

**From:** [Chris Carr](#)  
**To:** [Warnock, George MEM:EX](#)  
**Cc:** [Beattie, Brent C MEM:EX](#); [Narynski, Heather M MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Tuesday, April 14, 2015 4:30:17 PM  
**Attachments:** [image001.png](#)

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Hi George,

Based on the current TSF dam classification the next DSR is due in 2016. The current permit (which is to be amended prior to the 2016 Freshet) includes a condition that requires the next DSR to be completed prior to December 2016. A change to the classification could advance this schedule but there is currently no reason for a change. A dam break inundation study is due to be submitted prior to completion of the dam breach repair (any day now) so we should wait and see what the results are.

I consider that the geotechnical investigations completed following the TSF dam breach and the studies underway, including current work in progress by Golder Associates, will provide assurance that the dam is reasonably safe particularly in its current state of operation (or lack of). We could request a formal assurance statement from the EOR but I think it is premature.

In addition, I think the Ministry should modify the CDA table and include water quality consequence criteria that would apply to all mine site dams in BC. I suggested this previously to CDA when the guideline was under review in 2007 but my efforts were ignored.

Chris

---

**From:** Warnock, George MEM:EX [mailto:George.Warnock@gov.bc.ca]  
**Sent:** April-14-15 3:25 PM  
**To:** 'Chris Carr'; Demchuk, Tania MEM:EX  
**Cc:** Beattie, Brent C MEM:EX; Narynski, Heather M MEM:EX  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Chris,

The CDA Guidelines state that:

*During the dam's operational life, any significant change that might affect its safety should trigger a Dam Safety Review or appropriate investigation.*

We could therefore require a DSR at any time. Thoughts? Even if we decide that a DSR is not required owing to the many investigations, we could require the new EOR (Golder) to provide the Assurance Statement (and complete any work that they believe to be necessary to do so).

Just food for thought at this point – would like to hear what you think.

George

**From:** Chris Carr [mailto:[chris.carr@mpmc.ca](mailto:chris.carr@mpmc.ca)] s.22  
**Sent:** Tuesday, April 14, 2015 3:16 PM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** Beattie, Brent C MEM:EX; Narynski, Heather M MEM:EX; Warnock, George MEM:EX  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Tania,

I have reviewed the draft OMS manual submitted by MPMC. The document includes the major components of an OMS as suggested by MAC in “Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities”.

The title of the OMS is “Revision for 2015 Freshet Embankment” however much of the document covers the water management system including ditches and sumps and also includes Springer Pit. I suggest that the title be changed to be more representative of the infrastructure included.

There is very little mention of OMS requirements for Springer Pit in the main document. The OMS should include a discussion of action to be taken if, and when, the pond water level reaches elevation 1030 m? An update to the OMS may be required when these details are known.

Personnel Organization Chart is mislabelled and should be Figure 2.2.

The OMS Manual indicates that the mine has existing procedures for OMS orientation and training. How often is OMS training provided and is this training offered to contactors?

The main document indicates that Appendix B includes a plan showing instrument locations however I could not find it.

On page 83 the trigger level for slope inclinometers is 1 mm in the GLU. Since readings are to be taken weekly does this imply 1 mm/week or is it total displacement from baseline? Is this movement along a discrete plane or within the entire GLU unit? I assume this trigger applies to the upper GLU.

The trigger level for SAA is 1 mm in the GLU. Since readings are to be taken weekly does this imply 1 mm/week or is it total displacement from baseline? Is this movement along a discrete plane or within the entire GLU unit?

The trigger level for survey monuments is 0.01 m horizontal and 0.01 m vertical. Does this represent the total movement from baseline reading?

APEGBC has recently published a Professional Practice Guideline for Legislated Dam Safety Reviews in British Columbia. The Ministry will be checking that future DSRs follow the Practice Guideline and include an Assurance Statement indicating the safety status of the dam.



The document should be finalized and signed.

Regards,

Chris Carr, P.Eng.

Senior Geotechnical Engineer

On behalf of the BC Ministry of Energy and Mines

Tel: 250 544-0763

Email: s.22

---

**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]

**Sent:** March-29-15 11:31 AM

**To:** Beattie, Brent C MEM:EX; Chris Carr s.22

**Subject:** FW: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Chris and Brent,

Mount Polley has submitted their draft OMS manual. It is far too large to email but I have saved it here:

G:\15\_Mines-Exploration Sites\Major Mines\0E - PROJECTS\2 METAL\M-200 Mt Polley\01 Reports\GEOTECHNCIAL\2015 OMS\MPMC - Draft OMS Manual

Please add this to your list of items for review. I have confirmed to MPMC that we have received this document and that we will advise if there are comments or questions once MEM has had an opportunity to review it.

Chris – I have not added this to the GRIT list, is that something you will do, or do we need to ask Heather to do it? (I think she and George have been adding documents themselves due to errors with other making additions.)

Thank-you,

Tania

---

**From:** Demchuk, Tania MEM:EX

**Sent:** Sunday, March 29, 2015 11:28 AM

**To:** 'Luke Moger'; Howe, Diane J MEM:EX

**Cc:** Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry

**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Luke,

Thank-you the draft OMS manual has been successfully downloaded. MEM will follow-up with any comments or questions following its review.

Tania

**Tania Demchuk, MSc, PGeo**

Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]

**Sent:** Friday, March 27, 2015 7:31 PM

**To:** Howe, Diane J MEM:EX

**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry

**Subject:** Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.3 (B) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a draft version of the Operation, Maintenance and Surveillance (OMS) Manual for the 2015 Freshet Embankment has been prepared by Mount Polley Mining Corporation with input from Golder as the Engineer of Record.

Due to size limitations, the draft OMS Manual and corresponding Appendices (A through C) will be transferred via HighTail – confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Warnock, George MEM:EX](#)  
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**Cc:** [Beattie, Brent C MEM:EX](#); [Narynski, Heather M MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Tuesday, April 14, 2015 4:31:50 PM  
**Attachments:** [image001.png](#)

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Thank you Chris – I don't disagree with any of your comments.

**From:** Chris Carr [mailto:[s.22](#)]  
**Sent:** Tuesday, April 14, 2015 4:30 PM  
**To:** Warnock, George MEM:EX  
**Cc:** Beattie, Brent C MEM:EX; Narynski, Heather M MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

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Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: s.22

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**Sent:** March-29-15 11:31 AM  
**To:** Beattie, Brent C MEM:EX; Chris Carr s.22  
**Subject:** FW: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Chris and Brent,

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s.17

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Thank-you,  
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**Sent:** Sunday, March 29, 2015 11:28 AM  
**To:** 'Luke Moger'; Howe, Diane J MEM:EX  
**Cc:** Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Luke,

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**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

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**Sent:** Friday, March 27, 2015 7:31 PM  
**To:** Howe, Diane J MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

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Due to size limitations, the draft OMS Manual and corresponding Appendices (A through C) will be transferred via HighTail – confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



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Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Chris Carr](#)  
**To:** [Demchuk, Tania MEM:EX](#)  
**Cc:** [Warnock, George MEM:EX](#)  
**Subject:** RE: Mt Polley Visit  
**Date:** Wednesday, April 15, 2015 4:47:22 PM

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Hi Tania,

The information below confirms my understanding of the TSF breach repair progress.

Chris

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**From:** Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]  
**Sent:** April-15-15 3:48 PM  
**To:** Thorpe, Rolly MEM:EX  
**Cc:** Chris Carr s.22 ; Beattie, Brent C MEM:EX; Warnock, George MEM:EX; Rothman, Stephen MEM:EX  
**Subject:** RE: Mt Polley Visit

Thanks for this update Rolly. I am cc'ing our geotech team as they may also be interested in your update.

Could you tell if the overburden stripping and buttress placement on the north side of the TSF was part of the breach repair activities? Was this on the perimeter embankment?

Thanks,  
Tania

---

**From:** Thorpe, Rolly MEM:EX  
**Sent:** Wednesday, April 15, 2015 3:40 PM  
**To:** Hoffman, Al MEM:EX; Demchuk, Tania MEM:EX; Kupperts, Haley MEM:EX; Pocklington, Cheryl M MEM:EX  
**Cc:** Rothman, Stephen MEM:EX  
**Subject:** Mt Polley Visit

On April 14/15 Steve Rothman and I visited Mt. Polley operations. We viewed the progress at the cut-off wall in the breach area, the weir constructed at the outlet from Polley Lake and the remedial work being done in Hazeltine Creek, including the sediment settling ponds.

For the cut-off wall construction (by Golder Construction Services), 70 of 130 panels are complete. A panel is 1 m thick, 2.8 m long and 22 – 26 m deep. The cutter head was having difficulty getting through the packed rock fill so a 36" diameter auger hole is being drilled in each panel in advance of the cutter. Bentonite slurry is pumped through the cutter head into the panel, as the cutter is going down and cement slurry is pumped in as the cutter head is being withdrawn. Approximately 26,000 liters of bentonite and 7,000 liters of cement slurry are used per panel. The finished panel is left to set for a few days before an adjacent panel is cut. The finished cement/rock mix in each panel is sampled before it sets. A steel H-beam with a sampling chamber at the end is lowered into the cement mix by a crane and samples taken at different depths. It is planned that all 130 panels, spanning the whole breach, will be complete by April 27/15.



The weir controlling Polley Lake level is complete and operating. (A professional-looking structure). The level of the lake appeared to be at pre-breach elevation. There are several movable gates in the weir and an 18" diameter (?) pipe with a gate valve control. Water was being discharged into Hazeltine Creek through the pipe only, when we visited. The water discharging was quite clear but had some tannin (brown) staining. There is a screen, fish-excluder on the lake side of the weir.

The mine employees are placing rip-rap and landscaping along Hazeltine Creek channel. (The First Nations crew has been laid off). Wood chips and woody debris have been spread along the banks near Quesnel Lake. Coconut-fiber matting has been placed in some areas near the lake and willow shoots are being planted through the matting. The two settling ponds near Quesnel Lake are trapping sediment and the up-stream pond needs to be cleaned out. There is discussion going on with Golder (?) as to how to clean the pond; possibly with some sort of suction equipment. The water in the ponds and in lower Hazeltine creek is quite cloudy, probably from the channel landscaping disturbing tailings and native soil.

Dale Reimer, GM, stated that more layoffs will probably happen in the next few weeks. He said that if the permit goes through to partially operate, placing tailings in the Springer Pit would be 4 – 5 million te. max and only let them operate for 12 – 14 months. 26 holes have been drilled around the perimeter of the original TSF dam to test for basement sediments. Preliminary results have shown some glacio-lacustrine deposits, which are more competent than the breach area sediments. Some overburden stripping and buttress rock placement is being done on the north side of the TSF. The buttress rock is being recovered from inside the TSF, from the temporary dykes built after the breach.

Several FLNRO personnel were touring the mine while we were there. We did not speak with them.

Regards, Rolly

**From:** [Chris Carr](#)  
**To:** ["Luke Moger"](#)  
**Cc:** [Demchuk, Tania MEM:EX](#)  
**Subject:** RE: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Wednesday, April 29, 2015 5:44:36 PM  
**Attachments:** [image001.png](#)

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Hi Luke,

I have successfully downloaded the report.

Regards,

Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: s.22

---

**From:** Luke Moger [mailto:lmoger@mountpolley.com]  
**Sent:** April-29-15 4:09 PM  
**To:** 'Chris Carr' s.22  
**Cc:** Demchuk, Tania EMNG:EX (Tania.Demchuk@gov.bc.ca)  
**Subject:** FW: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Chris;

Please see e-mail below, I will be sending a copy of the Design Update to you via HighTail shortly.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

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**From:** Luke Moger  
**Sent:** April-29-15 4:07 PM  
**To:** Howe, Diane J EMNG:EX ([Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca))  
**Cc:** Demchuk, Tania EMNG:EX ([Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)); [rick.adams@gov.bc.ca](mailto:rick.adams@gov.bc.ca); Don Parsons; Dale Reimer; 'Eldridge, Terry'  
**Subject:** Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.1 (D) bullet point four (4), as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, an update to the design of the TSF Breach Repair based on information from the additional site investigation has been prepared by Golder for MPMC.

Due to size limitations, the Design Update will be transferred via HighTail – confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



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**From:** Demchuk, Tania MEM:EX  
**To:** [Morel, David P MEM:EX](#); [Halls, Lori D ENV:EX](#)  
**Cc:** [Bunce, Hubert ENV:EX](#)  
**Subject:** FYI - response plan for FN letter to MDRC  
**Date:** Tuesday, May 5, 2015 4:26:00 PM  
**Attachments:** [WLIB XFN MPMC Restart Application Response 04 21 15 exec.pdf](#)  
[Final J Kuipers report.pdf](#)  
[Technical Review Comments Summary BOA.pdf](#)

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David and Lori,

FYI in advance of the SOC meeting tomorrow afternoon:

MEM, MOE, FLNRO and MARR will be crafting a response to the attached letter from First Nations submitted with the technical review comments on the Restricted Restart application. This letter will be signed jointly from MEM and MOE, and have input from FLNRO and MARR to help address points on consultation, strength of claim and economic accommodation.

We plan to have a final draft of the letter by May 15 (next Friday). Please advise if you would like to review the final draft. I think this would be helpful given the overlap between this letter and issues being dealt with at the SOC and Principals Table.

Thank-you,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

April 21, 2015

Ministry of Energy and Mines  
PO Box 9320 Stn Prov Govt  
Victoria BC V8W 9N3

Ministry of Environment  
PO Box 9047 Stn Prov Govt  
Victoria BC V8W 9E2

Attention: Tania Demchuk, Mount Polley Project Manager  
Hubert Bunce, A/Director, Mount Polley

Dear Ms. Demchuk and Mr. Bunce:

Re: Mt. Polley Mining Corporation ("MPMC") Return to Restricted Operations Permit  
Amendment Application (the "Application") and the Approach for Long-Term Water  
Management Plan Development

This letter is intended to set out the initial response of the Williams Lake Indian Band ("WLIB") and Xat'sull First Nation ("XFN" and collectively, the "First Nations") to the above-referenced Application.

## I. BACKGROUND AND CONTEXT FOR CONSULTATION ON THE APPLICATION

On August 4, 2014 the failure of the MPMC Tailings Storage Facility ("TSF") resulted in the release of approximately 25 million cubic metres of tailings and wastewater into Hazeltine Creek and Polley Lake, ultimately making its way into Quesnel Lake. The failure caused a huge amount of environmental damage and the impacts of the spill, both short and long term, are still being studied and analyzed.

The Mount Polley disaster took place in an area of great significance to the First Nations. The First Nations have a strong *prima facie* claim of Aboriginal title to the area and the Quesnel Lake watershed has been used continuously throughout the history of both First Nations for the exercise of numerous Aboriginal rights. These uses are extensively described in the various Traditional Use Studies ("TUS") of both First Nations, including the enclosed *Mount Polley Traditional Knowledge, Land Use and Occupancy Study* completed in November of 2012 as a condition of the 2011 amendment to the MPMC M200 Permit. Without limiting the generality of the foregoing statement, the First Nations' TUS documents clearly and unequivocally establish that the areas surrounding Mount Polley Mine have been used, and continue to be used, for the following purposes:

- Hunting for moose, deer, black bear and other animals;



- Fishing for trout, salmon and other species;
- Gathering rhubarb, birch bark, strawberries, blueberries, huckleberries, soapberries and other plants for sustenance, medicinal and ceremonial purposes;
- Engaging in spiritual and ceremonial practices; and
- Camping as part of seasonal rounds.

The First Nations' intensive use of the area surrounding Mount Polley Mine has been acknowledged by the Province, and is part of the reason why, immediately following the Mount Polley disaster, a Letter of Understanding (the "LoU") was concluded between the Government of British Columbia and the First Nations. The guiding principles of the LOU contain the following statements:

*The Soda Creek Indian Band and the Williams Lake Indian Band (collectively, the "**First Nations**") and the Province of British Columbia ("**British Columbia**") agree to work in partnership, on a government-to-government basis through shared decision-making wherever possible, to jointly address all aspects of the tailings storage facility breach at the Mount Polley Mine ("**Mount Polley Mine Incident**").*

*The First Nations and British Columbia (collectively, the "**Parties**") agree that the processes for the joint oversight set out below will be conducted in accordance with the First Nations' traditional protocols, having regard to both traditional and scientific knowledge, and as expeditiously as possible.*

Under the LoU, a "Principals Table" and a "Senior Officials Committee" were established. While the LoU contains an acknowledgment that it "does not fetter statutory decision makers in carrying out their duties and responsibilities under the relevant provincial laws and regulations that apply to the Mount Polley Incident," the intention has always been that the decision-making process would, in relation to any activities at Mount Polley, be one that is jointly conducted between the Province of British Columbia and the First Nations. British Columbia has also advised the First Nations' representatives at the Principals Table that the First Nations' consent would be required for the Mount Polley Mine to reopen in any capacity.

Fittingly, the Province appears to acknowledge through the LoU, comments at the Principals Table, and Senior Officials Committee, and, in other discussions with the First Nations that the required level of consultation with respect to Mount Polley Mine is extremely deep. This is appropriate, given the strength of the First Nations' claims of Aboriginal rights, including title, in the area, and given the serious ongoing impacts that have resulted to the First Nations and their constitutionally-protected Aboriginal rights from the Mount Polley disaster and the serious impacts that a mine reopening is likely to cause to the First Nations' exercise of rights into the future.

The Mount Polley disaster is relevant to Crown consultation on the Application because the TSF failure has given rise to a number of important issues that need to be addressed as part of any proposed re-opening of the mine, including water management. The past and ongoing impacts from the Mount Polley disaster

are directly relevant to potential future impacts from a mine reopening, given that the TSF is not operational and given that it is important to ensure that areas that were devastated by the TSF failure and are being rehabilitated are not put at further risk. Mine operations, if the mine is reopened, will have to proceed in a different way than prior to the TSF failure and, as a result, new and additional impacts will result to the First Nations, their title lands and the exercise of their Aboriginal rights. The Mount Polley disaster also informs the First Nations, government and MPMC on what can go wrong, and highlights the need for adequate information and assessment before further decisions are made in relation to the mine. As history has taught us, there is much at stake. All due diligence must be used in considering the Application.

The courts have laid out a number of principles in relation to the content of the Crown's duty to consult;

- consultation and accommodation are constitutional obligations;
- consultation is an ongoing process and is always required;
- the duty to consult is a constitutional obligation of the Crown and an implicit constraint on the statutory power of any decision-maker based on the theory that the legislature intends its delegates to act constitutionally;
- consultation obligations are upstream of statutory obligations;
- the Crown is bound by its honour to balance societal and Aboriginal interests in making decisions that may affect Aboriginal claims;
- the purpose of consultation is not simply the minimization of adverse impacts - the core, underlying purpose of consultation is to reconcile the prior interests of First Nations with the assertion of Crown sovereignty;
- the Crown has an obligation to inform itself of the potential impacts to the rights of affected First Nations and to communicate those to the First Nations;
- the Crown needs to ensure it has sufficient, credible information in decision making and must take into account the long-term sustainability of section 35 rights;
- the Crown needs to consider not just "site specific" impacts of a proposed activity, but also indirect and derivative impacts, cumulative impacts and possible injurious affection, as well as the potential for future harm;
- the Crown must engage in consultation with an "open mind" and with the goal of substantially addressing the Aboriginal group's concerns - it cannot just be an opportunity for a First Nation to "blow off steam";



- the Crown must ensure that a First Nation's representations are seriously considered and, wherever reasonably possible, demonstrably integrated into the proposed plan of action;
- the controlling question in all situations is what is required to maintain the honour of the Crown and to effect reconciliation between the Crown and Aboriginal peoples with respect to the interests at stake;
- when a First Nation's Aboriginal rights claims are strong and/or the degree of potential impact from a proposed project is high, the Crown must attempt to accommodate the First Nation's concerns; and
- the Crown needs to be flexible in the accommodation measures it considers.

All of these principles are relevant to British Columbia's consultation with the First Nations on MPMC's application for a partial restart of Mount Polley Mine. The First Nations stand to be adversely affected by the re-opening of the mine. Potential impacts include further damage to their Aboriginal title lands, adverse effects to fish, wildlife and vegetation from discharges and further consequential impacts to harvesting activities because of avoidance of areas due to actual or perceived contamination. Given the strength of their claims, and the potential for more serious harm to result to the First Nations and their rights, the depth of consultation required in relation to the Application is at the deepest end of the consultation spectrum.

The First Nations have been working in good faith with MPMC and the Province of British Columbia to raise their concerns about issues that will inevitably arise as a function of, or in connection with, a restart of Mount Polley Mine, and to attempt to find ways to address those issues. However, as the courts have stated, the goal of consultation cannot be limited to merely trying to minimize adverse environmental effects. The Crown needs to be approaching consultation with the goal of reconciliation in mind. This requires British Columbia to try to find appropriate accommodation measures. Our suggestions on forms of accommodation measures that need to be considered are discussed further below.

## **II. Technical Issues Resulting from the Application**

As noted above, the courts have been clear that the Crown needs to ensure that it has sufficient information before it to understand potential impacts, prior to making a decision on an application. In order to assist British Columbia in assessing the adequacy of the information that has been provided by MPMC on the Application, the First Nations have subjected the Application to technical review and have commissioned technical reports from their advisors. Two of these technical reports, namely the *Technical Review Comments Summary* prepared by BOA Ltd, LGL Ltd. and MESL dated April 21, 2015 (the "BOA Report"), and the *Review and Comment on Mount Polley Mine Re-Opening Application and Water Management Plan* prepared by James R. Kuipers of Kuipers and Associates dated April 12, 2015 (the "Kuipers Report") are appended to this letter (collectively, the "Technical Reports"). The Kuipers Report



was written prior to our understanding that MPMC's consultants are in the process of developing a Technical Assessment Report ("TAR").

By way of brief and general response to the Application, there are numerous information and technical gaps in the documentation. In many ways, the Application represents an expectation on the part of MPMC that the First Nations engage in a "leap of faith" and assume that many of the issues and "unknowns" raised in the Application will be resolved at some undefined point in the future.

It is not the intention of this letter to restate all of the technical issues raised in the attached Technical Reports. It is fair to say that the Technical Reports reflect the intention of the First Nations to work reasonably and cooperatively with MPMC and the Province with regard to the review and consideration of the Application. However, it is clear that there are numerous issues that need to be addressed prior to any authorization of a restart of operations at Mount Polley Mine. Each of the significant issues addressed in the Technical Reports require a proper response from MPMC and the Province. This is necessary in order for British Columbia to be properly informed about potential impacts, as is required by the duty to consult. The First Nations are prepared to continue in a dialogue on these issues for as long as is required to ensure they are properly addressed.

By way of summary only, we would note the Application places reliance on a number of as of yet uncompleted documents to address many of the issues of potential concern to the First Nations. It is our understanding that MPMC is preparing the TAR to provide further information on the Application and the potential impacts of a restart on the environment. Without the TAR, it is premature to consider the Application, assess impacts or consider options because of numerous critical information gaps, including the following:

- Project management systems, wastewater discharges, and wastewater treatment have not been described;
- Pollution prevention alternatives have not been described;
- A treatment system has not been selected and, hence, no comparisons to best available technologies have been presented;
- No information was presented on the expected quality of the discharge after treatment;
- The proposed location(s) of the wastewater discharge were not described;
- Effluent quality has not been characterized;
- Baseline data on the receiving environment have not been presented;
- An assessment of the effects of the discharge(s) on designated water uses has not been conducted;
- Monitoring programs to evaluate effluent quality or effects on the environment have not been proposed; and

- An adaptive management plan has not been included in the submission.

As the BOA Report suggests (page 7) the “nature and severity of these deficiencies makes it difficult to evaluate the technical merits of the Application until such time as the forthcoming TAR has been developed and reviewed.”

The Application seeks to separate water storage and/or discharge issues and suggests that they can be addressed in water management documents that are to be submitted independent of, but parallel to, the Application. Despite our efforts to work MPMC and the Province on this issue, the First Nations continue to have grave concerns with this approach. The unfortunate reality is that the existence of Mount Polley Mine will necessitate significant discharges into an already damaged receiving environment, in an area over which the First Nations have strong Aboriginal title claims and that is critical to the First Nations for the exercise of their Aboriginal rights. While mine contact water may be released from the site, regardless of whether Mount Polley resumes operations or not, it is not acceptable for MPMC to use this fact as a means of escaping immediate ownership and responsibility for the long term water management issues. The First Nations need to have the requisite information to enable us to fully participate in the evaluation of the potential impact of discharges on our Aboriginal rights (including title) and interests before the Application can be given consideration. Indeed, the Province also needs this information, in order to meaningfully participate in consultation with us.

Our concerns about information gaps are substantiated by the Technical Reports. At page 8, the BOA Report concludes that “[a]t Minimum the Application needs to document that viable water management/water storage and the water treatment/water discharge options are available at the site and identify the selected option that will provide the basis for establishing the MA and EMA permits, if such permits are ultimately issued by the Province of British Columbia.”

At pages 9 through 11 the BOA Report explains with more precision why this data is critical, and why it is imperative for the First Nations to be able to properly assess the potential impacts to their Aboriginal rights and interests.

In order for the First Nations to provide an informed response to the Application, and for the Province to identify, consider and address potential impacts to our rights, the following data is required:

1. Evaluation of options for effluent discharge (i.e., identify and evaluate candidate wastewater discharge locations);
2. Predictions of effluent quality and receiving water quality conditions for operations, closure, and post-closure;
3. Identification of the need for water treatment to facilitate short-term and/or long-term water management;
4. Evaluation of the effects of wastewater discharges on receiving water quality and associated water uses (i.e., an effects assessment).



The Kuipers Report focuses on the need for a definitive short-term water management plan and states that “the present approach being taken in the application and WMP does not address the priority nature of the need to address imminent and as yet unmitigated or unpermitted mine discharges, and instead suggests re-opening in a manner that would add to the present urgency.”

The First Nations have been dramatically affected by the Mount Polley disaster. The Mount Polley disaster has created a new environment in which to operate the mine, and new challenges that need to be overcome for the mine to operate as safely and sustainably as possible. In the January 30, 2015 *Report on Mount Polley Tailings Storage Facility Breach*, the expert panel noted the lack of foresight in planning in relation to dam raising as a contributor to the TSF failure (p. 136 - see enclosed copy of report). It is imperative that the same mistake not be made again in the context of other issues relating to on-going operations and water management at the mine. Adequate information needs to be gathered, considered and assessed before decisions are made. As a result, there is a firm and reasonable expectation by the First Nations that we will be provided with the necessary information to make an informed analysis of the Application and about the potential for the activity envisioned by the Application to further impact our Aboriginal rights and interests. As stated above, the Province also needs that information to fulfill its constitutional duty. Based on the material provided by MPMC, we clearly do not yet have the ability to make that assessment, nor can the Province fulfil its duty to consult. As indicated earlier, the First Nations are committed to continuing the dialogue until the Application is fully fleshed out and all relevant issues are properly addressed in the TAR.

It is important to note that even though the LoU commits to “addressing the First Nations’ immediate and long-term funding requirements to respond to all aspects of the Mount Polley Mine Incident,” there was no funding in place from March 31, 2015 through to the time of the preparation of this letter. Thus, during a critical period of engagement on the Application, the First Nations had no source of funding to satisfy the cost of obtaining needed technical and legal advice and providing an informed response to the Application.

### **III. Additional Issues Related to the Potential Restart of Mount Polley Mine**

#### **Financial Security**

The failure of the TSF caused significant damage and considerably changed the face of operations at Mount Polley Mine. At the Principals Table, the Senior Officials Committee, and through our correspondence and communication with McM, MoE, MARR and MPMC, the First Nations have always maintained that there needs to be adequate financial security in place prior to a restart of Mount Polley Mine. This is an issue that is addressed in both of the Technical Reports. At page 3 of the Kuipers Report, Mr. Kuipers asserts:

*As acknowledged in the application, the “likely site conditions” are highly uncertain at this time. However, it is the responsibility of the MEM under sections 10 (4) and 10(5) of the British Columbia Mines Act to require adequate financial security under the existing conditions for the entire mine site as well as for the area requiring remediation from the TSF breach. Therefore, it*

*can be reasoned that an updated Reclamation and Closure Plan (RCP) and Financial Security reflecting the current site conditions and consistent with current best technology and practice should be a requirement prior to any re-opening. We recommend that the application be conditioned with a requirement that the RCP and Financial Security estimate be updated for closure under the existing condition and that new security be posted prior to authorization of re-opening activities. The RCP and security should also be updated, on or before September 30, 2015, to reflect conditions at the end of re-opening activities as one scenario, and at the end of all planned mining as another scenario.*

And further at page 7:

*Regardless of the re-opening application, an updated Reclamation and Closure Plan has been urgently required to ensure that liability for the currently existing site situation remains with the project operator and not potentially with the government and ultimately taxpayers. The TSF Breach was a significantly material event that in my experience should have called for an immediate revision to the financial security to include potential costs for remediation of the breach. As those potential costs have been acknowledged by MPMC the government should similarly acknowledge that they be recognized as a liability and that appropriate financial security for any remaining remediation be included as a condition prior to any future mining.*

And in the BOA Report at page 4:

*Much has changed at the Mount Polley mine site since the original Reclamation and Closure Plan was originally designed. The Plan needs to be updated to current conditions and to include the restoration and remediation components in this Plan. The Financial Security estimate needs to be updated accordingly and provided, in confidence, to the Williams Lake Indian Band and Xat'sull First Nation.*

As of the date of this correspondence, the First Nations do not yet have the required assurance regarding revisions to the Reclamation and Closure Plan and the posting of adequate financial security. The First Nations have suffered damage to their traditional territories and our ability to exercise our constitutionally protected Aboriginal rights has been impaired as a result of the Mount Polley disaster. There need to be firm operational and financial commitments in place, not just to mitigate the impacts of the disaster, but also to minimize the possibility, and plan for the contingency, that the damage could be further compounded by future operations at Mount Polley Mine.

### **Economic Accommodation**

Mount Polley Mine exists in an area of long-standing intensive use by the First Nations, where there is a strong claim for Aboriginal title and also proven Aboriginal rights. The Supreme Court of Canada concluded in *Delgamuukw* that Aboriginal title carries with it an inescapable economic component. This creates a Crown duty of consultation that can include financial compensation for infringement of rights and



title. Despite these facts, Mount Polley Mine was in operation for almost twenty years without returning any economic benefit to the First Nations.

It was not until the conclusion of an agreement with MPMC in late 2011 (when the first agreement was concluded between MPMC and WLIB, and a similar agreement was concluded with XFN in 2012), that any attempt was made to benefit the First Nations. Around that time, the Government of British Columbia's policy with respect to revenue sharing also began to evolve and there was some acknowledgment that, for new mines or significant expansions, mineral tax revenue should be shared with affected First Nations.

In 2012, the WLIB and XFN began negotiating with the Province of British Columbia regarding an "Economic and Community Development Agreement" ("ECDA") for Mount Polley, based on the expansion of the mine authorized by the 2011 amendment to the M200 Permit. The Mount Polley ECDA was concluded in March of 2013. The first payment under that ECDA was proffered by the Province approximately a month prior to the failure of the Mount Polley TSF.

The failure of the TSF has effectively negated any prospect for any economic accommodation to the First Nations under the current Mount Polley ECDA. If operations are resumed, there is acknowledgment by the Crown and MPMC that MPMC would be able to eliminate the mineral tax owing (and, hence, any revenue-sharing to be provided under the ECDA) by offsetting the significant capital costs associated with repair, remediation and the restart of operations required as a result of the Mount Polley disaster. In short, there would simply be nothing provided to the First Nations under the ECDA under future operations, because of the financial consequences of the TSF failure. As a result, the impacts of mine operations on the First Nations' constitutionally protected rights are not being accommodated under the ECDA.

WLIB and XFN have made it clear that this is an issue that needs to be addressed prior to the restart of operations at Mount Polley Mine. The First Nations have not received any of the past mineral tax revenue from the mine, they have suffered damage to their traditional territory as a result of the Mount Polley failure, and their rights will continue to be adversely affected by a resumption of mine operations, potentially to a greater extent than prior to the TSF failure because of the required water discharges. It is a fair and reasonable expectation that there be some form of economic accommodation connected with the resumption of operations at Mount Polley Mine.

The Crown has, at the Principals Table, Senior Officials Committee and various other meetings, acknowledged that this is a critical issue that needs to be addressed. Despite this fact, no progress on this issue has been made to date.

### **Conditions in relation to required MPMC Commitments**

As was noted above, WLIB and XFN concluded agreements with MPMC in 2011 and 2012. While these agreements marked an improvement in the relationship between MPMC and the First Nations, they did not contemplate (and probably could not have contemplated) the range of issues that have been brought about by the failure of the Mount Polley TSF.

The First Nations need more detailed commitments from MPMC about how the company proposes to work with WLIB and XFN on a day-to-day basis moving forward to address issues raised by the TSF failure and the potential resumption of operations. There needs to be more content regarding, and a commitment to, collaboration on environmental issues as they arise, not just in the application review process, but on an on-going basis during mine operations. Fully involving us in the development of the TAR would be a start, but there also needs to be a better information-sharing and decision-making process during operations, if they resume. There also needs to be a commitment to maximizing opportunities that could potentially flow to the First Nations from the resumption of operations at the mine. The First Nations have borne the brunt of mine impacts over the course of the life of the mine, and most severely as a result of the TSF failure. There need to be stronger commitments made by MPMC to ensure that the First Nations receive some benefits, rather than just burdens, from mine operations.

MPMC also needs to commit to sharing additional information with the First Nations so that they have an understanding of, and confidence in, the long-term plans for the Mine. For example, the Kuipers Report suggests (at page 4) that:

*Additional information needs to be provided to explain what makes the underground ore “of heightened importance”. This is one of the few places where MPMC possibly implies its motivation is to “high-grade” the mine for cash-flow purposes. MPMC also needs to explain how not having this high-grade source in future operations as compared to pre-breach operations will not result in future operations being less likely or long-lived.*

It is not realistic for the First Nations to rely exclusively on its engagement with the Crown to satisfy its need for information, nor are the current MPMC/WLIB/XFN agreements sufficient to satisfy this requirement. WLIB and XFN have had preliminary discussions with MPMC about the need to bolster their contractual relationship, but to date a resolution has not been reached.

### **Legislative and Regulatory Reform**

The TSF failure and ensuing investigations have punctuated the need for legislative and regulatory reform. The LoU provides that:

*The Parties acknowledge the impact of the Mount Polley Mine Incident on public confidence in mining and recognize the important economic contribution of mining to British Columbia. Accordingly, British Columbia, in partnership with the Soda Creek Indian Band and the Williams Lake Indian Band, commits to commencing a dialogue about existing laws, regulations and policies in relation to the mining industry in British Columbia. The scope and mechanism for this dialogue will be considered by the Senior Officials Committee and recommendations will be made to the Principals Table. Those future discussions will be informed by the collaborative work between the Parties on the Mount Polley Mine Incident.*

While WLIB and XFN assume that the Province of British Columbia will make good on its commitments in the LoU, there have as of yet been no firm commitments in terms of how these processes will work or



how input of WLIB and XFN will translate into legislative reform. More detail on this matter must be concluded prior to the Application being given consideration by the Government of British Columbia. We note as well that in the enclosed *Report on Mount Polley Tailings Storage Facility Breach*, the expert panel made a number of recommendations, including in relation to regulatory operations. We need to understand whether, and how, British Columbia intends to implement these recommendations, and how potential regulatory changes could help reduce the risks and impacts associated with a re-opening of the Mount Polley Mine, before a decision on re-opening is made.

#### **IV. Conclusion**

WLIB and XFN have been working diligently with the Crown and MPMC with respect to remediation of the TSF failure and matters in relation to potential reopening of Mount Polley Mine. The First Nations are fully aware, and considerate, of the economic significance of a potential mine re-opening and the benefits it could offer to the region through employment opportunities and direct and indirect economic spinoffs. First and foremost, though, the First Nations are concerned about the damage to their traditional territory, and the exercise of their Aboriginal rights, brought about by the TSF failure, and how the impacts of that disaster could be further exacerbated by a potential restart of operations at the mine, especially in the absence of adequate planning and water management approaches.

As outlined above and in the supporting Technical Reports, there are numerous information and technical gaps that need to be addressed before either British Columbia or the First Nations can properly understand the impacts on their Aboriginal rights and interests, and before the Crown can give the Application consideration. Further, there are a number of other matters which need to be resolved to the reasonable satisfaction of the First Nations before the Application can be given consideration, including:

- Proper assurances regarding revised plans for Reclamation and Closure, and sufficient financial security for future operations at Mount Polley Mine;
- A resolution regarding the issue of economic accommodation;
- A more defined commitment to a process for legislative and regulatory reform; and
- An enhanced contractual relationship between MPMC and the First Nations.

Given the information and technical gaps and the outstanding issues identified above, we cannot support the Application at this time and in this form. We are committed to continuing to working with the Crown and MPMC to address and resolve the issues identified in this letter.

We trust that these preliminary comments on the Application will be given the weight accorded by the LoU and the constitutional obligation on the Crown to meaningfully consult with the First Nations.

Sincerely,



Chief Ann C. Louie, Williams Lake Indian Band



Chief Donna Dixon, Xatsúll First Nation

**cc.** Honourable John Rustad, Minister of Aboriginal Relations and Reconciliation  
Honourable Mary Polak, Minister of Environment  
Honourable Bill Bennett, Minister of Energy and Mines  
Steve Robertson, Vice President, Imperial Metals

**encls.** (*Mount Polley Traditional Knowledge, Land Use and Occupancy Study; Technical Review Comments Summary; Review and Comment on Mount Polley Mine Re-Opening Application and Water Management Plan; Report on Mount Polley Tailings Storage Facility Breach*)



**Review and Comment on  
Mount Polley Mine Re-Opening Application and Water Management Plan, 20 March 2015**

James R. Kuipers, P.E.  
Kuipers & Associates  
12 April 2015

The following comments are provided based on my involvement as a technical advisor to the Soda Creek Indian Band (SCIB) and Williams Lake Indian Band (WLIB) in the review of the Mount Polley Mine Re-Opening Application and Approach for Long-Term Water Management Plan Development (WMP), both dated 20 March 2015, submitted to the British Columbia Ministry of Energy and Mines (BCMEm) and Ministry of Environment (BCMOE). These comments are also written in light of BCMEm's acceptance of the application for consideration in the decision-making process.

**Mount Polley Mine Re-Opening Application**

General Comment

The proponent Mount Polley Mining Corporation (MPMC) has submitted the Mine Re-opening Application together with the Water Management Plan (WMP) as a means to go forward with both short-term and long-term water management requirements and to allow mining to proceed over the short-term. However, upon review of the documents and consideration of other aspects such as the Tailings Storage Facility (TSF) 2015 Spring Freshet Breach Repairs, it is my view that the priorities for site management appear to be highly confused by the simultaneous nature of the applications for both mining operations and discharges.

Both short-term and long-term measures to address discharges from the mine site have to be taken regardless of the re-opening of the mine. Mining would decrease the available volume in the Springer Pit by approximately 1.5 M cubic meters according to MPMC (Application p. 35/42) or decrease the time available until a discharge occurs by roughly four months under average conditions. For this reason we conclude that the priority should be on ensuring the discharges that will occur from the mine within the next year as well as in the future under all circumstances are adequately addressed (e.g. designed and implemented) and that any future mining be contingent upon not increasing the risk of discharge. In other words, future milling should not occur until discharges are legally permitted and occurring at a rate that both prevents an unpermitted discharge under the existing condition but also offsets any increased discharge rate caused by resumption of milling activities.

We support the efforts of MPMC to bring forth a proposal for mine re-opening that can be widely supported. However, the present approach being taken in the application and WMP does not address the priority nature of the need to address imminent and as yet unmitigated or unpermitted mine discharges, and instead suggests mine re-opening in a manner that would actually add to the present urgency.

### Document Specific Comments

The following comments are based on our understanding that the screening process is intended to ensure that the information provided is adequate to assess the potential social and environmental impacts of the project. As described in the comments herein it is our professional opinion that the information provided is not adequate to undertake the assessment of the impacts of mine re-opening without further information on short-term water management, treatment, discharge quality and quantity and the receiving environment. While it is possible as suggested by the application to separate long-term discharges from the present proposal, it is not possible to evaluate the application without more information on short-term measures intended to protect water resources with or without future mining.

### Section 1 Introduction

“Tailings generated as a result of this milling would be deposited in (and contained by) the Springer Pit.”  
P. 1/42

Elsewhere (cite) the application suggests the tailings would be removed from the Springer Pit to an as yet to be determined location to accommodate future mining. For this reason the description should be changed to “temporarily deposited.” However, this suggests that overall the environmental as well as economic impacts of the proposed short-term action to resume mining cannot be determined without identification of future/permanent TSF.

“Total production targets also consider the existing obligations for management of volumes of potentially-acid-generating (PAG) waste rock for subaqueous disposal in the Springer Pit for a site closure scenario.” P. 1/42

This also confirms the “temporary” nature of the tailings deposition in the Spring Pit. In order for the PAG waste rock to be disposed subaqueous the tailings would need to be removed and stored in a permanent TSF which has not been identified in the proposal. This would appear to make this application contingent on identification of the permanent TSF location. Given that the re-use of the existing TSF or identification and use of an alternative TSF is a significant undertaking that has yet to be undertaken, this suggests that the re-opening application itself is premature without MPMC having performed this undertaking.

“Key benefits identified that would result from these restricted operating activities would include... Support of the construction of large buttresses around the TSF\* \*Buttressing of the TSF Embankments will be a time- and resource-intensive operation, and is anticipated to be required, under the direction of the Engineer of Record, for any future use of the TSF or for the closure of the TSF in its existing state. If future use of the TSF is feasible, it would be of benefit to complete buttressing activities in parallel with restricted operations to avoid future prolonged shut-down of the site associated with required buttressing activities in advance of operation.” P. 1/42-2/42

The re-opening application incorporates the TSF Embankment buttressing activities intended for "...any future use of the TSF or for the closure of the TSF in its existing state." However, it does not describe those activities and the future permanent storage of tailings from the proposed action as well as any future actions requires identification and evaluation of a permanent TSF facility.

Some critical questions arise that include the following: How will the embankment design be determined relative to future use or closure in its existing state using waste rock generated from mine re-opening? How will this be done without a reclamation and closure plan specifically for the TSF in its existing state as well as potential re-use scenarios? I recommend that any future embankment construction on the existing TSF incorporate slopes consistent with closure design requirements including for the existing and future scenarios where compatible.

"A formal update to the Reclamation and Closure Plan will be provided in support of a long-term operating application, mine closure scenario, or as otherwise required by regulators; there is a condition (E.1) under the existing MEM M-200 Permit to provide an updated to the Reclamation and Closure Plan on or before September 30, 2015." "For these reasons, it is believed, and understood to be acceptable to the above-mentioned parties, that it will be more appropriate to continue work tasks in parallel, but formalizing updates to the long-term site management plan and closure plan at a later date, when adequate detail and planning can be included to reflect the likely site conditions." P. 2/42

As acknowledged in the application, the "likely site conditions" are highly uncertain at this time. However, it is the responsibility of the MEM under sections 10 (4) and 10(5) of the *British Columbia Mines Act* to require adequate financial security under the existing conditions for the entire mine site as well as for the area requiring remediation from the TSF breach. Therefore, it can be reasoned that an updated Reclamation and Closure Plan (RCP) and Financial Security reflecting the current site conditions and consistent with current best technology and practice should be a requirement prior to any re-opening. We recommend that the application be conditioned with a requirement that the RCP and Financial Security estimate be updated for closure under the existing condition and that new security be posted prior to authorization of re-opening activities. The RCP and security should also be updated, on or before September 30, 2015, to reflect conditions at the end of re-opening activities as one scenario, and at the end of all planned mining as another scenario.

## Section 2 Mine Plan

"Production tonnages and timing of milling would be at the discretion of MPMC, and adjusted based on economic or site conditions and the filling of the Springer Pit (in accordance with the considerations for potential groundwater exfiltration as further detailed in this document)." P. 12/42

Resumption of timing of milling should not be at the discretion of MPMC, but rather should be conditional and require that MPMC demonstrate both implementation of a short-term plan to address the potential for unauthorized discharges prior to resumption of milling, and development of a long-term plan to address site water management under multiple potential scenarios as previously recommended.

“6.1). It is possible that during regular blast-hole sampling for both ore and PAG rock, or with alterations to pit designs, quantities of ore or PAG materials could increase or decrease as a result of geological uncertainty or revisions to planned mining activities, respectively. The result of such variation would be increases or decreases to the predicted quantities of PAG waste rock stored on the Temporary Northwest PAG Stockpile, and to quantities of low grade ore stockpiled in the Cariboo Stockpile.” P. 13/42

Some questions arise that are not answered in the application. For example, are we correct to assume that the low-grade ore stockpiled in the Cariboo Stockpile is primarily PAG that, depending on copper grade, may be classified as either low grade ore or PAG waste? How is the potential that the low-grade stockpile will not be milled but will be left in place following completion of short-term or long-term mining addressed in the existing reclamation and closure plan or in the financial security?

### Section 2.2 Mining - Underground

“Ore from the underground will provide a critical source of metals to the Mill, and will be of heightened importance for this restricted operations condition as compared to pre-breach operations.” P. 14/42

Additional information needs to be provided to explain what makes the underground ore “of heightened importance”. This is one of the few places where MPMC possibly infers its motivation is to “high-grade” the mine for cash-flow purposes. MPMC also needs to explain how not having this high-grade source in future operations as compared to pre-breach operations will not result in future operations being less likely or long-lived.

“Process water for the Mill will be sourced primarily from the Central Collection Sump (CCS), which will receive water from a variety of locations depending upon site water management conditions.” P. 15/42

The applicant should consider using Springer Pit as the source of mill water as an option. This may maximize the benefits of milling on pit lake water quality prior to discharge by providing greater mixing and possibly other benefits within the pit lake. An option under this alternative would be to utilize a tailings thickener and further treat (filter for TSS) and discharge the thickener overflow while using Springer Pit water as mill water. However, it should be kept in mind that both of these options are contingent on mill operations and should not be considered as primary treatment options for short-term or long-term discharges. At the same time, use of the existing mill facilities to be operated to accomplish water treatment without milling should be considered as a short-term measure to address imminent discharges which once accomplished could then allow for transition to milling and water treatment in a combined mode with the same measures available once milling is discontinued as a temporary or short-term water treatment scenario.

### Section 3 Short-Term Water Management

“This section provides information on short-term water management; long-term water management being unaffected by the short-term operating permit being sought. As stated above, it is the understanding of MPMC, from discussion involving the MEM, the MoE, stakeholders, and First Nations,

that longer-term water management strategies are to be developed in parallel with this Application, but permitted independently. For the purpose of this return to restricted operations Application, modelling and scheduling is based on a June 8, 2015 date for commencement of Mill operations.” P. 23/42

Figure 3.3.2 Springer Pit Filling Projections – Average Precipitation (P. 27/42) shows that for average conditions without mill tailings being added to Spring Pit discharge to groundwater at a pit lake elevation of 1030.0 m would occur in January 2016. The figure also shows that with milling the same elevation resulting in a discharge would occur in October 2015, or three months earlier if milling were allowed to resume in June 2015. Similarly, Figure 3.3.3 (P. 27/42) shows that for a 1:25 wet year that milling would result in a discharge to groundwater occurring in mid July 2015 whereas without milling it would not be expected to occur until September 2015.

As previously stated in these comments, short-term water management without milling needs to be developed, implemented and demonstrated at sufficient capacity prior to resumption of milling operations to offset the impact of decreasing the available volume remaining in the Springer Pit that would result from mill tailings being added to the pit. This makes resumption of milling operations on June 8, 2015 unrealistic. The modeling and scheduling should be first done without resumption of milling but with implementation of short-term water treatment and discharge provisions and then the appropriate time to resume milling (e.g. when discharges exceed rate at which overall water balance on site is achieved) can be determined.

“Relative to the larger volumes of water from other sources being added to the Springer Pit, this volume of groundwater is not expected to play a significant role in Springer Pit filling rates or Springer Pit lake chemistry during 2015.” P. 25/42

The geochemistry evaluation for the Springer Pit lake during filling has yet to be completed. While the evaluation may in fact show that groundwater will not play a significant role in Springer Pit filling rates or pit lake chemistry, the statement is presently not supported by facts.

“The water balance model includes the generation of water via the draining of tailings inside the TSF.” (P. 25/42)

We do not believe this is correct. The comparisons we have seen between actual pit lakes filling and expected filling show a gap which is most likely due to interstitial water draining from the tailings inside the TSF. The model has not been corrected for draining and while it has been suggested that a draindown analysis will be performed, it has not been provided or incorporated.

“Using the filling schedules shown in Figure 3.3.2 through Figure 3.3.4, and understanding that the Springer Pit lake will not have outflow into groundwater until the elevation reaches 1030m....” P. 28/42

Use of the 1030 m benchmark for discharge leaves no margin for safety or for potential errors in the estimate. While we believe the 1030 m level is based on competent professional practice, we question whether it is appropriate as the regulatory benchmark and would suggest that a lower level of 1025m be used in order to provide an adequate margin of safety so as to actually prevent any discharge. It making

this suggestion it should be noted that establishment of this lower threshold would result in the need for immediate water treatment and discharge measures to be established more quickly, and at the same time would result in even more exacerbation of the present circumstances were milling to resume in June 2015.

#### Section 3.4 Pit Lake Water Chemistry

“These data from the primary mine-influenced water storage locations can be used to represent the range of chemistry of water collected in the Springer Pit, as it is possible that some of these waters could be mixed as a result of water management measures and/or potential tailings deposition.” P. 29/42

This approach ignores the potential impact Springer Pit wall rock geochemical characteristics might have on the pit lake water characteristics as well as the impact of any treatment or tailings disposal influence. It is understood that geochemical modeling of the pit lake is being undertaken by SRK and any real analysis of the pit lake water chemistry both presently and in the future will depend on the work being performed by SRK. The application would benefit by providing reference to both the work being undertaken as part of the WMP (P. 15) relative to both short-term and long-term pit lake water chemistry predictions which identified the pit walls as a possible source term used for geochemical properties.

#### Section 3.5 Groundwater Monitoring

“Water chemistry (as listed above) and the rate of Springer Pit filling will continue to be monitored by a Qualified Person, and will be used to assess Springer Pit lake influence. Anomalous water elevation or water chemistry results, specifically at GW12-2A or GW12-2B, would be a trigger for additional monitoring. It will be the intention of MPMC to not allow the Springer Pit to fill beyond the point at which mine-influenced contact water would start infiltrating ground water (the 1030m elevation).” P. 31/42.

Anomalous water elevation or water chemistry results would indicate a discharge at a lower elevation than predicted. The question arises as to what impact in terms of responding to an anomalous situation additional monitoring would provide. It would appear from the information provided that in such an event the only mitigation would be to cease discharging into the Springer Pit, however there appear to be no contingency options other than to just monitor the discharge and attempt to lower the pit lake level. Additional discussion should be provided relative to this and other contingencies that need to be identified and addressed, prior to permit approval, and not as a deliverable post-approval.

“The ability to maintain the Springer Pit below the 1030m elevation will require further development of a longer-term site water management plan. Pumping of the Springer Pit lake to maintain the MPMC-planned elevation (below 1030m), could be completed by re-installing the pit dewatering infrastructure that was run during active mining operations. Maintenance of the Springer Pit lake below the groundwater influence elevation of 1030m would require the development of storage or discharge alternative in an appropriate timeline to facilitate transfer of water. In the case of 1-in-200-year ‘wet’ site condition, this would mean that a site discharge strategy for mine-influenced water would have to

be approved and operational by July of 2015. Development of storage or discharge alternatives is included in the water management planning documents submitted independent of, but parallel to, this Return to Restricted Operations Permit Amendment Application.” P. 33/42

This is confusing in that the first sentence references a “longer-term” site WMP however the remainder of the paragraph is describing actions relative to the short-term situation. The application would benefit by providing additional description of how the documents are intended to mesh including in terms of scheduling and outcomes so as to better understand how short-term discharge permitting, implementation of water management and treatment capacity can be accomplished so as to ensure that addition of tailings to the Springer Pit would not increase the potential for an unpermitted discharge.

#### Section 4 Potential Influence on Existing Closure Plans

“Understanding, from discussion with the MEM, the MoE, stakeholders and First Nations that the return to restricted operations Application will not require the submission of an updated Reclamation and Closure Plan (given the uncertainty existing with the future of the Mount Polley Mine Site and the anticipated small material influence of the proposed restricted operations on closure planning for the site)...” P. 34/42

The alleged “understanding” is not consistent with what has been discussed between the First Nations, the proponent, MEM and MoE. Regardless of the re-opening application, an updated Reclamation and Closure Plan has been urgently required to ensure that liability for the currently existing site situation remains with the project operator and not potentially with the government and ultimately taxpayers. The TSF Breach was a significantly material event that in my experience should have called for an immediate revision to the financial security to include potential costs for remediation of the breach. As those potential costs have been acknowledged by MPMC the government should similarly acknowledge that they be recognized as a liability and that appropriate financial security for any remaining remediation be included as a condition prior to any future mining.

In addition, our review of the reclamation and closure plan suggests it is not consistent with current best practice and that critical aspects including potential long-term operation and maintenance requirements and temporary closure details need to be recognized and addressed.

#### Section 4.5 Costing

“Reclamation costing is combined with closure-scenario liabilities for rehandling of PAG materials for subaqueous disposal (see Section 4.1), and submitted to the MEM as part of the Annual Environmental and Reclamation Report (AERR), copies of the AERR also provided to the MoE and First Nations and publically available to stakeholders.” P. 38/42

This paragraph suggests reclamation costing information is provided to the MoE and First Nations and publically available. However, as contained in the Mount Polley Mining Corporation Annual Environmental & Reclamation Report 2014, Section 12.1 Reclamation Cost Update, “A detailed reclamation cost update for the end of 2014 has been completed and submitted to MEM under separate



cover.” The application should be revised to acknowledge that reclamation costing information is not provided to the First Nations or public and therefore cannot be confirmed or assessed as to accuracy or adequacy.

The author has reviewed reclamation and closure plans and detailed financial security cost estimates for nearly every mine in the United States, all of which are publicly available. In addition the author has reviewed similar plans and detailed financial security estimates in the Yukon Territory which were publicly available. The policy of confidentiality in British Columbia is atypical of policies elsewhere and undermines public confidence that financial security is otherwise intended to bolster in both the company and the responsible regulators. I strongly encourage, particularly under the given circumstances that the detailed financial security cost estimates be publicly disclosed and opportunity for review and comment on the estimates be provided. Without this knowledge and opportunity, review of the limited information provided in the application would suggest the current financial security might be an order of magnitude less than would be realized by the government for cleanup of the site should MPMC go bankrupt or otherwise not be able to fulfill its current obligations at the site.

“For current site conditions, costing does not include reclamation work for Polley Lake, Hazeltine Creek or Quesnel Lake as this is part of independent liability calculations. The costing assumes completion of the TSF Breach repair work, as this is also part of independent liability calculations. Additionally, due to uncertainty surrounding the long-term water management for Mount Polley Mine, costing addressing this aspect is not included. For the costing provided, a scenario in which existing site water collection systems are returned to the local watersheds is assumed.” P. 38/42

This statement confirms and emphasizes the extent to which the current financial security does not address the current site conditions as well as future liabilities. In fact, the scenario wherein the existing site water collection systems would be returned to the local watersheds is an absolute best case outcome, and does not reflect either current site conditions, actual reclamation requirements to address actual site conditions, or likely longer-term conditions. Uncertainty as to future conditions should not be used or allowed to prevent the establishment of adequate financial security which should be established based on conservative assumptions rather than idealistic outcomes.

#### Section 5 Consequences for Reserve Viability

“The economic value of this reserve base is anticipated to be sufficient to warrant the effort required to remove any tailings placed in the Springer Pit during restricted operating conditions in the case of a future return to full operating conditions.” P. 40/42

As the economic value of the reserve is dependent on the price of copper and gold, what is the anticipated price that would be needed to warrant the effort to remove the tailings in the Springer Pit? This is important because if the current price of copper would not support that effort then it is possible if not likely that the tailings will remain in the pit and that a temporary closure extending for an indefinite period of time would occur. For this reason the application should provide additional information on a temporary closure plan of indefinite duration.

#### Section 6.1 Buttressing Requirements for a Repaired TSF



“A discussion of anticipated long-term buttressing requirements is included here because of the importance which this topic will have upon any and all long-term operating plans.”

The discussion should be limited to the need to utilize NAG waste rock from re-opening and avoid discussion of any anticipated re-use of the existing TSF. Discussion of any potential re-use is highly premature at this time and the result of it being included in this discussion is that it will likely be seen as a connected action and therefore something that must be resolved prior to re-opening. In addition, the suggestion of the re-use of the TSF is contradicted by statements in the WMP which suggest that future re-use of the TSF in a water holding mode is unlikely.

#### Section 6.2 Critical Permitting Events & Section 6.3 Projected Schedule of Key Items

The information provided in these sections requires additional description and explanation as to why events such as the return to full operations are included in this section but not otherwise mentioned elsewhere. In addition, it is not clear how the permitting for short-term discharges will take place or will be distinguished prior to actual discharges occurring from that of long-term discharges which will not be approved until possibly after discharges are required. The presentation also suggests that an application to resume full scale mining would occur in the 3Q2015. This would appear to have MPMC presume that the existing TSF can be easily repaired and reused without significant delay or controversy, which is likely to provoke strong public reaction to any mine re-opening proposal.

#### **Approach for Long-Term Water Management Plan Development (WMP)**

##### Section 1.0

According to the WMP (p. 1) a permit amendment was issued in 2010 for discharge to Hazeltine Creek and subsequently MPMC proposed an interim measure using a RO plant with discharge of treated water to Polley Lake. Why weren't these measures previously implemented? What aren't these measures, which already are permitted and/or have advanced designs, being implemented as short-term measures? While discharge to Hazeltine Creek does not provide adequate capacity by itself and RO is not a long-term solution, if they could be implemented rapidly and draw from Springer Lake then they should both be considered for immediate implementation.

##### Section 2.0

“It also recognizes that in the context of urgency, short term measures may be necessary, however, such measures should fit within the context of a long-term vision.” P. 2

We would argue that short-term measures as necessary must be taken, and that while ideally they should fit within the context of a long-term vision, that is contingent on long-term planning, and under the current circumstances short-term measures are required as necessary and alternatives must be considered which may not fit within the context of long-term vision.

“For this reason, Golder Proposes to actively consult while the plan is being developed.” P. 2

The WMP development document should have provided a detailed plan for consultation showing key opportunities and milestones. It should be noted that only limited meetings between the First Nations, other parties and Golder have taken place to date. Without a clear and robust consultation plan and schedule, as well as capacity to participate by the First Nations and their advisors, it would appear that Golder’s proposal in this regard is not being fulfilled.

#### Section 2.2.1 Existing Condition

“The Existing Conditions scenario reflects the current, post-breach water management,” P. 3

The existing condition scenario should extend until the current post-breach water management achieves a net negative water balance. This means that with respect to potential discharges under the existing conditions, adequate water treatment and discharge capacity must be permitted, implemented and operating so as to prevent a future unregulated discharge under any future scenario. Therefore the existing condition must be addressed and mitigation adequately achieved prior to Resumed Operations.

#### Section 2.2.3 Resumed Operations

“Resumed Operations refers to mining after commissioning of a re-built TSF. For the purposes of the long-term water management plan, Golder has taken note of the Minister’s panel recommendation that water not be stored in tailings storage facilities and that has been taken to mean that surplus water cannot be stored in the TSF.”

The assumption of commissioning of a re-built TSF is premature. While this may be possible, we would similarly note the Minister’s panel recommendation which actually suggests that wet tailings facilities not be utilized and instead alternative best technology such as dry stack tailings be used in the future. Given the circumstances we believe any suggestion of re-opening the TSF will require a complete and thorough vetting of alternatives such as converting to dry stack tailings, converting to paste tailings, and in both cases potentially utilizing the existing TSF in conjunction with those alternatives or constructing a new TSF using those alternatives. We would otherwise agree that under any present or future scenario no site contact water including that collected within the TSF other than for a minimal period of time should be stored in the TSF.

#### Section 2.2.4 Closure

“Closure refers to the phase after completion of mining.” P. 4

The WMP should also consider a “Temporary Closure” phase which might result between Restricted Start-up and Resumed Operations as well as at any other time in the future such as during a catastrophic or other unplanned event such as company bankruptcy.

#### Section 2.3.1 Restricted Restart Permit

“Since that time, MEM have advised that they will separate the two processes but... site water balance in the long term...” “MEM and MoE also required that a contingency measure be identified for water treatment and disposal to address the finite capacity of Springer Pit...” P. 4

We hope MEM and MoE have since realized that rather than treating it as a “contingency” prior to the processing of a restart application a short-term water management plan must be similarly processed to address the existing condition as well as future conditions such as for a restricted restart.

#### Section 2.3.2 Effluent Permit and Short-Term Contingency

“For treatment, existing infrastructure is in place if the restricted restart permit is granted because lime addition at the mill, using existing infrastructure, is straightforward.” P. 5

In the same manner, under the short-term existing condition scenario, it has been and continues to be possible to utilize the existing mill infrastructure to add lime and conduct water treatment operations without the restricted restart permit. While the operations would be ancillary to milling operations, this does not preclude the mill facilities (e.g. lime slaker, mixing tanks, thickener) from being utilized ahead of milling operations to achieve reasonable existing conditions (e.g. net negative water balance).

“To implement a contingency, an interim ... permit amendment is needed” P. 5

The “interim” permit mentioned in this section is apparently the “short-term” permit we recommend earlier in our comments.

#### Section 3.2.1 Water Quantity Module

We recommend that ongoing/long-term draindown water from the tailings within the TSF be included as an input in the WBM (p. 14). However, in doing so we recognize that by this time it may not be a significant contributor. But given the apparent discrepancy in existing models and actual pit water volume that can likely be accounted for by tailings draindown since the breach and subsequent capture was established, including long-term draindown would ensure that future models were more accurate.

#### Section 4.3.3 Effluent Conveyancing and Discharge (Short Term)

As discussed, we recommend that in addition to Hazeltine Creek and Quesnel Lake (p. 32-33), discharge into the Quesnel River should also be considered as a short-term discharge option. We also recommend that multiple or staged discharges be considered in the short-term.

#### Table 3: Summary of Criteria for evaluating discharge options

“The discharge option must be operational before Springer Pit water levels rise to the 1030 m elevation, to avoid emergency overflow/bypass of the TSF.” (p. 39)

An option that should be considered in the event water levels rise to the 1030 m elevation would be to continue to pump from the TSF to Springer Pit and cause an emergency overflow/discharge from Springer Pit in order to avoid bypass or overflow of the TSF.

“Data collection may (underline added) be initiated if feasible.” P. 39

We would assume or otherwise recommend that data collection will be initiated if feasible.

#### 7.0 Monitoring Plan

“Additional monitoring stations may be established at select locations to further monitor or qualify water quality and quantity trends as considered appropriate during the development of the water models.” P. 48

Consultations with FNs and MEM and MoE should take place with respect to evaluation of the water models and establishment of additional monitoring stations as may be needed to either improve upon or validate the model.

#### 8.0 Schedule

The draft project schedule (p. 48-49) is helpful but needs to be more thoroughly described and linked to the existing conditions/contingency/short-term permit and restricted opening as well as long-term permit requirements relative to both discharges and resumption of full operations. In addition, the schedule should identify key consultation opportunities and milestones with First Nations, local communities and agencies.

# Technical Review Comments Summary

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**Permit Amendment Application:  
Mount Polley Mine Return to Restricted Operations Revision 1**

**And the  
Approach for Long-Term Water Management Plan Development**

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April 21, 2015  
Williams Lake Indian Band



**Note on the preparation of the Technical Comments:**

The Technical Comments have been prepared by Don MacDonald of MacDonald Environmental Sciences, Dr. Elmar Plate and Marc Gaboury of LGL Ltd., and Brian Olding of BOA Ltd., under the direction of the Williams Lake Indian Band. Acknowledgement is made to Groundwater Solutions for their earlier insights into the hydrogeological aspects of the project.

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## Executive Summary

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The MPMC has recently submitted two documents, for the purpose of resuming restricted mining and milling operations at Mount Polley Mine, to the Williams Lake Indian Band, the BC Ministry of Energy and Mines, and to the BC Ministry of the Environment. The documents submitted are:

1. *Permit Amendment Application: Mount Polley Mine Return to Restricted Operations, Revision 1*; and
2. *Approach for Long-Term Water Management Plan Development.*

The Williams Lake Indian Band (WLIB) has prepared below Technical Comments (General and Specific) for both documents. The intent of our Technical Comments is threefold:

1. To identify Aboriginal environmental concerns regarding all potential impacts that may arise within the Traditional Territory with respect to the Permit Application;
2. To provide collaborative guidance to address identified Aboriginal environmental concerns for the preparation of the Technical Assessment Report which will accompany MPMC's Permit Amendment Application prior to permitting by the Province; and
3. To prevent further negative environmental impacts to the Hazeltine system, to Quesnel Lake and beyond.

It is understood that MPMC is currently preparing a Technical Assessment Report. The WLIB expects to work collaboratively with MPMC to ensure that all identified concerns identified in our Technical Comments are effectively addressed prior to re-opening. This will likely take the form of MPMC commitments made in the Technical Assessment Report, as well as permit conditions that speak directly to the Technical Comments. We expect this collaboration to be explicitly and fully committed to in the Technical Assessment Report.

The Technical Comments set out in this report are reasonably comprehensive in subject matter coverage, given the very limited time frame under which they were prepared. Some of the more serious outstanding environmental concerns identified by the WLIB include the concerns listed below.

### Springer Pit – Short-Term Water Management Plan

The efficacy of liming Springer Pit waters to reduce the concentrations of all Constituents of Potential Concern (COPCs) so that they meet defined Environmental Quality Objectives when discharged is not properly supported by our initial literature review and therefore does not instill confidence into the suggested approach. This lack of confidence is also based on the uncertainty around potential down gradient groundwater seepage towards Bootjack Lake,

uncertainty of point of groundwater discharge (1030m) and uncertainty of a management response to monitor and contain discharge into groundwater. Further, a management plan must be developed to address the precipitate sludge at the bottom of Springer Pit, generated by the liming process.

#### Effluent Treatment System and Point of Discharge

MPMC will have to select and describe the final effluent treatment systems (s), and to select a point of discharge (both for the Short-Term Water Management Plan and for the Long-term Water Management Plan) in the Technical Assessment Report. It is understood that this will be carried out in collaboration with the WLIB.

At this point we do not have the information that is needed to recommend which one of the lesser of two regrettable options, discharge into Quesnel Lake or discharge into Quesnel River, should be pursued from an environmental perspective. The MPMC and the FNs had never anticipated discharges to these two water bodies. These options are presented in the last instance to mitigate an unfortunate discharge metal laden sediments into the Quesnel System. Political and emotional factors will way into this decision.

The level of detail required to discharge into the environment is shown below in the Comments on Approach for Long-Term Water Management Plan Development – Specific Comments. Here, too, details of some of the work required for an effective Aquatic Effects Monitoring Program are provided.

#### Reclamation and Closure Plan

Much has changed at the Mount Polley mine site since the original Reclamation and Closure Plan was originally designed. The Plan needs to be updated to current conditions and to include the restoration and remediation components in this Plan. The Financial Security estimate needs to be updated accordingly and provided, in confidence, to the Williams Lake Indian Band.

## Introduction, Background, Structure and Goals for the Comments

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Following the breach of the Mount Polley Mine Tailings Storage Facility (TSF) on August 4, 2014, approximately 25 million m<sup>3</sup> of tailings and wastewater spilled over the channel of Hazeltine Creek and reached Polley Lake on the upstream end and Quesnel Lake on the downstream end.

Since the TSF breach, Mount Polley Mining Corporation (MPMC) has been undertaking some remediation and restoration of Hazeltine Creek and the re-building of the breached TSF dam. MPMC is now in the process of trying to obtain all permits necessary to re-open the mine.

One of the most important aspects of mine re-opening is the management of mine contact water. Based on MPMC's estimates, the expected volume of contact water that needs to be managed will exhaust the safe storage volume of Springer Pit, the current discharge location, within three months to a year depending on precipitation. In advance of preparing the Technical Assessment Report, Golder Associates wrote a water management plan development report which accompanies the Permit Amendment Application.

The documents reviewed in relation to the applications for these Permits are:

1. Permit Amendment Application: Mount Polley Mine Return to Restricted Operations, Revision1; and
2. Approach for Long-Term Water Management Plan Development.

This review sets out an Executive Summary, Introduction, General and Specific review comments for the Permit Amendment Application, and General and Specific Comments for the Approach for Long-Term Water Management Plan Development.

The intent of our Comments is threefold:

To identify Aboriginal environmental concerns regarding all potential impacts that may arise within the Traditional Territory with respect to the Permit Application;

To provide collaborative guidance to address identified Aboriginal environmental concerns for the preparation of the Technical Assessment Report which will accompany MPMC's Permit Amendment Application prior to permitting by the Province; and

To prevent further negative impacts to the Hazeltine system, to Quesnel Lake and beyond.



## Comments on Permit Amendment Application Mount Polley Mine

### Return to Restricted Operations Revision 1

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#### General Comments

According to BCMOE (2013), Applicants seeking an *EMA* permit are required to submit a technical assessment report (TAR) that provides enough information to fully understand the application and the potential impacts on the environment.

It is understood that MPMC is currently preparing this TAR. The WLIB expects to collaboratively participate, according to its capacity, in the development of the TAR, with MPMC. Our Technical Comments below reflect our Aboriginal concerns with respect to potential environmental impacts on Aboriginal interests throughout our Territory that may be impacted by the resumption to restricted operations, and, in particular, by the way in which short-term and long-term water management planning is carried out. We have identified our concerns in more detail in the Comments on Approach for Long-Term Water Management Plan Development Section below.

The Williams Lake Indian Band understands that this TAR is presently under development. The information provided in the TAR will need to include:

- Project scope, management systems, discharges, and treatment.

- Pollution prevention alternatives, how the selected treatment compares to best available technology, and expected quality of the discharge after treatment.

- Proposed location(s) of the discharge.

- Effluent quality and quantity.

- Baseline receiving environment information.

- Assessment of the potential for the discharge to cause an impact, including:

  - Expected exceedances of British Columbia Water Quality Guidelines.

  - Input on the development of site-specific water quality objectives.

  - Hydrogeological concerns with Springer Pit.

  - Identification of sensitive species and designated water uses.

  - Predictive impact assessment.

- A proposed monitoring program and adaptive management systems.

The prevailing hydraulic gradients that Golder has provided and that, in principle, have been confirmed by GW Solutions, suggests groundwater originating in Springer Pit Lake tends to flow westerly towards Bootjack Lake. There is a reasonably high likelihood that under restricted mining operations, water levels in Springer Pit may be high enough, or potentially significant seepage zones may already exist, for some groundwater from Springer Pit to discharge to Bootjack Creek.

The quality of the mine-influenced waters (based on existing concentrations of eight substances) would likely have negative impacts on aquatic resources if these waters were discharged to fish bearing lakes and streams within the project area.

Based on a review of the Application, it is apparent that the TAR has not yet been prepared and we understand that it is currently under development. There are, therefore, a number of serious deficiencies that must be addressed in the forthcoming TAR before a decision on issuance of a *MA* or *EMA* permit is rendered, including:

Project management systems, wastewater discharges, and wastewater treatment have not been described.

Pollution prevention alternatives have not been described.

A treatment system has not been selected and, hence, no comparisons to best available technologies have been presented.

No information was presented on the expected quality of the discharge after treatment.

The proposed location(s) of the wastewater discharge were not described.

Effluent quality has not been characterized.

Baseline data on the receiving environment have not been presented.

An assessment of the effects of the discharge(s) on designated water uses has not been conducted.

Monitoring programs to evaluate effluent quality or effects on the environment have not been proposed.

An adaptive management plan has not been included in the submission.

The nature and severity of these deficiencies makes it difficult to evaluate the technical merits of the Application until such time as the forthcoming TAR has been developed and reviewed.

## Comments on Permit Amendment Application Mount Polley Mine Return to Restricted Operations Revision 1

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### Specific Comments

Based on the information that was presented in the Application, Springer Pit could be filled to the extent that outflow to groundwater occurs (i.e., Elevation of 1030 m) as early as July, 2015. In addition, Springer Pit could be filled to the extent that surface water discharge occurs (i.e., Elevation of 1050 m) as early as March, 2016. Therefore, there is a critical need to evaluate water management, water treatment, and water discharge options at the site (i.e., a wastewater treatment and wastewater discharge plan).

The application provides information on potential water quality conditions in Springer Pit Lake. The data that are presented indicate that pit lake water is likely to have elevated levels of the following substances (the highest of the mean concentrations reported for the three water sources is presented in parentheses):

1. Nitrate (up to 8.4 mg/L; CCME WQG = 3.0 mg/L).
2. Sulphate (up to 540 mg/L; BCWQG = 409 mg/L).
3. Aluminum (up to 1.03 mg/L; BCWQG = 0.1 mg/L).
4. Copper (up to 0.062 mg/L; CCME WQG = 0.004 mg/L).
5. Iron (up to 1.18 mg/L; BCWQG = 1.0 mg/L).
6. Molybdenum (up to 0.18 mg/L; CCME WQG = 0.073 mg/L - aquatic life;  
BCWQG = 0.05 mg/L - wildlife).
7. Phosphorus (up to 0.033 mg/L; BCWQG = 0.005 to 0.015 mg/L); and,
8. Selenium (up to 0.043 mg/L; BCWQG = 0.002 mg/L).

Of the eight substances above, copper and selenium exceedances have the greatest potential for significant effects on aquatic organisms and terrestrial wildlife. Water treatment should, in particular, focus on reducing the concentrations of these two substances in receiving waters. Which of the above-listed COPCs would be unaffected by liming and what would the impact be on the short-term and long term water discharges?

The Application indicates that water storage and/or discharge alternatives are included in the water management planning documents that were submitted independent of, but parallel to, the Application. This is not appropriate. At minimum, the Application needs to

document that viable water management/water storage/water treatment/water discharge options are available at the site and identify the selected option that will provide the basis for establishing the MA and EMA permits, if such permits are ultimately issued by the Province of British Columbia. These minimum options are discussed below.

- The data on potential pit lake water quality conditions presented in the Application indicate that the concentrations of numerous chemicals of potential concern (COPCs) will exceed BC or CCME WQGs. In some cases, the BCWQGs are exceeded by a factor of up to 20 (i.e., selenium). Hence, discharge of this water to the environment has the potential to cause adverse effects on aquatic life and/or other designated water uses.
- The Application does not identify candidate wastewater discharge locations in the vicinity of the mine site. In addition, data on baseline water quality conditions have not been presented for any of the candidate receiving water bodies. In this respect, we expect a fulsome analysis of all factors related to the discharge to Quesnel Lake and Quesnel River. Furthermore, predictions of future water quality conditions are not provided for any of the candidate receiving water bodies located in the vicinity of the Mount Polley mine site. Hence, the Application does not provide sufficient information to support the development of EMA permit conditions.
- The Application does not include an evaluation of the effects on the environment that would be associated with discharges of pit water (or process water) to the environment. Such information is required to identify the need for mitigation and to support an evaluation of mitigation options for addressing impacts on receiving waters in the vicinity of the mine site.
- The Application has not provided information on the need for water treatment prior to release of wastewater to the environment, on water treatment options for addressing elevated COPC concentrations in pit water and/or wastewater from other sources, or on potential efficacy of candidate water treatment systems. This represents a major limitation of the Application because it prevents reviewers from evaluating the feasibility of discharging wastewater to the environment, now or in the future.

- The Application indicates that there is about 16,000,000 t of PAG waste rock currently stored on site and that this tonnage of waste rock would occupy a volume 8,000,000 m<sup>3</sup> when disposed of in Springer Pit. Because there is limited space within Springer Pit (estimated at 14,800,000 m<sup>3</sup> at an elevation of 1050 m), because the Application proposes to dispose of 2,900,000 m<sup>3</sup> of tailings in Springer Pit, because additional PAG waste rock will be produced during resumed mining (if permitted), and because all PAG waste rock must be submerged at closure, the technical basis for the volumes of PAG waste rock and tailings should be provided for review and evaluation. Additional options for disposal of PAG waste rock (i.e., beyond Springer Pit and Wight Pit) should be identified in case the volumes of PAG waste rock are higher than expected (i.e., if waste rock density is lower than expected).
- The Application indicates that placement of mine tailings in Springer Pit would not significantly change the requirements for long-term water management at the site. That is, placement of 4,000,000 t of tailings in Springer Pit would displace only 1,500,000 m<sup>3</sup> of water from the facility, which equates to one month of mine-influenced water storage. While it is understood that the tailings would include 1,500,000 m<sup>3</sup> of solids and 1,400,000 m<sup>3</sup> of interstitial water, it is unclear if this interstitial water was included in the calculations of water balance for the site. Therefore, more information is required to confirm that interstitial water associated with mine tailings is included in the water-balance model for the site.
- It is unclear if other options for disposal of mine tailings were considered in the Application. Therefore, more information should be provided on the other tailings disposal options that were considered (e.g., dry-stack disposal, etc.).

In summary, the Application does not provide all of the information needed to support development of a *MA* or *EMA* permit for return to restricted operations. In addition to the information provided, the Application needs to include the following elements:

1. Evaluation of options for effluent discharge (i.e., identify and evaluate candidate wastewater discharge locations);



2. Predictions of effluent quality and receiving water quality conditions for operations, closure, and post-closure;
3. Evaluation of the need for additional water storage and/or water treatment to facilitate short-term and/or long-term water management;
4. Evaluation of the effects of wastewater discharges on receiving water quality and associated water uses (i.e., an effects assessment);
5. Evaluation of the efficacy of various water management and water treatment options, and
6. Evaluation of the technical and economic feasibility of implementing the preferred water management and water treatment options.

We need to understand a full adaptive management response in the event that monitoring detects that seepage of degraded water is impacting Bootjack Lake. This includes an understanding of triggers (e.g. specific concentrations of copper or selenium) that would initiate the response. Given the uncertainty around the groundwater discharge level (currently estimated at 1030m), we need to know what a conservative level would be with which to manage discharge from Springer pit.

It may be ultimately shown that groundwater infilling does not play a significant role in the water levels of Springer Pit. There are no facts, at this time, however, to back up that assertion.

While it is understood that there is significant pressure to re-open the Mount Polley mine, decisions taken in the near future will have long-term implications. Therefore, it is essential that a viable plan for water management and wastewater discharge be developed prior to approving return to restricted operations at the mine site. Addressing the information needs identified above will help to ensure that decisions that have long-term implications relative to Aboriginal health and the traditional use of the environment are supported by the data and information required for issuance of MA and EMA permits.

Much has changed at the Mount Polley mine site since the original Reclamation and Closure Plan was originally designed. The Plan needs to be updated to current conditions and to include the restoration and remediation components in this Plan. The Financial Security estimate needs to be updated accordingly and provided, in confidence to the Williams Lake Indian Band.

## Comments on Approach for Long-Term Water Management Plan Development

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### General Comments

We understand that there will be two *Environmental Management Act* permits required for the EM Permit Application. One EMA permit will provide for the discharge of tailings from the mill to Springer Pit.

The second EMA Permit will provide for a discharge from Springer Pit under two possible scenarios. Springer Pit is likely to fill past the point of discharge to groundwater within the coming months. Further, there is uncertainty around the currently designated 1030m level where pit water would discharge to groundwater. Additionally, the modelling for the rate of filling of Springer Pit has proven to under-estimate this rate and the model is currently being re-calibrated.

### *Short-Term Water Management Plan (STWMP)*

Water from Springer Pit must necessarily be discharged and therefore a Short-term Water Management Plan (STWMP) has been developed to use the mill liming process to precipitate out, in Springer Pit, as many of the Contaminants of Potential Concern (COPCs) as possible, prior to an imminent discharge to the receiving environment. It is likely that the discharge route will lead down the soon to be completed, armoured Hazeltine Creek, and then to Quesnel Lake, or, the discharge will be transported by pipeline directly to Quesnel Lake.

### *Long-Term Water Management Plan LTWMP)*

Long-term water treatment options for the Springer pit discharge waters are currently under examination to provide discharge conditions that will meet the BC Water Quality Guidelines, the Federal Metal Mining Effluent Regulations (MMER) or Site Specific Water Quality Guidelines as may be required. We will refer to any of these conditions as Environmental Quality Criteria (EQC). The plan for the LTWMP must be sufficiently elaborated so as to clearly see how the water quality treatment will work. It must demonstrate how the EQC for each of the CPOCs will be met within the initial dilution Zone of the chosen discharge location. At this point it is likely that the LTWMP for Springer Pit will discharge pit waters to either the Quesnel River, downstream of spawning grounds, or to a submerged point within Quesnel Lake.

