

# Mount Polley Dam Breach August 4, 2014

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## Initial information gathering

Ministry of Energy and Mines Inspectors attended the Mount Polley Mine on August 5 and 6, 2014 to review information related to the August 4, 2014 dam breach at the tailings storage facility. Heather Narynski, P.Eng. (MEM Senior Geotechnical Inspector), Chris Carr, P.Eng (geotechnical consultant to MEM), and Steve Rothman, P.Eng. (MEM Senior Health and Safety Inspector) attended the site.

### August 5, 2014

The mines inspectors arrived at the mine at 11:20 am and met Dale Reimer (Mount Polley General Manager) and Art Frye (Mount Polley Mine Operations Manager). MEM was informed that the General Manager was not on site over the long weekend and that Luke Moger, EIT (Mount Polley Project Manager) was returning from a one week vacation.

After a brief meeting the MEM inspectors were introduced to Ryan Brown (Mount Polley Senior Mine Engineer), Luke Marquis EIT (AMEC Support Engineer) and Nicholas Bergeron, EIT (Mount Polley Junior Engineer, Mine Operations). Luke Marquis is classified as a junior geotechnical engineer and is based in the AMEC Prince George office. He informed us that he attends the mine about once a month and was last on site on July 9, 10 and 11. Nicholas Bergeron is classified as a junior engineer and reports to Luke Moger. We understand that Nicholas Bergeron was acting Mount Polley Project Manager at the time of the dam breach.

The following information package was provided:

- Piezometer and slope inclinometer records for the period since instrumentation was installed
- February 2014 As-built Plan showing Stage 9 construction station numbering
- February 2014 Instrumentation Plan showing geotechnical instrumentation locations
- Section D cross-section showing the as-built dam at Station 3+990 as of October 2013
- Section G cross-section showing the as-built dam at Station 4+470

MEM requested piezometer and slope inclinometer records for the area close to the dam breach with records covering the 2014 construction season.

From 12:15 to 12:45 pm Heather Narynski and Chris Carr inspected the area of the tailings storage facility dam breach, the area downstream of the breach, the area at the mouth of Polley Lake and the length of Hazeltine Creek down to Quesnel Lake by helicopter (Highland Helicopters). A photographic record was taken. No ground inspection was carried out as part of this site visit.

A meeting was held with Ryan Brown, Nicholas Bergeron and Luke Marquis. MEM had questions following a cursory review of the information package provided by Mount Polley Mining Corporation

(MPMC) related to the piezometer records, construction as-built records and dam design however the participants were not able to offer a meaningful response.

Art Frye, Mine Operations Manager, provided a summary of the events related to the Emergency call out that was initiated following the identification of a power-line failure resulting from the dam breach in the early hours of Monday morning August 4, 2014. It is understood that initial information related to the incident were released to the media by MPMC.

Staff from BGC (Iain Bruce and Daryl Dufault) arrived on site at about 2:30 pm.

Discussions with MPMC personnel provided the following information related to dam construction preceding the dam breach incident:

- No night shift construction August 3, 2014 because of the long weekend holiday (note: there was a report of equipment working on the South Embankment sand cell).
- Last construction activity from July 26 to 28, 2014 in the area of the dam breach.
- Dam raise from 967.5 to 970 m elevation was in progress.
- Perimeter Embankment was at 969 m elevation.
- Rock shell Zone C was raised on the Perimeter Embankment during the week prior the dam breach.
- Main Embankment was at 968.8 m elevation.
- Freeboard on July 31, 2014 recorded at 966.79 m.
- Lowest till core elevation at 968.5 m.

Peterson Contracting are responsible for placing the downstream rock fill shell (Zone C), transition rock (Zone T) and filter rock (Zone F). MPMC are responsible for constructing the till core (Zone S) and upstream sand cells (Zone U).

Laboratory testing of construction fill materials is carried out by MPMC with some testing by AMEC in Prince George. The AMEC Support Engineer indicated that some of the filter zone material tested coarser than specified on the lower end of the gradation curve.

MEM was informed that the upstream shell zone is composed mostly of tailings and that there has been no above water beach within the impoundment since spring 2014.

A statement was made by BGC that the downstream face of the dam may have been locally steeper than design in the area of a sand and gravel stockpile located at the dam toe.

BGC determined from their site inspection that the dam breach was 150 m wide at the base as measured by rangefinder.

August 6, 2014

MPMC, BGC and MEM met at 9:00 am at the Mount Polley mine office to discuss proposed plans to lower the water level in Polley Lake and to construct a temporary rock fill dam across the dam breach area to contain further tailings release.

