Attachment D6: Panel Boreholes and Sampling

- Panel Borehole Logs
- Field Photos of Tube Samples
Appendix D
Attachment 6
Panel Boreholes and Sampling
Panel Borehole Logs
<table>
<thead>
<tr>
<th>Hole Number</th>
<th>Northing (m)</th>
<th>Easting (m)</th>
<th>Elevation (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR14-101</td>
<td>5819826</td>
<td>595340</td>
<td>933.0</td>
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<tr>
<td>MR14-102</td>
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<tr>
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<tr>
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<td>928.5</td>
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<tr>
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<tr>
<td>MR14-106F</td>
<td>5819994</td>
<td>595134</td>
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</tr>
<tr>
<td>MR14-106G</td>
<td>5819997</td>
<td>595135</td>
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<td>5819998</td>
<td>595135</td>
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</tr>
<tr>
<td>MR14-106I</td>
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<td>595135</td>
<td>928.6</td>
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<tr>
<td>MR14-107</td>
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<tr>
<td>MR14-107B</td>
<td>5820013</td>
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<td>928.4</td>
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<td>MR14-108</td>
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<td>928.6</td>
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<td>928.6</td>
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<td>5820037</td>
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<td>928.1</td>
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<td>MR14-112</td>
<td>5820028</td>
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<td>928.9</td>
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<td>595076</td>
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<td>MR14-116</td>
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<td>595113</td>
<td>930.6</td>
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<td>MR14-116A</td>
<td>5819969</td>
<td>595112</td>
<td>930.6</td>
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<td>RH14-117*</td>
<td>5819939</td>
<td>595125</td>
<td>932.4</td>
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<td>RH14-117A*</td>
<td>5819936</td>
<td>595132</td>
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<td>RH14-118*</td>
<td>5819922</td>
<td>595176</td>
<td>937.7</td>
</tr>
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</table>

* locations not surveyed
### Basic Soil Symbols

<table>
<thead>
<tr>
<th>Predominant Material</th>
<th>Secondary Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAVEL</td>
<td>gravelly to some gravel</td>
</tr>
<tr>
<td>SAND</td>
<td>sandy to some sand</td>
</tr>
<tr>
<td>SILT</td>
<td>silty to some silt</td>
</tr>
<tr>
<td>CLAY</td>
<td>clayey to some clay</td>
</tr>
<tr>
<td>PEAT / ORGANICS</td>
<td>some organics</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td></td>
</tr>
<tr>
<td>BEDROCK</td>
<td></td>
</tr>
<tr>
<td>ORGANIC SILT</td>
<td></td>
</tr>
<tr>
<td>FILL / DEBRIS</td>
<td></td>
</tr>
</tbody>
</table>

### Symbol Variations - Examples

- SAND and GRAVEL
- SAND, silty
- SILT with some clay

### Proportion of Minor Components by Weight

<table>
<thead>
<tr>
<th>Component</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
<td>35 - 50%</td>
</tr>
<tr>
<td>y / ey</td>
<td>20 - 35%</td>
</tr>
<tr>
<td>some</td>
<td>10 - 20%</td>
</tr>
<tr>
<td>trace</td>
<td>0 - 10%</td>
</tr>
</tbody>
</table>

### Density of Granular Soils

<table>
<thead>
<tr>
<th>Description</th>
<th>SPT N&lt;sup&gt;(4)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 - 4</td>
</tr>
<tr>
<td>Loose</td>
<td>4 - 10</td>
</tr>
<tr>
<td>Compact</td>
<td>10 - 30</td>
</tr>
<tr>
<td>Dense</td>
<td>30 - 50</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

### Consistency of Cohesive Soils

<table>
<thead>
<tr>
<th>Description</th>
<th>Undrained Shear Strength (kPa)&lt;sup&gt;(4)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Soft</td>
<td>&lt; 12</td>
</tr>
<tr>
<td>Soft</td>
<td>12 - 25</td>
</tr>
<tr>
<td>Firm</td>
<td>25 - 50</td>
</tr>
<tr>
<td>Stiff</td>
<td>50 - 100</td>
</tr>
<tr>
<td>Very Stiff</td>
<td>100 - 200</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 200</td>
</tr>
</tbody>
</table>

### Penetration Tests

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Cone</td>
<td>❇</td>
</tr>
<tr>
<td>Penetration</td>
<td>❇</td>
</tr>
<tr>
<td>Standard Penetration</td>
<td>❇</td>
</tr>
<tr>
<td>Becker Closed Casing</td>
<td>❇</td>
</tr>
<tr>
<td>Becker Open Casing</td>
<td>❇</td>
</tr>
<tr>
<td>Bounce Chamber Pressure</td>
<td>❇</td>
</tr>
</tbody>
</table>

### Classification by Particle Size

<table>
<thead>
<tr>
<th>Name</th>
<th>Size Range&lt;sup&gt;(3)&lt;/sup&gt;</th>
<th>U.S. Standard Sieve Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>&gt; 200</td>
<td>8 inch</td>
</tr>
<tr>
<td>Cobble</td>
<td>75 - 200</td>
<td>3 inch</td>
</tr>
<tr>
<td>Gravel: coarse</td>
<td>19 - 75</td>
<td>0.75 inch</td>
</tr>
<tr>
<td>Gravel: fine</td>
<td>5 - 19</td>
<td>No. 4</td>
</tr>
<tr>
<td>Gravel: coarse</td>
<td>2 - 5</td>
<td>No. 10</td>
</tr>
<tr>
<td>Gravel: medium</td>
<td>0.4 - 2</td>
<td>No. 40</td>
</tr>
<tr>
<td>Gravel: fine</td>
<td>0.075 - 0.4</td>
<td>No. 200</td>
</tr>
<tr>
<td>Fines: silt</td>
<td>0.002 - 0.075</td>
<td>-</td>
</tr>
<tr>
<td>Fines: clay</td>
<td>&lt; 0.002</td>
<td>-</td>
</tr>
</tbody>
</table>

1. Only selected examples of the possible variations or combinations of the basic symbols are illustrated.
2. USCS refers to group symbols as defined by the Unified Soil Classification System. Soil descriptions related to fines and secondary materials are based on particle size where lab testing was completed by Thurber and visual and tactile field behaviour of samples where lab testing was not completed by Thurber.
3. Approximate metric conversion.
Drill with odex to 4.1 m through gravel and rock fill. Cvane is torvane. Cpen is pocket penetrometer.

Switch to mud rotary using tricone bit with side injection ports at 4.1 m.