According to BCMOE (2013), Applicants seeking an *Environmental Management Act* permit are required to submit a technical assessment report (TAR) that provides enough information to

fully understand the application and the potential impacts on the environment. The basic information categories provided in the TAR need to include:

1. Pollution prevention alternatives, how the selected treatment compares to best available technology, and expected quality of the discharge after treatment.
2. Project scope, management systems, discharges, and treatment.
3. Proposed location(s) of the discharge.
4. Effluent quality and quantity.
5. Adequate baseline receiving environment information.
6. Assessment of the potential for the discharge to cause an impact, including expected exceedances of British Columbia water quality guidelines (BCWQGs).
7. Input on the development of site-specific water quality objectives.
8. Identification of sensitive species and designated water uses.
9. Predictive impact assessment.
10. A proposed monitoring program and adaptive management systems.

It is understood that MPMC is currently preparing this TAR. The WLIB expects to collaboratively participate, according to its capacity, in the development of the TAR, with MPMC. The WLIB expects this collaboration to be explicitly and fully elaborated in the TAR. Our Technical Comments below reflect some of WLIB's Aboriginal concerns with respect to potential environmental impacts on Aboriginal interests throughout its Territory that may be impacted by both the STWQMP and the LTWQMP. The Comments reflect WLIB's expectations with how these identified Aboriginal concerns will be addressed in the TAR.

Below we provide specific technical comments on the Approach for Long-Term Water Management Plan Development. These comments will be re-visited in more detail upon MPMC's submission of the TAR.

## Comments on Approach for Long-Term Water Management Plan Development

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Specific Comments on sections of the Approach for Longer-Term Water Management Plan Development (note that the numbered Sections refer to the MPMC document Approach for Longer-Term Water Management Plan Development)

### Introduction 1.0

The increase from 1.4 million m<sup>3</sup>/year to >5 million m<sup>3</sup>/year of mine contact water appears to be very large. We would recommend undertaking the most in-depth analysis possible of how contact water production can be reduced. We recommend that any current surface run-off be directed away from contact with mine rock or tailings. Current watercourses may be re-directed. Rock piles may be covered to avoid contact with water. Water that flows over the mine but does not display any exceedances of Water Quality Guidelines may be separated from water that shows exceedances and be discharged directly.

### Technical Approach 2.2

We expect, as Golder has stated, that surplus water cannot be stored in the TSF. We would like that explicitly stated in the Technical Assessment Report under preparation.

### Effluent Permit and Short-term Contingency 2.3.2

Liming of mine contact water at the mill or directly in Springer Pit, suggested as an interim contingency measure, will lead to the precipitation and coagulation of heavy metals in Springer Pit. The sludge at the bottom of Springer Pit that will thus be created, will accumulate all metals found in the mine. If this option is to be considered, a management plan for this sludge needs to be provided.

### Water Quantity and Quality Monitoring 3.0

Without a defined water quantity and quality model that addresses all water sources, the evaluation of discharge options is impossible since concentrations of parameters of potential concern are unknown inside and outside the mixing zone in the receiving environment. This is a concern, as noted in more detail below in our comments on section 3.1.

Discharge to Hazeltine Creek

Based on a very cursory analysis carried out by LGL, the addition of the 5 Million m<sup>3</sup>/year (for simplicity we assumed an even discharge throughout the year) would be diluted by factors ranging from 1:2 to 1:10 if discharged into Hazeltine Creek (average addition of 160 L/sec). This discharge could be directed to the area below the sedimentation pond to avoid an increase of flow in the upper reaches of Hazeltine Creek. Additions of flow into the upper reaches could increase erosion, re-disturbance of tailings and thus increase turbidity.

#### Discharge to Quesnel River

We have not calculated discharge dilution ratios for Quesnel River at different locations. We expect that this work will be undertaken in the development of the TAR.

#### Discharge to Quesnel Lake

When discharged into Quesnel Lake, the concentrations at the diffuser as well as within a 100 m mixing zone will need to be calculated. Beyond the 100 m mixing zone, concentrations of parameters of potential concern will likely be below Water Quality Guidelines but their accumulation below the thermocline will need to be modelled or calculated. We expect that this work will be undertaken in the development of the TAR.

### Identifying Constituents of Potential Concern 3.1

The plan for developing a water quality and quantity model for the Mount Polley mine site is described in Section 3.0. Comments on this section are presented below.

It is a requirement for mines to develop predictions of future water quality conditions to support the permitting process. Such information is required to identify COPCs, to determine the quantity of water that must be managed at the site, to identify candidate wastewater treatment technologies, to evaluate the potential efficacy of candidate wastewater treatment technologies, and to evaluate the effects of the project on human health and the environment. We note that a water quantity or quality model has not been developed, at this time, for the site. Therefore, development of this model should be identified as a priority and proceed in the near term in the development of the TAR.

Table 2, P.11, presents the results of the screening-level assessment that was conducted to identify COPCs at the site. The results of this assessment indicate that the COPCs at the site include nitrate, sulphate, dissolved aluminum, total copper, total selenium, total iron, and TSS. While this evaluation identified some of the COPCs at the site, it should not be considered to be in any way comprehensive for the following reasons:



1. BCWQGs for water uses beyond protection of aquatic life were not considered. Identification of COPCs requires consideration of all water uses, not just aquatic life. For example, the BCWQG for molybdenum for the protection of wildlife is a factor of 20 lower than the BCWQG for the protection of aquatic life.
2. The following candidate COPCs were not considered in the evaluation: ammonia, phosphorus, dissolved metals (i.e., beyond Al, Cu, and Fe), and TDS.
3. No BCWQGs were reported for many of the candidate COPCs that were identified, including conductivity, pH, temperature, turbidity, alkalinity, and hardness.
4. For many of the metals, the BCWQGs are hardness dependent. However, the water hardness at the site is much higher than the upper limit that has been defined for calculating the BCWQGs for the protection of aquatic life. Therefore, the WQGs for metals may be overstated.
5. The three water sources evaluated may or may not fully reflect water quality conditions for sources at the site.
6. A predictive evaluation of future water quality conditions has not been conducted. As conditions may change in the future, the results of water quality modeling, as well as on-site measurements of water quality conditions, will need to be considered in the COPC identification process.

## Water Quality Module, Receiving Environment Module 3.2.2

To our knowledge, the H3D model is typically used for marine environments. We hope that it can be adjusted to consider the strong separation of the water column by the thermocline in the summer and the subsequent mixing of the water column in the fall and spring.

## Water Treatment Options 4.0

This section is a good summary of available options. The selection of the final water treatment system is a high level priority which must be comprehensively addressed in the TAR.

### STWMP

In the short-term and as a contingency, liming of the water in Springer Pit could be considered if the post-liming parameter concentrations of constituents of potential concern are provided.

## LTWMP

The evaluation of candidate wastewater treatment options needs to be informed by a comprehensive list of COPCs at the site. Limitations on the preliminary evaluation of COPCs render the evaluation of candidate wastewater treatment options uncertain. For example, it is uncertain if any of the candidate technologies provide a basis for removal of phosphorus, which is likely to be identified as a COPC once the existing concentrations in site water are compared to the BCWQGs for total phosphorus.

The design of wastewater treatment systems for the mine site will necessarily require information on the Environmental Quality Criteria (EQCs) that need to be achieved. Therefore, the following work needs to be undertaken, including the identification of the preferred discharge locations (i.e., Quesnel Lake, Quesnel River downstream of key salmon spawning habitat), development of site-specific WQOs, determination of the dimensions of the IDZ, and establishment of EQCs that will ensure that the site-specific WQOs are met at the edge of the Initial Dilution Zone. This should be identified as a high near-term priority. Evaluation and selection of active, semi-passive, and passive wastewater treatment systems for operations, closure, and post-closure will need to consider all of these inputs.

## Evaluation of Effluent Management Options 5.0

As for Section 5, the evaluations of the options presented in Section 6 is impossible without knowing the concentrations of the constituents of potential concern within the Initial Mixing Zone of all water bodies and the concentrations in the water body following mixing. As part of the information that needs to be presented, accumulation of constituents of potential concern in all water bodies or their final receiving environments (Fraser River and Georgia Strait for the Quesnel River option) need to be provided.

It is agreed that a wastewater treatment and wastewater discharge plan needs to be developed in the near term. It is also agreed that the infrastructure needed to facilitate discharge of treated wastewater to the environment needs to be constructed before water levels in Springer Pit reach the 1030 m elevation. However, this work should not be part of the long-term water management planning process or constrained by the Application for amendment of permits for return to restricted operations. Rather, this essential work should be initiated immediately and support an amendment of the *EMA* permit that addresses the need for wastewater discharge only. Other issues related to the return to restricted operations can be addressed subsequently or in parallel.

The proposed criteria for evaluating discharge options may represent some of the criteria that need to be established to support evaluation of long-term discharge options. However, the five criteria identified should not be considered to provide the necessary and sufficient basis for evaluating discharge options. Some of the other inputs that must be considered in the selection of a preferred long-term discharge option(s) include, but are not necessarily limited to:

1. Potential effects of Criteria of Potential Concern (CPPCs) on ecological receptors and human health (i.e., for toxic COPCs and for bioaccumulative COPCs).
2. Concentrations of COPCs in the receiving environment that would not impair designated water uses (as defined by BCWQGs, CCME WQGs, site-specific WQOs).
3. The presence of sensitive species and/or sensitive aquatic habitats, including risks to those species or habitats posed by discharge of contaminants to surface waters.
4. Dimensions of the IDZ.
5. Minimum dilution factors available based on effluent volume, stream flows, and/or mixing characteristics of the effluent with surface waters (i.e. behavior of effluent in surface waters can be influenced by temperature, density, and other factors).
6. Effluent toxicity, including acute and chronic toxicity.
7. Potential for chronic toxicity at the edge of the IDZ.
8. Timing of anticipated/planned wastewater discharges (i.e., during high flow conditions and/or at other times of the year).
9. Location of drinking water intakes.
10. Potential for eutrophication or blooms of toxic algal species.
11. Pollution prevention alternatives available at the site.
12. Potential for contamination of sediments.
13. Presence of debris, oil, grease, scum, or other objectionable materials in effluent from the site.
14. Presence of colour, turbidity, or odour-producing materials that could adversely affect aquatic life or wildlife.

As noted previously, wastewater discharges to Polley Lake, Hazeltine Creek, and Edney Creek should be avoided in so far as they have high ecological value and severely limited capacity to absorb potential wastewater discharges. Discharges of wastewater to any of these water bodies would degrade water quality conditions and put critical sockeye salmon rearing habitat in Quesnel Lake at risk. As stated earlier, we expect that a thorough analysis of the impacts of discharging to Quesnel Lake and to Quesnel River will be undertaken in the development of the TAR.

## Monitoring Plan 7.0

The proposed monitoring plan, is at best, cursory in nature. Therefore, there is a need to develop a long-term monitoring plan that will guide the collection of water quality and quantity data at the site. At minimum, three monitoring programs will be required, including:

Surveillance Network Program (SNP) - This program is required to provide data and information on water quality and quantity for all of the on-site sources. Effluent monitoring may be included in the SNP or AEMP.

Aquatic Effects Monitoring Program (AEMP) - This program is required to provide data and information on effluent quality/quantity, water quality/quantity, sediment quality, tissue quality, and biological integrity in the vicinity of the site. This information is needed to evaluate project-related effects and to guide adaptive management at the site.

Environmental Effects Monitoring (EEM) Program - This program is required to fulfill federal requirements under the Metal Mining Effluent Regulations.

The types of data and information that need to be included in the Aquatic Effects Monitoring Program AEMP include the following:

- Effluent chemistry
- Acute effluent toxicity
- Chronic effluent toxicity
- Effluent quantity
- Surface-water chemistry
- Chronic surface-water toxicity
- Surface-water quantity
- Sediment chemistry
- Sediment toxicity
- Algal community structure and abundance
- Benthic invertebrate community structure and abundance
- Fish community structure and abundance
- Incidence of deformities, fin erosion, lesions, and tumours in fish
- Algal-tissue chemistry
- Invertebrate-tissue chemistry
- Fish-tissue chemistry

Monitoring locations and frequency will need to be determined based on the conceptual site model that links sources and releases of COPCs to ecological receptors and human populations.

It is essential that appropriate baseline data be collected in the vicinity of the proposed discharge(s) to facilitate evaluation of project-related effects.

## Schedule 8.0

This Schedule should be supplemented with the estimated sequencing of all Permits and with the key points of collaboration with the Williams Lake Indian Band.



**From:** [Kuppers, Haley MEM:EX](#)  
**To:** [Hoffman, Al MEM:EX](#); [Douglas Kiloh](#); [McLeod, Harvey](#); [Pocklington, Cheryl M MEM:EX](#); [Demchuk, Tania MEM:EX](#); [Hynes, Michelle MEM:EX](#)  
**Cc:** [Hemphill, Naomi MEM:EX](#)  
**Subject:** FW: Mount Polley Investigation - Follow-up from May 6, 2015 Meeting with KP  
**Date:** Monday, May 11, 2015 12:03:38 PM  
**Attachments:** [Mount Polley Presentation to MEM - May 6, 2015.pdf](#)  
[Mount Polley 2014 Incident - Timeline.pdf](#)

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Attached please find the two presentations provided by Knight Piesold during our meeting on Wednesday, May 6<sup>th</sup>.

Regards,

Haley Kuppers, MSc.  
Inspector of Mines  
Health and Safety Specialist

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**From:** Gregory Smyth [mailto:[gsmyth@knightpiesold.com](mailto:gsmyth@knightpiesold.com)]  
**Sent:** Friday, May 8, 2015 5:58 PM  
**To:** Kuppers, Haley MEM:EX  
**Cc:** Ken Brouwer  
**Subject:** Mount Polley Investigation - Follow-up from May 6, 2015 Meeting with KP

Hi Haley

Great to meet with you this week. As discussed, please find attached the two presentations that we showed at our meeting on Wednesday.

If you have any questions, please let us know.

Kind Regards,

---

**Greg Smyth, B.Sc.**  
Project Manager | Associate  
**Knight Piésold Ltd.**

---

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2010



2014



Post Breach - 2014

# Mount Polley Dam Breach Overview Presentation

Ken Brouwer

May 6, 2015

# Knight Piésold Concerns

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1. We have determined that some of the conclusions drawn in the Panel Report are based on incorrect data and assumptions.
2. This has negatively and unfairly affected the good name of Knight Piésold

# Knight Piésold Concerns

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The Panel Report includes the following:

- Section 3.1 of the Panel Report names the EORs under the heading “Description of the TSF”.
- Section 5.2.4 again names EORs and opines that of the pre-failure site investigation drill holes, many were “of limited usefulness for embankment design purposes”
- Section 6.5 “Causes of Failure” names KP only and indicates that “the design was doomed to fail”
- Subsequent inflammatory discussion of the foundation characterization is referred to as “loading the gun” ....despite “the large number of experienced geotechnical engineers associated with the TSF over the years”



# Knight Piésold Concerns

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The Panel Report used incorrect data and assumptions as follows:

- Incorrectly chose the relevant cross-section of the embankment stages developed by Knight Piésold
- Incorrectly extrapolated embankment geometry and loading conditions, and erroneously presented these as Knight Piésold design
- Incorrectly calculated a Factor of Safety for the embankment developed by Knight Piésold when it was EOR
- Incorrectly concluded that the “original design” therefore “loaded the gun”

# Knight Piésold Concerns

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Further, the analysis in the Panel Report ignored information that was supplied by Knight Piésold in December 2014 that would have had a bearing on the results

It also ignored specific statements made by KP during the interview with the Panel.

It also ignored the confirmatory information provided in the follow up email after the interview

Part of the information provided and ignored indicated that there was an Independent Engineering Review Panel on Mount Polley initially, but it was disbanded by MEM at the request of Imperial Metals Corp.

# Knight Piésold Concerns

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We can demonstrate that the tailings dam was constructed with stable slopes and the impoundment was functioning properly with extensive drained tailings beaches and a relatively small volume of ponded water when we departed from the Mount Polley Project in 2010.

We can conclude that no breach would have occurred under the conditions prevalent during our tenure as EOR.

We can also demonstrate that after our departure, the embankment slopes became oversteepened, and water volumes dramatically increased, inundating the drained beaches in the breach location.

# Presentation to DvZ

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What follows in Slides 8 to 35 is the presentation as given to Dirk van Zyl on April 13, 2015, wherein we demonstrate:

- the errors in the Panel Report,
- stability of the tailings facility up to 2010,
- the reduction in stability factors from 2011 to the breach in 2014.



2010



2013



Post Breach - 2014

# Mount Polley Dam Breach Overview Presentation

Ken Brouwer

April 13, 2015

# Overview

- Knight Piésold (Vancouver) was the Engineer of Record (EoR) for the Mount Polley TSF from initial site investigations through Stage 6B (late 1980's through 2010)
- Knight Piésold (Vancouver) withdrew from the project and declined to bid on an RFP in late 2010
- In a letter dated February 10, 2011, Knight Piésold (Vancouver) stated that all contracted assignments pertaining to the Mount Polley TSF were complete as of January 25, 2011 and thereafter relinquished their role as EoR
- A formal handover was completed during the subsequent months to AMEC , who became the EoR



# Why did KP Depart?

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- Specific communications (Oct - Dec, 2010) highlighted KP concerns about:
  - geotechnical instrumentation,
  - potential weak foundation conditions,
  - tailings deposition,
  - water management procedures,
  - future operation of the tailings facility.
- MPMC did not come to agreement with KP on how to manage the identified concerns
- KP subsequently decided to depart from the project and resign as EoR

# TSF Water Management





# Stage 6B As-built - 2010

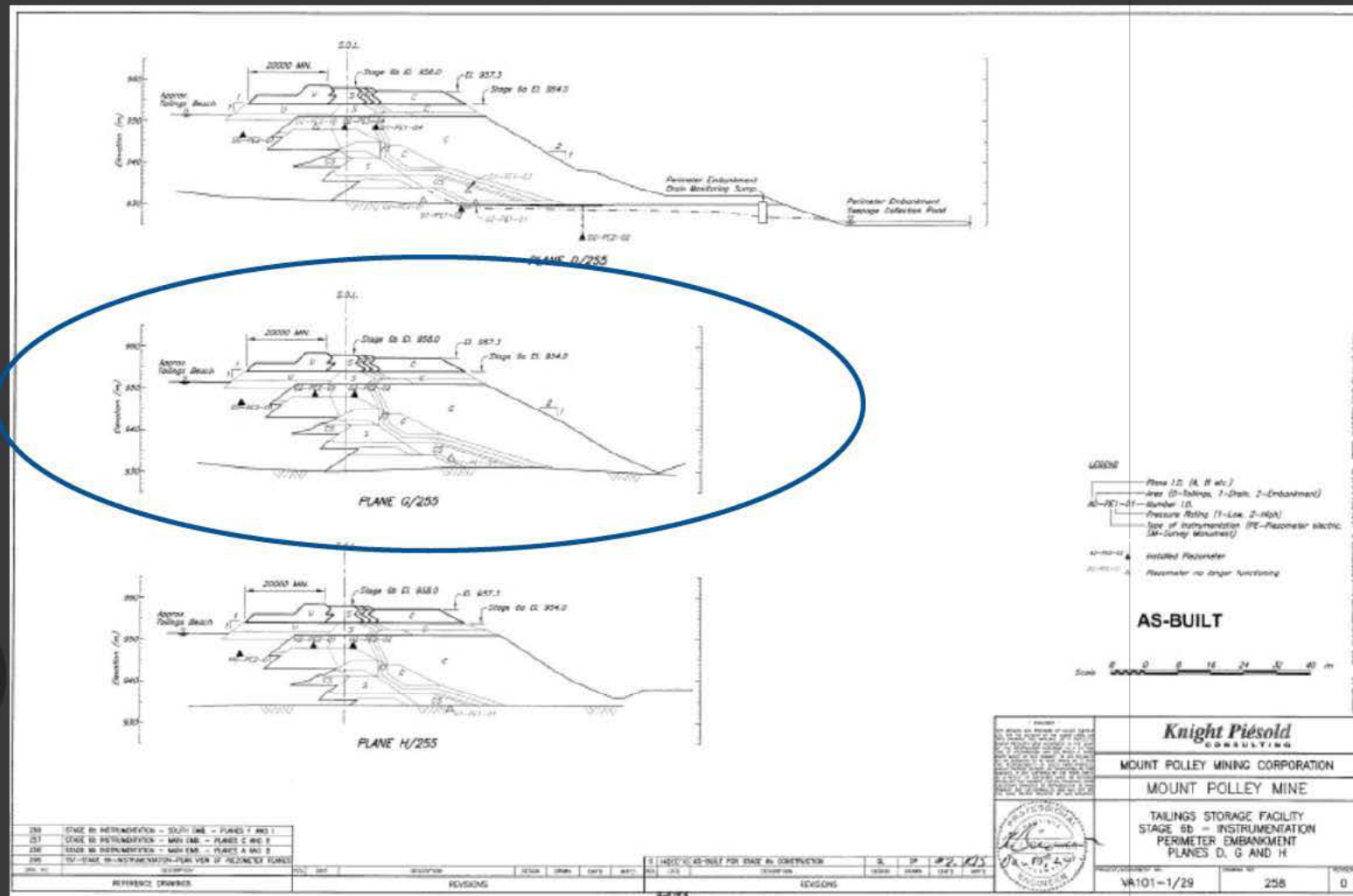


# KP Design Philosophy

---

- KP's design philosophy was to assume that weak materials could be present in complex glacial materials in the foundations
- Embankment designs and associated monitoring systems were required to accommodate for these weak foundation materials
- Flat embankment slopes and/or buttresses were incorporated to ensure appropriate Factors of Safety for each stage of development.

# Stage 6B PE As-Built Geometry

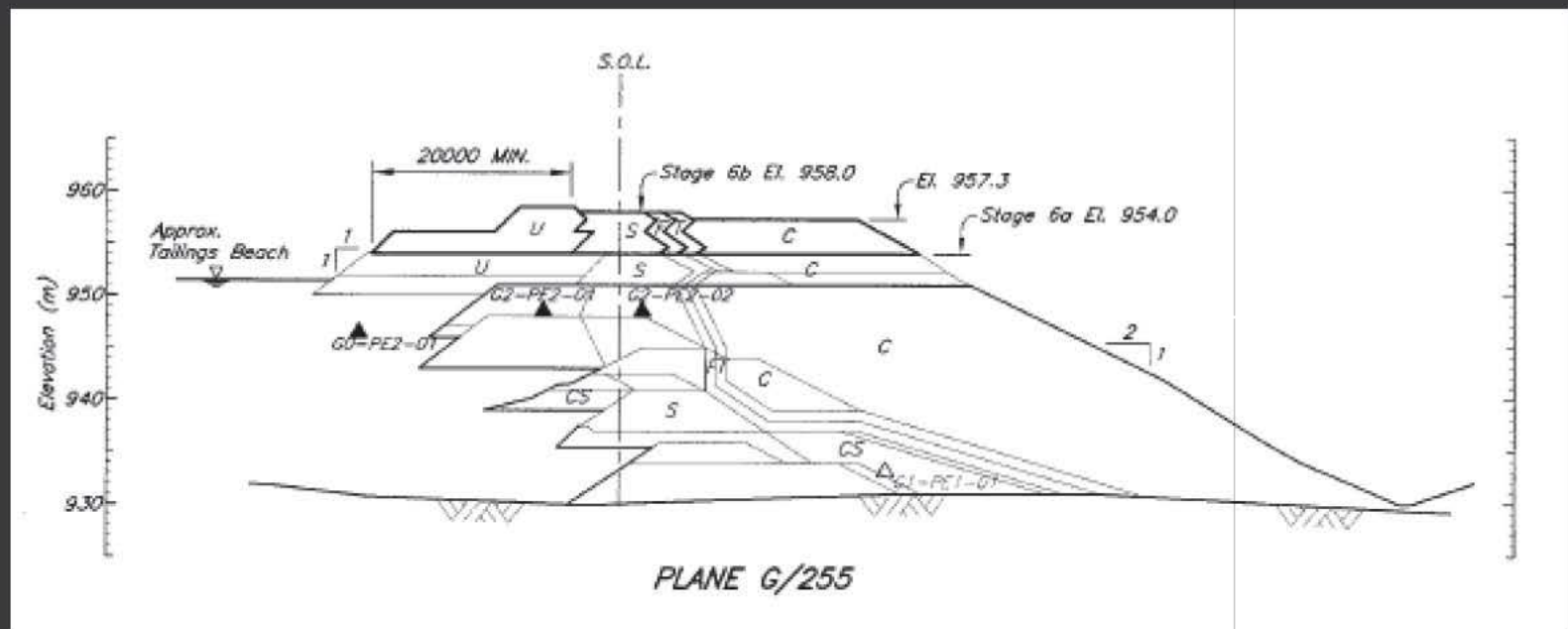


From 'Tailings Storage Facility – Report on Stage 6B Construction' (2011)



# Stage 6B As-Built

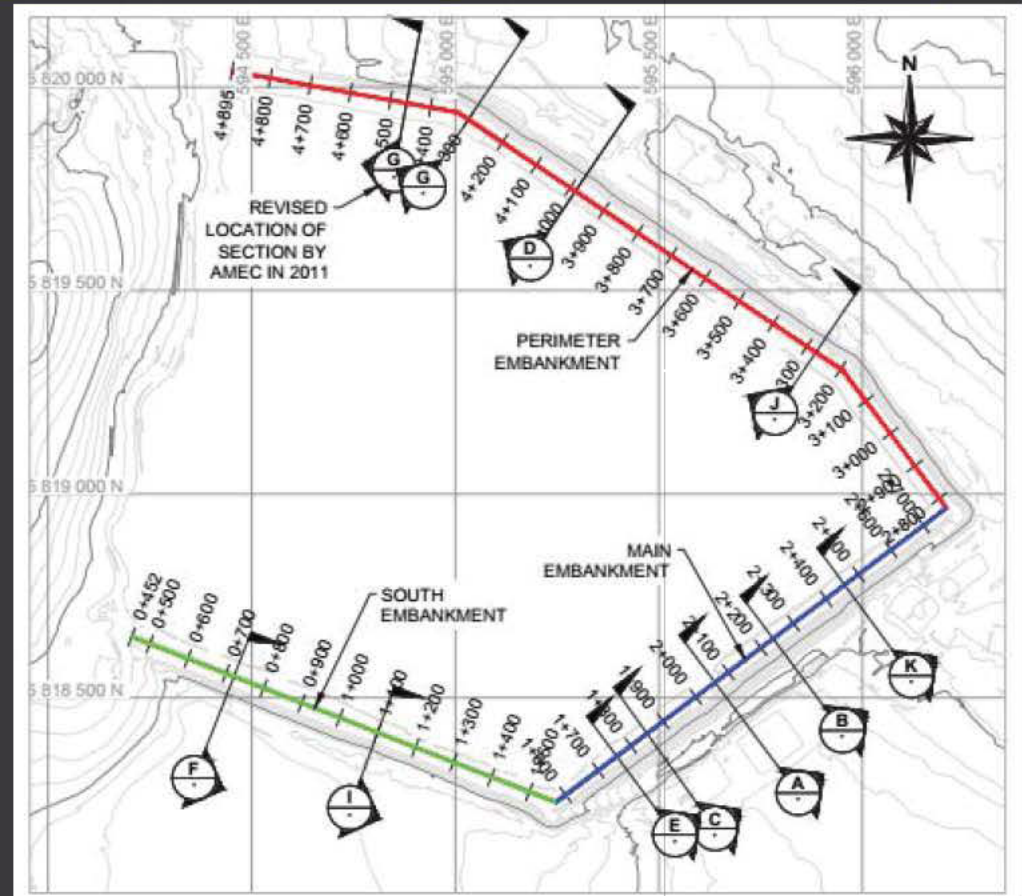
- Stage 6B Construction Report (KP, 2011)
  - crest at 958 masl
  - Constructed February 2010 – August 2010
  - Perimeter Embankment 28 m high
  - Downstream slope designed with 2H:1V slope



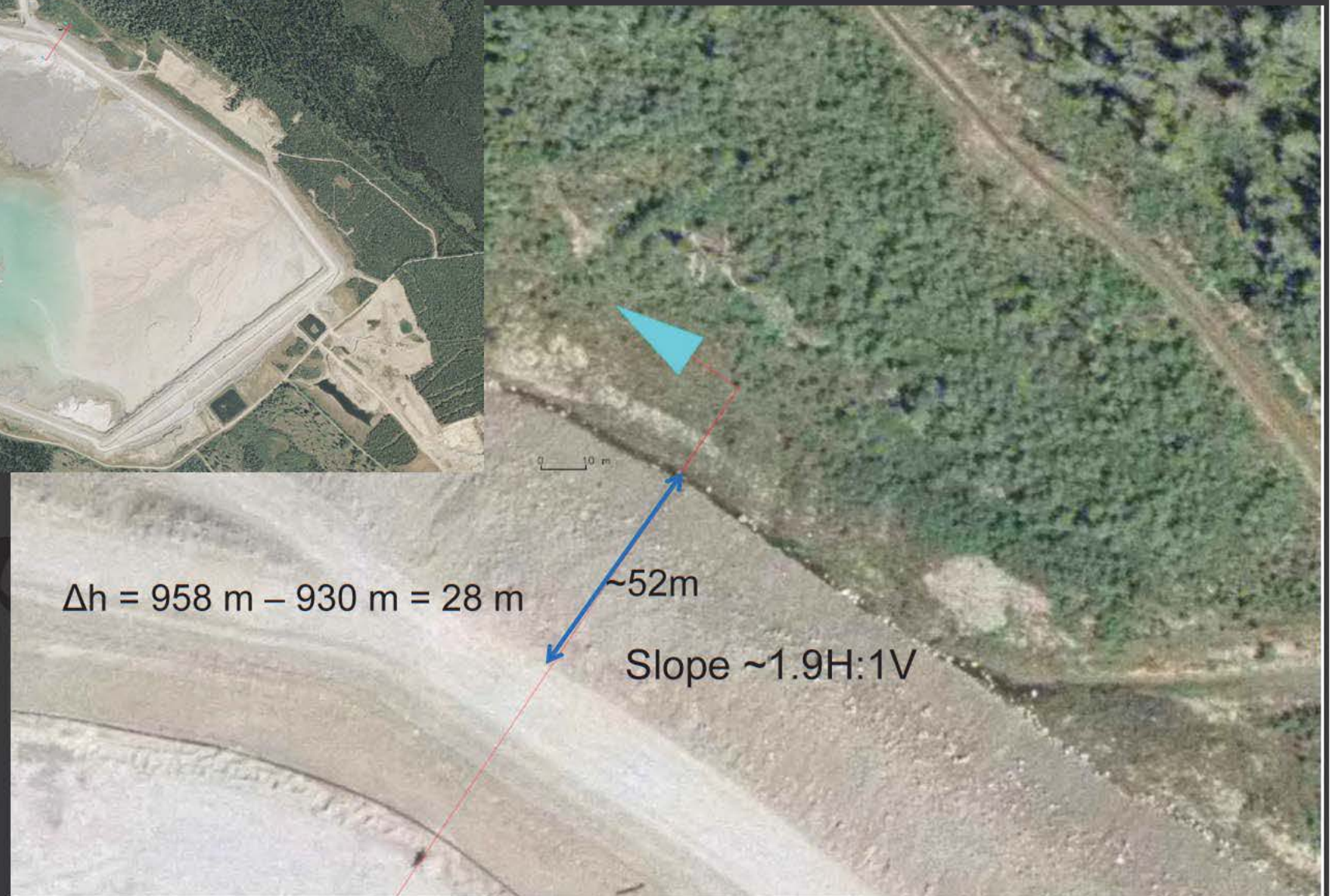


# Panel - Stage 6B Geometry

- Panel extrapolated geometry from Section 1/Plane D at Ch. 39+86 instead of Plane G at Ch. 43+00
- Panel assumed angle of repose embankment slopes incorporated in Stage 6 and subsequent stages



# 2010 Ortho at Plane G



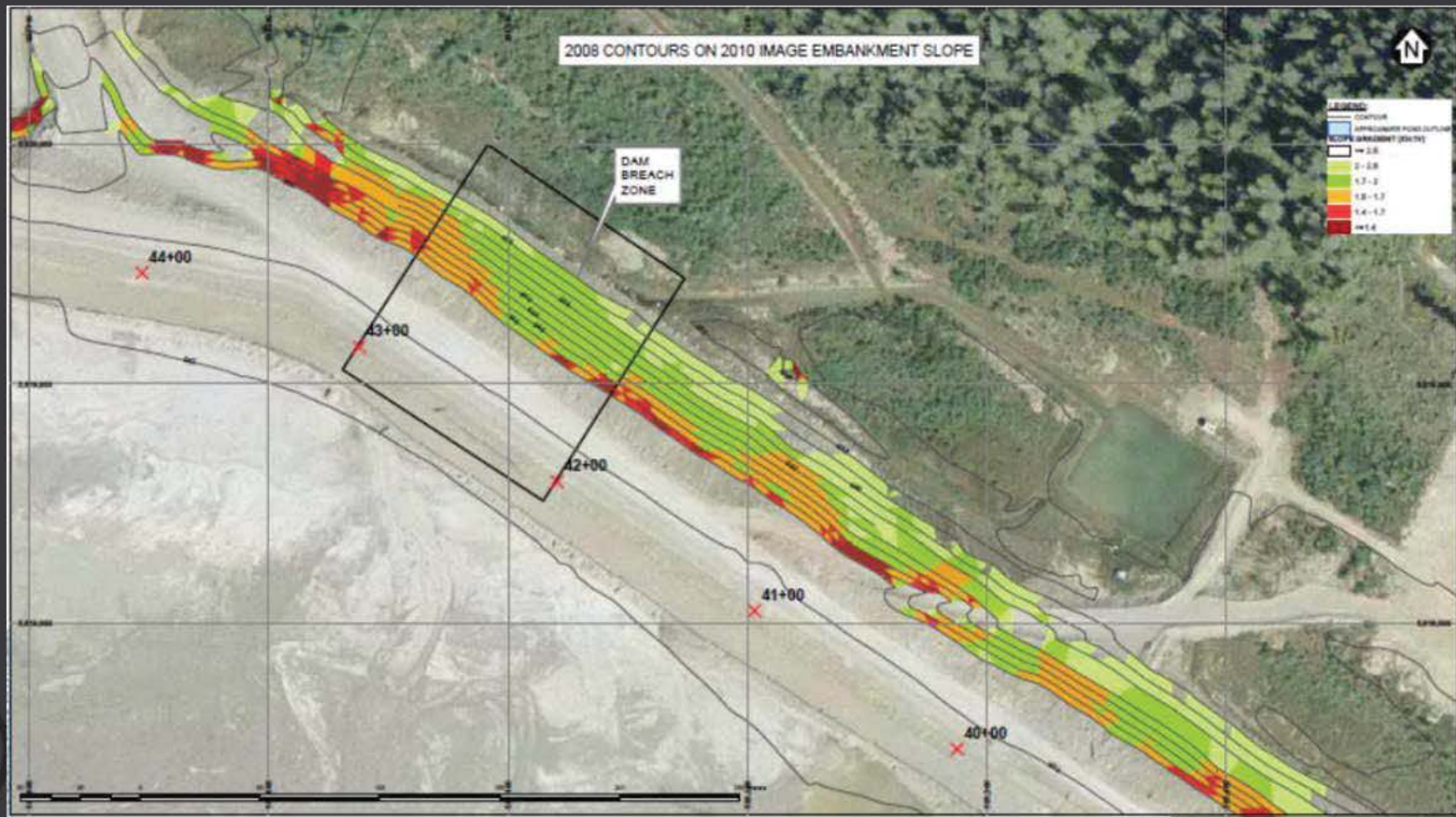
$$\Delta h = 958 \text{ m} - 930 \text{ m} = 28 \text{ m}$$

~52m

Slope ~1.9H:1V



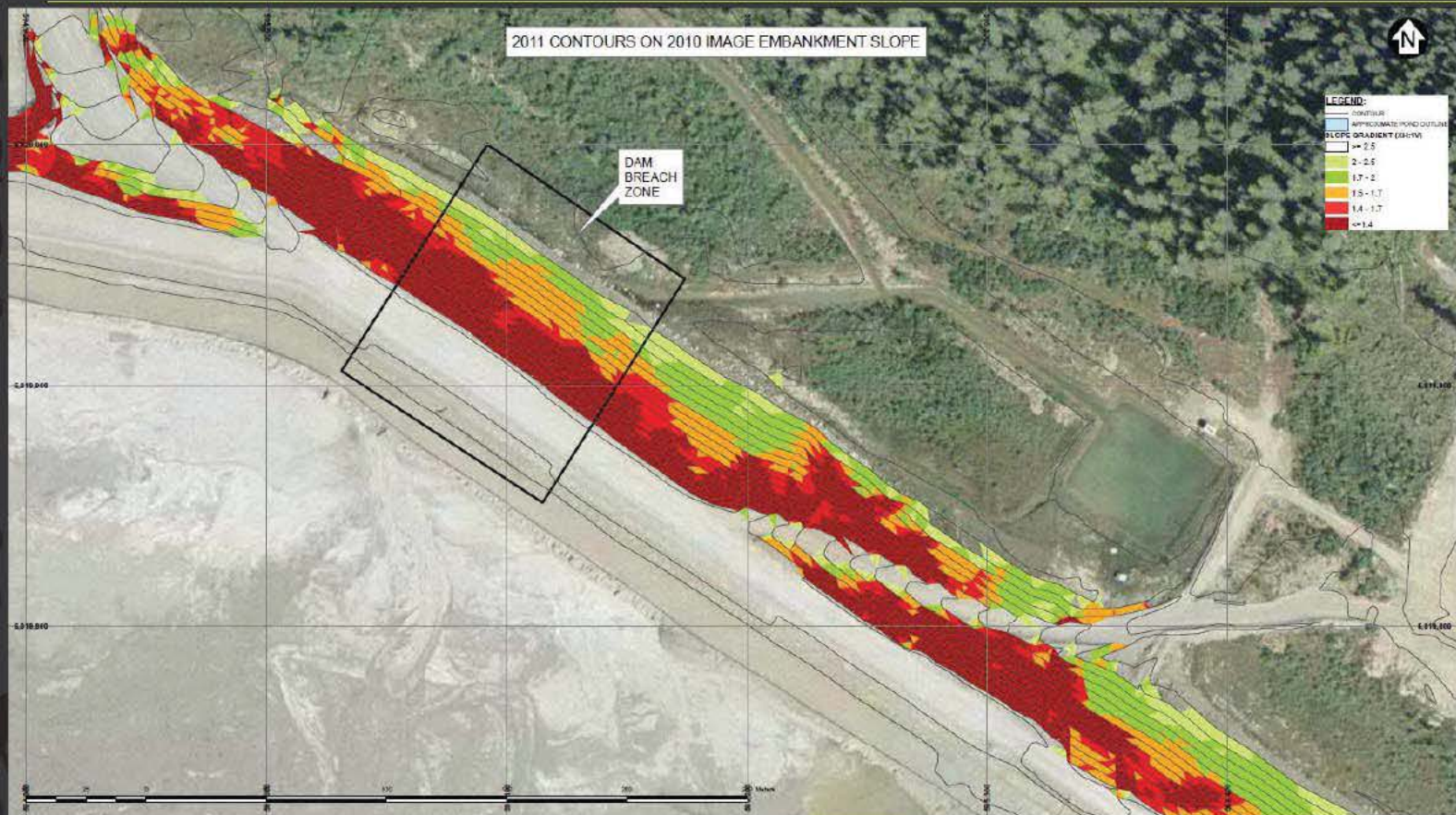
# Breach Area 2008 Slope Angles



- Detailed topography used to develop slope angle plots
- Embankment slopes generally approx. 2H:1V prior to 2011



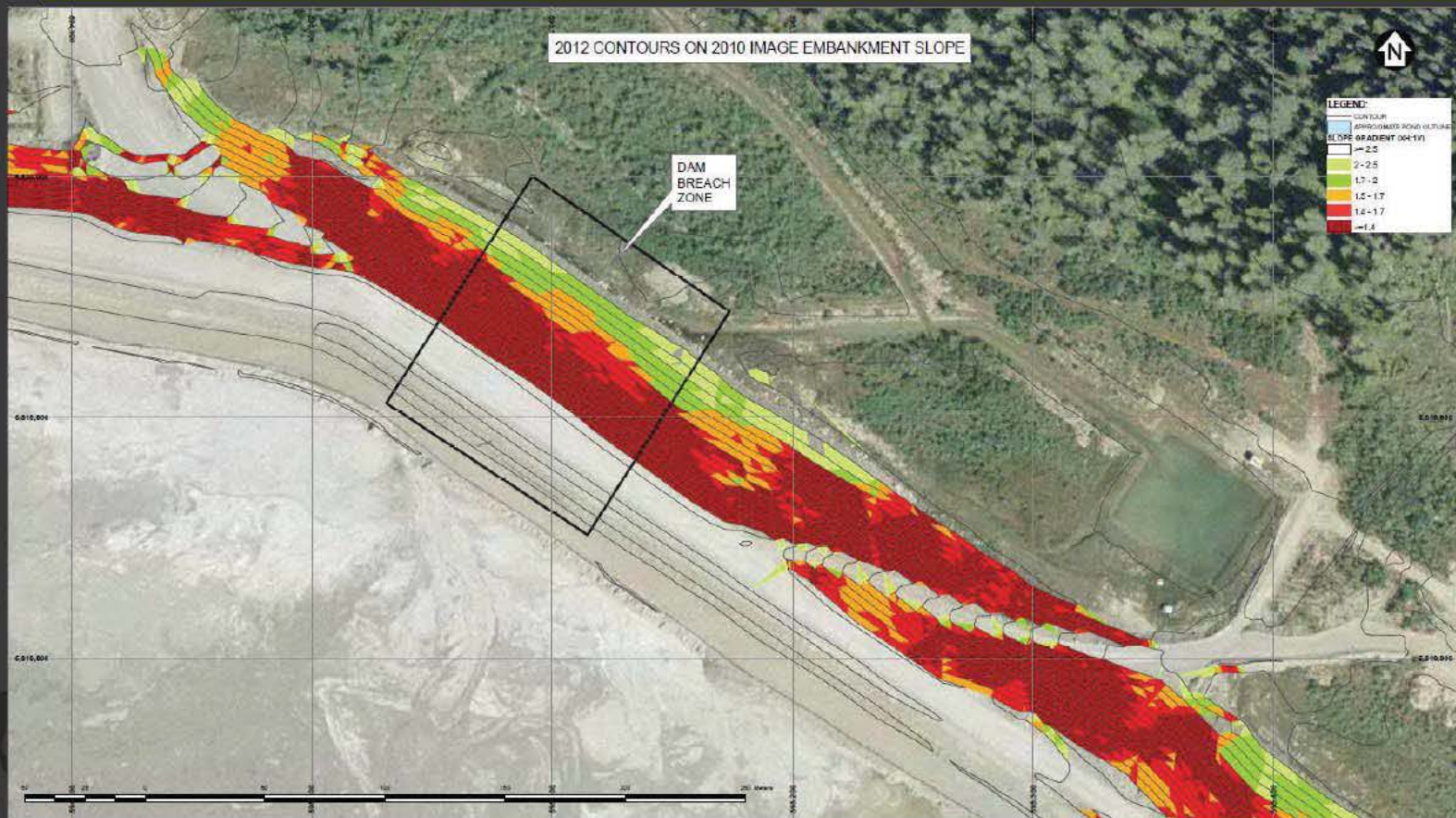
# 2011 Slope Angles



- Angle of repose slopes extended from crest down the slope



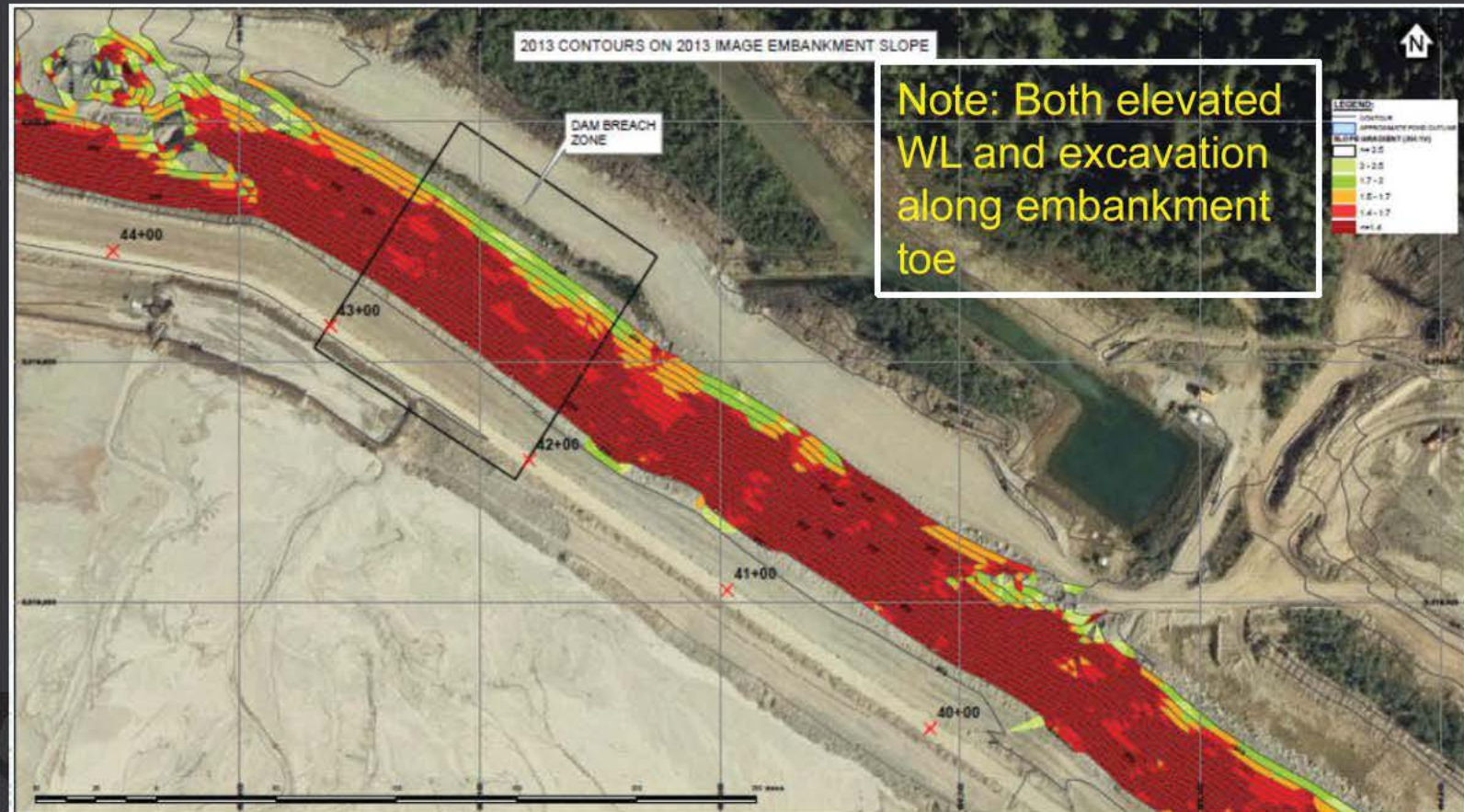
# 2012 Slope Angles



- Angle of repose slopes extended from crest down the slope



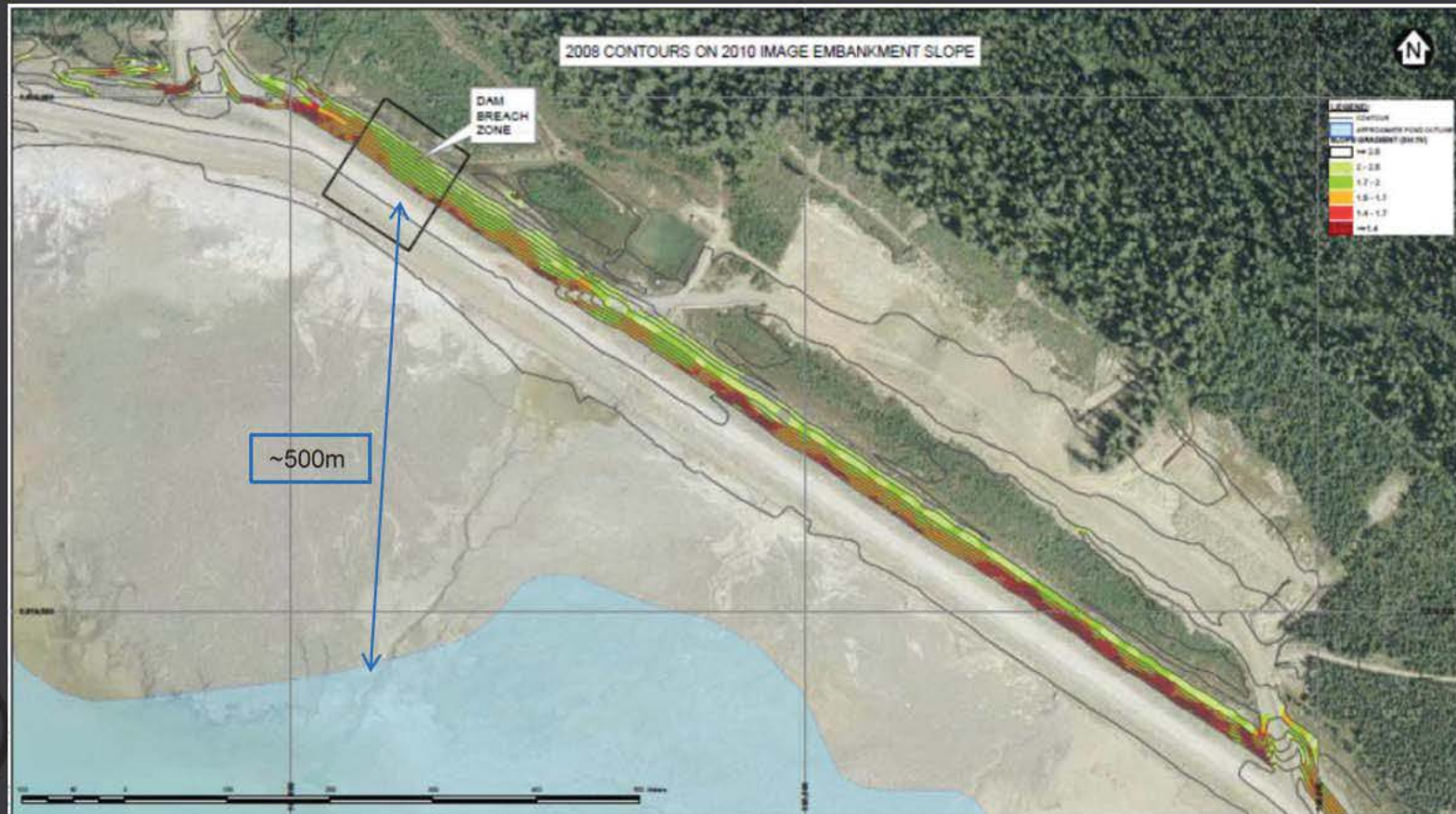
# 2013 Slope Angles



- Embankment slopes generally at angle of repose down entire slope by 2013
- Excavation at downstream toe noted
- Higher water levels at Seepage pond and ditch are evident



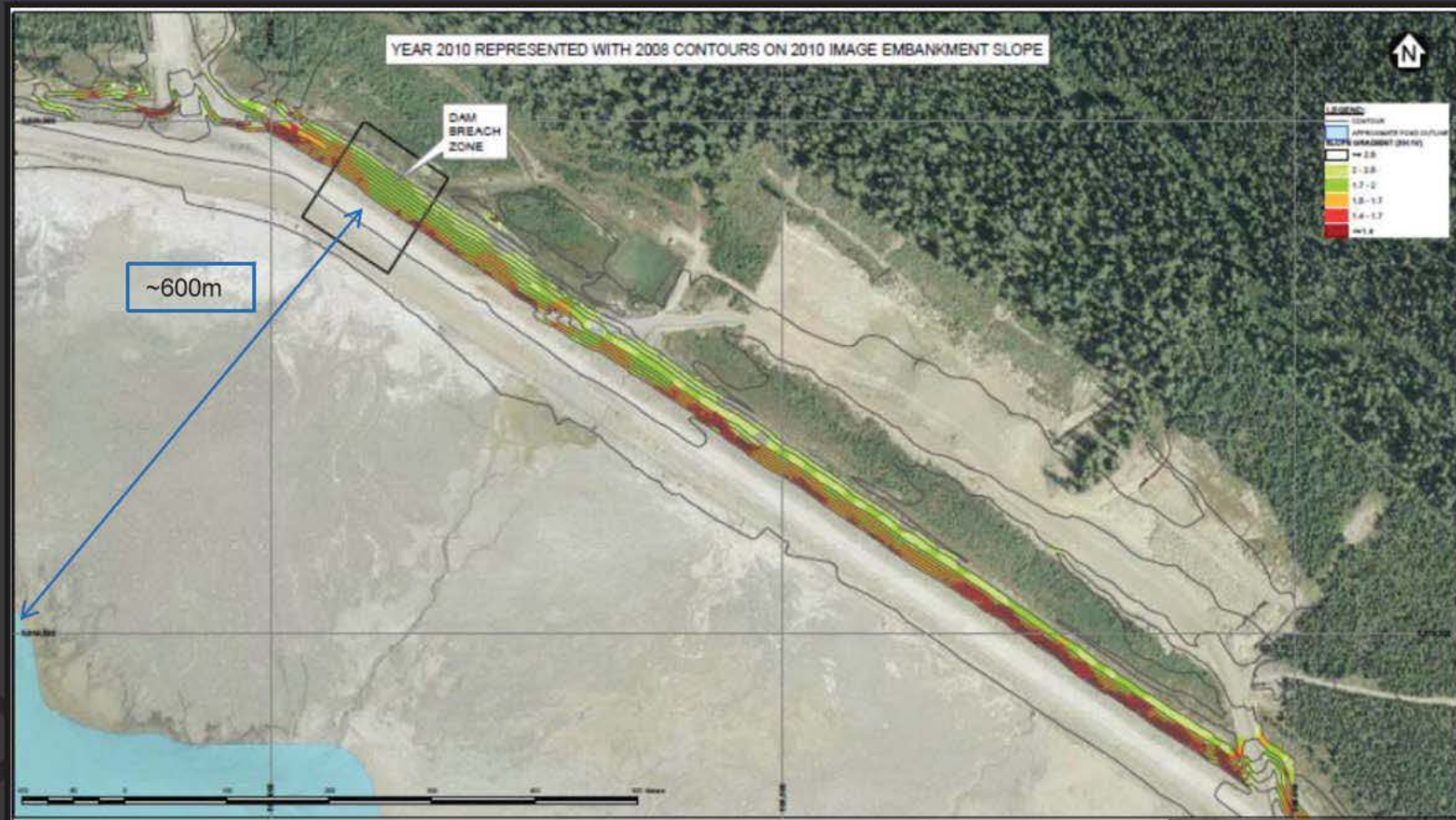
# 2008 Slope Angles



- Steeper slopes evident further to the south (where tension cracking noted in 2010 Annual Inspection Report)
- Extensive tailings beach present along 'dam breach zone'

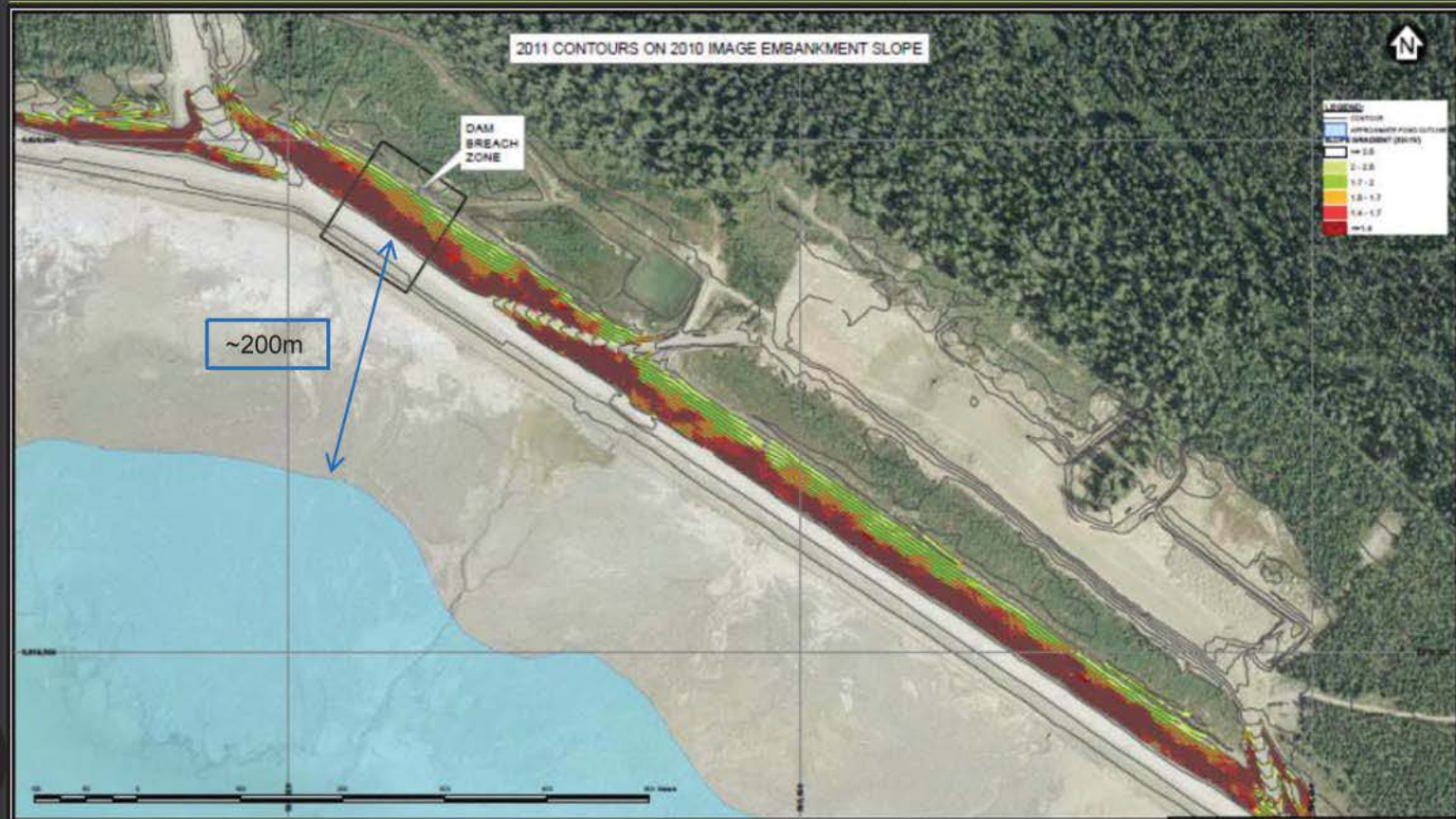


# 2010 Slope Angles



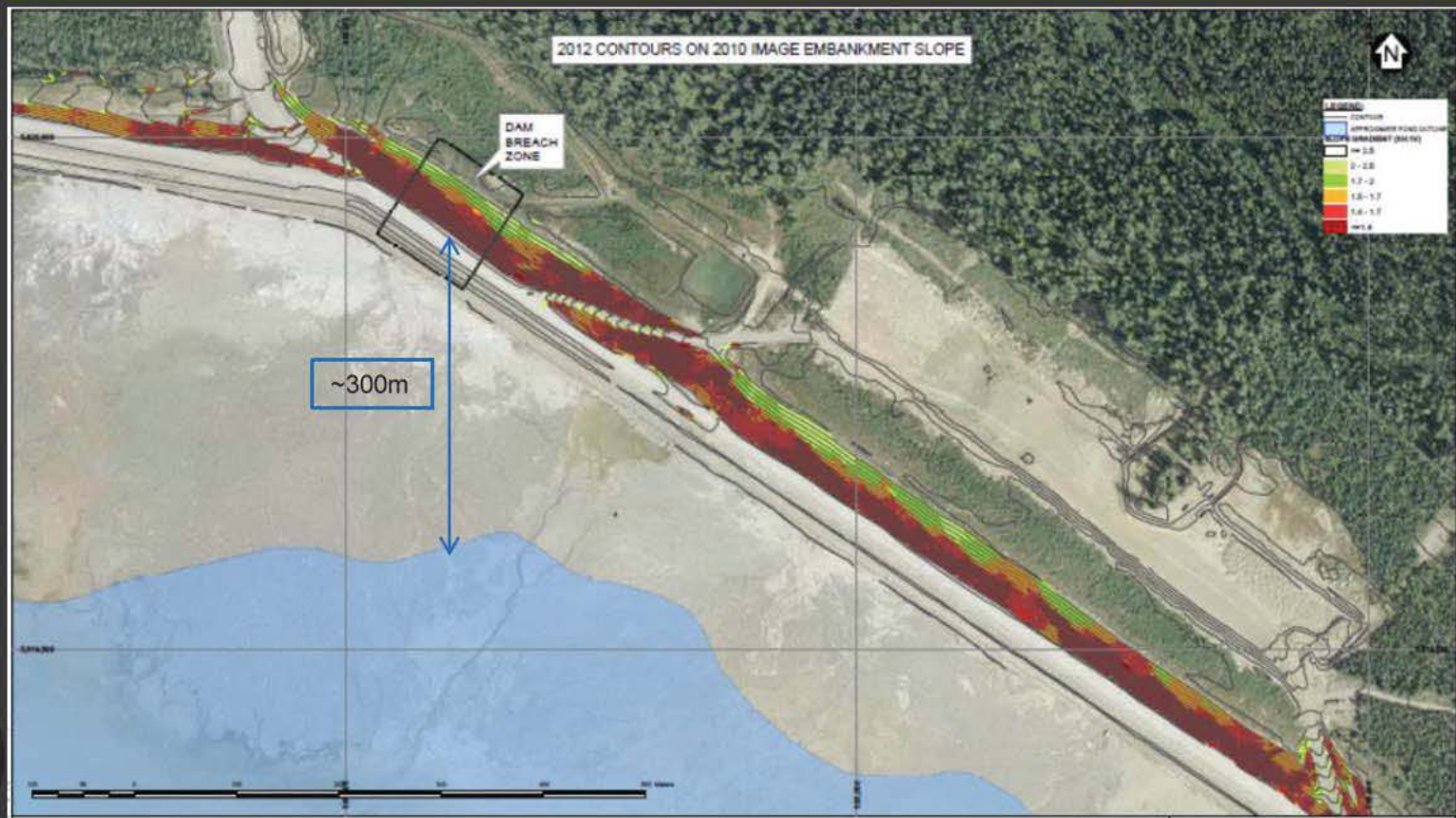
- Extensive tailings beaches present along entire PE
- Represents conditions when KP departed from the project.

# 2011 Slope Angles





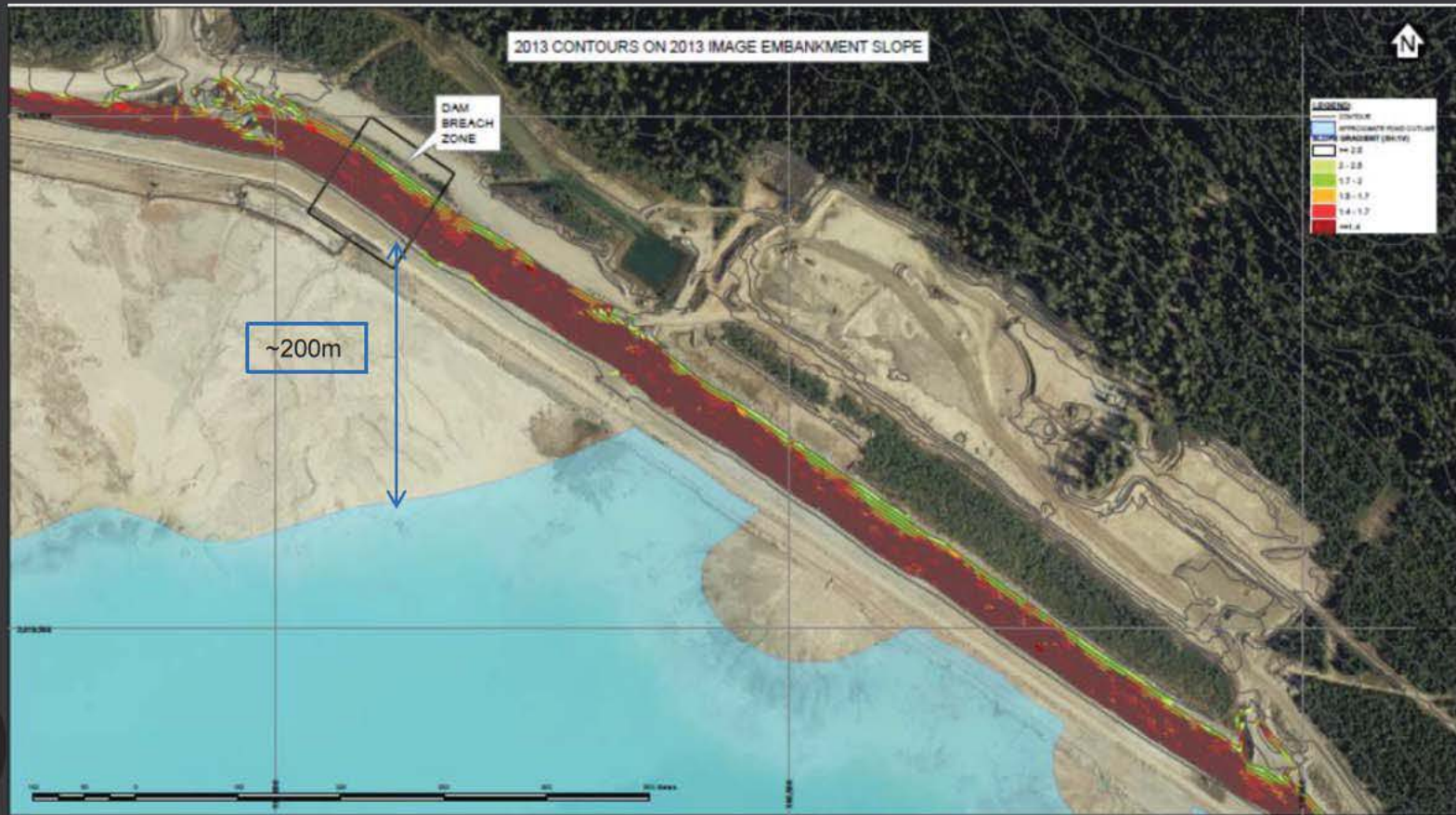
# 2012 Slope Angles



- Steep angle of repose slopes extended further downslope
- Large beaches still present adjacent to 'Dam Breach Zone'



# 2013 Slope Angles



- Steep angle of repose slopes extended further downslope
- Large beaches still present adjacent to 'Dam Breach Zone', but absent at other locations along PE.
- Note that the embankment slump would have been an 'incident' and not a 'Dam Breach failure' up to this point in time.



BREACH  
ZONE

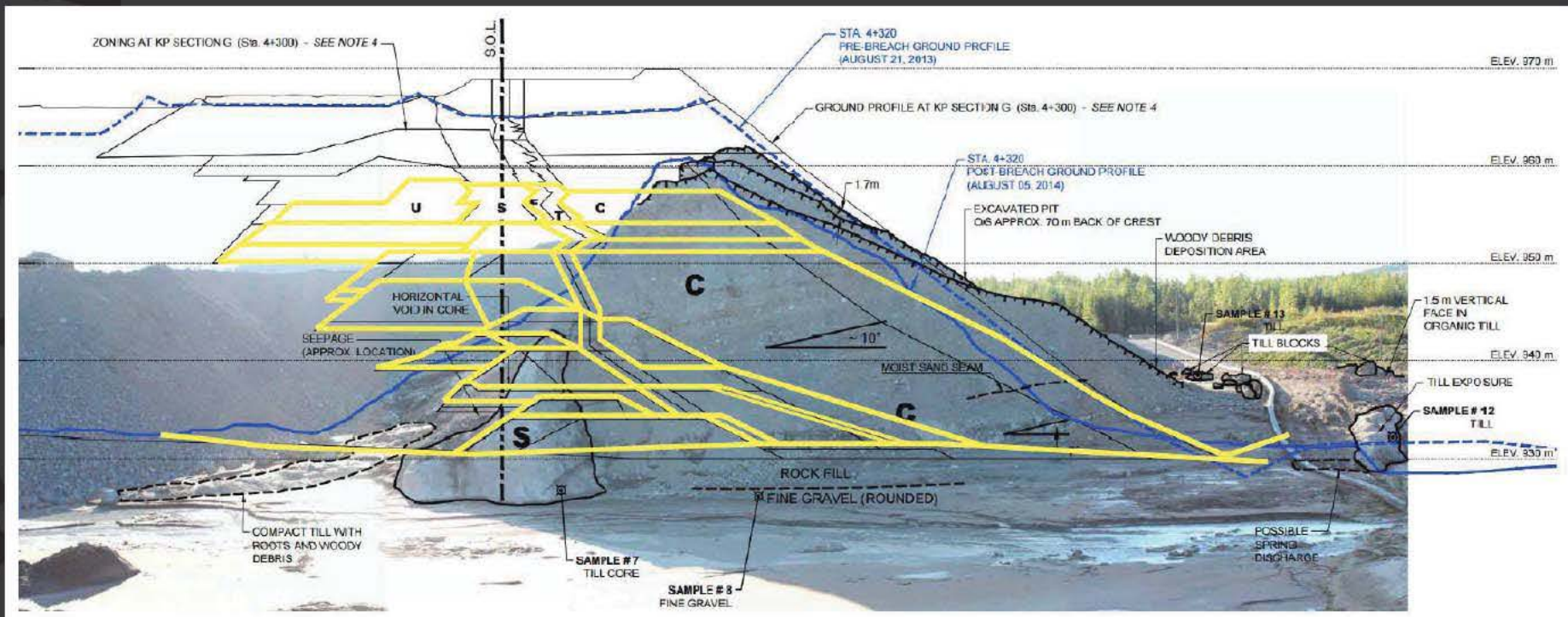
No beach present

- No data available for 2014 slopes - 2013 slopes shown above.
- Pond extends to the dam and along the dam breach zone.
- Pond overtopping the slumped area allowed for erosive breach to develop.



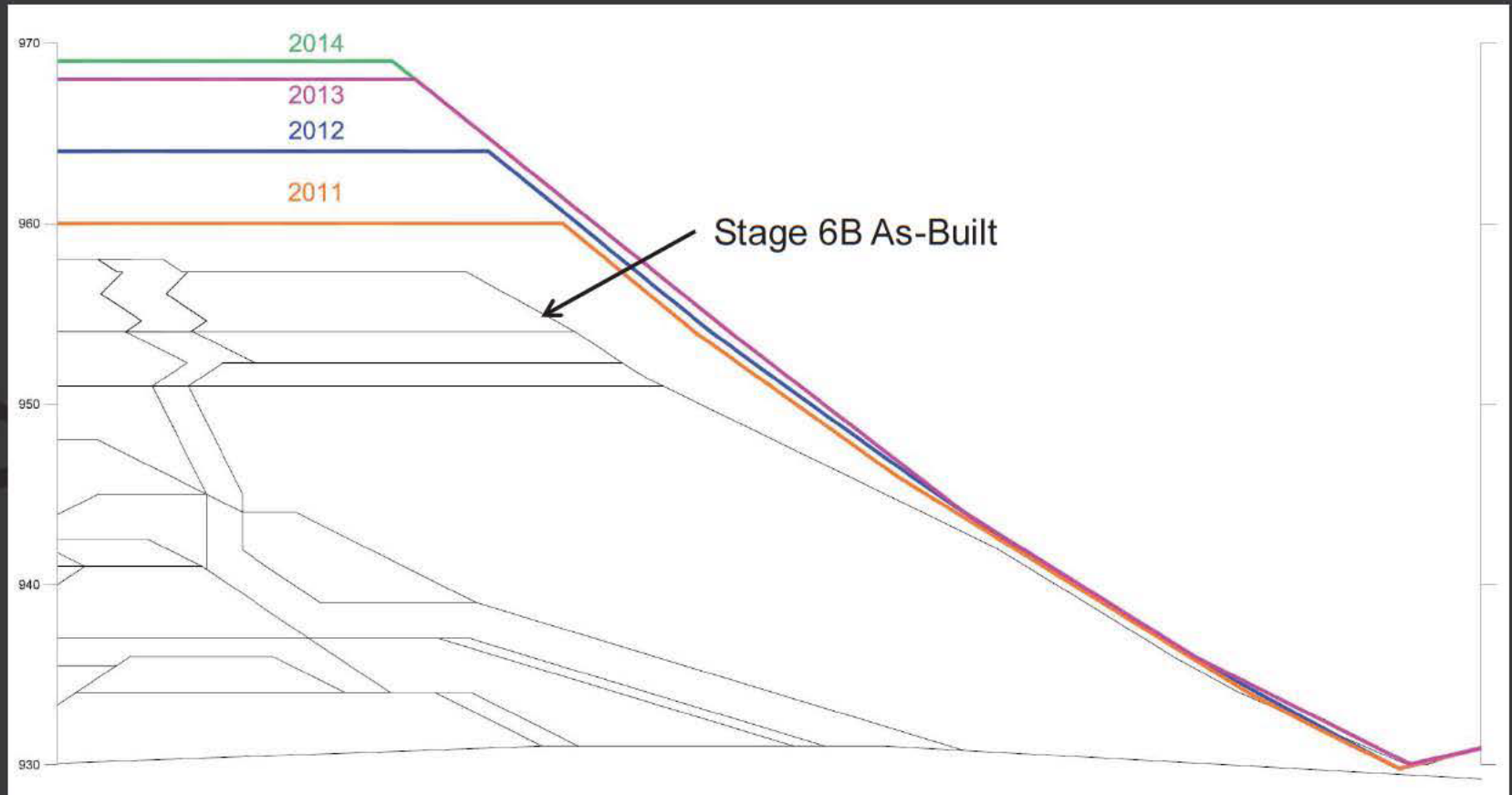
# Panel - Compacted Rockfill Layering

- Left Abutment Field Mapping Notes and Zoning at KP Section (Sta 4+300) (Figure C5) vs. Stage 6B As-Built
- Fill layering confirms flatter Stage 6B geometry rather than angle of repose slope
- Illustrates “bottom up” construction in compacted lifts up to Stage 6B



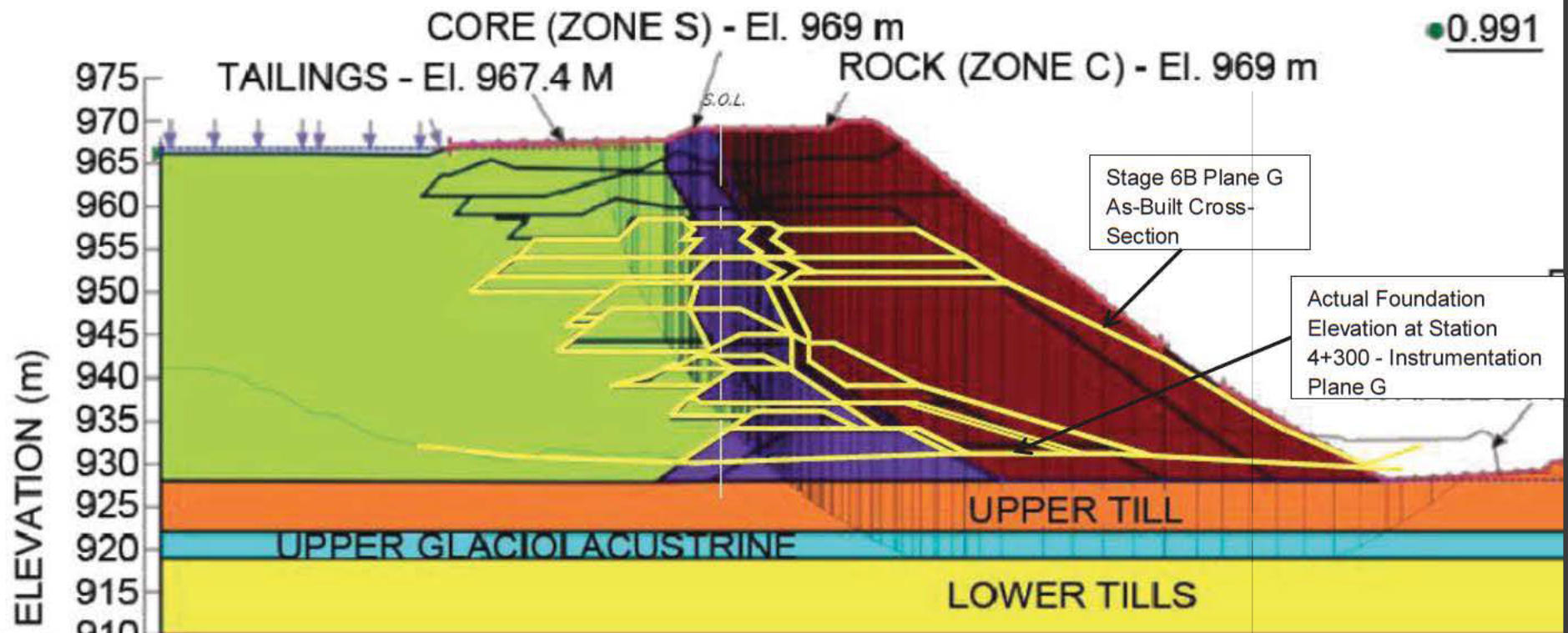
# Top Down End Dump

- Simplified sections generated from the 2011, 2012 and 2013 topography (backup information from the Panel report) and from the Panel's stability analysis (2014)
- Angle of Repose slopes developed using "top down" end dumping after Stage 6 (after 2010)



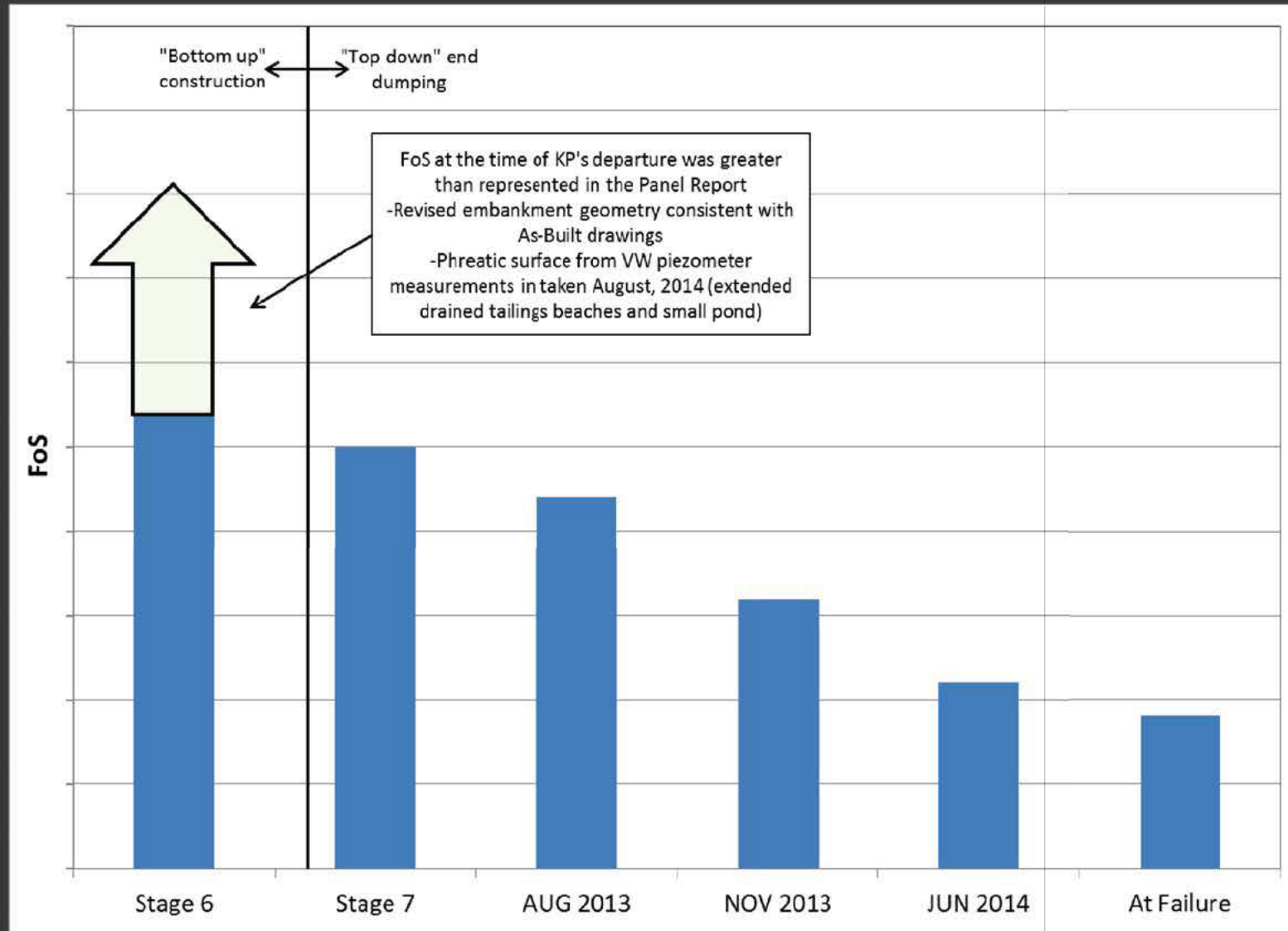


# Panel Stability Section vs Stage 6B As-Built



- Yellow outline shows actual geometry superimposed on Panel geometry
- Internal staging used by Panel is incorrect

# Panel Stability Assessment



# Some Inconsistencies in Panel Report

---

- Stage 6B Perimeter Embankment Geometry at Breach
  - Panel assumed Stage 6B constructed at angle of repose which is inconsistent with as-built drawings and 2010 orthophotos
  - Stage 6B constructed in lifts from the bottom up at ~2H:1V
- Phreatic Surface (Beach Development/Pond Size)
  - Extensive drained tailings beaches and a small pond volume were present in 2010.
- Panel stability analyses underestimated the Factor of Safety for Stage 6B
- Factor of Safety at the Perimeter Embankment met design criteria when KP departed from project

# Other Items

---

- KP made the following additional observations in the supplemental information package provided to MEM (VA15-02287, Mar 27, 2015):
  - The Panel's attempt to extrapolate from a preliminary 2005 tailings embankment concept to develop a predictive stability model was questionable and is not relevant. The Panel's model was incorrectly represented as a KP embankment design.
  - KP maintained a secure web-based data management system for the Mount Polley project. These electronic data are available for the investigating parties.



