SM | SILTY SAND, brown, moist | 29<br>30<br>35 | | 93 | Page 1 of 9<br>Bore hole advanced with tri-cone roller bits & Revert drilling fluid to the 197 foot depth.<br>Six inch diameter casing driven to 8 feet. |
| | | | | 31<br>42<br>49 | | 94 | 3 inch OD sampler driven with 250# hammer falling 24 inches. |
| 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<br>100/2" | | 96 | |
| 6.7 | 22.0 | SP | SAND, mostly fine to medium grained, brown, moist | 52<br>60<br>76 | | 97 | |
| 7.6 | 25.0 | | Continued on next page | | | | Crew Chief: Ron Kwilinski |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-3 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 9 |
| | | SP | SAND, mostly fine to medium grained, brown, moist | 39<br>50<br>50 | | 98 | |
| 10.4 | 34.0 | | | | | | |
| | | SP | SAND, medium to coarse grained, brown, moist | 100/6" | | 99 | |
| | | | | 42<br>49<br>62 | | 100 | |
| 12.8 | 42.0 | | | | | | |
| | | SP & GP | SAND & GRAVEL, brown, moist | 79<br>100/3" | | 101 | |
| 15.2 | 50.0 | | | 100/6" | | 102 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 15.2 | DEPTH FEET 50.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 3 of 9 |
| | | SP & GP | SAND & GRAVEL | | | | |
| 15.8 | 52.0 | | | | | | |
| | | SM | SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist | 57<br>63<br>100/3" | | 103 | |
| | | | | 76<br>83<br>100/3" | | 104 | |
| | | | | 59<br>100/3" | | 105 | |
| | | | Layer of olive CLAYEY SILT at 70' | 100/5" | | 106 | |
| 22.9 | 75.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-3 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 9 |
| | | SM | SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist | | | | |
| | | | | 100/4" | | 107 | |
| | | | | 83 | | | |
| | | | | 100/2" | | 108 | |
| | | | | 100/4" | | 109 | |
| | | | | 97 | | | |
| | | | | 100/1" | | 110 | |
| 30.5 | 100.0 | | | | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| 30.5 | 100.0 | | | | | | Page 5 of 9 |
| | | SM | SILTY SAND, a trace of fine gravel, a few cobbles, brown, moist | | | | |
| 33.2 | 109.0 | | | | | | |
| | | GP | FINE GRAVEL, brown, wet | 100/3" | | 111 | |
| 34.1 | 112.0 | | | | | | |
| | | SM | SILTY SAND, a little fine to medium gravel, brown, moist | | | | |
| | | | | 100/4" | | 112 | |
| 38.1 | 125.0 | | | | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 211-3 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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 9 |
| | | SM | SILTY SAND, a little fine to medium gravel, brown-reddish brown at 148', moist | | | | |
| | | | | 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

BRAUN ENGINEERING TESTING

**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 45.7 | DEPTH FEET 150.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | 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

BRAUN ENGINEERING TESTING

| | |
|---|---|
| **PROJECT:** DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | **BORING:** BE 211-3 (Continued)<br>**LOCATION:** At Staked Location<br>SCALE: 25.4 mm = 1.22 m<br>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 | | | | | | Page 8 of 9 |
| | | SM | SILTY SAND, a little fine to medium gravel, a few cobbles, reddish brown, moist | | | | NW Casing driven to 193'. |
| | | | | 73<br>79<br>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'<br>Fractured from 207' to 209'<br><br>Normal to fast rate of advance<br><br>Water pressure -- Normal<br><br>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

BRAUN ENGINEERING TESTING

**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

| DEPTH METERS | DEPTH FEET | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| 62.5 | 205.0 | | | | | | Page 9 of 9 |
| | | | Bedrock, silver-gray | | | | |
| | | | Recovery: 197' - 202' 23.3% | 14" | | | |
| | | | 202' - 205-1/2' 63.3% | 26½" | | | |
| | | | 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% | 53½" | | | |
| | | | Diamond bit plugged at 202' | | | | |
| 67.2 | 220.5 | | | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

| 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, brown, frozen to 2-1/2' then moist | | | | Bore hole advanced with tri-cone roller bits & Revert drilling fluid. |
| | | | | 5<br>7<br>9 | | 1 | Six-inch diameter casing driven to 8 feet |
| | | | | | | | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 8<br>8<br>6 | | 2 | |
| 4.0 | 13.0 | | | | | | |
| | | SP-SM | SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, brown, moist | 100/ | 2" | | |
| | | | Continuous boulders from 14-1/2' to 19' | 9<br>19<br>17 | | 3 | |
| 7.6 | 25.0 | | | 18<br>19<br>19 | | 4 | |
| | | | Continued on next page | | | | Crew Chief: William Donahue |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
| | | SP-SM | SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, brown, moist | | | | |
| 8.8 | 29.0 | | | | | | |
| | | SP-SM & GP | SLIGHTLY SILTY SAND & GRAVEL, some boulders, brown, moist to wet | 100/4" | | 5 | |
| | | | | 168/6" | | 6 | |
| | | | Continuous boulder from 48' to 65' | 97<br>85<br>76 | | 7 | |
| | | | | 100/0" | | * | *No Penetration |
| 15.2 | 50.0 | | | 100/0" | | * | *No Penetration |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 213-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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<br>(Water pressure evident at 70') | | | | |
| 22.9 | 75.0 | | | 50<br>54<br>72 | | 8 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

| 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 4 |
|---|---|---|---|---|---|---|---|
| 23.5 | 77.0 | SP-SM | SLIGHTLY SILTY SAND, some fine to medium gravel, brown, wet to waterbearing | | | | |
| | | | COBBLES | 100/4" | | 9 | |
| 25.3 | 83.0 | | | | | | |
| | | CL | SILTY CLAY, a trace of fine gravel, red, moist to wet | 113/6" | | 10 | |
| 26.8 | 88.0 | | | | | | |
| | | | Bedrock<br><br>Water pressure noted at 88' | | | | |
| 28.2 | 92.5 | | | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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<br>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<br>11<br>12 | | 11 | Six-inch diameter Casing driven to 8 feet. |
| | | | | 10<br>10<br>10 | | 12 | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 15<br>16<br>15 | | 13 | |
| 4.9 | 16.0 | | | | | | |
| | | SP-SM | SLIGHTLY SILTY SAND, some fine to medium gravel, some boulders, light brown, moist | 12<br>15<br>13 | | 14 | |
| 7.6 | 25.0 | | | 29<br>33<br>42 | | 15 | |
| | | | Continued on next page | | | | Crew Chief: William Donahue |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| 7.6 | 25.0 | | | | | | Page 2 of 4 |
| | | SP & GP | SAND & GRAVEL, brown, wet | 49<br>45<br>42 | | 16 | |
| | | | | 100/7" | | 17 | |
| 11.6 | 38.0 | | | | | | |
| | | GP | GRAVEL, fine to coarse, some boulders, moist to wet | 100/4" | | 18 | |
| | | | | 100/4" | | * | *No Recovery |
| 15.2 | 50.0 | | | 100/6" | | 19 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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'

(See Report and Standard Plates for evaluation and descriptive terminology.)

| DEPTH METERS 15.2 | DEPTH FEET 50.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes Page 3 of 4 |
|---|---|---|---|---|---|---|---|
| | | GP | GRAVEL, fine to coarse, some boulders & Cobbles, moist to wet | | | | |
| | | | 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 | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 | |
| | | | | 100/4" | | 22 | |
| 26.2 | 86.0 | | | | | | |
| | | CL | SILTY CLAY, a trace of fine gravel, reddish brown, moist | | | | |
| | | | | 100/5" | | 23 | |
| 28.3 | 93.0 | | | | | | |
| | | | Bedrock | | | | |
| 29.0 | 95.0 | | | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

| 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 5 |
| | | 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<br>14<br>16 | | 28 | Six-inch diameter casing driven to 4-1/2 feet. |
| | | | | 13<br>12<br>13 | | 29 | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 33<br>39<br>36 | | 30 | |
| 5.5 | 18.0 | | | | | | |
| | | SM | SILTY SAND, fine grained, brown, moist, waterbearing<br><br>Loss of drilling fluid from 15 feet | 46<br>75<br>79 | | 31 | |
| 7.3 | 24.0 | | | | | | |
| 7.6 | 25.0 | SP | SAND, fine grained, with medium** | 50<br>104 | | 32 | |
| | | | **gravel, brown, waterbearing<br><br>Continued on next page | | | | Crew Chief: William Donahue |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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'

| 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 |
| | | SP | SAND, fine to medium grained, with medium to coarse gravel, brown, waterbearing | | | | |
| 8.8 | 29.0 | | | | | | |
| | | SP | SAND, fine grained, brown, waterbearing | 50/100 | | 33 | |
| 10.4 | 34.0 | | | | | | |
| | | SP | SAND, fine to medium grained, with medium to coarse gravel, some boulders, brown, moist | 53/118 | | 34 | |
| | | | | 67/100 | | 35 | |
| | | | Boulder encountered at 44' | | | | |
| | | | | 200/4" | | 36 | |
| 15.2 | 50.0 | | | 70/100 | | 37 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 213-3 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>1" = 4' |

| DEPTH METERS | DEPTH FEET | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes<br>Page 3 of 5 |
|---|---|---|---|---|---|---|---|
| | | SP | SAND, fine to medium grained, with coarse gravel & boulders, brown, moist | | | | |
| | | | | 120/6" | | 38 | |
| | | | | 200/5" | | 39 | |
| | | | | 200/2" | | * | *No Recovery |
| 22.3 | 73.0 | | | | | | |
| | | SM | SILTY SAND, a little medium gravel, brown to reddish brown, moist | 38 | | 40 | |
| 22.9 | 75.0 | | | 78 | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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<br>112 | | 41 | |
| 25.3 | 83.0 | | | | | | |
| | | CL | SILTY CLAY, a trace of fine to medium gravel, reddish brown, moist | 52<br>95 | | 42 | |
| 27.1 | 89.0 | | | | | | |
| | | | Bedrock | 200/5" | | 43 | Bore hole extended from 89' to 100' with tri-cone roller bits & Revert drilling fluid. |
| | | | Normal rate of advance<br>Water pressure -- Normal<br>Minimal loss of water from 100 to 110'<br>High loss of water from 110' to 115' | 200/5" | | 44 | |
| 30.5 | 100.0 | | | 500/5" | | 45 | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 213-3 (Continued) | |
|---|---|---|
| | LOCATION: At Staked Location | SCALE: 25.4 mm = 1.22 m<br>1" = 4' |
| | DATE: 3-24-81 | |

| DEPTH METERS 30.5 | DEPTH FEET 100.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes<br>Page 5 of 5 |
|---|---|---|---|---|---|---|---|
| | | | Diamond Bit plugged at the 101-1/2 foot depth.<br><br>Recovery: 100' - 105' ---- 10% 6"<br>105' - 110' ----57.5% 34½'<br>110' - 115' 0% 0" | | | | NW Casing driven to 89'<br>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.<br><br>Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

| 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 |
| | | ML | SANDY CLAYEY SILT, brown, moist | | | | Bore hole advanced with tri-cone roller bits & Revert drilling fluid. |
| | | | | 9 | | | |
| | | | | 12 | | 50 | Six-inch diameter casing driven to 8 feet. |
| | | | | 19 | | | |
| 2.1 | 7.0 | | | | | | |
| | | SM | SILTY SAND, fine grained, brown, moist | | | | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 10 | | | |
| | | | | 19 | | 51 | |
| | | | | 25 | | | |
| 4.3 | 14.0 | | | | | | |
| | | ML with SM | CLAYEY SILT, brown with intrusions of orange-brown SILTY SAND, moist to wet | 12 | | 52 | |
| | | | | 15 | | | |
| | | | | 17 | | | |
| 5.5 | 18.0 | | | | | | |
| | | SM | SILTY SAND, fine grained, brown, moist | | | | |
| | | | | 19 | | | |
| | | | | 27 | | 53 | |
| | | | | 38 | | | |
| 6.7 | 22.0 | | | | | | |
| | | SP & GP | SAND & GRAVEL, brown, moist to wet | | | | |
| | | | | 86 | | | |
| 7.6 | 25.0 | | | 100/4" | | 54 | |
| | | | Continued on next page | | | | Crew Chief: William Donahue |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
| | | SP & GP | SAND & GRAVEL, a few cobbles, brown, moist | | | | |
| | | | Boulder 27' - 29' | 96 | | | |
| | | | | 84 | | 55 | |
| | | | | 73 | | | |
| | | | | 49 | | | |
| | | | | 53 | | 56 | |
| | | | | 74 | | | |
| 11.3 | 37.0 | | | | | | |
| | | SM | SILTY SAND, some fine to medium gravel, brown | 100/6" | | 57 | |
| | | | | 59 | | | |
| | | | | 67 | | 58 | |
| | | | | 67 | | | |
| | | | | 59 | | | |
| 15.2 | 50.0 | | | 43 | | 59 | |
| | | | | 49 | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 15.2 | DEPTH FEET 50.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes 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 | | | |
| 22.9 | 75.0 | | | 83 | | 62 | |
| | | | | 87 | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 216-1 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>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<br>Page 4 of 6 |
|---|---|---|---|---|---|---|---|
| | | SM & GP | SILTY SAND & GRAVEL, some cobbles & boulders, brown, moist to wet | | | | |
| | | | | 97<br>100/4" | | 63 | |
| | | | | 100/3" | | 64 | |
| | | | | 82<br>87<br>100/3" | | 65 | |
| | | | (Boulder from 91' to 94') | | | | |
| | | | | 100/4" | | * | *No Recovery |
| 30.5 | 100.0 | | | 72<br>79<br>100/3" | | 66 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 30.5 | DEPTH FEET 100.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes Page 5 of 6 |
|---|---|---|---|---|---|---|---|
| | | SM & GP | SILTY SAND & GRAVEL, some cobbles & boulders, brown, moist to wet | | | | |
| | | | (Boulder from 103' to 107') | | | | |
| | | | | 49 | | | |
| | | | | 57 | | 67 | |
| | | | | 69 | | | |
| | | | | 52 | | | |
| | | | | 59 | | 68 | |
| | | | | 78 | | | |
| 38.1 | 125.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| | |
|---|---|
| **PROJECT:** DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | **BORING:** BE 216-1 (Continued)<br>**LOCATION:** At Staked Location<br>SCALE: 25.4 mm = 1.22 m<br>1" = 4'<br>DATE: 3-10-81 |

| DEPTH METERS 38.1 | DEPTH FEET 125.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes Page 6 of 6 |
|---|---|---|---|---|---|---|---|
| | | SM | SILTY SAND, some fine to medium gravel, reddish brown, moist | 54<br>57<br>78 | | 69 | |
| | | | Boulder from 136' to 138' | 69<br>73<br>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