GRAVEL with some sand, a trace to some cobbles and a trace of silt. (Fill)

Very stiff to hard, sandy SILT to silty SAND with some gravel and cobbles and a trace of clay, inferred from CPT data. (Possible ablation/moraine till)
Very stiff to hard, sandy SILT to silty SAND with some gravel and cobbles and a trace of clay, inferred from CPT data. (Possible ablation/moraine till)

No recovery and no samples between 7.5 and 14.7 m.
No recovery and no samples between 7.5 and 14.7 m.

- cobble or boulder between 14.0 and 14.3 m

Very stiff to hard, gravelly SAND and SILT with some cobbles and a trace of clay. (Basal till)
Cpen > 225 kPa

Very stiff to hard, gravelly SAND and SILT with some cobbles and a trace of clay. (Basal till)

Very stiff to hard, clayey SILT with a trace of sand. (Glaciolacustrine)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Drill with odex to 2.8 m through gravel and rock fill.

Cvane is torvane. Cpen is pocket penetrometer.

Switch to mud rotary, set HW casing and use tricone bit with side injection ports at 2.8 m.

Cvane = 98 kPa

Cvane = 147 kPa
Cpen = 145 kPa

GRAVEL with some sand and a trace of silt. (Fill)

Stiff, gravelly, silty SAND with some clay and traces of wood fragments and organics. (Possible weathered ablation/moraine till)

Very stiff to hard, gravelly, silty SAND with some clay. (Possible ablation/moraine till)
Cvane = 98 kPa
Cpen = 170 kPa

- Very stiff to hard, gravelly, silty SAND with some clay. (Possible ablation/moraine till)
- Firm to stiff, sandy SILT with some clay and a trace of gravel. (Possible ablation/moraine till)
- Stiff to very stiff with some gravel
Stiff to very stiff, sandy SILT with some gravel and clay. (Possible ablation/moraine till)

Very stiff to hard, sandy SILT with some gravel and a trace of clay. (Basal till)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Drill with odex to 2.7 m through gravel and rock fill. Cvane is torvane. Cpen is pocket penetrometer.

Switch to mud rotary using wing bit with side injection ports at 2.7 m.

GRAVEL with some sand, a trace to some cobbles and a trace of silt. (Fill)

- boulder between 1.2 and 1.8 m

Stiff to hard, silty SAND with some gravel to gravelly and some clay. (Possible ablation/moraine till)

GRAVEL = 168 kPa

Sa 1  Sa 2

Sa 1  Sa 2
Cpен = 120 to 170 kPa

Cvane = 147 kPa
Cpен = 170 to 220 kPa

Cvane = 27.5 kPa

Cvane = 44 kPa
Cpен = 70 kPa

Stiff to hard, silty SAND with some gravel to gravelly and some clay. (Possible ablation/moraine till)

Firm to stiff, sandy SILT with some clay and a trace of gravel. (Possible ablation/moraine till)

Firm to stiff, brown, laminated clayey sandy SILT with a trace of gravel and some massive gravelly zones (Glaciolacustrine with ablation till inclusions).

Firm to stiff, sandy SILT with some clay and a trace of gravel. (Basal till)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
**LOCATION:** See Fig. 209  
E 595292, N 5819967

**TOP OF HOLE ELEV:** 930.8 m  
**METHOD:** PQ Air Coring / HQ Water Coring  
**DRILLING CO.:** Geotech Drilling Ltd.  
**INSPECTOR:** TB

**PROJECT:** Mount Polley Tailings Dam Breach  
**DATE:** October 25, 2014  
**FILE NO.:** 15-3-280

**SOIL DESCRIPTION**

- Rockfill.  
- Stiff to hard, brown, sandy, gravelly SILT with a trace of clay. (Possible ablation/moraine till)
  - very poor recovery, core barrel blocked by gravel between 2.6 and 3.6 m
  - poor recovery and heavily disturbed, loose in barrel liner between 3.6 and 5.1 m

**COMMENTS**

- Drill with ODEX to 2.6 m through gravel and rock fill.
- Switched to PQ air flush soil coring method with face injection carbide bit at 2.6 m.
Switched to HQ water flush soil coring method with diamond face injection bit and very low downfeed drill pressure at 5.2 m.

Increased downfeed drill pressure in attempt to improve recovery at 8.2 m.

Stiff to hard, brown, sandy, gravelly SILT with a trace of clay. (Possible ablation/moraine till)

- poor recovery and sample washed of fines between 5.2 and 6.7 m

- poor recovery and sample disturbed between 6.7 and 8.2 m

- poor recovery and sample disturbed between 8.2 and 9.8 m

- likely basal till below 8.6 m

End of hole at required depth.

Test hole grouted upon completion.

Top of hole backfilled with bentonite chips.
Drill with ODEX to 2.7 m through gravel and rock fill.

Cvane is torvane.

Cpen is pocket penetrometer.

Switched to HQ water flush soil coring method using SandDrill and Matex drill fluid additives at 2.7 m.

Cpen = 125 kPa

Stiff to hard, brown, sandy, gravelly SILT with a trace of clay. (Possible ablation/moraine till)

- core barrel blocked by cobble
Stiff to hard, brown, sandy, gravelly SILT with a trace of clay. (Possible ablation/moraine till)

- core barrel blocked by cobble

- likely basal till below 8.5 m

End of hole at required depth.
Test hole grouted upon completion.
**LOCATION:** See Fig. 209  
E 595290, N 5819868

**TOP OF HOLE ELEV:** 930.9 m

**METHOD:** PQ Water Soil Coring

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** TB

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** October 27, 2014

**FILE NO.:** 15-3-280

---

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPLES</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>GRAIN SIZE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>13</td>
<td></td>
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<td>14</td>
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<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS**

Top of hole backfilled with bentonite chips.
Cvane is torvane. Cpen is pocket penetrometer.

- Cvane = 100 kPa
- Cpen > 225 kPa

Drilled out. Fill of uncertain thickness.

Very stiff, brown, silty SAND with some gravel and clay. (Possible ablation/moraine till)
**Very stiff, brown, silty SAND with some gravel and clay. (Possible ablation/moraine till)**

**Brown, sandy GRAVEL with some silt.**

**Stiff to very stiff, brown, gravelly, silty SAND with some clay. (Possible ablation/moraine till)**

**Stiff, brown, sandy SILT with some gravel and a trace to some clay. (Possible ablation/moraine till)**

**Grey below 7.8 m**

Cvane = 88 kPa  
Cpen = 90 kPa
Cpen = 40 kPa

Cvane = 60 kPa

Cpen = 25 to 35 kPa

Stiff, brown, sandy SILT with some gravel and a trace to some clay. (Possible ablation/moraine till)

(Glaciolacustrine) Inferred from CT scanning, sample not extruded.

Firm to stiff, brown, sandy, silty CLAY with some gravel. (Possible ablation/moraine till)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Cvane is torvane. Cpen is pocket penetrometer.

