Independent Expert Engineering Investigation and Review Panel

Report on Mount Polley
Tailings Storage Facility Breach

Appendix D: DRAWINGS

**Drawing D1:** Pre-breach Subsurface Investigation Summary

**Drawing D2:** Subsurface Investigation 1996 and Prior

**Drawing D3:** Locations Greater Than 3m Depth Pre-breach Subsurface Investigation With In-Situ or Lab Testing Data

**Drawing D4:** Post-breach Subsurface Investigation Summary

**Drawing D5:** Pre-breach Subsurface Investigation in Breach Area

**Drawing D6:** Geological Section 6 - Simple

**Drawing D7:** Geological Section 6 - Complex

**Drawing D8:** Geological Section 4 - Simple

**Drawing D9:** Geological Section 4 - Complex

**Drawing D10:** Geological Section 5 - Simple

**Drawing D11:** Geological Section 5 - Complex

**Drawing D12:** Geological Section 3 - Simple

**Drawing D13:** Geological Section 3 - Complex

**Drawing D14:** Geological Section 7 - Simple

**Drawing D15:** Geological Section 7 - Complex

**Drawing D16:** Upper Glaciolacustrine Thickness Contours with Post-breach Ortho Photo

**Drawing D17:** Upper Glaciolacustrine Thickness Contours with Post-breach Topography

**Drawing D18:** Geotechnical Properties Summary Table

**Drawing D19:** Review of Field Sensitivity Using CPT Tip Resistance

**Drawing D20:** Comparison of Interpreted CPT Data to Oedometer Data in Upper GLU

**Drawing D21:** Longitudinal Variation in CPT Tip Resistance

**Drawing D22:** Upper GLU and Lower GLU

**Drawing D23:** GW96-1A / 1B Bore Hole Log

**Drawing D24:** VW11-10 Bore Hole Log
GENERAL NOTES:
1. CONTOURS DERIVED FROM LIDAR FLOWN ON AUGUST 06, 2014.
2. SEE TABLE D.2-1 FOR SUMMARY OF BOREHOLE NAMES, LOCATIONS AND REFERENCE DOCUMENT SOURCE.

NOTES:
SET A - BOREHOLES FROM 1996 AND PRIOR.
SET B - BOREHOLES FROM 1996 TO FEBRUARY 2011.
SET C - BOREHOLES FROM FEBRUARY 2011 TO JULY 2014.
CASE 1 - BOREHOLES GREATER THAN 8 m BELOW PRE-CONSTRUCTION ELEVATION WITH IN-SITU OR LAB TESTING.
CASE 2 - BOREHOLES BETWEEN 3 AND 8 m BELOW PRE-CONSTRUCTION ELEVATION WITH IN-SITU OR LAB TESTING.
CASE 3 - BOREHOLES LESS THAN 3 m BELOW PRE-CONSTRUCTION ELEVATION OR WITH NO IN-SITU OR LAB TESTING.
CASE 4 - BOREHOLES WHERE LOG NOT FOUND.
GENERAL NOTES:
1. CONTOURS DERIVED FROM LIDAR FLOWN ON AUGUST 05, 2014.
2. SEE TABLE D.2-1 FOR SUMMARY OF BOREHOLE NAMES, LOCATIONS AND REFERENCE DOCUMENT SOURCE.

LEGEND:
- 1996 AND PRIOR BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)
- 1996 AND PRIOR BOREHOLE (LESS THAN 3 m DEEP OR NO IN-SITU OR LAB TESTING)
- 1996 AND PRIOR BOREHOLE (LOG NOT FOUND)
- 1996 AND PRIOR TEST PIT (WITH LOG)
- 1996 AND PRIOR TEST PIT (LOG NOT FOUND)
LEGEND:
- 1996 AND PRIOR BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)
- 1996 - FEB 2011 BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)
- 1996 - FEB 2011 BOREHOLE (BETWEEN 3 AND 8 m BELOW PRE-CONSTRUCTION ELEVATION, WITH IN-SITU OR LAB TESTING)
- FEB 2011 - JULY 2014 BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)

GENERAL NOTES:
1. CONTOURS DERIVED FROM LIDAR FLOWN ON AUGUST 06, 2014.
2. SEE TABLE D.2-1 FOR SUMMARY OF BOREHOLE NAMES, LOCATIONS AND REFERENCE DOCUMENT SOURCE.

PRE-BREACH SUBSURFACE INVESTIGATION LOCATIONS GREATER THAN 3m DEPTH WITH IN-SITU OR LAB TESTING DATA

DRAWN D. VAN ZYL

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

JANUARY 02, 2015
POST-BREACH SUBSURFACE INVESTIGATION SUMMARY

NOTES:
1. CONTOURS DERIVED FROM LIDAR FLOWN ON AUGUST 05, 2014.