# Other Items (cont.)

- Page 62 of the Panel report indicated that AMEC conducted certain optimization studies for MPMC while KP was still the EoR. KP was unaware of these communications until reading the Panel report and recognizes that these communications may have contradicted or complicated the communications between KP and MPMC/IMC.
  - The AMEC optimization study documents were publically released by the Panel. KP found that many of the items presented in the optimizations studies contradicted KP's recommendations and advice as follows:
    - Questions requirements for a buttress
    - Indicates the water balance is "fine-tuned to an accuracy that is in the range of centimeters in terms of pond elevation"
    - Indicates the freeboard requirement may be reduced
    - States that beach development is not integral to the design as "there is no real need, subject to continued good piezometric conditions, for a formal subaerial beach during operations"
    - A thinner truncated core zone could be incorporated
    - Adjustments to site supervision and QA/QC requirements

# Closing

---

- KP continues to review the information that was released with the Panel report and will be developing additional comments and opinions.
- KP continues to support the on-going investigations by MEM and the Conservation Officers.
- KP is concerned that some public communications are inaccurate and are potentially damaging to KP's reputation
- KP is currently reviewing and developing a communications strategy.

*Knight Piésold*

# End Presentation to DvZ

---

End of Presentation to Dirk van Zyl

# Knight Piésold Concerns

---

Knight Piésold is active in the mineral industry in British Columbia, Canada, and globally.

The errors in the Panel Report have cast aspersions on Knight Piésold that we are defending throughout the jurisdictions in which we work.

This is primarily because the global mineral industry is very focused on the Mount Polley incident and the Government of British Columbia's response.

It is enhanced through ongoing conference presentations by Panel members.



# Knight Piésold Concerns

---

We further note that:

- MAC committees are relying on input from individuals who may have a conflict of interest
- APEGBC is developing guidelines that ignore key aspects of the Mount Polley breach, with undue focus on only certain aspects of the conclusions in the Panel Report

# What Went Right?

---

So where does Knight Piésold agree with the Panel Report?

1. The foundation included complex glacial layers that impacted stability
2. Slopes of the Perimeter Embankment grew high and very steep
3. The height of the embankment coupled with the steep slope angle resulted in sliding along the GLU in the foundation
4. The very high volume of water stored in the facility eroded the dam and transported tailings to Hazeltine Creek and on to Quesnel Lake

These are the very specific points that we feel should have been the focused conclusion of the Panel.

A more concise and dispassionate statement would also likely have resonated better with the mineral industry.

# Where could we go from here?

---

## Communications:

- It is important to remember at all times that two additional, more extensive investigations are ongoing.
- Language from the Ministry and from the Panel members should indicate this
- In public presentations and with the media, the Minister and Panel Members should specifically state that additional information may be forthcoming that could augment the Panel findings

# Where could we go from here?

---

Any mention of Knight Piésold should be done based on the corrected facts as outlined in this presentation that at the time of Knight Piésold's departure from the project:

- The embankments were stable
- The impoundment had large drained beaches
- The impoundment contained a relatively small volume of water
- Knight Piésold formally transferred the EOR responsibilities in February 2011



# Where could we go from here?

---

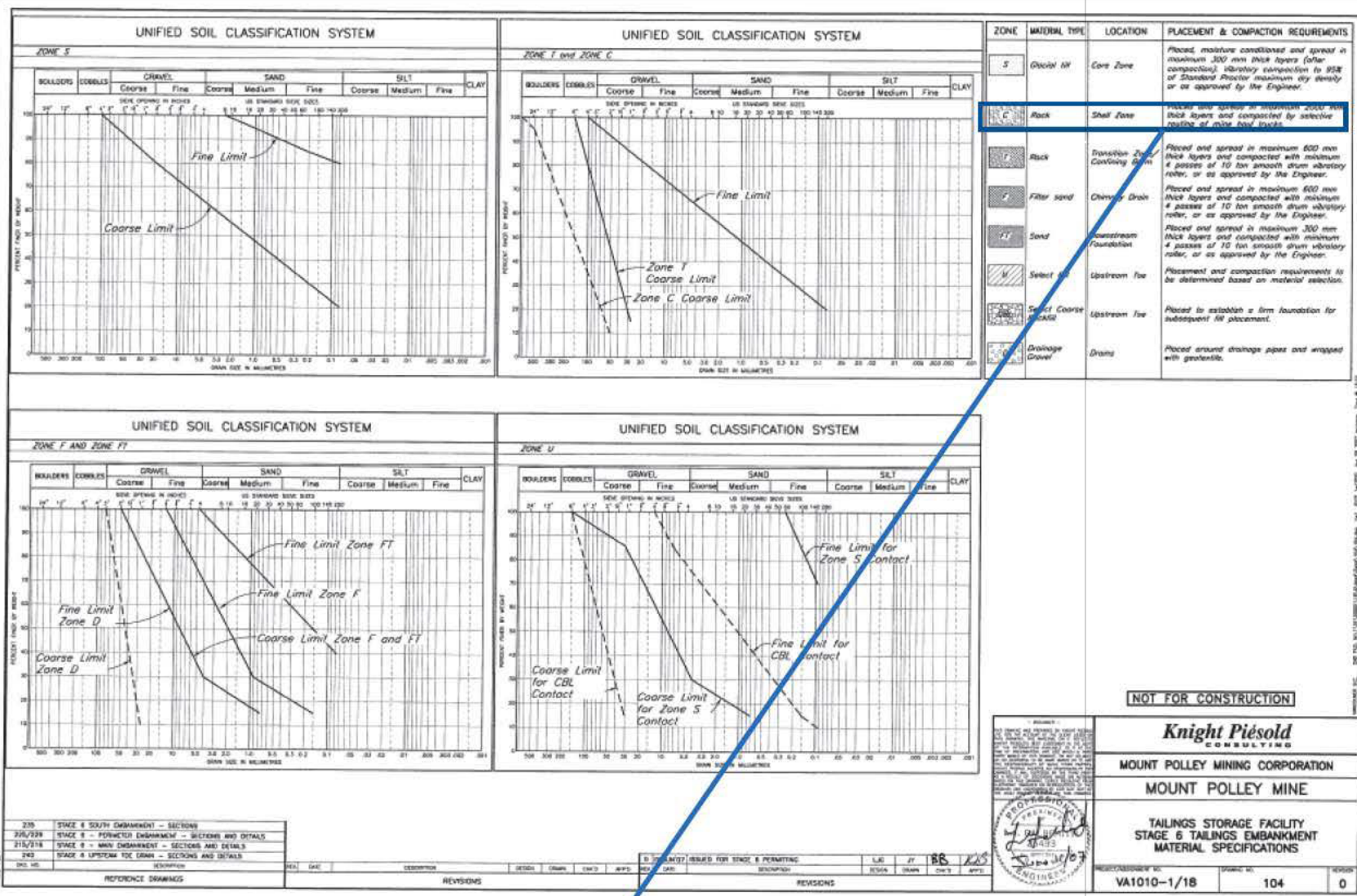
## Corrective Action:

Short of issuing errata to the Panel Report, it is important that the investigation under the Chief Inspector acknowledge discrepancies between the findings in its investigative report (expected in June) and the Panel Report (both conducted under MEM) to ensure that incorrect and unfair aspersions against KP are lifted

## THANK YOU



Stable Tailings Impoundment in 2010



**Rock**

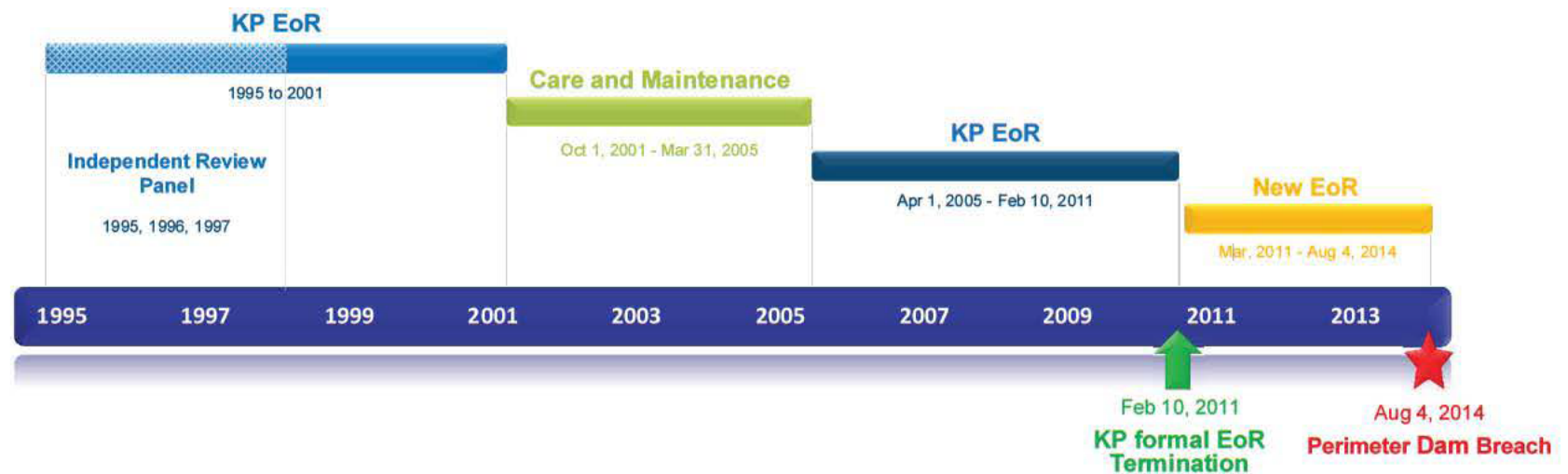
**Shell Zone**

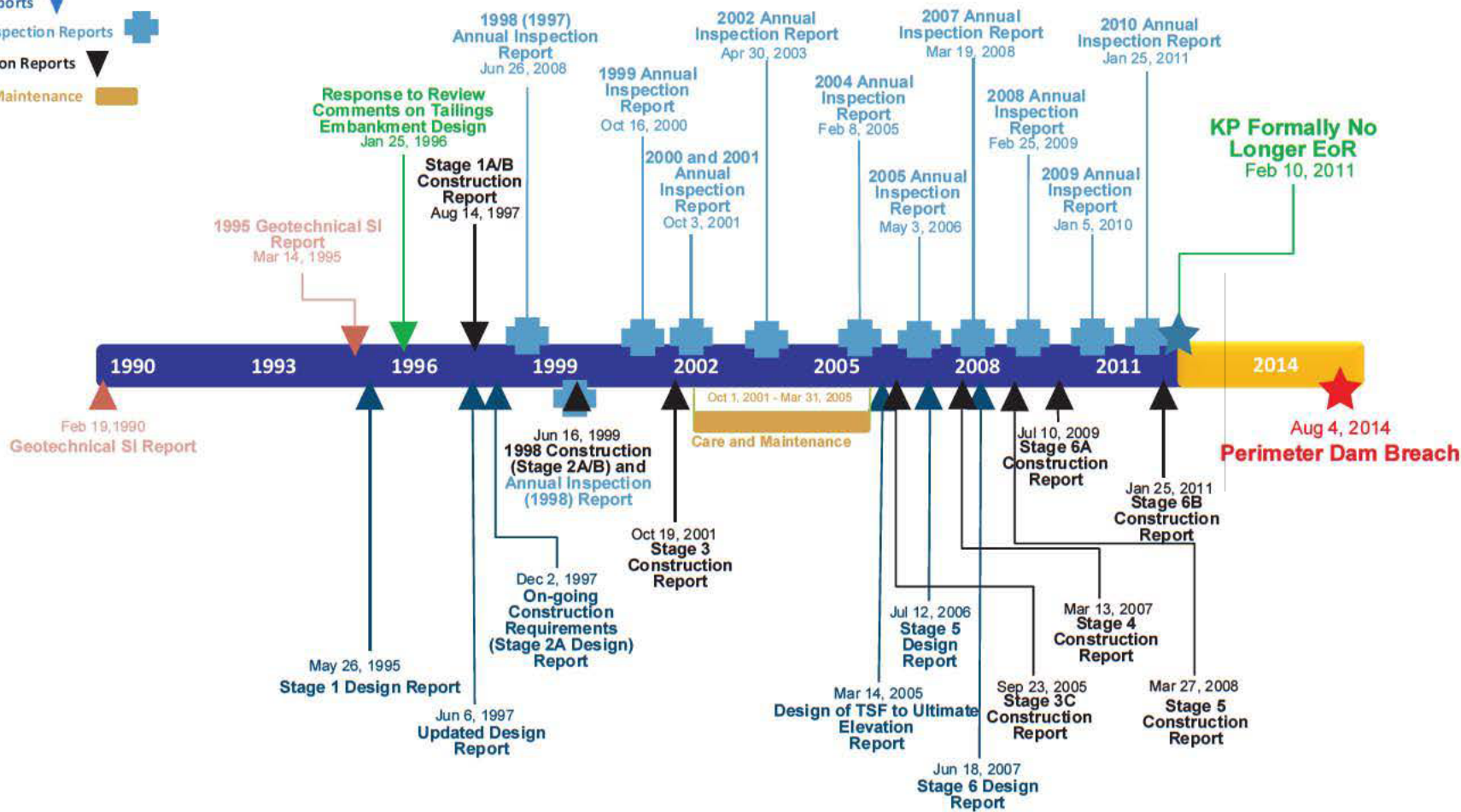
**Placed and spread in maximum 2000 mm thick layers and compacted by selective routing of mine haul trucks.**

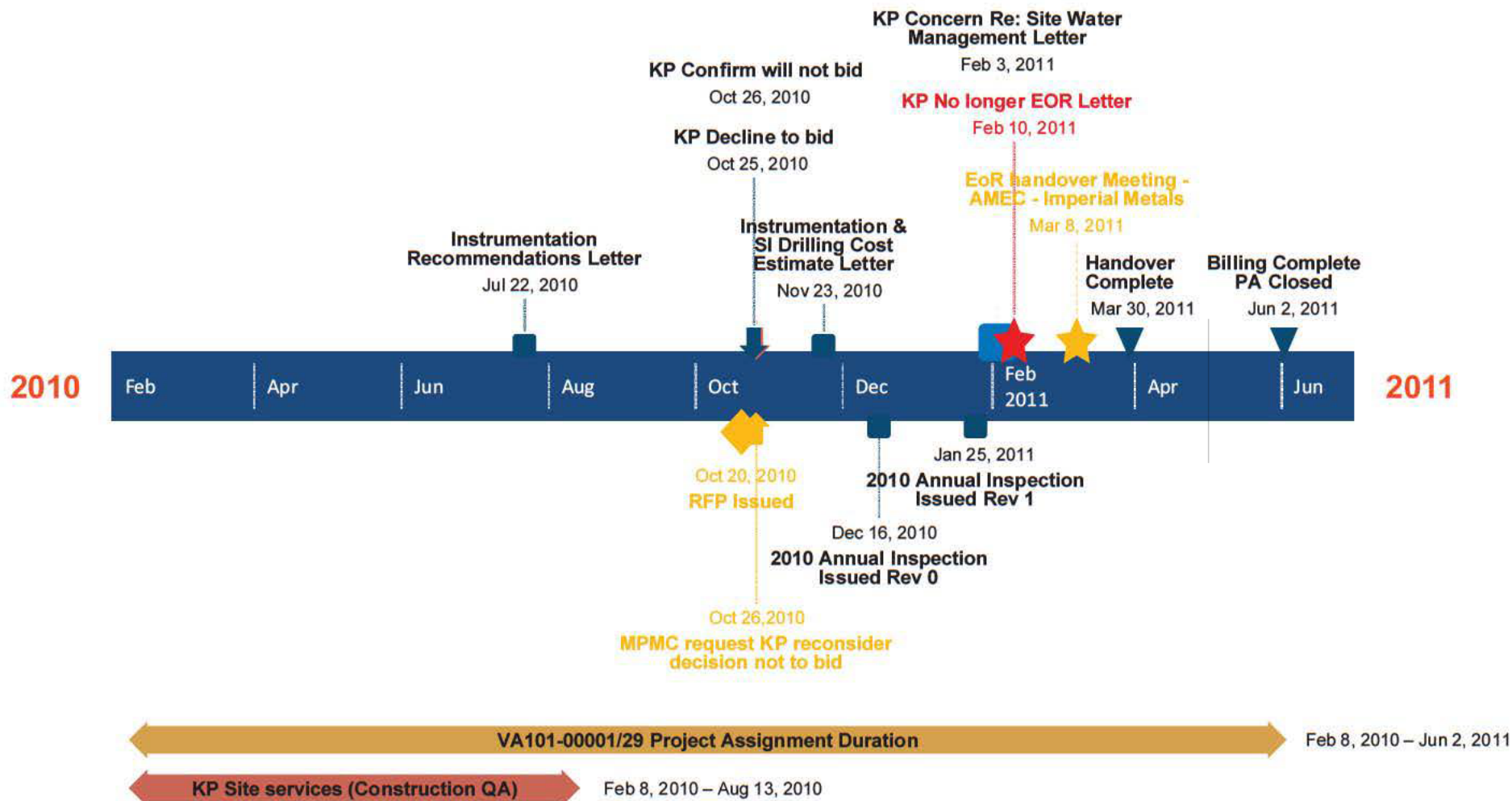
# Mount Polley 2014 Incident Historic KP Involvement Preliminary Timeline



# Mount Polley TSF Timeline – Four Phases







**From:** [Chris Carr](#)  
**To:** ["Luke Moger"](#)  
**Cc:** [Demchuk, Tania MEM:EX](#); [Beattie, Brent C MEM:EX](#)  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review  
**Date:** Tuesday, May 12, 2015 9:43:37 AM  
**Attachments:** [image001.png](#)

---

Hi Luke,

I have successfully downloaded the document.

Regards,

Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: s.22

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** May-12-15 9:28 AM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** 'Chris Carr' s.22  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Tania;

I checked the link and was able to download this morning, but will re-send a copy to yourself and Chris Carr.

Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
**Sent:** May-12-15 8:55 AM  
**To:** Luke Moger  
**Cc:** McConnachie, Jennifer MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry; Chris Carr s.22 Beattie, Brent C MEM:EX  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Luke,



For some reason I am not able to download the file from hightail. Are you able to send the link again?

Also, could you please send a link to Chris Carr as well?

Thank-you,  
Tania

---

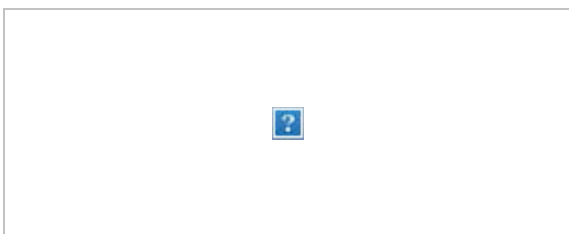
**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Tuesday, May 12, 2015 12:25 AM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** McConnachie, Jennifer MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Tania;

I will be sending an updated draft OMS Manual to you (and those cc'd on this e-mail) via Hightail that addresses comments made by Chris Carr on the last draft submission provided to the MEM (March 27, 2015) and based on our conversation with the MEM (yourself and Jennifer McConnachie) around the MEM comments on the Return to Restricted Operations permit application (see Section 3.2.3) around monitoring requirements. Confirmation of receipt and successful download of this file would be much appreciated.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Chris Carr](#)  
**To:** ["Luke Moger"](#)  
**Cc:** [Demchuk, Tania MEM:EX](#); [Beattie, Brent C MEM:EX](#)  
**Subject:** RE: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Wednesday, May 13, 2015 5:37:14 PM

---

Hi Luke,

I have downloaded the report.

Regards,

Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: s.22

-----Original Message-----

From: Luke Moger [<mailto:lmoger@mountpolley.com>]  
Sent: May-13-15 4:26 PM  
To: Demchuk, Tania MEM:EX  
Cc: 'Chris Carr' ( s.22  
Subject: RE: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Chris;

I will be sending you a copy of the Updated Design Report referenced below via HighTail shortly - confirmation of receipt would be appreciated.

Regards,

Kindest Regards,

Luke Moger, PMP  
Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

-----Original Message-----

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
Sent: May-13-15 6:55 AM  
To: Luke Moger  
Cc: Howe, Diane J MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
Subject: Re: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Luke,

I will try to download this one today and let you know if I am able to. Has this also been sent to Chris Carr? If not, could you please send him the link?

Thank-you!

Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

On May 12, 2015, at 1:54 PM, Luke Moger  
<lmoger@mountpolley.com<<mailto:lmoger@mountpolley.com>>> wrote:

Dear Diane;

An update has been prepared to the Design Report as submitted below based on corrections to some of the water content values of the foundation soils along the Perimeter Embankment.

I will be transferring a copy via Hightail - confirmation of receipt would be much appreciated.

Kindest Regards,

Luke Moger, PMP  
Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: LMoger@MountPolley.com<<mailto:lmoger@mountpolley.com>>

From: Luke Moger  
Sent: April-29-15 4:07 PM  
To: Howe, Diane J EMNG:EX  
(Diane.Howe@gov.bc.ca<<mailto:Diane.Howe@gov.bc.ca>>)  
Cc: Demchuk, Tania EMNG:EX  
(Tania.Demchuk@gov.bc.ca<<mailto:Tania.Demchuk@gov.bc.ca>>);  
rick.adams@gov.bc.ca<<mailto:rick.adams@gov.bc.ca>>; Don Parsons; Dale Reimer;  
Eldridge, Terry  
Subject: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.1 (D) bullet point four (4), as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, an update to the design of the TSF Breach Repair based on information from the additional site investigation has been prepared by Golder for MPMC.

Due to size limitations, the Design Update will be transferred via HighTail

- confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke

<image001.png>

Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: LMoger@MountPolley.com<<mailto:lmoger@mountpolley.com>>



**From:** [Luke Moger](#)  
**To:** [Howe, Diane J MEM:EX](#)  
**Cc:** [Demchuk, Tania MEM:EX](#); [Adams, Rick MEM:EX](#); [Don Parsons](#); [Dale Reimer](#)  
**Subject:** Final EPRP [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Monday, August 10, 2015 4:20:31 PM  
**Attachments:** [image001.png](#)  
[2015 08 08 - MPMC EPRP \[Compressed\].pdf](#)

---

Dear Diane;

Following up on the submission of the draft EPRP as outlined below, MPMC has prepared a final version of the document – please find a copy attached.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Luke Moger  
**Sent:** June-30-15 3:44 PM  
**To:** Howe, Diane J EMNG:EX (Diane.Howe@gov.bc.ca)  
**Cc:** Demchuk, Tania EMNG:EX (Tania.Demchuk@gov.bc.ca); rick.adams@gov.bc.ca; Don Parsons; Dale Reimer  
**Subject:** Draft EPRP [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.3. (D) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a draft version of the Emergency Preparedness and Response Plan (EPRP) for the 2015 Freshet Embankment has been prepared by Mount Polley Mining Corporation based on the draft Dam Breach and Inundation Study completed by Golder as the Engineer of Record.

As per clause C.3.(H), the EPRP was required for testing by June 30, 2015. With the ongoing construction of the Perimeter Embankment Buttressing as part of the TSF Breach Repair, testing was completed on the draft version of the EPRP as attached. As per clause C.5.(F), a summary of the EPRP test will be provided within one (1) month.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



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Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)



# **MOUNT POLLEY MINING CORPORATION**

**MOUNT POLLEY MINE**

**TAILINGS STORAGE FACILITY**

## **EMERGENCY PREPAREDNESS AND RESPONSE PLAN**

# MOUNT POLLEY MINING CORPORATION

## MOUNT POLLEY MINE

### TAILINGS STORAGE FACILITY

## EMERGENCY PREPAREDNESS AND RESPONSE PLAN

---

### UPDATE CONTROL

Rev. No.	Revision (Description)	Date	Approved
A	Final Draft (for EPRP Testing)	June 29, 2015	LM
0	Issued in Final	August 8, 2015	LM/DR

### RECORD OF TESTING

No.	Test (Description)	Date	Approved
1	TSF overtopping during extreme weather event	June 30, 2015	LM/DR

# MOUNT POLLEY MINING CORPORATION

## MOUNT POLLEY MINE

### TAILINGS STORAGE FACILITY

### EMERGENCY PREPAREDNESS AND RESPONSE PLAN

---

[GOLDER FRESHET EMBANKMENT DAM BREACH AND INUNDATION STUDY REF: 1413803-041-R-REV0-2000](#)

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Appendix A – Maps and Figures

Appendix B – Freshet Embankment Dam Breach and Inundation Study (Golder)

Appendix C – Supporting Documentation

## LIST OF FIGURES AND TABLES

### APPENDIX A

Figure 1 – Location Map

Figure 2 – Directions to Mount Polley Mine Site

Figure 3 – Site Plan

Figure 4 – TSF Plan

Figure 5 – Regional Topography and Watersheds

Figure 6 – TSF Inundation Map (Flood Depth)

Figure 7 – TSF Inundation Map (Flood Velocity)

### APPENDIX C

Table 1 – TSF Emergency Levels

Table 2 – Key Contacts

Figure 1 – EPRP Organizational Chart

Table 3 – Responsibility Overview

## LIST OF ABBREVIATIONS

CDA	Canadian Dam Association
EoR	Engineer of Record (Golder)
EPRP	Emergency Preparedness and Response Plan
ERP	Emergency Response Plan
Golder	Golder Associates Ltd.
Imperial	Imperial Metals Corporation
km	kilometres
m	metres
MEM	British Columbia Ministry of Energy and Mines
MoE	British Columbia Ministry of Environment
MPMC	Mount Polley Mining Corporation
OMS	Operation, Maintenance and Surveillance
SERDS	Southeast Rock Dump Site
TSF	Tailings Storage Facility

# MOUNT POLLEY MINING CORPORATION

## MOUNT POLLEY MINE

### TAILINGS STORAGE FACILITY

## EMERGENCY PREPAREDNESS AND RESPONSE PLAN

---

### 1.0 INTRODUCTION

This Emergency Preparedness and Response Plan (EPRP) pertains to the Mount Polley Mine Site Tailings Storage Facility (TSF) and is a definitive plan to establish clear emergency response structure specific to the Mount Polley Mine TSF. This EPRP is a standalone document to the site Mount Polley Mine Site [Emergency Response Plan](#) (ERP) and is referenced in Section 9.0 of the Mount Polley Mine Site [Operation, Maintenance and Surveillance](#) (OMS) Manual.

Based on the [M-200 Permit](#) amendment, entitled, “Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Freshet”, executed for the British Columbia Ministry of Energy and Mines (MEM) Chief Inspector of Mines, Al Hoffman, P.Eng, on December 17, 2014, the following regulatory conditions exist in regards to the operation of the TSF:

*An Emergency Preparedness and Response Plan (EPRP), incorporating the results of a dam breach analysis and inundation study, shall be prepared and submitted to the Chief Inspector prior to completion of TSF Breach Repair Construction.*

This EPRP is activated when a project-related emergency, accident or malfunction specifically related to the TSF occurs, or if such an incident is foreseeable. This EPRP describes the facility, emergency identification and evaluation, emergency response, responsible personnel and contact information, document management and certification and distribution.

## **2.0 FACILITY INFORMATION**

This section provides an overview of the Mount Polley Mine Site, including information on ownership, access to the Mount Polley Mine Site and TSF, a description of the TSF and an overview of the land surface drainage.

### **2.1 Ownership**

The Mount Polley Mine Site is 100% owned and operated by Mount Polley Mining Corporation (MPMC), a wholly owned subsidiary of Imperial Metals Corporation (Imperial), owner of Mount Polley Mine and property. Imperial is a Canadian mining company, with its corporate head office in Vancouver, British Columbia.

### **2.2 Access to Site and TSF**

The Mount Polley Mine is an open pit copper/gold mine located in central British Columbia, 56 kilometres (km) northeast of Williams Lake (latitude 52° 33' N and longitude 121° 38' W). A property location map is included as Figure 1 in Appendix A. Directions to the Mount Polley Mine Site from Williams Lake are provided as Figure 2 in Appendix A.

Public access to areas south of the Mount Polley Mine Site is also possible via the Gavin Lake Road and the Mitchell Bay Road (Horsefly-Likely Forest Service Road). Access to the Mount Polley Mine Site from these public access areas is controlled.

Access to the Mount Polley Mine Site TSF is via rock and gravel site access roads; a current site aerial is included as Figure 3 in Appendix A, exhibiting the mill and crusher sites, the TSF, open pit locations (Springer and Cariboo), underground mine location (Wight Pit), and active (SERDS, Temporary West PAG Stockpile) and historic (Boundary, North Bell, Highway to Heaven, NEZ) dumps. Lakes (Polley and Bootjack) and major road infrastructure (Site Access, West Haul, Tailings Access) are also identified for reference.

### **2.3 TSF Description**

The TSF is comprised of one (1) overall embankment that is approximately 4.3km long. The embankment, based upon original separate embankments, is subdivided into three (3) sections – referred to as the Main Embankment, Perimeter Embankment and South Embankment. Heights vary along the embankment and are approximately 58 metres (m), 40m, and 32m respectively (based upon the Main, Perimeter and South nomenclature). Crest elevations of the embankment are between 966m and 970m (the exception being in the area of the breach, which has a crest elevation of 950m at the breach repair).

On August 4, 2014, a breach of the Perimeter Embankment occurred near station 4+300, releasing tailings, embankment material, and water. The width of the breach was about 100m and overall damage occurred to about 400m of the Perimeter Embankment. The 2015 Freshet Embankment has been constructed at the Perimeter Embankment breach to an elevation of 950m. Figure 4 in Appendix A depicts the TSF.

## 2.4 Land Surface Drainage

Mount Polley Mine is located near the eastern edge of the Fraser Plateau physiographic sub-division, which is characterized by rolling topography and moderate relief. The Mine Site is situated along a topographic height of land known as the Mount Polley Ridge which has a maximum elevation of 1266m at the summit of Mount Polley, and runs northeast to southwest between Polley Lake and Bootjack Lake. The drainage system is clustered within the bend of the Quesnel River, west of Quesnel Lake. Drainage within this system is characterized by the saddle between the Bootjack Mountain and Polley Mountain peaks, which divides the drainage flow into two (2) generally opposite directions. Approximately 60% of the drainage travels into the Morehead Lake watershed that empties into the Quesnel River about 20km downstream of Likely. The remainder, including the TSF, drains to the southeast, and enters Quesnel Lake, via Hazeltine Creek, about 13km upstream of its outlet. Figure 5 in Appendix A provides an overview of regional topography and watersheds.



### 3.0 EMERGENCY IDENTIFICATION AND EVALUATION

The TSF has been designed and is operated to meet current standards, and has been designated a Significant consequence rating as per the 2013 Canadian Dam Association (CDA) Safety Guidelines (dam classification remaining unchanged in the 2014 technical bulletin, *Application of Dam Safety Guidelines to Mining Dams* published since). The Significant consequence classification is based on loss of life and environmental and cultural values; the Mount Polley Mine Site TSF is ranked Low based on infrastructure and economics.

This section provides information on a TSF breach and inundation, the inundation areas and the potential effects of inundation.

#### 3.1 TSF Breach and Inundation

A [Dam Breach and Inundation Study](#) was completed by Golder Associates Ltd. (Golder), Engineer of Record (EoR) for the Mount Polley Mine Site TSF, based on the TSF as existing at the completion of the 2015 Freshet Embankment construction. A copy of this study is included as Appendix B. The [Dam Breach and Inundation Study](#) identified the most likely location of the failure being at the Freshet Embankment, and a hypothetical overtopping failure scenario.

The overtopping scenario assumes that the available flood storage in the TSF (1-in-200-year wet freshet volume) is consumed to the design elevation of 950m, and is based on the *rainy-day* or *flood-induced* failure (upper bounds of possible inundation extents, water depths and water velocities as compared with alternative failure mechanisms). It is; therefore, highly improbable that such an event would occur without observation of accumulation of water in the TSF over an extended period, and even then, only over extreme seasonal hydrological events combining storms and snowmelt.

#### 3.2 Inundation Areas

Areas affected by inundation are as included as Figure 4 (based on flood depth) and Figure 5 (based on flood velocity) of the [Dam Breach and Inundation Study](#), and are included again for reference as Figure 6 and Figure 7, respectively, in Appendix A. As shown in these figures, in the unlikely event of an overtopping failure of the TSF, water would travel down gradient along the path of the previous tailings breach (i.e., down Hazeltine Creek and to Quesnel Lake). If the areas as indicated in these figures were to be inundated, the areas that would be affected would be:

- the Polley Lake Plug
- Hazeltine Creek
- Quesnel Lake Beach at Hazeltine Creek

From the [Dam Breach and Inundation Study](#), a potential failure of the Freshet Embankment could result in the following:

- *a maximum average flood depth of 4m;*
- *a maximum average velocity of 5m/s; and,*
- *travel times for the initial flood wave to reach the Gavin Lake Road and Mitchell Bay Road crossings and Quesnel Lake are estimated to be 35, 56, and 60 minutes respectively.*

### 3.3 Potential Effects of Inundation

Given that access to the inundation areas is controlled at this time, the failure would most likely only present risk for MPMC personnel, contractors and consultants working in the rehabilitation and reclamation in such areas. Risk for infrastructure loss would be low.

In such cases, mitigation of downstream risks by suspension of work in the inundation areas, additional security along access points to control access to potential inundation areas, and advance warning of activation of emergency response procedures would likely have occurred.

As stated above, the flood event as modelled is based on a condition in which the Freshet Embankment is operating at the 950m elevation; against the current operational objective of maintaining water level at a level as low as practicable. With the 950m elevation providing storage capacity for a 1-in-200-year wet freshet volume, filling to such an elevation would most likely be an operational emergency decision to prevent uncontrolled release of site contact water, in which case, transfer of water to the TSF would be ceased if possible, and work in inundation areas would have been suspended and access controlled in advance of such an emergency condition occurring.

This EPRP serves to establish clear emergency response structure specific to the Mount Polley Mine Site TSF. MPMC plans for, and responds to, emergency situations with the potential to cause significant harm to people, the environment and cultural values, and infrastructure and economics. In planning for emergencies, MPMC has developed a list of emergency situations and works cooperatively to mitigate risk and provide adequate response capabilities in the case of an incident.

This EPRP details the conditions or events that indicate existing or potential emergencies, provides a means of identifying an existing or potential emergency, outlines procedures for assessing the severity and magnitude of an existing or potential emergency, and designates the person(s) responsible for identifying and evaluating the emergency and activating the emergency response.

## **4.0 EMERGENCY RESPONSE**

This section provides details on emergency warning signs, emergency situations, incident notification procedures, actions to arrest or retard external erosion, and actions to mitigate downstream consequence.

The EPRP will enable MPMC to identify emergency and hazardous conditions threatening the TSF, expedite effective response actions to prevent failure, and reduce loss of life and property damage should failure occur. The EPRP provides TSF-specific guidance to complement the Mount Polley Mine Site [ERP](#).

In the event that MPMC is unable to comply with any of the terms and conditions of the [M-200 Permit](#) regarding the TSF, due to any cause, MPMC will:

1. Immediately notify the MEM of the failure to comply;
2. Immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the non-compliance, correct the problem, and if applicable, repeat sampling and analysis of any non-compliance immediately; and,
3. Submit a detailed written report to the MEM within thirty (30) days (five (5) days for upsets and bypasses), unless requested earlier by the MEM. The report will contain a description of the non-compliance, including dates and times, if the non-compliance has not been corrected, the anticipated time it is expected to continue, and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the non-compliance.

### **4.1 Warning Signs**

Three (3) levels of emergency conditions (or warning signs) can be identified with respect to the site operations. These are defined as follows:

#### *4.1.1 Level 1*

Unusual conditions that do not yet represent a potential emergency, but do require prompt investigation and resolution.

#### *4.1.2 Level 2*

Conditions that represent a potential emergency, if sustained or allowed to progress, but no emergency situation is imminent.

#### *4.1.3 Level 3*

An emergency defined by either failure of a significant component of the TSF and/or associated facility or a significant failure of the performance of a component of the TSF. Such failure may have already occurred, or be imminent.

### **4.2 Situations**

Typical situations that would be classified under the three (3) levels of emergency conditions (Level 1, 2 or 3) and the actions to be taken are outlined in [Emergency Levels](#) (included as Table 1 in Appendix C) and described below:

#### *4.2.1 Level 1 Situation*

The action in the event of a Level 1 Emergency Condition will typically involve an investigation, intensified monitoring, inspecting and/or testing, and defining and implementing possible corrective measures.

Construction equipment will be available at the mine and include, but not be limited to: excavator(s), grader(s), haul truck(s) and bulldozer(s). Material will be available both at the TSF and at the Mine for use in repairing or remediation of any damaged areas.

#### *4.2.2 Level 2 Situation*

The first action in the event of a Level 2 Emergency Condition is to discuss and define an action plan, at the site, under the direction of the Tailings Project Manager. After such a plan is prepared, it must be presented to the Mine General Manager for approval. Construction equipment should be made available, if required, at short notice.

#### *4.2.3 Level 3 Situation*

The first actions in the event of any Level 3 Emergency Condition are:

- Check that all persons who could possibly be affected are safe; and
- Initiate the appropriate chain of communications.

The person who initiated the communication should then stand by at a safe location near the problem area and await further instructions or decisions. All those involved in emergency response, after first having communicated with the appropriate parties, should consider two (2) types of actions as first steps in the emergency response, with respect to the protection of human life and health, environment and property:

- What can be done to prevent the situation from worsening?

- What can be done to reduce the consequences of the impending or actual failure?

Any such action must be presented to the Tailings Project Manager, who will decide on its implementation in consultation with the Mine General Manager, the EoR, and the MEM.

#### 4.3 Incident Notification Procedures

The following incident notification procedures are to be followed for all emergency conditions.

##### *4.3.1 Level 1 and Level 2*

The notification procedures are as follows:

- The person first noticing a Level 1 or Level 2 Emergency Condition shall notify the Tailings Project Manager and initiate corrective actions and intensified monitoring.
- The Tailings Project Manager shall notify the Mine General Manager and the EoR as appropriate.

##### *4.3.2 Level 3*

The notification procedure for a Level 3 Emergency Condition is as follows:

- The person noticing a Level 3 Emergency Condition shall notify the Tailings Project Manager and the Mine General Manager, and initiate corrective actions and/or intensified monitoring, as appropriate.
- The Mine General Manager shall notify the Corporate (Vancouver) office, MPMC Environmental Superintendent, the EoR, and the MEM.

In the event of an emergency situation that will result in an actual or potentially imminent dam failure, or unplanned release of water to the environment, the Mine General Manager shall also notify the Ministry of Environment (MoE), and Emergency Management BC.

Names and telephone numbers for the key contacts are in Table 2 of Appendix C.

#### 4.4 Actions to Arrest or Retard External Erosion

As the dam freeboard decreases during a major hydrological event, an emergency spillway should be constructed across the crest of the Freshet Embankment to control overtopping.



#### 4.5 Actions to Mitigate Downstream Consequence

As soon as a dangerous situation is perceived to be developing, MPMC personnel, or contractors or consultants working downstream, should be evacuated from the inundation area and downstream residents should be notified and alerted to the fact that MPMC has an unusual situation occurring related to its TSF.

If conditions deteriorate, depending on the situation and water level in the TSF, access along the Mitchell Bay Road (Horsefly-Likely Forest Service Road) on either side of Hazeltine Creek is to be secured by MPMC, and downstream residents should be alerted not to access Quesnel Lake at the mouth of Hazeltine Creek. In the unlikely event that the flood storage available in the pond is being used up, while the storm is not abating and the condition of the dam is deteriorating, the conditions may warrant the notification of imminent threat of dam breach.

If a dam break does occur, it will take approximately 35 minutes for the flood to reach the Gavin Lake Road crossing at Hazeltine Creek; 56 minutes to reach the Mitchell Bay Road crossing at Hazeltine Creek and 60 minutes to reach Quesnel Lake.

By providing effective communications with agencies and residents in the downstream affected communities, the impact to the downstream area can be kept to a minimum.

## **5.0 RESPONSIBLE PERSONNEL AND CONTACT INFORMATION**

The management structure consists of both internal (to MPMC) and external individuals. Direct reports (and associated structures) to the respective individuals still follow normal site-wide and external reporting relationships for application of the EPRP. External individuals are co-ordinated through the Tailings Project Manager through their respective representatives. Details of these positions are graphically illustrated in Figure 1 as included in Appendix C, with details of specific positions and responsibilities being as further defined in this section.

### **5.1 Site Personnel**

Internally, there is an EPRP Leadership Group consisting of the senior representatives from all departments directly involved in the operation of the TSF (and application of the EPRP, accordingly). Included in this group are the General (Mine) Manager, the Tailings Project Manager, the Mill Maintenance Superintendent, the Mine Operations Manager, the Environmental Superintendent, the Mill Operations Superintendent, and the Senior Safety Co-ordinator. Corporate level operations oversight is provided by the Imperial President and the Chief Operating Officer.

#### *5.1.1 General (Mine) Manager*

The Mine Manager is responsible for the overall activities of Mount Polley Mine, inclusive of the TSF.

#### *5.1.2 Tailings Project Manager*

The Tailings Project Manager is responsible for the planning, co-ordination and daily management of monitoring and water management activities. This includes interpreting the site water balance as well as calculating and scheduling material, equipment and manpower requirements for the water management and maintenance of the TSF. The Tailings Project Manager is also responsible for the administration of any contractor work required at the TSF.

The Tailings Project Manager co-ordinates EoR review and inspection reports; plans for and submits required permit amendments; and is responsible for updating the OMS and the EPRP.

#### *5.1.3 Mill Maintenance Superintendent*

The Mill Maintenance Superintendent is responsible for directing the mill crews in carrying out all applicable activities; namely, those involved with water management system pipelines and associated ditch, sump and pond components.

Activities are co-ordinated through a chain-of-command existing within the Mill Maintenance Department that follows the Mill Maintenance Superintendent down

through the Mill Maintenance General Foremen, the Surface Crew Supervisor and the Surface Crew Leadhand.

#### *5.1.4 Mine Operations Manager*

The Mine Operations Manager is responsible for directing the operating crews (with the guidance of the Tailings Project Manager) in carrying out all applicable activities; namely, those involving Mine equipment and personnel.

Activities are co-ordinated through a chain-of-command existing within the Mine Operations Department that follows the Mine Operations Manager down through the Mine Operations General Foreman and the Mine Operations Supervisors (Shiftbosses).

#### *5.1.5 Environmental Superintendent*

The Environmental Superintendent is responsible for ensuring that mining and milling activities comply with requirements of applicable regulations. The Environmental Superintendent is responsible for the control of the site water balance.

The Environmental Superintendent is responsible for the co-ordination of the Environmental Department, made up of an Environmental Coordinator, Environmental Technologists and Environmental Technicians.

#### *5.1.6 Mill Operations Superintendent*

The Mill Operations Superintendent is responsible for the operation of the Mill facilities.

#### *5.1.7 Senior Safety Co-ordinator*

The Senior Safety Co-ordinator is responsible for promoting safety in all aspects of Mine and Mill operations, inclusive of water management and the TSF.

#### *5.1.8 Corporate - President*

The Corporate President is responsible for providing appropriate resources to maintain conformance with regulatory requirements and MAC guidelines, and for reporting to the Board of Directors of Imperial Metals Corporation on tailings stewardship.

#### *5.1.9 Corporate – Chief Operating Officer*

The Corporate Chief Operating Officer is responsible for allocation of required personnel and financial resources to ensure tailings facility stewardship is in conformance with regulatory requirements and MAC guidelines.

## 5.2 Design Group (Golder)

As per the *Mines Act*, “Major impoundments, water management facilities and dams shall be designed in accordance with the criteria provided in the Canadian Dam Association, Dam Safety Guidelines”. Additionally, “Tailings impoundments, water management facilities, dams and waste dumps shall be designed by a professional engineer” (Section 10.1.5 and Section 10.1.8, respectively).

In the case of the Mount Polley TSF, Golder is the Design Engineer and EoR currently retained to fulfill these requirements. The current Golder EoR is Terry Eldridge, P.Eng.

## 5.3 Regulatory Group (MEM)

Currently, the individual responsible for the review of all relevant technical information pertaining to the TSF is the MEM Acting Manager of Geotechnical Engineering: Heather Narynski, P.Eng. The individual responsible for the amendment of the M-200 Mining Permit is the MEM Chief Inspector of Mines, Al Hoffman, P.Eng.

Table 3 of Appendix C provides responsibility overview and contact information for responsible personnel.

## **6.0 EPRP MANAGEMENT**

Review of the EPRP is to be conducted annually as part of the OMS Manual review. The operating procedures and personnel at the Mount Polley Mine may change during the operation of the Mine. It is the responsibility of the Tailings Project Manager to ensure that the EPRP is updated to reflect these changes (in the absence or change of such person, it shall become the responsibility of the Mine Operations Manager). It will also be the responsibility of the Tailings Project Manager (in the absence or change of such person, it shall become the responsibility of the Mine Operations Manager) to update the EPRP in the event of regulatory change. Substantial revisions to the EPRP shall be submitted to the MEM.

### **6.1 Emergency Preparedness**

Review of and training on the [OMS](#) will serve as the primary preparation for emergency preparedness and response.

#### *6.1.1 All Employees*

All employees, contractors and visitors to the Mount Polley Mine Site are provided a mine site orientation regarding hazard awareness and protective measures to be taken prior to performing any work on the site. Overview of BC's Mine Health and Safety Act and roles and responsibilities of supervision and workers, personal protective equipment requirements, emergency response provisions, environmental awareness, fire extinguisher use and any specific hazard awareness related to the area being worked are covered in this orientation.

#### *6.1.2 Employees and Contractors Working at the TSF*

In addition to the general orientation provided to all employees, all MPMC employees and contractors working at the TSF will be provided specific training/awareness related to the TSF in accordance with the [OMS](#).

#### *6.1.3 Outside Agencies*

A copy of the EPRP is provided to outside agencies and stakeholders directly involved should a dam emergency or breach occur. Each agency or stakeholder that is involved in the EPRP is asked to review the plan to become familiar with their role and responsibility.

### **6.2 Testing**

An annual tabletop exercise shall be conducted to test the plan.



### 6.3 Updating

The TSF Project Manager is responsible for updating the EPRP. Updates may include but be not limited to: procedures, phone list, roles and responsibilities. Revisions will be circulated to all affected agencies

## **7.0 CERTIFICATION AND DISTRIBUTION**

### **7.1 Control of the EPRP**

The EPRP will be controlled by the Tailings Project Manager. Copies will be maintained with the OMS.

### **7.2 Distribution of the Manual**

A letter of transmittal that clearly identifies the distribution list must accompany each revision of this manual, as included and tracked through the OMS. An update may comprise the entire manual or be limited to specific pages or sections. A copy of each transmittal letter of the OMS must be kept on record in the office of the Tailings Project Manager. Each revised page of the manual must be clearly marked as to the revision date prior to replacement. The replaced pages must be filed and kept on record in the office of the Tailings Project Manager.

### **7.3 Certification of the Manual**

This report was prepared, reviewed and approved by the undersigned.

Prepared by:



Luke Moger

Project Engineer & Tailings Project Manager, MPMC

Approved by:

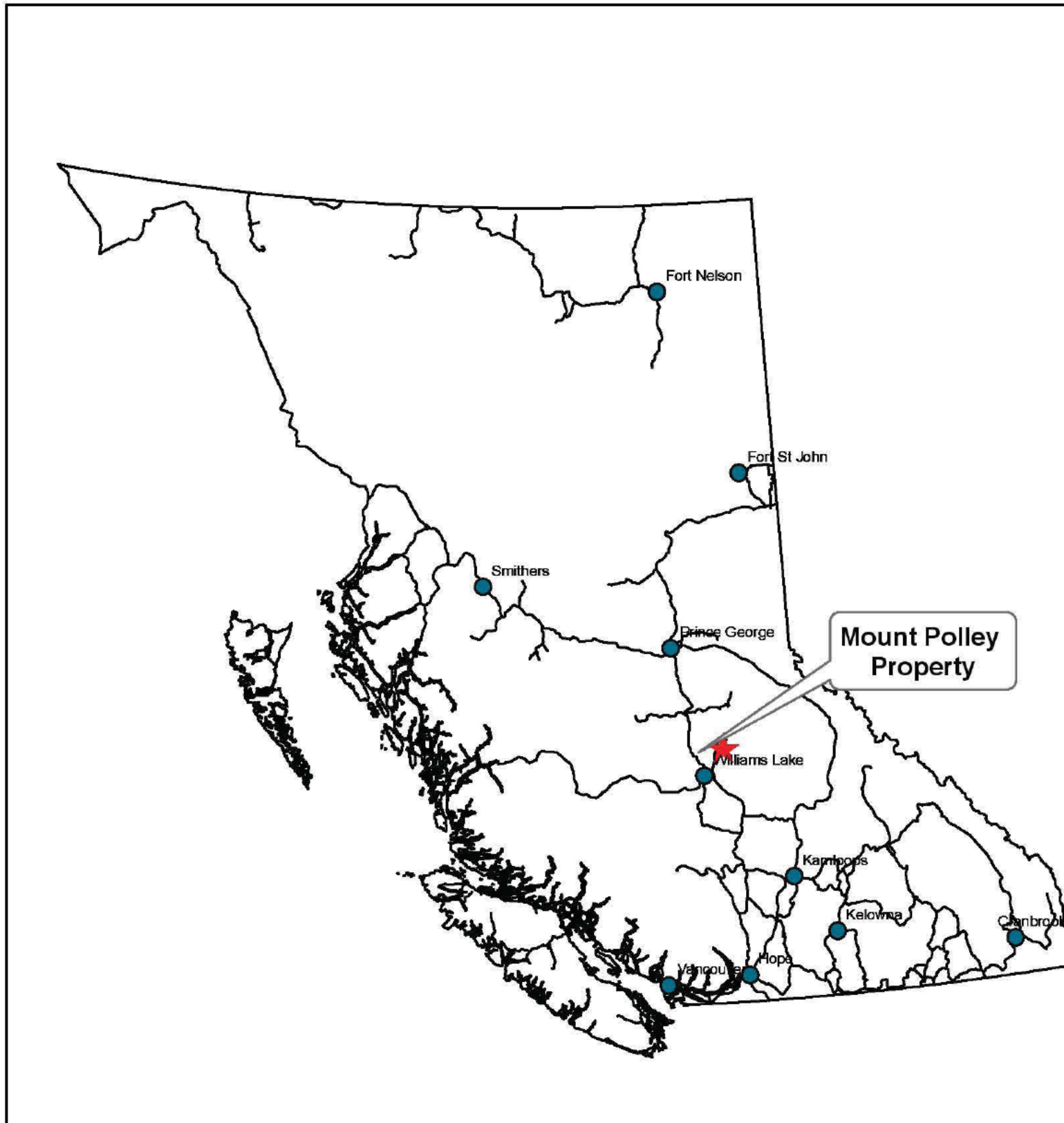


Dale Reimer

Mine Manager, MPMC

# APPENDIX A

## MAPS AND FIGURES



1:8,000,000

0 62.5 125 250 375 500 Kilometers

**MOUNT POLLEY MINING CORPORATION**

**Property Location Map**



## Directions to Mount Polley Mine Site (From Williams Lake)

- Take Highway 97 south from Williams Lake
- Turn **LEFT** onto Horsefly Likely Road (12.3km after the Super 8 Motel)  
Note: if you arrive in 150 Mile House, you have gone too far
- Turn **LEFT** onto Likely Road (4.5km along Horsefly Likely Road)
- Turn **RIGHT** onto Bootjack Forest Service Road (65km along Likely Road)  
Note: turnoff is shortly after Morehead Lake Resort
- Stay on Bootjack Road (~13km) to Mount Polley Mine parking lot  
Note: Stay left at the fork to Mount Polley Mine/Bootjack Lake Campground

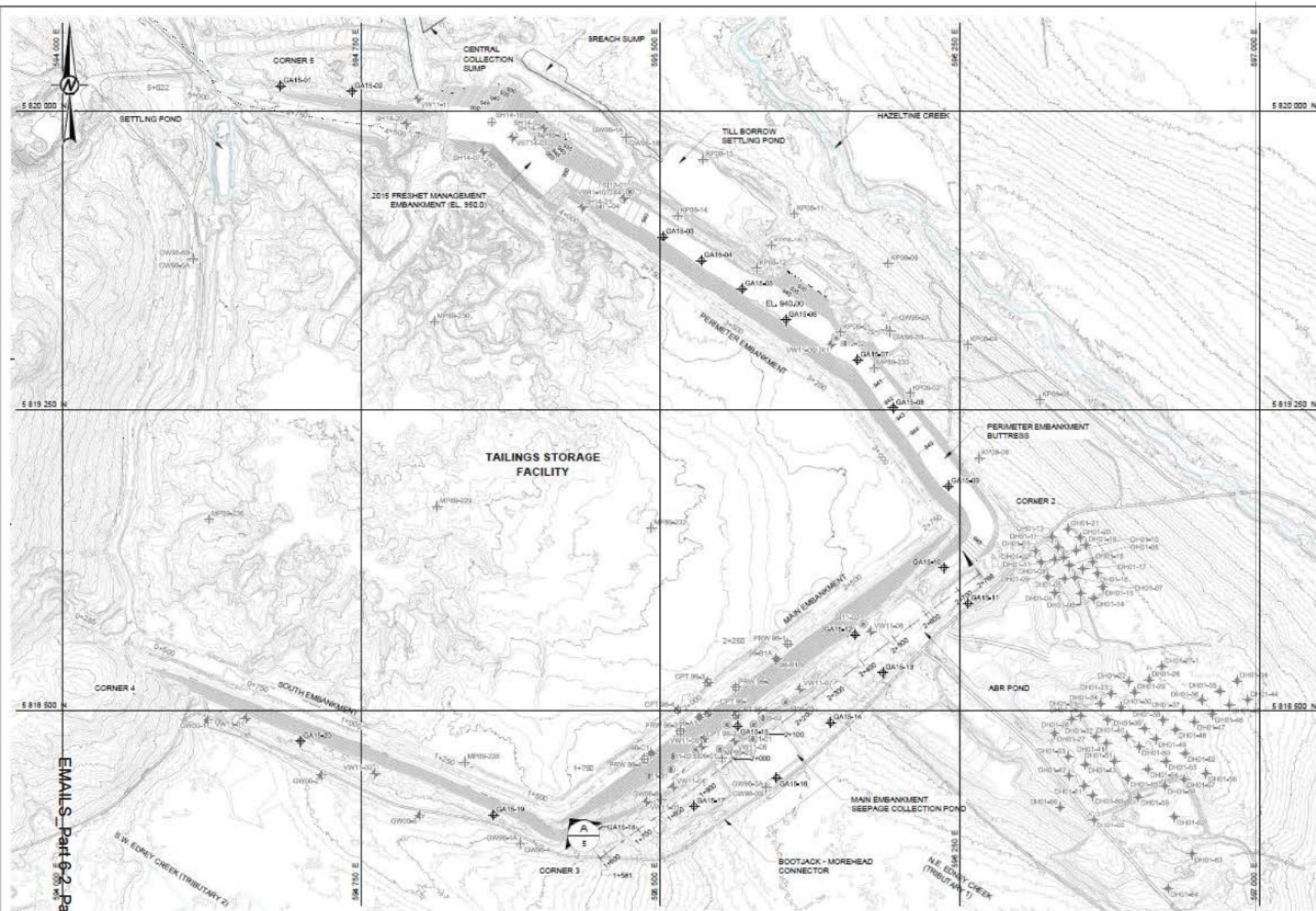
Copyright



Copyright







- LEGEND**
- GA15-20 SONIC DRILLING AND INSTRUMENTATION INSTALLATION (GOLDER 2015)
  - SP14-03 SHAPE ACCEL ARRAY
  - MP99-238 CONDEMNATION HOLES / PIEZOMETER INSTALLATION (KP, 1999)
  - 96-A1 SOLID AUGER, SPT, PIEZOMETER INSTALLATION (KP / R.E. GRAHAM ENG., 1996)
  - CPT 96-1 CPT (KP / CONTEC 1996)
  - PR99-96-1 SOLID STEM AUGER AND CPT, PRESSURE RELIEF WELL (KP, 1996)
  - GW 96-1 AIR ROTARY, SPT, MONITORING WELL INSTALLATION (KP, 1996)
  - GW03-3 ODEX, SPT, PIEZOMETER INSTALLATION (KP, 2000)
  - CP01-01 BORROW PROGRAM (KP, 2001)
  - KP08-01 SONIC DRILLING, SPT, BORROW PROGRAM (KP, 2008)
  - 2011-01 SLOPE INCLINOMETER INSTALLATION (2001, 2006 AND 2012)
  - VW11-01 SONIC DRILLING, VW PIEZOMETER INSTALLATION (AMEC, 2011)
  - 4+400 SETOUT LINE - S.O.L. - ORIGINAL ALIGNMENT (SEE REFERENCE 3)

- NOTES**
1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE IN METRES RELATIVE TO TAILINGS GRID DATUM.
  2. COORDINATES ARE SHOWN IN TAILINGS GRID.
  3. CONTOUR INTERVAL 1 m MINOR AND 5 m MAJOR. CONTOURS OF THE MOUNT POLLEY MINE SITE (SEE REFERENCE 1) WERE COMBINED WITH THE UPDATED TAILINGS STORAGE FACILITY SURVEY (SEE REFERENCE 2).
  4. DATA FROM GEOTECHNICAL INVESTIGATION FOLLOWING BREACH NOT SHOWN FOR CLARITY, EXCEPT FOR SAA INSTALLATION LOCATIONS.

- REFERENCES**
1. BASE TOPOGRAPHY FROM MPAC, FILE NAME: "MPac\_20140801\_m\_LIDAR\_Contour.dwg", RECEIVED: SEPTEMBER 3, 2014.
  2. TOPOGRAPHY PROVIDED BY MPAC, FILE NAME: "2015-02-18\_Drone\_Survey\_Contours - 1m.dwg", RECEIVED: MARCH 5, 2015.
  3. S.O.L. - ORIGINAL ALIGNMENT PROVIDED BY BGC ENGINEERING INC., DRAWING NO. 01, DRAWING TITLE: "31 PLANNING PLAN MAP", PROJECT NO. P14178, FILE NAME: "ACAD-01.DWG", DATED: SEPTEMBER 2014.

NOT FOR CONSTRUCTION



CLIENT  MOUNT POLLEY MINING CORPORATION

CONSULTANT	YYYY-MM-DD	2015-05-19
PREPARED	TAK	
DESIGN	GJ	
REVIEW	-	
APPROVED	-	

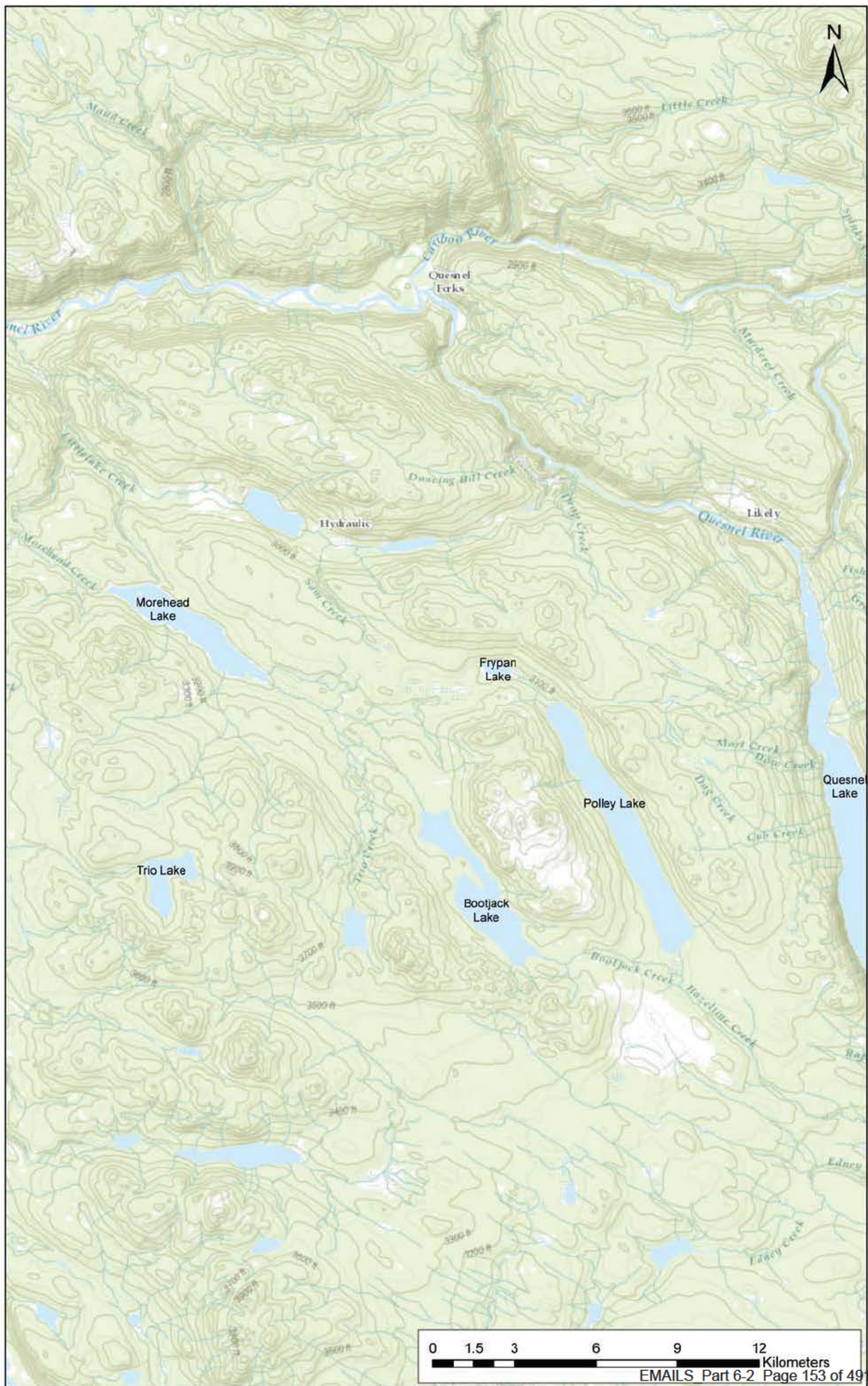


PROJECT  
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY  
ELEVATION 970 m EMBANKMENT DESIGN

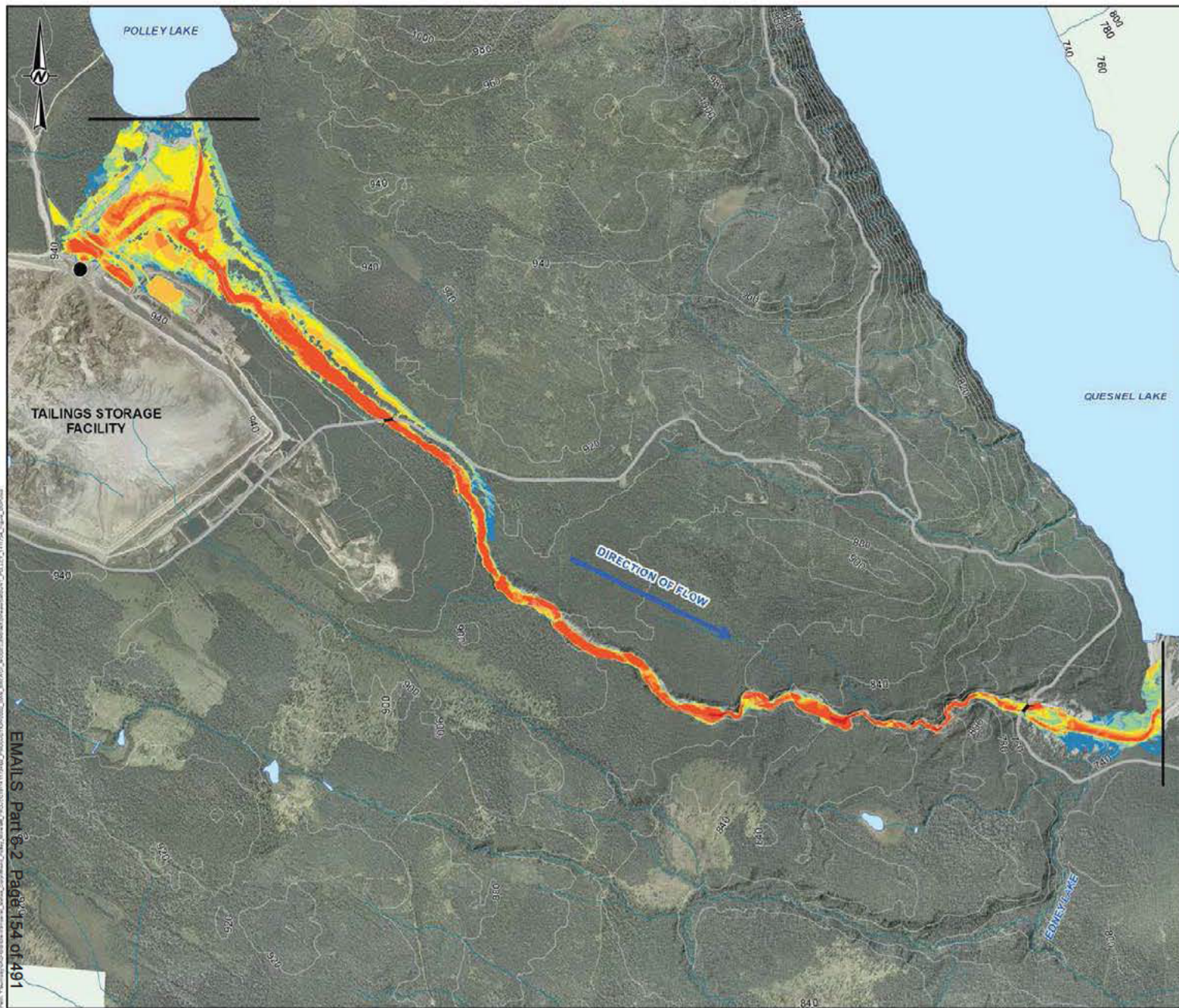
TITLE  
TAILING STORAGE FACILITY  
LAYOUT PLAN

PROJECT No. 1413803	PHASE/TASK 3000/3400	Rev. B	FIGURE 2
------------------------	-------------------------	-----------	-------------

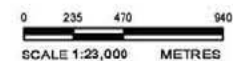
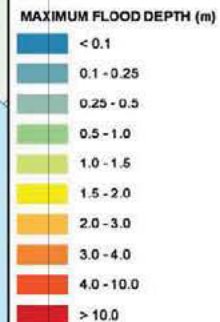








- LEGEND**
- BRIDGE
  - NUMERICAL SOURCE TERM
  - LIMIT OF NUMERICAL MODEL
  - ROAD
  - CONTOUR (10m)
  - WATERCOURSE
  - WATERBODY



WATER DEPTHS FROM MODEL RESULTS ARE RELATIVE TO THE SURFACE OF THE LIDAR DATA USED TO CREATE THE TERRAIN FOR FLOW-3D. LIDAR DATA IS LIMITED TO WATER SURFACE NOT STREAM BATHYMETRY.

**REFERENCES**

ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED  
IMAGERY (2014) OBTAINED FROM SNC LAVALIN INC.  
PROJECTION: NAD 1983 UTM ZONE 10

**CLIENT**  
IMPERIAL METALS  
MOUNT POLLEY MINING CORPORATION

**PROJECT**  
MOUNT POLLEY MINE  
FRESHET EMBANKMENT INUNDATION STUDY

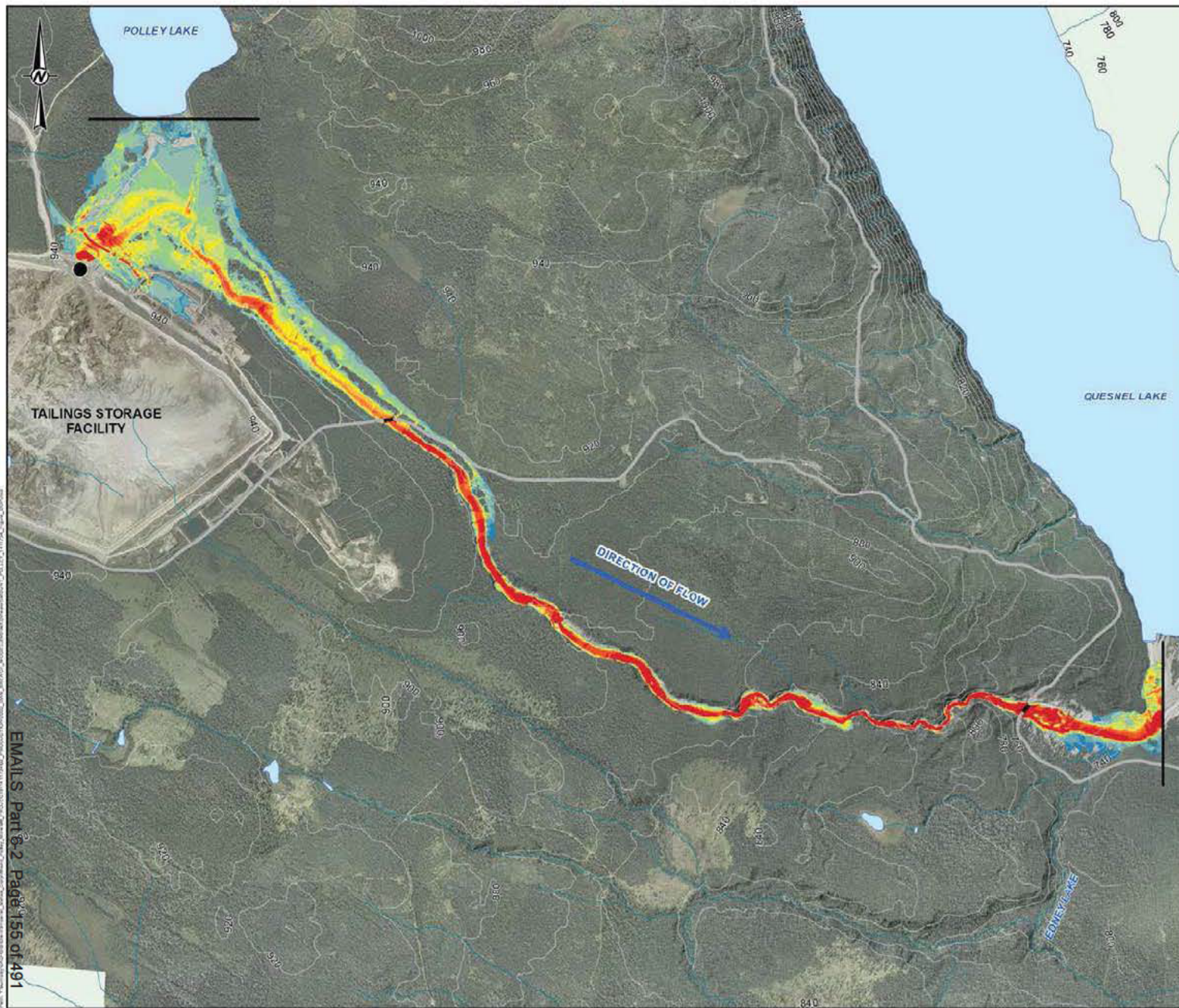
**TITLE**  
DAM BREACH  
MAXIMUM FLOOD DEPTH

CONSULTANT	YYY-MM-DD	2015-03-21
	PREPARED	RH
	DESIGN	WOG
	REVIEW	RM
	APPROVED	TE



PROJECT No.	CONTROL	Rev.	FIGURE
1411734	2000	0	4





- LEGEND**
- BRIDGE
  - NUMERICAL SOURCE TERM
  - LIMIT OF NUMERICAL MODEL
  - ROAD
  - CONTOUR (10m)
  - WATERCOURSE
  - WATERBODY

**MAXIMUM FLOOD VELOCITY (m/s)**

- < 0.1
- 0.1 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.5
- > 4.5

0 235 470 940  
SCALE 1:23,000 METRES

**REFERENCES**  
ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED  
IMAGERY (2014) OBTAINED FROM SNC LAVALIN INC.  
PROJECTION: NAD 1983 UTM ZONE 10

**CLIENT**  
IMPERIAL METALS  
MOUNT POLLEY MINING CORPORATION

**PROJECT**  
MOUNT POLLEY MINE  
FRESHET EMBANKMENT INUNDATION STUDY

**TITLE**  
DAM BREACH  
MAXIMUM FLOOD VELOCITY

<b>CONSULTANT</b>	YYY-HM-00	2015-03-21
	PREPARED	RH
	DESIGN	WOG
	REVIEW	RM
	APPROVED	TE

<b>PROJECT No.</b>	<b>CONTROL</b>	<b>Rev.</b>	<b>FIGURE</b>
1411734	2000	0	5

## APPENDIX B

# FRESHET EMBANKMENT DAM BREACH AND INUNDATION STUDY (GOLDER)



March 31, 2015

## MOUNT POLLEY MINE

# Freshet Embankment Dam Breach and Inundation Study, Likely, BC

**Submitted to:**

Mount Polley Mining Corporation  
PO Box 12  
Likely, BC  
V0L 1N0

Attention: Don Parsons and Luke Moger

REPORT



**Reference Number: 1413803-041-R-Rev0-2000**

**Distribution:**

1 Electronic Copy - Mount Polley Mining Corp.  
1 Hard Copy - Mount Polley Mining Corp.  
2 Hard Copies - Golder Associates Ltd.











































































**From:** [Luke Moger](#)  
**To:** [Demchuk, Tania MEM:EX](#)  
**Subject:** Follow Up Re: Laying Rock at the Main Embankment Buttress  
**Date:** Thursday, December 17, 2015 4:38:01 PM  
**Attachments:** [image001.png](#)

---

Hi Tania;

Just following up on our discussion yesterday re: permit condition B.2.(b) of the October 22, 2015 *Mines Act* Permit M-200 Amendment, there is verbiage indicating that indicates, "The Permittee is to submit copy of the construction specifications and QA/QC to the Chief Inspector prior to initial rockfill buttress construction."

It was my understanding that this information was provided in the detailed design, but if there are any outstanding information requirements, if you could please let me know as soon as possible that would be much appreciated and I can follow up with Golder. We are looking to commence construction on foundation areas that will become available for approval.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Luke Moger](#)  
**To:** [Beattie, Brent C MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** RE: Follow-up: Mount Polley Main Embankment Buttressing condition  
**Date:** Thursday, December 17, 2015 4:40:23 PM

---

Hi Brent;

Thank you for the clarification – looks like my e-mail to Tania on this and yours to me crossed in cyberspace!

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

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**From:** Beattie, Brent C MEM:EX [mailto:[Brent.Beattie@gov.bc.ca](mailto:Brent.Beattie@gov.bc.ca)]  
**Sent:** December-17-15 4:39 PM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** Luke Moger  
**Subject:** RE: Follow-up: Mount Polley Main Embankment Buttressing condition

Hello Luke,

As per Condition B.2(b) early submission is required as follows:

“The Permittee shall submit a copy of the construction specifications and QA/QC to the Chief Inspector prior to initial rockfill buttress construction.”

Review of the report titled “Elevation 970m Embankment Stability Analysis and Buttress Design” dated July 10, 2015 by Golders Associates Ltd. submitted on July 31, 2015 with the Main Embankment Buttressing permit amendment application indicates that Appendix B contains the “Main and Perimeter Embankment Buttress Technical Specifications” which has a short discussion on the QA/QC procedures to be implemented during the buttress construction.

Based on this information MEM considers the requirements have been met for Condition B.2(b).

I hope this addresses your concern, please call me or email me if you need any further assistance.

Regards,  
Brent

---

**Brent Beattie, P.Eng**  
Sr. Geotechnical Inspector  
Ministry of Energy And Mines

1810 Blanshard St., Victoria, BC V8W 9N3  
W:250-356-0510  
C: 778-677-6795

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**From:** Demchuk, Tania MEM:EX  
**Sent:** Wednesday, December 16, 2015 3:03 PM  
**To:** Beattie, Brent C MEM:EX  
**Subject:** Follow-up: Mount Polley Main Embankment Buttressing condition

Hi Brent,

As discussed, MPMC is seeking clarification on what information is required to be submitted to comply with Condition B.2(b) in their Oct. 22 Main Embankment Buttressing permit amendment. "The Permittee shall submit a copy of the construction specifications and QA/QC to the Chief Inspector prior to initial rockfill buttress construction."

I've attached the amendment here for your reference. The application documents are here:  
G:\15\_Mines-Exploration Sites\Major Mines\0E - PROJECTS\2 METAL\M-200 Mt Polley\01 Reports\2015 08 01 Main Emb Buttress

Luke has indicated that the foundation prep work has been completed and they are ready to start rockfill placement as soon as the above question has been resolved. Are you able to follow-up with Luke directly this week to provide clarification?

Thank-you!  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417



**From:** Demchuk, Tania MEM:EX  
**To:** [Narynski, Heather M MEM:EX](#)  
**Subject:** Stage 10 dam raise application  
**Date:** Tuesday, August 5, 2014 6:16:00 PM

---

Hi Heather,

In case we forget to ask on our check in call tonight.

Has this Stage 10 amendment request been received by MEM?

Thanks,

Tania

**From:** Demchuk, Tania MEM:EX  
**To:** [Bellefontaine, Kim EMPR:EX](#)  
**Subject:** FW: Urgent request for exemption from permit requirement  
**Date:** Tuesday, August 5, 2014 12:32:00 PM  
**Attachments:** [Permit 11678 Exemption Request.pdf](#)  
**Importance:** High

---

FYI – request to discharge at max capacity this spring. I will ask if this request was granted when we have the call this afternoon.

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**From:** McConnachie, Jennifer MEM:EX  
**Sent:** Tuesday, August 5, 2014 12:18 PM  
**To:** Demchuk, Tania MEM:EX  
**Subject:** FW: Urgent request for exemption from permit requirement  
**Importance:** High

---

**From:** Colleen Hughes [<mailto:chughes@mountpolley.com>]  
**Sent:** Thursday, March 20, 2014 3:48 PM  
**To:** Metcalfe, Shelley ENV:EX; Bunce, Hubert ENV:EX  
**Cc:** Keogh, Kym A ENV:EX; Swan, Chris L ENV:EX; Bings, Dan P ENV:EX; McConnachie, Jennifer MEM:EX  
**Subject:** Urgent request for exemption from permit requirement  
**Importance:** High

Good Afternoon Shelley,

Please find attached a letter requesting a temporary exemption from Permit 11678 requirement for continuous monitoring at W7.

If you have further questions please contact me at the number below.

Regards,

**Colleen Hughes, EP**  
**Environmental Coordinator**  
**Mount Polley Mining Corporation**  
**PO Box 12**  
**Likely, BC V0L 1N0**  
**250-790-2617**  
[chughes@mountpolley.com](mailto:chughes@mountpolley.com)



# Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

March 19, 2014

Shelley Metcalfe  
Authorizations Section Head - Mining  
Ministry of Environment  
10470 – 152<sup>nd</sup> Street  
Surrey, BC  
V3R 0Y3

RE: Urgent request for exemption of permit requirement

Dear Shelley,

Mount Polley Mining Corporation (MPMC) is requesting an immediate and temporary exemption from the Permit 11678 requirement for continuous conductivity, temperature, and flow rate monitoring at Hazeltine Creek (W7) while operating the Hazeltine Discharge System (authorized under section 1.2 of Permit 11678). The details of the requirement are outlined in the MPMC Annual Monitoring Plan (MPMC, 2014) and the 2014 Annual Discharge Plan (MPMC, 2014).

As you are aware, the Tailings Storage Facility (TSF) at MPMC currently contains approximately 6.5 Mm<sup>3</sup> of excess water. As shown in Table 1, MPMC also has experienced above average snowfall in 2013/14, adding to the urgent requirement to manage additional water reporting to the TSF from site runoff collection systems. While MPMC is moving forward on an application to treat and discharge excess water, we would like to use our current permit to discharge water to Hazeltine Creek from April through October to the maximum capacity in order to reduce geotechnical risk of the TSF and return water to the natural environment.