Stiff to very stiff, silty, fine SAND with some clay, a trace to some gravel and traces of clay and wood fragments. (Possible fill)

Cvane = 170 kPa
Cpen > 225 kPa

Cvane = 50 kPa
Cpen = 63 kPa

Cvane = 83 kPa
Cpen = 88 kPa

Stiff to hard, brown, silty, fine SAND with some clay and gravel. (Possible ablation/moraine till)
Cvane = 45 kPa  
Cpen = 41 kPa

Stiff to hard, brown, silty, fine SAND with some clay and gravel. (Possible ablation/moraine till)

- grey below 5.9 m

Cvane = 70 kPa  
Cpen = 55 kPa

Firm to stiff, brown, fine sandy SILT with some clay and gravel. (Possible ablation/moraine till)

Cvane = 70 kPa  
Cpen = 55 kPa

Firm to stiff, brown, laminated silty CLAY with traces of sand and gravel. (Glaciolacustrine)

Cpens = 78 kPa

Firm to stiff, brown, fine sandy SILT with some clay and gravel. (Possible ablation/moraine till)
Cvane = 25 kPa
Cpen = 28 kPa

Firm to stiff, brown, fine sandy SILT with some clay and gravel. (Possible ablation/moraine till)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Test hole drilled to complete vane shear testing.
Cevane is an in-situ electric vane shear test. Remolded values were taken after 10 rotations.

Drilled out to 1.7 m.

Very stiff, fine sandy SILT with a trace to some wood fragments and a trace of clay. (Possible fill)

End of hole at required depth. Test hole backfilled with drill cuttings and bentonite chips upon completion.
Cvane is torvane. Cpen is pocket penetrometer.

Brown, silty, fine SAND. (Tailings)

Stiff to hard, brown, silty, fine SAND with some clay and gravel. (Possible ablation/moraine till)
Cpen = 88 kPa
Cpen = 50 kPa
Cvane = 55 kPa
Cpen = 50 kPa
Cvane = 110 kPa
Cpen = 119 kPa

Stiff to hard, brown, silty, fine SAND with some clay and gravel. (Possible ablation/moraine till)

- silty SAND and GRAVEL between 5.7 and 6.6 m

- firm to stiff below 6.3 m

Firm to stiff, brown CLAY with some silt and a trace of fine sand. (Glaciolacustrine)

Stiff to very stiff, brown, fine sandy SILT with some clay and gravel. (Basal till)
Cvane = 103 kPa
Cpen = 213 kPa
Stiff to very stiff, brown, fine sandy SILT with some clay and gravel. (Basal till)
Hard, brown, clayey SILT with a trace of sand. (Glaciolacustrine)
No recovery and no samples below 10.7 m.
End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Test hole drilled to complete vane shear testing.
Cvane is torvane. Cpen is pocket penetrometer.
Cevane was completed in-situ, using an electric vane. Remolded values were taken after 10 rotations.

Remolded values were taken after 10 rotations.
LOCATION: See Fig. 209  
E 595146, N 5819997

TOP OF HOLE ELEV: 928.7 m

METHOD: Mud Rotary

DRILLING CO.: Geotech Drilling Ltd.

INSPECTOR: TB

CLIENT: Mount Polley Independent Expert Engineering Investigation and Review Panel

PROJECT: Mount Polley Tailings Dam Breach

DATE: October 31, 2014

FILE NO.: 15-3-280

SOIL DESCRIPTION

ELEVATION (m)

923
922
921
920
919

5
6
7
8
9
10

DEPTH (m)

10 20 30 40 50 60 70 80 90 100

PENETRATION (blows/300 mm)

WATER CONTENT (%)

Disturbed

Undisturbed

WATER LEVEL

Plastic

Liquid

USCS

Grab Sample

Tube Sample

No Recovery

SAMPLES

UNDRAINED SHEAR STRENGTH (kPa)

Peak

Remolded

Residual

Pocket Pen

GRAIN SIZE (%)

Passing #4 sieve

Passing #200 sieve

SOILTOPEHOLE-MAUPEO 15-3-280 THURBER.GPJ THURBER. BC.GDT 14/1/15-THURBER BC.GLB

Cevane: Peak > 192 kPa

Cevane: Peak = 350 kPa

Cevane: Peak = 130 kPa

Cevane: Peak = 138 kPa

Remolded = 29 to 34 kPa

Cevane: Peak = 156 kPa

Remolded = 43 kPa

- a trace of gravel below 7.2 m

Hard, brown, Silt and Clay with a trace of fine sand. (Glaciolacustrine)

Very stiff, grey, clayey Silt with a trace to some gravel, and a trace of fine sand. (Basal till)

End of hole at required depth.

Test hole grouted upon completion.

Top of hole backfilled with bentonite chips.

Hard, brown, fine sandy Silt with a trace to some gravel and a trace of clay. (Possible ablation/moraine till)
Drilled out, no sampling.
Drilled out, no sampling.

No recovery.

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Drilled out to 7.2 m.

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Drilled out to 7.2 m.

Drilled out to 7.2 m.
Cvane is torvane.
Cpen is pocket penetrometer.

Drilled out to 7.2 m.

Firm to stiff, grey to brown SILT and CLAY with a trace to some sand. (Glaciolacustrine)

Cvane = 56 kPa
Cpen = 24 to 34 kPa
Cvane = 19 kPa
Cpen = 4 to 9 kPa

No recovery.

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
**LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER.GPJ  THURBER BC.GDT  14/1/15- THURBER BC.GLB**

<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPLES</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>GRAIN SIZE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crude</td>
<td>Peak</td>
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<td>Limit</td>
<td>passing #4 sieve</td>
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</tr>
</tbody>
</table>

**COMMENTS**

Drilled out to 7.6 m.

**LOCATION:** See Fig. 209
E 595137, N 5819993

**TOP OF HOLE ELEV:** 928.7 m

**METHOD:** Mud Rotary

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** BSP

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** November 5, 2014

**FILE NO.:** 15-3-280

**LOCATION:**

**DEPTH (m):** 0 1 2 3 4 5

**COMMENTS:**

**SOIL DESCRIPTION:**

- Drilled out to 7.6 m.
Cvane is torvane. Cpen is pocket penetrometer. Drilled out to 7.6 m.

Drilled out to 7.6 m. Drilled out to 7.6 m.

Firm, grey, moist, silty CLAY with a trace of sand. (Glaciolacustrine)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.

Cvane = 20 kPa
Cpen = 5 kPa
Drilled out to 7.1 m.

LOCATION: See Fig. 209
E 595134, N 5819990

TOP OF HOLE ELEV: 929.0 m

METHOD: Mud Rotary

DRILLING CO.: Geotech Drilling Ltd.