LEGEND:
- PANEL INVESTIGATION LOCATION (SURVEYED POINT)
- PANEL INVESTIGATION LOCATION (CENTROID POINT)
- KCB INVESTIGATION LOCATION (SURVEYED POINT)
- KCB INVESTIGATION LOCATION (CENTROID POINT)
- PRE-BREACH INVESTIGATION LOCATION GREATER THAN 8 m DEEP WITH IN-SITU AND/OR LAB TESTING
- RESISTIVITY SURVEY LINE
- SEISMIC SURVEY LINE
GENERAL NOTES:
1. CONTOURS DERIVED FROM LIDAR FLOWN ON AUGUST 05, 2014.
2. SEE TABLE D.2-1 FOR SUMMARY OF BOREHOLE NAMES, LOCATIONS AND REFERENCE DOCUMENT SOURCE.

LEGEND:
- 1996 AND PRIOR BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)
- 1996 - FEB 2011 BOREHOLE (BETWEEN 3 AND 8 m BELOW PRE-CONSTRUCTION ELEVATION WITH IN-SITU OR LAB TESTING)
- 1996 - FEB 2011 BOREHOLE (GREATER THAN 8 m DEEP WITH IN-SITU OR LAB TESTING)
- 1996 - FEB 2011 BOREHOLE (LESS THAN 3 m BELOW PRE-CONSTRUCTION ELEVATION OR WITH NO IN-SITU OR LAB TESTING)

PRE-BREACH SUBSURFACE INVESTIGATION IN BREACH AREA

PRE-BREACH INVESTIGATION SUBSIDIARY

PLOT JUNE 30, 2015
MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

DRAWN: D. VAN ZYL
APPROVED: D. VAN ZYL
DATE: JANUARY 06, 2015
NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.

LEGEND:
- 14-12 DRILL HOLE
- 14-10 CPT

GEOLOGICAL SECTION 6 - SIMPLE

KEY PLAN: NOT TO SCALE
NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES.
   REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.

LEGEND:
- DRILL HOLE
- CPT

GEOLOGICAL SECTION 6 - COMPLEX

DATE APPROVED: DECEMBER 22, 2014

D. VAN ZYL

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

DATE: DECEMBER 22, 2014

D7
NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES.
   REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.

LEGEND:
- **T** — TRANSITION
- **F** — CHIMNEY DRAIN
- **S** — ROCK FILL
- **D** — DISTURBED ROCK FILL
- **U** — UPSTREAM SELECT FILL

GEOLOGICAL SECTION 4 - SIMPLE

PRE-BREACH GROUND PROFILE

ZONING AT KP SECTION G (Sta. 4+300)

POST-BREACH GROUND PROFILE

MAPPED POST-BREACH TILL OUTCROP

PRE-BREACH GROUND PROFILE

NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES.
   REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.
NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
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1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
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NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
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NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.
NOTES:

1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.

2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRRED.
NOTES:
1. STRATIGRAPHY SHOWN ON THE LOGS HAS BEEN SIMPLIFIED FOR DISPLAY PURPOSES. REFER TO THE ACTUAL TEST HOLE LOGS FOR COMPLETE INFORMATION.
2. STRATIGRAPHIC BOUNDARIES BETWEEN TEST HOLES ARE SCHEMATIC AND INFERRED.
1. POST-BREACH ORTHO PHOTO FROM LIDAR SURVEY DATED AUGUST 5, 2014.

2. CONTOURS OF UPPER GLACIAL-LACUSTRINE THICKNESS ARE INTERPRETED FROM DRILLING INFORMATION. THESE ARE APPROXIMATE ONLY AND SHOULD BE CONSIDERED TO BE SCHEMATIC. CONTOUR INTERVAL IS 0.5 METRES.
1. POST-BREACH CONTOURS SHOWN ARE FROM LIDAR SURVEY DATED AUGUST 5, 2014. CONTOUR INTERVAL IS 2 METRES.