BRAUN ENGINEERING TESTING

**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

(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 |
| | | SM | SILTY SAND, a trace of fine gravel, brown, moist | | | | Bore hole advanced with tri-cone roller bits & Revert drilling fluid. |
| | | | | 39<br>53<br>64 | | 71 | Six-inch diameter casing driven to 8 feet. |
| | | | | | | | 3-inch OD sampler driven with 250# hammer falling 24 inches. |
| | | | | 42<br>45<br>59 | | 72 | |
| 4.0 | 13.0 | | | | | | Redrilled bore hole 5' NW of staked location due to caving conditions at the 52 foot depth. |
| | | SP & GP | SAND & GRAVEL, mostly medium to coarse grained, moist to wet | 29<br>28<br>31 | | 73 | |
| | | | | 30<br>26<br>35 | | 74 | |
| 7.0 | 23.0 | | | | | | |
| | | GP | GRAVEL, brown, moist | | | | |
| 7.6 | 25.0 | | | | | | |
| | | | Continued on next page | 100/3" | | * | *No Recovery |
| | | | | | | | Crew Chief: William Donahue |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: BE 216-2 (Continued) |
|---|---|
| | LOCATION: At Staked Location |
| | SCALE: 25.4 mm = 1.22 m<br>1" = 4' |

| DEPTH METERS 7.6 | DEPTH FEET 25.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes<br>Page 2 of 6 |
|---|---|---|---|---|---|---|---|
| | | GP | GRAVEL, some cobbles, brown, moist | | | | |
| | | | | 100/4" | | 75 | |
| 10.4 | 34.0 | | | | | | |
| | | SP | SAND, mostly medium grained, brown, moist | 68<br>72<br>100/3" | | 76 | |
| | | | | 59<br>53<br>79 | | 77 | |
| | | | Boulders from 44' to 49' | | | | |
| 14.6 | 48.0 | | | | | | |
| | | SP & GP | SAND & GRAVEL, some boulders, brown, moist | | | | |
| 15.2 | 50.0 | | | 100/3" | | 78 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 15.2 | DEPTH FEET 50.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | SP & GP | SAND & GRAVEL, some boulders, brown, moist | | | | Page 3 of 6 |
| | | | Loss of water at 52', Caving conditions | 100/4" | | 79 | |
| | | | | 100/3" | | 80 | |
| 18.6 | 61.0 | | | | | | |
| | | SM | SILTY SAND, a little fine gravel, a few boulders, brown, moist | 59<br>100/4" | | 81 | |
| | | | | 78<br>85<br>97 | | 82 | |
| 22.9 | 75.0 | | | 100/3" | | 83 | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

BRAUN ENGINEERING TESTING

**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 30.5 | DEPTH FEET 100.0 | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 5 of 6 |
| | | SM | SILTY SAND, a little fine gravel, brown, moist | 59<br>63<br>47 | | 88 | |
| | | | | 79<br>93<br>100/3" | | 89 | |
| | | | | 63<br>94<br>100/2" | | 90 | |
| 38.1 | 125.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: | DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: | BE 216-2 (Continued) |
|---|---|---|---|
| | | LOCATION: | At Staked Location |
| | | SCALE: | 25.4 mm = 1.22 m<br>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<br>Page 6 of 6 |
|---|---|---|---|---|---|---|---|
| | | SM | SILTY SAND, a little fine gravel, brown, moist | | | | |
| 39.3 | 129.0 | | | | | | |
| | | CH | FAT CLAY, red, moist to wet | 87<br>100/4" | | 91 | |
| 42.1 | 138.0 | | | | | | |
| | | | Bedrock | 100/3" | | 92 | |
| 42.8 | 140.5 | | | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

| DEPTH METERS | DEPTH FEET | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 1 of 7 |
| | | | Boulders | | | | Bore hole advanced with tri-cone roller bits & Revert drilling fluid to the 150 foot depth. |
| .92 | 3.0 | | | | | | |
| | | ML | SANDY SILT, brown, wet | 10<br>5<br>6 | | 120 | |
| | | | | | | | Six inch diameter casing driven to 8 feet. |
| 2.4 | 8.0 | | | | | | |
| | | SM | SILTY SAND, brown, wet | 17<br>6<br>4 | | 121 | 3 inch OD sampler driven with 250# hammer falling 24 inches |
| | | | | 5<br>6<br>10 | | 122 | |
| 6.1 | 20.0 | | | | | | |
| | | SP | SAND, mostly fine to medium grained, brown, moist | 23<br>45<br>67 | | 123 | |
| 7.6 | 25.0 | | | | | | |
| | | | Continued on next page | | | | Crew Chief: William Donahue |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 | | | | | | Page 2 of 7 |
| | | SP | SAND, mostly fine to medium grained, a few cobbles, brown, moist | 87<br>100/2" | | 124 | |
| 9.9 | 32.5 | | | 87<br>69<br>73 | | 125 | |
| | | SM | SILTY SAND, a trace of fine gravel, a few cobbles & boulders, brown, moist | 100/4" | | 126 | |
| | | | | 92<br>100/0" | | 127 | |
| 15.2 | 50.0 | | | 63<br>69<br>100/2" | | 128 | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| 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<br>78<br>100/2" | | 131 | |
| | | | | 71<br>53<br>89 | | 132 | |
| | | | | 100/4" | | 133 | |
| 22.9 | 75.0 | | | | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

| PROJECT: | DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | BORING: | BE 216-3 (Continued) |
|---|---|---|---|
| | | LOCATION: | At Staked Location |
| | | SCALE: | 25.4 mm = 1.22 m<br>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<br>Page 4 of 7 |
|---|---|---|---|---|---|---|---|
| | | SM | SILTY SAND, a little fine to medium gravel, a few boulders, reddish brown, moist | 89<br>92<br>100/2" | | 134 | |
| | | | Boulders from 82' to 86' | 100/5" | | 135 | |
| | | | | 43<br>49<br>98 | | 136 | |
| 27.1 | 89.0 | | | | | | |
| | | SP | SAND, mostly fine to medium grained, some cobbles, brown, moist to wet | 61<br>72<br>100/2" | | 137 | |
| | | | Cobbles from 94' to 99' | 100/3" | | * | *No Recovery |
| 30.5 | 100.0 | | | | | | |
| | | | Continued on next page | | | | |

# LOG OF BORING

BRAUN ENGINEERING TESTING

| | |
|---|---|
| **PROJECT:** DS81-04 Soil Borings & Piezometer Installation<br>Proposed Mine Facility<br>Crandon, Wisconsin | **BORING:** BE 216-3 (Continued)<br>**LOCATION:** At Staked Location<br>SCALE: 25.4 mm = 1.22 m<br>1" = 4' |

| 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<br>97<br>100/2" | | 138 | Page 5 of 7 |
| | | | | 93<br>100/3" | | 139 | |
| | | | | 100/6" | | 140 | |
| 38.1 | 125.0 | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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 |
|---|---|---|---|---|---|---|---|
| | | | | | | | Page 6 of 7 |
| | | SP | SAND, mostly fine to medium grained, some fine to medium gravel, brown, moist to wet | | | | |
| 38.7 | 127.0 | | | | | | |
| | | SM | SILTY SAND, some fine to medium gravel, a few boulders, reddish brown, moist | | | | |
| | | | | 100/4" | | 141 | |
| | | | | 53 | | | |
| | | | | 93 | | 142 | |
| | | | | 100/2" | | | |
| 45.7 | 150.0 | | | | | | |
| | | | Continued on next page | | | | |

(See Report and Standard Plates for evaluation and descriptive terminology.)

# LOG OF BORING

BRAUN ENGINEERING TESTING

**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

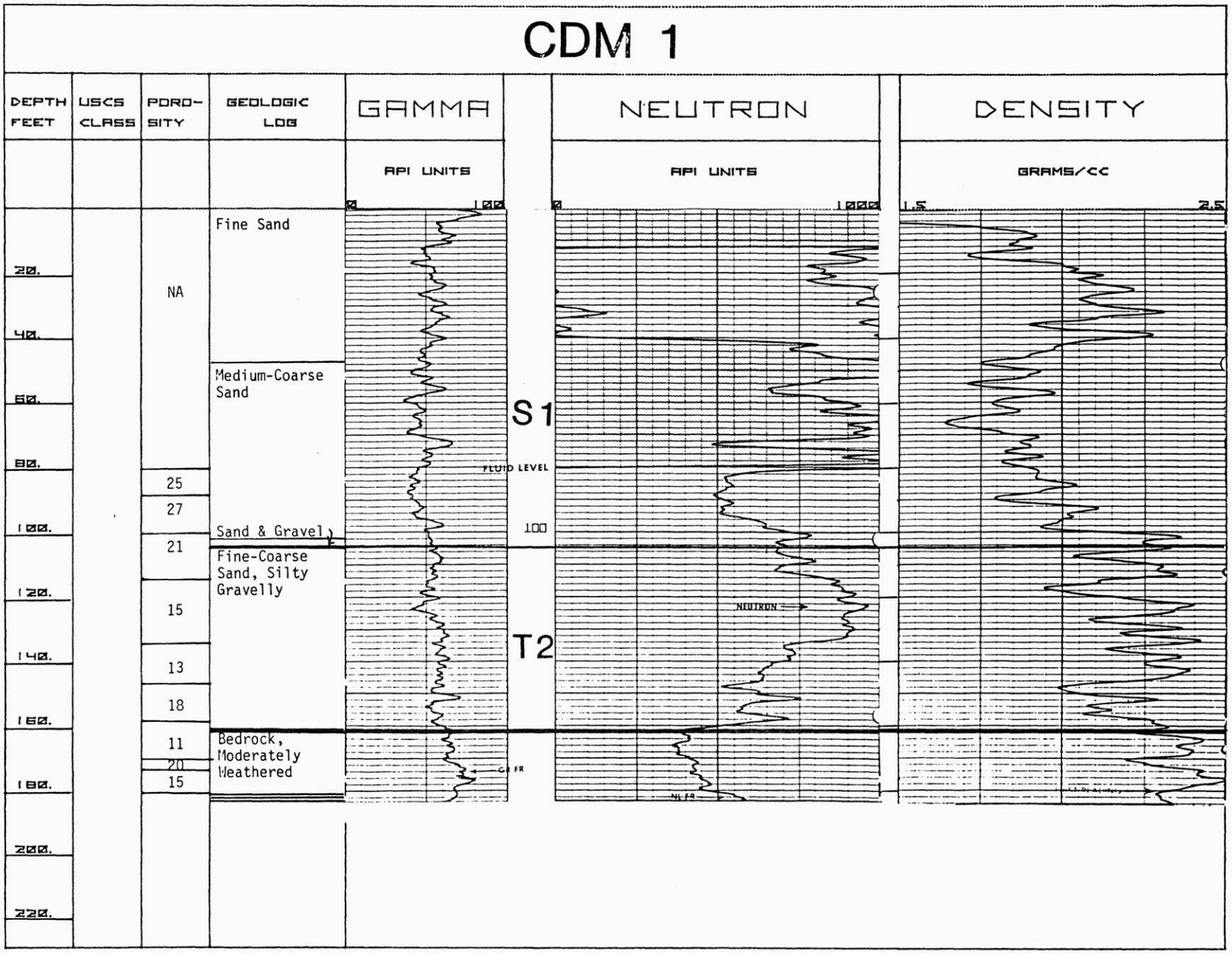
(See Report and Standard Plates for evaluation and descriptive terminology.)