INSPECTOR: BSP

ELEVATION (m)

928
927
926
925

COMMENTS

PROJECT: Mount Polley Tailings Dam Breach

DATE: November 5 and 6, 2014

FILE NO.: 15-3-280

CLIENT: Mount Polley Independent Expert Engineering Investigation and Review Panel

PROJECT FILE NO.: MR14-106E

Sheet 1 of 2
Cvane is torvane.
Cpen is pocket penetrometer.

Drilled out to 7.1 m.

Stiff, grey, moist, silty CLAY with a trace of sand.
(Glaciolacustrine)

Cvane = 62 kPa
Cpen = 68 to 98 kPa

Cvane = 63 kPa
Cpen = 63 to 68 kPa

Cvane = 171 kPa
Cpen > 225 kPa

No recovery.

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
**LOCATION:**
See Fig. 209
E 595134, N 5819994

**TOP OF HOLE ELEV:**
928.7 m

**METHOD:**
Mud Rotary

**DRILLING CO.:**
Geotech Drilling Ltd.

**INSPECTOR:**
BSP

---

**COMMENTS**

- Drilled out 7.0 m.

---

**SOIL DESCRIPTION**

<table>
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<tr>
<th>DEPTH (m)</th>
<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPLING DETAILS</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>GRAIN SIZE (%)</th>
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**CLIENT:**
Mount Polley Independent Expert Engineering Investigation and Review Panel

**DATE:**
November 6, 2014

**FILE NO.:**
15-3-280

---

**LOCATION:**
Mount Polley Tailings Dam Breach

**DATE:**
November 6, 2014

**FILE NO.:**
15-3-280

**INSPECTOR:**
Geotech Drilling Ltd.

**CLIENT:**
Mount Polley Independent Expert Engineering Investigation and Review Panel

---

**LOCATION:**
See Fig. 209
E 595134, N 5819994

---

**LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER.GPJ  THURBER BC.GDT  14/1/15 - THURBER BC.GLB**
**LOG OF TEST HOLE - MT POLLEY 15-3-280**

**LOCATION:** See Fig. 209
E 595134, N 5819994

**TOP OF HOLE ELEV:** 928.7 m

**METHOD:** Mud Rotary

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** BSP

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** November 6, 2014

**FILE NO.:** 15-3-280

<table>
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<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPOMES</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
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</table>

**COMMENTS**

Cvane is torvane. Cpen is pocket penetrometer.

**SOIL DESCRIPTION**

Drilled out 7.0 m.

Firm, grey, moist, SILT and CLAY with some rounded gravel. (Glaciolacustrine)

Firm, grey, moist, silty CLAY with a trace of sand. (Glaciolacustrine)

- some sand below 8.6 m
- stiff to very stiff at 8.7 m

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Drilled out to 7.0 m.
Cvane = torvane.
Cpen is pocket penetrometer.

Drilled out to 7.0 m.

Firm to stiff, grey, moist, SILT and CLAY with a trace of sand. (Glaciolacustrine)

- some sand partings below 8.2 m

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Drilled out to 7.3 m.
Cvane is torvane.
Cpen is pocket penetrometer.

Drilled out to 7.3 m.

Firm to stiff, grey, moist, thinly laminated SILT and CLAY with a trace of fine sand in partings. (Glaciolacustrine)

Stiff, grey, moist, SILT and CLAY with a trace of fine gravel. (Glaciolacustrine)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
**LOCATION:**  See Fig. 209
E 595135, N 5820001

**TOP OF HOLE ELEV:**  928.6 m

**METHOD:**  Mud Rotary

**DRILLING CO.:**  Geotech Drilling Ltd.

**INSPECTOR:**  BSP

**CLIENT:**  Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:**  Mount Polley Tailings Dam Breach

**DATE:**  November 7, 2014

**FILE NO.:**  15-3-280

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<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPLES</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>GRAIN SIZE (%)</th>
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<td>Plastic</td>
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<td>Tube Sample</td>
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<td></td>
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<td></td>
<td>Passing #4 sieve</td>
<td>No Recovery</td>
<td>Passing #2 sieve</td>
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<td></td>
<td>Passing #8 sieve</td>
<td>No Recovery</td>
<td>No Recovery</td>
<td></td>
</tr>
</tbody>
</table>

**LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER.GPJ  THURBER BC.GDT  14/1/15- THURBER BC.GLB**

**COMMENTS:**  Drilled out to 7.3 m.

**SOIL DESCRIPTION:**
Cvane is torvane.
Cpen is pocket penetrometer.
Cvane = 78 kPa
Cpen = 29 to 39 kPa
Cpen = 107 to 117 kPa
Drilled out to 7.3 m.
Firm to stiff, grey, moist, SILT and CLAY with traces of sand and fine gravel. (Glaciolacustrine)
Stiff to very stiff, grey, moist, gravelly, sandy SILT with some clay. (Basal till)
End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Cvane = torvane.
Cpen = pocket penetrometer.

Cvane = 98 kPa
Cpen = 146 kPa

Brown to grey, silty fine SAND. (Tailings)

Stiff to hard, brown SAND, SILT and GRAVEL with some clay. (Possible ablation/moraine till)
**COMMENTS**

- Cvane = 88 kPa
  - Cpen = 59 kPa
- Cpen = 63 kPa
- Cvane = 90 kPa
  - Cpen = 60 kPa
- Cvane = 100 kPa
  - Cpen = 75 kPa

**SOIL DESCRIPTION**

- Stiff, hard, brown SAND, SILT and GRAVEL with some clay. (Possible ablation/moraine till) + stiff below 5.2 m
- Stiff, brown, SILT and CLAY with a trace of sand. (Glaciolacustrine)
- Stiff, brown, gravelly, silty SAND with some clay. (Basal till)

**ELEVATION (m)**

<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
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<tbody>
<tr>
<td>923</td>
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<td>921</td>
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<tr>
<td>920</td>
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<tr>
<td>919</td>
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</tbody>
</table>
No recovery and no samples below 8.5 m.

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Test hole drilled to complete vane shear testing.

Drilled out to 5.5 m.
Cvane is torvane.
Cpen is pocket penetrometer.

Cevane is an in-situ electric vane shear test.

Drilled out to 5.5 m.