**Table 1:** February 2014 month end water balance summary

Item	Description
TSF Water Volume	6,789,160 m <sup>3</sup> (up 143,184 m <sup>3</sup> from last month)
TSF Water Elevation	964.46 m (up 0.03 m from last month)
Cariboo Pit Water Volume	942,953 m <sup>3</sup> (as of Dec. 15 <sup>th</sup> – no access)
Cariboo Pit Water Elevation	1081.42 m (as of Dec. 15 <sup>th</sup> – no access)
TSF + Cariboo Pit Water Volume	7,139,872 m <sup>3</sup> (based on Dec. 15 <sup>th</sup> Cariboo Pit volume)
TSF + Cariboo Pit Water Volume Change (since last month)	143,184 m <sup>3</sup> (based on Dec. 15 <sup>th</sup> Cariboo Pit volume)
Weather Statistics Actual	Mean Temperature = -10.3 °C Snowpack (snow water equivalent) = 316 mm
Weather Statistics Average	Average February Mean Temperature = -4.5 °C Average Snowpack (snow water equivalent) = 173 mm

Unfortunately, the volume of ice currently built up at W7 restricts us from installing the continuous monitoring equipment outlined in the aforementioned Plans. MPMC is proposing that we operate the system without this equipment until creek conditions allow installation. This exemption would allow MPMC to initiate the 2014 discharge into Hazeltine Creek without the installation of monitoring equipment at W7.

Proposed monitoring until installation of continuous monitoring equipment includes:

- Daily inspections of the discharge location (HD-1) and W7.
- Daily collection of field parameters (pH, temperature, and conductivity) from W7.
- Continuous conductivity and flow monitoring at HD-1.
- All other monitoring and reporting as required by Permit 11678 and the Monitoring Plans.

The MPMC 2014 Annual Discharge Plan provides detailed flow and water quality predictions for HD-1 and W7. We were able to collect a flow measurement in Hazeltine Creek on March 18, 2014, just downstream of the ice blockage. It is important to note that this area was kept open during the winter to allow access to collect water samples, but is not in the area where equipment can be installed. The recorded flow was 0.0874 m<sup>3</sup>/s. Based on flow measurements taken 2006 through 2014, the average flow rate expected from the toe drain system that feeds HD-1 is 0.010 m<sup>3</sup>/s, equivalent to 11% of the current W7 flows. Details of the water quality predictions discussed above indicate that discharging this percentage would not result in any exceedences of the BC Water Quality Guidelines. In addition, available historic flow data at W7 indicates that the average flow rate in Hazeltine in April is 0.753 m<sup>3</sup>/s; this increase due to runoff further reduces the risk of exceeding BC Water Quality Guidelines and Permit 11678 guidelines.

As the requirement to discharge water at MPMC is crucial for long-term water management and the stability of the TSF we are asking for a response to this request by March 31, 2014.

Sincerely,



Colleen Hughes, EP  
Environmental Coordinator  
Mount Polley Mining Corporation  
[chughes@mountpolley.com](mailto:chughes@mountpolley.com)  
250-790-2617

Pages 181 through 182 redacted for the following reasons:

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s.14

**From:** Demchuk, Tania MEM:EX  
**To:** [Brody, Margo X MEM:EX](#)  
**Cc:** [Hoffman, Al MEM:EX](#)  
**Subject:** Urgent: Chief Inspector Order - safe work procedures for sampling  
**Date:** Thursday, August 7, 2014 4:22:00 PM  
**Importance:** High

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Hi Margo,

Please prepare a letter with these two orders for Al to sign and send ASAP (before end of day today)!

The letter should be addressed to Dale Reimer, Mine Manager and cc'd to Jake Love and Don Parsons of Imperial Metals.

The letter should also be cc'd to Steve Rothman, George Warnock and Heather Narynski, Hubert Bunce, Gabi Matscha and Jennifer McGuire.

#### **Order One**

Pursuant to Part 1.1.2 of the Health Safety and Reclamation Code for Mines in British Columbia, the Permittee is ordered to submit a safe work procedure for all water or materials sampling being conducted in and around the tailings storage facility, downstream of the dam breach, Polley Lake, the outlet of Hazeltine Creek and in Quesnel Lake.

This safe work procedure shall be submitted by August 8, 2014 and prior to further sampling work requiring personnel to be in proximity of the outlet of Hazeltine Creek in Quesnel Lake.

#### **Order Two**

Pursuant to Part 1.1.2 of the Health Safety and Reclamation Code for Mines in British Columbia, the Permittee is ordered to submit a safe work procedures for all work being conducted on or off the mine site related to the tailings dam breach. This is including but not limited to Polley Lake dewatering activities and construction of the temporary containment berm upstream of the dam breach.

This safe work procedure shall be submitted by August 8, 2014.

Thanks!!

Tania



**From:** Demchuk, Tania MEM:EX  
**To:** [Hoffman, Al MEM:EX](#); [Nikolejsin, Dave MEM:EX](#); [Morel, David P MEM:EX](#)  
**Cc:** [Bellefontaine, Kim MEM:EX](#); [Amann-Blake, Nathaniel MEM:EX](#); [Narynski, Heather M MEM:EX](#)  
**Subject:** RE: Polley Lake - Tailings Breach Remediation  
**Date:** Friday, August 8, 2014 2:25:00 PM

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The yellow line on the figure represents the pipeline route. No difference between the solid and the dashed. This was confirmed by the company.

Tania

---

**From:** Hoffman, Al MEM:EX  
**Sent:** Friday, August 8, 2014 9:47 AM  
**To:** Nikolejsin, Dave MEM:EX; Morel, David P MEM:EX  
**Cc:** Bellefontaine, Kim MEM:EX; Demchuk, Tania MEM:EX; Amann-Blake, Nathaniel MEM:EX; Narynski, Heather M MEM:EX  
**Subject:** FW: Polley Lake - Tailings Breach Remediation

Dave

This is a better photo showing the location of the proposed pipeline. Note the satellite image that had to be used was taken before the dam breached.

Al Hoffman

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**From:** Jack Love [<mailto:JLove@imperialmetals.com>]  
**Sent:** Friday, August 8, 2014 9:36 AM  
**To:** Demchuk, Tania MEM:EX; Luke Moger  
**Cc:** Hoffman, Al MEM:EX; Bellefontaine, Kim MEM:EX  
**Subject:** RE: Polley Lake - Tailings Breach Remediation

Hi Tania,

Here it is  
Jack

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**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
**Sent:** Friday, August 08, 2014 8:31 AM  
**To:** Luke Moger; Jack Love  
**Cc:** Hoffman, Al MEM:EX; Bellefontaine, Kim MEM:EX  
**Subject:** RE: Polley Lake - Tailings Breach Remediation  
**Importance:** High

Hi Both,

Could one of you please send us a standalone file of Figure 1 – the Figure showing the plan?  
I know you are very busy – if you could send as soon as possible that would be appreciated!

Thank-you,  
Tania

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**From:** Hoffman, Al MEM:EX  
**Sent:** Thursday, August 7, 2014 9:58 PM  
**To:** Haslam, David GCPE:EX  
**Cc:** Amann-Blake, Nathaniel MEM:EX; Narynski, Heather M MEM:EX; Demchuk, Tania MEM:EX; Bellefontaine, Kim MEM:EX; Koncohrada, Karen MEM:EX  
**Subject:** FW: Polley Lake - Tailings Breach Remediation

This is the mine's plan to lower the level in Polley Lake. I have drafted a letter indicating that I have received it and that I consider it emergency work.

Al

---

**From:** Rothman, Stephen MEM:EX  
**Sent:** Thursday, August 7, 2014 1:55 PM  
**To:** Thorpe, Rolly MEM:EX; Hoffman, Al MEM:EX; Kuppers, Haley MEM:EX  
**Subject:** Fwd: Polley Lake - Tailings Breach Remediation

Sent from my iPhone

Begin forwarded message:

**From:** "Luke Moger" <[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)>  
**To:** "Rothman, Stephen MEM:EX" <[Stephen.Rothman@gov.bc.ca](mailto:Stephen.Rothman@gov.bc.ca)>  
**Cc:** "Warnock, George MEM:EX" <[George.Warnock@gov.bc.ca](mailto:George.Warnock@gov.bc.ca)>, "Narynski, Heather M MEM:EX" <[Heather.Narynski@gov.bc.ca](mailto:Heather.Narynski@gov.bc.ca)>, "Brian Kynoch" <[bkynoch@imperialmetals.com](mailto:bkynoch@imperialmetals.com)>, "Dale Reimer" <[dreimer@mountpolley.com](mailto:dreimer@mountpolley.com)>, "Art Frye" <[afrye@mountpolley.com](mailto:afrye@mountpolley.com)>, "Ryan Brown" <[rbrown@mountpolley.com](mailto:rbrown@mountpolley.com)>, "Steve.Rice@Amec.com" <[Steve.Rice@Amec.com](mailto:Steve.Rice@Amec.com)>, "ibruce@bgcengineering.com" <[ibruce@bgcengineering.com](mailto:ibruce@bgcengineering.com)>, "Daryl Dufault" <[DDufault@bgcengineering.ca](mailto:DDufault@bgcengineering.ca)>  
**Subject:** Polley Lake - Tailings Breach Remediation

Steve;

As per our conversation yesterday, please find attached a document from Dale Reimer, General Manager of MPMC, endorsed by AMEC and BGC, outlining the work MPMC will be undertaking in the reduction of the water level in Polley Lake.

Kindest Regards,

Luke

**From:** [Thorpe, Rolly MEM:EX](#)  
**To:** [Mount Polley Mining Corp.](#)  
**Cc:** [Hoffman, Al MEM:EX](#); [Kuppers, Haley MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** Dangerous Occurrence Investigation  
**Date:** Saturday, August 9, 2014 6:53:43 AM

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Mr. Reimer: You are ordered, as per the Mine Code, Part 1.7.1(4) the manager shall ensure an investigation is carried out by persons knowledgeable in the type of work involved, as well as the co-chairpersons of the OHSC or their designates. Also, a report prepared, per Code 1.7.2, and forwarded to the OHSC and Mine Inspector. To have as complete an investigation as possible, it is important to involve the OHSC and get their input. Thanks, Rolly

Sent from my iPhone

**From:** Demchuk, Tania MEM:EX  
**To:** [Hoffman, Al MEM:EX](#)  
**Cc:** [Bellefontaine, Kim EMPR:EX](#); [Narynski, Heather M MEM:EX](#); [Warnock, George MEM:EX](#); [Rothman, Stephen MEM:EX](#)  
**Subject:** FW: Temporary Upstream Dyke - Tailings Breach Remediation  
**Date:** Saturday, August 9, 2014 2:17:00 PM  
**Attachments:** [image001.png](#)  
[Notice of Work \(Temporary Upstream Dyke\) - Tailings Breach Remediation - 2014 08 06.pdf](#)

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**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Saturday, August 9, 2014 12:47 PM  
**To:** Demchuk, Tania MEM:EX  
**Subject:** FW: Temporary Upstream Dyke - Tailings Breach Remediation

Tania;

As requested.

Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Luke Moger  
**Sent:** August-07-14 1:00 PM  
**To:** Rothman, Stephen MEM:EX ([Stephen.Rothman@gov.bc.ca](mailto:Stephen.Rothman@gov.bc.ca))  
**Cc:** Warnock, George EMNG:EX ([George.Warnock@gov.bc.ca](mailto:George.Warnock@gov.bc.ca)); Narynski, Heather M EMNG:EX ([Heather.Narynski@gov.bc.ca](mailto:Heather.Narynski@gov.bc.ca)); [bkynoch@imperialmetals.com](mailto:bkynoch@imperialmetals.com); Dale Reimer; Art Frye; Ryan Brown; 'Steve.Rice@Amec.com'; 'ibruce@bgcengineering.com'; Daryl Dufault  
**Subject:** Temporary Upstream Dyke - Tailings Breach Remediation

Steve;

As per our conversation yesterday, please find attached a document from Dale Reimer, General Manager of MPMC, endorsed by AMEC and BGC, outlining the work MPMC will be undertaking at the TSF in the construction of an upstream dyke.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)



**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

August 7, 2014

Steve Rothman, P.Eng  
Senior Inspector of Mines – Health and Safety  
Ministry of Energy and Mines  
441 Columbia Street  
Kamloops, B.C  
V2C 2T3

Dear Mr. Rothman:

**RE: Notice of Work (Temporary Upstream Dyke) – Tailings Breach Remediation**

As requested by the Ministry of Energy and Mines (MEM) in an onsite meeting held with Mount Polley Mining Corporation (MPMC), AMEC and BGC Engineering (BGC) on August 6<sup>th</sup>, 2014 regarding the tailings storage facility (TSF) breach remediation planning, please find below an outline of the work planned by MPMC in constructing an upstream dyke within the confines of the previously constructed TSF.

This plan has been developed in coordination with AMEC and BGC. The work will consist of placing run-of-mine non-acid-generating (NAG) material upstream of the breached area along the Perimeter Embankment with an aim of securing tailings solids within the TSF. Please see Figure 1 below depicting the proposed area of construction.



Figure 1 – Upstream Dyke





**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

The work is to be conducted under a safe work procedure, which will be a "live" document updated as construction is advanced; please find a copy attached for reference.

Work is to commence immediately on this project, and updates will be provided to MEM as per regularly scheduled meetings.

Should you have any questions, please do not hesitate to contact me at (250) 790-2215 ext. 2600.

Sincerely,

Dale Reimer, Mine Manager  
Mount Polley Mining Corporation  
[DReimer@MountPolley.com](mailto:DReimer@MountPolley.com)

Reviewed and Endorsed:

Iain Bruce, Chief Technical Officer  
BGC

Steve Rice, Principal Engineer  
AMEC

Cc. George Warnock, Heather Narynksi, Brian Kynoch, Art Frye, Luke Moger, Ryan Brown, Steve Rice, Iain Bruce, Daryl Dufault

<b>MOUNT POLLEY MINING CORPORATION STANDARD PROCEDURE</b>	
<b>SUBJECT: Tailings Containment Dyke Construction</b>	<b>PROCEDURE NO:</b>
<b>EFFECTIVE DATE: August 6, 2014</b>	<b>REVISION DATE:</b>

**OBJECTIVE:**

- To ensure the safety of Personnel when constructing the tailings containment dyke (operating upon or within the tailings facility embankments).

**Procedure**

All work performed upon or within the tailings embankments will be performed in accordance with plans issued by the Senior Mine Engineer or his designate. Specific requirements are outlined below:

1. All employees operating equipment or working within the defined area are required to read and demonstrate understanding of this procedure before beginning work.
2. Survey control will be available at all times for operational support.
3. All working areas and travel ways will be continuously illuminated during night shifts.
4. A dump supervisor will be continuously inside the defined area, performing regular visual checks of the road/dump surface. Every 5 loads, the dump head must be visually inspected for irregular cracking and any other signs of instability. A detailed record of these inspections must be maintained.
5. All haul trucks will dump at least 30m short of the dump berm.
6. Dump berm heights will be maintained to the full height of the largest haul truck tire in the fleet.
7. A guard will be placed at the junction of the waste haul road and the Orica access road. No personnel will be allowed through this guard without the permission of the Shifter.

*If you feel uncomfortable in performing any part of this procedure, please discuss with your supervisor.*

**From:** Demchuk, Tania MEM:EX  
**To:** [Day, Alan MEM:EX](#); [Bailey, Kristopher W MEM:EX](#)  
**Subject:** Safe work procedures for site remediation works  
**Date:** Sunday, August 10, 2014 12:22:00 PM  
**Attachments:** [image001.jpg](#)  
[Safe Work Proceedure - Polley Lake Water Lake Reduction.docx](#)  
[Safe Work Proceedure - Tailings Breach Dyke Construction.docx](#)  
[Safe Work Proceedure - Sampling.docx](#)  
[Mount Polley August 7 2014.pdf](#)  
[Dangerous Occurrence Investigation.msg](#)

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As discussed –

- three safe work procedures (word docs).
- CIM order requiring these to be put in place (PDF file)
- Emailed order from Rolly Thorpe requiring the investigation to include the OHSC chair

We will cc you both when the next orders are sent out.

Tania

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**From:** Art Frye [mailto:[afrye@mountpolley.com](mailto:afrye@mountpolley.com)]  
**Sent:** Saturday, August 9, 2014 4:26 PM  
**To:** Art Frye; Brody, Margo X MEM:EX; Dale Reimer; Jack Love; Don Parsons  
**Cc:** Hoffman, Al MEM:EX; Musgrove, Kate MEM:EX; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Booth, Richard MEM:EX; Thorpe, Rolly MEM:EX; Narynski, Heather M MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Bellefontaine, Kim MEM:EX; Warnock, George MEM:EX; Bunce, Hubert ENV:EX; Matscha, Gabriele ENV:EX; McGuire, Jennifer ENV:EX  
**Subject:** RE: Mount Polley Safe work procedures

Dear Mr. Hoffman;

Please accept this e-mail as a follow up on a response provided by myself on August 8, 2014 to your memorandum Re: Safe Work Procedures for Sampling dated August 7, 2014.

Order Two:

- Please find attached a safe work procedure for the Polley Lake water level reduction activities prior to the operation of the proposed system.
- Safe work procedures will continue to be submitted for all work being conducted on or off the mine site related to the tailings dam breach, as arising.

Regards,  
Art



**MOUNT POLLEY MINING CORPORATION  
STANDARD PROCEDURE**

**SUBJECT: Polley Lake Water Level  
Reduction**

**PROCEDURE NO:**

**EFFECTIVE DATE:  
August 9, 2014**

**REVISION DATE:**

**OBJECTIVE:**

- To ensure the safety of Personnel when working around areas around and downstream of the Polley Lake water level reduction pumping into Hazeltine Creek.

**Procedure**

All work performed upon on Polley Lake, in Hazeltine Creek and at the outlet of Hazeltine Creek and in Quesnel Lake will be performed in accordance with plans issued by the Mine Operations Manager or his designate. Specific requirements are outlined below:

1. All employees working within the areas as referenced above are required to read and demonstrate understanding of this procedure before beginning work.
2. No access is to be granted to the surface of Polley Lake, save for work completed upstream of the tailings plug, on foot, from the shoreline.
3. No access is to be granted on Hazeltine Creek.
4. When work is to be completed at the outlet of Hazeltine Creek in Quesnel Lake, continuous means of direct communication is to be maintained between Personnel and a spotter (deemed qualified by the Mine Operations Manager or his designate) located at the existing Hazeltine Creek discharge pipe location with an unobstructed view of the tailings plug. The spotter shall instruct such Personnel to immediately vacate the area if instability of the tailings plug or any other dangerous conditions are observed.
5. Polley Lake water elevation measurement is to be completed daily by an individual deemed qualified by the Mine Operations Manager or his designate.

*If you feel uncomfortable in performing any part of this procedure, please discuss with your Supervisor.*

**MOUNT POLLEY MINING CORPORATION  
STANDARD PROCEDURE**

**SUBJECT: Tailings Containment  
Dyke Construction**

**PROCEDURE NO:**

**EFFECTIVE DATE:**  
**August 6, 2014**

**REVISION DATE:**

**OBJECTIVE:**

- To ensure the safety of Personnel when constructing the tailings containment dyke (operating upon or within the tailings facility embankments).

**Procedure**

All work performed upon or within the tailings embankments will be performed in accordance with plans issued by the Senior Mine Engineer or his designate. Specific requirements are outlined below:

1. All employees operating equipment or working within the defined area are required to read and demonstrate understanding of this procedure before beginning work.
2. Survey control will be available at all times for operational support.
3. All working areas and travel ways will be continuously illuminated during night shifts.
4. A dump supervisor will be continuously inside the defined area, performing regular visual checks of the road/dump surface. Every 5 loads, the dump head must be visually inspected for irregular cracking and any other signs of instability. A detailed record of these inspections must be maintained.
5. All haul trucks will dump at least 30m short of the dump berm.
6. Dump berm heights will be maintained to the full height of the largest haul truck tire in the fleet.
7. A guard will be placed at the junction of the waste haul road and the Orica access road. No personnel will be allowed through this guard without the permission of the Shifter.

*If you feel uncomfortable in performing any part of this procedure, please discuss with your supervisor.*



**MOUNT POLLEY MINING CORPORATION  
STANDARD PROCEDURE**

**SUBJECT: Water or Materials  
Sampling Conducted Post-  
Tailings Storage Facility Breach**

**PROCEDURE NO:**

**EFFECTIVE DATE:  
August 8, 2014**

**REVISION DATE:**

**OBJECTIVE:**

- To ensure the safety of Personnel when completing water or materials sampling being conducted in and around the tailings storage facility, downstream of the dam breach, Polley Lake, the outlet of Hazeltine Creek and in Quesnel Lake.

**Procedure**

All work performed upon or within the tailings embankments, downstream of the dam breach, on Polley Lake, at the outlet of Hazeltine Creek and in Quesnel Lake will be performed in accordance with plans issued by the Mine Operations Manager or his designate. Specific requirements are outlined below:

1. All employees working within the areas as referenced above are required to read and demonstrate understanding of this procedure before beginning work.
2. Water or material sampling being conducted in and around the tailings storage facility or immediately downstream of the breach is to be conducted after consultation with a qualified geotechnical engineer approved by the Mine Operations Manager or his designate.
3. No access is to be granted to the surface of Polley Lake, save for water or materials sampling completed upstream of the tailings plug, on foot, from the shoreline.
4. No access is to be granted on Hazeltine Creek.
5. When sampling is to be completed at the outlet of Hazeltine Creek in Quesnel Lake, continuous means of direct communication is to be maintained between samplers and a spotter (deemed qualified by the Mine Operations Manager or his designate) located at the existing Hazeltine Creek discharge pipe location with an unobstructed view of the tailings plug
6. All water and materials sampling is to take place only during daylight hours

*If you feel uncomfortable in performing any part of this procedure, please discuss with your supervisor.*



August 7, 2014

Mr. Dale Reimer  
Mine Manager  
Mount Polley Mining  
Box 12  
Likely, BC V0L 1N0

Mine: 1101163  
ORCS: 19020-40

By mail and email: [dreimer@mountpolley.com](mailto:dreimer@mountpolley.com); [afrye@mountpolley.com](mailto:afrye@mountpolley.com); [jlove@imperialmetals.com](mailto:jlove@imperialmetals.com); [dparsons@imperialmetals.com](mailto:dparsons@imperialmetals.com)

Dear Mr. Reimer:

**Re: Safe Work Procedures for Sampling**

**Order One**

Pursuant to Part 1.1.2 of the Health Safety and Reclamation Code for Mines in British Columbia, the Mine Manager is ordered to submit a safe work procedure for all water or materials sampling being conducted in and around the tailings storage facility, downstream of the dam breach, Polley Lake, the outlet of Hazeltine Creek and in Quesnel Lake.

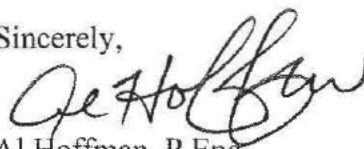
This safe work procedure shall be submitted by August 8, 2014 and prior to further sampling work requiring personnel to be in proximity of the outlet of Hazeltine Creek in Quesnel Lake.

**Order Two**

Pursuant to Part 1.1.2 of the Health Safety and Reclamation Code for Mines in British Columbia, the Mine Manager is ordered to submit safe work procedures for all work being conducted on or off the mine site related to the tailings dam breach. This is including but not limited to Polley Lake dewatering activities and construction of the temporary containment berm upstream of the dam breach.

This safe work procedure shall be submitted by August 8, 2014.

Sincerely,

  
Al Hoffman, P.Eng.  
Chief Inspector of Mines

.../2

Ministry of  
Energy and Mines

Health, Safety and  
Permitting Branch

Mailing Address:  
PO Box 9320  
Stn Prov Govt  
Victoria, BC  
V8W 9N3

Phone: 250 952 0793  
Fax: 250 952 0491

Cc: Mr. David Morel, Assistant Deputy Minister, MEM  
Ms. Diane Howe, Deputy Chief Inspector of Mines, Permitting and Reclamation, MEM  
Mr. Richard Booth, A/Deputy Chief Inspector of Mines Health and Safety, MEM  
Mr. Rolly Thorpe, Deputy Chief Inspector of Mines, Health and Safety, MEM  
Ms. Heather Narynski, Senior Geotechnical Inspector, MEM  
Mr. Stephen Rothman, Senior Inspector of Mines, Kamloops, MEM  
Ms. Tania Demchuk, Senior Environmental Geoscientist, MEM  
Mr. George Warnock, Manager, Geotechnical Engineering, MEM  
Mr. Art Frye, Chief Operating Manager, Imperial Metals Corporation  
Mr. Jack Love, Environmental Superintendent, Imperial Metals Corporation  
Mr. Don Parsons, Chief Operating Officer, Imperial Metals Corporation  
Mr. Hubert Bunce, Environmental Protection, Mining Operations Director, MOE  
Ms. Gabi Matscha, Environmental Quality Section Head, Ministry of Environment  
Ms. Jennifer McGuire, Executive Director, Environmental Protection Division, MOE

**From:** [Thorpe, Rolly MEM:EX](#)  
**To:** [Mount Polley Mining Corp.](#)  
**Cc:** [Hoffman, Al MEM:EX](#); [Kuppers, Haley MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** Dangerous Occurrence Investigation  
**Date:** Saturday, August 9, 2014 6:53:43 AM

---

Mr. Reimer: You are ordered, as per the Mine Code, Part 1.7.1(4) the manager shall ensure an investigation is carried out by persons knowledgeable in the type of work involved, as well as the co-chairpersons of the OHSC or their designates. Also, a report prepared, per Code 1.7.2, and forwarded to the OHSC and Mine Inspector. To have as complete an investigation as possible, it is important to involve the OHSC and get their input. Thanks, Rolly

Sent from my iPhone

**From:** Demchuk, Tania MEM:EX  
**To:** [Day, Alan MEM:EX](#); [Bailey, Kristopher W MEM:EX](#)  
**Subject:** notice of work - Polley Lake reduction and upstream berm construction  
**Date:** Sunday, August 10, 2014 1:07:00 PM  
**Attachments:** [Notice of Work \(Temporary Upstream Dyke\) - Tailings Breach Remediation -....pdf](#)  
[Letter to Dale Reimer Mine Manager Imperial Metals - Temporary Upstream Dyke August 9 2014.pdf](#)  
[Figure 1 Mitigation Plan V2.png](#)  
[Notice of Work \(Polley Lake\) - Tailings Breach Remediation - 2014 08 06.pdf](#)  
[Mount Polley August 8 2014.pdf](#)

---

Here are the two notices of work and AI's responses.

Note, we have requested a more detailed drawing of the upstream berm being constructed in the TSF.





**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

August 7, 2014

Steve Rothman, P.Eng  
Senior Inspector of Mines – Health and Safety  
Ministry of Energy and Mines  
441 Columbia Street  
Kamloops, B.C  
V2C 2T3

Dear Mr. Rothman:

**RE: Notice of Work (Temporary Upstream Dyke) – Tailings Breach Remediation**

As requested by the Ministry of Energy and Mines (MEM) in an onsite meeting held with Mount Polley Mining Corporation (MPMC), AMEC and BGC Engineering (BGC) on August 6<sup>th</sup>, 2014 regarding the tailings storage facility (TSF) breach remediation planning, please find below an outline of the work planned by MPMC in constructing an upstream dyke within the confines of the previously constructed TSF.

This plan has been developed in coordination with AMEC and BGC. The work will consist of placing run-of-mine non-acid-generating (NAG) material upstream of the breached area along the Perimeter Embankment with an aim of securing tailings solids within the TSF. Please see Figure 1 below depicting the proposed area of construction.



Figure 1 – Upstream Dyke





**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

The work is to be conducted under a safe work procedure, which will be a "live" document updated as construction is advanced; please find a copy attached for reference.

Work is to commence immediately on this project, and updates will be provided to MEM as per regularly scheduled meetings.

Should you have any questions, please do not hesitate to contact me at (250) 790-2215 ext. 2600.

Sincerely,

Dale Reimer, Mine Manager  
Mount Polley Mining Corporation  
[DReimer@MountPolley.com](mailto:DReimer@MountPolley.com)

Reviewed and Endorsed:

Iain Bruce, Chief Technical Officer  
BGC

Steve Rice, Principal Engineer  
AMEC

Cc. George Warnock, Heather Narynksi, Brian Kynoch, Art Frye, Luke Moger, Ryan Brown, Steve Rice, Iain Bruce, Daryl Dufault

<b>MOUNT POLLEY MINING CORPORATION STANDARD PROCEDURE</b>	
<b>SUBJECT: Tailings Containment Dyke Construction</b>	<b>PROCEDURE NO:</b>
<b>EFFECTIVE DATE: August 6, 2014</b>	<b>REVISION DATE:</b>

**OBJECTIVE:**

- To ensure the safety of Personnel when constructing the tailings containment dyke (operating upon or within the tailings facility embankments).

**Procedure**

All work performed upon or within the tailings embankments will be performed in accordance with plans issued by the Senior Mine Engineer or his designate. Specific requirements are outlined below:

1. All employees operating equipment or working within the defined area are required to read and demonstrate understanding of this procedure before beginning work.
2. Survey control will be available at all times for operational support.
3. All working areas and travel ways will be continuously illuminated during night shifts.
4. A dump supervisor will be continuously inside the defined area, performing regular visual checks of the road/dump surface. Every 5 loads, the dump head must be visually inspected for irregular cracking and any other signs of instability. A detailed record of these inspections must be maintained.
5. All haul trucks will dump at least 30m short of the dump berm.
6. Dump berm heights will be maintained to the full height of the largest haul truck tire in the fleet.
7. A guard will be placed at the junction of the waste haul road and the Orica access road. No personnel will be allowed through this guard without the permission of the Shifter.

*If you feel uncomfortable in performing any part of this procedure, please discuss with your supervisor.*



August 9, 2014

Mr. Dale Reimer  
Mine Manager  
Mount Polley Mining  
Box 12 Likely, BC V0L 1N0

Mine: 1101163  
ORCS: 19020-40

By mail and email: [dreimer@mountpolley.com](mailto:dreimer@mountpolley.com); [bkynoch@imperialmetals.com](mailto:bkynoch@imperialmetals.com) [afrye@mountpolley.com](mailto:afrye@mountpolley.com); [rbrown@mountpolley.com](mailto:rbrown@mountpolley.com); [Steve.Rice@Amec.com](mailto:Steve.Rice@Amec.com); [ibruce@bgcengineering.com](mailto:ibruce@bgcengineering.com); [DDufault@bgcengineering.ca](mailto:DDufault@bgcengineering.ca); [lmoger@mountpolley.com](mailto:lmoger@mountpolley.com) [jlove@imperialmetals.com](mailto:jlove@imperialmetals.com); [dparsons@imperialmetals.com](mailto:dparsons@imperialmetals.com)

Dear Mr. Reimer:

**Re: Notice of Work (Temporary Upstream Dyke) – Tailings Breach Remediation**

I am in receipt of your August 7, 2014 letter entitled "Notice of Work (Temporary Upstream Dyke) – Tailings Breach Remediation". I understand this letter is to provide notification of emergency works that Mount Polley Mining Corporation will be undertaking to contain tailings in the impoundment area and prevent further release of tailings to the environment.

I also acknowledge receipt of the August 6, 2014 "Mount Polley Mining Corporation Standard Procedure Tailings Containment Dyke Construction" outlining safe working procedures in this area.

Please provide me with an updated design diagram of the temporary upstream containment dyke that shows more detail of the location, and dimensions of the structure. Please also provide me with additional information that generally shows and describes how water and tailings will be managed in this area. I would appreciate receiving this as soon as possible, and not later than August 13, 2014.

Please continue to provide me with regular updates as the work proceeds.

Sincerely,

Al Hoffman, P.Eng.  
Chief Inspector of Mines

.../2

Cc: Mr. David Morel, Assistant Deputy Minister, MEM  
Ms. Diane Howe, Deputy Chief Inspector of Mines, Permitting and Reclamation, MEM  
Mr. Rolly Thorpe, Deputy Chief Inspector of Mines, Health and Safety, MEM  
Ms. Heather Narynski, Senior Geotechnical Inspector, MEM  
Mr. Stephen Rothman, Senior Inspector of Mines, Kamloops, MEM  
Ms. Tania Demchuk, Senior Environmental Geoscientist, MEM  
Mr. George Warnock, Manager, Geotechnical Engineering, MEM  
Mr. Art Frye, Chief Operating Manager, Imperial Metals Corporation  
Mr. Jack Love, Environmental Superintendent, Imperial Metals Corporation  
Mr. Don Parsons, Chief Operating Officer, Imperial Metals Corporation  
Mr. Hubert Bunce, Environmental Protection, Mining Operations Director, MOE  
Ms. Gabi Matscha, Environmental Quality Section Head, Ministry of Environment  
Ms. Jennifer McGuire, Executive Director, Environmental Protection Division, MOE





Polley Lake

Polley Lake Road

Hazeltine Creek

Tailings Haul Road

Proposed New Pipeline

Upstream Tailings Dyke

TSF





# MOUNT POLLEY MINING CORPORATION

A DIVISION OF IMPERIAL METALS CORPORATION

August 7, 2014

Steve Rothman, P.Eng  
Senior Inspector of Mines – Health and Safety  
Ministry of Energy and Mines  
441 Columbia Street  
Kamloops, B.C  
V2C 2T3

Dear Mr. Rothman:

## **RE: Notice of Work (Polley Lake) – Tailings Breach Remediation**

As requested by the Ministry of Energy and Mines (MEM) in an onsite meeting held with Mount Polley Mining Corporation (MPMC), AMEC and BGC Engineering (BGC) on August 6<sup>th</sup>, 2014 regarding the tailings storage facility (TSF) breach remediation planning, please find below an outline of the work planned by MPMC in reducing the artificially high level of water in Polley Lake caused by a plug of the main outlet by tailings debris.

This plan has been developed in coordination with AMEC and BGC. The work will consist of reducing the raised water level of Polley Lake back to original stable levels. The pumped water will be discharged back into Hazeltine Creek downstream of the tailings material deposit at the outflow at the south of Polley Lake into Hazeltine Creek. Pumping infrastructure will be installed at the terminus of Polley Lake Road and conveyed by pipeline to the discharge location. Please see Figure 1 below depicting the proposed area of construction.



Figure 1 – Upstream Dyke





**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

Work is to commence immediately on this project, and updates will be provided to MEM as per regularly scheduled meetings.

Should you have any questions, please do not hesitate to contact me at (250) 790-2215 ext. 2600.

Sincerely,

Dale Reimer, Mine Manager  
Mount Polley Mining Corporation  
[DReimer@MountPolley.com](mailto:DReimer@MountPolley.com)

Reviewed and Endorsed:

Iain Bruce, Chief Technical Officer  
BGC

Steve Rice, Principal Engineer  
AMEC

Cc. George Warnock, Heather Narynksi, Brian Kynoch, Art Frye, Luke Moger, Ryan Brown, Steve Rice, Iain Bruce, Daryl Dufault



August 8, 2014

Mr. Dale Reimer  
Mine Manager  
Mount Polley Mining  
Box 12 Likely, BC V0L 1N0

Mine: 1101163  
ORCS: 19020-40

By mail and email: [dreimer@mountpolley.com](mailto:dreimer@mountpolley.com); [bkynoch@imperialmetals.com](mailto:bkynoch@imperialmetals.com)  
[afrye@mountpolley.com](mailto:afrye@mountpolley.com); [rbrown@mountpolley.com](mailto:rbrown@mountpolley.com); [Steve.Rice@Amec.com](mailto:Steve.Rice@Amec.com);  
[ibruce@bgcengineering.com](mailto:ibruce@bgcengineering.com); [DDufault@bgcengineering.ca](mailto:DDufault@bgcengineering.ca); [Imoger@mountpolley.com](mailto:Imoger@mountpolley.com)  
[jlove@imperialmetals.com](mailto:jlove@imperialmetals.com); [dparsons@imperialmetals.com](mailto:dparsons@imperialmetals.com)

Dear Mr. Reimer:

**Re: Notice of Work (Polley Lake) – Tailings Breach Remediation**

I am in receipt of your August 7, 2014 letter entitled "Notice of Work (Polley Lake) – Tailings Breach Remediation". I understand this letter is to provide notification of emergency works you will be undertaking to mitigate the risk of a breach of the tailings and debris plug located in Polley Lake.

Please continue to provide me with regular updates as the work proceeds.

I also remind you of my two orders of August 7, 2014 to ensure Safe Work Procedures are in place for all work on and off the mine related to the tailings breach.

Sincerely,

Al Hoffman, P.Eng.  
Chief Inspector of Mines

.../2

Cc: Mr. David Morel, Assistant Deputy Minister, MEM  
Ms. Diane Howe, Deputy Chief Inspector of Mines, Permitting and Reclamation, MEM  
Mr. Rolly Thorpe, Deputy Chief Inspector of Mines, Health and Safety, MEM  
Ms. Heather Narynski, Senior Geotechnical Inspector, MEM  
Mr. Stephen Rothman, Senior Inspector of Mines, Kamloops, MEM  
Ms. Tania Demchuk, Senior Environmental Geoscientist, MEM  
Mr. George Warnock, Manager, Geotechnical Engineering, MEM  
Mr. Art Frye, Chief Operating Manager, Imperial Metals Corporation  
Mr. Jack Love, Environmental Superintendent, Imperial Metals Corporation  
Mr. Don Parsons, Chief Operating Officer, Imperial Metals Corporation  
Mr. Hubert Bunce, Environmental Protection, Mining Operations Director, MOE  
Ms. Gabi Matscha, Environmental Quality Section Head, Ministry of Environment  
Ms. Jennifer McGuire, Executive Director, Environmental Protection Division, MOE

**From:** Demchuk, Tania MEM:EX  
**To:** [Morel, David P MEM:EX](#); [Hoffman, AI MEM:EX](#)  
**Subject:** RE: Order?  
**Date:** Monday, August 11, 2014 1:28:00 PM  
**Attachments:** [Letter to Dale Reimer Mine Manager Imperial Metals - Inspection Orders August 10 2014.docx](#)

---

Not sure of timing, latest letter is attached, under review with Karen Tannas right now.

---

**From:** Morel, David P MEM:EX  
**Sent:** Monday, August 11, 2014 1:25 PM  
**To:** Hoffman, AI MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** Order?

Can I see the most recent draft of the order? When are you targeting it being sent ?

Thanks

Assistant Deputy Minister  
Ministry of Energy and Mines  
Mines and Mineral Resources Division

Pages 212 through 214 redacted for the following reasons:

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s.14

**From:** Demchuk, Tania MEM:EX  
**To:** [Day, Alan MEM:EX](#); [Hoffman, Al MEM:EX](#)  
**Subject:** FW: August 8 2014 Temporary Upstream Dyke - Tailings Breach Remediation  
**Date:** Monday, August 11, 2014 8:01:00 PM  
**Attachments:** [Letter to MEM - Updated Design Diagram \(Temporary Upstream Dyke\) - Tailings Breach Remediation - 2014 08 06.pdf](#)  
[Figure 1 - Containment Dykes.pdf](#)  
[Appendix A - Cross-Sections.pdf](#)  
[BGC Work Procedures - Establishment of a Temporary Tailings Containment Rockfill Berm - 2014 08 11.docx](#)

---

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Monday, August 11, 2014 1:47 PM  
**To:** Bellefontaine, Kim MEM:EX; Dale Reimer; Brian Kynoch; Art Frye; Ryan Brown; Steve.Rice@Amec.com; [ibruce@bgcengineering.com](mailto:ibruce@bgcengineering.com); [DDufault@bgcengineering.ca](mailto:DDufault@bgcengineering.ca); Jack Love; Don Parsons  
**Cc:** Hoffman, Al MEM:EX; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Booth, Richard MEM:EX; Thorpe, Rolly MEM:EX; Narynski, Heather M MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Warnock, George MEM:EX; Bunce, Hubert ENV:EX; Matscha, Gabriele ENV:EX; McGuire, Jennifer ENV:EX; Brody, Margo X MEM:EX  
**Subject:** RE: August 8 2014 Temporary Upstream Dyke - Tailings Breach Remediation

Mr. Hoffman;

Please find attached a letter from the Mine Manager (Dale Reimer) regarding your letter referenced in the e-mail thread below.

Please find attached in support of this letter:

- 1) Figure 1 - Containment Dykes
- 2) Appendix A - Cross-Sections
- 3) BGC Work Procedures - Establishment of a Temporary Tailings Containment Rockfill Berm - 2014 08 11

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Bellefontaine, Kim MEM:EX [<mailto:Kim.Bellefontaine@gov.bc.ca>]  
**Sent:** August-09-14 2:31 PM  
**To:** Dale Reimer; Brian Kynoch; Art Frye; Ryan Brown; [Steve.Rice@Amec.com](mailto:Steve.Rice@Amec.com); [ibruce@bgcengineering.com](mailto:ibruce@bgcengineering.com); [DDufault@bgcengineering.ca](mailto:DDufault@bgcengineering.ca); Luke Moger; Jack Love; Don Parsons  
**Cc:** Hoffman, Al MEM:EX; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Booth, Richard MEM:EX; Thorpe, Rolly MEM:EX; Narynski, Heather M MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Warnock, George MEM:EX; Bunce, Hubert ENV:EX; Matscha, Gabriele ENV:EX; McGuire,



Jennifer ENV:EX; Brody, Margo X MEM:EX

**Subject:** RE: August 8 2014 Temporary Upstream Dyke - Tailings Breach Remediation

Mr. Reimer,

Please find attached a letter from the Chief Inspector of Mines regarding the Temporary Upstream Dyke - Tailings Breach Remediation.

The original signed paper copy will be in Monday's mail.

***Kim Bellefontaine, M.Sc., P.Geo.***

Manager Environmental Geoscience & Permitting

B.C. Ministry of Energy and Mines

P.O. Box 9320, Stn Prov Gov't, Victoria, BC, V8W 9N3

Courier: 6th Floor, 1810 Blanshard Street, Victoria, BC, V8T 4J1

Phone: (250) 952-0489 Fax: (250) 952-0481

E-mail: [Kim.Bellefontaine@gov.bc.ca](mailto:Kim.Bellefontaine@gov.bc.ca)



**MOUNT POLLEY MINING  
CORPORATION**  
A DIVISION OF IMPERIAL METALS CORPORATION

August 11, 2014

Al Hoffman, P.Eng  
Chief Inspector of Mines  
Ministry of Energy and Mines  
PO Box 0329  
Stn Prov Govt  
Victoria, BC  
V8W 9N3

Dear Mr. Hoffman:

**RE: Updated Design Diagram (Temporary Upstream Dyke) – Tailings Breach Remediation**

---

As requested by the Ministry of Energy and Mines (MEM) in an e-mail sent on behalf of Al Hoffman on August 9, 2014 subject *RE: August 8 2014 Temporary Upstream Dyke – Tailings Breach Remediation*, please find below an updated design diagram of the work planned by MPMC in establishing the temporary upstream dyke within the confines of the previously constructed TSF.

This plan has been developed in coordination with BGC. The work will consist of placing run-of-mine non-acid-generating (NAG) material upstream of the breached area along the Perimeter Embankment with an aim of securing tailings solids within the TSF. Please find Figure 1 attached depicting the proposed dyke, and, attached as Appendix A, cross-sections through this design along the planes identified therein.

The work is to be conducted under the safe work procedure previously submitted, which will be a “live” document updated as construction is advanced. Please also find attached a document with technical guidance on the work procedures provided by BGC; this document also provides design intent relating to tailings and water management through the structure.

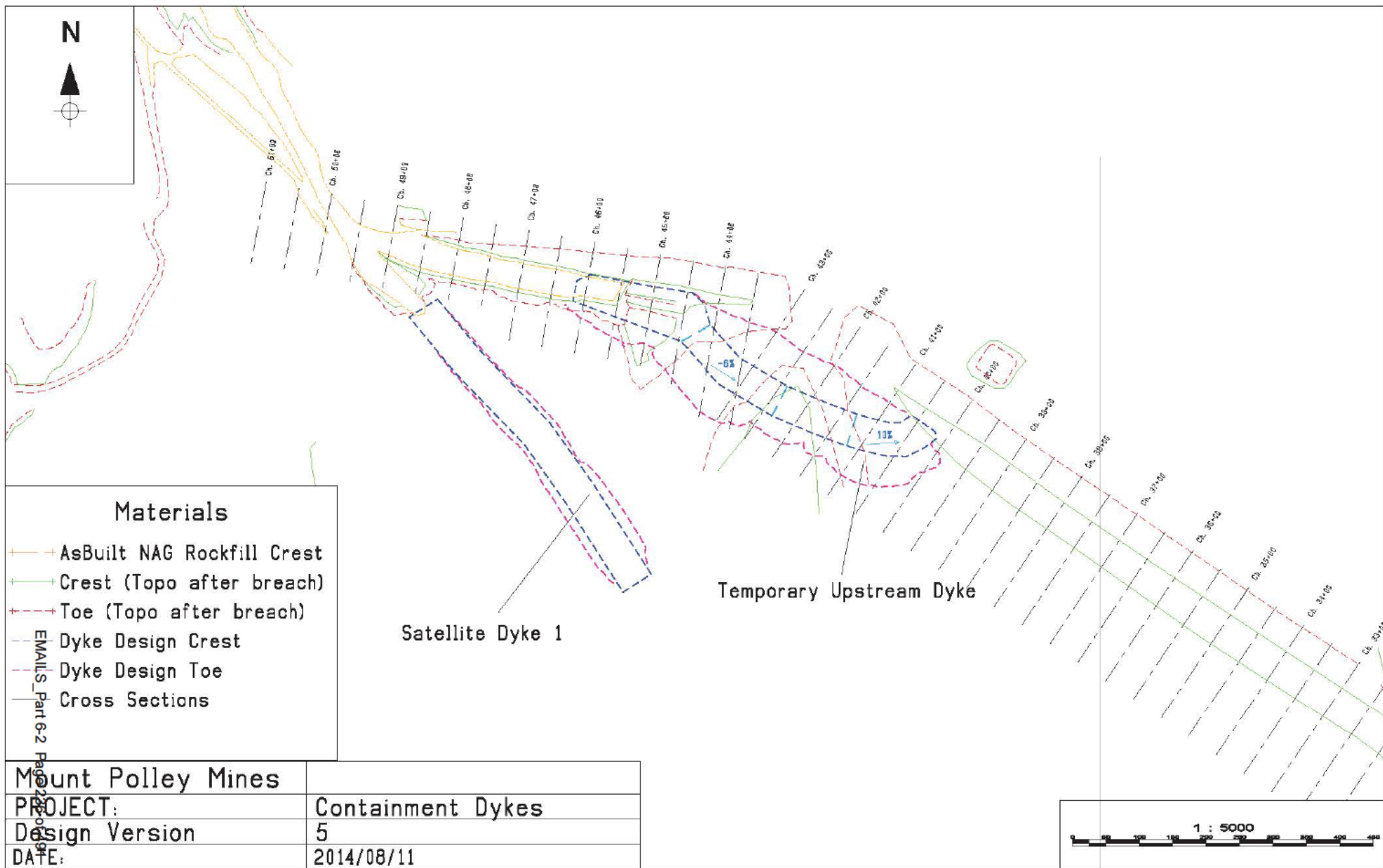
Work has already commenced on this project, and updates will be provided to MEM as per regularly scheduled meetings.

Should you have any questions, please do not hesitate to contact me at (250) 790-2215 ext. 2600.

Sincerely,

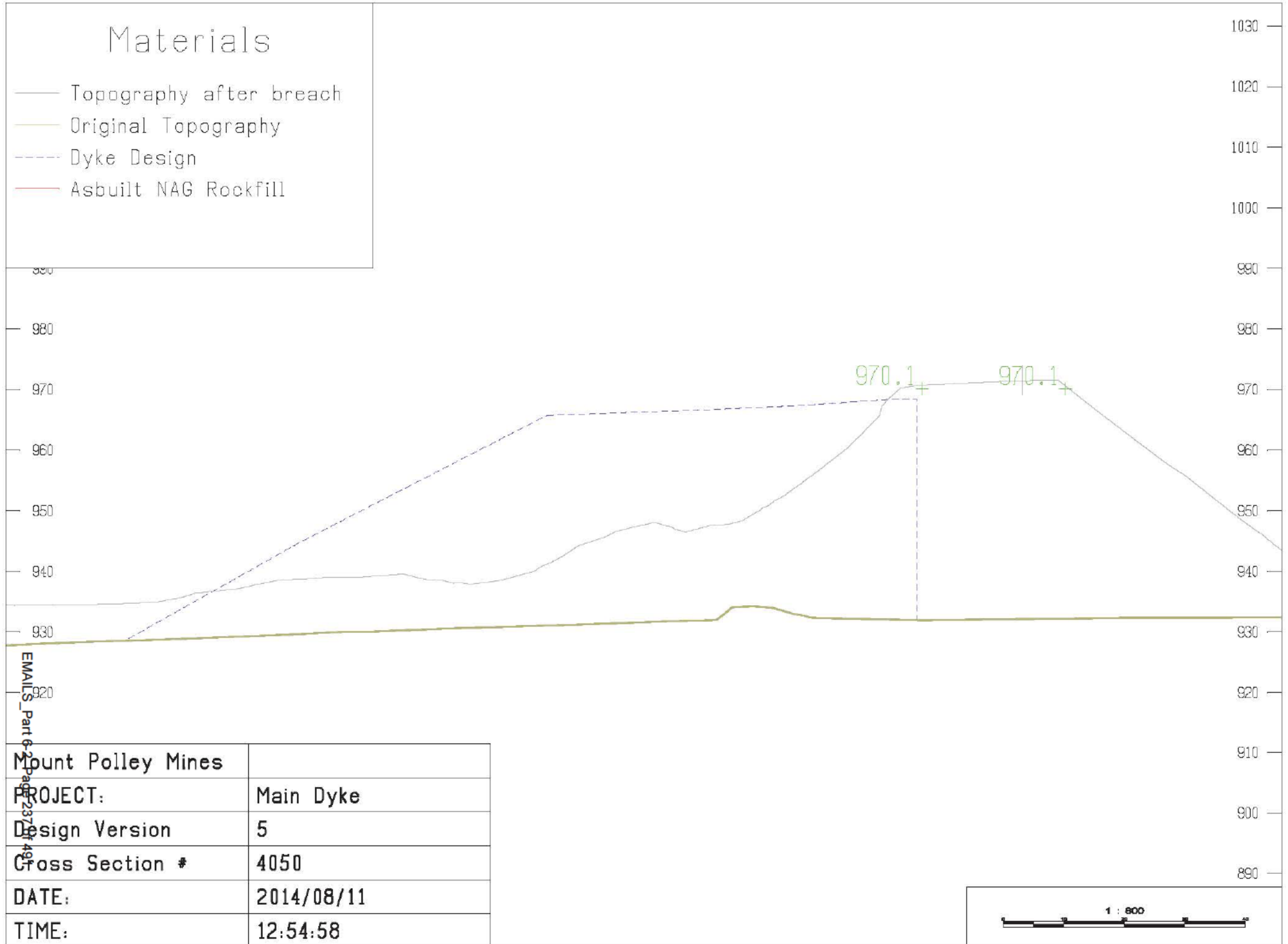
Dale Reimer, Mine Manager  
Mount Polley Mining Corporation  
[DReimer@MountPolley.com](mailto:DReimer@MountPolley.com)

Cc. Brian Kynoch, Art Frye, Ryan Brown, Steve Rice, Iain Bruce, Daryl Dufault, Luke Moger, Jack Love, Don Parsons, David Morel, Diane Howe, Rolly Thorpe, Heather Narynski, Stephen Rothman, Tania Demchuk, George Warnock, Hubert Bunce, Gabi Matscha, Jennifer McGuire



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



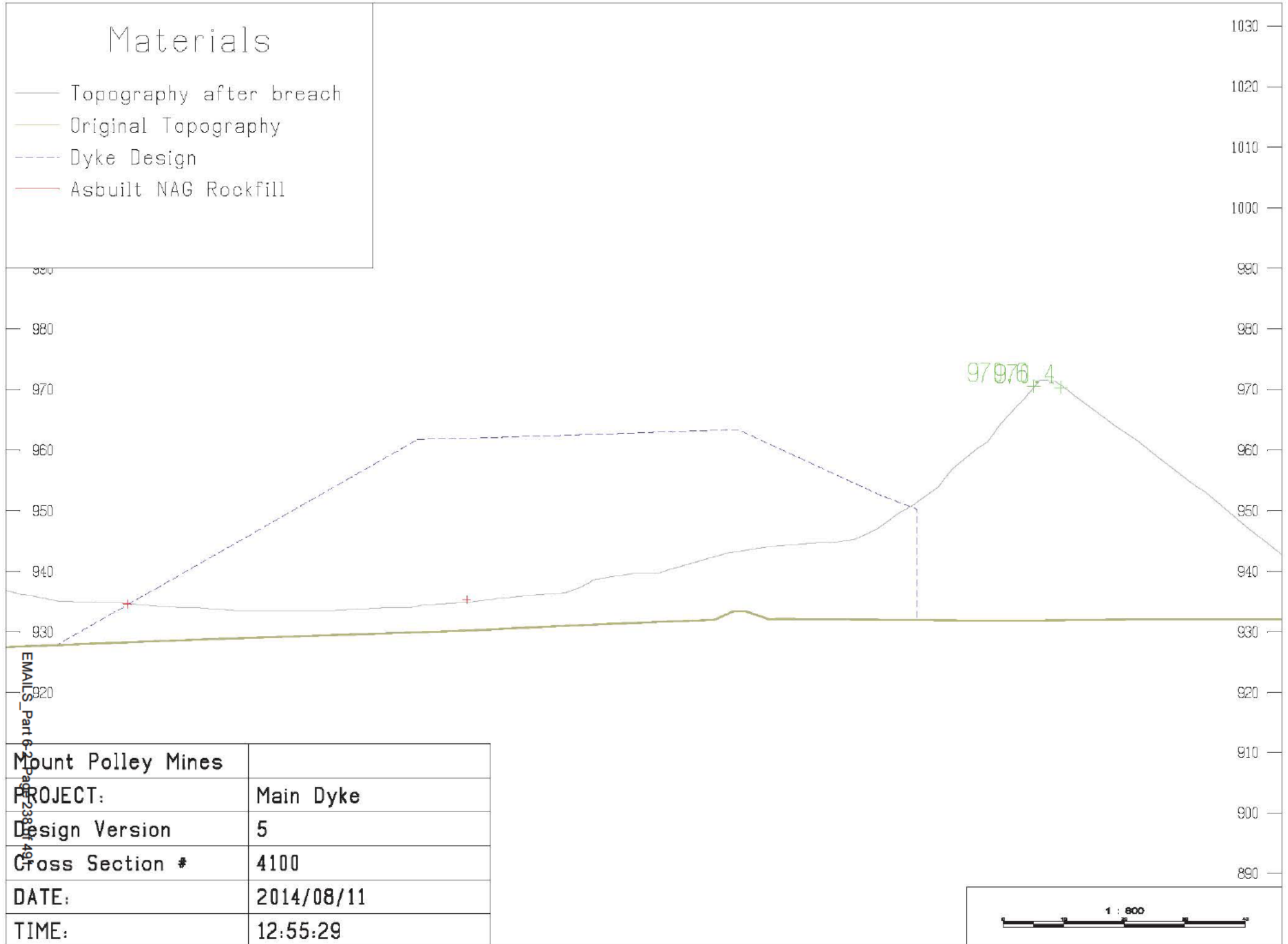
EMAILS\_Part 6 - 23748

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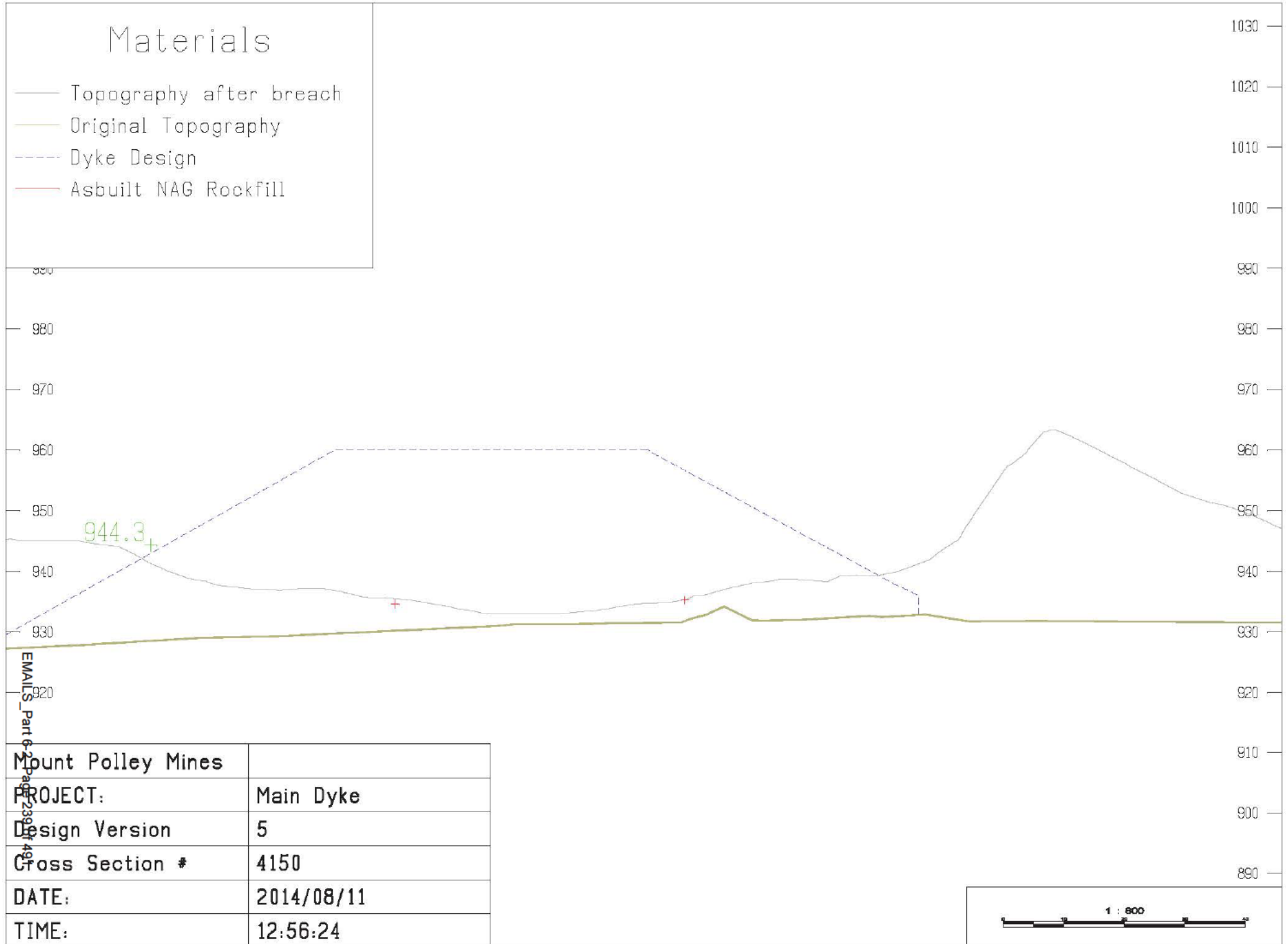
# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMAILS\_Part 6 - Part 2397.dgn

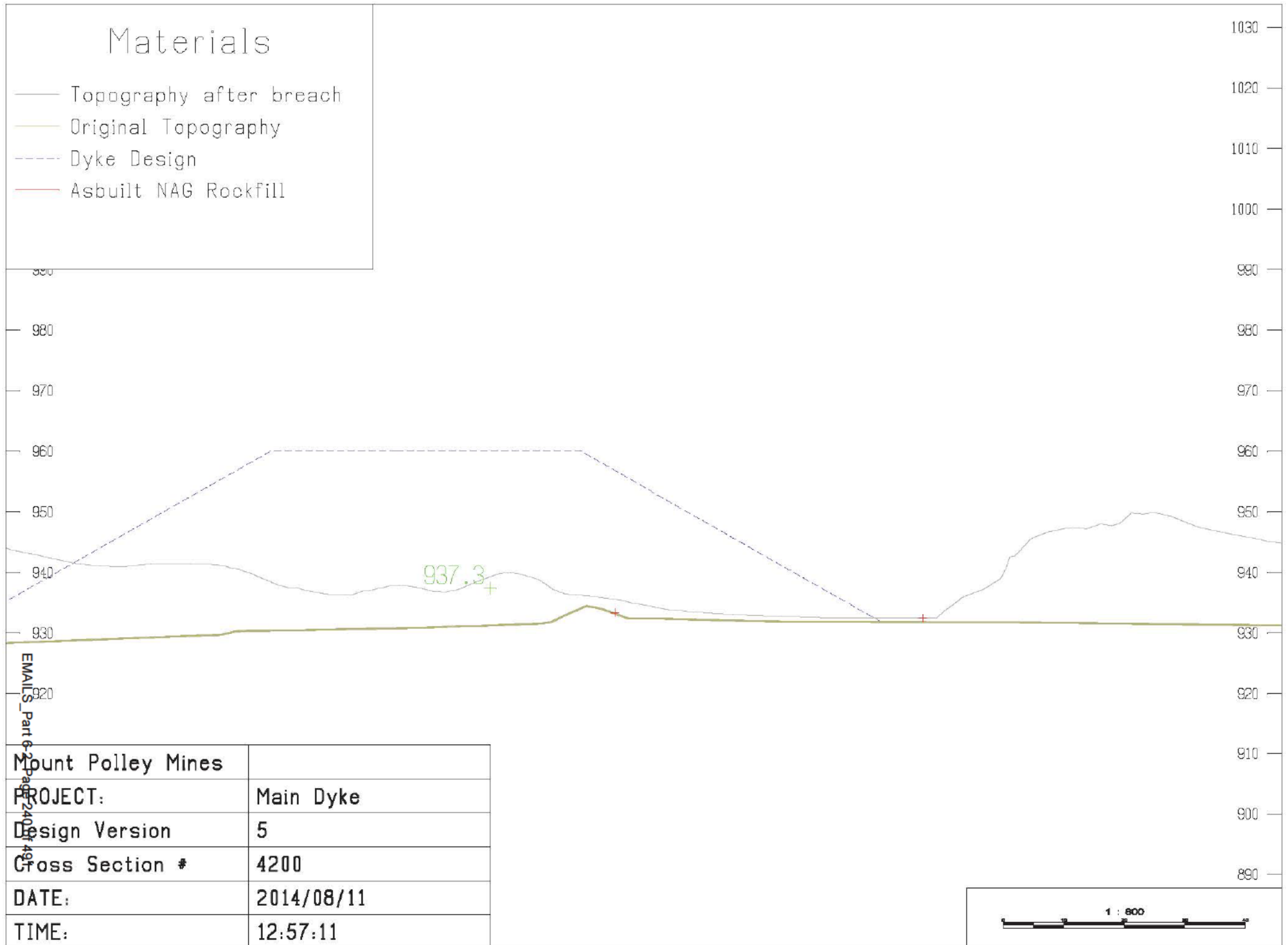
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Design Version	5
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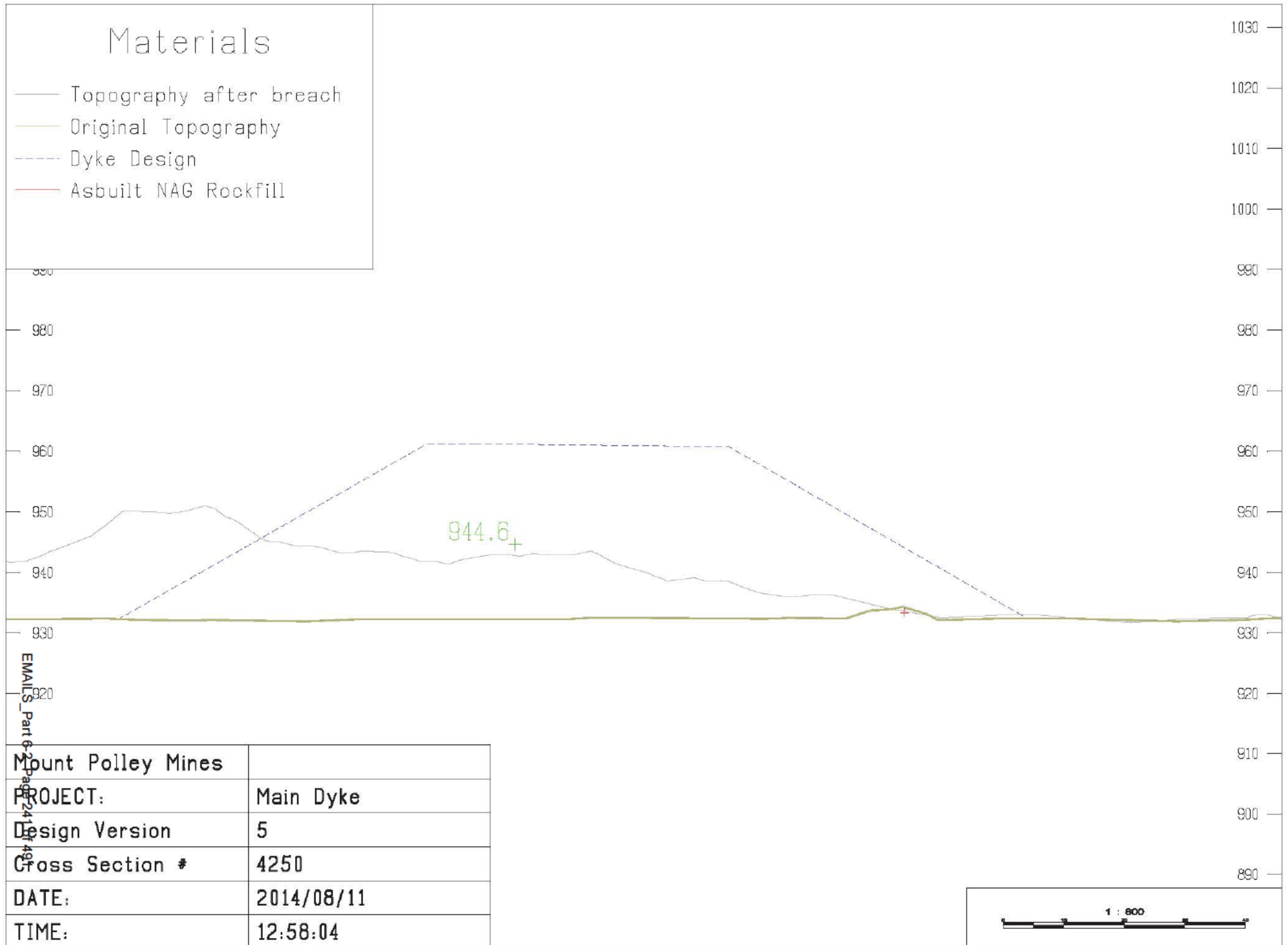
# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



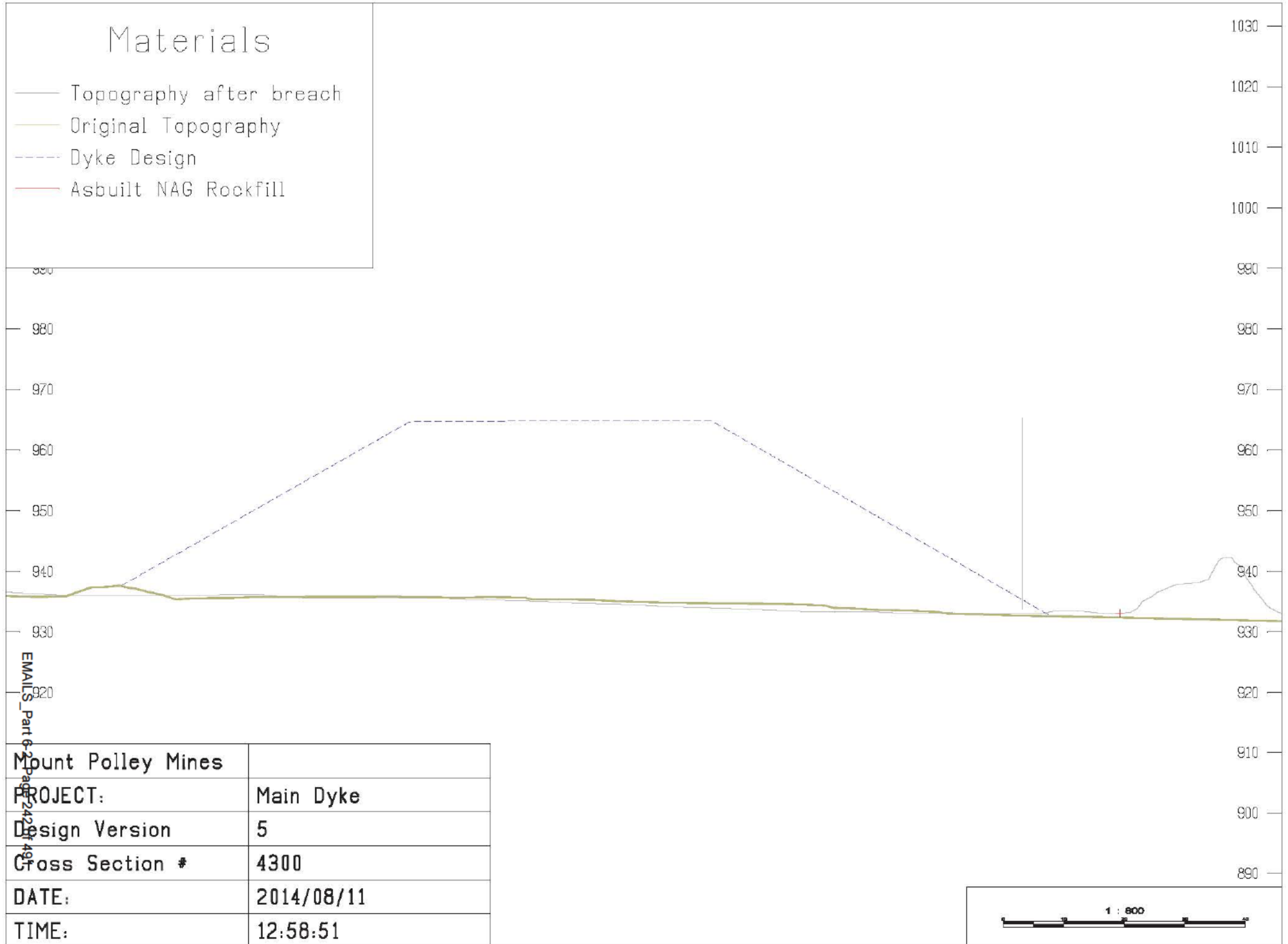
# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



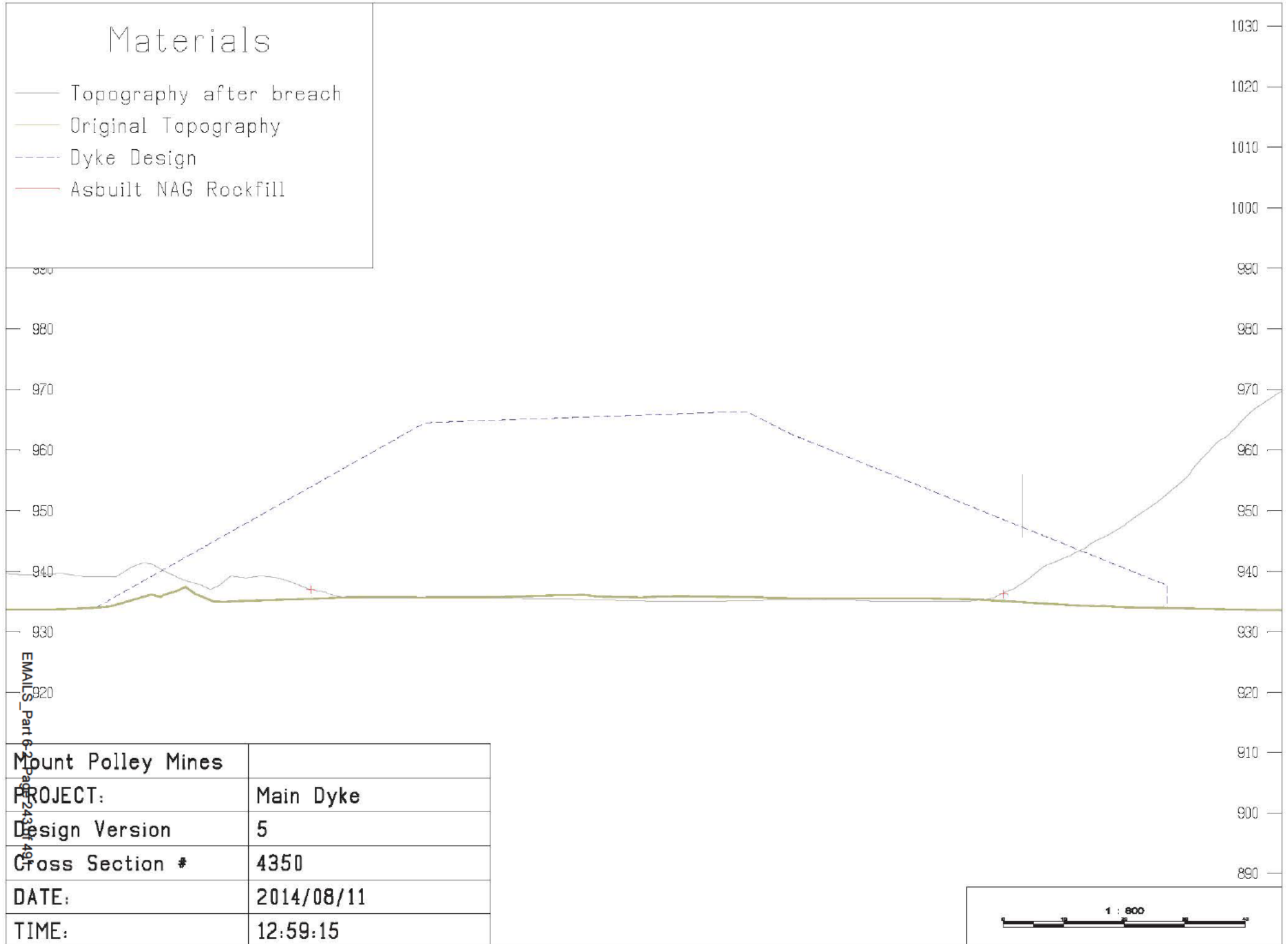
EMAILS\_Part 6 - 2014-08-11  
Page 242 of 491

Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4300
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TIME:	12:58:51

1 : 800

# Materials

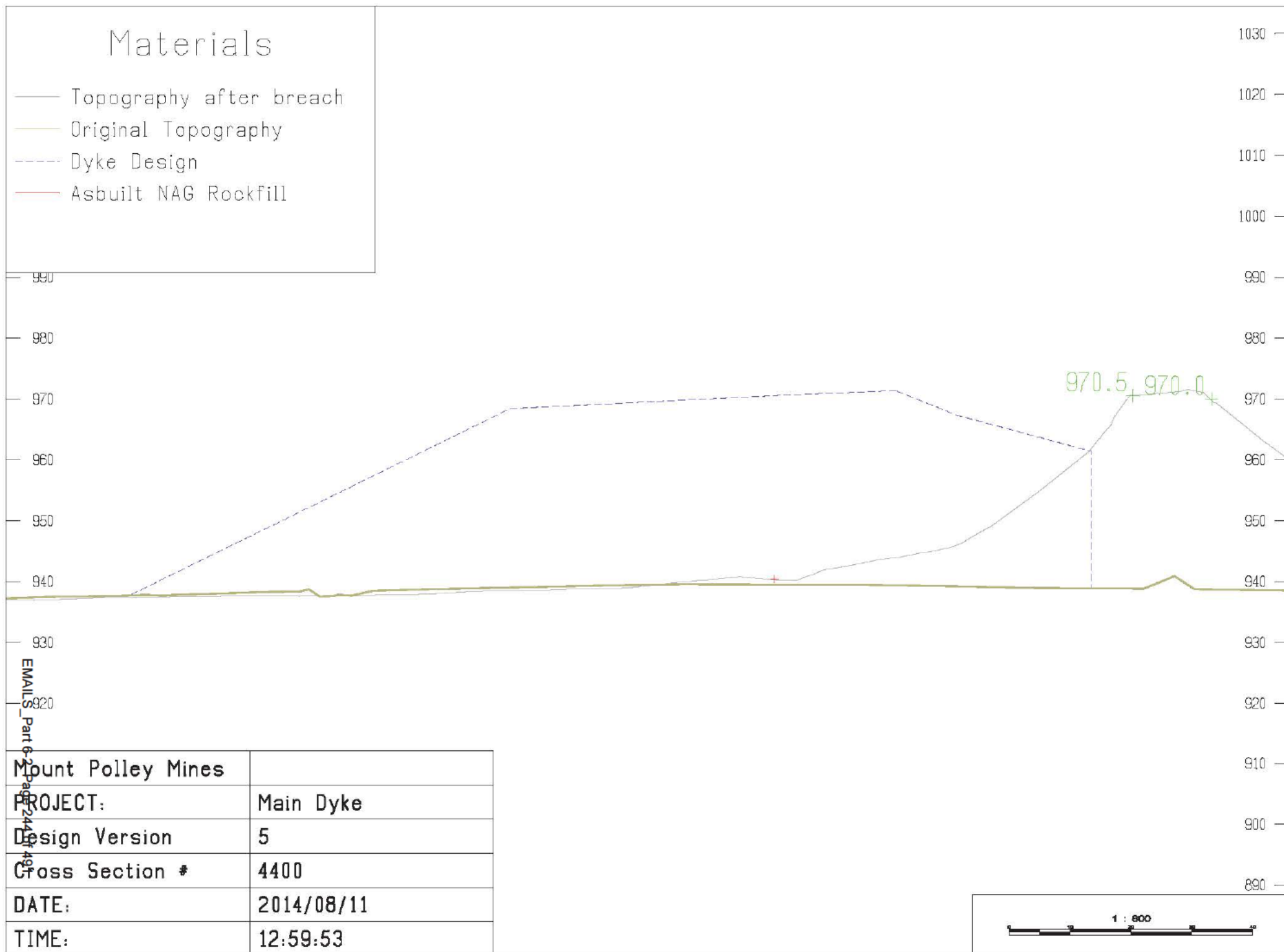
- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMAIL: S\_Part6-2-Part6-2-4350-18

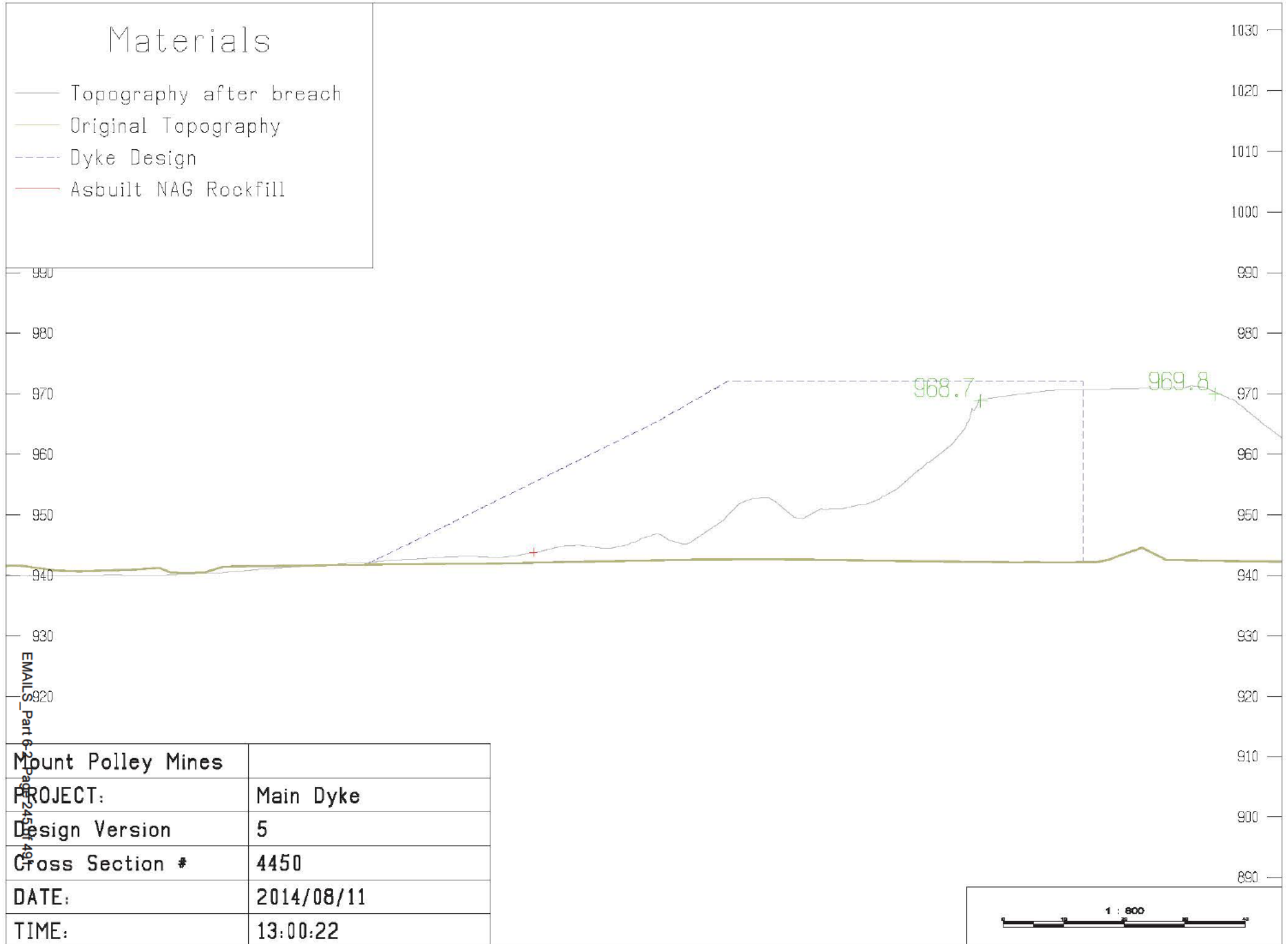
# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill

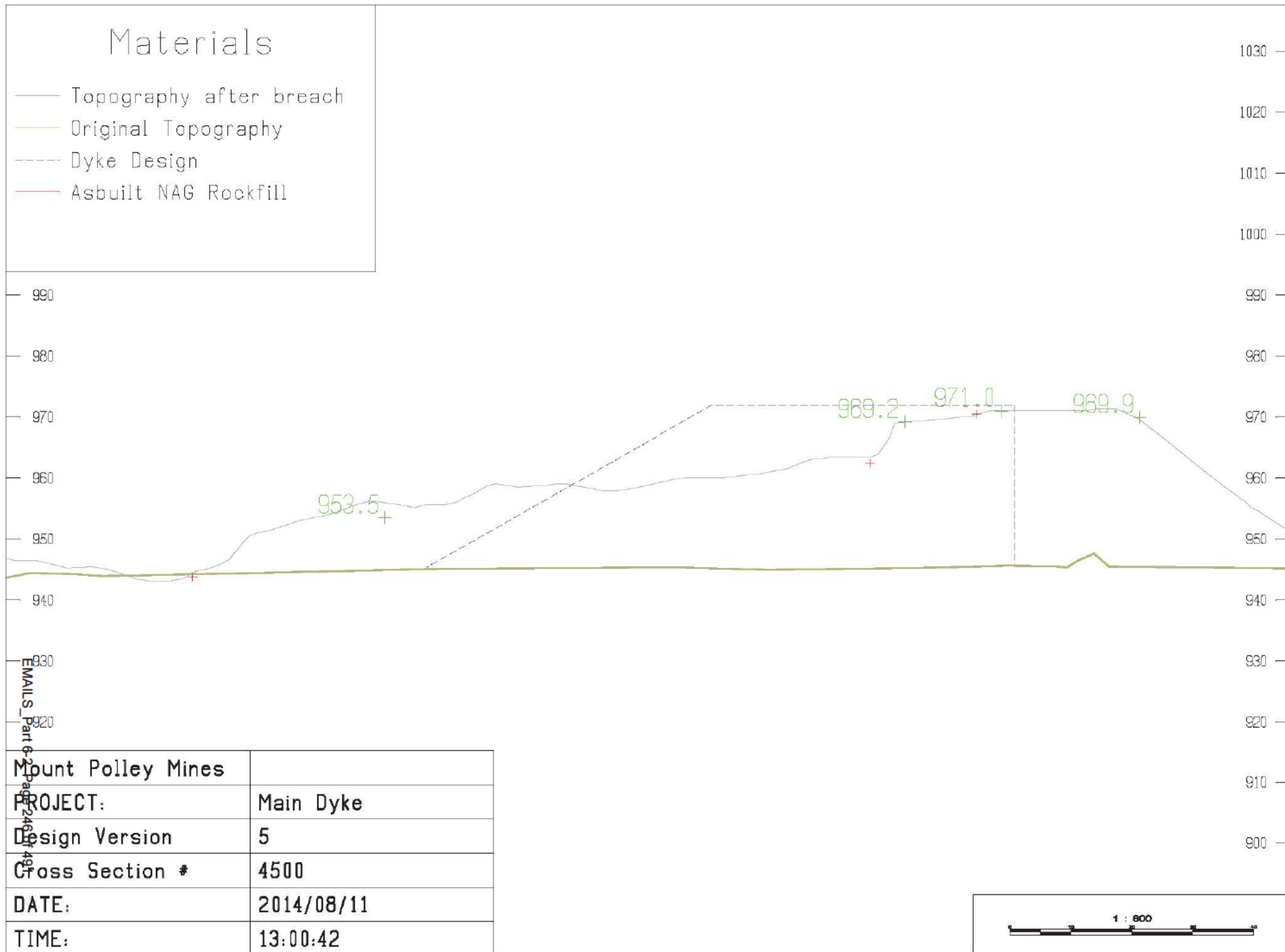


Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4450
DATE:	2014/08/11
TIME:	13:00:22



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill

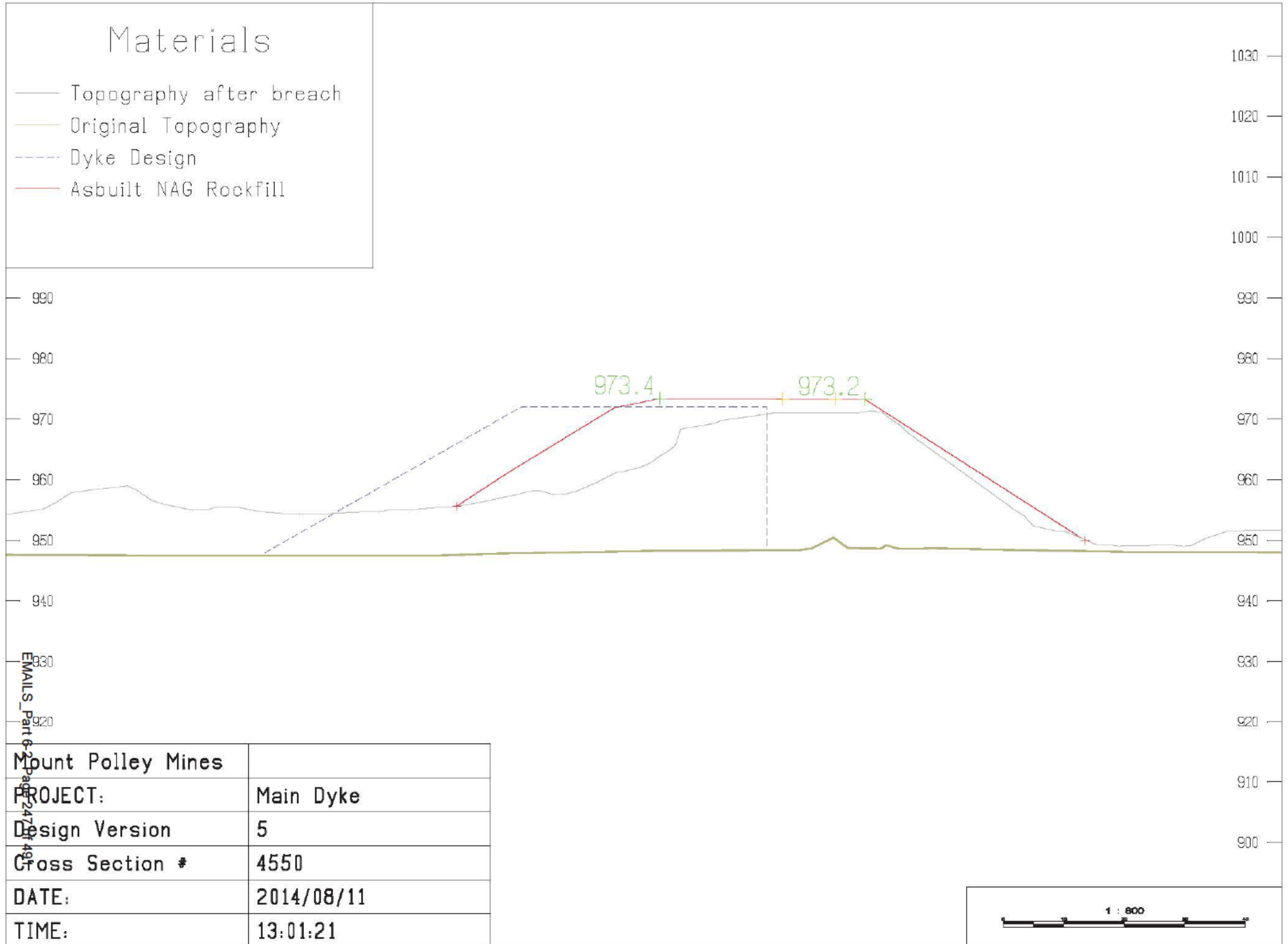


Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4500
DATE:	2014/08/11
TIME:	13:00:42

EMALS\_Part 6 - Page 246 of 491

# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



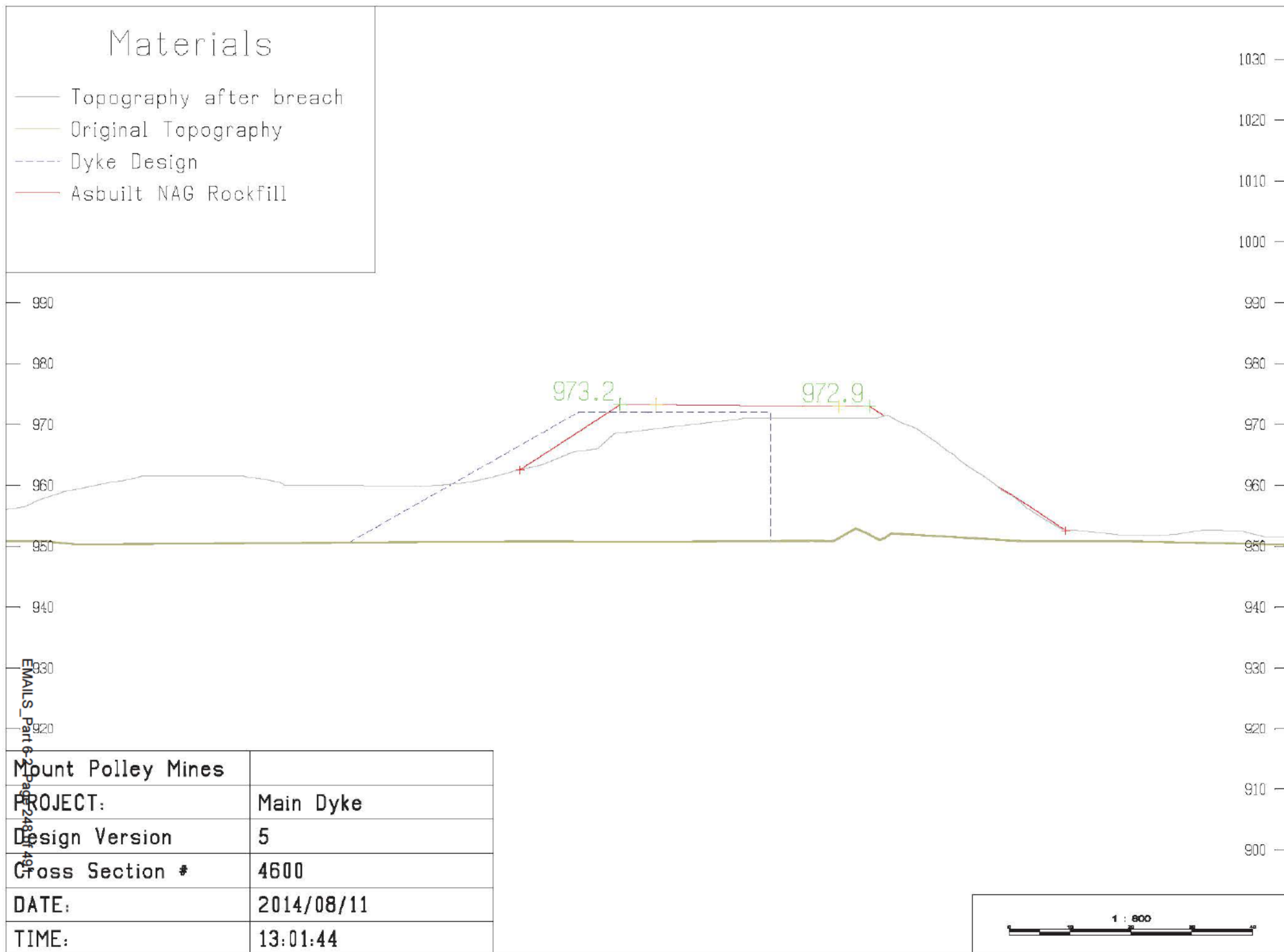
EMALS\_Part 6 -  
Part 6 -  
2477  
189

Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4550
DATE:	2014/08/11
TIME:	13:01:21

1 : 800

# Materials

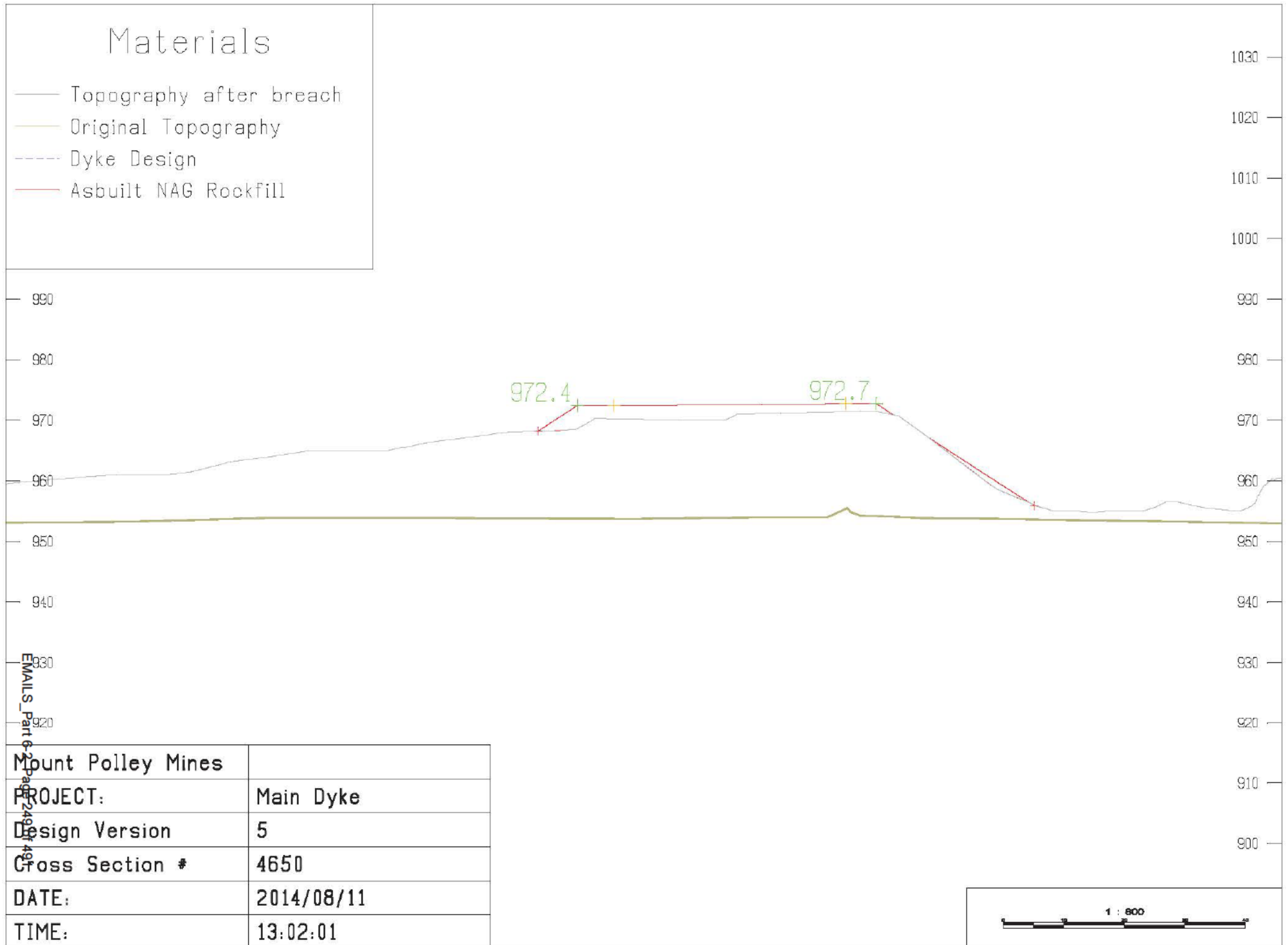
- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4600
DATE:	2014/08/11
TIME:	13:01:44

# Materials

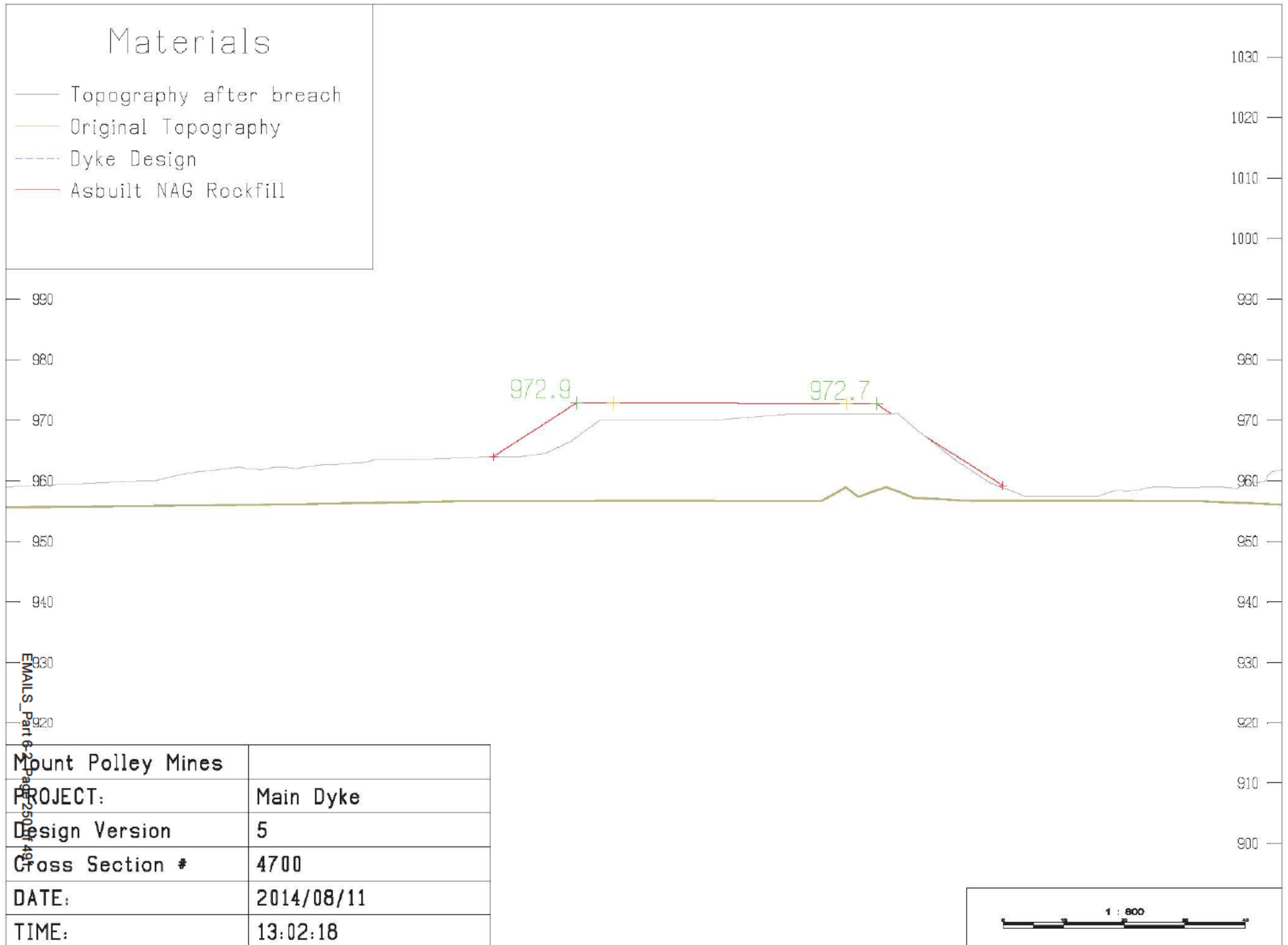
- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMALS\_Part 6 -  
Part 2497-19

# Materials

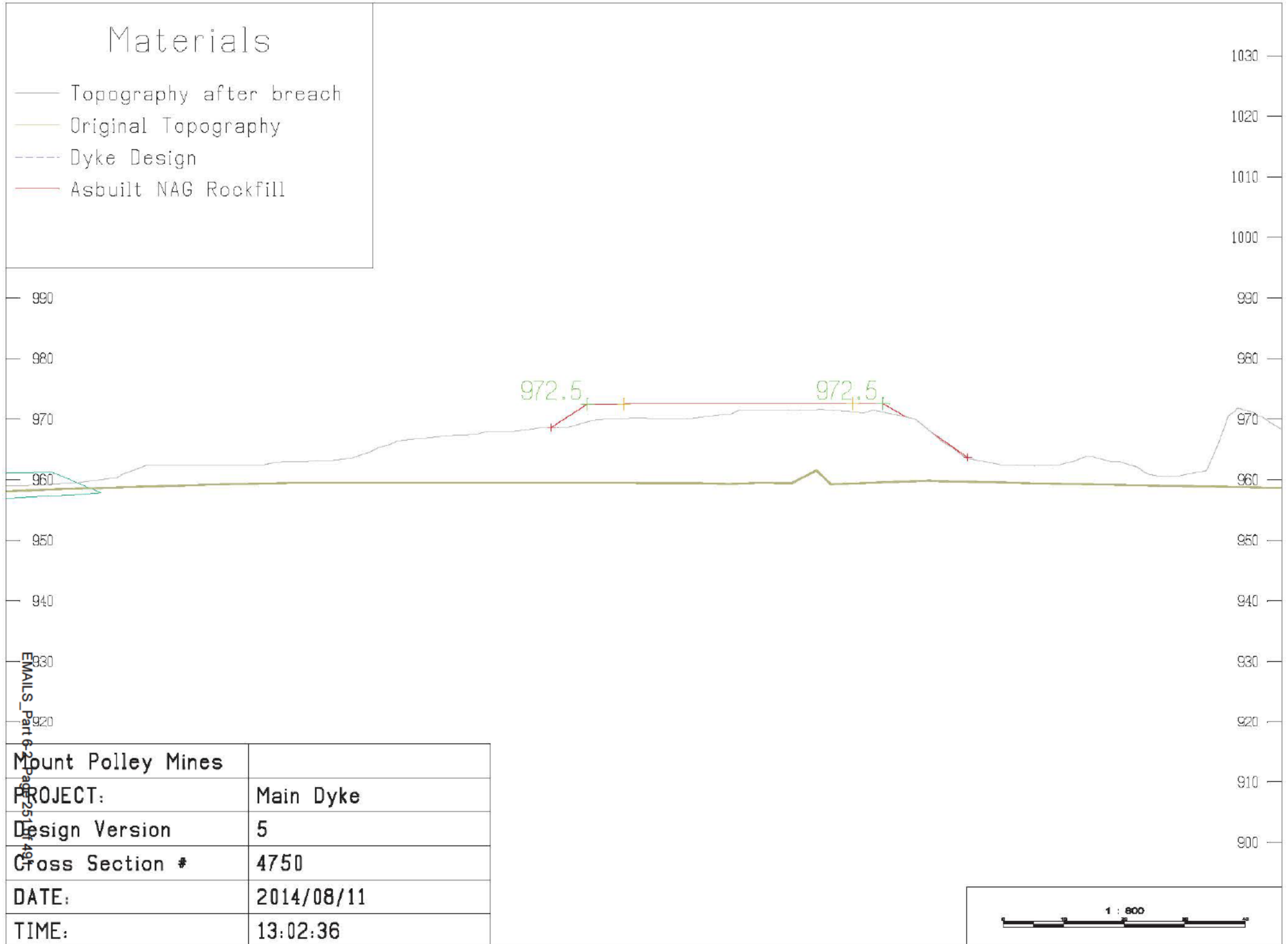
- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMails\_Part6-2-Page 2500 of 49

# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMALS\_Part 6 -  
Part 6 -  
2517  
18

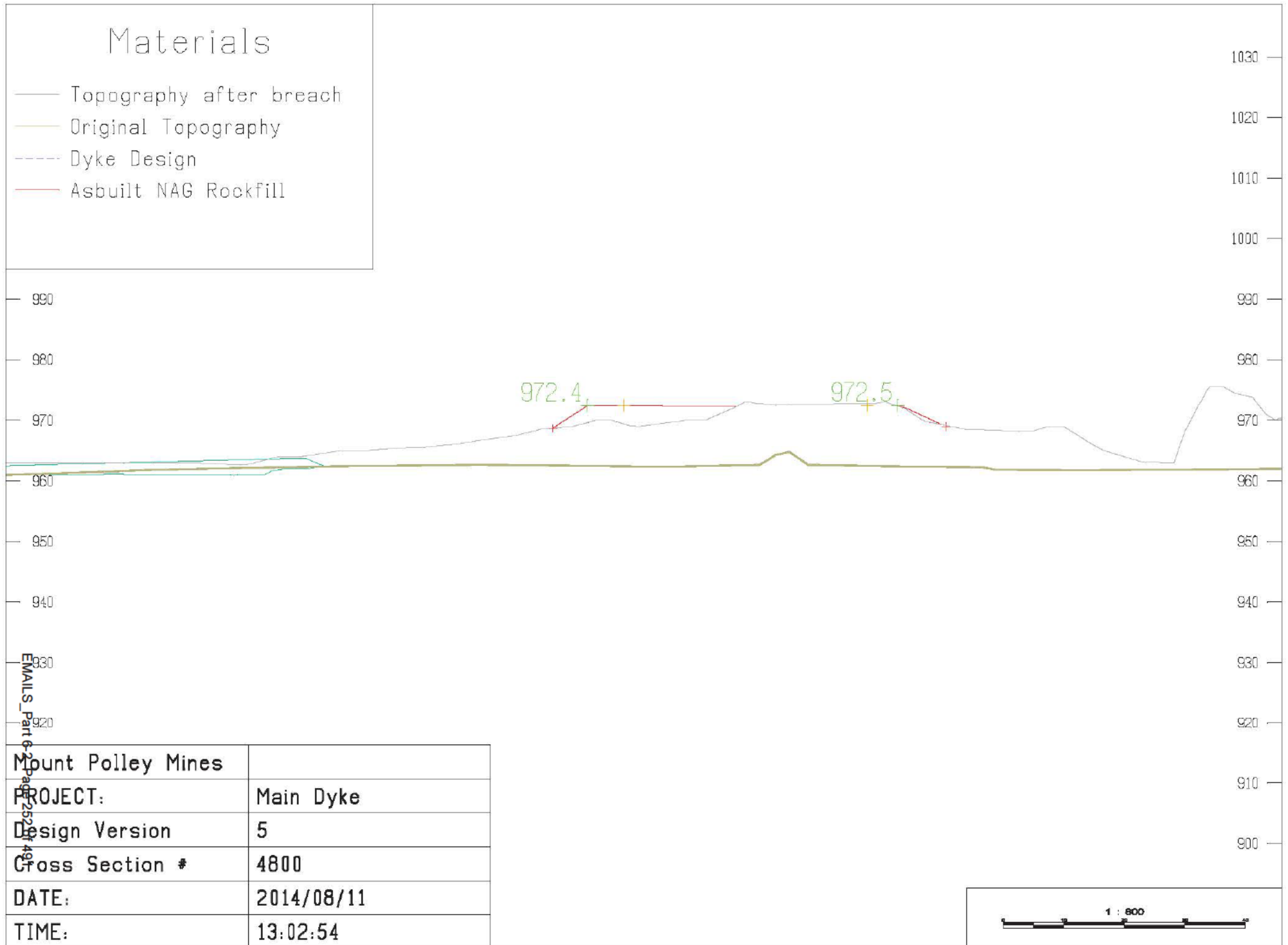
Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4750
DATE:	2014/08/11
TIME:	13:02:36

1 : 800



# Materials

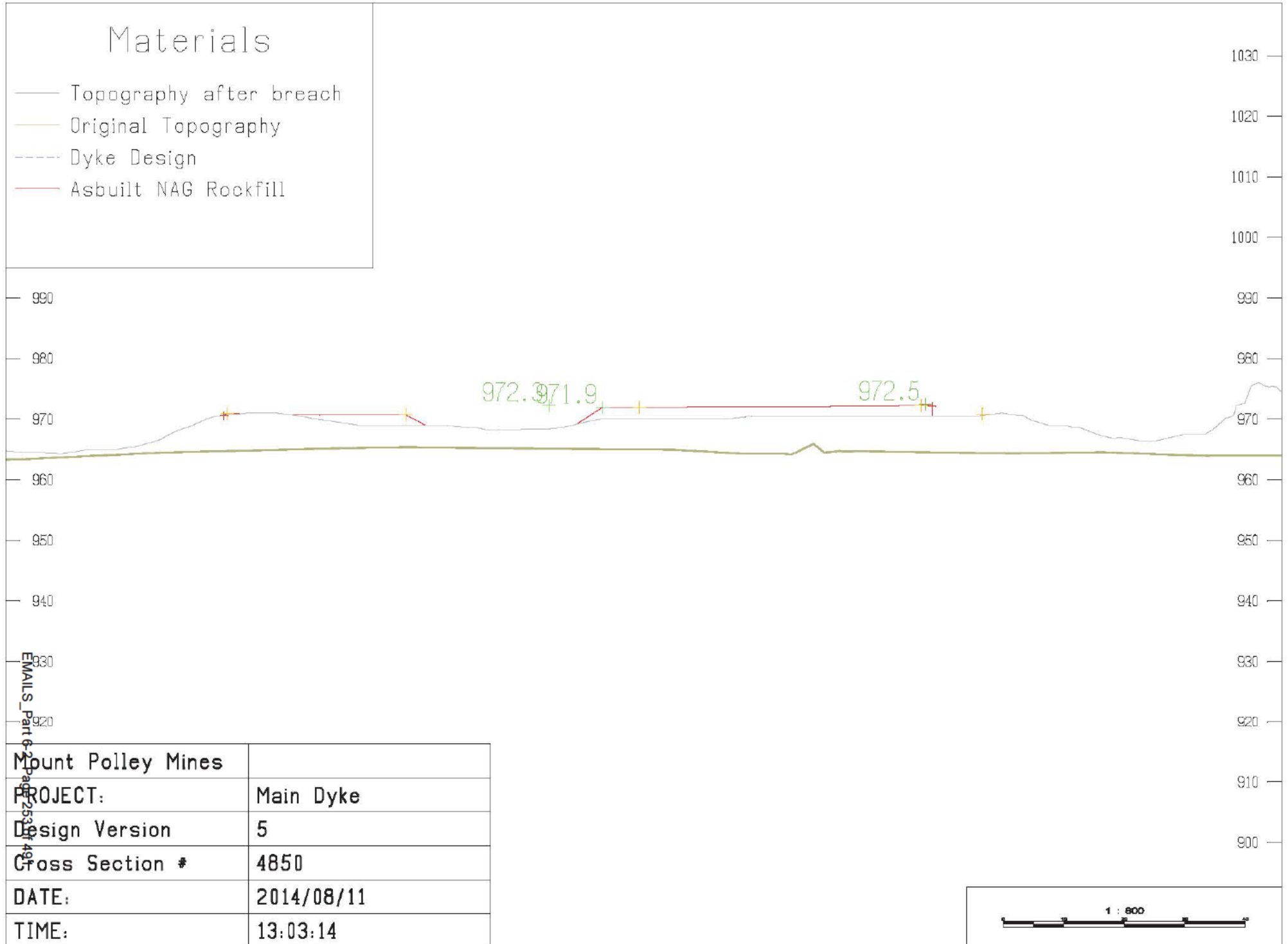
- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



EMails\_Part6-2527-19

# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



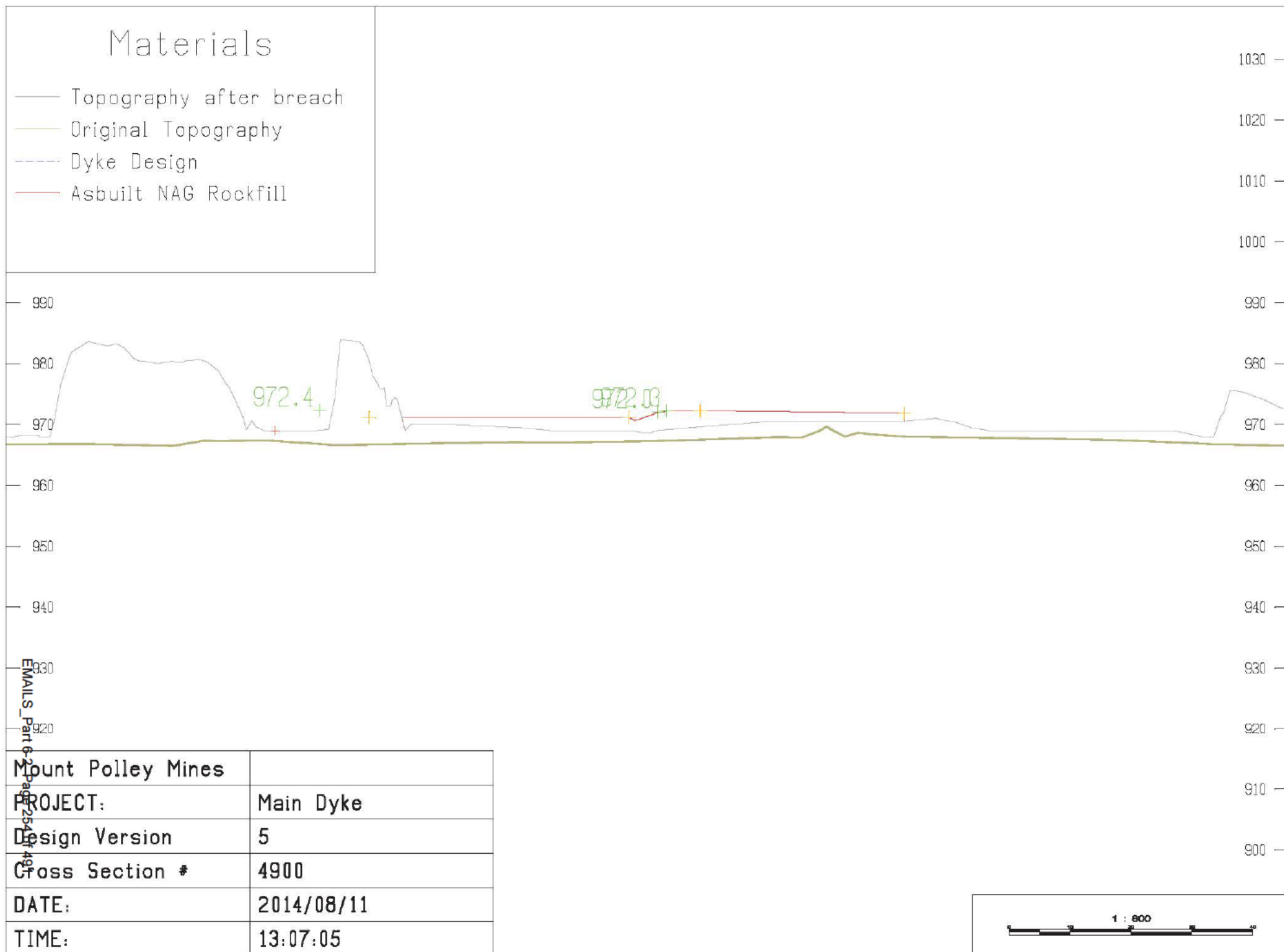
EMALS\_Part 6 - Page 253 of 49

Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4850
DATE:	2014/08/11
TIME:	13:03:14



# Materials

- Topography after breach
- Original Topography
- - - Dyke Design
- Asbuilt NAG Rockfill



Mount Polley Mines	
PROJECT:	Main Dyke
Design Version	5
Cross Section #	4900
DATE:	2014/08/11
TIME:	13:07:05

1 : 800

## **Work procedures for the establishment of a temporary tailings containment rockfill berm**

A rockfill berm is planned to contain tailings solids upstream of the existing breach, to minimize further tailings release and to allow limited access to the area downstream of the breach for remediation and investigation efforts. The intent is to push rock fill off the upstream face of the dam and through a gulley eroded through tailings to get as close as possible to natural ground.

The rockfill will be advanced across the breach from left to right to tie into the far side of the dam. The berm is temporary and should be kept far enough upstream to not contaminate investigative efforts in the area of the breach.

The intent is to truck dump rockfill short and push with bulldozer. Haul trucks are to be kept back 30-50m from the advancing face. Bulldozers will be used to push rockfill to the advancing face. The advancing face should be developed to maximize the displacement of the tailings. The initial material pushed in should be as coarse as possible to penetrate and displace as much tailings as possible. The rockfill should be kept at least 25 to 30 m high at the deepest location to prevent any material from overtopping the rockfill.

If stiffer tailings are encountered an excavator may be used to excavate the tailings prior to advancing the berm. The amount and ability to remove or disturb the tailings to allow deeper penetration will be limited by safety and the reach of the excavator.

The permeability of the rockfill berm will be controlled by the trapped tailings and accumulated tailings on the upstream face. The berm is not intended to be a water retaining structure and if tailings and water starts to accumulate, then the excess water must be pumped out. The flow through the berm could temporarily be collected and pumped to a designated area.

Given the coarseness of rockfill berm, tailings may migrate through the berm, the discharge should be monitored. If fines are noted to be migrating through in large quantities, progressively finer rockfill should be dumped down the upstream face to reduce the migration.

### **Safety**

During construction there should be full-time monitors to observe and document:

- Cracks and deformation
- Seepage quantity and migration of fines
- Accumulation of water and tailings upstream of the berm

The rockfill may adopt a slope flatter than the normal angle of repose for waste rock. The monitor is to alert the operators of any developing cracks. The operator should place more

rock in the downslope side of any cracks and should be aware of any sudden drops in the rock surface.

In the event of a high intensity precipitation event construction activities may have to be temporarily halted.

The construction can proceed at night provided there is a full time observer watching for cracks and there are light pants set up to provide visibility.

**From:** Demchuk, Tania MEM:EX  
**To:** [Bronstein, Nancy MEM:EX](#); [Howe, Diane J MEM:EX](#)  
**Subject:** RE: Mt Polley FOI Dam Failure .xlsx  
**Date:** Tuesday, August 12, 2014 10:05:00 AM

---

Awesome, thanks Nancy!

---

**From:** Bronstein, Nancy MEM:EX  
**Sent:** Tuesday, August 12, 2014 10:01 AM  
**To:** Howe, Diane J MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** Mt Polley FOI Dam Failure .xlsx

Hello Diane and Tanya,  
Here is a spreadsheet format, that would be helpful.  
I suggest using the documentation format that Litigation Branch uses, as this will be more efficient and productive in the long run.

I suspect litigation will be likely, in the future.  
If we properly document at the beginning it will save a lot of time.  
I will send along the litigation branch documentation next email.

*Sincerely,*

*Nancy Labenek Bronstein A. Ag.*

Nancy Labenek Bronstein  
Ministry of Energy and Mines  
Mines and Mineral Resources Division  
6th Floor 1810 Blanshard Street  
P.O. Box 9320 Stn Prov Govt  
Victoria BC V8W 9N3  
Tel: 250-952-0475 Fax: 250-952-0491



**From:** Demchuk, Tania MEM:EX  
**To:** [Bronstein, Nancy MEM:EX](#); [Bellefontaine, Kim MEM:EX](#); [Rollo, Andrew MEM:EX](#); [Narynski, Heather M MEM:EX](#)  
**Cc:** [Metcalf, Megan MEM:EX](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#)  
**Subject:** RE: Mt Polley FOI Dam Failure Listing of Offsite documents M-200 Mine 1101163  
**Date:** Wednesday, August 13, 2014 2:30:00 PM

---

Thanks Nancy!

All – the boxes are being stored in my office, which is locked every night.

Tania

---

**From:** Bronstein, Nancy MEM:EX  
**Sent:** Wednesday, August 13, 2014 2:05 PM  
**To:** Bellefontaine, Kim MEM:EX; Rollo, Andrew MEM:EX; Demchuk, Tania MEM:EX; Narynski, Heather M MEM:EX  
**Cc:** Metcalfe, Megan MEM:EX  
**Subject:** Mt Polley FOI Dam Failure Listing of Offsite documents M-200 Mine 1101163

Hello Tania, Kim, Heather and Andrew,  
Here is a listing of the offsite Mt Polley boxes M-200 Mine 1101163 and files.  
All the files in these boxes have been labelled with the Assession box they are to be returned to except the ones already pulled by Heather Narynski, already.  
Please ensure the information is returned to the correct box.

The listing is in the format required by Litigation Branch.

If you need any assistance I would be happy to help.

*Sincerely,*

*Nancy Labenek Bronstein A. Ag.*

Nancy Labenek Bronstein  
Ministry of Energy and Mines  
Mines and Mineral Resources Division  
6th Floor 1810 Blanshard Street  
P.O. Box 9320 Stn Prov Govt  
Victoria BC V8W 9N3  
Tel: 250-952-0475 Fax: 250-952-0491

**From:** Demchuk, Tania MEM:EX  
**To:** [Rollo, Andrew MEM:EX \(Andrew.Rollo@gov.bc.ca\)](mailto:Rollo.Andrew MEM:EX (Andrew.Rollo@gov.bc.ca))  
**Subject:** FW: Mount Polley Order  
**Date:** Wednesday, August 13, 2014 5:07:00 PM  
**Attachments:** [PollutionAbatementOrder\\_20140805.pdf](#)  
[ATT00001.htm](#)

---

---

**From:** Bellefontaine, Kim MEM:EX  
**Sent:** Monday, August 11, 2014 10:18 AM  
**To:** Howe, Diane J MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** Fwd: Mount Polley Order

Kim Bellefontaine, M.Sc., P.Geo.  
Manager Environmental Geoscience and Permitting  
BC Ministry of Energy & Mines  
250-952-0489  
[Kim.Bellefontaine@gov.bc.ca](mailto:Kim.Bellefontaine@gov.bc.ca)

Begin forwarded message:

**From:** "Sundher, Avtar S ENV:EX" <[Avtar.Sundher@gov.bc.ca](mailto:Avtar.Sundher@gov.bc.ca)>  
**Date:** August 11, 2014 at 10:15:29 AM PDT  
**To:** "Hoffman, Al MEM:EX" <[Al.Hoffman@gov.bc.ca](mailto:Al.Hoffman@gov.bc.ca)>, "Bellefontaine, Kim MEM:EX" <[Kim.Bellefontaine@gov.bc.ca](mailto:Kim.Bellefontaine@gov.bc.ca)>  
**Cc:** "McGuire, Jennifer ENV:EX" <[Jennifer.Mcguire@gov.bc.ca](mailto:Jennifer.Mcguire@gov.bc.ca)>  
**Subject:** Mount Polley Order

Kim/Al

Order attached

Avtar



Date: August 5, 2014

File: 107461

MOUNT POLLEY MINING  
CORPORATION  
SUITE 200  
580 HORNBY ST  
VANCOUVER, BC  
V6C 3B6

### **POLLUTION ABATEMENT ORDER**

I have reasonable grounds to believe that pollution is being caused by the discharge of mine tailings from the tailings storage facility at the Mount Polley Mine site into the environment. The discharge is occurring from a property located approximately 5 kilometers southeast of Likely, BC and is legally described as Mineral Claim CB-20, Cariboo Mining Division, Cariboo Land District, owned and/or operated by MOUNT POLLEY MINING CORPORATION.

It has been reported to the Ministry of Environment that on Monday, August 4, 2014 mine tailings escaped an impoundment facility via a dam breach on the above-mentioned property. Further investigation has revealed that a significant volume of materials have left the property and impacted Polley Lake, Hazeltine Creek and Quesnel Lake.

Pursuant to Section 83 of the *Environmental Management Act* [SBC 2003] Chapter 53, MOUNT POLLEY MINING CORPORATION is hereby ordered to comply with the following requirements:

1. Immediately take action, under the direction of a suitably qualified professional, to abate the discharge of mine-affected materials and sediments from the impoundment facility, and specifically into Polley Lake, Hazeltine Creek and Quesnel Lake. A written summary of actions taken must be submitted to the Director on August 13, 2014
2. Immediately retain a suitably qualified professional to initiate a preliminary Environmental Impact Assessment (EIA) and provide the name of the qualified professional to the Director for approval by August 6, 2014.
3. Retain a suitably qualified professional to initiate a comprehensive Environmental Impact Assessment (EIA) and provide the name of the qualified professional to the Director for approval by August 13, 2014.

---

**Ministry of Environment**

Mining Operations  
Environmental Protection

Mailing Location/Address  
2080 Labieux Rd.  
Nanaimo, BC V9T 6J9

Telephone: (250) 751-3100  
Facsimile: (250) 751-3103  
<http://www.gov.bc.ca>

4. Upon completion of the preliminary EIA, immediately implement clean up activities, mitigation measures and management actions as required by the EIA.
5. Upon completion of the comprehensive EIA, immediately implement clean up activities, mitigation measures, site restoration and management actions as required by the comprehensive EIA.
6. Based on the preliminary EIA, develop and submit to the Director by August 6, 2014 for approval, an Action Plan detailing measures relative to the preliminary EIA to be taken to:
  - a. Characterize the materials that were released into the receiving environment (including their expected behaviour in the receiving environment, settling rates, etc.);
  - b. Recover or otherwise manage mine-affected materials and sediments currently in the receiving environment;
  - c. Mitigate residual risks to the environment;
  - d. Assess and monitor the impacts and risks posed by the mine-affected materials and sediments currently in the receiving environment, as well as from the recovery and management efforts themselves; and
  - e. Report on the implementation of Action Plan measures on a weekly basis to regulatory agencies and stakeholders.
7. Based on the comprehensive EIA, develop and submit to the Director by August 15, 2014 for approval, an Action Plan detailing measures relative to the comprehensive EIA to be taken to:
  - a. Fully characterize the materials that were released into the receiving environment (including their expected behaviour in the receiving environment, settling rates, etc.);
  - b. Fully recover or otherwise manage mine-affected materials and sediments currently in the receiving environment;
  - c. Define Site mitigation and/or mitigate residual risks to the environment;
  - d. Assess and monitor the impacts and risks posed by the mine-affected materials and sediments currently in the receiving environment, as well as from the recovery and management efforts themselves; and
  - e. Report on the implementation of Action Plan measures on a weekly basis to regulatory agencies and stakeholders

8. Prepare and submit a formal written update by September 15, 2014. The update report is to include at a minimum:
  - a. A list of all other qualified professionals who contributed to the report, and a summary of their qualifications;
  - b. A summary of the preliminary EIA and results;
  - c. A summary of the comprehensive EIA and results;
  - e. A description of clean up activities, mitigation measures, site restoration and management actions that were implemented as a result of the preliminary and comprehensive EIA;
  - f. Recommendations for additional mitigation and restoration measures, if appropriate; and
  - g. A proposed ongoing monitoring program.

Failure to comply with the requirements of this order is a contravention of the *Environmental Management Act* and may result in legal action. I direct your attention to Section 120(10) of the *Environmental Management Act*, which reads:

*“(10) A person who contravenes an order...that is given, made or imposed under this Act by a ...director...commits an offence and is liable on conviction to a fine not exceeding \$300 000 or imprisonment for not more than 6 months, or both.”*

Failure to comply with the requirements of this order may also result in an administrative penalty under the *Administrative Penalties Regulation (Environmental Management Act) (B.C. Reg 133/2014)* (Regulation). I direct your attention to Section 12(4) of the *Regulation*, which reads:

*“(4) A person who fails to comply with an order under the [Environmental Management] Act is liable to an administrative penalty not exceeding \$40 000.”*

This order does not authorize entry upon, crossing over, or use for any purpose of private or crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with you. It is also your responsibility to ensure that all activities are carried out with due regard for the rights of third parties, and comply with other applicable legislation that may be in force, such as municipal bylaws relating to the discharge of waste to municipal storm or sanitary sewers.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date notice is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

If you have any questions, please call the undersigned or Jack Green at (250) 398-4544.

Yours truly,



Hubert Bunce  
for Director, Environmental Management Act  
Vancouver Island Region

cc: Environment Canada  
Al Hoffman, Chief Inspector, Ministry of Energy and Mines  
Dale Reimer, Mine Manager  
Colleen Hughes, Environmental Coordinator



**From:** Demchuk, Tania MEM:EX  
**To:** [Bailey, Kristopher W MEM:EX](#); [Hoffman, Al MEM:EX](#); [Kuppers, Haley MEM:EX](#); [Thorpe, Rolly MEM:EX](#)  
**Cc:** [Day, Alan MEM:EX](#)  
**Subject:** RE: Mt Polley, Kris Bailey Notes Summary Aug 11 to 13th.  
**Date:** Thursday, August 14, 2014 2:10:00 PM

---

Thank-you for this Kris.

I will file.

Cheers,  
Tania

---

**From:** Bailey, Kristopher W MEM:EX  
**Sent:** Thursday, August 14, 2014 2:07 PM  
**To:** Hoffman, Al MEM:EX; Kuppers, Haley MEM:EX; Demchuk, Tania MEM:EX; Thorpe, Rolly MEM:EX  
**Cc:** Day, Alan MEM:EX  
**Subject:** Mt Polley, Kris Bailey Notes Summary Aug 11 to 13th.

Re,

Mt Polley TSF Breach:  
MEM Health and Safety & Site Observations.  
Kris Bailey's note summary.

Good Afternoon MEM team.

-

**Background:**

The following is a brief summary of my notes which were taken with my site visit with Alan Day from August 11, 2014 to August 13, 2014. The primary objective at the site was to establish an MEM presence to ensure H&S procedures were in place. The secondary objective was to take notes and observe the site "as is" for the upcoming investigation. It should be noted that we didn't solicit for information on how the incident happened , however we did inform people that we will be looking for potential witnesses to give interviews for the investigation. The list below is a summary to catch key information and to bring forth some items of importance/interest for the investigation.

**August 11, 2014 Note Summary:**

Shifter Rolly Mailholt toured us around the site and the following areas were looked at. (Rolly was very accommodating and professional with us.)

- Active dig faces in springer pit and waste rock dump. (material was being used for coffer dam construction.)
- Sump in the Wright pit adjacent to U/G Decline.
- Polley Lake pumps.
- Cofferdam construction.
- Main breach area (both west and east sides).
- Hazeltine Creek Polley lake water discharge.

15:00 conference call/meeting with Jack Love: One of Jacks main goals here was to seek baseline environmental data sources. Although not mentioned on the live meeting call, I did suggest to Jack that they consider looking at Geoscience BC geochemical baseline data as well as ARIS reports, in order to possibly get some baseline data on background metals in the area.

-

**August 12, 2014 Note Summary:**

Al Day flew to the site with Kevin Richter. My focus was to inspect the public access points to the site and to ensure they had check points in place. A main check point had been established at 8.1km on main mine entrance road. Following points were inspected.

- 8.1km check point main access.
- Likely-Horesfly FSR "Ditch Road" 18km access control point to Polley Lake. (Ross Woods manning post here.)
- Morehead road. No access to the site.
- Bootjack-Gavin FSR. Road comes off of main Polley access road at 7km and doesn't access the site.

**August 13, 2014 Note Summary:**

-

Met with Murray Dymant (JOSH Chair) to go over MR Coverage and tour emergency facilities. Murray also provided some names of importance (provided below). Shifter Rolly toured us around to the dig faces and coffer dam construction. An in pit blast was scheduled for 14:15 hours but cancelled. (blast pattern that was loaded prior to the incident.)

**List of Potential Witnesses:**

- 
- **Ross Woods:** I talked to Ross in person at the 18km ditch road check point on Aug 12<sup>th</sup>. Ross has been with company for aprox 5 years working in the pit and would like to provide a statement. I gave him my card and told him to email me and I will put him in contact with the investigation leads. We didn't discuss anything about causes of the breach however he did state employees had been talking about the conditions of the TSF. It should be noted that Ross is also a resident of Likely.
  - **Rod Miller:** Rod's Name and the following information was provided by Murray Dymant. Rod Miller was the shift electrician at the time of the incident and did the "rounds" at the TSF shortly before the breach. We didn't see or talk to Rod.
  - **Garrett Blackwood:** Garrets name and the following information was provided by Murray Dymant. According to Murray, Garrett Blackwood had to check on a power outage which lead Garrett to the TSF where Garrett heard the rushing water.
  - **Josh Lammi:** Al and I met Josh in the shifters bay. Josh was working with the lead hand at the time of the breach. I Gave josh a my card.
  - **Joseph Sarnowski:** Al and I talked to Joseph at the shifter bay/ambulance bay. Joseph is a HD mechanic and heard the water rushing. Joseph said that he had cards from other "investigators"
  - **AJ:** AJ's name was given by Joseph Sarnowski. According to Joseph AJ is lubber and was on site at the time of the breach. We didn't see or talk to AJ.

**General Observations:**

-

One of the common themes that continually stuck in my mind from listening to people on the site was that at the time of (and time leading up) to the incident, a lot of people were either on holidays or some sort of shift rotation. (also includes the mine manager Dale Reimer)

**Photo's:**

G:\Mines Operations\Victoria\RECLAMATION\0E - MINING PROJECTS\MINE LIST\2  
METAL\M-200 Mt Polley\File Compilation August 2014\Inspectors Notes\Kris Bailey Aug 2014

-

If there is anything that you need me to further elaborate on please let me know and I can be available. Please feel free to distribute to the rest of the investigation team as required.

Regards, -Kris

Kris Bailey  
Inspector of Mines - Permitting.  
Prince George B.C. Omineca/Northeast  
Tel. 250 565 4271  
Fax.250 565 4328

**From:** Demchuk, Tania MEM:EX  
**To:** [Howe, Diane J MEM:EX](#)  
**Subject:** RE: Mount Polley TSF - Stage 10 Design Report  
**Date:** Thursday, August 14, 2014 5:50:00 PM  
**Attachments:** [image002.png](#)  
[image003.png](#)

---

Okay, thanks. Can you let me know where you put it?

---

**From:** Howe, Diane J MEM:EX  
**Sent:** Thursday, August 14, 2014 5:03 PM  
**To:** Demchuk, Tania MEM:EX  
**Subject:** FW: Mount Polley TSF - Stage 10 Design Report

I'll add this one into our files.

Regards, Diane

-

**Diane Howe**

Deputy Chief Inspector, Reclamation and Permitting  
Ministry of Energy and Mines  
Victoria, BC  
(250) 952-0183



---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Monday, July 28, 2014 12:14 PM  
**To:** Warnock, George MEM:EX  
**Cc:** Howe, Diane J MEM:EX; Dale Reimer; Art Frye; Daryl Dufault; Todd Martin ([TMartin@bgcengineering.ca](mailto:TMartin@bgcengineering.ca))  
**Subject:** Mount Polley TSF - Stage 10 Design Report

Hi George;

Following up on our previous discussion, please find attached a transmittal letter outlining the (also attached) Stage 10 raise design report for the Mount Polley Tailings Storage Facility. The raise design report (to 972.5m) has been prepared by BGC Engineering, who will take over Engineer-of-Record responsibilities from AMEC Earth and Environmental upon the completion of the current Stage 9 design (970.0m). Construction to the 970.0m elevation is currently projected for completion in late August of this season (2014).

I will be in receipt of hard copies of the design report next week; please advise who you would like me to send these to.

If you should have any questions or comments in regards to the report, please feel free to contact me at the information below.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Morel, David P EMNG:EX](#)  
**Subject:** FW: 2014 08 17 Daily Remediation Report  
**Date:** Sunday, August 17, 2014 6:05:04 PM  
**Attachments:** [Remediation Daily Report \(MPMC\) - 2014 08 17.pdf](#)

---

From: Art Frye [<mailto:afrye@mountpolley.com>]  
Sent: Sunday, August 17, 2014 5:10 PM  
To: Bellefontaine, Kim MEM:EX; Howe, Diane J MEM:EX; Hoffman, Al MEM:EX; Jack Love; McGuire, Jennifer ENV:EX; Metcalfe, Shelley ENV:EX; Rothman, Stephen MEM:EX  
Subject: FW: 2014 08 17 Daily Remediation Report

Hi,

Please see attached Mount Polley Daily Remediation Report from August 17th, 2014.

Thank you  
Art





**WEATHER:** 22°C Cloudy with Showers

**DESCRIPTION OF WORK PERFORMED TODAY**

**Remediation Activities**

**Upstream Dyke:** numbers are for end of night shift August 16<sup>th</sup>, 2014

- **Advance:** 7m (258m completed in preparing haul access, 175m completed of 596m design)
- Five hours lost on night shift due to dense fog.
- **Volume:** 11,735 t (cumulative placed: 477,947 t)
- **Percent Complete:** 18% (for today we changed the assumption to: 20% of rock to dam is going to the upstream dyke due to the run-out yesterday and a 20% overbuild on dyke)
- Tomorrow's report will have the survey volumes placed on each dyke.
- **Incidents:** none

**Satellite Dyke:** numbers are for end of night shift August 16<sup>th</sup>, 2014

- **Advance:** 51m (113m completed in preparing haul access, 214m completed of 523m design)
- Five hours lost on night shift due to dense fog.
- **Volume:** 46,936 t (cumulative placed: 114,435 t).
- **Percent Complete:** 32% (For today we changed the assumption to: 80% of rock to dam is going to the satellite dyke and a 20% overbuild on dyke).
- Tomorrow's report will have the survey volume placed on each dyke.
- **Incidents:** none

**Polley Lake Water Level Reduction:**

- **Water Level:** 923.19m (923.28m August 9<sup>th</sup>, 2014 prior to commissioning of pumping)
- **Pump Rates:** South End: five (5) pumps discharging below tailings plug. Due to maintenance (primary screens being installed) of pumps I wasn't able to obtain an accurate flow today.
- North End: one (1) pump with output of 1,000 gallons/min (discharging into Wight Pit, running day shift only).

**Debris Cleanup:** updates are from august 16<sup>th</sup>, 2014

Not a lot happened today as most of the crew was off. They do have a stand-by crew to call onto the lake if needed and a patrol boat from likely going out a few times daily.

- **Hazeltine Creek Outlet:** none
- **Mitchell Bay:** They had a hoe working on the beach trying to get ahead of the ground crew.
- **Quesnel Lake:** Had one boat patrolling to ensure everything continued to stay secure and remove anything they found floating in the lake (everything was looking good and secure).
- **West Fraser Reload:** Had one danger tree faller and two traffic controllers clearing the hydro line into the reload. Logs were delivered to the reload which are being scaled today (August 17<sup>th</sup>, 2014) so they can be prepped and added to the boom string by the auger crew.



**Hazeltine Creek**

**Pipe Discharge (HAD-1):**

- **Sample Status:** one (1) sample collected at discharge, three (3) samples collected at Polley Lake.

**Mouth:**

- **Water Sampling:** ten (10) samples collected at Quesnel Lake, three (3) samples collected at Quesnel River.
- **Sediment Sampling:** none
- **Benthic sampling:** none
- **Biological sampling:** one (1) northern pike minnow sample

**Pollution Abatement Order**

**Status Update:** Preliminary action plan, submitted on August 6<sup>th</sup>, 2014, accepted. Additional directives provided by MOE on August 10<sup>th</sup>, 2014.

**Site Security**

- **Bootjack Forestry Service road - 8km:** guarded (no unauthorized entry)
- **Gavin Lake road:** guarded (no unauthorized entry)
- **Ditch road (Horsefly access):** guarded (no unauthorized entry)
- **Ditch road (Likely access):** guarded (no unauthorized entry)
- **Polley Lake Pipe Discharge:** guarded (no significant events)

**REMARKS** (Delays, interruptions, extra work activities, unusual occurrences, etc. relevant to today's work)

- none

**CRITICAL INFORMATION**

- none

**Report Compiled By**  
Levi Nelson, MPMC

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date





**Daily Photos:**

**Temporary Dyke dump face (pushed rock out due to a soft spot)**





**Temporary Dyke (pushed rock out due to a soft spot)**







**Satellite Dyke dump face**





**Overview from South side of breach**







**Polley Lake Water Level Reduction discharge (HAD-1)**







**Polley Lake Water Level Reduction discharge (HAD-1)**







**Polley Lake Water Level Reduction discharge (HAD-1)**



**From:** Demchuk, Tania MEM:EX  
**To:** [Nakatsuka, Caroline M MEM:EX](#)  
**Cc:** [Hoffman, Al MEM:EX](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#)  
**Subject:** Work in area downstream of the breach  
**Date:** Wednesday, September 3, 2014 2:15:00 PM

---

Hi Caroline,

Wondering if you can help with this. I will swing by to discuss in a minute.

There has been some discussion about if the impact area of the breach should be declared a mine so that the Mines Act applies to that area and we have the ability to regulate access and also oversee health and safety of workers. Due to the ongoing spill-response and requirements for management by MOE, the suggestion moving forward is that right now is not the appropriate time to declare the area a mine.

MEM has taken on the H&S role so far, however technically people working downstream of the breach are outside MEM's jurisdiction. We are wondering about connecting with WorkSafe BC to discuss. We are not sure they even realize that this area is not part of the minesite, and there needs to be clarity around who would respond and investigate in the event of an accident. There may be options, one could be to have an MOU or agreement structured that MEM would take responsibility for this area for now.

Would you be able to follow-up on this and figure out options and a recommended resolution?

I expect that David will be looking for clarity about this sooner rather than later.

Thank-you,  
Tania

**Tania Demchuk, MSc, GIT**  
Senior Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

**From:** Demchuk, Tania MEM:EX  
**To:** [Morel, David P MEM:EX](#)  
**Subject:** RE: Orders Polley  
**Date:** Wednesday, September 3, 2014 2:59:00 PM  
**Attachments:** [Letter to Dale Reimer Mine Manager Mount Polley - Chief Inspector Orders August 11, 2014.pdf](#)  
[Inspector Order to protect breach area and foundation August 21 2014.pdf](#)  
[Mount Polley August 7 2014.pdf](#)  
[Letter to Dale Reimer Mine Manager Imperial Metals - Temporary Upstream Dyke August 9 2014.pdf](#)  
[BGC Work Procedures - 2014 08 11.docx](#)  
[Safe Work Procedure - Polley Lake Water Lake Reduction.docx](#)  
[Safe Work Procedure - Sampling.docx](#)  
[Safe Work Procedure - Tailings Breach Dyke Construction.docx](#)  
[Orders to Mt Polley.pdf](#)

---

Hi David,

Attached are:

**1. Orders:**

- To provide safe work procedures for sampling and all work on or off the mine site related to the tailings dam breach (Hoffman)
- To protect breach area and foundation (Rothman)
  - Also note a hand written order to secure the site was made by H&S inspectors on site.
- To conduct an investigation of the breach (Hoffman)
- To restrict access to the Mount Polley area (Hupman)

**2. Letters acknowledging receipt of:**

- The plans for tailings breach remediation by constructing the temporary upstream dyke. (August 9)

**3. Safe Work Procedures:**

- For temporary upstream dyke construction (tailings breach dyke)
  - And also BCG's procedures
- For sampling downstream of breach area
- For Polley Lake water reduction

NOTE: we are waiting for receipt of Safe Work Procedures for working downstream of Polley Lake in Hazeltine Creek.

Tania

---

**From:** Morel, David P MEM:EX  
**Sent:** Wednesday, September 3, 2014 2:34 PM  
**To:** Demchuk, Tania MEM:EX  
**Subject:** Orders Polley

Can I get a copy of any formal orders we have given to company re Mt Polley or things we have agreed to like safe work procedures.

Thanks

David





August 11, 2014

Mr. Dale Reimer  
Mine Manager  
Mount Polley Mining Corporation  
Box 12 Likely, BC V0L 1N0

Mine: 1101163  
ORCS: 19020-40

By mail and email: [dreimer@mountpolley.com](mailto:dreimer@mountpolley.com); [bkynoch@imperialmetals.com](mailto:bkynoch@imperialmetals.com);  
[afrye@mountpolley.com](mailto:afrye@mountpolley.com); [lmoger@mountpolley.com](mailto:lmoger@mountpolley.com); [ilove@imperialmetals.com](mailto:ilove@imperialmetals.com);  
[dparsons@imperialmetals.com](mailto:dparsons@imperialmetals.com)

Dear Mr. Reimer:

**Re: Chief Inspector Orders in follow-up to site inspections of August 4-8, 2014**

In follow-up to directions you may have received verbally and by email from mines inspectors attending the Mount Polley Mine site between the dates of August 4 to 8, 2014, I wish to follow-up with written orders and additional actions that are required to be undertaken by Mount Polley Mining Corporation.

In response to the dam failure of August 4, 2014, you are reminded of your responsibility to conduct a comprehensive investigation of the root cause(s) of the event.

- (a) Pursuant to Part 1.7.1(4) of the Health, Safety and Reclamation Code for Mines in British Columbia (Code), the Mine Manager shall ensure that the investigation is carried out by persons knowledgeable in the type of work involved as well as the co-chairpersons of the OHSC or their designates.
- (b) Pursuant to Part 1.7.2 of the Code, on completion of the investigation the Mine Manager shall prepare, for the Chief Inspector, a report that:
  - a. to the extent practicable identifies the causes of the accident,
  - b. identifies any unsafe conditions, acts, or procedures which contributed in any manner to the accident,
  - c. makes recommendations which may prevent similar accidents, and
  - d. is forwarded to the OHSC.
- (c) It is requested that the investigation report be submitted to the Chief Inspector no later than January 15, 2015.

Mount Polley Mining Corporation is also reminded that the Chief Inspector will be conducting a separate investigation of this incident. Pursuant to Section 15(7) of the *Mines Act*, and the Mine Regulation, you will be required to provide full access to all areas of the mine site and all relevant information.

.../2

Ministry of  
Energy and Mines

Health, Safety and  
Permitting Branch

Mailing Address:  
PO Box 9320  
Stn Prov Got  
Victoria, BC  
V8W 9N3

Phone: 250 952 0793  
Fax: 250 952 0491

Order 1

Pursuant to Section 15(4)(d) of the *Mines Act* the Mine Manager shall undertake to remediate the dam failure in a manner that ensures future stability of the tailings storage facility and prevents further release of tailings.

Order 2

The current condition of the tailings impoundment since the dam breach of August 4, 2014, represents a significant departure from the approved work system and reclamation plans for the Mount Polley Mine. Thus, pursuant to Section 10.1.11 of the Health, Safety and Reclamation Code, the Mine Manager shall submit a *Mines Act* Permit Amendment Application for the remediation of the dam failure. The application, including detailed designs, must be submitted by May 31, 2015 to the Chief Inspector for review and approval.

It is requested that a status update on the remedial plan and a schedule for implementation of the remedial works be provided to the Chief Inspector by January 15, 2015.

Sincerely,



Al Hoffman, P.Eng.  
Chief Inspector of Mines

Cc: Mr. David Morel, Assistant Deputy Minister, MEM  
Ms. Diane Howe, Deputy Chief Inspector of Mines, Permitting and Reclamation, MEM  
Mr. Rolly Thorpe, Deputy Chief Inspector of Mines, Health and Safety, MEM  
Ms. Heather Narynski, Senior Geotechnical Inspector, MEM  
Mr. Stephen Rothman, Senior Inspector of Mines, Kamloops, MEM  
Ms. Tania Demchuk, Senior Environmental Geoscientist, MEM  
Mr. George Warnock, Manager, Geotechnical Engineering, MEM  
Mr. Art Frye, Chief Operating Manager, Imperial Metals Corporation  
Mr. Jack Love, Environmental Superintendent, Imperial Metals Corporation  
Mr. Don Parsons, Chief Operating Officer, Imperial Metals Corporation  
Mr. Hubert Bunce, Environmental Protection, Mining Operations Director, MOE  
Ms. Gabi Matscha, Environmental Quality Section Head, MOE  
Ms. Jennifer McGuire, Executive Director, Environmental Protection Division, MOE



Ministry of  
Energy and Mines

Thursday, August 21, 2014

Dale Reimer, Mine Manager  
Mount Polley Mining Corp. – Imperial Metals  
Likely, BC

Dear Mr. Reimer:

**Re: Tailings Dam Breach**

---

The following order is issued to protect a scene for the purpose of incident investigation.

The areas downstream on both sides of the tailings dam breach have been flagged off and signed by this inspector to order "Do not Enter, Do not disturb" for reasons of protecting the scene through the investigation. The upstream side of the breach is unable to be flagged but still needs to be protected from disturbance.

It has been discussed and observed that the current engineered design of the coffer dam is within close proximity of the upstream toe of the remaining tailings pond dike; in particular, the breached areas of the dam which need to be isolated throughout the investigative process.

As per our discussion today, the area both upstream and downstream of both sides of the breach at the Mount Polley Mines TSF shall not be disturbed during the investigative process. The mine manager shall ensure the scene is protected by including in the design, a set-back distance that shall be maintained throughout construction to preserve the original dike in its found condition.

The mine manager is asked to extend the flagging to expand the protected area as soon as the Polley Lake - discharge line is removed.

Yours truly,

A handwritten signature in black ink, appearing to read "S. Rothman".

Stephen Rothman  
Sr. Inspector of Mines, P Eng.

cc: Al Hoffman, Chief Inspector of Mines  
George Warnoch, Senior Geotechnical Inspector





Friday, August 8, 2014

File:14675-20/1101163

Dale Reimer  
Mount Polley Mining Corporation

Dear Mr Reimer:

**Re: Public Safety and Access Control**

---

I understand that as the result of recent events initiated by the tailings dam breach at the Mount Polley mine site, that there may be remaining risks related to instability along Hazeltine Creek and Polley Lake shore line.

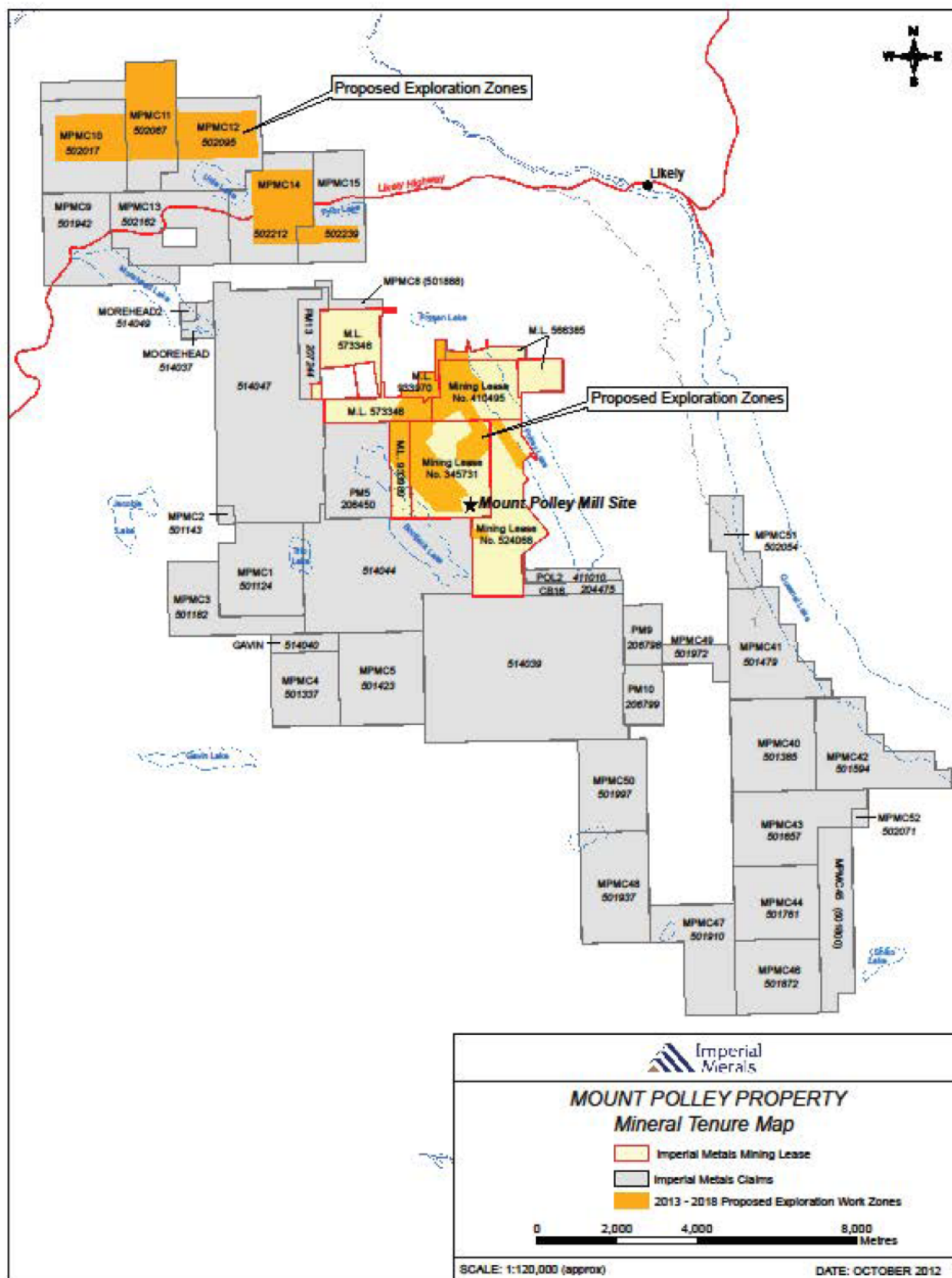
In order to safe guard the public from any risk arising out of this event I am issuing the following orders under my authority outline in Section 6 of the *Mines Act*:

- 1) The Mine Manage must develop and immediately implement a security protocol to restrict access to the following tenures: 411010, 204475, 514039, 501997, 501937, 501910, 501761, 501657, 501385, 501479, 501972, and 206798, as out lined on the attached map necessary to control access to the potential areas of risk,
- 2) Notice to this effect shall be posted at all roads entrances to these tenures, and
- 3) Unless Authorized by the mine manager, no person shall enter or leave these tenures except by recognized means of entry or exit.

Sincerely,

Bruce Hupman PAg  
Regional Director, South Region  
Office of the Chief Inspector  
Ministry of Energy and Mines

Cc Al Hoffman, Chief Inspector of Mines



**From:** Demchuk, Tania MEM:EX  
**To:** [Warnock, George MEM:EX](#); [Hoffman, Al MEM:EX](#); [Thorpe, Rolly MEM:EX](#)  
**Cc:** [Bellefontaine, Kim EMPR:EX](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#)  
**Subject:** FW: BGC Plug Monitoring Plan  
**Date:** Friday, September 5, 2014 9:05:00 AM  
**Attachments:** [20140901\\_Polley Lake Sediment Plug Monitoring\\_FINAL.pdf](#)

---

---

**From:** Sal Bafaro [mailto:[sbafaro@mountpolley.com](mailto:sbafaro@mountpolley.com)]  
**Sent:** Thursday, September 4, 2014 5:23 PM  
**To:** Meade, Laurie MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Pocklington, Cheryl M MEM:EX; Hoffman, Al MEM:EX  
**Cc:** Don Parsons; Dale Reimer  
**Subject:** BGC Plug Monitoring Plan

Good Afternoon,

Please see attached plug monitoring plan developed by BGC Engineering. The daily inspections detailed in this report will be used by Mount Polley management to authorize or restrict work on Polley Lake and Hazeltine Creek as per the Hazeltine Creek Safe Work Plan.

Regards,

Sal Bafaro  
Senior Safety Coordinator  
Mount Polley Mining Corporation  
PO Box 12  
Likely, BC V0L 1N0  
P: 250-790-2215 x 2609  
[sbafaro@mountpolley.com](mailto:sbafaro@mountpolley.com)





# **BGC ENGINEERING INC.**

## **AN APPLIED EARTH SCIENCES COMPANY**

Suite 800 - 1045 Howe Street, Vancouver, BC Canada V6Z 2A9  
Telephone (604) 684-5900 Fax (604) 684-5909

---

### **BGC Project Memorandum**

---

<b>To:</b>	<b>Mount Polley Mining Corp.</b>	<b>Doc. No.:</b>	<b>1197002.14.001</b>
<b>Attention:</b>	<b>Luke Moger, Don Parsons</b>	<b>cc:</b>	
<b>From:</b>	<b>Greg Wenger, Daryl Dufault</b>	<b>Date:</b>	<b>September 2, 2014</b>
<b>Subject:</b>	<b>Polley Lake Sediment Plug Stability Monitoring</b>		
<b>Project No.:</b>	<b>1197002</b>		

---

#### **1.0 INTRODUCTION**

The Mount Polley Mine Tailings Storage Facility (TSF) breach has deposited material at the outlet of Polley Lake, blocking outflow of water into Hazeltine Creek. Mount Polley Mining Corp. (MPMC) requires personnel to access the Hazeltine Creek channel downstream of Polley Lake to carry out EIA sampling and install erosion control structures. A sudden release of water or sediment from Polley Lake or the TSF poses a hazard for personnel working in the downstream creek channel.

BGC Engineering Inc. (BGC) has been retained by MPMC to assess the stability of the material blocking the outlet of Polley Lake for the purpose of allowing personnel to access the downstream creek channel. This memorandum is issued in response to that request and presents a monitoring plan that will form part of a short term hazard mitigation plan to allow safe access to Hazeltine Creek.

The extent and condition of the materials blocking the Polley Lake outlet described herein are based on visual inspections undertaken between August 24 and 28, 2014. Access to the upstream portion of the plug is not possible at this time as the sediments are extremely soft. Equipment cannot access any part of the sediment plug at this time.

#### **2.0 POLLEY LAKE SEDIMENT PLUG**

The material at the outlet of Polley Lake consists predominantly of tailings sediments, with some fill from the tailings dam breach, reworked overburden and vegetation. The sediment plug is approximately 500 m to 900 m long down valley and 150 m to 300 m wide across the valley. There is uncertainty in thickness estimates, but discussions with MPMC suggest the sediment plug is 1 to 3 m thick. The maximum thickness has not been confirmed due to limited

access to the original creek channel. Pre-breach topography is unreliable in this area and the breach runout likely scoured the original ground surface. The elevation of the creek channel directly downstream of the sediment plug is 920.0 m. The lake level before the dam breach was 921.63, and rose to 923.35 immediately after the sediment plug blocked the lake outflow. See Figure 2-1 for an approximate layout of the sediment plug.

Copyright

**Figure 2-1. Before and after imagery of the Polley Lake sediment plug.**

### **3.0 SEDIMENT PLUG STABILITY**

The stability of the sediment plug could be compromised by (1) internal erosion caused by seepage of water through the sediment plug, and (2) erosion from external surface water flow onto the sediment plug leading to down cutting. The short term plug stability will be enhanced by limiting the height of water ponded behind the sediment plug, and reducing the flow of water that reports to sediment plug. The relevant sources of water are listed below and are shown on Figure 3-1. Current efforts to control these water sources are briefly described:

- Polley Lake: the lake water level is being drawn down with pumps and being discharged downstream of the sediment plug. Figure 3-2 shows the lake level before the dam breach, and as pumping continues.
- Dam breach water: turbid flow draining through the breached dam has been diverted into a series of sumps and no longer reports to the sediment plug during low flow conditions. However, on August 26 and 27, 2014, relatively small daily rainfall accumulations of 5 mm and 3 mm overcame the sump downstream of the dam breach, and flowed through the breach runout zone to the downstream portion of the sediment plug before reporting to the Hazeltine Creek channel. It is expected that dam breach

flow will report to the sediment plug footprint in the coming weeks during rainfall events while MPMC improves the dam breach water control infrastructure.

- Long Ditch water: site runoff from the Long Ditch has been reporting to the sediment plug footprint along with the dam breach outflow. However MPMC is in the process of installing the Long Ditch sump and associated pumping infrastructure which will prevent the water from reporting to the sediment plug.
- Rainfall runoff: The existing Long Ditch at the western side of the plug limits some of the runoff water reporting to the sediment plug from the West. All runoff on the eastern side of the plug currently reports to the sediment plug and has been observed to pond along the slope.

The stability of the sediment plug during a large rainfall event or spring runoff cannot be assured. Removal of the sediment plug, or diversion of water around the plug with a diversion channel should be completed as soon as possible.