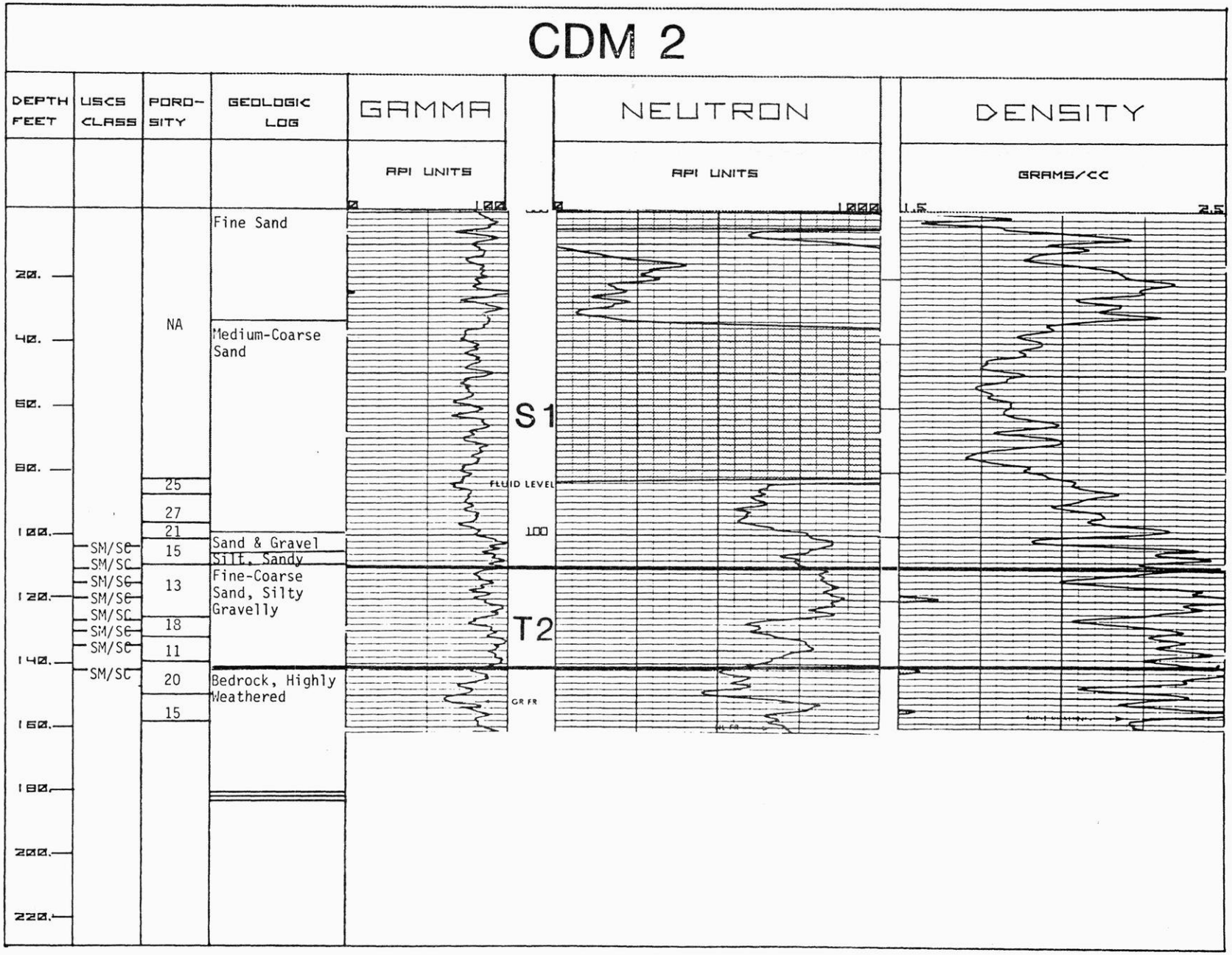
| DEPTH METERS | DEPTH FEET | ASTM D2487 Symbol | Description of Materials (ASTM: D2488) | BPF | WL | Sample Number | Tests or Notes |
|---|---|---|---|---|---|---|---|
| 45.7 | 150.0 | | | | | | Page 7 of 7 |
| | | | Bedrock, reddish orange | | | | NW casing driven to 152'. |
| | | | Normal rate of advance<br>Increased pressure needed to drill from 169-1/2' to 178-1/2' | | | | Bore hole extended from 152' to 178-1/2' with NQ Diamond Bit & "Q" series wire line coring equipment. |
| | | | Minimal loss of drilling fluid. | | | | |
| | | | Water pressure -- normal | | | | |
| | | | Recovery: 152' - 154-1/2' 93.3% | 28" | | | |
| | | | 154-1/2'-159-1/2' 100% | 60" | | | |
| | | | 159-1/2'-164-1/2' 100% | 60" | | | |
| | | | 164-1/2'-169-1/2' 97.5% | 58" | | | |
| | | | 169-1/2'-174-1/2' 100% | 60" | | | |
| | | | 174-1/2'-178-1/2' 0%* | 0" | | | *NQ core barrel abandoned in bore hole |
| 54.4 | 178.5 | | | | | | |
| | | | Water level not measured due to the presence of drilling fluid. | | | | |

BORING LOGS

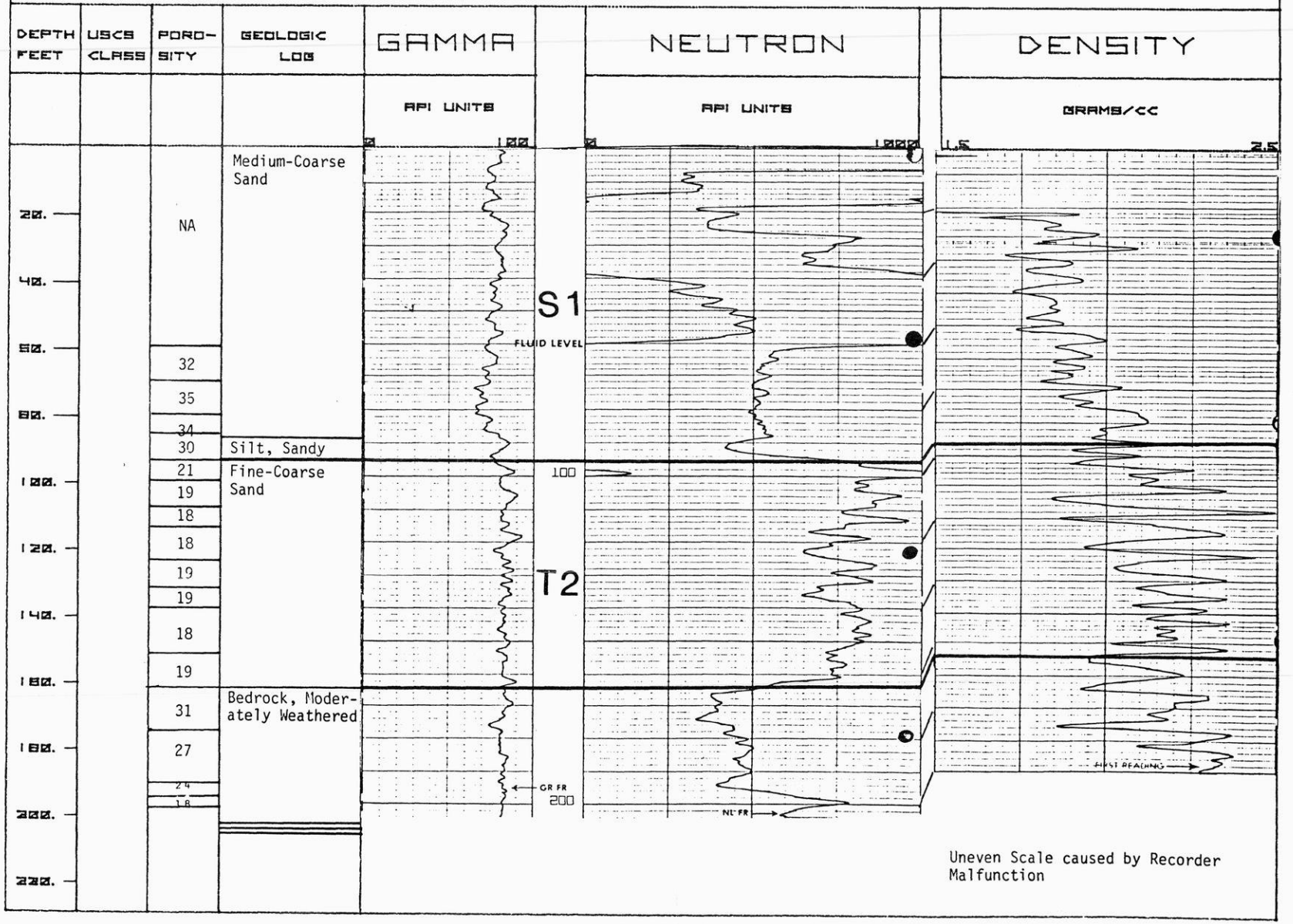
CAMP DRESSER & McKEE

| Boring Logs | Number of Sheets |
|---|---|
| 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 |

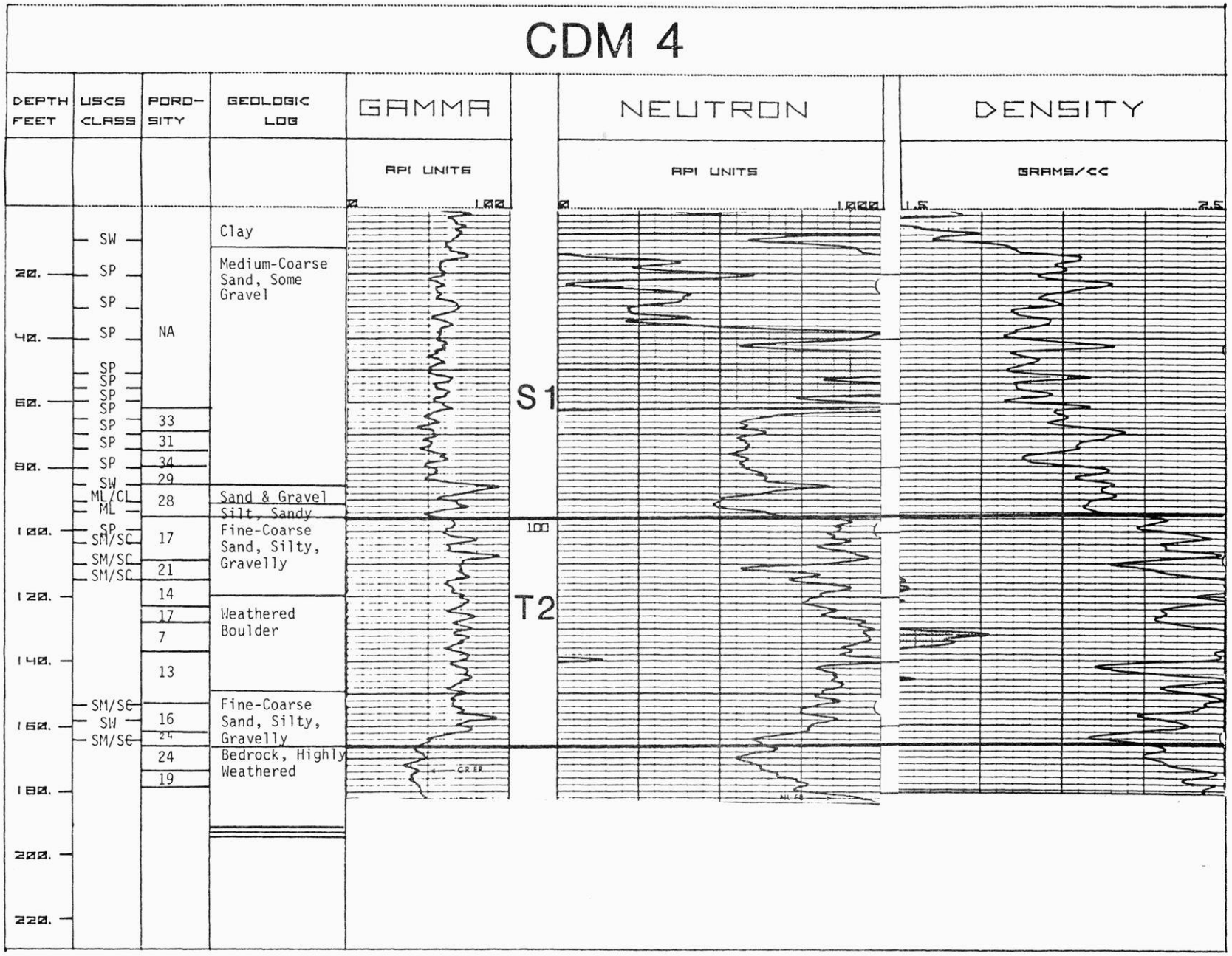

CDM 1
DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
NA
25
27
21
15
13
18
11
20
15
Fine Sand
Medium-Coarse Sand
Sand & Gravel
Fine-Coarse Sand, Silty Gravelly
Bedrock, Moderately Weathered
S1
FLUID LEVEL
100
T2
NEUTRON


CDM 2
DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
Fine Sand
Medium-Coarse Sand
NA
25
27
21
15
13
18
11
20
15
Sand & Gravel
Silt, Sandy
Fine-Coarse Sand, Silty Gravelly
Bedrock, Highly Weathered
SM/SC
S1
FLUID LEVEL
100
T2
GR FR