Stiff, brown, fine sandy SILT with a trace to some gravel and a trace of silt. (Possible ablation/moraine till)

Stiff, grey, SILT and CLAY with a trace of fine sand. (Glaciolacustrine)
- sandy below 7.4 m

Stiff to very stiff, brown, fine sandy SILT with some gravel and clay. (Basal till)
LOCATION: See Fig. 209
E 595132, N 5820013
TOP OF HOLE ELEV: 928.3 m
METHOD: Mud Rotary
DRILLING CO.: Geotech Drilling Ltd.
INSPECTOR: TB

CLIENT: Mount Polley Independent Expert Engineering Investigation and Review Panel
PROJECT: Mount Polley Tailings Dam Breach
DATE: October 30, 2014
FILE NO.: 15-3-280

ELEVATION (m)
918
917
916
915
914
913
912
911
910
909
908
907
906
905
904
903
902
901
900

COMMENTS
PROJECT:
DATE:
FILE NO.:
15-3-280

SOIL DESCRIPTION

Stiff to very stiff, brown SILT with traces of clay and fine sand. (Glaciolacustrine)

Very stiff, brown, fine sandy SILT with traces of clay and gravel. (Basal till)

Stiff, dark grey, laminated clayey SILT with traces of fine sand, gravel and organic odour. (Glaciolacustrine)
- trace to no gravel below 11.7 m

Dense (inferred), dark grey, fine to medium SAND with a trace to some silt. (Possible glaciofluvial)
End of hole at required depth. Test hole grouted to surface upon completion.
**Test hole drilled to complete vane shear testing.**

**Drilled out to 6.6 m.**
Cvane is torvane. Cpen is pocket penetrometer. Cevane is an in-situ electric vane shear test. Remolded values were taken after 10 rotations.

Drilled out to 6.6 m.

Firm to stiff, grey, SILT and CLAY with a trace of fine sand. (Glaciolacustrine)

Cvane = 30 kPa Cpen = 50 kPa

Cevane: Peak = 98 kPa Residual = 42 kPa Remolded = 17 kPa

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
**LOCATION:**
See Fig. 209
E 595105, N 5820013

**TOP OF HOLE ELEV:**
928.6 m

**METHOD:**
Mud Rotary

**DRILLING CO.:**
Geotech Drilling Ltd.

**INSPECTOR:**
TB

---

**COMMENTS**
Cvane is torvane. Cpen is pocket penetrometer.

**SOIL DESCRIPTION**
- Brown to grey, silty, fine SAND. (Tailings)
- Very stiff to hard, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)
- gravelly between 2.3 and 3.2 m
- boulder at 2.7 m
- Cvane = 125 kPa
  Cpen = 213 kPa
- Cvane = 128 kPa
  Cpen = 125 kPa
- Cvane = 125 kPa
  Cpen > 225 kPa
LOCATIONS: See Fig. 209
E 595105, N 5820013

TOP OF HOLE ELEV: 928.6 m

METHOD: Mud Rotary

DRILLING CO.: Geotech Drilling Ltd.

INSPECTOR: TB

CLIENT: Mount Polley Independent Expert Engineering Investigation and Review Panel

PROJECT: Mount Polley Tailings Dam Breach

DATE: October 24, 2014

FILE NO.: 15-3-280

- Cvane = 50 kPa
  Cpen = 42 kPa

- Cvane = 48 kPa
  Cpen = 63 kPa

- Cvane = 73 kPa
  Cpen = 100 kPa

- Firm to stiff, gravelly, fine sandy SILT with some clay. (Possible ablation/moraine till)

- Firm to stiff, brown, silty CLAY. (Possible glaciolacustrine)

- Stiff to very stiff, fine sandy, gravelly SILT with a trace of clay. (Possible ablation/moraine till)

- No recovery and no samples below 8.1 m.
No recovery and no samples below 8.1 m.

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Drilled out to 8.5 m.
Cvane is torvane.
Cpen is pocket penetrometer.

Drilled out to 8.5 m.

Very hard, grey to brown SILT with a trace to some gravel and a trace of fine sand. (Basal till)

No recovery between 9.5 and 11.4 m.
Pitcher Sampler Used.

Cvane = 105 kPa
Cpen > 225 kPa

No recovery between 9.5 and 11.4 m.

Very stiff, grey, moist, clayey SILT with a trace of fine sand. (Glaciolacustrine)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Cvane is torvane. Cpen is pocket penetrometer.

Brown to grey, silty, fine SAND. (Tailings)

Stiff to hard, brown, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)

Cvane = 75 kPa
Cpen = 175 kPa

Cvane = 95 kPa
Cpen = 180 kPa

Cvane = 95 kPa
Cpen > 225 kPa

Cvane = 75 kPa
Cpen = 175 kPa

Cvane = 50 kPa
Cpen = 175 kPa

Cvane = 95 kPa
Cpen > 225 kPa
Cpen = 175 kPa

Stiff to hard, brown, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)

Stiff to hard, grey GRAVEL, SAND and SILT with a trace of clay. (Basal till)

No recovery and no samples between 6.7 and 12.2 m.

Sa 5

GC-GM
Cvane = 75 kPa
Cpen > 225 kPa

No recovery and no samples between 6.7 and 12.2 m.

Stiff to hard, grey, fine sandy SILT with some gravel and clay. (Basal till)

No recovery and no samples below 12.6 m.

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Cvane is torvane. Cpen is pocket penetrometer.

Brown to grey, silty, fine SAND. (Tailings)

Stiff to hard, brown, fine SAND and SILT with some gravel and clay. (Possible ablation/moraine till)

- gravelly between 2.3 and 3.5 m

Cp = 150 kPa
Cp = 138 kPa
Cvane = 80 kPa
Cp = 150 kPa
Stiff to hard, grey, fine sandy SILT with a trace to some gravel and a trace of clay. (Possible ablation/moraine till)

Cvane = 75 kPa
Cpen = 113 kPa

No recovery and no samples between 5.9 and 12.2 m.
Very stiff to hard, brown, clayey SILT with a trace of fine sand. (Glaciolacustrine)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Cvane is torvane.

Cpen is pocket penetrometer.

Brown to grey, silty, fine SAND. (Tailings)

Stiff to hard, brown, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)

Stiff, brown, SAND, SILT and CLAY with some gravel with bedded zones of clay. (Glaciolacustrine with ablation till inclusions)

Stiff to hard, brown, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)
Cvane = 110 kPa
Cpen = 190 kPa

Stiff to hard, brown, fine sandy SILT with some gravel and clay. (Possible ablation/moraine till)
- likely basal till below 6.8 m

Cvane > 110 kPa
Cpen > 225 kPa
No recovery and no samples below 10.0 m.

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Test hole drilled to complete vane shear testing. Cevane is an in-situ electric vane shear test.