2. CONTOURS OF UPPER GLACIOACUSTRINE THICKNESS ARE INTERPRETED FROM DRILLING INFORMATION. THESE ARE APPROXIMATE ONLY AND SHOULD BE CONSIDERED TO BE SCHEMATIC. CONTOUR INTERVAL IS 0.5 METRES.
<table>
<thead>
<tr>
<th>Major Stratigraphic Unit</th>
<th>Stratigraphic Sub-Unit</th>
<th>Consistency</th>
<th>Undrained Shear Strength from In Situ Vane</th>
<th>CPT qtr (Bars)</th>
<th>SPT N</th>
<th>LPT N</th>
<th>Color</th>
<th>Moisture Content</th>
<th>Plastic Limit</th>
<th>Liquid Limit</th>
<th>Plasticity Index</th>
<th>Liquidity Index</th>
<th>Gradation</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Till</td>
<td>Firm to Hard</td>
<td>Inconclusive due to gravel</td>
<td>10 - 120</td>
<td>5 - 20</td>
<td>8 - 15</td>
<td>Grey-Brown to Grey</td>
<td>5 - 30</td>
<td>10 - 20</td>
<td>20 - 40</td>
<td>5 - 20</td>
<td>0 - 0.2</td>
<td>Gravel 5 - 30%, Sand 25 - 40%, Fines 35 - 65%</td>
<td>SC/GC to CL to GM</td>
<td></td>
</tr>
<tr>
<td>Upper Glaciolacustrine</td>
<td>Firm to Stiff</td>
<td>Peak 90 - 140 kPa Residual 40 to 65 kPa Remoulded 20 - 35 kPa</td>
<td>10 - 35</td>
<td>-</td>
<td>5 - 9</td>
<td>Grey</td>
<td>15 - 40</td>
<td>10 - 25</td>
<td>20 - 70</td>
<td>10 - 50</td>
<td>0.4 - 0.7</td>
<td>Gravel 0 to 5%, Sand 0 - 20%, Fines 80 - 100%</td>
<td>CL to CH</td>
<td></td>
</tr>
<tr>
<td>Lower Till</td>
<td>Very Stiff to Hard</td>
<td>Inconclusive due to gravel</td>
<td>20 - 215</td>
<td>-</td>
<td>-</td>
<td>Grey</td>
<td>5 - 30</td>
<td>10 - 20</td>
<td>20 - 40</td>
<td>5 - 20</td>
<td>0 - 0.1</td>
<td>Gravel 10 - 40%, Sand 50 - 80%, Fines 80 - 100%</td>
<td>SC to GC</td>
<td></td>
</tr>
<tr>
<td>Lower Glaciolacustrine</td>
<td>Very Stiff to Hard</td>
<td>-</td>
<td>35 - 200</td>
<td>-</td>
<td>40 - 60</td>
<td>Grey to Brown</td>
<td>10 - 30</td>
<td>15 - 25</td>
<td>30 - 50</td>
<td>10 - 30</td>
<td>0.1 - 0.4</td>
<td>Gravel 0 - 5%, Sand 0 - 15%, Fines 85 - 100%</td>
<td>CL to CL/ML</td>
<td></td>
</tr>
<tr>
<td>Glaciolacustrine</td>
<td>Compact to Very Dense</td>
<td>-</td>
<td>80 - 270</td>
<td>-</td>
<td>-</td>
<td>Grey to Brown</td>
<td>10 - 25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Gravel 0 - 60%, Sand 20 - 95%, Fines 5 - 80%</td>
<td>GP/SP to SM to ML</td>
<td></td>
</tr>
<tr>
<td>Lower Basal Till</td>
<td>Very Stiff to Hard/Very Dense</td>
<td>-</td>
<td>100 - 300</td>
<td>-</td>
<td>-</td>
<td>Highly variable</td>
<td>5 - 30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Gravel 10 - 40%, Sand 30 - 50%, Fines 30 - 60%</td>
<td>SC to GC</td>
<td></td>
</tr>
<tr>
<td>Weak Bedrock</td>
<td>Hard Soil / Weak Rock</td>
<td>-</td>
<td>100 - 300</td>
<td>-</td>
<td>-</td>
<td>Highly variable</td>
<td>5 - 55</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Gravel 0 - 90%, Sand 0 - 50%, Fines 10 - 100%</td>
<td>GM to ML to CH</td>
<td></td>
</tr>
</tbody>
</table>

Ranges given are general and may not be exclusive. Refer to laboratory results and test hole log for complete information. Consistency descriptions from CPT and Vane Shear test data, not from visual observations of disturbed core. Text in red is estimated from field descriptions of sonic core without laboratory results.

GEOTECHNICAL PROPERTIES SUMMARY TABLE

CHS NAK

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

D. VAN ZYL

JANUARY 16, 2015

D18
REVIEW OF FIELD SENSITIVITY USING CPT TIP RESISTANCE

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

D. VAN ZYL

DECEMBER 22, 2014

D19
Comparision of Interpreted CPT Data to Oedometer Data in Upper GLU

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL

DESIGNED: PJW
DRAWN: NAK
APPROVED: D. VAN ZYL
DATE: JANUARY 14, 2015
Dwg. No.: D20
LONGITUDINAL VARIATION IN CPT TIP RESISTANCE

D. VAN ZYL
JANUARY 22, 2015
D21

MOUNT POLLEY INDEPENDENT EXPERT ENGINEERING INVESTIGATION AND REVIEW PANEL
**SOIL DESCRIPTION**

**UPPER TILL**
- Silty, clayey, organic, brown to grey, root inclusion (Glaucous万台)

**LOWER TILLS**
- Silty, clayey, organic, brown to grey, root inclusion (Glaucous万台)

**WEAK BEDROCK**
- Weak, brown, weathered

**ADDITIONAL INFORMATION**

1. PANEL INTERPRETATION OF STRATIGRAPHIC UNIT SHOWN ON COLOUR BAR.
2. CPT PROFILE IS FROM RCPT14-13.