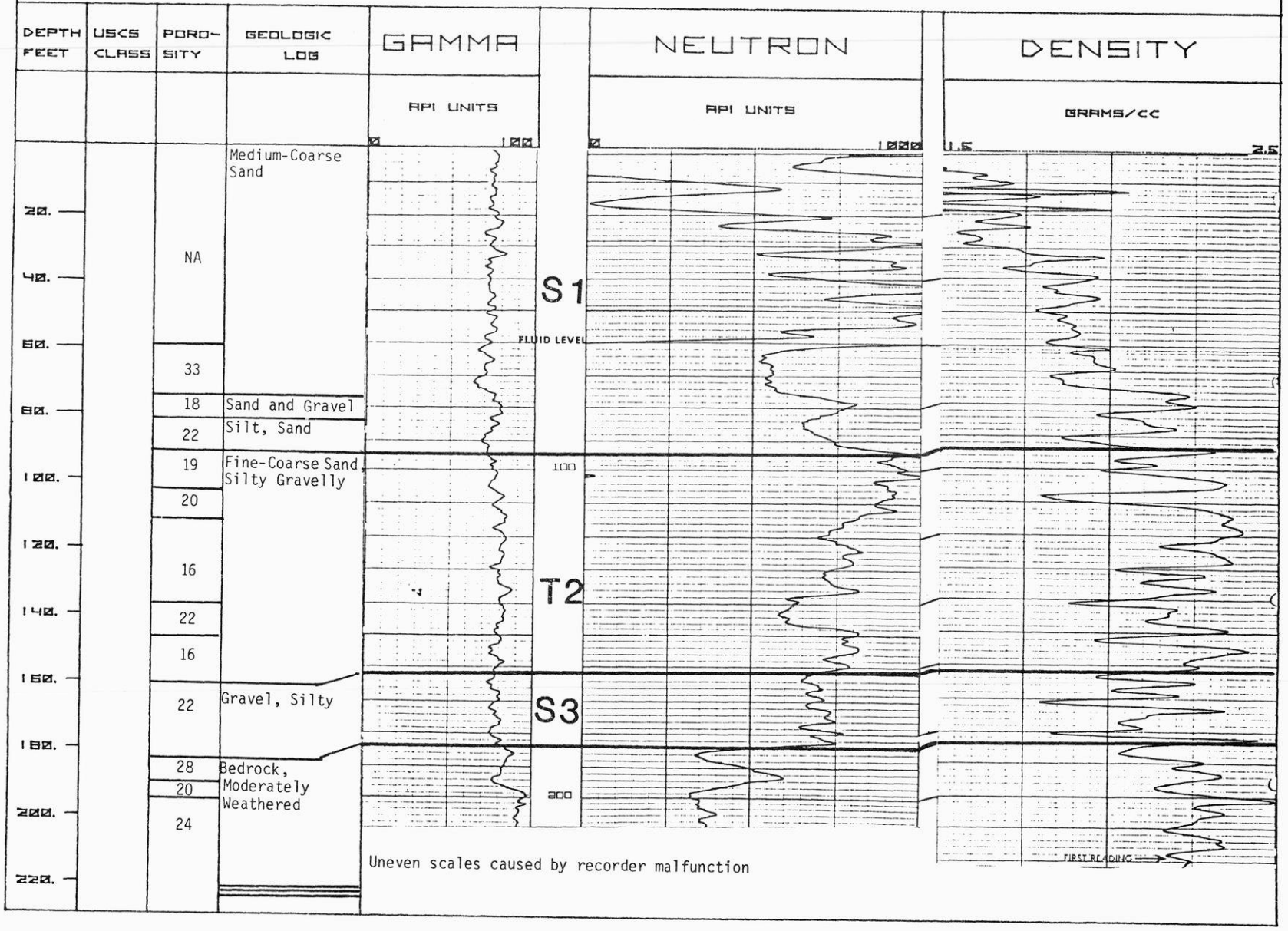
# CDM 3




Uneven Scale caused by Recorder Malfunction

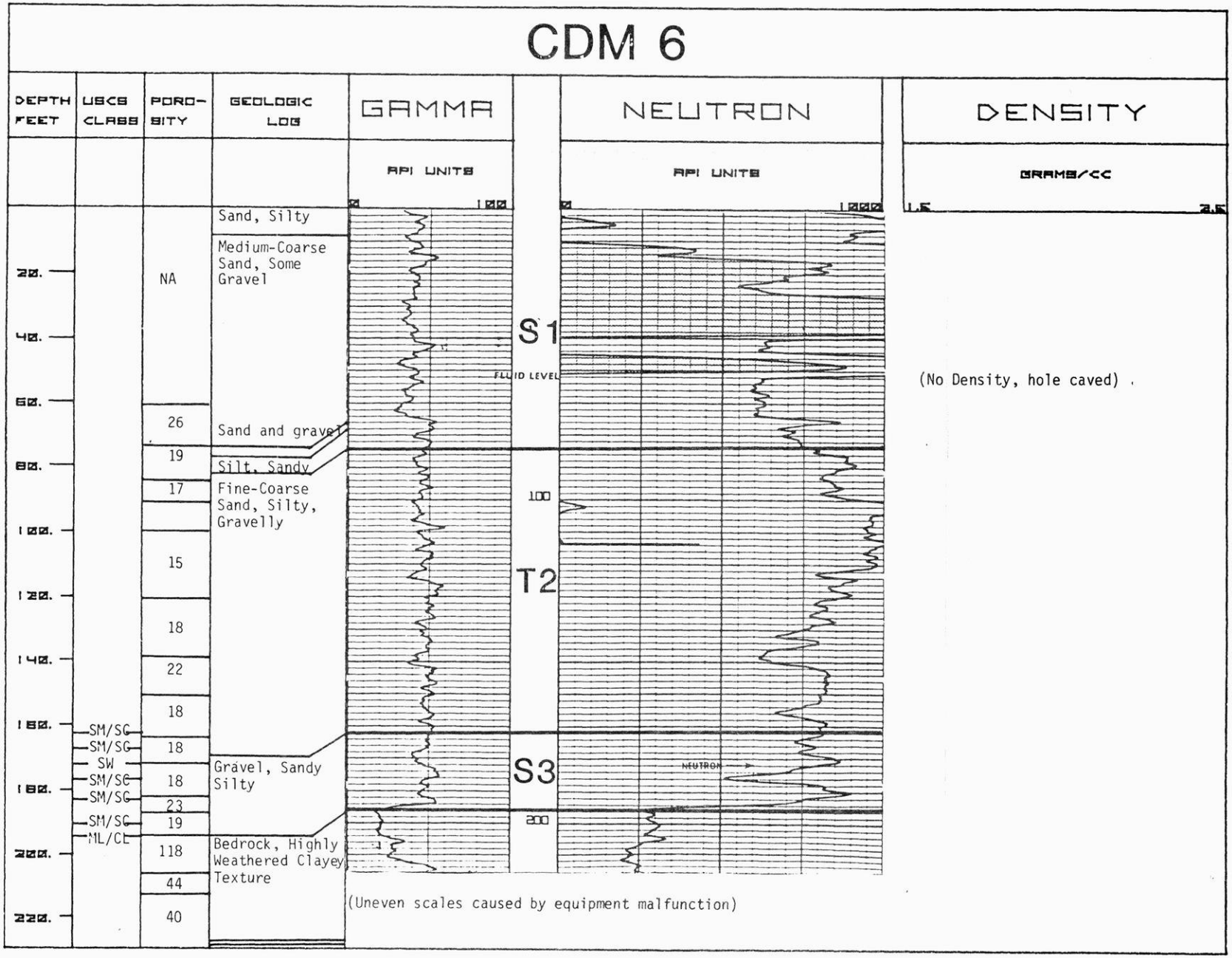

CDM 4
DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
SW
SP
SP
SP
SP
SP
SP
SP
SP
SP
SW
ML/CL
ML
SP
SM/SC
SM/SC
SM/SC
SM/SC
SM/SC
SW
SM/SC
NA
33
31
34
29
28
17
21
14
17
7
13
16
24
24
19
Clay
Medium-Coarse Sand, Some Gravel
Sand & Gravel
Silt, Sandy
Fine-Coarse Sand, Silty, Gravelly
Weathered Boulder
Fine-Coarse Sand, Silty, Gravelly
Bedrock, Highly Weathered
S1
100
T2

# CDM 5




Uneven scales caused by recorder malfunction

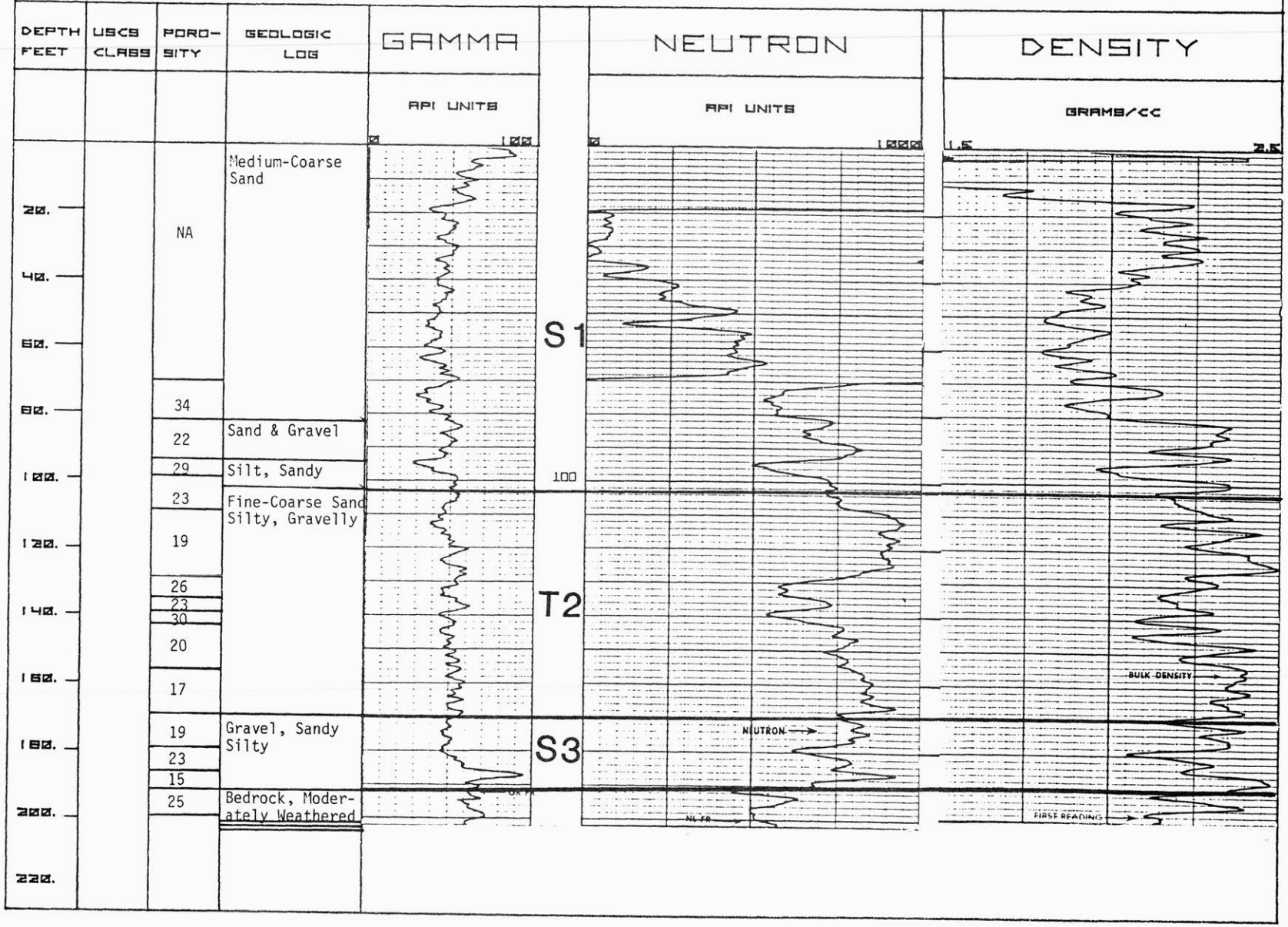
# CDM 6



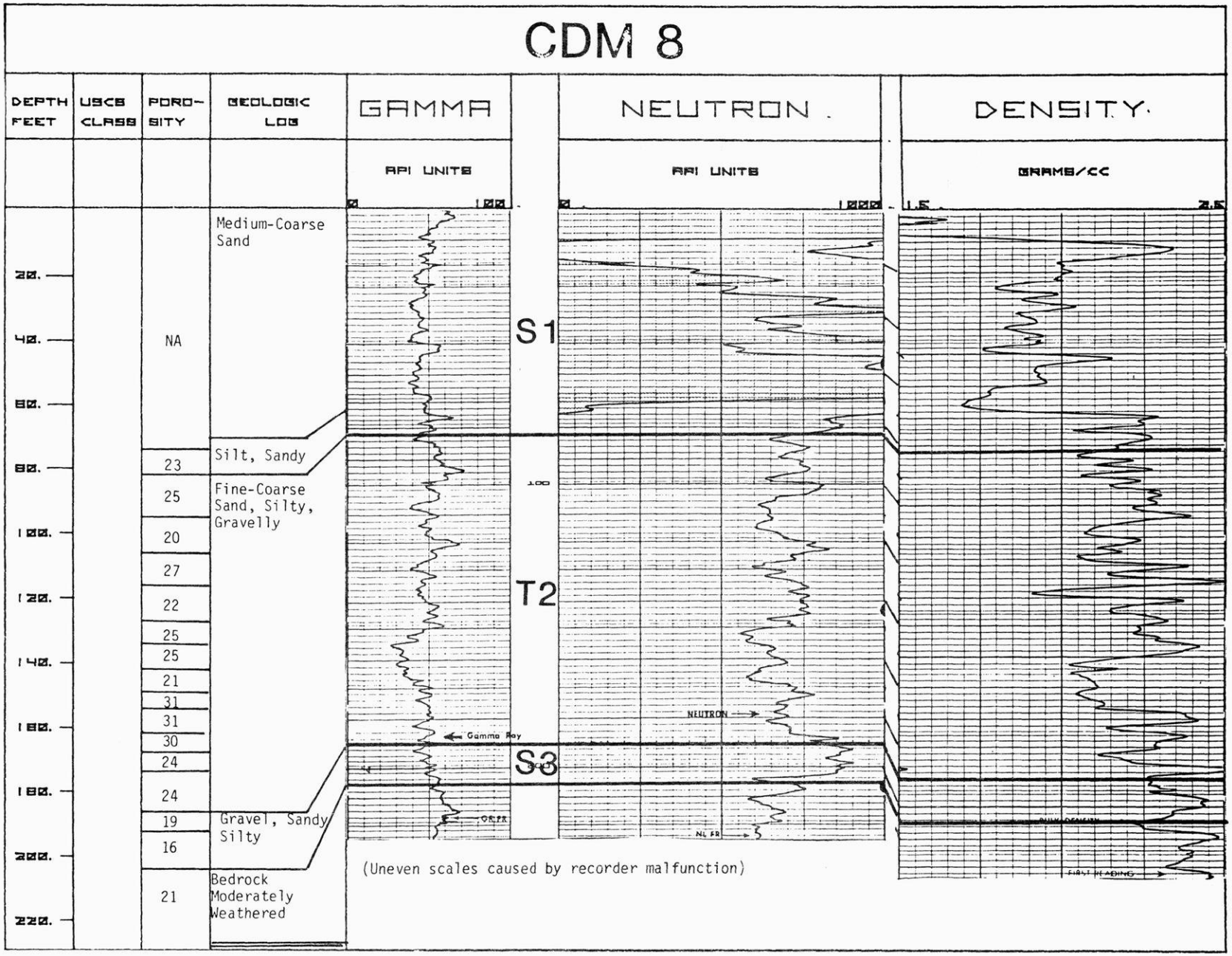

(No Density, hole caved)

(Uneven scales caused by equipment malfunction)