Drilled out to 4.2 m. Hard, grey, silty, sandy GRAVEL with a trace of clay. (Possible ablation/moraine till)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
**LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER BC**

**LOCATION:** See Fig. 209  
E 595149, N 5820028

**TOP OF HOLE ELEV:** 928.9 m

**METHOD:** Mud Rotary

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** TB

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** October 22, 2014

**FILE NO.:** 15-3-280

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**ELEVATION (m):**

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<th>Penetration (blows/300 mm)</th>
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**WATER CONTENT (%):**

- Disturbed
- Undisturbed

**WATER LEVEL:** Plastic Limit

**SAMPLES:**

- Grab Sample
- Tube Sample
- No Recovery

**UNDRAINED SHEAR STRENGTH (kPa):**

- Peak
- Remolded
- Residual
- Pocket Pen
- Passing #200 sieve
- Passing #4 sieve

**GRAIN SIZE (%):**

**SOIL DESCRIPTION:**

- Brown to grey, silty fine SAND. (Tailings)
- Hard to stiff, brown, silty SAND and GRAVEL with some clay. (Possible ablation/moraine till)
- Brown, laminated silty CLAY with traces of gravel, fine sand and organics. (Glaciolacustrine)
- Hard to stiff, brown, silty SAND and GRAVEL with some clay. (Possible ablation/moraine till)

**COMMENTS:**

- Cvane is torvane. Cpen is pocket penetrometer.
- Cpen = 156 kPa
- Cvane = 90 kPa
- Cpen = 158 kPa
**LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER.BC.GPJ THURBER BC.GDT 20/1/15- THURBER BC.GLB**

**LOCATION:** See Fig. 209  
E 595149, N 5820028

**TOP OF HOLE ELEV:** 928.9 m

**METHOD:** Mud Rotary

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** TB

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** October 22, 2014

**FILE NO.:** 15-3-280

**ELEVATION (m):**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Hard to stiff, brown, silty SAND and GRAVEL with some clay. (Possible ablation/moraine till)</td>
</tr>
<tr>
<td>6</td>
<td>No recovery and no samples below 7.0 m.</td>
</tr>
</tbody>
</table>

**SOIL DESCRIPTION**

- **Cpen = 106 kPa**
- **Sa 5**
- **Sa 6**

**WATER CONTENT (%):**

- Plastic Limit
- Liquid Limit

**PENETRATION (blows/300 mm):**

- Undisturbed
- Disturbed

**WATER LEVEL:**

- Plastic
- Liquid

**SAMPLES:**

- Grab Sample
- Tube Sample
- No Recovery

**UNDRAINED SHEAR STRENGTH (kPa):**

- Undisturbed
- Disturbed

**GRAIN SIZE (%):**

- Passing #4 sieve
- Passing #200 sieve

**INSPECTOR:**

- TB

**CLIENT:**

- Mount Polley Independent Expert Engineering Investigation and Review Panel
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>PENETRATION (blows/300 mm)</th>
<th>WATER CONTENT (%)</th>
<th>WATER LEVEL</th>
<th>SAMPLES</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>GRAIN SIZE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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<td>15</td>
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</tbody>
</table>

**COMMENTS**

- End of hole at required depth.
- Test hole grouted upon completion.
- Top of hole backfilled with bentonite chips.
Test hole drilled to complete vane shear testing.  
Cevane is an in-situ electric vane shear test.

Drilled out to 2.4 m.

Hard, brown, sandy SILT with a trace to some gravel and a trace of clay. (Possible ablation/moraine till)

Cevane: Peak > 194 kPa

Cevane: Peak > 190 kPa

End of hole at required depth.  
Test hole grouted upon completion.  
Top of hole backfilled with bentonite chips.
Cvane is torvane.
Cpen is pocket penetrometer.

Cvane = 75 kPa
Cpen = 92 kPa

Brown to grey, silty fine SAND. (Tailings)
Hard to stiff, brown SAND and SILT to sandy SILT with some clay and traces of gravel and organics. (Possible ablation/moraine till)

Cpen = 175 kPa

- gravelly between 3.6 and 5.5 m

Cvane = 75 kPa
Cpen = 92 kPa
Hard to stiff, brown SAND and SILT to sandy SILT with some clay and traces of gravel and organics. (Possible ablation/moraine till)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Cvane is torvane.
Cpen is pocket penetrometer.

Cvane = 70 kPa
Cpen = 110 kPa

Cvane = 80 kPa
Cpen > 225 kPa

Cvane = 80 kPa
Cpen = 112 kPa

Rockfill.
Stiff to hard, brown, gravelly SILT and SAND with some clay. (Possible ablation/moraine till)
**Cvane** = 80 kPa  
**Cpen** = 88 kPa  

Stiff to hard, brown, gravelly SILT and SAND with some clay. (Possible ablation/moraine till) - likely basal till below 8.4 m

End of hole at required depth.  
Test hole grouted upon completion.  
Top of hole backfilled with bentonite chips.
Cvane is torvane. Cpen is pocket penetrometer.

Cvane = 95 kPa
Cpen = 110 kPa

Cvane = 68 kPa
Cpen = 63 kPa

Cvane = 89 kPa
Cpen > 225 kPa

Brown to grey, silty, fine SAND. (Tailings)

Stiff to hard, brown, gravelly SAND and SILT with some clay. (Possible ablation/moraine till)

No recovery and no samples below 4.9 m.
No recovery and no samples below 4.9 m.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Penetration (blows/300 mm)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
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<td>15</td>
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</tbody>
</table>

**SOIL DESCRIPTION**

- No recovery and no samples below 4.9 m.
- End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Penetration recorded are uncorrected field values from large penetration test (LPT) with 7.6 cm outer diameter and 6.1 cm inner diameter, driven with SPT hammer.

Stiff to very stiff, grey to brown, moist, sandy, rounded gravelly SILT with some clay. (Possible ablation/moraine till)

- 2 to 3 mm thick layer of fine to medium sand at 2.5 m
- minimum 100 mm diameter cobble at 4.4 m
### Soil Description

**Stiff to very stiff, grey to brown, moist, sandy, rounded gravelly SILT with some clay. (Possible ablation/moraine till)**

- Firm, grey, moist, thinly laminated, silty CLAY with some sand on horizontal laminations. (Glaciolacustrine)
  - laminations 2 to 3 mm thick

- 100 mm thick layer of clay at 5.8 m

- Very stiff, grey, moist, silty, sandy GRAVEL with some clay. (Possible ablation/moraine till)

- blow counts not recorded

- possible pushing a cobble ahead of sampler (possible glaciolacustrine)

- No recovery between 8.7 and 10.5 m
- blow counts may be affected by cobble below

- possible cobble at 10.4 m

Firm to stiff, grey, moist SILT with some clay and a trace of fine to medium sand. (Glaciolacustrine)

Firm to stiff, grey, moist, thinly laminated, silty CLAY with some 50 mm clay layers and fine sand in laminations. (Glaciolacustrine)

- generally laminations 2 to 3 mm thick

- a trace of rounded gravel 2 to 3 mm thick

No recovery between 8.7 and 10.5 m

Very stiff, grey, moist SILT with some fine sand laminations 3 to 5 mm thick. (Glaciolacustrine)
Hard, grey, moist, clayey SILT with some fine sand laminations 3 to 5 mm thick. (Glaciolacustrine)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
Penetration recorded are uncorrected field values from large penetration test (LPT).

