



Mount Polley Mines

Mount Polley Project Tailings Facility Summary





Overview of Presentation

- General information
- Project background
- Tailings Storage Facility
- TSF Ultimate Design
- Checklist



General Information

Mount Polley Project, 2001 Air photo





General Information

- Production started June 1997
- Care and Maintenance status October 2001 to March 2005
- Regular inspections
- Start up March 2005
- Stage 4 Tailing Storage Facility (TSF) construction per existing permits to elevation 948m from May 2005 to present
- Additional Mines Branch permits required for on-going expansion of TSF
- Stage 5 crest for 951m to be constructed before October 2006
- Stage 4 raise was an upstream cap
- Stage 5 raise will be a modified centerline construction



Hydrometeorology (Update Required)

- Mean annual precipitation of 755mm at TSF
- Probable Maximum Precipitation (PMP) is 203mm





Project Background – Water

Management

Site Water Management (Wight pit not shown)





Project Background – Water Balance (Update Required)

Typical water balance calculations for Wight Pit expansion:



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Project Background – TSF

Configuration

General Plan



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Project Background – TSF Geology

Previous investigation work from 1989 to 1999 included: testpits, drillholes, laboratory tests and Cone Penetration Tests.

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Project Background – TSF Geology

- Major geological units in TSF:
 - Surficial Till
 - Glaciolacustrine / glaciofluvial sediments
 - 🛚 Basal Till
 - Bedrock

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Main Geological X-sections

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South Geological X-sections

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South Geological X-sections

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South Geological X-sections

February 3, 2005

Project Background – Tailings

Properties

- Tailings Slurry:
 - Solid throughput: **20,000 tonnes per day**
 - Percent solids: 25 30%
 - Solid Specific Gravity: 2.70
 - In situ density: 1.44 tonne/m³
 - Geochemical characteristics:

Sulphur (percent)	Paste pH	Acid Potential (kg CaCO ₃ /t)	Neutralization Potential (kg CaCO ₃ /t)	Net Neutralization Potential (kg CaCO ₃ /t)
0.02	8.22	0.6	24.6	24.0

- Seepage water quality: **Ron Martel**
- Supernatant water quality: Ron Martel

Project Background – Tailings

Properties

Tailings PSA summary :

Tailings Storage Facility (TSF) layout:

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- Currently Permitted:
 - Stage 1a/1b constructed to El. 934m in 1996/1997 reviewed by Fred Matich
 - Stage 2a/2b constructed to El. 937m in 1998 reviewed by Chuck Brawner
 - Stage 3a/3b constructed to El. 942.5m in 2000/2001 reviewed by Chris Carr
 - Stage 3c constructed to El. 945m in 2004/2005 reviewed by Chris Carr
 - Stage 4 construct to El. 948m on embankments in progress
- Pending Permits:
 - On-going expansions to El. 965m embankments to 2012
 - Stage 5 construct to El. 951m on embankments summer 2006

Perimeter Embankment X-section:

Main Embankment X-section

- Design Criteria
- Geotechnical Model
- Proposed Expansions
- Water Management
- Construction Quality Assurance
- Monitoring
- Closure
- Schedule and Sequence

Design Criteria

Design Operation Life			7 years
Hazard rating:	During Operations After Closure		LOW by CDA Consequence Classification HIGH by CDA Consequence Classification
Design Earthquakes:	<i>Operations</i> DE M <i>After Closure</i> M	BE DE CE	1 in 475 year event (M = 6.5, $A_{max} = 0.37$ g) 50% of the 1 in 2000 year event or MCE (M = 6.5, $A_{max} = 0.065$ g) 1 in 2000 year event
Embankment Crest Width: (Final Width)			9 m
Design Tonnage			7,300,000 tpy (20,000 tpd)
Freeboard:	Operations Closure		24 hour PMP event (679,000 m ³) plus 1.0 m wave run Sufficient to provide routing of PMF plus wave run-up
Storage Capacity:			76,000,000 tonnes

Step 1 – Haul Zone C from Wight Pit and place on the ME (Power lines may need to be raised)

> Step 2 - Haul Zone U and Zone S from borrow area 3 and place on the PE

Generic Geotechnical Model

Generic Geotechnical Model

Designs based on conservative lower bound numbers: $\phi' = 35^{\circ}$, $S_u = 0$ kPa

Hydrogeology

= Groundwater well

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Proposed waste rock dump and haul road.

Proposed On-going Stages

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Draft Perimeter Embankment X-section

Draft South Embankment X-section

Typical analyses for ultimate Main Embankment (965m) SLOPE/W

Typical analyses for ultimate Main Embankment (965m) SEEP/W

Base case with upstream toe drain

Case without upstream toe drain

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TSF – Sand Cell Construction

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Cell dimensions: 18m x 150m

Sand Cell Procedure

Step 1 - Drains are set at end on cell, tailings are discharged from the opposite end of the cell. (Note: if drains are not set at the very end of the cell of the cell slimes will build)

Step 2 - A cat works the cell lengthwise by pushing material foreward, then back blading which helps separate the fines from the coarse tailings. The cell must be worked constantly to prevent the build up of slimes.

Step 3 – As soon as possible, sand is pushed up against the core to prevent the core from becoming saturated.

Step 4 - The drains are raised as the elevation of the sand increases. Note: The success of this procedure is dependent on the quality of the tailings.

1 foot of sand in 7.5 hours

Drain Flow Readings

Typical foundation drain flow readings

Typical upstream toe drain flow readings

Inclinometer readings

Typical inclinometer reading

- Water Management
 - Tailings Deposition Strategy

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- Seepage from Main Embankment Seepage Recycle Pond pumped into tailings pond

 \otimes = Pump

- -Tailings supernatant pond volume increases over life of mine
- Freeboard maintained for containment of PMP runoff plus 1m for wave run-up

Proposed Closure Plan

From Report on Cycloned sand Construction of Stage 3 and On-going Stages of The Tailings Storage Facility, 1999

Proposed Schedule

- Design Report by March 1, 2005
- Agency review and approval by May 1, 2005
- Stage 4 construction commenced May 1, 2005

2006 Checklist

- □ Make a checklist
- □ Maintain Beaches
- □ Install new inclinometers on the Main Embankment.
- Investigate and fix seepage on the Perimeter Embankment before Zone C is placed. This may involve extending the upstream to drain outlet pipe to the ultimate toe.
- □ Dig test pits near the South Embankment and place Zone S in areas where the basin liner is less than 2m thick.
- Place stage 5 Zone C starting on the Main Embankment to 944m. Place Till to 948m starting on the Perimeter Embankment.
- □ Place Zone F, Zone T and Zone C from 944m to 951m.
- □ Install upstream toe drain in the Zone U at 948m.

- □ Install downstream toe drain and sump on the South Embankment.
- □ Place CBL on the Zone U at 948m.
- □ Place Zone U and Zone S on all Embankments to 951m.
- □ Remove and ultimately reestablishing seepage pond pipelines.