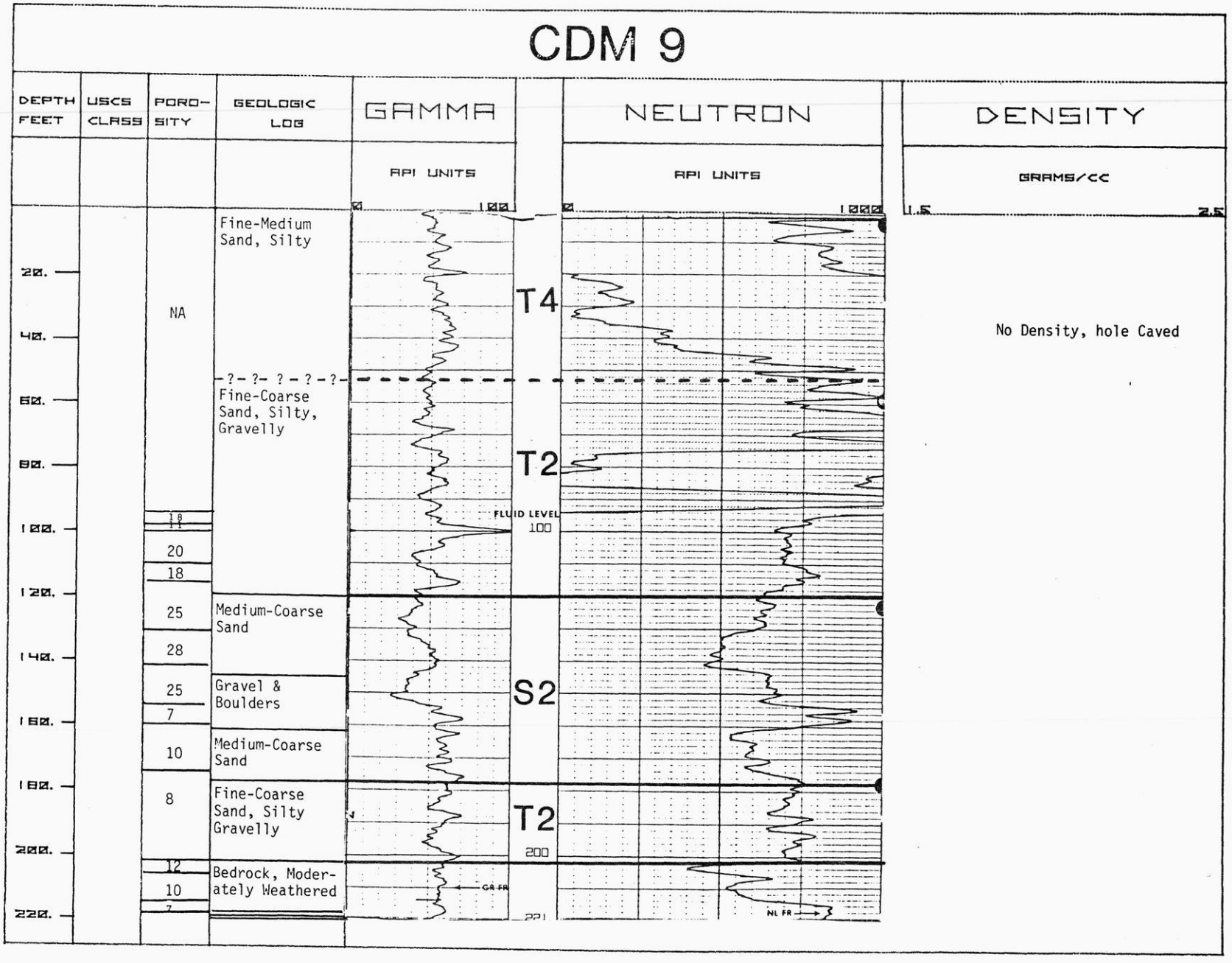
# CDM 7


DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
NA
34
22
29
23
19
26
23
30
20
17
19
23
15
25
Medium-Coarse Sand
Sand & Gravel
Silt, Sandy
Fine-Coarse Sand Silty, Gravelly
Gravel, Sandy Silty
Bedrock, Moderately Weathered
S1
T2
S3
100
NEUTRON
BULK DENSITY
FIRST READING

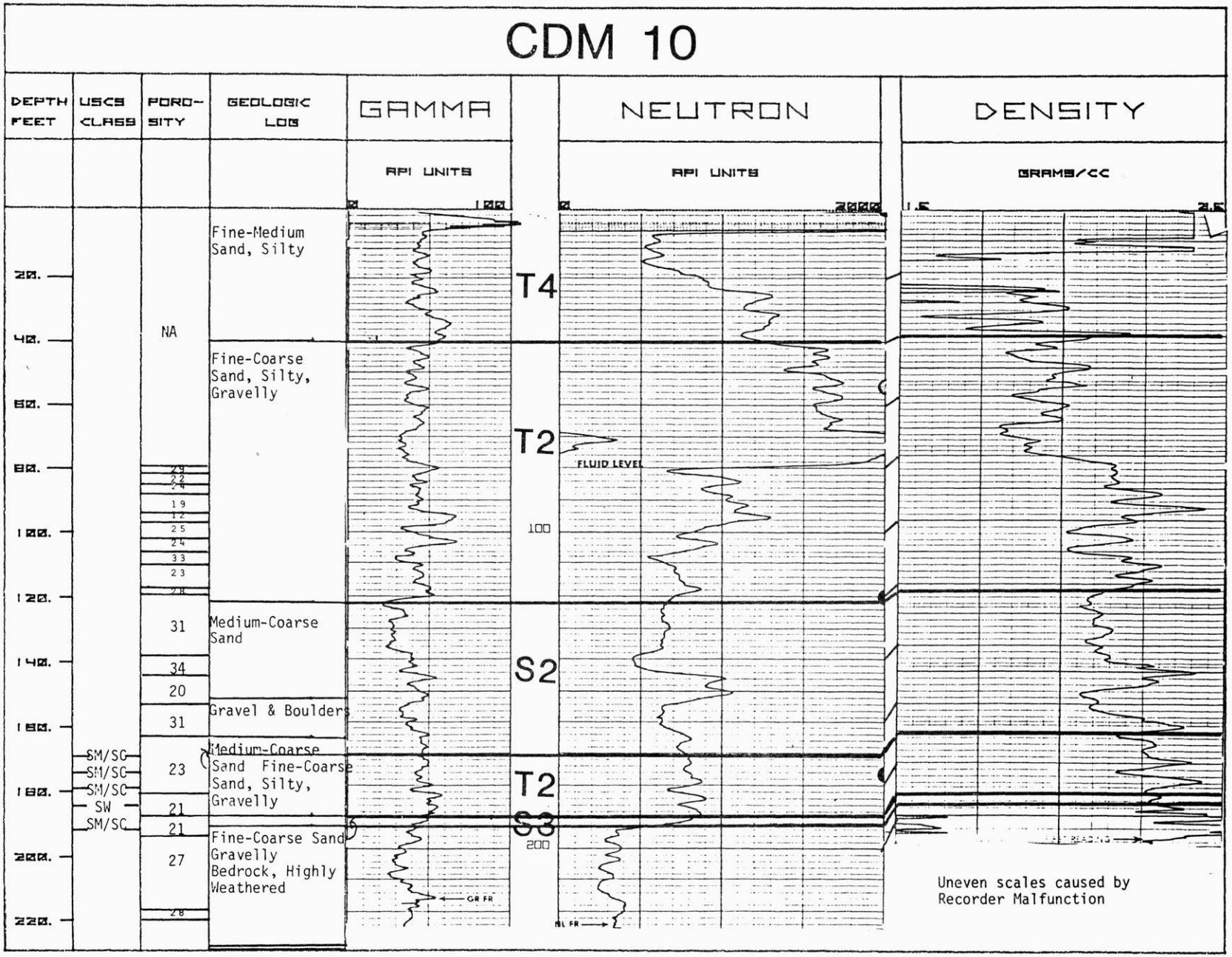
# CDM 8


DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
NA
23
25
20
27
22
25
25
21
31
31
30
24
24
19
16
21
Medium-Coarse Sand
Silt, Sandy
Fine-Coarse Sand, Silty, Gravelly
Gravel, Sandy Silty
Bedrock Moderately Weathered
S1
T2
S3
100
Gamma Ray
NEUTRON
DENSITY
FIRST READING
(Uneven scales caused by recorder malfunction)

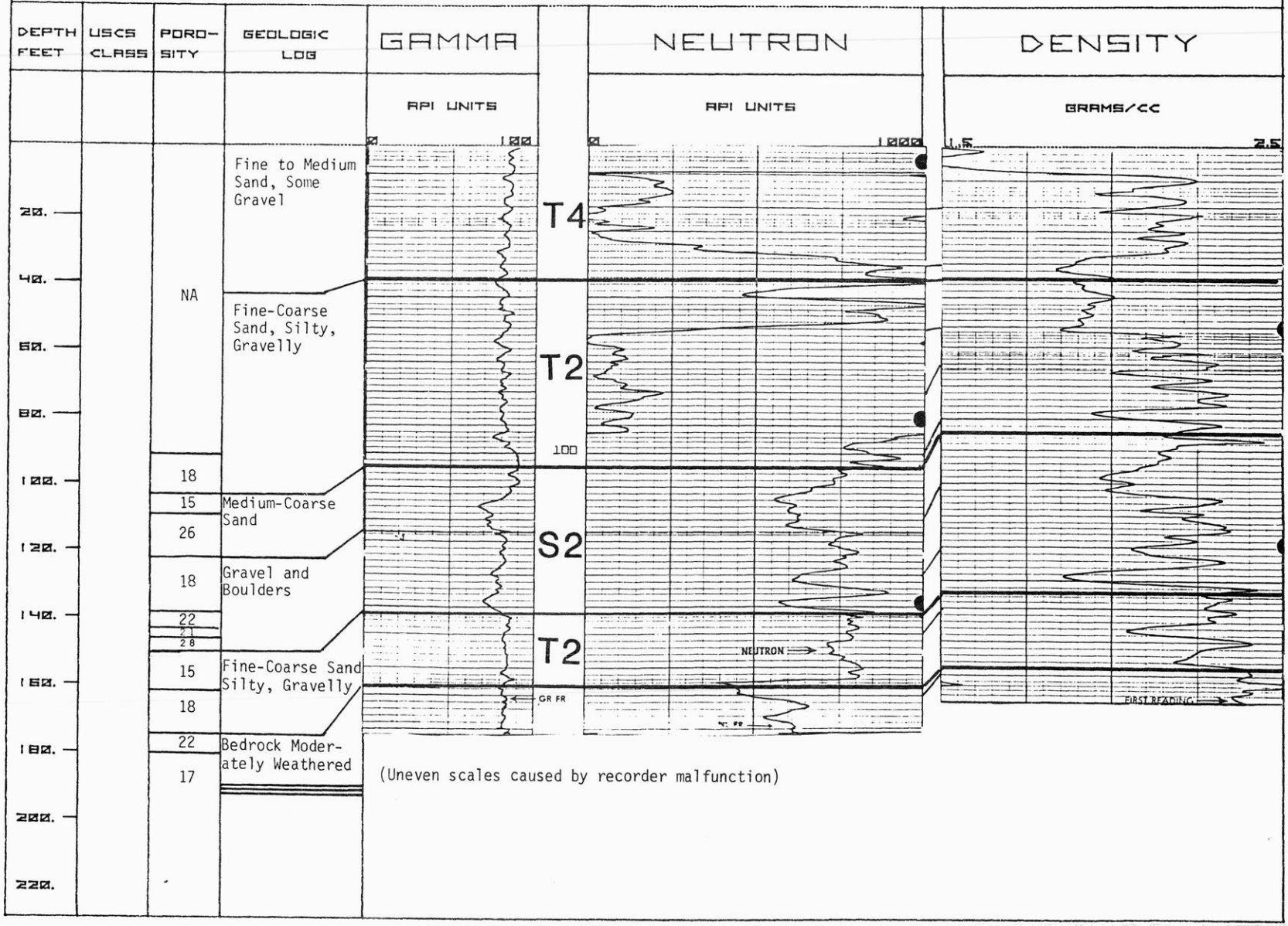
# CDM 9


DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
No Density, hole Caved
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
NA
18
11
20
18
25
28
25
7
10
8
12
10
7
Fine-Medium Sand, Silty
?-?-?-?-?
Fine-Coarse Sand, Silty, Gravelly
Medium-Coarse Sand
Gravel & Boulders
Medium-Coarse Sand
Fine-Coarse Sand, Silty Gravelly
Bedrock, Moderately Weathered
T4
T2
FLUID LEVEL
100
S2
T2
200
GR FR
221
NL FR

# CDM 10

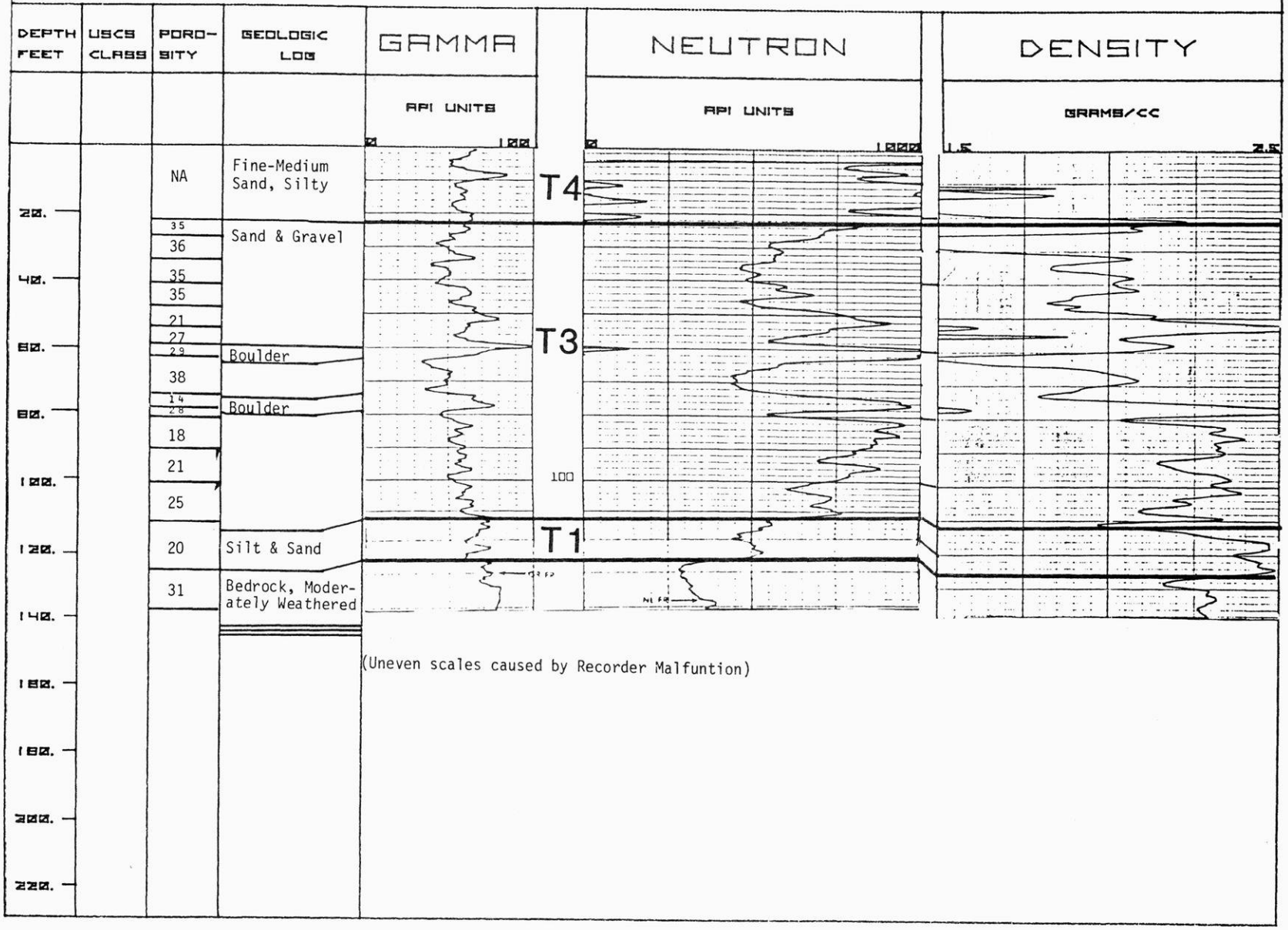

DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
2000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
NA
29
22
24
19
12
25
24
33
23
28
31
34
20
31
23
21
21
27
28
SM/SC
SM/SC
SM/SC
SW
SM/SC
Fine-Medium Sand, Silty
Fine-Coarse Sand, Silty, Gravelly
Medium-Coarse Sand
Gravel & Boulders
Medium-Coarse Sand Fine-Coarse Sand, Silty, Gravelly
Fine-Coarse Sand Gravelly Bedrock, Highly Weathered
T4
T2
FLUID LEVEL
100
S2
T2
S3
200
GR FR
NL FR
Uneven scales caused by Recorder Malfunction