Stiff to very stiff, brown, moist, sandy, silty GRAVEL to 50 mm diameter with some clay.

(Possible ablation/moraine till)

End of hole at required depth.

Test hole grouted upon completion.

Top of hole backfilled with bentonite chips.
**Location:** See Fig. 209
E 595126, N 5819944 (est.)
Near KCB SH14-03

**Top of Hole Elevation:** 932.4 m (est.)

**Method:** Odex / Mud Rotary

**Drilling Co.:** Geotech Drilling Ltd.

**Inspector:** BSP

**Client:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**Project:** Mount Polley Tailings Dam Breach

**Date:** November 12, 2014

**File No.:** 15-3-280

**Penetration (blows/300 mm):**

<table>
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<tr>
<th>Depth (m)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Disturbed</td>
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<tr>
<td>Undisturbed</td>
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</table>

**Water Level:**

- Plastic Limit
- Liquid Limit

**Samples:**

- Undisturbed
- Disturbed
- Passing #4 sieve
- Passing #200 sieve
- No Recovery

**Undrained Shear Strength (kPa):**

- Undisturbed
- Disturbed

**Grain Size (%):**

- Passing #200 sieve
- Pocket Pen
- Passing #4 sieve

**Soil Description:**

- Drilled with odex.
- Drilled out 11.9 m.
## Geotechnical Log

**Location:** See Fig. 209
E 595126, N 5819944 (est.)
Near KCB SH14-03

**Top of Hole Elev.:** 932.4 m (est.)

**Method:** Odex / Mud Rotary

**Drilling Co.:** Geotech Drilling Ltd.

**Inspector:** BSP

**Client:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**Project:** Mount Polley Tailings Dam Breach

**Date:** November 12, 2014

**File No.:** 15-3-280

### Log Details

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Penetration (blows/300 mm)</th>
<th>Water Level</th>
<th>Water Content (%)</th>
<th>Samples</th>
<th>UNDRAINED SHEAR STRENGTH (kPa)</th>
<th>Grain Size (%)</th>
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</tbody>
</table>

### Comments

- Drilled out 11.9 m.

### Soil Description

- Drilled out 11.9 m.
Switched to mud rotary at 10.0 m.

Cvane is torvane. Cpen is pocket penetrometer.

Cvane = 30 kPa
Cpen = 14 to 53 kPa

Cvane = 56 kPa
Cpen = 55 kPa

Cvane = 62 kPa
Cpen = 117 to 166 kPa

Switched to mud rotary at 10.0 m.

Cvane is torvane. Cpen is pocket penetrometer.

Cvane = 30 kPa
Cpen = 14 to 53 kPa

Cvane = 56 kPa
Cpen = 55 kPa

Cvane = 62 kPa
Cpen = 117 to 166 kPa

Drilled out 11.9 m.

Firm, grey, moist, 2 mm thick laminations sub-horizontal to sub-vertical, silty CLAY. (Glaciolacustrine)

Firm to stiff, grey, moist, silty CLAY with some sand and a trace of gravel. (Glaciolacustrine)

- cobble at 13.0 m

Stiff to very stiff, grey, moist, silty CLAY with some sand and rounded gravel to 25 mm diameter. (Basal till)

End of hole at required depth. Test hole grouted upon completion. Top of hole backfilled with bentonite chips.
Drilled with odex. Drilled out to 11.9 m.
LOCATION: See Fig. 209
E 595125, N 5819939 (est.)
Near KCB SH14-03

TOP OF HOLE ELEV: 932.6 m (est.)

METHOD: Odex / Mud Rotary

DRILLING CO.: Geotech Drilling Ltd.

INSPECTOR: BSP

CLIENT: Mount Polley Independent Expert Engineering Investigation and Review Panel

PROJECT: Mount Polley Tailings Dam Breach

DATE: November 12, 2014

FILE NO.: 15-3-280

LOG OF TEST HOLE - MT POLLEY 15-3-280 THURBER.GPJ THURBER BC.GDT 14/1/15-THURBER BC.GLB

Drilled out to 11.9 m.

<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>927</td>
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<td>909</td>
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<td>908</td>
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</tbody>
</table>

E 595125, N 5819939 (est.)
Near KCB SH14-03

SAMPLES

USCS Grab Sample
USCS Tube Sample
No Recovery

USCS Plastic Limit
USCS Liquid Limit

PENETRATION (blows/300 mm)

WATER CONTENT (%)

Disturbed
Undisturbed

WATER LEVEL

Plastic
Liquid

GRAN SIZE (%)

Undisturbed
Disturbed

Passing 200 sieve
Passing #4 sieve
Passing #200 sieve

Drilled out to 11.9 m.
Switched to mud rotary at 10.0 m.

Cvane = 46 kPa
Cpen = 4 to 14 kPa

Firm, grey, moist, silty CLAY with traces of sand and rounded gravel to 30 mm diameter.
(Glaciolacustrine)

End of hole at required depth.
Test hole grouted upon completion.
Top of hole backfilled with bentonite chips.
<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
<th>COMMENTS</th>
<th>SOCIL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>937</td>
<td>Drilled with odex.</td>
<td></td>
</tr>
<tr>
<td>936</td>
<td>Drilled out to 11.6 m.</td>
<td></td>
</tr>
</tbody>
</table>
Drilled out to 11.6 m.
Cpen = pocket penetrometer.

Switched to mud rotary at 11.6 m.