Copyright

**Figure 3-1. Site plan of the sediment plug between Polley Lake and Hazeltine Creek. Water sources influencing the sediment plug are noted.**

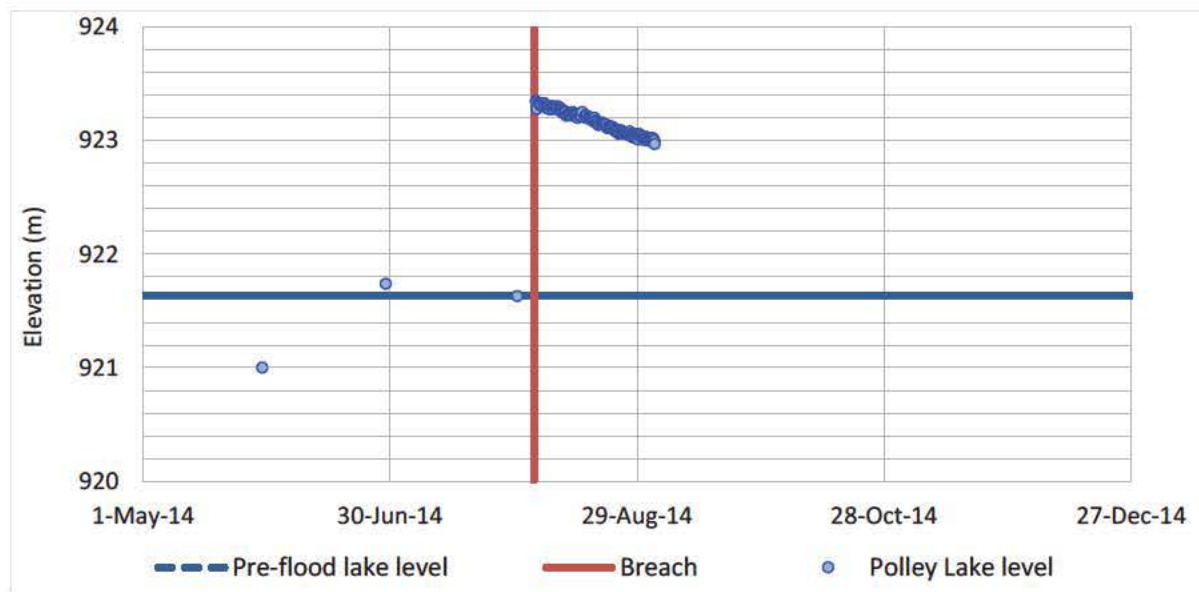


Figure 3-2. Polley Lake water level.

#### 4.0 HAZARD MITIGATION PLAN

Downstream creek channel access is required and a hazard mitigation plan has been prepared by MPMC. The mitigation plan is intended to reduce the risk of a release of water or sediment to personnel working downstream of the plug. The hazard mitigation plan will be operated by MPMC and includes the following components:

- Plug seepage and erosion monitoring by a qualified person
- Full time monitoring of the plug outlet by a spotter when personnel are in the downstream creek channel
- A radio alert system
- Radio check-in and check-out procedures
- Job Safety Assessments (JSA) by each person/group entering the downstream creek bed to determine entry and exit points and evacuation limits
- A no-entry zone where Hazeltine Creek is deeply incised and exit times cannot be completed in a timely manner

It is understood that periodic plug seepage and erosion monitoring will be conducted by BGC personnel, and MPMC staff will coordinate the remaining hazard mitigation components. Elements of the plug seepage and erosion monitoring are described below; the other hazard mitigation components are described by MPMC under separate cover.



## **5.0 SEDIMENT PLUG SEEPAGE AND EROSION MONITORING**

Seepage monitoring through the sediment plug will be undertaken at regular intervals by a qualified geotechnical engineer and will include the following elements:

- Polley Lake water level
- Visual daily inspections of the extent of 'moist', 'very moist' and 'wet' soil zones on the surface of the plug. Areas where fingers of the 'wet' zone extend into the 'very moist' zone, or 'very moist' zones extend into 'moist' zones will be targeted. These soil conditions, as observed during site reconnaissance August 23, 2014, are shown and described in Appendix A.
- Visual confirmation that little to no seepage is observed at the downstream limits of the sediment plug and that there is no evidence of seepage erosion.

Monitoring of surficial erosion of plug sediments will include:

- Visual inspections that the Long Ditch and dam breach inflows continue to be controlled as described above.
- Visual inspection after rainfall events that significant erosion has not occurred.

Access to the Hazeltine Creek channel below the sediment plug will be authorized on a daily basis provided the continued falling Polley Lake water level, the retreat of the 'moist' and 'wet' soil zones toward the upstream, no evidence of seepage erosion, and no significant surficial erosion is observed. Any observations to the contrary or heavy rainfall will provide the basis to prohibit downstream access to the creek channel. After rainfall, re-entry to the creek channel will be authorized at the discretion of the site geotechnical engineer.

## **6.0 RECOMMENDATIONS**

Sediment plug monitoring as part of a hazard mitigation plan will allow work to proceed in the Hazeltine Creek channel in the short term while Polley Lake continues to be drawn down. As work continues in the creek channel over the coming months, it is recommended that MPMC maintain the lake water below elevation 921.6 m, the level before the dam breach. Investigations should be undertaken to determine the thickness of the sediment plug to establish a safe lake level to allow personnel to access the downstream creek channel.

To accommodate high rainfall events and spring freshet, the removal of the sediment plug, or diversion of water around the plug with a channel should be completed as soon as possible. Details relating to removal of the sediment plug and diversion channel construction have not yet been developed.

## 7.0 CLOSURE

BGC Engineering Inc. (BGC) prepared this document for the account of Mount Polley Mining Corp.. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

As a mutual protection to our client, the public, and ourselves, all documents and drawings are submitted for the confidential information of our client for a specific project. Authorization for any use and/or publication of this document or any data, statements, conclusions or abstracts from or regarding our documents and drawings, through any form of print or electronic media, including without limitation, posting or reproduction of same on any website, is reserved pending BGC's written approval. If this document is issued in an electronic format, an original paper copy is on file at BGC and that copy is the primary reference with precedence over any electronic copy of the document, or any extracts from our documents published by others.

Yours sincerely,

**BGC ENGINEERING INC.**  
**per:**

ISSUED AS DIGITAL DOCUMENT.  
SIGNED HARDCOPY ON FILE WITH  
BGC ENGINEERING INC.

ISSUED AS DIGITAL DOCUMENT.  
SIGNED HARDCOPY ON FILE WITH  
BGC ENGINEERING INC.

Greg Wenger, M.A.Sc., E.I.T.  
Project Engineer

Daryl Dufault, P.Eng.  
Senior Geotechnical Engineer

Reviewed by:

Roy Mayfield, Ph.D., P.E.  
Principal Engineer

DD/RM /gw /sjk



## **APPENDIX A**

### **POLLEY LAKE SEDIMENT PLUG SOIL ZONE CLASSIFICATION**

## Polley Lake Sediment Plug

August 24, 2014



Green 'Moist' zone: Moist to dry, no surface water, stiff, easy to traverse on foot



Yellow 'Very Moist' zone: Moist, no surface water, soft, difficult to traverse on foot



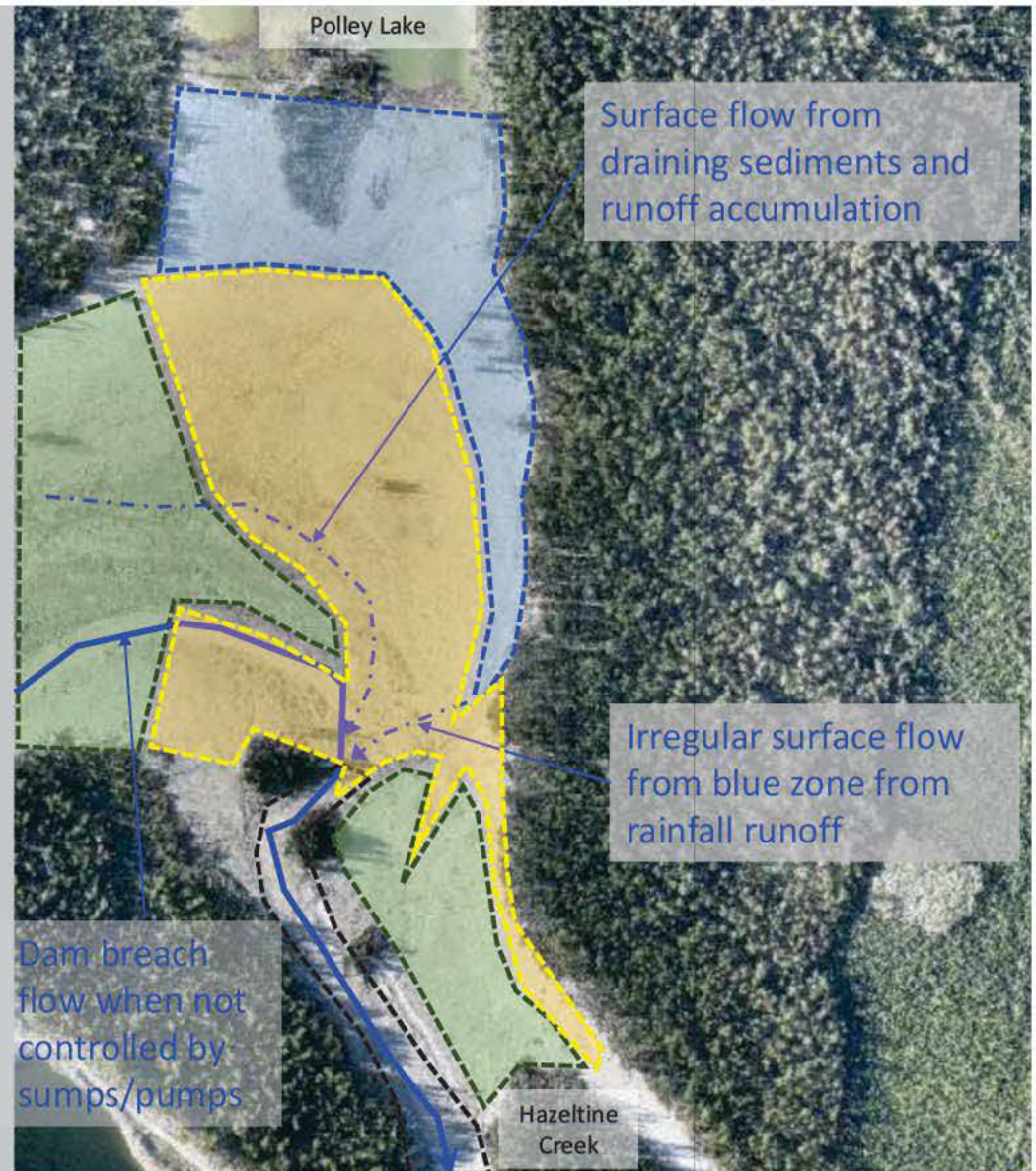
Blue 'Wet' zone: Wet, discontinuous surface water visible, very soft to fluid, impassable on foot



Running water



Original creek channel







### Green 'Moist' Zone:

- Moist to dry, no surface water, stiff, awkward to travers on foot (sink in 0 to 5 cm)
- Drained sandy soil or fine grained soil with deep desiccation cracks
- Observed at the southern and western extent of the sediment plug







S.22



### Yellow 'Very Moist' zone:

Moist to wet, no surface water, soft, difficult to travers on foot (sink in >5 cm)

Observed along the boundary of the blue zone.





Finger of very moist zone extending into the moist zone







### Blue 'Wet' zone:

Wet, discontinuous surface water visible, very soft to fluid, impassable on foot.

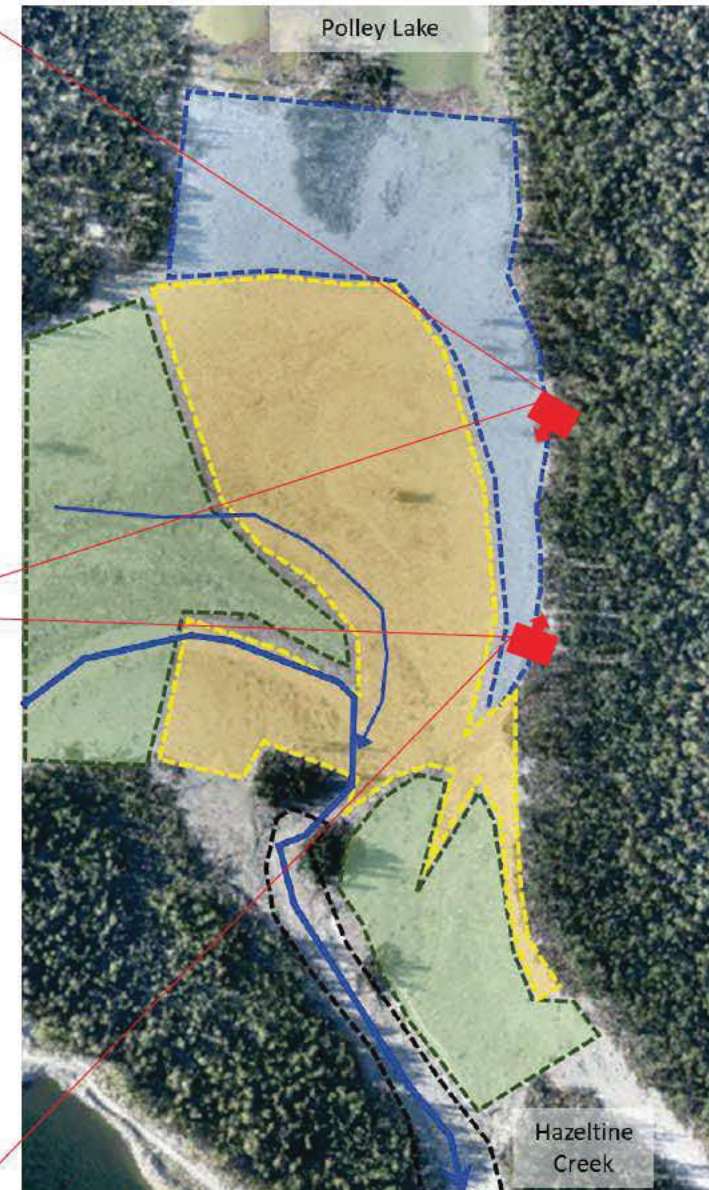
Observed at the upstream near Polley Lake and along the eastern tree line along the assumed original lake outflow channel.





## Blue zone

Some surficial  
water draining  
from eastern  
forested area

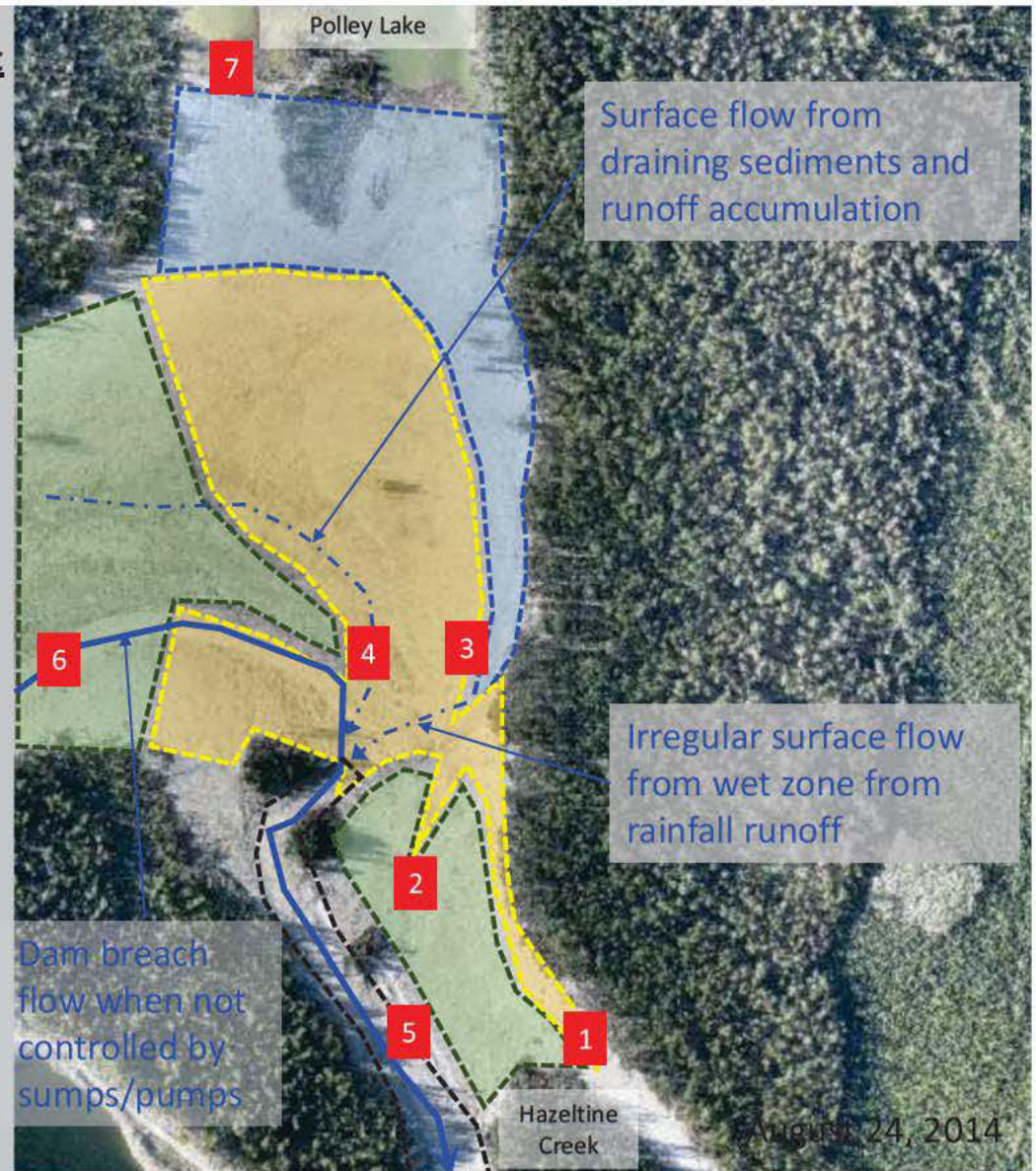




## **Polley Lake Sediment Plug Daily Inspection Checklist**

(to be updated as required)

- 1** Check extent of yellow zone finger and for evidence of seepage erosion at toe.
- 2** Check extent of yellow zone finger.
- 3** Check extent of blue zone along eastern tree line. Monitor erosion of irregular surface flow.
- 4** Check surface flow and surficial erosion
- 5** Check for seepage along original creek channel bank and for evidence for seepage erosion
- 6** Check for dam breach inflow and surficial erosion
- 7** Check Polley Lake water level



**From:** Demchuk, Tania MEM:EX  
**To:** [Warnock, George MEM:EX](#); [Hoffman, Al MEM:EX](#); [Thorpe, Rolly MEM:EX](#)  
**Cc:** [Bellevfontaine, Kim EMPR:EX](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#)  
**Subject:** FW: Signed Copy of Safe Work Permit  
**Date:** Friday, September 5, 2014 9:06:00 AM  
**Attachments:** [Signed - Hazeltine Creek SWP - Revision 3 - 4 September 2014.pdf](#)  
[Hazeltine Creek SWP - Revision 3 - 4 September 2014 - Digital Copy.pdf](#)

---

FYI

---

**From:** Sal Bafaro [mailto:[sbafaro@mountpolley.com](mailto:sbafaro@mountpolley.com)]  
**Sent:** Thursday, September 4, 2014 4:41 PM  
**To:** Meade, Laurie MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Pocklington, Cheryl M MEM:EX  
**Cc:** Don Parsons; Dale Reimer  
**Subject:** Signed Copy of Safe Work Permit

Good Afternoon,

Please see attached Safe Work Plan for Polley Lake and Hazeltine Creek. I have attached the signed copy as well as a digital version that clearly shows the images.  
Please forward this document on to any interested parties.

Regards,

Sal Bafaro  
Senior Safety Coordinator  
Mount Polley Mining Corporation  
PO Box 12  
Likely, BC V0L 1N0  
P: 250-790-2215 x 2609  
[sbafaro@mountpolley.com](mailto:sbafaro@mountpolley.com)



# Mount Polley Mining Corporation Hazeltine Creek Remediation Safe Work Plan

---

Revision 3  
September 4<sup>th</sup>, 2014



Copyright

Mount Polley  
College Branch  
B.C.



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## 1 INTRODUCTION

This plan has been developed and compiled to contain practical rules, procedures and allocation of responsibilities for the safe coordination of work on Polley Lake and Hazeltine Creek. The Safe Work Plan is to be provided to all internal areas of management and contractors that will be working in the area affected by this plan. Compliance with the relevant provisions of the Emergency Response Plan and Safe Work Plan during an emergency will facilitate information flow and provide support and assistance.

To familiarize all employees with the contents of this Safe Work Plan, it is essential for the supervisors to review pertinent sections of the Safe Work Plan together with their employees:

- when they are new or when they have been transferred to a new area,
- when their duties and the responsibilities assigned to them within the department have been changed or modified, and
- when they are assigned to a specific duty within this Plan.



## 2 EMERGENCIES

Emergency response shall follow the terms and conditions set out in the Mount Polley Emergency Response Manual. In the event of an emergency, supervisors will refer to the Emergency Response Manual.

An emergency is an undesired event that generates real or potential danger/risks that directly affect:

- The people
  - the health and welfare of employees
  - the health and welfare of members of the general public
- The property
- The process
- The environment
- The reputation of the company

An event need not be directly related to Mount Polley operations to adversely affect company reputation. Public, media and/or government perceptions about our industry and its products can have a long-term impact.

### 2.1 Work Zones and Reference Points

For ease of emergency response and accountability of workers, the work area from Polley Lake to the mouth of Hazeltine Creek on Quesnel Lake has been broken into work zones and segments. Please make note of the area maps attached at Appendices C-E. Work will be split into the Following Zones:

**North Zone** - All areas north (upstream) of the Gavin Lake Road washout and including Polley Lake

- Segment A - Polley lake to the area of the plug
- Segment B - Downstream of Polley Lake plug to Gavin Lake Road washout

**South Zone** - All areas south (downstream) of the Gavin Lake Road washout including the mouth of Hazeltine Creek

- Segment C - Area downstream of Gavin Lake Road to Reference Point A
  - **Reference Point A - 52°30'11.24"N, 121°33'23.26W**
- Segment D - Area downstream of Reference Point A to Reference Point B
  - **Reference Point B - 52°29'53.26"N, 121°32'26.19W**
- Segment E - Area downstream of Reference Point B to Ditch Road Washout
- Segment F - Area downstream of Ditch Road Washout to Quesnel Lake

### 2.2 Injuries or Medical Emergencies

#### First on Scene Persons Duties

- Quickly assess the situation determining the number of injured persons, the severity of injuries and what resources may be required to deal with the emergency situation.
- Initial emergency notifications as per section 3
- Give the pit supervisor the following information:
  - Your name
  - The location of the accident by referencing of work zones on attached maps

- The number of injured persons
- The nature of the injuries
- The best route to be used to approach the accident location
- The pit supervisor will contact the Mine Rescue Team.
- Do not move the injured unless they are in imminent danger.

### **Injuries or Medical Emergencies Supervisors Duties**

- Dispatch appropriate emergency response (Mine Rescue/First Aid Attendant)
- Ensure that the Area Manager has been notified.
- If safe to do so, go to scene of emergency and assist with casualty management until Health & Safety representative and/or Mine Rescue Team arrives.
- Supervise safety medical responders.
- Control access to and preserve the emergency scene.
- Note and record all details of the incident as soon as possible.
- Prepare a report of the incident

### **2.3 Location of First Aid Services**

First aid services will be provided from two locations.

North Zone - Will be covered by emergency personnel located at the mine

South Zone - Will be covered by an ETV and medic who will be located at the intersection of the Gavin Lake Road and Ditch Roads (52°30'24.26"N, 121°31.29.17"W). This is referenced in Appendices C and E by a star.

### 3 COMMUNICATIONS

#### 3.1 Emergency Communication/Incident Notification

EMERGENCY COMMUNICATION / INCIDENT NOTIFICATION
EMPLOYEE / BYSTANDER
<p><b>Emergency Communications</b></p> <ol style="list-style-type: none"> <li>1. By Radio Channel Pit Ops 1 / EMERGENCY - EMERGENCY - EMERGENCY - I have an Emergency</li> <li>2. Report significant details of the incident:</li> </ol> <p><b>Provide the following information:</b></p> <ol style="list-style-type: none"> <li>1. Your name and company</li> <li>2. Zone and description of location of work</li> <li>3. Location of the Emergency</li> <li>4. Description of the Emergency</li> <li>5. Number of injured persons if any and their health condition</li> <li>6. Telephone number or radio channel you will be monitoring</li> <li>7. Notify your Supervisor <ul style="list-style-type: none"> <li>• DO NOT CALL the local media to report the emergency</li> <li>• DO NOT CALL the family or friends of the persons involved in the emergency (Management will take charge of making such calls)</li> <li>• DO NOT CALL the government agencies (Management will take charge of making such calls)</li> </ul> </li> </ol>
SUPERVISOR
<p><b>Senior Area Supervisor present at the scene:</b></p> <ol style="list-style-type: none"> <li>1. Informs Safety of the resources needed at the scene</li> <li>2. Directs the on-scene activities</li> <li>3. Initiates the dispatch of the resources for the appropriate response: <ul style="list-style-type: none"> <li>• Site Mine Rescue or First Aid</li> <li>• RCMP, BC Ambulance</li> <li>• Medical: BC Ambulance</li> <li>• Fire: 911 Local Fire Response Rescue; Forestry Fire Service</li> <li>• Site Safety department representative.</li> </ul> </li> <li>4. Contacts the Mine Manager or designate senior on call or the next higher level to report the Level of Emergency and response needs.</li> </ol>
MANAGER
<p><b>Senior Manager at the site or project:</b></p> <ol style="list-style-type: none"> <li>1. Confirms or Determines the Level of Emergency &amp; assumes command at pre-designated Incident Command Post (Mount Polley Boardroom).</li> <li>2. Responsible for the overall management of an emergency.</li> <li>3. Initiates the dispatch of the resources for the appropriate response: <ul style="list-style-type: none"> <li>• Ministry of Mines, Ministry of Environment</li> <li>• RCMP</li> <li>• Coroner</li> </ul> </li> </ol>

### 3.2 Initial Radio and Task Procedure

INITIAL RADIO AND TASK PROCEDURES WHEN AN EMERGENCY IS DECLARED	
When an Emergency is called:	
•	Pit Operations Channel Pit Ops 1 is reserved for Emergency Incident Reporting, Management & High Priority Communications only
•	All Employees Monitor Pit Ops 1 to stay informed of the incident and listen for updates & instructions. Maintain radio silence unless you have a Priority Message
•	Evacuate Creek Bed Downstream of Polley Lake ensure all personnel are clear of the washout area of the creek
•	Cease High Risk Activities in the initial stages of any reported emergency until a status can be determined by Management
•	Wait For Instruction - Communications may be done with briefness on regular assigned channels to ask or receive instructions from your immediate Supervisor &/or Management
•	Prolonged Work Interruptions will be at the discretion of the On-site Manager

### 3.3 Hazeltine Creek Radio Channels

Hazeltine Creek Communications			
Radio Channel	Area	Receive	Transmit
Pit Ops 1	Pit Operations (Repeater) All communications	167.910	170.430

### 3.4 Hazeltine Creek Key Phone Numbers

Hazeltine Creek Key Phone Numbers	
General Manager Dale Reimer	250.790.2215 ext 2600
Cell / Night	250.305.8530
Mine Operations Manager Art Frye	250.790.2215 ext 2606
Cell / Night	250.809.4595
Project Engineer Luke Moger	250.790.2215 ext 2113
Cell / Night	250.267.8552
Environmental Coordinator Colleen Hughes	250.790.2215 ext 2617
Cell / Night	250.257.0207
Senior Safety Coordinator Sal Bafaro	250.790.2215 ext 2609
Cell / Night	
Geotech Engineer - BGC Engineering Greg Wegner/Greg Hunchuk	250.790.2215 ext 2210
Cell / Night	

Russ Gibson Assistant Forests Operations Manager	Pit Ops 1
Cell / Night	250.3032276
Health and Safety Manager - SNC Lavalin Kelly Mikkelsen	250.562.5172 ext 56544
Cell / Night	778.349.1135



## 4 HAZARD ASSESSMENT AND CONTROLS

### 4.1 Risk Assessment

Task	Potential Hazard	Risk Rating	Recommended Control and Procedures	Residual Risk Rating
Remediation and sampling work on Polley Lake and Hazeltine Creek	Plug failure causing sudden release of water and sediments, which could entrap or engulf workers	H	<ol style="list-style-type: none"> <li>1. Prior to any work commencing a daily geotechnical inspection must be performed by a qualified engineer to determine if conditions in the plug are stable. This report shall be updated throughout the day if significant weather or condition changes pose a hazard to personnel. This report shall be emailed to the designated management team.</li> <li>2. All supervisors with crews working on Polley Lake and Hazeltine Creek shall contact the on-shift BGC Engineer to confirm status of this inspection. This shall be done prior to authorizing work each day.</li> <li>3. A spotter shall be assigned to the Hazeltine discharge point to continually monitor water flow from Polley Lake. If significant changes are noted to water or sediment flow then the spotter shall be responsible to alert all teams working on Polley Lake and Hazeltine Creek. This spotter shall maintain a log (Attached at Annex B) of all groups working on this project and their check-in/out times.</li> <li>4. All supervisors must check-in with the spotter upon commencing work and inform the spotter of how many personnel will be working downstream. The supervisor shall ensure they check-out with the spotter at the completion of daily duties.</li> <li>5. All workers in the Hazeltine creek shall have access to a two way radio or be in verbal communication distance to someone assigned a radio. Radios must be monitored for emergency communication and all workers shall leave the creek bed as instructed.</li> <li>6. In the event of an emergency, the spotter shall make direct contact with each supervisor to ensure emergency communication has been received and clearing of the creek is completed.</li> </ol>	M

Access/egress of workers in Hazeltine Creek	1. Inability of quick egress in event of emergency 2. Slips/trip/falls	<b>M</b>	All work areas shall identify an appropriate access and egress route. This route shall allow for quick egress in the event of an emergency requiring evacuation of work area. Consideration shall be given to the construction of ladders or tag lines where needed.	<b>L</b>
Work involving ground disturbance	Creation of Respirable dust	<b>M</b>	Project supervisors shall monitor all work. If significant dust is being created, then respirators shall be worn by employees.	<b>L</b>
Work near overhead power line (751v - 25 kv)	Electrocution	<b>H</b>	Any work within 6 meters shall be under the supervision of a spotter and consideration shall be given to de-energizing the line. No work shall be done within 3 meters without the line being de-energized by an electrician.	<b>L</b>
Work near open water	Drowning	<b>H</b>	1. Where there is a risk of drowning the worksite shall have a life ring with sufficient rope and life jackets available. 2. If an employee is required to work near open water alone then a life jacket must be worn at all times. 3. If work is to be performed on water (i.e. from a boat) then all workers shall wear appropriate life vests	<b>L</b>
Working in remote locations	Animal Encounters	<b>M</b>	1. Ensure working in groups. If working alone workers should have access to bear spray, air horn and two-way radio 2. Ensure all animal sightings are reported to other groups working in area	<b>L</b>
Working Alone	Delayed response time in event of injury or incident	<b>M</b>	1. Workers will be required to check-in with supervisor at intervals of no longer than 2 hours. This interval can be reduced in duration if appropriate due to higher hazard job tasks. This should be indicated on the appropriate Job Hazard Analysis. 2. In the event an employee misses a check-in, the supervisor will attempt to contact the employee. If contact is not established within 15 minutes then the supervisor shall dispatch appropriate resources to search for employee.	<b>L</b>
Use of All Terrain Vehicle (ATV)	Personal injury	<b>M</b>	1. All ATV used on or around the mine shall comply with Chief Inspector Directive - January 18 <sup>th</sup> , 2013. In summary only ATVs with CSA or OHSA approved Roll over Protection Structures (ROPS) and seatbelts may be used. 2. Operators and passengers of ATVs must wear a DOT approved helmet with	<b>L</b>

			adequate eye and face protection. 3. All operators must have received appropriate training from a competent trainer. Training records must be available and will be approved upon review by management. 4. The ATV must be operated within limits as dictated in the manufacturer's operation manual. 5. ATVs are not to be operated on any public road where interaction with motor vehicles could occur. 6. ATVs shall not be operated on any mine haul road where light duty vehicles or heavy equipment interaction could occur. 7. ATVs shall be transported by appropriate trailer or pick-up on above listed roads.	
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#### 4.2 Requirement for Appropriate Hazard Assessment

Prior to commencing any project in the Hazeltine Creek restricted area, the appropriate supervisor will be responsible to lead a Job Hazard Analysis (form attached at Annex A). This analysis shall be completed with input from workers assigned to complete the task and shall accomplish the following:

- Review job scope and tasks
- Identify hazards associated with the job tasks
- Review appropriate controls for identified hazards with consideration given to the hierarchy of controls:
  - Elimination
  - Substitution
  - Engineering
  - Administrative
  - Personal Protective Equipment

Once the Job Hazard Assessment is completed, the supervisor must ensure all workers have reviewed and signed the assessment prior to starting work. This includes any new or transferred employees who join the work group.

#### 4.3 Personal Protective Equipment

PPE at a minimum shall be CSA approved hard hat, safety glasses with side shields, high-vis vest and CSA approved Grade 1 footwear with ankle support. Other PPE shall be considered where appropriate and could include, face mask, respirator, face shield, life vest, harness and tag line, etc.

Any variation to the minimum levels of PPE must be assessed in the relative Job Hazard Assessment and approved by a manager.

## 5 SAFE WORK PLAN MANAGEMENT

Date	Rev. #	Revision	Originator
26 Aug 2014	1	Document Creation	Sal Bafaro
2 Sep 2014	2	Document Review and Edits	Sal Bafaro
4 Sep 201	3	-Change area of coverage to include work on Polley Lake. -Added section 2.1 and 2.3 Added Section 6 -Change distance reference in Section 4.1 - Work near overhead power lines Added Appendices C through E	Sal Bafaro

## 6 SAFE WORK PLAN APPROVAL

The following personnel have reviewed and approved this Safe Work Procedure

**//SIGNED COPY ON FILE AT MOUNT POLLEY//**

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Charlie Rueger,  
Hourly OHSC Co-Chair  
Mount Polley Mining Corporation

**//SIGNED COPY ON FILE AT MOUNT POLLEY//**

---

Dale Reimer  
General Manager  
Mount Polley Mining Corporation

## APPENDIX A - JOB HAZARD ASSESSMENT FORM

### Job Hazard Analysis

<b>Date:</b> _____ <b>Time:</b> _____			
<b>Project Location:</b> _____			
<b>Job Task:</b> _____ _____ _____			
<b>Work Permit in place:</b> <b>Yes</b> _____ <b>Type/#</b> _____ <b>Not Applicable</b> _____			
<hr/>			
<b>Assessment Team:</b>	Name: _____		Position: _____
	Name: _____		Position: _____
	Name: _____		Position: _____
	Name: _____		Position: _____
* Include Supervisor or Designate and 1 or 2 other involved workers depending on size of job.			
<b>Tools/Equipment Required</b>		<b>Material Required</b>	<b>PPE Required</b>
<b>Step #</b>	<b>Task Steps</b>	<b>Potential Accidents/Hazards</b>	<b>Control Measures</b>
<b>1</b>			

**Approved By:**

\_\_\_\_\_  
Supervisor Name (print)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Position



**ALL CREW MEMBERS** involved with this particular job task **MUST SIGN BELOW**, indicating they understand and acknowledge the risks and hazards associated with this work and the appropriate Hazard Control / Safe Work Methods for this task.

Print	Signature	Print	Signature

Reviewed with above noted crew members on: (Date) \_\_\_\_\_

By: (Print) \_\_\_\_\_ Signature \_\_\_\_\_

**RETAIN COMPLETED JHA ON SITE OR LOCAL OFFICE RECORDS**

## APPENDIX B - HAZELTINE CREEK ACCOUNTABILITY FORM

[illegible]

APPENDIX C - AREA MAP

Copyright

## APPENDIX D - NORTH ZONE MAP

Copyright

## APPENDIX E - SOUTH ZONE MAP

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# Mount Polley Mining Corporation Hazeltine Creek Remediation Safe Work Plan

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Revision 3  
September 4<sup>th</sup>, 2014



Mount Polley  
Mining Corporation



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## 1 INTRODUCTION

This plan has been developed and compiled to contain practical rules, procedures and allocation of responsibilities for the safe coordination of work on Polley Lake and Hazeltine Creek. The Safe Work Plan is to be provided to all internal areas of management and contractors that will be working in the area affected by this plan. Compliance with the relevant provisions of the Emergency Response Plan and Safe Work Plan during an emergency will facilitate information flow and provide support and assistance.

To familiarize all employees with the contents of this Safe Work Plan, it is essential for the supervisors to review pertinent sections of the Safe Work Plan together with their employees:

- when they are new or when they have been transferred to a new area,
- when their duties and the responsibilities assigned to them within the department have been changed or modified, and
- when they are assigned to a specific duty within this Plan.

## 2 EMERGENCIES

Emergency response shall follow the terms and conditions set out in the Mount Polley Emergency Response Manual. In the event of an emergency, supervisors will refer to the Emergency Response Manual.

An emergency is an undesired event that generates real or potential danger/risks that directly affect:

- The people
  - the health and welfare of employees
  - the health and welfare of members of the general public
- The property
- The process
- The environment
- The reputation of the company

An event need not be directly related to Mount Polley operations to adversely affect company reputation. Public, media and/or government perceptions about our industry and its products can have a long-term impact.

### 2.1 Work Zones and Reference Points

For ease of emergency response and accountability of workers, the work area from Polley Lake to the mouth of Hazeltine Creek on Quesnel Lake has been broken into work zones and segments. Please make note of the area maps attached at Appendices C-E. Work will be split into the Following Zones:

**North Zone** - All areas north (upstream) of the Gavin Lake Road washout and including Polley Lake

- Segment A - Polley lake to the area of the plug
- Segment B - Downstream of Polley Lake plug to Gavin Lake Road washout

**South Zone** - All areas south (downstream) of the Gavin Lake Road washout including the mouth of Hazeltine Creek

- Segment C - Area downstream of Gavin Lake Road to Reference Point A
  - **Reference Point A - 52°30'11.24"N, 121°33'23.26W**
- Segment D - Area downstream of Reference Point A to Reference Point B
  - **Reference Point B - 52°29'53.26"N, 121°32'26.19W**
- Segment E - Area downstream of Reference Point B to Ditch Road Washout
- Segment F - Area downstream of Ditch Road Washout to Quesnel Lake

### 2.2 Injuries or Medical Emergencies

#### First on Scene Persons Duties

- Quickly assess the situation determining the number of injured persons, the severity of injuries and what resources may be required to deal with the emergency situation.
- Initial emergency notifications as per section 3
- Give the pit supervisor the following information:
  - Your name
  - The location of the accident by referencing of work zones on attached maps

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- The number of injured persons
- The nature of the injuries
- The best route to be used to approach the accident location
- The pit supervisor will contact the Mine Rescue Team.
- Do not move the injured unless they are in imminent danger.

#### **Injuries or Medical Emergencies Supervisors Duties**

- Dispatch appropriate emergency response (Mine Rescue/First Aid Attendant)
- Ensure that the Area Manager has been notified.
- If safe to do so, go to scene of emergency and assist with casualty management until Health & Safety representative and/or Mine Rescue Team arrives.
- Supervise safety medical responders.
- Control access to and preserve the emergency scene.
- Note and record all details of the incident as soon as possible.
- Prepare a report of the incident

#### **2.3 Location of First Aid Services**

First aid services will be provided from two locations.

North Zone - Will be covered by emergency personnel located at the mine

South Zone - Will be covered by an ETV and medic who will be located at the intersection of the Gavin Lake Road and Ditch Roads (52° 30' 24.26"N, 121° 31.29.17"W). This is referenced in Appendices C and E by a star.



### 3 COMMUNICATIONS

#### 3.1 Emergency Communication/Incident Notification

<b>EMERGENCY COMMUNICATION / INCIDENT NOTIFICATION</b>	
<b>EMPLOYEE / BYSTANDER</b>	
<p><b>Emergency Communications</b></p> <ol style="list-style-type: none"> <li>1. By Radio Channel <b>Pit Ops 1 / EMERGENCY - EMERGENCY - EMERGENCY - I have an Emergency</b></li> <li>2. Report significant details of the incident:</li> </ol> <p><b>Provide the following information:</b></p> <ol style="list-style-type: none"> <li>1. Your name and company</li> <li>2. Zone and description of location of work</li> <li>3. Location of the Emergency</li> <li>4. Description of the Emergency</li> <li>5. Number of injured persons if any and their health condition</li> <li>6. Telephone number or radio channel you will be monitoring</li> <li>7. <b>Notify your Supervisor</b> <ul style="list-style-type: none"> <li>• DO NOT CALL the local media to report the emergency</li> <li>• DO NOT CALL the family or friends of the persons involved in the emergency (Management will take charge of making such calls)</li> <li>• DO NOT CALL the government agencies (Management will take charge of making such calls)</li> </ul> </li> </ol>	
<b>SUPERVISOR</b>	
<p><b>Senior Area Supervisor present at the scene:</b></p> <ol style="list-style-type: none"> <li>1. Informs Safety of the resources needed at the scene</li> <li>2. Directs the on-scene activities</li> <li>3. Initiates the dispatch of the resources for the appropriate response: <ul style="list-style-type: none"> <li>• Site Mine Rescue or First Aid</li> <li>• RCMP, BC Ambulance</li> <li>• Medical: BC Ambulance</li> <li>• Fire: 911 Local Fire Response Rescue; Forestry Fire Service</li> <li>• Site Safety department representative.</li> </ul> </li> <li>4. Contacts the Mine Manager or designate senior on call or the next higher level to report the Level of Emergency and response needs.</li> </ol>	
<b>MANAGER</b>	
<p><b>Senior Manager at the site or project:</b></p> <ol style="list-style-type: none"> <li>1. Confirms or Determines the Level of Emergency &amp; assumes command at pre-designated Incident Command Post (Mount Polley Boardroom).</li> <li>2. Responsible for the overall management of an emergency.</li> <li>3. Initiates the dispatch of the resources for the appropriate response: <ul style="list-style-type: none"> <li>• Ministry of Mines, Ministry of Environment</li> <li>• RCMP</li> <li>• Coroner</li> </ul> </li> </ol>	

### 3.2 Initial Radio and Task Procedure

INITIAL RADIO AND TASK PROCEDURES WHEN AN EMERGENCY IS DECLARED	
When an Emergency is called:	
•	<b>Pit Operations Channel Pit Ops 1</b> is reserved for Emergency Incident Reporting, Management & High Priority Communications only
•	<b>All Employees Monitor Pit Ops 1</b> to stay informed of the incident and listen for updates & instructions. Maintain radio silence unless you have a Priority Message
•	<b>Evacuate Creek Bed Downstream of Polley Lake</b> ensure all personnel are clear of the washout area of the creek
•	<b>Cease High Risk Activities</b> in the initial stages of any reported emergency until a status can be determined by Management
•	<b>Wait For Instruction</b> - Communications may be done with brevity on regular assigned channels to ask or receive instructions from your immediate Supervisor &/or Management
•	<b>Prolonged Work Interruptions</b> will be at the discretion of the On-site Manager

### 3.3 Hazeltine Creek Radio Channels

Hazeltine Creek Communications			
Radio Channel	Area	Receive	Transmit
Pit Ops 1	Pit Operations (Repeater) All communications	167.910	170.430

### 3.4 Hazeltine Creek Key Phone Numbers

Hazeltine Creek Key Phone Numbers	
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Senior Safety Coordinator Sal Bafaro	250.790.2215 ext 2609
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Cell / Night	

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Russ Gibson Assistant Forests Operations Manager	Pit Ops 1
Cell / Night	250.3032276
Health and Safety Manager - SNC Lavalin Kelly Mikkelsen	250.562.5172 ext 56544
Cell / Night	778.349.1135

## 4 HAZARD ASSESSMENT AND CONTROLS

### 4.1 Risk Assessment

Task	Potential Hazard	Risk Rating	Recommended Control and Procedures	Residual Risk Rating
Remediation and sampling work on Polley Lake and Hazeltine Creek	Plug failure causing sudden release of water and sediments, which could entrap or engulf workers	H	<ol style="list-style-type: none"> <li>1. Prior to any work commencing a daily geotechnical inspection must be performed by a qualified engineer to determine if conditions in the plug are stable. This report shall be updated throughout the day if significant weather or condition changes pose a hazard to personnel. This report shall be emailed to the designated management team.</li> <li>2. All supervisors with crews working on Polley Lake and Hazeltine Creek shall contact the on-shift BGC Engineer to confirm status of this inspection. This shall be done prior to authorizing work each day.</li> <li>3. A spotter shall be assigned to the Hazeltine discharge point to continually monitor water flow from Polley Lake. If significant changes are noted to water or sediment flow then the spotter shall be responsible to alert all teams working on Polley Lake and Hazeltine Creek. This spotter shall maintain a log (Attached at Annex B) of all groups working on this project and their check-in/out times.</li> <li>4. All supervisors must check-in with the spotter upon commencing work and inform the spotter of how many personnel will be working downstream. The supervisor shall ensure they check-out with the spotter at the completion of daily duties.</li> <li>5. All workers in the Hazeltine creek shall have access to a two way radio or be in verbal communication distance to someone assigned a radio. Radios must be monitored for emergency communication and all workers shall leave the creek bed as instructed.</li> <li>6. In the event of an emergency, the spotter shall make direct contact with each supervisor to ensure emergency communication has been received and clearing of the creek is completed.</li> </ol>	M

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Access/egress of workers in Hazeltine Creek	1. Inability of quick egress in event of emergency 2. Slips/trip/falls	M	All work areas shall identify an appropriate access and egress route. This route shall allow for quick egress in the event of an emergency requiring evacuation of work area. Consideration shall be given to the construction of ladders or tag lines where needed.	L
Work involving ground disturbance	Creation of Respirable dust	M	Project supervisors shall monitor all work. If significant dust is being created, then respirators shall be worn by employees.	L
Work near overhead power line (751v - 25 kv)	Electrocution	H	Any work within 6 meters shall be under the supervision of a spotter and consideration shall be given to de-energizing the line. No work shall be done within 3 meters without the line being de-energized by an electrician.	L
Work near open water	Drowning	H	1. Where there is a risk of drowning the worksite shall have a life ring with sufficient rope and life jackets available. 2. If an employee is required to work near open water alone then a life jacket must be worn at all times. 3. If work is to be performed on water (i.e. from a boat) then all workers shall wear appropriate life vests	L
Working in remote locations	Animal Encounters	M	1. Ensure working in groups. If working alone workers should have access to bear spray, air horn and two-way radio 2. Ensure all animal sightings are reported to other groups working in area	L
Working Alone	Delayed response time in event of injury or incident	M	1. Workers will be required to check-in with supervisor at intervals of no longer than 2 hours. This interval can be reduced in duration if appropriate due to higher hazard job tasks. This should be indicated on the appropriate Job Hazard Analysis. 2. In the event an employee misses a check-in, the supervisor will attempt to contact the employee. If contact is not established within 15 minutes then the supervisor shall dispatch appropriate resources to search for employee.	L
Use of All Terrain Vehicle (ATV)	Personal injury	M	1. All ATV used on or around the mine shall comply with Chief Inspector Directive - January 18 <sup>th</sup> , 2013. In summary only ATVs with CSA or OHSA approved Roll over Protection Structures (ROPS) and seatbelts may be used. 2. Operators and passengers of ATVs must wear a DOT approved helmet with	L

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			<p>adequate eye and face protection.</p> <p>3. All operators must have received appropriate training from a competent trainer. Training records must be available and will be approved upon review by management.</p> <p>4. The ATV must be operated within limits as dictated in the manufacturer's operation manual.</p> <p>5. ATVs are not to be operated on any public road where interaction with motor vehicles could occur.</p> <p>6. ATVs shall not be operated on any mine haul road where light duty vehicles or heavy equipment interaction could occur.</p> <p>7. ATVs shall be transported by appropriate trailer or pick-up on above listed roads.</p>	
--	--	--	--	--

#### 4.2 Requirement for Appropriate Hazard Assessment

Prior to commencing any project in the Hazeltine Creek restricted area, the appropriate supervisor will be responsible to lead a Job Hazard Analysis (form attached at Annex A). This analysis shall be completed with input from workers assigned to complete the task and shall accomplish the following:

- Review job scope and tasks
- Identify hazards associated with the job tasks
- Review appropriate controls for identified hazards with consideration given to the hierarchy of controls:
  - Elimination
  - Substitution
  - Engineering
  - Administrative
  - Personal Protective Equipment

Once the Job Hazard Assessment is completed, the supervisor must ensure all workers have reviewed and signed the assessment prior to starting work. This includes any new or transferred employees who join the work group.

#### 4.3 Personal Protective Equipment

PPE at a minimum shall be CSA approved hard hat, safety glasses with side shields, high-vis vest and CSA approved Grade 1 footwear with ankle support. Other PPE shall be considered where appropriate and could include, face mask, respirator, face shield, life vest, harness and tag line, etc.

Any variation to the minimum levels of PPE must be assessed in the relative Job Hazard Assessment and approved by a manager.




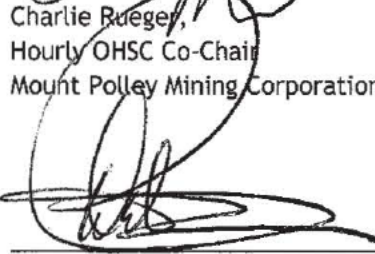
## 5 SAFE WORK PLAN MANAGEMENT

Date	Rev. #	Revision	Originator
26 Aug 2014	1	Document Creation	Sal Bafaro
2 Sep 2014	2	Document Review and Edits	Sal Bafaro
4 Sep 201	3	-Change area of coverage to include work on Polley Lake. -Added section 2.1 and 2.3 Added Section 6 -Change distance reference in Section 4.1 - Work near overhead power lines Added Appendices C through E	Sal Bafaro

## 6 SAFE WORK PLAN APPROVAL

The following personnel have reviewed and approved this Safe Work Procedure

  
 Charlie Rueger,  
 Hourly OHSC Co-Chair  
 Mount Polley Mining Corporation

  
 Dale Reimer  
 General Manager  
 Mount Polley Mining Corporation

Revision 3 - 4 September 2014

APPENDIX A - JOB HAZARD ASSESSMENT FORM

**Job Hazard Analysis**

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Project Location: \_\_\_\_\_

Job Task: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Work Permit in place: Yes \_\_\_\_\_ Type/# \_\_\_\_\_ Not Applicable \_\_\_\_\_

---

Assessment Team: Name: \_\_\_\_\_ Position: \_\_\_\_\_  
 Name: \_\_\_\_\_ Position: \_\_\_\_\_  
 Name: \_\_\_\_\_ Position: \_\_\_\_\_  
 Name: \_\_\_\_\_ Position: \_\_\_\_\_

\* Include Supervisor or Designate and 1 or 2 other involved workers depending on size of job.

Tools/Equipment Required		Material Required	PPE Required
Step #	Task Steps	Potential Accidents/Hazards	Control Measures
1			

Approved By: \_\_\_\_\_  
 Supervisor Name (print) Signature Position



**ALL CREW MEMBERS** involved with this particular job task **MUST SIGN BELOW**, indicating they understand and acknowledge the risks and hazards associated with this work and the appropriate Hazard Control / Safe Work Methods for this task.

Print	Signature	Print	Signature

Reviewed with above noted crew members on: (Date) \_\_\_\_\_

By: (Print) \_\_\_\_\_ Signature \_\_\_\_\_

**RETAIN COMPLETED JHA ON SITE OR LOCAL OFFICE RECORDS**

## APPENDIX B - HAZELTINE CREEK ACCOUNTABILITY FORM

[illegible]

## APPENDIX C - AREA MAP

Copyright

## APPENDIX D - NORTH ZONE MAP

Copyright

## APPENDIX E - SOUTH ZONE MAP

Copyright

**From:** Demchuk, Tania MEM:EX  
**To:** [Morel, David P MEM:EX](#)  
**Cc:** [Bunce, Hubert ENV:EX](#); [Fenwick, Leigh-Ann FLNR:EX](#); [McGuire, Jennifer ENV:EX](#); [Howe, Diane J MEM:EX](#)  
**Subject:** RE: Signed Copy of Safe Work Permit  
**Date:** Friday, September 5, 2014 4:24:00 PM

---

MEM does not approve safe work procedures. But these are items that we see as gaps that need to be addressed.

-----Original Message-----

From: Morel, David P MEM:EX  
Sent: Friday, September 5, 2014 4:23 PM  
To: Demchuk, Tania MEM:EX  
Cc: Bunce, Hubert ENV:EX; Fenwick, Leigh-Ann FLNR:EX; McGuire, Jennifer ENV:EX; Howe, Diane J MEM:EX  
Subject: Re: Signed Copy of Safe Work Permit

Does this mean the work order is not improved.

David

Sent from my iPhone

> On Sep 5, 2014, at 11:09 AM, "Demchuk, Tania MEM:EX" <Tania.Demchuk@gov.bc.ca> wrote:  
>  
> Hubert/Leigh-Ann  
>  
> Just FYI, MEM has requested the following immediate updates to address deficiencies in the safe work plan for Hazeltine Creek.  
>  
> Tania  
>  
> From: Demchuk, Tania MEM:EX  
> Sent: Friday, September 5, 2014 10:58 AM  
> To: 'Sal Bafaro'; Meade, Laurie MEM:EX; Rothman, Stephen MEM:EX; Pocklington, Cheryl M MEM:EX  
> Cc: Don Parsons; Dale Reimer; Hoffman, Al MEM:EX; Warnock, George MEM:EX; Howe, Diane J EMPR:EX (Diane.Howe@gov.bc.ca)  
> Subject: RE: Signed Copy of Safe Work Permit  
>  
> Hello Sal,  
>  
> Thank-you for providing both a signed and colour copy of the safe work plan for Hazeltine Creek. Please address the comments below following MEM's review the plan:  
>  
>  
> 1. The Ministry requires confirmation that this work procedure has been vetted by BGC.  
>  
> 2. Details around exiting the creek bed in the event that evacuation are vague and insufficient. Further details are required to define this aspect of the plan.  
>  
> 3. Section 4 is missing information about risks related to weather. These may include risk associated with rain events and also reduced visibility conditions that could impact work and also egress abilities.  
>  
> The Ministry expects that these deficiencies will be addressed immediately and requests an updated plan be forwarded to those included on this email.  
>



> Regards,  
> Tania  
>  
> Tania Demchuk, MSc, GIT  
> Senior Environmental Geoscientist  
> Mines and Mineral Resources Division  
> Ministry of Energy and Mines  
> 250-952-0417  
>  
> From: Sal Bafaro [<mailto:sbafaro@mountpolley.com>]  
> Sent: Thursday, September 4, 2014 4:41 PM  
> To: Meade, Laurie MEM:EX; Rothman, Stephen MEM:EX; Demchuk, Tania MEM:EX; Pocklington, Cheryl M MEM:EX  
> Cc: Don Parsons; Dale Reimer  
> Subject: Signed Copy of Safe Work Permit  
>  
> Good Afternoon,  
>  
> Please see attached Safe Work Plan for Polley Lake and Hazeltine Creek. I have attached the signed copy as well as a digital version that clearly shows the images.  
> Please forward this document on to any interested parties.  
>  
> Regards,  
>  
> Sal Bafaro  
> Senior Safety Coordinator  
> Mount Polley Mining Corporation  
> PO Box 12  
> Likely, BC V0L 1N0  
> P: 250-790-2215 x 2609  
> sbafaro@mountpolley.com<<mailto:sbafaro@mountpolley.com>>  
>  
> <Hazeltine Creek SWP - Revision 3 - 4 September 2014 - Digital Copy.pdf>

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Bellefontaine, Kim MEM:EX](#)  
**Subject:** Fwd: Mount Polley - September 7 highlights of site update  
**Date:** Sunday, September 7, 2014 3:55:45 PM

---

Tania Demchuk, MSc, GIT  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

Begin forwarded message:

**From:** "Demchuk, Tania MEM:EX" <[Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)>  
**Date:** September 7, 2014 at 3:55:08 PM PDT  
**To:** "Hoffman, Al MEM:EX" <[Al.Hoffman@gov.bc.ca](mailto:Al.Hoffman@gov.bc.ca)>, "Thorpe, Rolly MEM:EX" <[Rolly.Thorpe@gov.bc.ca](mailto:Rolly.Thorpe@gov.bc.ca)>, "Pocklington, Cheryl M MEM:EX" <[Cheryl.Pocklington@gov.bc.ca](mailto:Cheryl.Pocklington@gov.bc.ca)>, "McLean, Greg MEM:EX" <[Greg.McLean@gov.bc.ca](mailto:Greg.McLean@gov.bc.ca)>, Naomi Hemphill s.22  
"Hemphill, Naomi MEM:EX" <[Naomi.Hemphill@gov.bc.ca](mailto:Naomi.Hemphill@gov.bc.ca)>, "Kuppers, Haley MEM:EX" <[Haley.Kuppers@gov.bc.ca](mailto:Haley.Kuppers@gov.bc.ca)>, "Warnock, George MEM:EX" <[George.Warnock@gov.bc.ca](mailto:George.Warnock@gov.bc.ca)>, "McLeod, Harvey" <[HMcLeod@klohn.com](mailto:HMcLeod@klohn.com)>  
**Cc:** "Morel, David P MEM:EX" <[David.Morel@gov.bc.ca](mailto:David.Morel@gov.bc.ca)>, "Howe, Diane J MEM:EX" <[Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca)>, "Narynski, Heather M MEM:EX" <[Heather.Narynski@gov.bc.ca](mailto:Heather.Narynski@gov.bc.ca)>, "Rothman, Stephen MEM:EX" <[Stephen.Rothman@gov.bc.ca](mailto:Stephen.Rothman@gov.bc.ca)>, "Bellefontaine, Kim EMPR:EX" <[Bellefontaine@Victoria1.gov.bc.ca](mailto:Bellefontaine@Victoria1.gov.bc.ca)>, "Kim EMPR:EX" <[EX@Victoria1.gov.bc.ca](mailto:EX@Victoria1.gov.bc.ca)>  
**Subject:** Mount Polley - September 7 highlights of site update

Highlights of the September 7 call with MPMC/MOE/MEM:

- Polley lake level unchanged from yesterday due to pump manifold maintenance. Pumps back to full capacity today.
- weather: overcast, forecast for 1mm of rain over night.
- main dyke: 13.5 m advance
- satellite dyke: 64.5 m advance
- Art will be speaking to BGC regarding concerns about water buildup behind the main dyke. Looking at options for monitoring levels safely, will be at least 2 weeks before pumping system behind the satellite dyke is in place.
- characterized current water build-up as flushing/pulsing through the dyke every so often prior to any large build up.
- expect to follow-up with George Warnock about BGC's recommendations for management and monitoring of this water by Wednesday.
- also discussing option for spillway through main dyke.
- understands concerns about radio traffic and will follow-up with those in charge

of safe work procedure.

- we indicated that safe work procedure may also now need contact with spotter on main dyke as well as Polley lake plug.
- will have update on log boom removal and silt curtain installation for tomorrow's call.

Tania

Tania Demchuk, MSc, GIT  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

On Sep 6, 2014, at 3:42 PM, "Demchuk, Tania MEM:EX"  
<[Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)> wrote:

Highlights of September 6<sup>th</sup> site update call with MPMC/MOE/MEM

- <!--[if !supportLists]-->• <!--[endif]-->Weather: sunny, 20 degrees
- <!--[if !supportLists]-->• <!--[endif]-->Polley Lake at 922.88 m – down 3 cm from yesterday.
- <!--[if !supportLists]-->• <!--[endif]-->Main dyke: 15.3 m advancement; Satellite dyke: 30 m advancement; good progress on settling pond inside impoundment.
- <!--[if !supportLists]-->• <!--[endif]-->Pumping system at breach sump is working well. Completed work this afternoon to capture a side channel into the pumping area.
  - <!--[if !supportLists]-->○ <!--[endif]-->Design for settling channel downstream of breach sump is being worked on this weekend by Art, Ryan and others. Art will send a drawing (Monday?).
- <!--[if !supportLists]-->• <!--[endif]-->Electrical line for new sump is strung; hope to wire by end of day today/tomorrow.
- <!--[if !supportLists]-->• <!--[endif]-->Received confirmation that the silt curtain for mouth of Hazeltine Creek is on site and ready for installation following completion of woody debris removal.
- <!--[if !supportLists]-->• <!--[endif]-->Art Frye confirmed that equipment and people capacity should not be an issue that holds up construction of sediment and erosion control works in Hazeltine Creek. (note: there is a skeleton crew on this weekend as many people have taken a break. Expect work to be full steam ahead on Monday)
- <!--[if !supportLists]-->• <!--[endif]-->Requested written response to comments on safe work procedure: these will be received on

Monday once Sal and Dale are back on site.

<!--[if !supportLists]-->• <!--[endif]-->Preparing materials for Open House.

<!--[if !supportLists]-->• <!--[endif]-->Will have SNC rep on Monday's call to provide more detailed update about works for Hazeltine Creek.

Tania

**Tania Demchuk, MSc, GIT**

Senior Environmental Geoscientist

Mines and Mineral Resources Division

Ministry of Energy and Mines

250-952-0417

Pages 326 through 329 redacted for the following reasons:

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s.14

**From:** Demchuk, Tania MEM:EX  
**To:** [Pocklington, Cheryl M MEM:EX](#)  
**Subject:** FW: Weekly Update For September 5 2014 - Mount Polley Tailings Breach  
**Date:** Tuesday, September 9, 2014 11:47:00 AM  
**Attachments:** [image001.jpg](#)  
[Weekly Update September 5.pdf](#)  
[621717-006 SEDLocPlan\\_140905.pdf](#)  
[HazeltineCreek SW 20140903.pdf](#)  
[HazeltineCreek SED 20140904.pdf](#)

---

Cheryl – use PDFs HazeltineCreek\_Sed\_20140904 for data and 621717-006 SEDLocPlan\_140905 for a map. I did not include water quality information but we do have that in a weekly update format as well. Sorry, I didn't realize that these results had gone in to MOE.

Working on your request for a site map.

---

**From:** Jancicka, Erik [mailto:[erik.jancicka@snclavalin.com](mailto:erik.jancicka@snclavalin.com)]  
**Sent:** Friday, September 5, 2014 4:35 PM  
**To:** Bunce, Hubert ENV:EX  
**Cc:** Zacharias-Homer, Christa ENV:EX; Hoffman, Al MEM:EX; Jack Love; 'chughes@mountpolley.com'; 'dreimer@mountpolley.com'; Metcalfe, Shelley ENV:EX; McGuire, Jennifer ENV:EX; Bev Sellars (b.sellars@xatsull.com); Ann Louie (ann.louie@williamslakeband.ca); Aaron Higginbottom (Aaron.Higginbottom@williamslakeband.ca); Julia Banks (nrcoordinator@xatsull.com); Steve Robertson; Demchuk, Tania MEM:EX; Pierre Stecko; Green, Jack E ENV:EX; Brian Kynoch; dreimer@mountpolley.com; RC Cory Koenig; Don Parsons; Luke Moger (lmoger@mountpolley.com); Art Frye (afrye@mountpolley.com); Johnson, Gordon; Bellefontaine, Kim MEM:EX; Howe, Diane J MEM:EX; McConkey, Trevor; Hill, Douglas J FLNR:EX; Vanderburgh, Ken FLNR:EX; Luke Moger (lmoger@mountpolley.com); Paslawski, Janice; amy@fairmining.ca; Katie McMahan  
**Subject:** Weekly Update For September 5 2014 - Mount Polley Tailings Breach

Hello Hubert and all.

On behalf of Mount Polley Mining Corp, attached please find the weekly update report.

Thank you.

**Erik Jancicka, P.Chem.**

*Operations Manager, Prince George*  
Environment & Water

Tel.: 250-562-5172 x 56553

**SNC-Lavalin Inc.**

---

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**MOUNT POLLEY MINING  
CORPORATION**  
IMPERIAL METALS CORPORATION

Date September 5, 2014

Ministry of Environment,  
Mining Operations Environmental Protection  
2080 Labieux Rd.  
Nanaimo, B.C. V9T 6J9

Attention: Hubert Bunce, Director Environmental Management Act

Re: Weekly Update for week ending September 3, 2014

### **Monitoring Update**

As of September 3, 2014, the Monitoring Program implemented in response to the tailings release consists of the following: 1) Water Quality Programs (Quesnel Lake, Polley Lake, Residential Intakes, and Hazeltine Creek), 2) Sediment Quality (Quesnel Lake), 3) Fish Sampling, and 4) Soil Sampling. The following sections summarize the programs, changes, and key actions and interactions relevant to the program.

#### *Water Quality Programs*

More than 80 water quality sampling locations have been established as of September 3, 2014 to assess and monitor water quality as part of the program. Drawing 621717-005 shows sample locations

The following parameters continue to form the basis for the monitoring program and evaluating impacts to water quality as a result of the release.

- Total and dissolved metals (including mercury);
- Anions: sulphate, chloride, fluoride;
- Nutrients: total ammonia, nitrate, nitrite, total nitrogen, total Kjeldahl nitrogen, orthophosphate, total phosphorous, dissolved phosphorous; and
- Toxicity testing: acute and/or chronic

Table A below summarizes the various Water Quality Programs. With the exception of toxicity testing, results have been provided in Tables 1a, 3, and 4 (attached).

**TABLE A: Summary of Water Quality Monitoring Programs**

Monitoring Program	Area	Frequency	Sample Locations
Surface Water Quality	Quesnel Lake	<i>Single Sample</i>	No additional sample locations added to program
		<i>Repeated Sites</i>	QUL-3 , QUL-18, QUL-20, QUL-23  As of week of August 28, 2014: Ongoing repeated sampling (approximately every other day) is being carried out at locations QUL-18, QUL-20, and QUL-23
	Polley Lake	<i>Repeated Sites</i>	POL-3, POL-4  As of week of August 28, 2014: Ongoing repeated sampling (weekly) is being carried out at locations POL-3 and POL-4.
	Polley Discharge and Hazeltine Crk.	<i>Sampling Sites</i>	HAD-1 (Daily), HAD-2 (Daily), HAC-01 (every other day), HAC-02, HAC-03, HAC-04, HAC-05, and HAC-06.  As of week of August 28, 2014: HAD-1 and HAD-2 collected on an approximate daily basis. HAC-01 collected every other day.
	Quesnel River	<i>Repeated Sites</i>	QUR-1 (includes QURU-1x & QUR-3). ISKO sampler collects 3 samples per day. A fourth grab sample is also collected at this location.  A datalogger records measurements of pH, temperature, conductivity, and conductivity every 15 minutes).
Water Quality Profiles	Quesnel Lake	<i>Single Sample</i>	QUL-ST-FFF-1, QUL-ST-REF-1, QUL-96
		<i>Repeated Sites</i>	QUL-2,, QUL-20, QUL-21, QUL-22, QUL-66, QUL-79,  As of week of August 28, 2014: QUL-2, QUL-21, QUL-22, QUL-66, and QUL-79 are visited on a rotational basis approximately every other day.  Samples are collected near surface and near lake bottom, and in consideration of CTD field monitoring results.
Residential Water Intake Sampling Program	Quesnel Lake	<i>Single Sample</i>	QUL-91, QUL-92, QUL-93, QUL-94, QUL-95, QUL-100, QUL-101
		<i>Repeated Sites</i>	QUL-37, QUL-38, QUL-60, and QUL-61.

Results of the toxicity testing completed to date are provided in Table B. Additional results are pending and will be updated as they become available.

**Table B: Summary of Draft Water Toxicity Testing**

Date	Location	Location Description	Acute (96h) Rainbow Trout <sup>1</sup>	Acute (48-h) Daphnia magna <sup>2</sup>	Sublethal (7-d) fish survival and growth <sup>3</sup>	Sublethal (7-d) invertebrate survival and reproduction <sup>4</sup>	Sublethal (72-h) algal growth <sup>5</sup>	Sublethal (7-d) plant growth <sup>6</sup>	Results
August 6, 2014	QUR-1	Quesnel River at Research Station				✓			LC50, IC25, IC50 all >100%
August 9, 2014	POL-2	Polley Lake near South End				✓			LC50, IC25, IC50 all >100%
August 13, 2014	HAD-1	Discharge from Polley to Hazeltine	□	□	✓	✓	✓	✓	> 100% for all tests
August 20, 2014	HAD-1	Discharge from Polley to Hazeltine	✓	✓					100% survival
August 21, 2014	QUL-66-40m	Quesnel Lake Plume	✓	✓	✓	✓	✓	✓	100% acute survival; awaiting sub-lethals
August 28, 2014	QUL-66-40m	Quesnel Lake Plume	✓	✓	✓	✓	✓	✓	Pending
September 3, 2014	QUL-66-45m	Quesnel Lake Plume			✓	✓			Pending
September 3, 2014	HAD-2	Discharge from Polley to Hazeltine			✓	✓			Pending

<sup>1</sup>Rainbow trout acute lethality (96-hours)<sup>2</sup>Daphnia magna acute lethality (48-hours)<sup>3</sup>Fathead minnow survival and growth (7-days)<sup>4</sup>Ceriodaphnia dubia survival and reproduction (up to 8-d)<sup>5</sup>Algal growth (Pseudokirchneriella subcapitata - 72-hours)<sup>6</sup>Plant growth (Lemna minor - 7-days)

### *Sediment Quality Program*

Since August 28, 2014, an additional five sampling locations (HAC-REF-1, HAC-REF-2, HAC-REF-3, QUL-ST-REF, QUL-ST-FFF) have been established as part of the sediment monitoring program. These and previously collected sediment sample locations are shown on Drawing 621717-006 (attached). Available sediment data is provided on Tables 2a and 5a (attached).

## **Summary of Modifications to the Monitoring Program**

- A review of current analytical and field monitoring results in progress and adaptations to the monitoring program will be considered on an ongoing basis.
- Water quality at HAD-2 is similar to that measured at HAD-1 (similar intake locations). Therefore HAD-1 is being dropped from the sampling program. Field monitoring will continue to confirm similar field measurements (EC, pH, etc.). HAD-1 will be monitored on a weekly basis going forward.
- POL-3 and POL-4 will be reduced to sampling on a monthly basis going forward. Additional sampling and profiling being considered for water quality impact assessment.
- HAC-01 will continue with sampling every other day.
- Requests for monitoring of water quality at residential intakes are being catalogued and an appropriate program will be developed for ongoing response to these requests.
- Toxicity testing at QUL-66 (within plume) will continue on a weekly basis; however, only for sublethal tests.
- Mercury parameters are being dropped from routine monitoring program and are being considered as part of water quality impact assessment.
- Profiling locations (CTD and sampling) are being completed on a daily rotational basis (every other day) to confirm surface water quality and quality near the bottom of the lake, and at elevated CTD and/or turbidity readings.
- Evidence of a sediment plume near surface in Quesnel Lake in the area of Hazeltine Creek triggered some reactive profiling and sampling by field crews.
- Water samples below TSF breach location (BREACH-1) added to routine monitoring program on a weekly basis.

## **Gaps Identified in the Monitoring Program and Next Actions**

Plume Monitoring remains a priority. Some additional profiling and sampling was completed near the mouth of Hazeltine Creek within Quesnel Lake. Data from the EBA Tetra-Tech vessels are being evaluated and considered in monitoring program going forward.

## **Summary of Daily Observations and Public Interactions**

August 28 to September 3 – Ongoing dialogue and data review with private property and lodge owners regarding water quality results as requested.

September 3- Residential sample data made available for review on a request by request basis.

August 28 – Two vessels (EBA TetraTech) equipped for bottom, sediment, and plume mapping are implementing related scopes of work. Equipment on board vessels includes deep water monitoring and sampling devices.

August 29 – MPMC is evaluating proposals from UNBC for opportunities for partnering and integration with the planned CEIA.

September 3- Evidence of a sediment plume near surface in Quesnel Lake in the area of Hazeltine Creek toward Mitchell Bay triggered some reactive profiling and sampling by field crews.

Sincerely,

**MOUNT POLLEY MINING CORPORATION**

*Via email*

Jack Love, R.P.Bio.  
Environmental Manager  
Imperial Metals-Red Chris Mine-Mount Polley Mine-Hwy37 Power Corp  
604-358-2699 MOBILE  
250-790-2215\*2560







TABLE 4: Summary of Analytical Results for Mount Polley, Hazeline Creek - Surface Water DRAFT

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters										Dissolved Inorganics										
			Hardness (mg/L)	pH (field) (pH)	pH (pH)	Temperature (field) (C)	Turbidity (NTU)	Conductivity (µS/cm)	TDS (mg/L)	TSS (mg/L)	DOC (mg/L)	Total Nitrogen (N) (mg/L)	Ammonia Nitrogen (µg/L)	Nitrate Nitrogen (µg/L)	Nitrite Nitrogen (µg/L)	Nitrate+Nitrite Nitrogen (µg/L)	Chloride (mg/L)	Fluoride (µg/L)	Sulphate (mg/L)	Total Alkalinity (as CaCO3) (mg/L)	Ortho phosphate (mg/L)	Total Phosphorus (mg/L)	
BC Standards																							
BCWQG Aquatic Life (AW) <sup>a,c</sup>			n/a	6.5-9	6.5-9	n/a	Under Review by SNC Lavalin	n/a	n/a	n/a	n/a	n/a	700-5,680 <sup>d</sup>	32,800 (max)	60 (Cl<2)	32,800 (max)	600	1323.5-1537.8	309 <sup>d</sup>	n/a	n/a	0.005 - 0.015	
BCWQG Aquatic Life (30day) (AW) <sup>b,c</sup>			n/a	6.5-8.5	6.5-8.5	n/a		n/a	n/a	n/a	n/a	n/a	n/a	10,000	1,000	10,000	250	1,500	500	n/a	n/a	0.01	
BCWQG Drinking Water (DW)			n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	135-1,090 <sup>d</sup>	3,000	20 (Cl<2)	3,000	150	n/a	309 <sup>d</sup>	n/a	n/a	n/a	
Canadian Drinking Water Quality (DW)			n/a	n/a	n/a	n/a		n/a	500	n/a	n/a	n/a	n/a	10,000	1,000	10,000	250	1,500	500	n/a	n/a	n/a	
HAD-1	HAD-1	2014 08 10	99	8.96	8.68	19.8	5.24	198	140	10.7	6.82	0.378	< 5	< 5	< 1	-	< 0.5	64	27.5	71.8	< 0.001	0.0056	
	HAD-1	2014 08 11	102	8.94	8.50	8.9	2.16	199	139	< 3	6.77	0.366	< 5	< 5	< 1	-	< 0.5	62	27.4	74.4	< 0.001	0.0056	
	HAD-1	2014 08 12	99.9	8.99	8.65	9.0	2.64	198	148	< 3	6.12	0.348	< 5	< 5	< 1	-	< 0.5	63	27.2	74.7	< 0.001	0.0061	
	HAD-1	2014 08 13	97.4	9.11	8.80	9.1	1.5	194	135	< 3	6.32	0.386	6.7	< 5	< 1	-	< 0.5	65	27.3	73.9	0.0011	0.0053	
	HAD-1	2014 08 14	99	9.00	8.59	9.0	1.24	200	131	< 3	6.45	0.341	< 5	< 5	< 1	-	< 0.5	63	27.4	76.2	< 0.001	0.0048	
	HAD-1	2014 08 15	99.1	8.79	8.43	8.8	1.25	201	136	< 3	6.39	0.37	< 5	< 5	< 1	< 5.1	< 0.5	81	27.3	75	< 0.001	0.0057	
	HAD-1	2014 08 16	101	8.67	8.26	8.7	3.21	203	141	4.5	6.71	0.363	< 5	< 5	< 1	< 5.1	< 0.5	67	27.6	75.2	< 0.001	0.0058	
	HAD-1X	2014 08 16	102	8.67	8.21	8.7	3.04	203	138	3.4	6.73	0.371	< 5	< 5	< 1	< 5.1	< 0.5	69	27.5	74.8	< 0.001	0.0061	
	QA/QC RPD %			< 1	0	< 1	0	5	0	2	*	< 1	2	*	*	*	*	*	< 1	< 1	*	*	
	HAD-1	2014 08 17	97.9	-	8.21	-	2.95	201	141	< 3	6.57	0.352	< 5	< 5	< 1	-	< 0.5	69	27.5	75	< 0.001	0.0068	
	HAD-1	2014 08 18	100	-	8.37	-	1.51	201	135	< 3	7.37	0.425	5.7	< 5	< 1	-	< 0.5	67	27.4	76.1	< 0.001	0.0064	
	HAD-1	2014 08 19	98	-	8.28	-	1.52	200	105	< 3	7.02	0.372	< 5	< 5	< 1	-	< 0.5	75	26.8	76.3	< 0.001	0.0059	
	HAD-1	2014 08 20	102	8.72	8.21	20.7	7.79	201	139	8.5	6.45	0.364	< 5	< 5	< 1	-	< 0.5	63	26.8	76	< 0.001	0.0062	
	HAD-1	2014 08 10	100	9.08	8.86	21.3	2.75	193	138	< 3	6.58	0.361	< 5	< 5	< 1	-	< 0.5	65	27.4	74.7	< 0.001	0.0075	
	HAD-1	2014 08 21	101	-	8.32	-	5.14	200	141	4	6.29	0.34	< 5	< 5	< 1	-	< 0.5	65	27.5	74.8	< 0.001	0.0046	
	HAD-1	2014 08 22	103	8.58	8.29	-	4.33	200	131	4.2	6.61	0.349	< 5	< 5	< 1	-	< 0.5	66	27.5	75.2	< 0.001	0.0069	
	HAD-1	2014 08 24	104	8.22	8.11	18.2	7.44	207	140	7.8	6.95	0.354	< 5	< 5	< 1	-	< 0.5	69	27.2	77.7	0.0012	0.0036	
	HAD-1	2014 08 26	106	8.66	8.47	17.6	1.14	204	130	< 3	6.2	0.364	7.6	10.4	< 1	-	< 0.5	67	29.5	77	< 0.001	0.0044	
	HAD-1	2014 08 28	108	8.78	8.33	18.2	1.08	209	132	< 3	6.88	0.335	5	< 5	< 1	-	< 0.5	67	28.9	76.8	0.001	0.0075	
	HAC01	HAC01	2014 08 24	161	8.22	8.17	18.19	> 4000	343	243	3,350	6.04	0.902	62.2	453	6.1	-	1.56	120	75.9	93.4	0.0056	0.009
		HAC01-24HRS	2014 08 24	159	-	8.24	-	52.1	345	255	38.7	5.71	0.691	72.9	461	6.4	-	1.58	119	77.7	95.5	0.0061	0.0077
		HAC01	2014 08 25	155	8.62	8.23	18.6	4.090	320	140	4,040	5.73	1.81	63.2	408	4.4	-	1.3	111	69	92.1	0.0032	0.0082
		HAC01	2014 08 26	151	8.76	8.3	17.99	> 4000	317	219	3,930	6.16	0.73	67.3	418	4.8	-	1.01	120	65.1	94.7	0.0066	0.0099
		HAC01	2014 08 27	166	8.83	8.17	18.8	> 4000	396	280	35,000	5.43	2.7	183	356	20.9	-	3.45	226	101	90.6	0.0024	0.0068
	HAD-FIELD BLANK			FIELD BLANK			2014 08 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HAC01-FB			2014 08 27	< 0.5	-	5.99	-	< 0.1	< 2	< 10	< 3	-	< 0.05	< 5	< 5	< 1	-	< 0.5	< 20	< 0.5	< 1	< 0.001
HAD-TRAVEL BLANK			2014 08 27	< 0.5	-	5.65	-	< 0.1	< 2	< 10	< 3	-	< 0.05	< 5	< 5	< 1	-	< 0.5	< 20	< 0.5	< 1	< 0.001	< 0.002 <sup>d</sup>

Associated ALS files L1500203, L1500608, L1501501, L1501554, L1502400, L1503098, L1503928, L1503934, L1503943, L1504261, L1504997, L1505933, L1506592, L1506998, L1507977, L1508649, L1509589, L1509671, L1510298, L1510307, L1507958.

All terms defined within the body of SNC-Lavalin's report (available upon request).

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard.

\* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

**SHADED** Concentration greater than BCWQG Aquatic Life (AW) guideline.

**BOLD** Concentration greater than BCWQG Drinking Water (DW) guideline.

**SHADED** Concentration greater than BCWQG Aquatic Life (30day) (AW) guideline.

**BOLD** Concentration greater than or equal to Canadian Drinking Water Quality (DW) guideline.

<sup>a</sup> Laboratory detection limit out of range.

<sup>b</sup> British Columbia Approved Water Quality Guide lines 2006 Edition, updated 2014.

<sup>c</sup> A Compendium of Working Water Quality Guidelines for British Columbia, updated August 2006.

<sup>d</sup> Guideline varies with pH, and or Temperature or Hardness.