MEM was informed that the lake level in Polley Lake has risen by about 1.5 m as a result of damming by the tailings released from the TSF dam breach. The plan to lower the water level in Polley Lake included pumping water from the lake to Wight Pit and then to Springer Pit. An additional pump with a 20 to 24 inch intake would be installed to pump water via an HDPE pipeline to Hazeltine Creek.

MEM expressed concern about re-suspension of tailings solids in Hazeltine Creek and questioned whether it would be possible to bypass Hazeltine Creek by installing a longer pipeline to Quesnel Lake. BGC brought up a concern regarding public safety downstream of the dam breach area based on reports that the public were accessing the area.

The plan to contain further tailings release from the TSF included construction of a rock fill dam across the dam breach area on the upstream side of the breach to tie in with the existing tailings dam embankment on each side of the breach. Two temporary rock fill embankment options were presented with an expected construction time of between 4 weeks for Option 1 and 10 days for Option 2. It was considered that Option 2 would be the preferred option. The rock fill embankment would be constructed with NAG waste rock by dump short and push methods using a spotter to check stability during construction. The intent is to displace tailings from the foundation area by liquefying the tailings at the dump toe during construction of the rock fill embankment.

MEM informed MPMC that a safe work procedure would have to be developed, including details for visual monitoring during construction.

Following the meeting MEM contacted Ministry staff in Victoria to discuss the MPMC proposed remediation plans to divert water from Polley Lake and to construct a temporary embankment dam across the TSF dam breach area. After discussion it was decided that MPMC should provide written notification of the proposed emergency works to the Chief Inspector and that MPMC should contact MOE and the CRD. This information was passed on in a meeting with MPMC. It was made clear that a formal approval for the emergency works would not be provided by MEM but that a safe work procedure is required as per Section 1.1.2 of the Health, Safety and Reclamation Code.

A meeting was held with Luke Moger (MPMC Project Manager) between 12:00 pm and 2:00 pm to discuss the dam breach incident and to obtain information. MEM was informed that project management duties related to the TSF were being handled by Nicholas Bergeron during the period that Luke Moger was away on vacation starting on July 30, 2014.

Conversations with Luke Moger confirmed that dam construction was following the design, material specifications including Quality Assurance and Quality Control, bi-weekly instrumentation readings and reporting requirements including daily reporting to the design engineer AMEC. MEM was informed that

the filter material was found to be out of compliance based on gradation testing and that this was being rectified. Luke indicated that nothing unusual was noticed with the dam prior to his departure.

MEM was informed that on August 3, 2014 Peterson Contracting were working on the South Embankment including preparation for upstream sand cell construction and that they were also grading on the Perimeter Embankment including placing rock to bury a pipe.

MEM was informed that on August 3, 2014 the tailings discharge line was not active on the Perimeter Embankment and that tailings discharge by end dumping was in progress on the South Embankment between Station 10+80 and 11+92.

The following details are applicable to the Perimeter Embankment based on July 31, 2014 records:

- Till core construction on Perimeter Embankment from Station 3+155 to 3+357
- Till core elevation 969.1 m
- Rock shell elevation 969.1 m
- Filter zone elevation 968.2 m
- Pond water level 966.83 m

The MPMC Project Manager confirmed that there had been no above water beach against the Perimeter Embankment at any time during the 2014 construction season.

The MPMC Project Manager confirmed that Peterson Contracting are responsible for placing rock for the downstream rock fill shell, the transition and the filter and also for placing till for the core zone. MPMC are responsible for construction of the upstream sand/rock fill cell construction. MPMC are responsible for Quality Assurance and AMEC are responsible for Quality Control.

MPMC was requested to provide the following additional information:

- Report of dam beach event including emergency response actions/timeline.
- Location and details of dam construction on the day of the dam breach.
- Details of construction activity in the area of the dam breach preceding the dam breach.
- Details of any unusual QA or QC results.
- Foundation information including drill holes, test pits, geotechnical instrumentation installation (e.g. slope inclinometers).
- Construction drawings showing design slopes, etc.
- Records of under-drain monitoring.

Steve Rice (AMEC Principal Engineer) arrived on site in the afternoon. MEM met with BGC and AMEC at 3:40 pm. BGC and AMEC considered that a joint collaboration between the two companies may be possible but were waiting direction from MPMC.

There was additional discussion related to the temporary rock fill embankment proposed to be constructed across the TSF dam breach area. Preliminary planning indicated that the embankment would be about 30 m high and 45 to 55 m wide at the base and would require approximately 2 million

tons of NAG waste rock. MEM informed BGC that construction shall follow the Health, Safety and Reclamation Code. In addition, a compacted berm is required on both sides of embankment dam constructed to the full height of the haul truck tires. The MEM Health and Safety inspector will be carrying out periodic inspections to ensure that the safe work procedures are being followed.

MEM left the mine site at about 4:30 pm.