Firm to stiff, grey, silty, sandy GRAVEL with some clay. (Possible ablation/moraine till)

Cpen = 113 to 152 kPa

Drilled out to 11.6 m.
**LOG OF TEST HOLE - MT POLLEY  15-3-280 THURBER.GPJ  THURBER BC.GDT  14/1/15- THURBER BC.GLB**

**LOCATION:** See Fig. 209  
E 595176, N 5819922 (est.)  
Near KCB SH14-06

**TOP OF HOLE ELEV:** 937.7 m (est.)

**METHOD:** Odex / Mud Rotary

**DRILLING CO.:** Geotech Drilling Ltd.

**INSPECTOR:** BSP

**CLIENT:** Mount Polley Independent Expert Engineering Investigation and Review Panel

**PROJECT:** Mount Polley Tailings Dam Breach

**DATE:** November 11, 2014

**FILE NO.:** 15-3-280

---

### Soil Description

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Water Content (%)</th>
<th>Undrained Shear Strength (kPa)</th>
<th>Grain Size (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
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<td>20</td>
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</tbody>
</table>

**COMMENTS:**

- **15 m:** Firm to stiff, grey, silty, sandy GRAVEL with some clay. (Possible ablation/moraine till)
- **16 m:** No recovery from 15.5 to 16.8 m  
  (Possible glaciolacustrine)
- **17 m:** Very stiff, grey, moist, sandy, gravelly SILT with some clay. (Basal till)
- **18 m:** No recovery
- **19 m:** End of hole at required depth.  
  Test hole grouted upon completion.  
  Top of hole backfilled with bentonite chips.
Field Photos of Tube Samples
MR14-101 SAMPLE #3

MR14-101 SAMPLE #4
MR14-101 SAMPLE #5

MR14-101 SAMPLE #6
MR14-103 SAMPLE #5

MR14-103 SAMPLE #6
MR14-104 PHOTO SUMMARY

SEVERE DAMAGE – SAMPLE BAG REQUIRED
SEVERE DAMAGE – SAMPLE BAG REQUIRED
MR14-105 PHOTO SUMMARY

NO RECOVERY

MR14-105 SAMPLE #1

MR14-105 SAMPLE #2
MR14-105 SAMPLE #7

15-3-280
MR14-105
Sa #7
22'7" - 23'8"

MR14-105 SAMPLE #8

15-3-280
MR14-105
Sa #8
25'10" - 28'
MR14-105 SAMPLE #9

15-3-280
MR14-105
Sa #9
30’ - 32’-1”

MR14-105 SAMPLE #10

15-3-280
MR14-105
Sa #10
35’ - 37’-1”
MR14-106 SAMPLE #3

15-3-280
MR14-106
Sa # 3
17’-17’-7”

MR14-106 SAMPLE #4

15-3-280
MR14-106
Sa # 4
18’-9”-20’-9”
MR14-106 SAMPLE #5

MR14-106 SAMPLE #6 – SAMPLE TUBE WAS SPLIT IN THE FIELD
MR14-106 SAMPLE #6 – SPLITT SAMPLE

MR14-106 SAMPLE #7
MR14-106 SAMPLE #8

MR14-106 SAMPLE #9
MR14-106A PHOTO SUMMARY

MR14-106A SAMPLE #1
MR14-106B PHOTO SUMMARY

NO RECOVERY

MR14-106B SAMPLE #1

NO RECOVERY

MR14-106B SAMPLE #2
MR14-106C PHOTO SUMMARY

MR14-106C SAMPLE #1

MR14-106C SAMPLE #2
MR14-106D PHOTO SUMMARY

MR14-106D SAMPLE #1

MR14-106D SAMPLE #2
MR14-106F PHOTO SUMMARY

MR14-106F SAMPLE #1

MR14-106F SAMPLE #2

MR14-106F SAMPLE #3
MR14-106H PHOTO SUMMARY

MR14-106H SAMPLE #1

MR14-106H SAMPLE #2
MR14-106I PHOTO SUMMARY

MR14-106I SAMPLE #1

MR14-106I SAMPLE #2
MR14-107 PHOTO SUMMARY

MR14-107 SAMPLE #1

NO RECOVERY

MR14-107 SAMPLE #2
MR14-107 SAMPLE #3

MR14-107 SAMPLE #4
MR14-107 SAMPLE #5

MR14-107 SAMPLE #6
MR14-107A PHOTO SUMMARY

MR14-107A SAMPLE #1

15-3-280
MR14-107A
Sa# 1
23.5'-25.5'

MR14-107A SAMPLE #2

15-3-280
MR14-107A
Sa# 2
27.9'-29.9'
MR14-107A SAMPLE #2

MR14-107A SAMPLE #3
MR14-107A SAMPLE #4

15-3-280
MR14-107A
Sa#4
33-34.5'

MR14-107A SAMPLE #5

15-3-280
MR14-107A
Sa#5
35.5-36.9'
MR14-107A SAMPLE #6

MR14-107A SAMPLE #7
MR14-107B PHOTO SUMMARY

MR14-107B SAMPLE #1
NO PHOTO TAKEN

MR14-108A SAMPLE #3

NO RECOVERY

MR14-108A SAMPLE #4
MR14-109 PHOTO SUMMARY

MR14-109 SAMPLE #1

MR14-109 SAMPLE #2
MR14-109 SAMPLE #3

MR14-109 SAMPLE #4
MR14-110 SAMPLE #3

MR14-110 SAMPLE #4
MR14-110 SAMPLE #5

MR14-110 SAMPLE #6
MR14-111 PHOTO SUMMARY

MR14-111 SAMPLE #1

MR14-111 SAMPLE #2
NO RECOVERY
MR14-112 PHOTO SUMMARY

MR14-112 SAMPLE #1

NO RECOVERY

MR14-112 SAMPLE #2
MR14-112 SAMPLE #5

MR14-112 SAMPLE #6
MR14-113 PHOTO SUMMARY

MR14-113 SAMPLE #1

MR14-113 SAMPLE #2
MR14-113 SAMPLE #3

MR14-113 SAMPLE #4
MR14-113 SAMPLE #5

MR14-113 SAMPLE #6
MR14-114 PHOTO SUMMARY

MR14-114 SAMPLE #1

MR14-114 SAMPLE #2
NO RECOVERY
NO RECOVERY
MR14-114 SAMPLE #7
DISTURBED BAG SAMPLE – NO PHOTO
MR14-115 SAMPLE #3

MR14-115 SAMPLE #4
NO RECOVERY

MR14-115 SAMPLE #5

NO RECOVERY

MR14-115 SAMPLE #6
RH14-117 PHOTO SUMMARY

RH14-117 SAMPLE #1 – FIELD LABEL INCORRECT

RH14-117 SAMPLE #2 – FIELD LABEL INCORRECT

RH14-117 SAMPLE #3 – FIELD LABEL INCORRECT
RH14-117A PHOTO SUMMARY

RH14-117A SAMPLE #1 – FIELD LABEL INCORRECT

RH14-117A SAMPLE #2 – FIELD LABEL INCORRECT
RH14-118 PHOTO SUMMARY

DISTURBED BAG SAMPLE
NO PHOTO

RH14-118 SAMPLE #1 – FIELD LABEL INCORRECT

RH14-118 SAMPLE #2

DISTURBED BAG SAMPLE
NO RECOVERY
NO PHOTO

RH14-118 SAMPLE #3

RH14-118 SAMPLE #4
RH14-118 SAMPLE #5 – FIELD LABEL INCORRECT

RH14-118 SAMPLE #6 – FIELD LABEL INCORRECT