# CDM 11



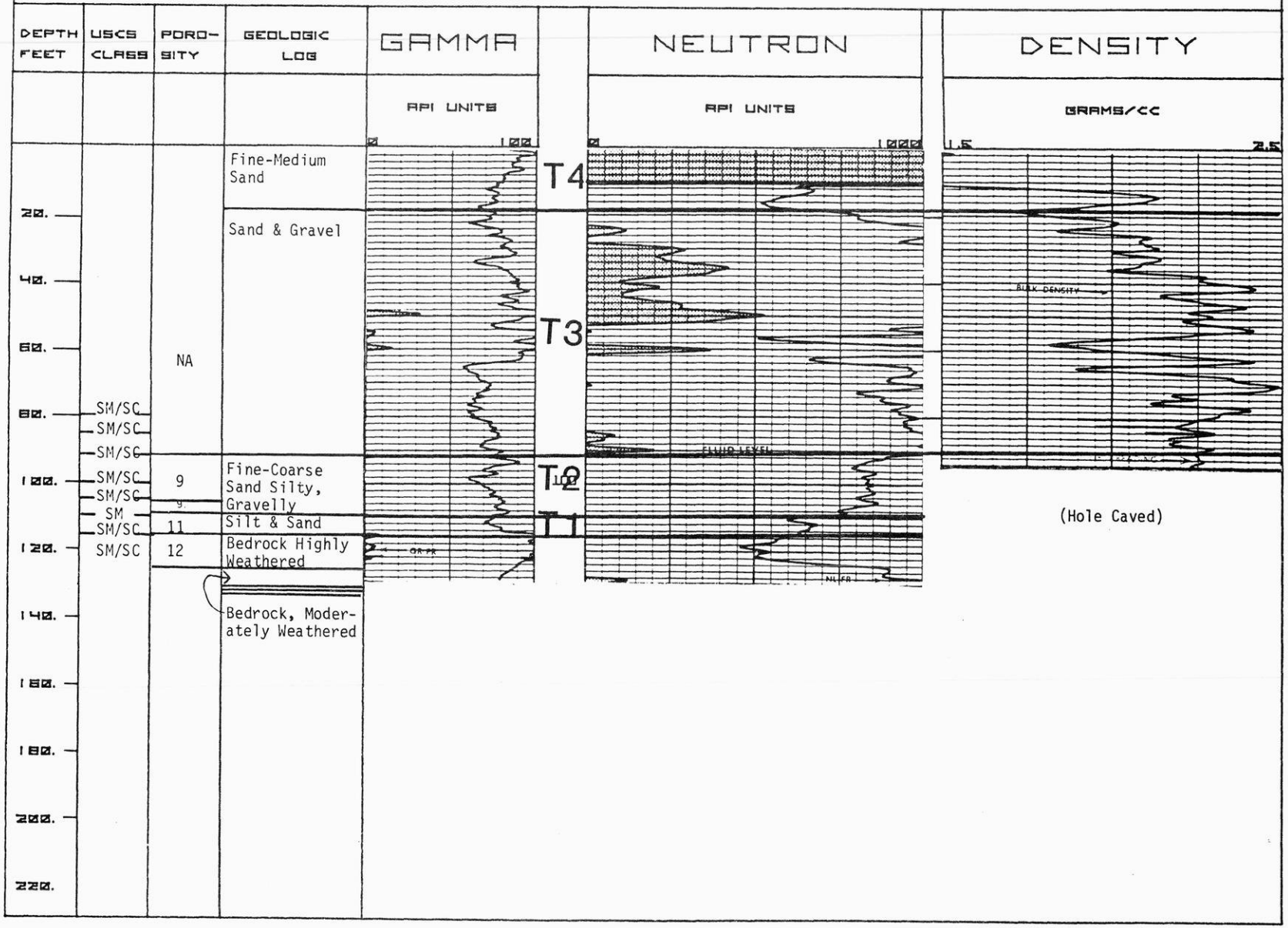

(Uneven scales caused by recorder malfunction)

# CDM 12

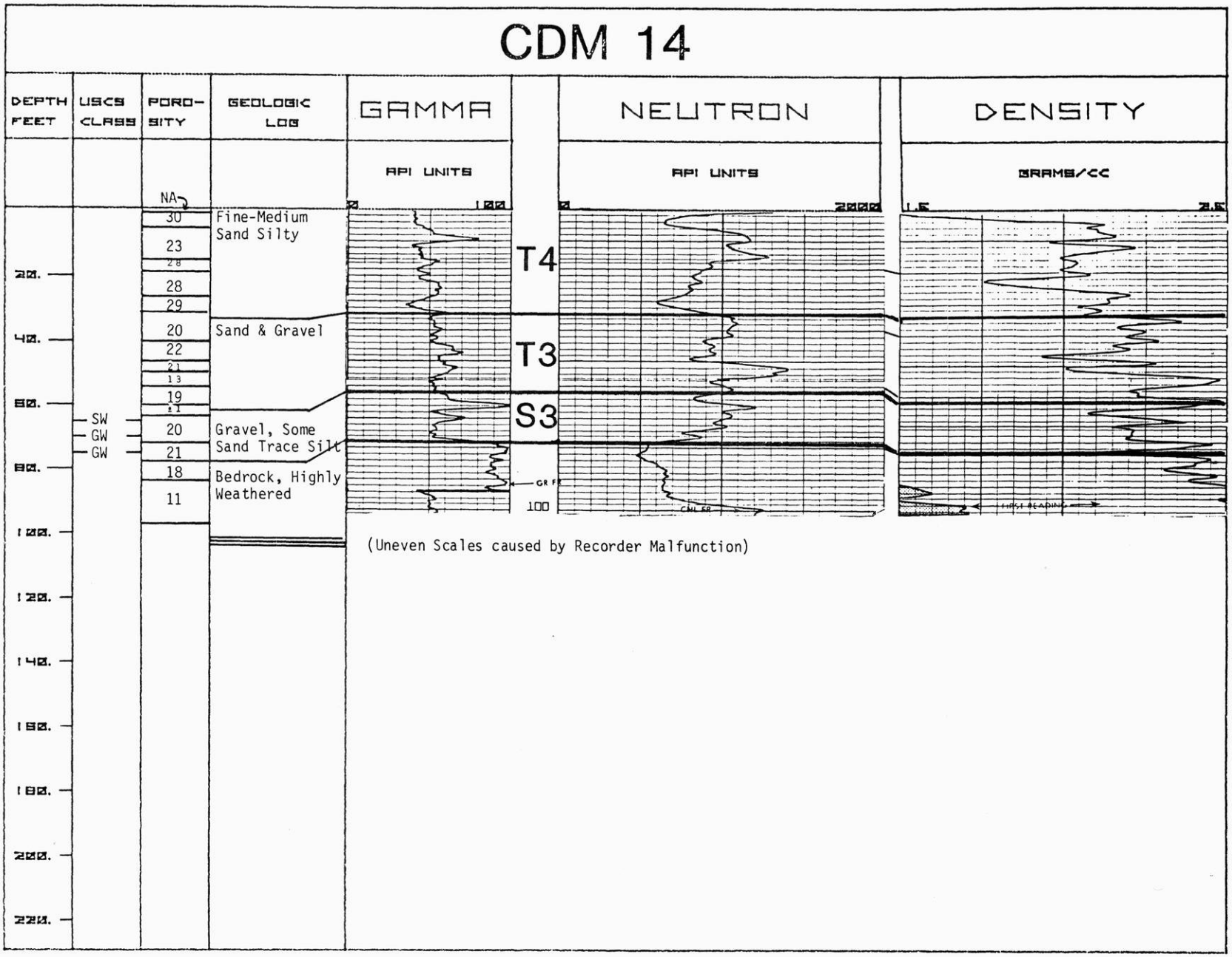



(Uneven scales caused by Recorder Malfuntion)

# CDM 13


DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
DENSITY
GRAMS/CC
1.5
2.5
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
SM/SC
SM/SC
SM/SC
SM/SC
SM/SC
SM
SM/SC
SM/SC
NA
9
9
11
12
Fine-Medium Sand
Sand & Gravel
Fine-Coarse Sand Silty, Gravelly
Silt & Sand
Bedrock Highly Weathered
Bedrock, Moderately Weathered
T4
T3
T2
T1
FLUID LEVEL
BULK DENSITY
(Hole Caved)

# CDM 14

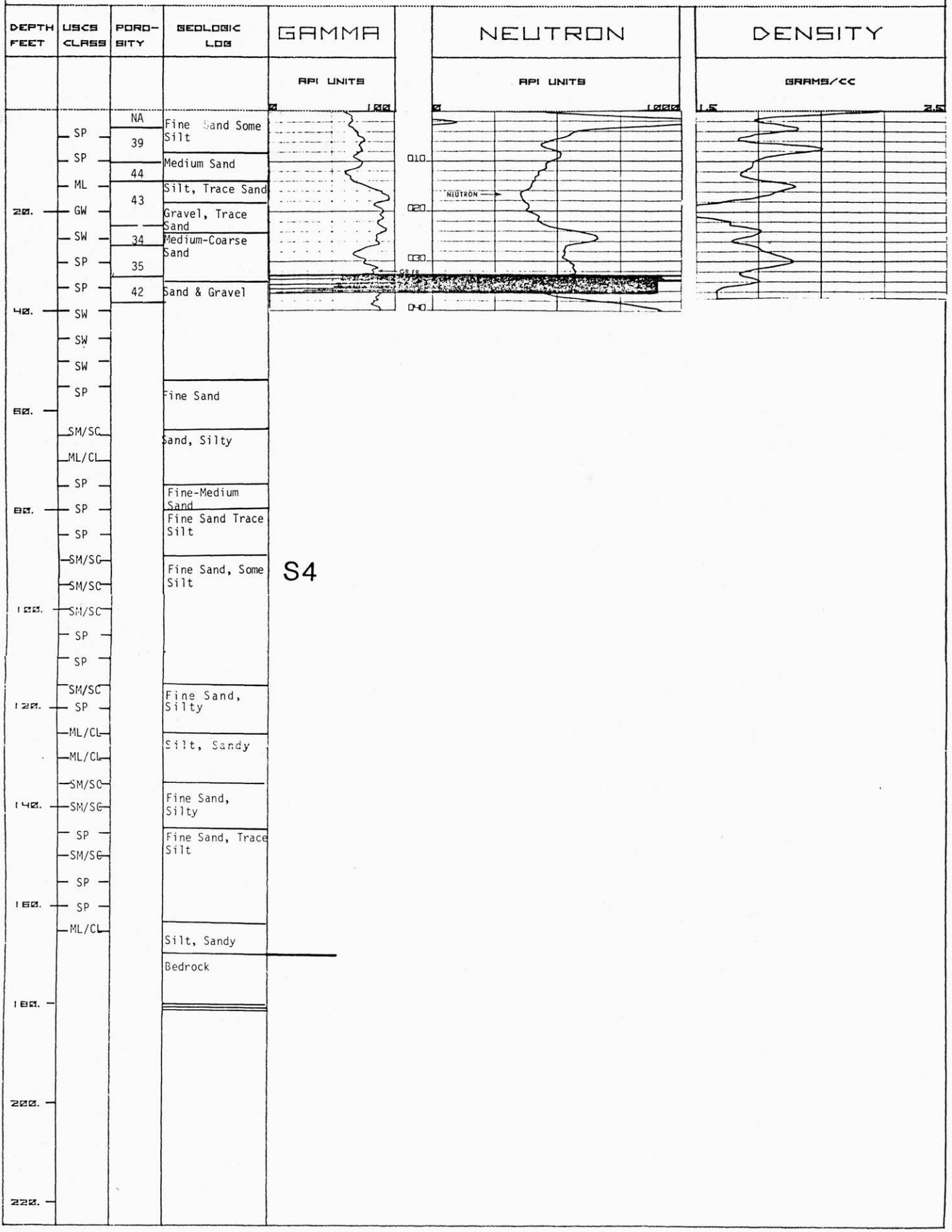



(Uneven Scales caused by Recorder Malfunction)

# CDM 15

| DEPTH FEET | USCS CLASS | POROSITY | GEOLOGIC LOG | GAMMA API UNITS 0 – 100 | NEUTRON API UNITS 0 – 1000 | DENSITY GRAMS/CC 1.5 – 3.5 |
|---|---|---|---|---|---|---|
| 20. | SM/SC, SW, SP | | Fine - Coarse Sand, some Silt, some Gravel | | | |
| 40. | SM/SC | | | | | |
| 60. | SM/SC | | | T2 | (NO GEOPHYSICAL LOGS RUN) | |
| 80. | | | Boulder | | | |
| | SM/SC, SW | | Fine - Medium Sand | | | |
| 100. | SM/SC, SW, SP | | Sand and Gravel | S2? | | |
| | SM/SC | | Fine Sand | | | |
| | SM/SC | | Silt and Sand | | | |
| 120. | SM/SC | | Fine - Coarse Sand, some Silt some Gravel | T2 | | |
| | GM/GC, SW | | Sand and Gravel | | | |
| 140. | SM/SC | | Fine - Coarse Sand, Silty, Gravelly | | | |
| 160. | | | Boulder | | | |
| | SM/SC | | Fine - Coarse Sand, Silty, Gravelly | | | |
| 180. | | | Bedrock | | | |
| 200. | | | | | | |
| 220. | | | | | | |