TABLE 4: Summary of Analytical Results for Mount Polley, Hazelitine Creek - Surface Water DRAFT

			Dissolved Metals																											
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Dissolved Aluminum (µg/L)	Dissolved Calcium (mg/L)	Dissolved Iron (µg/L)	Dissolved Magnesium (mg/L)	Dissolved Manganese (µg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Lithium (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Thallium (µg/L)	Titanium (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)	
BC Standards																														
BCWQG Aquatic Life (AW) <sup>b,c</sup>			100 (pH> 6.5)	n/a	350	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
BCWQG Aquatic Life (30day) (AW) <sup>b,c</sup>			200	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
BCWQG Drinking Water (DW)			50 (pH> 6.5)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Canadian Drinking Water Quality (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
HAD-1	HAD-1	2014 08 10	14.8	31.6	< 30	4.85	5.48	0.458	4.4	< 0.1	0.61	10.9	< 0.1	19	< 0.01	< 0.5	< 0.1	3.4	< 0.05	< 0.5	2.84	< 0.5	0.56	< 0.01	< 0.01	< 10	0.11	1.1	< 3	
	HAD-1	2014 08 11	10.4	32.5	< 30	4.97	2.44	0.407	4.25	< 0.1	0.53	8.45	< 0.1	21	< 0.01	< 0.5	< 0.1	2.49	< 0.05	< 0.5	2.68	< 0.5	0.58	< 0.01	< 0.01	< 10	0.106	1.1	< 3	
	HAD-1	2014 08 12	9.5	32	< 30	4.85	1.4	0.356	4.14	< 0.1	0.53	7.48	< 0.1	22	< 0.01	< 0.5	< 0.1	2.15	< 0.05	< 0.5	2.62	< 0.5	0.59	< 0.01	< 0.01	< 10	0.107	1.1	< 3	
	HAD-1	2014 08 13	10	31.2	< 30	4.73	0.282	0.397	4.43	< 0.1	0.58	7.67	< 0.1	20	< 0.01	< 0.5	< 0.1	2.41	< 0.05	< 0.5	2.41	< 0.5	0.53	< 0.01	< 0.01	< 10	0.098	1.2	< 3	
	HAD-1	2014 08 14	8.9	31.9	< 30	4.67	0.224	0.388	4.48	< 0.1	0.6	7.51	< 0.1	22	< 0.01	< 0.5	< 0.1	2.19	< 0.05	< 0.5	2.63	< 0.5	0.57	< 0.01	< 0.01	< 10	0.113	1.1	< 3	
	HAD-1	2014 08 15	10.1	31.7	< 30	4.86	3.31	0.434	4.59	< 0.1	0.61	7.72	< 0.1	19	< 0.01	< 0.5	< 0.1	2.51	< 0.05	< 0.5	2.51	< 0.5	0.58	< 0.01	< 0.01	< 10	0.118	1.1	< 3	
	HAD-1	2014 08 16	11.1	32.4	< 30	4.9	7.12	0.463	4.43	< 0.1	0.62	8.52	< 0.1	18	< 0.01	< 0.5	< 0.1	2.77	< 0.05	< 0.5	2.59	< 0.5	0.59	< 0.01	< 0.01	< 10	0.101	1.1	< 3	
	HAD-1X	2014 08 16	10.9	32.6	< 30	4.92	7.97	0.477	4.47	< 0.1	0.6	8.45	< 0.1	18	< 0.01	< 0.5	< 0.1	2.67	< 0.05	< 0.5	2.52	< 0.5	0.57	< 0.01	< 0.01	< 10	0.102	1.1	< 3	
	QA/QC RPD %		-	< 1	-	< 1	11	3	< 1	-	3	< 1	-	-	-	-	-	-	4	-	-	3	-	-	-	-	-	< 1	-	-
	HAD-1	2014 08 17	10.4	31.5	< 30	4.7	0.578	0.467	4.56	< 0.1	0.57	8.05	< 0.1	21	< 0.01	< 0.5	< 0.1	2.65	< 0.05	< 0.5	2.66	< 0.5	0.54	< 0.01	< 0.01	< 10	0.106	1.1	< 3	
	HAD-1	2014 08 18	10	32.2	< 30	4.78	4.26	0.463	4.43	< 0.1	0.57	8.29	< 0.1	20	< 0.01	< 0.5	< 0.1	2.41	< 0.05	< 0.5	2.62	< 0.5	0.52	< 0.01	< 0.01	< 10	0.108	1.1	< 3	
	HAD-1	2014 08 19	10.8	31.5	< 30	4.71	7.21	0.465	4.44	< 0.1	0.61	8.15	< 0.1	20	< 0.01	< 0.5	< 0.1	2.44	< 0.05	< 0.5	2.6	< 0.5	0.57	< 0.01	< 0.01	< 10	0.1	1.2	< 3	
	HAD-1	2014 08 20	15.1	32.7	< 30	4.85	4.9	0.478	4.52	< 0.1	0.61	9.04	< 0.1	19	< 0.01	< 0.5	< 0.1	3.31	< 0.05	< 0.5	2.62	< 0.5	0.58	< 0.01	< 0.01	< 10	0.105	1.1	< 3	
	HAD-1	2014 08 20	13.9	32.3	< 30	4.81	4.56	0.444	4.52	< 0.1	0.6	11	< 0.1	19	< 0.01	< 0.5	< 0.1	3.19	< 0.05	< 0.5	2.77	< 0.5	0.55	< 0.01	< 0.01	< 10	0.099	1.2	< 3	
	HAD-1	2014 08 21	13.5	32.3	< 30	4.9	0.453	0.467	4.57	< 0.1	0.59	8.23	< 0.1	20	< 0.01	< 0.5	< 0.1	2.99	< 0.05	< 0.5	2.61	< 0.5	0.55	< 0.01	< 0.01	< 10	0.103	1	< 3	
	HAD-1	2014 08 22	10.7	33.1	< 30	4.91	3.02	0.48	4.66	< 0.1	0.63	8.69	< 0.1	20	< 0.01	< 0.5	< 0.1	2.92	< 0.05	< 0.5	2.66	< 0.5	0.57	< 0.01	< 0.01	< 10	0.104	1.1	< 3	
	HAD-1	2014 08 24	15.1	33.5	< 30	4.92	3.04	0.532	4.69	< 0.1	0.67	9.76	< 0.1	18	< 0.01	< 0.5	< 0.1	3.71	< 0.05	< 0.5	2.79	< 0.5	0.56	< 0.01	< 0.01	< 10	0.107	1.1	< 3	
	HAD-1	2014 08 26	31.5	34.4	< 30	4.98	4.05	0.675	5	< 0.1	0.63	9.06	< 0.1	19	0.014	< 0.5	< 0.1	3.59	0.078	< 0.5	4.53	< 0.5	0.63	< 0.01	< 0.01	< 10	0.117	1.1	56.5	
	HAD-1	2014 08 28	10.9	34.7	< 30	5.07	2.33	0.495	4.96	< 0.1	0.65	8.74	< 0.1	21	< 0.01	< 0.5	< 0.1	2.82	< 0.05	< 0.5	2.98	< 0.5	0.69	< 0.01	< 0.01	< 10	0.116	1.1	< 3	
	HAC01	HAC01-140824	2014 08 24	11.6	50	< 30	8.79	52.7	2.08	9.63	< 0.5	1.72	35.2	< 0.5	< 50	< 0.05	< 0.5	< 0.5	17.5	< 0.25	3.2	12.3	< 2.5	3.44	< 0.05	< 0.05	< 10	0.986	< 5	< 5
HAC01-24HRS		2014 08 24	10.3	49.2	< 30	8.83	53.9	2.16	9.82	0.27	1.93	37.9	< 0.1	29	0.013	< 0.5	0.12	17.8	< 0.05	1.11	12.2	0.74	3.77	< 0.01	< 0.01	< 10	0.984	3.2	< 3	
HAC01		2014 08 25	9.6	48	< 30	8.45	51.6	1.78	8.23	0.23	1.65	38.6	< 0.2	24	< 0.02	< 0.5	< 0.2	15.8	< 0.1	< 1	10.1	< 1	3.35	< 0.02	< 0.02	< 10	0.66	2.5	< 3	
HAC01		2014 08 26	12.1	46.4	< 30	8.44	52.8	1.7	7.95	< 0.5	1.67	38.4	< 0.5	< 50	< 0.05	< 0.5	< 0.5	16	< 0.25	< 2.5	10.4	< 2.5	3.43	< 0.05	< 0.05	< 10	0.746	< 5	< 5	
HAC01		2014 08 27	27	53	< 30	8.28	49.2	4.2	18.5	< 2	2.5	44.6	< 2	< 200	< 0.2	< 2	< 2	19.6	< 1	< 10	35.9	< 10	3	< 0.2	< 0.2	< 10	1.51	< 20	< 20	
HAD-FIELD BLANK	FIELD BLANK	2014 08 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	HAC01-FB	2014 08 27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HAD-TRAVEL BLANK	TRIP BLANK	2014 08 27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Associated ALS files L1500203, L1500608, L1501501, L1501554, L1502400, L1503098, L1503928, L1503934, L1503943, L1504261, L1504997, L1505933, L1506592, L1506998, L1507977, L1508649, L1509589, L1509671, L1510298, L1510307, L1507958.

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\* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

SHADED Concentration greater than BCWOG Aquatic Life (AW) guideline.

BOLD Concentration greater than BCWOG Drinking Water (DW) guideline.

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BOLD Concentration greater than or equal to Canadian Drinking Water Quality (DW) guideline.

<sup>a</sup> Laboratory detection limit out of range.

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<sup>d</sup> Guideline varies with pH, and/or Temperature or Hardness.

TABLE 4: Summary of Analytical Results for Mount Polley, Hazeltine Creek - Surface Water DRAFT

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Total Metals																													
			Aluminum (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Bismuth (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)	Thallium (µg/L)	Titanium (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)	
BC Standards																																
BCWQG Aquatic Life (AW) <sup>b,c</sup>			n/a	20	5	5,000	n/a	5.3	n/a	1,200	0.032-0.034 <sup>d</sup>	n/a	1 (Cr(+6))	110	11.2-11.7 <sup>d</sup>	1,000	78.9-84.8 <sup>d</sup>	870	n/a	1,613-1.675 <sup>d</sup>	Under review by SNC-Lavalin	2,000	65 <sup>d</sup>	373,000	2	0.1-3 <sup>d</sup>	n/a	0.3	2,000	300	6	38.55-42.75 <sup>d</sup>
BCWQG Aquatic Life (30day) (AW) <sup>b,c</sup>			n/a	14	25	n/a	4	n/a	5,000	n/a	n/a	n/a	n/a	500	50	n/a	n/a	n/a	n/a	250	n/a	n/a	10	n/a	2	n/a	n/a	n/a	n/a	n/a	n/a	5,000
BCWQG Drinking Water (DW)			n/a	n/a	n/a	1,000	n/a	n/a	n/a	n/a	n/a	n/a	4	3.9-4.12 <sup>d</sup>	n/a	6.4-6.6 <sup>d</sup>	14	n/a	1,034-1.058 <sup>d</sup>	1	1,000	n/a	n/a	n/a	n/a	0.05-1.5 <sup>d</sup>	n/a	n/a	n/a	n/a	13.05-17.25 <sup>d</sup>	
Canadian Drinking Water Quality (DW)			100	6	10	1,000	n/a	n/a	5,000	5	n/a	50	n/a	1,000	300	10	n/a	n/a	50	1	n/a	n/a	n/a	10	n/a	200,000	n/a	n/a	n/a	20	n/a	5,000
HAD-1	HAD-1	2014 08 10	356	< 0.1	1.07	17	< 0.1	< 0.5	20	< 0.01	31,900	< 0.5	0.24	21.5	247	0.162	< 0.5	5,030	28.9	< 0.05	3.01	< 0.5	559	0.59	< 0.01	4,690	< 0.01	19	0.131	2.1	< 3	
	HAD-1	2014 08 11	76.8	< 0.1	0.56	8.68	< 0.1	< 0.5	23	< 0.01	32,300	< 0.5	< 0.1	4.11	49	< 0.05	< 0.5	4,960	9.59	< 0.05	2.93	< 0.5	401	0.66	< 0.01	4,100	< 0.01	< 10	0.122	1.2	< 3	
	HAD-1	2014 08 12	36.8	< 0.1	0.54	7.25	< 0.1	< 0.5	22	< 0.01	31,400	< 0.5	< 0.1	2.82	< 30	< 0.05	< 0.5	4,950	5.57	< 0.05	2.72	< 0.5	346	0.62	< 0.01	3,970	< 0.01	< 10	0.122	1.1	< 3	
	HAD-1	2014 08 13	26.7	0.1	0.65	7.91	< 0.1	< 0.5	22	< 0.01	31,400	< 0.5	< 0.1	3.21	< 30	< 0.05	< 0.5	4,800	4.8	< 0.05	2.51	< 0.5	420	0.57	< 0.01	4,630	< 0.01	< 10	0.103	1.2	< 3	
	HAD-1	2014 08 14	30.9	< 0.1	0.68	8.08	< 0.1	< 0.5	23	< 0.01	32,800	< 0.5	< 0.1	3.29	< 30	< 0.05	< 0.5	4,840	6.54	< 0.05	2.76	< 0.5	418	0.58	< 0.01	4,620	< 0.01	< 10	0.115	1.3	< 3	
	HAD-1	2014 08 15	44.2	< 0.1	0.64	8.34	< 0.1	< 0.5	20	< 0.01	31,800	< 0.5	< 0.1	3.51	< 30	< 0.05	< 0.5	4,790	8.96	< 0.05	2.6	< 0.5	439	0.6	< 0.01	4,530	< 0.01	< 10	0.107	1.2	< 3	
	HAD-1	2014 08 16	164	< 0.1	0.64	10.6	< 0.1	< 0.5	21	< 0.01	32,000	< 0.5	0.14	6.79	110	0.051	< 0.5	4,910	16.8	< 0.05	2.71	< 0.5	511	0.58	< 0.01	4,530	< 0.01	< 10	0.112	1.4	< 3	
	HAD-1X	2014 08 16	128	< 0.1	0.63	9.87	< 0.1	< 0.5	21	< 0.01	32,300	< 0.5	0.11	6.15	99	< 0.05	< 0.5	4,900	16.7	< 0.05	2.68	< 0.5	516	0.57	< 0.01	4,450	< 0.01	< 10	0.108	1.4	< 3	
	QA/QC RPD %		25	-	2	7	-	-	-	-	-	< 1	-	-	-	-	-	< 1	-	-	1	-	< 1	-	-	2	-	-	4	-	-	
	HAD-1	2014 08 17	121	< 0.1	0.64	9.62	< 0.1	< 0.5	21	< 0.01	32,800	< 0.5	0.11	6.51	93	< 0.05	< 0.5	4,910	12.5	< 0.05	2.67	< 0.5	510	0.57	< 0.01	4,750	< 0.01	< 10	0.107	1.4	< 3	
	HAD-1	2014 08 18	64.7	< 0.1	0.65	9.22	< 0.1	< 0.5	22	< 0.01	32,100	< 0.5	< 0.1	4.34	59	< 0.05	< 0.5	4,800	14.2	< 0.01	2.63	< 0.5	495	0.58	< 0.01	4,500	< 0.01	< 10	0.107	1.3	< 3	
	HAD-1	2014 08 19	52.8	< 0.1	0.65	9.03	< 0.1	< 0.5	23	< 0.01	32,300	< 0.5	< 0.1	3.8	49	< 0.05	< 0.5	4,910	10.9	< 0.05	2.78	< 0.5	482	0.6	< 0.01	4,680	< 0.01	< 10	0.108	1.2	< 3	
	HAD-1	2014 08 20	382	< 0.1	0.75	13.8	< 0.1	< 0.5	22	< 0.01	32,500	< 0.5	0.28	13.9	273	0.103	0.57	4,990	19.2	< 0.05	2.87	< 0.5	596	< 0.5	< 0.01	4,710	< 0.01	19	0.118	2	< 3	
	HAD-1	2014 08 10	121	< 0.1	0.68	12.9	< 0.1	< 0.5	20	< 0.01	31,700	< 0.5	< 0.1	6.69	86	0.061	< 0.5	4,860	13.1	< 0.05	2.94	< 0.5	489	0.61	< 0.01	4,720	< 0.01	< 10	0.106	1.6	< 3	
	HAD-1	2014 08 21	288	< 0.1	0.72	12.3	< 0.1	< 0.5	21	< 0.01	33,600	< 0.5	0.21	11.8	206	0.069	0.51	5,290	13.7	< 0.05	2.75	< 0.5	572	0.59	< 0.01	4,860	< 0.01	17	0.119	1.8	< 3	
	HAD-1	2014 08 22	227	< 0.1	0.72	11.9	< 0.1	< 0.5	21	< 0.01	33,500	< 0.5	0.17	9.07	159	0.058	< 0.5	5,040	12.5	< 0.05	2.92	< 0.5	566	0.61	< 0.01	4,700	< 0.01	13	0.121	1.8	< 3	
	HAD-1	2014 08 24	392	< 0.1	0.79	15.3	< 0.1	< 0.5	21	< 0.01	34,400	< 0.5	0.3	15.1	285	0.107	0.6	5,260	15.8	< 0.05	3	< 0.5	652	0.6	< 0.01	4,820	< 0.01	16	0.124	2	< 3	
	HAD-1	2014 08 26	62.3	< 0.1	0.66	9.05	< 0.1	< 0.5	19	< 0.01	32,700	< 0.5	< 0.1	4.1	40	< 0.05	< 0.5	4,950	7.67	< 0.05	3.34	< 0.5	511	0.65	< 0.01	4,880	< 0.01	< 10	0.123	1.2	< 3	
	HAC01	HAD-1	2014 08 28	46.9	< 0.1	0.63	9	< 0.1	< 0.5	23	< 0.01	33,100	< 0.5	< 0.1	3.87	< 30	< 0.05	< 0.5	4,890	5.53	< 0.01	3.13	< 0.5	504	0.65	< 0.01	4,940	< 0.01	< 10	0.12	1.3	< 3
HAC01-140824		2014 08 24	75,200	0.67	47.4	795	2.4	< 2.5	54	1.02	178,000	114	66.2	1,860	111,000	42.4	80.5	55,400	2,990	0.183	13.3	126	10,900	5.8	1.02	12,800	0.363	4,290	4.91	265	285	
HAC01-24HRS		2014 08 24	14,400	0.18	16.4	311	1.01	< 0.5	38	0.825	156,000	19.3	20.9	1,360	20,200	25.3	12.1	19,200	1,540	0.193	2.91	42.3	4,210	3.25	0.023	11,300	0.055	52	2.8	53.9	84.2	
HAC01		2014 08 25	63,400	0.6	35.1	660	2.03	< 1	43	1.05	146,000	119	60.1	1,200	113,000	40.1	77.9	51,500	2,590	0.312	8.46	131	9,200	4.88	0.865	10,500	0.391	3,220	3.82	223	266	
HAC01		2014 08 26	73,300	0.72	42.1	736	2.25	< 2.5	53	1.04	145,000	132	67.8	1,490	118,000	43.5	81	57,500	2,870	0.265	9.16	146	9,710	5.31	0.954	10,700	0.426	3,910	4.41	266	300	
HAD-FIELD BLANK	HAC01	2014 08 27	360,000	< 2	245	4,970	15.3	< 10	270	4.78	757,000	309	378	19,000	413,000	254	432	232,000	16,600	2.89	49.8	355	42,100	18.4	8.17	41,300	1.02	10,600	20.6	1,250	1,490	
	FIELD BLANK	2014 08 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.05	-	-	-	-	-	-	-	-	-	-	-	-	
HAD-TRAVEL BLANK	HAC01-FB	2014 08 27	< 3	< 0.1	< 0.1	< 0.05	< 0.1	< 0.5	< 10	< 0.01 <sup>a</sup>	< 50	< 0.5	< 0.1	< 0.5	< 30	< 0.05	< 0.5	< 100	< 0.05	< 0.01	< 0.05	< 0.5	< 50	< 0.5	< 0.01	< 50	< 0.01	< 10	< 0.01	< 1	< 3	
	TRIP BLANK	2014 08 27	< 3	< 0.1	< 0.1	< 0.05	< 0.1	< 0.5	< 10	< 0.01 <sup>a</sup>	< 50	< 0.5	< 0.1	< 0.5	< 30	< 0.05	< 0.5	< 100	< 0.05	< 0.01	< 0.05	< 0.5	< 50	< 0.5	< 0.01	< 50	< 0.01	< 10	< 0.01	< 1	< 3	

Associated ALS files L1500203, L1500608, L1501501, L1501554, L1500424, L1503098, L1503928, L1503934, L1503943, L1504261, L1504997, L1505933, L1506592, L1506998, L1507977, L1508649, L1509589, L1509671, L1510298, L1510307, L1507958.

All terms defined within the body of SNC-Lava in's report (available upon request).

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard.

\* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

**SHADED** Concentration greater than BCWQG Aquatic Life (AW) guideline.

**BOLD** Concentration greater than BCWQG Drinking Water (DW) guideline.

**SHADED** Concentration greater than BCWQG Aquatic Life (30day) (AW) guideline.

**BOLD** Concentration greater than or equal to Canadian Drinking Water Quality (DW) guideline.

<sup>a</sup> Laboratory detection limit out of range.

<sup>b</sup> British Columbia Approved Water Quality Guide lines 2006 Edition, updated 2014.

<sup>c</sup> A Compendium of Working Water Quality Guidelines for British Columbia, updated August 2006.

<sup>d</sup> Guideline varies with pH, and/or Temperature or Hardness.

**TABLE 5a: Summary of Analytical Results for Mt.Polley Hazeltine Creek - Sediment**

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Grain Size			
			Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BC Standards						
CSR Fresh Water Sediment (FW Sediment)			n/a	n/a	n/a	n/a
HAC-REF SOIL-1	HAC-REF SOIL-1A	2014 08 19	21.4	7.88	54.7	16
	HAC-REF SOIL-1B	2014 08 19	0.56	10.2	68.3	21
	HAC-REF SOIL-1C	2014 08 19	4	23.9	47.2	24.9
HAC-REF SOIL-2	HAC-REF SOIL-2A	2014 08 19	1.07	12.3	71.3	15.4
	HAC-REF SOIL-2B	2014 08 19	4.83	15.6	62.4	17.2
	HAC-REF SOIL-2C	2014 08 19	12.4	23	43.2	21.4
HAC-REF SOIL-3	HAC-REF SOIL-3A	2014 08 19	4.64	16.2	65.6	13.6
	HAC-REF SOIL-3B	2014 08 19	38.3	23	29.5	9.22
	HAC-REF SOIL-3C	2014 08 19	13	36.8	40.4	9.83

Associated ALS file: L1507380.

All terms defined within the body of SNC-Lavalin's report (available upon request).

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard.

RPD Denotes relative percent difference.

TABLE 5b: Summary of Analytical Results for Mt.Polley Hazeltine Creek - Sediment

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Total Metals																															
			pH (pH)	Aluminum (µg/g)	Antimony (µg/g)	Arsenic (µg/g)	Barium (µg/g)	Beryllium (µg/g)	Cadmium (µg/g)	Calcium (µg/g)	Chromium (µg/g)	Cobalt (µg/g)	Copper (µg/g)	Iron (µg/g)	Lead (µg/g)	Lithium (µg/g)	Magnesium (µg/g)	Manganese (µg/g)	Mercury (µg/g)	Molybdenum (µg/g)	Nickel (µg/g)	Phosphorus (µg/g)	Potassium (µg/g)	Selenium (µg/g)	Silver (µg/g)	Sodium (µg/g)	Strontium (µg/g)	Tin (µg/g)	Thallium (µg/g)	Titanium (µg/g)	Uranium (µg/g)	Vanadium (µg/g)	Zinc (µg/g)	
BC Standards																																		
CSR Fresh Water Sediment (FW Sediment)																																		
HAC-REF SOIL-1	HAC-REF SOIL-1A	2014 08 19	5.54	15,200	0.29	3.48	186	0.38	0.362	4,870	34.3	21.5	35.3	26,100	12.3	17.5	5,200	2,180	0.0824	0.68	19.5	673	1,280	< 0.2	0.47	150	n/a	42.7	< 2	0.116	511	0.451	56.7	90.5
	HAC-REF SOIL-1B	2014 08 19	5.29	15,700	0.34	4.65	86.1	0.36	0.219	3,390	37.5	11.5	22.6	28,500	7.81	20.9	6,330	591	0.0382	< 0.5	23.1	701	1,070	< 0.2	0.17	120	32.8	< 2	0.088	665	0.52	60	67.8	
	HAC-REF SOIL-1C	2014 08 19	5.9	18,500	0.42	6.42	108	0.47	0.151	3,800	45	14.1	35.8	32,500	8.84	21.1	7,400	730	0.0533	0.52	29.7	593	1,600	< 0.2	< 0.1	140	41.8	< 2	0.112	871	0.6	67.5	66	
HAC-REF SOIL-2	HAC-REF SOIL-2A	2014 08 19	7.74	5,870	0.16	1.84	572	< 0.2	7.74	42,800	12	14	68.4	10,700	4.02	6	3,210	5,950	0.0953	0.79	18.3	831	720	0.31	1.25	200	251	< 2	0.087	240	0.172	24.2	771	
	HAC-REF SOIL-2B	2014 08 19	6.49	18,300	0.32	5.7	77.5	0.44	0.429	5,770	41.5	11.2	29.1	29,800	6.72	20.2	6,520	509	0.0316	< 0.5	27.8	1,410	1,290	< 0.2	0.3	140	51.7	< 2	0.073	693	0.517	62.9	95.3	
	HAC-REF SOIL-2C	2014 08 19	6.7	19,200	0.39	6.15	109	0.47	0.299	5,630	43.9	13.5	34.8	31,900	8.38	20.9	7,290	638	0.0509	0.52	31	987	1,780	0.21	0.21	160	50.6	< 2	0.106	784	0.572	67.4	96.9	
HAC-REF SOIL-3	HAC-REF SOIL-3A	2014 08 19	7.03	16,900	0.38	5.02	145	0.55	0.387	16,100	34.4	14.3	137	25,900	8.39	14.1	6,240	948	0.13	1.79	23.6	827	1,560	0.41	0.5	340	103	< 2	0.13	669	0.729	68.3	78.3	
	HAC-REF SOIL-3B	2014 08 19	5.15	17,300	0.46	4.75	70.6	0.44	0.242	3,950	59.2	10.5	28.9	26,800	6.26	19.1	7,840	482	0.0309	0.96	28.8	576	1,260	0.26	0.26	170	27.7	< 2	0.099	1,030	0.643	76.7	62	
	HAC-REF SOIL-3C	2014 08 19	5.34	13,000	0.25	3.77	46.4	0.29	0.091	3,040	44.8	7.79	16.7	21,700	4.93	18.1	6,760	313	0.0258	0.59	23.2	570	970	0.21	< 0.1	120	18.1	< 2	0.083	778	0.533	54	43.8	

Associated ALS file: L1507380.  
All terms defined within the body of SNC-Lavalin's report (available upon request).  
< Denotes concentration less than indicated detection limit or RPD less than indicated value.  
- Denotes analysis not conducted.  
n/a Denotes no applicable standard.  
RPD Denotes relative percent difference.

**BOLD** Concentration greater than CSR Fresh Water Sediment (FW Sediment) standard.

<sup>a</sup> No CSR Sediment Criteria, BCWQG guideline shown.

**TABLE 5c: Summary of Analytical Results for Mt.Polley Hazeltine Creek - Sediment**

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters							Soil Salinity				
			Moisture (%)	TOC (%)	Total Carbon (µg/g)	Available Nitrate (µg/g)	Total Nitrogen % (%)	Available Phosphate (µg/g)	Available Sulphate (µg/g)	% Saturation (%)	Conductivity (µS/cm)	Sodium Adsorption Ratio (None)	Saturated Paste Sodium (µg/g)	Saturated Paste Chloride (µg/g)
HAC-REF SOIL-1	HAC-REF SOIL-1A	2014 08 19	29.1	6.65	6.7	< 4	0.312	7	38.1	66.8	349	< 0.4	< 7	11.4
	HAC-REF SOIL-1B	2014 08 19	16.6	1.35	1.4	< 4	0.097	27.3	9.5	41.5	98	< 0.7	< 4	2.2
	HAC-REF SOIL-1C	2014 08 19	15.7	0.78	0.8	< 4	0.055	6.2	< 6	32.9	57	< 1	< 3	< 2
HAC-REF SOIL-2	HAC-REF SOIL-2A	2014 08 19	44.7	21.8	22.1	< 6	1.04	14.1	112	112	605	0.43	20	16.7
	HAC-REF SOIL-2B	2014 08 19	20.6	1.4	1.5	< 4	0.083	137	22.4	49	235	< 0.4	< 5	5.7
	HAC-REF SOIL-2C	2014 08 19	16.6	1	1	< 4	0.063	53.8	12.2	34.7	180	< 0.5	< 3	2.6
HAC-REF SOIL-3	HAC-REF SOIL-3A	2014 08 19	34.2	10.9	11	< 6	0.501	14.7	91.2	104	598	0.67	28	15.9
	HAC-REF SOIL-3B	2014 08 19	15.5	1.94	2	< 4	0.122	5.3	15.4	49.7	206	< 0.5	< 5	3.1
	HAC-REF SOIL-3C	2014 08 19	12.5	0.63	0.7	< 4	0.051	2.7	7.5	29.7	268	0.44	< 3	23.2

Associated ALS file: L1507380.

All terms defined within the body of SNC-Lavalin's report (available upon request).

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- Denotes analysis not conducted.

n/a Denotes no applicable standard.

RPD Denotes relative percent difference.



**From:** Demchuk, Tania MEM:EX  
**To:** ["Ryan Brown"](#); [Colleen Hughes](#)  
**Cc:** [Metcalf, Shelley ENV:EX](#); [Bunce, Hubert ENV:EX](#)  
**Subject:** RE: Breach sump additional sediment control  
**Date:** Thursday, September 11, 2014 2:15:00 PM

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Hi Ryan,

Thank-you for that summary. Do you have drawings or plans for these features to help us understand their scale and location?

Regards,  
Tania

---

**From:** Ryan Brown [<mailto:rbrown@mountpolley.com>]  
**Sent:** Wednesday, September 10, 2014 5:32 PM  
**To:** Colleen Hughes; Demchuk, Tania MEM:EX  
**Cc:** Metcalfe, Shelley ENV:EX; Bunce, Hubert ENV:EX  
**Subject:** RE: Breach sump additional sediment control

Sure,

The ditches and ponds being constructed downstream of our current breach sump are intended only as a mitigation measure in the event of a loss of containment at the Breach Sump. The function of the new ditch alignment is to lengthen and flatten the flow path somewhat, slowing down the water. Along the ditch alignment there will be a number of small settling ponds which are intended to facilitate settlement of solids in the flow. Currently the ditches and ponds only are constructed a couple hundred meters below the Breach Sump, as we cannot disturb the tailings plug further down at this point. The ponds in this system will not have significant volume capacity for water relative to the likely flow volumes during a loss of containment (for example a large rain event).

Please let me know if there are any additional questions.

Regards,

Ryan Brown, P.Eng  
Senior Mine Engineer  
Mount Polley Mining Corporation  
[rbrown@mountpolley.com](mailto:rbrown@mountpolley.com)  
250-790-2215 ext 2256

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**From:** Colleen Hughes  
**Sent:** Wednesday, September 10, 2014 4:35 PM  
**To:** Ryan Brown; Demchuk, Tania EMNG:EX  
**Cc:** Metcalfe, Shelley ENV:EX; Bunce, Hubert ENV:EX  
**Subject:** Breach sump additional sediment control

Hi Ryan

Would you please provide Tania, Shelley, and Hubert with some information about the design/plan for the additional sediment control structures being created downstream of the breach sump.

Thank you.

**Colleen Hughes, EP**  
**Environmental Coordinator**  
**Mount Polley Mining Corporation**  
**PO Box 12**  
**Likely, BC V0L 1N0**  
**250-790-2617**  
**[chughes@mountpolley.com](mailto:chughes@mountpolley.com)**

 Please consider the environment before printing this e-mail.

**From:** Demchuk, Tania MEM:EX  
**To:** ["Luke Moger"](#)  
**Cc:** [Eldridge, Terry](#); [Dale Reimer](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#)  
**Subject:** Re: Bi-Weekly Construction Progress Report #1  
**Date:** Tuesday, January 13, 2015 1:41:00 PM  
**Attachments:** [image001.png](#)

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Hi Luke,

On review of the bi-weekly report, MEM would like to suggest that the following additions would be helpful for future bi-weekly reports:

- Site plan showing location of construction activity for the period covered in the report.
- Representative photographs of construction activity.
- Summary of geotechnical instrumentation readings (piezometers and slope inclinometers) in the vicinity of construction.

Please let me know if you have any concerns with including the above items.

Regards,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Friday, January 2, 2015 3:16 PM  
**To:** Howe, Diane J MEM:EX; Thorpe, Rolly MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Dale Reimer; Eldridge, Terry  
**Subject:** Bi-Weekly Construction Progress Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane and Rolly;

As per clause C.5 (a) of the M-200 Permit Amendment Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment, please find attached Bi-Weekly Construction Progress Report #1. It is my understanding from the Permit condition that you are the two (2) intended recipients for these reports; please advise if these should be directed elsewhere. I have cc'd Tania Demchuk as Mount Polley Project Manager and Rick Adams as Cariboo Regional Mine Development Review Committee Chair.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** [Michelle.Hynes@gov.bc.ca](mailto:Michelle.Hynes@gov.bc.ca)  
**Subject:** Mount Polley TSF-related permitting chronology  
**Date:** Thursday, January 22, 2015 7:49:00 AM  
**Attachments:** [Mount Polley certification and permitting chronology 21Jan2015.xlsx](#)

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Hi Michelle,

Can you take a quick look at the attached table before I send to others and let me know if you think that tab one and tab 2 should be combined? Tab one is the permitting chronology for the TSF only. Table 2 is the permitting chronology for the entire mine (i.e. all amendments) but without the other milestone events. The Minister has asked for a detailed chronology so he can understand review timelines, etc. for each amendment.

I'm thinking maybe tab 1 as is but then adding that detail into tab 2. Thoughts?

Thanks!!

T

\*\*\*\*\*

Hi all,

FYI: After the briefing yesterday I mentioned recalling third party review requirements early in the TSF design/review process. It appears that there were two 3<sup>rd</sup> party reviews, one that the ministry had done and one that the ministry required to commission using one of five engineers. I can't speak to the specifics of what was reviewed or results of the reviews, but they do appear to have been completed. This information was included in the package that was provided to the Panel.

In response to the minister's request for a chronology I have modified the attached (previously provided) table. The table captures each TSF-related permit amendment in bold, and length of time for each review process. I've also added some other milestones. Not sure if we want to include the notes on timing of the 3<sup>rd</sup> party reviews. Also, there are non-TSF amendments that are not included. Could add back in, just makes for a long table. The second tab in the excel file includes all permit amendments.

Have asked EAO if they have info re: timeline on the original review and certificate issuance.

Tania

**From:** Demchuk, Tania MEM:EX  
**To:** ["Luke Moger"](#)  
**Cc:** [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#); [Thorpe, Rolly MEM:EX](#)  
**Subject:** RE: Bi-Weekly Construction Progress Report #3 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Monday, February 2, 2015 8:37:00 AM  
**Attachments:** [image001.png](#)

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Luke,

Thank-you for the bi-weekly report, this email confirms receipt.

Please update your contact information for Jacinda Mack, her new email address is: 'Jacinda Mack' [miningcoordinator@nstq.org](mailto:miningcoordinator@nstq.org)

Regards,  
Tania

---

**From:** Luke Moger [mailto:[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)]  
**Sent:** Sunday, February 1, 2015 9:12 PM  
**To:** Howe, Diane J MEM:EX; Thorpe, Rolly MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Dale Reimer; Eldridge, Terry; Chris Carr  
s.22 Jim Kuipers; Rothman, Stephen MEM:EX; 'Douglas (Mobile) Watt'; Jacinda Mack  
s.22 s.22 ; Ryan Brown  
**Subject:** Bi-Weekly Construction Progress Report #3 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane and Rolly;

As per clause C.5 (a) of the M-200 Permit Amendment Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment, please find attached Bi-Weekly Construction Progress Report #3. I have cc'd individuals at the request of Tania Demchuk as per previous correspondence.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)





**From:** Demchuk, Tania MEM:EX  
**To:** [Chris Carr](#) s.22  
**Subject:** FW: Adaptive Management Plan [M-200 Permit - Approccing the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Thursday, February 5, 2015 8:43:00 AM  
**Attachments:** [image001.png](#)  
[1413803-033-TM-Rev0-2000 Adaptive Managment Plan 30JAN 15.pdf](#)

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**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Wednesday, February 4, 2015 6:39 PM  
**To:** Kirk.Dressler@williamslakeband.ca; Aaron Higginbottom (Aaron.Higginbottom@williamslakeband.ca); Byron.Louie@williamslakeband.ca; nrmanager@xatsull.com; 'Referrals' (referrals@xatsull.com); carenvir@wlake.com; cthomas@xatsull.com; miningcoordinator@nstq.org; MiningAssistant@nstq.org; Jim Kuipers (jkuipers@kuipersassoc.com); 'Doug Watt (dwatt@telus.net)' (dwatt@telus.net); Janis Bell (jbell@cariboord.bc.ca) (jbell@cariboord.bc.ca); jsorely@cariboord.bc.ca  
**Cc:** Demchuk, Tania MEM:EX; Art Frye; Steve Robertson; Dale Reimer  
**Subject:** FW: Adaptive Management Plan [M-200 Permit - Approccing the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi All;

Pursuant to the condition of the Mines Act permit for the breach repair, please find attached the Adaptive Management Plan as submitted to the MEM.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Luke Moger  
**Sent:** January-31-15 12:06 AM  
**To:** Howe, Diane J EMNG:EX ([Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca))  
**Cc:** Demchuk, Tania EMNG:EX ([Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)); [rick.adams@gov.bc.ca](mailto:rick.adams@gov.bc.ca); Don Parsons; Dale Reimer; 'Eldridge, Terry'; Haynes, Andy ([Andy\\_Haynes@golder.com](mailto:Andy_Haynes@golder.com))  
**Subject:** Adaptive Management Plan [M-200 Permit - Approccing the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.1.(E) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, an Adaptive Management Plan has been prepared by the Engineer of Record, Golder Associates, for Mount Polley Mining Corporation – please find a copy attached.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke

cid:image001.png@01D03CE4.07AE5520



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** "Ryan Brown"; "Luke Moger"; Chris Carr s.22 ; "Jim Kuipers"  
**Cc:** [Adams, Rick MEM:EX](#); [Howe, Diane J EMPR:EX \(Diane.Howe@gov.bc.ca\)](#); [Don Parsons](#); [Eldridge, Terry](#); [Haynes, Andy \(Andy\\_Haynes@golder.com\)](#); [Bunce, Hubert ENV:EX](#); "Jacinda Mack"  
**Subject:** Proposed phone call: Contingency and Adaptive Management Plans  
**Date:** Friday, February 20, 2015 10:39:00 AM  
**Attachments:** [20Feb2015 MEM comments for discussion re water management and contingency plans.docx](#)  
**Importance:** High

---

Hello All,

In follow-up to the submission of the Contingency Water Management Plan as well as the Adaptive Management Plan, MEM has a number of comments and questions. I also understand through discussion with Jim Kuipers that there are comments and questions from First Nations as well. I suggest that a phone call is likely an efficient way to discuss/resolve questions and comments in recognition that everyone is extremely busy and resources at the mine site are focussed on the ongoing works in preparation for freshet.

Proposed agenda:

- Adaptive Management Plan – FMEA discussion (Key people: Terry/Andy, Jim, Chris)
  - Decision point: need for update of the plan based on the discussion
- Contingency Plan / Water Management Plan – see attached comments from MEM
  - Update on progress of work requirements set out in the plan
  - Questions and comments on contingencies measures and site water management plan
- Other?

I have attached my initial comments on the plans for your review in advance of the meeting. Others will likely bring additional questions/comments.

**Ryan or Luke**, please respond and indicate a date and time next week when at least one of you and Golder (Terry or Andy) are available for this discussion. I estimate we will require up to 4 hours. Tuesday and Wednesday are not available.

I can be reached today at 250-818-6426 if you want to discuss.

Thank-you,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417



February 17, 2015

Permit No.: M-200  
Mine: 1101163

The Ministry of Energy and Mines (MEM) received the plans listed below in accordance with conditions of the Mines Act permit amendment for the 2015 Breach Repair for Freshet, dated December 17, 2014:

1. "Water Management Plan", dated 30 January 2015, by Mount Polley Mining Corporation
2. "Mount Polley 2015 Freshet Management Embankment Adaptive Management Plan", dated 30 January 2015, by Golder Associates
3. "Water Management Contingency Plan", dated 13 February 2015, by Mount Polley Mining Corporation

Following a review of these documents MEM has the following comments and questions for discussion:

Water Management Plan and Water Management Contingency Plan

Comments regarding these two documents have been listed together, as the Water Management Contingency Plan is based on, and provides updates to, the information set out in the Water Management Plan.

1. The Water Management Plan document indicates input from three departments. Who has the overall responsibility to ensure that the water management is occurring as planned and that necessary maintenance is carried out? Who has overall responsibility for ensuring that the contingency measures are implemented as required to avoid discharge of mine-impacted water?
2. Water Management Plan, Page 3 – Snow course measurements are taken a minimum of monthly and are input into the water balance. At what frequency is the water balance being updated and reviewed to ensure adequate measures are in place for managing predicted water levels on site?
3. Water Management Plan, Page 5 – Currently the Springer Pit is the ultimate storage location for all site contact water.
  - a. Water level monitoring in the Springer Pit is completed monthly. Has any consideration been given to increasing monitoring frequency of Springer Pit water levels during the freshet period (i.e. March-July)? Or, is there a trigger level at which point monitoring would be increased? And, has this taken into consideration the increased groundwater interaction predicted if the Pit Lake level exceeds 1030 m asl?

---

Ministry of  
Energy and Mines

Health, Safety and  
Permitting Branch

Mailing Address:  
PO Box 9320  
Stn Prov Got  
Victoria, BC  
V8W 9N3

Phone: 250 952 0793  
Fax: 250 952 0491

- b. In reference to Figures 2 and 3, what is the current elevation of the Springer Pit lake?
- 4. What is the design efficiency of the various ditch systems and sumps? Are they lined and how much water lost to infiltration and how has that been assessed in consideration of flows and water balance as part of the site-wide water management plan?
- 5. In general the terms “design flow, low-flow, or high-flow” are not quantified in these documents. Are these qualitative terms based on specified design parameters? Have these been reviewed with respect to the ongoing water balance updates, and is the design basis for the various water management infrastructure still adequate given any updates to the water balance since the various water management structures were constructed?
- 6. The documents highlight maintenance items that are required to be completed in advance of Freshet. Please provide a status update regarding completion of the required work. Where work remains to be completed, a schedule is requested. The schedule should take into consideration recent site conditions and indications that spring freshet may arrive early this year.
- 7. A key contingency that is identified throughout the documents is adding additional pumps and pipe/hose to various sumps if needed. The Water Management Contingency Plan identifies the extra pumps that are on site.
  - a. How was the number and type of spare pump determined to be appropriate?
  - b. How will it be determined when these pumps need to be added into the system (i.e. what is the trigger)? Who is responsible for ensuring this occurs in a timely manner?
- 8. Given the recent leakage/spills from the Central Collection Sump and the Bootjack sump, are there any updates required to the monitoring, maintenance, or contingencies identified for these or other sumps on the site?
  - a. Has the maintenance specified in this report for Bootjack Sump been completed? Are any additional activities required?
- 9. It appears that a number of the ditches (i.e. Lower West, Orica, SERDS, Long Ditch) do not have identified maintenance or contingencies. Is it correct that these undergo regular maintenance and monitoring? Where is this outlined?

Mount Polley 2015 Freshet Management Embankment Adaptive Management Plan

- 10. The adaptive management plan dated January 30, 2015 indicates that tailings sand is to be used for upstream fill. MEM understands that this design has now changed based on site conditions. Please indicate how the change in upstream fill materials impacts seepage or other issues if the cutoff wall is not completed prior to freshet.
- 11. A second cutter soil mixer (CSM) will be mobilized if the cutoff wall is three weeks behind schedule. Has that timeline taken into consideration the mobilization time for that equipment to actually be onsite and functioning? The “input data” into that decision making process is a combination of length of incomplete wall and water reporting to the TSF, how are these two variables being balanced to determine at what point the three week point is reached? Who makes that decision?



12. If the freeboard behind the breach repair is approaching minimum design requirements, the adaptive management plan states that pumping water to the TSF will stop and that water will be pumped to the Central Collection Sump. Is it reasonable to expect that the Central Collection Sump would have capacity to receive this water if conditions are such that the freeboard minimum has been reached? How has this adaptive management measure been considered together with the site-wide water management plan to ensure that it is appropriate?
13. Table 4 identifies potential conditions that may occur and the associated adaptive management plan to be implemented. MEM believes that based on current site conditions and weather in the area, there should be consideration of an early freshet scenario and how that will be managed. Is the April 1 target date still deemed to be appropriate? Additionally, what is the impact of failures of other components of the site-wide water management systems to the 2015 Freshet Management Embankment?

I look forward to discussing the items above with you by phone during the week of February 23.

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager,  
Sr. Environmental Geoscientist,  
Ministry of Energy and Mine

**From:** Demchuk, Tania MEM:EX  
**To:** "Luke Moger"; Ryan Brown; Chris Carr s.22 ; Jim Kuipers  
**Cc:** Adams, Rick MEM:EX; Howe, Diane J MEM:EX; Don Parsons; Eldridge, Terry; Haynes, Andy (Andy\_Haynes@golder.com); Bunce, Hubert ENV:EX; "Jacinda Mack"  
**Subject:** RE: Proposed phone call: Contingency and Adaptive Management Plans  
**Date:** Friday, February 20, 2015 3:40:00 PM

---

Hi Luke,

Let's try to make something later on Thursday work, or Friday is also an option.

Alternatively, the discussion of the adaptive management plan and Failure Modes Effects Assessment could move forward on Tuesday with Jim and Chris if they (and Golder) are available, however I am not available and so that would end up meaning two separate discussions would be required as my comments also need to be addressed. I understand from Jim that he would like to discuss the FMEA with Terry and Chris.

Jim/Chris – if you have any additional comments or topics to be discussed please let Luke know in advance if possible.

Tania

---

**From:** Luke Moger [mailto:lmoger@mountpolley.com]  
**Sent:** Friday, February 20, 2015 1:20 PM  
**To:** Demchuk, Tania MEM:EX; Ryan Brown; Chris Carr ( s.22 ; Jim Kuipers  
**Cc:** Adams, Rick MEM:EX; Howe, Diane J MEM:EX; Don Parsons; Eldridge, Terry; Haynes, Andy (Andy\_Haynes@golder.com); Bunce, Hubert ENV:EX; 'Jacinda Mack'  
**Subject:** RE: Proposed phone call: Contingency and Adaptive Management Plans

Hi Tania;

With Tuesday and Wednesday not an option, we would have to look at availability on Thursday or Friday. We have a site tour, Implementation Committee and TSF Breach Technical Working Group meetings on Thursday, so we may be available Thursday late afternoon, but if four (4) hours are required, this may not provide enough time.

It would be helpful to have any additional comments, referenced in your e-mail below, provided by respective groups as soon as possible.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
**Sent:** February-20-15 10:39 AM  
**To:** Ryan Brown; Luke Moger; Chris Carr s.22 Jim Kuipers  
**Cc:** Adams, Rick MEM:EX; Howe, Diane J MEM:EX; Don Parsons; Eldridge, Terry; Haynes, Andy ([Andy\\_Haynes@golder.com](mailto:Andy_Haynes@golder.com)); Bunce, Hubert ENV:EX; 'Jacinda Mack'  
**Subject:** Proposed phone call: Contingency and Adaptive Management Plans  
**Importance:** High

Hello All,

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  - Decision point: need for update of the plan based on the discussion
- Contingency Plan / Water Management Plan – see attached comments from MEM
  - Update on progress of work requirements set out in the plan
  - Questions and comments on contingencies measures and site water management plan
- Other?

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**Ryan or Luke**, please respond and indicate a date and time next week when at least one of you and Golder (Terry or Andy) are available for this discussion. I estimate we will require up to 4 hours. Tuesday and Wednesday are not available.

I can be reached today at 250-818-6426 if you want to discuss.

Thank-you,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Chris Carr](#)  
**Subject:** Fwd: Breach Repair: MEM Request for Additional Information  
**Date:** Tuesday, February 24, 2015 6:49:41 AM  
**Attachments:** [2015 02 23 - Technical Memorandum Response to MEM Request \(Golder\).pdf](#)  
[ATT00001.htm](#)

---

Hi Chris,

Are you able to take a look at this memo from Golder before the weekly breach repair update call on Thursday?

If there are any follow-up questions I can see if either Terry or Andy is available to sit in on the weekly call on Thursday morning.

Thank-you!

Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

Begin forwarded message:

**From:** "Luke Moger" <[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)>  
**To:** "Demchuk, Tania MEM:EX" <[Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)>, "Dale Reimer" <[dreimer@mountpolley.com](mailto:dreimer@mountpolley.com)>, "Ryan Brown" <[rbrown@mountpolley.com](mailto:rbrown@mountpolley.com)>  
**Cc:** "Chris Carr" s.22 "Warnock, George MEM:EX" <[George.Warnock@gov.bc.ca](mailto:George.Warnock@gov.bc.ca)>, "Andy Haynes" <[ahaynes@golder.com](mailto:ahaynes@golder.com)>, "Terry Eldridge" <[teldridge@golder.com](mailto:teldridge@golder.com)>, "Adams, Rick MEM:EX" <[Rick.Adams@gov.bc.ca](mailto:Rick.Adams@gov.bc.ca)>, "Howe, Diane J MEM:EX" <[Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca)>  
**Subject:** RE: Breach Repair: MEM Request for Additional Information

Hi Tania;

Please find attached a Technical Memorandum from Golder Associates addressing Chris' comments.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

# TECHNICAL MEMORANDUM

**DATE** February 23, 2015

**REFERENCE** 1413803-035-TM-Rev0-2000

**TO** Dale Reimer, Mine Manager  
Mount Polley Mining Corporation

**CC** Luke Moger and Don Parsons

**FROM** Terry Eldridge and Andy Haynes

**EMAIL** Terry\_Eldridge@golder.com;  
Andy\_Haynes@golder.com

**RESPONSE TO MEM FEBRUARY 15, 2015 REQUEST FOR ADDITIONAL INFORMATION**

On Friday February 13, 2015, Mr. Rick Adams of the Ministry of Energy and Mines requested additional information regarding construction of the 2015 Freshet Management Embankment. The MEM requests are shown below in *italics*. Our responses follow the MEM requests.

■ **Specifications of the geotextile used including puncture resistance.**

The specifications of the geotextile are attached to this memo.

■ **Long-term filtration characteristics of the geotextile compared to the approved rock filter zone.**

The geotextile has an AOS (apparent opening size) of 0.15 mm. The maximum  $D_{15}$  specified for the granular filter is 0.7 mm.

■ **Method of geotextile installation.**

Geotextile is placed over the till and embankment core material and covered with granular filter. The geotextile is placed within 0.75 m of the centerline of the cut-off wall so that the soil cutter mixer will not be required to cut the geotextile. Near and on the abutments the geotextile has also been placed between the filter and the transition material.

■ **Confirmation that the filter materials already placed meets the grain size distribution specified.**

The granular filter placed meets the  $D_{15}$  requirement for retaining the till core and foundation and the tailings. In some areas the placed material does not meet all requirements for internal stability. A geotextile was therefore added to the section as a contingency measure to supplement the granular filter.

- **Confirmation that the materials being used for upstream embankment construction will act to reduce seepage rates and are being compacted to meet design specification.**

A zone of compacted tailings sand is being placed directly upstream of the cut-off aggregate. This material has a tested hydraulic conductivity of  $2 \times 10^{-6}$  m/s and will reduce the seepage rates through the breach repair area until the cut-off wall is completed. The material is being compacted.



## 1.0 CLOSURE

Please contact the undersigned if any additional information is required.

**GOLDER ASSOCIATES LTD.**

Terry Eldridge, P.Eng.  
Principal

Andy Haynes, P.Eng.  
Principal

Attachment 1: Geotextile Specifications

TLE/AJH/it

o:\final\2014\dynamics numbers - mining division\1413803\1413803-035-tm-rev0-2000\1413803-035-tm-rev0-2000-response to mem request 23feb\_15.docx





SKAPS Industries (Nonwoven Division)  
335, Athena Drive  
Athens, GA 30601 (U.S.A.)  
Phone (706) 354-3700 Fax (706) 354-3737  
E-mail: info@skaps.com

Sales Office:  
Engineered Synthetic Product Inc.  
Phone: (770)564-1857  
Fax: (770)564-1818

**November 8, 2013**  
**Layfield Geo & Ind Fabrics**  
17720 - 129 Avenue NW  
Edmonton, AB, T5V 0C4  
**PO : E28637**  
**BOL : 38975**

Dear Sir/Madam:

This is to certify that SKAPS GT116 (Layfield LP 16) is a high quality needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, randomly networked to form a high strength dimensionally stable fabric. SKAPS GT116 (Layfield LP 16) resists ultraviolet deterioration, rotting, biological degradation. The fabric is inert to commonly encountered soil chemicals. Polypropylene is stable within a pH range of 2 to 13. SKAPS GT116 (Layfield LP 16) conforms to the property values listed below:

PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Grab Tensile	ASTM D 4632	lbs (kN)	380 (1.69)
Grab Elongation	ASTM D 4632	%	50
Trapezoidal Tear	ASTM D 4533	lbs (kN)	145 (0.65)
CBR Puncture	ASTM D 6241	lbs (kN)	1080 (4.82)
Permittivity*	ASTM D 4491	sec <sup>-1</sup>	0.70
Water Flow*	ASTM D 4491	gpm/ft <sup>2</sup> (l/min/m <sup>2</sup> )	50 (2037)
AOS*	ASTM D 4751	US Sieve (mm)	100 (0.15)
UV Resistance	ASTM D 4355	%/hrs	70/500

**Notes:**

\* At the time of manufacturing. Handling may change these properties.

**PALAK PATEL**  
QUALITY CONTROL MANAGER

[www.skaps.com](http://www.skaps.com)

[www.espsynthetic.com](http://www.espsynthetic.com)

**Product : GT116-180 (Layfield LP 16)**

ROLL # ASTM METHOD UNITS TARGET	MD TENSILE D4632 lbs. 380	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 380	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 145	XMD TRAP D4533 lbs 145	CBR PUNCTURE D6241 lbs. 1080	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft <sup>2</sup> 50	PERMITTIVITY D4491 sec <sup>-1</sup> 0.70
030465977	500	70	485	96	156	191	1405	120	66	0.88
030466838	482	65	502	92	194	274	1447	120	65	0.87
030466839	482	65	502	92	194	274	1447	120	65	0.87
030466840	496	70	517	100	168	199	1375	120	65	0.87
030466841	496	70	517	100	168	199	1375	120	65	0.87
030466842	496	70	517	100	168	199	1375	120	65	0.87
030466845	496	70	517	100	168	199	1375	120	65	0.87
030466879	492	65	507	94	172	221	1387	120	65	0.87
030466880	492	65	507	94	172	221	1387	120	65	0.87
030466882	492	65	507	94	172	221	1387	120	65	0.87

\* All values are MARV.

LAYFI ELD GROUP  
I VAN KROOK  
E-mail: IKROOK@LAYFI ELDGROUP.COM

BOL#: 2138660  
Order #: 1078103-000  
PO#: E28968

This is to certify that LP16 is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. LP16 is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Code	Test Method	Minimum Average Roll Value			
GRAB TENSILE STRENGTH (MD)	GRABMD	ASTM D4632	380	LBS	1691	N
GRAB TENSILE STRENGTH (CD)	GRABCD	ASTM D4632	380	LBS	1691	N
ELONGATION (MD)	ELMD	ASTM D4632	50	%		
ELONGATION (CD)	ELCD	ASTM D4632	50	%		
TEAR STRENGTH (MD)	TTMD	ASTM D4533	140	LBS	623	N
TEAR STRENGTH (CD)	TTCD	ASTM D4533	140	LBS	623	N
APPARENT OPENING SIZE - SI EVE	AOS	ASTM D4751	100	#		
PERMEABILITY	PTVY	ASTM D4491	.70	SEC-1		
WATER FLOW RATE	FLOW	ASTM D4491	50.0	GPM/FT2	2037.0	L/M/N/M2
CBR PUNCTURE	CBR	ASTM D6241	1025	LBS	4561	N
APPARENT OPENING SIZE - MM	AOS2	ASTM D4751	.15	MM		
UV RESISTANCE @500 HOURS	UV	ASTM D4355	70	%		

Certification reflects test results at time of manufacturing and shipment. TenCate Geosynthetics is not responsible for environment or other factors which could alter the physical properties.

ASTM D 3786: Modified - tare weight not removed

ASTM D 4751, AOS is a Maximum Opening Diameter Value

\* \* \* END OF REPORT \* \* \*

This June 17, 2014



Jennifer Clark, Quality Manager

CERT#: 2138660-001

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Accreditation #: GAI-LAP-25-97

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Pendergrass, GA 30567

Tel 706 693 2226  
Tel 888 795 0808

Fax 706 693 2122  
www.tencate.com



## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 1

Order#: 1078103-000 BOL#: 2138660 PO#: E28968

## Geotextile Properties

	ACS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERM T	TRAP	TRAP
	U. S.	PUNC	ATI ON	ATI ON	FLOW	TENSI LE	TENSI LE	TI VI TY	TEAR	TEAR
	SI EVE	TURE	( CD)	( MD)	RATE	( CD)	( MD)		( CD)	( MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM FT2	LBS	LBS	SEC- 1	LBS	LBS
J10058272	140	1220	73	71	65.0	488	478	0.88	162	154
J10058280	140	1220	73	71	65.0	488	478	0.88	162	154
J10058281	140	1220	73	71	65.0	488	478	0.88	162	154
J10058287	140	1220	73	71	65.0	488	478	0.88	162	154
J10058288	140	1220	73	71	65.0	488	478	0.88	162	154
J10058289	140	1220	73	71	65.0	488	478	0.88	162	154
J10058290	140	1220	73	71	65.0	488	478	0.88	162	154
J10058335	140	1220	73	71	65.0	488	478	0.88	162	154
J10058382	140	1220	81	72	65.0	480	470	0.88	176	151
J10058383	140	1220	81	72	65.0	480	470	0.88	176	151
J10058384	140	1220	81	72	65.0	480	470	0.88	176	151
J10058401	140	1220	81	72	65.0	480	470	0.88	176	151
J10058402	140	1220	81	72	65.0	480	470	0.88	176	151
J10058404	140	1220	81	72	65.0	480	470	0.88	176	151
J10058405	140	1220	81	72	65.0	480	470	0.88	176	151
J10058406	140	1220	81	72	65.0	480	470	0.88	176	151
J10058407	140	1220	81	72	65.0	480	470	0.88	176	151
J10058408	140	1220	81	72	65.0	480	470	0.88	176	151
J10058415	140	1220	79	71	74.0	460	478	1.00	200	154
J10058416	140	1220	79	71	74.0	460	478	1.00	200	154
J10058417	140	1220	79	71	74.0	460	478	1.00	200	154
J10058421	140	1220	79	71	74.0	460	478	1.00	200	154
J10058422	140	1220	79	71	74.0	460	478	1.00	200	154
J10058423	140	1220	79	71	74.0	460	478	1.00	200	154
J10058424	140	1220	79	71	74.0	460	478	1.00	200	154
J10058425	140	1220	79	71	74.0	460	478	1.00	200	154

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 2

Order#: 1078103-000 BOL#: 2138660 PO#: E28968

## Geotextile Properties

	ACS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERM T	TRAP	TRAP
	U. S.	PUNC	ATI ON	ATI ON	FLOW	TENSI LE	TENSI LE	TI VI TY	TEAR	TEAR
	SI EVE	TURE	( CD)	( MD)	RATE	( CD)	( MD)		( CD)	( MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM FT2	LBS	LBS	SEC- 1	LBS	LBS
J10058426	140	1220	79	71	74.0	460	478	1.00	200	154
J10058428	140	1220	79	71	74.0	460	478	1.00	200	154
J10058429	140	1220	79	71	74.0	460	478	1.00	200	154
J10058430	140	1220	79	71	74.0	460	478	1.00	200	154
J10058563	140	1220	74	65	59.0	489	419	0.81	178	150
J10058564	140	1220	74	65	59.0	489	419	0.81	178	150
J10058565	140	1220	74	65	59.0	489	419	0.81	178	150
J10058566	140	1220	74	65	59.0	489	419	0.81	178	150
J10058567	140	1220	74	65	59.0	489	419	0.81	178	150
J10058574	140	1220	74	65	59.0	489	419	0.81	178	150
J10058575	140	1220	74	65	59.0	489	419	0.81	178	150
J10058576	140	1220	74	65	59.0	489	419	0.81	178	150
J10058577	140	1220	74	65	59.0	489	419	0.81	178	150
J10058578	140	1220	74	65	59.0	489	419	0.81	178	150
J10058579	140	1220	74	65	59.0	489	419	0.81	178	150
J10058580	140	1220	74	65	59.0	489	419	0.81	178	150
J10058581	140	1220	74	65	59.0	489	419	0.81	178	150
J10058582	140	1220	74	65	59.0	489	419	0.81	178	150
J10058583	140	1220	74	65	59.0	489	419	0.81	178	150
J10058584	140	1220	74	65	59.0	489	419	0.81	178	150
J10058585	140	1220	74	65	59.0	489	419	0.81	178	150
J10058586	140	1220	74	65	59.0	489	419	0.81	178	150
J10058620	140	1220	79	76	59.0	506	497	0.81	203	166
J10058621	140	1220	79	76	59.0	506	497	0.81	203	166
J10058625	140	1220	79	76	59.0	506	497	0.81	203	166
J10058626	140	1220	79	76	59.0	506	497	0.81	203	166

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

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Order#: 1078103-000 BOL#: 2138660 PO#: E28968

## Geotextile Properties

	ACS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERM T	TRAP	TRAP
	U. S.	PUNC	ATI ON	ATI ON	FLOW	TENSI LE	TENSI LE	TI VI TY	TEAR	TEAR
	SI EVE	TURE	( CD)	( MD)	RATE	( CD)	( MD)		( CD)	( MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM FT2	LBS	LBS	SEC- 1	LBS	LBS
J10058627	140	1220	79	76	59.0	506	497	0.81	203	166
J10058628	140	1220	79	76	59.0	506	497	0.81	203	166
J10058631	140	1220	79	76	59.0	506	497	0.81	203	166
J10058633	140	1220	79	76	59.0	506	497	0.81	203	166
J10058634	140	1220	79	76	59.0	506	497	0.81	203	166
J10058638	140	1220	79	76	59.0	506	497	0.81	203	166
J10058639	140	1220	79	76	59.0	506	497	0.81	203	166
J10058640	140	1220	79	76	59.0	506	497	0.81	203	166
J10058641	140	1220	79	76	59.0	506	497	0.81	203	166
J10058642	140	1220	79	76	59.0	506	497	0.81	203	166
J10058643	140	1220	79	76	59.0	506	497	0.81	203	166
J10058644	140	1220	79	76	59.0	506	497	0.81	203	166
J10058645	140	1220	79	76	59.0	506	497	0.81	203	166
J10058646	140	1220	79	76	59.0	506	497	0.81	203	166
J10058647	140	1220	79	76	59.0	506	497	0.81	203	166
J10058648	140	1220	79	76	59.0	506	497	0.81	203	166
J10058649	140	1220	79	76	59.0	506	497	0.81	203	166
J10058650	140	1220	79	76	59.0	506	497	0.81	203	166
J10058651	140	1220	79	76	59.0	506	497	0.81	203	166
J10058652	140	1220	79	76	59.0	506	497	0.81	203	166
J10058653	140	1220	79	76	59.0	506	497	0.81	203	166
J10058654	140	1220	79	76	59.0	506	497	0.81	203	166
J10058655	140	1220	79	76	59.0	506	497	0.81	203	166
J10058656	140	1220	79	76	59.0	506	497	0.81	203	166
J10058657	140	1220	79	76	59.0	506	497	0.81	203	166
J10058658	140	1220	79	76	59.0	506	497	0.81	203	166

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

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Order#: 1078103-000 BOL#: 2138660 PO#: E28968

## Geotextile Properties

	ACS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERM T	TRAP	TRAP
	U. S.	PUNC	ATI ON	ATI ON	FLOW	TENSI LE	TENSI LE	TI VI TY	TEAR	TEAR
	SI EVE	TURE	( CD)	( MD)	RATE	( CD)	( MD)		( CD)	( MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM FT2	LBS	LBS	SEC- 1	LBS	LBS
J10058659	140	1220	79	76	59.0	506	497	0.81	203	166
J10058661	140	1220	79	76	59.0	506	497	0.81	203	166
J10058662	140	1220	79	76	59.0	506	497	0.81	203	166
J10058663	140	1220	79	76	59.0	506	497	0.81	203	166
J10058664	140	1220	79	76	59.0	506	497	0.81	203	166
J10058665	140	1220	79	76	59.0	506	497	0.81	203	166
J10058666	140	1220	79	76	59.0	506	497	0.81	203	166
J10058672	140	1220	79	76	59.0	506	497	0.81	203	166
J10058673	140	1220	79	76	59.0	506	497	0.81	203	166
J10058674	140	1220	79	76	59.0	506	497	0.81	203	166
J10058675	140	1220	79	76	59.0	506	497	0.81	203	166
J10058676	140	1220	79	76	59.0	506	497	0.81	203	166

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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SKAPS Industries (Nonwoven Division)  
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Athens, GA 30601 (U.S.A.)  
Phone (706) 354-3700 Fax (706) 354-3737  
E-mail: contact@skaps.com

Sales Office:  
Engineered Synthetic Product Inc.  
Phone: (770)564-1857  
Fax: (770)564-1818

**October 23, 2014**  
**Layfield Canada Ltd.**  
17720 - 129 Avenue NW  
Edmonton, AB, T5V 0C4  
**PO : E28912**  
**BOL : 044397**

Dear Sir/Madam:

This is to certify that SKAPS GT116 (Layfield LP 16) is a high quality needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, randomly networked to form a high strength dimensionally stable fabric. SKAPS GT116 (Layfield LP 16) resists ultraviolet deterioration, rotting, biological degradation. The fabric is inert to commonly encountered soil chemicals. Polypropylene is stable within a pH range of 2 to 13. SKAPS GT116 (Layfield LP 16) conforms to the property values listed below:

PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Grab Tensile	ASTM D 4632	lbs (kN)	380 (1.69)
Grab Elongation	ASTM D 4632	%	50
Trapezoidal Tear	ASTM D 4533	lbs (kN)	145 (0.65)
CBR Puncture	ASTM D 6241	lbs (kN)	1080 (4.82)
Permittivity*	ASTM D 4491	sec <sup>-1</sup>	0.70
Water Flow*	ASTM D 4491	gpm/ft <sup>2</sup> (l/min/m <sup>2</sup> )	50 (2037)
AOS*	ASTM D 4751	US Sieve (mm)	100 (0.15)
UV Resistance	ASTM D 4355	%/hrs	70/500

**Notes:**

\* At the time of manufacturing. Handling may change these properties.

**PALAK PATEL**  
QUALITY CONTROL MANAGER

[www.skaps.com](http://www.skaps.com)

[www.espgeosynthetics.com](http://www.espgeosynthetics.com)

**Product : GT116-180 (Layfield LP 16)**

ROLL # ASTM METHOD UNITS TARGET	MD TENSILE D4632 lbs. 380	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 380	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 145	XMD TRAP D4533 lbs 145	CBR PUNCTURE D6241 lbs. 1080	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft <sup>2</sup> 50	PERMITTIVITY D4491 sec <sup>-1</sup> 0.70
140534793	392	67	400	77	163	169	1089	120	64	0.85
140534796	392	67	400	77	163	169	1089	120	64	0.85
030505470	504	67	472	89	194	202	1429	120	53	0.71
030505492	535	67	474	95	211	225	1276	120	53	0.71
030505494	535	67	474	95	211	225	1276	120	53	0.71
030505496	535	67	474	95	211	225	1276	120	53	0.71
030505497	535	67	474	95	211	225	1276	120	53	0.71
030505499	535	67	474	95	211	225	1276	120	53	0.71
030505500	535	67	474	95	211	225	1276	120	53	0.71
030505501	535	67	474	95	211	225	1276	120	53	0.71
030505502	535	67	474	95	211	225	1276	120	53	0.71
030505504	535	67	474	95	211	225	1276	120	53	0.71
030505505	535	67	474	95	211	225	1276	120	53	0.71
030505506	535	67	474	95	211	225	1276	120	53	0.71
030505507	535	67	474	95	211	225	1276	120	53	0.71
030505508	535	67	474	95	211	225	1276	120	53	0.71
030505509	535	67	474	95	211	225	1276	120	53	0.71
030505510	535	67	474	95	211	225	1276	120	53	0.71
030505511	535	67	474	95	211	225	1276	120	53	0.71
030505512	535	67	474	95	211	225	1276	120	53	0.71
030505513	535	67	474	95	211	225	1276	120	53	0.71
030505514	535	67	474	95	211	225	1276	120	53	0.71
030505515	535	67	474	95	211	225	1276	120	53	0.71
030505516	535	67	474	95	211	225	1276	120	53	0.71
030505517	535	67	474	95	211	225	1276	120	53	0.71
030505518	535	67	474	95	211	225	1276	120	53	0.71
030505519	535	67	474	95	211	225	1276	120	53	0.71
030505523	498	71	500	100	171	191	1375	120	53	0.71
030505524	498	71	500	100	171	191	1375	120	53	0.71
030505525	498	71	500	100	171	191	1375	120	53	0.71
030505528	498	71	500	100	171	191	1375	120	53	0.71
030505529	498	71	500	100	171	191	1375	120	53	0.71
030505530	498	71	500	100	171	191	1375	120	53	0.71
030505532	498	71	500	100	171	191	1375	120	53	0.71
030505533	498	71	500	100	171	191	1375	120	53	0.71
030505534	498	71	500	100	171	191	1375	120	53	0.71

\* All values are MARV.



**Product : GT116-180 (Layfield LP 16)**

ROLL # ASTM METHOD UNITS TARGET	MD TENSILE D4632 lbs. 380	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 380	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 145	XMD TRAP D4533 lbs 145	CBR PUNCTURE D6241 lbs. 1080	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft <sup>2</sup> 50	PERMITTIVITY D4491 sec <sup>-1</sup> 0.70
030505535	498	71	500	100	171	191	1375	120	53	0.71
030505536	498	71	500	100	171	191	1375	120	53	0.71
030505537	498	71	500	100	171	191	1375	120	53	0.71
030505540	498	71	500	100	171	191	1375	120	53	0.71
030505544	498	71	500	100	171	191	1375	120	53	0.71
030505545	498	71	500	100	171	191	1375	120	53	0.71
030505546	498	71	500	100	171	191	1375	120	53	0.71
030505547	498	71	500	100	171	191	1375	120	53	0.71
030505548	498	71	500	100	171	191	1375	120	53	0.71
030505549	498	71	500	100	171	191	1375	120	53	0.71
030505550	498	71	500	100	171	191	1375	120	53	0.71
030505551	498	71	500	100	171	191	1375	120	53	0.71
030505552	564	76	513	98	182	213	1472	120	53	0.71
030505553	564	76	513	98	182	213	1472	120	53	0.71
030505554	564	76	513	98	182	213	1472	120	53	0.71
030505555	564	76	513	98	182	213	1472	120	53	0.71
030505556	564	76	513	98	182	213	1472	120	53	0.71
030505558	564	76	513	98	182	213	1472	120	53	0.71
030505559	564	76	513	98	182	213	1472	120	53	0.71
030505560	564	76	513	98	182	213	1472	120	53	0.71
030505561	564	76	513	98	182	213	1472	120	53	0.71
030505562	564	76	513	98	182	213	1472	120	53	0.71
030505566	564	76	513	98	182	213	1472	120	53	0.71
030505567	564	76	513	98	182	213	1472	120	53	0.71
030505568	564	76	513	98	182	213	1472	120	53	0.71
030505569	564	76	513	98	182	213	1472	120	53	0.71
030505570	564	76	513	98	182	213	1472	120	53	0.71
030505572	564	76	513	98	182	213	1472	120	53	0.71
030505573	564	76	513	98	182	213	1472	120	53	0.71
030505574	564	76	513	98	182	213	1472	120	53	0.71
030505575	564	76	513	98	182	213	1472	120	53	0.71
030505576	564	76	513	98	182	213	1472	120	53	0.71
030505599	502	77	542	101	183	196	1665	120	90	1.20
030505600	502	77	542	101	183	196	1665	120	90	1.20
030505601	502	77	542	101	183	196	1665	120	90	1.20
030505680	515	76	537	102	187	201	1538	120	90	1.20

\* All values are MARV.

**Product : GT116-180 (Layfield LP 16)**

ROLL # ASTM METHOD UNITS TARGET	MD TENSILE D4632 lbs. 380	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 380	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 145	XMD TRAP D4533 lbs 145	CBR PUNCTURE D6241 lbs. 1080	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft <sup>2</sup> 50	PERMITTIVITY D4491 sec <sup>-1</sup> 0.70
030505681	515	76	537	102	187	201	1538	120	90	1.20
030505682	515	76	537	102	187	201	1538	120	90	1.20
030505692	515	76	537	102	187	201	1538	120	90	1.20
030505693	515	76	537	102	187	201	1538	120	90	1.20
030506441	483	80	494	97	205	221	1377	120	71	0.95
030506531	460	73	478	93	236	242	1308	120	62	0.83
030506630	470	71	507	100	191	214	1527	120	62	0.83
030506634	470	71	507	100	191	214	1527	120	62	0.83
030506635	470	71	507	100	191	214	1527	120	62	0.83
030506658	446	70	448	102	194	202	1399	120	62	0.83
030507895	523	74	548	112	182	222	1326	120	63	0.84
030508019	493	73	508	107	211	240	1452	120	90	1.20
030508020	493	73	508	107	211	240	1452	120	90	1.20
030508033	478	72	489	102	189	234	1548	120	90	1.20
030508035	478	72	489	102	189	234	1548	120	90	1.20
030508036	478	72	489	102	189	234	1548	120	90	1.20
030508040	478	72	489	102	189	234	1548	120	90	1.20
030508041	478	72	489	102	189	234	1548	120	90	1.20
030508042	478	72	489	102	189	234	1548	120	90	1.20
030508043	478	72	489	102	189	234	1548	120	90	1.20
030508044	478	72	489	102	189	234	1548	120	90	1.20
030508045	478	72	489	102	189	234	1548	120	90	1.20
030508046	478	72	489	102	189	234	1548	120	90	1.20
030508047	478	72	489	102	189	234	1548	120	90	1.20
030508048	478	72	489	102	189	234	1548	120	90	1.20
030508049	478	72	489	102	189	234	1548	120	90	1.20
030508050	478	72	489	102	189	234	1548	120	90	1.20
030508058	478	72	489	102	189	234	1548	120	90	1.20
030508061	478	72	489	102	189	234	1548	120	90	1.20
030508064	505	73	507	104	182	203	1448	120	90	1.20
030508067	505	73	507	104	182	203	1448	120	90	1.20
030508074	505	73	507	104	182	203	1448	120	90	1.20
030508075	505	73	507	104	182	203	1448	120	90	1.20
030508077	505	73	507	104	182	203	1448	120	90	1.20
030508086	505	73	507	104	182	203	1448	120	90	1.20
030508096	494	71	504	102	184	219	1391	120	90	1.20

\* All values are MARV.

**Product : GT116-180 (Layfield LP 16)**

ROLL # ASTM METHOD UNITS TARGET	MD TENSILE D4632 lbs. 380	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 380	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 145	XMD TRAP D4533 lbs 145	CBR PUNCTURE D6241 lbs. 1080	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft <sup>2</sup> 50	PERMITTIVITY D4491 sec <sup>-1</sup> 0.70
030508097	494	71	504	102	184	219	1391	120	90	1.20
030508098	494	71	504	102	184	219	1391	120	90	1.20
030508108	494	71	504	102	184	219	1391	120	90	1.20
030508112	494	71	504	102	184	219	1391	120	90	1.20
030508113	494	71	504	102	184	219	1391	120	90	1.20
030508117	494	71	504	102	184	219	1391	120	90	1.20
030511167	498	76	534	108	215	304	1445	120	90	1.20
030511168	498	76	534	108	215	304	1445	120	90	1.20
030511169	498	76	534	108	215	304	1445	120	90	1.20

\* All values are MARV.



# TENCATE

## LP16 Certification

TenCate Geosynthetics Americas

Page: 1

LAYFIELD GROUP  
IVAN KROOK  
E-mail: IKROOK@LAYFIELDGROUP.COM

BOL#: 2138527  
Order#: 1078034-000  
PO#: E28961

This is to certify that LP16 is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. LP16 is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Code	Test Method	Minimum Average Roll Value			
GRAB TENSILE STRENGTH (MD)	GRABMD	ASTM D4632	380	LBS	1691	N
GRAB TENSILE STRENGTH (CD)	GRABCD	ASTM D4632	380	LBS	1691	N
ELONGATION (MD)	ELMD	ASTM D4632	50	%		
ELONGATION (CD)	ELCD	ASTM D4632	50	%		
TEAR STRENGTH (MD)	TTMD	ASTM D4533	140	LBS	623	N
TEAR STRENGTH (CD)	TTCD	ASTM D4533	140	LBS	623	N
APPARENT OPENING SIZE - SIEVE	AOS	ASTM D4751	100	#		
PERMITTIVITY	PTVY	ASTM D4491	.70	SEC-1		
WATER FLOW RATE	FLOW	ASTM D4491	50.0	GPM/FT2	2037.0	L/MIN/M2
CBR PUNCTURE	CBR	ASTM D6241	1025	LBS	4561	N
APPARENT OPENING SIZE - MM	AOS2	ASTM D4751	.15	MM		
UV RESISTANCE @ 500 HOURS	UV	ASTM D4355	70	%		

Certification reflects test results at time of manufacturing and shipment. TenCate Geosynthetics is not responsible for environment or other factors which could alter the physical properties.