# CDM 16


DEPTH FEET
USCS CLASS
POROSITY
GEOLOGIC LOG
GAMMA
API UNITS
0
100
NEUTRON
API UNITS
0
1000
010
020
030
040
NEUTRON
DENSITY
GRAMS/CC
1.5
2.5
NA
39
44
43
34
35
42
SP
SP
ML
GW
SW
SP
SP
SW
SW
SW
SP
SM/SC
ML/CL
SP
SP
SP
SM/SC
SM/SC
SM/SC
SP
SP
SM/SC
SP
ML/CL
ML/CL
SM/SC
SM/SC
SP
SM/SC
SP
SP
ML/CL
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.
Fine Sand Some Silt
Medium Sand
Silt, Trace Sand
Gravel, Trace Sand
Medium-Coarse Sand
Sand & Gravel
Fine Sand
Sand, Silty
Fine-Medium Sand
Fine Sand Trace Silt
Fine Sand, Some Silt
Fine Sand, Silty
Silt, Sandy
Fine Sand, Silty
Fine Sand, Trace Silt
Silt, Sandy
Bedrock
S4

BORING LOGS

SOIL TESTING SERVICES

| Boring Logs | Number of Sheets |
|---|---|
| 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 |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| Crandon Mine Development | Prospecting Project |

| DEPTH ELEVATION | SAMPLE NO. | TYPE SAMPLE | SAMPLE DIST. | RECOVERY | DESCRIPTION OF MATERIAL | UNIT DRY WT. LBS./FT.3 |
|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | |
| | 1 | 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 | |
| | 2 | SS | | | | |
| 5 | 3 | SS | | | Brown silty clayey fine to medium sand (SC)- with lenses of silty fine sand - some gravel - moist - dense | |
| | 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 | SS | | LS | Note: Broken stone at tip of of sample | |
| 10 | 6 | SS | | | Cobble and boulder layer - cobbles average ±6 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 | | | Brown fine to coarse sand (SW)- trace of silt - a little to some fine to coarse gravel - grades finer with depth - moist - extremely dense | |
| 25 | 9 | SS | | | Note: Boulder encountered at 18.5 to 20.0 feet<br>Occasional boulders or cobbles encountered at 22.7 to 32.3 feet | |
| 30 | 10 | SS | | | | |
| 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 | 121.9 |
| 42 | | | | | Continued | |

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

8 15 38 33/6" 53/6" 164/3" 107/6" 52/6" 27/6" 154 65/0" BNCG 100/2" 204/3 187/4"

| 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-8 | 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. 1 (cont.)

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| Crandon Mine Development | Prospecting Project |

| DEPTH ELEVATION | SAMPLE NO. | TYPE SAMPLE | SAMPLE DIST. | RECOVERY | DESCRIPTION OF MATERIAL | UNIT DRY WT. LBS./FT. 3 |
|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | |
| 42 | | | | | Continued | |
| 45 | 13 | SS | | | Brown mottled grayish brown sandy silt (ML) - trace of clay - a little fine gravel - very moist - extremely dense | 116.0 |
| 50 | 14 | SS | | | | |
| 55 | 15 | SS | | | | 130.1 |
| 60 | 16 | SS | | | | 131.7 |
| 65 | 17 | SS | | | Brown silty fine to medium sand (SM) - trace of coarse sand - a little to some fine to coarse gravel - with decomposed gravel fragments - color changes to orange brown at 65 feet - grades finer at 70 feet - with pockets of silty fine sand at 75 feet - moist changing to wet at 70 feet - extremely dense<br>Note: Boulder encountered at 80.5 to 82.5 feet | 134.6 |
| 70 | 18 | SS | | | | |
| 75 | 19 | SS | | | | 143.4 |
| 80 | 20 | SS | | | | |
| 85 | 21 | SS | | | | |
| 86.2 | 21A | SS | | | | |
| | | | | | Continued | |

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

110/1"
180/1" BNCG
121/6"
76
110/6"
130/6"
138/6"
137/6"
108

| 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 | | | 1-21-80 |
| BORING COMPLETED | | | 1-25-80 |
| RIG | W-8 | FOREMAN | EVH |
| DRAWN | JPJ | APPROVED | TWW |
| JOB # | 8736 A | SHEET | 2 of 3 |

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

B-S-107

LOG OF BORING NO. 1 (cont.)

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| SITE | PROJECT NAME |
| 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 % X — WATER CONTENT % ● — LIQUID LIMIT % △ / STANDARD "N" PENETRATION (BLOWS/FT.) ⊗ (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | |
| 86.2 | 21A | SS | | | Continued | | |
| | | | | | Reddish brown silty fine to coarse sand (SM) - a little gravel - trace to a little clay - moist - extremely dense | | |
| 90 | 22 | SS | | | | | 75/.05 ⊗ BNCG |
| 95 | 23 | SS Run #1 | | | Felsic phyllite* with mafic chloritic fragments - moderately weathered at 90 feet (observation of wash sample obtained in split spoon) - vertical cleavage - predominantly vertical fractures - some fractures filled with a trace of saprolite - a few fractures with higher clay content - gray and greenish gray with some local rust staining | | 90/0" ○ BVCG |
| 100 | | Run #2 | | | | | |
| | | Run #3 | | | | | |

| | DEPTH | REC | FRACTURE FREQ | RQD |
|---|---|---|---|---|
| Run #1 | 95.0-97.5 | 92% | 1.3/ft. | 83% |
| Run #2 | 97.5-102.8 | 100% | .9/ft + | 76% |
| Run #3 | 102.8-110.3 | 89% | .7/ft.+ | 86% |

+ Core is highly fractured from 102.5 to 103.5 feet
* Parent rock classified as Felsic - Intermediated Lapilli Tuff

End of Boring
Boring terminated in phyllite bedrock
Boring advanced to 8.0 feet by solid stem auger
5 feet of 6 inch casing installed
Boring advanced to 95 ffet by roller bit and Revert drilling mud
Boring advanced to 110.3 feet by NX split barrel core barrel and Revert
2"ø observation well installed at 84.7 feet
Top of metal protector pipe elevation = 1657.72
Note: Penetration test results labled as blows/distance

Penetration Test Method:

1. 2 inch split barrel sampler, N ROD, 140 lb. hammer 0-10'
2. 3 inch split barrel sampler, N ROD, 360 lb. hammer 10-40'
3. 2½ inch split barrel sampler, N ROD, 360 lb. hammer 40-95'

| WATER LEVEL OBSERVATIONS | | |
|---|---|---|
| W.L. | | |
| W.L. | B.C.R. | A.C.R. |
| W.L. | Ground water elevation = 1590.6 on 2-13-80 | |

**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-8 | FOREMAN | EVH |
| DRAWN | JPJ | APPROVED | TWW |
| JOB # | 8736 A | SHEET | 3 of 3 |

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS 197

# LOG OF BORING NO. 2

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 %; STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 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 | | | | | 21 |
| 5 | 3 | SS | | | Brown silty fine sand (SM) - trace of medium to coarse sand - trace of gravel - moist - medium dense | | 21 |
| | 4 | SS | | | | | 17 |
| | 5 | 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 - | | 73 |
| 10 | 6 | SS | | | Note: Broken stone in sample at 8 feet | | 57 |
| | 7 | SS | | | | | 61 |
| 15 | 8 | SS | | | | | 52/6" |
| | 9 | SS | | | | | 105/6" |
| | | | | | | | 103/3 |
| 20 | 10 | SS | | LS | | | 103/2" BNCG |
| | 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 | | 174/SET |
| 25 | 12 | SS | | LS | Note: Boulder or cobbles encountered at 20 to 20.4 feet<br>1.5 foot boulders between 21.0 and 25.0 feet<br>0.5 foot boulders between 25.0 and 28.0 feet<br>1.1 foot boulders between 28.0 and 30.0 feet<br>1.4 foot boulders between 30.0 and 35.8 feet | | 102/1" |
| | 13 | SS | | LS | | | 198/1" |
| 30 | 14 | SS | | | | | 101/3" BNCG |
| 35 | 15 | SS | | | | | 147/2" |
| 40 | | | | | | | |
| 40.5 | 16 | SS | | | | | 157/SET |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 10.0 feet by solid stem auger<br>Boring advanced from 10.0 to 40.5 feet by roller bit and Revert drilling mud<br>15 feet of HW casing used<br>Frost encountered to 0.5 feet | | |

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 | | | 1-25-80 |
| BORING COMPLETED | | | 1-28-80 |
| 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.

BBS 107

# LOG OF BORING NO. 3

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| Crandon Mine Development | 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 (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | 1 | SS | | | Brown very fine sandy silt (ML) - trace of roots and organics to 1.5 feet - some seams of silty fine sand (SM) - a little medium to coarse sand and fine gravel - broken stone in sample at 0.2 feet - moist - medium dense | | 4/6" 20/6" |
| | 2 | SS | | | | | 14 |
| 5 | 3 | SS | | | Brown silty fine to medium sand (SM) - a little to some gravel - moist - medium dense | | 28 |
| | 4 | SS | | | | | 15 |
| | 5 | SS | | | Brown silty fine to coarse sand (SM) and gravel with broken stone observed in sample from 15 to 16.5 feet - grades coarser with depth - moist to wet - medium dense to extremely dense | | 13 |
| 10 | 6 | SS | | | | | 27 |
| 15 | 7 | SS | | | | | 103 |
| 20 | | | | | | | |
| 21 | 8 | SS | | | | | 65/6" |

End of Boring
Boring terminated in silty fine to coarse sand
Boring advanced to 21.0 feet by solid stem auger

| 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 | | | 1-18-80 |
| 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.

# LOG OF BORING NO. 4

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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.<br>PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT %<br>STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| | | | | | 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 | | 11/6" |
| 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 ½ inch seams of fine sand (SP) - grades fine to medium at 15 feet - moist - medium dense to very dense<br>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 | | |
| 20 | 8 | SS | | | | | 55/6" |
| 21 | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 10.0 feet by solid stem auger<br>Boring advanced from 10.0 to 21.0 feet by roller bit and Revert drilling mud<br>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 | 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.

BBS 107

# LOG OF BORING NO. 5

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % — STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 1 | SS | | E.S | 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 | | 19 |
| | 2 | SS | | E.S | | | 29 |
| 5 | 3 | SS | | | | | 20 |
| | 4 | SS | | | | | 19 |
| | 5 | SS | | | | | 12 |
| 10 | 6 | SS | | | | | 13/6" 24/6" |
| | | | | | | | 16 |
| 15 | 7 | SS | | | | | |
| 20 | 8 | SS | | | | | 17 |
| 25 | 9 | SS | | | 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<br>Note: Broken stone observed in sample at 35 feet | | 80 |
| 30 | 10 | SS | | | | | 100/9" |
| 35 | 11 | SS | | | | | 100/9" |
| 40 | | | | | | | |
| 41 | 12 | SS | | | | | 105/6" |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 8.0 feet by solid stem auger<br>Boring advanced from 8.0 to 41.0 feet by roller bit and Revert 15 feet of HW casing used<br>Frost encountered to 1.0 feet | | |

| 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 |
| 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. 6

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION ↴ | | 1 2 3 4 5 — PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
| | 1 | PA | | | Dark brown very fine sandy silt (ML) - trace of roots - trace of gravel - wet | | |
| | 2 | SS | | | | | 24 |
| 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<br>Note: Broken stone in sample at 8.0 feet | | 25 |
| | 4 | SS | | | | | 30 |
| | 5 | SS | | | | | 23 |
| 10 | | | | | | | |
| | 6 | SS | | | | | 35 |
| 15 | | | | | Brown fine to coarse sand (SP) - some gravel - trace to a little silt - grades coarser with depth - moist - dense to extremely dense | | |
| | 7 | SS | | | | | 85/1" BNCG |
| 20 | | | | | | | |
| 20.4 | 8 | SS | | | | | 103/5" |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 20.4 feet by solid stem auger<br>Frost encountered to 0.7 feet | | |

| 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 | | | 1-30-80 |
| 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 | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 1 | SS | | | Brown silty very fine to fine sand (SM-ML) - some fine to medium gravel - trace of roots - moist - medium dense | | 14 |
| | 2 | SS | | | Rusty brown silty fine sand (SM) - trace of medium to coarse sand - a little gravel - moist - very dense to dense<br>Note: Broken stone in sample at 2 feet | | 72 |
| 5 | 3 | SS | | | | | 20 |
| | 4 | SS | | | Brown to rusty brown silty fine to coarse sand (SM) and gravel - moist - medium dense | | 15 |
| | 5 | SS | | | | | 32 |
| 10 | 6 | SS | | | | | 35 |
| 15 | 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 | | 60 |
| 20 | | | | | | | |
| 21.5 | 8 | SS | | | | | 102 |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 8.0 feet by solid stem auger<br>Boring advanced from 8.0 to 21.5 feet by roller bit and Revert<br>10 feet of HW 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 | | | 1-29-80 |
| 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. 8

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| 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 | | 1/6" |
| | 1A | SS | | | sand - moist - medium dense - color changes to brown a t 0.5 feet | | 1/6" |
| | 2 | SS | | | | | 25 |
| 5 | 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 | | 20/6" |
| | 4 | SS | | | | | 9/6" |
| | 5 | SS | | | | | 18 |
| | 5A | SS | | | | | 1/6" |
| 10 | 6 | SS | | | | | 8/6" 27 |
| | | | | | 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 | | |
| 15 | 7 | SS | | | Note: Cobble or boulder at 20 feet | | 100/5" |
| 20 | 8 | SS | | | | | 100/SET BNCG |
| | | | | | End of Boring<br>Boring terminated in fine to medium sand<br>Boring advanced to 8.0 feet by solid stem auger<br>Boring advanced from 8.0 to 20.0 feet by roller bit and Revert<br>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 | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 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 | | 25 |
| | 2 | SS | | | | | 26 |
| 5 | 3 | SS | | | Brown silty fine to medium sand (SM) - a little to some gravel - trace of clay - moist - medium dense | | 14 |
| | 4 | SS | | | | | 28 |
| | 5 | SS | | | | | 8/5" |
| | 5A | SS | | | | | 11/6" |
| 10 | 6 | SS | | | Light brown fine sand (SP) - moist - dense to extremely dense | | 39 |
| 15 | 7 | SS | | | | | 95 |
| 20 | | | | | Brown fine to coarse sand (SP) - a little fine gravel - wet - extremely dense | | 100/4" |
| 20.9 | 8 | SS | | | | | |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 10.0 feet by solid stem auger<br>Boring advanced from 10.0 to 20.9 feet by roller bit and Revert<br>Boulders or obstructions encountered from 0 to 2 feet<br>10 feet of NW 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 | | | 1-17-80 |
| 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.

# LOG OF BORING NO. 10

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | 1 2 3 4 5 — 10 20 30 40 50 |
| | 1 | SS | | | Dark brown slightly organic silty topsoil (OL-ML) - trace of gravel - a little very fine sand - trace of roots - moist - medium dense | | 10 |
| | 1A | SS | | | | | |
| | 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 |
| 5 | 3 | SS | | | | | 9 |
| | 4 | SS | | | | | 9 |
| | 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 |
| 10 | 6 | SS | | | | | 18 |
| 15 | 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" |
| 20 | | | | | | | |
| 21.5 | 8 | SS | | | | | 72 |
| | | | | | End of Boring<br>Boring terminated in fine to coarse sand<br>Boring advanced to 10.0 feet by solid stem auger<br>Boring advanced from 10.0 to 21.5 feet by roller bit and Revert 10 feet of NW 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 | | | 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.

# LOG OF BORING NO. 11

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION → | | | | | | | |
| | 1 | SS | | | Brown silty very fine sand (SM-ML) - trace of roots - moist - loose | | 2 |
| | 2 | SS | | | Brown silty fine to medium sand (SM) - a little coarse sand to fine gravel - moist - medium dense to dense | | 28 |
| 5 | 3 | SS | | | | | 44 |
| | 4 | SS | | | | | 15 |
| | 5 | SS | | | | | 21 |
| 10 | 6 | SS | | | Brown fine to medium sand (SP-SM) - trace of silt - with some lenses of silty fine sand to 10.0 feet - lense of fine to coarse sand at 20 feet - grades fine to medium at 10 to 11.5 feet - moist - medium dense to extremely dense | | 43 |
| 15 | 7 | SS | | | | | 83 |
| 20 | | | | | | | 85 |
| 21.5 | 8 | SS | | | | | |
| | | | | | End of Boring<br>Boring terminated in fine sand<br>Boring advanced to 10.0 feet by solid stem auger<br>Boring advanced from 10.0 to 21.5 feet by roller bit and Revert 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 | 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 TEST PIT NO. TP-1

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % / 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 | | |
| 5 | 3 | S | | | Brown silty very fine to fine sand (SM) - trace of gravel - moist | | |
| 8.5 | 4 | S | | | Reddish brown clayey fine to medium sand (SC) - trace of fine gravel - trace to a little silt - moist | | |

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 | | | 1-28-80 |
| 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 TEST PIT NO. TP-2

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| | | | | | 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 | 3 | S | | | Brown silty clayey very fine sand (SM-SC) - trace of gravel - moist | | |
| 8 | 4 | S | | | Rusty brown silty fine sand (SM) - trace of gravel - with pockets sandy silt and clayey sand | | |

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

| 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 | | | 1-28-80 |
| 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.

BRG 107

LOG OF TEST PIT NO. TP-3

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | |
| | 1 | S | | | Brown silty sandy topsoil (OL) - trace of roots - moist | | |
| | 2 | S | | | Yellowish brown silty very fine sand (SM-ML) - trace of roots - trace of gravel and cobbles - moist | | |
| 5 6 | 3 | S | | | Yellowish brown fine sand (SP) - with pockets of silty fine sand (SM) - moist - dense | | |

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.

LOG OF TEST PIT NO. TP-4

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS FT.) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | 1 2 3 4 5 — 10 20 30 40 50 |
| | 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

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 | | | 1-28-80 |
| 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 TEST PIT NO. TP-5

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % / STANDARD "N" PENETRATION (BLOWS FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | |
| | 1 | S | | | Black silty topsoil (OL) - some roots - moist | | |
| | 2 | S | | | Yellowish brown silty very fine sand (SM-ML) - trace of roots - trace of gravel and cobbles - moist | | |
| 5 5 | 3 | S | | | Reddish brown silty fine to medium sand (SM) - a little gravel and cobbles - trace of clay - 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- -80 |
| BORING COMPLETED | | | 1- -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.

BBS 107

LOG OF TEST PIT NO. TP-6

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % — STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
|---|---|---|---|---|---|---|---|
| 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 | | |
|---|---|---|
| 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- -80 |
| BORING COMPLETED | | | 1- -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 TEST PIT NO. TP-7

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % · STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
|---|---|---|---|---|---|---|---|
| | 1 | S | | | SURFACE ELEVATION ↴ | | |
| | | | | | Black silty sandy topsoil (OL) - trace of roots - moist | | |
| | 2 | S | | | Brown very fine sandy silt (ML) - trace of cobbles - trace of roots - moist | | |
| 5 | 3 | S | | | Reddish brown silty fine sand (SM) - trace of clay - some gravel with pockets of clayey sand - moist - dense | | |
| 6 | | | | | | | |

| WATER LEVEL OBSERVATIONS | | |
|---|---|---|
| WL | Dry | |
| WL | B.C.R. | A.C.R. |
| 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 TEST PIT NO. TP-8

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 1 | S | | | Black silty topsoil (OL) - trace of roots - moist | | |
| | 2 | S | | | Yellowish brown sandy silt (ML) - trace of roots - some gravel - moist | | |
| 5 | 3 | S | | | Reddish brown silty fine sand (SM) - trace of clay - with pockets of fine to medium sand and gravel - some cobbles - moist | | |
| 6.5 | | | | | | | |

| 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 |
| 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 TEST PIT NO. TP-9

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % — STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION ↴ | | |
| | 1 | S | | | | | |
| | 2 | S | | | Black silty sandy topsoil (OL) - some roots - moist | | |
| | | | | | Brown silty very fine to fine sand (SM) - trace of gravel - moist | | |
| | 3 | S | | | Reddish brown silty fine sand (SM) - trace of clay - some gravel and cobbles - moist | | |
| 5 | | | | | | | |
| 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 | | | 1-29-80 |
| BORING COMPLETED | | | 1-29-80 |
| 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 TEST PIT NO. TP-10

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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. 1 2 3 4 5 — PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 1 | S | | | Black silty topsoil (OL) - trace of roots - moist | | |
| | 2 | S | | | Yellowish brown silty very fine sand (SM-ML) - trace of roots - trace of cobbles - moist | | |
| 5 | 3 | S | | | Reddish brown silty fine sand (SM) - a little gravel - with pockets and seams of fine to medium sand - moist | | |
| 7 | | | | | | | |

| 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 |
| 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.

LOF OF TEST PIT NO. TP-11

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % — STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION → | | |
| | 1 | S | | | Black silty topsoil (OL) - with some roots - moist | | |
| | 2 | S | | | Yellowish brown silty very fine sand (SM-ML) - trace of gravel - trace of roots - moist | | |
| | 3 | S | | | Brown fine sand (SP) - trace of silt - with pockets of silty fine sand - trace of clay - trace of cobbles - moist | | |
| 5 | | | | | | | |

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 | | | 1-29-80 |
| BORING COMPLETED | | | 1-29-80 |
| 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 TEST PIT NO. TP-12

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % / STANDARD "N" PENETRATION (BLOWS/FT.) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION ↴ | | 1 2 3 4 5 — 10 20 30 40 50 |
| | 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 | | |
| 5 | 3 | S | | | Brown silty fine sand (SM) - trace of gravel - trace of cobbles - trace of clay - 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- -80 |
| BORING COMPLETED | | | 1- -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 TEST PIT NO. TP-13

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| Exxon Minerals U.S.A. | |
| **SITE** | **PROJECT NAME** |
| 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 % · STANDARD "N" PENETRATION (BLOWS/FT.) 10 20 30 40 50 |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| | 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 | | |
| 5 | 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 | | |
| 10 | 5 | S | | | Brown fine to medium sand (SP) - trace of silt - some gravel and cobbles - moist - | | |
| 11 | | | | | | | |

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 | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | PA | | | Ice | | |
| 5 | | | | | Water | | |
| 10 | | | | | | | |
| | 1 | ST | | | | | |
| 15 | 2 | ST | | | Black and green organic silt (OL) - fibrous - wet - very loose | | |
| | 3 | ST | | | | | |
| 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 | TWW |
| JOB # | 11728 | SHEET | 1 of 2 |

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

BBS 1021

## LOG OF BORING NO. STS LSL-1 Continued

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION → | | |
| | | | | | **CONTINUED** | | |
| 40 | | | | | | | |
| | 13 | ST | | | Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand seams - wet - soft to firm | 88.6 | ● |
| | 14 | ST | | | | | |
| | 15 | ST | | | | | |
| | 16 | ST | | | | | |
| | 17 | SS | | LS | Brown sandy gravel (GP) - wet - dense | | ⊗ 26 |
| | 18 | SS | | | | | ⊗ 44 |
| | | | | | End of Boring<br>Boring advanced to 52.0 feet by roller bit and wash water<br>28.0 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 | | | 3-18-82 |
| BORING COMPLETED | | | 3-18-82 |
| RIG | CME 55 | FOREMAN | TT |
| DRAWN | K00 | 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-2

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION → Ice | | |
| 5 | | | | | Water | | |
| 10 | | | | | | | |
| 15 | 1 | SS | | | Black organic silt (OL) - wet - very loose | | |
| 20 | 2 | SS | | | | | |
| | 3 | ST | | | | | |
| 25 | 4 | ST | | | | | |
| | 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<br>Boring advanced to 40.5 feet by roller bit and wash water<br>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 | 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-3

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | SURFACE ELEVATION | | |
| | | | | | Ice | | |
| 5 | | | | | Water | | |
| 10 | | | | | | | |
| | 1 | ST | | | Black organic silt (OL) - fibrous - wet - very loose | | |
| 15 | 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 | | | Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm | | |
| 35 | 10 | ST | | | | | |
| | 11 | ST | | | | | |
| | 12 | ST | | | | 87.8 | |
| 40 | 13 | ST | | | | | |
| | 14 | SS | | | | | |
| | 14A | SS | | | | | |
| 45 | 15 | BL | | | Brown fine to medium sand (SP) - trace of silt - wet - medium dense | | ⊗ 15 |
| | | | | | End of Boring<br>Boring advanced to 45.0 feet by roller bit and wash water<br>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 | 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-4

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| SITE | PROJECT NAME |
| Little Sand Lake | Sediment Sampling |

| 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 (1 2 3 4 5) / PLASTIC LIMIT % X — WATER CONTENT % ● — LIQUID LIMIT % △ / STANDARD "N" PENETRATION (BLOWS/FT.) ⊗ (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | | | | 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 | 81.0© | X - - - △ - - ● |
| | 10 | ST | | LS | | | |
| 35 | 11 | ST | | | | | |
| | 12 | ST | | | | | |
| 40 | 13 | ST | | LS | | | |
| | 14 | ST | | | | | |
| 43 | | | | | 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 | | | 3-20-82 |
| BORING COMPLETED | | | 3-21-82 |
| RIG | CME 55 | FOREMAN | TT |
| DRAWN | KOO | APPROVED | TWW |
| 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 | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION | | | | | | | |
| 40 | | | | | **CONTINUED** | | |
| | 15 | ST | | | | | |
| | 15A | ST | | | | | |
| 45 | | | | | Brown silty fine to medium sand (SM) - trace of gravel - wet - medium dense | | |
| | 16 | BL | | | | | ⊗ 37 |
| 47 | | | | | End of Boring<br>Boring advanced to 47.5 feet by roller bit and wash water<br>47.0 feet of HW casing used | | © ORGANIC CONTENT |

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 | | | 3-20-82 |
| BORING COMPLETED | | | 3-21-82 |
| RIG | CME 55 | FOREMAN | TT |
| 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 | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % / STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| SURFACE ELEVATION → | | | | | | | |
| | | PA | | | Ice | | |
| 5 | | | | | 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 | ● |
| | 6 | SS | | | | | |
| 25 | 7 | SS | | | | | |
| | 8 | SS | | | | | |
| | 9 | SS | | | | 84.5 | ● |
| 30 | 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<br>Boring advanced to 36.0 feet by roller bit and wash water<br>18.0 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 | | | 3-21-82 |
| BORING COMPLETED | | | 3-21-82 |
| 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.

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# LOG OF BORING NO. STS LSL-6

| OWNER | ARCHITECT-ENGINEER |
|---|---|
| EXXON Minerals Company | |
| **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 % — STANDARD "N" PENETRATION (BLOWS/FT.) (10 20 30 40 50) |
|---|---|---|---|---|---|---|---|
| | | PA | | | Ice | | |
| 5 | | | | | Water | | |
| 10 | 1 | SS | | | Brown and black organic silt (OL) - fibrous - wet - very loose | | ROD WEIGHT |
| | 2 | SS | | | | | ROD WEIGHT |
| 15 | 3 | SS | | | Greenish brown organic silt (OH) - trace to a little fiber - trace of sand - wet - soft | | ROD WEIGHT |
| | 4 | OS | | | | 41.8 | © 107.4 / 115.3 / X 62.6 |
| 20 | 5 | ST | | | Grayish brown mottled black silty clay (CL) - trace of organics - trace of sand - wet - firm | | |
| | 6 | SS | | | | | ROD WEIGHT |
| | 7 | OS | | | | | |
| 25 | 8 | SS | | | | | ROD WEIGHT |
| | 9 | SS | | | | | ROD WEIGHT |
| | 10 | OS | | | | 86.8 | ● |
| 30 | 11 | ST | | | | | |
| | 12 | SS | | | Brown clayey fine to medium sand (SC) - trace of gravel - wet - medium dense | | ⊗ 23 |
| 35 | 13 | BL | | | Brown fine to coarse sand (SP) - trace of silt - a little gravel - wet - medium dense | | ⊗ 38 |
| 36 | | | | | End of Boring<br>Boring advanced to 36.0 feet by roller bit and wash water<br>34.0 feet of HW casing used | | © ORGANIC CONTENT |

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 | | | 3-20-82 |
| BORING COMPLETED | | | 3-20-82 |
| 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.