ASTM D 3786: Modified - tare weight not removed

ASTM D 4751, AOS is a Maximum Opening Diameter Value

\* \* \* END OF REPORT \* \* \*

This June 18, 2014

*Jennifer Clark*

Jennifer Clark, Quality Manager

CERT#: 2138527-004

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Accreditation #: GAI-LAP-25-97

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365 South Holland Dr.  
Pendergrass, GA 30567

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 3

Order#: 1078034-000 BOL#: 2138527 PO#: E28961

## Geotextile Properties

	AOS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERMIT	TRAP	TRAP
	U.S.	PUNC	ATION	ATION	FLOW	TENSILE	TENSILE	TIVITY	TEAR	TEAR
	SIEVE	TURE	(CD)	(MD)	RATE	(CD)	(MD)		(CD)	(MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM/FT2	LBS	LBS	SEC-1	LBS	LBS
J10058492	140	1220	78	72	74.0	457	438	1.00	155	147
J10058493	140	1220	78	72	74.0	457	438	1.00	155	147
J10058494	140	1220	78	72	74.0	457	438	1.00	155	147
J10058496	140	1220	78	72	74.0	457	438	1.00	155	147
J10058497	140	1220	78	72	74.0	457	438	1.00	155	147
J10058498	140	1220	78	72	74.0	457	438	1.00	155	147
J10058499	140	1220	78	72	74.0	457	438	1.00	155	147
J10058500	140	1220	78	72	74.0	457	438	1.00	155	147
J10058501	140	1220	78	72	74.0	457	438	1.00	155	147
J10058502	140	1220	78	72	74.0	457	438	1.00	155	147
J10058503	140	1220	78	72	74.0	457	438	1.00	155	147
J10058505	140	1220	78	72	74.0	457	438	1.00	155	147
J10058506	140	1220	78	72	74.0	457	438	1.00	155	147
J10058507	140	1220	78	72	74.0	457	438	1.00	155	147
J10058508	140	1220	78	72	74.0	457	438	1.00	155	147
J10058509	140	1220	78	72	74.0	457	438	1.00	155	147
J10058510	140	1220	78	72	74.0	457	438	1.00	155	147
J10058523	140	1220	78	72	74.0	457	438	1.00	155	147
J10058692	140	1293	76	73	83.0	490	507	1.13	215	173
J10058693	140	1293	76	73	83.0	490	507	1.13	215	173
J10058694	140	1293	76	73	83.0	490	507	1.13	215	173
J10058695	140	1293	76	73	83.0	490	507	1.13	215	173
J10058696	140	1293	76	73	83.0	490	507	1.13	215	173
J10058697	140	1293	76	73	83.0	490	507	1.13	215	173
J10058698	140	1293	76	73	83.0	490	507	1.13	215	173
J10058699	140	1293	76	73	83.0	490	507	1.13	215	173

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 2

Order#: 1078374-000 BOL#: 2139146 PO#: E28993

## Geotextile Properties

	AOS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERMIT	TRAP	TRAP
	U.S.	PUNC	ATION	ATION	FLOW	TENSILE	TENSILE	TIVITY	TEAR	TEAR
	SIEVE	TURE	(CD)	(MD)	RATE	(CD)	(MD)		(CD)	(MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM/FT2	LBS	LBS	SEC-1	LBS	LBS
J10058551	140	1220	74	65	59.0	489	419	0.81	178	150
J10058552	140	1220	74	65	59.0	489	419	0.81	178	150
J10058553	140	1220	74	65	59.0	489	419	0.81	178	150
J10058554	140	1220	74	65	59.0	489	419	0.81	178	150
J10058556	140	1220	74	65	59.0	489	419	0.81	178	150
J10058557	140	1220	74	65	59.0	489	419	0.81	178	150
J10058558	140	1220	74	65	59.0	489	419	0.81	178	150
J10058559	140	1220	74	65	59.0	489	419	0.81	178	150
J10058560	140	1220	74	65	59.0	489	419	0.81	178	150
J10058561	140	1220	74	65	59.0	489	419	0.81	178	150
J10058562	140	1220	74	65	59.0	489	419	0.81	178	150
J10058570	140	1220	74	65	59.0	489	419	0.81	178	150
J10058571	140	1220	74	65	59.0	489	419	0.81	178	150
J10058573	140	1220	74	65	59.0	489	419	0.81	178	150
J10058602	140	1220	74	65	59.0	489	419	0.81	178	150
J10058603	140	1220	74	65	59.0	489	419	0.81	178	150
J10058606	140	1220	79	76	59.0	506	497	0.81	203	166
J10058610	140	1220	79	76	59.0	506	497	0.81	203	166
J10058622	140	1220	79	76	59.0	506	497	0.81	203	166
J10058623	140	1220	79	76	59.0	506	497	0.81	203	166
J10058624	140	1220	79	76	59.0	506	497	0.81	203	166
J10058677	140	1220	79	76	59.0	506	497	0.81	203	166
J10058679	140	1293	76	73	83.0	490	507	1.13	215	173
J10058680	140	1293	76	73	83.0	490	507	1.13	215	173
J10058682	140	1293	76	73	83.0	490	507	1.13	215	173
J10058683	140	1293	76	73	83.0	490	507	1.13	215	173

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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## GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 2

Order#: 1079119-000 BOL#: 2140489 PO#: E29051

## Geotextile Properties

	AOS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERMIT	TRAP	TRAP
	U.S.	PUNC	ATION	ATION	FLOW	TENSILE	TENSILE	TIVITY	TEAR	TEAR
	SIEVE	TURE	(CD)	(MD)	RATE	(CD)	(MD)		(CD)	(MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM/FT2	LBS	LBS	SEC-1	LBS	LBS
J10074844	140	1085	77	77	61.0	535	471	0.82	196	158
J10074845	140	1085	77	77	61.0	535	471	0.82	196	158
J10074846	140	1085	77	77	61.0	535	471	0.82	196	158
J10074848	140	1085	77	77	61.0	535	471	0.82	196	158
J10074849	140	1085	77	77	61.0	535	471	0.82	196	158
J10074850	140	1085	77	77	61.0	535	471	0.82	196	158
J10074854	140	1085	77	77	61.0	535	471	0.82	196	158
J10074855	140	1085	77	77	61.0	535	471	0.82	196	158
J10074856	140	1085	77	77	61.0	535	471	0.82	196	158
J10074857	140	1085	77	77	61.0	535	471	0.82	196	158
J10074860	140	1085	77	77	61.0	535	471	0.82	196	158
J10074861	140	1085	77	77	61.0	535	471	0.82	196	158
J10074862	140	1085	77	77	61.0	535	471	0.82	196	158
J10074863	140	1085	77	77	61.0	535	471	0.82	196	158
J10074864	140	1085	77	77	61.0	535	471	0.82	196	158
J10074865	140	1085	77	77	61.0	535	471	0.82	196	158
J10074868	140	1085	77	77	61.0	535	471	0.82	196	158
J10074869	140	1085	77	77	61.0	535	471	0.82	196	158
J10074872	140	1085	77	77	61.0	535	471	0.82	196	158
J10074875	140	1085	77	77	61.0	535	471	0.82	196	158
J10074876	140	1085	77	77	61.0	535	471	0.82	196	158
J10074877	140	1085	77	77	61.0	535	471	0.82	196	158

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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GEOSYNTHETICS PROPERTIES FOR PRODUCT - LP16

PAGE 1

Order#: 1079119-000 BOL#: 2140489 PO#: E29051

Geotextile Properties

	AOS	CBR	ELONG	ELONG	WATER	GRAB	GRAB	PERMIT	TRAP	TRAP
	U.S.	PUNC	ATION	ATION	FLOW	TENSILE	TENSILE	TIVITY	TEAR	TEAR
	SIEVE	TURE	(CD)	(MD)	RATE	(CD)	(MD)		(CD)	(MD)
	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM	ASTM
	D4751	D6241	D4632	D4632	D4491	D4632	D4632	D4491	D4533	D4533
	#	LBS	%	%	GPM/FT2	LBS	LBS	SEC-1	LBS	LBS
J10074547	140	1143	71	73	55.0	472	437	0.75	180	140
J10074548	140	1143	71	73	55.0	472	437	0.75	180	140
J10074550	140	1143	71	73	55.0	472	437	0.75	180	140
J10074563	140	1143	71	73	55.0	472	437	0.75	180	140
J10074564	140	1143	71	73	55.0	472	437	0.75	180	140
J10074566	140	1143	71	73	55.0	472	437	0.75	180	140
J10074569	140	1143	71	73	55.0	472	437	0.75	180	140
J10074571	140	1143	71	73	55.0	472	437	0.75	180	140
J10074572	140	1143	71	73	55.0	472	437	0.75	180	140
J10074574	140	1143	71	73	55.0	472	437	0.75	180	140
J10074578	140	1143	71	73	55.0	472	437	0.75	180	140
J10074582	140	1143	71	73	55.0	472	437	0.75	180	140
J10074585	140	1143	71	73	55.0	472	437	0.75	180	140
J10074586	140	1143	71	73	55.0	472	437	0.75	180	140
J10074589	140	1143	71	73	55.0	472	437	0.75	180	140
J10074599	140	1143	71	73	55.0	472	437	0.75	180	140
J10074600	140	1143	71	73	55.0	472	437	0.75	180	140
J10074605	140	1143	71	73	55.0	472	437	0.75	180	140
J10074753	140	1143	80	77	69.0	551	464	0.93	209	156
J10074825	140	1085	77	77	61.0	535	471	0.82	196	158
J10074834	140	1085	77	77	61.0	535	471	0.82	196	158
J10074835	140	1085	77	77	61.0	535	471	0.82	196	158
J10074838	140	1085	77	77	61.0	535	471	0.82	196	158
J10074841	140	1085	77	77	61.0	535	471	0.82	196	158
J10074842	140	1085	77	77	61.0	535	471	0.82	196	158
J10074843	140	1085	77	77	61.0	535	471	0.82	196	158

Final "put-up" rolls taken from a single master roll and having identical properties and test data. Results may only be available for tested rolls.

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Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
**Sent:** February-20-15 10:41 AM  
**To:** Dale Reimer; Luke Moger; Ryan Brown  
**Cc:** Chris Carr s.22 ; Warnock, George MEM:EX; Andy Haynes ([ahaynes@golder.com](mailto:ahaynes@golder.com)); Terry Eldridge ([teldridge@golder.com](mailto:teldridge@golder.com)); Adams, Rick MEM:EX; Howe, Diane J MEM:EX  
**Subject:** RE: Breach Repair: MEM Request for Additional Information  
**Importance:** High

Ryan,

In follow-up to the weekly update call this morning, I am sending this email as a reminder that Chris Carr has requested the information set out below. It is the expectation of this ministry that a response will be received by end of day Monday, February 23. If it is not possible to address the information requests by that time, it is expected that a response will be received setting out how and when the information will be provided.

Please call me if you have questions or concerns about addressing this information request. I can be reached today at 250-818-6426.

Thank-you,  
Tania

---

**From:** Adams, Rick MEM:EX  
**Sent:** Friday, February 13, 2015 4:04 PM  
**To:** Dale Reimer ([dreimer@mountpolley.com](mailto:dreimer@mountpolley.com)); Luke Moger; Ryan Brown  
**Cc:** Chris Carr s.22 Warnock, George MEM:EX; Demchuk, Tania MEM:EX; Andy Haynes ([ahaynes@golder.com](mailto:ahaynes@golder.com)); Terry Eldridge ([teldridge@golder.com](mailto:teldridge@golder.com))  
**Subject:** Breach Repair: MEM Request for Additional Information

Dale, further to review of Ryan Brown's weekly update, and Luke Moger's Bi-Weekly Construction Progress Report #4, by our geotechnical consultant, the Ministry of Energy and Mines requests Mount Polley Mining Corporation immediately provide the following information:

- <!--[if !supportLists]-->• <!--[endif]-->Specifications of the geotextile used including puncture resistance.
- <!--[if !supportLists]-->• <!--[endif]-->Long-term filtration characteristics of the geotextile compared to the approved rock filter zone.
- <!--[if !supportLists]-->• <!--[endif]-->Method of geotextile installation.
- <!--[if !supportLists]-->• <!--[endif]-->Confirmation that the filter materials already placed meet the grain size distribution specified.



<!--[if !supportLists]-->• <!--[endif]-->Confirmation that the materials being used for upstream embankment construction will act to reduce seepage rates and are being compacted to meet design specification.

The Ministry of Energy and Mines further advises Mount Polley Mining Corporation that the Ministry of Energy and Mines must be notified in advance of proceeding with any changes to the breach repair design configuration.

We would be happy to discuss further with you and your consultants by conference call if required.

Rick Adams  
Inspector of Mines  
2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3  
Telephone: 250-828-4583

**From:** Demchuk, Tania MEM:EX  
**To:** [Chris Carr](#) s.22  
**Subject:** FW: Breach Repair: MEM Request for Additional Information  
**Date:** Friday, February 27, 2015 3:17:00 PM

---

Hi Chris,  
Do you have thoughts on the request below?  
Thanks,  
Tania

-----Original Message-----

From: Luke Moger [<mailto:lmoger@mountpolley.com>]  
Sent: Friday, February 27, 2015 2:03 PM  
To: Demchuk, Tania MEM:EX; Ryan Brown  
Cc: Chris Carr s.22 ; Jim Kuipers; Eldridge, Terry; Don Parsons  
Subject: RE: Breach Repair: MEM Request for Additional Information

Hi Tania;

I believe that this was followed up on by Ryan, but wanted to make sure that we were all on the same page.

As per clause C.1.(d), bullet point three (3) of the December 17, 2014 M-200 Permit Amendment, MPMC is to submit a revised design by March 31, 2015 that incorporates information from the final Panel Report. It is MPMC's intent that this update (completed by Golder) will include information from the Panel report, information from the KCB report, and information available from the current drilling being completed as part of the 2015 Site Investigation. Additionally, this update would include the information developed during construction of the 2015 Freshet Embankment and any of the changes that have been made to accommodate weather, ground or material conditions. Would MEM accept such requested updates, as outlined in the letter provided including those by Chris Carr, as part of this revised design report due on or before March 31, 2015? This would be the preferred option of MPMC and Golder.

Kindest Regards,

Luke Moger, PMP  
Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

-----Original Message-----

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
Sent: February-26-15 8:52 AM  
To: Ryan Brown  
Cc: Luke Moger; Chris Carr s.22 ; Jim Kuipers  
Subject: FW: Breach Repair: MEM Request for Additional Information

Ryan,  
As discussed, here are the follow-up questions from Chris in response to the memo from Golder.  
Tania

-----Original Message-----

From: Chris Carr [<mailto:>] s.22

Sent: Tuesday, February 24, 2015 10:40 AM  
To: Demchuk, Tania MEM:EX  
Subject: RE: Breach Repair: MEM Request for Additional Information

Hi Tania,

I have reviewed the information included in the memo from Golder.

There are three issues that concern me:

Issue #1

The memo does not provide sufficient information to show how the geotextile is being installed. A cross-section may be useful. The geotextile must be in intimate contact with the adjacent fill materials to prevent voids and to reduce the possibility of fines collecting and clogging the geotextile. Is the geotextile installed with an overlap or are the laps machine sewn? How is puncturing of the geotextile avoided when placed over and adjacent to the sharp, angular aggregate that is being used as embankment fill?

Issue #2

The memo indicates that there are areas of placed filter that do not meet requirements for internal stability. Is this a concern?

Issue #3

The memo does not confirm that the tailings material placed on the upstream embankment has been, or is being, compacted to meet the required specification. The memo merely states that the material is being compacted.

One way of resolving these issues, rather than getting into more discussion, is to request the EOR to provide a letter stating that the design changes are not materially significant and that the constructed embankment will function in accordance with the design intent.

Regards,

Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: s.22

-----Original Message-----

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
Sent: February-24-15 6:50 AM  
To: Chris Carr  
Subject: Fwd: Breach Repair: MEM Request for Additional Information

Hi Chris,

Are you able to take a look at this memo from Golder before the weekly breach repair update call on Thursday?

If there are any follow-up questions I can see if either Terry or Andy is available to sit in on the weekly call on Thursday morning.

Thank-you!  
Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist

Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

Begin forwarded message:

From: "Luke Moger" <lmoger@mountpolley.com<<mailto:lmoger@mountpolley.com>>>  
To: "Demchuk, Tania MEM:EX"  
<Tania.Demchuk@gov.bc.ca<<mailto:Tania.Demchuk@gov.bc.ca>>>, "Dale Reimer"  
<dreimer@mountpolley.com<<mailto:dreimer@mountpolley.com>>>, "Ryan Brown"  
<rbrown@mountpolley.com<<mailto:rbrown@mountpolley.com>>>  
Cc: "Chris Carr s.22", "Warnock, George MEM:EX"  
<George.Warnock@gov.bc.ca<<mailto:George.Warnock@gov.bc.ca>>>, "Andy Haynes"  
(ahaynes@golder.com<<mailto:ahaynes@golder.com>>)"  
<ahaynes@golder.com<<mailto:ahaynes@golder.com>>>, "Terry Eldridge"  
(teldridge@golder.com<<mailto:teldridge@golder.com>>)"  
<teldridge@golder.com<<mailto:teldridge@golder.com>>>, "Adams, Rick MEM:EX"  
<Rick.Adams@gov.bc.ca<<mailto:Rick.Adams@gov.bc.ca>>>, "Howe, Diane J MEM:EX"  
<Diane.Howe@gov.bc.ca<<mailto:Diane.Howe@gov.bc.ca>>>  
Subject: RE: Breach Repair: MEM Request for Additional Information

Hi Tania;

Please find attached a Technical Memorandum from Golder Associates addressing Chris' comments.

Kindest Regards,

Luke Moger, PMP  
Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: LMoger@MountPolley.com<<mailto:lmoger@mountpolley.com>>

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]  
Sent: February-20-15 10:41 AM  
To: Dale Reimer; Luke Moger; Ryan Brown  
Cc: Chris Carr s.22 Warnock, George MEM:EX; Andy Haynes  
(ahaynes@golder.com<<mailto:ahaynes@golder.com>>);  
Terry Eldridge (teldridge@golder.com<<mailto:teldridge@golder.com>>); Adams, Rick MEM:EX; Howe, Diane J  
MEM:EX  
Subject: RE: Breach Repair: MEM Request for Additional Information  
Importance: High

Ryan,

In follow-up to the weekly update call this morning, I am sending this email as a reminder that Chris Carr has requested the information set out below.

It is the expectation of this ministry that a response will be received by end of day Monday, February 23. If it is not possible to address the information requests by that time, it is expected that a response will be received setting out how and when the information will be provided.

Please call me if you have questions or concerns about addressing this information request. I can be reached today at 250-818-6426.

Thank-you,  
Tania

From: Adams, Rick MEM:EX  
Sent: Friday, February 13, 2015 4:04 PM  
To: Dale Reimer (dreimer@mountpolley.com<<mailto:dreimer@mountpolley.com>>);  
Luke Moger; Ryan Brown  
Cc: Chris Carr s.22 ; Warnock, George MEM:EX; Demchuk, Tania  
MEM:EX; Andy Haynes (ahaynes@golder.com<<mailto:ahaynes@golder.com>>); Terry Eldridge  
(teldridge@golder.com<<mailto:teldridge@golder.com>>)  
Subject: Breach Repair: MEM Request for Additional Information

Dale, further to review of Ryan Brown's weekly update, and Luke Moger's Bi-Weekly Construction Progress Report #4, by our geotechnical consultant, the Ministry of Energy and Mines requests Mount Polley Mining Corporation immediately provide the following information:

- . Specifications of the geotextile used including puncture resistance.
- . Long-term filtration characteristics of the geotextile compared to the approved rock filter zone.
- . Method of geotextile installation.
- . Confirmation that the filter materials already placed meet the grain size distribution specified.
- . Confirmation that the materials being used for upstream embankment construction will act to reduce seepage rates and are being compacted to meet design specification.

The Ministry of Energy and Mines further advises Mount Polley Mining Corporation that the Ministry of Energy and Mines must be notified in advance of proceeding with any changes to the breach repair design configuration.

We would be happy to discuss further with you and your consultants by conference call if required.

Rick Adams  
Inspector of Mines  
2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3  
Telephone: 250-828-4583

**From:** Demchuk, Tania MEM:EX  
**To:** "Luke Moger"; Ryan Brown  
**Cc:** Chris Carr s.22 im Kuipers; Eldridge, Terry; Don Parsons  
**Subject:** RE: Breach Repair: MEM Request for Additional Information  
**Date:** Friday, February 27, 2015 5:49:00 PM

---

Hi Luke,

We understand that it is very busy and that there is a high workload related to reporting, development of plans and responding to questions. That said, March 31, 2015 is too late for a response to the outstanding geotechnical questions set out below.

Please provide a response. We can arrange for a discussion between Terry and Chris if that would be helpful.

Regards,  
Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

-----Original Message-----

From: Luke Moger [<mailto:lmoger@mountpolley.com>]  
Sent: Friday, February 27, 2015 2:03 PM  
To: Demchuk, Tania MEM:EX; Ryan Brown  
Cc: Chris Carr s.22 Jim Kuipers; Eldridge, Terry; Don Parsons  
Subject: RE: Breach Repair: MEM Request for Additional Information

Hi Tania;

I believe that this was followed up on by Ryan, but wanted to make sure that we were all on the same page.

As per clause C.1.(d), bullet point three (3) of the December 17, 2014 M-200 Permit Amendment, MPMC is to submit a revised design by March 31, 2015 that incorporates information from the final Panel Report. It is MPMC's intent that this update (completed by Golder) will include information from the Panel report, information from the KCB report, and information available from the current drilling being completed as part of the 2015 Site Investigation. Additionally, this update would include the information developed during construction of the 2015 Freshet Embankment and any of the changes that have been made to accommodate weather, ground or material conditions. Would MEM accept such requested updates, as outlined in the letter provided including those by Chris Carr, as part of this revised design report due on or before March 31, 2015? This would be the preferred option of MPMC and Golder.

Kindest Regards,

Luke Moger, PMP  
Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)



-----Original Message-----

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]

Sent: February-26-15 8:52 AM

To: Ryan Brown

Cc: Luke Moger; Chris Carr s.22 Jim Kuipers

Subject: FW: Breach Repair: MEM Request for Additional Information

Ryan,

As discussed, here are the follow-up questions from Chris in response to the memo from Golder.

Tania

-----Original Message-----

From: Chris Carr [<mailto:>] s.22

Sent: Tuesday, February 24, 2015 10:40 AM

To: Demchuk, Tania MEM:EX

Subject: RE: Breach Repair: MEM Request for Additional Information

Hi Tania,

I have reviewed the information included in the memo from Golder.

There are three issues that concern me:

Issue #1

The memo does not provide sufficient information to show how the geotextile is being installed. A cross-section may be useful. The geotextile must be in intimate contact with the adjacent fill materials to prevent voids and to reduce the possibility of fines collecting and clogging the geotextile. Is the geotextile installed with an overlap or are the laps machine sewn? How is puncturing of the geotextile avoided when placed over and adjacent to the sharp, angular aggregate that is being used as embankment fill?

Issue #2

The memo indicates that there are areas of placed filter that do not meet requirements for internal stability. Is this a concern?

Issue #3

The memo does not confirm that the tailings material placed on the upstream embankment has been, or is being, compacted to meet the required specification. The memo merely states that the material is being compacted.

One way of resolving these issues, rather than getting into more discussion, is to request the EOR to provide a letter stating that the design changes are not materially significant and that the constructed embankment will function in accordance with the design intent.

Regards,

Chris Carr, P.Eng.

Senior Geotechnical Engineer

On behalf of the BC Ministry of Energy and Mines

Tel: 250 544-0763

Email: s.22

-----Original Message-----

From: Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]

Sent: February-24-15 6:50 AM

To: Chris Carr  
Subject: Fwd: Breach Repair: MEM Request for Additional Information

Hi Chris,  
Are you able to take a look at this memo from Golder before the weekly breach repair update call on Thursday?

If there are any follow-up questions I can see if either Terry or Andy is available to sit in on the weekly call on Thursday morning.

Thank-you!  
Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

Begin forwarded message:

From: "Luke Moger" <lmoger@mountpolley.com<<mailto:lmoger@mountpolley.com>>>  
To: "Demchuk, Tania MEM:EX"  
<Tania.Demchuk@gov.bc.ca<<mailto:Tania.Demchuk@gov.bc.ca>>>, "Dale Reimer"  
<dreimer@mountpolley.com<<mailto:dreimer@mountpolley.com>>>, "Ryan Brown"  
<rbrown@mountpolley.com<<mailto:rbrown@mountpolley.com>>>  
Cc: "Chris Carr s.22", "Warnock, George MEM:EX"  
<George.Warnock@gov.bc.ca<<mailto:George.Warnock@gov.bc.ca>>>, "Andy Haynes"  
(ahaynes@golder.com<<mailto:ahaynes@golder.com>>)"  
<ahaynes@golder.com<<mailto:ahaynes@golder.com>>>, "Terry Eldridge"  
(teldridge@golder.com<<mailto:teldridge@golder.com>>)"  
<teldridge@golder.com<<mailto:teldridge@golder.com>>>, "Adams, Rick MEM:EX"  
<Rick.Adams@gov.bc.ca<<mailto:Rick.Adams@gov.bc.ca>>>, "Howe, Diane J MEM:EX"  
<Diane.Howe@gov.bc.ca<<mailto:Diane.Howe@gov.bc.ca>>>  
Subject: RE: Breach Repair: MEM Request for Additional Information

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Kindest Regards,

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Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
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To: Dale Reimer; Luke Moger; Ryan Brown  
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Terry Eldridge (teldridge@golder.com<<mailto:teldridge@golder.com>>); Adams, Rick MEM:EX; Howe, Diane J  
MEM:EX  
Subject: RE: Breach Repair: MEM Request for Additional Information  
Importance: High

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Thank-you,  
Tania

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Sent: Friday, February 13, 2015 4:04 PM  
To: Dale Reimer (dreimer@mountpolley.com<<mailto:dreimer@mountpolley.com>>);  
Luke Moger; Ryan Brown  
Cc: Chris Carr s.22 ; Warnock, George MEM:EX; Demchuk, Tania  
MEM:EX; Andy Haynes (ahaynes@golder.com<<mailto:ahaynes@golder.com>>); Terry Eldridge  
(teldridge@golder.com<<mailto:teldridge@golder.com>>)  
Subject: Breach Repair: MEM Request for Additional Information

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Rick Adams  
Inspector of Mines  
2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3  
Telephone: 250-828-4583

**From:** Demchuk, Tania MEM:EX  
**To:** [Chris Carr](#) s.22  
**Cc:** [Warnock, George MEM:EX](#)  
**Subject:** FW: MPMC TSF Independent Engineering Review Panel - Terms of Reference  
**Date:** Thursday, March 5, 2015 7:04:00 PM  
**Attachments:** [image001.png](#)  
[2015 03 04 - MPMC Terms of Reference \(Independent Engineering Review Panel\).pdf](#)

---

Chris, FYI. I haven't had a chance to review this yet but would appreciate any comments, questions or concerns that you have. Perhaps a topic for discussion while we are at site next week.

Thank-you!!

Tania

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Thursday, March 5, 2015 4:45 PM  
**To:** Hoffman, Al MEM:EX  
**Cc:** Dale Reimer; Art Frye; Don Parsons; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Thorpe, Rolly MEM:EX; Narynski, Heather M MEM:EX; Pocklington, Cheryl M MEM:EX; Rothman, Stephen MEM:EX; Warnock, George MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** MPMC TSF Independent Engineering Review Panel - Terms of Reference

Dear Mr. Hoffman,

As per the request in your January 9, 2015 letter addressed to Dale Reimer, *Re: Independent Review Panel*, please find attached the Terms of Reference for the Mount Polley Mining Corporation Tailings Storage Facility Independent Engineering Review Panel.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)



# Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

## Independent Engineering Review Panel - Terms of Reference

---

### Background Information

Mount Polley Mining Corporation (MPMC), a subsidiary of Imperial Metals Corporation (Imperial), is the owner of the Mount Polley Mine and property. Imperial is a Canadian mining company, with its corporate head office in Vancouver, British Columbia.

MPMC was formed in 1996 through a joint venture between Imperial and Sumitomo Corporation (SC Minerals Canada Limited) by means of loan financing. Construction of the 18,000 tonne per day (tpd) mill feed Mount Polley Mine and milling facility began in May 1996, and was completed in June 1997. Imperial increased its interest in the Mount Polley Mine to 100% in December 2000 by acquiring Sumitomo's 47.5% interest. Mining operations continued until September 2001, at which time operations were suspended due to low metal prices. In August 2004, Imperial completed a feasibility study which included an updated ore reserve statement and a new mining plan, and confirmed the viability of restarting operations at Mount Polley Mine. In October 2004, a mining permit amendment and a mining lease were granted, and milling operations commenced in March 2005. The official Mount Polley Mine re-opening ceremony took place in September 2005. Operations continued until a breach of the Mount Polley Mine Tailings Storage Facility (TSF) occurred on August 4, 2015, since which time the site has been under care and maintenance as breach remediation work is completed.

Mount Polley Mine is an open pit copper/gold mine located in central British Columbia (Figure 1), 56 kilometres (km) northeast of Williams Lake (latitude 52° 33' N and longitude 121° 38' W). A general post-breach site plan is included as Figure 2.

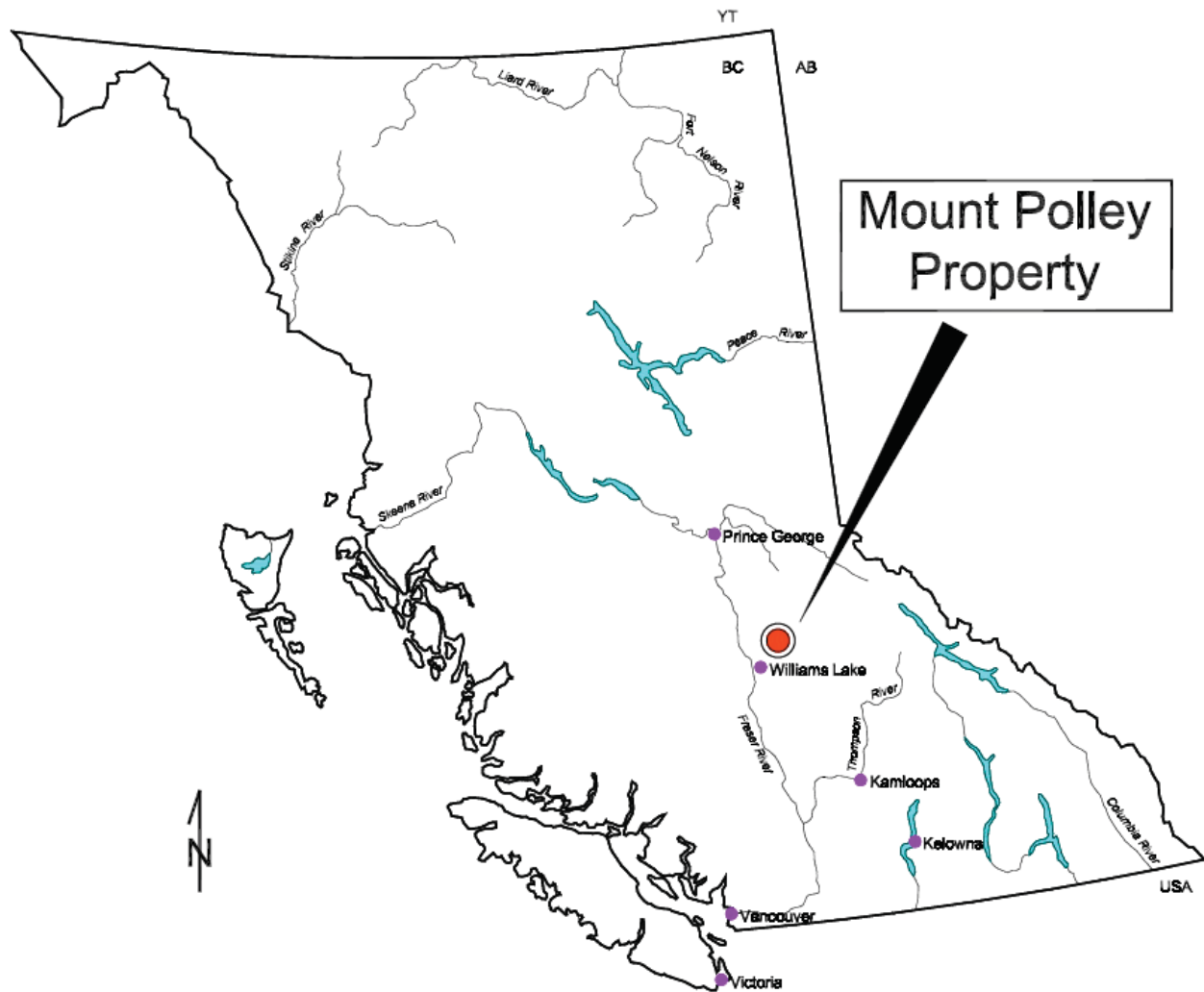


Figure 1 - Location Map



Copyright

*Figure 2 – 2014 Site Plan (Post-Breach)*

## **Official Name**

The MPMC TSF Independent Engineering Review Panel; herein referred to as the “Independent Engineering Review Panel” or “IERP”.

## **Members and Composition**

The IERP is established by the Owner [MPMC] and made up of three (3) qualified experts, acceptable to the Ministry of Energy and Mines (MEM) Chief Inspector.

The MEM Chief Inspector, as set out in a letter addressed to Dale Reimer, Mine Manager of Mount Polley Mine, *Re: Independent Review Panel* dated January 19, 2015, does,

*“reserve the right to nominate a fourth panel member or call for additional requirements based on any recommendations by the Expert Review Panel...or the development of subsequent guidance documents for the establishment of this type of panel for mines in British Columbia.”*

The IERP working group will include representation from MPMC and MPMC’s Engineer of Record (EOR). MPMC’s EOR will provide information on the design, construction, and operation of the TSF. The MPMC Representative will facilitate the convening of the IERP, chair meetings, and support the provision of information to the IERP by MPMC’s EOR.

## **Term of Membership**

There is no term of membership imposed upon members of the IERP. IERP members shall continue to serve until they resign or are terminated by MPMC. The composition of the IERP will change to meet the evolving needs of the Mount Polley Mine. MPMC will periodically assess membership requirements and discuss these with the IERP and obtain recommendations on appropriate composition.

When a member of the IERP is vacating their position, it shall be ensured that the remaining membership maintains sufficient continuity to provide knowledge transfer between exiting and entering members.

## **Formation Details**

MPMC expressed their intent to establish an IERP in October of 2014. The requirement to establish an IERP was also set out under clause A.5 (a) of the M-200 Permit Amendment Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment (the M-200 Permit) granted to MPMC by the MEM on December 17, 2014,

*“An independent engineering review panel (IERP) shall be established by the Permittee [MPMC] to provide expert technical guidance related to all aspects of the design, construction, operation and closure planning for the TSF.”*

## **Vision**

The establishment of the IERP is intended to provide an opportunity for peer review of geotechnical design to provide recommendations and guidance to MPMC. The IERP is seen as a medium to add value to stakeholders in the Mount Polley Mine, including, but not limited to: MPMC, MPMC's EOR, regulators, the local community, and First Nations.

The IERP should provide opinion on: whether the design, construction and operation of the TSF are consistent with satisfactory long-term performance; whether design and construction have been performed in accordance with their expectation of good practice; whether safety and operation of the TSF conform to their expectation of good practice; and, whether there are weaknesses that would reasonably be expected to have a material adverse effect on the integrity of the TSF, human health, safety, and successful operation of the facility for its intended purpose.

The IERP is intended to serve as a review and advisory board, and any decisions regarding implementation of their recommendations for site investigation, design, construction, operation and closure are the responsibility of MPMC's EOR and MPMC.

## **Mission Statement**

The IERP is to provide expert technical guidance to all aspects of the design, construction, operation and closure planning for the Mount Polley Mine TSF.

## **Goals**

1. To confirm that the design and operation of the TSF is consistent with industry guidelines of best practice
2. To identify areas where risk reduction measures may be required
3. To provide advice that may add value to the safe operation, closure and long term maintenance of the TSF

Specifically, as included as clause A.5 (d) of the M-200 Permit,

*“the first meeting of the IERP shall involve a technical review of the design of the 2015 Freshet Embankment and associated upgrades to the TSF.”*

In completing this technical review, the IERP should specifically provide guidance for MPMC's proposed GLU characterization (strength) for ongoing design, representative sections for the 2015 Freshet Repair, buttresses for the remaining dams, foundation investigation, instrumentation and longer term tailings operations.

## **Frequency of Meetings, Meeting Format and Manner of Call**

The IERP meetings shall be scheduled at regular intervals to suit the design, construction, operation and closure activities at Mount Polley Mine, and shall occur at a minimum annually, as set out in clause A.5 (b) of the M-200 Permit. Meetings, at a minimum annually, shall include a site tour of the Mount Polley Mine TSF. The IERP may also be convened for special sessions to address critical issues, such special sessions including a site tour if required.

Meetings will generally consist of the following agenda items:

- A preliminary presentation session during which MPMC and MPMC's EOR briefly summarize recent developments and current operating conditions;
- A site inspection and/or discussion session;
- A meeting of only the IERP members to deliberate on presented material and/or observations and their resulting conclusions; and
- A presentation made by the IERP, made in a confidential closeout meeting, to key MPMC staff and, if appropriate, MPMC's EOR.

An agenda will be prepared by the MPMC Representative prior to each meeting and should include key technical questions or topics that MPMC, MPMC's EOR or the IERP wish to raise.

The IERP will be called by the MPMC Representative or MPMC's EOR by e-mail, with contacts of members of the respective parties as outlined in the Active Membership Contact Information herein.

As per clause A.5 (d) of the M-200 Permit, the first meeting shall be held prior to March 15, 2015.

## **Resources and Budget**

The members of the IERP shall be under contract to MPMC. The MPMC Representative, or his designate, shall manage resources and provide support to the IERP, with costs to be borne by MPMC; the IERP shall not be responsible for any budgetary contribution to the convening, reporting or presentation as applicable to their work.

It will be the responsibility of the MPMC Representative to ensure that all of the design documents, construction documentation, operating manuals/procedures and operational history documentation and data, as appropriate, are provided to the IERP.

An FTP site will be set up by the MPMC Representative, with access provided to the IERP members, containing all key documents and an index of all reports.

## Reporting and Deliverables

The IERP shall report to the MPMC Representative.

The IERP shall be responsible for the production of a report, submitted to the MPMC Representative, upon the conclusion of any convening of the IERP. The IERP shall be responsible for submitting this as a draft summary at the end of the closeout meeting, with a formal report being submitted within three (3) weeks following the closeout meeting. Copies of the draft summary and final report will be circulated to MPMC and MPMC's EOR for review of technical accuracy - suggested corrections or edits will be considered by the IERP, but changes will remain entirely at their discretion.

The IERP shall be responsible for the production of a report at the request of the MPMC Representative for any special sessions for which they are convened.

MPMC will be entitled to disclose any IERP reports to representatives of the Provincial or Federal government, including their ministries and agencies, and to representatives of local communities and First Nations groups.

Specifically, as included as clause A.5 (c) of the M-200 Permit,

*“a report prepared by the IERP [Independent Engineering Review Panel] shall be submitted to the Chief Inspector [by the Owner] within one (1) month of completion of the review meeting.”*

In this instance, the review meeting referenced is that included under the “Goals” section of this Terms of Reference, which will also be the first scheduled meeting of the IERP.

## Communications

The IERP shall report to the MPMC Representative. The primary medium of communication will be through attendance of scheduled meetings. Correspondence is also accepted by means of e-mail, with contacts of the members of the respective parties as outlined in the Active Membership Contact Information herein. The IERP will coordinate its activities with, and deliver its reports to, the MPMC Representative, who will be responsible for further distribution of the reports.

It shall be the responsibility of the MPMC Representative to disclose any reports to the MEM, stakeholders and/or First Nations, as appropriate, and to organize any convening of the IERP to present on their work or reports. At a minimum, the IERP shall be made available once per year, as organized by MPMC, for discussion with stakeholders and First Nations in regards to their continued work on the Mount Polley Mine TSF.

Working papers of the IERP are confidential to MPMC and are not to be distributed. Coordination with MPMC is required prior to any interviews made by or on behalf of the IERP.

## **Reviewing Terms of Reference**

The Terms of Reference shall be reviewed annually, but may be requested to be reviewed by the group or individuals at any time.

## **Date of Last Review**

March 4, 2015.

## **Hereto Agreed By**

---

**Name:**

---

**Name:**

---

**Name:**

---

**Name:**



**Active Membership Contact Information**

<b>Name</b>	<b>Title</b>	<b>IERP Role</b>	<b>E-Mail</b>	<b>Phone</b>
Don Parsons	Imperial Metals Chief Operating Officer	MPMC Representative	<a href="mailto:DParsons@ImperialMetals.com">DParsons@ImperialMetals.com</a>	(604) 488-2652
Dale Reimer	Mount Polley Mining Corporation General Manager	None Specified	<a href="mailto:DReimer@MountPolley.com">DReimer@MountPolley.com</a>	(250) 790-2215 ext. 2600
Luke Moger	Mount Polley Mining Corporation Project Engineer	None Specified	<a href="mailto:LMoger@MountPolley.com">LMoger@MountPolley.com</a>	(250) 790-2215 ext. 2113
Terry Eldridge	Golder Associates Ltd. Principal/Mine Waste Management Practice Leader – South America	Engineer of Record	<a href="mailto:Terry_Eldridge@Golder.com">Terry_Eldridge@Golder.com</a>	(604) 296-4292
M. John Brodie	Brodie Consulting Ltd. Geotechnical Engineer	Panel Member	<a href="mailto:MJohnBrodie@shaw.ca">MJohnBrodie@shaw.ca</a>	Phone: (604) 922-2034 Cell: (604) 790-1853
Nigel Skermer	Consulting Engineer – Geotechnics	Panel Member	<a href="mailto:NSkermer@shaw.ca">NSkermer@shaw.ca</a>	Phone: (604) 562-2375
H.R. (Rod) Smith	Smith Water Management Services Inc. Independent Senior Hydrogeologist/Reviewer	Panel Member	<a href="mailto:Rod@SmithWMS.com">Rod@SmithWMS.com</a>	Phone: (604) 304-0110 Cell: (604) 329-5928

**From:** Demchuk, Tania MEM:EX  
**To:** ["Luke Moger"](#)  
**Cc:** [Jim Kuipers \(jkuipers@kuipersassoc.com\)](mailto:jkuipers@kuipersassoc.com); "Chris Carr" s.22 ; [Don Parsons](#)  
**Subject:** RE: MEM Report on Cause of Failure  
**Date:** Friday, March 6, 2015 4:29:00 PM  
**Attachments:** [image001.png](#)

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Hello Luke,

Thank-you for the question. I do not believe that the condition states or intends that the required design update be informed by MEM's full investigation. The requirement is to base confirmation or modifications to the design on results of field and laboratory testing completed as part of the forensic geotechnical investigation and drilling along the toe of the perimeter embankment. My understanding is that Mount Polley Mining Corporation and Golder have been provided with all of the results of the field and laboratory testing completed by KCB.

I will discuss your question below with the MEM team and confirm the interpretation of the permit conditions next week.

Regards,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Friday, March 6, 2015 4:13 PM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** [Jim Kuipers \(jkuipers@kuipersassoc.com\)](mailto:jkuipers@kuipersassoc.com); 'Chris Carr' s.22 ; [Don Parsons](#)  
**Subject:** MEM Report on Cause of Failure

Hi Tania;

I am just following up on an item from one of our previous weekly update calls.

Under clause C.1 (d) of the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Design for 2015 Freshet, an update to the design is required by March 31, 2015. Additionally, an update for the design of the Perimeter Embankment Rockfill Buttress based on results of additional site investigation is required by April 30, 2015. As per the data-sharing arrangement established at the onset of the geotechnical investigation work, MPMC is in receipt of data from KCB and data from the Expert Panel for incorporation into these design updates. Additionally, both MPMC and the Expert Review Panel have presented on their investigation of the root cause of the failure. Thus far, there has been no report made available from MEM on the root cause of the failure.

In previous discussion with Jim Kuipers, Chris Carr and me, you had indicated that MEM is not anticipating releasing their report on the TSF Breach until June. With this timeline, MPMC was looking for guidance on how the findings of the MEM/KCB investigation were to be incorporated into the two (2) updates required as referenced above. It is my understanding from our previous meetings that you would require follow up internally (MEM) on this, and I am wondering if there was any update that you could provide. It is also my understanding that Jim Kuipers and Chris Carr had also indicated that this would be important to clarify for design updates.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** "Luke Moger"  
**Cc:** "Dale Reimer"; Don Parsons; Chris Carr s.22 Warnock, George MEM:EX; Narynski, Heather M MEM:EX; Beattie, Brent C MEM:EX; Hoffman, Al MEM:EX; Howe, Diane J EMPR:EX (Diane.Howe@gov.bc.ca)  
**Subject:** MPMC TSF Independent Engineering Review Panel - Terms of Reference  
**Date:** Tuesday, March 10, 2015 9:06:00 AM  
**Attachments:** [image001.png](#)  
[Re Update to Cariboo MDRC - Community and the Mount Polley IERP \(Independent Engineering Review Panel\).msg](#)

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Hello Luke,

Thank-you for the submission of the IERP Terms of Reference, dated March 5, 2015. MEM has reviewed the document and has the following comments and questions for clarification:

1. The section "*Reporting and Deliverables*" appears to state that the only report that will be submitted to MEM is the report following the first meeting. MEM would like to ensure that it is clear that condition A.5(c) requires that a report prepared by the IERP be submitted to the Chief Inspector within one month following completion of every review meeting, not just the meeting referenced by condition A.5.(d) related to the "IERP technical review of the design of the 2015 Freshet Embankment and associated upgrades to the TSF." Please provide clarification that it is the intent that a report will be provided to MEM within one month of each IERP meeting. It should be noted that under the conditions of the December 17, 2014 permit amendment, these reports would also be provided to First Nations, the Cariboo Regional District and the Community of Likely.

2. The IERP should be a standalone body that is not influenced by the mine, design consultant, regulators, First Nations, community, etc. However, there is high public interest in the discussions and functioning of the IERP for Mount Polley, due to the public interest in the mine following the breach and subsequent response activities. The Terms of Reference indicate that at a minimum the IERP shall be made available once per year for discussion with First Nations and stakeholders. Given the current degree of interest, could you please indicate if MPMC intends to provide a venue for IERP discussion with stakeholders in the near future? The involvement of the public and First Nations was raised during the drafting of the December 17<sup>th</sup> 2014 permit amendment, however requests for some form of involvement in the IERP's work was left for MPMC to determine. How has MPMC given consideration to including interested parties in some part of the IERP process?

For your reference I have attached an email sent to the MDRC from Doug Watt inquiring as to the process for public involvement.

3. It has been identified that there may be value in informing MEM prior to scheduled IERP meetings in the event that the MEM has any issues to provide to the IERP for consideration. Is MPMC able to share the meeting schedule with MEM?
4. There are no signatures on page 8 indicating that final sign-off and acceptance of the TOR has occurred. Is this considered the final draft? MEM would like to share the Terms of Reference and IERP member names with the MDRC.

I would be happy to discuss the above in more detail when we are on site with you tomorrow.

Regards,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Thursday, March 5, 2015 4:45 PM  
**To:** Hoffman, Al MEM:EX  
**Cc:** Dale Reimer; Art Frye; Don Parsons; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Thorpe, Rolly MEM:EX; Narynski, Heather M MEM:EX; Pocklington, Cheryl M MEM:EX; Rothman, Stephen MEM:EX; Warnock, George MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** MPMC TSF Independent Engineering Review Panel - Terms of Reference

Dear Mr. Hoffman,

As per the request in your January 9, 2015 letter addressed to Dale Reimer, *Re: Independent Review Panel*, please find attached the Terms of Reference for the Mount Polley Mining Corporation Tailings Storage Facility Independent Engineering Review Panel.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** [Beattie, Brent C MEM:EX](#); [Chris Carr](#) s.22  
**Subject:** FW: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Sunday, March 29, 2015 11:31:00 AM  
**Attachments:** [image001.png](#)

---

Chris and Brent,

Mount Polley has submitted their draft OMS manual. It is far too large to email but I have saved it here:

s.15

Please add this to your list of items for review. I have confirmed to MPMC that we have received this document and that we will advise if there are comments or questions once MEM has had an opportunity to review it.

Chris – I have not added this to the GRIT list, is that something you will do, or do we need to ask Heather to do it? (I think she and George have been adding documents themselves due to errors with other making additions.)

Thank-you,  
Tania

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**From:** Demchuk, Tania MEM:EX  
**Sent:** Sunday, March 29, 2015 11:28 AM  
**To:** 'Luke Moger'; Howe, Diane J MEM:EX  
**Cc:** Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** RE: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Luke,

Thank-you the draft OMS manual has been successfully downloaded. MEM will follow-up with any comments or questions following its review.

Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Friday, March 27, 2015 7:31 PM  
**To:** Howe, Diane J MEM:EX



**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.3 (B) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a draft version of the Operation, Maintenance and Surveillance (OMS) Manual for the 2015 Freshet Embankment has been prepared by Mount Polley Mining Corporation with input from Golder as the Engineer of Record.

Due to size limitations, the draft OMS Manual and corresponding Appendices (A through C) will be transferred via HighTail – confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



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Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Adams, Rick MEM:EX](#)  
**To:** [Howe, Diane J MEM:EX](#); [Demchuk, Tania MEM:EX](#)  
**Subject:** FW: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Tuesday, April 7, 2015 8:46:55 AM  
**Attachments:** [image001.png](#)  
[2015 04 02 - Mount Polley IERP Meeting #1.pdf](#)

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Diane, I suggest when our geotechnical staff review this report, they give special consideration to the following comments and advise if further action/follow-up by MEM with MPMC is required:

- p. 5: It is conceivable that this system could be required for more than one year, in which case the system and hydrologic design criteria would be less than best industry practice;
- p. 6: Specifically, based on mean gradations shown on Figure 5 (page 15), however the till to filter parameters are beyond the range of requirements for filter according to the USBR.
- P. 6: Uniformity coefficients for filter zone and transition zone materials are respectively 20 and 6 on average. Future designs could consider a single more broadly graded filter/transition zone that could likely work just as well.
- P. 6/7: A portion of the Perimeter Embankment around roughly Sta. 3 + 950, was assessed using undrained strength, and residual friction angle, and the latter results in a FOS less than 1.5 for static loading conditions, Section 6.3, Mount Polley Independent Engineering Review Panel Table 14.
- P. 7: Connection of cut-off wall to core of original embankment:
  - Consideration should be given to extending the cut-off wall well into the original core as we cannot be certain as to the depth of damage to the till core.
  - In the event that the designer opts to modify the cut-off from a rectangular profile to one with tapered ends, then the IERP recommends that a minimum embedment depth be established.
  - The IERP feels it is important that the connection of the cut-off wall to the core be clarified in detail such that construction personnel can ensure that the intent of the design is achieved.

Tania, we will need to ensure the following comments from the IERP Report have been fully addressed by MPMC in their Return to Restricted Operations Application before we could be in a position to forward the application to Diane for decision:

- The plan for water management (pumping to Springer Pit) is reasonable for 2015. However, it is noted that the pit will rapidly fill and that the 2015 strategy is unlikely to be viable into 2016.
- Further to the above point, the construction of 2014/15 is expected to successfully manage the 2015 freshet. However, the TSF is an integral component of the site water management system. In the current configuration, the TSF is a liability, not an asset, to site water management. The IERP recommends that design, permitting and construction of additional works for water management be pursued with the same urgency as the 2015 Freshet Embankment, lest there be a new situation in 2016.
- In the event that MPMC intends to resume mining operations:
  - Plans for completion of stability works for all embankments
  - plans for raising the 2015 Freshet Embankment to full height
  - plans for tailings deposition

- o plans for site water management (interim and operations)
- o updated closure plan for the TSF
- o plans for inspection, monitoring and reporting

I would presume in having the IERP Report in hand that MPMC would specifically address the above IERP comments in their final application, or do you think we still need to emphasize this to them on Thursday's call?

Rick Adams  
Chair, Cariboo MDRC  
250-828-4583

---

**From:** Luke Moger [mailto:[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)]  
**Sent:** Saturday, April 4, 2015 4:43 PM  
**To:** Howe, Diane J MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause A.5 (C) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a report from the first Mount Polley Mining Corporation (MPMC) TSF Independent Engineering Review Panel (IERP) has been prepared for MPMC. This report is based on the meeting held March 2, 3 and 4, 2015 on site at Mount Polley Mine and in the offices of Golder Associates in Vancouver - please find attached a copy of the report.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

<b>Mount Polley Independent Engineering Review Panel</b>		
<b>Mr. John Brodie, P. Eng.</b> 2537 Marine Drive West Vancouver, B.C. V7V 1L5 Tel: 604-922-2034 <a href="mailto:mJohnBrodie@shaw.ca">mJohnBrodie@shaw.ca</a>	<b>Mr. Nigel Skermer, P. Eng.</b> 101 Maple Street Penticton, B.C. V2A 5V4 Tel: 604-562-2375 <a href="mailto:nskermer@shaw.ca">nskermer@shaw.ca</a>	<b>Mr. Rod Smith, P. Eng.</b> 10371 Springwood Crescent Richmond, B.C. V7E 1X5 Tel 604-304-0110 <a href="mailto:rod@smithwms.com">rod@smithwms.com</a>

April 2, 2015

Mount Polley Mining Corporation  
Suite 200 – 580 Hornby Street  
Vancouver, B.C., V6C 3B6

**Attention: Mr. Luke Moger, PMP**  
**Project Engineer, Mining Operations**

Dear Sir,

**Reference: Mount Polley Tailings – Independent Engineering Review Panel**  
**Meeting No. 1 DRAFT Report**

## **1.0 INTRODUCTION**

Meeting No. 1 of the Mount Polley Independent Engineering Review Panel (IERP) was carried out on March 2, 3 and 4, 2015 at the Mount Polley Site, and at the Vancouver office of Golder Associates Ltd. (GAL). The meeting consisted of presentations by Mount Polley Mining Corporation (MPMC) and the Engineer of Record for the 2015 Freshet Embankment, Golder Associates, and a site tour. The IERP then deliberated and provided a close-out presentation to Mount Polley and GAL.

This letter presents a brief summary of the IERP's findings and recommendations from the presentations.

## 2.0 MEETING AGENDA & PRESENTATIONS

The primary objective of this first meeting was as included as clause A.5 (d) of the M-200 Permit:

*“The first meeting of the IERP shall involve a technical review of the design of the 2015 Freshet Embankment and associated upgrades to the TSF.”*

This objective is addressed in the context of the Goals of the IERP which are:

1. To confirm that the design and operation of the TSF is consistent with industry guidelines of best practice
2. To identify areas where risk reduction measures may be required
3. To provide advice that may add value to the safe operation, closure and long term maintenance of the TSF

The agenda for Meeting No. 1 was as follows:

- Conduct a site inspection of the Mount Polley TSF, with focus on the 2015 Freshet Embankment
- Review and discuss design and construction considerations for the 2015 Freshet Embankment.

Prior to, and at the meeting, the IERP was provided with and reviewed the following information:

- Mount Polley Dam Failure - Site Investigation Progress Reports #1 and #2, by KCB, Dec. 2014 and Jan. 2015,
- Report on Mount Polley Tailings Storage Facility Breach, by Independent Expert Engineering Investigation and Review Panel, Jan. 2015,
- Mount Polley Mine, 2015 Freshet Embankment Design, GAL, November 28, 2014,

- Assorted aerial photographs.

The meeting was attended by the following:

- Don Parsons (MPMC)
- Luke Moger (MPMC)
- Terry Eldridge (GAL), Engineer of Record
- Andy Haynes (GAL)
- John Brodie (IERP)
- Nigel Skermer (IERP)
- Rod Smith (IERP)

### **3.0 GENERAL COMMENTS**

The IERP acknowledges the time and effort required in preparing for these meetings, and appreciates the informative presentations provided by MPMC and GAL personnel and the frank and open discussions.

The following general comments are provided by the IERP:

1. The IERP's first involvement is after design of the 2015 breach repair was complete, and construction of that work was nearing completion (as of March 3, 2015).
2. Despite the short time frame of our review, the IERP is of the opinion that design is reasonable and appropriate for the 2015 situation, given time available for construction and the constraints of winter construction.



## **4.0 GLU CHARACTERIZATION**

As described by the Independent Expert Engineering Investigation and Review Panel, and acknowledged by GAL, the characteristics of the glacio-lacustrine unit (GLU) in the foundation of the dam was critical in the mechanism of failure. The IERP is aware that considerable field and laboratory testing by multiple parties have been undertaken at the site of the 2015 Freshet Embankment which is far beyond industry practise. In the opinion of the IERP, the GLUs, both upper and lower, have been characterized in detail with respect to:

- both drained and undrained shear strength parameters; and
- consolidation behavior.

The IERP would like to see core samples of the GLU soils during the next meeting on site.

## **5.0 2015 FRESHET EMBANKMENT**

GAL presented a description of the 2015 Freshet Embankment investigations, design and current status of construction.

The 2015 Freshet Embankment incorporates:

- A structure with crest at 950 m (about 20 m below original embankment)
- Upstream fill of compacted sand (tailings)
- Compacted aggregate zone (3/4" minus material for installation of cut-off wall)
- Transition and filter zones

- Downstream shell of compacted rock fill which is relatively wide for reasons of constructability
- Plastic (cement-bentonite) concrete cut-off wall for seepage control

The IERP understands that the 2015 Freshet Embankment is to contain the April freshet flow from a 200 year return period, which is estimated to be  $2.1 \text{ M m}^3$ , and that:

- This is a contingency storage which requires operation of the pumping system and storage in the perimeter embankment till borrow pit, and ultimately in the Springer Pit;
- This system and design criteria are reasonable (tolerable) for one year;
- It is conceivable that this system could be required for more than one year, in which case the system and hydrologic design criteria would be less than best industry practice; and
- Geotechnical design criteria for slope stability do meet industry practice, specifically CDA guidelines.

A very detailed foundation investigation and laboratory testing program has been conducted by several parties. Results of investigations from these parties have been cooperatively compiled. Subsequently, there have been ongoing investigations of the remainder of the embankments to investigate the potential for other modes or locations of embankment failure.

The IERP is satisfied that investigations to date are thorough and sufficient to meet current needs for the Freshet Embankment. The IERP provides the following additional comments concerning the design of the Freshet Embankment:

- The IERP notes that the 300 m extent (4+075 to 4+375) of the cut-off wall of the 2015 Freshet Embankment adequately covers the extent of the breach and partially sheared portion of the original structure.

- It is possible that there are cracks in the foundation which could allow seepage. This concern is not specifically addressed by the existing design. However should any such seepage occur, it is expected to be mitigated by tailings filling those cracks. In addition, a filter blanket was placed downstream of the cutoff wall to prevent material piping out of the foundation. The blanket extends 25 m from the cutoff wall. The IERP considers this to be an appropriate construction to mitigate the risk of piping.
- Filters: The gradations of filter and transition materials in general satisfy filter criteria. Specifically, based on mean gradations shown on Figure 5 (page 15), however the till to filter parameters are beyond the range of requirements for filter according to the USBR. The gradation of the till, however, is in general quite broad and it contains clay sized material. As such in our opinion it is expected to be self-healing. Any migration of fines into the filter zones are likely to be prevented from further transport by transition zone material. We are satisfied therefore that filter protection measures are adequate.
- Uniformity coefficients for filter zone and transition zone materials are respectively 20 and 6 on average. Future designs could consider a single more broadly graded filter/transition zone that could likely work just as well.
- Cut-off Wall into core of existing embankment: It is understood that the cut-off wall mix has a cementitious content of 130 kg/m<sup>3</sup> (100 kg cement and 30 kg bentonite). This is a typical lean mix design and the IERP is satisfied that it will perform as intended. The IERP were shown the results of permeability and compression testing carried out in the GAL laboratories and we are satisfied that they meet mix design criteria for the cut-off wall. Tests were carried out at hydraulic gradients up to 60.
- Stability analysis: It noted that the Freshet Embankment Design meets stability requirements. A portion of the Perimeter Embankment around roughly Sta. 3 + 950, was assessed using undrained strength, and residual friction angle, and the latter results in a FOS less than 1.5 for static loading conditions, Section 6.3,

Table 14. It is understood further investigation of this foundation has been conducted and additional stability analyses are pending. It may be helpful to the designers to consult the paper in the Geol. Soc. America, Reviews in Eng. Geol., Vol X, 1995, Effect of Test Method and Procedure on Measurements of Residual Shear Strength..... by Stephen M. Watry and Perry L. Ehlig., pp 13 - 38. It presents a good overview on many types of clays.

In the opinion of the IERP, the design of this structure is adequate for stability and seepage control.

The IERP has identified the following risks for consideration by MPMC and GAL:

- Connection of cut-off wall to core of original embankment:
  - Consideration should be given to extending the cut-off wall well into the original core as we cannot be certain as to the depth of damage to the till core.
  - In the event that the designer opts to modify the cut-off from a rectangular profile to one with tapered ends, then the IERP recommends that a minimum embedment depth be established.
  - The IERP feels it is important that the connection of the cut-off wall to the core be clarified in detail such that construction personnel can ensure that the intent of the design is achieved.
- Hydrology and Water Management
  - The IERP notes that the 2015 Freshet Embankment could perform as an emergency spillway if there was a hydrologic event that is more severe than the 200 year event which is the basis of the 2015 design.

- The plan for water management (pumping to Springer Pit) is reasonable for 2015. However, it is noted that the pit will rapidly fill and that the 2015 strategy is unlikely to be viable into 2016.
- Further to the above point, the construction of 2014/15 is expected to successfully manage the 2015 freshet. However, the TSF is an integral component of the site water management system. In the current configuration, the TSF is a liability, not an asset, to site water management. The IERP recommends that design, permitting and construction of additional works for water management be pursued with the same urgency as the 2015 Freshet Embankment, lest there be a new situation in 2016.

## **6.0 NEXT IERP MEETING**

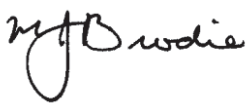
In an effort to continue the strategy of ramping up IERP engagement so that we can fulfil our Terms of Reference, the following topics are suggested for inclusion on the agenda for the next meeting, conceptually scheduled for late or post-freshet 2015:

- In the event that MPMC intends to resume mining operations:
  - Plans for completion of stability works for all embankments
  - plans for raising the 2015 Freshet Embankment to full height
  - plans for tailings deposition
  - plans for site water management (interim and operations)
  - updated closure plan for the TSF
  - plans for inspection, monitoring and reporting
- In the event that MPMC intends to permanently close the mine:
  - Updated closure plan for the TSF

## 7.0 CLOSURE

The IERP would like to thank all participants for their candid discussions and time prior to and during the meetings. Do not hesitate to contact us if you require any clarifications of the comments issued in this report.

Respectfully submitted:



M. John Brodie P.Eng.



Nigel Skermer, P.Eng



H.R. (Rod) Smith, P.Eng.

cc: Mr. Don Parsons  
Mr. Dale Reimer



**From:** Demchuk, Tania MEM:EX  
**To:** Chris Carr s.22 [Beattie, Brent C MEM:EX](#)  
**Cc:** [Adams, Rick MEM:EX](#); [Warnock, George MEM:EX](#); [Narynski, Heather M MEM:EX](#)  
**Subject:** FW: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Tuesday, April 7, 2015 10:17:00 AM  
**Attachments:** [image001.png](#)  
[2015 04 02 - Mount Polley IERP Meeting #1.pdf](#)  
[FW IERP Report #1 M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment.msg](#)

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Good morning Chris and Brent,

Please find attached the first IERP report from Mount Polley. Brent, could you please add this to the GRIT list for Mount Polley and save it to the M-200 reports folder on the G drive (I'm not able to connect to the network drives).

Rick Adams has had a chance to take a read and sent the attached comments to Diane. I would appreciate your review and thoughts, and perhaps this report may help inform any additional review comments you have in response to the Restricted Restart application.

Tania

---

**From:** Luke Moger [mailto:lmoger@mountpolley.com]  
**Sent:** Saturday, April 4, 2015 4:43 PM  
**To:** Howe, Diane J MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

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If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



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E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** [Adams, Rick MEM:EX](#); [Howe, Diane J MEM:EX](#)  
**Cc:** Chris Carr s.22  
**Subject:** RE: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Tuesday, April 7, 2015 10:33:00 AM  
**Attachments:** [image001.png](#)

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Hi Rick,

Thanks for the comments. I've passed them along.

Also, re: the comments for restart – I wonder if that refers to restart that proposes to use the TSF... Is that what you mean by final application?

Tania

---

**From:** Adams, Rick MEM:EX  
**Sent:** Tuesday, April 7, 2015 8:47 AM  
**To:** Howe, Diane J MEM:EX; Demchuk, Tania MEM:EX  
**Subject:** FW: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Diane, I suggest when our geotechnical staff review this report, they give special consideration to the following comments and advise if further action/follow-up by MEM with MPMC is required:

- p. 5: It is conceivable that this system could be required for more than one year, in which case the system and hydrologic design criteria would be less than best industry practice;
- p. 6: Specifically, based on mean gradations shown on Figure 5 (page 15), however the till to filter parameters are beyond the range of requirements for filter according to the USBR.
- P. 6: Uniformity coefficients for filter zone and transition zone materials are respectively 20 and 6 on average. Future designs could consider a single more broadly graded filter/transition zone that could likely work just as well.
- P. 6/7: A portion of the Perimeter Embankment around roughly Sta. 3 + 950, was assessed using undrained strength, and residual friction angle, and the latter results in a FOS less than 1.5 for static loading conditions, Section 6.3, Mount Polley Independent Engineering Review Panel Table 14.
- P. 7: Connection of cut-off wall to core of original embankment:
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  - In the event that the designer opts to modify the cut-off from a rectangular profile to one with tapered ends, then the IERP recommends that a minimum embedment depth be established.
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Tania, we will need to ensure the following comments from the IERP Report have been fully addressed by MPMC in their Return to Restricted Operations Application before we could be in a

position to forward the application to Diane for decision:

- The plan for water management (pumping to Springer Pit) is reasonable for 2015. However, it is noted that the pit will rapidly fill and that the 2015 strategy is unlikely to be viable into 2016.
- Further to the above point, the construction of 2014/15 is expected to successfully manage the 2015 freshet. However, the TSF is an integral component of the site water management system. In the current configuration, the TSF is a liability, not an asset, to site water management. The IERP recommends that design, permitting and construction of additional works for water management be pursued with the same urgency as the 2015 Freshet Embankment, lest there be a new situation in 2016.
- In the event that MPMC intends to resume mining operations:
  - o Plans for completion of stability works for all embankments
  - o plans for raising the 2015 Freshet Embankment to full height
  - o plans for tailings deposition
  - o plans for site water management (interim and operations)
  - o updated closure plan for the TSF
  - o plans for inspection, monitoring and reporting

I would presume in having the IERP Report in hand that MPMC would specifically address the above IERP comments in their final application, or do you think we still need to emphasize this to them on Thursday's call?

Rick Adams  
Chair, Cariboo MDRC  
250-828-4583

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Saturday, April 4, 2015 4:43 PM  
**To:** Howe, Diane J MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause A.5 (C) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a report from the first Mount Polley Mining Corporation (MPMC) TSF Independent Engineering Review Panel (IERP) has been prepared for MPMC. This report is based on the meeting held March 2, 3 and 4, 2015 on site at Mount Polley Mine and in the offices of Golder Associates in Vancouver - please find attached a copy of the report.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** ["Scott Jackson"; Bunce, Hubert ENV:EX](#)  
**Cc:** [Justin Bourne](#)  
**Subject:** RE: 2015 Post-TSF Breach Monitoring Plan (for MoE)  
**Date:** Tuesday, April 7, 2015 4:14:00 PM  
**Attachments:** [REDUCEDMine Site Water Monitoring Program \(with Appendices\)\[2\].pdf](#)  
[image001.jpg](#)

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Hi Scott,

Are you referring to the post-breach water monitoring plan (attached)? Or, can you point me to the reference in the application so we can make sure you get the correct doc?

Note, I have reduced the file size of the PDF as I was not able to transmit the original doc to you.

Thanks,  
Tania

---

**From:** Scott Jackson [mailto:[Scott.jackson@lorax.ca](mailto:Scott.jackson@lorax.ca)]  
**Sent:** Tuesday, April 7, 2015 12:10 PM  
**To:** Demchuk, Tania MEM:EX; Bunce, Hubert ENV:EX  
**Cc:** Justin Bourne  
**Subject:** 2015 Post-TSF Breach Monitoring Plan (for MoE)

Hi Tania/Hubert,

Do either of you have a copy of this plan that you could forward to us?

Thanks in advance,  
Scott

Description: Lorax



**Scott Jackson | Hydrologist**  
Tel: 604-688-7173 ext. 225 | Fax: 604-688-7175  
Email: [scott.jackson@lorax.ca](mailto:scott.jackson@lorax.ca) | Website: [www.lorax.ca](http://www.lorax.ca)  
2289 Burrard Street, Vancouver, British Columbia, Canada V6J 3H9



**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Luke Moger](#); [Don Parsons](#)  
**Cc:** [Dale Reimer](#); [Eldridge, Terry](#); Chris Carr s.22 [Beattie, Brent C MEM:EX](#)  
**Subject:** FW: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Friday, April 10, 2015 12:20:00 PM  
**Attachments:** image001.png

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Hi Luke,

Please see the comments below from Chris Carr and as summarized during yesterday's MDRC call by Brent Beattie. MEM would like a response to the IERP report as per the comments below:

- The IERP state that the use of TSF water management system beyond one year would not meet best industry practice however they do not explain why. I assume that this means the TSF should not be used to store tailings or the 2016 freshet without further hydrologic design.

The IERP identify several risks associated with the breach repair, in particular construction of the cut-off wall. I suggest that MPMC provide a response ASAP that includes a discussion on how the following issues will, or have been, addressed:

- Because the depth of damage to the till core is uncertain consideration should be given to extending the cut-off wall well into the original core.
- If the cut-off wall is changed from a rectangular profile to one with tapered ends the minimum embedment depth into the foundation should be established.
- The connection of the cut-off wall to the core should be clarified in detail so that construction personnel can ensure that the design intent is achieved.

The IERP report also points out the limited use of Springer Pit to store mine water and the urgency for completing design, permitting and construction of additional water management controls before the end of this year.

Best Regards,  
Tania

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** Saturday, April 4, 2015 4:43 PM  
**To:** Howe, Diane J MEM:EX  
**Cc:** Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause A.5 (C) as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, a report from

the first Mount Polley Mining Corporation (MPMC) TSF Independent Engineering Review Panel (IERP) has been prepared for MPMC. This report is based on the meeting held March 2, 3 and 4, 2015 on site at Mount Polley Mine and in the offices of Golder Associates in Vancouver - please find attached a copy of the report.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



**Luke Moger, PMP**  
Project Engineer, Mine Operations  
Mount Polley Mining Corporation  
PO Box 12  
Likely, BC V0L 1N0  
Canada

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Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** ["Luke Moger"](#)  
**Subject:** RE: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Wednesday, April 29, 2015 4:29:00 PM  
**Attachments:** [image001.png](#)

---

Thanks Luke.

Please also send a high-tail link to me so that I can download and file the document.

Tania

---

**From:** Luke Moger [mailto:[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)]  
**Sent:** Wednesday, April 29, 2015 4:09 PM  
**To:** 'Chris Carr' s.22  
**Cc:** Demchuk, Tania MEM:EX  
**Subject:** FW: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Chris;

Please see e-mail below, I will be sending a copy of the Design Update to you via HighTail shortly.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Luke Moger  
**Sent:** April-29-15 4:07 PM  
**To:** Howe, Diane J EMNG:EX ([Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca))  
**Cc:** Demchuk, Tania EMNG:EX ([Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)); [rick.adams@gov.bc.ca](mailto:rick.adams@gov.bc.ca); Don Parsons; Dale Reimer; 'Eldridge, Terry'  
**Subject:** Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.1 (D) bullet point four (4), as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, an update to the design of the TSF Breach Repair based on information from the additional site investigation has been prepared by Golder for MPMC.

Due to size limitations, the Design Update will be transferred via HighTail – confirmation of receipt

would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** ["Luke Moger"](#)  
**Cc:** [McConnachie, Jennifer MEM:EX](#); [Don Parsons](#); [Dale Reimer](#); [Eldridge, Terry](#); Chris Carr s.22  
[Beattie, Brent C MEM:EX](#)  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review  
**Date:** Tuesday, May 12, 2015 8:55:00 AM  
**Attachments:** [image001.png](#)

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Hi Luke,

For some reason I am not able to download the file from hightail. Are you able to send the link again?

Also, could you please send a link to Chris Carr as well?

Thank-you,  
Tania

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**From:** Luke Moger [mailto:[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)]  
**Sent:** Tuesday, May 12, 2015 12:25 AM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** McConnachie, Jennifer MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Tania;

I will be sending an updated draft OMS Manual to you (and those cc'd on this e-mail) via Hightail that addresses comments made by Chris Carr on the last draft submission provided to the MEM (March 27, 2015) and based on our conversation with the MEM (yourself and Jennifer McConnachie) around the MEM comments on the Return to Restricted Operations permit application (see Section 3.2.3) around monitoring requirements. Confirmation of receipt and successful download of this file would be much appreciated.

Kindest Regards,

Luke



Direct: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** Demchuk, Tania MEM:EX  
**To:** ["Chris Carr"](#); ["Luke Moger"](#)  
**Cc:** [Beattie, Brent C MEM:EX](#)  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review  
**Date:** Tuesday, May 12, 2015 9:53:00 AM  
**Attachments:** [image001.png](#)

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Hi Chris,

Could you please save this to the M-200 folder on the G drive? There must be some block on the download right now. It is still not working for either Jennifer or myself.

Thank-you!

Tania

**From:** Chris Carr [mailto:[s.22](#)]  
**Sent:** Tuesday, May 12, 2015 9:43 AM  
**To:** 'Luke Moger'  
**Cc:** Demchuk, Tania MEM:EX; Beattie, Brent C MEM:EX  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Luke,

I have successfully downloaded the document.

Regards,

Chris Carr, P.Eng.  
Senior Geotechnical Engineer  
On behalf of the BC Ministry of Energy and Mines  
Tel: 250 544-0763  
Email: [s.22](#)

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]  
**Sent:** May-12-15 9:28 AM  
**To:** Demchuk, Tania MEM:EX  
**Cc:** 'Chris Carr' [s.22](#)  
**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Tania;

I checked the link and was able to download this morning, but will re-send a copy to yourself and Chris Carr.

Regards,

**Luke Moger, PMP**  
Project Engineer, Mining Operations



Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Demchuk, Tania MEM:EX [<mailto:Tania.Demchuk@gov.bc.ca>]

**Sent:** May-12-15 8:55 AM

**To:** Luke Moger

**Cc:** McConnachie, Jennifer MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry; Chris Carr  
s.22 Beattie, Brent C MEM:EX

**Subject:** RE: OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Luke,

For some reason I am not able to download the file from hightail. Are you able to send the link again?

Also, could you please send a link to Chris Carr as well?

Thank-you,

Tania

---

**From:** Luke Moger [<mailto:lmoger@mountpolley.com>]

**Sent:** Tuesday, May 12, 2015 12:25 AM

**To:** Demchuk, Tania MEM:EX

**Cc:** McConnachie, Jennifer MEM:EX; Don Parsons; Dale Reimer; Eldridge, Terry

**Subject:** OMS Update - MEM Comments (Chris Carr) and Permit Application Review

Hi Tania;

I will be sending an updated draft OMS Manual to you (and those cc'd on this e-mail) via Hightail that addresses comments made by Chris Carr on the last draft submission provided to the MEM (March 27, 2015) and based on our conversation with the MEM (yourself and Jennifer McConnachie) around the MEM comments on the Return to Restricted Operations permit application (see Section 3.2.3) around monitoring requirements. Confirmation of receipt and successful download of this file would be much appreciated.

Kindest Regards,

Luke



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Fax: +1 (250) 790-2613  
E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Luke Moger](#)  
**Cc:** [Howe, Diane J MEM:EX](#); [Adams, Rick MEM:EX](#); [Don Parsons](#); [Dale Reimer](#); [Eldridge, Terry](#)  
**Subject:** Re: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]  
**Date:** Wednesday, May 13, 2015 6:54:43 AM  
**Attachments:** [image001.png](#)

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Hi Luke,  
I will try to download this one today and let you know if I am able to. Has this also been sent to Chris Carr? If not, could you please send him the link?  
Thank-you!  
Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

On May 12, 2015, at 1:54 PM, Luke Moger <[lmoger@mountpolley.com](mailto:lmoger@mountpolley.com)> wrote:

Dear Diane;

An update has been prepared to the Design Report as submitted below based on corrections to some of the water content values of the foundation soils along the Perimeter Embankment.

I will be transferring a copy via Hightail – confirmation of receipt would be much appreciated.

Kindest Regards,

**Luke Moger, PMP**

Project Engineer, Mining Operations  
Mount Polley Mining Corporation

Tel: +1 (250) 790-2215 ext. 2113  
Fax: +1 (250) 790-2613  
Email: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

---

**From:** Luke Moger  
**Sent:** April-29-15 4:07 PM  
**To:** Howe, Diane J EMNG:EX ([Diane.Howe@gov.bc.ca](mailto:Diane.Howe@gov.bc.ca))  
**Cc:** Demchuk, Tania EMNG:EX ([Tania.Demchuk@gov.bc.ca](mailto:Tania.Demchuk@gov.bc.ca)); [rick.adams@gov.bc.ca](mailto:rick.adams@gov.bc.ca); Don Parsons; Dale Reimer; Eldridge, Terry  
**Subject:** Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.1 (D) bullet point four (4), as set out in the December 17, 2014 M-200 Permit Amendment Approving TSF Breach Repair and Perimeter Embankment Rockfill Buttress Design for 2015 Freshet, an update to the design of the TSF Breach Repair based on information from the additional site investigation has been prepared by Golder for MPMC.

Due to size limitations, the Design Update will be transferred via HighTail – confirmation of receipt would be much appreciated.

If you should have any questions or comments, please don't hesitate to contact me.

Kindest Regards,

Luke

<image001.png>

Direct: +1 (250) 790-2215 ext. 2113

Fax: +1 (250) 790-2613

E-mail: [LMoger@MountPolley.com](mailto:LMoger@MountPolley.com)

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Parent, Matthew MEM:EX](#)  
**Subject:** Re: Mount Polley Outstanding Notes Needed by FRIDAY, MAY 15TH  
**Date:** Wednesday, May 13, 2015 10:27:51 AM

---

Those three folders can just be deleted. It was easier for me to just redo the work into a new folder. Likewise, if you need additional information from me it will be easier to recreate the files than sort through those folders for you.

Thanks.  
Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

On May 13, 2015, at 10:24 AM, Parent, Matthew MEM:EX <[Matthew.1.Parent@gov.bc.ca](mailto:Matthew.1.Parent@gov.bc.ca)> wrote:

Hi Tania,

Thank you for your detailed descriptions and documentation. I was wondering if the files which you placed into the Briefcase on the G:Drive were to be left alone then? I believe you put these in there a few weeks ago and mentioned that you wanted to do some things with them. Just ignore those for now?

Thank you,  
Matthew

---

**From:** Demchuk, Tania MEM:EX  
**Sent:** Tuesday, May 12, 2015 12:48 PM  
**To:** Parent, Matthew MEM:EX; Pocklington, Cheryl M MEM:EX; Hemphill, Naomi MEM:EX  
**Subject:** RE: Mount Polley Outstanding Notes Needed by FRIDAY, MAY 15TH

Hello Cheryl, Matthew and Naomi:

I have added a number of files, related specifically to the TSF (as per attached correspondence with Matthew), to the investigation briefcase. These are saved in the folder **Demchuk\_TSF\_specific**. Unfortunately I am not able to go through and rename all of them for you at this time.

<!--[if !supportLists]-->• <!--[endif]-->I have included some of the early communications emails for GCPE and MO. There is MUCH more that I would

be happy to provide, however I am unable to sort through it without further direction.

<!--[if !supportLists]-->• <!--[endif]-->I have done my best to not include emails to/from investigation team members, as I am considering that those have been captured already by those people.

<!--[if !supportLists]-->• <!--[endif]-->I have not included any of the daily/weekly update call notes, or other information from remediation planning that is not directly related to the TSF structure itself.

<!--[if !supportLists]-->• <!--[endif]-->Regarding notebooks, please confirm that you have now received and scanned all my notebooks from August 4 2014 to May 1 2015.

<!--[if !supportLists]-->• <!--[endif]-->There are many files on the G drive (i.e. the location below) in folders that I believe you are already aware of, so I have not included those again in my folder.

<!--[if !supportLists]-->○ <!--[endif]-->G:\15\_Mines-Exploration  
Sites\Major Mines\OE - PROJECTS\2 METAL\M-200 Mt Polley\File  
Compilation August 2014

I have a vast quantity of emails and reports related to ongoing work at the site since the breach including permitting of the breach repair and subsequent permitting activities. To my knowledge these have not yet been provided to you. Please advise if any of these are of interest.

Thank-you,  
Tania

**Tania Demchuk, MSc, PGeo**  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Mines and Mineral Resources Division  
Ministry of Energy and Mines  
250-952-0417

---

**From:** Parent, Matthew MEM:EX  
**Sent:** Wednesday, May 6, 2015 9:49 AM  
**To:** Nakatsuka, Caroline M MEM:EX; Thorpe, Rolly MEM:EX; Hoffman, Al MEM:EX;  
Pocklington, Cheryl M MEM:EX; Demchuk, Tania MEM:EX; s.22  
Kuppers, Haley MEM:EX; Hemphill, Naomi MEM:EX; Bellefontaine, Kim MEM:EX; Narynski,  
Heather M MEM:EX  
**Subject:** Mount Polley Outstanding Notes Needed by FRIDAY, MAY 15TH

Hi Everyone,

If everyone could collect and provide any outstanding notes you may have in relation to the Mount Polley Investigation no later than **Friday, May 15<sup>th</sup>** it would be greatly appreciated. In order to stick to our timeline we cannot afford to have notes coming



in after said date.

If you have already provided us with all your notes and you are confident that you do not have any documents for us – thank you!

If you have any notes in hard copy, please just provide them to me and I will take care of the scanning, etc.

If they are messy – there is no need to correct, edit or “clean-up” your notes, we just need them as they are.

Although proper naming conventions are appreciated, at this point in time there is no need to go through your documents and edit these – we will be able to do this for you.

If you have any concerns / questions, please do not hesitate to ask. Again, if you are 100% you have provided everything to us, please confirm with me that this is the case so we can audit your contributions to the dataset. Otherwise, I look forward to receiving your notes by **May 15<sup>th</sup>**.

Regards,

Matthew Parent  
Information Analyst  
Mount Polley TSF Breach Investigation

Cell: (204) 880 - 2108  
[Matthew.1.Parent@gov.bc.ca](mailto:Matthew.1.Parent@gov.bc.ca)

Mines and Mineral Resource Division  
Ministry of Energy and Mines  
PO BOX 9320 STN PROV GOV,  
Victoria, BC  
V8W 9N3

**From:** [Demchuk, Tania MEM:EX](#)  
**To:** [Chris Carr](#)  
**Cc:** [Beattie, Brent C MEM:EX](#); [Narynski, Heather M MEM:EX](#)  
**Subject:** Re: Mt Polley reports from MPMC  
**Date:** Wednesday, May 13, 2015 10:47:13 PM

---

Thanks Chris. That is much appreciated, I know you are short on time right now.

Tania

Tania Demchuk, MSc, PGeo  
Mount Polley Project Manager  
Sr Environmental Geoscientist  
Ministry of Energy and Mines  
(250) 952-0417

From my mobile device

On May 13, 2015, at 5:54 PM, Chris Carr < s.22 > wrote:

Hi Tania,

s.15

2015 05 11 – 2015 Freshet Embankment OMS (Golder&MPMC) – DRAFT2.pdf  
2015 05 08 – Freshet Embankment Design Update (Golder).pdf

Chris